Section II.
Social, Economic and Cultural Sustainability

Elk in Wahoo Canyon by Micah Kiesow

Introduction

The Gila NF is responsible for sustainable management of ecological resources within its boundaries, and the ecosystem services provided by those resources. This means that people are just as affected by forest management as are the ecological resources that are managed by the Forest. People benefit, either directly or indirectly from multiple use of forest resources. The plan area has a long human history of occupation that precedes the establishment of the Gila NF. Native American, Hispanic and Anglo-American traditional communities continue to use the Forest for economic, social and cultural purposes. Local communities, surrounding areas and visitors all gain some benefit and have expectations of what the Gila NF can offer them in terms of livelihoods, traditional uses, clean air and water, forest products and recreation to name a few. This section of the report focuses on the human dimension of forest management, and when considered hand in hand with the ecological analysis, provides for a comprehensive assessment.

The management of the Gila NF contributes to social and economic sustainability by maintaining a set of desired social, cultural and economic conditions within the Forest and beyond the Forest boundary that benefit people. Since this forest planning effort informs decisions about how to manage the Gila NF, understanding how that management contributes to, or affects social, economic and cultural conditions in this area of influence is the focus for evaluating sustainability. The Gila NF area of influence is comprised of the four counties that contain the Gila NF within their boundaries: Catron, Grant, Hidalgo, and Sierra counties (Figure 177). Areas beyond these four counties are part of the broader landscape where Forest contributions can affect a specific interest, but do not fundamentally affect the social, cultural, and economic conditions.

This section is broken into nine chapters to fully address the social, cultural and economic components of the Gila NF as follows:

Chapter 10: **Social, Cultural and Economic Conditions** provides context related to current social, cultural and economic conditions, depicts the demographic make-up of the area and shows the economic contributions provided by the Gila NF.

Chapter 11: **Multiple Uses** assesses the contributions of wood products and other plant resources, livestock grazing, water, wildlife and fish and the sustainability of those contributions.

Chapter 12: **Recreation** addresses sustainable recreation opportunities, including settings, access, current demands and future trends, conflicts between uses and opportunities for community involvement.

Chapter 13: **Designated Areas** describes the congressionally and administratively designated areas on the Forest including wilderness, wilderness study areas, inventoried roadless areas, wild and scenic rivers, a national scenic trail, and a research natural area.

Chapter 14: **Infrastructure** includes the physical facilities and systems that support the use of the Forest. The five major categories of facilities and systems are transportation, administrative, recreation and both privately owned and public facilities or utilities sited on the Forest and operated under permit.

Chapter 15: **Lands** analyzes patterns of landownership, access and travel across the Forest. It includes ownership patterns affecting the Forest, special uses on the Forest, land and resource plans from adjacent jurisdictions and current and historic access issues.

Chapter 16: **Minerals** identifies the mineral resources that have historically been developed on the forest, as well as the potential availability of mineral resources for current and future exploration and

development. These include renewable and non-renewable energy resources, leasable, locatable and saleable minerals.

Chapter 17: **Cultural and Historic Resources** provides the historic and cultural context in which the Gila NF resides. Cultural and historic resources and uses are critical to the social, economic and ecological sustainability.

Chapter 18: **Areas of Tribal Importance** identifies and evaluates available information regarding tribal rights and areas of known tribal importance within the Gila NF that are affected by management and the condition and trends of Forest resources that might affect them.

Chapter 10. Social, Cultural, and Economic Conditions

Introduction

One of the most unique characteristics of southwestern New Mexico is its diversity of people, culture, traditions, and values. This chapter describes the area's demographics illustrating the area's diversity; and highlighting the social, cultural, and economic conditions and trends. This chapter presents demographic and economic statistics within the context of a multi-county "area of influence." The Final Directives define the area of influence as "where the management of the plan area substantially affects social, cultural, and economic conditions" (FSH 1909.12, section 13.21). The area of influence concept recognizes that the Forest provides contributions and has effects outside the Forest boundary. The Gila NF area of influence is comprised of the four counties that contain the Gila NF within their boundaries: Catron, Grant, Hidalgo, and Sierra counties (Figure 177). Areas beyond these four counties are part of the broader landscape where Forest contributions can affect a specific interest, but do not fundamentally affect the social, cultural, and economic conditions.

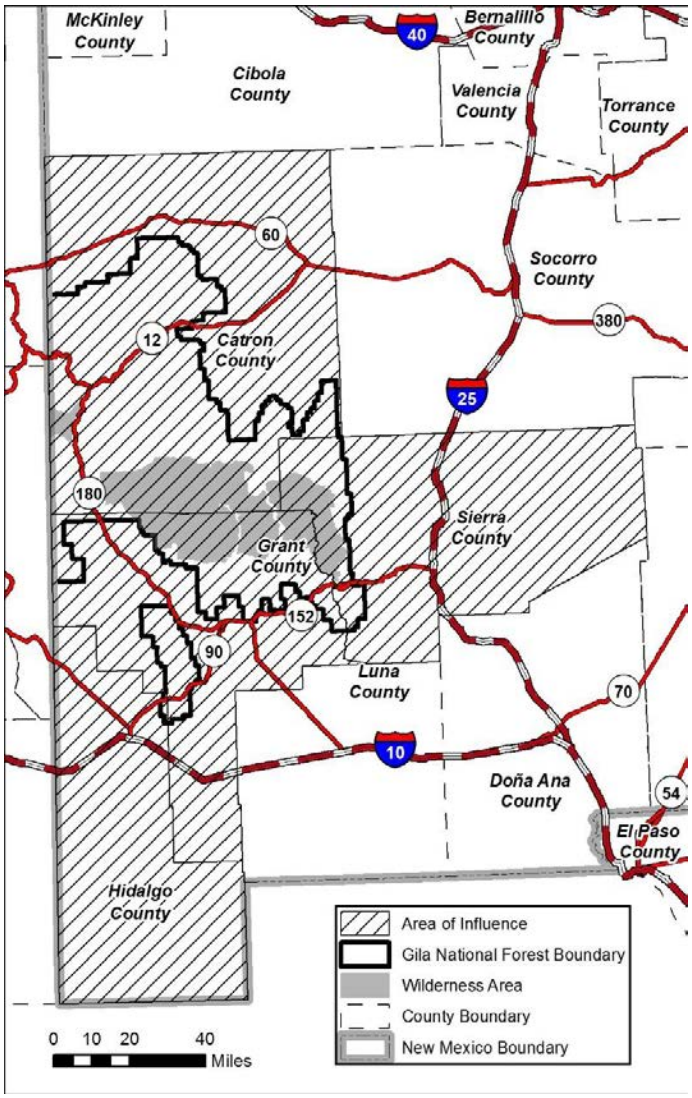


Figure 177. Gila National Forest Area of influence for the social, cultural, and economic analysis

This information provides context for understanding the setting of the Gila NF, stakeholders, and the social and economic demands that influence forest management on the Gila NF. Demographic and socioeconomic data reported for the area of influence are based on the U.S. Census Bureau county-wide data. Statistics for the State of New Mexico are presented for comparison with the area of influence. In some cases, the data for the multi-county area of influence has been aggregated using a program economic tool kit from Headwaters Economics (2015a). Many statistics were compiled by the University of New Mexico Bureau of Business and Economic Research (UNM-BBER). Not all of the data are reported in this assessment report, and to read more please see the UNM-BBER Socioeconomic Assessment Supplement for the Gila NF (2014) and the UNM-BBER Socioeconomic Assessment for the Gila NF (2007), which are part of the planning record.

Population Statistics

Total Population

In 2010, New Mexico was home to more than 2 million people (less than 1% of the U.S. population) (U.S. Census Bureau 2000a.). Since 1980, the state's population has grown more rapidly than that of the U.S. New Mexico's population grew by 16, 20, and 13 percent between 1980 and 1990, 1990 and 2000, and 2000 and 2010, respectively. In comparison, the U.S. population grew at 10, 13, and 10 percent during these same time periods. UNM Geospatial and Population Studies has projected state population growth rates for the next two decades of 14 and 11 percent, which will result in a 2030 population of more than 2.6 million people (UNM BBER 2014).

Figure 178 depicts the percentage change in each New Mexico county population between 2000 and 2010. The population growth rate varies greatly among counties with some experiencing population increases and others decreases. Where population declines occurred in New Mexico during these years is in part a result of the Great Recession requiring many people to move to find work (UNM-BBER 2014). The Great Recession refers to a period of severe economic decline in 2008 and 2009 due to a housing market correction and subprime mortgage crisis.

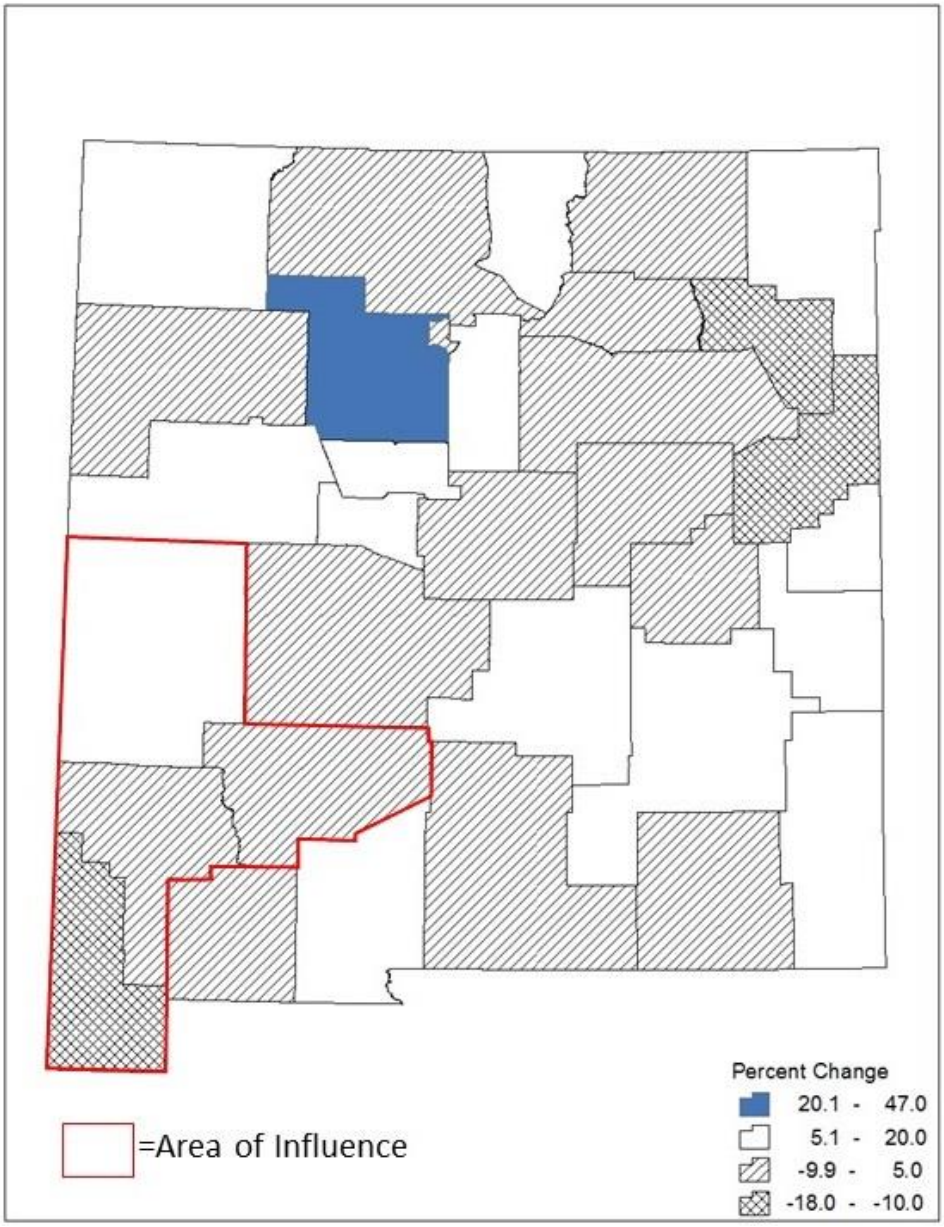


Figure 178. Percentage change in each New Mexico county population between 2000 and 2010. Figure from UNM-BBER 2014.

The area of influence (Catron, Grant, Hidalgo, and Sierra Counties) contains approximately 2.4 percent of the population of New Mexico. In 2010, the area of influence had a population of 50,121 with Grant County being the most populous (29,514) and Catron County being the least (3,725). Figure 179 graphically depicts the population trend for the four-county area, which has increased slowly from the 1980s to the early 2000s when it reached a peak, and then declined slightly in 2010 due to the Great Recession and depressed copper prices leading to temporary mine operation suspension and layoffs in Grant County in 2009. Between 2010 and 2030 the area's population is expected to hold relatively constant (UNM-BBER 2014).

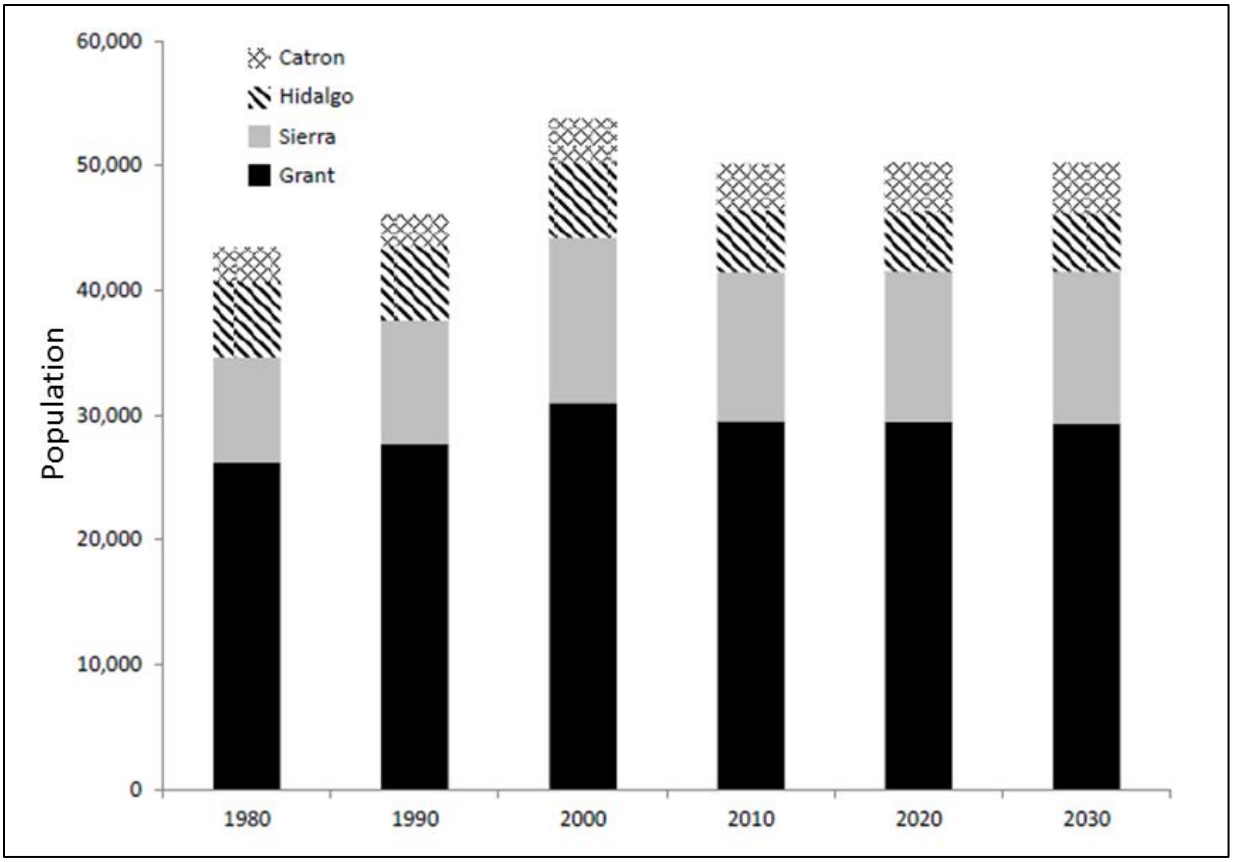


Figure 179. Historical and projected population of Gila NF area of influence counties. Figure from UNM-BBER 2014.

Population Density

Compared to other states, New Mexico has a relatively small population. In 2010 New Mexico's population rank was 36 with only 14 states having smaller populations. In addition to having a small population, New Mexico's land area is large resulting in a low average population density. In 2010, New Mexico had a population density of only 17 people per square mile. Only four states have a lower population density: Alaska, Montana, North Dakota, and Wyoming. The Gila NF area of influence is rural, with an average 2010 population density of fewer than 3 people per square mile. Due to the presence of Silver City, densities have historically been highest in Grant County, where the population density was more than 7 people per square mile in 2010. Catron County's population density is exceedingly low, at 0.5 persons per square mile, making it one of New Mexico's least densely-populated counties (UNM-BBER 2014).

Net Migration

Net migration is a useful indicator of the population dynamics of an area. Are people moving in or leaving or is the population stable? Migration has played a relatively minor role in New Mexico's population growth. Net in-migration to New Mexico was approximately 150,000 people between 1990 and 2000, and approximately 100,000 people between 2000 and 2010. Between 1990 and 2000, most counties associated with the Gila NF area of influence experienced some level of net in-migration. Hidalgo County was the one exception possibly due to differences attracting an influx of retirees from the baby-boomer generation (UNM-BBER 2007). Between 2000 and 2010 migration patterns changed with the exception of Catron County, all area of influence counties experienced net out-migration likely due to many people moving to find employment during the Great Recession (Figure 180) (UNM BBER 2014).

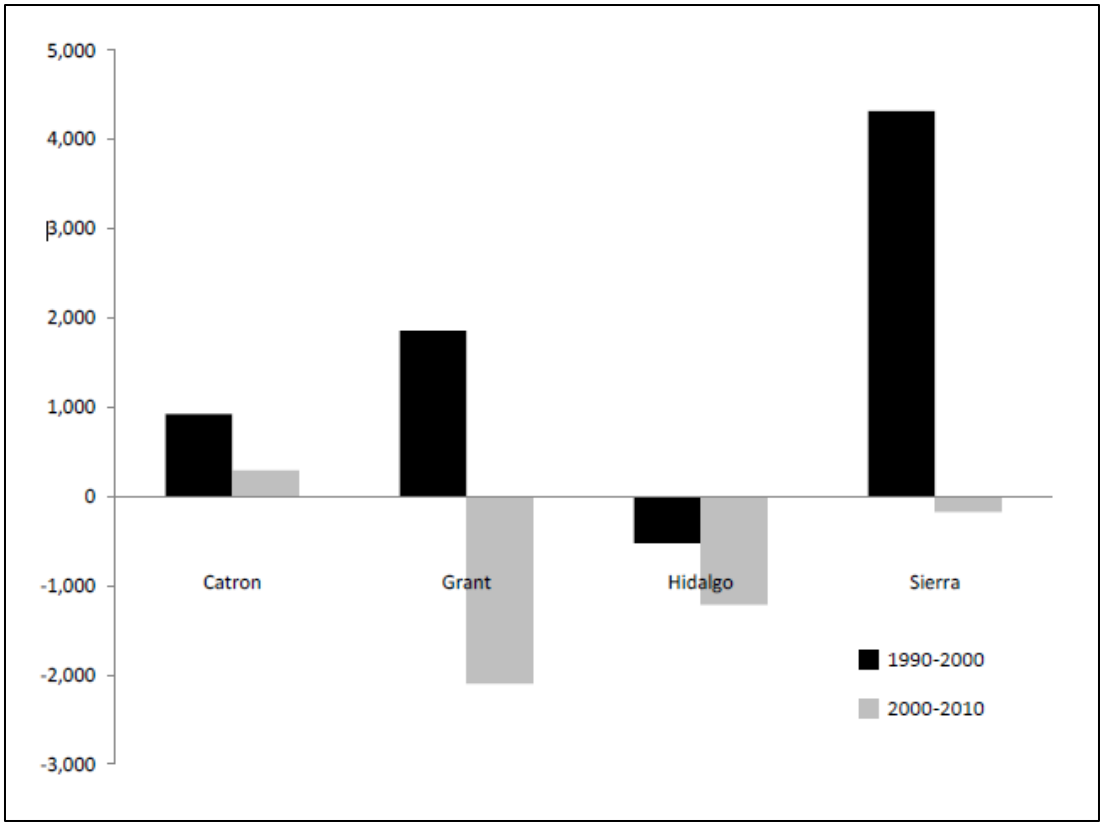


Figure 180. Net migration to/from Gila NF area of influence counties. Figure from UNM-BBER 2014.

Age and Gender Distribution

Changes in the age structure of New Mexico's population are similar to that of the United States. The portion of the population in the 14 and under group steadily declined between 1990 and 2010 (from 25 to 21 percent), while the portion that is age 65 or older steadily increased from 11 to 13 percent. These trends are expected to continue. The BBER report (2014) projects that by 2030, those of ages 0 to 14 will comprise 20 percent of New Mexico's population, and individuals age 65 and older will comprise 21 percent. Between 1990 and 2010, the portion of New Mexico's population of working age (ages 15 to 64) grew from 64 to 66 percent, but is expected to decline to 60 percent by 2030 (UNM BBER 2014).

Since at least 1990, compared to the rest of New Mexico, a smaller portion of the area of influence population is between the ages of 0 and 14, while a larger portion is age 65 or older. Age structure differences between the area of influence and New Mexico have increased over time. The portion of the population that is less than 15 years of age has declined more rapidly in the area of influence than in New Mexico, while at the same time the portion of the population that is over the age of 64 has increased more rapidly in the area of influence than in New Mexico. Figure 181 shows a continued increase in the proportion of the population over 64 projected in the area of influence for 2030, while the proportion of the population between 15 and 64 is expected to decline (UNM-BBER 2014). Facing limited opportunities for employment, younger people migrate to larger communities, accelerating the aging of the population. In addition, some counties in the area of influence are attracting an influx of retirees from the baby-boomer generation (UNM-BBER 2007). Older populations are likely to have different needs and preferences related to Forest use than younger populations.

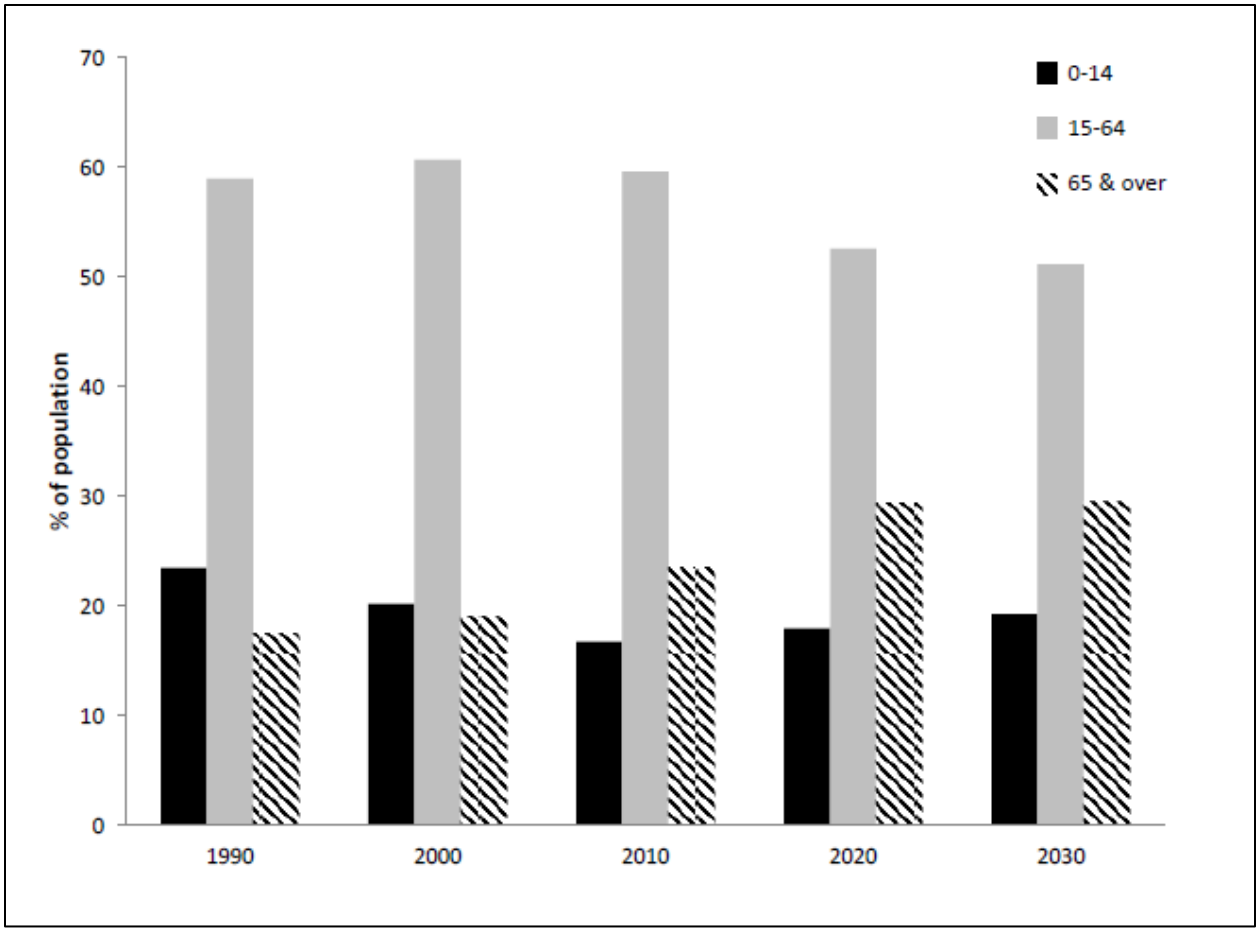


Figure 181. Historical and projected age distribution in Gila NF area of influence. Figure from UNM-BBER 2014.

The gender makeup of the area of influence (49.8% male; 50.2% female) is quite similar to the State of New Mexico (49.5% male; 50.5% female) (U.S. Census Bureau 2014).

Racial Composition and Ethnicity

Cultural diversity is rich and evident in New Mexico. In 2000, New Mexico became a majority-minority state, with a total minority population exceeding that of the white non-Hispanic population (UNM-BBER 2007). The portion of the New Mexico population that identified themselves as of Hispanic descent increased from 38 to 46 percent between 1990 and 2010 (UNM-BBER 2014). As a whole, the Hispanic/Latino composition of the area of influence remained fairly stable between 1990 and 2010.

The ethnic compositions of the four counties differ notably. Since 1990 the populations of Catron and Sierra Counties have been between approximately 70 and 80 percent non-Hispanic White, while between 40 and 50 percent of the populations of Grant and Hidalgo Counties have been non-Hispanic White (UNM-BBER 2014). In comparison to New Mexico, Table 171 shows that the area of influence population is notably more White and less African American, American Indian, and Asian.

Table 171. Those who self-identify as Hispanic, within the area of influence (4 counties), New Mexico, and the U.S.

Hispanic & Race/Population	Area of Influence (pop.)	New Mexico (pop.)	U.S. (pop.)	Area of Influence (%)	New Mexico (%)	U.S. (%)
Total population	49,462	2,080,085	314,107,084	--	--	--
Hispanic/Latino (any race)	21,131	978,189	53,070,096	42.7%	47.0%	16.9%
Not Hispanic or Latino	28,331	1,101,896	261,036,988	57.3%	53.0%	83.1%
White alone	26,744	824,291	197,159,492	54.1%	39.6%	62.8%
Black or African American alone	117	37,519	38,460,598	0.2%	1.8%	12.2%
American Indian alone	497	177,555	2,082,768	1.0%	8.5%	0.7%
Asian alone	201	26,991	15,536,209	0.4%	1.3%	4.9%
Native Hawaiian & other Pacific Is. alone	4	942	493,155	0.0%	0.0%	0.2%
Some other race alone	8	3,718	611,881	0.0%	0.2%	0.2%
Two or more races	760	30,880	6,692,885	1.5%	1.5%	2.1%

Source: US Census Bureau 2010-2014

Language

Over 70 percent of people who live in the area of influence primarily speak English (Table 172). Spanish is spoken by 28 percent while 2 percent speak a language other than English or Spanish. When compared to the rest of the United States, the cultural diversity of the communities surrounding the Gila NF is evident by the percentage of people who speak a language other than English although the State of New Mexico has a greater diversity of languages spoken as a whole.

Table 172. Language spoken at home in the area of influence, New Mexico, and the U.S.

Language	Area of Influence (%)	New Mexico (%)	U.S. (%)
Only English	71%	64%	79%
In addition to English	29%	36%	21%
Spanish	28%	29%	13%
Other Indo-European	1%	1%	4%
Asian & Pacific Island	0%	1%	3%
Other languages	1%	5%	1%
Speak English less than “very well”	5%	9%	9%

Source: US Census Bureau 2010-2014

Education

Educational attainment is a category where the State of New Mexico has historically struggled. New Mexico's population has become more educated during the last two decades. The portion of individuals age 25 or older with less than a 9th grade education decreased from 11 to 8 percent; the portion with some high school education but no diploma or GED decreased from 14 to 10 percent; and the portion with an associates or other advanced degree increased from 26 to 33 percent (UNM BBER 2014).

Although in 1990 the area of influence's population was less educated than New Mexico's population, now the two populations are similar in educational attainment (Table 173). Between 1990 and 2010, the portion of the area of influence population with less than a high school education declined from nearly 33 to 16 percent. During this same time period, the portion of the area's population with at least some college education increased from just over 33 to nearly 54 percent. The higher share for Grant County may be partly related to access to education since Western New Mexico University is located in Silver City (UNM-BBER 2007). The lingering effects of the Great Recession will likely continue to create an incentive for individuals to obtain higher levels of education (Carnevale et al. 2012). Therefore, it is expected that educational improvements will continue throughout the Gila NF associated counties (UNM-BBER 2014).

Table 173. Education attainment within the area of influence, New Mexico, and U.S.

Education/Population	Area of Influence (pop.)	New Mexico (pop.)	U.S. (pop.)	Area of Influence (%)	New Mexico (%)	U.S. (%)
Total population 25 years or older	36,158	1,360,013	209,056,129	--	--	--
Less than 9th grade	2,137	96,892	12,193,679	6%	7%	6%
9th to 12th grade, no diploma	3,361	121,093	16,394,069	9%	9%	8%
High school graduate (includes equivalency)	10,924	358,007	58,440,600	30%	26%	28%
Some college, no degree	9,127	324,492	44,241,558	25%	24%	21%
Associate's degree	2,442	104,758	16,580,076	7%	8%	8%
Bachelor's degree	4,489	201,686	38,184,668	12%	15%	18%
Graduate or professional degree	3,678	153,085	23,021,479	10%	11%	11%

Source: US Census Bureau 2010-2014

Employment

Prior to this century, New Mexico's unemployment rate typically exceeded that of the United States. The relationship changed after 2002, and since 2006 the New Mexico unemployment rate has been considerably below that of the rest of the Nation. Between 2000 and 2008, much of the growth in New Mexico nonfarm employment occurred in health and social assistance, local government, professional and business services, and construction. In 2008 to 2009 the economy crashed, resulting in what is now referred to as the Great Recession. More than 34,000 NM jobs were lost between 2008 and 2009. A large portion of these losses (nearly 10,000 jobs) occurred in the construction industry. Other areas of significant

job loss during this time were manufacturing, administrative and waste services, retail trade, and mining. However, strength remained in the health care and social assistance industry as well as government (UNM-BBER 2014).

The gap between New Mexico and U.S. unemployment rates grew during the Great Recession, as the U.S. unemployment rate rose faster than New Mexico's. The gap between the two was greatest in 2009, when New Mexico had an unemployment rate of 6.8 percent, while the U.S. unemployment rate was 9.3 percent. In 2011, both the New Mexico and U.S. unemployment rates began to fall from their 2010 peaks. The U.S. rate fell more rapidly than the New Mexico rate, narrowing the gap between the two. As of 2011, the U.S. had an unemployment rate of 8.9 percent, while New Mexico had a rate of 7.4 percent. As the economy continues to recover from the Great Recession, unemployment rates are expected to continue declining (UNM-BBER 2014).

Since at least 1990, the area of influence has had an unemployment rate that exceeds that of New Mexico. In all but seven years between 1990 and 2010, Catron County had an unemployment rate higher than Grant, Hidalgo, and Sierra counties. At the other end of the spectrum is Sierra County, which has had an unemployment rate that has frequently been lower than that of New Mexico. The spike in unemployment caused by the Great Recession (after 2007) is evident in Figure 182. As the national economy continues to slowly recover, unemployment rates should gradually decline (UNM-BBER 2014).

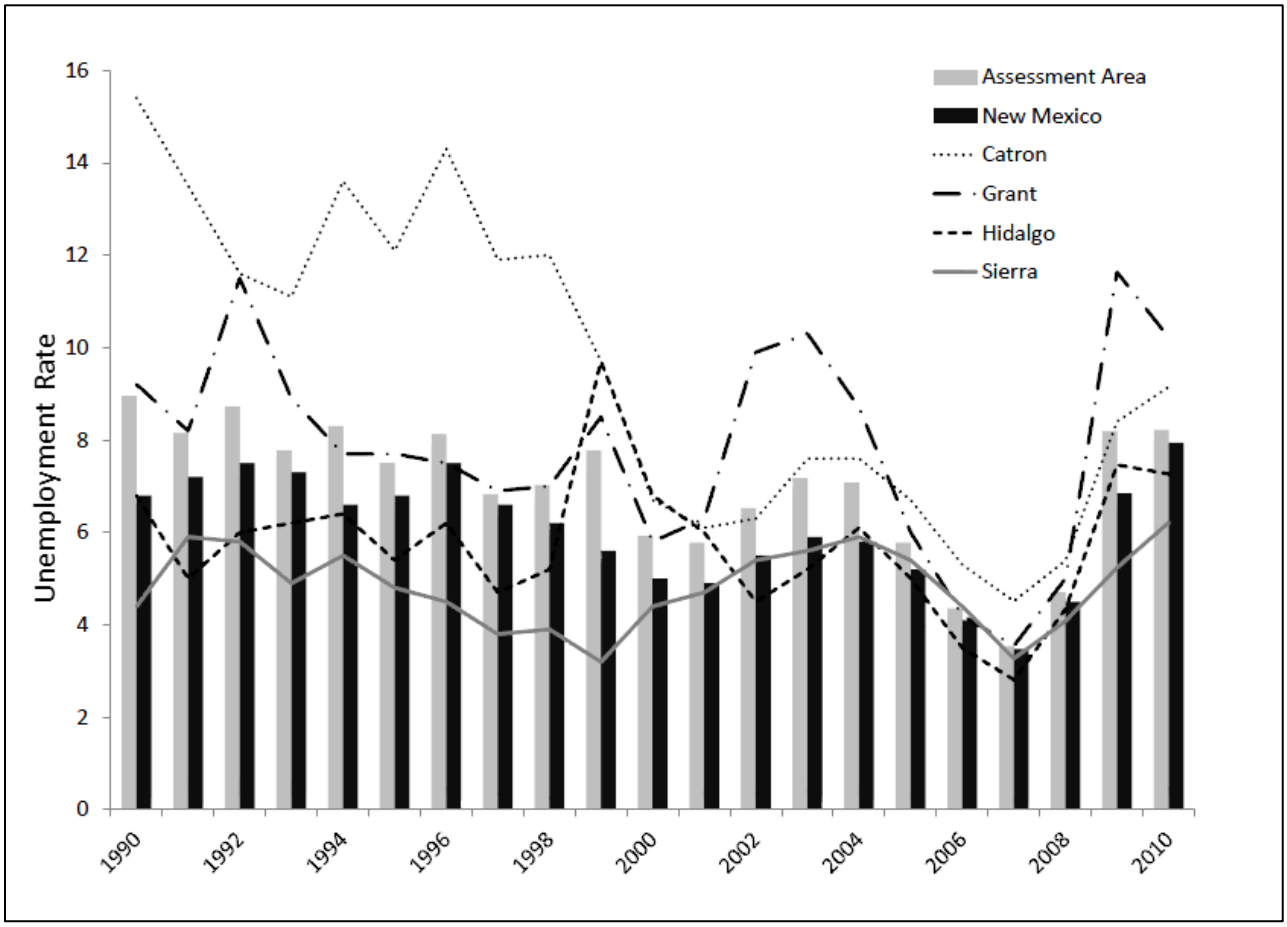


Figure 182. Unemployment rate in Gila NF Counties (1990-2010).
Please note that "assessment area" is the same as "area of influence." Figure from UNM-BBER 2014.

Sectors of the Economy

Table 174 depicts employment levels by aggregated job sectors within the area of influence. The table stresses the importance of the government, retail trade, health care and social assistance, mining, and agriculture job sectors (IMPLAN 2014). Together these industries provide 60% percent of the area's employment. The majority of area of influence jobs (more than 60 percent) are located within Grant County (UNM-BBER 2014).

Table 174. 2014 employment levels by industry classification for Gila NF area of influence.

Job Sector	Employment[a] In Area of Influence	Job Sector Employment as Percent of Total Employment
Agriculture	1,675	7%
Mining	2,034	9%
Utilities	121	1%
Construction	1,356	6%
Manufacturing	454	2%
Wholesale Trade	249	1%
Transportation and Warehousing	381	2%
Retail Trade	2,425	11%
Information	155	1%
Finance and Insurance	514	2%
Real Estate, Rental, and Leasing	776	3%
Professional, Scientific, and Technical Services	1,006	4%
Management of Companies	83	0%
Administrative, Waste Management, and Remediation Services	394	2%
Educational Services	279	1%
Health Care and Social Assistance	2,261	10%
Arts, Entertainment, and Recreation	636	3%
Accommodation and Food Services	1,671	7%
Other Services	1,017	4%
Government	5,129	23%
Total	22,617	100%

[a] Employment: jobs in IMPLAN are the annual averages of monthly jobs in each industry. Thus, one job lasting 12 months is equivalent to two jobs lasting six months each, or three jobs lasting four months each. A job can be either full-time or part-time - the job estimates are not full-time equivalents (FTEs).

Source: IMPLAN 2014

Income

New Mexico's aggregate household income grew by 41 percent between 1989 and 1999, and grew by 11 percent between 1999 and 2006-2010. In contrast, aggregate household income in the area of influence grew by 34 percent between 1989 and 1999, but subsequently shrank by 5 percent between 1999 and 2006-2010. It is expected that as the economic recovery continues the area of influence will experience more aggregate household income growth, although lingering effects of the Great Recession will likely limit growth for some time. Specifically, the low levels of population growth projected for the area (and in fact population declines for some area counties) will further dampen growth in aggregate household income (UNM-BBER 2014).

Table 175 lists the median household income for area of influence counties, the state, and the nation. All counties in the area have median household incomes below the state and nation. The un-weighted average of household income in the four-county area is approximately $10,000 below the state median

and nearly $20,000 below the national median. These data suggest that area of influence residents are more likely to be on the economic margins of society. Economic changes (either positive or negative) may have a more pronounced effect the economic well-being of the area.

Table 175. Median Household Income

Location	Median Household Income (2011)
Catron County	$37,857
Grant County	$36,925
Hidalgo County	$35,532
Sierra County	$28,373
New Mexico	$44,631
United States	$52,762

Source: U.S. Census Bureau, 2012

Total personal income comprises labor and non-labor income. Labor income is the wage or salary received by an employee or sole proprietor. Non-labor income includes investments (e.g. rent, dividends and interest) and age-related transfer payments (e.g. Social Security) and hardship-related transfer payments (e.g. welfare). Table 176 identifies the division of labor and non-labor income in the area counties, the state, and the nation.

Table 176. Share of Labor and Non-Labor Income

	Labor Income (%)	Non-Labor Income (%)
Catron County	45	55
Grant County	46	54
Hidalgo County	56	44
Sierra County	41	59
AREA OF INFLUENCE	**47**	**53**
New Mexico	62	38
United States	65	35

Source: U.S. Bureau of Economic Analysis 2010, REIS Table CA30

The four-county analysis area is much more reliant on non-labor income than the state and the nation. Total personal income in New Mexico and the US is composed of approximately two-thirds labor income and one-third non-labor income. In contrast, three out of the four area of influence counties receive more non-labor income than labor income. Sierra County is particularly skewed toward non-labor income. From 1990 to 2014 in the four-county analysis area, labor income grew from $594 million to 767 million (in real terms; a 29% increase), while non-labor income grew from $487 million to $956 million (in real terms; a 96% increase) (Headwaters Economics 2015a). These data suggest that the area of influence has a growing concentration of retirees possibly attracted by high quality of life, mild climate, and affordable housing. The non-labor income is primarily from investments (35%), age-related transfer payments (35%), and hardship-related transfers (24%). The reliance on non-labor income may also indicate dependence on government transfer payments. Non-labor income may help to stabilize the economy, as it is not tied to employment status. However, non-labor income may fluctuate based on asset market performance (e.g., investments in stocks and bonds) or changes in government policy.

The distribution of household income for the area of influence shows that the portion of households with incomes of less than $35,000 has declined, while the portion with incomes greater than $50,000 has consistently increased (Figure 183). This trend is similar to what has occurred across New Mexico, and is

expected to continue. Per capita income has also been rising in the area of influence, from $16,816 in 1989 to $18,320 in 1999 and $19,044 in 2006-2010. The portion of area of influence individuals living below poverty has declined somewhat from 22 percent during 1989 to 19 percent during 2006-2010. Although the distribution of households across income categories has improved in all area counties, poverty rates have not consistently improved in all counties. While the portion of the population living below poverty declined between 1989 and 2006-2010 in both Catron and Grant Counties, it rose in both Hidalgo and Sierra Counties. Changes in poverty rates have also varied by ethnicity and race. As the economy continues to slowly recover from the Great Recession, per capita income is expected to slowly increase while poverty rates are expected to continue to gradually decline (UNM-BBER 2014).

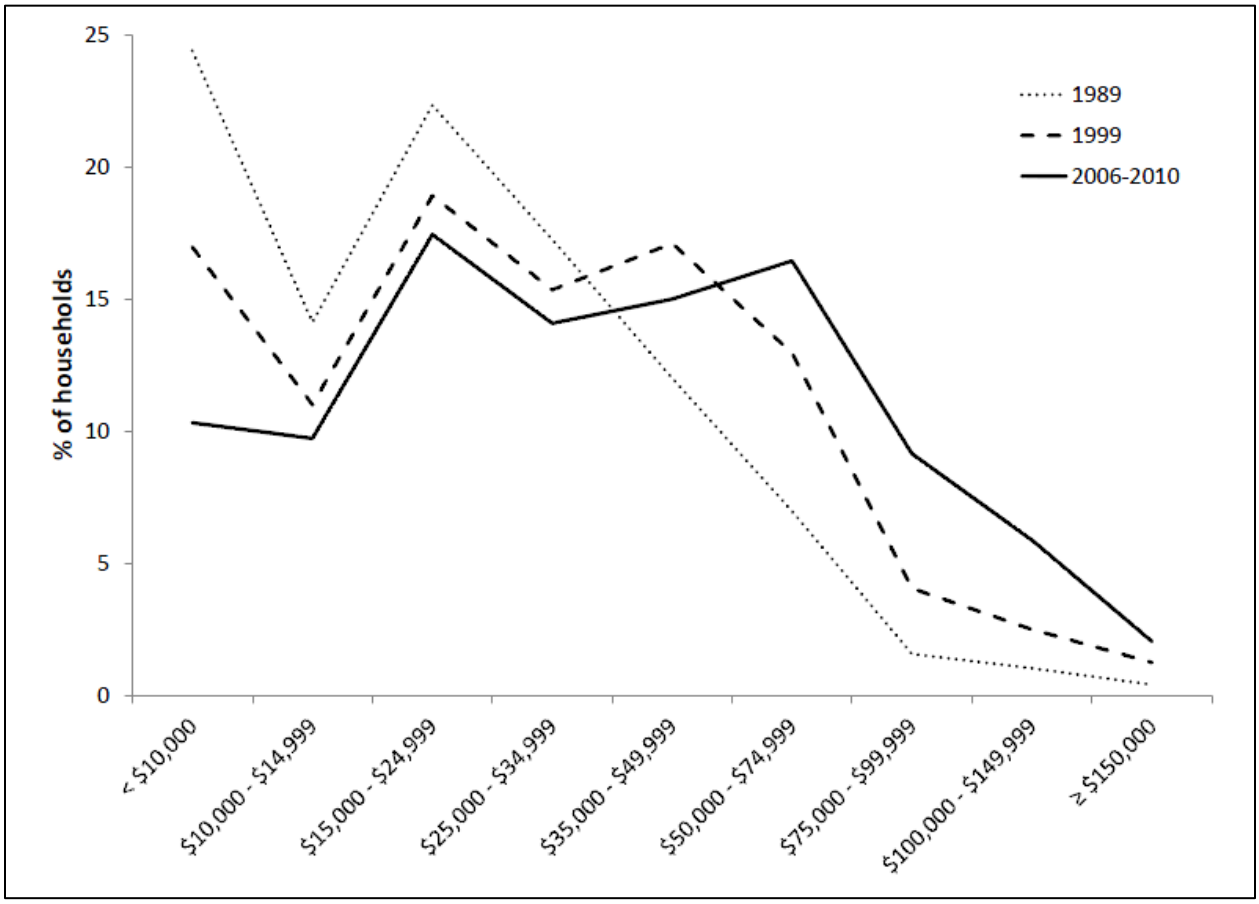


Figure 183. Household income distribution in the area of influence.
Figure from UNM-BBER 2014.

Remoteness of Area of Influence

The area boosts many environmental amenities, such as scenery and recreation opportunities, that improve quality of life. However, one of the biggest economic challenges of all the counties in the area of influence is their remoteness. Often to capitalize on environmental amenities in the form of economic growth, an area also needs to have access to markets (via airports or highways), an educated workforce, and a diverse economy that welcomes newcomers (Rasker et al. 2008). The area of influence for the Gila NF is considered rural and isolated in terms of interstate airports (although Grant County does have a small airport with daily flights to Albuquerque) and driving time length to major cities. Isolated, rural counties in the West often have slower rates of growth in population, employment, and real income (Rasker et al. 2008). The area's ability to attract and retain people, businesses, and industry is limited by the lack of

ready access to major population centers. Conversely, isolation may have some advantages in terms of slower pace of life and affordable housing.

Agriculture Patterns

Table 177 shows that the number of ranches and farms is increasing, but that the number of acres in farms and ranches and the average size of ranches and farms is decreasing. These trends suggest that private agricultural farms and ranches are being subdivided, and a portions are being converted to other uses including residential development. Private farms and ranches are important in contributing to local economic diversity, scenery, local culture, and community vitality. This conversion can also have implications for the Gila NF including growth of the wildland-urban interface (and the cost of protecting homes from wildfires), spread of invasive plants onto the Gila NF, the loss of access to public lands for recreation, the loss of wildlife habitat and wildlife movement corridors that cross private-public land boundaries, and the potential for conflict among user groups (Headwaters Economics 2015b).

Table 177. Agricultural statistics on the number and size of farms and ranches

Agriculture Statistics	Catron County	Grant County	Hidalgo County	Sierra County	Area of Influence	New Mexico
Number of Farms[a] 2007	259	327	162	265	1,013	20,930
Number of Farms 2012	351	407	171	256	1,185	24,721
Number of Farms (Percent Change 2007-2012)	36%	24%	6%	-3%	17%	18%
Land in farms (acres, 2007)	1,482,579	1,213,349	1,028,547	1,344,339	5,068,814	43,238,049
Land in farms (acres, 2012)	1,077,534	1,064,487	930,271	1,250,136	4,322,428	43,201,023
Land in farms (Percent Change 2007-2012)	-27%	-12%	-10%	-7%	-15%	0%
Average size of farm (acres, 2007)	5,724	3,711	6,349	5,073	5,214	2,066
Average size of farm (acres, 2012)	3,070	2,615	5,440	4,883	4,002	1,748
Average size of farm (Percent Change 2007-2012)	-46%	-30%	-14%	-4%	-23%	-15%

Source: USDA 2014

[a] Farm: This refers to all forms of agricultural production, including livestock operations. These data exclude leased public land from total land in farms.

Seasonal and Recreational Homes

The number of vacant seasonal and recreational homes in New Mexico steadily increased between 1990 and 2010, although growth between 1990 and 2000 was much more pronounced than that between 2000 and 2010. Ultimately, the number of such homes increased by 68 percent during the last two decades from fewer than 22,000 homes in 1990 to more than 36,000 homes in 2010. The number of vacant seasonal and recreational homes in the assessment area doubled between 1990 and 2010, with much of the increase occurring between 1990 and 2000. The slower increase between 2000 and 2010 is likely a result of the effects on the housing market during the Great Recession. The increase in the number of such homes within the assessment area was more pronounced than that within New Mexico (UNM-BBER 2014).

The largest assessment area increase (both absolute and relative) occurred in Catron County, where the number of such homes grew from 258 homes in 1990 to 1,120 homes in 2010 (a 334 percent increase)

(Figure 184). Hidalgo County experienced a similar increase between 1990 and 2010, although the number of such homes in Hidalgo County (88 homes in 2010) is much lower than in Catron County. Sierra County has more vacant seasonal and recreational homes than other area counties, although between 2000 and 2010 the number declined by 15 percent, from 1,543 to 1,326 homes. The proportions of the vacant seasonal and recreational homes located within four-county area have shifted over time. Although the proportions in Grant and Hidalgo Counties have remained relatively stable, the proportion in Catron County has grown from 17 percent in 1990 to 36 percent in 2010, and the proportion in Sierra County has meanwhile declined from 64 percent in 1990 to 42 percent in 2010 (UNM-BBER 2014). Implications of this development for the Gila NF, if occurring near the Forest boundary or as an inholding surrounded by public land, are discussed further in the Wildland-Urban Interface section below and the Lands Chapter.

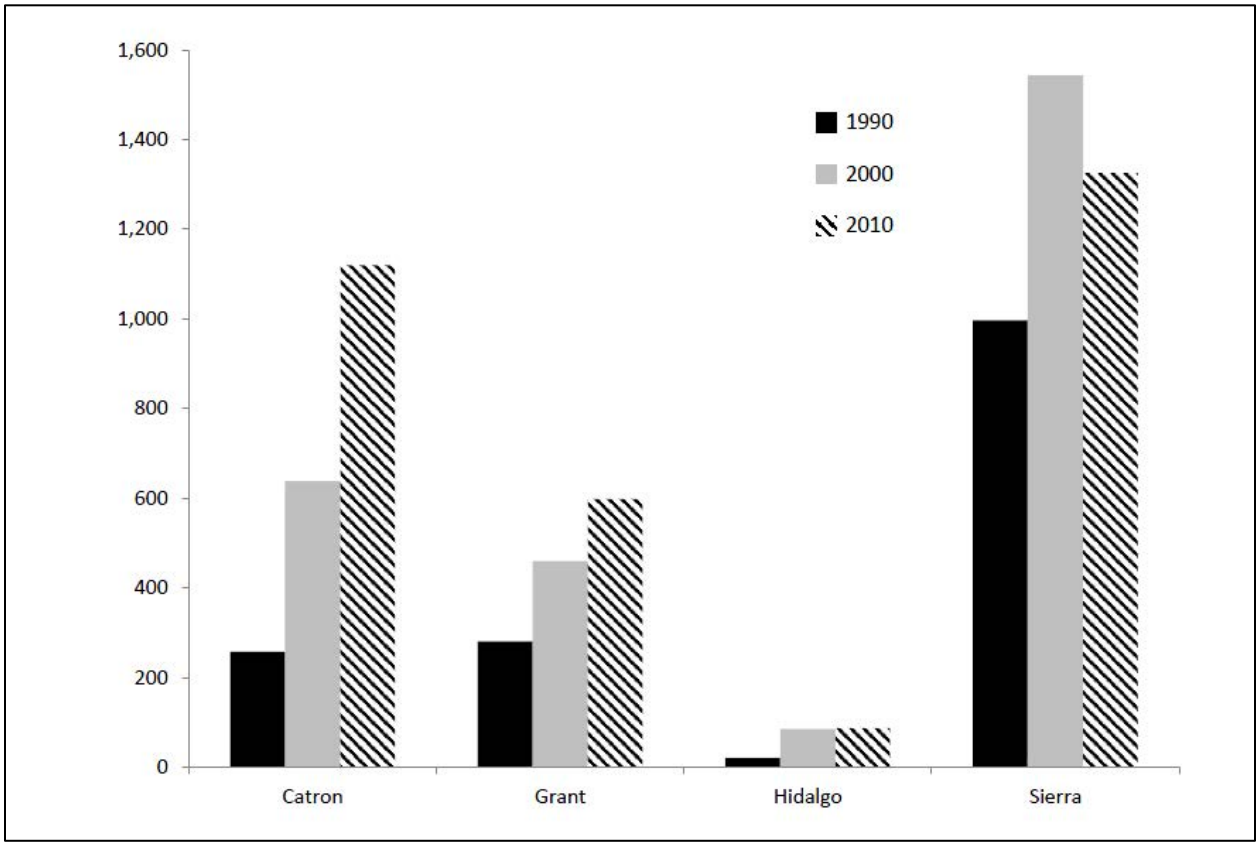


Figure 184. Vacant seasonal/recreational homes in the area of influence counties, by county
Figure from UNM-BBER 2014.

Homes within the Wildland-Urban Interface

It is now common to have a large number of homes, second homes, and vacation homes bordering or surrounded by public lands in the western United States. Since wildfire is a natural disturbance on western public forests, these homes are especially vulnerable to the risk of wildfire, and are said to be within the wildland-urban interface (WUI). A WUI refers to the zone of transition between unoccupied land and human development. Communities that are within 0.5 miles of the zone may also be included.

Around 32 percent of U.S. housing units and one-tenth of all land with housing are in the WUI and housing growth is expected to continue (Stein et al. 2013). While the degree of risk may vary from one place to another, given the right conditions wildfire can affect people and their homes in almost any location where wildland vegetation is found. Even structures not immediately adjacent to wildland vegetation are at risk

of damage from fire, because embers can be transported by wind and ignite vulnerable homes a mile or more ahead of the flame front (Stein et al. 2013). As more people live or work in the WUI, fire management becomes more complex and the costs to reduce fire risk, manage wildfires, and protect human lives and homes have risen sharply in recent decades (Stein et al. 2013). Today, the rising expense of wildland fire management on both public and private lands costs the Federal Government more than $3 billion per year.

Six percent of the homes found within the area of influence are located in the WUI (Table 178). It is estimated that 30 percent of those homes are second homes. In recent years, the Forest Service, including the Gila NF, has planned and implemented many projects that specifically decrease the potential undesirable effects of wildfires within these areas (e.g., prescribed burning and mechanical treatments to reduce fuels). Fire plays an important part in many wildland ecosystems. However, many years of fire suppression, much of it undertaken to protect private property, has resulted in fuel buildup, which in turn increases the probability of a large, severe fire. Warmer temperatures, less snowpack, and drier forests also result in longer and more intense fire seasons across the West (Headwaters Economics 2015a). See the Upland Vegetation Chapter for more information related to the fire regimes of the Gila National Forest.

Table 178. Total homes and wildland-urban interface homes in the area of influence and New Mexico

	Catron County	Grant County	Hidalgo County	Sierra County	Area of Influence	New Mexico
Total Number of Homes	3,289	14,693	2,393	8,356	28,731	901,388
WUI Homes	437	602	na	687	1,726	27,387
Second Homes in WUI	200	108	na	209	517	10,924
WUI Homes as % of Total Homes	13.3%	4.1%	na	8.2%	6.0%	3.0%
Second Homes as % of WUI Homes	45.8%	17.9%	na	30.4%	30.0%	39.9%

Source: Headwaters Economics 2015a

Note: The source material used “na” to describe the WUI statistics for Hidalgo County presumably because there currently are no homes in WUI areas in Hidalgo County.

Demographic Summary

The Gila NF is located in a rural area of southwestern New Mexico. For the assessment of social, cultural, and economic conditions, the Gila NF area of influence is comprised of the four counties that contain the Gila NF within their boundaries: Catron, Grant, Hidalgo, and Sierra counties. Although all the counties associated with the Gila NF are rural, their social and economic characteristics differ notably. The populations of all four counties were less than 30,000 in 2010, but the population of Grant County was ten times larger than that of Catron County. The area experienced moderate net in-migration between 1990 and 2000, but during the decade of the Great Recession net out-migration occurred in all counties but Catron. The area’s population is expected to be relatively constant for the next two decades. The ethnic composition of the area of influence has remained rather stable since at least 1990 – the area is approximately 58 percent non-Hispanic and 42 percent Hispanic, a composition that is similar to that of the state. The area of influence is not as racially diverse as the state; the area population is more predominantly White than that of the state, and has smaller portions of African-Americans, American Indians, and Asians. The area of influence population is aging. Educational attainment has improved in all area counties.

In 2010, Grant County (home of Silver City, which is the area's largest urban area) provided the majority of the area's employment opportunities. The importance of Sierra County to the area's economy is increasing. Unemployment rates have historically varied greatly across the assessment area. Although the distribution of households across income categories has improved in all area counties, poverty rates have not consistently improved. As the economy continues to recover from the Great Recession, per capita income is expected to slowly increase, and unemployment and poverty rates are expected to gradually decline. Non-labor income, such as retirement and investment funds, now make up over half of total personal income. The number of ranches and farms is increasing, but the number of acres in farms and ranches and the average size of ranches and farms is decreasing. The number of seasonal and recreational homes has grown in all area counties, and most notably in Catron County, where the number of such homes more than tripled between 1990 and 2010. Six percent of the homes found within the area of influence are located in the wildland-urban interface.

The demographic and economic characteristics discussed in this report have been shown to affect forest use, volunteerism, environmental attitudes, preferences for site development, and opinions regarding forest management (UNM-BBER 2014). Understanding the unique characteristics, trends, history, and challenges of the area of influence communities is an important consideration for public land managers working to meet the needs of the public. The demographic characteristics can also help to identify how communication and outreach efforts could be tailored to different audiences.

Gila National Forest's Contribution to Social, Cultural, and Economic Conditions

Introduction

For over a century, communities have relied on the Gila NF as a source of sustenance. This has manifested through various means ranging from utilizing the natural resources on the Forest for livelihood; creating community synergy around issues and events; offering a place for groups to commune, work, and recreate together; to providing solitude, peace, and relaxation for individuals who want to get away from the social pressures and pace of their everyday world. While ways and means may have changed over time, people enjoy all manners of activities on the Forest. Firewood gathering is regarded as a traditional family activity, since many local residents still rely on wood to heat their homes during the cold winter months. Commercial woodcutters also sell firewood collected from the Gila NF. Recreational group sites are used by families and friends who come together and celebrate weddings, birthdays, life-changing events, family reunions, and holidays. Permitted livestock grazing on the Gila NF is a long-standing tradition. In addition, local residents rely on the Gila NF for parts of their livelihood, by capitalizing on the opportunity to provide outfitting and guiding, tourist activities, and other services on NFS lands. Forest management continues to bring communities together over issues that affect them or to foster involvement through volunteer work on their favorite part of the Forest. Others continue to engage in some of the more traditional uses. All of these uses help maintain social cultures and longstanding traditions.

This section will explore the relationship between the Gila NF and surrounding communities by examining the benefits the Gila NF offers its communities; the demands for Forest resources and ecosystem services placed on the Gila NF from local communities; how social and cultural conditions influence the Forest; and finally, how the Gila NF contributes to the economies of the area of influence, which is the multi-county analysis area of Catron, Grant, Hidalgo, and Sierra Counties. This section is based on what the Gila NF heard during 6 community conversations (March 2015), at 6 assessment community meetings (August 2015), and from emails and letters from stakeholders during the assessment phase. In addition, this section uses information from "Values, Attitudes and Beliefs Toward National Forest System Lands: The Gila National Forest"[57] (USDA FS 2006a).

Important Social, Cultural, and Economic Influences on the Gila National Forest

Benefits People Obtain from the Gila National Forest

The Gila NF is rich in unique New Mexico cultural and traditional heritage that has blended with modern uses. The Forest continues to provide (to varying degrees) benefits that have been historically significant, as well has offering modern benefits that present day New Mexico culture has come to desire, expect, or rely upon. From a cultural and social standpoint, the best source to identify these benefits comes from the people and communities who directly benefit from them. At 6 community meetings conducted for this assessment in August 2015 and via email and letters, stakeholders of the Forest had the opportunity to share what those benefits were (USDA FS Gila NF 2015a). Some of the stakeholder input included:

<u>Traditional Benefits</u>

- Gathering firewood
- Harvesting house logs for construction needs
- Livestock grazing
- Timber harvesting

[57]Data collection for this 2006 report was accomplished by a combination of individual interviews and small group discussions within the assessment area.

- Hunting and fishing
- Irrigation systems

Natural Resource Oriented Benefits

- Clean water
- Wildlife habitat
- Fresh air

Nature Benefits

- Being away from civilization
- Solitude
- Natural Beauty/Scenery/Aesthetics

Recreation Benefits

- Hiking
- Biking
- Camping
- Horseback riding
- Off-highway vehicle use
- Wildlife watching
- Sight-seeing
- Night sky viewing
- Hunting
- Fishing
- Rockhounding
- Driving for pleasure
- Recreational aviation

Wilderness Benefits:

- Enjoying wilderness values
- Quiet

Lifestyle Benefits:

- Providing business and income opportunities (e.g., commercial services such as outfitting and guiding) through special use permits
- Family bonding through outdoor activities
- Health (mental and physical)
- Exercise
- Spiritual connections
- Economic growth from tourism from people outside of the community visiting the Gila NF

Extraction Benefits

- Mining
- Sand and gravel collection
- Recreational prospecting and gold panning
- Decorative rock for personal use

These benefits will continue to be desired even with changing demographics, and the Forest will be expected to continue to provide these benefits into the future. While these are all benefits offered by the Gila NF, they are also considered to be ecosystem services. Ecosystem services are defined as the benefits people obtain from ecosystems. The four categories of ecosystem services are explained in the Introduction to the Assessment, Ecosystem Services Framework. All benefits obtained from the Gila NF fall into all four categories: provisioning (clean air, water, wood, forage, etc.), regulating (long-term carbon storage, climate regulation, flood control, water filtration, etc.), supporting (pollination, seed dispersal, soil formation, nutrient cycling, etc.), or cultural (spiritual and recreational experiences) services. Chapter 1 Ecological Integrity and Sustainability addresses ecosystem services from an ecological perspective. The following chapter on Multiple Uses will look at ecosystem services from a social, cultural, and economic perspective.

Concerns about the Gila National Forest

Participants at the community meetings and stakeholders that sent emails and letters discussed concerns as they relate to both the Gila NF and to natural resource management in general. These concerns are relevant in that they express underlying needs or demands that may need to be addressed in the future. Interestingly, many of the concerns expressed are also shared by the Forest. Many of the concerns expressed by stakeholders are summarized below (USDA FS Gila NF 2015a):

- How much use of the Forest is sustainable in various resources areas, such as water, timber, and mineral extraction? How are these uses impacting forest, wildlife habitat, and watershed health?
- People are worried about diminishing water supplies and water quality, which affect water available for irrigation, livestock, fish and wildlife, and domestic use.
- There is a general impression that restrictions have increased and not enough forest management is occurring.
- There is wide recognition of the overgrown condition of many of the forest types and juniper encroachment of the grasslands.
- There is concern about the increased risk of uncharacteristic wildfire, and threats to private property and adjacent communities.
- There is broad interest in fuel management strategies such as thinning and prescribed fire.
- Many people would like to see more timber harvesting and grazing to support local economies.
- To what extent should the Gila NF be used for local economic development?
- Can recreation activities on the Forest provide needed economic benefits to local communities? If so, what activities and to what extent?
- How to maintain the quality of recreational experiences while accommodating larger numbers of visitors?
- Some people feel the travel management process reduced motorized access by too much on the Gila NF, while others feel the transportation system should be further reduced.
- People perceive there is a decline in overall access resulting from the lack of right-of-ways across private land to get to portions of public land on the Gila NF.

- People want the existing trails and roads maintained, but how much investment and focus should there be on road, trail, and facility conditions and maintenance (including signage)?
- Some people want more wilderness areas, while others feel they are being locked out of the Forest by the addition of more wilderness areas.
- Some people would like to see less elk on the landscape to reduce competition for forage, while others believe there is an appropriate amount of elk for hunting opportunities.
- How should invasive plant and animal species be controlled to protect ecosystem integrity?
- How will climate change affect the Forest, forest health, and the surrounding communities that rely on the forest?
- Many stakeholders expressed the need for systematic and scientifically sound monitoring of forest conditions and management actions.
- Some people want to see more education, specifically on the cultural significance of the area, ecosystems (especially fire dynamics), and geology of the Forest.
- Some believe there is not enough enforcement of the rules and regulations on the Gila NF and want to see "bad behavior" that takes place on the Forest addressed. Others think there are too many restrictions and rules limiting their ability to use and access the Forest.
- There is a need for better communication and working relationships between the Forest Service, local communities and governments, stakeholder groups, and members of the public who are interested or affected by management activities on the Gila NF.
- Many people acknowledge the Forest Service is operating in a time of declining budgets and recognize the need and desire for more partnerships between the Forest Service, local governments and communities, and stakeholder groups.

More stakeholder perspectives are included in the "Stakeholder Input Received" section of each chapter.

Influence of the Gila National Forest on Local Social, Cultural and Economic Conditions

Relationship of the Gila National Forest to Local Social and Cultural Conditions

Since its inception in the early 1900s as the Gila Forest Reserve, the Gila NF has been the provider for many of the needs essential for settling this region of the southwestern frontier. It served Native American tribes, Spain, and Mexico long before it became a United States property and its borders were established. The heritage, culture, traditions, and values that grew from this time period were handed down over generations and still exist in New Mexico today. While those historical values are still prevalent, the social and cultural environment has evolved into the modern age. By this virtue, the Gila NF has the unique challenge of serving two different eras through present day management.

Aside from time steeped heritages and traditions, the Gila NF has a diverse community composition, where Native American, Hispanic, Anglo, and other cultures have combined to make New Mexico a multicultural center. All of these cultures have ties to the Forest through strong attachments to the land that may be generations old or a new found discovery. In addition to serving the local population, the Gila NF also offers visitors who travel to the region a unique experience in culture, exploration, wilderness, and other activities such as hunting and backpacking. Collectively, the area of influence and the Gila NF are strongly influenced and shaped by local time honored traditions, cultural diversity, and by those who wish to experience this unique setting from other areas around the country.

Traditions

Residents of communities surrounding the Gila NF have a strong connection to the land and its resources. There is also a strong sense of community across all of the diversity that exists within the area of influence. Both sentiments date back centuries, before the United States acquired this part of the country. Local passions continue to demonstrate these time honored connections to the land and culture, thereby giving long-lasting vibrancy to deeply rooted traditions and ways of life. The Gila NF has been an integral part of this history and continues to play a prominent role in the long-standing traditions and uses of the area of influence.

There is a strong sense of attachment to the land that is the Gila NF. There are three major components that characterize this sense of attachment. The first comes from traditional users having a sense of personal stewardship, based on historical associations with NFS lands (USDA FS 2006a). There is a significant generational element to this theme, which dates back to the time before the Gila NF was established. The second component is derived from historical practices around the use of natural resources. These traditional users believe their first-hand knowledge and self interest in management of Forest resources results in a culturally based understanding, and attachment to, Forest lands (USDA FS 2006a). The third component views the Gila NF as a sustainable legacy. It is viewed that this land is a unique resource that should be cared for, conserved, and passed down to future generations (USDA FS 2006a).

Likewise, these historical connections to the land have been instrumental in giving the Gila NF a large part of its character. They still influence the Forest in present day terms, through various means, especially through traditional uses.

Acequias are the historical ditches that bring water from rivers and streams to communities for irrigation purposes. They are generally community run through associations headed by the majordomo (ditch-master) and some date back to the time of Spanish settlement. These waterways are still in use today for the original purposes for which they were established. They are also a representation of how important water is in the arid Southwest and were instrumental in the settlement of the Southwest. Those who use and maintain these ditches serve to protect their historic values, as well as their utilitarian purposes. These values are also recognized by the State of New Mexico through the New Mexico Acequia Commission.

Acequias are considered political subdivisions of the state and are collaborated with as local governments. Acequias are vital in the production of crops and livestock, they are inherently special riparian areas for many species of wildlife and plants, and they provide spiritual and aesthetic value. Acequias are an integral part of the cultural and traditional heritage identified in the area of influence. The Gila NF plays a role in this heritage by working with acequia commissions or ditch associations to support ongoing maintenance, accommodate access, and assist with infrastructure improvements for the 30 historic ditches that originate on or cross the Gila National Forest.

Traditional uses as they relate to the Gila NF are uses that have strong cultural ties to New Mexico's heritage. They hold historic significance, since they were necessities for survival, and many uses defined a way of life. While their prevalence has diminished somewhat over time, those with cultural ties to the area of influence still engage in many of these uses and view them as a vital part of their heritage. Those who have a cultural investment in the traditional uses of the area look to the Gila NF to continue providing these opportunities as a matter of right. These uses consist of livestock grazing, hunting and fishing, medicinal herb gathering, firewood gathering, open forest access, and wood harvesting for commercial uses.

Transitions in the Social Environment

In the past, communities and families who lived within the area of influence relied on natural resources to get by. The main activities were logging, mining, grazing, ranching, and farming. Today, logging and farming especially are not as prevalent as they once were. The declines in traditional uses are generally due to market demands, regulatory changes, and other economic constraints such as the long distance to markets. The decline in traditional uses is strongly felt in the local economies of some communities, and many people would like more opportunities for economic development.

In addition to traditional uses that continue to weather the test of time, the Gila NF has also experienced a gradual progression more contemporary in nature. There has been a shift toward recreation and tourism, and when asked, some of the public view the Gila NF with a strong recreation emphasis especially hunting (USDA FS 2006a). The elk hunting season attracts hunters from across the country, and private outfitter guide companies provide a range of services to clients. Many other visitors come to experience the cultural distinctiveness, while others come to partake in various outdoor pursuits, and the beauty of the landscape is an attraction in and of itself. For these reasons, recreation and tourism have become focal points on portions of the Gila NF, incorporating its unique social and cultural setting. Approximately 514,000 people visit the forest each year with 73 percent of those visits being for recreational purposes (USDA FS 2011). However, some people doubt that recreation can replace the traditional uses as an economic base (USDA FS 2006a).

The four-county area and the Gila NF elicit a strong sense of connection that is not only traditionally based, but is also shared by those who are considered "non-traditional" users and live in the area or visit the Forest. Many of these connections are also based on interactions with the Forest and its resources, as well as personal experiences and values. Some users have special places on the Forest, while others speak of the inspiration, solitude, and appreciation they feel by being in the Gila NF. The diversity of wildlife, plants, landscape, and other resources is another important value of the Forest. There is a local environmental presence that has actively pursued implementing preservation values and beliefs about forest management and landscape conditions (USDA FS 2006a).

There is a perception that a transition is occurring within the social fabric of the area communities. This shift involves the exodus of younger people and the influx of newcomers. Younger people are believed to be leaving the area in search of jobs, which are limited within the area of influence. Despite a strong sense of attachment, many of these young people rarely make it back. It is also believed that newcomers are increasing in number attracted by the natural resources, rural lifestyle, and quality of life amenities. This influx has increased the diversity of lifestyles, most recently retirees and others who are not dependent on local economies for their income. Newcomers may not have the same appreciation for traditional uses, and may even view natural resource issues in different ways than longer term residents (USDA FS 2006a). These characteristics imply a mix of values and beliefs based on types of use, length of residence, and cultural background. These diverse views, especially those concerning polarized natural resource issues, have created some social tensions. These perceptions indicate a social scenario where communities are feeling a change, and possibly a loss of traditional ways of life.

The assessment input also reveals areas of broader agreement that could be the focus of future collaboration efforts. Restoration of forests, grasslands, and watersheds is a perceived need that could improve ecosystem function and offers potential economic benefits to local communities. Despite the contentiousness of past relationships, there appears to be a potential foundation for future collaboration with stakeholders throughout the area. Coordinating with stakeholders, such as other federal agencies, state agencies, local governments, organizations, and private landowners would not only improve efficiency and effectiveness of these restoration efforts, but could also bridge gaps between social differences and value conflicts within communities (USDA FS 2006a).

Gila National Forest's Contributions to Local Economic Conditions

Economic Contribution Analysis

The Gila NF makes up nearly 3.3 million acres or 7.9% percent of the area of influence, which is the multi-county analysis area of Catron, Grant, Hidalgo, and Sierra Counties, making it an important contributor to the local economies. These lands contribute a wide range of economic values to people. Market goods such as timber, livestock, minerals, and recreation opportunities generate employment and income, as well as payments to local communities and revenue for the U.S. Treasury. Non-market goods, such as existence values of Gila trout or unique ecosystems and habitats, generate value everyone reaps, but do not necessarily pay for. Other forest benefits such as outdoor recreation and scenery are valued by the people who use them, but only a portion of this value is represented in market purchases. The economic contribution analysis considers only the market transactions that result from activities on the Gila NF. Numerous non-market social and economic values are associated with the Forest. The value of ecosystem services, such as clean air and water, are not captured in the economic contribution analysis. Therefore, this analysis should not be conflated with a representation of the total economic value of the Forest.

The economic role of the Gila NF in the area of influence was modeled with IMPLAN Professional 3.0 software using 2014 data (IMPLAN 2014). IMPLAN is an input-output model, which estimates the economic outcomes of activities, projects, and policies on a region. Input-output analysis represents linkages between sectors in an economy. For example, Forest visitors spend money on accommodation and food (a direct effect). Accommodation and food service businesses buy supplies from other businesses (an indirect effect). The employees of these firms spend their earnings on a variety of goods and services (an induced effect). These transactions result in direct, indirect, and induced effects in the analysis area economy, respectively. Definitions of terms used in the analysis are described below:

- **Direct impacts** are the value of goods and services that are directly provided by Gila NF.
- **Indirect impacts** are from linkages to other industries, not directly associated with the Gila NF.
- **Induced impacts** occur when labor income increases, resulting in increased demand for goods and services in the local economy, creating additional employment and output.
- All three types of impacts are measured in **employment**, **labor income**, **value added**, and **output**.
- **Employment** measures the number of jobs generated in the economy by the Gila NF. These numbers are in terms of number of jobs and not in terms of full-time equivalent employees.
- **Labor income** is income earned by the labor force because of the Gila NF's presence.
- **Value added** by the Gila NF is the total amount paid for all factors of production (inputs that are used in the production of goods and services) in the analysis area including labor. It is a measure of Gila NF's contribution to the local economy.
- **Output** is the value of industry production in the analysis area measured in producer's price. Producer's price is the amount received by a producer by selling one unit of goods or services produced minus any value added tax or other deductible taxes.

IMPLAN uses Forest Service data on expenditures and resource uses to estimate the economic consequences of Gila National Forest management (IMPLAN 2014). This economic contribution analysis includes recreation, livestock grazing, mineral removal, timber harvesting, payments to states and counties, and Forest Service expenditures. Quantitative inputs (e.g., animal unit months, recreation visits,

and FS payments to counties) were averaged for fiscal year 2013 to fiscal year 2015 to lessen the effect of annual fluctuations[58]. The economic contribution analysis methods and data are described in detail in Appendix E. The Gila National Forest extends into four New Mexico counties – Catron, Grant, Hidalgo, and Sierra. These counties form the area economy for the economic contribution analysis. There are at total of approximately 22,617 jobs and $882 million in personal income in the four-county area. The five largest aggregated job sectors (out of 20), in terms of employment, in the area economy are: (1) government, (2) retail trade, (3) health care and social assistance, (4) mining, and (5) agriculture. When using the more detailed 536 possible job sectors in the North American Industry Classification System, the five largest job sectors in the area economy are: (1) state and local government, (2) copper mining, (3) cattle ranching and farming, (4) real estate, and (5) restaurants. The extraction and consumption of forest products (e.g., timber and forage), recreation visitors, and Forest expenditures (e.g., equipment and salaries) contribute to economic activity in the region. The total economic contributions of these activities on the Gila National Forest are displayed by sector in Table 179.

[58] Minerals data were averaged over the period 2011 to 2013, since more recent data were unavailable at the time of this analysis.

Table 179. Current Contribution of the Gila National Forest to the Regional Economy

Sector	Employment [a]		Labor Income [b] (Thousands of 2014 Dollars)	
	Area Totals	FS [c]-Related	Area Totals	FS [c]-Related
Agriculture	1,675	374	$68,331	$2,464
Mining	2,034	10	$152,595	$273
Utilities	121	1	$10,887	$164
Construction	1,356	12	$48,842	$418
Manufacturing	454	35	$15,408	$882
Wholesale Trade	249	9	$8,081	$498
Transportation and Warehousing	381	62	$12,054	$1,358
Retail Trade	2,425	51	$52,614	$2,435
Information	155	5	$7,313	$206
Finance and Insurance	514	64	$13,975	$1,622
Real Estate, Rental, and Leasing	776	24	$7,093	$337
Professional, Scientific, and Technical Services	1,006	52	$23,946	$1,024
Management of Companies	83	2	$3,698	$89
Administrative, Waste Management, and Remediation Services	394	8	$9,601	$241
Educational Services	279	2	$2,607	$40
Health Care and Social Assistance	2,261	13	$73,710	$560
Arts, Entertainment, and Recreation	636	4	$4,209	$36
Accommodation and Food Services	1,671	18	$28,977	$328
Other Services	1,017	10	$27,220	$364
Government	5,129	227	$311,060	$15,060
Total	22,617	981	$882,222	$28,700
FS as Percent of Total	--	4.3%	--	3.3%

[a] Employment: jobs in IMPLAN are the annual averages of monthly jobs in each industry. Thus, one job lasting 12 months is equivalent to two jobs lasting six months each, or three jobs lasting four months each. A job can be either full-time or part-time - the job estimates are not full-time equivalents (FTEs).

[b] Labor income: includes employee compensation and proprietors' income - the wages, salaries, and benefits paid to employees and self-employed individuals.

[c] FS=Forest Service

Source: IMPLAN 2014

Market transactions attributable to activities on the Gila National Forest support an estimated 981 jobs and $28.7 million in labor income in the area economy. Forest Service activities on the Gila National Forest are responsible for approximately 4.3 percent of total employment and 3.3 percent of labor income in the four-county area. The Gila National Forest contributions are largest in the agriculture and government sectors. Although activities on Forest Service lands in the plan area contribute the most jobs to the agriculture sector (374 jobs or approximately 20 percent of total employment in the sector), the contribution to labor income is comparatively minor ($2.5 million dollars or about 3.9 percent of total labor income in the sector). Most of the employment in the agriculture sector is attributable to livestock grazing on Forest Service lands in the plan area. Livestock grazing jobs are typically lower paid than other occupations. Additionally, many ranches rely on unpaid family labor. The modeling system counts unpaid family labor as a job, but these jobs would not contribute to labor income. Therefore, the relative

importance of livestock grazing on Forest Service lands in the plan area shows the discrepancy between share of employment and labor income attributable to activities on Forest Service lands.

Table 180 displays the economic contribution of Gila National Forest activities by program area. Livestock grazing and Forest Service expenditures contribute the most to employment in the area economy, each supporting about 400 jobs on an average annual basis. However, Forest Service expenditures provide approximately $13 million more in labor income compared to livestock grazing, despite similar levels of employment. This indicates that jobs related to Forest Service expenditures are more likely to be full-time and provide higher wages than jobs related to livestock grazing in the four-county area.

Table 180. Current Contribution of the Gila National Forest by Program Area

Program Area	Employment	Labor Income (Thousands of 2014 Dollars)	Value Added (Thousands of 2014 Dollars)	Total Output (Thousands of 2014 Dollars)
Recreation	71	$2,666	$4,784	$12,045
Grazing	434	$5,579	$12,972	$34,823
Timber	8	$314	$351	$2,274
Minerals	0	$0	$0	$0
Payments to Counties	69	$1,487	$2,933	$10,357
Forest Service Expenditures	400	$18,654	$21,496	$32,552
Total	981	$28,700	$42,536	$92,052

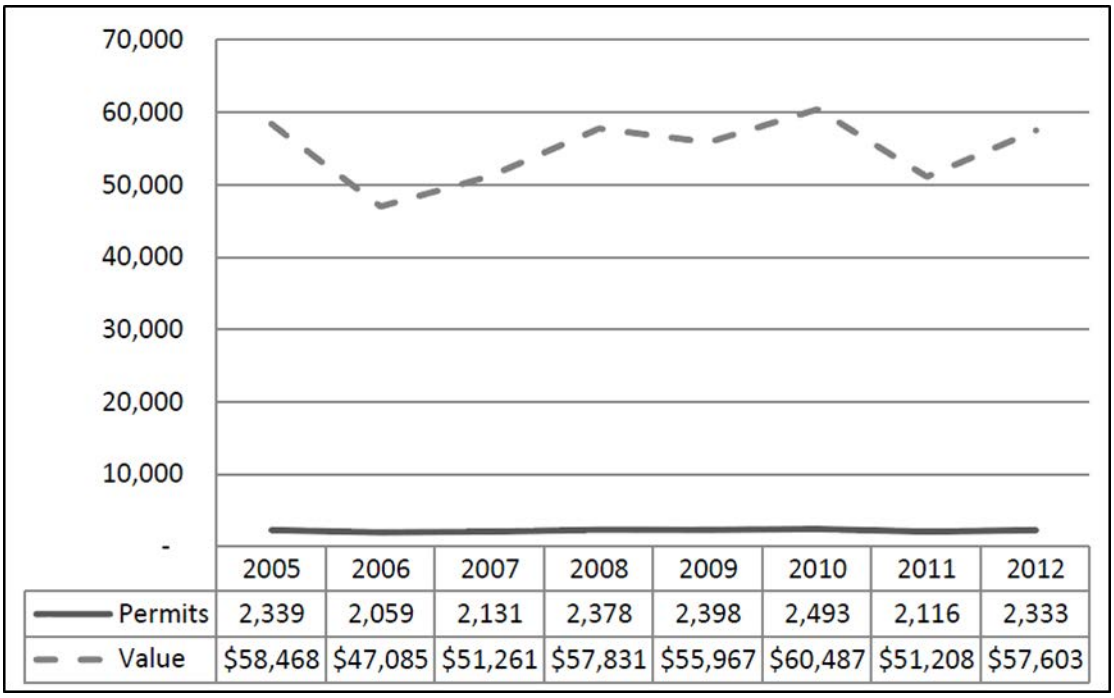
Grazing plays an important role in the local area economy. The Gila NF grazing program contributes approximately 434 jobs, $5.5 million in labor income, and $34 million in total output to the four-county area. These jobs and income are not only from direct grazing activities such as ranching, but also include indirect and induced effects. When a rancher purchases machinery or veterinary services, these impacts are also included. In addition, when ranchers spend earned income in the local economy on food, this is accounted for in the induced effects. The impacts on grazing from Forest Service activities is based upon three-year averages of animal unit months (AUMs), by livestock category, to minimize the effect of short-term variations in authorized livestock grazing use. See the Multiple Uses Chapter section on grazing for more details on number of permits, acres, and range condition.

Although mineral extraction occurs on the Forest, the quantities of stone, sand and gravel removed are insufficient to result in measureable economic contributions to the four-county economy. In the four-county area, most of the active copper mines with large employment occur on private property, and mining employment generally follows copper prices.

The Gila NF recreation program contributes approximately 71 jobs, $2.7 million in labor income, and $12 million in total output to the four-county area. Growing populations in Albuquerque, Las Cruces, El Paso, and Tucson have led to more people seeking out the diverse recreation opportunities offered by the Forest. There are well-developed transportation links from these major population centers; however, the Forest is still relatively remote distance-wise. There were approximately 514,000 visits to the Forest during 2011 with 55% of these visits from local residents (USDA FS 2011). The area holds ecotourism potential, and there recently has been increased marketing by the state and local entities to generate more visitation.

The amount of employment in the timber industry is greatly diminished from the 1980s. See the Multiple Uses Chapter section on timber harvesting for more details. Fuelwood gathering on the Forest is still tied to livelihoods in some of the surrounding communities. Wood for fires continues to be widely used either aesthetically or as the primary heat source within homes. Approximately 48% of the housing units in Catron County rely on wood as the primary heating fuel type. In Grant, Hidalgo, and Sierra Counties,

approximately 5 to 12% of the housing units use wood for heat (U.S. Census Bureau 2000b). The use of wood for heating homes may be tied to long-term customs, traditions, and culture of the community, but it may also provide economic savings over propane, natural gas and electricity. Figure 185 displays the quantity and value (in nominal dollars) of fuelwood permits on the Forest since 2005.



	2005	2006	2007	2008	2009	2010	2011	2012
Permits	2,339	2,059	2,131	2,378	2,398	2,493	2,116	2,333
Value	$58,468	$47,085	$51,261	$57,831	$55,967	$60,487	$51,208	$57,603

Figure 185. Quantity and Value of Forest Fuelwood Permits, 2005-2012.

Source: USDA FS Gila NF 2013c

In addition to fuelwood, piñon nuts, greenery, gravel, rocks, and other forest products are gathered on the Forest for both commercial and personal uses. Gathering habits have been part of the customs, tradition, and culture of the people for many years (USDA FS 2006a). The above analysis considers only the market transactions that result from activities on the Gila National Forest. Numerous non-market social and economic values are associated with the Gila National Forest.

Total Federal Land Payments

Counties containing federal lands have historically received a percentage of the revenues generated by the sale or use of natural resources on these lands. A steep decline in federal timber sales on national forests during the 1990s significantly decreased revenues received by counties from the Forest Service. Federal land payments are payments made by the federal government to state and local governments to compensate for non-taxable federal land within their borders. In the area of influence, the Forest Service makes contributions through both appropriations and revenue sharing via various programs, such as the appropriated Payment in Lieu of Taxes (PILT), and revenue sharing programs, such as the Secure Rural Schools program. However, dependency on these transfers exposes local services to changes in federal policy and spending decisions.

PILT are federal payments to local governments that help offset losses in property taxes due to nontaxable federal lands within their boundaries. PILT payments help local governments fund operations, such as emergency services and road maintenance. Payments are made annually for tax-exempt federal lands administered by the Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, USDA Forest Service, and for federal water projects and some military installations. Payments to counties

are based on population, receipt sharing payments, and the amount of federal land within a county (Table 181).

Table 181. Payments in Lieu of Taxes (PILT) to the States and Counties, FY 2015

Location	Payment	Acres of Federal Land
Catron County	$619,691	2,717,893
Grant County	$2,078,740	1,161,528
Hidalgo County	$745,488	822,875
Sierra County	$1,205,512	1,301,253
State Total	$37,466,124	22,470,290

Source: USDI 2015

The Secure Rural Schools (SRS) and Community Self-Determination Act of 2000, reauthorized in April 2015, was enacted in part to stabilize payments to counties dependent on declining revenues from federal timber sales. This law ensures counties across the country can receive payments that provide funding for schools and roads and make additional investments in projects that enhance forest ecosystems. The SRS Act authorizes the use of Resource Advisory Committees as a mechanism for local communities to collaborate with federal land managers in recommending projects on federal lands that will benefit resources. The Secure Rural Schools payments to the area counties for fiscal year 2014 are in Table 182.

Table 182. Secure Rural Schools and Community Self-Determination Act, FY 2014 Payments

Location	Fiscal Year 2014 Payments
Catron County	$2,107,965
Grant County	$796,473
Hidalgo County	$5,184
Sierra County	$313,147
Total	$3,222,770

Source: USDA FS 2015f

Forest Service Gross Receipts from Commercial Activities

The Gila NF provides various economic opportunities to surrounding communities. These income producing opportunities for local businesses range including timber harvesting, ranching, and providing recreation services to the visiting public. Figure 186 shows the gross receipts collected by the Gila NF and deposited into the National Treasury as fees collected from those who utilize such opportunities. Grazing generates the largest share of gross receipts, with land special use related activities (e.g. communication site leases) coming in second.

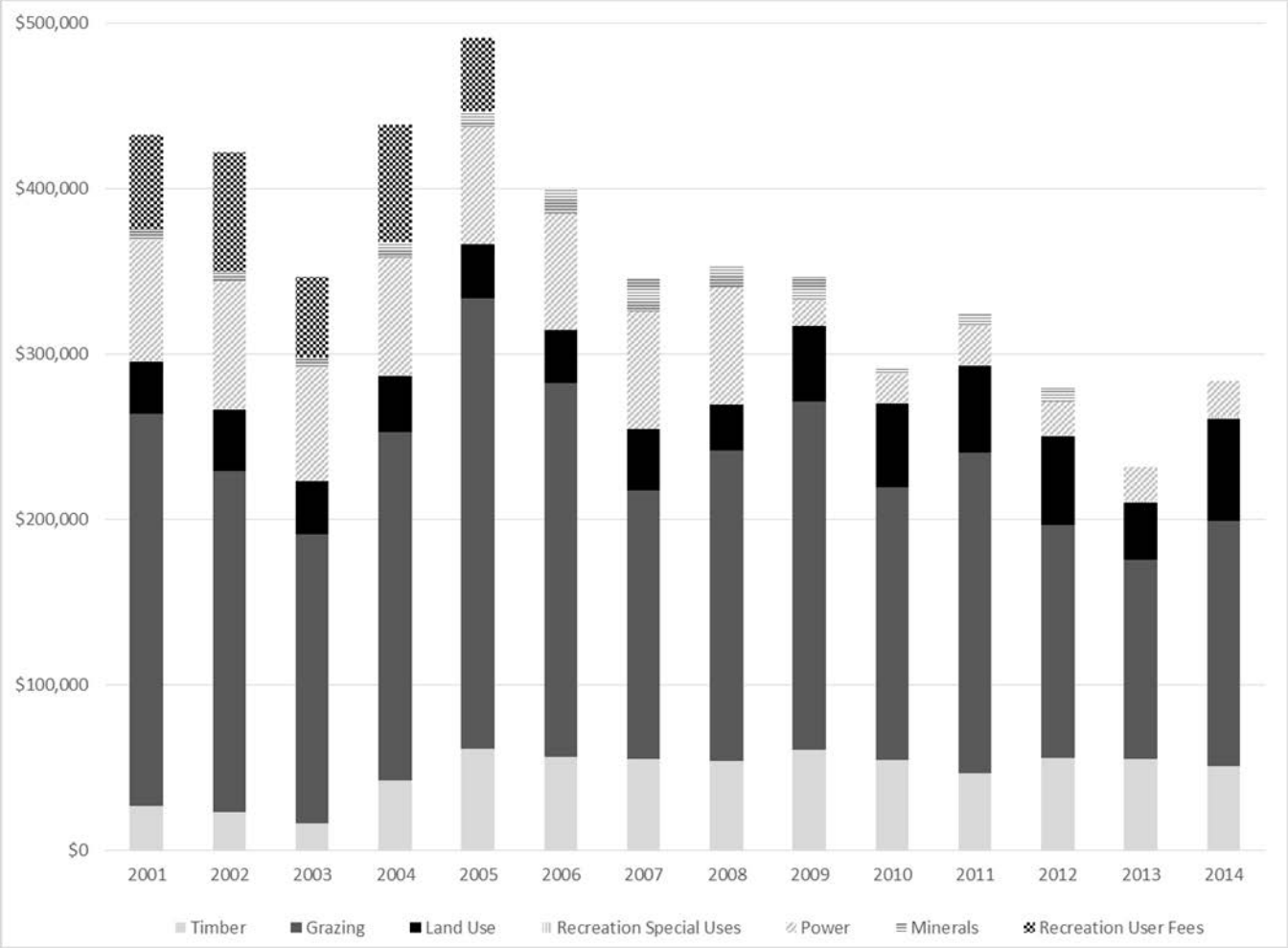


Figure 186. Gila National Forest gross receipts by source, 2001-2014

Aesthetics

Aesthetics and scenery are an important component of the Gila NF and the four-county area. The Forest is perceived as having a range of aesthetic resources that are valued by both local residents and visitors to the area. Scenery and other natural amenities are also believed to attract new residents to the four-county area (USDA FS 2006a). The opportunity to be away in an environment perceived to be vast, aesthetically pleasing, and readily accessible is an important characterization of Forest lands by longtime residents and visitors alike (USDA FS 2006a). The scenery and perceived beauty of the area contributes to the recreation and tourism industry in the area. For example, the Gila NF is a scenic back-drop to many communities within the area and influences the value of real estate. Property adjacent to or near the Forest boundary can sell for a much higher price than a similar property located further away. Scenery is discussed in more detail in the Recreation Chapter, which describes various parts of the Forest according to their scenic character.

Influence of the Gila National Forest on Social, Cultural and Economic Conditions in the Broader Landscape

Hunting

Culturally, hunting is an important activity for the people of New Mexico. Early inhabitants hunted and lived off the land. Many of the people in rural areas and small towns in southwestern New Mexico continue this traditional practice that provides food, is a bonding activity between parents and children, and is a way of teaching children about nature and the land around them. Recently, sport hunting has emerged as a recreational activity, which can involve larger groups, OHVs, and hunting camps. Sport hunting can be very social and many hunters return to the Forest annually for this activity. The growth of sport hunting has given rise to a community of commercial outfitters and guides. The Gila NF is known for its trophy animals, especially elk, which attract hunters from all over the country. Ranchers are taking advantage of the hunting opportunities by developing outfitting and guiding businesses. Outfitters and guides look to the Gila NF for special use permits that allow them to host tourist activities on Forest Service lands. Some rely on this as a main portion of their income. For more details on the economic contributions of hunting, please see the Multiple Uses Chapter.

Wilderness

Part of the Gila National Forest's niche is the freedom to explore vast expanses of backcountry. The fact that the Gila NF is home to the first wilderness area along with the strong ties to Aldo Leopold creates a national and international destination for visitors who seek a primitive natural experience. Popular activities within wilderness areas on the Gila NF include: hiking, backpacking, horseback riding, camping, hunting, fishing, and wildlife viewing. Additional discussion on wilderness can be found in Designated Areas Chapter.

Summary

In a social context, the Gila NF offers a unique setting in terms of history, diversity, and economic conditions. There is strong attachment to the land by the residents within the multi-county analysis area of Catron, Grant, Hidalgo, and Sierra Counties. There are also benefits derived from and demands placed on the Gila NF that the public and other stakeholders communicated during the course of this assessment. Many of these benefits are related to traditional uses, natural resources, nature, recreation, wilderness, and lifestyle. The demands were generally expressed as concerns or desires. In summary, the public's and stakeholders' main interests were related to (a) roads, trails, and facility maintenance; (b) support for economic development; (c) ecosystem sustainability; (d) recreation; (e) fire and fuels management; (f) diminishing water supplies; (g) wildlife habitat; (h) access and travel management; (i) invasive plants and animals; (j) drought and climate change; (k) wilderness; (l) more educational and volunteer opportunities; and (m) better communication with the Forest.

The social environment of the area has characteristics that influence values and beliefs about the Gila NF. These characteristics include: a multi-cultural heritage; traditional use economies transitioning to include tourism and amenity uses; a strong local environmental presence; a changing population mix with an increased presence of retirees and other newcomers; and an outdoor lifestyle. These characteristics imply a mix of values and beliefs based on types of use, length of residence, and cultural background. This social environment is also characterized by polarization about certain Forest management issues although there may be broader agreement on the need for restoration of forests, grasslands, and watersheds.

The demographics of the area also highlight some of the hardships people face, especially in terms of income and a struggling educational system. Most people in the four-county area work for the government or the copper mines, and average household income tends to be lower compared to New Mexico and the nation. Younger generations are perceived to be leaving the area in search of better economic

opportunities. The Gila NF provides economic benefits to the four-county area. Economic contributions from the Forest provide benefits to the area from direct, indirect, and induced impacts. Overall, the Forest contributes over 981 jobs and $28.7 million to the local economies. Grazing, timber, recreation, and Forest expenditures all provide economic contributions. The federal government also contributed more than $3.2 million to local counties for payments in lieu of taxes in 2015 and over $4.6 million to the Secure Rural Schools program in 2014. Also in 2014, the Gila NF received $288,350 in gross receipts from income generated by timber, grazing, and special uses, among other programs.

When considering the social context, the attachment people have, and the contributions the Gila NF makes, it is evident that the Forest is not separate from the communities it serves, but is an integral part of them. Reliance on Forest Service lands in some form or another is part of the culture within the area and will continue to be so for as long as the Forest remains in place.

Chapter 11. Multiple Uses and Their Economic Contributions

Introduction

The Forest Service is a multiple-use agency providing a range of benefits and services from the variety of resources provided by national forests and grasslands. The multiple-use mandate comes from the Multiple-use Sustained Yield Act of 1960 and the National Forest Management Act of 1976. The mandate is not exclusive to a single resource or use, and the sustained yield principle applies to all multiple-uses for which the national forests and grasslands are administered. Recreation, timber, range, water, and wildlife, fish and plant resources contribute to maintaining social cultures, maintain long-standing traditions, connect people to the land, and contribute to the quality of life for many Americans and communities.

This chapter describes the social and economic contributions from timber, range, water, and wildlife, fish, and plant resources. The Recreation description of social and economic contributions are included in the Chapter 12 Recreation.

Timber and Special Forest Products

Plant products, including firewood, timber and other building materials, as well as special forest products (e.g., Christmas trees and transplants/wildings) are important resources available from the Gila NF. Firewood is the sole source of heat for the homes of many people within the area of influence, largely because it provides economic savings over propane, natural gas and electricity. Gathering firewood and Christmas tree cutting are often family events. Other wood products, such as lumber, posts, poles, and traditional building materials (e.g., latillas and vigas), are culturally and economically important as well. The Forest has increased the number of forestry treatments it implements, to improve forest health, reduce potential for uncharacteristic wildfire, and make forest products more available. This section discusses the current condition and trends of timber and special forest products on the Gila National Forest by identifying and evaluating:

- Ecosystem services from timber and special forest products
- Current condition of forested areas within the plan area
- How programs such as the Collaborative Forest Restoration Program, fit into the management of timber and special forest products
- Contribution of timber management to ecological sustainability
- Current timber and special forest product production in the plan area and broader landscape
- Trends influencing supply and demand of timber and special forest products coming from the plan area.
- Contributions the plan area makes to social, cultural, and economic sustainability
- Summary of timber and special forest products on the Gila National Forest

Timber and Special Forest Products Ecosystem Services

The vegetation that contributes to timber, firewood and special forest products provides many ecosystem services on which humans and other life forms depend, including:

- **Supporting** ecosystem services of timber and forest products at the most basic level convert

sunlight and carbon dioxide into oxygen and carbohydrates (primary production).

- **Regulating** ecosystem services of timber and forest products are key to soil formation and stability, thermoregulation (shading and evaporative cooling), nutrient and hydrologic cycling, carbon sequestration, and energy flow.
- **Provisioning** ecosystem services of timber and forest products provide wildlife habitat (cover, nest sites), food (piñon nuts for humans and other animal species, browse for wildlife), and fiber (lumber, paper, fuel).
- **Cultural** ecosystem services of timber and forest products (e.g., Christmas trees, botanical remedies, and aesthetics) are especially important to humans and society.

Current Conditions and Trends of Forested Areas

The Gila NF encompasses approximately 3.3 million acres, predominantly comprised of relatively dry ponderosa pine and mixed conifer forests, spruce-fir forest, piñon-juniper woodlands, and semi-desert grassland. Nearly 2,804,477 million acres (84%) are considered to be forested, of which about 432,361 acres (13%) are designated as suitable for timber production, where technology is available to ensure timber production, without irreversible resource damage (USDA FS Gila NF 1986). A periodic forest inventory of New Mexico's forests is conducted by the National Forest Inventory and Analysis (FIA) program[59]. FIA plot data were summarized using Forest Inventory Data Online (FIDO) standard reports from 2005 to 2013 inventory data[60]. According to these data, gross standing tree[61] volume on the Forest consists of about 877 million cubic feet (MMCF) and includes growth in the wilderness. These data from the 1997 inventory also indicate average annual mortality of 2.2 MMCF.

The Gila National Forest's 1986 forest plan (USDA FS Gila NF 1986) provides timber resource direction that generally prescribes a sustained yield from scheduled harvesting, while considering other resource needs. In 1996, the forest plan was amended to incorporate Regional guidance for northern goshawk habitat and Mexican spotted owl recovery. As a result, the Gila NF forestry program shifted emphasis from predominantly even-aged to predominantly uneven-aged forest management practices. In combination with waning budgets, the Forest gradually declined in forestry staffing, outputs, and accomplishments. Although projects and activities addressing hazardous fuel loading had been a part of the vegetation management approach since at least the 1980s, the 2000 National Fire Plan[62] provided directional emphasis to reduce the impacts of wildfires on communities and to restore fire-adapted ecosystems to healthy conditions. The directive of the Gila National Forest's new forestry program was to further integrate with wildlife, watershed, and fuels management programs, subsequently providing wood products as a byproduct of other management objectives rather than a primary objective.

Table 183 displays annual average acres treated by Ecological Response Unit[63] (ERU) from 1996 through 2014. Management activities include harvesting, prescribed burning, non-commercial thinning and fuels treatments. Harvesting includes the sale of forest products to enhance the characteristics and health of

[59] FIA data are publicly available from the national FIA Website at www.fia.fs.fed.us. This site includes data downloads, online tools that allow users to perform custom queries, and documentation of FIA's field inventory protocols, database structure, and publications.
[60] Available at: Forest Inventory Data Online Website.
[61] Tree species at least 5 inches diameter at breast height or diameter at root collar
[62] The report entitled "Managing the Impact of Wildfires on the Communities and the Environment", was released September 8, 2001. This report, and a set of corresponding agency strategies, formed the basis of what is now known as the National Fire Plan.
[63] The assessment of terrestrial ecosystem condition is stratified using the ERU classification system, which is a grouping of sites that are each similar in plant species composition, succession patterns, and disturbance regimes. See Chapter 2: Upland Vegetation for more details.

existing stands. Non-commercial thinning is the thinning of material less than nine inches diameter at breast height (DBH) to reduce competition and increase health of a stand of trees. Fuels treatments are treatments that cut mechanically or by hand to reduce the amount of fuel within a stand; reduce the number of trees per acre; and to increase the amount of space between canopies. Material from all treatments except prescribed burning are usually made available for forest products including saw logs, fuelwood, post and poles. The majority of management activities occurred within ponderosa pine and piñon pine / juniper ERUs because they are most prevalent on the Forest.

Table 183. Gila National Forest's average management activity treatment (acres) by Ecological Response Unit* from 1996 to 2014

Management Activity	PPE	MCD	MCW	SFF	PJW	MSG	CPGB	SDG	MMS	Total
Harvest-thinning	133	9	8	8	7	0	0	0	0	165
Harvest-uneven-aged	140	15	0	0	0	0	0	0	0	155
Burning-prescribed	6,469	372	23	5	3,902	253	91	13	198	11,326
Non-commercial thin	547	155	0	0	0	193	0	0	0	895
Fuels treatment	2,482	353	0	0	2,130	0	128	120	232	5,445
Total	9,771	904	31	13	6,039	446	219	133	430	17,986

*Ecological Response Unit - Ponderosa Pine Evergreen Oak and Ponderosa Pine-Forest (PPE); Mixed Conifer, with Frequent Fire (MCD); Mixed Conifer with Aspen (MCW); Spruce-Fir Forest (SFF); Piñon Juniper Woodland, Piñon Juniper Evergreen Shrub, Piñon Juniper Grass, and Juniper Grass (PJW); Montane Subalpine Grassland (MSG); Colorado Plateau Great Basin Grasslands (CPGB), Semi-desert Grasslands (SDG), and Mountain Mahogany Mixed Shrubland (MMS). (See Upland Vegetation Chapter)

General management objectives for the Forest have largely revolved around forest ecosystem restoration, which includes improving forest resilience, watershed condition, and wildlife habitat, while reducing fire hazard (fuels) and providing wood products to local communities. From 1996 to 2005 the majority of products harvested on the Gila National Forest were fuelwood, posts, and poles. When timber sales were offered on the Forest during that time period, there were often no bids from local mills, due to their size and capacity, or from Arizona sawmills unless the sale was within an economic hauling distance.

In 2005 a new mill was built in Reserve, New Mexico that could handle more capacity and material from 9" to 24" in diameter. Since the mill's establishment, the number of acres treated mechanically and the volume of material removed from the Forest has increased dramatically. Treatments have included timber sales, commercial and personal use fuelwood sales, post and pole permits, and other forest product sales. Between fiscal year 2005 and 2015 approximately 37,000 acres were treated[64]. Sale volume associated with projects implemented on the treated acres averaged about 23.0 MMCF annually (Table 184). Fuelwood sales (personal and commercial) and sale of personal use forest products (posts, vigas, house logs, etc.) accounted for about 80 percent of the volume during this 11-year period.

[64] This number includes fuelwood areas and non commercial thinning units that were not included in the table above.

Table 184. Volume sold on the Gila National Forest by product and fiscal year in million cubic feet (MMCF).

Product	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total	Yearly avg.
Saw Timber	0.2	13.5	2.5	0	0	2.1	0	6.3	4.5	0	18.0	47.4	4.3
Pole	0.2	0.2	0.5	0.5	2.5	0.3	0.1	0.2	0.1	0.4	1.0	6.0	0.5
Post	3.5	8.7	3.5	8.9	8.8	7.6	3.6	6.1	10.4	7.2	0.4	68.7	6.2
Fuelwood	5.5	4.6	4.9	5.8	5.6	6.1	5.1	5.8	5.5	5.8	8.0	62.7	5.7
Misc. Convertible	7.1	4.5	10.3	2.8	15.8	5.4	4.0	8.7	2.1	4.7	2.3	67.7	6.2
Total	16.5	31.5	22.0	18.0	32.6	21.5	12.8	27.2	22.6	18.0	29.8	252.4	23.0

Collectively, timber harvest from the Gila National Forest averaged 4.3 MMCF per year from 2005 through 2015 (Table 184). There were three active primary wood products facilities within Catron and Grant counties in 2012 (Sorensen et al. 2015), and wood products from these facilities include lumber, vigas, and latillas. There are several portable saw mills in the region that the Forest provides material to as needed by the purchasers. The demand from these operation is not consistent because these mills are operated on a part-time basis.

As implied by the amount of harvest activities, the timber base largely draws from the ponderosa pine evergreen oak and ponderosa pine forest (PPE) and mixed conifer with frequent fires (MCD) ecological response units (ERU) (Table 183). Ponderosa pine and mixed conifer with frequent fires ERUs are abundant on the landscape, but their age and size classes are departed from historical conditions, largely due to interruptions to the natural fire regime and/or influences from land management activities such as harvesting and lack of thinning to improve timber stands. These ERUs are vulnerable to widespread, high severity wildfire and susceptible to a variety of insect and disease mortality, due to changes in species age, size and density across the landscape. Widespread, high severity wildfire and insect and disease mortality can reasonably be expected to occur in these ERUs in the future, potentially exacerbating a current trend of even-aged, relatively young stands at a broad extent that did not exist in the reference condition. Large scale disturbance could potentially affect the availability of timber resources on the Forest, shifting harvest activities to other ERUs. Harvest activities from other ERUs would be far more challenging, as traditional use of species from within PPE and MCD ERUs is driven in part by ease of access (i.e., close proximity to communities, generally modest slopes, and higher road density). A more detailed analysis of ecological condition and trend by ERU can be found in the Upland Vegetation Chapter.

Timber and Special Forest Products Management on the Gila National Forest

Collaborative Forest Restoration Program

In 2000, Congress passed the Community Forest Restoration Act (Public Law 106-393, Title VI). The Act authorized the establishment of the Collaborative Forest Restoration Program (CFRP) in New Mexico to provide cost-share grants to stakeholders for forest restoration projects on public land designed through a collaborative process. These projects may be entirely on any combination of federal, tribal, state, county, or municipal forest lands, and must include a diverse and balanced group of stakeholders in their design and implementation. Each project must also address specific restoration objectives including: (1) wildfire threat reduction; (2) reestablishment of historic fire regimes; (3) reforestation; (4) preservation of old and large trees; and (5) increased utilization of small diameter trees.

Since 2001, 22 CFRP grants have been awarded on the Gila National Forest, totaling $6.9 million in funding and the treatment of 8,550 acres. There is currently one ongoing CFRP project on the Forest, which involves training members of the Alamo Band of the Navajo Nation to pursue careers in forestry or natural resource fields. These grants have also allowed businesses to purchase equipment that can utilize small diameter timber; assist in the completion of NEPA; and training people to pursue careers in forestry and natural resources. CFRP Grants on the Forest have also helped employ 105 people to harvest and manufacture forest products from the private sector as reported in the 2015 CFRP Grant Report (USDA FS 2015g). The most important part of the CFRP program has been the partnerships that have been established. Through these partnerships the Forest has been able to complete NEPA analysis and implement restoration projects on the ground. In addition to CFRP, the businesses that utilize material from the Gila NF have been successful in obtaining federal grants from the USDA, USDA Forest Service Forest Products Laboratory, Department of Energy and various grants from the State of New Mexico.

Contributions of Timber and Special Forest Products to Ecological Sustainability

Land managers are often concerned about a forest's resilience to disturbances like insect, disease, and wildfire. These concerns are commonly addressed by commercial or non-commercial thinning of forests, as tree density is the major factor that a forester can manipulate (Daniel et al. 1979). Tree vigor can increase the availability of defense mechanisms used to protect against insects and diseases (Oliver and Larson 1996). Thinning can increase tree vigor by reducing competition between individuals, and can improve overall stand vigor by removing less vigorous individuals. The greater the individual and stand vigor, the greater forest resistance and resilience to insect and disease outbreaks. Thinning also addresses wildfire hazards by reducing density of smaller trees in the under and mid-story (ladder fuels) and decreases the overstory canopy density. Ladder fuels can carry a surface fire into the overstory canopy. Overstory canopy density is the primary factor driving crown fire behavior. Reducing the overall number of trees and canopy density reduces the risk of crown fire in stands (Graham et al. 1999).

Forest restoration involves using uneven-aged cutting methods to conduct single tree and group selection treatments. Prescribed cutting as one of several methods that may include: free thinning, low thinning, single tree selection, group selection, or rarely even-aged regeneration methods. Prescribed cutting is a selective process, where undesirable characteristics can be selected against, and desirable characteristics can be retained or promoted. For example, prescribed cutting tactics can prescribe removal of weak, diseased, and dying individuals, or species and individuals with characteristics that are more susceptible to drought, fire, and/or insect mortality. Prescribed cutting strategies can prescribe preferential retention of disturbance resilient species, such as ponderosa pine. Prescribed cutting can allow for manipulation of species composition and stand structure, such that they promote natural disturbance regimes and ecological functions.

Recently, momentum has increased for a more holistic approach of forest restoration (Reynolds et al. 2013). Generally, the prescribed cutting methods used to accomplish restoration objectives place more emphasis on developing diversity in forest structure, age classes, and species composition akin to historic conditions. This approach generally includes selective cutting methods paired with prescribed burning, intended to develop and maintain uneven-aged forest conditions that are considered more resilient to natural disturbance, and thus more sustainable long-term. However, their extent covers only a small fraction of the landscape. Treatments are limited in part by workforce capacity and current forest plan standards that are very prescriptive, restraining management options across broad extents. The magnitude of prescribed burning accomplishments is affected by weather and other environmental factors that can be highly variable year to year, and is limited by air quality regulations, and to a lesser degree, workforce capacity and concerns over public safety and values at risk (i.e. water quality, wildlife habitat, soil productivity).

Impacts of Timber Harvest on Ecological Integrity and Species Diversity

Past management activities have altered stand structure, composition, and fire occurrence patterns on the Gila National Forest, as described in the System Drivers and Stressors chapter of this document. Current ponderosa pine and dry mixed conifer stands are overstocked, have an overabundance of shade tolerant species, and are often even-aged and multi-storied, with few examples of the historic open, fire-maintained stand conditions remaining.

Current stands contain more small trees, and fewer large trees than existed in the past, increasing the amount of ladder fuels. In each of the vegetation types described, forest fuels have accumulated from plant material that is dead and dying. Relatively drier climatic conditions and slow decomposition rates, combined with the interruption of historical fire return intervals, have resulted in large accumulations of

burnable materials. Current tree growth rates are commonly slow, and stand vigor is declining as competition for water, nutrients, and growing space has increased as a result of higher tree density. The low level of tree and stand vigor makes trees more susceptible to insect attack and disease mortality, combined with increased density of vegetation and continuity of fuels coalesces in an increased probability of severe effects from wildfire.

Timber management activities on the Gila National Forest are trending toward targeting improvements to forest structure and function. Addressing mid- and overstory conditions is critical to these restorative efforts, as this affects overstory species composition, stand structure, potential crown fire starts and spread, stand density, and influences on understory conditions. Relying on other vegetation management methods, such as understory burning, does not necessarily have the same selective capacity, especially with regards to the overstory.

Short-term negative impacts to forest soils and hydrology can be expected from timber management activities. Limited soil compaction and waterway sedimentation may occur due to disturbances from logging equipment, skidding, landings and temporary road construction, and use. These effects are typically mitigated by limiting ground-based operations to relatively gentle slopes, as well as establishing limits to extent of disturbance and proximity to riparian and/or other sensitive areas. Long-term benefits to ecosystem resilience, disturbance regime, nutrient cycling, biodiversity and food webs, old-growth condition, overall hydrologic function, wood products, and aesthetics and recreation can outweigh short-term negative impacts (Reynolds et al. 2013).

Trends Driving Supply and Demand of Timber and Special Forest Products

The supply and demand for timber is driven by regional, national, or global forces. Local drivers are smaller in scope and scale, and generally have only minor effects on the overall market for timber and lumber products. Demand for woody material from the Forest is largely driven by fuelwood needs. This demand is made evident by the proportion of volume sold as fuelwood as discussed above (Table 184). Other local demand for woody material comes from mills that generate rough cut lumber, fuelwood, and other specialty products for use in local custom-built homes. The demand for firewood by families and communities has remained stable to slightly increasing over the last five years, primarily due to higher cost of natural gas and propane delivery versus the availability of wood in close proximity to the communities the Gila NF serves.

The Forest Service recently acknowledged the critical need to increase the pace of restoration to address a variety of threats including fire, climate change, and insect and disease outbreaks (USDA FS 2012c). Across the nation and in the Southwest, there is broad public support for actively managing forests to be more resilient to these threats. In response, the Gila National Forest is generally shifting planning and implementation efforts to encompass larger landscapes. This broad recognition is piquing interest in the feasibility of commercial use of traditionally sub-merchantable materials, such as small diameter dimensional lumber and wood-based energy production for forest product business located in eastern Arizona. The Gila NF will continue to work with other Federal, State, and local government agencies, as well as non-government organizations to build facilities and markets that will use this type of material.

The near-term potential for impacts to the Forest is probably low, as the haul distance to these facilities is long. Future projects/activities in the northwest portion of the Forest (Quemado Ranger District) could provide material for eastern Arizona business. What is clear is that the Forest intends to manage National Forest System lands such that species composition, structure, and function are more akin to historical conditions, and to do so at a broad scale. This work will be completed within the agency as well

as with the assistance of partners that would include Federal, State, and local government agencies, conservation groups, businesses, and any other interested stakeholders. The Gila NF plans to work with these partners and build upon our past successes to use all available options to make more wood products available than current local manufacturing facilities can support. These options include but are not limited to the use of grants, agreements, contract options, and authorities allowed on National Forest System Lands.

Contributions of Timber and Special Forest Products to Social, Cultural, and Economic Sustainability

The Gila National Forest administers its lands for a variety of objectives that can generally be described as forest ecosystem and watershed restoration. Timber and woody material is largely derived as a byproduct of restoration and other activities. There has been a long-term historic demand for firewood, which continues to this day. The ability to access the Forest and gather firewood is very important for local communities. The Forest makes firewood available throughout the Forest as part of CFRP projects and designated areas for those with a permit to gather firewood. The ability to access the Forest and gather firewood is very important traditional use for families and communities surrounding the Forest. Often firewood gathering is a family event. The use of firewood for heating saves many families money over the cost of using utility sources for their heating.

The Forest is adjacent to the Cibola National Forest and Apache-Sitgreaves National Forests in Arizona, as well as Bureau of Land Management, state, and privately owned lands. Currently, the mill in Reserve, New Mexico employs eight people at the mill and up to ten people on timber sales. There are also approximately five active smaller mills that purchase timber to produce rough cut lumber and other forest products on a limited scale and at least seven fuelwood businesses based upon sales of permits. The number of employees in these businesses is not known and many may be self-employed businesses with no paid employees. In 2013, timber-related jobs accounted for less than one percent of private sector employment within the four counties: Catron, Sierra, Grant and Hidalgo; that the Forest is situated (Headwaters Economics 2016). Catron County has the largest percent of the total timber-related employment due to the number of permits sold and the location of these businesses.

There is a broad interest in increasing the pace of restoration activities, which may pave the way for potentially innovative wood facilities in the future. The efficient management and sustainable use of wood resources was identified as one of the Natural Resources policies within the Grant County Comprehensive Plan (2004). Sierra County identified opportunities to explore markets for harvested materials and sustainable wood product industry for wide spectrum of producers and local entrepreneurship (Sierra County 2006).

The relation of timber to the social and economic importance to Catron County are identified in the Catron County Comprehensive Plan (2007), which include:

- Per the Healthy Forest Initiative, continue to work with the US Forest Service in order to support efforts to revive the timber industry in the County with a focus on smaller diameter trees and wood products (Economic Development Goal 1; Objective 1d).
- Workforce development and training is essential for Catron County's future economic growth, especially given the lack of population. One of the biggest issues regarding business retention and attraction is the lack of training for people entering the workforce. Workforce development and training is especially important should the timber industry become viable again or to meet new opportunities such as potential growth in the construction industry.

- Targeted industries…need to be appropriate to Catron County and take into consideration existing County resources such as water and values…The following industries are reasonable for targeting for location in Catron County:
    - Specialty Retail consisting of smaller shops focusing on specific products such as woodcrafts, arts, crafts due to timber products being available.
    - Bio-Fuels due to availability of materials generated from forest projects.

Stakeholder Input

Many comments received from stakeholders were related to economic development and opportunities related to wood products. There is a desire to increase timber or wood product cutting to aid in economic development, create jobs, and establish or improve business and mill infrastructure. Employment is not just related to mills, but also crews for thinning and piling on logging operations or restoration projects reducing tree densities or reducing fuel hazards. It is felt that there needs to be more collaboration between the Forest Service and private sector to be successful.

The reduction of logging and thinning is thought to have resulted in overgrown forested areas, more fuel load to burn, and insect infestation. The lack of logging or removal of dead or dying trees resulting from fires are adding to the fire risk and more insect infestation. It is felt that there is a loss of economic opportunity by the lack of logging or cutting available materials; having fires consuming woodland and forest resources; and not harvesting burned dying trees shortly after fire events when material is still viable for use.

Comments expressed the need to have more proactive management of forests. There is a sentiment that effective tree reduction (management) would benefit communities, property owners, industry, and forest ecosystems.

Alternative opportunities were suggested for the use of smaller diameter trees, burned logs, slash material, or other products. This included such things as wood pellet or chip production or creating material for bio-generator use. Greenwood fuel wood cutting areas could be increased in size with easier accessibility and size restrictions on trees changed to promote more collection and reduction of juniper stands in grasslands.

Many comments expressed concern about the occurrence of illegal wood cutting on the Forest. Some examples of impacts identified with illegal wood cutting were damage to the land and resources from use of motor vehicles driving everywhere and cutting fences. It was articulated that there needed to be more management, restrictions, and law enforcement presence to address the concern of illegal wood cutting.

Summary

The Gila NF's primary contribution of timber and forest products is to local communities around the Forest for logs, firewood, and other forest products. An increased emphasis on land restoration projects should allow for the continued ability to contribute to this demand. The Forest should be able to continue to meet demand for the local mills which operate in or adjacent to the planning area. An increase in forest restoration projects will be vital to help sustain forest and watershed health, reduce potential for uncharacteristic wildfire, and improve or maintain wildlife habitat.

Range

Multiple use management on the Gila NF includes producing forage for wild ungulates and domestic livestock. The ranching culture and tradition in New Mexico is deeply rooted in history. The Forest Service began administering grazing on NFS lands in 1899, however rangelands were grazed long before then by earlier generations. Because settlers had utilized these lands for so long, raising livestock has become a very important part of the culture of the communities surrounding the Forest. As a result of historical use the plan area has inherited a legacy of ecological impacts from high numbers of livestock. As the majority of land ownership in the assessment area is either federal or state, many ranching operations still rely on public lands for livestock grazing. Maintaining the sustainability of ecological resources is important for sustaining this social, cultural and economic benefit for local communities. This section identifies and evaluates:

- Ecosystem services derived from grazing multiple use
- Current grazing and trends on the Gila National Forest
- Range condition and trends on the Forest
- Capability and productivity to support grazing
- Impacts of livestock grazing on ecological integrity and species diversity
- Contributions of livestock grazing to social, cultural, and economic sustainability
- Summary of rangeland and livestock grazing on the Gila National Forest

Ecosystem Services

Rangelands on the Gila NF provide a variety of benefits to local communities. Forage produced on rangelands has sustained ranching operations for generations; some of which would not remain viable without access to public grazing land. Not only does grazing generate income for the ranching families, but it also benefits the local economy by producing food and other products, providing local jobs, and commerce to local businesses for goods and services needed locally to manage livestock/ranching operations. Rangelands sustain cultures and traditions by contributing to the historical western way of life, and connect future generations to the land and livestock. Rangelands provide open space and opportunities for recreational activities such as picnicking, hiking, biking, OHV and horseback riding, hunting, etc. In addition, range improvements such as water developments benefit different species of wildlife.

Current Level and Trends

Currently 2.6 million acres of the 3.3 million acres of the Gila National Forest are managed for livestock grazing. As of March 2016, there were 138 active grazing allotments, 11 vacant (included in the active allotments) and 3 closed allotments on the Forest, all of which are administered by six different ranger districts (Table 185). Vacant allotments are included in the active allotments because they can be used as relief allotments, on an “as needed” basis by a valid permit holder. This case may occur as an adaptive management response to address resource concerns such as fire or drought.

For administrative purposes of livestock management, there are three units identified for distinct purposes:

1. **Head month (HM)** is a month’s use and occupancy of rangeland by one weaned or adult cow, bull, steer, heifer, horse, burro, or mule, or five sheep or five goats. Head months are used for grazing fee calculation and collection purposes.
2. **Permitted numbers** represent the total number of livestock pairs or individuals permitted on a given grazing allotment.

3. **Authorized numbers** are expressed in head months and represent the year to year actual stocking on the allotment, based on forage and water availability, condition of range improvements, climatic conditions, personal convenience for the permittee, or resource protection non-use.

Permittees or the Forest may place an allotment or their permitted numbers into partial or total non-use for either personal convenience (3 year limit), or for resource protection (longer term non-use associated with a Memorandum of Understanding between the permittee and the Forest). There are currently 13 allotments that have been placed in long-term non-use for resource protection due to circumstances such as drought, and/or inadequate infrastructure (i.e., fences, water sources, corrals) (Table 185). During the past 10 years, authorized numbers have been below those permitted, mostly due to adaptive management responses to drought (Figure 187).

Table 185. Grazing allotments on the Gila National Forest by ranger district (2016).

Status / District	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
Active [1]	19	27	29	11	21	31
Vacant [2]	1	1	3	2	1	3
Non-use [3]	3	0	0	6	0	4
Closed [4]	0	0	0	0	0	3
Total Allotments	**23**	**28**	**32**	**19**	**22**	**41**

[1] Active includes long term non-use & vacant

[2] Vacant may be used as a grass bank

[3] Long term non-use for resource protection or infrastructure needs

[4] Closed is closed by NEPA Decision

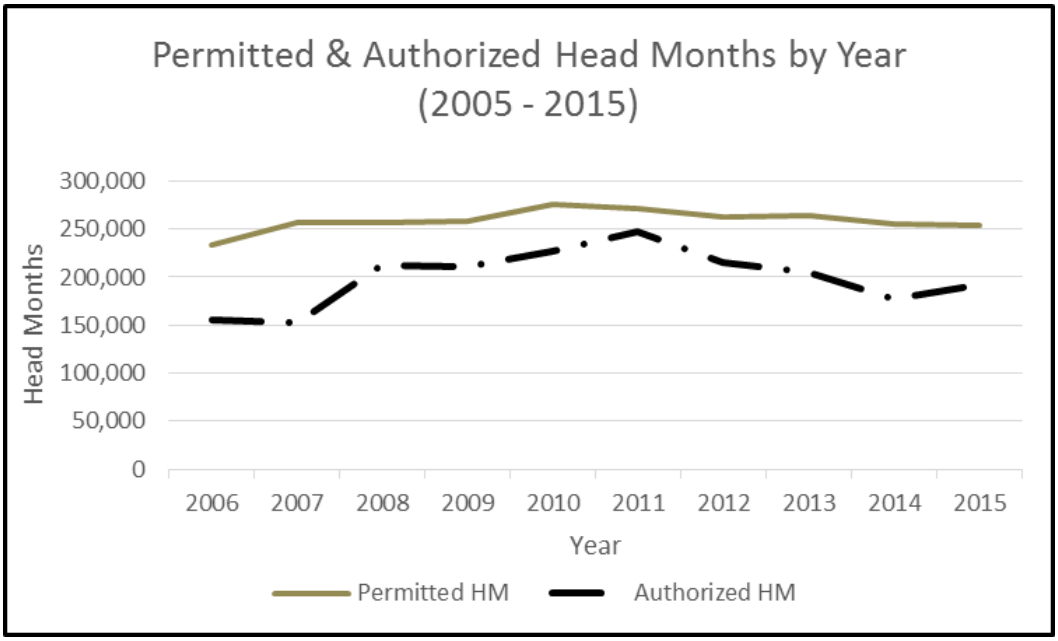


Figure 187. Permitted and authorized livestock head months (HM) on the Gila National Forest 2005-2015. Source: USFS Gila NF 2016b

Grazing Management

Management direction under the current Gila Land Management Plan (USDA FS Gila NF 1986) states:

- Provide forage to the extent benefits are commensurate with costs without impairing land productivity and within the constraints of social needs.
- Provide cooperation with other agencies and private range landowners to reduce impacts of livestock grazing.
- Identify and manage areas that contain threatened and endangered species of plants.

Grazing management for specific grazing allotments is determined through completion of the NEPA range analysis process under FSH 2209.13 – Chapter 90 Rangeland Management Decision-making. The Gila NF is continuing to work through a schedule for range analysis and preparing to initiate reviews of older decisions in accordance with NEPA. Current grazing management includes adaptive management strategies which is a system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or re-evaluated. This allows management flexibility within the NEPA decision, such as changes in livestock number, season or length of use in response to variable resource or climatic conditions.

Range Condition

Range condition can be described as the "state of health" of the range. More specifically, range condition is an ecological measure of the current condition of the range as compared to the potential (often called "climax") (McGinty and White 2016). The Gila National Forest Land Management Plan (USDA FS Gila NF 1986) states "Range condition as evaluated and ranked by the Forest Service is a subjective expression of the status or health of the vegetation and soil relative to their combined potential to produce a sound and stable biotic community. Soundness and stability are evaluated relative to a standard that encompasses the composition, density, and vigor of the vegetation and physical characteristics of the soil." Range condition is evaluated for each allotment on the Forest through the project to plan analysis under the guidance of FSH 2209.13, Grazing Permit Administration Handbook, Ch. 90 Rangeland Management Decision Making.

Historical

Livestock grazing was introduced in the Southwest in the late 16th century by the Spanish and included cattle, horses, goats and sheep. Pueblos and Spanish-American villages practiced year-long grazing in the tradition of open range for several hundred years. By the early 1800s Spanish-Americans had developed large cattle herds in New Mexico. After 1870, the cattle industry expanded. It is estimated that on New Mexico rangelands there were 158,000 cattle in 1870 and 1,065,000 in 1886. Range conditions deteriorated and following the drought of 1886, thousands of cattle starved. This drought, range deterioration and competition for grazing lands brought about the fencing of private rangelands. Open-range grazing ended on all but Federal lands. By 1900, there were so many livestock on public lands that evidence of degradation was apparent even in "good" years (Baker et al. 1988).

The 1905 USGS report included a description of range conditions across the Forest. In the vicinity of the T Bar Grasslands, the report documents the grazing of sheep had produced "a barren desert, not a blade of grass to be seen and even the roots being entirely destroyed." Conditions were similar, "but not so bad" over much of the Forest. The area around the East Fork Gila River and the Black Mountains was an exception, which Rixon described as having "a fine growth of grass" (Rixon 1905).

Based on decadal averages, from 1910 to 1960, livestock grazing on the Gila National Forest was reduced by 64 percent. Sheep and goat numbers began to decline and no longer grazed the Forest after the 1970s,

although most of these animals were taken off the Forest long before. During the 1930s, many watershed structures were installed across the Forest in attempts to control gully and rill erosion. Many non-native perennial species were seeded in association with those structures to assist in stabilizing the soil. Most of these structures were never properly maintained for long and are either at capacity or otherwise non-functional.

Current Range Conditions

Range condition long term trend monitoring has occurred on the Forest since the 1950s, when the first transects were established using the Parker Three Step method. The majority of grazing allotments have undergone range analysis that determines overall range condition, directly relating to estimated capacity, permitted numbers, season of use, and grazing management. Many of these decisions date back to the mid and late 1990s. The Forest is scheduled to complete NEPA analysis on all allotments by 2025.

Range condition on the Gila NF is for the most part determined by using the Parker 3 step method which involves collecting data related to plant composition and vigor, and soil characteristics; then determining a "condition class" and trend to the specific area. These condition classes include very poor, poor, fair, good and excellent ratings and are associated with a trend of upward, downward or stable.

After centuries of grazing, overall rangeland conditions on the Forest have improved substantially over the past several decades. Review of past and current range analysis, photo records and personal communication with district range and Forest staff, indicate most rangeland areas within the plan area are in "fair" to "good condition" with stable to upward trends. There also remains some areas within the Forest that reflect "poor" conditions. However, as mentioned above, many allotments on the Forest are in need of NEPA review to evaluate new information.

In addition to long term trend analysis and professional judgement, other indications of range condition can be inferred from riparian assessments such as Proper Functioning Condition, Watershed Condition Assessments and annual implementation monitoring outcomes for forage utilization, and overall grazing management compliance.

Riparian Areas

Streams on the Gila NF provide essential habitat for many aquatic, terrestrial and riparian species, and in some cases water for livestock. Some riparian areas on the Gila NF are inaccessible to livestock due to natural barriers (topography), or excluded by fencing due to resource concerns (see Systems and Drivers Chapter for more details). Regardless of accessibility, streams are evaluated during range analysis using the Proper Functioning Condition protocol (Prichard et al. 1998). These assessments are accomplished during the range analysis process. Overall, these assessments depict improving trends across the Forest's riparian areas (personal communication, M. Natharius). Please refer to the Chapter 7 Riparian for more information about riparian conditions and functions.

Watershed Condition Framework/Classification As An Indicator of Range Condition

The Watershed Condition Framework (USDA FS 2004, FSM 25231.1) also gives us information about range condition, as several of the indicators relate directly to rangeland vegetation condition and the presence of invasive species. This classification uses 12 core national indicators to describe overall watershed health and function, three of which are informative for range condition: rangeland vegetation, invasive species and soil condition. These three indicators for the 6th code watersheds assessed showed functioning at risk (70%), and functioning properly (23%) for rangeland vegetation; functioning properly (99%) for invasive species; and functioning at risk (46%) and functioning properly (32%) for soil conditions. This framework is discussed in more detail within the Water Chapter.

Although the indications of historic overgrazing cannot be reversed, adaptive management strategies have led to improved range condition in some areas, stabilized trend in others, and the identification of those areas still in poor condition. Monitoring data continues to accumulate, and the prospects are good for adaptive management to lead to further improvement even in the face of climate change.

Stressors to Rangelands and Grazing

Drought/Climate Change

Livestock ranching operations manage millions of acres of US rangeland ecosystems. These operations produce food and are increasingly important for providing ecosystem services as more rangelands are permanently converted to development. Droughts like the one that began in 2011 and affected huge areas of the central and western US can trigger undesirable ecological changes in rangelands, reduce livestock production and provision of ecosystem services and threaten ranching livelihoods (Kachergis et al. 2014).

In 2015, the Forest Service Southwestern Region prepared the Climate Change Vulnerability Assessment (CCVA) for the Gila NF (Triepke 2015). This is an ecosystem-based vulnerability assessment for all major upland ecosystems (Ecological Response Units) in Arizona and New Mexico based on the anticipated effects of climate change. Four vulnerability categories are reported: low, moderate, high and very high. These categories are accompanied by uncertainty categories to account for difference in climate model predictions and are also reflected as low, moderate, high and very high. This assessment describes the relative susceptibility of an ecological type conversion. Overall, the Forest falls into the moderate vulnerability and uncertainty categories. Given these predictions, rangeland managers must stay judicious in providing for flexibility in managing rangelands (e.g. ability to use multiple management options/adaptive management) for drought, which is imperative to ranching operations and range ecosystem sustainability. Please refer to the Drivers and Stressors section of this document for more information about the CCVA.

Although livestock managers have historically dealt with drought conditions (e.g. Dust Bowl year of the 1930s, the mid 1950s drought and the 1988 drought), current efforts associated with the dry years of the early 21st century demonstrate that there is a need for adaptive management to increase resiliency of the rangeland vegetation and sustainability of rural communities and economies. Adaptive management necessitates that 1) adjustments are made when temporally appropriate (both within and across years), 2) experiential and experimental knowledges blended to provide sufficient capacity for flexibility with predicted long-term droughts that are more intense/severe, as well as “flash” droughts like the one experienced across a wide swath of the US in 2013 and 3) spatial and temporal variability are embraced rather than looked at as negatives. Key for livestock managers is how to increase flexibility in management to adapt to increasing weather variability associated with a changing climate (Derner 2015).

Invasive Species

Invasive plant species within the Gila NF are not well established across the landscape when compared to other western United States National Forests. However, disturbances such as fire, drought, vehicle travel, herbivory and possible adjacent land owner infestations increase the risk of invasive species introduction, establishment and spread on rangelands. The majority of invasive species are unpalatable to livestock and their presence reduces the overall quantity and quality of palatable forage to sustain livestock. When established, invasive species disrupt the structure and stability of native plant communities, degrades native wildlife habitat by out competing and replacing native plant species,

changes soil characteristics, all of which threaten overall rangeland ecosystem health. For more details refer to the System Drivers and Stressors chapter.

Management Challenges for Rangelands and Grazing

Fire Effects to Grazing

Wildfire, managed fire and prescribed fire, can provide long term benefits to maintaining the ecological integrity of grasslands and preventing woody species encroachment. However, fire management activities do pose short-term management challenges for rangeland managers and livestock operators. These challenges often include the need to rest areas from grazing after fire to provide forage recovery, which can cause the permittee to change pasture rotations, find other allotments to graze, or move livestock off the National forest to deeded land.

Threatened & Endangered Species

The presence of species listed as threatened or endangered under the Endangered Species Act can also present management challenges for managers and operators on many allotments in the Gila NF. The presence of listed fish species in some cases restricts watering areas for cattle or requires fencing and related fence maintenance. Mexican wolf-livestock conflicts and depredations are a major concern to permittees. Depredations, managing around den or rendezvous areas increases the intensity and cost of livestock management.

Capability and Productivity of the GNF

The Gila has supported public grazing for many years. As stated above, livestock numbers have been greatly reduced since the early 1900s. The past 20 years have seen minor fluxes in authorized grazing use mostly due to drought and/or personal convenience non-use. Summaries from range analysis and professional judgement depict an upward trend in range condition overall; utilization monitoring in general is within or below established utilization standards, other than in isolated areas; and other range assessments such as upward trends in riparian conditions indicate that the Forest is capable of supporting livestock grazing. These observations combined with adaptive management strategies that allows grazing management to respond to changing resource or climatic conditions, further demonstrates that the Gila NF rangelands are able to provide the needed forage and resource productivity to support public grazing as a multiple use.

Impacts of grazing on Ecological Integrity and Species Diversity

Impacts from unmanaged livestock grazing can result in adverse impacts on ecological integrity and species diversity. The effects of poor grazing management are well documented. Fleischner (1994) identified the ecological cost of livestock grazing as loss of biodiversity; reduced population densities for a wide variety of taxa; disruption of ecosystem functions, including nutrient cycling and succession; changes in community organization; and change in the physical characteristics of both aquatic and terrestrial habitats.

According to Holechek et al. (2010), heavy stocking (51%-60% utilization) consistently caused a downward trend in ecological condition, light stocking (0%-30% utilization) caused an upward trend, and a slight improvement occurred under moderate stocking (41%-50%). “Conservative” grazing is defined by Holecheck et al. 2000, as a level of grazing between light and moderate which optimizes ranching risk, financial returns, vegetation productivity, and livestock productivity. This equates to an average of 35% utilization (range of 31%-40% utilization). In order to promote upward trend in range condition, this conservative level is the standard adhered to on the majority of the grazing allotments administered by

the Gila NF. In addition, the presence of livestock on the rangelands can result in positive outcomes such as invasive plant detection, reduction of fine fuels (decadent grasses and forbs), and supplementary water developments in uplands that benefit wildlife.

Competition for forage between livestock and elk is an ongoing concern for livestock producers within the plan area. Livestock grazing has been considered detrimental to wildlife; however, livestock grazing and diverse and productive wildlife populations can coexist provided good management is in place for all species. It is difficult to generalize the impact of livestock grazing on wildlife because of the uniqueness of each grazing situation and varying habitat requirements of different wildlife species. Improperly managed grazing of livestock, or wildlife can have negative impacts to ecological integrity and species diversity. This would include poor distribution, grazing numbers above ecological capacity, and over populated wildlife. However, there are potential benefits to wildlife habitat from managed livestock grazing. Livestock grazing can improve forage quality by removing coarse grasses and allowing for nutrient-rich regrowth (NMSU 2016). According to Vavra (2005), managed livestock grazing programs, have the potential to maintain habitat diversity and quality for wildlife. In addition, the indirect advantages of livestock on the landscape include additional water developments and invasive species detection.

According to Westoby et al. (1989), "Vegetation changes occur as a result of many factors other than grazing, and disturbance is a natural feature of plant communities. Grazing is not necessarily a primary driver of vegetation change and even when grazing has been the cause of vegetation change, current levels of grazing may be inconsequential and even completely removing grazing will not always result in return to historical conditions." Within the Gila NF, areas of forage reduction (i.e., denser forests, infill, meadow encroachment); poor distribution of livestock for various reasons and lack of water in upland areas during drought periods are the primary reasons for localized overgrazing of both terrestrial and riparian habitats.

Although the legacies of historic overgrazing cannot always be reversed, more intense management and adaptive management strategies have led to improved range condition in some areas, and stabilized trend in others. With ongoing range analysis and new monitoring technologies, the prospects are good for adaptive management to lead to further improvement of rangeland ecosystems as a whole. See System Drivers and Stressors Chapter for more information.

Contributions of grazing in the plan area to Social, Economic, and Ecological Sustainability (on Forest and in outlying communities)

Grazing plays an important role in the local area economy. The Gila National Forest grazing program contributes approximately 434 jobs, $5.5 million in labor income, and $34 million in total output to the four-county area (see Chapter 10 Social, Cultural, and Economic Conditions). These jobs and income are not only from direct grazing activities such as ranching, but also include indirect effects. For instance, when a rancher purchases machinery, veterinary services, or groceries, these economic contributions also occur. See Social, Cultural and Economic Conditions chapter for more details of economics in the plan area.

Almost all ranching operations in New Mexico are family businesses, and also the socio-economic baseline for many communities in the state (Table 186). There are approximately 6,800 beef and sheep producers in New Mexico. Among the beef producers, approximately 67% own less than 50 head of cows. However, there are nearly 200 ranches that have greater than 500 head. Ranching has been a

relatively stable economic and cultural foundation for the majority of New Mexico communities (NMSU 2016).

Table 186. Number of cattle, farm and ranches, and cash receipts from cattle/calve production from the New Mexico Agricultural Statistics (2012-2014) for New Mexico and counties which include the Gila National Forest (USDA 2014).

	Cattle Number	Farm & Ranches	Cash Receipts from cattle/calves ($1000's)
New Mexico	1,340,000	24,721	$1,092,753
Catron County	26,000	351	$21,203
Grant County	26,500	407	$21,610
Hidalgo County	26,500	171	$21,610
Sierra County	18,600	256	$15,168
Total	**97,600 (7.3%)**	**1,185 (4.8%)**	**$79,591 (7.3%)**

Note: Values shown in ( ) are percent of the four counties in relation to entire state values.

Ranching historically has been a part of the base traditional social and economic structure of the counties encompassing the Forest. Maintaining and protecting the traditions of ranching and associated economic contributions to families, communities, and counties is important to all of the counties encompassing the Forest (Grant County 2004, Sierra County 2006, Catron County 2007; Hidalgo County 2011). Ranching provides an opportunity for Catron County (2007) and Sierra County (2006) to consider an existing resource within the Counties to potentially develop a tourism industry related to the life of a cowboy by driving cattle, building fence, or branding.

The Gila National Forest has one of the largest grazing programs in Southwestern Region. Since a substantial amount of the four county assessment area is federal land (see Lands Chapter), grazing on federal land is vital to the economic sustainability of the surrounding communities of the Gila NF. Many members of rural communities have historical ties to ranching, and many families continue to carry on this profession both for livelihood and to retain cultural/traditional values. Ranching is a long-term commitment of investment capital and personal devotion that also provides economic stability to the State of New Mexico.

Stakeholder Input

There are often many points of view regarding grazing cattle on the Forest. One is to graze more cattle, including sheep, goats, and horses; and another is to vacate all or some allotments and rest the land. There are also those who want to continue managed cattle grazing but have protection and improvement of resources, including streams, riparian habitat, watershed condition, and grasslands.

It is a concern that past reduction of cattle numbers has impacted the lifestyle and tradition of ranching for families and contributed to the loss of revenue to both ranchers and counties. Overall there is desire to graze more and improve economic revenue.

The capacity to graze livestock is impacted by encroachment of juniper and piñon pine tree species grasslands on the Gila NF. The reduction in the availability of grass is impacting both cattle and wild game including elk. It was suggested to utilize livestock in improving ecosystems by allowing grazing to assist in the reduction of grass, brush height, and density therefore reducing fuel loading. There were concerns expressed that elk are contributing to impacts to resources and contributing to the reduction of livestock numbers. Comments expressed the need for the Forest Service and New Mexico Department of Game and Fish do more coordination and work on a grazing management plan to manage forage, wildlife numbers, and cattle.

Regulations, including NEPA, threatened and endangered species, and cultural clearances are seen as too stringent or restricting and time consuming, impacting the permittee and management of livestock on the ground. There are concerns that changes cannot be made to management decisions until new NEPA is completed, which may be a long time to wait. There is a sentiment that allotment permittees, especially long-term permittees, should be listened to and allowed to manage the livestock because they have more knowledge about the area.

Other concerns are the impacts of feral cattle affecting riparian habitat and the lack of action to address the problem.

Water

This section briefly describes the water resources, uses and trends on the Gila National Forest and surrounding counties, in addition to looking at the contribution of water resources to social and economics. Aquatic ecosystems provide a variety of ecosystem services and economic benefits to society, ranging from products such as safe drinking water to healthy and abundant fish populations that provide food and recreational opportunities (USDA FS 2012d).

Water Resources and Uses

Water resources on the Forest include streams, wetlands, riparian areas, lakes, ponds, reservoirs, and numerous stock ponds and tanks. Most of these resources are used for consumptive purposes such as livestock watering, drinking water, and agriculture or irrigation; while some provide recreational, fishing, wildlife viewing, or other opportunities of use and enjoyment. Water originating on the Forest flows southwest into the Gila River basin; northwest into the Little Colorado River, east into the Rio Grande, and southeast into the Rio Grande basin.

Approximately 957 miles of perennial streams and 546 miles of intermittent streams are within the Forest boundary. There are 30 acequias (irrigation ditches) which rely upon water diverted from some of these stream systems that are permitted by the Gila National Forest. In 2011, the New Mexico Environmental Department, Surface Water Quality Bureau, designated all perennial rivers and streams located in wilderness areas as outstanding national resource waters (eighty streams ~368 miles) that would be beneficial to the State of New Mexico and contribute to special trout waters or other area designation, or have exceptional recreational or ecological significance. These specially designated waters within the State are given the highest level of protection against degradation.

The Forest manages one lagoon wastewater system near the Gila Cliff Dwellings National Monument which receives all sewage pumped from the nearby area (vault toilets, RV dumps, etc.), and multiple leach field / septic type wastewater systems. There are estimated 2,369 earthen tanks on the Forest for livestock and 344 wells, most of which provide water for livestock and wildlife. Fifteen of the wells provide water for Forest recreation and administration facilities.

Surface and groundwater withdrawals supply water for various uses across the four counties in which the Forest is located. The main water use in Catron, Grant, Hidalgo and Sierra Counties is irrigation for agriculture purposes (Longworth et al. 2013). Other water uses include livestock, public water supply, mining, commercial, and domestic uses. Water is important in supporting current and future economic development in the counties, but also sustaining and supporting communities including future development and population growth.

Climate change is increasing hydrologic uncertainty and may reduce available supplies and increase demands (USDA FS 2012d). The assessment of the larger Southwest is likely to face the challenge of bringing water demand more in balance with water supply. The projected levels of vulnerability suggest that drier areas will continue to experience pressures to mine groundwater and deplete streamflow (USDA FS 2012d). The Water Chapter provides more detail pertaining to the ecological aspects of impacts and trends of water resources in the plan area and the broader landscape.

Lake Roberts, Quemado Lake, Bear Canyon, Bill Evans Lake, and Snow Lake are waterbodies included in New Mexico Department of Game and Fish, Wildlife Management Areas program. Fishing is the main management purpose of these lakes, but also provide opportunities for such things as wildlife viewing, photography, and hiking. These lakes are located within or adjacent to the Forest. In Sierra County, Caballo Lake and Elephant Butte, which are part of the Rio Grande, are managed by New Mexico State Parks and provide fishing and other water related recreational activities. Bill Evans Lake, Caballo Lake, and Elephant

Butte not only provide recreational opportunities, but are also part of water conveyance systems for other consumptive uses such as mining, irrigation, municipal, and industrial.

Wildlife, Fish, and Plants

The Gila National Forest is rich in wildlife, plants, trees, and other resources that are enjoyed by people in a variety of ways. Based on the 2011 National Visitor Use Monitoring report, *viewing wildlife* (57%) and *hunting* (20%) were near the top of the list of activities that Forest visitors participated in (USDA FS 2011). *Fishing* and *gathering forest products* were also identified activities, but participation levels were lower, 11% and 4% respectively. When visitors were asked to identify their primary activity or purpose of visiting the Forest, *hiking/walking* (21%), *hunting* (20%) and *viewing natural features* (12%) were the top three activities. *Fishing* and *viewing wildlife* were in the top ten primary activities listed (USDA FS 2011).

Wildlife, fish, and plant resources have long been used for practical uses such as food, clothing, and tools, as well as for economic purposes such as trading or providing goods. Over the past several decades, there has been a shift in the way people regard the values and uses of natural resources. The change is tied to diversifying to other services including ecotourism, wildlife viewing, outdoor recreation, cultural or spiritual inspiration, and ecosystem function and health.

This section will cover the more common hunting and fishing species; forest products; and wildlife viewing in relation to condition and trends; impacts to ecological integrity and species diversity; and social and economic contributions.

Condition and Trend of Commonly Hunted Species

The Gila National Forest provides habitat for a wide variety of wildlife species and is a popular hunting destination. Many of the species managed by the New Mexico Department of Game and Fish for hunting and trapping can be found within the Forest boundary or on adjoining lands.

Elk – Elk use a variety of different habitat types. They typically utilize higher elevation meadows and forest with grass understories in the summer and migrate to lower elevation piñon-juniper woodlands and shrub lands in the winter. Elk forage predominately on grass, but rely on denser areas of shrubs and trees for cover. Elk are common species in the Gila National Forest (USDA FS 2008b). Elk herds statewide are stable with some regional differences. Populations statewide are estimated to be between 70,000 and 90,000 (NMDGF 2015b). Population within the Greater Gila Elk Herd, which encompasses the majority of the Gila NF in Game Management Units 15 and 16A-16E, is estimated between 20,700 – 21,900 animals (NMDGF 2014a). Within the Greater Gila Elk Herd, population trend appears to be stable.

Mule Deer – Mule deer are statewide in distribution and occupy most habitats. Populations have declined throughout New Mexico in recent decades. New Mexico Department of Game and Fish has identified the mule deer as a "Species of Greatest Conservation Need" due to habitat loss, habitat fragmentation, ecological succession, and drought impacts to populations (NMDGF 2006). The statewide population is estimated at 90,000 to 110,000 (NMDGF 2015b). New Mexico's climate and weather patterns are extremely important to deer survival. Periods of significant rainfall produce ample forage and vegetative cover, which improves fawn survival. However, harsh winters or prolonged periods of drought can have devastating effects on fawn survival and overall deer numbers. Other limiting factors are changes in habitat composition, lack of water, predation, and competition with other species.

On the Forest, mountain mahogany and oak are important nutritional forage species for mule deer. Low lying shrubs or branches and regeneration of new growth of these browse species is decreasing due to mixed mountain mahogany shrublands and ponderosa pine evergreen oak woodlands moving towards more tree dominated cover versus a mosaic of shrubs and trees (See Upland Vegetation chapter for more details). Fire historically maintained vegetation types in a mosaic of differing seral stages (USDA FS Gila NF

2012). Past management activities including wildfire suppression have contributed to a decrease in browse for mule deer.

Winter surveys conducted from 1987-2011 indicate that mule deer numbers on the Gila National Forest vary widely and parallel fluctuations seen at the state level. During the 1990s, fawn to doe ratios were very poor which corresponded with the decrease in deer populations. In the 2000s, fawn to doe ratios increased, but populations were so low that the increased recruitment only led to a small change in the overall population. Recent observations show a slight decline due to poor recruitment related to drought conditions (USDA FS Gila NF 2012).

Pronghorn – Pronghorn are inhabitants of plains and meadows of short grass from the deserts to the grasslands of the high plateaus up to the piñon-juniper zone. They prefer areas of grasses and scattered shrubs or dissected hills or mesas (BISON-M 2016). New Mexico's pronghorn population has declined in recent years because of habitat loss due to woody species encroachment, fire suppression, predation, fencing, and drought. Pronghorn are fairly common on the Gila National Forest (USDA FS 2008b). The regional and national population trends have generally been increasing (USDA FS Gila NF 2012). The population statewide is estimated at 40,000 to 45,000 (NMDGF 2015b).

Black Bear – Black bears are typically found in nearly all forested habitat types including mixed conifer, ponderosa pine, piñon/juniper, oak woodland, and spruce fir (BISON -M 2016). They typically feed on mid-seral fruit-producing shrubs and plentiful grasses and forbs (BISON-M 2016). Black bears have been identified by New Mexico Department of Game and Fish as a "Species of Greatest Conservation Need" and threats to the species include habitat conversion/loss, drought, and human conflicts (NMDGF 2006). Black Bears are a common species in the Gila National Forest (USDA FS 2008b). The population statewide is estimated at 8,000 to 9,000 (NMDGF 2015b).

Mountain Lion – Mountain lions are a wide-ranging species and can be found in a variety of habitat types. In New Mexico, they are found in areas of abundant prey, rough terrain, and adequate vegetation to provide hunting cover (NMDGF 2011). Deer are considered their staple diet (NMDGF 2011), therefore trends in deer populations may affect mountain lions. Although not often seen due to their secretive behavior, mountain lions are a fairly common species in the Gila National Forest (USDA FS 2008b). The population statewide is estimated at 3,123 to 4,269 (NMDGF 2015b).

Condition and Trend of Commonly Fished Species

The majority of the stream and lake fishing opportunities in the southwest corner of New Mexico are found within the Gila National Forest and the New Mexico State Parks along the Rio Grande (http://www.wildlife.state.nm.us/download/fishing/maps/New-Mexico-Public-Fishing-Waters-Map.pdf). There are opportunities for either or both cold (e.g. trout) and warm water (e.g. bass) species.

In 2015, the New Mexico Department of Game and Fish stocked across the state more than 3.5 million triploid rainbow trout and more than 500,000 each of channel catfish, Rio Grande cutthroat trout and striped bass. To a smaller degree, largemouth and smallmouth bass, Gila trout, bluegills, and tiger muskie were stocked (NMDGF 2015b). The stocking program allows for the persistence of these species to occur throughout the plan area, and provides the availability of angling in these areas. The stocking and management of the state's streams and lakes/reservoirs is outlined in the 2016 Statewide Fisheries Management Plan (NMDGF 2016a).

Special Trout Water Fishing

The New Mexico Game and Fish Department ceased stocking nonnative rainbow trout in streams and rivers within the Gila Watershed in the early 2000s due to conflicts with native fish populations but continues to stock rainbow trout seasonally in lakes. Gila trout are listed as threatened under the federal

Endangered Species Act and the New Mexico Wildlife Conservation Act. Restoration efforts are ongoing to recover the species within its historical habitat. Many of the streams that had populations of wild Gila Trout on the Forest experienced severe resource damages from wildfires which negatively affected Gila Trout populations. Currently, there are two wild populations of Gila trout that are open to angling in New Mexico: a segment of Mogollon Creek within the Gila Wilderness and a segment of Black Canyon extending from FSR 150 into the Aldo Leopold Wilderness.

The population of Gila trout in Mogollon Creek is in good condition. The Black Canyon population was impacted by the 2013 Silver Fire and subsequent flooding. Habitat conditions are beginning to rebound. In 2015, over 3,500 Gila trout, 4" in length, were stocked throughout Black Canyon, with an additional 1,105, 6" in length, being stocked in March 2016.

There are also opportunities to fish for stocked Gila trout. Gila trout are stocked in Sapillo Creek below the Highway 15 bridge, Willow Creek, West Fork of the Gila River, Gila Forks area, and Lake Roberts. Trout populations in Willow Creek were eliminated by the 2012 Whitewater Baldy Fire and subsequent flooding. Approximately 19,000 Gila trout have been stocked in these streams and lake between 2014 and 2016 (NMDGF 2016d). Recovery efforts for the native Gila Trout could lead to reductions in the ability to fish for non-native trout species in some waters, but would increase angling opportunities for the Gila Trout over time as the population increases.

Tiger Muskie

Tiger muskie are a sterile hybrid (i.e. cannot produce fertile offspring) between northern pike and muskellunge. Approximately 147,000 tiger muskie fry and fingerlings were planted in Quemado Lake between 2003 and 2012 as a biological control to assist with reducing goldfish numbers. Goldfish were estimated to be in excess of 70,000 mature fish in 1999 contributing to the decline of trout population in Quemado Lake. The 2014 population estimate of tiger muskie in Quemado Lake was 639 fish. Population continues to be stable and surveys show the fish to have good condition indices and size distribution (NMDGF 2014b). Currently the daily bag and possession limits allow one tiger muskie 40 inches or longer to be taken at Quemado Lake.

The introduction of tiger muskie assisted in reaching fishery management goals in Quemado Lake. Goldfish numbers have been drastically reduced and rainbow trout numbers have stabilized. A survey in 2014 gives indication that rainbow trout have improved in health and range in size from 7 to 18 inches (NMDGF 2014b). The angling opportunities in Quemado Lake has been enhanced with the improvement in conditions for rainbow trout and the addition of tiger muskie. The challenge for management is maintaining the balance of the number of tiger muskie to continue providing control over unwanted fish, providing the unique angling experience for tiger muskie, and maintaining or expanding other angling opportunities including trout in the lake (NMDGF 2016a).

Habitat Stamp Program

The New Mexico Habitat Stamp Program is a joint venture between sportsmen, the New Mexico Department of Game and Fish, the Bureau of Land Management, and the U.S. Forest Service implemented under authority of the Sikes Act (16 U.S.C. 670a) and the New Mexico State Game Commission. Since statewide implementation in 1991, all licensed hunters, anglers, and trappers are required to purchase the $5.00 Habitat Stamp, if they will be hunting or fishing on federal lands, in addition to the normal license. Revenue is dedicated to wildlife conservation and rehabilitation projects on public lands within the state of New Mexico.

The Gila National Forest has been receiving an average of $115,000 per year to assist with project implementation including contracts for work or other services. Projects on the Forest include development and maintenance of water sources, road access, fencing, and aquatic and terrestrial habitat

improvements. In the last four years, wildlife habitat projects have included restoration of grasslands for pronghorn and thinning and/or burning to stimulate grasses, forbs, and browse for deer.

Condition and Trend of Commonly Used Plant Species

The collection of various plant species for pigments, medicine, food, tools, and building structures in and around the Forest has been a traditional and cultural practice for many generations. These resources have been and continue to be of Tribal importance (see Tribal Areas of Importance Chapter 18).

The Gila National Forest provides opportunities for the gathering of various plant species for personal and commercial uses. Some of the products currently permitted on the Forest are: Christmas trees, fuelwood, piñon nuts, pine cones, house logs, vigas, poles, posts, stays, and wildings. The most common activities are the collection of:

Piñon nuts – Piñon nuts or seeds have been a key dietary staple to people of the southwest and are still a popular food item available both in grocery stores and at road-side stands. The piñon is a source of pride with the piñon tree being New Mexico's state tree and that the New Mexico legislature in 1978 passed the Piñon Nut Act that required labeling standards on products and instituted genetic research for piñon in the state.

The public may gather piñon for personal use without a permit. Those interested in harvesting for commercial use (harvest more than 25 pounds of nuts) must obtain a permit from the Forest Service. Piñon nuts take approximately two years to mature on the tree, so production amounts can be greatly influenced by drought and rainfall patterns. During the past decade, the southwest has been in drought conditions, which has been impacting the health and resistance of the trees and subsequently the seed production.

Firewood – Firewood gathering is important to many people who live within or adjacent to the Gila National Forest. For some, it is part of their heritage and tradition and for some it is an important fuel for winter heating. Many communities rely on fuelwood for economic well-being. Approximately 46% of the housing units in Catron County rely on wood as the primary heating fuel. In Grant, Hidalgo, and Sierra Counties, approximately 5 to 20% of the housing units use wood for heat (U.S. Census Bureau 2000b). Commercial and personal firewood permits are issued on the Forest. A firewood permit on the Gila National Forest allows the gathering of two cords of wood. From 2011 to 2015, issuance of permits for fuelwood ranged from 2,107 to 2,503, averaging 2,316 permits per year. The Forest has been and will continue to utilize commercial and personal gathering of fuelwood as a tool for assisting in implementing vegetation treatment projects.

Christmas trees – Christmas tree cutting is a popular winter pastime for many. The following species are commonly collected: piñon pine, juniper, ponderosa pine, Douglas fir, white fir, and Engelmann spruce. A Christmas tree tag or permit is required for each tree. The public is asked to cut trees as close to the ground as possible and to not just take the tops of trees. The Forest averages approximately 1,100 permits per year.

Wildlife Viewing Opportunities

Wildlife viewing or watching refers to individuals or groups whose primary interest or purpose is viewing of wildlife around their homes or at another location at least 1 mile from their home of natural settings. Activities include such things observing, trying to identify birds or other wildlife, or photography. Around the home it can include creating and maintaining natural areas; planting shrubs, flowers, etc. that benefit wildlife; and putting out feeders for birds, hummingbirds, or wildlife.

Bird Watching Locations

Southwestern New Mexico Birding Trail

The *Southwestern New Mexico Birding Trail* is product developed through the efforts of: New Mexico Department Game and Fish, New Mexico Audubon Society and Council; New Mexico Department of Transportation, U.S. Department of Interior, National Park Service, The Nature Conservancy, U.S. Forest Service, and New Mexico Rural Economic Development through Tourism. There are currently 41 sites listed in the guide (http://www.wildlife.state.nm.us/recreation/birding/); with 15 being located within the Forest boundary. The birding trail was developed to provide locations for people to get out and enjoy New Mexico's diversity and abundance of bird life, as well as learn more about the locations.

Important Bird Areas (IBA)

The Audubon Society in partnership with BirdLife International, has been identifying and working to conserve a network of Important Bird Areas (IBAs) throughout the United States. The Important Bird Area program is an effort to identify and conserve areas that provide essential habitat for one or more species of bird and that include breeding, wintering, and/or migration habitat.

There are 62 IBAs in the state of New Mexico with 13 located within Catron, Grant, Hidalgo, and Sierra Counties (http://netapp.audubon.org/IBA/State/US-NM). Three of which are located entirely or in part within the Forest boundary:

- **Emory Pass** is located at the top of the Black Range Mountains at an elevation of approximately 8,500 feet, providing opportunities to observe high elevation bird species.
- **Gila Bird Area** is located along the Gila River lined with southwest riparian vegetation where over 200 species of birds have been recorded.
- **Mimbres River** extends from the lower Mimbres Valley extending 30 miles into the Forest and described as being an excellent example of a riparian gallery forest.

Wildlife Viewing Locations

Watchable Wildlife

Watchable Wildlife areas are considered prime wildlife viewing areas (http://www.wildlife.state.nm.us/recreation/). There are five identified in the Gila region of southwestern New Mexico. All five provide both wildlife viewing and bird watching opportunities. All except the Lower Gila Box are within the Gila National Forest boundary. The Lower Gila Box is located on Bureau of Land Management west of the Burro Mountains. The five *Watchable Wildlife* sites are:

- Fort Bayard – Watchable Wildlife Site #48
- Heart Bar – Watchable Wildlife Site #47
- Lower Gila Box – Watchable Wildlife Site #72
- The Road to the Cliff Dwellings – Watchable Wildlife Site #46
- San Francisco Hot Springs Area – Watchable Wildlife Site #42

New Mexico Department of Game and Fish – Wildlife Management Areas and Gaining Access Into Nature Program

Wildlife Management Areas (http://www.wildlife.state.nm.us/conservation/wildlife-management-areas/) are properties owned or managed by the New Mexico State Game Commission. Many Wildlife Management Areas (WMAs) are being opened to additional wildlife-associated recreation activities beyond traditional uses of hunting and fishing through the Gaining Access Into Nature (GAIN) program

(http://www.wildlife.state.nm.us/recreation/g-a-i-n/). Depending on the WMA, these new activities include wildlife viewing, photography, hiking, bicycling, skiing, snowshoeing, and horseback riding. The following are near or within the Gila National Forest:

- Bear Canyon Reservoir (GAIN)
- Bill Evans Lake (GAIN)
- Glenwood State Fish Hatchery
- Heart Bar Wildlife Area (GAIN)
- Lake Roberts (GAIN)
- Mimbres River Tract (GAIN)
- Quemado Lake
- Snow Lake

Impacts of Hunting, Fishing, or Plant Collection on Ecological Integrity and Species Diversity

Hunting, trapping, and fishing permits and regulations are used for the management objectives of the species developed by New Mexico Department of Game and Fish. These are methods to control species population numbers which has beneficial impacts to the health of the species, habitat conditions, and species diversity. The New Mexico Department of Game and Fish objectives are to have sustainable wildlife management practices and continue to provide opportunities for continued hunting, trapping, and fishing.

The majority of users of the outdoors are good stewards of the land, but impacts do occur. They include activities like trampling of vegetation (habitat alteration), noise disturbance, improper disposal of trash, establishing unauthorized user-created routes, and introducing or spreading non-native plants or animals. These activities are not widespread, but there are isolated areas where signs of such impacts are evident across the Forest.

Freshwater systems are particularly affected by the introduction of nonnative species (USDA FS 2012d). Hybridization, depredation, and competition from stocking non-native fish for sport fishing or by accident through bait bucket transport have contributed to diversity and distribution declines of native fish species and may also affect macroinvertebrate and aquatic plant species. The continued stocking of non-native fish is very important for supporting sport fishing, but limits opportunity for the reintroduction of native fish species.

Contribution of the Use and Enjoyment to Social and Economic Sustainability

Wildlife, fish and plants on the Gila National Forest contribute to social sustainability by promoting recreational and educational opportunities. They also provide for cultural aspects of social sustainability such as preservation of traditions, history, art, and traditional uses in the plan area. Many tribes rely on resources within the plan are for cultural, traditional and religious uses. These are *cultural* ecosystem services which contribute to social wellbeing and quality of life.

These resources contribute to the economic sustainability as well by added tourism, employment opportunities, support of small businesses, and federal receipts shared with local governments. In 2013, New Mexico Department of Game and Fish commissioned a study of hunting, fishing, and trapping to estimate county-level and state-wide contributions to the state's economy (Southwick Associates 2014). The study found 248,334 New Mexico residents and nonresidents hunted, fished, or trapped in New

Mexico in 2013 (Table 187). Of these participants, 24% (59,751) hunted, trapped and fished in the four counties encompassing the Gila National Forest (Table 187), expending approximately $46,595,774.

Table 187. Sportsmen participation and expenditures statewide and by county by activity in 2013.

Location	Hunters	Economic Value	Trappers	Economic Value	Anglers	Economic Value
New Mexico	**86,384**	**$342,368,654**	**1,639**	**$3,493,874**	**160,311**	**$267,717,023**
Catron County	12,406	$15,018,759	109	$71,283	7,328	$1,841,330
Grant County	6,802	$8,902,764	161	$114,044	10,141	$6,452,871
Hidalgo County	2,281	$1,619,381	29	$16,107	153	$112,231
Sierra County	5,329	$4,357,758	29	$16,090	14,983	$8,073,156
Four County Total	**26,818**	**$29,898,662**	**328**	**$217,524**	**32,605**	**$16,479,588**

From: Southwick Associates 2014

The New Mexico Department of Game and Fish conducted a review of the eleven state owned dams and the economic contribution of associated lakes to the state. The estimated economic contribution to the state by anglers is approximately $21 million (NMDGF 2014c). Four of the lakes are located within the Gila National Forest boundary (Lake Roberts, Bear Canyon, Snow Lake, and Quemado Lake). The economic value to the state from these four lakes totals approximately $6.6 million.

The expenditures of hunters, trappers, and anglers support jobs and garners additional tax revenues. Statewide, approximately 7,936 full- and part-time jobs, providing approximately $268 million in labor income and adding $106 million in tax revenue (Table 188). In the four counties, there was approximately 620 full- and part-times jobs, providing approximately $12 million in labor income.

Table 188. Total number of jobs, income, and taxes statewide and by county from hunting, trapping, and fishing in 2013.

Location	Jobs	Labor Income	Local, State & Federal Taxes
New Mexico	**7,936**	**$267,920,790**	**$106,493,369**
Catron County	259	$3,703,806	$2,675,882
Grant County	187	$4,760,746	$2,514,814
Hidalgo County	21	$502,401	$278,245
Sierra County	153	$3,370,197	$1,506,065
Four County Total	**620**	**$12,337,150**	**$6,975,006**

From: Southwick Associates 2014

Outfitting and Guiding

New Mexico has several different outfitting and guide industry segments including river rafting, backcountry skiing, river and lake fishing trips, and big game hunting. The hunting and fishing industry in the state of New Mexico is well established and has been creating a livelihood for outfitter and guides for many decades (NMCOG 2014).

On a state-wide level, the New Mexico Council of Outfitters & Guides 2014 report estimated the annual economic contribution to the state from guided fishing industry to be $50,000,000 and from outfitting for big game hunts more than $44,000,000. The vast majority of outfitter and guides conduct hunts for elk (94%), deer (79%), pronghorn (67%), and bear (46%) (NMCOG 2014).

In 2013, there were 1,511 outfitter/guides registered in the state (NMCOG 2014). On the Gila National Forest, an average of 139 permits are issued to outfitters and guides per year (Table 189). Based on Forest Service annual revenue collected, it is estimated that an average $2,159,000 in gross revenue is generated annually from outfitter and guide activities on the Forest (Table 189).

Table 189. Number of outfitter and guide permits issued annually from 2010 to 2015 on the Gila National Forest and total reported revenue.

Fiscal Year	No. of Permits	Reported Revenue
2010	131	2,188,274.00
2011	143	2,159,373.67
2012	132	2,357,139.33
2013	128	1,778,180.33
2014	131	2,350,166.00
2015	125	2,118,501.33
Average	**139**	**2,158,605.78**

Source: USDA FS Gila NF 2016c

Wildlife Watching

In 2011, 566,000 people participated in wildlife watching activities of feeding, observing or photographing (USDI-USDC 2014). Most of the participants (82%) stayed at or close to home and 46% traveled more than a mile from home to watch wildlife. Bird watching was the most participated activity by both at-home and away-from home wildlife watchers. Wildlife watchers spent $327 million in the state of New Mexico in 2011 on equipment and travel (USDI-USDC 2014).

Stakeholder Input

Stakeholders describe the Forest as having high quality hunting areas, especially for elk. Hunting by individuals and outfitter and guide trips is identified as a major economic contribution to the local communities and counties in the area. Wildlife viewing, ecotourism, and utilizing the resources of the Forest to draw tourists to the area were identified as potential sources of economic development for local communities.

Comments expressed concern in the decline of recreational fishing opportunities and associated economics due to ash, debris, and sediment impacts to streams from fires and Gila trout restoration activities. The restoration of Gila trout has resulted in not stocking or the removal of rainbow, brown, or brook trout from specific areas. For some this reduces fishing satisfaction and economic benefit, while others feel restoring Gila trout would provide a unique fishing opportunity attracting sportsmen into the area.

Summary

The public derives substantial social and recreational value from wildlife, fish, and vegetation resources on the Gila NF. Aquatic ecosystems also provide a variety of ecosystem services and economic benefits to society, such as safe drinking water and healthy and abundant fish populations that provide food and

recreational opportunities (USDA FS 2012d). Economically, participation in activities focused on wildlife and fish provide considerable contribution to within and beyond the area of influence.

Multiple Use Stakeholder Input

Comments received from stakeholders generally fell into two clusters regarding the concept of multiple-uses. First, many comments expressed that the concept of multiple uses on the Gila National Forest has greatly diminished or is not the primary direction currently being followed. Commenters felt the Forest needs to return to more multiple use management and find opportunities to maintain or increase employment, industry (i.e. timber, cattle grazing, recreation), and economic development in local communities and counties. Concern was expressed that resources are being preserved rather than conserved. Also, there was a feeling that regulations, threatened and endangered species, and litigation has limited or even eliminated opportunities for multiple use management, and therefore decline in economics and opportunities and causing an impact to cultural and traditions of the local areas.

The other perspective is that the forest resources are being over-utilized. Some felt that political influence is involved in the level of resource utilization, resulting in impacts to such areas as watersheds, listed species, and other wildlife habitat. It was suggested that the use of the land by logging, recreation, mining, and grazing should be removed or greatly reduced to improve and maintain ecological conditions for future generations.

Chapter 12. Recreation

Introduction

The purpose of this chapter is to assess aspects of recreation on the Gila National Forest (Gila NF) as it relates to recreation settings, opportunities, access, and scenic character. Current conditions, trends, and risks will be the main the focus along with influences (both environmental and social from within and beyond the planning area) with the consideration of future sustainability.

This chapter is divided into the following sections:

- Introduction
- Ecosystem services of recreation
- Recreational setting
- Recreational Opportunity Spectrum
- Trends in recreation
- Types of recreation opportunities
- Compatibility of different recreation activities
- Emerging recreational trends that may affect future recreation demand
- Recreation fees
- Nature, extent, and condition of trails, roads and other transportation and other infrastructure to provide recreational access
- Opportunities to foster greater connection between people and nature
- Scenic character
- Conditions and trends affecting the quality of recreational settings
- Sustainability of recreation opportunities and scenic character
- Influences outside of the planning area that affect the demand for recreation
- Recreation opportunities on other lands within the broader landscape
- Stakeholder Input
- Summary

Multiple studies, reports, and databases were utilized to compile information in this chapter. The National Visitor Use Monitoring survey (NVUM) is conducted every five years on every national forest. The Gila NF has conducted three separate surveys in 2001, 2006, and 2011 (USDA FS 2006b, 2011). The most recent survey is currently being implemented in 2015-2016 although results will not be available until 2017. Due to a difference in survey methodology, results from the 2001 NVUM study are not used in this assessment because trends and comparisons would not be consistent with the 2006 and 2011 survey methodologies and results.

Other documents utilized include, but are not limited to, the Gila NF Sustainable Recreation Strategy Action Plan (USDA FS Gila NF 2015c), Gila NF Travel Management Recreation Specialist Report (USDA FS Gila NF 2013c), Gila NF Recreation Opportunity Spectrum draft report (USDA FS Gila NF 2016d), and New Mexico Statewide Comprehensive Outdoor Recreation Plan (2010 – 2014) (NM EMNRD 2009, 2015a). Data was extracted from various Forest Service Natural Resource Manager Databases (INFRA and SUDS), Gila NF Geographic Information Systems (GIS) corporate data, and New Mexico Game and Fish Department databases.

Ecosystem Services of Recreation

Outdoor recreation contributes to ecosystem services in a variety of ways. From a cultural and social perspective the Forest offers a variety of opportunities for recreation, scenic viewing, and places to connect with nature. It also offers rejuvenation and escape from urban environments and lifestyles, while providing an opportunity to experience solitude to connect to nature. Recreation contributes greatly to the physical, mental, and spiritual health of individuals, and bonds family and friends. Outdoor recreation on the Gila National Forest also contributes to tourism and the economies of the local communities. Recreational gathering of firewood and plant materials provide products from the Forest for people's enjoyment and use. Hunting and fishing are two recreational activities that have regulating functions for ecosystems by helping to manage wildlife populations.

Recreation Setting

The Gila NF consists of approximately 3.3 million acres, and offers spectacular scenery, ranging from high, cool mountains of aspen and Douglas fir to warm semi-arid lowlands with juniper, oak, and cactus. It remains one of the most remote, uniquely continuous, and least developed national forests in the southwest United States. Twenty-four percent of the Forest's land mass consists of congressionally designated wilderness to be managed for primitive and semi-primitive non-motorized use. The Gila NF is home to the first designated wilderness and has a proud history of wilderness management in the Gila, Aldo Leopold, and Blue Range Wilderness Areas. Along with the previously mentioned Wilderness Areas, there are a variety of specially designated areas, trails, and byways on the Gila NF (see Designated Areas Chapter for more details). Local communities' quality of life and economic opportunities are interwoven with the Forest's future. This is best summarized in the Gila National Forest Recreation Facility Analysis (USDA FS Gila NF 2007), which identified the Gila NF's niche and desired condition as follows:

> "From wilderness to western heritage, visitors to the Gila National Forest have the opportunity to 'find themselves' in the wildness of the forest. The essence of the Gila is the freedom to explore vast expanses of backcountry. Heritage and cultural connections allow local communities, Native Americans, and recreationists to establish long-term bonds with the forest. Traditional gathering of forest products and hunting bring visitors from near and far. Rivers and lakes, uncommon in the Southwest, provide relief from heat across the forest."

Recreational Opportunity Spectrum

Since the early 1980s, the Recreation Opportunity Spectrum (ROS) has been used as a framework to identify, classify, plan, and manage a range of recreation settings for both existing and desired conditions. The ROS defines recreation setting based on physical, social, and managerial attributes. The physical setting is defined by the absence or presence of the sights and sounds of people, size, and the amount of environmental modification caused by human activity and authorized uses. The social setting reflects the amount and type of contact between individuals or groups. It indicates opportunities for solitude and interactions with a few individuals or large groups of visitors as one moves across the spectrum. The managerial setting reflects the amount and kind of restrictions placed on people's actions by the administering agency or private landowner which affects recreation opportunities. ROS provides a range of recreation opportunities that can be enjoyed in diverse settings. ROS remains the best available framework for recreation planning (McCool et al. 2007).

ROS is divided into six different classes as defined below:

Primitive areas are characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use and mechanized equipment within the area are not permitted.

Semi-Primitive Non-Motorized areas are characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The areas are managed in such a way that minimum on-site controls and restrictions may be present but are subtle.

Semi-Primitive Motorized areas are characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Concentration of users is low, but there is often evidence of other users. The areas are managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is permitted.

Roaded Natural areas are characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of people. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Rural areas are characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of people are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by large numbers of people. Facilities are often provided for special activities, such as amphitheaters, group pavilions, group fire rings and cooking units, and so forth. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.

Urban areas are characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of people on-site are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

The Gila National Forest visitors have opportunities to experience solitude at one end of the spectrum within wilderness areas and more remote sections of the Forest; or to experience more of social opportunity in Forest locations near communities and major travel routes within the Forest. Campers also have a range of recreation opportunities, from developed campgrounds with electrical hook ups to user-developed dispersed camping sites located in remote areas. Water based recreation opportunities include more highly developed facilities located near one of the lakes located on the Forest, or nearby a stream in close proximity to a major travel route, to a challenging experience at one of many remote streams accessible only by trail. Another popular recreation opportunity on the Gila NF is hunting, which varies from utilizing an outfitter and guide to a more self-reliant “on your own” hunt at a remote location within or outside of a designated wilderness area.

When ROS classes were first delineated for the Forest, they were incorporated as part of the 1986 Gila NF Forest Plan. As part of the current Forest Plan Revision process, a new ROS inventory is in the process of being completed (USDA FS Gila NF 2016d). Due to differences in the inventory methodology from the 1986 Gila ROS to the draft 2016 Gila ROS, trends and comparisons are not possible, and only data from the draft 2016 Gila ROS Inventory will be summarized for this assessment. As presented in Table 190, approximately 16% of Forest lands offer recreation opportunities in the primitive setting, 24% in the semi-primitive non-motorized setting, 7% in the semi-primitive motorized setting, 53% in the roaded natural

setting, and 0.2% in the rural setting. Currently there are no lands administered by the Gila NF managed under the urban class. Refer to Figure 188 for the graphic portrayal of ROS settings.

Table 190. Recreation Opportunity Spectrum (in acres and percentage) on the Gila NF

ROS Class	Acres	Percentage of Gila NF
Primitive	526,611	16%
Semi-Primitive, Non-Motorized	787,063	24%
Semi-Primitive, Motorized	240,940	7%
Roaded Natural	1,768,071	53%
Rural	5,083	0.2%
Urban	0	0%
Total Evaluated for ROS	3,327,768	100%

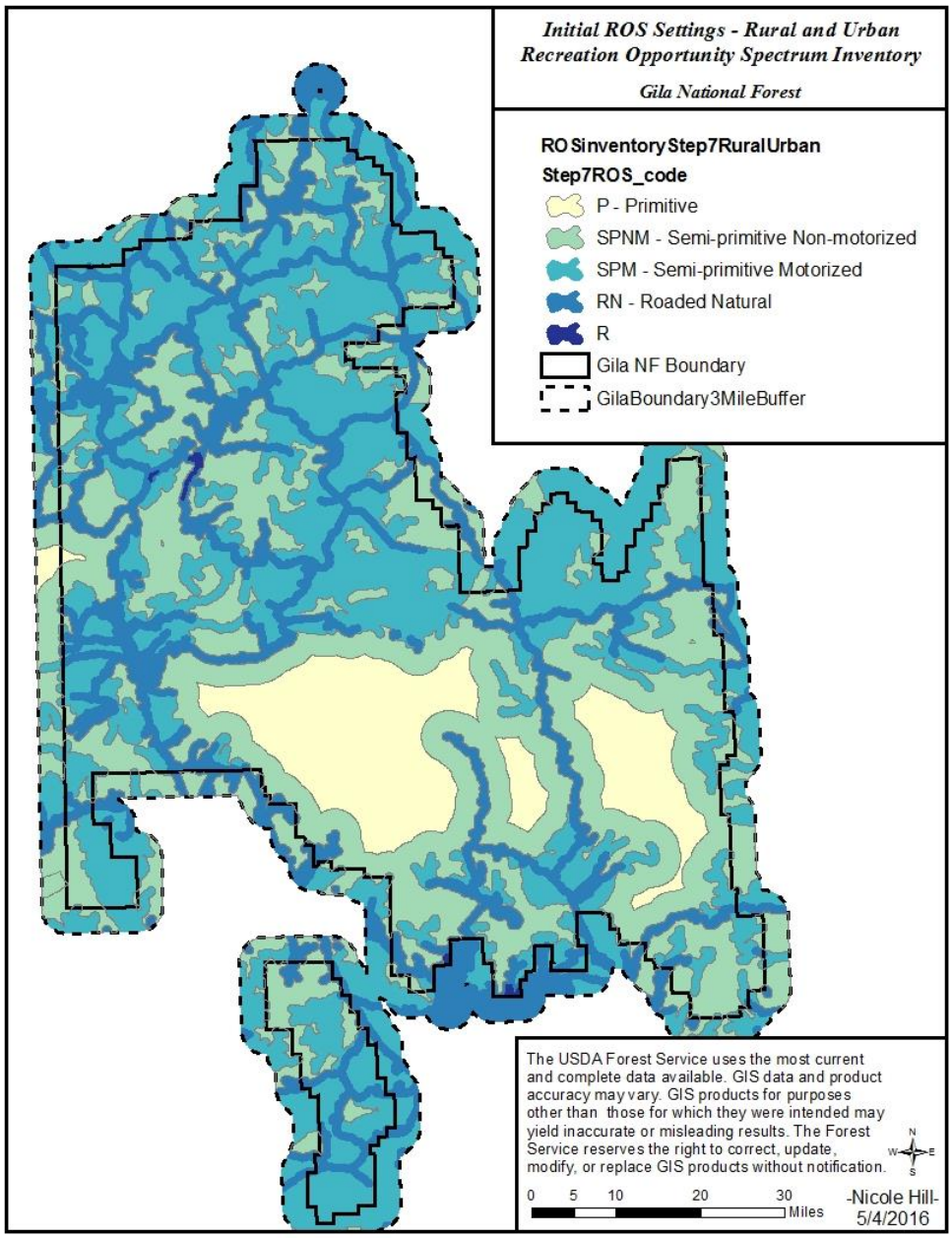


Figure 188. Draft Gila NF ROS Inventory 2016

*Note - lighter colors represent more primitive classes while darker colors represent more urban classes

Trends in Recreation

The results of numerous studies indicate that outdoor recreation has become a major component of many Americans' lifestyles (Roper 2004, Cordell 2008), and participation in outdoor recreation activities has been on the increase since the Great Depression and World War II. However, studies differ on whether participation in outdoor recreation activities has been increasing or decreasing since 2001. Some reports show a decline in recreation participation nationally beginning in 2001. Suggested reasons for this trend include the general state of the economy, personal security concerns associated with transportation following the September 11th, 2001 terrorist attacks, and increased interest and availability of computer games, the Internet, and television (Roper 2004). Alternatively, other studies show an overall increase in outdoor recreation participation, but a change in the mix of outdoor activities and their relative popularity. For instance, participation in some traditionally popular outdoor activities (such a hunting and fishing) has been on the decline, replaced by other activities such as driving for pleasure, wildlife or bird watching and photography (Cordell 2008).

The goal of this section of the Recreation Assessment is to assess visitation to the Gila NF, identify trends and changes with visitation, and identify possible causes and implications of changes in visitation. The visitation statistics were developed by compiling and analyzing information from several sources, including Forest visitation numbers, recreation site visitation data, trip specific data, and economic information. This information was obtained from Gila National Forest National Visitor Use Monitoring (NVUM) data collected from surveys conducted during Fiscal Years 2006 and 2011.

The NVUM data differentiates recreation sites by the following categories:

- **Day Use Developed Site**: a site that is designed for recreation use, which has some sort of development that restricts overnight camping. Examples of these sites include picnic areas, the Catwalk National Recreation Trail, and interpretive sites.
- **Overnight Use Developed Site**: a site which allows overnight / multi-day stays that has infrastructure to support this use. Examples of these sites include campgrounds, some trailheads, and livestock corrals.
- **General Forest Area**: National Forest lands that are considered undeveloped with the exception of roads and trails. These areas are typically associated with dispersed recreation. Examples of uses on general forest areas are dispersed camping, Off Highway Vehicle (OHV) riding, hunting, backpacking, and horseback riding.
- **Designated Wilderness**: an area designated by Congress for preservation and protection in their natural condition and may also contain ecological, geological, or other feature(s) of scientific, educational, scenic, or historical value. The Gila NF has three designated wilderness areas – Gila Wilderness, Aldo Leopold Wilderness, and Blue Range Wilderness.

Gila NF Visitation Numbers

Total visitation to the Gila National Forest increased by 69%, or from 305,000 to 514,000 visitors between 2006 and 2011 based on the NVUM survey results. Figure 189 represents the estimated annual visits to the Gila NF between 2006 and 2011 by site category. Each site type had an increase of visitation, with General Forest Areas (78% increase) having the largest growth and with Designated Wilderness (17% increase) having the least amount of increase.

The current level of visitation within the Forest is considered to be at manageable levels. The risk posed by a significant increase of visitation above current levels include possible overcrowding, resource damage, and conflicts between differing types of recreation user groups. Since the largest increases in visitation occur in General Forest Areas, which tend to have different uses spread out across the Forest, to date there have been minimal issues with overcrowding or conflicts between user groups. Areas of

concentrated use is a concern especially in popular areas and trails near Silver City and at frequently used sites like Sapillo and Forks Campground. In the Silver City area, there is risk of overcrowding especially during holiday weekends and a risk of user conflicts between equestrians and dog walkers, and the Forest is monitoring these risks and trends.

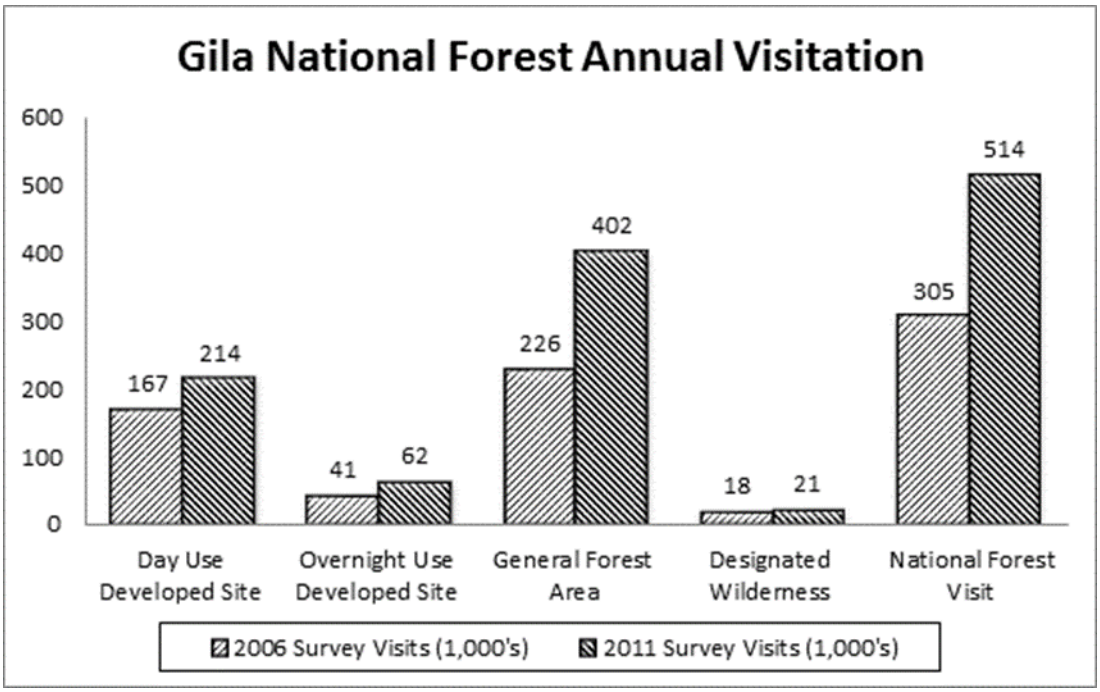


Figure 189. Gila NF Annual Visitation Numbers between 2006 and 2011

When assessing the proportion of site type used from 2006 to 2011, the biggest changes were in Day Use Developed sites (decreased by 6%) and General Forest Area (increased by 7%). Table 191 shows that while total visitation has increased, the type of site utilized is quite similar between 2006 and 2011. There is a noticeable trend of visitors shifting from utilizing developed sites to dispersed sites. A large percentage dispersed site use is associated with hunting and utilization of backcountry areas including trail use. The risks associated with an increase of dispersed recreation use include resource damage within riparian areas due to concentrated recreation, increased litter, and the possibility of greater conflicts among visitors.

Table 191. Distribution of Site Type Used between 2006 and 2011

Site Type	2006	2011
Day Use Developed Site	36.9%	30.6%
Overnight Use Developed Site	9.1%	8.9%
General Forest Area	50.0%	57.5%
Designated Wilderness	4.0%	3.0%
Total	100.0%	100.0%

Figure 190 represents the average duration of visit by site type (i.e. hours spent at any given site per visit) between 2006 and 2011. Site types that experienced longer duration per visit include General Forest Area (increase by 19.3 hours per visit), Overnight Use Developed Site (increase by 17 hours per visit), and Designated Wilderness (increase by 1.8 hours per visit).

This trend of longer duration per visit may be an indication that a significant number of Forest visitors are now staying for three-day visits as compared to two-day visits. Day Use Developed Sites were the only site type that experienced a shorter visitor stay duration, by 1.4 hours. The overall duration of a National Forest Visit has increased by 2.4 hours per visit. Risks associated with this trend could be competition for access to, and overuse at popular recreation sites.

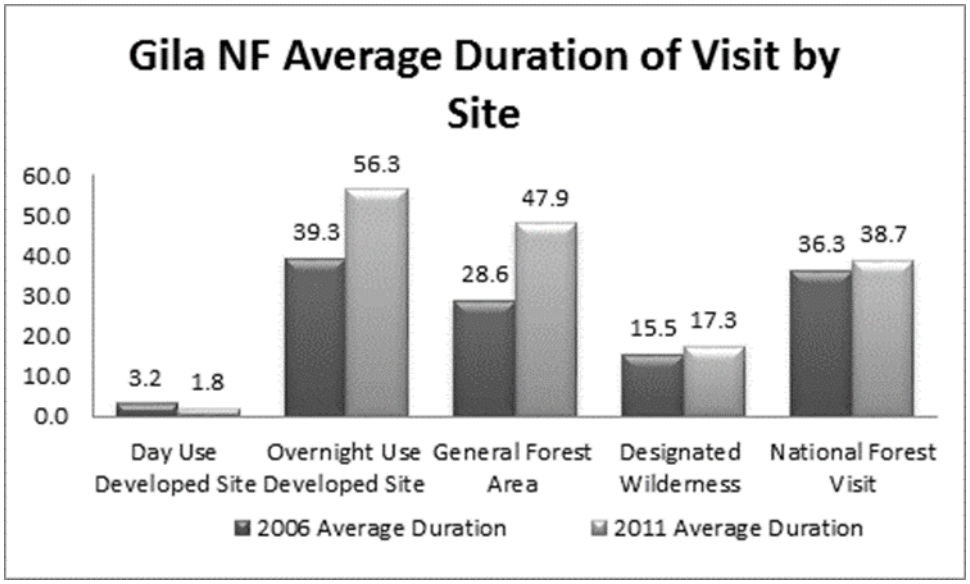


Figure 190. Gila NF Average Duration (hours) of Visit by Site Type between 2006 and 2011

Table 192 examines the visitor's main activity (i.e. why they are visiting the Forest) comparing Gila NF visitation data from 2006 and 2011 along with the 2012 national average on National Forest System administered lands. Hiking/walking is the largest draw for Forest visitors on the Gila NF (both in 2006 and 2011) and nationally.

From 2006 to 2011 the three recreation activities that showed the greatest increase on the Gila National Forest were OHV use (increased 125%), hunting (increased 121%), and horseback riding (increased 100%). The risks posed by these increased recreation uses may include conflicts with other users, and exceeding the capacity of permitted outfitter/guides in certain areas. The Forest will need to monitor for these risks and develop mitigation actions as needed. Ecological risks associated with increased user conflicts could involve increased resource damage in new areas as users spread out attempting to find areas with less use while these new areas may not be able to support that specific use. This could lead to such things as more user created roads and trails, new dispersed camping sites, and utilization of areas near water that historically have not been used recreationally.

During that same time period, the three recreation activities showing the greatest decrease in use included nature study (decreased by 100%), nature center activities (decreased by100%), and visiting historic sites (decreased by 92%). This data references only the main activity that visitors cite as the reason for their Forest visit. It is a common occurrence that visitors may actually participate in many other recreation activities within a given visit. For example, hiking may be the main reason cited by a user for visiting the Gila NF, however they may also utilize a developed recreation facility for a picnic after their hike. This is an important factor to take into consideration when assessing existing and potential future recreational use trends.

When comparing the 2011 Gila NF main activities by percent to 2012 national average, the three activities above the national average by the greatest percent are: hunting (240%), horseback riding (186%), and picnicking (173%).

Differences from the national average could be due to the Gila NF's status as a premiere big game hunting destination for elk and mule deer, the abundance of available wilderness and backcountry trails for horseback riding, and prevalence of secluded, open spaces that provide respite from the heat of the arid desert for picnicking. These differences from the national average for these recreational activities serve to help to define the Gila NF's niche while emphasizing what makes it a special place for visitors.

Table 192. Main activities by percent for the Gila NF compared to the National Average

	Percent of Total		
	Gila NF		National Average
Main Activity	2006	2011	2012
Hiking / Walking	17.4	21.4	19.3
Hunting	8.9	19.7	5.8
Viewing Natural Features	12.8	12.1	13.4
Driving for Pleasure	10.6	12	4.7
Relaxing	8.1	7.6	5.7
Fishing	13.8	7.3	7
Some Other Activity	0.3	6.7	3.8
Picnicking	6.1	4.1	1.5
Viewing Wildlife	3.4	3.9	1.9
Horseback Riding	1	2	0.7
OHV Use	0.8	1.8	1.4
Developed Camping	2.2	0.8	3.1
Visiting Historic Sites	9.8	0.8	0.3
Backpacking	1.1	0.3	0.7
Other Non-Motorized	3.1	0.3	2.2
Bicycling	1.1	0.2	2.6
Non-Motorized Water	0	0.1	1.2
Primitive Camping	0.8	0.1	0.6
Gathering Forest Products	0.9	0.1	1
Nature Center Activities	0.3	0	0.3
Nature Study	0.2	0	0.3

Gila NF Trip Specific Data

Figure 191 shows the percent of visitations by the distance travelled from the visitor's home to the Gila NF. The NVUM summary report defines Forest visitors traveling 50 miles or less to the site as local, and those travelling from more than 50 miles from the Forest as a non-local visitor. From 2006 to 2011, local visitation grew from 30.8% to 54.8%, which is a 43.8% increase. The largest percent decrease in visitation was within the group that traveled 500+ miles from home to the Forest. In 2006 the percentage of visitors traveling from more than 500 miles was 20.3% as compared to 7.1% in 2011, which is a decrease of 185%.

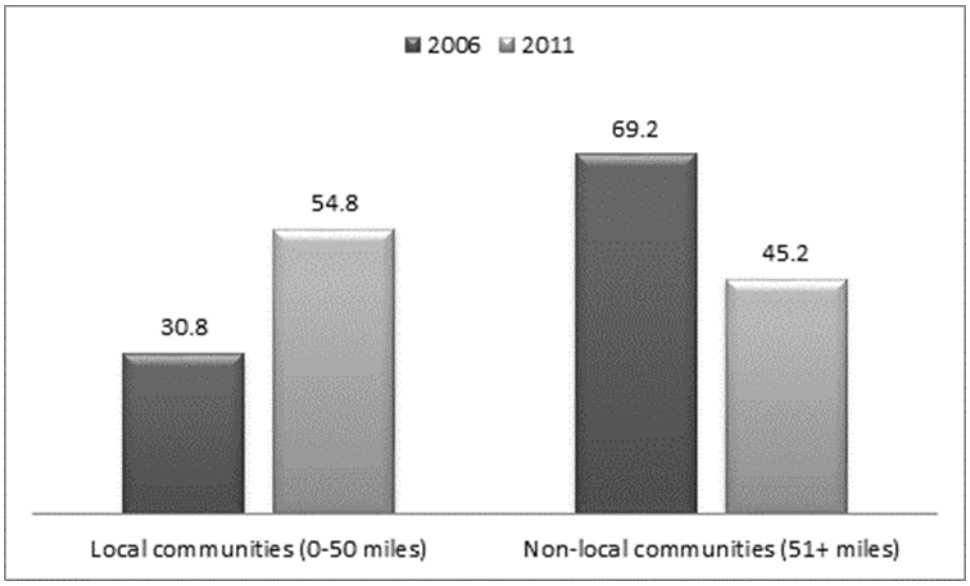


Figure 191. Percent of Visitation by Distance Traveled between 2006 and 2011

Table 193 represents the total number of visits by individuals to the Gila NF within a given year from 2006 to 2011 surveys by percent. Since 2006, the number of individuals visiting the Gila NF 21-30 times, 51-100 times, and 101-200 times annually within a one-year timeframe has seen a dramatic increase. There have been decreases in the number of visits for 1-10 times and 31-40 times within a calendar year. Analysis of these trends may assist in assessing and prioritizing information needs regarding available recreation opportunities to existing constituents while identifying outreach to future visitors that may be unaware of the opportunities on the Gila NF.

Table 193. Number of annual visits by individuals to the Gila NF between 2006 and 2011 by percent.

	Number of Annual Visits								
	1 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51 - 100	101 - 200	201 - 300	300+
2006	77.1%	8.8%	2.7%	4.3%	3.8%	1.9%	0.1%	0.2%	1.1%
2011	59.2%	9.1%	5.3%	2.4%5	4.5%	9.8%	9.4%	0.3%	0%

Combining the Table 193 results with the distance traveled results from Figure 191, emphasizes the trend of local visitation with multiple annual visits increasing significantly in that five-year period. The risks of increased local visitation are over utilized popular sites and activities near communities and an increased possibility of user conflicts especially at sites that serve multiple recreational users. Currently, many sites around Silver City experience user concentration impacts and litter. Many other communities that are adjacent to the Forest experience increased visitation by local citizens. The common activity near these communities are hiking local trails nearby their community, and often these people will informally monitor trail conditions and pick up litter. The Forest is evaluating the possibility of implementing an adopt-a-trail program that would formally recruit local citizens as volunteers to maintain and patrol local trails.

Figure 192 is a comparison of visits from various age groups as a percentage of the total visitation. Groups that demonstrated the most increases in visitation are aged 30-39 years (20% increase), aged 60-69 years (42% increase), and aged 70+ years (72% increase). The largest decreases in visitation are within the age groups under 16 years (50% decrease), aged 16-19 years (142% decrease), and aged 20-29 years (55% decrease). This trend aligns closely with current demographics of neighboring communities. Southern

New Mexico is a popular retirement destination, while a significant percentage of the population between the ages of 18 to 29 years is known to relocate in search of better economic opportunities. The Forest will need to assess available recreation opportunities in light of these demographic trends to suit the needs of the local populations. Currently, the Forest has limited accessible recreation sites and trails for those with disabilities. Accessible facilities will be important for accommodating a diverse and aging recreating public. However, many system trails have limited potential to be upgraded to become accessible due to rugged topography.

The risk of the decreasing trend of users under the age of 30 represents a potential loss of connection between younger people to their public lands. If this trend continues, it may lead to a decrease in visitation by younger visitors (and/or future generations), or a loss of the appreciation for the resource of public lands as a whole. This trend emphasizes the need for pursuing opportunities to foster greater connection between people and public lands, especially with the younger generations.

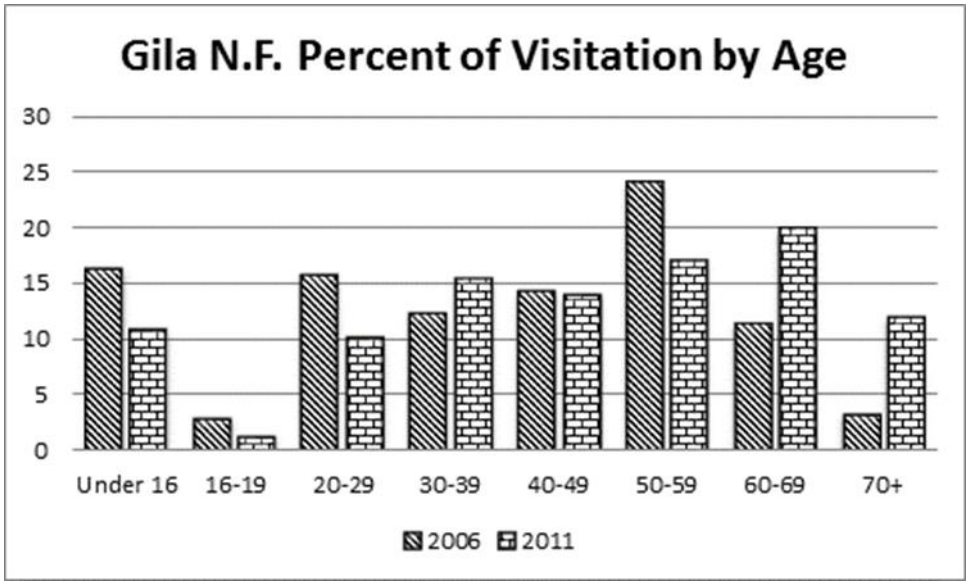


Figure 192. Gila N.F. Percent of Visitation by Age

Social, Cultural, or Economic Conditions Impacting Recreational Participation

New Mexico is known for its multicultural population including Hispanic, Native American, and Anglo influences. This rich diversity is ever-changing, and from 2000 to 2011, the Hispanic population in New Mexico increased by 28 percent (Brown and Lopez 2013). According to the 2006 and 2011 NVUM survey data (Table 194), the percentage of Hispanic visitors has increased by 24.8% during this time period. The increase of Hispanic visitors is close to the rate of the Hispanic population. Efforts by the Gila NF to increase awareness and visitation by diverse and underserved populations (e.g. bilingual brochures) is showing progress, although continued work on this front will be needed.

Table 194. NVUM survey data for visitation to the Gila NF by Race/Ethnicity

Visitation by Race/Ethnicity	2006 Forest Visits (%)	2011 Forest Visits (%)
American Indian / Alaska Native	1.9	3.7
Asian	0.3	0.2
Black / African American	0.3	0.2
Hawaiian / Pacific Islander	0	0.1
White	68.5	59.6
Hispanic / Latino	29	36.2

According to the New Mexico Statewide Comprehensive Outdoor Recreation Plan (NM EMNRD 2009), over 30 percent of New Mexico residents earn below $25,000 a year, and approximately 43 percent earn less than $35,000 per year. This large percentage of New Mexico residents with limited incomes may impose limitations on the types of recreation residents can participate in due to travel and equipment costs. This could also result in local residents that live closer to the Gila NF choosing to recreate on the Forest rather than other locations outside of the assessment area. Additionally, recreating locally may be considered more cost effective because there are a limited number of fee sites on the Forest.

Gila Visitation Summary

Visitor data can be used to assess current and future trends across the Forest to determine potential future impacts of increased or decreased use to developed and dispersed recreation sites. The likely future trend on the Gila NF is an increase in visitation (both in terms of site visits and duration of stay). The risks associated with increased visitation include overcrowding of popular sites or resource damages to sites that regularly exceed site capacity (this includes the urban trail system around Silver City, Emory Pass, popular campgrounds during holiday weekends, and popular trailheads). If visitation trends continues to increase, these issues could be more widespread across the Forest and occur more frequently at popular sites.

Another significant trend is an increase of local visitors. This may be at least in part as the result of a downturn in the economy and higher gas prices during the time the 2011 NVUM survey was conducted.

Survey data shows that recently more visitors to the Forest have been utilizing dispersed recreation opportunities as compared to developed recreation sites. The risk associated with increased dispersed recreation use is that undeveloped Forest areas could experience resource damage due to high levels of use. OHV use has increased largely due to the growing popularity of UTVs that make motorized access to some remote areas of the Forest possible. The Gila NF has a small percentage of the existing trail system that continues to be open to motorized use, and has contributed to resource damage due to increased use with limited opportunities. The Forest is currently in the process of implementing the Travel Management decision, which may reduce resource damage by diverting existing motorized use onto trails and roads that continue to be open to motorized use. As the Travel Management decision is implemented, and as motorized recreation use continues to be monitored and assessed, future planning may be focused to align opportunities while mitigating any resources concerns.

The Gila NF has also experienced a significant increase of visitors older than 60 years old. Southern New Mexico has gained popularity as a retirement location due to a relatively low cost of living and mild climate, resulting in a higher percentage of visits from this particular age group. In direct contrast to this trend, there is a corresponding decrease of younger visitors to the Forest. The risks associated with a decline in visitation by younger demographics include is a loss of connection between younger people and management of public lands.

Types of Recreation Opportunities

Dispersed Recreation

Dispersed recreation activities occur outside and completely independent of designated recreation sites or developed recreation facilities. The large size of the Gila NF and contiguous Forest land ownership provide a unique opportunity for dispersed recreationists to experience solitude outside of designated wilderness areas. Dispersed recreation includes a variety of both motorized and non-motorized activities, and may occur throughout the year.

Motorized dispersed recreation activities may include, but are not limited to, OHV driving, scenic driving, and car camping. Most dispersed motorized recreation use occurs on existing Forest roads or motorized trails, which vary in condition and level of development (see Infrastructure Chapter).

Many Forest system roads are backlogged for maintenance, and have been degraded by flooding and erosion. Some motorized recreation visitors seek out these types of driving conditions, and consider them to be a challenging 4x4 experience. However, the risk of continued erosion will limit the use of these roads at the development level for which they are classified as well as lead to further resource damage.

The trend of use for OHV recreational use has shown an increase over the five-year period from 2011 to 2016. Many of the roads and trails across the Forest are user created that later became system roads/trails during a roads inventory process in the 1990s. The trend of user created travel routes creates a situation where many of these routes are in need of design features to minimize resource damages. Implementation of the Travel Management decision will reduce the number of user created roads and trails by identifying routes that are open for motorized travel and limit cross country motorized travel to specific areas for specific purposes. These specific routes and areas identified for motorized travel have been selected to provide motorized access to areas while limiting resource damages.

Non-motorized dispersed recreation activities include, but are not limited to, hiking, backpacking, climbing, mountain biking, horseback riding and packing, some forms of dispersed camping, fishing, hunting, boating, exploring caves, geocaching, and nature viewing. Forest visitors engaging in these forms of dispersed recreation experiences often make use of the Gila NF's extensive single-track developed trail system. For conditions, trends, and risks associated with the developed trail system, see the trails section later in this chapter.

Hunting while dispersed camping on-forest is a very popular recreation activity on the Gila National Forest. There are many popular user-developed dispersed campsites distributed throughout the Forest. Most of these sites are in excellent condition. Many visitors that utilize existing user-developed campsites have been observed to be conscientious in maintaining a clean camp and minimizing any resource damage they may cause. Some common risks associated with dispersed campsites include litter, wheel ruts in the ground during wet conditions, and unattended campfires.

According to the 2011 NVUM survey, hiking/walking is most popular primary recreation activity of Forest visitors. The Forest has limited opportunities for day hiking due to distances to trailheads, limited loop opportunities, and closures of popular trails following flooding and wildfire events. As a result of these conditions, there is a trend of increasing use at many popular day hiking trails. The risk associated with increased use at a limited number of trail opportunities include user conflicts, limited opportunities to experience solitude, and overcrowding during high use times.

Equestrian use (horseback riding and backcountry stock-packing) are also popular forms of non-motorized recreation on the Forest. This type of use primarily occurs within wilderness and less-developed Forest areas adjacent to communities. Backcountry horseback riders visiting wilderness areas use vehicles and stock trailers to access trailheads and areas throughout the Forest. It is common for some of these users to pull stock trailers for 3 to 5 hours to reach a trailhead. Many of these backcountry trips are multi-day in duration, and involve the use of both pack and saddle stock. Day use equestrians are more likely to make use of Forest trails located immediately adjacent to local communities. Conflicts between user groups are more likely to occur on these popular trails located nearby to population centers.

Although the Gila National Forest is located within a semi-arid landscape, fishing and water-based recreation opportunities are available on approximately 957 miles of perennial streams and rivers, as well as on three reservoirs: Quemado Lake (112 acres), Lake Roberts (68 acres), and Snow Lake (72 acres).

Some of the more common sport fish found in these waters include rainbow and brown trout, large and small mouth bass, as well as channel and flathead catfish. Quemado Lake is one of only two lakes in New Mexico that have a population of tiger muskie, which is a draw that attracts anglers from all across the region.

Many native fish are also found in the streams on the Forest, some of which are federally listed as threatened or endangered under the Endangered Species Act. A particular draw attracting fishermen to the Gila Forest region is the opportunity to fish for the threatened Gila trout. Many of the streams that had populations of wild Gila trout on the Forest have experienced severe negative effects from wildfires to fish habitat. The Gila NF is partnering on several projects with the New Mexico Game and Fish Department with the goal of restoring Gila trout habitat and fish populations.

The available recreation facilities associated with the three lakes located on the Forest have been steadily improved, including new boat ramps installed at Lake Roberts and Quemado Lake, improving access to for watercraft use on these waters. Several developed campgrounds are located near these bodies of water.

Current fisheries improvements along with increased stocking levels has created an increase of fishing based recreation. Access to many of the rivers and streams located on the Forest is by way of system trails. Fishing and other water-based recreation activities are dependent upon current water quality conditions. One of the most significant risks to water conditions is negative effects from wildfire to vegetation and soils. Another risk to fisheries on the Forest is the effects of prolonged severe droughts limiting the availability of water and affecting the amount of stream flow. Many lakes and streams rely on winter snow pack runoff, are spring feed, or some combination of both. For more detailed information about stream and lake conditions, see the Water Chapter.

Developed Recreation

Developed recreation is defined as recreation that requires facilities and results in concentrated use of an area (Gila Forest Plan 1986). The Gila National Forest currently has 33 developed campgrounds (including 2 group sites), 6 picnic sites (including 3 group sites), 98 developed trailheads, 3 public target shooting ranges on the Glenwood, Silver City, and Reserve Ranger Districts, an observation site, and an Interpretive Visitor Center near the Gila Cliff Dwellings National Monument. Developed sites and areas experience greater use during the summer and fall seasons and on holidays, although several facilities (primarily on the southern and lower elevation portion of the Forest) remain open and receive use year-round.

The Gila NF conducted a Recreation Facility Analysis (RFA) process in 2007 (USDA FS Gila NF 2007). Through this process, Forest recreation staffs analyzed all recreation facilities and evaluated how they might operate and maintain these sites and facilities more efficiently. The product resulting from the RFA process was a document that outlined a five-year program of work that included all of the tasks required to bring the Forest's recreation infrastructure into alignment with the resources available to operate and maintain it to standard. These tasks included such actions as a seasonal closure of some facilities after hunting season, suspension of trash removal services at several sites, a change in visitor capacity at some facilities, installation of new signs, repairs and renovations, decommissioning of some sites, establishing fees at some facilities, and increasing them at other current fee sites, and increasing the recruitment and use of volunteers to help maintain facilities.

Many of the tasks identified by the RFA were completed within the five-year time period which streamlined the management of many of the facilities. Revisions to the fee structure across the Forest have not yet been accomplished at the time of this analysis. Additional opportunities for fee sites have been explored since the RFA was completed. These opportunities are currently being evaluated and initial planning is being conducted, including some site improvements required to be completed prior to

implementation. One such opportunity currently being evaluated is to implement a cabin rental program on the Gila NF.

All recreation facilities are scheduled for a recreation facility condition assessment to be conducted and the results entered into the INFRA Recreation database at least once every five years. The inspections result in the documentation of all completed deferred maintenance requirements. An analysis that compares the between completed and deferred maintenance costs to the replacement value for each asset is known as the facility condition index (FCI). The FCI correlates to a facility condition rating of good, fair, or poor (Table 195). A good condition rating describes a recreation site that is fully functional and poses little to no safety concerns to the public and agency personnel. A fair condition rating indicates that there is room for improvement, but overall function of the site is acceptable. An FCI rating of poor typically indicates the need for major repairs, replacement, or decommissioning of the facility.

The majority of the Gila National Forest developed recreation facilities are currently rated as in good condition (Table 195). Annual and deferred maintenance needs and costs are identified and tracked in the INFRA Recreation database. The trend for many Forest developed recreation facilities are declining condition due to the growing backlog of deferred maintenance, age of infrastructure, cost of maintenance or replacement, and vandalism (e.g., graffiti, litter, physical damage to facilities, etc.). The risks associated with developed recreation facilities not being maintained to a minimum acceptable condition include threats to public safety by such hazards as poor condition of infrastructure, deficiency of hazard tree mitigations, non-accomplishment of improvements to limit damages from flooding and other environmental conditions, and health and safety issues associated with vault toilets. Other risks include a limitation on services provided at some facilities, site closures, imposing seasonal closures at more locations, or longer timeframes for seasonal closure periods.

Table 195. Recreation buildings on the Gila National Forest, with their facility condition ratings

Ranger District	Number of Structures	Good	Fair	Poor
Black Range	7	6	1	0
Quemado	26	16	6	4
Glenwood	16	14	0	2
Wilderness	54	28	5	21
Reserve	16	12	2	2
Silver City	25	20	5	0
TOTAL	144	96	19	29

Many of the risks to developed recreation facilities are posed by environmental conditions and natural disaster events such as fires, flooding, and prolonged drought, as well as insect and disease outbreaks. Any of these natural events may impact and create hazard trees within and surrounding developed recreation sites. Additionally, the presence of dead and dying trees within and near recreation facilities will have negative effects to the visual qualities of the area. Dead and dying hazard trees also result in decreased shading and increased risk to public safety due to dead trees falling on roads, trails, or facilities. To mitigate safety risks to the public, developed recreation sites are continuously evaluated for hazardous

conditions and appropriate mitigation actions are taken as needed. Where appropriate, signage is posted within recreation sites and at trailheads warning of risks from falling trees.

There are several developed recreation sites that are currently closed due to damage from recent wildland fires and/or flooding. There are other sites that have instituted some type of seasonal closure or restrictions due to seasonal threat of flooding (e.g. monsoon season). Many of the Forest's developed recreation sites are located within floodplains which increases of the risk of flooding related damages. Since these sites are within riparian areas and floodplains, there are many limitations on what type of improvements can be implemented due to resource and public safety concerns. This creates a management challenge because terrain often limits moving these sites immediately outside of floodplains. The Forest is attempting to balance meeting the visitor needs for developed recreation sites near water and providing for public safety concerns.

A trend on the Forest is increased seasonal closures of some developed recreation sites. The risks associated with implementing additional seasonal closures include limiting availability of recreation opportunities, possibility of increased vandalism, and decreased visitation to these sites.

Vandalism that is known to occur on the Gila NF includes graffiti to structures within sites, destruction of government property, theft and damage to signs, and cutting of vegetation within the developed recreation sites. The Gila NF has been implementing the use of building materials that are more durable and resistant to environmental factors and vandalism. The disadvantage to using these materials is that they tend to be expensive, which places financial limitations on how many sites are able be upgraded each year.

Special Uses

All uses of NFS lands, improvements and resources are considered "special uses" except for noncommercial recreational activities and certain activities governed by other regulations such as mining, timber, grazing, or road use (36 CFR 251.50). The Forest Service Special Uses Program authorizes use of National Forest System lands and resources through the issuance of a permit. Permit terms and conditions protect public and natural resource values while affording the permit holder the opportunity to conduct business on the national forest, or private recreation opportunities in limited circumstances (such as recreation residences). Under various laws and regulations set by Congress, the Forest Service collects land use rental fees for special use authorizations. While most land use rental fees are returned to the US Treasury, some fees are retained by the Forest. Certain recreation special use authorizations, such as outfitter/guides and recreation events, generate revenue for the Forest, which is directed to improve visitor services and address upgrades or deferred maintenance of recreation facilities.

The Gila NF recreation program manages a variety of special use permits including outfitting and guiding, tours, trail guides, special events, photography and filming, and various other types of uses. Currently the Gila NF manages 112 outfitter and guiding permits, 3 recreation residence permits, 1 marina permit, 2 target range permits, 6 recreation events, 1 visitor center / museum permit, and 2 church group event permits along with many single occurrence type events. Some the single occurrence type events that typically occur on the Forest are weddings, family reunions, field schools, school-related field trips, and many others.

The demand for outfitter / guides to operate big game hunts on the Forest is currently being met, although this situation may change over the next few years as competition for trophy big game animals continues to increase. The Gila NF needs to complete a capacity analysis for all special use permits to ensure there is an appropriate number of permits issued for any given activity within certain location perimeters.

To date, there have been few reported conflicts among those currently permitted to operate on the Forest. The relatively large land base of the Gila allows competing outfitter/guides to disperse, and limits the likelihood of them coming into conflict over specific locations.

There have been a small number of conflicts known to occur between outfitter/guides and the general public related to use of specific areas to hunt or establish a campsite. Most of these reported conflicts are resolved between the two parties when they occur. Typically, if conflicts occur repeatedly by a certain permittee, appropriate actions may be taken through the administration of their permit. Many outfitter/guides have been operating on the Forest for many years, and they have gained the knowledge of where other guides typically operate along with popular areas where the general public tend to hunt. Because of this accumulated knowledge of use patterns, many permittees will choose operate in areas where there is little potential for competition and conflicts with other hunters. Some outfitter/guides utilize private property to base hunting operations from, but many other special use permittees will locate their camps on Forest. Proper permit administration, including regularly conducted field inspections, serve to ensure there are little to no impacts to resources on the ground.

With New Mexico becoming more popular within the film industry for film production due to tax credits, the demand for additional special use permits for commercial filming may increase as well. Often film permits require additional time to administer due to the complexity and duration of many filming productions. Large film productions could impact many different resources on the Forest.

Some common challenges across the Forest with administering special use permits include a lack of personnel and training available to properly issue and administer permits. Due to many vacancies within the recreation program within the past five years, administration of special use permits has been completed by other staff areas that have not received proper training. This has resulted in an inconsistent approach on how new and existing special use permits have been administered. A risk of not properly administering permits often results very few, if any, inspections to ensure there are not conflicts, overuse of popular sites, and resource damages. With the Gila NF recreation program becoming more organized across the Forest and vacant positions being filled, these issues should be addressed and resolved in a unified approach across the Forest. A current condition of many special use permits on the Gila NF is that many of the long term priority use permits are due to expire within the next couple of years. As permits are renewed, proper NEPA clearances will be completed which will identify resource concerns and proper mitigation actions. The Forest has experienced a trend of more permit requests for special events, endurance races, and a variety of guiding operations. This risk of this trend is an increase of possible user conflicts and a possibility of the Forest exceeding the capacity of use in popular areas.

Caves

The Federal Caves Resources Protection Act of 1988 directs the Secretary of Agriculture to prepare and maintain a list of significant caves. The criteria for listing are found in 36 CFR part 290.3(c). The Forest Service policy is to identify and manage significant caves, although under certain circumstances the location of significant caves can be withheld.

Cave resources include wildlife habitat, most notably for bat populations such as Pale Townsend's big-eared bat. Risks to bats include activities known to impact habitat, such as mining, vandalism, and recreational caving, as well as disease such as White Nose Syndrome. White Nose Syndrome has not been reported in New Mexico to date, but the disease has been spreading west from places where it is currently documented. At present, the Forest recommends a few precautions to limit the spread of the disease, such as sanitizing gear and clothing before entering a cave. There are six caves on the Gila National Forest that have either been evaluated for significance, or currently are being evaluated, but at this time no caves

have yet been designated as significant. When designated, all significant caves will be managed to protect and maintain the caves and cave resources.

The Gila National Forest does not yet have a forest-wide cave management plan. The Forest has utilized partnerships with local grotto groups, along with the Lincoln NF cave specialist, for assistance in the management of caves. Two caves are currently being managed for recreational purposes with minimum development, and the other caves require further evaluation for development of an appropriate management strategy. All of the caves being evaluated for significance are also being monitored for resource concerns.

Coffee Cave is the only gated cave on the Forest, and a key can be checked out by the public to allow controlled access to the cave. Road access to the cave has been damaged by flooding from the Silver Fire which currently limits access to the entrance. The condition of Coffee Cave is considered good, with limited occurrences of resource damage. Robinson Cave is the other cave being managed for recreational purposes, although this cave regularly experiences problems with littering and graffiti. Currently, there is no restricted access or registration requirements to access this cave. The Forest is presently monitoring the litter and graffiti damages, and undertaking clean up actions as required. There is no road or system trail access to Robinson Cave, so cross country travel and knowledge of the location are required to locate the cave.

Further cooperation from our partners will be necessary to help with the identification and exploration of additional caves located within the Gila NF. It is possible there are many more caves eligible as significant located on the Gila NF, but are not yet known to Forest personnel. There is limited data available on visitation trends to caves on the Gila NF. Most of the available information is from Coffee Cave, which consists of records of when the key is checked out. The amount of use of Coffee Cave has been steady to slightly increasing each year as this cave becomes better known. There is potential to grow and expand the cave program across the Forest with the cooperation and assistance of partner organizations and recruitment of volunteers.

Night Sky

Boasting some of the darkest nights in the Southwest, the Gila National Forest offers many visitors the chance to view and admire the natural night sky, a glittering dome peppered with stars, planets, and passing meteors. Much of the Gila National Forest lies within the darkest category on the Clear Sky Chart light pollution map (Figure 193), and on the Bortle scale rates a 1 or a 2 as being in the range of excellent to typical truly dark sky.

The Cosmic Campground on the Glenwood Ranger District has gained the recognition as an International Dark Sky Sanctuary by the International Dark Sky Association. This is the first International Dark Sky Sanctuary located on National Forest System lands. International Dark Sky Sanctuaries are lands possessing an exceptional or distinguished quality of starry nights. The Cosmic Campground offers a 360-degree, unobstructed view of the night sky, and often hosts “star parties” in cooperation with the partner group Friends of the Cosmic Campground. Having this designation will help further protect and raise awareness for the value for dark skies. This site is situated where there is little light pollution and low development. The greatest threat to this dark sky resource is increased development in the immediate area that could cause light pollution. However, design for the campground will ensure light pollution controls will be in place for the immediate area.

With trends of more and more people residing in expanding urban and suburban areas, the experience of viewing the natural night sky is becoming rarer and more unique This opportunity to view the natural night sky is relevant not only to astronomers, but also stargazing recreationists. The trend of recreationists utilizing the Cosmic Campground for stargazing will increase as awareness about the designation and as

opportunities to view the natural night sky become rarer across the United States. Currently there are limited islands of areas that have these qualities across the region (Figure 193), and they will be increasingly rare as more development occurs.

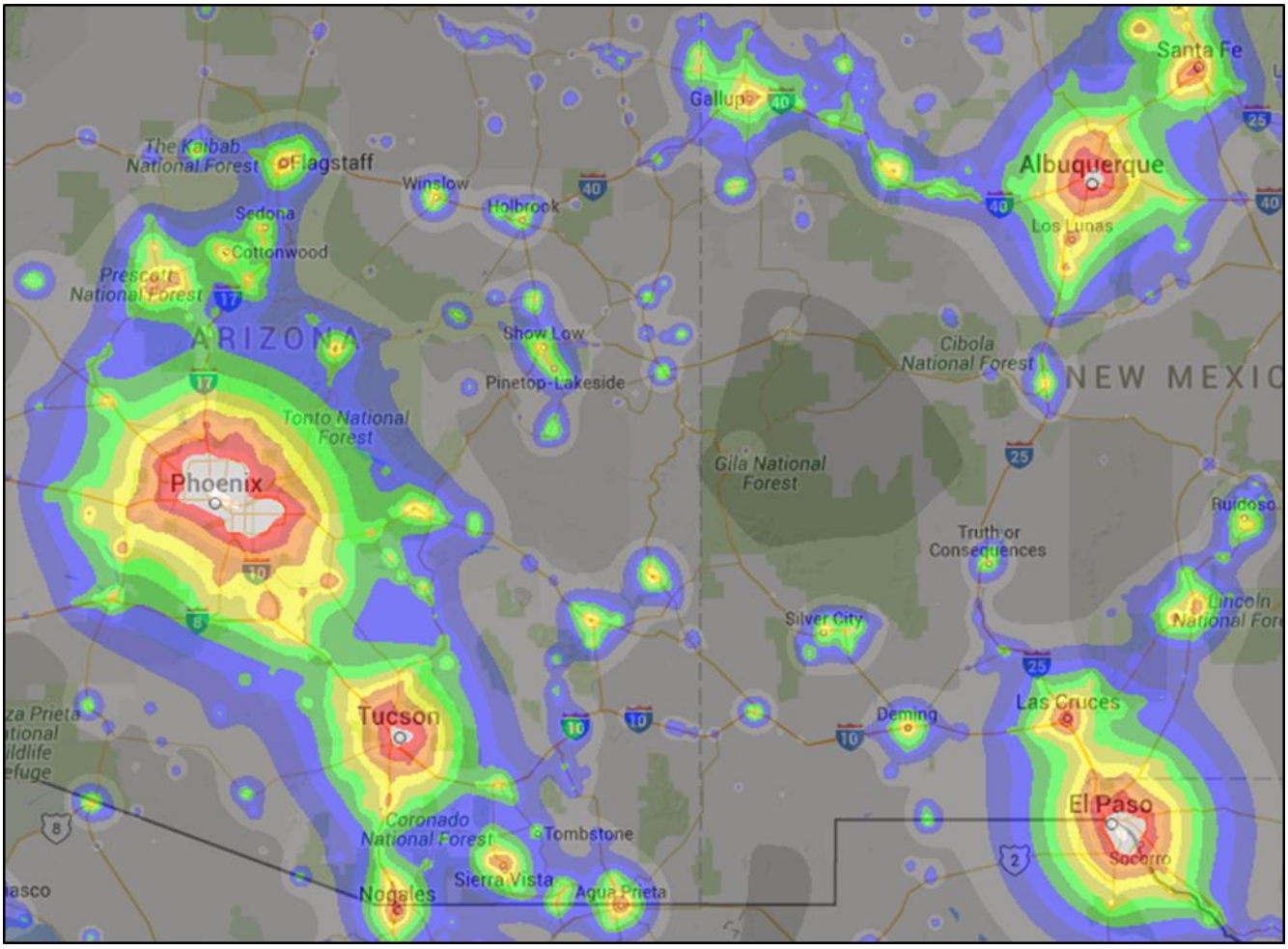


Figure 193. Map of light pollution in the region surrounding the Gila National Forest.
Note: Warmer (lighter) tones indicate more light pollution and cooler (darker) tones indicate less light pollution.
From the Light Pollution Atlas (Lorenz 2006)

Compatibility of Different Recreation Activities

Participants in the Values, Attitudes and Beliefs (VAB) Survey for the Gila NF (USDA FS 2006a) discussed increasing demand for limited recreational resources, which results in the increased potential for one type of use to conflict with another (USDA FS 2006a). Participants in the VAB were concerned about conflicts between motorized and non-motorized uses. Participants also believed that many of the "problem users" simply lacked information about appropriate Forest rules and regulations. Unauthorized routes continue to appear and are created by both motorized and non-motorized activities, such as OHVs, horses, and hikers. Mountain biking is becoming an increasingly popular activity on the Forest. There is a variety of opportunities for bikers on the Gila NF, but there is potential for conflict with other trail users, in addition to impacts to the resource if bikers travel off designated routes.

On the Gila NF, many visitors tend to use the Forest for multiple types of recreation purposes in a single visit. For example, a visitor to the Forest for big game hunting is also likely to camp either in a dispersed site or in a developed campground, using Forest roads and trails, viewing scenery and wildlife, or driving

an OHV or using pack stock. A visitor enjoying a scenic drive viewing wildlife may also picnic, day hike, or visit an interpretative area.

Since most visitors to the Gila NF enjoy multiple recreation uses within a single visit, and are typically seeking solitude, conflicts amongst different user groups are minimal. The Gila NF being is a large uninterrupted area of public lands, providing ample opportunities for recreationists to find less crowded areas. Additionally, different user groups use the same locations but at different times of year. Where the majority of user conflicts occur are at developed recreation sites and areas where the Forest is near communities, and are more likely during popular weekends and holidays when there is increased visitation.

A trend of increasing conflicts has been observed between hikers, equestrian users, and mountain bikers on the Gila NF trail system. These types of conflict are most commonly known to occur in the area near Silver City, and are increasing as the area becomes more popular and receives more visitation by a range of recreation users. The risk associated with user conflicts on the Forest trail system include impacts to trail conditions, and negative interactions between user groups adversely affecting all trail users' recreation experiences. Examples include horses being spooked by dog walkers, and mountain bikers passing hikers at high speeds, creating an impression of unsafe conditions.

Another common and increasing conflict occurs between motorized and non-motorized recreationists. This conflict is typically limited in location due to the few areas where these activities overlap. One example is where motorized trail use is encroaching on sections of the Continental Divide National Scenic Trail (CDNST) where roads cross the trail. The risks associated with this conflict include increased user conflicts, impacts to trails not designed for motorized use, and resource impacts associated with the formation of user created trails that split off of the system trail.

Increased visitation to the Forest is one of the biggest factors contributing to the risk of conflict amongst different user groups. As visitation numbers rise, the likelihood of user conflicts also increases. Competition between user groups for more desirable recreation sites also increases the risks for user conflicts.

Emerging recreational trends that may affect future recreation demand

There is a growing interest in adventure races and similar events such as boot camps, mud events and endurance races. These events are usually held under a special use permit by "for profit" organizations, although some are conducted as fundraisers. The activities associated with these recreation events may include: running, bicycling, paddling, climbing, orienteering, and other activities that require endurance, strength and agility.

One such event that occurs on the Gila NF is the "Ride the Divide" mountain bike race. This race follows as close as possible to the CDNST, and participants attempt to ride the entire CDNST unsupported. Another Gila NF recreation event is the "Tommyknockers 10" race that occurs within the Fort Bayard trail system near Silver City. This event is a 10 hour endurance mountain bike race that makes use of multiple trails to create a loop that participants complete as many laps as possible. The first official event occurred in February 2016, and was very popular.

Other recreation activities that may contribute to the demand for recreation within the Gila National Forest plan area include the growing interest in zip lines, use of drones, and geo- or eco-tourism. Depending on where these activities may occur, if not managed they could exacerbate environmental and social stressors described throughout this chapter. If managed appropriately, these activities attract visitation to the area and contribute to the local economies without undesirable impacts.

Recreation Fees

The Federal Lands Recreation Enhancement Act (FLREA) was signed into law by President Bush in 2004. It permits federal land management agencies to establish, modify, charge and collect modest recreation fees at campgrounds, rental cabins, and at day use sites that meet specific facility criteria. Recreation fees provide crucial resources that allow the federal agencies to respond to increased recreational demand on federal lands. The goal is to provide visitors with a quality recreation experience through enhanced facilities and services.

The Forest charges use fees at some of the developed recreation areas including the Catwalk Recreation Area, Dipping Vat Campground, Juniper Campground, Mesa Campground, Piñon Campground, and Upper End Campground. A majority of the revenue generated from these fee areas stays on the Forest and supplements appropriated dollars to maintain and enhance recreation opportunities and amenities. However, the revenue that is generated by the fee areas is not sufficient to address all deferred maintenance needs.

The Catwalk National Recreation Trail is a tourist destination which experiences high visitation levels. This site contributes significantly to the local economy of the town of Glenwood. Due to the location of the trail within lower Whitewater Canyon, it is susceptible to damage from flooding, and has experienced periodic closures for cleanup and repairs. The risk associated with these periodic closures of the trail include impact to the economy of Glenwood and surrounding areas, while the loss of FLREA fee revenue affects future maintenance and enhancements. When significant damages occur to the trail, repairs are prohibitively expensive, causing strain to the Forest recreation budget.

Since the Dipping Vat, Juniper, Mesa, Piñon, and Upper End Campgrounds all collect fees and generate revenue used in their maintenance and improvement, these facilities are currently in good condition. These sites typically have volunteer campground hosts to assist with collecting fees, distributing information, and performing routine maintenance. As unforeseen events occur and maintenance issues arise, having a campground host on-site to address or report them to managers helps to minimize the extent of damage and likelihood of closure for repairs.

Visitation to these fee sites has been increasing, as observed by total fees collected. Total revenues increased from $57,758 in FY 2014 to $63,488 in FY 2015. Dipping Vat Campground is located at Snow Lake, Mesa and Upper End Campgrounds are located at Lake Roberts, and Juniper and Piñon Campgrounds are located at Quemado Lake. Since all of these Forest campgrounds are located near lakes, drought and associated lower lake levels are among the greatest risks to visitation numbers for these campgrounds. Other risks that could affect visitation include quality of fishing opportunities, occurrence of nearby wildfires, condition of access roads, and negative impacts to the view shed of the surrounding Forest.

Compared to adjacent national forests, the Gila NF has very few sites that charge fees. Many campgrounds and developed recreation sites are provided at no cost to the visitor. . While providing many campgrounds and other developed sites without user fees allows Forest visitors from all economic backgrounds the opportunity utilize these sites, it does strain the recreation budget to continue to operate, maintain, and improve these sites. The risk as associated with lack of user fees include a lack of maintenance funding as appropriated funding stagnates or declines. In order to mitigate impacts from these trends, the Forest may need to consider alternative management actions that may include increasing the number of facilities that charge fees, increasing existing fees; reducing services at non-fee sites; implementing seasonal closure of sites during lower-use times of the year; and seeking assistance from outside partners.

Nature, Extent, and Condition of Trails, Roads, and Other Transportation and Other Infrastructure to Provide Recreational Access

This section will assess the conditions, risks and trends as it relates to transportation access for Forest recreation opportunities and trails. The Gila NF is located the southwestern portion of New Mexico and is nestled north of Interstate 10 and west of Interstate 25 (Figure 194). These two interstates provide the primary access to the federal and State Highways that pass through or near the Forest and surrounding communities. For more detailed information related to roads, see the Infrastructure Chapter.

Access to Recreation Opportunities

Most of the State Highways located on the Gila NF are paved (with the exception of State Highway 163 and portions of State Highways 159 and 59). The paved State Highways are suitable for passenger vehicles, and are typically open for use year round unless closed due to weather events. The majority of these highways are suitable for motorhomes and trailers. Portions of several State Highways passing near or through the Gila NF may be challenging driving situations for larger vehicles and vehicles towing trailers due to sharp curves and steep grades. A high percentage of the Gila NF developed recreation sites (excluding trailheads) are located off of State Highways. Typically county and National Forest System (NFS) roads accessing campgrounds adjacent to highways are well-maintained and are accessible most of year. The biggest risks to use of these highways are during periods of inclement weather such as heavy snow or rain. Another risk to all roads in and around the Gila NF is the threat of wildfires and flooding. Roads may be closed for safety during fires or floods, and for longer periods depending upon the amount of damage to their condition. There are a number of developed campgrounds that are only accessible by NFS roads, and are considered to be remote.

Compared to developed recreation sites, the majority of trailheads tend to be located in remote areas accessible only by NFS roads. Many of these roads accessing Forest trailheads are classified as Maintenance Level 2, and are recommend for high clearance vehicles only. These roads typically have little to no improvements and receive only minimal maintenance. The condition of the Level 2 roads may vary across the Forest, depending upon the time of year, location, and recent weather conditions. During the drier times of year, most of these roads tend to be in good condition. When the Forest receives precipitation, many level 2 roads become very difficult to travel and vehicles may become stuck and/or create ruts in the road during wet conditions. Other risks to Level 2 roads include damage from wildfires and flooding.

There is a current backlog of maintenance to many roads within the Gila NF due to declining budgets and a limited number of personnel and equipment available to perform maintenance. The risks of a limited maintenance budget and a backlog of road maintenance include safety concerns for visitors, a loss of utility for roads as deteriorating conditions could make them unusable while creating a high risk of resource damage as vehicles create new routes to bypass impassable sections of roads. Resource damages from user created routes include loss of vegetative groundcover from the creation of ruts, soil compaction and increased soil erosion on steep slopes. For additional information on road conditions, risks, and trends please see the Infrastructure Chapter.

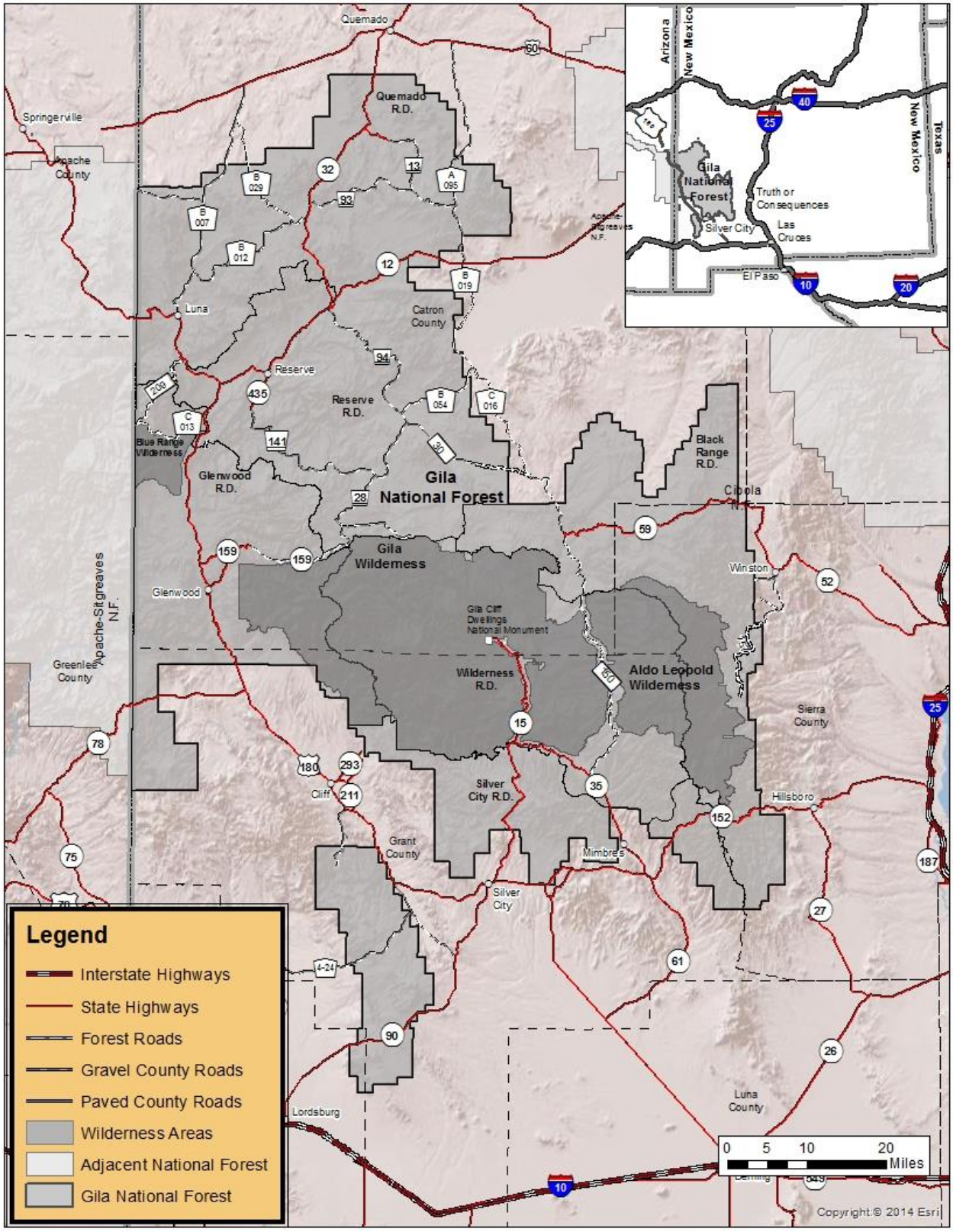


Figure 194. Major access routes in and around the Gila National Forest

The current quality of road access to water features (Figure 195) on the Forest varies depending on the body of water. Quemado Lake, Lake Roberts, and many trailheads that provide access to the Gila River (including the West, Middle, and East Forks) are accessible by paved roads that are in good condition. Snow Lake is accessible by NFS roads that are well-maintained but not paved, and during wet seasons or periods of heavy snow, accessibility may be difficult.)

The boat ramps at Quemado Lake and Lake Roberts have recently been extended and resurfaced. These boat ramps are in excellent condition. Many of the major streams located on the Gila NF are accessible by State, county, and NFS roads with the majority of streams being accessible by non-motorized trails. Many of these trails are located immediately adjacent to or in the streambeds in the case of low water crossings. Due to their location in flood prone areas, the majority of trails near streams are in fair to poor condition. The tendency of deteriorating trail conditions is common across the Forest, with an accelerated pace of deterioration along streams due to regular flooding.

Three lakes (Bill Evans Lake, Wall Lake, and Bear Canyon) are located near the Gila NF but are not administered by the Forest Service.

Trails

The most popular recreation activity for visitors to the Gila NF is hiking, and the Gila NF contains several large wildernesses, numerous inventoried roadless areas, an abundance of undeveloped backcountry, and limited motorized access. Trails are not only important for recreational use, but are a vital component of the Forest transportation system. Many of the trails on the Gila NF also provide access for range or wildlife improvements, livestock management, lookout towers, and for fire management.

Many of the trails within the Forest were established by past users of the land prior to the establishment of the Gila NF. The location of many of the trails is terrain influenced, along with access to water resources. Since water availability is limited, system trails located near or to water resources are very popular with recreationists. These same trails typically are vulnerable to damage from frequent flooding and may contribute to resource damage.

Currently the Gila NF has a total of 1,927 miles of system trails. There is a total of 179 miles of motorized trails and 1,752 miles of non-motorized trails, with 861 miles of trails located within designated wilderness. Under current and projected funding of the trails program, it is likely that there are more miles of existing trail than that can be maintained by the Forest. There are several options that managers are currently exploring to address this issue.

One option is to complete a travel analysis with possible decommissioning of less-used trails or trails that receive so little use or maintenance that they no longer exist on the ground. Other options include teaming with partner organizations, volunteers, and special use permittees to assist with trail maintenance, including an “adopt a trail” program. With limited funding and fewer personnel available to maintain the existing trail system, it will be necessary to develop a sustainable trail system that meets the needs of the trail users but is manageable with available resources. Additionally, trails designed and designated for specific user groups may help minimize user conflicts in certain areas.

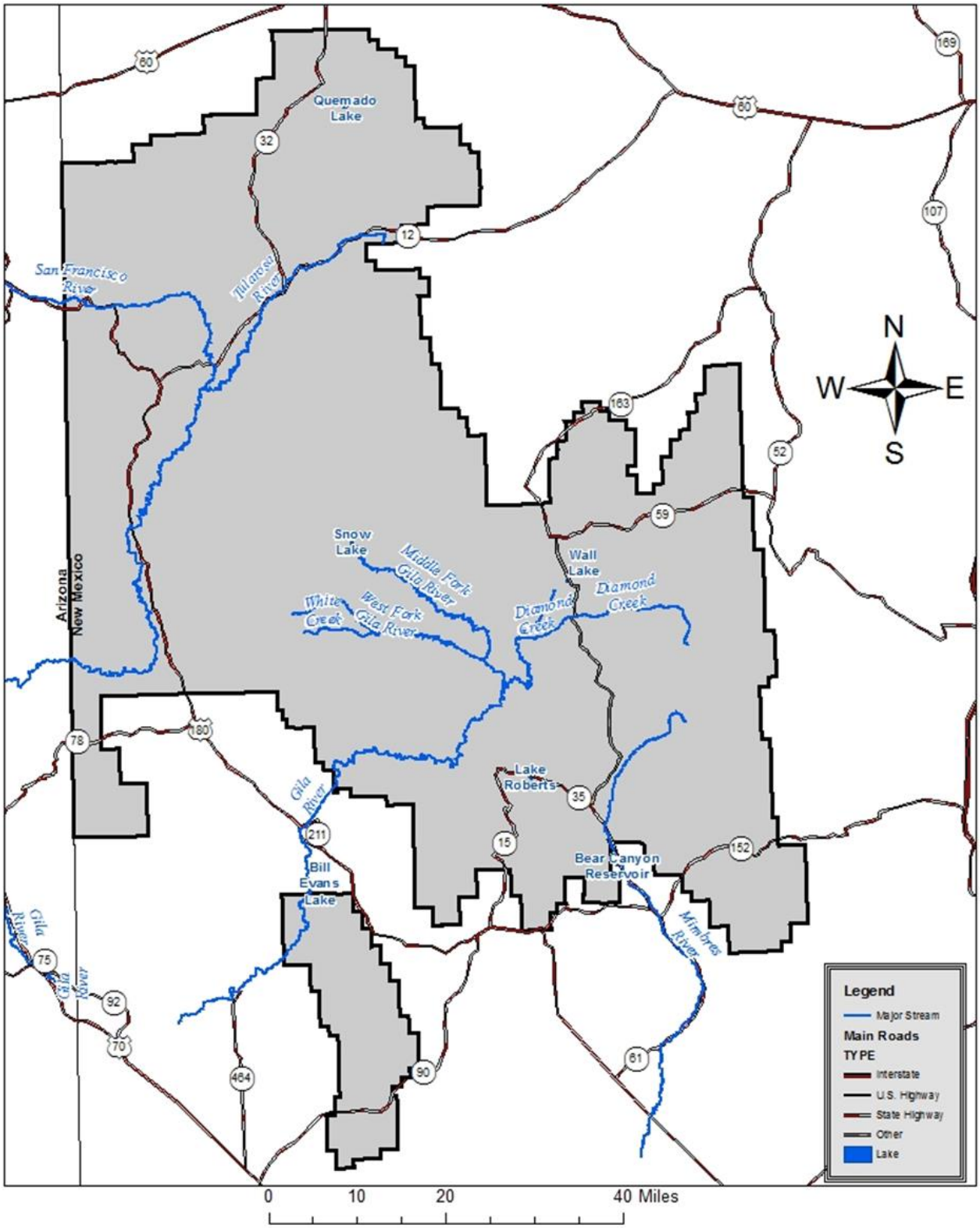


Figure 195. Major bodies of water on the Gila National Forest

Trail conditions vary throughout the Forest. The trails in the best condition are usually the most popular trails, associated with access to water, access lookout towers, nationally designated trails, popular day hikes, and interpretative trails. Because of regular use by the public, these trails are typically better maintained, and when there are condition issues, they are reported and addressed by Forest personnel. However, the majority of system trails are less used and have deferred maintenance issues to the point that they are difficult to locate and travel.

Many trails are missing signs and many existing signs are unreadable due to weathering. There is a lack of accurate maps of the trail system available to the public, and there is often limited information available on current trail conditions. The risk associated limited information can lead to frustrated, disappointed recreational users, or the possibility of increased Search and Rescue incidents due to visitors becoming lost.

Major disturbances such as high severity wildfires and flooding have resulted in an accelerated rate at which trails are experiencing damage across the Forest. While the Forest has prioritized maintenance of popular trails within the disturbed areas, many secondary trails within the disturbed areas and other trails outside of them are neglected, which further compounds maintenance issues.

There are many risks to the condition of trails. The effects of wildfires and floods tend to cause immediate and long lasting threats. Damage includes soil loss, vegetation loss, erosion, debris and fallen trees blocking trails, and encroachment of nuisance vegetation on trails following disturbances. Vandalism and theft of trail signs are a threat to the navigability of the trails. Another risk to the trail system across the Forest is an increasing trend of user created trails. In many cases, these trails lack proper design and are in locations that can create resource damages and lack erosion control design features.

Opportunities to Foster Greater Connection between People and Nature

Participation in outdoor recreation is the most common way that most Americans come to know their National Forests, making recreation an important portal for understanding the meaning, history, and relevance of all public lands. Connecting with nature reminds people of the resources that sustain life and helps them understand and care about those resources.

The Gila NF trails, picnic grounds, campgrounds, wilderness areas, group use areas, and interpretive displays/sites present countless opportunities for visitors to connect with nature. Other opportunities for visitors to get connected with the Gila NF include:

- **Volunteering** can provide a meaningful connection with nature and benefit management of the Gila NF resources. Volunteers are typically engaged in a variety of activities, including maintaining and constructing trails, maintenance of recreation sites, maintenance and construction at administrative facilities, staffing interpretive facilities, serving as a campground hosts, and presenting interpretive/conservation education programs. Currently, there are a number of volunteers working across the Forest during different times of year. The Gila NF continues to explore opportunities to expand the volunteer base. There is a need to reach out to different volunteer groups to help develop relationships, which will help with coordinating current and future partnerships to complete projects. With a limited workforce, the Forest continues to emphasize the importance and value of volunteers.

  Currently there is an increased emphasis on growing volunteer opportunities to foster a greater connection between people and nature while supplementing a limited agency workforce to complete necessary work. The current trend on the Gila NF is increased interest from the public to volunteer. The Forest has not been able to accommodate many volunteer requests due to the

limited capacity within the recreation program to manage volunteers. A risk of not being able to utilize willing volunteers to their desired capacity could result in losing potential volunteers that eventually seek opportunities elsewhere or lose interest. This could potentially result in fewer individuals connecting to the natural environment. Growing the volunteer program along with increasing capacity to more effectively manage volunteer projects could result in a more sustainable workforce, increased opportunities for the public to connect to the natural environment, enhanced partnerships, and increase the public perception of the importance of natural resource management and public lands.

- **Fee Waiver Days** waive recreation day use fees at most federal recreation areas to promote and encourage increased public interest and use. The Forest Service participates in five fee waiver days: Martin Luther King, Jr. Day; President's Day weekend; National Get Outdoors Day; National Public Lands Day and Veterans Day Weekend. The only site on the Gila NF that qualifies for Fee Waiver Days is the Catwalk Recreational Area.
- **Conservation Education/Interpretation** on the Gila NF includes a variety of conservation education and interpretive programs including Smokey Bear Fire Prevention, Junior Rangers, career fairs, nature hikes and programs for schools on and off site. Several youth groups and summer camp programs also use the Gila NF as a setting for their programs. Charter schools like the Aldo Leopold Charter School in Silver City routinely make use of the Forest as an outdoor classroom to connect students to nature. The National Outdoor Leadership School (NOLS) runs seven to ten backpacking courses on the Gila NF each year to develop outdoor skills, environmental studies, and leadership education. The Forest has been experiencing an increased trend of requests for environmental education presentations. A trend with youth in many local communities is a growing disconnect with the natural environment. The risk of having a limited environmental education program on the Gila NF is not being able to properly meet the increasing requests for educational presentations.
- **Agreements** with youth development programs such as the Southwest Conservation Corps, Youth Conservation Corps, Rocky Mt. Youth Corps and Arizona Youth Corps provide meaningful outdoor work opportunities for young people between the ages of 14 and 25. Conservation Corps trail crews have completed trail rehabilitation projects on several Districts across the Forest. There are several Youth Conservation Corps partnered with the Forest to complete trail work, maintain recreation facilities, and construct recreation signs. With limited budgets to hire seasonal temporary employees, the Forest has increased the use of agreements with different conservation groups. There has been a trend in recent years in the southwestern United States of fewer conservation corps crews that are available for agreements. A risk of fewer available crews is more competition for crew availability during a short field season. Within the past five years, there have been three different conservation groups that have been utilized on the Forest, due to long travel times to work locations and the skill sets required to complete work within designated wilderness areas. As the Forest continues to utilize agreements, there will be a need to have a Forest liaison to work with these partners to set up agreements, coordinate prior to implementation of projects, and provide an educational component to conservation crews about the history and legacy of the Gila NF. Increasing the use of conservation crews on the Gila NF will help increase the awareness and knowledge of the Forest and its legacy with the youth, especially to crew members from other states.
- **Special Use Permits** allow private individuals and businesses to provide valuable services for visitors that may not possess the skills, equipment, or knowledge of the area to be able to participate in some recreation activities on the Gila NF independently. Privately provided recreation services provided under Special Use permits may include, but are not limited to, outfitting and guiding for hunting and fishing, tours, guided hikes or equestrian trail rides, and

special recreation events. See the section on Special Uses for more detailed information relating to the Special Uses program on the Gila NF.

- **Forest Product Permits** allow the public to gather firewood, cut Christmas trees, and harvest other types of timber products for personal, non-commercial use. Many people use wood-burning stoves or furnaces to heat their homes, and gathering firewood on the Forest has become a tradition for the entire family. The number of timber product permits sold has been steadily increasing during the past several years. The Forest recently removed restrictions on the maximum amount of fuelwood permits that an individual may purchase in a calendar year, which has increased the number of permits sold. Availability, accessibility, limitations on numbers of new green fuelwood areas combined with remoteness of location (distance needed to travel to remove products) are risks to future forest products use. Other forest products besides firewood that are typically gathered by the public include rocks, minerals, and piñon nuts. If a permit is required to harvest a forest product, they are administered under the authority of the Timber Program Manager or the Lands and Minerals specialist. A significant risk to continued availability of many forest products is climate change.
- **Scenic Byways / Scenic Highways** offer opportunities to drive for pleasure, view natural features, and view wildlife. There are two National Scenic Byways on the Gila NF: the Geronimo Trail and Trail of the Mountain Spirits. See the Designated Areas Chapter for more detailed information.

Scenic Character

This portion of the chapter provides background information on scenic character, evaluates the existing and potential conditions, and trends affecting scenic character.

People are concerned about the quality of their environment, including aesthetic values of the landscape, particularly scenery and spiritual values (USDA FS 1995). Located in New Mexico, the Gila National Forest features an abundance of spectacular scenery, ranging from high cool mountains forested with aspen and Douglas fir to warm semi-arid lowlands of juniper, oak and cactus. Forest Service lands that provide the scenic backdrop to adjacent communities offer a sense of place and contribute to the identity of those communities, while benefiting the local and regional economies. It is important to manage scenic resources to provide natural appearing landscapes that ensure quality sightseeing and other recreation opportunities for the public, as well as maintaining natural landscapes for communities adjacent to the Forest.

Natural appearing scenery provides the basis for high quality recreation experiences on the Forest. In other words, scenery is an integral component of all Forest settings, and contributes to the quality of visitors' recreation experience. Scenic resources or natural settings are recognized as a central component of the recreation niche of the Forest.

When the Gila National Forest Plan was developed and approved in 1986, it identified Visual Quality Objectives and Recreation Opportunity Spectrum (ROS) classes by management area. However, electronic maps for analysis purposes are unavailable of that data. The Visual Management System (VMS) provided the framework for inventorying the visual resource and providing measurable standards for managing it. The Forest Service replaced the VMS in 1995 with the Scenery Management System (SMS) for the inventory and analysis of the aesthetic values of National Forest System lands. The SMS is described in Agriculture Handbook 701, Landscape Aesthetics: A Handbook for Scenery Management (USDA FS 1995), which provides a systematic approach for determining the relative value and importance of scenery in National Forest lands.

The 2012 Planning Rule defines scenic character as: "A combination of the physical, biological, and cultural images that gives an area its scenic identity and contributes to its sense of place. Scenic character provides

a frame of reference from which to determine scenic attractiveness and to measure scenic integrity." (36 CFR 219.19). Forest Service agency policy (FSM 2382.3) mandates that the Gila National Forest will update scenery inventory using the SMS with the initiation of the current Forest Plan Revision.

There are many ecological and physical considerations that factor into the scenic character assessment of the Gila National Forest along with considerations for management of specially designated areas. The diversity of vegetation across the landscapes of the Forest is a key attribute of scenic character. Species composition across the various elevation zones and ecological settings, existing conditions, and distribution all contribute to scenic character conditions.

The Gila NF is home to many diverse landforms and landmarks that enhance scenic qualities. Landform types found on the Forest include steep rugged mountains, rolling hills, valleys, steep canyons, water features, and vast open grasslands. Where multiple and/or unique landforms occur in a single location, it tends to create unique landmarks that enhances scenic opportunities within the Gila NF. Figure 196 is an example of steep, rugged mountains and canyons meeting, and combined with a variety of vegetative species create a unique scenic opportunity. The management of specially designated areas require additional considerations to protect and enhance the scenic character that contributes to the designation. For additional information refer to the Designated Areas Chapter.

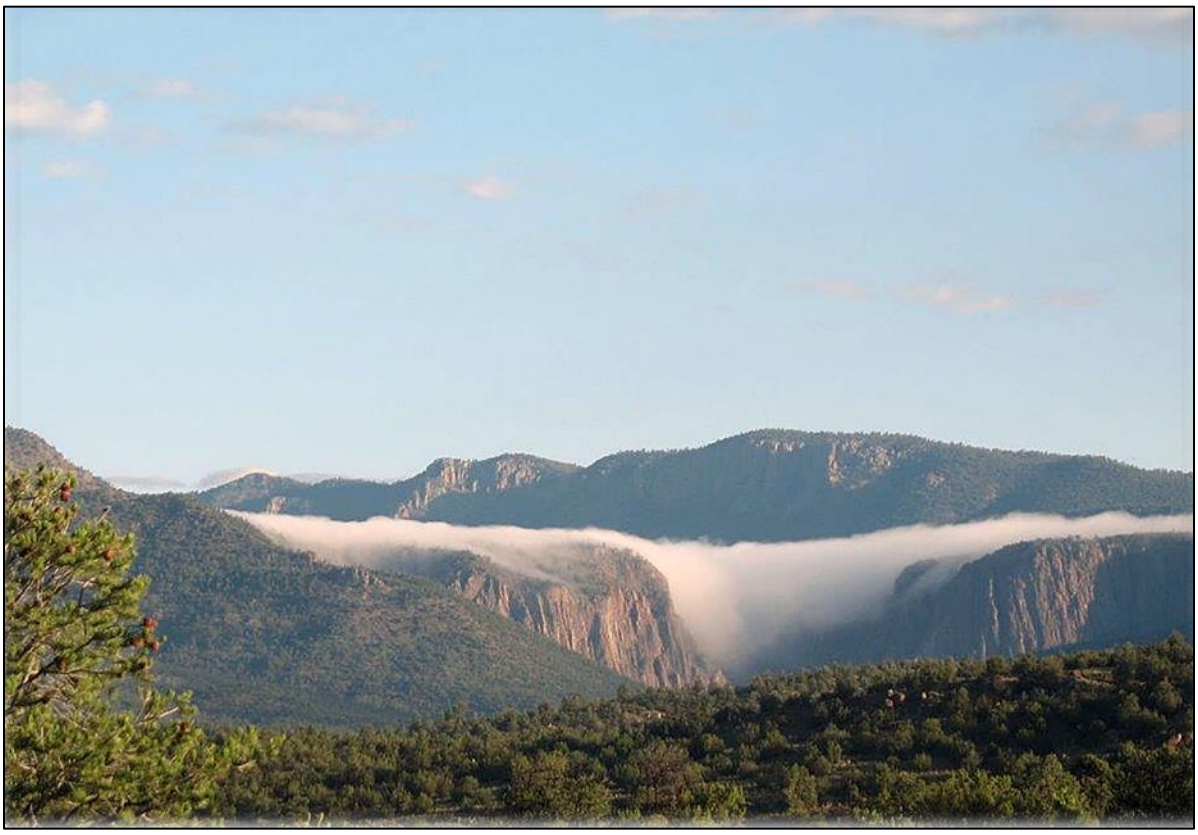


Figure 196. San Francisco Box Landform

Existing Scenic Character

A variety of landscapes across the Forest are managed to appear natural. This is done through a variety of management scenarios including providing semi-primitive non-motorized recreation settings. Approximately 45 percent of Forest lands are either designated wilderness areas or are inventoried

roadless areas. Together these areas of the Forest provide an abundance of natural appearing landscapes. Refer to Figure 197 for a map depicting these natural landscapes.

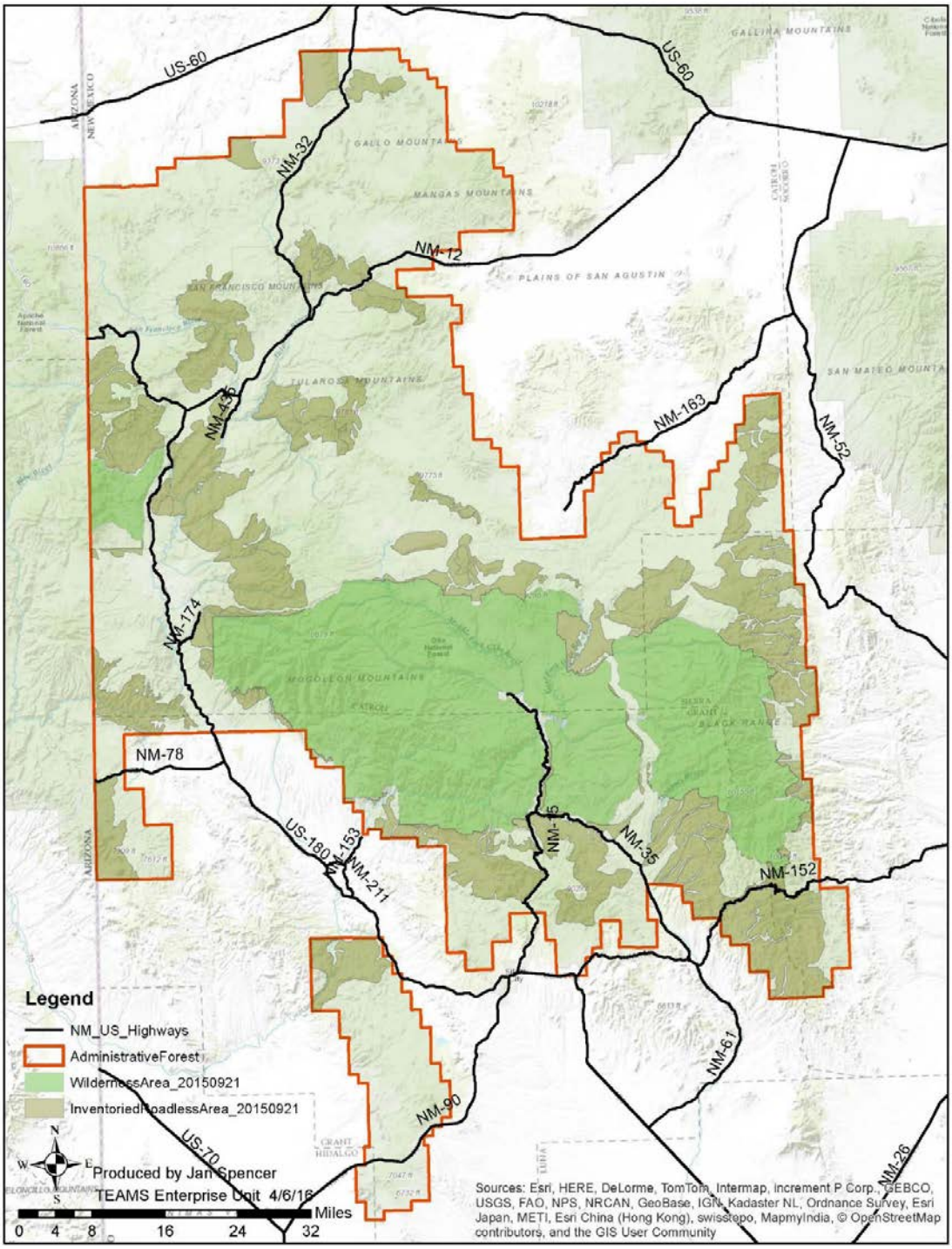


Figure 197. Map of areas that are natural appearing based on wilderness and inventoried roadless areas

The landscapes identified as suitable for timber harvesting may range from appearing slightly altered (but still natural appearing) to heavily altered depending upon implementation of planned management activities. Timber harvesting records from 1945 to 1993 show that 8 percent of the Forest had been managed for timber. During this time period timber production could be very noticeable in the landscape over several years. Although timber harvesting is one of the most noticeable activities on the landscape besides mining activities, because activity is site-specific and limited in scale, the majority of the scenic characteristics of the landscape were intact.

Natural disturbances affect Forest landscapes to varying degrees. Typically the events that create the most notable changes in the landscapes are insect and disease infestations, and fires that burn outside of the range of historic variability. The section "Trends Affecting the Condition of Scenic Character" has detailed information on how different disturbances affect current and future scenic conditions.

Potential Scenic Character

Natural appearing scenic character is a key component of recreation settings that attract outdoor recreation participants from all walks of life. The Forest has recognized the important contributions that scenic character plays by emphasizing it in the Forest recreation niche. Management of scenic character is intended to be planned in concert with the various multiple-uses that occur across the Forest to sustain the natural appearance of the landscape.

As shown in Figure 197, almost half of the Forest is managed to provide natural appearing landscapes. As long as the Forest continues to implement management activities that meet Scenic Integrity Objectives under the SMS, and react to natural disturbances such as insect epidemics and uncharacteristic wildfires in ways that would reduce the impacts to scenic character, natural appearing landscapes should continue to dominate the Forest. When recreation facilities are updated or newly constructed, efforts should be made to ensure the facilities meet the visual quality objectives and the Forest Service Built Environment Image Guide.

Factors Affecting the Condition of Scenic Character on the Gila National Forest

Landscape characteristics of scenery have been modified over the last century by implementation of management activities such as timber harvesting, prescribed burning, fire suppression, grazing, wildlife habitat improvements, utility corridor development, and recreation developments. These management activities typically impact scenic resources, but not to the same extent for all activities. This section will discuss the effects of the individual disturbances to scenic character.

Natural Disturbance Regimes

A wildfire that burns outside of the natural range of variability is likely to dramatically impact scenic resources over a long period of time. In contrast, localized patches of insect epidemics may cause tree mortality in a random pattern across a landscape level area. The mortality would impact scenic character, but may not be a dramatic effect to scenic character at the landscape level. These natural disturbance drivers combined with drought cycles have played a role in creating the current vegetative mosaic.

Fire

A current Gila NF priority is to restore and maintain ecosystems that are adapted to fire. In an attempt to use naturally-occurring wildland fire to reduce fuel levels along with achieving various resource benefits, the Gila NF manages natural fire starts if climatic conditions, private property, safety, and other conditions are favorable without risk of uncharacteristic fire for the vegetation type. Restoring the natural role of fire to these ecosystems has a very positive, long term effect to ecosystem resiliency. The reduction of the risk of large, high intensity, uncharacteristic fires occurring also contributes to the sustainability of scenic

character in the future. When these resource areas benefit from using fire as a management tool, so does the scenic characteristics of vegetation.

Wildfire, whether human caused or a natural ignition, can heavily alter the vegetative component of scenic character. Forested areas that once had a closed canopy can rapidly become an open canopy with few live trees. This can have dramatic effect on the experiences of Forest visitors that have an attachment or sense of place about an area that has experienced high levels of tree mortality following a fire event.

The size of the majority of wildfire occurrences on the Gila NF is typically very small, ranging from 2 acres to less than 100 acres. In recent years drought conditions have contributed to an increase in wildfire size and intensities (see System Drivers and Stressors Chapter). Impacts to scenic character from wildfires vary across the Forest from having little impact to drastically impacting large areas.

Although many factors (naturally occurring and human caused) contribute to fire severity and frequency, impacts from fires can have both negative and positive impacts to scenic character. An example is a stand replacement fire (i.e. high severity fire) in a mature mixed conifer vegetation type. Immediately after the fire event, the area have negative impacts to scenic character due to the amount of dead blackened trees, the presence of ash on the ground, and an overall lack of vegetation in that area. While the majority of these impacts initially have negative impacts to scenic character, the view from within the affected area to adjacent areas are increased. As the area recovers from the immediate effects of the fire event, wildflowers and ground cover increases along with a possible increase regeneration of aspen trees to provide a colorful setting to the area. The following figures are examples of effects from recent large fires with high severities. See the Upland Vegetation Chapter for more information on the fire regimes of the different ecosystems.

Figure 198. Effects from the Silver Wildfire of 2013 seen from Emory Pass Vista

Figure 199. Effects from the 2006 Bear Fire

Insects and Disease

Insects and diseases are natural components in forest ecosystems. The cyclic nature of endemic and epidemic levels of each have played a role in the historic vegetative patterns across the landscape, and will continue to influence the vegetative mosaic of the future. Both positive and negative changes to vegetation can arise from insect and disease presence. Positive changes may include, but are not limited to, variable openings creating diversity in the forest or woodland canopy, increased heterogeneity of species type, and structural age class. Large scale epidemics may negatively impact scenic characteristics of the landscape, such as a bark beetle epidemic that kills hundreds of acres of ponderosa pine. Historical records show no clear changes in outbreak patterns of native insects and diseases on the Gila NF. Refer to the Insects and Disease discussion in the Upland Vegetation Chapter and System Drivers and Stressors Chapter for further information.

Human-Caused Disturbance

A variety of management activities have occurred over a century across the landscape of the Gila NF. Some of these activities have included timber harvesting to support the railroad industry, grazing, mining, and fire suppression. Spread of nonnative species and noxious weeds has occurred in various locations. These historical activities have contributed to the vegetative mosaic influencing the current scenic characteristics. Suppression of fire has led to stands to becoming overstocked, creating a higher risk of wildfire. Grazing has been taking place since before the establishment of the National Forest. Other activities include, but are not limited to, communication site development, utility lines, and mining.

Fuels Reduction Treatments

Fuel reduction treatments, including mechanical methods and prescribed burning, help contribute to a natural appearing landscape and reduce the risk of high intensity fire which would negatively impact scenic character.

The following activities, accomplished in 2010 and 2011, are reflective of typical fuel reduction treatments on the Gila National Forest. In 2010 the Forest treated a total of 23,400 acres through the use of prescribed fire and mechanical removal. The majority of acres were treated with prescribed fire. In the five years prior to 2016, mechanical treatments have focused on the wildland urban interface (WUI) areas. Vegetation treatments in WUI and other areas that promote the natural role of fire across the landscape also serve to enhance the vegetative components of scenic character.

Timber

Prior to 1996 the Gila NF emphasis for timber management was to conduct even-age management treatments. In an effort to comply with the Mexican spotted owl and northern goshawk guidance, the Forest transitioned to emphasizing the use of uneven-aged management techniques. The uneven-aged management treatments result in more natural appearing landscape characteristics. In the last decade the majority of treatments occurred in ponderosa pine and piñon pine/ juniper stands. This shift in management practices enhances scenic character by reducing the likelihood of uncharacteristic wildfires. Refer to the Timber section of the Multiple Uses Chapter for additional details regarding these practices.

Vegetation management activities can have variable impacts to the scenic characteristics of the vegetative component of scenery management. Some activities may be more dominant in the surrounding natural appearing landscape than others. The permanent land clearing that was done for the Tucson Electric Power Company electric transmission line corridor is in direct contrast to the surrounding natural landscape characteristics and would be considered as very low scenic integrity. Shelterwood establishment cuts, wildlife habitat regeneration cuts, and fuel breaks usually also have a low scenic integrity. The thinning and mastication shown in Figure 200 and the prescribed burn in Figure 201 have a moderate scenic integrity level/slightly altered appearance.

Figure 200. Thinning and Mastication around Poverty Creek

Figure 201. Prescribed Fire at Indian Peaks

Developed Recreation

Developed recreation facilities on the Forest should be designed to complement and blend into the landscape. This is true of both Forest Service facilities and facilities operated under special use permit. The 1986 Forest plan, along with national policies for developed recreation sites, have provided direction as to what visual quality objectives needed to be met for developed recreation facilities on the Forest. Under the new plan, the Scenery Integrity Objectives for these areas will be managed under Scenery Management System.

The Gila NF has a range of developed recreation facilities, including day use sites, trailheads, campgrounds, and boat ramps. The facilities vary in the degree that they blend into the surrounding landscape characteristics. Figure 202 and Figure 203 display examples of developed recreation facilities.

Figure 202. Quemado Lake Recreation Area

Figure 203. Campsite in the Mesa Campground blending into the surrounding landscape

Utilities

Installation and maintenance of utilities rights of way on Forest lands usually create long-term modifications to the landscape. Powerline corridors are by necessity managed to keep vegetation at a minimum height over the width of the corridor. The following photo taken on the Quemado District illustrates the contrast of the surrounding Forest and a maintained utility corridor. The distinct edge of the corridor is defined by lack of vegetation on the hill in the middle of the photo.

Figure 204. Powerline Utility Corridor in the Foreground Distance Zone

Conditions and Trends Affecting the Quality of Recreational Settings

External factors affecting the opportunity and condition of recreation related activities primarily involve wildfire. In the previous 15 years, the Gila NF has experienced many large, high severity wildfires that have drastically changed landscapes across the Gila NF. These large wildfires have directly and indirectly impacted many recreation facilities and trails on the Gila NF. Although there have been many large scale prescribed fires and managed fires for resource benefit on the Gila NF, typically care was taken to minimize effects from these types of fires to values such as recreation opportunities, trail opportunities and scenic character. In the previous five years, there have been a total of 1,208,354 acres of wildfires at a minimum of 1,000 acres in size occurring within or immediately adjacent to the Gila NF. During this same time period, there were four fires over 85,000 acres each, and in three consecutive years (2011, 2012, and 2013), the Gila NF had a fire over 100,000 acres in size each of these years.

The current trend shows a likelihood for higher severity fire and flood events to occur in the future, along with more frequent intervals of these events. There are many common impacts from the aforementioned wildfires to recreation facilities and trails. Some of the impacts include: temporary recreation area and trail closures during the incident and post-fire effects of infrastructure damage and visual impacts to the landscape. Typically impacts from large, high severity wildfires may cause greater damage with a longer duration of effect. Areas within and surrounding large fires typically experience more intense and frequent flooding. Other impacts/damages include landslides, dead trees falling on or within facilities and trails, encroaching nuisance vegetation, erosion, extended closures due to hazardous conditions, and silting in of available water sources. Rehabilitation and restoration projects may take several years to fund and complete, which could delay other planned projects from being addressed.

Climate Conditions

The Southwest has recently experienced an extended drought, and climate predictions indicate drought conditions are likely to reoccur on a cyclical basis. As fire danger increases, restrictions may be put in place to reduce the risk of human-caused fires. Depending on the severity of conditions, restrictions typically

range from a ban on open campfires to Forest closures. These restrictions limit access to recreational settings and opportunities.

Extended periods of warm weather may also lead to a longer "summer" recreation season, starting earlier in the spring and extending later into the fall. A longer recreation season may necessitate the need to extend employment for seasonal staff, while incurring additional operation and maintenance costs.

Extended droughts directly affect available water sources for hikers. Across the Forest, there is already limited water sources, and in many areas the distance between water sources limits the opportunities for trail users. The Forest has experienced loss of previously reliable water sources from extended droughts, damages from wildfires, and a lack of maintenance to remote water developments. The risk associated with the loss of water sources is limitations to user experiences due to lack of reliable water and an increasing need to carry larger amounts over longer distances.

In addition to water sources, these same stressors affect water levels of the streams and lakes located within the Gila NF. As stream and lake levels decrease, the diversity of recreational opportunities become more limited. This results in concentrated use of streams that continue to have flowing water conditions, and adds pressure to streamside trails. The flow rate, along with depth, can determine the quality of fishing, navigability by watercraft, and suitability for swimming or bathing in hot springs. At lakes, decreasing lake levels affect access along shorelines, practical utility of boat ramps, and may result in lower visitation numbers.

Sustainability of Recreation and Scenic Character Opportunities

The goal of sustainable recreation is to:

- Provide a diverse range of quality natural and cultural resources-based recreation opportunities, and protect the natural, cultural, and scenic environment for present and future generations to enjoy
- Partner with public and private recreation benefit providers to meet public needs and expectations
- Perform and plan by implementing systems and processes to ensure effective decisions, sound investments and economic efficiencies.

National forests can no longer depend solely upon appropriated funding to meet constituents' needs, and must unite diverse interests and focus scarce resources to sustain and expand the benefits of outdoor recreation. To sustain these benefits, the recreation program must achieve a sustainable balance among the three spheres of environmental, social, and economic conditions (USDA FS 2010h).

The current trend observed on the Gila NF is of increasing demand for services and levels of recreation use, in conjunction with flat or declining budgets and fewer staff. These factors make it increasingly difficult to maintain and operate existing recreation program infrastructure to standard. In addition, recreation facilities, particularly older sites, may no longer align with the capacity or use for which they were originally designed. The risk associated with not implementing a Forest-wide sustainable recreation strategy is that the program will continue to struggle to provide quality recreational opportunities to the public.

The Gila NF has created a Sustainable Recreation Strategy Action Plan to enable the recreation program to meet the needs of the public and protect resources, while being more efficient, effective, and sustainable within the current budget environment. The Forest expects this action plan to be an evolving document based upon stakeholder input both internally and externally.

Influences Outside of the Plan Area Affecting Demand for Recreation

There are many factors and influences outside of the planning area that affect the use of and demand for recreation on the Gila NF. Examples of these influences include the preferences of New Mexico residents and out of state visitors for recreation opportunities, economic conditions, statewide and national recreation activity trends, and current / future recreational development within New Mexico.

Approximately every five years, the New Mexico State Parks with cooperating agencies and partners produce a comprehensive outdoor recreation plan. These documents compile data of trends and influences that affect recreation along with objectives and actions for New Mexico State Parks and partners. The two most recent plans were published in 2009 and 2015.

According to the 2015 Plan (NM EMNRD 2015), the favorite outdoor activities across the state of New Mexico are as follows:

- Walking, hiking, and running 41%
- Hunting, fishing, shooting, and wildlife viewing 17%
- Camping 10%
- Visiting parks, lakes, and sightseeing 6%
- Team and individual sports 6%
- Biking and equestrian 5%
- Swimming and boating 4%
- Other activities 9%

These numbers are comparable to the NVUM data collected on the Forest and show that the trend of preferred activities on the Gila NF and within the State of New Mexico are similar. This information emphasizes the importance of meeting the desired activities of visitors.

The Viva New Mexico plan identifies five key themes in which objectives and action items were identified to increase benefits that outdoor recreation can provide within New Mexico. The five themes are as follows:

- Community Livability
- Trails
- Health
- Economic Vitality
- Environmental Health

It is important that the Gila National Forest reference this plan when developing strategies for forming new partnerships or strengthening existing partnerships. These plans provide useful information such as the availability of alternative funding sources that could be taken advantage of to assist with completing future projects. Wherever the goals and actions of these plans align with those of the Gila NF recreation program, coordinated efforts could result in improved recreational opportunities within the Gila NF to future potential visitors.

Currently there is an emphasis by the Gila NF to coordinate and partner with the State of New Mexico, local communities, chamber of commences, and other government agencies. Coordination with these partners helps to develop a common vision for needs and desires of the recreating public, and to make the most of developing new opportunities and improving existing ones. The Forest is already working with local communities to emphasize recreation opportunities that could attract visitation and provide benefit

to local economies. The biggest risk associated with insufficient communication with these partners is a possible difference of priorities and vision.

Recreation opportunities on other lands within the broader landscape

There are a number of recreation opportunities available adjacent to and nearby the Gila National Forest. The Gila Cliff Dwellings National Monument, administered by the National Park Service, is located near the center of the Gila NF; and to the west of the Gila NF and across the border in the state of Arizona are the Apache-Sitgreaves NFs; and to the northeast are segments of the Cibola NF. Both of these Forests offer many similar recreational opportunities to ones that may be found on the Gila NF. Differences from opportunities with these two nearby forests are the Gila NF has significantly larger wilderness areas and less development, while the Apache-Sitgreaves NFs tend draw more visitors for snow related activities, and have more fishing opportunities.

There are several New Mexico State Parks in the area surrounding the Gila NF that offer hiking and camping. Two nearby State Parks are located on some of largest lakes in New Mexico (Elephant Butte Lake and Caballo Lake), offering a variety of water related recreation opportunities as well as camping and hiking. Two other state managed lakes in the area that are popular fishing destinations are Bill Evans Lake and Bear Canyon Lake. City of Rocks State Park offers camping and hiking opportunities.

There are a number of BLM developed recreation sites in the Gila NF region that offer hiking, camping, visitor center activities, and other opportunities. Additionally, many adjacent BLM lands (and New Mexico State Lands) allow both hunting and dispersed camping. The primary difference between many of these aforementioned areas (except for the Apache-Sitgreaves NFs) is that they feature a semi-arid desert environment with limited forested areas as compared to the Gila NF.

There are several National Wildlife Refuges administered by the U.S. Fish and Wildlife Service located within the broader area, including the Bosque Del Apache, Sevilleta, and San Andres National Wildlife Refuges. These refuges all provide excellent opportunities for wildlife viewing, including large bird migrations.

Many of the recreation opportunities adjacent to the Gila NF have a minimal impact on the demand for recreation services provided by the Forest. In many situations, visitors to nearby opportunities will make use of recreation sites on the Forest as well. The majority of adjacent recreation opportunities offer a different recreation experience (either in a different ecological setting or unique activity not offered on the Gila NF), which allows visitors to southern New Mexico a variety of experiences in diverse settings. A common trend observed among visitors to southern New Mexico is that when visiting their planned destination, they discover other recreation opportunities found within the area.

Stakeholder Input

There were a number of comments received relating to the personal value of recreation on the Gila NF. Some common values identified included: opportunities for hunting and fishing, trails and roads for access and recreation, opportunities for developed and dispersed recreation, open access to the Forest, the need for current information, development of the Cosmic Campground, protection of wilderness and primitive areas, economic benefits to local communities, and opportunities for future generations to use the Gila NF.

Comments related to current recreation conditions on the Gila NF were similar. Many comments noted that the majority of trails were in poor condition, and that many popular trails were currently closed to the public. Other comments also mentioned the impact of flooding and wildfires on trail conditions, and noted that declining budgets affected the amount of maintenance being completed. Comments also

noted that many trail signs are unreadable or completely missing, and the need for updated trail maps. There were many comments about the need to update and improve existing campgrounds. People felt that there is a need for additional opportunities for camping. It was also identified that there is lack of interpretive and environmental education services offered by the Forest.

Many trends were identified through public comments. An increase of litter and trash scattered throughout the Forest has been observed. Conflicts amongst different user groups have been increasing. The trend of decreased budgets and emphasis of the recreation program affecting the conditions of facilities and trails was observed. Limiting access, closing roads / trails, and closing existing campgrounds was also a common comment.

Comments also identified several risks to the recreation program. Risks of declining visitation and use of the Gila NF due declining conditions of facilities and trails will have negative impacts to local economies. Lack of outreach about recreational opportunities will result in future visitors overlooking the Gila NF as a destination. The risk of extended and seasonal closures of developed recreation sites and trails will lead to overcrowding of open sites, increased user conflicts, and an increase in resource damages.

Summary

The Gila NF features a unique and diverse range of recreational opportunities as compared to other national forests within the Southwest Region. Opportunities for solitude, either as part of a wilderness experience, or even when pursuing more developed recreation experiences is one of the strengths of the Gila NF. This opportunity for experiencing large areas of undeveloped wilderness combined with the Gila NF's association with Aldo Leopold creating of the world's first designated wilderness area make the Forest a national and international destination.

Demand for recreational opportunities on the Gila NF is increasing, while many in-demand opportunities have limited availability on lands adjacent to the Forest. Effects to the recreation program are increasing by more frequent, uncharacteristically severe intensity wildfires, post-fire flooding, drought, insects and disease, and an increasing backlog of deferred maintenance for recreation facilities and trails. These impacts negatively affect the quality of recreation settings, opportunities, seasons of use, and visitor experiences. Management of Forest recreation opportunities with stagnant or declining budgets, limited staffing, conflicting user group demands, and resource impacts will continue to be a challenge. It will be vital for the Forest recreation program to work internally with other program areas and externally various partner groups and volunteers to develop and implement a sustainable recreation program.

Chapter 13. Designated Areas

Introduction

Every National Forest has areas that contain special, exceptional, or unique values. Many of these areas meet the criteria to be considered special places and can be designated special status. This status can be on a national, regional, or local scale. Designated areas are specific areas or features within the plan area that have been given a permanent designation to maintain its unique special character or purpose. Designation of these areas undergoes rigorous scrutiny and study that can last years, depending on individual circumstances. Official designation of areas may be established by statute (statutorily designated areas or often called congressionally designated areas) or by administrative processes (administratively designated areas).

Designated areas within the Gila NF by type of designation include:

- Statutorily Designated Areas
    - Three wilderness areas
    - Two wilderness study areas
    - One national scenic trail
- Administratively Designated Areas
    - 29 inventoried Roadless areas
    - Eight listed eligible wild and scenic rivers (eligibility is completed administratively, official designation is completed through Statute)
    - One established and four proposed research natural areas
    - Two scenic byways
    - Three national recreation trails
    - Six species that have finalized critical habitat

Some benefits of designated areas may include connecting people to their natural and cultural heritage, providing unique recreational opportunities, preserving intact natural systems, and protecting special or unique features.

This chapter will discuss:

- Ecosystem Services of Designated Areas
- Descriptions of Existing Designated Areas located within the Gila NF
- Current Conditions, Uses, and Trends of Designated Areas Within the Gila NF
- Designated Areas located adjacent and near the Gila NF
- Potential Need or Opportunity for Future Designations
- Contributions of Designated Areas to Social, Economic, and Ecological Sustainability
- Synopsis of Stakeholder Input received on designated areas
- Chapter Summary

The chapter will not address the separate but required inventory and evaluation process which is governed by Chapters 70 and 80 of the 2012 Planning Rule. This separate process requires the Gila NF to identify and evaluate lands which may be suitable for inclusion in the national wilderness preservation system (see FSH 1909.12, Chapter 70) or the wild and scenic rivers system (see FSH 1909.12, Chapter 80). The Gila NF will conduct inventory and analysis through a separate public engagement process following the

assessment but prior to the development of alternatives during the formal plan development process as governed by the National Environmental Policy Act.

Ecosystem Services of Designated Areas

Designated areas offer ecosystem services including, but not limited to:

- *Supporting:* Ecosystem services of designated areas offer nutrient cycling, plant production, soil formation, etc. through the ecosystems they support either directly or indirectly through designation.
- *Regulating:* Ecosystem services of designated areas provide some level of protection for the values they were designated for. This allows regulating services, such as storage of carbon, water filtration, climate regulation etc. to function with some level of protection.
- *Provisioning:* Ecosystem services of designated areas are important to water resources that offer provisioning services by providing water for ecosystem and domestic use.
- *Cultural:* Ecosystem services of designated areas deliver unsurpassed recreational and scenic opportunities, places to connect with nature and spirit, and contribute to the local tourism industry. They also offer the ability to connect with history and provide places for research.

Wilderness

The concept of managing some areas within the National Forest System as wilderness was first applied in 1924, with the administrative designation of the Gila Wilderness at the urging of the conservation pioneer Aldo Leopold. The Gila Wilderness became a part of the National Wilderness Preservation System when Congress passed the Wilderness Act of 1964. The definition of wilderness from the 1964 Wilderness Act is:

> "A Wilderness in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

In the 1964 law, Congress acknowledged the immediate and lasting benefits of wild places, by passing landmark legislation that permanently protected some of the most natural and undisturbed places in America. The Wilderness Act established the National Wilderness Preservation System "...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." In 1980, the Blue Range and Aldo Leopold Wilderness Areas became part of the National Wilderness Preservation System with the passage of the New Mexico Wilderness Act. The three wilderness areas together total around 792,584 acres, or approximately 24 percent of the Gila National Forest (Figure 205).

The Wilderness Act prohibits permanent roads and the use any form of motorized or mechanized transport within wilderness areas. The Wilderness Act requires management of human-caused impacts and protection of the area's wilderness character to insure that it is "unimpaired for the future use and enjoyment as wilderness."

The Wilderness Act describes wilderness using the following four qualities of "wilderness character":

- Untrammeled – free from modern human control or manipulation
- Natural – where the natural condition of the land, its plants, wildlife, water, soil, air and the ecological processes are managed, protected and preserved
- Undeveloped – retaining its primeval character and influence, as is essentially without permanent improvements or human occupation
- Outstanding opportunities for Solitude or Primitive and Unconfined Recreation – opportunities for solitude or primitive and unconfined recreational experiences

There is sometimes a fifth quality of wilderness character called "Other Features of Value," which are ecological, geological or other features of scientific, educational, scenic, or historical value that are truly unique and essential to the character of a particular wilderness, but this may not be applicable to all wilderness areas.

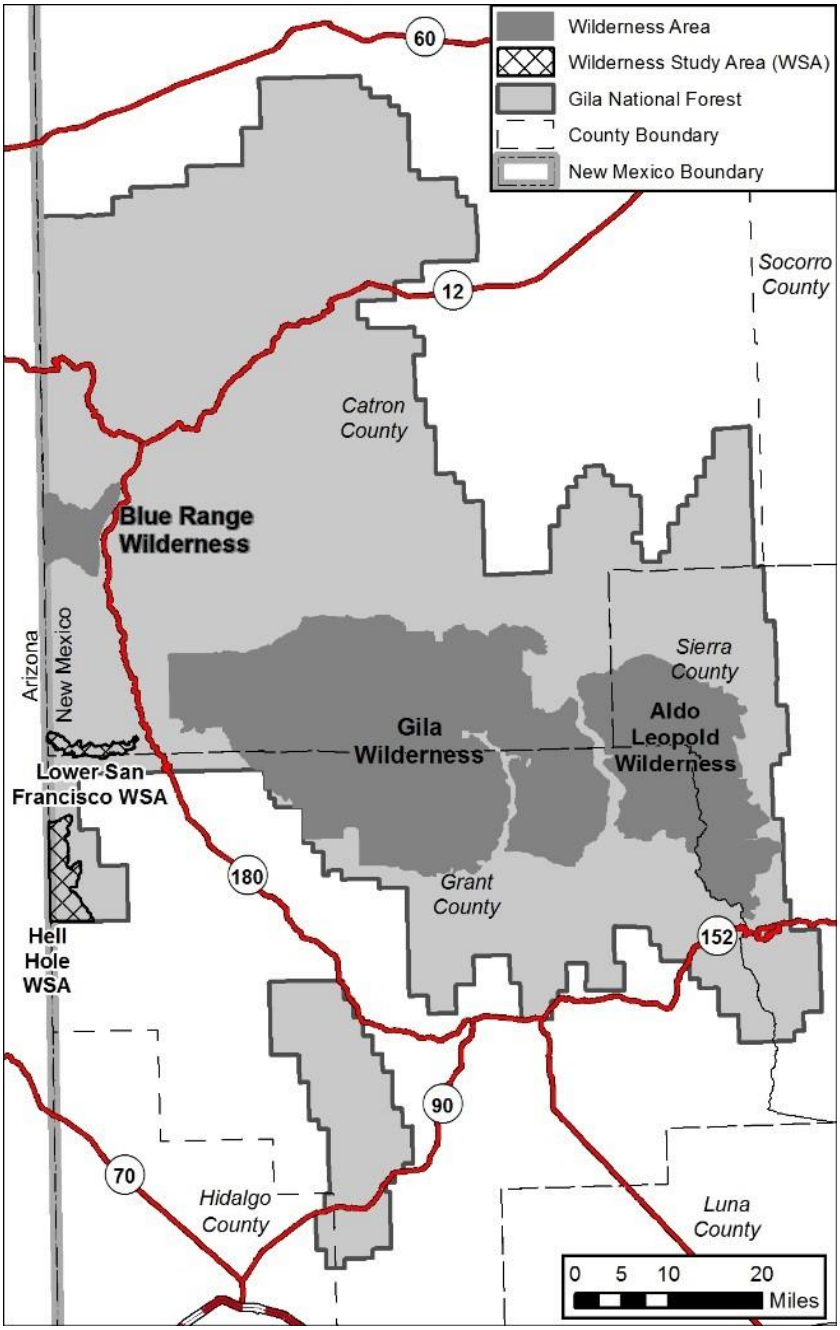


Figure 205. Wilderness and Wilderness Study Areas, Gila National Forest

All of the Gila NF's wilderness areas have the following characteristics in common:

- Popular activities within wilderness on the Gila NF include: hiking, backpacking, horseback riding, camping, hunting, fishing, and wildlife viewing.
- Many of these activities provide opportunities to seek solitude in a natural primitive setting.
- Current overall recreational use of the wilderness on the Forest is considered relatively low as compared to other wilderness areas located nearer to large metropolitan areas. However, each wilderness area has popular trails and specific that may experience periods of high use and associated concerns for impacts to resources and the solitude component of wilderness character.
- There are significant numbers of documented intrusions by motorized vehicles in all of the wilderness areas. This tends to mostly occur where gentle terrain intersects the boundaries of wilderness areas, and additional undocumented intrusions may be occurring in remote locations of the wilderness boundaries. Implementation of the travel management decision (including the prohibition on cross-country travel and designation of a motorized route system) may reduce the recurrence of motorized trespass and help protect wilderness character.
- The sights and sounds of military overflights have a negative effect on opportunities for solitude in wilderness across the Forest.
- The 1986 Gila Forest Plan mandates the management of the wilderness resource for quality wilderness experiences and to protect and preserve the unique wilderness character of each wilderness area. The plan provides a number of standards and guidelines for the purpose of achieving this desired condition.
- The 1986 Forest Plan also provides direction for allowing wildfire to be managed for resource benefit within wilderness. Managing fires for resource benefit can be challenging due to public concerns, adjacent private land issues, and the effects of fuel loading, slope, aspect, terrain, and/or seasonality on fire intensity. Use of prescribed fire presents challenges dealing with fuel loadings, threatened and endangered species restrictions, and mimicking the timing of naturally occurring fire. Although wilderness resource benefits may be a positive secondary effect, by agency policy prescribed (agency ignited) fire may only be used in wilderness for fire management objectives (i.e., to reduce the possibility of future wildfires moving onto adjacent private property, or to reduce fuel loading and the likelihood of high intensity wildfires outside the natural range of variability).
- The 1986 Forest Plan provides the following management direction specific to wilderness areas:
    - Maximum group size of 25 persons and/or 35 head of pack and saddle stock
    - Organized recreation events either competitive or non-competitive (for example: runs, games, trail endurance events, etc.) will not be allowed within designated wilderness areas
- To meet the requirements of law, policy and regulation, the Forest must undergo a Minimum Requirements Analysis (MRA) prior to undertaking any management action within congressionally designated wilderness. The MRA is a process to determine what is the least intrusive tool, equipment, device, force, regulation, or practice determined to be necessary to accomplish an essential task that will also achieve wilderness management objectives. The management tool that is most commonly used to conduct an MRA process is known as the Minimum Requirements Decision Guide (MRDG).

According to National Visitor Use Monitoring (NVUM) data that was collected on the Gila NF in 2006 and 2011, there has been an increase of visitation to wilderness areas from 18,000 reported visits in 2006 to 21,000 visits in 2011 on the Gila NF. In addition to the trend of increased number of visits, the average duration of a visit to wilderness areas on the Gila NF has increased from 15.5 hours per visit to 17.3 hours

per visit. The risk of increased visitation is that popular areas may be experiencing periods of high use which could decrease the quality of a solitude experience. This risk may be a contributing factor to the trend of longer average duration of a single visit, due because of a need to visit more remote areas to experience solitude.

Gila Wilderness

The cache of being the world's first formerly designated wilderness, combined with the associated ties to legacy of conservationist Aldo Leopold, makes the Gila Wilderness a national and international destination. However, the Gila is also a draw for visitors who seek a primitive natural experience, regardless of its place in the history of wilderness management. At 559,688 acres, the Gila is New Mexico's largest wilderness, with an extensive trail system providing access. High mesas, rolling hills, and deep canyons distinguish the eastern portions, as do piñon and juniper woodland and a few grassland areas. Ponderosa pines blanket the central portion, with sheer cliffs outlining the Gila River. The west and southwest portions boast high mountains with spruce-fir forests, particularly within the Mogollon Range, with elevations up to 10,895 feet at Whitewater Baldy. The headwaters of many important rivers and creeks originate in the Gila Wilderness.

Of all the wilderness areas on the Gila NF, the Gila Wilderness receives the majority of recreational use. Most of this use occurs from early spring through late fall. Popular recreation activities within the Gila Wilderness include backpacking, day hikes, horse / pack trips, and big game hunting. Current visitation is generally light, with minimal user conflicts. Some areas within the Gila Wilderness do experience periods of high use, in particular the East, Middle, and West Forks of the Gila River and trails located near Gila Cliff Dwellings National Monument. When water levels in the rivers are high enough, rafting and kayaking does occur on the Gila River from Grapevine Campground to Mogollon Box. The popularity of these areas are due to proximity to water sources and access to the wilderness boundary.

The Gila Cliff Dwellings National Monument (administered by the National Park Service) is a popular destination, and many visitors to the monument also take time to hike on one of the nearby trails that lead into the Gila Wilderness. This contributes to the trend of high visitation to these areas of the Gila Wilderness during summer months. The risk of increased visitation includes over-crowding which could limit the opportunity for visitors to experience solitude.

Other risks of popular areas and trails are increased opportunity for user conflicts, resource damage from overuse of popular trails and campsites, and increased user-developed trails. There are many areas within the Gila Wilderness that experience very light visitation. These areas include trailheads located away from populated areas with difficult access, areas within the Gila Wilderness that are greater than 10 miles from the nearest boundary, and many locations within the wilderness that have limited water sources. The risk to these areas is that without regular use, many remote trails are a low priority to receive maintenance and tend to be declining in condition. Many trails in these less-visited areas are difficult to find and to follow.

Although grazing and grazing improvements in wilderness are allowed under the 1964 Wilderness Act, some visitors to the Gila Wilderness have expressed that it negatively affects their wilderness experience. Significant grazing reductions on the Gila NF within wilderness and non-wilderness alike occurred in the 1950s and then again in the 1990s. Grazing numbers within the Gila Wilderness have remained fairly stable, with some decline for at least the past 10 years. There are a number of grazing allotments within the Gila Wilderness that are currently in non-use status, or grazing less than the administratively permitted numbers. Grazing management activities that occur within the Gila Wilderness on active allotments includes maintenance to range improvements such as fences, water structures, gates, and holding pens. There is a risk that these activities could impact visitors' solitude experience during

implementation and consequential negative visual effects. However, to mitigate any visual effects from fences and structures, the location is preferred to be out of the view of existing trails. Additionally when possible, materials and designs that blend in with the surrounding area are utilized to minimize impacts that can detract from a wilderness experience.

There are many existing or potential management activities that occur within the Gila Wilderness. The risk of nonnative species establishment and expansion within the Gila Wilderness has profound negative impacts to the natural quality of wilderness character, particularly in riparian/aquatic areas where many nonnative species may outcompete native species. The short-term negative effects to untrammeled quality during nonnative control activities are considered against the long-term positive effects to the natural quality of the wilderness character in the Minimum Requirements Analysis process.

The Gila NF routinely partners with the New Mexico Game and Fish Department along with the US Fish and Wildlife Service to complete a variety of habitat improvement and species management activities within the Gila Wilderness. The trend of these activities has remained constant in recent years. Most of these activities occur on an annual basis, and after being analyzed by the Minimum Requirements Decision Guide are found to have minimal impacts to wilderness character in comparison to positive effects. The risk of these projects include negative effects to the untrammeled quality of wilderness character, short term disruptions in location-specific areas while work is conducted that could affect opportunities for solitude. However, the risk if these projects are not completed would have a negative effect to the natural qualities of wilderness character.

Other activities that may impact wilderness character and visitor experiences include trail maintenance/construction, administrative cabin maintenance, and fire lookout tower operations. Many times, the risk of affecting wilderness character has a short duration during the activity, but has a long-term benefit overall. When these activities occur, the design of the features attempts to blend them into the natural environment when possible.

The ecological condition of the Gila Wilderness is dependent on many environment factors. During periods of prolonged drought, decreased water levels in streams, springs, and rivers within the Gila Wilderness have been observed. Drought and reduced water levels may limit recreational opportunities, affect wildlife, impact aquatic species, and affect vegetative health, increasing susceptibility to insect and disease outbreaks and increased likelihood of uncharacteristic wildfires outside the natural fire regime for specific ecosystems (see System Drivers and Stressors Chapter).

Fire management activities that occur within the Gila Wilderness include actions related to fire suppression and management of naturally ignited fires. The Gila NF has trended towards managing naturally ignited fires within the Gila Wilderness across the landscape since the 1970's when conditions are favorable. Risks associated with managed fire include short term negative effects to air quality, potential for areas experiencing high severity fire effects, and possible temporary area closures. However, the risk of not managing these fires leads to continued fuel loading and a higher potential for uncharacteristic fire severity in the future negatively impacting the ecosystem. Restoring the natural role of fire to the ecosystem has a very positive, long-term effect to wilderness character and ecosystem resiliency. In contrast, large areas of uncharacteristic fire may be detrimental to wilderness character and cause significant ecological impacts such as erosion, stream sedimentation, vegetation loss, and negative impacts to certain wildlife and aquatic species (see System Drivers and Stressors Chapter).

During the past ten years there have been several large fires that have occurred within the Gila Wilderness, see Figure 206. The majority of these large fires have occurred in the central and western portions of the Gila Wilderness. Fire severity is dependent on weather conditions, fuel loading / type, and when the area has last experienced fire. Many fires within the Gila Wilderness burn in a mosaic pattern with lower

severities in locations where recent fire has occurred to high severity where there has been minimal fire in recent history.

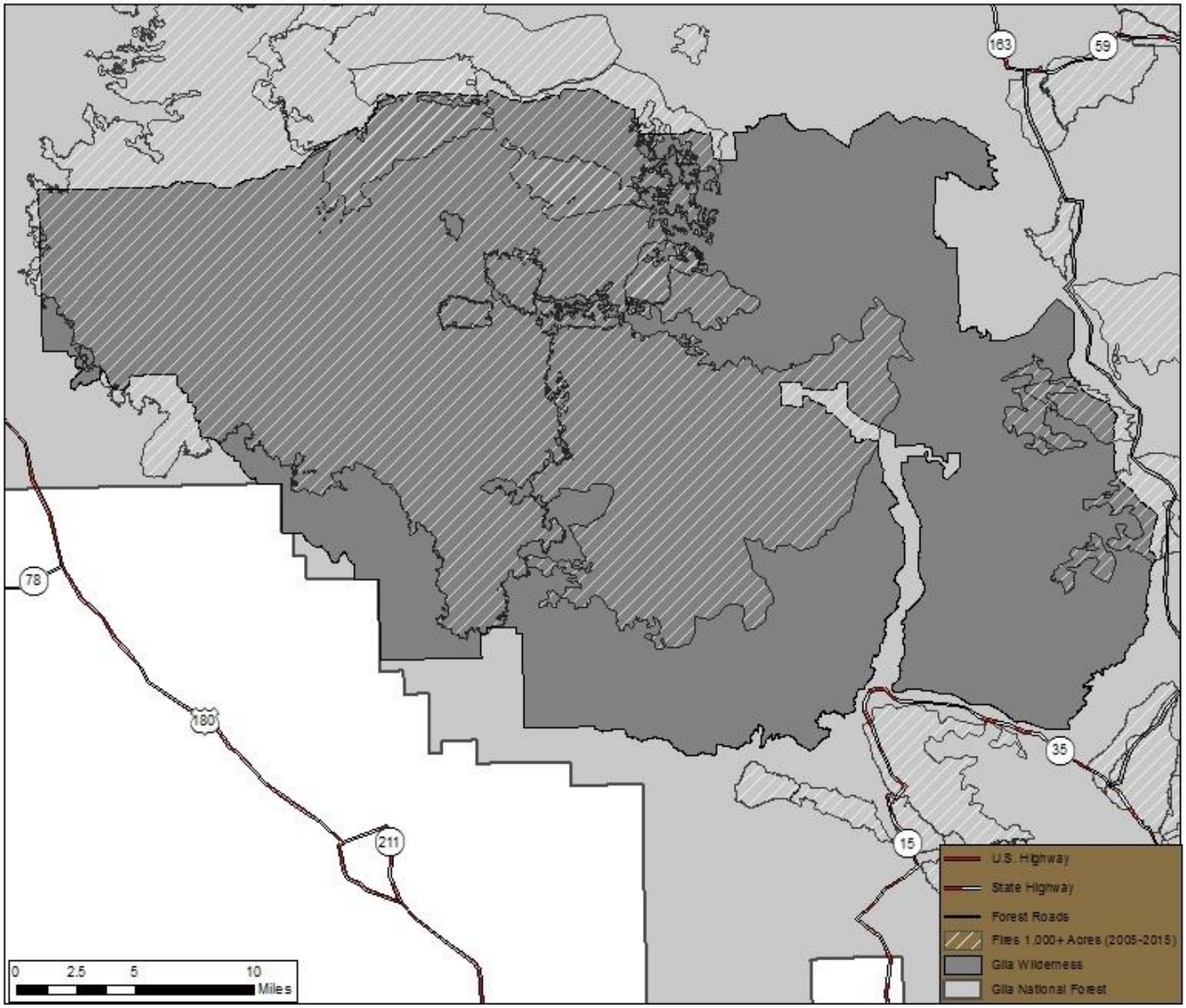


Figure 206. Fires 1,000+ acres within the Gila Wilderness 2005 – 2015

The Gila Wilderness is the only class 1 airshed within the Gila National Forest (see Air Chapter). Currently, air quality within the Gila Wilderness is very high quality, with minimal impacts from pollution. The long distances from large urban areas contributes to the increased air quality along with minimal impacts from air and light pollution. A risk to the air quality of the Gila Wilderness is smoke impacts from fires burning within and adjacent to the wilderness. When planning for prescribed fire project implementation near the Gila Wilderness, potential impact from smoke to air quality is a significant consideration for implementing the project. With many prescribed fire projects, implementation is planned when wind conditions are favorable to have a minimal impact to the class 1 airshed.

Aldo Leopold Wilderness

The Aldo Leopold Wilderness is 203,797 acres (New Mexico's third largest), and straddles the crest of the Black Range. Containing some of the most rugged portions of these mountains, the crest of the range overlooks a series of east-west trending steep and narrow stream valleys, one thousand or more feet deep. The Continental Divide cuts across the center ridgeline of the Wilderness, and a section of the Continental Divide National Scenic Trail (CDNST) is present. Hiking and backpacking are the major recreational activities, but scarcity of water inhibits many potential visitors as most streams and springs are seasonal and unreliable. The Aldo Leopold Wilderness is often considered New Mexico's "wildest wilderness" with low use and excellent opportunities for solitude. Only Forest Service Road 150 separates the Aldo Leopold Wilderness from the even larger Gila Wilderness. Prior to construction of this road, the area that is now the Aldo Leopold Wilderness was part of the original administratively designated Gila Wilderness. Hunting is another popular activity within the Aldo Leopold Wilderness. Rugged terrain and limited access points reduce the amount of hunters that are able to utilize remote areas within the wilderness.

Access into the Aldo Leopold Wilderness is limited, and many trailheads are in remote areas and accessed by forest roads that require high clearance vehicles. Most trailheads are located off of paved roads and require hiking several miles before entering the wilderness boundary. This limitation on direct access is a contributing factor to lower visitation numbers than the neighboring Gila Wilderness. The majority of visitors to the Aldo Leopold Wilderness stay for multiple days, likely due to the remoteness of the area. During recent years, there has been an increasing trend of visitors requesting trail information for the Aldo Leopold Wilderness. Many of the information requests are for areas to experience solitude, but also inquiring about water availability. Visitors often report that during their trip they did not see another person the entire time.

Existing or potential management activities that may affect wilderness character have occurred within the Aldo Leopold Wilderness. As with all management actions in wilderness, these activities are analyzed with a Minimum Requirements Decision Guide to determine the minimum requirements to accomplish wilderness management objectives. These management activities include native fish reintroduction within Diamond Creek, South Diamond Creek, and Animas Creek. These three systems are typically some of the only streams in the area that consistently have water throughout the year. Impacts to wilderness character from these activities are outweighed by long-term benefits to natural quality, and offset somewhat by use of primitive tools and pack stock to transport needed supplies to accomplish these projects.

Trail maintenance routinely occurs within the Aldo Leopold Wilderness. The majority of trail work occurs on the CDNST and the Black Range Crest Trail. There are minimal impacts to the wilderness character due to the use of primitive tools, and interactions between trail crews and hikers seldom occur.

Grazing is an existing use the Aldo Leopold Wilderness. Maintenance of fences and range improvements do occur, however the majority of maintenance work is with primitive tools, and much of the range infrastructure is located away from popular trails. The risk of grazing related activities include possible interactions between wilderness visitors and cattle. Very few occurrences result in negative interactions although some of the interactions could detract from a wilderness experience. Since water is a limited resource within the Aldo Leopold Wilderness, cattle and other ungulates could cause impacts to riparian areas (see Riparian Chapter).

Environmental disturbances include drought, insect and disease outbreaks, and fire. Since the Aldo Leopold Wilderness has limited sources of water, the risk of a long duration drought has the potential to have significant impacts to wildlife and vegetation condition. The Wilderness has experienced trends of increased length and severity of droughts during the past 10 years. There have been many annual below historic average measures of snowpack and monsoonal moisture events in recent years. Along with below

average snowpacks, snow has typically melted off earlier than normal. The risk of snowpacks melting earlier in the year increases the potential for water sources to become dry during the summer months and for less moisture to remain in the soil throughout the year (see Water and System Drivers and Stressors Chapters).

During the mid-2000s, there was an outbreak of bark beetles associated with drought that affected large stands of ponderosa pine throughout the Aldo Leopold Wilderness. As many ponderosa pine trees died, this elevated the risk of wildfire. As many of these dead trees began to fall, it increased the amount of fuel loading in these stands, which would also increase the intensity and severity of wildfire. See the System Drivers and Stressors Chapter for more details on insects and diseases on the Forest.

Since the mid-1990s, the Aldo Leopold Wilderness has experienced a number of large-acreage fires (see Figure 207). The majority of these fires have occurred along the crest of the Black Range mountains within mixed conifer and ponderosa pine stands. The Silver Fire in 2013 burned a large part of the south half of the Aldo Leopold Wilderness, including large areas of high severity. Risks associated with large contiguous areas of high severity fires (as opposed to a mosaic of different fire severities) include a reduction of mature, late successional stands of forests across extensive areas leading to reduction of shade and increases in temperatures and drying of these sites. Soil erosion and large scale flooding often follow these large, high severity fire events, and due to the steep terrain found throughout the Aldo Leopold Wilderness the magnitude of these fire effects can be more severe than other parts of the Forest.

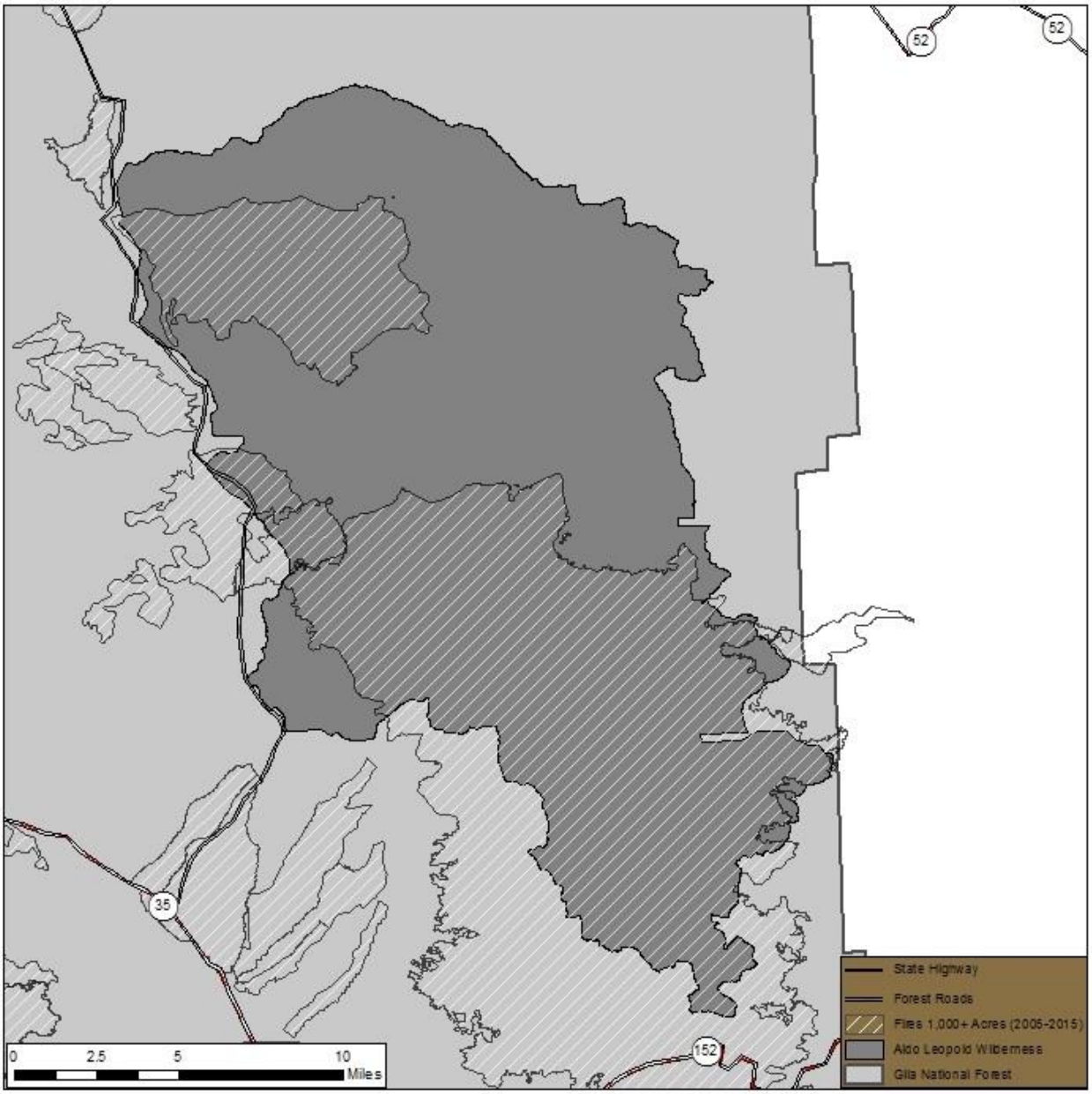


Figure 207. Fires 1,000+ acres within the Aldo Leopold Wilderness 2005 – 2015

Blue Range Wilderness

While the Blue Range Wilderness is the smallest wilderness area on the Gila NF at 29,099 acres, it is also located immediately adjacent to the Blue Range Primitive Area (199,505 acres) of the Apache-Sitgreaves National Forests in Arizona. The state line is all that separates the two areas, with New Mexico's Wilderness tucked into the Blue Range Mountains and halved by the Mogollon Rim, a dramatic edge of the Colorado Plateau that runs east to west. The Blue Range Wilderness is managed with an emphasis on the primitive end of the Recreation Opportunity Spectrum (ROS) (USDA FS 1986b). There are six trails located in the Wilderness, two of which may only be accessed from the Arizona side of the boundary. All have higher degrees of difficulty to follow, and there are no dependable water sources available. There is minimal visitation to this area by hikers and in the fall by hunters, offering excellent opportunities for solitude. However, many visitors to the area seeking opportunities for solitude tend to visit either the Gila

Wilderness or Blue Range Primitive Area in Arizona, because of more trail opportunities and available sources of water, which contributes to low visitation of the Blue Range Wilderness. The risk of a trend of low visitation is becoming a low priority for trail maintenance. This may further limit opportunities for trail users, while enhancing the experience for visitors that are seeking a primitive wilderness experience. There are concerns about recreational mining and permitted powerline (immediately adjacent to the wilderness boundary) impacts affecting wilderness character. There are also concerns of motorized intrusions within the lower elevations on the eastern and southern wilderness boundaries.

The ecological condition of the Blue Range Wilderness is currently within a late seral successional regime due to limited disturbances in the area. This area has not had large fire events or insect and disease outbreaks during the last 25 years. Periods of drought have affected the Wilderness, reducing water levels and flow rates, impacting vegetation and wildlife, and limiting already scarce water sources for visitors.

Wilderness Study Areas

When the New Mexico Wilderness Act was passed in 1980, it designated two areas, the Hell Hole and Lower San Francisco Wilderness Study Areas for review to determine if they feature wilderness characteristics to make them worthy of designation by Congress as wilderness (Figure 208). The Forest Plan (USDA FS Gila NF 1986) evaluated the Hell Hole and Lower San Francisco Wilderness Study Areas for wilderness suitability as directed by Congress and the New Mexico Wilderness Act, and recommends that these areas not be designated as wilderness. Until such time that Congress acts on this recommendation, the Forest Plan calls for managing these lands to maintain existing wilderness character. However, no baseline monitoring data has been collected for the Wilderness Character within these WSAs.

Hell Hole Wilderness Study Area

The Hell Hole WSA (18,860 acres in size[65]) is located south of Mule Creek, New Mexico with the boundary running along the Arizona State line. Access is from the north via Highway 78 west of Mule Creek. A county road heading south from Mule Creek forms the eastern boundary of the WSA.

The landscape of the southern portion of the WSA is dominated by topographic features including deep, rugged canyons, rocky peaks, and steep cliffs. The northern portion of the WSA is primarily rolling hills. Vegetation varies greatly with elevation and aspect. The presence of ponderosa pine in the WSA is somewhat unusual, as it is rather scarce in surrounding areas. The area lends itself to a variety of primitive recreation activities. The degree of difficulty and variety of conditions found in the WSA provide an adequate level of challenge regardless of user's skills. Current recreation activities are primarily hunting and viewing scenery and wildlife. There are no developed recreation sites or designated trails within the area. The present and expected future use of this area is low.

According to the Record of Decision for the 1986 Gila Forest Plan, the Hell Hole WSA was originally part of a larger Roadless Area Review and Evaluation (RARE) II area that extended into Arizona. The Arizona portion contained an ecosystem that was under-represented in the Wilderness System. As a result, the entire area was designated a Further Planning Area in the RARE II process. When the New Mexico Wilderness Act was passed, the area was designated a Wilderness Study Area. Since that time, the Arizona Wilderness Bill in 1984 released the Arizona portion for other multiple uses. Since this was the portion that contained the under-represented ecosystem, and because existing wilderness on the Gila NF already contained vegetation similar to the New Mexico portion of Hell Hole WSA, the 1986 plan decision determined that wilderness designation of the area would not contribute significant ecological diversity

[65] Acres as listed in the New Mexico Wilderness Act

to the Wilderness System. The 1986 Gila Forest Plan manages this WSA to maintain semi-primitive recreation opportunities, and no fuelwood, timber, or forest products harvest is permitted.

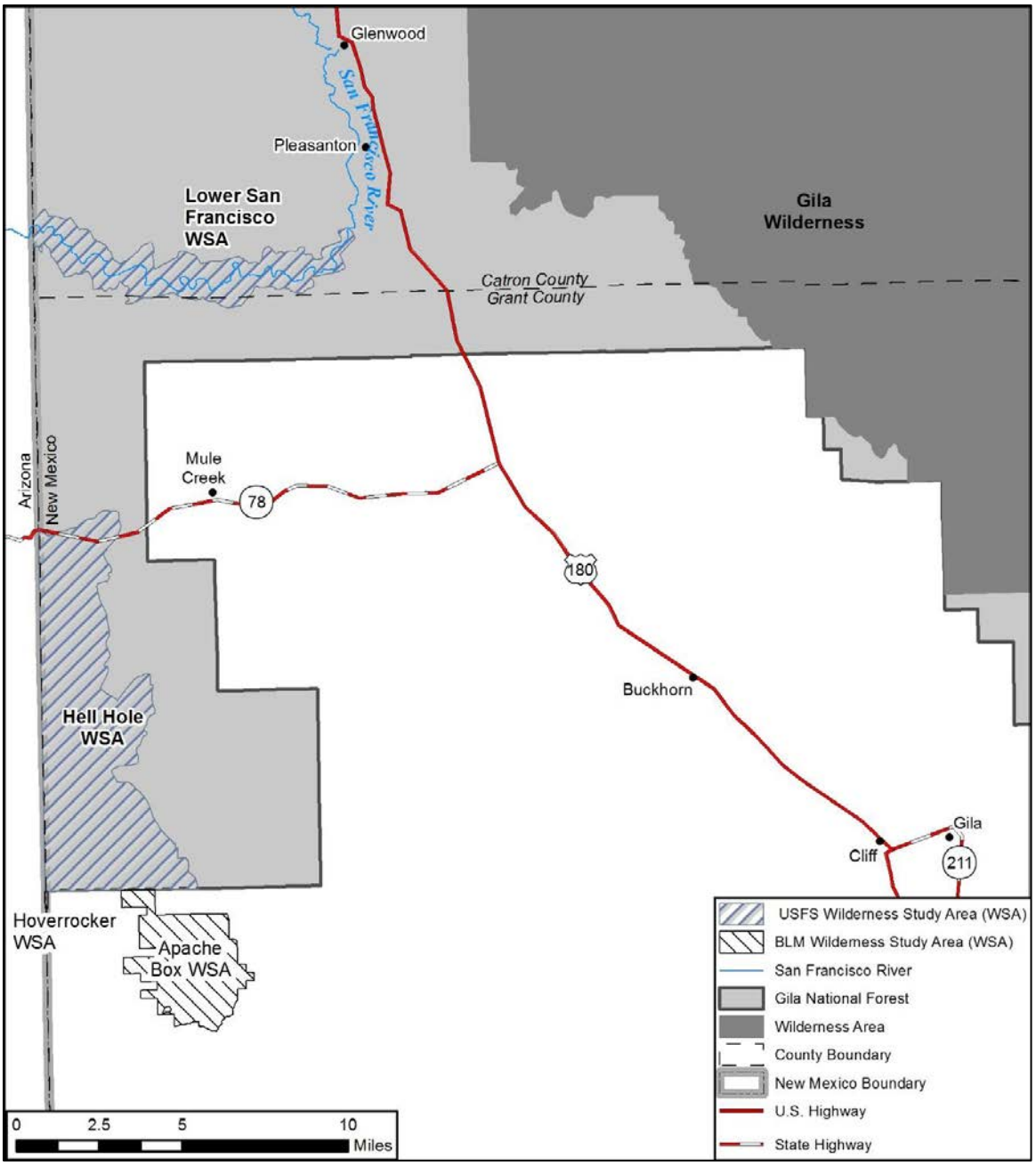


Figure 208. Forest Service and BLM Wilderness Study Areas

There are very few internal roads in the Hell Hole WSA –most roads associated with this area are on the perimeter. With the implementation of the Travel Management decision (USDA FS Gila NF 2014b), the total number of roads and mileage of roads will be reduced, along with impacts from dispersed recreation associated with motorized use. The TMR decision also prohibits cross-country travel. Implementation of the Travel Management decision should enhance the area's wilderness characteristics particularly the opportunities for solitude. Travel management implementation in this area will be challenging due to the prevalence of illegal firewood gathering and an extensive network of user-created routes occurring on the

east side of the WSA. Traces of the undesignated routes will likely remain visible for a long time, especially those occurring on steep slopes subject to erosion and poor plant establishment.

The ecological condition of the WSA is similar to the Blue Range Wilderness. There have not been any large scale disturbances within the WSA. Under the current ecological classification system used in this assessment, all of the Fremont Cottonwood/Oak riparian Ecological Response Unit acres on the Gila NF are located within this WSA (see Riparian Chapter). Non-native species may be present, but no surveys have specifically been conducted in the area. More information on the ecological condition of local unit (Mogollon Front) can be found in Section I: Ecological Integrity and Sustainability.

Lower San Francisco Wilderness Study Area

The 8,800-acre Lower San Francisco WSA is located north of the Hell Hole WSA, west of Highway 180 and the town of Glenwood, NM and extends to the Arizona/New Mexico state boundary. Popular recreation activities include accessing the San Francisco River at Big Dry Creek to picnic, fish, and hunt. There are no NFS system trails located within the WSA. In spring when the river is high enough, rafting and kayaking occur. Rafters typically put in above the San Francisco Hot Springs south of Glenwood and take out at Martinez Ranch on the Apache Sitgreaves NF in Arizona.

Prior to the Travel Management decision, there were 8.2 miles of NFS roads located within the Lower San Francisco WSA. During Travel Management planning, motorized use in the San Francisco River corridor was very controversial. Opinions expressed by the public ranged from a total closure of the entire River corridor to reduce impacts to riparian and aquatic habitat, to keeping the entire corridor open to motorized vehicle use to maintain access for fishing, camping, bird watching, and traditional family outings. This is only one of very few public access points to this section of the San Francisco River. This wide range of opinion and the concerns raised were considered in developing the Travel Management proposed action, alternative development, environmental impact study, and final decision.

The Travel Management decision (USDA FS Gila NF 2014b) maintained public access via Big Dry Creek, to continue the parking and camping opportunities currently available near the San Francisco River, but closed motorized routes along the river to reduce the impacts to riparian and aquatic resources. Implementation of the Travel Management decision are expected to enhance the WSA's wilderness characteristics. Reduced motorized access within the WSA has the likelihood to reduce intrusions and the influence of modern human activities, which would improve the undeveloped qualities of the area. Fewer intrusions would reduce resource damage and improve visual quality objectives, improving natural qualities. In the Lower San Francisco WSA, periodic flooding events are expected to physically remove the routes located in the river bottom within 10 years.

The San Francisco River within the Lower San Francisco River WSA is designated as critical habitat for both the loach minnow and spikedace species of fishes. Currently, the native fishery within this reach of river has been severely degraded due to the dominance of nonnative fish (J. Monzingo pers. obs). Known infestations of saltcedar (*Tamarix* spp.) are scattered through-out the San Francisco River corridor from the confluence of Whitewater Creek downstream to the border of Arizona/New Mexico (K. Brown pers. obs).

The Tucson Electric Power (TEP) powerline right- of-way (ROW) is located in the Lower San Francisco WSA. The ROW is periodically maintained per the terms and conditions of the special use permit, including helicopter access, use of roads, and vegetation management within the corridor, all of which may be audible or visible to the recreating public.

Inventoried Roadless Areas

Inventoried Roadless Areas (IRAs) were established under the 2001 Roadless Area Conservation Rule (36 CFR Part 294). The "inventoried" part of the name comes from two Roadless Area Review and Evaluation (RARE) national forests conducted in the 1970s (RARE) and 1980s (RARE II). Approximately 22 percent of the Forest's land mass (733,836 acres) is located within 29 individual Inventoried Roadless Areas (Figure 209). The following are characteristics considered under RARE II for IRA designation:

- Natural - being substantially free from the effect of modern civilization.
- Undeveloped - having little or no permanent improvements or human habitation.
- Outstanding opportunities for solitude or primitive and unconfined recreation.
- Special features and values, or the potential to contribute to unique fish, wildlife and plant species and communities; outstanding landscape features; and significant cultural resource sites.
- Manageability, meaning the area is at least 5,000 acres in size.

The Roadless Area Conservation Final Rule prohibits road construction, reconstruction, and timber harvest, except under certain circumstances, in Inventoried Roadless Areas because they have the greatest likelihood of altering and fragmenting landscapes, resulting in immediate long term loss of Roadless area values. Some roads and motorized trails may be present within IRAs. The Roadless Rule does not prohibit travel on existing roads or motorized trails.

Inventoried Roadless Areas provide opportunities for dispersed outdoor recreation, opportunities that diminish as open space and natural settings are developed elsewhere, however, most of the IRAs on the Forest attract little attention by the public. Management direction for existing IRAs is provided by direction of the 2001 Roadless Rule and the Gila NF's 1986 Forest Plan for Management Areas with semi-primitive and primitive recreation opportunities. Since the implementation of the Forest Plan in 1986, existing roads and trails on the boundaries of and within IRAs have continued to be maintained. Trails within IRAs are also regularly maintained to prevent resource damage and preserve recreation opportunities. Grazing, outfitter/guide, communication site and utility right-of-way special uses permittees all use existing roads within IRAs on for access.

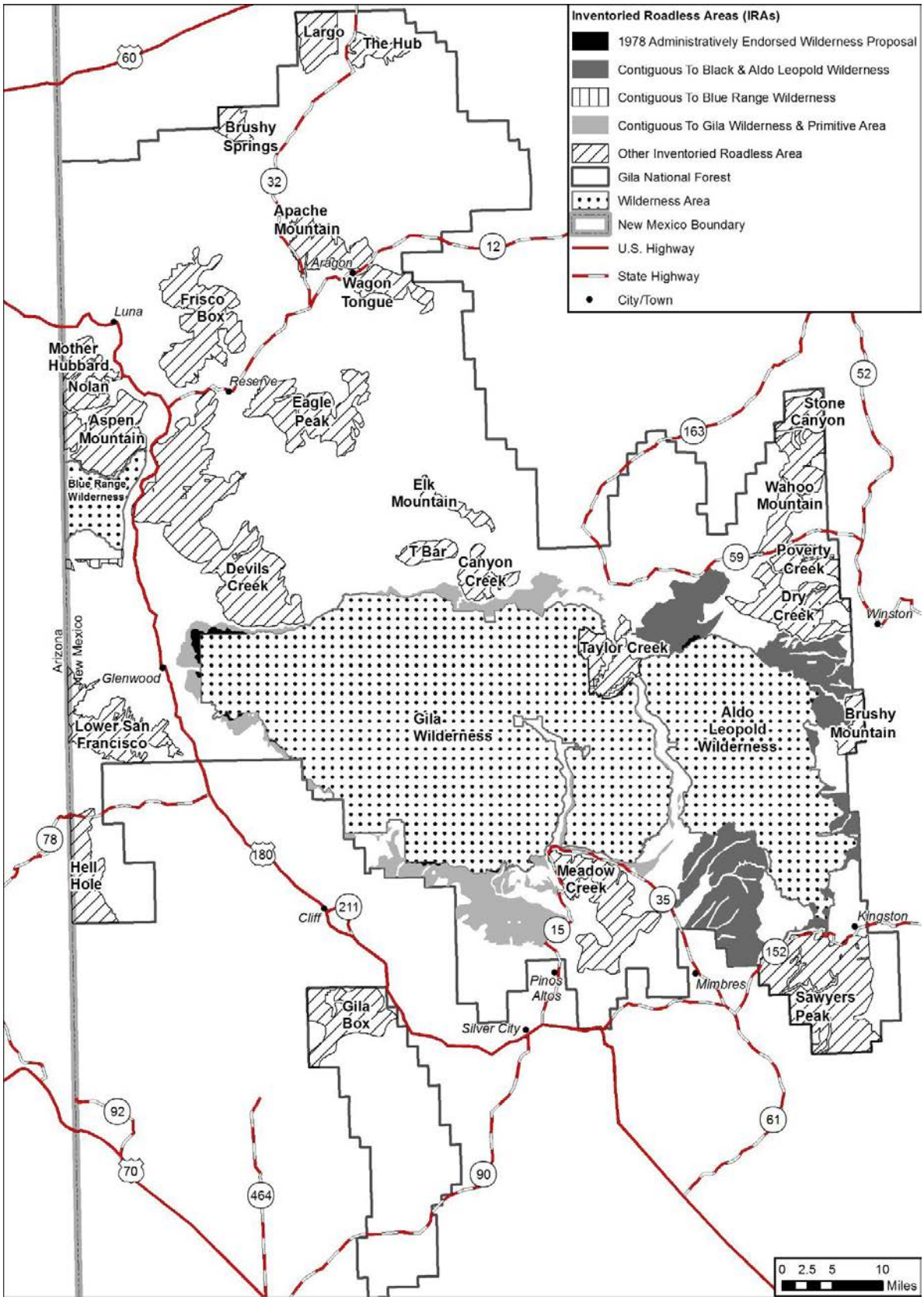


Figure 209. Inventoried Roadless Areas, Gila National Forest

Table 196 below lists acres of each IRA and associated local unit(s) located on the Forest.

Table 196. Inventoried Roadless areas, Gila National Forest

Inventoried Roadless Areas	Official Acres (Albers)(1)	Local Scale unit
1978 Administratively Endorsed Wilderness Proposal	4,286	Black Range, Little Colorado-San Agustin Fringe, Lower Gila River, Mogollon Front, Upper Gila River
Apache Mountain	17,506	Apache
Aspen Mountain	23,783	Mogollon Front
Brushy Mountain	7,199	Black Range
Brushy Springs	5,735	Little Colorado-San Agustin Fringe
Canyon Creek	9,824	Little Colorado-San Agustin Fringe, Upper Gila River
Contiguous to Black & Aldo Leopold Wilderness	111,811	Black Range, Little Colorado-San Agustin Fringe
Contiguous to Blue Range Wilderness	1,980	Mogollon Front
Contiguous to Gila Wilderness and Primitive Area	79,048	Little Colorado-San Agustin Fringe, Lower Gila River, Mogollon Front, Upper Gila River
Devils Creek	89,915	Apache, Mogollon Front,
Dry Creek	26,719	Black Range, Little Colorado-San Agustin Fringe
Eagle Peak	34,016	Apache
Elk Mountain	6,550	Little Colorado-San Agustin Fringe, Upper Gila River
Frisco Box	38,977	Apache
Gila Box	23,759	Lower Gila River
Hell Hole(2)	19,553	Mogollon Front
Largo	12,730	Little Colorado-San Agustin Fringe
Lower San Francisco(2)	26,459	Mogollon Front
Meadow Creek	34,167	Black Range, Lower Gila River
Mother Hubbard	5,895	Apache, Mogollon Front
Nolan	13,050	Apache, Mogollon Front
Poverty Creek	8,770	Black Range
Sawyers Peak	59,743	Black Range
Stone Canyon	6,801	Black Range
T Bar	6,823	Upper Gila River
Taylor Creek	16,639	Little Colorado-San Agustin Fringe
The Hub	7,498	Little Colorado-San Agustin Fringe
Wagon Tongue	11,411	Apache, Little Colorado-San Agustin Fringe
Wahoo Mountain	23,121	Black Range
TOTAL	**733,836**	

(1) The official acres are calculated using Albers from 2001 Roadless Area Conservation rule, 36 CFR Part 294.

(2) The Hell Hole and Lower San Francisco IRAs encompass the Hell Hole and Lower San Francisco Wilderness Study Areas (WSAs).

The condition of the IRAs across the Forest are variable, and influenced by the local unit within which they are located (Table 196). Invasive species are threats to Roadless characteristics, due to negative effects to soil resources, diversity of plant and animal communities and the overall naturalness associated with the area's landscape character (USDA FS Gila NF 2013d). Invasive species treatment, vegetation projects (of the specific type allowable under the Roadless Rule), ongoing trail maintenance and reconstruction, and

fire management activities all have the potential to improve the areas' Roadless characteristics. Additional information on the ecological condition of local units can be found in Section I: Ecological Integrity and Sustainability.

Threats to the IRA characteristics mandated for protection by the Inventoried Roadless Rule include the occurrence of new and existing unauthorized user-developed motorized routes. However, current trends are for increased management actions under implementation of the Travel Management decision to rehabilitate and reduce existing unauthorized routes, and prevention of the occurrence of new ones.

As part of the current forest plan revision process, areas potentially suitable for wilderness across the planning area will be inventoried and evaluated using criteria consistent with the 2012 Planning Rule. All IRAs located within the Gila National Forest will be included as part of the potential wilderness inventory process, however, existing IRA boundaries are not being reconsidered via the plan revision process.

Eligible Wild and Scenic Rivers

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. For a River to be eligible for Wild & Scenic River (W&S) designation it must be free flowing and (with its adjacent land area) must possess one or more Outstandingly Remarkable Values (ORVs). ORVs are specific to each river segment and may include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. None of the streams or rivers on the Gila National Forest are currently designated as Wild & Scenic Rivers.

The Gila National Forest Plan 1986 as amended in 2002 incorporated direction to identify and protect eligible Wild & Scenic Rivers for their ORVs, and preserve their character pending determination of suitability for inclusion in the National Wild & Scenic River System. The following Rivers were included in the eligibility findings: Whitewater Creek, Spruce Creek, Middle Fork Gila River, West Fork Gila River, Diamond Creek, South Diamond Creek, Holden Prong, and Las Animas Creek (Table 197; Figure 210).

Table 197. Eligible Wild and Scenic Rivers on the Gila NF

River	Outstanding Remarkable Values	Total Miles	Classification[1] (# of miles)
Diamond Creek	Fish, Historic	31	Wild (26 miles), Recreational (6 miles)
Holden Prong	Fish	8	Wild (8 miles)
Las Animas Creek	Fish, Historic	9	Wild (3 miles), Scenic (6 miles)
Middle Fork Gila River	Scenic	27	Wild (27 miles)
South Diamond Creek	Fish	9	Wild (9 miles)
Spruce Creek	Fish	5	Wild (5 miles)
West Fork Gila River	Scenic, Historic	26	Wild (26 miles), Recreational (1 mile)
Whitewater Creek	Recreation, Historic	14	Wild (11 miles), Recreational (3 miles)

[1]*Wild*: Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watershed or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

Scenic: Those rivers or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational: Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Most of these eligible rivers occur in the Gila or Aldo Leopold Wilderness areas. The recent travel management decision provides management direction to implement management actions intended to

address unauthorized routes within Wild & Scenic River corridors outside of Wilderness. Past management activities implemented near eligible Wild & Scenic Rivers include upland vegetation thinning, herbicide application of saltcedar (*Tamarix* spp.), and fire management activities. Discussion on the condition, trends, and stressors to water resources on the Gila National Forest can be found in the Water Chapter.

Threats to Eligible Wild and Scenic Rivers generally include any change in condition, or lack of appropriate management response to a change in condition, that puts the ORVs of that river segment at risk. Factors that could affect a change in ORV conditions on the Gila NF include unauthorized, user-developed motorized routes within the river corridor, non-native invasive species, drought, wildfires that burn outside of the range of historic variability, and post-wildfire flooding and erosion.

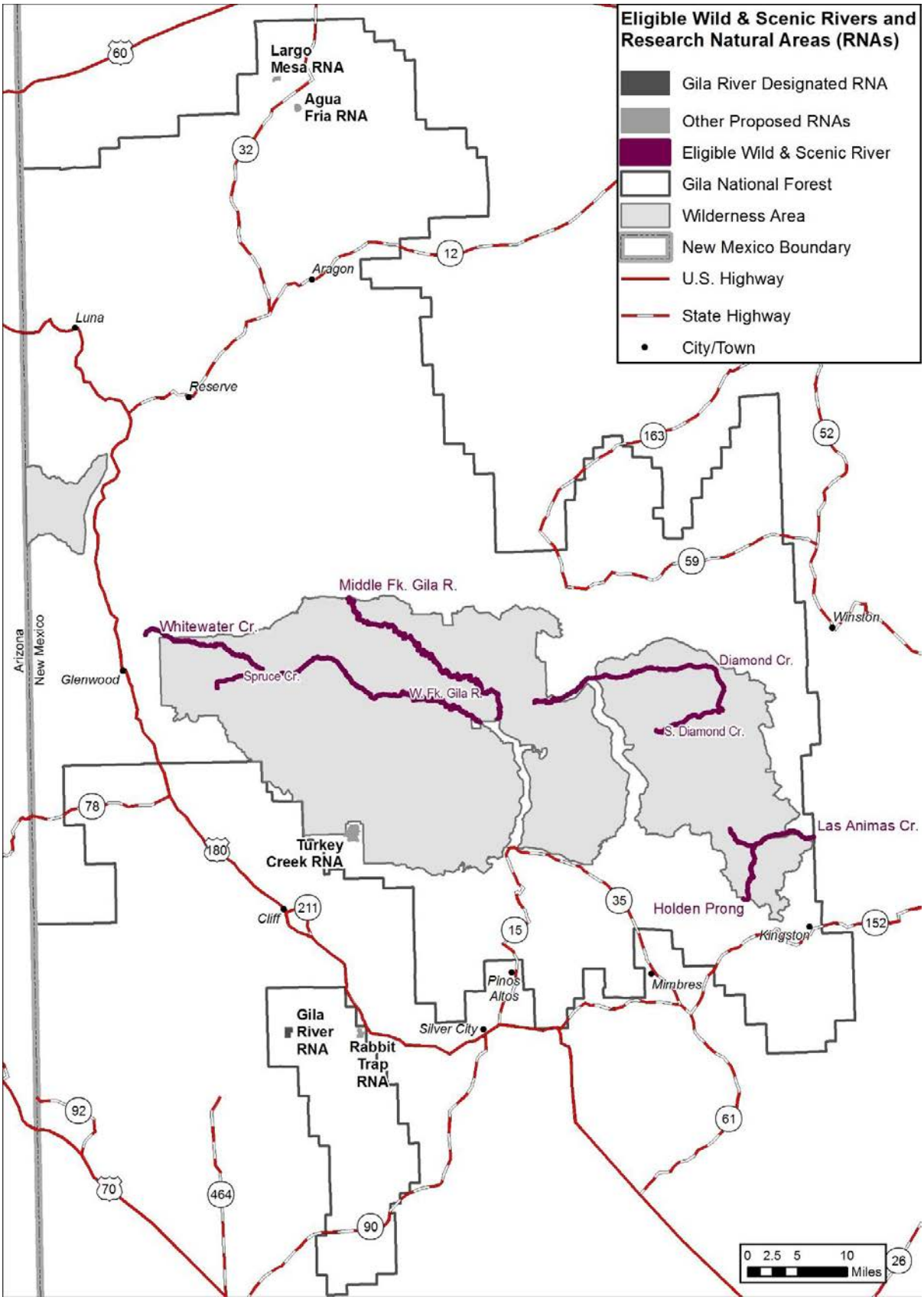


Figure 210. Eligible Wild and Scenic Rivers and Research Natural Areas, Gila National Forest

Research Natural Areas

Forest Service research natural areas (RNAs) are designated for the purpose of permanently protecting and maintaining natural conditions for the conservation of biological diversity, conducting non-manipulative research and monitoring, and fostering education. They are designated to "maintain a wide spectrum of high quality representative areas that represent the major forms of variability found in forest, shrub land, grassland, alpine, and natural situations that have scientific interest and importance that, in combination, form a national network of ecological areas for research, education, and maintenance of biological diversity" (FSM 4063.02). Included in this RNA network are:

- High quality examples of widespread ecosystems
- Unique ecosystems or ecological features
- Rare or sensitive species of plants and animals and their habitat (USDA FS RMRS 2016)

RNAs are managed to maintain the natural features for which they were established and to maintain natural processes. Because of the emphasis on natural conditions, they are excellent areas for studying ecosystems or their component parts and for monitoring succession and other long-term ecological change. The Gila NF has one established research natural area (Figure 210). Previously proposed RNAs are discussed in the Potential Need or Opportunity for Future Designations section towards the end of this chapter.

The Gila River RNA was established in 1972 and consists of 402 acres near the Gila River Bird Area in the northern Burro Mountains on the Silver City District. The area provides a well-developed example of the riparian ecosystem in New Mexico, and provides habitat for rich and unique birdlife. 231 species of birds, 43% of the bird species verified in NM, have been detected in the adjacent Gila River Bird Area (Shook 2015). Some of these species are at the northern edge of their natural range in southwestern New Mexico. Federal or State threatened or endangered species using the area include bald eagle, common blackhawk, peregrine falcon, Gila woodpecker, southwestern willow flycatcher, Bell's vireo, and Abert's towhee (Shook 2015). The Gila River in the Cliff-Gila Valley (including the Gila River RNA) is an important habitat area for native fish, including endangered loach minnow and spikedace. The ecological condition of the RNA is affected by the local unit where it is located (Lower Gila River), and the ecological response units (ERUs) it consists of. More information on the ecological condition, trends, and risk of the riparian ERUs can be found in the Riparian Chapter. Under direction of the 1986 Forest Plan, the RNA is managed to maintain the natural features for which it was established.

The Burro Mountains are known to be rich in copper, and to the north and along the east side of the Gila River nearby the location of the RNA there are existing mineral claims. Because of this possible conflict with mining, the Research Natural Area was located below the optimum habitat for the birds and riparian vegetation and withdrawn from mineral entry. However, none of these mining claims in the immediate vicinity of the RNA have been developed into operational mines.

Less than an hour drive from Silver City, the Gila River Bird Area is becoming more popular for recreational uses such as hiking, birdwatching, river access, and dispersed camping, although most those activities take place near the access road. Recreational use in the RNA itself is light, although there is a developed trail that travels 3 miles from the end of the bird area access road to the RNA. This trail passes partly within the RNA, and may be in conflict with Forest Plan direction for this designation by introducing a source of human-caused environmental disruptions. Cross country motorized travel in this area has been restricted since 1986. The riparian area is closed to grazing. Non-native species may be present, but no surveys have been conducted in the RNA since the 1972 establishment report. A restoration project in the Gila River Bird Area was completed in the early 1990s that restored over a 100 acres of dense riparian area (Boucher et al. 2003), which likely improved the connectivity of the riparian habitat at the RNA.

There are plans for future water development projects within the Cliff-Gila Valley that may negatively affect conditions within the RNA. The existence of the trail passing through part of the Area, is a threat to the purposes for which it was designated. Because there is a lack of recent survey data, the presence of invasive species are unknown, but may be an additional threat to the area.

Scenic Byways

The National Scenic Byways Program is administered by the U.S. Department of Transportation, Federal Highway Administration. It was established to help recognize, preserve, and enhance selected roads throughout the nation. The U.S. Secretary of Transportation recognizes and designates these designated roads based on one or more intrinsic qualities — archaeological, cultural, historic, natural, recreational, or scenic (DOT FHA 1995).

Two scenic byways travel through the Forest; the Trail of the Mountain Spirits traces a loop in the southern half of the Forest, while the Geronimo Trail creates a longer tour encompassing portions of the eastern edge of the Forest along with large tracts of land outside the Forest boundary (Figure 211). The primary uses along the Scenic Byway routes are driving for pleasure, cycling, sightseeing, birdwatching, and developed recreation sites. Most of the roads comprising the national scenic byways on the Gila NF are managed by the New Mexico Department of Transportation.

The Trail of the Mountain Spirits National Scenic Byway is a 93-mile route connecting Silver City, the Gila Cliff Dwellings National Monument, Sapillo and Mimbres valleys, the mining district, and many points of interest in between. This route is also used during the Tour of the Gila, an annual multistage international cycling competition. The routes this Scenic Byway follows through the National Forest are State Highways 15 and 35. This byway receives moderate use year-round, from both visitors as well as travel by residents and local commuters.

A National Scenic Byway corridor management plan provides guidance and direction for the conservation and enhancement of the byway's intrinsic qualities, as well as promotion of tourism and economic development. The Trail of Mountain Spirits Corridor Management Plan (Trail of the Mountain Spirits Scenic Byway Committee 2004) supports efforts to strengthen volunteer participation, explore alternative sources for project funding, increase membership, leverage business support, and identify project managers for the implementation and completion of byway projects. Among the implementation items included in the plan are providing interpretive materials and media, protecting an archeological site adjacent to the byway, and promoting and marketing regional tourism. These projects benefit byway traveler experiences by developing, enhancing, and interpreting existing sites along the byway corridor.

The Geronimo Trail National Scenic Byway, designated in 2005, typically begins in Truth or Consequences, NM. From there, one can explore the northern route (82 miles) or southern route (56 miles). Each route ties together many charming locales and traverses many life zones from the creosote and cholla-swept sands of the Chihuahuan Desert, to the piñon-juniper woodlands and ponderosa forests of the Gila National Forest. The routes through the National Forest are State Highway 152 to San Lorenzo along the southern route, and State Highways 52 and 59 to the Beaverhead workstation along the northern route. The North Star Mesa Road (FR150) is listed as a “side trip”, connecting the two routes to form a loop, but a 4-wheel drive vehicle and knowledge of road conditions are needed. The portions of the Forest along the byway receive low (northern route) to moderate (southern route) use year-round by visitors.

Geronimo Trail National Scenic Byway has a Corridor Management Plan (Geronimo Trail Advisory Committee 2008) that strives to showcase and preserve the corridor area for its historic multi-cultural heritage and natural resources. Some of the goals of the plan are to market the byway as a unique tourism opportunity, develop interpretive signs and other amenities along the byway, ensure services provided

along the route meet travelers' needs, and preserve the byway's resources so the route is a sustainable tourist and recreation attraction. The city, county, state, and federal agencies with management responsibilities along the byway work in concert with the Geronimo Trail Advisory Committee to achieve these goals. There are concerns about the viewshed and land development along the scenic byway.

Because the primary visitor experience and purpose of the byways are scenic in nature, primary threats to these types of designated areas are associated with scenic values. One of these threats is excess or incompatible development along Scenic Byways; however, most of this type of development occurs on private, rather than NFS Lands. Other threats to the scenic values of byways include those that apply to scenic values throughout the Forest. For detailed information on current conditions, trends and threats to scenic resources across the Gila National Forest, please refer to the Scenic Character section of Chapter 12 Recreation.

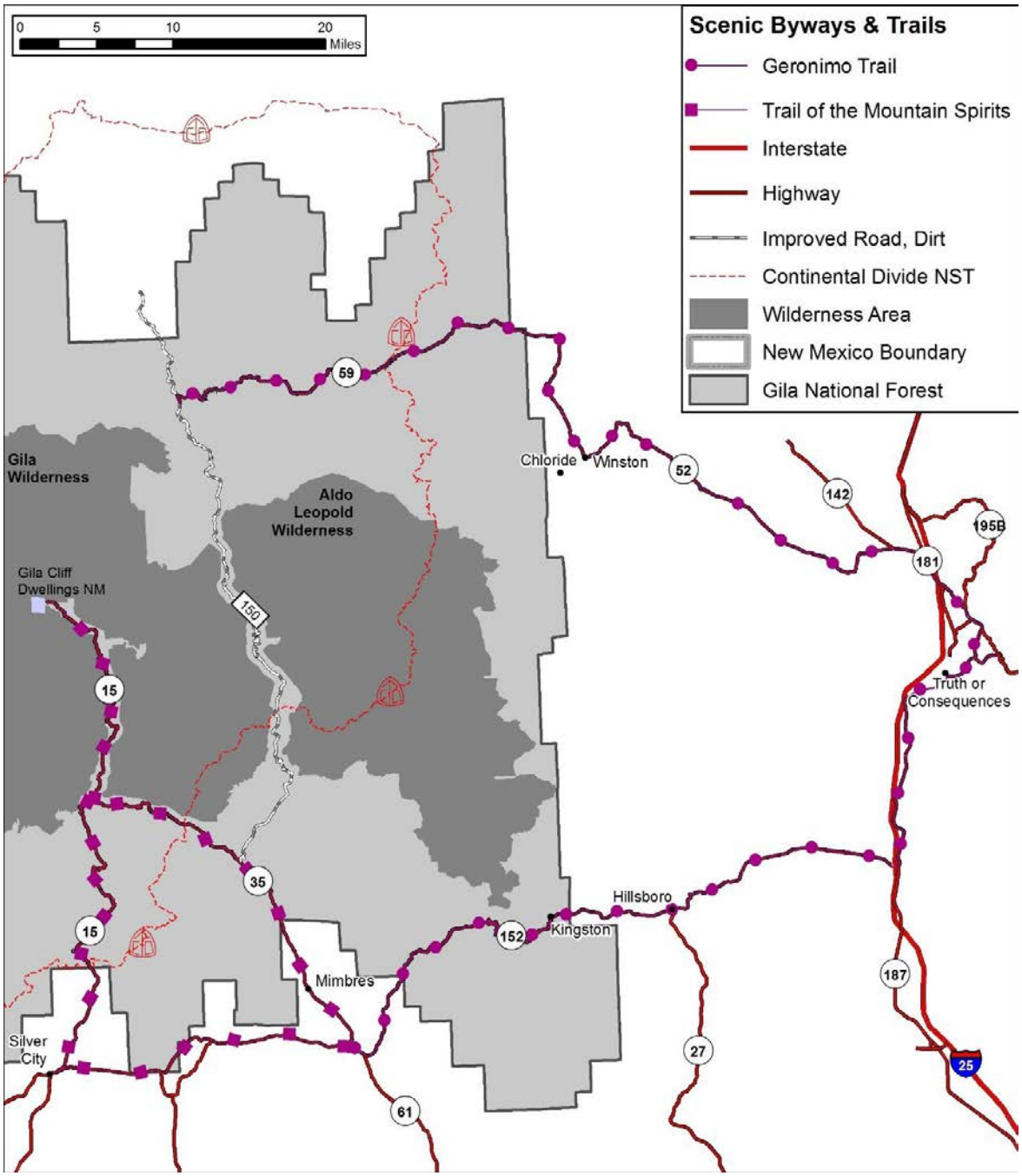


Figure 211. National scenic byways through the Gila NF

National Scenic and Recreation Trails

A nationwide trails study led to publication of a 1966 report entitled "Trails for America." The report called for federal legislation to foster the creation of a nationwide system of trails. The report heavily emphasized national scenic trails and the role they should play in meeting the nation's needs for trail-dependent outdoor recreation. The Appalachian Trail was to be the first designated National Scenic Trail. The report also proposed three other national scenic trails, including the Continental Divide Trail, a section of which crosses through the Gila NF. Congress passed the National Trails System Act in 1968. The Act authorized creation of a national trail system comprised of national scenic trails, national historic trails, and national

recreation trails. National Scenic and Historic Trails are statutorily designated through laws passed by Congress, and National Recreation Trails are an administrative designation instituted by the agency. The Gila NF administers one national scenic trail (Continental Divide National Scenic Trail) and three national recreation trails (Catwalk National Recreation Trail, Sawmill Wagon Road National Recreation Trail and Woodhaul Wagon Road National Recreation Trail) (Figure 212).

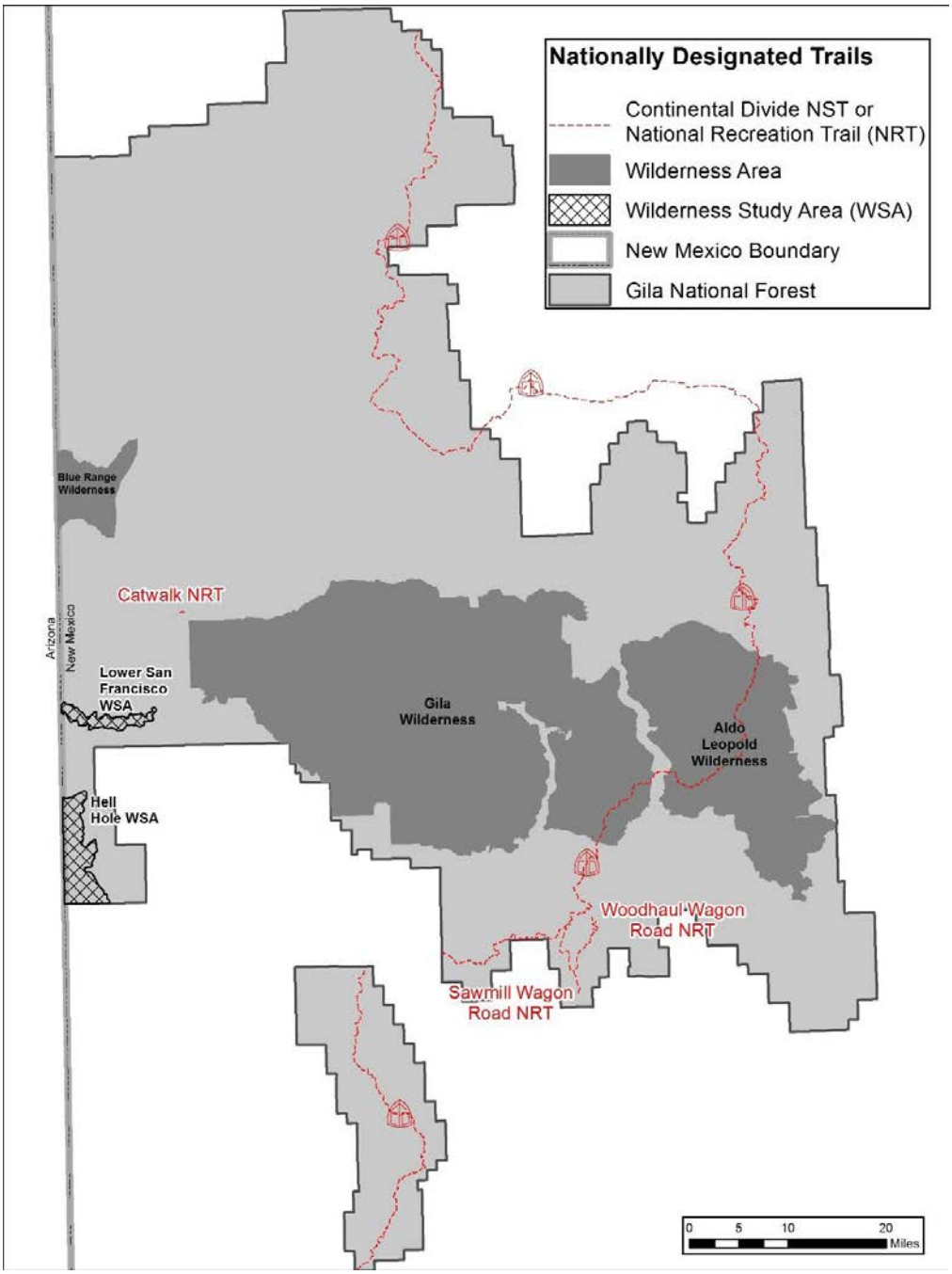


Figure 212. Map of the National Scenic Trail and National Recreation Trails on the Gila NF

National Scenic Trails

As envisioned in "Trails for America," national scenic trails are to be very special: "A standard for excellence in the routing, construction, maintenance, and marking consistent with each trail's character and purpose

should distinguish all national scenic trails (USDA FS 2015h). Each should stand out in its own right as a recreation resource of superlative quality and of physical challenge." According to the Act, national scenic trails "will be extended trails so located as to provide for maximum outdoor recreation potential and for the conservation and enjoyment of nationally significant scenic, historic, natural, and cultural qualities of the area through which such trails may pass" (American Trails Website). National scenic trails are located so as to represent desert, marsh, grassland, mountain, canyon, river, forest, and other areas, as well as landforms that exhibit significant characteristics of the physiographic regions of the nation. The corridor will be normally located to avoid established uses that are incompatible with the protection of a trail in its natural condition and its use for outdoor recreation.

The Continental Divide National Scenic Trail (CDNST) traverses the Rocky Mountains from Canada to Mexico for approximately 3,100 miles (USDA FS 2015h). It travels through portions of 20 national forests, 3 national parks, one national monument, 13 BLM field offices, as well as various State and private lands in Montana, Idaho, Wyoming, Colorado, and New Mexico. It was established by Congress in 1978 to provide high-quality scenic, primitive hiking, and horseback riding opportunities, and to conserve natural, historic, and cultural resources along the CDNST corridor. The CDNST navigates dramatically diverse ecosystems through mountain meadows, granite peaks, and high-desert surroundings. It is one of the most renowned trails in the United States for its scenic beauty, recreational opportunities, elevation gains, and primitive character. The Gila NF manages 254 miles of the CDNST according to direction provided in The Continental Divide National Scenic Trail Comprehensive Plan (USDA FS 2009).

The CDNST is a significant draw to hikers and other trail users; attracting a significant number of visitors to the Gila NF. The trail is managed and maintained on the ground by five different Ranger Districts across the Forest. There are many sections of the CDNST that pass through areas with limited water sources available, creating a challenge for long-distance trail users. In the area near where the trail enters the Forest at the northern boundary, a significant number of trail users opt to not follow the designated route, instead crossing private property, creating conflict with property owners. Some sections of the trail are impacted by past wildfires, making the trail difficult to follow in certain areas.

The alignment of the trail across the Forest is a meandering route, entering the Forest at the northwest corner, following east along the Black Range Crest, then travelling southwest towards Silver City (see Figure 212). The trail leaves the Forest for a number of miles west of Silver City, but re-enters the Burro Mountains segment of the Forest just west of Mangas Springs. From the point it re-enters the Forest, the trail takes a slightly meandering southerly route, crossing NM Hwy 90 and exiting the Forest for a final time in the area of Walker Mountain at the south end of the Forest.

The bulk of the CDNST is located in remote regions within the Gila NF, and long sections have limited road access points, which reduces visitor use and limits resupply options for thru hikers. Along with other factors, including poor trail conditions, a desire minimize mileage crossing the Forest, access to better water sources, types of travel being restricted within designated wilderness, motivates many CDNST users to follow alternative routes using other trails to cross the Gila NF.

Trail conditions vary, but tend to be better maintained than other Forest System Trails (see Infrastructure Chapter for discussion on trails). The Continental Divide Trail Coalition partners with the Forest to organize volunteers to assist with trail maintenance. The segment of the trail outside the Forest boundary between the Bear Mountain trailhead northwest of Silver City to Mangas Creek in the Burro Mountains does not have a route on the ground designated or constructed.

Currently, the trail corridor makes use of some motorized routes as it passes through the Forest, however any motorized use within these shared rights of way is not an identified National Scenic Trail use as

stipulated by the Act. Future plans include moving the trail onto strictly non-motorized routes when it becomes practicable.

Some of the most common users to the CDNST are thru-hikers, mountain bikers, and horseback riders. The most popular times of year are in spring and fall when thru-hikers are travelling north and south respectively. Other types of uses occur year round. The purpose of the CDNST is to provide for high-quality scenic, primitive hiking and horseback riding opportunities and to conserve natural, historic, and cultural resources along the CDNST corridor. The intent of the National Scenic Trail pursuant to the National Trails System Act of 1968 is for non-motorized use. Currently, the CDNST follows open motorized trail for 2.4 miles and open motorized road for 30.9 miles on the Gila NF. Public comments received in travel management and forest planning expressed concerns that concurrent motorized use is incompatible with National Scenic Trail objectives, and detrimental to recreation experiences sought by hikers and horseback riders on the CDNST. Specific areas identified included the Burro Mountains and Sapillo Campground, with motorized intrusion an issue on the Quemado District.

As opportunities have occurred, trail routes have been realigned to move the CDNST from roads to better meet the intent of the trail. The implementation of the Travel Management decision is likely to reduce the occurrence of motorized trespass of the trail, improving the qualities associated with intended uses of the Continental Divide Scenic Trail. For condition, trends, and risks to the trail system on the Gila NF, see the Recreation Chapter.

National Recreation Trails

National Scenic and Historic Trails may only be designated by an act of Congress, but National Recreation Trails may be designated by the agency to recognize exemplary trails of local and regional significance. These trails receive status as part of America's National System of Trails, and provide trail-based outdoor recreation activities in a variety of urban, rural, and remote areas. The Gila NF manages the Catwalk National Recreation Trail and Whitewater Picnic Area, the Sawmill Wagon Road National Recreation Trail and Woodhaul Wagon Road National Recreation Trail.

The Catwalk National Recreation Trail (NRT) is a very unique trail incorporating a hanging walkway suspended from cliff walls above Whitewater Creek. The trail attracts a significant numbers of visitors to the area, contributing to the local economy, and provides an important social connection as people have been visiting the Catwalk for generations connecting them to the Forest.

Due to the trail's location in a narrow canyon, it is inherently at-risk to flooding impacts, and the walkway and trail have been damaged and rebuilt several times after devastating floods, most recently following the 2012 Whitewater Baldy Fire. The Catwalk Recreation Area is a FLREA fee area that generates revenue for the Forest to help fund maintenance expenses.

The Sawmill Wagon Road and Wood Haul Wagon Road National Recreation Trails were both designated l in 1979. The 7-mile Sawmill Wagon Road Trail was an integral part of the original Fort Bayard Military Reservation in the late 1800s (see Cultural and Historic Resources Chapter). Soldiers used the trail to transport fuelwood and construction timber from the high ponderosa pine forests of the Pinos Altos Mountain Range to the military reservation.

The Wood Haul Wagon Road Trail is also part of the trail system close to Silver City, and travels from the Gila NF Fort Bayard Administrative Site to the popular destination "Wagon Wheel Ruts." These Wood Haul Wagon Ruts are a result of the tireless passing of supply wagons hauling construction and fuel wood to the Fort Bayard Military Reservation. Mule and oxen drawn wagons were used to haul the heavy loads. Over time the hard wagon wheels cut into the volcanic cap rock leaving a testament to the endurance of

these early settlers. The 11.5-mile route to the Wagon Wheel Ruts follows primitive roads (double track) that pass over land that was once part of the Military Reservation.

The Fort Bayard area trails are in moderate to good condition with a stable trend, although there are a few areas in need of maintenance. The trails are heavily used by hikers, mountain bikers, and equestrians, in part due to their close proximity to Silver City. The Aldo Leopold Youth Conservation Corps has adopted the trail maintenance for this area. For condition, trends, and risks to the trail system on the Gila NF, see the Recreation Chapter.

Former Designated Areas

Wild Horse and Burro Area

The Deep Creek Wild Horse and Burro Territory was established under Forest Service regulations promulgated under the Wild and Free-Roaming Horses and Burros Act of 1971. The horse herd in this area originally numbered approximately 15-25. By the 1980s the horse herd had dwindled to zero due to lack of reproduction and predation by mountain lions. The 1986 Forest Plan formally discontinued the Deep Creek Wild Horse and Burro Territory.

Designated Critical Habitat for Threatened and Endangered Species

Critical habitat (USDI FWS 2015c) is defined under the Endangered Species Act as a specific geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species, but will be needed for its recovery. Critical habitat does not preclude activities within its borders; however, conservation of the habitat for the identified species is an important consideration when planning or allowing activities in these areas.

The US Fish and Wildlife Service has analyzed species needs and designated critical habitat within the Gila NF boundary for the Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), Chiricahua leopard frog (*Lithobates chiricahuensis*), Gila chub (*Gila intermedia*), spike dace (*Meda fulgida*), and loach minnow (*Tiaroga cobitis*). There is also proposed critical habitat for the narrow-headed garter snake (*Thamnophis rufipunctatus*), Northern Mexican gartersnake (*Thamnophis eques megalops*), and yellow-billed cuckoo (*Coccyzus americanus*). Table 198 displays the area of critical habitat on the Gila NF by species. See the At-Risk Species Chapter 8 for more details.

Table 198. Critical habitat area on Gila National Forest, by species

Species	Acres
Chiricahua Leopard Frog	2,488
Gila Chub	764
Loach Minnow	11,673
Mexican Spotted Owl	1,122,802
Narrow-headed Gartersnake (proposed)	52,430
Northern Mexican Gartersnake (proposed)	8,717
Southwestern Willow Flycatcher	1,547
Spikedace	9,968
Yellow-billed Cuckoo (proposed)	1,680

Adjacent Designated Areas, National Monuments, and National Parks

In addition to the specially designated areas found within the Gila NF, there are specially designated areas managed by other government agencies near and adjacent to the Forest. These areas add recreation values, scenic values, wildlife opportunities, and other resources values complementing those of the Gila National Forest.

Forest Service –Apache-Sitgreaves National Forests

In 1933, the Secretary of Agriculture proclaimed that the Blue Range Primitive Area, at that time located on the Apache National Forest in Arizona and New Mexico, should be managed for primitive uses to maintain the wildness of that area, and administratively designated it as a Forest Service Primitive Area. In 1971, the President of the United States forwarded a recommendation by the Forest Service for a Blue Range Wilderness in New Mexico and Arizona to Congress, who acted in 1980 on a portion of it, designating the Blue Range Wilderness in New Mexico, located on the portion of the Apache National Forest now administered by the Gila NF. The remaining Blue Range Primitive Area on the Apache-Sitgreaves NFs (A-S NF) is the last designated primitive area in the National Forest System, all others having been designated as wilderness by Congress through the Wilderness Act of 1964 and other subsequent wilderness legislation.

The remaining Blue Range Primitive Area, along with presidential recommendation additions from the 1971 recommendation to Congress, together total 199,505 acres, and by law, agency policy, and the 2015 Apache-Sitgreaves Revised Forest Plan continue to be managed with the same mandate as congressionally designated wilderness to protect wilderness character . The Gila NF borders the Blue Range Primitive Area along the Arizona/New Mexico state boundary for approximately 8 miles of adjoining designated Blue Range Wilderness and 7 miles of non-wilderness Forest lands on the New Mexico side.

During their forest plan revision effort, the Apache Sitgreaves NFs deferred the decision whether to recommend the Hells Hole, Nolan, and Mother Hubbard potential wilderness areas (a total of 26,023 acres) for wilderness designation until the Gila National Forest completes its potential wilderness evaluation and forest plan revision (USDA FS A-S NFs 2014a). These potential wilderness areas are composed of inventoried Roadless areas that straddle the Arizona/New Mexico state boundary, partially located on both the Gila and Apache-Sitgreaves National Forests. The Hells Hole, Nolan, and Mother Hubbard potential wilderness areas continue to be managed to protect wilderness characteristics until a decision is made during the Gila NF Forest Plan revision process as to whether or not to recommend these areas for wilderness designation (USDA FS A-S NFs 2014a).

The Lower San Francisco IRA located in Arizona on the Apache-Sitgreaves NFs lies to the west of the Lower San Francisco WSA and IRA located in New Mexico. As part of their forest plan revision, the Apache Sitgreaves NFs evaluated (West Blue/San Francisco Potential Wilderness[66] PW-03-01-052; USDA FS A-S NFs 2012b), but did not recommend as wilderness the Lower San Francisco IRA located in Arizona (USDA FS A-S NFs 2015). Instead, these areas will now be managed as Natural Landscape management areas under the A-S NF Revised Plan. These are generally undeveloped areas that are natural appearing and provide primitive and semi primitive recreation opportunities. Management activities are allowed but are primarily focused on ecosystem restoration. This management area includes most of the inventoried Roadless areas (IRAs) that were identified in the 2001 Roadless Area Conservation Rule. IRAs are managed to protect and conserve their Roadless character.

The Apache Sitgreaves NFs also has identified three Eligible Wild and Scenic Rivers with the potential to be influenced by Gila NF management decisions because portions of each are located across shared forest

[66] The West Blue/San Francisco Potential Wilderness included 3,577 acres on the Gila NF

boundaries. The San Francisco River's headwaters are located on the A-S NFs west of Alpine, AZ but it flows through Gila NF administered and private lands in New Mexico before reentering Arizona and the A-S NFs.

The upper San Francisco River from its headwaters and across the Gila NF administered lands is not currently designated as an Eligible or Suitable Wild and Scenic River.; However, the lower portion of the river located on the Apache- Sitgreaves NFs is currently administratively designated as an Eligible Wild and Scenic River. The Gila NF also contains small portions of Coal Creek and Campbell Blue Creek, both of which are also administratively designated Eligible Wild and Scenic Rivers by the Apache-Sitgreaves NFs (USDA FS A-S NFs 2014b).

National Park Service

Gila Cliff Dwellings National Monument is a 533-acre National Park Service administered designated area surrounded by National Forest System lands (including the congressionally designated Gila Wilderness) managed by the Gila National Forest. Gila Cliff Dwellings National Monument offers visitors the opportunity to visit interpreted archeological sites originating from the Mogollon culture (see Cultural and Historic Resources Chapter). From 2008 through 2011, an average of 37,000 people visited the Monument per year (Mitchell et al. 2014). Many of these same visitors also likely recreated on the Gila NF as well, including visiting one of many scenic overlooks, developed campgrounds, trails, and interpretive signs along the way. The Gila Visitor Center located near the monument is operated jointly by the National Park Service and the US Forest Service (see Infrastructure Chapter). The revised management plan for the Gila Cliff Dwellings National Monument will be finalized soon (Hugh Hawthorne, Park Superintendent, pers. comm.).

Bureau of Land Management

The 7,161-acre Apache Box Wilderness Study Area (WSA), located on lands administered by the Bureau of Land Management (BLM) is contiguous for one mile of the southern boundary of the Hell Hole WSA, located on NFS lands administered by the Gila NF.

Another BLM administered unit, the Hoverrocker WSA, is located west of the Hell Hole and Apache Box WSAs (Figure 208). The Hoverrocker WSA is a 22-acre area that remained after the adjacent Arizona portion was released from wilderness review in 1990, but continues to be managed as a WSA in New Mexico pending congressional action.

The BLM Continental Divide WSA consists of 68,671 acres, encompassing parts of Pelona Mountain and a portion of the Continental Divide National Scenic Trail. This WSA is adjoins non-wilderness lands administered by the Gila National Forest for two miles.

All three of these BLM WSAs await congressional action, by either designating the area as wilderness or releasing it to be managed by the agency for other purposes. The WSAs are managed to protect wilderness qualities, so as not to impair the suitability of such areas for wilderness designation by Congress, according to the appropriate Resource Management Plan and BLM Manual 6330 Management of BLM Wilderness Study Areas.

State of New Mexico

The State of New Mexico has several areas in the vicinity of the Gila National Forest area that are designated for public outdoor recreation use and for wildlife habitat. The state also has historical markers distributed throughout all of the assessment area counties. The recreational sites, state parks, and wildlife areas located near or in the forest plan assessment area are listed below:

Recreational Sites and State Parks

- Caballo Lake State Park
- City of Rocks State Park
- Elephant Butte State Park

Wildlife Areas

- Glenwood State Fish Hatchery
- Heart Bar Wildlife Area
- Mimbres River Tract
- Quemado Lake[67]
- Snow Lake[67]
- Lake Roberts[67]
- Bill Evans Lake
- Bear Canyon Reservoir

The Gila NF works in partnership with all of these state and federal agencies to maintain communication and seek shared management objectives.

Potential Need or Opportunity for Future Designations

The Gila NF is not aware at the time of this report of any published documents or county, state, or tribal plans that identify the need or potential for additional designated areas within the plan area, with the exception of previously mentioned proposed critical habitat for narrow-headed garter snake, Northern Mexican gartersnake, and yellow-billed cuckoo. The 2012 Planning Rule and the directives associated with Forest Plan Revision require an inventory and evaluation for lands that may be suitable for inclusion in the National Wilderness Preservation system, and inventory of eligibility of rivers for potential inclusion in the Wild and Scenic Rivers System. These inventory and evaluation processes will occur in the next Plan Revision phase with significant public engagement.

Other potential special designations, such as special interest areas (e.g. botanical, geological areas) and RNAs will also be further considered and evaluated as part of the Forest Plan Revision process. There may be opportunities to establish additional Research Natural Areas (RNAs), including previously proposed RNAs, as well as new areas. The Gila NF currently has four proposed Research Natural Areas: Agua Fria (350 acres featuring mountain grassland), Largo Mesa (300 acres of piñon-juniper woodland), Rabbit Trap (297 acres featuring scrub grassland), and Turkey Creek (1,335 acres of riparian hardwood) (Figure 210). These proposed research natural areas are currently managed to maintain their present natural condition. Areas previously recommended can be re-recommended (and would need joint Regional Forester/Research Station Director approval to designate), or can be made available for other kinds of management.

The 1986 Forest Plan provided direction to inventory the following areas to determine if they should be considered for RNA designation:

- Eagle Peak (aspen; mixed conifer; common juniper forest)
- Lower San Francisco (riparian ecosystem)
- Mineral Creek

[67] While the dams for these lakes are owned and maintained by the New Mexico Game and Fish Department, they are at least partially located on lands administered by the National Forest. See Infrastructure Chapter for more details.

- Mule Creek (riparian ecosystem)
- Pinos Altos Mountain (Arizona pine)
- Rocky Canyon (Arizona pine)
- Tillie Hall Canyon (mixed one, two, and three needle piñon pine and associated desert scrub)

It should be noted that selection of these ecosystem types were based on an earlier ecosystem stratification and were recently updated to the Ecological Response Units (ERUs) currently referenced in the ecological assessment of this report (see Upland Vegetation Chapter).

A region-wide assessment of RNA ecological representation has been conducted to help identify ecosystems and vegetation types that are underrepresented among the region's currently established RNAs. This may lead to previously proposed or new potential RNAs being identified on the Forest that may meet regional needs for ecological representativeness. All of the Ecological Response Units identified on the Gila National Forest currently occur in wilderness or wilderness study areas except for Desert Willow, Little Walnut-Ponderosa Pine, and Sparsely Vegetated.

In addition, should existing mining claims located near the Gila River RNA be determined as invalid, the establishment report recommended that it should be extended up the Gila River approximately ½ mile (USDA FS Gila NF 1969)

Contribution to Social, Economic, and Ecological sustainability

Designated special areas contribute to social sustainability by connecting people to their natural and cultural heritage, and providing economic benefits to surrounding communities. They promote the preservation of cultural traditions including historical features that contribute to social wellbeing through education, and provide recreational opportunities. Contributions to economic sustainability may occur by increased visitation to designated areas, which may increase employment opportunities, support to small businesses, and sharing Federal receipts with county and state governments. In addition, designated areas often contain particularly unique/valued resources of one kind or another that may result in specific public interest/value.

Designated areas contribute to ecological sustainability as well, by preserving intact natural systems and their individual components for future generations. Designated areas provide clean drinking water and function as biological strongholds for populations of threatened and endangered species. They provide large, relatively undisturbed landscapes that are important to biological diversity and the long-term persistence of at-risk species. Designated areas provide forest visitors with opportunities for dispersed outdoor recreation, opportunities that diminish as open space and natural settings are developed elsewhere. They also serve as bulwarks against the spread of non-native invasive plant species, and provide reference areas for study and research (USDA FS Gila NF 2013d).

There has been an economic transition from using the Forest as a commodity for the economy to also developing the Forest for economic benefits from recreation use (USDA FS 2006). There are many local businesses in the Gila NF surrounding area that receive a majority of their yearly business during hunting season, when some areas of the Forest are experiencing the highest volume of visitation. Many of the local businesses benefit economically due to the Forest visitors recreating in these designated areas when they are travelling through the local communities to their destinations. However, designated areas can also impose opportunity costs on local economies due to land use restrictions and foregone commodities (Steed et al. 2011; Ashcroft et al. 2012).

National Scenic and Recreation Trails draw a variety of trail users to the area. The label of "gateway community" for towns such as Silver City, which was the first to be designated a Continental Divide Trail

gateway community, creates opportunities for attracting visitors who want to access the trail for day trips or short treks or, in the case of thru hikers and riders, stop for resupply and rest before continuing on their journey. This benefits the economy of the town, and may even encourage people to relocate to the area. The communities then become stewards of the trail and partner with the Forest Service to maintain the sustainability of the recreation resource.

Stakeholder Input

From the input received from stakeholders, it is clear that designated areas is a polarized issue, especially concerning wilderness. Some comments praised the Gila National Forest's unique wilderness heritage of being the first formal wilderness area in the nation. With increasing urbanization and development in the region, some stakeholders call for more designations to preserve important qualities of the Forest, such as watershed function, unfragmented wildlife habitat, clean air, hunting opportunities, scenery, recreation, and future scientific research. Some commenters noted that they perceived improvements to ecosystems, soils, and water conditions in the wilderness areas, and also connected the wilderness area designation to enabling the restoration of the natural role of fire to ecosystems on a landscape scale. One stakeholder suggested developing "quiet areas" in addition to wilderness.

Other stakeholders feel that designated areas, with their higher levels of management restrictions, have led to a narrowing of uses, access, and benefits, resulting in negative economic impacts. The restrictions within wilderness are viewed by some as restricting active management of resources and reducing public access to a limited few with the skills and resources for using horses, or the physical ability to travel by foot within the wilderness.

There are beliefs expressed by some that the Forest currently has sufficient (or too much) wilderness area, and does not require more. There is also perception by some commenters that the wilderness areas on the Forest have poor watershed quality, and poor forest health, resulting in larger fires. There is nearly universal agreement however, that trail conditions in the wilderness areas are poor and require increased maintenance, that signage needs to be improved, and wilderness maps require updating.

Wild and scenic rivers face a similar polarization. Some stakeholders believe that earlier Forest Service decisions not to recommend the Gila and San Francisco Rivers as eligible wild and scenic rivers were missed opportunities. They feel that climate change and current water development planning under the Arizona Water Settlement Act represents changed circumstances, warranting reevaluation of these waterways' Wild and Scenic designation eligibility. Others point to the historic and current water diversions for irrigation along the rivers and feel the Gila River can remain free flowing in designated wilderness, but that downstream water users should continue to have authority to manage water resources outside of these areas. The concerns expressed by these stakeholders is that changes in the Forest Plan, including additional designated area recommendations, could negatively affect downstream water rights holders or impinge on the State's ability to exercise its legal rights to administer water use.

Other suggestions from the public for special designation consideration included a population of Chihuahuan pine near Bear Mountain; the Gila Middle Box; the Mogollon Box or Upper Gila Box; and Mineral Creek.

Summary

Designated areas on the Gila NF represent identified exceptional areas that have distinct or unique characteristics warranting special designation, either administratively by the Forest, region, or agency, or statutorily through legislation passed by Congress. Designated areas have specific management objectives to maintain their unique characteristics and are important ecologically and socially for the exceptional values they offer and protect.

The three congressionally designated wilderness areas of the Gila National Forest (Gila, Aldo Leopold, and Blue Range) are managed to protect their wilderness character. Because wilderness character measures are applied to a wilderness as a whole, localized threats to wilderness character affect the entire areas. Threats to wilderness character include potential impacts to air quality and associated loss of visibility, military aircraft overflights, recreational mining activity, utility development near the wilderness boundary, the ecological effects of climate change, invasive, non-native species, poor trail conditions, impacts associated with inadequate management of the outfitter/guide program within wilderness, and the encroachment of user-created motorized routes and accompanying motorized incursions. The implementation of the Travel Management decision on the Forest is expected to address many concerns with illegal motorized use and route development. With the New Mexico Wilderness Act of 1980, Congress previously designated two wilderness study areas on the Forest, Hell Hole and Lower San Francisco River WSAs. These were analyzed and recommended for removal of consideration as Wilderness under the 1986 Gila Forest Plan. However, because Congress has taken no further action, the Forest has the existing mandate to manage the WSAs to protect their wilderness characteristics. Threats to WSAs are similar to designated Wilderness, but also include localized issues such as illegal firewood gathering in the Hell Hole WSA, and salt cedar infestations potentially causing ecological impacts within the Lower San Francisco River WSA.

There are 29 Inventoried Roadless Areas (IRAs) within the Forest, designated under the 2001 Roadless Area Conservation Rule. IRAs are managed to protect their Roadless characteristics, with road construction, reconstruction, and timber harvest prohibited, although travel is allowed to continue on existing roads or motorized trails. These areas are managed by the Gila NF to provide for primitive and semi-primitive non-motorized recreation experiences. Threats to the IRA characteristics include unauthorized motorized use and the presence of illegal user-developed motorized routes. Current trend is increased management actions from implementation of the Travel Management decision, reducing existing unauthorized routes, and preventing new ones.

Currently there are eight Eligible Wild and Scenic Rivers (WSRs) within the Gila National Forest. Eligible WSR is an administrative designation, which carries a mandate to manage these rivers and their associated corridors for preservation of their Outstandingly Remarkable Values (ORVs). Threats to ORVs on the Gila NF include unauthorized, user-developed motorized routes within the river corridor, non-native invasive species, drought, wildfires that burn outside of the range of historic variability, and post-fire flooding and erosion damage.

During the plan revision process, the Forest is required to conduct an inventory and evaluation for lands that may be suitable for inclusion in the National Wilderness Preservation system, and inventory of eligibility of rivers for potential inclusion in the Wild and Scenic Rivers System. Both of these designations may only be made statutorily, through legislation passed by Congress. Other potential special designations (e.g. botanical, geological areas) and RNAs will also be further considered and evaluated in the Forest plan revision process.

The 1986 Gila Forest Plan established the Gila River Research Natural Area (RNA) for purposes of permanently protecting and maintaining natural conditions for the conservation of biological diversity, conducting non-manipulative research and monitoring, fostering education, maintaining the natural features for which they were established and maintaining natural processes. Potential threats to the RNA include possible future water diversion developments and the existence of the trail associated with the adjacent Gila River Bird Area passing through part of it. Because there is a lack of recent survey data, the presence of invasive species are unknown, but may be an additional threat to the area.

Two National Scenic Byways, the Trail of the Mountain Spirits and the Geronimo Trail, are located partly within the Gila NF boundary. The National Scenic Byways Program was established to help recognize,

preserve, and enhance selected roads throughout the nation. Both Scenic Byways are managed in cooperation with partners and have corridor management plans in place to provide management guidance and direction for implementing changes and improvements. Potential threats to Byways include incompatible development outside the Forest but within the byway corridors, and any threats to scenic values of the corridor within the Forest.

The congressionally designated Continental Divide National Scenic Trail (CDNST) traverses the Rocky Mountains for approximately 3,100 miles, with 254 miles of the CDNST travelling through the Gila NF. Management direction for the Trail is provided by a Comprehensive Plan. All National Scenic and Historic Trails are managed as "extended trails so located as to provide for maximum outdoor recreation potential and for the conservation and enjoyment of nationally significant scenic, historic, natural, and cultural qualities of the area through which such trails may pass". Threats to the CDNST are in common with other non-motorized trails on the Forest, detailed within the Infrastructure and Recreation Chapters.

National Recreation Trails are administratively designated by the agency to recognize exemplary trails of local and regional significance and as part of America's national system of trails, provide for trail-based recreation activities in a variety of urban, rural, and remote areas. The Gila NF manages the Catwalk National Recreation Trail, the Sawmill Wagon Road National Recreation Trail and Woodhaul Wagon Road National Recreation Trail. Threats to these trails are concurrent with those of all trails on the Gila National Forest, see the Infrastructure and Recreation Chapters for more detail.

The US Fish and Wildlife Service has analyzed species needs and designated critical habitat within the Gila NF boundary for six species of wildlife. See the At-Risk Species Chapter 8 for more details.

In addition to the specially designated areas found within the Gila NF, there are areas specially designated by other agencies that surround the Forest. These areas add recreation values, scenic values, wildlife opportunities, and other resources values complementing those of the Forest. The Gila NF works closely with all of these state and federal agencies to maintain communication and seek shared management objectives.

Forest Service designated special areas contribute to social, economic, and ecological sustainability by connecting people to their natural and cultural heritage, preserving intact natural systems and their individual components, and providing economic benefits to surrounding communities. Designated areas can also impose some opportunity costs on local economies by restricting certain uses or extraction of forest products.

Input received to the Forest Plan revision process so far has shown that Designated Areas, and in particular congressionally designated Wilderness, is a polarizing issue for Gila National Forest stakeholders. Some commenters feel that current conditions, both locally and globally (i.e. climate change) warrant the preservation of additional designated areas, including Wilderness and Wild and Scenic Rivers, while others feel that such designations hinder the management of these areas to prevent large scale wildfires and may negatively affect water rights holders.

Chapter 14. Infrastructure

Introduction

Infrastructure is considered the human built property created to support the use of NFS lands. It includes roads, trails, dams, bridges, and administrative and recreation facilities owned and managed by the Forest Service; and it includes roads and utility infrastructure owned and managed by other governments and private entities. The infrastructure influences the Forest's ability to contribute to the social, cultural, and economic conditions within the plan area and the broader landscape. Infrastructure allows for sufficient access and use of the Forest, through a variety of multiple uses and ecosystem services. It should be integrated within the landscape, to preserve its scenic beauty and character and enhance the experience of Forest users. Forest infrastructure should be well planned, managed, and maintained, so as not to harm the ecological integrity of the Forest and allow for continued enjoyment and use of the Forest by many user groups. This section identifies and evaluates:

- The current condition and maintenance level of the Forest's infrastructure – roads, bridges, administrative and recreation facilities, dams, utility systems, trails and other infrastructure.
- How funding and maintenance trends may affect infrastructure in the future.
- And the contribution infrastructure makes to the public's ability to use and benefit from Forest resources.

Ecosystem Services of Infrastructure

Forest transportation infrastructure supports the ability of the Forest to provide ecosystem services by allowing access for Forest Service employees to implement project work, which contributes to the health of Forest ecosystems. Healthy Forest terrestrial, riparian, and aquatic ecosystems increase the ability of the Forest to provide supporting and regulating ecosystem services. Transportation infrastructure allows visitors and permit holders to gain access to the many provisioning ecosystems services important to them. The trail system, campgrounds, and other recreation infrastructure provide cultural ecosystem services through recreation opportunities, scenic vistas, and enjoyment with nature.

Transportation Infrastructure

Visitors from all over travel to and through the relatively remote Gila National Forest. Most start off on federal, state and/or county roads and eventually make their way onto connecting Forest roads. Once on the Forest, users may choose to continue their journey on higher standard roads or transition to lower standard roads where high clearance and/or four wheel drive vehicles are recommended. Whether the road is a four lane highway or a primitive road, this multi-agency, multi-standard network of roads is maintained to provide reliable access by the motorized public.

Primary Access Routes Servicing the Forest

Access to the Gila National Forest, and many of the more popular destinations, is accomplished through a network of federal, state, and county routes (Figure 213). The portion of this network found in the higher elevations is subject to periodic closure during heavy winter snows. Motorists may also encounter delays associated with rock or debris flows from storm runoff especially in areas of recent fire activity. Several different agencies are responsible for keeping these roads open and safe for all users year-round. Many of these roads serve as primary access for communities in and around the planning area.

National Forest System Road (NFSR) 150, also known as the North Star Mesa Road, is the only National Forest System Road motorists can use to travel from the southern boundary of the Forest to the northern boundary. NFSR 150 falls within the corridor that separates the Gila Wilderness from the Aldo Leopold

Wilderness. In 2011, the Forest has made significant investments in NFSR 150. Even with those improvements, there are times when NFSR 150 may become impassable by low clearance vehicles. During those times, low clearance motorists traveling from north to south or vice versa will have to rely upon U.S. Highway (US) 180 on the west side of the Forest or Interstate (I) 25 and N.M. Highway (NM) 52 to the east.

The Gila National Forest's 3.3 million acres is separated into six ranger districts. The northern portion is primarily comprised of the Quemado and Reserve Ranger Districts (RD). These two districts are accessible from Quemado to the north via NM-32, or Socorro to the northeast via NM-12, and from Springerville, AZ via US60 or US-180. Motorists coming in from the south will typically use US-180 from Silver City, NM

The Glenwood Ranger District is located on the west central portion of the Gila National Forest and can be accessed from the north (Luna and Reserve) and south (Silver City) via US-180. Travelers coming from Arizona can access the Glenwood RD via NM-78 from the southwestern portion of the district.

The eastern portion of the Forest is occupied by the Black Range RD. It can be accessed from the north (Datil and Socorro) and east (Truth or Consequences) via NM-52 and NM-59. The southern end of the District can be accessed via NM-152 and NM-27.

The Wilderness District is primarily comprised of wilderness and thus motorized access is limited. NFSR 150 is the primary access from the north. The only other access is through Silver City or Mimbres via NM-15 or NM-35 from the south and southeast respectively.

The Silver City Ranger District is located on the southern end of the Forest. This district is the home of the Supervisor's Office, located in the town of Silver City. This is the only district on the Forest that is discontiguous. The Silver City RD is comprised of three separate areas; the area immediately surrounding Silver City, the portion in the southern Black Range Mountains, and the Burro Mountains area. Motorists can find their way to this district by way of US-180 when coming from the north and west (Glenwood) or south and east (Deming), via NM-90 from the south and west (Lordsburg) or from the east by way of NM-152 (Truth or Consequences and Hillsboro).

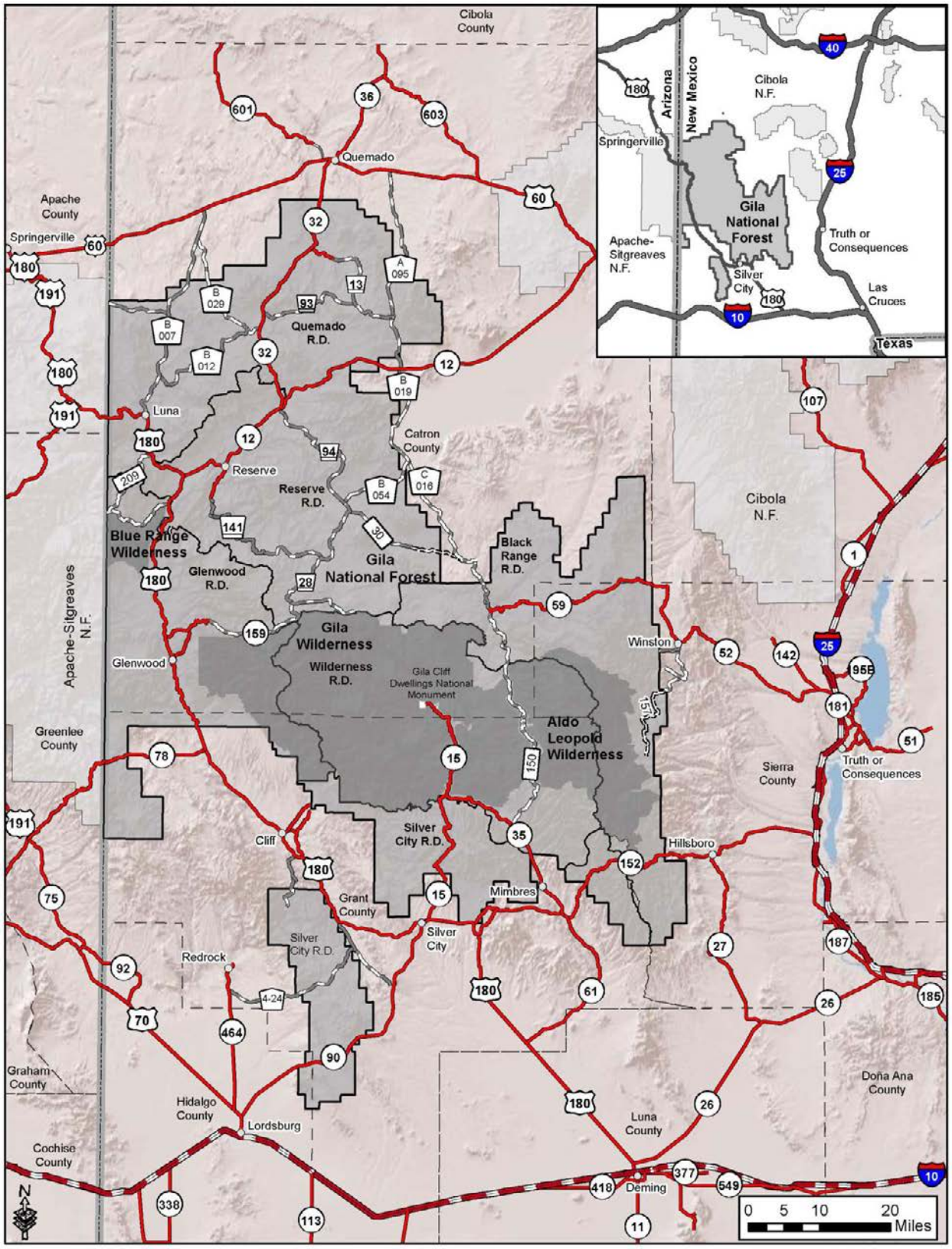


Figure 213. Major access routes in and around the Gila National Forest

Forest Transportation System

The Forest Service uses a Road Maintenance Management System to provide a systematic process for Forests to set priorities, plan, budget, schedule, perform, monitor, and evaluate maintenance of Forest roads. Every NFS road is assigned Road Management Objectives which then help determine its Maintenance Level (ML). The Forest Service uses the Road Management Objectives to describe the level of service provided by a specific NFS road. Several factors are considered when assigning maintenance levels; user safety, traffic volume, traffic speeds, road investment, user comfort and convenience, funding levels etc. When roads are scheduled for maintenance, the maintenance performed should meet the maintenance criteria for the road's assigned ML. Maintenance Levels range from 1 to 5. A ML 1 road provides the lowest level of service and a ML 5 is associated with roads providing the highest level of service. A road intended to move more traffic at a higher rate of speed would be assigned a higher maintenance level than a road maintained for high-clearance vehicles at much lower speeds.

ML 1 roads are closed to all vehicular traffic, but may require basic custodial maintenance to prevent damage to adjacent resources or to preserve the road for future resource management needs. Roads assigned to ML 2 through 5 may provide year-round or intermittent access. ML 2 roads, which are managed for high-clearance vehicles, account for the majority of the open NFS road miles. These roads typically don't receive a lot of traffic but they provide motorized access to more acres of Forest for various purposes (e.g., hunting, camping, access to trailheads, firewood gathering, recreational driving) than all of the ML 3 through ML 5 roads combined. No provision is made for user comfort, user convenience, and speed of travel. Neither is any provision made to warn users about changing conditions and safety concerns on the road ahead. On the other hand, level 3 roads are passable to prudent drivers in passenger cars. Users can reasonably drive with expectations of predictable road conditions and can expect warning signs and traffic control devices meeting standards from the Manual on Uniform Traffic Control Devices when hazards are present. The distinctions between maintenance levels 3, 4, and 5, which are roads managed as public roads, are not sharply defined. Some parameters overlap. Maintenance levels are selected based on the best overall fit of the parameters for the road in question. In those situations where the parameters do not indicate a definite selection, the assignment of ML should be based on the desired level of user comfort and convenience as the overriding criteria.

Maintenance of NFS roads on the Gila NF occurs year-round. NFS roads on the north end of the Forest (Quemado and Reserve RDs) are typically scheduled for maintenance during the warmer months to avoid the adverse conditions (frozen roadbeds, snow and other inclement winter weather, etc.) of the winter months. During the winter months, maintenance is performed on NFS roads on the southern end of the Forest where temperatures are typically milder and conditions are more conducive. Flash floods from isolated thunderstorms, persistent monsoon rains, downed trees from the past winter or spring winds, and potholed pavements from freeze-thaw cycles comprise the maintenance challenges through the year. Emerging trends are the impacts of larger and more severe fires, and the subsequent monsoon rains that follow, leading to increased flooding and roadway washouts.

Forest Service Handbook (FSH) 7709.59-40 requires roads "open to public travel", i.e., passable by four-wheel standard passenger cars and open to the general public, meet certain standards of the Highway Safety Act of 1966 associated with design, construction, maintenance, signing and traffic accident surveillance. NFS roads managed as ML 3, 4 or 5 are subject to the Highway Safety Act. These roads see more traffic traveling at higher speeds than ML2 roads and thus, more time and money are directed to the maintenance of these facilities.

Funding levels for road maintenance have significantly declined over the years. Since 2011, funding levels for road maintenance on the Gila National Forest have seen an average reduction of 11% per year. In 2015, the Gila NF road maintenance budget was $738,400. The Forest is completing basic custodial maintenance

(grading the road surface, maintaining ditch lines, select sign replacement, minor brushing of roadside vegetation, etc.) on approximately 300 miles (out of the 3,334 total miles) of the existing roads on an annual basis; approximately 75% of those miles are ML 3, 4 and 5 roads and the remaining 25% are ML 2 roads. Approximately 80% of the 300 miles of maintained roads are the same and appear on the maintenance schedule every year.

The majority of these miles are not maintained fully, i.e., correcting all deficiencies to ensure the road and all its features are functioning properly. The annual maintenance needs displayed in Table 199 and the available maintenance budget shows a large discrepancy and presents the Forest having a road system that cannot be fully maintained. Further, road maintenance budgets are forecasted to decline in the foreseeable future, therefore continuing to make it difficult to provide basic custodial maintenance to entire road system.

Table 199. Annual road maintenance needs by maintenance level

Maintenance Level	Miles	Annual Estimated Maintenance Needs $/mile[a]	Total
2	2,932	$350	**$1,026,200**
3	251	$8,282	**$2,078,782**
4	129	$10,294	**$1,327,926**
5	22	$6,597	**$145,134**
Total	**3,334**		**$4,578,042**

[a] Annual Costs per Mile from "Identifying a Financially Sustainable Road System Spreadsheet Tool" (USDA FS 2006c)

The result of the Forest's inability to perform full maintenance is a maintenance backlog known as deferred maintenance. Examples of deferred maintenance include replacing culverts, cattle guards, surfacing and signs based on their life cycle or only when needed, and removing all roadside vegetation encroaching into the roadway or only that which is limiting site distances. An estimate of the current deferred maintenance for NFS roads on the Gila National Forest is $272,265,429. This number is subject to grow as funding levels continue to decline.

Bridges

The Gila NF has 12 road bridges as part of its transportation system. All but one of the Forest's bridges have been in service for 50 years or more. The Forest does plan to replace or rehabilitate eight bridges on NFSR 150 once funding becomes available. Two of the bridges are scheduled for replacement and another for rehabilitation in 2016. The Forest has designs in place to replace another five structures once funding becomes available. Of the remaining four bridges, two are rated in "good" condition or better and the other two are rated to be in "fair" condition. None of the remaining four bridges are subject to load restrictions at this time. All twelve bridges are inspected every two years. Inspectors document all observed deficiencies and create a list of work items that are prioritized and corrected as funding permits. The funding source for minor bridge repair and maintenance is the same as funds available for road maintenance. Funds for major work items, rehabilitation and bridge replacements are typically competed for at a regional level.

Travel Management

To address the concern about unmanaged off-highway vehicle (OHV) use, the Forest Service published final travel management regulations for use of motor vehicles on National Forest System lands on November 9, 2005. The Travel Management Rule (USDA FS 2005) requires that each national forest and grassland "provides for a system of National Forest System (NFS) roads, NFS trails, and areas on NFS lands that are designated for motor vehicle use...including the class of vehicle and time of year..." The Gila National Forest's Travel Management decision was released in June 2014, and the decision will be implemented upon publication of the motor vehicle use maps (MVUMs). Designated roads, trails, and areas open for motor vehicle use are identified on the Gila NF MVUMs. Consistent with the rule, motor vehicle use off designated roads, trails, and areas identified on an MVUM is prohibited on the Gila NF. The Gila NF MVUMs currently identify 3,334 miles of NFS roads designated for public motorized use (Table 200). Approximately 2,932 miles (88%) are ML 2. The remaining designated NFS roads (402 miles or 12%) are ML 3 to ML 5 and are managed for passenger car use.

Roads not selected as part of the designated public system can be used administratively or by written authorization, or will be stored for future use or decommissioned. The status of these stored roads will be evaluated during future project planning.

Table 200. Miles of Gila National Forest roads by maintenance level

Maintenance Level	ML2	ML3	ML4	ML5	Total
Miles	2,932 (88%)	251 (8%)	129 (4%)	22 (<1%)	3,334 (100%)

Aviation

There are 4 airstrips located on the Forest that receive semi-regular maintenance (Beaverhead, Negrito, MeOwn, and Jewett Mesa) by the Forest. These airstrips provide access for emergency services, fire management operations, burned area emergency response actions, and other administrative activities of the Forest Service. These airstrips are also considered open for general public use and receive occasional recreational use. Two other airstrips are located on the Gila National Forest, but are under special use permit to Catron County (Reserve and Glenwood). All the airstrips located on the Gila National Forest are considered "primitive" according to the Airstrip Classification matrix (USDA FS 2012e), with the exception of Reserve which is developed. The New Mexico Department of Transportation is actively working with the recreation aviation community and other stakeholders to promote the use of airstrips around the State and to help the Forest Service maintain recreational opportunities associated with existing airstrips. Pilots are reminded that it is their responsibility to check Federal Aviation Administration (FAA) Notices to Airmen (NOTAMS), the Aeronautical Information Manual, FAA flight service stations, and current airstrip conditions from the airstrip manager before conducting any flight operations.

Facilities

Administrative Facilities

Much of the planning for facilities for the Forest is guided by Facilities Master Plan which is scheduled to be updated and revised regularly. Currently, the Facilities Master Plan is overdue for update, however it will be updated by an independent group in fiscal year 2016, and this will reflect current vision and direction for facilities on the Forest. The Gila NF has six ranger districts of which one is a combination Supervisor's Office / District Office. Of the six ranger district offices, four are owned by the USFS. Of the other two districts, the Black Range District Office in Truth or Consequences, NM is leased and the Silver City District office, which is shared with the Supervisor's Office, is also a leased facility. The Supervisor's

Office also leases land from the Grant County Airport for facilities at the Aerial Firebase / Cache. With the exception of the Black Range Ranger Station, the ranger stations are self-contained compounds, typically including an office, warehouse/shop, residences/crew quarters, materials storage sheds, horse facilities, and water/wastewater systems. Several of the districts also have remote work centers due to long distances between district areas, which include living quarters as well.

The Wilderness Ranger District also has facilities and land owned by the USFS, but are used and managed by the National Park Service at the Gila Visitor's Center near the Gila Cliff Dwellings National Monument. These facilities are shared by both agencies in many cases, and costs are spilt for maintenance and upkeep on an informal basis. Currently, the USFS and the National Park Service are in the process of instituting a formal agreement between the two to determine responsibilities of these lands and structures going forward. While details aren't currently available, this should formalize who is both physically and fiscally responsible for the well-being of this infrastructure.

The Gila NF maintains a total of 264 non-recreation administrative buildings including all range facilities which include range cabins and barns and are maintained by the permittee. Each structure receives a facility condition assessment by qualified personnel every five years. The inspections result in the documentation of all required maintenance needs. The result of comparing the required maintenance to the generated replacement value for each asset is a facility condition index (FCI). The FCI correlates to a facility condition rating of good, fair, or poor (Table 201). A good condition rating is considered a site that is fully functional and pose little to no safety concerns to the public and agency personnel. With a good condition rating, there is room for improvements to the sites, but overall function of the site is acceptable. A rating of poor typically indicates the need for major repairs, replacement or decommissioning of the facility.

Table 201. Administrative buildings on the Gila National Forest, with their facility condition ratings

Ranger District	Number of Structures	Good	Fair	Poor
Supervisor's Office	50	24	7	19
Black Range	43	15	3	25
Quemado	43	22	5	16
Glenwood	35	14	3	18
Wilderness	35	16	2	17
Reserve	43	19	6	18
Silver City	15	8	1	6
TOTAL	264	118	27	119

The deferred maintenance of administrative facilities on the Gila NF, excluding the leased property, is valued at over $7.3 million dollars. With a limited budget to address all facility needs, prioritization of investment in maintenance occurs according to the following sustainability goals: (1) address existing or potential health and safety hazards; (2) emergency repairs to restore serviceability of building; (3) repair to existing building and utility system to prevent further damage and deterioration; (4) maintenance of facilities to the objective service level; and (5) improvements to reduce maintenance and operation costs.

Many of the facilities identified as being in poor condition are older buildings and many of those are range buildings (such as range cabins and barns) which are to be maintained by the permittee. These buildings are currently being maintained to address only required health and safety issues. Priority for maintenance is given to office, residential, and warehouse buildings. The facilities budget for maintenance of these buildings has not increased in recent years, leading to the significant deferred maintenance backlog. The expectation is that future funding will not increase, resulting in a decline in the condition of other administration facility structures. Current plans are to reduce overall footprint of facilities and consolidate resources in order to reduce facility maintenance costs.

Recreation Facilities

The Gila NF has a total of 33 developed campgrounds which include two group campgrounds. All of these campgrounds have vault toilets (see Wastewater Systems) and seven provide drinking water (see Drinking Water Systems). The Forest also manages a horse camp with water for stock and corrals. There are also a total of nine interpretive sites, five observation / vista areas, six picnic sites, five boating facilities, and 98 developed trailheads all with some type of development. Eleven sites have horse corrals (2 campgrounds, 7 trailheads, 1 interpretive site, 1 horse camp), while five different sites have a total of 10 pavilions.

The majority of recreation facilities are currently considered to be in good condition (Table 202). There are a couple of sites that are currently closed due to damages from wildland fires and/or flooding. There are other sites that currently have some sort of seasonal closure or restrictions due to time of year and threat of flooding (e.g. monsoon season). There has been a significant amount of rehabilitation work at several recreation facilities that have been affected by large wildland fires. Rehabilitation efforts have resulted in improved conditions compared to the previous ratings prior to the fire impacts. For more detailed information on conditions, risks, and trends related to recreation facilities see Chapter 12 – Recreation.

Table 202. Recreation buildings on the Gila National Forest, with their facility condition ratings

Ranger District	Number of Structures	Good	Fair	Poor
Supervisor's Office	0	0	0	0
Black Range	7	6	1	0
Quemado	26	16	6	4
Glenwood	16	14	0	2
Wilderness	54	28	5	21
Reserve	16	12	2	2
Silver City	25	20	5	0
TOTAL	144	96	19	29

Drinking Water Systems

The Gila NF has 15 drinking water systems - 7 systems serve recreational facilities and 8 serve administrative sites. Many of the drinking water systems were developed or improved during the 1990s and early 2000s and currently range from good to poor in condition. However, each drinking water system

still must meet water quality and system operation standards according to its classification type. The administrative sites include the Grant County Airport, Kingston Administrative area, Beaverhead Administrative area, Luna Administrative area, Glenwood Administrative area, Wilderness Administrative area, Negrito Administrative area and Fort Bayard Administrative area. The remaining administrative sites (Quemado, Reserve and Silver City Administrative sites) are served by municipal water systems. Recreation sites include Quemado Lake, Catwalk, Lake Roberts, Gila Visitor's Center, Willow Creek, Snow Lake and Little Walnut.

Due to shrinking budgets, current plans for the water systems are to correct and maintain these systems to a good condition rating and discourage installation of any new water systems. Testing and sampling of water systems are up to date and in compliance and will continue to do so until systems are properly decommissioned.

Wastewater Systems

The Gila NF manages 1 lagoon wastewater system near the Gila Cliff Dwellings National Monument which receives all sewage pumped from the nearby area (vault toilets, RV dumps, etc.), and multiple leach field / septic type wastewater systems. The Gila NF also ties into 4 municipal septic systems. There are 104 vault toilets on the Gila NF as well as 18 pit toilets.

The majority of the vault toilets on the Forest were installed in the 1970s and 80s, but have been replaced in the last 20 years as part of campground reconstruction projects by CXT model toilets. Vault toilets are an all-inclusive system which contains both the building and the below-ground vault for wastewater. Currently 73 vault toilets are in good condition, 14 are fair, and 17 are in poor condition. The approximate replacement value for one vault toilet is $40,000. Replacement of the 17 poor condition units would be a cost of around $680,000. Over time, we will seek to replace the 17 poor rated (older) vault toilets with new CXT vault toilets or equivalent.

The deferred maintenance of septic/wastewater systems on the Gila NF currently is estimated at $300,000. Once a septic tank/leach field system fails, it must be replaced in its entirety. Since wastewater is an important health and safety issue, funding for future administrative wastewater projects would be a priority.

Trail Systems

The Gila NF manages a total of 1,927 miles of trails. There is a total of 179 miles of motorized trails, 861 miles of trails within wilderness areas, and 891 miles of non-wilderness / non-motorized trails. Trails on the Gila NF are a vital contribution to Forest infrastructure since they provide access to the wilderness areas and are a key component to the recreation program. For information on condition, risks, and trends related to the trail system see Chapter 12 – Recreation.

Communication Sites

The Gila NF has 6 control / base radios located throughout the Gila NF. In addition to this, there are 11 repeaters throughout the Forest that have communication equipment utilized by the Gila NF. The majority of the communication equipment and sites are all in good condition. However, some of the buildings are beginning to show some wear due to deferred maintenance.

To date, the Gila NF is currently in process of upgrading the current radio system via radio replacement. In that, there are plans to all existing base stations to control base repeaters in order to improve coverage and aide users in hearing and sending messages better throughout the Forest. A current issue the Forest is having is that the base stations receive traffic and send it to the Forest Dispatch Center via hard line and then are transmitted back via hard line to the base station and out to the users. In doing this, other users only hear the transmission sent by dispatch and not the initial traffic by other users. In only hearing one

side of the communication, many users face confusion on messages, and other messages, which may be pertinent, are completely missed by listeners. Modifications to these base stations will now allow users to hear both transmissions from the other users as well as dispatch. This should improve communications at Glenwood, San Francisco Divide, Mangas Mountain, Signal Peak and Copperas Peak areas.

The continued maintenance and service of the communication sites and equipment is critical for Forest Service personnel and public safety. Most of the Forest is not accessible to mobile phone service. The current trend is for funding to be available when needed to perform maintenance. All funding for communication is borne by the Forest Service Communication Information Office.

Dams

The Gila NF has 3 large earthen dams forming lakes located within the Plan area. The Snow Lake Reservoir and Quemado Lake Reservoir are located entirely on National Forest land and the Lake Roberts Reservoir has some of the backwaters located on National Forest land. While all three of these lakes are located on National Forest Land, none of the dams are owned or maintained by the Gila National Forest. All three dams mentioned are maintained by the New Mexico Game and Fish Department, and current inspection reports show that while there are some operation and maintenance issues, the dams are in "satisfactory" condition. All three of these lakes have been separately permitted for use by "special use permit."

Other Infrastructure

Several electrical, telephone, and oil and gas distribution systems cross the Gila NF, but are owned, operated, and maintained by public utilities or private companies. These systems and other infrastructure require a special use permit and / or easement from the Forest Service (see Lands). The infrastructure is significant because poor design and/or management can impact Forest resources.

In addition, the Gila National Forest has various range infrastructure including fences, corrals, cattle guards, and assorted types of water developments including; springs, wells, windmills, solar pumps, pipelines, water storage tanks, and water troughs. Many of these improvements related to livestock management are maintained by livestock grazing permittees as part of their grazing permit. Any new range infrastructure is coordinated through the District Range Staff and Line Officers on the Gila National Forest.

Other wildlife infrastructure includes trick tanks and drinkers for wildlife, fish barriers, fishing piers, floating docks, boat ramps, fish habitat enhancement structures, and fish cleaning stations which are maintained by the US Forest Service. The fish barriers are located throughout the Forest and require little to no maintenance. Additional fish barriers may be considered pending recommendations and consultation between the U.S. Forest Service and the New Mexico Department of Game and Fish. All other fishing type infrastructure is also typically a joint effort as coordinated between the USFS and the New Mexico Department of Game and Fish.

Sustainability of the Forest Infrastructure

Over the last 20-years, the Gila NF has invested millions in mission critical and non-critical facilities. Money has been spent to upgrade facilities to be more energy efficient, abate hazardous materials and other health hazards as well as decommission and demolish facilities no longer needed for service. The Forest's trail system is in fair to poor condition, and its roads and bridges are currently safe for visitor travel. However, recent budgets are far less than what was distributed to the Forest in past years. If this trend continues, it is likely that some of the infrastructure will deteriorate beyond repair, which will force decisions on consolidation and possibly relocation.

Contributions of Infrastructure to Social, Economic, and Ecological Sustainability

The Gila NF's transportation system is integral to supporting the many uses and opportunities enjoyed by the public. Roads allow access to gather firewood, hunt, fish, hike, and recreate. Local businesses and communities benefit from visitors who want to use the Forest because they can safely access and experience the Forest on NFS roads and trails. Gaining access to the Forest through roads and trails are important for local residents to continue their traditional uses, which are integral in maintaining the social and cultural fabric of many Forest communities. The trail system allows Forest users to hike for exercise or simply to experience the beauty of the Forest. Recreation infrastructure (i.e., trails, roads, campgrounds, and toilet facilities) allow for recreation opportunities, which support communities directly (e.g., outfitter guide jobs) and indirectly (e.g., increased tourism in community lodges, shops, and restaurants). A well planned, managed, and maintained Forest infrastructure allows for these opportunities.

Infrastructure contributes to ecological sustainability when it is properly designed, integrated within the landscape, and well maintained. Transportation infrastructure allows Forest Service personnel to access the Forest to perform valuable monitoring and implement land and water restoration projects. The wildlife guzzlers provide fresh drinking water in times of low rainfall and when natural water sources are scarce.

Negative economic and social contributions would include having to close sites, because funds are inadequate to provide appropriate maintenance to keep sites safe for human use. Closures would reduce or limit opportunities to access and gain enjoyment of recreational resources and experiences. Negative ecological sustainability would result from a key dam failure, major road or trail erosion, or issues with septic systems.

Stakeholder Input

Many stakeholders commented on the state of the infrastructure on the Forest. Some participants expressed concern about the lack of road maintenance and how that relates to resource damage or a loss to the local economies that rely on visitors who like recreational driving. Some people thought the Forest Service should allow them to perform road maintenance. Others stated they felt there are too many roads while others thought more roads should remain open for fire management access, firewood gathering, general recreation, game retrieval, private land access, etc. A few participants indicated public road maps for the Gila National Forest are not accurate.

In regards to the travel management rule, some expressed concern about losing access to parts of the Forest due to road closures, especially those who are elderly or mobility impaired. There were also those who felt the Forest was receiving resource damage from off road traffic and use of off road vehicles while others felt there was no damage associated with off road vehicle use. Some also commented that enforcement of the travel management rule will be difficult with reduced budgets and that road signage and additional public information will be important.

Public comments regarding trails and recreational facilities have several commonalities. As for the conditions of trails across the Forest, the vast majority of comments mention that current trail conditions are in poor shape. Many comments mention the need for additional emphasis on trail maintenance to keep the existing trails open and easy to navigate. There are a number of different suggestions on how to improve the condition of trails. Some comments include the need for addition funding, additional trail crews, improved signage, increase the use of different volunteer groups, utilize different partnerships (school groups, hiking and equestrian clubs, conservation groups), and create more loop trails. Another common theme presented by the public is the need for more information about the current condition of the trails on the Forest. Some of the different approaches include improved maps, updated information on the Forest website, and providing an avenue for the public to comment about trail conditions that they

encounter. Other similar comments made by the public include the need to keep as many trails open as possible, not limiting trail access, and the use of outfitter / guides to do trail maintenance in exchange for waiving their fees for special use permits. Naming of trails was an issue, where the majority commenters would like to see geographic type names for trails instead of the standard of utilizing a numbered trail naming system.

An issue that has multiple different opinions is the motorized use of trails. One segment of the public would like to limit motorized use on trails and is distracted by the noise and damages caused by off road vehicle use on existing trails and roads. Another group of the public would like to see an increase of trails and roads that are made available for motorized use including an increase in the allowed width of motorized equipment on trails from 50” to 60” to accommodate side by side Utility Task Vehicles (UTVs).

Comments regarding recreation facilities were similar to those about trails. A common comment was how many of campgrounds and trailheads were in need of additional maintenance and repairs. A shared recommendation was to increase the number of campgrounds that have campground hosts to help with monitoring and maintaining campgrounds. Another mutual comment was to keep campgrounds open and available for motorized type camping, while the comments vary as to what kind of motorized type camping is requested. The range is from sites for car camping up to sites being able to park a 35’ recreational vehicle (RV).

Many people expressed how important recreational opportunities on the Gila NF are to the local economy. More services being offered on the Forest along with continued improvements to existing infrastructure will continue to draw more visitors to the Forest and surrounding communities. Having more visitors will increase the economic contribution to the local communities near the Forest and local economies will benefit. Therefore the local citizens have a strong interest in management activities that occur on the Gila NF.

Summary

Infrastructure in the plan area is currently serviceable. Funding is the biggest risk to maintaining infrastructure into the future. Funding levels have decreased in recent years, while the costs to perform maintenance have increased. Closure of infrastructure (i.e., motorized roads, administrative facilities, and campgrounds) could result in reduced access, recreation services, and enjoyment by the public. Deterioration of infrastructure (i.e., roads, dams, and utilities) could result in ecological damage to the Forest.

Chapter 15. Land Status and Ownership, Use and Access Patterns

Introduction

This chapter discusses existing patterns and trends of land ownership, status, and use both within, and near, the Gila National Forest (Forest). It also explains how land status, ownership, use, and access patterns influence management of the Forest and vice versa.

Land Ownership

Land ownership is the basic pattern of public and private ownership of both surface and subsurface estates and legal restrictions and permissions on the use of the land. It refers to the ownership of land and interests in land.

The Gila National Forest is composed of land proclaimed as Forest Reserve land by numerous Presidential proclamations, executive orders and laws through the years, along with lands which have been acquired from private or other governmental owners. The Gila National Forest is one of the largest National Forests in the nation, occupying approximately 3.3 million acres. Federal ownership within the Forest is mainly consolidated as a large whole unit with the exceptions of some communities and other large and small tracts of private land located within the Forest.

Private land inholdings within the three designated wilderness areas in the Gila National Forest are almost non-existent. The Aldo Leopold Wilderness has two five-acre private land parcels within its boundaries; the Blue Range Wilderness contains no private land parcels; and the Gila Wilderness has six parcels of private land within its boundaries. There are no private land parcels within the boundaries of the two wilderness study areas (Hells Hole and Lower San Francisco River).

The Gila NF is located in the southwest corner of New Mexico within the counties of Catron, Grant, Hidalgo, and Sierra. Table 203 displays land ownership within these counties (Headwaters Economics 2015a). The majority of the Gila NF land area resides in Catron and Grant counties. The Forest comprises approximately 46 percent of Catron County and 34 percent of Grant County. With the combination of other federal, state, and tribal lands, only 26 percent of Catron and 39 percent of Grant County is privately owned. The amount of the Gila NF within Sierra County (13%) and Hidalgo County (0.4%) is less significant although only 25 percent and 42 percent is privately owned in these counties, respectively, due to significant holdings by other federal and state agencies.

Table 203. Land ownership (percent) in the counties that include the Gila NF

	Catron County	Grant County	Hidalgo County	Sierra County	County Region	U.S.
Private Lands	25.5	38.6	42.1	25.3	31.3	58.7
Conservation Easement	0.1	0.0	0.8	0.0	0.2	0.6
Federal Lands	62.7	47.4	41.6	63.2	55.6	28.8
Forest Service	49.5	33.9	3.5	13.9	29.5	8.4
Gila NF	45.9	33.9	0.4	13.2	27.4	<0.01
Cibola NF	3.6	0.0	0.0	0.7	1.5	<0.01
Coronado NF	0.0	0.0	3.1	0.0	0.6	<0.01
BLM	13.2	13.4	38.1	28.8	21.4	11.1
National Park Service	0.0	0.0	0.0	0.0	0.0	3.4
Military	0.0	0.1	0.0	19.3	4.4	1.1
Other Federal	0.0	0.0	0.0	1.3	0.3	4.7
State Lands	11.5	14.0	16.3	11.4	12.9	8.4
State Trust Lands	11.5	14.0	16.3	10.5	12.7	1.9
Other State	0.0	0.1	0.0	0.9	0.2	6.6
Tribal Lands	0.3	0.0	0.0	0.0	0.1	4.0
City, County, Other	0.0	0.0	0.0	0.0	0.0	0.2

Land Ownership Adjustment

The current 1986 Forest Plan allows for the adjustment of landownership for resource management goals. Management of the enormous land base of the Gila National Forest can be extremely complex. This task is magnified by patterns of ownership that are not contiguous in particular locations. Parcels of private land have been acquired by the Forest in the past via donation, purchase and exchange (trade), and these opportunities still occur. Acquisition of some of these private parcels can be helpful in achieving a desired Forest landownership pattern that supports resource management goals, addresses fragmentation, and reduces future management costs. For example, acquisitions of specific properties may expand access opportunities for the general public in areas of the National Forest which may have been extremely difficult to reach in the past. Acquisition of particular private inholdings may assist in recovery efforts of threatened and endangered species. Conversely, the sale or disposal of Forest land can assist communities in moving toward community objectives such as area for expansion or other municipal purposes.

Trends Affecting Land Ownership

The land area of the Forest has also been adjusted by numerous acquisitions, sales and exchanges. It is unclear what the future holds as funding for land acquisition is extremely limited and this scarce funding is shared and competed for throughout the nation. Land exchanges are becoming more infrequent as the transaction costs continue to rise and the time for the completion of a transaction to occur can be many years.

There is a trend of private ranches being subdivided, and portions being converted to other uses including residential development. This residential development can often occur near the Forest boundary it is a desirable amenity (often reflected in the real estate listing and sale price) for a piece of private property to be near or adjacent to the National Forest. This conversion to residential development can also have implications for the Gila NF including growth of the wildland-urban interface (and the cost of protecting homes from wildfires), the spread of invasive plants onto the Gila NF, the loss of access to public lands for recreation, the loss of wildlife habitat and wildlife movement corridors that cross private-public land boundaries, and the potential for conflict among user groups (Headwaters Economics 2015b).

It is now common to have a large number of homes, second homes, and vacation homes bordering public lands in the western United States. Since wildfire is a natural disturbance on western public forests, these homes are especially vulnerable to the risk of wildfire, and are considered within the wildland urban interface (WUI). Prolonged drought over the past 15 years (see the Water Chapter for more details) has increased the risk of more severe and intense wildfire. Catron, Grant, Hidalgo, and Sierra counties each have County Wildfire Protection Plans (CWPP), which seek to manage residential growth in WUI areas, promote partnership and collaboration, and identify and prioritize hazardous fuels reduction areas. Six percent (1,726) of the homes found within the four-county area are located in WUI areas. In recent years, the Gila NF has planned and implemented many projects that specifically decrease the risk of wildfires within these areas (e.g., prescribed burning and mechanical treatments to reduce fuels). See the discussion on WUI in the Social, Cultural and Economic Conditions Chapter.

Influences of Land Ownership on Social and Economic Conditions

With approximately 69% of the area owned by Federal and State governments, the multi-county area of Catron, Grant, Hidalgo, and Sierra counties often lacks private land within and adjacent to existing communities for expansion and sustainability. Because so little of the multi-county area is in private ownership, land ownership has a strong influence on social, economic, and ecological conditions. The tax base in these counties is very limited, due to the lack of land that is able to be developed.

This area's unique land ownership pattern also acts as a draw for hundreds of thousands of visitors to the Gila NF each year. Visitors to the Forest and counties generate tourism, recreation-related jobs, and provide tax revenue for local governments. Expanding recreational uses both on and off the Forest has the potential of impacting adjacent private lands via trespass or resource damage. Payments are made by the federal government to state and local governments to compensate for non-taxable federal land within their borders (e.g. Payment in Lieu of Taxes-PILT). See the Social, Cultural, and Economic Conditions chapter for more details on these programs as well as the economic contributions of public lands to local economies.

Land Status

Land status is defined as the ownership record of title to lands, including withdrawals, rights, and privileges affecting or influencing the use and management of National Forest System (NFS) lands. For NFS lands, land status refers to the use or specific designations of a geographic area that provide general guidance and policy for the management of a defined geographic area. This guidance can take the form of use restrictions (e.g., withdrawals or dedication) and encumbrances (e.g., rights-of-way acquired or granted, reservations, outstanding rights, partial interests, or easements). Land status differs from land ownership. Land ownership refers to the ownership of land and interests in land; whereas, land status refers to the legal character or condition of the land.

Certain portions of National Forest System lands on the Gila NF and Apache-Sitgreaves NFs along the New Mexico/Arizona state boundary are administered by the adjacent National Forest due to being a part of a grazing allotment overlapping both states and the difficulty of accessing these lands from the parent National Forest (Figure 214). This administration is authorized by a "State Line Agreement," which was originally instituted in 1979 and later amended by the respective Forest Supervisors.

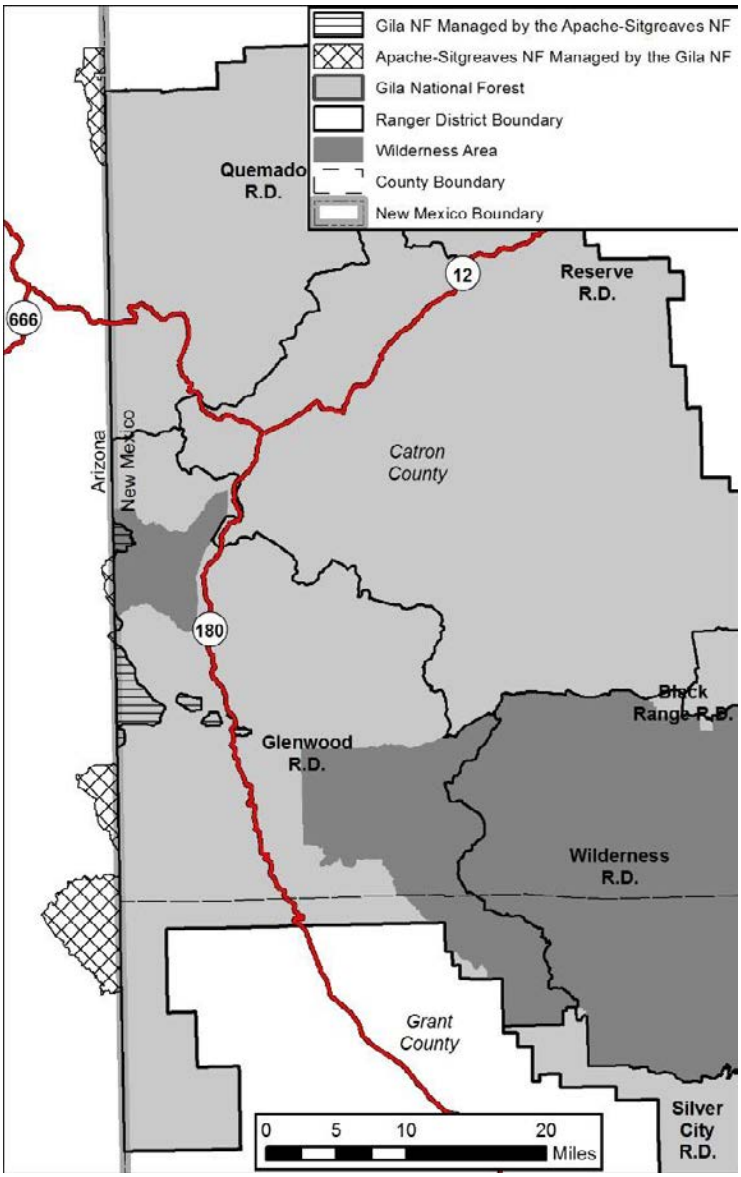


Figure 214. "State Line Agreement" areas administered by the adjacent National Forest along the NM/AZ boundary

The Gila National Forest also administers the portion of the Apache National Forest that is located in New Mexico (Figure 215), as well as designated Federal lands owned by the Veteran's Administration that are part of Fort Bayard (Figure 216). For purposes of clarification, "Forest" or "Gila National Forest" used throughout this report consists of all lands designated as the Gila NF and those lands it administers. "Administration" means that the portions of the Apache National Forest and Fort Bayard fall under the management direction outlined in the Gila Forest Plan.

The Apache National Forest split its administration up in 1971, where the New Mexico portion went to the Gila National Forest for administration, and the Arizona portion was combined with the Sitgreaves National Forest to form the Apache-Sitgreaves National Forests. The Gila National Forest combined with the New Mexico portion of the Apache National Forest and are managed as one National Forest. The use of "Apache National Forest" is only referred to when it is necessary to describe its location within a legal manner. In the National Forest System, the size of the supervisory administrative units has often been

adjusted for efficiency and effectiveness. In many cases, two or more Forests are administratively combined and assigned to one supervisor's office. Since these combinations do not change the formal individual names of the Forests, or their boundaries, or the goods and services produced, there has been no need for congressional action regarding them (Davis 1983).

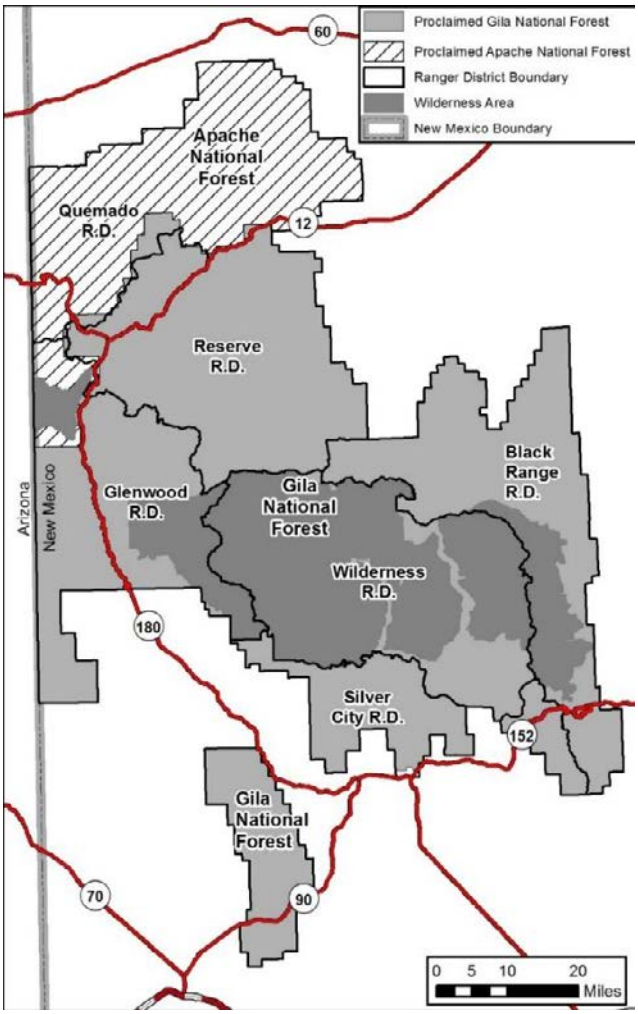


Figure 215. Proclaimed Gila and Apache National Forests that are administered by the Gila National Forest along with the current District Boundaries

Fort Bayard area started as a military reservation in 1869 consisting of approximately 8,200 acres and then in the early 1900s, the War Department added more acreage to the area. In 1941, the Fort Bayard area, excluding 640 acres which consisted of the hospital and associated facilities, was entrusted to the custody of the Department of Agriculture, through the Forest Service. Also there is an area composed of approximately three sections of land at Fort Bayard that is designated as Federal land that is classified as Veteran's Administration property, which was transferred by this government agency to the administration of the Gila NF in 1954 (Figure 216). The land has remained in the control of the Department of Agriculture with the exception of some sales to the State of New Mexico and adjacent community of Santa Clara.

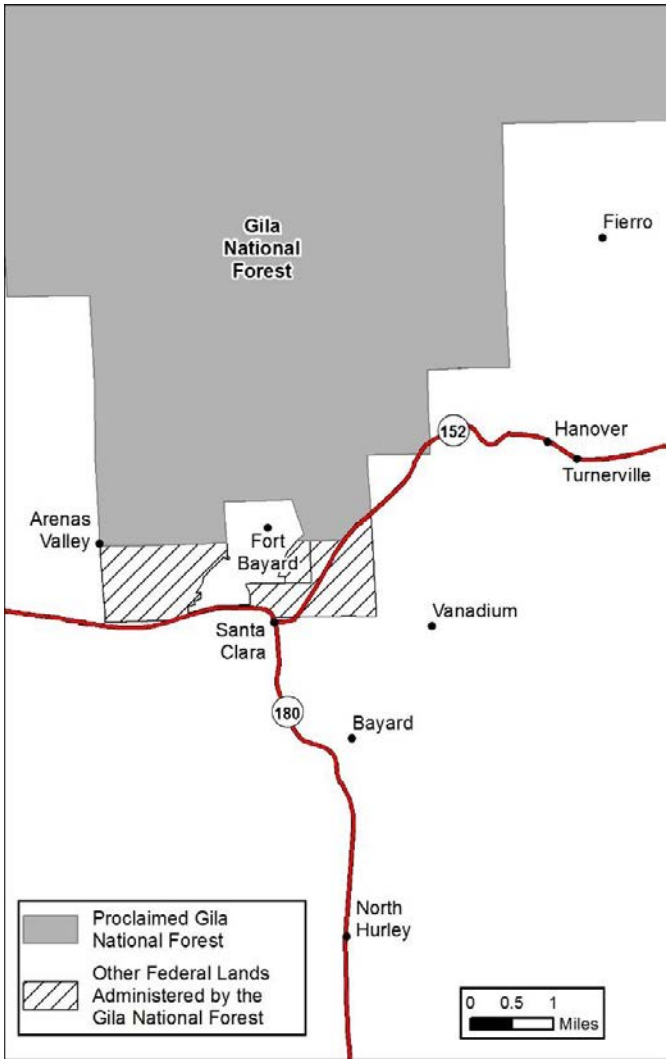


Figure 216. Other Federal lands administered by the Gila National Forest near part of the former Fort Bayard

Land Status and Boundary Management

Boundary Issues

Boundary problems on the Gila National Forest have generally resulted from the remoteness, terrain, and associated accessibility of the Forest area. All original survey work for township and range lines ceased in the early 1900s. Very few of the corners from the original surveys were able to be located. Lack of well-established boundary corners and markers adjacent to and within the Forest during the homestead period has resulted in boundary line disputes as new surveys with better technology are completed.

In the past, property disputes between land owners generated numerous complaints to the General Land Office. These complaints by land owners have resulted in independent resurveys by the BLM and General Land Office over the years to fix the boundary lines. This independent resurvey authority is still used today by the BLM and by Forest Service surveyors to fix problem areas.

Many of the corners that define the Gila National Forest boundaries need to be established or re-established. Some of these corners are missing due to substandard original surveys that have yet to be addressed by the Forest, while others are missing due to natural and human forces. In addition to the

backlog of land boundaries to be defined, none of the administrative boundaries such as wilderness area boundaries have been surveyed and posted by a licensed Forest Service surveyor on the ground. Most of these administrative boundaries have been signed and posted by USFS employees that are not surveyors or under the direction of a surveyor, therefore these posted lines should be considered unofficial and for maintenance purposes only. These boundary issues have resulted in title claims and encroachments.

Title Claims

A title claim is a dispute over who owns the title to a parcel of land, i.e., two or more parties are claiming title to the same parcel of land, or interests in land. The nature of the private land ownership in and around the Gila National Forest has predominantly been composed of large ranching and mining interests. The mining interests have for the most part surveyed and maintained their boundary lines to protect the valuable minerals that they wish to extract below the ground. The large ranches that surround the Forest are comprised of multiple parcels of land that are generally separated by either BLM or Forest Service administered lands. These parcels are associated with grazing leases on the federal lands that surround them. Since the ranchers run their cattle on both the federal and private lands, fences are located and maintained based on the locations of water and forage more than they are on the location of federal and private lands. In some areas in and around the Forest, the nature of the ownership has changed from large ranches to smaller ranches and single family ownerships. As the nature of the ownership has changed, the attitude towards the land and the desire to define the boundaries has changed as well. This change in ownerships and attitudes has resulted in many ownership or title claims throughout the Forest.

Encroachments

An encroachment is the act of trespassing upon the domain of another. It is the partial or gradual displacement of an existing use by another use. There are numerous cases of encroachments throughout the Forest such as a portion of a building thought to be completely located on private property, but actually found by a survey to be partially located on the National Forest. Many of these property trespasses are innocent, due to the lack of known landlines on the ground or mistaken assumptions that a particular area was owned by another party. Encroachment issues are typically identified when a property adjacent to the Forest is sold and a survey is completed. Rectifying these mistakes can be expensive and time consuming. The responsible individual(s) creating the encroachment may have to pay to remove the property from the National Forest, as well as clean up the site of the infraction.

Mineral Entry

The Forest is open for mineral entry, unless a parcel is specifically designated as withdrawn. A withdrawal is: (1) A management tool for setting aside an area of NFS land from entry, or for limiting activities. (2) Withholding an area of Federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area, or reserving the area for a particular public purpose or program. Lands that have been designated as wilderness areas are withdrawn from mineral entry, under the mining laws and from disposition under all laws pertaining to mineral leasing (Wilderness Act of 1964). Mineral resource surveys were conducted to evaluate the mineral potential of areas prior to wilderness designations for the Gila Wilderness, Aldo Leopold Wilderness, and the Blue Range Wilderness (Figure 217). The Forest has also withdrawn mineral entry in other specifically designated areas to avoid interference with the main use or objective of the specific designation. This includes administrative sites and developed recreation sites. Some large waterpower withdrawals exist that would allow for future dams and adjacent water storage, however, these hydropower proposals are not currently being evaluated or planned. Appendix F contains all the areas withdrawn from mineral entry. A review and evaluation of all of the existing Gila NF mineral withdrawals is currently necessary.

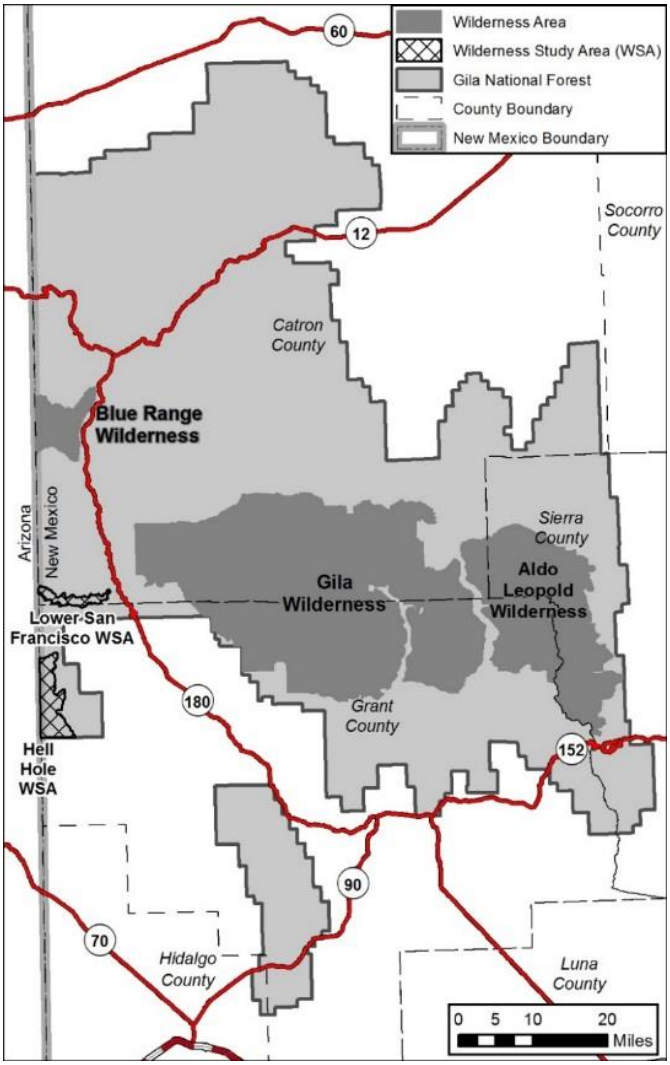


Figure 217. Wilderness Areas and Wilderness Study Areas on the Gila National Forest

Trends Affecting Land Status

Forest lands near or adjacent to communities or inholdings may receive concentrated uses due to proximity and ease of accessibility to participate in such things as recreating, hunting, or collecting fuelwood. Associated with some of the larger communities or inholdings are access roads, communication and power lines, and water conveyance structures for irrigation or domestic water uses. As larger inholdings have subdivided, there has been additional requests for access and sometimes expansion of utility corridors on Forest lands. The Forest will authorize these type of uses under a special use permits (see later section on Special Uses).

Due to its immense size, the Gila National Forest has a huge task of identifying all of its property lines, boundaries, and locations of its designated areas. Available funding to accomplish this work is not adequate to maintain what boundary posting needs currently exist. This contributes to the current situation of numerous occupancy and trespass issues scattered throughout the Forest.

Influence of Land Ownership Status on Social, Economic, and Ecological Conditions

Land status can restrict certain activities on Gila NF lands. Most notable of these are areas that are withdrawn from mineral entry, which eliminates commercial mining activity in those areas. Conversely,

these same designations can provide additional opportunities for the public (see Designated Areas and Recreation Chapters).

Land Use

Land use describes the activities to which the land is devoted, such as residential, commercial, industrial or agricultural uses usually described for private lands, and current land allocations and the uses permitted for NFS lands, such as grazing, mining, recreation, administration, etc. There are often several land uses occurring simultaneously on many areas of the Gila NF Forest. The land base of the Gila NF is comprised of a vast multi-dimensional terrain having a wide variety of resources. Within this land base there is a multitude of ownerships, as well as many resources to be shared, used, and enjoyed by the mix of private land residents and Forest visitors. The goals and objectives of the Forest are to continue to provide its resources for public use and enjoyment without harming the integrity of the area or its resources.

Currently 2.6 million acres of the 3.3 million acres of the Gila National Forest are managed for livestock grazing. Other uses such as mining and timber harvesting occur on smaller scales while hunting and recreation uses are widespread, but can have localized impacts. Resources are protected from land uses via evaluation through NEPA or special use permit processes to ensure the continued integrity of the affected Forest resources. Many times potential impacts can be mitigated through Forest Plan components, best management practices and other permit/project conditions.

Land Use Policies

A recent review was conducted of the plans of counties and other governmental entities adjacent to the Gila NF. The following section examines the context of the regional entities from a land use perspective.

Gila National Forest Plan

The 1986 Gila Forest Plan (USDA FS Gila NF 1986) is the principal document that guides Forest managers' decisions about management of the land and resources. The 1986 Forest Plan identifies how resources will be managed Forest-wide, through a set of management prescriptions for each resource. The Plan currently subdivides the forest into geographic management areas. These areas specify management prescriptions for the more focused management of resources in a given area. Forest-wide prescriptions supplement and support the prescriptions for management areas. The Gila National Forest is currently in the process of revising the 1986 Forest Plan.

Other Neighboring Federal Land Management Agencies

The Apache-Sitgreaves National Forests revised Forest Plan was published in 2015 (USDA FS A-S NFs 2015). Key provisions in the 2015 Plan provide guidance to restore and/or maintain 14 vegetation types occurring on the Forests, resulting in a return to natural fire regimes, a reduction of excess tree densities, and a sustainable supply of wood products. Also addressed are the restoration of key watersheds and riparian areas to proper functioning condition, and the maintenance/restoration of key habitats for fish and wildlife.

The Bureau of Land Management has lands adjacent to the Gila National Forest. The Las Cruces District Office is located in Las Cruces, NM. The Las Cruces District released a draft Tri-County Resource Management Plan (RMP) in 2013 encompassing Sierra, Otero, and Doña Ana Counties. The Mimbres RMP (1993; currently under revision) encompasses Doña Ana, Grant, Hidalgo, and Luna Counties. The Socorro Field Office RMP (2010) encompasses Catron and Socorro Counties. These RMPs provide broad-scale direction for the management of public lands and resources using principles of multiple use and sustained yield.

Counties

There is a wide range of different planning and land use strategies in the adjacent counties. The impact of the Gila NF varies throughout the region, with the variation related to the proportion of the county that is NFS land, as well as the different relationships of county economies to areas in Federal ownership.

Catron County adopted its Catron County Capital Improvement/Comprehensive Plan in 2007. Planning areas include land use (including interface with public lands), water, infrastructure and transportation, housing, public safety (including the CWPP), and economic development. Catron County is predominantly rural in character, and its comprehensive plan reflects the County's commitment to maintaining traditional economic structures of mining, timber, ranching, and recreation. A key issue is ensuring that land is available to support future development given the limited amount of private land available. Other implementation measures include outdoor recreation/tourism promotion, revival of the timber industry with a focus on smaller diameter trees and wood products, localized CWPPs by community, WUI area fuel treatments, and forest health community outreach.

Grant County adopted its Grant County Comprehensive Plan in 2004. This Plan emphasizes preserving the county's unique natural and cultural elements, while meeting current and future needs, to maintain and improve the quality of life for long-term established residents and newcomers. The Plan includes policies to partner with the Gila National Forest in watershed management, tourism promotion, fire prevention, and WUI fuel load reduction.

Hidalgo County adopted its Hidalgo County Comprehensive Plan update in 2011. There are seven elements including land and water, economic development, housing, transportation, infrastructure/community facilities, hazard mitigation, and implementation. Hidalgo County has a tradition of ranching, farming, and mining uses. The Plan mentions the risk of large-scale flooding in the Virden Valley due to post-fire effects in the upper Gila watershed on the Gila National Forest.

Sierra County has a Sierra Country Comprehensive Plan dated 2006. The Plan suggests several ways to foster more communication and collaboration between local government and federal land management agencies including regular meetings around areas of mutual interest, cooperating agency status, data sharing agreements, and collaborative partnerships. Other Plan issues related to the Gila National Forest include WUI area fuel treatments, watershed restoration, small diameter wood utilization, forest products infrastructure, Sierra CWPP implementation, obtaining access easements, working with permittees during droughts, and "initial screening process for new subdivisions/development within inholdings on the Gila National Forest." There is also an Interim Land Use Policy of Sierra County (No. 91-00) that calls for closer coordination between federal, state, and local governments concerning land use planning, land acquisition/disposal/exchanges, and land adjustments.

Soil and Water Conservation Districts

The State of New Mexico has encouraged Soil and Water Conservation Districts (SWCD) to write land use plans (LUPs) to promote responsible and effective use and management of the soil and water resources in the SWCDs. Sierra SWCD has drafted a LUP which was adopted in 2014 (Sierra SWCD 2014). The San Francisco SWCD adopted their LUP in 2013 (San Francisco SWCD 2013). The Grant SWCD provided a 5-year Plan of Action that includes many land use concerns and proposed actions (Grant SWCD 2014). Other SWCDs containing portions of the Gila National Forest in their boundaries include Caballo, Hidalgo, Quemado, and Salado SWCDs. The Forest will continue to engage and work with SWCDs to mutually benefit the conservation and land use efforts of these entities.

State of New Mexico

The New Mexico Statewide Natural Resources Assessment and Strategy and Response Plan was issued in 2010 (NM EMNRD 2010). The Plan guides the planning and implementation of natural resource

management and restoration activities for the state. The Plan also provides strategies of working with and integrating resources across boundaries with federal, tribal, and private landowners. Watershed health and restoration, healthy urban and community forests, and enhanced public benefit from the states natural resources are the primary components of the Plan.

Influence of Land Use Planning on Social, Economic, and Ecological Conditions

Due to the large amount of non-private land in Catron, Grant, Hidalgo, and Sierra counties, changes to zoning by the public land management agencies could have a significant influence on both the social and economic conditions in these counties. The amount of private land is such a low percentage of the counties that their tax base is very limited. Any changes, particularly acquisition of private land by public land management agencies, could appear to influence the counties' revenue. However, Payments in Lieu of Taxes (PILT) could offset some of these losses (see the Social, Cultural, and Economic Conditions Chapter). The counties' relatively large physical size can strain their ability to provide services.

Public lands that have been or could be withdrawn from mineral development may impact the economic well-being of the counties, as these withdrawals have the potential of reducing or eliminating commercial mining or leasing activities and the income associated with them. Any changes to zoning across the area of influence in regards to commodity resources could result in negative impacts to the surrounding counties' economic and social conditions. In addition, any changes that cause a reduction in commercial enterprise on public land could have negative impacts on the economy of the counties.

Special Uses

Special uses are those primarily conducted by a single individual, a small group of people, a corporation, a university or another government agency which has a particular need to use a portion of the Forest without harming the integrity of the land base. These uses are authorized on a temporary or term basis. Some authorizations may be issued to a corporation for a use which may directly benefit the public (e.g. powerline). The issued authorization has limits and restrictions to help ensure that the use stays within the guidelines of laws and regulations governing management of National Forest lands.

In order for a special use permit to be issued, a review process is conducted including an environmental review to ensure that the proposed special use meets laws and rules, and protects resource integrity. Providing adequate biological assessments & evaluations, cultural resource clearances and engineering assessments and designs for permits involving ground disturbing activities are the responsibility of the special use applicant.

Cost recovery fees are required[68] for work conducted by the Forest Service for review and analysis of a special use application and resource reports. These fees are for the cost of Forest workers and specialists who are needed to study and evaluate the special use proposals. An assessment of the amount of time to accomplish the task is determined and assessed to the proponent of the project.

Special Use Authorizations are written permits, term permits, leases, or easements that authorizes use or occupancy of NFS lands, and specifies the terms and conditions under which the use or occupancy may occur. The Forest Service divides the management of special uses into two categories: recreation special uses (see Recreation Chapter) and non-recreation (i.e. lands) special uses. The Gila National Forest has issued hundreds of special use permits related to lands. These authorizations include irrigation ditches, weather instrument locations, communication sites, access roads, electric transmission and distribution utilities, and scientific research among many others.

[68] Some special uses are exempt from cost recovery.

The direct and indirect value and influence of NFS lands for delivering goods and services is critically important to the public at local, regional, national, and even international levels. Utility corridors accommodate high pressure natural gas pipelines for industrial, commercial, and domestic purposes; high-powered transmission lines provide for interstate transfer of electricity; as well as distribution lines for power delivery to local homes and businesses. Communication sites accommodate rapidly evolving wireless technology, while at the same time providing critical radio communication for safety and security needs.

The Forest has no designated utility or transportation corridors across the Forest other than the individual alignments of any one particular use. The reasoning for this is that the existing utility companies are not coming and going in similar directions to help encourage a consolidated route or corridor. Power and energy corridors and large utility sites need to be well-planned and coordinated. The following linear utilities cross portions of the Forest to transmit and/or distribute their current, signal or resource to areas off and/or within the Forest boundary.

Electric Transmission

El Paso Electric (EPE) (Arizona Interconnection Project – AIP)
Tucson Electric Power (TEP)
Public Service Company of New Mexico (PNM)

Electric Distribution

Navopache Electric Cooperative (NEC)
Public Service Company of New Mexico (PNM)
Sierra Electric Cooperative
Socorro Electric Cooperative

Natural Gas

Gas Company of New Mexico

Telephone Lines

Century Link
Western New Mexico Telephone Company (WNMTC)
Windstream Communications

Communication Sites

There are currently 18 designated communication sites located on the Forest which are compatible for low power administrative, government and/or commercial electronic communication use (Table 204). There are no sites currently identified on the Forest as suitable for high power commercial communication installations, which are typically high power radio and television broadcasters.

Since 1990, radio and wireless technology has evolved at an extraordinary rate. However, no new studies by the Forest Service have been conducted to determine if new communication sites should be added to the Forest. There have been individual studies by local entities to propose additional single client uses for areas outside of the delineated area for existing communication sites. Further, the Gila NF has low power sites which are limited to a maximum radio power output of 500 watts of effective radiated power that have been identified for commercial use. These sites may only be suitable for administrative use. Other low power sites have senior users (like the Federal Aviation Administration) which have very little room for additional uses due to potential interference, thereby limiting otherwise compatible uses.

Lack of cell phone service in certain areas is an issue affecting safety, visitor perceptions, and economic development. Because of the rapid pace of technological advancement, the high economic value that communication sites represent, the finite number of both low and high power sites and the significant gap in time since any analysis was conducted, a thorough analysis is necessary to determine how to best serve administrative and commercial needs, while also protecting natural resource objectives. Industry should be included in this analysis, and it is likely that the expertise necessary to perform the analysis is not available on the Forest and may need to be outsourced or contracted. Some topics like Homeland Security requirements and the inherently high risk nature of tower management have never been considered in a thorough analysis. In other instances, the Forest Service encourages shared facilities to be used in common wherever possible. This co-location would help accommodate more uses within the finite space available at communication sites.

Communication Site Plans are being developed by the Gila NF at sites with the most users. These Plans facilitate the administration of the area, and once an analysis of the type of use within the area has been conducted, updates and new uses are easier to get approved. The priority of developing a Communication Site Plan is based on the number of users on a particular site. Those sites with only one or a couple of users may not necessitate the creation of a Communication Site Plan.

Table 204. Designated Communication/Electronic Sites on the Gila National Forest

Name	Ranger District	Communication Site Plan in place?*
Apache Mountain	Quemado	No
Black Peak	Silver City	No
Boundary	Silver City	No
Copperas Hill (Peak)	Wilderness	Yes
Divide	Silver City	No
Emory Pass	Black Range	No
Forks	Wilderness	No
Fox Mountain	Quemado	Yes
Glenwood Brushy	Glenwood	Yes
Jack's Peak	Silver City	Yes
Luna C.O.	Quemado	No
Luna Passive	Quemado	No
Mangus Mountain	Quemado	No
Mimbres Passive	Wilderness	No
Radar Brushy	Glenwood	No
Signal Peak	Silver City	No
St. Cloud	Black Range	No
San Francisco Divide Mountain	Quemado	Yes

* Most of the communication sites without Communication Site Plans consist of one or two users, which may not necessitate a plan.

Access

Visitor accessibility to the Gila NF by way of federal, state, and county roads from outside the National Forest is good (see Infrastructure Chapter). Within the Gila NF, motorized access on the 3,334 miles of NFS roads is available as designated on the Forest Motor Vehicle Use Map (MVUM).

While there are thousands of miles of NFS and other roads (county, state, other federal) on the Gila NF, there are some access issues primarily associated with private inholdings on the Forest. The sprinkling of

parcels of private land along major travelways and water corridors can make access to desirable areas of the Gila NF sometimes difficult to obtain. The Gila NF lacks rights-of-way across some private lands and may not have a feasible alternative to accommodate a new route around the private land due to topography and/or funding. The Gila is looking to acquire easement/permits across private land for public access where possible.

Rights-of-Way

For most of the history of the Forest Service, access methods to areas of the Forest were mainly a product of the need, desirability, terrain, and cost of construction. Access routes are normally broken up into two categories: roads and trails. The trails are used for pedestrian and equestrian/horseback use, while roads are used for vehicles (originally constructed for the use of wagons and later motorized vehicles). Most of the access routes on the Forest were a product of the type of use. Road construction was often initiated by the need to access private property and/or remove a forest product from the Forest. This later resulted in engineered constructed roads to meet the needs of motorized vehicles for increasing speeds, as well as supporting large heavy transports loaded with commodities, and making the route smoother to travel on. Many roads also resulted from travel to and from tracts of private land within the boundaries of the National Forest. Access to private property was and remains an important purpose for roads within the Forest. Roads were initiated by use across the land, usually in a route which was the closest distance from point to point in good terrain. Sometimes these routes crossed over other parcels of private land to get to the final destination. At the time, there usually wasn't a problem with a particular road crossing other parcels of private land without a document of authorization, easement or right-of-way. This is no longer the case. It is now commonplace for owners of private property to restrict public travel across their parcel of ownership. Because of this change, the Forest Service is behind in acquiring legal easements for many of the Forest roads and trails which are currently routed across parcels of private land. This issue is especially prevalent on the Black Range District.

The backlog of easement needs is quite extensive for the limited budget the Forest Service is allocated for right-of-way (easement) acquisitions. Prioritization of these needs is continually being made. These priorities are fluid, as needs continue to arise or change for various reasons. Donations of easements are a way the agency can acquire a right-of-way. However, donations of rights-of-way and property to the Forest Service are not common.

At this time, right-of-way acquisitions are unpredictable due to the dependency on willing sellers or donors. It is useful to determine the highest of priority right-of-way acquisitions that are needed, as well as which landowners may be agreeable to negotiate an agreement. Sometimes, priorities are weighted in the favor of agreeable landowners since these cases are more likely to be processed and completed if there is a willing seller.

Public access is not solely dependent on the Forest Service acquiring easements. By law, county roads are open to the public. As subdivisions are created, some of the subdivision roads are dedicated to public use though dedication of the roads to the county. The local counties have also desired to take over the operation and maintenance of many Forest roads. This allows the county to receive funding from the State to be used for road maintenance.

Private Land Access

Reasonable access to private land is a right granted by the Alaska National Interest Lands Conservation Act (ANILCA 1980), which applies to other states besides Alaska. However, this right only applies to a private inholding (i.e. a parcel of private land completely surrounded by NFS land). It is incumbent upon the owner of the original patented tract of land (prior to its subdivision or parceling off) to provide access to the pieces of property which is or was originally broken off from it.

In essence, while the Forest Service may be required to allow access, this requirement is not unqualified. Within NFS boundaries, the Gila NF is legally obligated to allow physical access to private property that is identified as an inholding. The Forest Service is not required to physically construct an identified access route or to absorb the construction cost. The manner in which access is provided to a private inholding is a discretionary management decision, and is based upon the individual case circumstances. The Gila NF is not required to authorize access in a manner that would degrade natural resources. For example, if a property has historically been accessed via a riparian area and that manner of access is causing resource damage, an alternative means of access and location may be substituted and allowed instead. The Gila NF can also dictate the location of a new access route across its land. If a tract of land is already accessed, substituting the existing route for another route across NFS land is subjective and the decision to permit the new route is entirely up to the Forest Officers.

It is the responsibility of the owner of a particular property to obtain access from adjacent private lands. Once a private patented inholding property is accessed by a road, the entity subdividing a parent parcel is obligated to provide access to the new parcel, which is broken off from the original patent. It is not incumbent on the Forest Service to provide access to every ownership parcel because of convenience, or because an owner of a parcel does not desire to share his property for access to another adjacent parcel, or to avoid an environmentally difficult access route within the property. The Gila NF will work with owners of inholdings desiring access across NFS land where no access exists. Construction and maintenance of this access will be the responsibility of the owner. The route used and mode of travel will be determined by the Gila NF and will be in compliance with the laws of the designated land. This means that a constructed road may not be permitted where motor vehicle use is prohibited, but only trail access may be considered reasonable access.

While the Gila NF is required to authorize access to inholdings, a similar requirement does not exist for authorizing power to private lands. The ever-expanding spread of power distribution lines is closely aligned with the similarly expanding WUI areas. In addition to providing service to existing primary home sites and recreational properties, the Gila NF receives requests for extensions into new areas which have the potential to dramatically alter the landscape with a proliferation of WUI areas.

Developers of recreational and rural home sites typically request that power be extended to their properties. However, the proliferation of above-ground distribution lines, which may be maintained by small rural electric cooperatives, has left a landscape compromised by significant wildfire threats from possible downed powerlines. These rural co-ops are suffering maintenance challenges with aging infrastructure, increasing right-of-way costs, and rate structures driven by local economic conditions. The result has been several significant wildland fires within the Region (although not on the Gila NF) caused by downed trees hitting powerlines, resulting in extensive damage, controversy and legal/financial challenges.

Although regulation of private lands is not the responsibility of the Forest Service, it is responsible for managing NFS lands as they are used to develop private lands. There are reasonable and justifiable natural resource-related motivations for making improvements, such as reducing visual impacts and minimizing forest fires (e.g. by burying powerlines), and more stringent requirements associated with roads used for subdivision purposes. Subdivisions created under the family subdivision exemption often create difficult or unmanageable demands on local governments. If local governments are unable to support unregulated growth by maintaining these road systems, then access across NFS lands could be delayed until the local governments are prepared to handle the growth. The Forest Service needs to meet its ANILCA-based requirements for authorizing access, but it also must manage the rate of WUI expansion in coordination with county governments. Failure to recognize and act on these trends has the potential to seriously affect management of natural resources on the Forest.

Trends Affecting Access in the Broader Landscape

Access controlled by the State and counties is not expected to change dramatically in the near future. For access controlled by the Forest Service, the Gila NF will implement the travel management decision that was released in June 2014, which involves signage, Motor Vehicle Use Map (MVUM) distribution, education, and enforcement. Designated roads, trails, and areas open for motor vehicle use are identified on the Gila NF MVUMs. The Gila NF MVUMs currently identify 3,334 miles of NFS roads open for motorized use. Roads not selected as part of the designated system will be used administratively or by written authorization, or will be stored for future use or decommissioned. The status of these stored roads will be evaluated during future project planning, as needed.

Historically, many landowners have been willing to provide access to public hunters and recreationists across their private lands. Personal relationships were established, and respect for private property was demonstrated. Unfortunately, this traditional access has diminished as changing patterns of landownership have eroded the personal relationships between landowners, hunters, and recreationists. Landowners now often perceive recreationists as trespassers who are disrespectful of their private property rights, or sometimes lack an understanding of simple courtesies like closing gates and not scaring livestock. Many access opportunities have been lost across private lands due to historic landownership patterns, changing private ownership conditions, and a lack of established, legally defensible access across private lands. Inadequate access to public lands impacts a wide range of outdoor recreation activities, including hunting, hiking, camping, viewing scenery and wildlife, horseback riding, fishing, wilderness area use, and mountain biking. People want to use their public lands and are becoming sensitive to restrictions on that ability.

Influence of Access on Social, Economic, and Ecological Conditions

The Gila NF occupies much of the land that provides for the traditional and cultural uses of local communities and families. Generations of users have relied upon the Forest for firewood gathering, grazing lands, and hunting. These traditional and cultural uses contribute to the social fabric and support the economies of the families and communities who live near the Forest. As land ownership changes around the Forest, there is a potential threat that access to tribal, cultural, and sacred sites on the Forest may be impacted. Access to both recreational and commercial facilities has a great influence on social and economic conditions.

Opportunities to Provide Open Space Connections

The Forest shares boundaries with other federal, state, and private lands. The Gila Cliff Dwellings National Monument, administered by the National Park Service, is surrounded by the Gila NF. The Bureau of Land Management has a significant amount of land surrounding the Gila National Forest boundary. The Gila NF manages about 254 miles of the Continental Divide National Scenic Trail. The trail traverses the length of the country from Mexico to Canada and provides an open space connection for the public. The majority of the trail is complete and provides a unique opportunity to hike and experience vistas in five states. There have been discussions on how to create a connector trail from Western New Mexico University in Silver City to the Continental Divide National Scenic Trail nearby on the Gila National Forest. The Town of Silver City Trails and Open Spaces Plan (2002) includes a goal and action items to develop an area-wide trail system providing connectivity between neighborhoods, commute destinations, and open spaces including the Gila National Forest.

Stakeholder Input

People feel strongly about ensuring access to public and private property. There is especially a concern over increased instances of locked gates blocking access over traditionally used roads. This typically demonstrates a lack of easements for roads that have been traditionally used by the public. Others have

noted a decline in private property in the counties, but when talking to people they still want additional access to public lands. When learning that certain properties are acquired to increase access, most people are content.

Many people noted conversion of ranch properties to subdivisions. There is strong interest in planning treatments in the WUI to reduce risk to private property from wildfire. In addition, many people and emergency service providers desire cell phone and internet access for safety and communication purposes across more areas of the Forest even in remote and wilderness areas. The airspace over the Gila NF is used by the military for training and overflight purposes, which can create conflicts with the wilderness experience as well as wildlife and livestock.

People suggested that trail and road closures due to access issues be posted regularly on the Gila Forest website. People also suggested that federal government agencies need to increase coordination with all stakeholders with respect to local landowners/leaseholders and their individual uses.

Summary

Land ownership patterns are important because decisions made by public land managers may influence the local economy, particularly if public lands represent a large portion of the land base. Communities in the four-county assessment area, Catron, Grant, Hidalgo, and Sierra Counties, are limited in their ability to grow and expand. Communities and local governments rely upon the Gila NF and other federal and state lands for support of their economies, available clean water, and the products integral to supporting traditional and cultural uses. The federal land agencies also make payment in lieu of taxes to the counties, which is a vital source of county revenue.

Federal and state land managers, private landowners, and others are constrained in different ways by laws and regulations that dictate how different lands can be managed. This can lead to adjacency challenges and opportunities. Residential development has increased adjacent to many Forest boundaries, and adjacent at-risk communities in the wildland-urban interface have responded to the threat of uncharacteristic wildfire by developing community wildfire protection plans.

A trending loss of access to Gila NFS lands has developed as a result of unwillingness of many private landowners to allow public access across their property to NFS lands. The Gila NF desires to acquire road rights-of-way where possible to provide adequate access for public and administrative use.

Chapter 16. Energy and Mineral Resources

Introduction

This chapter identifies and discusses available information relevant to the assessment area for mineral and renewable and non-renewable energy resources.

Energy and mineral resources provide ecosystem services that are important to people at a local and, in some cases, regional and even global scales. They are an important contribution to social, cultural, and economic conditions of the assessment area. This section identifies and evaluates:

- The potential for renewable and nonrenewable energy sources on the Gila NF, such as wind, solar, coal, oil, or natural gas. Existing energy transmission corridors are also described.
- Existing and potential nonrenewable mineral resources, such as locatable mineral deposits, leasable minerals, and mineral materials on the Gila NF and their production trends.
- The presence and condition of known abandoned mines and existing geologic hazards in the Plan area.
- Impacts of these resources on ecological integrity and species diversity.
- The contribution of these resources to social and economic sustainability.

Ecosystem Services of Renewable and Nonrenewable Energy and Mineral Resources

Within the region, a variety of resources have provided energy or mineral materials to meet the needs of the country and the world. Energy and mineral production provide the raw materials necessary to sustain the quality of life we all enjoy. Along with the direct benefit of usable minerals or energy resources for homes, businesses and transportation, these resources provide economic benefits through jobs and taxes, and the cultural service of educational and research experience.

Management of Renewable and Nonrenewable Energy and Mineral Resources

The U.S. Mining and Mineral Laws authorize the appropriation of mineral resources on federal lands, including minerals located by mining claims, those obtained by mineral leases/contracts, and those disposed of by free-use or mineral sale. Forest Service regulations designated by 36 CFR 228, Minerals, sets forth rules and procedures for use of the surface of the National Forest in connection with operations conducted under the U.S. Mining and Mineral Laws. These regulations cover the use of the land surface for mineral prospecting, exploration, extraction and reclamation.

The Southwestern Region of the Forest Service is party to a New Mexico state-wide Memorandum of Understanding (MOU), along with the New Mexico State Office of the Bureau of Land Management (BLM) and the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division regarding the coordination of federal, locatable minerals administration in concert with the State Mining Act administrative regulations. Under this MOU, most operations are jointly bonded to avoid duplication for operators and, when possible, joint operations visits are made. Bonding is conducted to assure completion of reclamation of a site following an operation. The participating agencies share information regarding significant administrative actions and coordinate those actions where appropriate.

For the assessment area, minerals and energy are very different types of resources.

- **Minerals** information can best be addressed specific to each commodity and geographic area where key minerals occur. This is because for each mineral occurrence, the relevant information consists of an integrated mix of information about mineral type, extent, current activity, potential activity, trends and social economic and ecological sustainability information that is specific to that particular mineral resource occurrence and geographic area.

- **Energy** resource information will be addressed for the assessment area as a whole, and will be organized by the relevant topics of information listed above.

The likelihood for energy and mineral activities to be conducted within the assessment area is based upon the geologic presence of a particular mineral, as well as the type of mineral and the specific laws regulating legal access to the mineral. The Lands chapter of this assessment report discusses land status classifications and how they affect mining and mineral administration activity.

Access for locatable minerals is granted under the 1872 Mining Law, whereas for leasable minerals, access is only granted following an analysis through an area-specific NEPA process. The interplay of several factors determines whether the minerals activity is discretionary (leasable) or non-discretionary (locatable) on the part of the Forest Service. It is essential to know the class of mineral resource and the land status of the area in order to identify whether a legal right to the mineral resource may already exist.

Before beginning the assessment, it is important to detail how all federal minerals (which include energy resources) are administrated as falling into one of three categories: locatable minerals, leasable minerals, or mineral materials. Each of these categories of minerals is administrated under separate laws and regulations, and each requires a different means for the public to obtain these resources.

Three Classifications of Minerals

- **Locatable minerals** are, in general, the hardrock minerals mined and processed for metals (for example: gold, silver, copper, zinc, tin, and some types of non-metallic minerals), and rare earth elements, plus some "uncommon variety minerals". These minerals are called "locatable" because they are subject to mining claim location under the United States mining laws. All public domain lands are available for locatable mineral entry under the 1872 Mining Law (as amended), unless the lands are withdrawn from mineral entry (and in such case they are not available for mineral activities). Withdrawn lands include congressionally withdrawn areas, such as Wilderness, designated National Recreation Areas, Wild and Scenic Rivers, Resource Natural Areas and administrative withdrawals, such as campgrounds or administrative sites. Areas also restricted for entry include "acquired" lands, which were once out of federal ownership and then acquired back, including the mineral estate. Other than the above exceptions, the public may obtain locatable minerals by a mining claim through the BLM by staking a mining claim according to federal rules and regulations. Access to these minerals will necessitate an approved Plan of Operation through the Forest Service.

  The discretion of the Forest Service to allow mining operations is governed by the United States Mining Laws, including the 1872 Mining Law. The Forest Service has limited discretion regarding the development of locatable minerals on National Forest System (NFS) lands. Specifically, the Forest Service cannot categorically deny an otherwise reasonable plan of operation for locatable minerals. United States v. Weiss, 642 F.2d 296 (9th Cir. 1981). The Forest Service does have the authority to deny an unreasonable plan of operations or a plan otherwise prohibited by law. The Forest Service would return an illegal or unreasonable plan to the claimant with the reasons for disapproval and request submission of a new plan that addresses the issue(s) of concern. The Mining Law, as amended, does not "trump" or preclude the application of any other

environmental laws, such as the Clean Water Act, the National Environmental Policy Act (NEPA), the Endangered Species Act, or the National Historic Preservation Act. Though a proposal to mine may be allowed under the law, it is incumbent upon the Operator or proponent to provide a detailed Plan of Operation to layout the mitigation measures which will be incorporated with the action, so that the surface resources are minimally affected by the proposed operation.

The 1872 Mining law has been amended multiple times by law (most notably to remove leasable minerals and saleable minerals as not subject to location on a mining claim). The U.S. Mining Laws have been defined through court cases and rulings such that the laws now provide considerable authority to land management agencies, including the Forest Service, to regulate all aspects of locatable mining operations by imposing conditions as part of any operating plan approval. These conditions are developed and specified for each operation and are intended to reduce the impact of the operation to the resources of the National Forest. An approved plan for reclamation of the area during and/or following the specific operation or portion of it will be required, as well. Bonding for this work is usually required in advance to insure the reclamation will be completed.

- **Leasable minerals** are, generally nonrenewable energy resources including fossil fuels, such as oil, gas and geothermal energy sources. These are important national energy resources. Leasable minerals are defined by the Mineral Leasing Act of 1920, and include: coal, oil, natural gas, oil shale, sodium, phosphate, potassium, geothermal and (in New Mexico) sulfur. Leases to extract these minerals from NFS lands are obtained through the BLM, with the consent or concurrence of the Forest Service to offer these mineral resources. Once a BLM lease is issued, the Forest Service must allow resource extraction subject to the stipulations and conditions in the lease. Discretion by the Forest Service of whether to allow use is exercised at the time of offering lands for lease. For coal, oil, natural gas, and geothermal leasing, the regulations require that decisions regarding the availability (and therefore suitability) of National Forest System (NFS) lands for leasing require a leasing analysis as set forth in 36 CFR 228.102. Court decisions have affirmed that leasing availability decisions must be made with full NEPA disclosure.

- **Mineral Materials/Salable/Common Variety Minerals**. Mineral materials are also known as salable or common variety minerals. These are synonymous terms for the class of minerals that can be sold under a mineral material contract. These mineral resources are found “commonly” unlike precious metals, for example. These minerals are relatively low value per volume, such as sand, gravel, cinders, common building stone, and decorative rock. Many of the materials are used for road surfacing, landscape boulders and engineering construction or may be specialty resources such as soil amendments or decorative rock.

  These minerals are typically sold unless used internally by the Forest Service, by another government agency, or needed for ceremonial uses. In these cases, they may be provided free of charge. Non-commercial permits are sold to individuals for a small amount for personal use. Commercial use may require a public bid sale. Issuing a permit for all types of salable minerals whether for commercial or personal use is discretionary on the part of the Forest Service.

Locatable Minerals

The Gila National Forest contains mineral resources, with metallic ores concentrated in the mountainous portions of the region often as a result of interactions between hydrothermal (hot water) solutions with host rock during volcanic activity (North and McLemore 2005). Past mining for metallic minerals has primarily produced gold, silver, copper, lead, manganese, zinc, iron, and tin. Historically, the concentrations of metallic ores found throughout in the area helped lead to populating the region as a whole. Over a hundred years ago, the mountain regions of the Forest were the focus of intense

prospecting and mining. The existing communities and former communities of Mogollon, Kingston, Grafton and Cooney are examples of communities which had large populations in their mining peaks and were located within the current National Forest boundary, but these lands didn't have National Forest status at the time they were heavily populated. These communities presently have very low to non-existent populations. The communities of Chloride, Pinos Altos, and Silver City, which are adjacent to the National Forest, also boomed as a result of mining. They all experienced a major population growth and then a rapid decline, once the ore prices dropped and the mining boom ended. Only Silver City has held out from the mining downturn to remain a robust, full-service community.

Mining of metallic minerals is a supply and demand type of market prone to significant commodity price fluctuations. The Forest to this day experiences cycles of mineral interest when prices of metals increase nationally. The deposits of minerals within the context area of the Forest are distributed in a number of known mining districts (Figure 218). Future demand for locatable minerals will likely occur in and around these mining districts. Table 205 lists the mining districts in the context area with past production and future potential. As shown on the table, most of the districts are not presently active. Any one particular mineral may or may not have high enough concentrations to facilitate an active mining operation. Economic feasibility is dependent upon many different situations, including concentration of the ore body, form of the chemical nature of the ore, value of the ore, access availability, location of a smelter or processing plant capable of processing the type of ore available, etc.

Figure 218. Mining districts in southwestern New Mexico with significant metal deposits.

Table 205. Significant metal deposits in the context area, by mining district, based on past production and known resources.

Mining District	Mine or Deposit	Year of Initial Production	Year of Last Production	Estimated Cumulative Production	Is There Future Potential	Significant Commodities
Bayard		1902	1969	>$60,000,000	no	gold, silver, copper, lead, zinc
Burro Mountains	Tyrone, Little Rock, Niagra	1879	present	>$2,000,000,000	yes	gold, silver, copper, lead, fluorite
Chloride	St. Cloud	1879	1988	$20,000,000	possible	silver
Chloride Flat	Boston Hill, Chloride Flat	1871	1946	$13,000,000	no	gold, manganese, iron

Mining District	Mine or Deposit	Year of Initial Production	Year of Last Production	Estimated Cumulative Production	Is There Future Potential	Significant Commodities
Fierro-Hanover	Cobre, Hanover Mountain, Continental	1889	1980	>$2,000,000,000	yes	gold, zinc, copper, iron
Georgetown		1866	1985	$3,500,000	no	silver
Hillsboro	Copper Flat, Mesa del Oro	1877	1982	$8,500,000	yes	copper, molybdenum, gold, silver
Kingston		1880	1957	$6,600,000	no	silver
Lordsburg		1870	1999	>$60,000,000	yes	gold, silver, copper, lead
Mogollon		1875	1969	>$25,000,000	possible	gold, silver
Pinos Altos	Pinos Altos	1860	1997	>$11,000,000	yes	gold, silver, copper, lead, zinc
Santa Rita	Chino	1801	present	>$2,000,000,000	yes	copper, gold, silver
Steeple Rock	Carlisle, Center, Jim Crow, Summit	1880	1993	$10,000,000	yes	gold, silver
Taylor Creek		1919	1969	$7,500	no	tin

Economic and other factors must be considered before mining of most of these deposits can occur. From McLemore (2005).

Gold and Silver

Gold and silver were mined heavily on the Gila NF and the context area in the late 1800s and 1900s. There are still individuals classed as "recreational miners", who pan for gold on the Forest (see the Noncommercial Mineral Collecting Activities section). Recently, a mill operated on the Forest adjacent to Mogollon, NM in the 1980s. The mill operated for a 10 year period extracting both gold and silver from numerous mines and waste locations on both the Forest and private land. There are no production quantities available to report on what was milled and processed.

Copper

The area of Silver City and the Mining District (comprised of Bayard, Santa Clara, and Hurley) south of the assessment area is rich in copper from porphyry-copper and associated contact metamorphic (or skarn deposits). There are three large open-pit copper mines operated by Freeport-McMoRan Inc. with parts of two of them (Tyrone and Cobre) directly adjacent to the Forest boundary. Freeport-McMoRan Inc. is the largest employer in Grant County, NM. However, when production is cut back due to the prices of the metal on the world market, employment suffers due to resulting layoffs. Currently, the copper extracted from the ore bodies is being shipped all over the world with China currently being one of the main purchasers of the metal.

Tin

In the early 1990s an approved Plan of Operation for tin production was initiated for the Taylor Creek mining district. The development of this resource stopped as the closest smelter for the ore was located in St. Louis, Missouri. Other smelters would not accept the material because the ore was too pure.

Uranium

Current Condition

There are no active uranium mines or exploration projects on the Gila National Forest. Uranium occurrences are primarily found in the White Signal, Black Hawk, Tyrone, and Telegraph mining districts in the Burro Mountains (McLemore 1983). A few mines from these mining districts produced some limited uranium ore in the 1950s (McLemore 1983).

Future Potential

Most of New Mexico's uranium reserves, and virtually all past production, are in northwestern New Mexico (Bland and Scholle 2007). As global demand and prices have increased, there has been renewed interest from the private sector in uranium mining in New Mexico using conventional and in-situ leaching methodologies although this interest is predominantly focused in northwestern New Mexico (McLemore et al. 2013).

Rare Earth Elements

Current Condition

Rare earth minerals, which contain rare earth elements (REE), are needed for cell phones, televisions, computers, iPods, video games, wind turbines, hybrid/electric cars, and solar panels. The Burro Mountains in the Silver City District encompass a number of mining districts (Black Hawk, Gold Hill, Telegraph, and White Signal) with rare earth elements consisting of Proterozoic alkaline rocks and pegmatites (McLemore 2015). Currently, no proposed plan of operations to mine for rare earth minerals has been received by the Forest.

Future Potential

According to McLemore (2015), pegmatites in New Mexico are usually too small to be currently mined for rare earth elements, but residual placers from the pegmatites could have future potential.

Kaolin

An open pit mine for kaolin clay (Sierra Kaolin Project) on the Black Range District was approved in 2009 in an area previously mined. There has been no recent activity at this site.

Mineral Materials

Current Condition

Deposits of common variety minerals, including sand, gravel and rock are found throughout the assessment area and are concentrated in the drainages. According to data collected by the Forest Service, the only mineral materials currently removed directly from the Forest are crushed stone and construction sand and gravel. Between 2011 and 2013, an average of 16,305 short tons of crushed rock and 370 short tons of construction sand and gravel were removed from the Forest.

Future Potential

The demand for the materials, the relative remoteness of the area where they exist, and the local economy dictate whether there may have value and demand for any particular rock commodity as a mineral material. Generally, demand for mineral materials is related to population growth as construction occurs to accommodate growth. The trend for salable minerals is expected to remain level. Efforts are underway to foster partnerships with local county governments through the use of gravel and aggregate sources on the Forest to be used for road construction purposes in the Forest.

Noncommercial Mineral Collecting Activities

The Gila National Forest allows non-commercial rock and mineral collecting. This falls into the category of "casual use". The Forest allows members of the public to go onto NFS lands and use non-mechanized tools to search and collect minerals for personal use. Caution should be used under these categories, as no authorization is given if the lands are claimed under the mining law. Parcels of private land are scattered throughout the Forest. Most of these parcels are not fenced nor their boundaries marked. Also, all mining activity is banned from designated wilderness areas.

Recreational gold panning is permitted on the Forest. It is policy to allow this activity if the member of the public reports beforehand in writing the proposed activity with the location, duration of time and the individual's name and contact information requesting the activity.

Abandoned Mine Lands

Abandoned mine lands include known abandoned mines and/or mining-related hazards in need of reclamation or restoration. An abandoned and inactive mine land inventory was conducted on the Gila National Forest in December 1998. This inventory identified 353 mine sites, of which, some were inaccessible and some were located on private land. It is the desire of the National Forest to eliminate known and potential hazards relating to abandoned mine lands. Many abandoned mine lands contain minerals like arsenic, cadmium, copper, lead, mercury and zinc which can cause human health and environmental hazards as well as other physical safety hazards (USDA FS MGM 2012). Work to reclaim these mine problem areas is conducted as time and money permits. However, the number of problems within the assessment area is vast and it will take many years and a lot of money to complete all of the work which is needed to accomplish.

To avoid the future occurrence of abandoned mine lands, all Plan of Operation now incorporate a Reclamation Plan. This Reclamation Plan is developed by the operator and approved by the agency. Usually a bond is required to accompany this Reclamation Plan to ensure that the proposed reclamation work will be accomplished following the proposed mining work. This bond is held until the reclamation is conducted and approved. If the operator fails to comply with the terms of the approved Reclamation Plan, then the bond is forfeited, so the agency can use it to complete the work.

Energy Resources

Renewable Energy Resources.

These resources include solar, wind, hydropower, biomass, and geothermal. However, constructing the infrastructure to utilize these resources may be a limiting factor for development. Renewable portfolio standards, which require utilities to produce or procure a minimum amount or percentage of their electricity from renewable energy sources, exist in New Mexico and other western states, and may contribute to increased renewable energy development statewide.

Geothermal Resources

Current Condition

Several hot springs are directly used for recreational purposes on the Forest, although there are no developed geothermal resources in the assessment area. The Gila National Forest has two identified Known Geothermal Resource Areas (KGRA) and a couple of areas identified for noncompetitive lease applications. Under the Final Environmental Statement Geothermal Leasing completed in 1978 (USDA FS Gila NF 1978), these areas were identified as the Gila Hot Springs KGRA and the Lower Frisco KGRA. The final decision restricted areas available for leasing to a small area of the San Francisco Hot Springs Known Geothermal Resource Area and lands west of the community of Glenwood. New Mexico. There has not been any proposed action taken on this potential resource in this area.

Future Potential

Areas on the Gila National Forest have been classified as low to moderately favorable for geothermal energy (Figure 219) (DeAngelo and Williams 2010). Issues limiting large scale use of geothermal energy are water rights, limited power transmission capability, markets, federal regulatory requirements, and a lack of government incentives (Fleischmann 2006). In 2013, New Mexico's first utility-scale geothermal power plant came online in the Animas Valley in Hidalgo County south of the Forest.

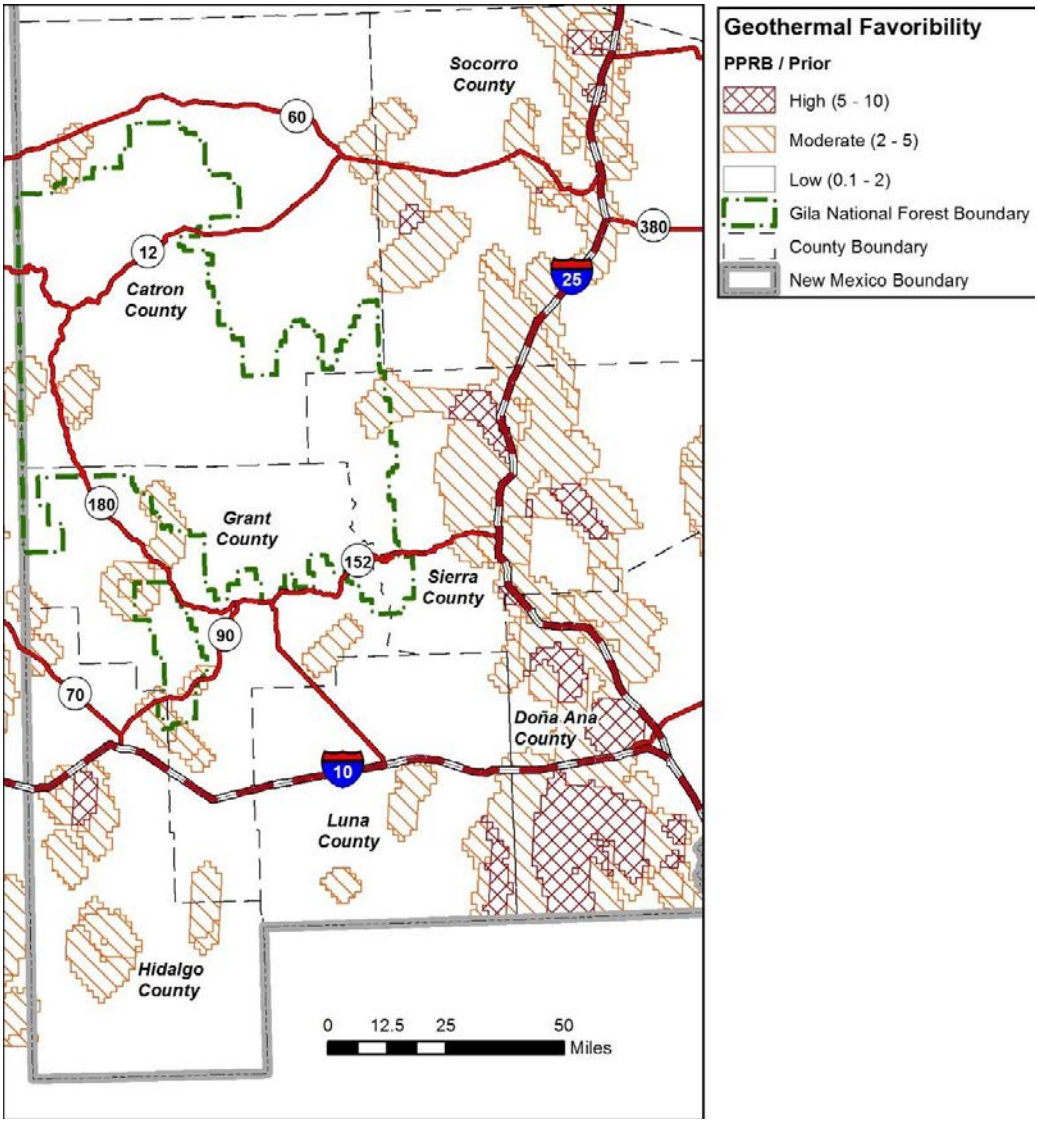


Figure 219. Geothermal favorability in southwestern New Mexico. Data from DeAngelo and Williams 2010.

Wind Energy

Current Condition

There are no active or pending proposals for wind energy on the Forest. However, the Forest has had an application for wind power development in the past. The location of the proposal was in an inventoried roadless area, and located in steep terrain without reasonable access routes to the sites for development.

Future Potential

Due to low average wind speeds, the Forest does not likely have the conditions necessary for economical wind energy production (Karsteadt et al. 2005; NM EMNRD 2007a).

Solar Energy

Current Condition

The Forest has not received any proposals for solar power facilities.

Future Potential

The Forest has a high potential for solar development (Karsteadt et al. 2005) with a significant acreage of land with modelled solar resources of 7 kWh/m2 or more conducive for concentrating solar power or photovoltaics. Development of these resources may be limited due to the lack of infrastructure to any current potential site locations. Electric transmission lines would have to be built to connect the sources to a power grid. The potential areas would probably need to be located along existing power transmission line alignments. At present, it appears that other available areas off the Forest would be less costly and more efficient. These resources can be found around major population areas, without the need for major electric transmission lines to be constructed for many miles to move the energy to the locations desiring to use the electricity.

Hydropower

Current Condition

There is no Federal Energy Regulatory Commission licensed hydroelectric power generation on the Forest.

Future Potential

The Forest does not have any water sources that would likely support a large commercial hydropower facility.

Biomass

Current Condition

There is one biomass plant adjacent to the Forest at the old Fort Bayard Medical Center consisting of a commercial scale wood-chip boiler system to produce steam and heat. This 150-horsepower steam boiler was designed to annually consume 1,000 tons of wood thinned from the Gila National Forest (NM EMNRD 2007b). However, this system has been idle since the new Fort Bayard Medical Center replacement facility was constructed, since it was unable to cost effectively heat the new facility compared to conventional gas systems (Ecosphere 2013).

Future Potential

The future of biomass energy in the Forest faces limitations. The current market demand for biomass heat is diminished due to the relatively low price of natural gas. If market conditions change, the biomass systems may become economical to operate (Ecosphere 2013). Another limitation to biomass cost effectiveness is hauling costs. Wood is expensive to transport, so it needs to be used near wood source areas. Material handling in the supply chain also needs to be minimized for cost effectiveness.

Energy Transmission Corridors

Currently, there are two large high voltage electric transmission lines that cross the Gila National Forest (Figure 220). The existing energy transmission corridors were currently designated by the individual permitted area of each of the power companies requiring access through the Forest namely, Tucson Electric Power and El Paso Electric. There are no defined corridors for several companies to use in tandem

to transport energy resources or to collocate transportation facilities (e.g. highways and railroads). The reason for this is that the electric transmission lines and transportation routes are coming and going from different places and there were not any opportunities to share the same routes at the time of construction. The Forest is not positioned in the direct path of transcontinental or multi-state connection routes for energy and transportation. Some of this is due in part to the topography or mountain ranges which exist on the Forest. Recently proposed regional transmission corridors (SunZia and Southline) designed to transport electricity to western power markets have been located off the Forest. There is a small distribution natural gas line which crosses part of the Forest to reach the Fort Bayard Medical Center. However, there are no large interstate natural gas transmission lines crossing the Forest.

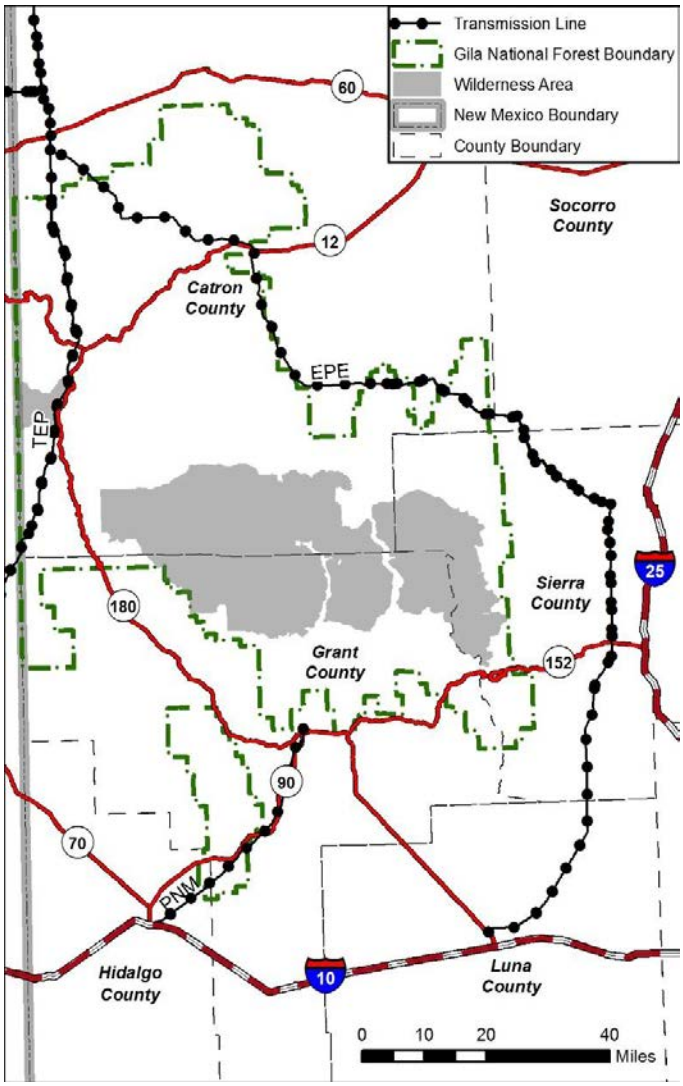


Figure 220. Major energy transmission lines intersecting the Gila National Forest.

Non-Renewable Energy Resources.

Leasable minerals (i.e. coal, oil, natural gas) within the assessment area have historically been minimal to no development. There is no current development, extraction or use of this form of mineral material from the assessment area. Companies have conducted test drilling and seismic analysis of the subsurface for non-renewable energy resources in various locations of the Forest throughout the years.

Oil and Gas

Current Condition

The Analysis of the Management Situation for the 1986 Gila Forest Plan identified interest in the Quemado Lake and Beaverhead areas for potential oil and gas development. To date, only limited geophysical prospecting work has been conducted. There is currently no oil and gas exploration surveys or production or leases (active or pending) on the Forest.

Future Potential

The Zuni Uplift and San Agustin Basin plays (or prospects) in Catron County have low and moderate potential, respectively, for oil and gas (URS 2003). The currently producing oil and gas basins in New Mexico are located outside of the context area primarily in the San Juan and Permian Basins (Figure 221). Limited understanding of the oil dynamics of the Zuni Uplift and San Agustin Basin plays represent a high level of risk to private companies under current market conditions (URS 2003). If market demands for oil and/or gas change substantially, more exploratory activity might occur in these areas in the future.

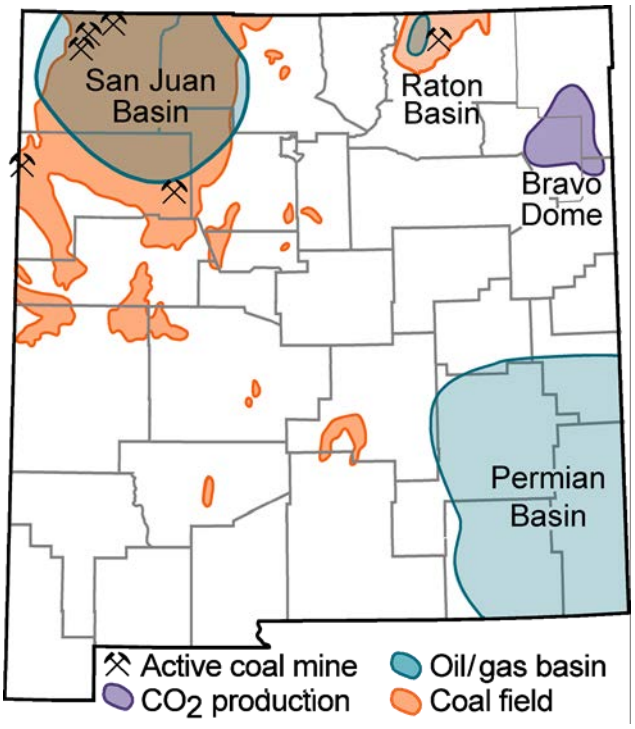


Figure 221. Currently producing oil and gas basins in New Mexico. From New Mexico Bureau of Geology and Mineral Resources (2016).

Coal

Current Condition

There is currently no coal production or leases (active or pending) on the Forest.

Future Potential

The U.S. Geological Survey identified no coal areas on the Forest (East 2013), so the future potential of coal is low for the assessment area. The nearest coal fields to the assessment area are the Salt Lake and Datil Mountain Coal Fields located north of US Highway 60 in Catron County and the Engle coal field east of Interstate 25 in Sierra County (Figure 222). Most of the active coal mines found in New Mexico are in the northern half of the state, primarily in the San Juan and Raton basins.

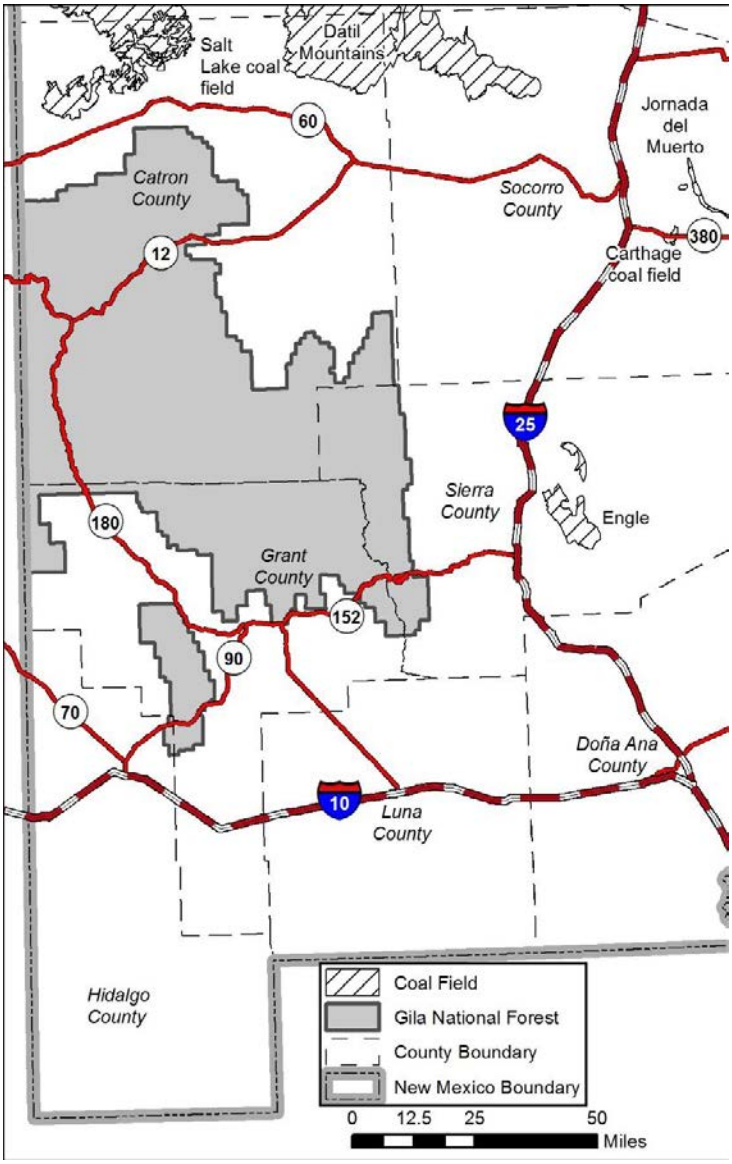


Figure 222. Coal fields in southwestern New Mexico. Data from McLemore et al. 2005.

Geologic Hazards

Geologic hazards are defined as those hazards that are geological in nature that pose a risk to human health and safety. They include risks such as earthquakes, floods, avalanches, mud slides, and volcanic activities. Geologic hazards are important in the social context, because they have the potential to affect human safety or the landscape humans use for various needs. On the Gila NF, the specific geological hazards that are relevant to the Forest include seismic hazards, flooding, landslides, and rockfalls.

Seismic hazards

Historically, the majority of earthquake activity in New Mexico has occurred along the Rio Grande Rift, and has been concentrated in the Rio Grande Valley between Socorro and Albuquerque (USGS 2015a). Figure 223 shows the probability of an earthquake measuring over 5.0 magnitude in southwest New Mexico within the next 20 years (USGS 2015b). The probability of an earthquake strong enough to do significant damage within the assessment area is low.

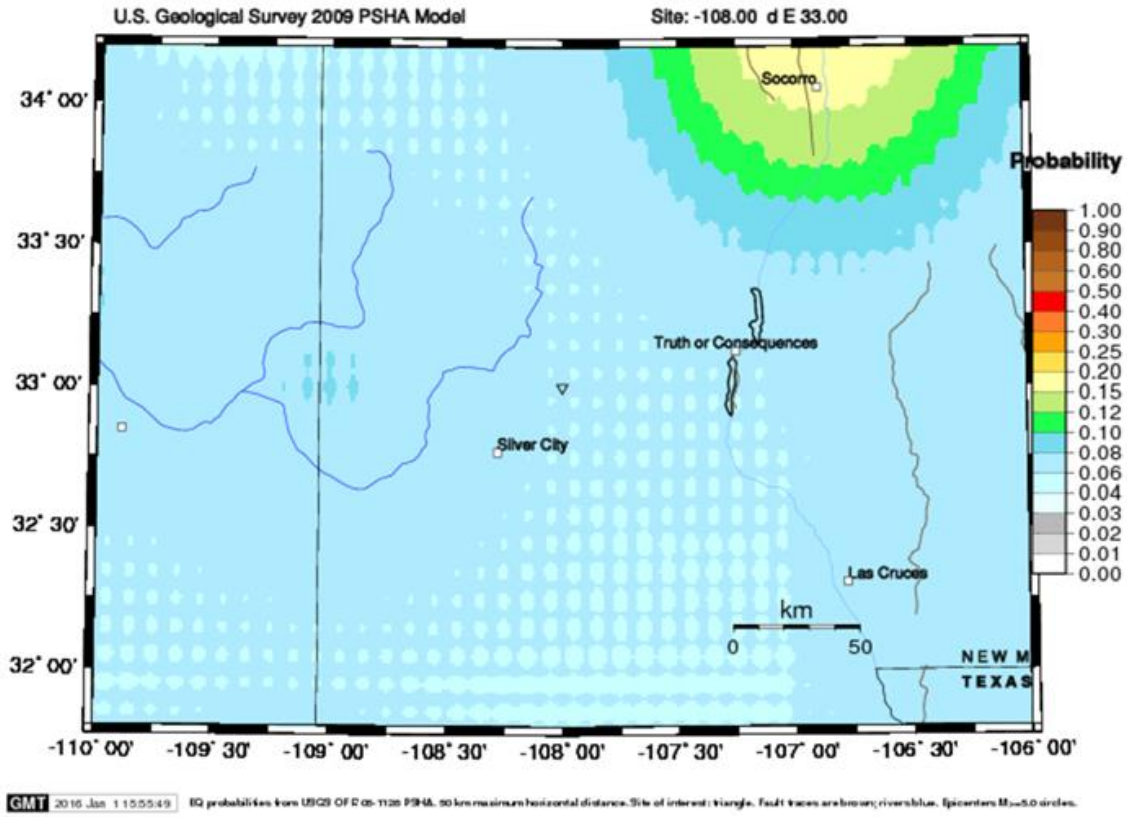


Figure 223. Probability of an earthquake measured over 5.0 magnitude in southwest New Mexico over the next 20 years
From USGS 2015b.

Landslides and Rockfalls

Many of the soil units on the Forest are conducive to landslides and rockfalls. Rockfalls are a continual hazard on the Gila NF and frequently occur during the summer monsoon season. Rockfalls are of the greatest concern when they occur along Forest and state or county roads with high vehicle traffic.

Impacts of Renewable and Nonrenewable Energy and Minerals Development on Ecological Integrity and Species Diversity

The former release of contaminates into the environment from historical mining activities predating environmental regulations is known as a “legacy” issue that can have effects on ecological integrity and species diversity. For example, Cold Springs Creek is listed as impaired for water quality for cold water aquatic life due to elevated concentrations of cadmium and lead (NMED 2014b). Historic mines in the upper watershed are the proximal source of the metal contamination. The Forest Service in cooperation with the New Mexico Environment Department is working to prepare, fund, and implement a comprehensive remediation effort.

Renewable energies in the form of geothermal or solar energy developed on a large scale disturb soils and potentially displace vegetation. Disturbances occur in the localized area of development, from motorized vehicle access, and the need for transmission lines. These disturbances can impact vegetation, wildlife habitat, and water resources. No renewable energy sources have been developed on the Gila NF and it is unlikely there will be in the near future.

Stakeholder Input

There is interest in additional mining and energy development on the Forest although people felt this should be well-regulated. There is a perception that the Forest has not done enough to promote mineral and energy development although many times commodity prices, other market or regulatory forces, and deposit characteristics play larger roles than Forest Service management.

Individuals also desired to know the policies and regulations concerning personal collecting of rocks, minerals and gold ore from the Forest as this information has been disseminated in an ambiguous or uneven way in the past. More internal Forest Service training and communication on this subject was requested to improve the accuracy and consistency of responses to public inquiries. Questions also came up concerning personal use collecting of rocks and minerals within areas designated as withdrawn from mineral entry (specifically areas with wilderness designation).

Summary

The Gila National Forest and surrounding areas contain mineral resources, with past mining for metallic minerals primarily producing gold, silver, copper, lead, manganese, zinc, iron, and tin. Future demand for locatable minerals (primarily copper) will likely occur in and around known mining districts. Mining is an especially important industry in southwestern New Mexico. Recreational gold panning is permitted on the Forest. Uranium and rare earth elements occur in the Burro Mountains, but the future potential is low at least in the near term. The Plan area contains many salable/mineral materials/ common variety minerals such as sand, gravel, and rock. There are abandoned mine lands from historical mining operations in the Plan area, some of which could pose physical and environmental hazards.

Leasable minerals (i.e. coal, oil, natural gas) within the Plan area have historically been minimal to no development of non-renewable energy resources. There is currently little to no renewable energy production on the Forest; although, the potential for solar and geothermal energy sources does exist. Currently, there are two large high voltage transmission lines that cross the Gila National Forest, but the Forest is not positioned in the direct path of transcontinental or multi-state connection routes for energy and transportation.

Chapter 17. Cultural and Historic Resources

Introduction

The Gila National Forest (the Plan Area) contains archaeological resources that demonstrate human occupation and use for approximately the past 12,000 years. The occupation and use of the Forest by Native Americans (American Indians) with Pueblo and Athabaskan ethnic affiliation and groups ancestral to these ethnic affiliations has occurred over this entire time span. Occupation and use of the Forest by Euro-Americans and other peoples from the Old World occurred over the past 400 years. The Plan Area has been under the management of the United States Department of Agriculture, Forest Service beginning in A.D. 1907, or for a little more than 100 years. Native American, Hispanic, and Anglo-American traditional communities continue to use the Gila National Forest for economic, social, and religious purposes.

This chapter presents an assessment of the current known cultural and historic resources and uses on the six ranger districts of the Gila National Forest. This chapter will discuss:

- Ecosystem services of cultural and historic resources
- Cultural and historical context of the Plan Area
- Description of cultural and historic properties
- National Register sites, National Register eligible sites, and priority heritage assets on the Gila NF
- Current conditions and trends of known cultural and historic resources on the Forest
- Contributions of cultural and historic resources to social, economic, and ecological sustainability
- Summary of cultural and historic resources on the Gila NF

Ecosystem Services of Cultural and Historic Resources

Cultural and historic resources and uses in the Plan Area are critical to the social, economic, and ecological sustainability of the Forest, the Southwestern Region, and the Nation. Archaeological sites within the Gila National Forest are a record of historic process and events important in the identity of local communities, the state of New Mexico, the region, and the Nation. Contemporary uses of resources and characteristics of the Plan Area by Native American, Hispanic, and Anglo-American traditional communities are critical to maintaining the identity of these communities. Cultural tourism is a significant component of the regional economy. Tourists are attracted by the nature and significance of archaeological resources and by the character of surrounding traditional communities. Archaeological sites contain a wealth of information for scientific researchers regarding ecological conditions and changes over the past twelve millennia, and human successes and failures in coping with these changes. This information is of value to managers making decisions regarding the contemporary ecological management of the Forest. This information is also of value for educating the public about ecological sustainability.

Cultural History of the Assessment Area

This section summarizes the history of the occupation and use of the Plan Area over the past approximately 12,000 years. Contemporary uses of the Forest by traditional communities that are considered important to the cultural identity of those communities are discussed in the Description of Cultural and Historic Resources section. The Gila National Forest encompasses what archaeologists describe as the Mogollon Culture area. The larger Mogollon area represents a rather large portion of the southern southwest and extends from the northern portions of Chihuahua, Mexico north to the modern town of Quemado, New Mexico. The eastern and western boundaries of the Mogollon Culture area are located in the Trans-Pecos area of Texas and along the San Simon River drainage in eastern Arizona.

Relevant to the Plan Area, two subdivisions of the larger Mogollon Culture area are present. These subdivisions include the Highland/Mountain Mogollon located in areas north of the Gila River, and the Mimbres Mogollon located in the areas south of the Gila River. In general, these two Mogollon groups exhibit similar characteristics throughout much of the area's occupation (around 6,000 through 1,000 years ago). However, differences emerge that warrant this geographical division particularly during the Pueblo period (ca. A.D. 1000-1400).

Occupational History

This sub-section is divided into three parts:

- Native American views of their historic origins.
- Native American history prior to A.D. 1600. This section addresses the span of time when Native Americans were the only groups to use the Plan Area.
- The span of time after A.D. 1600, when both Native American and Euro-Americans (and others of Old World descent) used and occupied the Plan Area.

This history of occupation and use has been prepared from archaeological studies, which employ historical documents and records, and from oral histories that transmit the traditions of Native American groups and others. While this history incorporates information from Native American oral history, it is written from a Western archaeological and historical perspective. Traditional Native American oral history differs from Western history in its measurement of the passage of time and in the causality identified for the course of human events and historic process. Despite these distinctions, scholars have found broad concordances in information regarding Native American history in the American Southwest between archaeology, historic records, and Native American oral history for at least the past millennium.

Native American oral tradition and Western scholarship differ regarding the ultimate origins of Native Americans in the region and in the Western Hemisphere. Western scholarship, using evidence from archaeology, genetics, and linguistics, places the ultimate origins of Native Americans in northwestern Asia, with a migration to the Western Hemisphere sometime prior to 12,000 years ago and movement into the American Southwest soon afterwards.

Archaeological, genetic, and linguistic evidence indicates that Pueblo people are the descendants of these earliest migrants, while Athabaskan people are in part descendent from peoples that migrated from Asia more recently, and entered the American Southwest as recently as 500 to 600 years ago. The oral traditions of both Puebloans and Athabaskans, however, place their ultimate and organic origin within the region itself. As such, Native Americans' views of their own origins are considered in a separate section.

Relative to the Plan Area, there are 10 federally recognized American Indian tribes with which the Gila National Forest routinely consults. Five of these tribes are of Pueblo ethnic affiliation: Acoma Pueblo, Laguna Pueblo, the Hopi tribe, Ysleta Del Sur Pueblo, and the pueblo of Zuni. Five of the tribes are of Athapaskan affiliation: the San Carlos Apache Tribe, the Mescalero Apache Tribe, the Fort Sill Apache Tribe, the White Mountain Apache Tribe, and the Navajo Nation (additionally contacting the Alamo and Ramah Chapters of the Navajo Nation).

While united by common origins, within each ethnic group, there is tremendous cultural diversity. This diversity manifests itself in the variety of languages spoken between groups and the various methods of organizing the social and cultural practices performed by different groups.

Native American Perspectives on their Origins

Native Americans, who have occupied and used the Plan Area both currently and historically, understand their own history in ways that are distinct and sometimes differ from the version of history that is derived

from Western scholarly traditions. The historical traditions of Native Americans with ties to the Plan Area are oral in nature. This is to say, that historical knowledge is maintained by passing it from one generation to the next through verbal communication, rather than having historical knowledge transmitted through written documents.

Until recently, Native American groups connected to the Gila National Forest did not have what Western society considers written languages. A few groups, most notably the Navajo, have developed written forms of their language within the last 150 years. The majority of the Native American groups affiliated with the Forest, however, do not have a written form of their language, though other iconographic displays (e.g. rock art, pottery designs, etc.) likely were imbued with symbolic content that conveyed messages. In some cases, the lack of written language is an intentional act, reflecting traditional beliefs that historical knowledge, along with other types of esoteric knowledge, should be restricted. The version of Native American history presented here reflects what has been written in English by Native writers or told to non-Native researchers.

For Native American groups in the Southwest, geographical features on the landscape are integral to their understanding of history and cultural identity. Native groups describe their conception of history as being geographical rather than chronological, as spatial connections are more important for understanding cultural identity than a chronological sequence of events (Deloria, Jr. 1994; Ferguson and Hart 1985; Van Dyke 2008). Because of their permanence as geological features, these places are used to remember historical narratives and traditions and thus become a way of linking the past to the present and vise-versa (Ball, M.W. 2000). Although the Native American groups affiliated with the Plan Area all trace their historical roots to the American Southwest, origin histories are diverse among the various groups.

In discussing Native American origin stories in the Plan Area, it is important to note that even within a particular tribe, there is no unified account of a group's emergence and/or entrance into the Southwest. Oral traditions tend to place more emphasis on understanding and internalizing the message of the story rather than recounting an absolute truth. As a result, the details of any one story may vary from one individual to the next.

Three types of Native American origin stories are discussed in this section:

1. Pueblo origin stories (with emphasis on the Acoma, Hopi, and Zuni, which have had more ethnographic documentation),
2. Apache stories from the Chiricahua and the Mescalero tribes, and
3. Navajo/Diné origin stories.

Many of the Pueblo groups share a particular origin myth that involves a gradual assent through three different worlds before emerging into the present (fourth) world. The details and characters involved in the account vary from group to group. For instance, in the Hopi origin story, the people are led through the worlds by a series of animals. In the Zuni accounts, it was the twin boys of Earth Mother and Sun Father that led all beings into the final world (Griffin-Pierce 2000; Sando 1992; Sheridan and Parezo 1996). The point of emergence is usually described as being somewhere in the Southwest, but the exact location varies from tribe to tribe. Once inside the fourth world, many of the pueblos describe a time of migration where the group searched for the place that was granted to them as their ultimate homeland. This period of migration is believed to have occurred over many years and across much of the Southwest (Anscheutz 2012; Colwell-Chanthaphonh and Ferguson 2012a; Colwell-Chanthaphonh and Ferguson 2012b).

Although stories that recount the creation of human beings and the world are common among Athapaskan groups (and even other Apache groups), neither the Chiricahua nor the Mescalero Apache have a true creation story (Opler 1983, 1994). However, there are several stories that discuss the early history of the

world and the Apache's place within that history. According to contemporary Mescalero Apache oral history, people were once ethnically and linguistically homogeneous, with no cultural differentiation. At some point, the first Big Tipi was created and as people stood around it, they were given different beliefs and cultural practices. References indicate that the first "Big Tipi" was revealed to the Mescalero Apache "at the top of the world" (presumably some place north of the Southwest) and the group subsequently migrated to the Southwest (Ball, M.W. 2000). Once settled in this new territory, the landscape gradually became an embodiment of Apache identity and relationship to place.

The way relationship to place is connected with identity is particularly evident in the Apache's adoption of the Mountain Spirit tradition. The Mountain Spirit tradition has no definitive date of origin, but is seen by both Apache people and anthropologists as relatively recent, probably originating sometime in the past few hundred years. The mountain spirits are healing spirits that help the Apache during times of need. They reside within the mountains of the Southwest. Apache groups will most commonly cite four mountains as being sacred mountains that represent the four directions. However, there are many mountains that have been listed as being important to Apache tribes. Even within a single Apache tribe, there is often no consensus on which mountains the four sacred mountains are and which of the four directions they represent (Ball, M.W. 2000).

Navajo/Diné creation stories describe a journey through a series of worlds (three or four depending on the account) before arriving in the present world. The earlier worlds are chaotic, each a different color and filled with its own primordial beings. As they traveled through the different worlds, the Diné were in search of a place where there would be order and harmony. In the third (or fourth) world, a water monster created a flood to take revenge on Coyote for kidnapping her baby. As the flood waters rose, the people and animals gathered onto a hollow reed and climbed towards the final world. Once in the present world, the first man and the first woman formed the four sacred mountains: Blanca Peak in the east, Mount Taylor in the south, the San Francisco Peaks in the west, and Hesperus Peak in the north. They adorned the world with natural beauty and created the night and day (Griffin-Pierce 2000; Parezo 1996).

Brugge (2005) contends that some Navajo oral tradition reflects a division between two types of Navajo clans, each claiming a separate point of origin. According to Brugge, the first group of Navajo clans claims a local place of origin in the Southwest. These clans claim to have either descended from the people who survived the age of the monsters or that a supernatural event resulted in their creation. The second group of clans (the Western Water Clans) claim to have been created by the Navajo deity, Changing Woman, at her home in the ocean. Some accounts indicate that the two groups merged some place along the San Juan River.

Native American Occupation and Use to A.D. 1600

For virtually the entire span of human history in the Plan Area, Native Americans were the only people to occupy and use the land. Their use of the Plan Area is concurrent with the earliest human occupation of the Western Hemisphere, and persists to the present day. In the American Southwest, prior to A.D. 1600, Native American history is divided into five broad time frames:

1. *The Paleoindian period* is associated with the initial colonization of the region during the end of the Pleistocene, when dramatic environmental changes took place within the region. The first Paleoindian occupants were nomadic hunter and gatherers.
2. *The Archaic period* is a long span of time in the early and middle Holocene when environmental conditions stabilized and became approximately the same as those in the present day. The Archaic era saw an increase in population, social and technological changes, along with the initial introduction of maize (corn) and other domesticated plants from Mesoamerica, but with continued focus on wild resources.

3. *The Pithouse period* corresponds to the period of time when Native American groups inhabiting the Plan Area manufactured ceramic wares and lived in semi-subterranean dwellings. This time period generally dates from roughly 1,800 to 1,000 years ago (ca. A.D. 200-1000) and is divided into the Early Pithouse period (ca. A.D. 200-550) and Late Pithouse period (ca. A.D. 550-1000). It is during this time period that maize agriculture takes hold across the Plan Area, groups become increasingly sedentary, and populations grow in size.
4. *The Pueblo period* corresponds to the last millennium of Native American occupation prior to A.D. 1400. It is characterized by the advent of a more sedentary life way, increased population, and an increased reliance on cultigens. The origins of the modern ethnic identities of contemporary Pueblo peoples also lie within this era. Athabaskan peoples colonize portions of the American Southwest during the end of the Pueblo era, although initially as small bands of hunters and gatherers.
5. *The Protohistoric period* represents the time period from the pan-regional abandonment of once densely populated areas around A.D. 1450 through when permanent settlement of the area was undertaken by groups with written historical records (ca. A.D. 1600). It is during this time period that Native Puebloan groups aggregate into extant pueblo settlements (e.g. Hopi, Zuni, etc.) and the first Spanish explorations enter the area. Athabaskan groups continue their southward migration and enter the Plan Area during this time period.

The human occupation of the Western Hemisphere, and the American Southwest, began around 12,000 years ago, as nomadic hunters and gatherers who entered the hemisphere from northern Asia via Alaska. These earliest Native Americans are known as Paleoindians. Their arrival in the hemisphere coincided with the end of the Pleistocene (last ice age), and rapidly changing climatic and ecological conditions.

The Paleoindian period

The Paleoindian period (ca. 11000 B.C. – 6000 B.C.) within the Mogollon culture area is probably the most poorly understood in the cultural sequence. This is due both to the lack of investigation of sites dating to this time period and to preservation issues associated with the great time depth of this time period. Most of what is known of this period comes from cross dating projectile point styles found in the Plan Area to dated specimens found elsewhere in the Southwest (Lekson 1992, 2006).

While there has been considerable debate regarding the existence of groups inhabiting the Americas prior to 12,000 years ago, there is little controversy surrounding the fact that humans were within the present-day Southwest by around 12,000 years ago (Fiedel 2002; Waters and Stafford 2007). The sites of Folsom and Blackwater Draw in eastern New Mexico provided evidence of early man in association with extinct mega-fauna that attested to the presence of people in the area during Paleoindian times (Bousman et al. 2004; Collins 2002; Cotter 1938; Figgins 1927; Howard 1935; Meltzer 2004; Nemecek 2000). The presence of Paleoindian peoples within the area is based upon the fact that distinctive projectile points, for example Clovis, Folsom, Sandia, and Plainview have been found at sites throughout the United States and many are associated with extinct mega-fauna (Collins 2002; Hofman and Graham 1998; Meltzer 2004; Wyckoff 1999). The life-ways of groups inhabiting the continent during this time are thought to be based on highly residentially mobile groups following a wandering subsistence base, megafauna. While this view of Clovis peoples as big-game hunters has been within the theoretical lexicon of archaeology since the excavations at Blackwater Draw were undertaken in the 1930s, new research is showing that these groups developed a knowledge of local flora and faunal regimes and might have been broad spectrum foragers as opposed to specialized hunters reliant on large megafauna (Collins 2002; Meltzer 2004; Nemecek 2000; Stanford 1991).

After Clovis, a number of other occupations/adaptations to life in the southwest emerged and evolved. Currently, the chronology for these occupations/adaptations (Holliday 2000; Justice 2002) are based on

radiocarbon dates obtained from materials associated with distinctive projectile points as follows: Folsom and Midland (9000-8000 B.C.); Plainview, Milnesand, and Agate Basin (8200-7200 B.C.); Lake Mojave and Silver Lake (9000-6000 B.C.); and Scott's Bluff, Eden, and Cody (7500-6500 B.C.). The sites dating to these different time periods have been interpreted differently, either as groups consisting of broad spectrum foragers, or as specialized hunter groups traversing the landscape in their subsistence quest.

Paleoindian groups undoubtedly used the Plan Area as a place to hunt and gather resources; and there is evidence that tools were manufactured from stone collected from nearby areas (Banks 1990; Hamilton et al. 2013; Haynes and Huckell 2007; LeTourneau 2000). While there are some isolated artifacts, there are few archaeological sites from the Paleoindian era known on the Forest. Only a handful of archaeological resources in the Plan Area have Paleoindian components (No. < 5). Most of these are present in the more mountainous areas surrounding the modern day Reserve and Quemado Ranger Districts.

The Archaic period

The Archaic period (ca. 6000 B.C. – A.D. 200) represents a time of substantial change amongst prehistoric peoples. The transition between the Paleoindian and Archaic eras took place around 8,500 to 8,000 years ago. The era is marked by the onset of the Holocene epoch, and with it the arrival of climatic and ecological conditions similar to the present day. During the Archaic period, Native Americans continued the hunting and gathering lifestyle seen during the Paleoindian period. It is distinguished from the preceding Paleoindian period by the appearance of part-time cultivation of domestic plants and associated plant processing tools (i.e. groundstone tools). Many of the defining characteristics of the following Pithouse and Pueblo periods, such as the cultivation of domestic plants and the construction of permanent dwellings, make their first appearance in the later years of the Archaic period. The adoption of pottery containers is often used as a marker for the end of the Archaic period (Huckell 1996).

The Archaic period is poorly understood in most portions of the U.S. What is known about Archaic period peoples is that they pursued a hunter-gatherer life-way similar to that of the preceding Paleoindian period peoples, although the mobility of the latter groups is believed to have decreased. In the Southwestern U.S. this is evident by the emergence of variation within projectile point assemblages recovered from different portions of the region (Huckell 1996). Here, between 9,000 and 7,500 years ago, Archaic populations replaced earlier Paleoindian populations. Based on the evidence at hand, regional variation is thought to represent decreasing ranges traversed by groups who possess a greater knowledge of the exploitable resources within their local landscape. It is during this period that the seeds of the vicious feedback loop involving increased sedentism, increased reliance on cultigens, and population growth are planted.

The criteria used to differentiate the Archaic period from the Paleoindian period are somewhat varied. Most archaeologists place the emergence and proliferation of groundstone technology as the key hallmark that separates the two periods. This coupled with the use of thermal features (i.e. burned rock middens) for food processing points to another key aspect that differentiates the Archaic from the Paleoindian period: the increased use of locally available resource and the incorporation of more of these resources into group subsistence regimes. Finally, it is during the Archaic period that side-notched projectile points appear and begin to replace the lanceolate and stemmed projectile points of the preceding period (Huckell 1996; Justice 2002; McBrinn 2010; Sayles and Antevs 1941).

As stated above, the Archaic Period in the American Southwest traditionally dates from around 8,000 to 1,800 years ago (ca. 6000 B.C. – A.D. 200). This long time span is divided into the Early Archaic period (6000-3500 B.C.), the Middle Archaic period (3500-1500 B.C.) and the Late Archaic/Early Agricultural period (1500 B.C.-A.D. 200) (Huckell 1996). As can be imagined, considerable variability exists among the groups inhabiting the vast area of the Southwest during these time periods. Despite this problem, researchers have postulated that some groups exhibit enough similarities in material culture to be

classified as distinct traditions/cultures. One of these distinct traditions, the Cochise Culture, inhabited what is today southeastern Arizona and southwestern New Mexico (Sayles and Antevs 1941).

The Archaic is either not well reported or well represented in the Mimbres Valley but it is documented from work in the nearby Gila Hot Springs area, the upper reaches of the Gila River near Cliff and Gila, New Mexico and in the Middle San Francisco River Valley near Glenwood. Surveys near Gila Hot Springs by Honea (1963) resulted in the documentation of a probable Cochise site. West, in the Upper Gila area, small villages of shallow pithouses occupied toward the latter part of the Archaic have been documented (Hemphill 1983; Hammack et al. 1966; Chapman et al. 1985). The presence of pithouses and corn at the Eaton Site (Fitting et al. 1982) and at LA 29397 (Laumbach 1980) from the same area suggest that between 200 B.C. and 350 B.C. Archaic populations at these sites may have led a relatively sedentary lifestyle even before the introduction of pottery.

While Archaic period sites are limited in areas south of the Gila River, a few sites around Reserve have demonstrable Archaic period occupations (e.g. Bat Cave, Cordova Cave, Tularosa Cave, and O-Block Cave, LA 37917, LA 43766, LA 45508, LA 70188, LA 78439, and LA 89846) (Dick 1965; Martin et al. 1949, 1954; Oakes and Zamora 1999; Waters 1998; Wills 1988, 1996). Early in the history of the region's research solid carbon radio-carbon assays associated with these sites often gave false dates in excess of 4,000 years before present, reanalysis of some of these samples as well as samples collected from more recent research endeavors show that populations were firmly established in the area by the Late Archaic/Early Agricultural period (ca. 1500 B.C. – A.D. 200) (Huckell 1996; Oakes and Zamora 1999; Waters 1998; Wills 1988, 1996).

The Pithouse periods

The Pithouse periods (ca. A.D. 200-1000) in the Plan Area represent a time of substantial change. Archaeologists traditionally divide this time span into the Early Pithouse period (ca. A.D. 200-550) and the Late Pithouse period (ca. A.D. 550-1000). It is during this time that Mogollon brownware ceramics begin being produced in the area. Initially, ceramics of this tradition consisted of non-decorated wares and decorated varieties with fairly simple exterior surface treatments (e.g. neck banding/corrugations, scoring, incising, etc.). As time progresses through the Pithouse and Pueblo periods, surface treatment on Mogollon Brownware ceramics become more elaborate (e.g. Mimbres Classic Corrugated, Reserve Indented Corrugated, Tularosa Patterned Corrugated, etc.). Similarly, ceramics with painted designs make their appearance during the Pithouse periods. Red slipped ceramics first appear during the Early Pithouse period and Black-on-white ceramics first appear during the Late Pithouse period. As was the case for textured wares, Black-on-white ceramics become more elaborate through time, culminating with Mimbres Black-on-white Style III and Mimbres Polychrome ceramics during the Pueblo period (discussed below).

It is also during this time that extra-regional exchange relations become more prevalent. Specifically, during the Late Pithouse period, interaction with Hohokam groups intensifies. This is evident through the increasing presence of shell items procured from the Gulf of California as well as the presence of stone palettes and stone censors at Late Pithouse period sites throughout the Mogollon area. Similarly, interaction with northern and southern groups appears to have intensified through time. This is evidenced by the increasing presence of Cibolan Whiteware ceramics in the Plan Area as well as the increasing presence of copper and turquoise materials in areas to the north and south that likely originated from source groups in close proximity to the Gila National Forest. It is also during this time period that macaws enter the archaeological record. Macaws were likely obtained either through exchange with groups occupying portions of southern Mexico or were directly procured by Mogollon peoples. Finally, during the Late Pithouse period, Mogollon groups likely began trading Mule Creek obsidian throughout the Plan Area and with other nearby cultural groups (Taliaferro et al. 2010).

The Early Pithouse period (ca. A.D. 200 – A.D. 550), like other earlier occupations of the Forest is relatively poorly understood. This is primarily due to the lack of investigation of sites dating to this period. The dates associated with this period are based solely on a few radiocarbon assays which range from A.D. 130 to A.D. 645 (Lekson 1992: 66-74). The Early Pithouse period is distinguished from earlier occupations by the introduction of ceramic technology, a notable shift in subsistence strategies, a unique settlement pattern, and the appearance of new architectural characteristics.

The Early Pithouse period is marked by the introduction of Alma Plain brownware pottery and thinly slipped redwares. Like ceramics common to later occupations in the area, Early Pithouse period brownwares are formed using the coil and scrape method and exhibit a variety of surface finishing techniques (e.g. incising, scoring, etc.). These plainware and textured-ware varieties are the first that appear in the sequence and are followed by thinly slipped redware vessels that have come to be called Mogollon Early Red ceramics (Diehl and LeBlanc 2001). Mogollon Early Red wares are differentiated from their later San Francisco Red counterparts due to their thinner slip and the absence of other surface treatments (e.g. polished surfaces, dimpled exteriors, and scored interiors) (Diehl and LeBlanc 2001: 109).

Finally, the Early Pithouse period was initially interpreted as marking the transition from a hunting and gathering life-way to one with a greater dependence on agriculture. However, new evidence from the Tucson Basin demonstrates that Late Archaic people were fairly reliant on cultigens, at least for some portions of the year, and took great strides to improve agricultural productivity of lands surrounding their settlements. It should be noted that the Late Archaic period is poorly documented for the Plan Area when compared to surrounding areas to the north and west. Be this as it may, research in these areas demonstrates that people were experimenting with horticulture well before the advent of the Early Pithouse period. Research in these areas suggest that Early Pithouse period subsistence economies represent an intensification of those present in preceding periods (Wills 1988, 1996).

To date, roughly nine Early Pithouse period sites have been partially excavated in the Mogollon area (Diehl and LeBlanc 2001; Fitting 1973a; Haury and Sayles 1947; Martin 1943; Martin and Rinaldo 1947; Martin et al. 1940, 1949; Oakes et al. 1999; Wallace 1998). In the Highland/Mountain Mogollon area this time period is sometimes referred to as the Pine Lawn phase (Martin and Rinaldo 1950a; Oakes and Russell 1999). The results of these investigations demonstrated that house floor plans of this period vary from circular, to “Bean” shaped, to amorphous in shape, though most have lateral entryways (Diehl and LeBlanc 2001). These structures cover roughly 26 square meters on average and are relatively large when compared to domestic structures of the Late Archaic and Late Pithouse periods (Diehl and Leblanc 2001; Martin 1943; Martin and Rinaldo 1947; Martin et al. 1940, 1949). The exact reason for this size difference is unknown but could be related to social organization, in that larger social groups may have been needed to perform household practices. These larger social groupings may have carried over or been replaced by the courtyard groupings of the Late Pithouse period (see below). While villages range in size, all appear to have at least one larger structure that is believed to have served communal/ceremonial purposes. Early Pithouse period communal structures were generally larger in floor area and possessed lobes on either side of their entryway. Other than their size and their lobed protrusions around the entryway, no other features distinguish communal/ceremonial structures from their domestic counterparts during the Early Pithouse period (Anyon and LeBlanc 1980).

The Late Pithouse period (ca. A.D. 550- A.D. 1000) is subdivided into the Georgetown phase (ca. A.D. 550-700), the San Francisco phase (ca. A.D. 700-850), and the Three Circle phase (ca. A.D. 850-1000). While the sample of excavated Early Pithouse period sites is small for the Mimbres and Highland Mogollon areas, numerous Late Pithouse period components have been excavated. The vast majority of these have been the result of work undertaken at later occupations where surface architecture is present and few isolated Late Pithouse period sites have been excavated (see Haury 1936; Martin and Rinaldo 1950a; and Roth

2010, 2015 for examples of isolated Late Pithouse period sites). Because the Late Pithouse period has been so intensively investigated in the areas surrounding the Gila National Forest, only a cursory overview is presented highlighting the key traits of the period (see Anyon 1980; Anyon and LeBlanc 1984; Bradfield 1929; Cosgrove and Cosgrove 1932; Creel 2006a; Haury 1936; Lekson 2006; Martin 1943; Martin and Rinaldo 1947, 1950a; Nesbit 1931, 1938; and Shafer 2003 for detailed discussion of Late Pithouse period remains within the Mogollon area).

The traditional phase designation used for the Late Pithouse period was first established by Haury (1936) based on his work at Mogollon Village along the San Francisco River near Alma, New Mexico and Harris Village along the Mimbres River near Mimbres, New Mexico. Based on his work at Mogollon and Harris Villages, Haury (1936) differentiated the Georgetown, San Francisco, and Three Circle phases primarily due to changes in architecture and ceramic assemblages.

Aside from these changes in architecture and ceramic assemblages, the other main characteristic of the Late Pithouse period is a shift in settlement patterns. While Early Pithouse period sites tend to be located on higher elevation landforms, Late Pithouse period sites are usually located along the first bench overlooking drainages. If LeBlanc's rationale for the positioning of Early Pithouse villages were correct, then this would indicate that the threat of violence decreased during the Late Pithouse period (Diehl and LeBlanc 2001; LeBlanc and Whalen 1980). However, if Diehl's model is correct, then this would suggest that population densities reached a certain threshold whereby the visibility of a community was no longer deemed necessary to facilitate social interaction (Diehl and LeBlanc 2001).

Regardless of the scenario responsible for the changes in settlement location, other patterns present in preceding periods intensify during the Late Pithouse period. It is during this time period that feedback mechanisms involving population increase, increased sedentism, and increased reliance on cultigens become firmly entrenched. As populations grow, so too does the need to feed them. Cultigens provide a predictable source of nourishment and can be relatively easily manipulated to produce greater yields and thrive in different environments. Conversely, having a predictable subsistence base also allows for population growth. Because cultigens are modified by human agency, they often require this intervention to survive. Thus, once groups begin to invest in agricultural production to meet the food demands of the burgeoning population, they will probably need to remain present throughout some portion of the year to ensure that this subsistence base produces. This causes groups to become more sedentary for at least some part of the year. Similarly, as populations grow, it becomes increasing more difficult to remain highly mobile. Throughout the Late Pithouse period agricultural production intensifies.

Throughout the Georgetown, San Francisco, and Three Circle phases, domestic structures change in morphology from circular in shape to square in shape with lateral entryways. Communal structure morphology changes from circular structures with lobed entryways to square structures that are nearly quadruple the size of their domestic counterparts. Decorated ceramic production changes from simple red-slipped vessels, to brownwares with red designs (Mogollon Red-on-brown), to black-on-white designs executed on brownware vessels with increasing complex designs (Mimbres Black-on-white Style I, Mimbres Black-on-white Style II). Plain and textured varieties of brownwares are produced throughout the Late Pithouse period. Subsistence practices seem to follow earlier occupations and generally consisted of increasing reliance on cultigens as a result of increasing population that was partially offset by hunting and gathering of wild resources. Sometime during the San Francisco phase, a more productive variety of Maiz de ocho was introduced and grew in prominence (Diehl 1996, 2012; Gruber 2007). Finally, it is during this period that the inhabitants of the Forest and surrounding areas begin intensively targeting the Mule Creek obsidian sources for lithic tool stone raw material.

At some point in time, probably during the late Three Circle phase, a new form of social organization likely emerged. Researchers have noted that certain structures during the Three Circle phase were organized as

what some call courtyard groups or clusters (Creel 2006a; Lucas 1996; Roth 2015). These courtyard groupings consist of multiple contemporaneous pithouse structures arranged so that their entryways open onto a common area/courtyard and most groupings tend to have a non-domestic pitstructure incorporated amongst their ranks. These groupings have come to be interpreted as corporate groups that are thought to have consisted of a multifamily kin-group (Creel 2006b). The emergence of these corporate groups represents another level of social organization that had not existed during preceding periods. Prior to their emergence, village organization consisted of a low level of organization, the individual pithouse social unit, and a higher level of organization, the community as a whole integrated through the large communal facilities (great kivas) present at most pithouse villages. Corporate groups are believed to represent co-residential units that shared domestic and economic practices and could thus be interpreted as households (Shafer 2006; Wilshusen 1989). Shafer (2006) argues that these corporate groups emerged as a response to the need to share commonly controlled resources, namely the irrigation system that is hypothesized to have existed in Mimbres valley during the Late Pithouse and Classic periods (Creel and Adams 1986; Herrington 1979; Shafer 2003). The emergence of this irrigation system and the ensuing emergence of corporate groups are believed to have had drastic ramifications for socio-political organization in the region (Shafer 2006).

The Pueblo period

The Pueblo period (ca. A.D. 1000-1400) refers to the time span when groups began to construct above ground architecture. The time period traditionally dates from around 1,000 years ago to roughly 600 years ago and is separated into early and late components. The Early Pueblo period traditionally dates from around 1,000 to 800 years ago (ca. A.D. 1000-A.D. 1200) and the Late Pueblo period traditionally dates from around 800 to 600 years ago (ca. A.D. 1200-A.D. 1400). Perhaps the greatest divergence of distinct traditions in the Mogollon culture area takes place during these time spans. For areas south of the Gila River, the Early Pueblo period is referred to as the Classic period (ca. A.D. 1000-1150). For areas north of the Gila River in the Highland/Mountain Mogollon area, this time period is referred to as the Reserve phase (ca. A.D. 1000-1200). For areas south of the Gila River, the Late Pueblo period is divided into the Black Mountain phase (ca. A.D. 1150-1300) and the Cliff/Salado phase (ca. A.D. 1300-1450). For areas north of the Gila River in the Highland/Mountain Mogollon area, the Late Pueblo period is referred to as the Tularosa Phase (ca. A.D. 1200-1400). In both areas these time periods are marked by the transition to above ground architecture, the continued growth of populations in the area, an increased reliance on cultigens, and an increase in regional interaction.

During the Early Pueblo period, the extra-regional exchange relations with Hohokam groups to the west appears to decrease in intensity. This is based on the decreasing quantities of stone palettes and stone censors at Mogollon sites. However, shell ornaments obtained from the Gulf of California are encountered at Classic period sites (Gilman 2006). Interaction with northern Ancestral Pueblo groups potentially intensifies during the Pueblo periods. It is during this period that Mimbres Black-on-white ceramics wane in popularity in the Highland Mogollon area and Cibolan ceramics become more prevalent at Reserve and Tularosa phase sites. Some researchers speculate that the southern extent of the Chaco regional system extends into the Quemado and Reserve Ranger Districts. Indeed, there are certain sites in the northern portions of the Forest that exhibit Chaco style architecture with faced masonry construction and high proportions of Cibolan Whiteware ceramics. During the Late Pueblo period in the Mimbres area, production of Mimbres Black-on-white ceramics ceases and groups begin obtaining decorated ceramics from areas to the north, south, east, and west. Obsidian data demonstrates that patterns present in the Late Pithouse period continue into the Pueblo periods. Specifically, Mule Creek obsidian continues to be the most utilized source throughout much of the Mogollon culture area and continues to be traded with groups to the north, south, east, and west (Taliaferro et al. 2010). Some researchers speculate that Salado groups originally from the Kayenta area in present day northeastern Arizona migrated into the Mule Creek

area during the 13th or 14th centuries to lay claim to this important source group (see Huntley 2010, 2012 and papers therein).

The Classic period and Reserve phase date from around 1,000 years ago to around 850-800 years ago (ca. A.D. 1000-A.D. 1150/1200) and is marked by the transition from pithouse architecture to above ground cobble-walled roomblocks that, in some cases, incorporate kivas. Pueblos of this time period range in size from one to 200 rooms arranged as multiple roomblocks. Most, however, contain between one to 12 rooms (Bluhm 1960). Large communal structures (great kivas) cease being constructed in the Mimbres area during this time period. However, based on limited data, large communal structures appear to continue to be constructed in the Highland/Mountain Mogollon area.

The presence of Mimbres Black-on-white Style III pottery also marks the beginning of this period in the southern portions of the Forest. The exchange of this commodity, as well as the exchange of exotic materials, is characteristic of the increased socio-political interactions taking place during this time period. Near the end of the Classic period, production of Mimbres Black-on-white Style III ceramics declines and ceramics produced in areas to the north, south, east, and west begin to appear in the southern portions of the Forest. While Mimbres Black-on-white Style III pottery is common in the Mimbres area, the prevalence of Mimbres Black-on-white pottery decreases in the Highland/Mountain Mogollon area as Reserve Black-on-white and other Cibolan ceramics increase in popularity (Bluhm 1957, 1960; Martin and Rinaldo 1950b; Martin et al. 1949; Oakes and Zamora 1999). Based on the relative abundance of sites believed to date to this time period, researchers believe that populations reached their peaks during the Classic period and Reserve phase (Blake et al. 1986; Bluhm 1960).

The Black Mountain phase dates from around 850 to 700 years ago (ca. A.D. 1150-A.D. 1300) and exhibits distinct differences from the preceding Classic period. These differences included the apparent cessation of Mimbres Black-on-white pottery production and use, the emergence of new ceramic traditions in the area, the increasing use of cremation as a means of disposing of the dead, and the emergence of new architectural styles and features within the Mimbres area near the end of the Classic period (Creel 1999; LeBlanc 1977, 1980a; Shafer 1999). The new ceramic traditions that entered the area include the apparently immediate appearance of Playas Redware, El Paso Polychrome, St. Johns Polychrome, Chupadero Black-on-white, and Three Rivers Red-on-terracotta vessels at the time that Mimbres Black-on-white ceramics cease to be present in the archaeological record. The main differences in architecture and settlement patterns during the Black Mountain phase include the apparent abandonment of large Classic period villages during the Black Mountain phase and the emergence of new villages in the lower portions of the Mimbres Valley which were constructed of coursed adobe. These coursed adobe structures are perceived as generally containing rooms which are larger than their Classic period counterparts. They incorporate small clay lined circular adobe hearths, raised box-hearths, and a two-post roof support system which differ from the square slab-lined hearths, three post roof support pattern, and cobble masonry rooms of the Classic period (LeBlanc 1977, 1980a).

To date, only five Black Mountain phase sites have been moderately tested in the Mimbres area: Black Mountain, Galaz, Montoya, Old Town, and Walsh (Anyon and LeBlanc 1984; Creel 2006a; LeBlanc 1976, 1977; Putsavage 2015; Ravesloot 1979; Taliaferro 2014). All of these sites are located outside of the Plan Area. However, there are a few sites where Black Mountain phase ceramics have been encountered on the Gila National Forest. Usually these Black Mountain phase ceramics are present in small numbers and could represent the occupation of a Classic period site into the Terminal Classic period (ca. A.D. 1130-1180) or a limited occupation of a Classic period site by Black Mountain phase peoples.

The Tularosa phase dates from around 800 to 600 years ago (ca. A.D. 1200-A.D. 1400). In contrast to the Black Mountain phase, Tularosa phase sites do not appear to represent a distinct break in cultural traditions when compared to earlier manifestations in the Highland/Mountain Mogollon area. In these

areas the Tularosa phase appears to represent a direct trajectory of the preceding Reserve phase. Tularosa phase sites mirror their Reserve phase counterparts in all respects except for size. Tularosa phase sites grow larger in comparison than those present during the Reserve phase with some containing upwards of 60 rooms. While larger, Tularosa phase sites are less numerous when compared to the settlement pattern present in the Reserve phase. The combination of larger pueblos and less numerous small structures during this time period could represent the consolidation of populations into fewer settlements. Ceramic assemblages present at Tularosa phase sites mirror those of the preceding Reserve phase though new ceramic types are introduced (e.g. Tularosa Black-on-white, Tularosa White-on-red, and St. John's Polychrome) and gain in popularity (Oakes 1993; Oakes and Zamora 1999). Tested Tularosa phase sites in the area include the East Ridge Ruin (Oakes 1993), Higgins Flat Pueblo (Martin et al. 1957), the Hough Site (Oakes and Zamora 1999), Starkweather Ruin (Nesbitt 1938), Fornholt (Dungan 2012; Dungan et al. 2012), and 3-Up (Dungan et al. 2012).

In stark contrast to areas to the south around the Mimbres River, inhabitants of the Highland/Mountain Mogollon area continue to construct and use large communal pitstructures throughout the Pithouse periods and into the Pueblo Periods. A few Reserve phase great kivas have been excavated in the Pine Lawn valley (e.g. Sawmill site) though the vast majority of tested great kivas in the northern Mogollon area date to the Tularosa phase (e.g. Fornholt, Higgins Flat, Hough Pueblo, East Ridge, and WS Ranch). These generally tend to be similar to Three Circle phase great kivas in their overall shape as well as the features present within their confines though some are either attached to room blocks or are surrounded by ancillary rooms.

The Cliff/Salado phase dates from around 700 to 550 years ago (ca. A.D. 1300-A.D. 1450) and was originally formulated by the Mimbres Foundation to describe sites occupied during the time span during which Salado Polychrome ceramics were manufactured. Sites dating to this time period represent the late occupation of portions of the Plan Area by groups who share a similar material culture with groups occupying the Hohokam heartland of the Tonto Basin, the lower Salt River Valley, and the Middle Gila River Valley (LeBlanc and Nelson 1976; LeBlanc and Whalen 1980; Lekson 2002, 2006; Lyons 2004; Lyons and Lindsay 2006). Based on the presence of Gila and Tonto polychrome ceramics, as well as similarities in architectural construction techniques, Mimbres Foundation archaeologists stipulated that "Cliff phase populations entered the Mimbres River bearing a fully developed Salado pattern rather than having evolved" in situ from resident populations (LeBlanc and Nelson 1976: 77). Thus, the Cliff phase is seen as a distinct break in the area's occupation where migrating groups reoccupied an essentially abandoned landscape.

While Cliff phase remains are found as far east as the Mimbres Valley, the phase gets its name from the dense occupation of Salado-like sites around the modern town of Cliff, New Mexico. In this area the presence of Tucson and Maverick Mountain Polychrome ceramics show connections with groups in east-central and southeastern Arizona though the architectural patterns at these sites shows more similarities to "puebloan patterns" than to the "compound architecture" of the Hohokam area (Wallace 1998:6). Despite the fact that there appears to have been a substantial Cliff/Salado period occupation in southwestern New Mexico, few sites relating to this occupation of the area are found north of the Gila River in New Mexico (Hegmon et al. 1999).

The Protohistoric period

The Protohistoric period in the American Southwest covers a relatively short time period and refers to the time span after the pan-regional large scale abandonments that took place around 550 years ago (ca. A.D. 1450) up to the time when permanent settlements occupied by groups producing historic written records were present in the area (around 400 years ago). Sometime around 550 years ago the native puebloan groups occupying the Plan Area are believed to have abandoned the Mimbres area and the

Mountain/Highland Mogollon area. There are two possible scenarios as to where these Mogollon groups went. In one scenario, these groups likely dispersed to neighboring settlements to the north, east, and south. In another scenario, these groups were possibly assimilated into Athabaskan groups migrating south from the Great Plains.

After A.D. 1450, and well into the historic era, Athabaskan groups occupied the Plan Area. The exact timing of the introduction of Athabaskan groups into the Plan Area, as well as their route into the Southwest, is debated. Most early dates associated with Athabaskan components tend to cluster around 550 to 450 years ago (ca. A.D. 1450-A.D. 1550). However, these dates range up to 1,100 years ago to as late as 300 years ago (ca. A.D. 900 to A.D. 1700) (Brown 1996; Hogan 1989; Oakes and Russell 1999; Schaafsma 1981; Wiley 1966). The migration route for the different Athabaskan groups entering the area was likely along the flanks of the Rocky Mountains and/or through the Great Plains into the San Juan Basin (Perry 1991; Schaafsma 1981; Seymour 2012; Towner and Dean 1996). Radio carbon assays, Native American oral histories, and Spanish accounts demonstrate that Apaches were present in the Forest possibly as early as 550 years ago with a definite presence by 480 years ago (Oakes and Russell 1999; Seymour 2008a).

The Spanish presence within the southwest likely began shortly after Athabaskan groups entered the area. Expeditions into the northern frontier of New Spain in what is now New Mexico and Arizona began after Cabeza de Vaca's return from his years of wandering in the wilderness after being shipwrecked off the Florida/Alabama coast in 1528 (Bandelier 1981). Upon his return to Mexico, Cabeza de Vaca and those within his party (Alonzo Maldonado, Andres Dorantes, and Estevanico) told their accounts and of what they had been told about the natives to the north. Even though their accounts made little mention of vast riches within these lands, they spurred Spanish interest within the northern frontier (Bandelier 1981; Burke 1973).

Numerous Spanish entradas would enter the Northern Territory after Cabeza de Vaca. However, only the initial entradas led by Fray Marcos and Coronado likely entered the Plan Area (Figure 224). The early expeditions followed a different route into the northern frontier which traversed from Compestela in the modern Mexican state of Nayarit; up to Vacapa in the modern Mexican state of Sonora; before crossing the present day international boundary by traveling up the Rio de Sonora, San Pedro River, and Gila River. After the Coronado expedition of 1540-1542, expeditions followed a different route, called the Camino Real which led from Mexico City up to present day El Paso, Texas, before traversing north along the Rio Grande.

After Coronado, It would be roughly forty years before another expedition into the northern frontier would be undertaken. Spanish settlement within the Northern Frontier of the present day Mexican states of Sonora and Chihuahua in the forty years since Coronado's expedition had allowed entradas to follow a new route: the Camino Real de Tierra Adentro (Figure 224). From 1581 until a permanent Spanish settlement was established at Santa Fe in 1598, five major expeditions traversed the Camino Real on their way to pueblos in the Northern Territory (Table 206). In most instances, the interaction that took place between the Spanish and Native American Puebloan groups ended in violence and the removal of Spaniards in the area. It would take the establishment of Santa Fe and a permanent presence with military personnel in the region to stabilize relations.

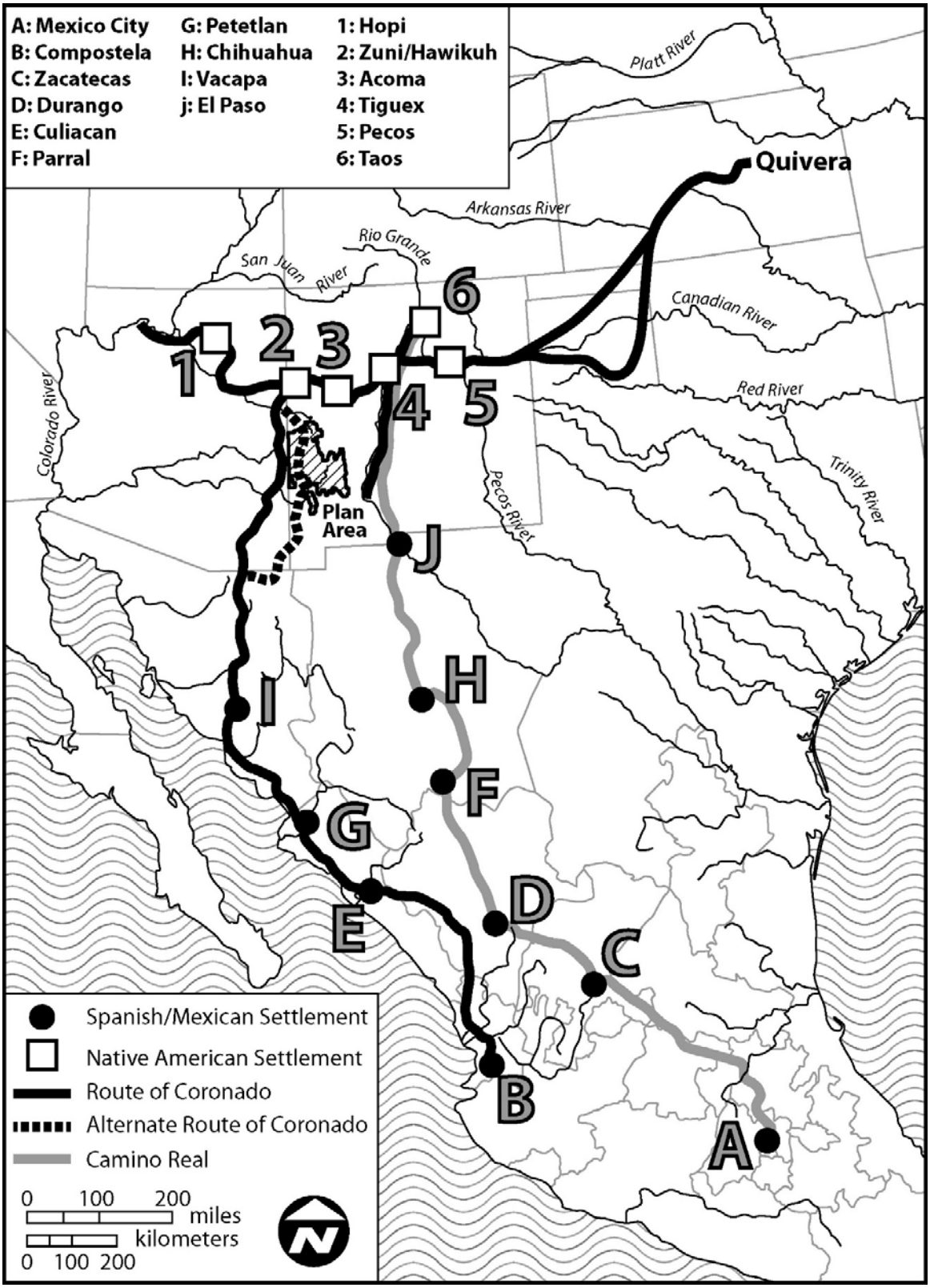


Figure 224. Depiction of routes followed by Fray Marcos and Coronado and later entradas along the Camino Real.

Table 206. Early Spanish entradas entering New Spain along the Camino Real.

Year	Expedition	References
1581	Fray Augustin Rodriguez	Barrado 1967a, 1967b; Bolton 1967; Burke 1973; Bustamente 1967; Kessell 2002; Villamanrique 1967
1582	Antonio de Espejo	Barrado 1967a, 1967b; Burke 1973; Espejo 1967a; Kessell 2002
1590	Gaspan Castano de Sosa	Burke 1973; Hackett 1923; Kessell 2002
1590	Francisco Leyva de Bonilla and Antionio Gutierrez de Humana	Burke 1973; Hackett 1923; Kessell 2002
1596	Don Juan de Onate	Bolton 1967; Burke 1973; Hackett 1923; Kessell 2002; Onate 1923a, 1923b, 1967a, 1967b, 1967c, 1967d, 1967e; Riley 1999

Native American Occupation and Use after A.D. 1600

After the establishment of Santa Fe in 1598, the Spanish Government began producing copious records of its activities associated with their attempts to colonize the northern frontier. As time progressed, and colonial administrations entered into previously unoccupied areas, the number of such records increased. These records allow for a more thorough study of activities taking place from A.D. 1600 through to the present. For the intents of the following discussion, Native American and Anglo-American history can be divided into three broad time frames:

1. *The Early Historic period* corresponds to the time period from 1600 to 1680. During this time span numerous Spanish settlements are established along the Camino Real and missions are established at Native American pueblo settlements. The Early Historic period ends with the expulsion of European settlers from the region as a result of the Pueblo Revolt of 1680.
2. *The Middle Historic period* corresponds to the time period from 1680 to 1890. It is during this time period that European settlement is reestablished in New Spain's northern frontier. It is during this time span that administration of present day New Mexico shifts as different nation states gain control of the area through armed conflict (i.e. Spain, Mexico, and the United States).
3. *The Late Historic period corresponds to the time period from 1890 through to the recent past (ca. A.D. 1950). It is during* this period that Apache groups residing in the Plan Area are forcibly removed and Anglo-American settlement within the region expands, the Plan Area is established as a Forest Reserve, and New Mexico gains statehood. Cattle ranching, logging, and mining activities increase in the region as America enacts its Manifest Destiny.

The Early Historic period

The Early Historic period (ca. A.D. 1600-1680) was a time of substantial change for both the colonial and native populations. During this period, many missions were established. In relation to the Gila National Forest, the closest missions were those present in the Salinas Basin, roughly 75 miles to the northeast. From 1625 through 1629, a series of missions were established in this area by Fray Francisco Acevedo (Prince 1915). Father Acevedo was responsible for the construction of missions at the pueblos of Abo, Tabira, and Tenabo. By 1630 missions had also been established at nearby Quarai and Gran Quivera. Between 1675 and 1680, the missions present in the Salinas Basin were destroyed (Prince 1915). Some attribute the demise of these institutions to Apache raids while others attribute their destruction to intra-

community conflict that emerged from economic stress brought about by drought, the introduction of pathogens into Native American communities, the desecration of traditional ceremonial structures, and the increasingly authoritative hand of Spanish settlers at nearby communities (Prince 1915).

A combination of socio-economic factors led to the Pueblo Revolt of 1680, where, under the guidance of Pope, an Indian from San Juan Pueblo (today known as Ohkay Owingeh), the puebloan populations rose in unison and attacked Spanish settlements and missions, causing those who did not perish, to flee from the area and resettle in areas surrounding El Paso, Texas. On August 10, 1680, pueblo Indians throughout the province of New Mexico rose up and slaughtered the Spanish within their communities and razed evidence of their presence to the ground. The final battle of the revolt took place at Santa Fe on the 16th of August; Pope accompanied by Indians from the Tewa pueblos, Taos, Picuris, Tiwa groups and others, numbering around 2,500 natives in all, attacked the town of Santa Fe, pushing the Spanish soldiers in the town to fortify the Governors Palace. Pope laid siege to the Palace and managed to set part of the structure on fire; on the 18th, Otermin, governor of New Mexico, took two hundred of his toughest soldiers and fought through the Indian forces. On the 19th, the governor led his population to Isleta Pueblo to search for survivors; there they caught news of a plotted attack, picked up and moved south, taking a group of Isleta natives with them to El Paso.

The Middle Historic period

The Middle Historic period (ca. A.D. 1680-1890) represents the time span after the Pueblo Revolt to when Apache groups occupying the Plan Area were forcibly removed from their native homelands. This time period is further subdivided based on the nation state administration responsible for the Plan Area. From 1600 through 1821, present day New Mexico was administered by the Spanish Government. In 1821, Mexico gained its independence from Spain and as a result gained control of the Plan Area. In 1848, with the signing of the Treaty of Guadalupe Hidalgo, the United States acquired the Western Territory, an area encompassing lands west of the Rio Grande to present day California. The southern portions of present day New Mexico and Arizona were acquired through the Gadsden Purchase of 1854.

The Spanish Administration of its northern frontier was partially interrupted by the Pueblo Revolt. However, settlement into present day Sonora and Chihuahua, Mexico continued during this time frame. While the Pueblo Revolt represents one of the only attempts by Native Americans to expel the European colonists invading the New World, it was a short-lived revolution. By 1690 the northern frontier was again part of New Spain. While the Spanish had made some strides in reestablishing relations with Pueblo groups along the Rio Grande, their relations with other Native American groups waned. This was in part due to the fact that Spanish settlements near areas occupied by non-Puebloan groups prior to the Pueblo Revolt were depopulated and/or abandoned (e.g. the Salinas Basin pueblos). It would be roughly 100 years before Spanish explorations entered the Plan Area again.

Despite sporadic conflict with Navajos, Apaches, and other tribes, Spanish settlement expanded from the northern and central Rio Grande Valley following the Pueblo Revolt. The Spanish crown (followed by the Mexican government after 1821) issued grants of land to individuals and communities to settle and use lands along the margins of the Spanish colony. Fifteen grants were issued for settlements adjacent to the Plan Area between 1718 and 1844 (Figure 225, Table 207).

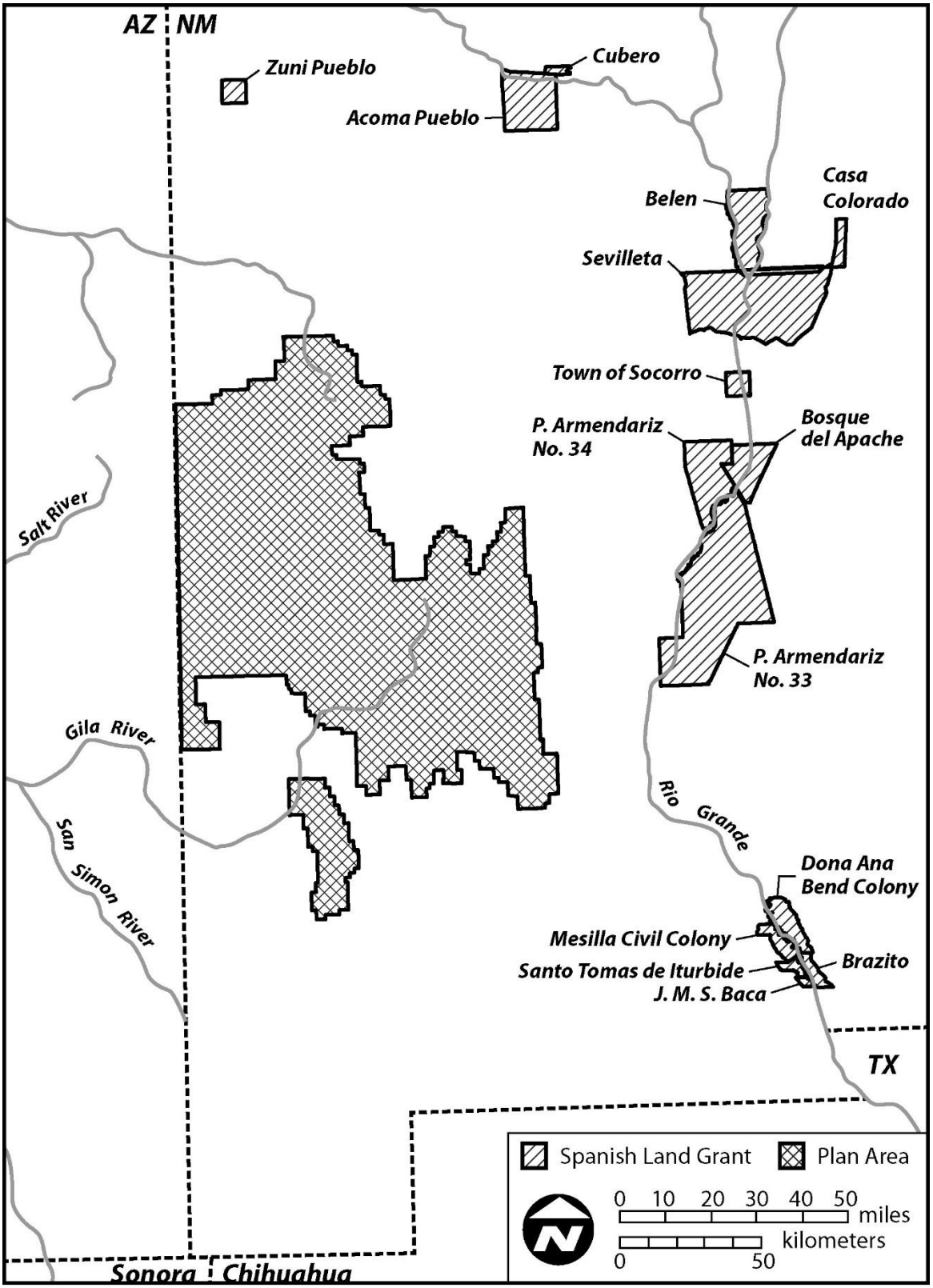


Figure 225. Location of Spanish and Mexican land grants adjacent to the Plan Area

Table 207. Spanish and Mexican land grants established within 50 miles of the Plan Area.

Grant Name	Date Issued (Spain/Mex.)	Type	Date Confirmed (U.S.)	Adjacent/Nearest Ranger District
Acoma Pueblo	1689	Community	1877	Quemado
Armendaris No. 33, Pedro	1819	Private	1860	Black Range
Armendaris No. 34, Pedro	1820	Private	1860	Black Range
Belen	1740	Community	1858	Quemado
Bosque del Apache	1845	Private	1860	Black Range
Brazito	1823	Private	1879	Black Range/ Silver City
Casa Colorado	1823	Community	1858	Quemado
Cubero	1833	Community	1897	Quemado
Dona Ana Bend Colony	1840	Community	1902	Black Range/ Silver City
J.M.S. Baca	1853	Private	1902	Black Range/ Silver City
Mesilla Civil Colony	1853	Community	1902	Black Range/ Silver City
Santo Tomas de Iturbide	1853	Community	1903	Black Range/ Silver City
Sevilleta Grant	1819	Community	1901	Quemado
Town of Socorro Grant	1815	Community	1895	Quemado/Black Range
Zuni Pueblo	1689	Community	1877	Quemado

After attempts to use missions to convert Native groups had failed, Spain began implementing a system whereby the military was used to secure amicable relations between Euro American and Native American groups who occupied the Plan Area. After 1786 the Spanish government offered Apaches goods in exchange for residing near presidios, termed “establieimientos de paz” (peace establishments), these administrative units would influence future relations between Apache groups and the shifting Nation-State administrations of the area (Griffen 1989:9). From 1786 through 1793, the Spanish government issued rations to peaceful Apache groups living within 10 miles of presidios. While none of these “peace establishments” existed in New Mexico, those present in the modern Mexican states of Sonora and Chihuahua serviced Apache groups who sometimes resided in the Plan Area. In 1794, the Spanish government began steadily decreasing funding for these rations. Despite the lessening rations, there was a period of relative stability and peace between the Spanish and Apache groups in the Northern Frontier until Mexican independence in 1821 (Griffen 1989).

Between ca. A.D. 1770-1790, the Chiricahua Apache occupied the Plan Area. This group belonged to the southern division of the Athabaskan linguistic stock and was divided into four bands: a southern group

referred to as the Nednhis band, the Central Chiricahua band, a northern group known as the Bedonkohes band, and an eastern group referred to as the Chihenne band (Sweeney 1998). Each of these groups had a fairly well defined territory. The Nednhis band is sometimes referred to as the Janeros, Carrizalenos and/or the Pinery Apaches. These distinctions refer to geographic locations where these groups were known to frequent. The Janeros were frequently encountered around the presidio of Janos while the Carrizalenos were commonly encountered near the presidio of Carrizal, both in the modern Mexican state of Chihuahua (Sweeney 1998). However, the range of these groups extended north past the present-day international four-corners area (Arizona, New Mexico, Sonora, Chihuahua). The Central Chiricahua band was commonly encountered in southeastern Arizona, north to the Gila River, south to the northern portions of the modern Mexican states of Sonora and Chihuahua, and east into southwestern New Mexico (Sweeney 1998). The Bedonkohes inhabited areas around the Gila River north into the Mogollon Highlands. To the east, the Chihenne band inhabited the region encompassed by much of the Plan Area (Sweeney 1998). Like the Janero/Carrizaleno local group distinction for the Janero band, the Chihenne are sometimes referred to variously as the Mimbres, Copper Mines, Warm Springs, or Gila Apaches based on areas frequently inhabited by different local groups.

The leaders of the Janero band from roughly 1820 through 1860 were Juan Diego Compá, Juan José Compá, Coleto Amarillo, Láceres, Galindo, and Juh. During this same time period, the Carrizalenos were led by Jasquedegá, Cristóbal, Francisquillo, Cigaretto, Cojinillin, and Felipe. From 1800 through 1860 the leaders of the Central Chiricahua band were Pisago Cabezón, Matias, Tapilá, Yrigóllon, Esquinaline, Miguel Narbona, and Cochise. During this same time period, the Bedonkohes were led by Mahko, Mano Mocha, Teboca, and Phalios Palacio. Finally, the Chihenne band was led by Ojos Coloradas, Mangas Coloradas, Pluma, Cuchillo Negro, Itán, Ponce, Delgadito, and Victorio.

Many of these early band leaders inherited a general time of peace. From roughly 1780 through 1810, hostilities between the Spanish and the Apaches were minimal, though small raiding parties did attack Spanish settlements on occasion. Many of these conflicts erupted over the establishment of a mining settlement at Santa Rita del Cobre in 1803 (directly south of the Plan Area). By 1807, members of the Chihennes and Bedonkohes Apache began systematically attacking this settlement. The frequency of attacks on Santa Rita del Cobre and other Spanish settlements increased throughout the following years.

The Mexican Administration of the region began in 1821 when Mexico won its independence from Spain and assumed control over the colony of New Mexico. Located at the fringe of the newly organized nation, New Mexico was relegated a minor role in national politics. The change of government resulted in less official oversight of local politics and permitted a greater degree of religious and secular autonomy for Native American groups in New Mexico. The lack of oversight, however, also resulted in additional losses of Pueblo lands that were once protected by the Spanish Crown (Hudson 2011; Weber 1982).

Unlike their Spanish predecessors, the Mexican government did not initially provide rations to Apache groups living in the territory of New Mexico (Griffen 1989). From 1821 through 1830, the Mexican government sent little to the frontier. Busy dealing with expended treasuries and reorganizing a central government, the frontier settlements were essentially left to whither. With what little assistance came, some rations were able to trickle into Apache Rancherias near presidios. By 1830, rationing ceased, and by 1831 nearly “every Apache band formerly under Mexican influence had gone to war” (Sweeney 1998: 43). With no reason to remain settled around the Spanish presidios, Apache groups began dispersing into the surrounding mountain ranges. With the dissolution of amicable relations, Apache groups resumed their raiding of the invading European and Mexican settlers.

Throughout the early part of the nineteenth century, western expansion of the United States increased the level of American influence over the Southwestern region. Following disputes over the Unites States’ annexation of Texas, and the subsequent attack of Mexico on Texas settlements in disputed territory, the

United State declared war on Mexico on May 13, 1846. General Zachary Taylor was ordered to attack Mexico from Texas and Colonel Stephen Watts Kearny was charged with organizing an invasion force from Fort Leavenworth, Kansas. Kearny was ordered to occupy New Mexico, and then head west towards California. Kearny left Kansas with roughly 3,200 men spread out in three companies led by himself and Colonel Sterling Price.

On August 18, 1846, Kearny entered Santa Fe and garrisoned his troops; on September 25, 1846 he headed to California with 300 of his men. On April 6, 1846, Kearny's contingent crossed paths with Kit Carson near Socorro. Apparently Carson had encountered a group of Apache outside of Santa Rita del Cobre who were waiting for the American General who controlled the territory. Carson had conducted peaceful exchanges with this Chihenne group. Upon hearing this, Kearny enlisted Carson as a guide for his route to California and sent 200 of his men back to Santa Fe. On October 10, 1846, Kearny, Carson, and 100 soldiers made camp near Santa Rita del Cobre. Later that evening, Mangas Coloradas entered camp where he "pledged good faith and friendship to all Americans" (Sweeney 1998:143). Due to the years of nearly constant war between the Chiricahua Apache and the Mexican Government various Apache groups were willing to enter peaceful relations with the American Government if this meant aid against Mexico.

The American Administration of the region began in 1848 as a result of the United States' victory over Mexico during the Mexican-American War. As a result, the United States found itself with a new frontier in need of exploration to determine the nature and extent of the newly acquired resources. In efforts to inventory these resources, it quickly became apparent the area was inhabited by both Native American groups with a long history of occupation as well as more recent Spanish/Mexican groups. While some of these groups acclimated to the change in government, other groups made attempts to preserve their life-ways in the face of an "unknown and alien power" (Stewart 1993: 4).

As stipulated in the Treaty of Guadalupe Hidalgo, the "savage tribes" occupying the newly acquired territory were to become the responsibility of the United States Government. The treaty also stipulates that incursions of these savage tribes into Mexico "would be prejudicial in the extreme…and that such incursions shall be forcibly restrained by the Government of the United States…and that when they cannot be prevented, they shall be punished by said government…with equal diligence and energy, as if the same incursions were mediated or committed within its own territory, against its own citizens" (Thrapp 1967:7). While these demands were later rescinded in the Gadsden Treaty of 1854, the United States Government was still expected to keep Apache groups inhabiting the new territory from raiding Mexican settlements across the newly established international boundary.

It was from a series of ever expanding military posts that many campaigns were mounted against the Apache groups inhabiting the Plan Area. The time period come to be known as the Apache Wars (ca. A.D. 1849-1886) had its roots as the entrance of Spanish into the southwest and the increasingly urgent desire to protect native homelands from the invading onslaught of Euro-American settlers.

Military fortifications in New Mexico began with the construction of Fort Marcy near Santa Fe in 1846. This and other forts constructed in the area in the intervening years were used to hold and protect population centers, protect travel routes, and mount campaigns against hostile Native American groups. The first military presence near the Plan Area began shortly after the construction of Fort Marcy. In 1851 Fort Fillmore was constructed to protect the inhabitants of Mesilla (present day Las Cruces) and traders traveling to California. In the same year, the first Fort Webster was established in Santa Rita to protect the workers of the emerging mining town. In 1853, the garrison stationed at Fort Webster moved to the newly constructed Fort Thorn, located just north of Santa Barbara (modern day Hatch, New Mexico). By the 1860s, multiple forts had been established in southwestern New Mexico. In 1866, Fort Bayard was constructed to protect the mining operations and resident populations around Silver City and Pinos Altos.

In the same year, Fort Webster was reoccupied to protect the Santa Rita mines. Finally, Fort Tularosa was constructed in 1872 to administer an Apache reservation intended to house Warm Springs Apache groups.

In July of 1852, Mangas Coloradas met with Colonel Edwin Vose Sumner, the military commander of New Mexico, and John Greiner, the acting Superintendent of Indian Affairs in New Mexico, at Acoma Pueblo to go over the terms of a peace treaty. The treaty contained eleven articles which called for the Chihennes and Bedonkohes to recognize the United States and establish friendly relations between the two races, and to allow the United States to establish military and administrative units in their territory. Mangas Coloradas was the only Chiricahua Apache leader to sign the treaty, though the names of Ponce, Itán, Sergento, Dosientos, and José Nuevo were included on the treaty. In the following months many important Chiricahua Apache leaders inhabiting the Plan Area came into Fort Webster to formally express their interest in having peaceful relations with the American military. These compacts obligated the United States government to issue rations to peaceful Apache groups living in proximity to Fort Webster. In exchange, Apache groups were to begin practicing agriculture along the Mimbres River and were to be given a breeding stock to become pastoralists. These stipulations were never fully carried out by the Americans stationed in New Mexico despite the peaceful relations between the Apaches and Americans.

Because of the inability of the U.S. Government to follow through on its treaty obligations, tensions between American settlers and Apache groups inhabiting the Plan Area grew and culminated in various armed confrontations. On December 4th, 1860, a number of miners and settlers from Texas attacked an Apache Rancheria in the Mimbres Valley. The Battle of the Mimbres River, and the ensuing Bascom Affair, which led to the capture of members of Cochise's immediate family, led to multiple retaliations including battles at Cookes Canyon in August of 1861, in the Florida Mountains in August of 1861, in Pinos Altos in September of 1861, and at Apache Pass in July of 1862 (Sweeney 1998: 412-440). These and other armed confrontations established a precedent that would guide relations between Americans and Chiricahua Apaches until the latter were forcibly removed from the area.

In retaliation to these skirmishes, the United States Government established Fort West near Santa Lucia to more easily agitate the group of Gila Apache under the guidance of Mangas Coloradas. On January 17, 1863, Mangas Coloradas was lured into Pinos Altos where he was captured by the town militia. The Apache leader was later handed over to General Joseph Rodman West at Fort McLane which had been abandoned in 1861 and later burned to the ground by Apache raiders. Mangas Coloradas was murdered the following night by a group of soldiers ordered to guard the prisoner.

Upon the death of Mangas Coloradas, Delgadito assumed leadership responsibility for the Bedonkohe and Chihenne Apaches at Santa Lucia. His tenure as tribal leader was short lived and upon his death in 1864, Victorio became one of the most prominent leaders of the Santa Lucia local group of Apache.

By 1866, most Chiricahua Apache groups inhabiting the Plan Area had actively expressed interest in establishing peace with the United States though only if they were able to settle their native lands at Ojo Caliente/ Cañada Alamosa. Finally, in 1870, the U.S. Government began establishing a reservation for the Warm Springs Apache at Ojo Caliente and by the end of the year nearly 1,000 Apaches were present in the area (Thrapp 1974). However, as the Apache presence in the area increased, surrounding Anglo-American inhabitants became increasingly weary of having such a concentration of "hostile" Apaches nearby. Because of growing tensions, Chiricahua Apache groups began to abandon the informal Ojo Caliente reservation and retired to the safety of the surrounding mountains.

Another reservation was hastily established at Tularosa and Apache groups began the forced relocation in May of 1872. By June of 1872, roughly 400 Apaches were residing within the confines of the reservation (Thrapp 1974). However, by October of 1872, Apaches had begun filtering out of the reservation due to "sickness and death amongst children; the impurity of the water; coldness of the climate; (and) the crops

failing from early frost" (Thrapp 1974: 148). By this time, the Chiricahua Apaches residing at Tularosa were growing weary. They had been promised that they would be allowed to return to Cañada Alamosa within a year. However, unbeknownst to the Apaches, plans had already been made to resettle Apaches further east.

By May of 1877, many of the Warm Springs Apache were forced to resettle at the San Carlos Reservation (Thrapp 1974) and by July of 1879 were again forced to the Mescalero Apache reservation at Fort Stanton. On April 21st, 1879, shortly after hearing he was wanted for theft and murder charges in Grant County, Victorio and the majority of the Warm Springs Apache groups at Fort Stanton fled the Mescalero Reservation (Thrapp 1974:218).

Victorio and his forces entered their first in a series of armed skirmishes with the U. S. Military on September 14th, 1879. Victorio led his group of Chiricahua Apache in a number of armed confrontations throughout the following year (Table 208). These culminated on October 15, 1880 with the battle at Tres Castillos, where Mexican forces led by Juaquine Terrazas ambushed Victorio's Apaches. When the conflict ended the following morning, 78 apaches had been killed, among them Victorio, and 68 Apaches had been taken prisoner (Thrapp 1974:303).

Table 208. Armed confrontations led by Victorio from September, 1879 through October, 1880.

Battle Name/Location	Military	Date
Massacre Canyon/New Mexico	United States	September 14, 1879
Cuchillo Negro Creek/New Mexico	United States	September 29, 1879
Guzman Mountain/Mexico	United States	October-November, 1879
Candelaria Mountain/Mexico	Mexico	November-December, 1879
Hembrillo Canyon/New Mexico	United States	April, 1880
Cooney's Mining Camp/New Mexico	United States	April 29, 1880
Palomas River/New Mexico	United States	May 23, 1880
Cookes Peak/New Mexico	United States	June 5, 1880
Tres Castillos/Mexico	Mexico	October 15, 1880

As Thrapp notes, the death of Victorio marked the last time Apaches were able to roam in such numbers as to "ravage" the country (Thrapp 1974:312). While opposition to the reservation system being implemented was always present, more Chiricahua Apaches began to accept the system. Future forays from notable Apache leaders such as Nana, Loco, Juh, and Geronimo were brief and generally entailed less than 30 warriors (Thrapp 1967). The last major armed confrontation between Chiricahua Apaches and the U.S. military took place in the spring of 1886. After the resulting surrender of Geronimo, many of the Chiricahua Apaches residing on reservations were gathered as prisoners of war and transported to military establishments in Florida. In 1914, the remaining Prisoners of War received allotments in Oklahoma (the Fort Sill Apache Tribe). To date, the Warm Springs Chiricahua Apache are one of the only Native American groups to never have a formal reservation established in the ancestral homeland (Thrapp 1967).

The Late Historic period

The Forest Service administration of the area began with the establishment of seven forest reserves and national forests between 1899 and 1909. The Big Burro National Forest was added to the Gila in 1908. Portions of the Datil National Forest were transferred to the Gila in 1931 and portions of the Crook National Forest were transferred to the Gila in 1953. The Gila National Forest also administers portions of the

Apache National Forest in New Mexico. Portions of the Apache National Forest in Arizona were combined administratively with the Sitgreaves National Forest in 1974 (see the Lands Chapter for more details).

The initial establishment of Forest Service jurisdiction over the Plan Area likely had an impact on its use by traditional Spanish and Native American communities, with the greatest effect being the regulation of grazing. Many small operations were granted free use permits by the agency, but this practice was phased out after World War II with a strong negative impact on small operators (deBuys 1985; Raish and McSweeney 2008). The advent of industrial logging and mining in the Forest arguably had a greater impact on the Native American, Hispanic, and Anglo peoples who lived in the vicinity of the Plan Area.

The development of the logging and mining industries on the Gila National Forest were driven by the development of the transcontinental railroad system in the United States. The railroad reached Albuquerque in 1880, and the Santa Fe Railroad connected with the Southern Pacific Railroad at Needles in 1883, cutting the travel time to New Mexico from Chicago from three months to five days. Along the spine of this railroad connection was built a network of railroad lines throughout Arizona and New Mexico, and the commercial logging industry in New Mexico boomed (Baker et al. 1988).

In nearly every ranger district on the Forest, commercial logging endeavors took place. In certain instances, like logging activities near Pinos Altos, these endeavors were facilitated by the establishment of railroad spurs that transported harvested timber to mills located outside the Gila National Forest. In other instances, mule teams transported timber to mills constructed within the Forest. Milled lumber was then distributed via the emerging rail lines. Logging activities on the Wilderness Ranger District were severely hampered by the administrative establishment of the Gila Wilderness area in 1924. Similar acts of Congress (i.e. the Endangered Species Act of 1973), the removal of railroad spurs adjacent to the Plan Area, and the subsequent relocation of timber mills away from the Forest likewise dealt substantial blows to the logging industry in the Plan Area over the coming years.

As with the logging industry, the railroad facilitated mining in the vicinity of the Plan Area. The early part of the twentieth century saw copper, gold and silver mines in the mountains on the Black Range, Silver City, and Glenwood Ranger Districts. Many of these mining districts, particularly those surrounding the Silver City Ranger District, first began being exploited by Spanish miners and continue to produce substantial quantities of ore today.

The Great Depression was the worst economic disaster the United States has ever experienced and marked a turning point in American history. Young people entering the work force were most affected by the economic crisis. Jobs were not available for unskilled laborers and there were limited opportunities for people entering the job market to gain experience.

In 1933, President Roosevelt introduced the New Deal program to the American people. The New Deal was a combination of short-term strategies designed for immediate relief, and longer-term strategies designed to promote the economic recovery. It included banking practice reforms like the Federal Deposit Insurance Corporation (FDIC), the Farm Security Administration, and the Civilian Conservation Corps (CCC). Men in the New Deal programs operated under several Federal agencies, including the Soil Conservation Service and the National Park Service, but more than 50 percent of all the public works projects administered by the New Deal were undertaken by the Forest Service (Otis et al. 1986).

From 1933 through 1939 approximately 13 CCC camps and spike-camps were established within or near Plan Area (Table 209). Work conducted by enrollees at these camps included extensive watershed rehabilitation projects, construction of campgrounds, construction of telephone lines, construction of range improvements (e.g. cattle tanks, fences, etc.), and construction of roads.

Table 209. Civilian Conservation Corps camps established in the Plan Area.

Camp No.	Camp	Company No.	Date	Railroad	Post Office
DF-2-N	Tularosa	1849	7/12/1934	Silver City	Reserve
DPG-1-N	Silver City	1861	6/9/1934	Silver City	Silver City
F-11-N	Mimbres/Camp Sully	2841	4/29/1936	Silver City	Silver City
F-11-N	Mimbres/Camp Sully	3343	10/14/1939	Silver City	Mimbres
F-12-N	Redstone/Jack Fleming Camp	813	5/10/1933	Silver City	Pinos Altos
F-15-N	Little Walnut/Whitehill Camp	846	5/25/1933	Silver City	Silver City
F-1-N	Pueblo Park/Camp Beale	841	6/4/1933	Silver City	Reserve
F-24-N	Glenwood	3835	10/11/1939	Silver City	Glenwood
F-25-N	Glenwood	813	10/15/1934	Silver City	Glenwood
F-25-N	Glenwood	3836	10/11/1941	Silver City	Glenwood
F-25-N	Glenwood	3836	5/4/1936	Silver City	Glenwood
F-2-N	Apache Creek/Camp Chaffee/Tularosa	1818	6/30/1933	Silver City	Apache Creek
F-2-N	Apache Creek/Camp Chaffee/Tularosa	2358	11/1/1939	Socorro	Apache Creek
F-34-N	Beaverhead	835	5/1/1934	Silver City	Silver City
F-34-N	Beaverhead	886	5/18/1935	Silver City	Silver City
F-34-N	Beaverhead	3343	6/28/1940	Silver City	Mimbres
F-52-N	Willow Creek/Mogollon	3836	6/1/1938	Silver City	Glenwood
SCS-14-N	Little Walnut	2844	7/26/1935	Silver City	Silver City
SCS-15-N	Whitewater	2846	10/22/1936	Whitewater	Whitewater
SCS-18-N	Buckhorn	1851	8/9/1934	Silver City	Gila
SCS-18-N	Buckhorn	2845	7/22/1935	Silver City	buckhorn
SCS-20-N	Mangas	843	10/7/1934	Lordsburg	Red Rock
SCS-26-N	Silver City	2839	12/31/1939	Silver City	Silver City

Description of Cultural and Historic Resources including Heritage Assets Present in the Assessment Area

Cultural and historic resources can be divided into two, overlapping categories: archaeological resources; and characteristics of historic and cultural importance to traditional communities. Historic properties are defined under Section 110 of the National Historic Preservation Act (NHPA) [16 U.S.C. 470(a)(1)(A) and (B)] and NPS Bulletin 15 (National Register of Historic Places Staff 2002) as objects, structures, buildings, and sites, and districts of the four aforementioned property types, that are listed or eligible for listing to the National Register of Historic Places (NRHP), based on their importance to local, regional, or national history. Thus, the term "historic properties" represents a specific designation for archaeological resources that are eligible for listing in the NRHP. In accordance with the Region 3 Programmatic Agreement (USDA 2010), archaeological resources for which eligibility cannot be established ("undetermined" resources) are treated as if eligible to the NRHP. The treatment of "undetermined' resources as if they are eligible for inclusion in the NRHP is a general practice for all projects in the Plan Area. Also included in this discussion are resources that have been evaluated and found to be not eligible to the NRHP. Although not considered historic properties under U.S.C. 470(a)(1)(A) and NPS Bulletin 15, because of the information gathered as part of their NRHP evaluation can be valuable for the interpretation of historic occupation and use of Gila National Forest, resources determined to be not eligible for inclusion in the NRHP are also considered here. Traditional cultural properties (TCPs) are a subset of historic properties, and are discussed more in the Areas of Tribal Importance chapter. Traditional cultural properties are historic properties that are in the main or in part eligible to the NRHP because of their "association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1998). The sources and descriptions of the data used to describe historic properties in this and the remaining sections of this assessment are found in the Planning Record.

The places and characteristics of the Plan Area that are of cultural and historic significance to the traditional communities in the vicinity of the Gila National Forest can include TCPs and other historic properties, but are not limited to them. More broadly, characteristics of cultural and historic importance are places within or qualities of the Plan Area that are important to maintaining the cultural and historic identity of traditional communities. These characteristics can be defined as historic properties, general areas corresponding to the distribution of physical attributes such as types of plants or geographic features, or non-place based characteristics such as solitude.

Information used to compile this assessment consisted of published sources, site and report records for the Gila National Forest, corporate geographic information system (GIS) and INFRA databases for the Gila National Forest, State of New Mexico GIS clearinghouse, and New Mexico Cultural Resources Information System (NMCRIS) database information relevant to the Gila National Forest. As directed by 36CFR 296(a)(2), interested parties who are knowledgeable about the cultural and historic resources and uses of the Forest, including American Indian tribes, traditional communities, scientific researchers, and professional and avocational organizations, were contacted to request information regarding the Plan Area. Letters were sent to interested parties in the winter and fall of 2015 and other activities (e.g. email correspondence and phone calls) were conducted to contact interested parties.

In the following discussions, the terms cultural resources and archaeological sites are somewhat used interchangeably. For the Gila National Forest, a cultural resource site is defined as "a locus of purposeful human activity which has resulted in a deposit of cultural material beyond one or a few accidentally lost artifacts." Cultural resources that qualify as sites should exhibit at least one of the following:

1) One or more features

2) One formal tool if associated with other cultural material, or more than one formal tool

OR

3) An occurrence of cultural material that contains one of the following:
    a. Three or more types of artifacts
    b. Two types of artifacts or materials in a density of at least 10 items per 100 square meters
    c. A single type of artifact or material in a density of at least 25 items per 100 square meters.

Likewise, usage of the term "historic property" is reserved for those heritage/cultural resources that have been determined to be eligible for inclusion, or those that are listed in the National Register of Historic Places (NRHP). Thus, historic properties represent a specific type of archaeological site with a specific determination of eligibility in relation to national guidelines.

Description of Archaeological Resources

On the Gila National Forest, the parameters for the description of archaeological resources are set by the extent of inventories conducted for the identification of those resources, which are typically termed cultural resources inventories or surveys. Such inventories have been conducted systematically since the early 1970s as part of the Section 106 (NHPA) process. Additional surveys have been conducted under Section 110 (NHPA), and by other entities for research purposes unrelated to forest management.

As of September of 2015, approximately 580,092 acres within the Plan Area or approximately 17.1 percent of its total area have been inventoried. Of this, approximately 399,421 acres or 11.8 percent of the total Forest are considered to have been inventoried to current standards. The term "current standards" reflects inventory endeavors what have been conducted by systematically walking a survey block with transect spacing no greater than 15 meters apart. As one can imagine, survey standards have changed through time. In most instances, those surveys not conducted to current standards implemented either a sampling strategy whereby the entire project area was not systematically inventoried or the transect interval implemented in the survey exceeded the 15 meter spacing required by the State of New Mexico for current inventories. Inventory has not been conducted evenly across the six districts, or within each district. Acres inventoried by district are listed in Table 210 and shown in Figure 226.

Because the vast majority of inventory conducted within the Plan Area has been conducted for Section 106 (NHPA) purposes, the amount of inventory reflected in Table 210 for each district is a consequence of the extent of land management activities conducted on each over the past four decades. An emphasis on timber harvesting and fire-adapted ecosystem restoration has meant that inventory has been concentrated in the ponderosa pine and mixed conifer vegetation zones on the Reserve and Quemado Ranger Districts. On the Wilderness Ranger District, a major portion of these forest types are in designated wilderness areas where timber harvesting and most ecosystem restoration activities are prohibited or limited in scope.

Table 210. Archaeological survey acres for each Ranger District.

District and Inventory Characteristic	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
District Size (Ac.)	557,572	603,382	525,448	686,171	613,118	406,766
Survey to Standard (Ac.)	27,256	136,435	56,423	18,839	108,222	52,243
Survey not to Standard (Ac.)	23,629	72,758	4,699	3,863	70,600	5,118
Total Survey (Ac.)	50,886	209,194	61,123	22,702	178,823	57,361
Percent Inventoried	9.13	34.67	11.63	3.31	29.17	14.10

While the spatial distribution of inventories has biased our understanding of the location of archaeological sites within the Plan Area, there is enough information to describe the nature, cultural affiliation, and distribution of archaeological resources in its holdings. As of September of 2015, a total of 6,168 archaeological sites have been recorded on the Gila National Forest. As most of the inventories conducted have been carried out for management purposes, almost all of the archaeological sites recorded were located by these inventories. The distribution of archaeological sites and their densities are listed in Table 211 and their locations are displayed in Figure 227.

Table 211. Number of archaeological sites and their density on each Ranger District

Ranger District	Number	Density/100 Acres Surveyed	Density/Mile^2 Surveyed
Black Range	338	0.66	4.25
Quemado	1,685	0.81	5.16
Glenwood	811	1.33	8.49
Wilderness	922	4.06	25.99
Reserve	1,344	0.75	4.81
Silver City	1,068	1.86	11.92

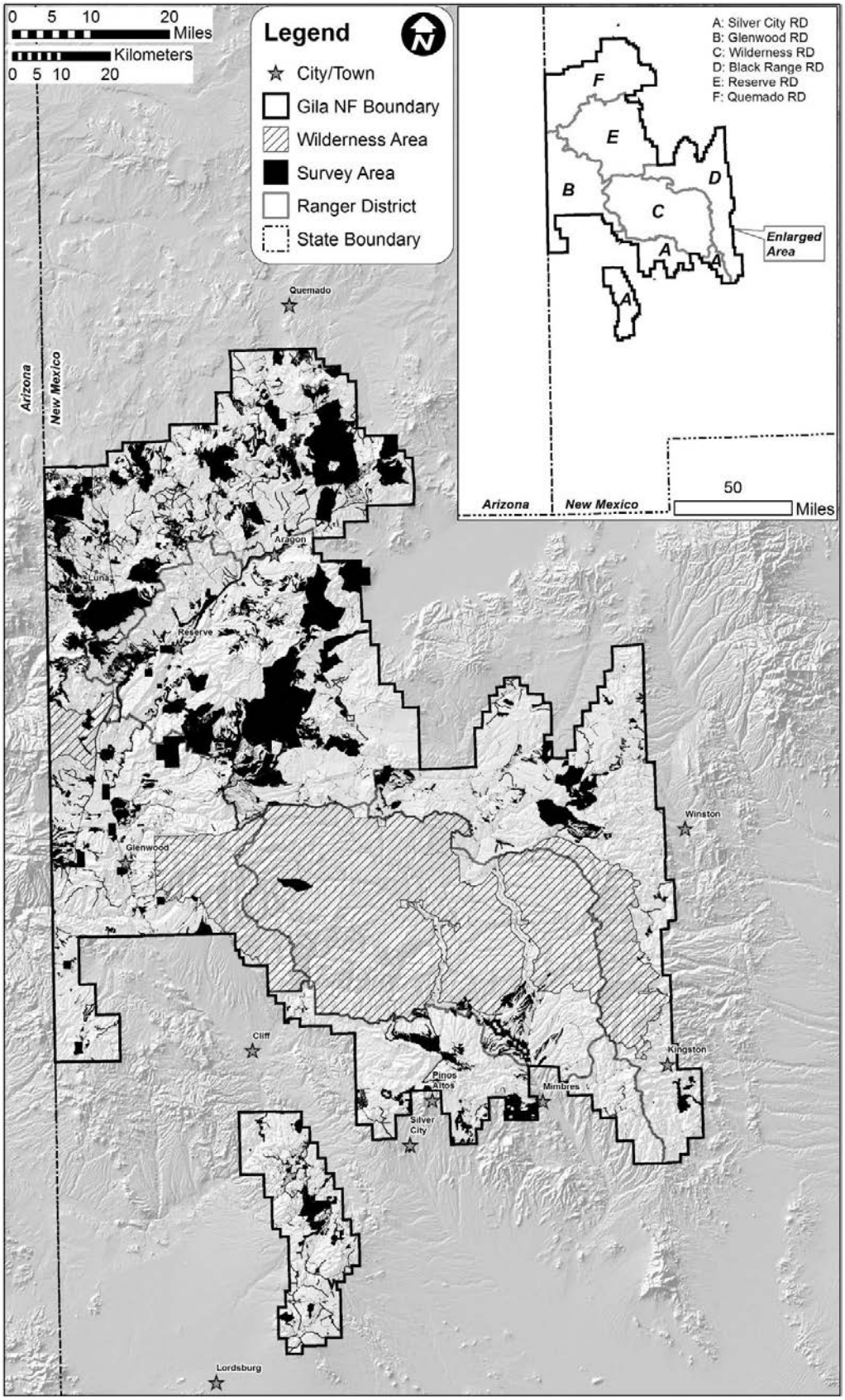


Figure 226. Depiction of areas where archaeological survey has been conducted in the Plan Area

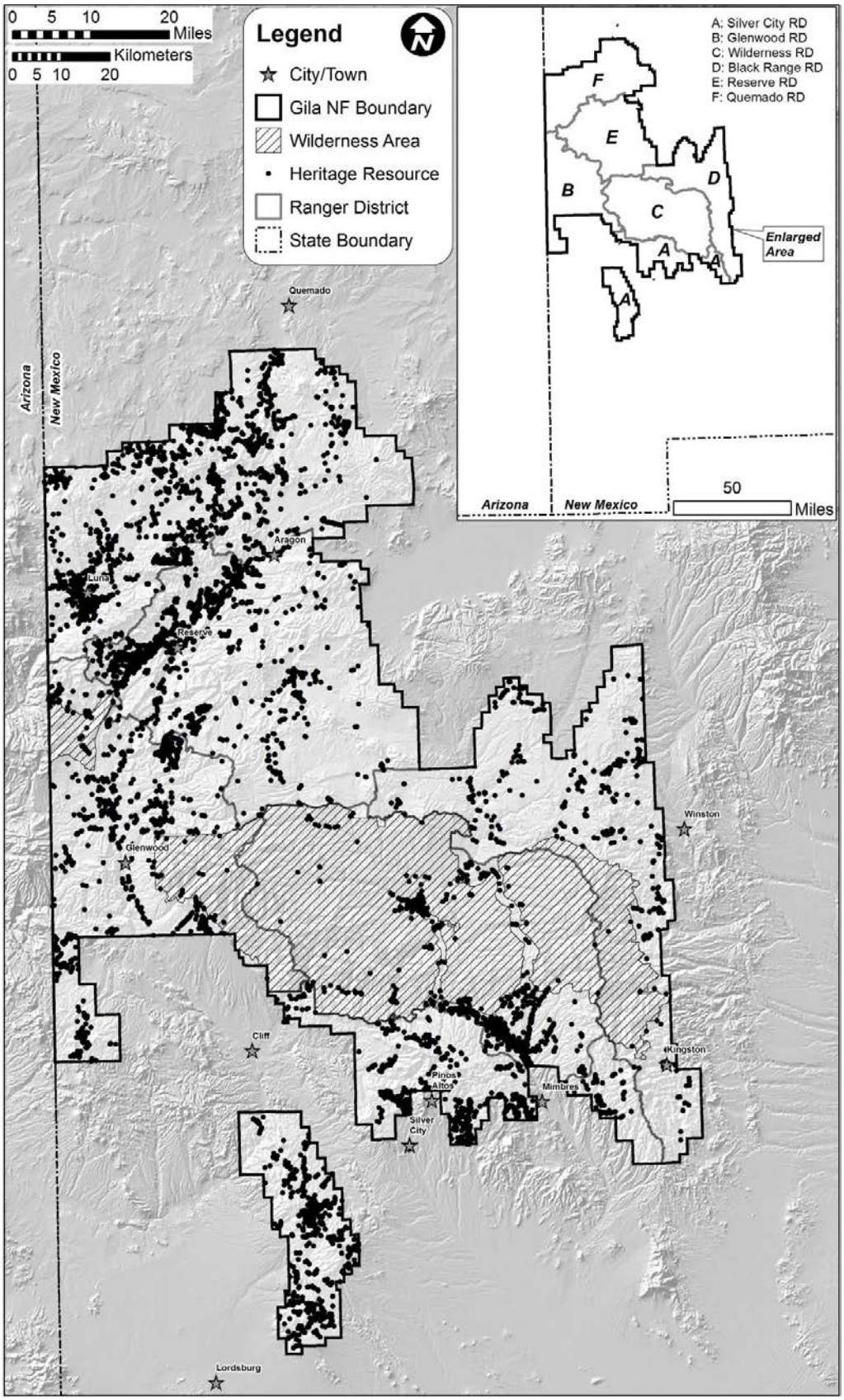


Figure 227. Location of known archaeological sites present within the Gila National Forest.

In the following sections attempts are made to describe the distribution of archaeological sites in relation to characteristics of the natural landscape. The characteristics chosen for analysis include the elevation of the landform upon which a site located, the major vegetation community surrounding a site, the gradient of the landform the site is located on, the distance to the nearest water source from a site, the agricultural potential of the landform upon which the site is situated, and the physical description of the landmass the site is located on. These variables were chosen for analysis because they influence the types of activities possible by site inhabitants. For instance, elevation affects what types of natural resources are available in an area (e.g. elk, deer, piñon nuts, etc.) and also affects agricultural pursuits as the length of the frost-free-period decreases as elevation increases. The variables used in this analysis were likely similarly considered when prehistoric and historic peoples undertook activities responsible for the site formation process.

Roughly 95 percent of the archaeological resources on the Forest are found at elevations below 8,000 feet above mean sea level (Table 212). Some of this pattern can be explained by the fact that approximately 80 percent of the terrain in the Plan Area falls at or below 8,000 feet in elevation and that statistically less high elevation territory has been inventoried. However, sampling doesn't fully account for the lower site count at higher elevations; this is particularly evident on the Glenwood, Wilderness, and Silver City Ranger Districts, where site densities drop sharply even in areas where inventory has been conducted at high elevations (>8,000 ft). The Reserve and Quemado Ranger Districts are an exception to this pattern. Roughly 10 percent of the sites on the Quemado District are located in areas above 8,000 feet, and nearly five percent of sites on the Reserve District are located in higher elevations (>8,000 feet). This is in part because these districts have a considerable portion of their holdings in these high elevation areas (Reserve ca. 28% and Quemado ca. 36%). However, this is also a reflection of past land use strategies. Many of the high elevation sites on these districts are a result of logging activities in the area as well as high elevation hunting areas of unknown socio-temporal affiliation. From an archaeological standpoint, it appears that prehistoric use was focused on lower elevation areas. This is potentially a result of subsistence practices associated with the prehistoric occupation of the Plan Area. For many of the prehistoric resources on the Forest, agricultural products are believed to have contributed to groups' subsistence economies. Inhabiting lower elevation areas increases the growing season for certain crops and allows for a greater number of frost-free days for plant growth.

Table 212. Number of archaeological sites located in specified elevation bands on each Ranger District.

Elevation	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
4,000 - 5,000			52	13		30
5,000 - 6,000	12	12	322	127	130	232
6,000 - 7,000	122	102	372	658	807	704
7,000 - 8,000	194	1402	52	121	349	100
8,000 - 9,000	8	162	7		56	1
9,000 - 10,000	1	7	5	1	2	1
>10,000	1		1	2		

The distribution of archaeological sites relative to the major vegetation and ecological communities aligns closely with their distribution across the Forest (Table 213). The three most common vegetation communities associated with archaeological sites are ponderosa pine woodland, juniper woodland, and piñon-juniper woodland in order of occurrence. These vegetation communities are also the most prevalent types of vegetation across the Forest. Most of the cultural resources in the Plan Area are found within the ponderosa pine woodland biotic province. The high proportion of archaeological sites in this

vegetation community is in all likelihood the result of a sampling bias, in that the majority of projects within the Plan Area were conducted in ponderosa pine woodland areas for logging activities and fuels reduction projects.

Table 213. Number of archaeological sites located in specified vegetation zone on each Ranger District.

Vegetation Zone *	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
Madrean Encinal				4		126
Piñon-Juniper Woodland	30	29	335	190	313	200
Pine-Oak Forest and Woodland		1	58	4	7	62
Aspen Forest and Woodland	1	1	4	2	2	1
Spruce-Fir Forest and Woodland		2	1	4		
Mixed Conifer Forest and Woodland	3	6	7	1	3	2
Ponderosa Pine Woodland	145	1,169	197	408	522	446
Juniper Savanna		21			1	
Juniper Woodland	127	339	77	272	457	110
Riparian Woodland and Shrubland	1		2		3	2
Subalpine Grassland		4		1	1	
Mogollon Chaparral	3	2	23	16	1	40
Mesquite Upland Shrub			31			14
Grassland and Steppe	3		55	1	10	29
Juniper Savanna			1	2		2
Semi-Desert Grassland	14	30		11	13	5
Semi-Desert Shrub Steppe	5	56	1		7	
Cliff, Canyon, and Massive Bedrock	2	1	13	4	1	6
Other	4	24	6	2	3	23

In order to ascertain if other characteristics of the physical environment influenced the location of archaeological resources on the Gila National Forest, a number of additional analyses were conducted that measured the distribution of archaeological sites in relation to the slope of the landform upon which the resources reside, the distance to the nearest water source, the agricultural potential of the land upon which the resource is located, and the landform classification of the area where the archaeological resource is located.

With respect to the gradient of the land mass upon which the archaeological site is located, most resources are generally located on relatively gently sloping landforms (Table 214). Roughly two-thirds of all archaeological sites located in the Gila National Forest are on landforms with less than a ten degree

gradient. From a cultural standpoint, the high frequency of sites on relatively level landforms is to be expected given that such conditions are conducive to human behavior (e.g. sleeping, cooking, processing resources, etc.). Be this as it may, landforms with a 0-10 degree gradient compose, on average, roughly 38 percent of each Ranger District's holdings (Table 215). Conversely, landforms with a 10-40 degree gradient compose approximately 60 percent of each Ranger District's holdings (Table 215). The proportion of archaeological resources located on landforms with steeper gradients decreases exponentially across the entire Plan Area.

Table 214. Number of known archaeological sites within each district that are located on landforms with the specified gradient.

Slope (degrees)	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
0 -5	115	823	344	310	628	473
5 -10	94	529	213	262	400	340
10 -20	79	266	137	238	201	200
20 -30	30	58	61	62	74	43
30 - 40	15	7	32	28	32	6
40 - 50	3	1	13	19	7	5
>50	2	1	11	3	2	1

Table 215. Proportion of each Ranger District's holdings with landforms of the specified gradient.

Slope Interval (Degrees)	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
0-5	18%	37%	14%	11%	25%	14%
5-10	18%	22%	15%	14%	21%	20%
10-20	28%	26%	28%	29%	32%	33%
20-30	23%	12%	25%	27%	17%	23%
30-40	11%	3%	15%	14%	4%	8%
40-50	2%	<1%	3%	4%	<1%	1%
>50	<1%	<1%	<1%	<1%	<1%	<1%

The distribution of archaeological sites in relation to their proximity to water is fairly predictable and is inversely correlated. Thus, more archaeological sites are located closer to water resources than further from these resources (Table 216). Nearly 43 percent of the archaeological sites on the Forest are located less than 100 meters from a stream channel. Nearly 92 percent of all archaeological resources are located less than 400 meters from a stream channel. While the data present in Table 216 depict some sites in excess of 600 meters from a stream, this is likely a result of the spatial data used in the analysis. High resolution stream data was pulled from the Gila National Forest's geospatial database. In some instances the streams extended beyond the jurisdictional boundary for the Forest. In other instances, streams present outside of the Gila National Forest were not included. Thus, there is a possibility that streams located outside of the Gila National Forest boundary were closer than the 600+ meter distance depicted in Table 216 but were not captured due to data limitations. The majority of archaeological sites in excess of 600 meters from a stream are generally located along the boundary of the Plan Area.

Table 216. Number of known archaeological sites on each Ranger District that are located within the specified distance to a stream.

Distance to Stream (Meters)	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
0 - 100	203	635	369	434	621	421
100 - 200	63	447	233	295	322	271
200 - 300	42	273	96	121	195	176
300 - 400	14	144	52	38	110	99
400 - 500	11	88	17	24	59	52
500 - 600	5	47	18	6	25	18
>600		51	26	4	12	31

As one can imagine, if agriculture was an important part of a group's subsistence base, then the availability of agricultural land would greatly affect the settlement pattern of that group. For much of the Plan Area's occupation, both in prehistoric and historic times, groups practiced agriculture. Numerous models have been developed to investigate the suitability of lands around the Gila National Forest for agricultural practices (Pool 2002; Pyne 2004; Schoolmeyer 2009; Toney 2012). These models have generally shown that much of the Plan Area was potentially arable despite modern and historic land use practices. Generally, the models demonstrate a strong correlation between those areas most suitable for agriculture and archaeological site location. A similar study was conducted for the Forest to investigate if historic property location had a similar pattern.

The agricultural potential of an area was investigated based primarily on soil characteristics, namely soil permeability, and a series of hydrological parameters (i.e. precipitation and runoff catchment areas)(see Schollmeyer 2009 and Toney 2012 for a discussion of methodology). These data were compiled from the State Survey Geographic databases available through the Natural Resource Conservation Service and Gila National Forest corporate data. The results of these analyses divided the Gila National Forest into three regions differentiated by their agricultural potential. The distribution of archaeological sites within the Plan Area in relation to the agricultural potential of the land upon which they reside is presented Table 217.

Table 217. Number of known archaeological sites within each Ranger District located on lands with different degrees of agricultural potential.

	AGRICULTURAL POTENTIAL		
Ranger District	Non-Productive	Marginal	Productive
BLACK RANGE	223	114	1
QUEMADO	1,115	510	60
GLENWOOD	526	285	
WILDERNESS	651	216	55
RESERVE	841	455	48
SILVER CITY	777	285	6

Generally, the majority of archaeological sites on the Forest are located in areas whose agricultural potential is severely limited. Approximately 67 percent of all known cultural resources are located on land which was determined to be non-productive agriculturally. This is to somewhat be expected given the fact

that people practicing agriculture would likely build their habitation in areas adjacent to the most productive lands, but not on the lands themselves. This would maximize the amount of prime agricultural land that could be brought into production. This also explains the relative lack of archeological resources in areas that are agriculturally productive. It is of interest to note that few archaeological sites within the Plan Area have been interpreted as representing the remains of agricultural fields. This is likely due to multitude of reasons but historic and modern land use practices are likely responsible for their lack of recognition. In most cases, those areas most conducive to agriculture were occupied for long periods of time. Thus, modern land use practices in areas with relatively dense modern populations have potentially altered the prehistoric features once present in an area.

Only around three percent of the cultural resources in the Plan Area are located on agriculturally productive lands. It should be noted that the majority of resources located on agriculturally productive lands on the Quemado and Reserve Ranger Districts are rock art sites located along the bluffs overlooking drainages. The high proportion of archaeological sites on agriculturally productive land in the Wilderness District are located in an area that has a long history of dense occupation. The majority of these resources are located along the Mimbres River and Sapillo Creek drainages. While the model demonstrates that sites in these areas are shown to reside on agriculturally productive lands, this may not be the case. Sites in these areas area normally located on higher elevation landforms overlooking the agriculturally productive floodplains below. The resolution of the data used in the analysis (30 meter grids) may not have been sufficient to capture the subtle variations in topography located in these areas. Finally, one third of the known archaeological sites reside on lands which were determined to be marginally productive agriculturally. These sites likely represent attempts to bring marginal land into agricultural production or represent other resource procurement locales.

The last variable measured for the current analysis was a classification of the landform upon which a historic property was located. The historic property records for both the State and the Gila National Forest require that an assessment be made of the landform upon which a property is located. While these data were available for use, they are often inconsistent between individuals recording the information. To alleviate this ambiguity, landforms were classified using the methodology outlined by Weiss (2001). This landform classification model differentiates ten landform types based on their slope and topographic position.

The distribution of archaeological sites in relation to the landform upon which they reside is presented in Table 218. These data demonstrate that roughly 46 percent of the sites in the Plan Area are located on Mountain Tops/High Ridges and in Canyons/Deeply Incised Streams. These two landform classes also constitute a high proportion of the study area (15 and 13 percent respectively). Thus, the high proportion of archaeological sites in these landform areas is to be expected. Upland Drainages/Headwaters is the most prevalent landform class within the Plan Area (ca. 32 percent). However, only two percent of the archaeological resources on the Forest are located in these landforms. This is likely because these areas are generally located above 8,000 feet in elevation and on relatively steep terrain (>20 degree gradient).

Similarly, both U-Shaped Valleys and Local Ridges/Hills in Valleys were shown to contain a high proportion of sites (ca. 25 and 10 percent respectively). However, these two landform classes compose a small proportion of the overall Plan Area (ca. seven and five percent respectively). These results suggest that these two landform classes are good predictors of site location. These areas usually consist of the relatively gently sloping terrain (<10 degree gradient) and ridges surrounding broad drainage valleys and their associated flood plains. This observation would support the contention that sites were often located adjacent to the most agriculturally productive lands, rather than immediately on them, maximizing the amount of suitable land that could be brought into production.

Table 218. Number of known archaeological sites on each district located on specified landforms.

Landform Classification	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
Mountain Tops, High Ridges	57	337	155	254	233	263
Canyons, Deeply Incised Streams	130	392	223	239	326	246
Midslope Drainages, Shallow Valleys	1	17	2	2	4	2
Upland Drainages, Headwaters	7	43	15	20	30	18
U-Shaped Valleys	80	502	175	190	367	218
Plains	6	48	33	19	76	30
Open Slopes	1	15	6	4	18	9
Upper Slopes, Mesas	14	154	96	51	148	114
Local Ridges, Hills in Valleys	37	139	89	126	107	132
Midslope Ridges, Small Hills in Valleys	3	22	13	15	35	18
Unknown	2	16	4	2		18

Archaeological sites in the Plan Area are traditionally separated into those with a Native American affiliation that predates A.D. 1600 and those with an increasing diversity of cultural affiliation that date to after A.D. 1600 (Table 219). These data demonstrate that the majority of cultural resources on the Gila National Forest are of Native American affiliation that predate A.D. 1600. Roughly 80 percent of archaeological sites are of prehistoric Native American affiliation. Only 13 percent of sites on the Forest represent a post-A.D. 1600 occupation. Finally, roughly three percent of cultural resources represent a combination of these two broad occupational categories.

Table 219. Number of known archaeological sites within each district dating to the specified time period where features are either present or absent.

	HISTORIC		MULTIPLE		PREHISTORIC		UNKNOWN		
Ranger District	Feature Present	Feature Absent	Feature Present	Feature Absent	Feature Present	Feature Absent	Feature Present	Feature Absent	No Data
BLACK RANGE	13	94	3	22	141	52	3		10
QUEMADO	33	122	9	43	324	1109	8	16	21
GLENWOOD	24	114	6	10	237	372	9	4	35
WILDERNESS	14	46		4	215	592		2	49
RESERVE	42	108	3	20	252	894	1	1	23
SILVER CITY	22	187	8	44	224	548		4	31

While there are archaeological sites in the Plan Area that date to all periods of human occupation, there are portions of the Forest with clusters of resources that correspond to specific time periods and/or with specific ethnic affiliations [i.e. resources dating to the Pueblo Era (ca. 1,000 to 600 years ago)] (Table 220). In some cases, these clusters of sites are evenly distributed across the Forest, while others are concentrated on specific districts. Based on current data, roughly 84 percent of the archaeological sites within the Gila National Forest are associated with its prehistoric occupation. Archaeological resources

associated with the historic occupation of the area (ca. 400 to 50 years ago) comprise roughly 16 percent of the known resources in the Plan Area. The vast majority of these prehistoric sites are classified as containing either an Archaic era occupation or a Pueblo era occupation. Archaic era sites constitute roughly 14 percent of all known prehistoric resources in the Plan Area and Pueblo Era sites constitute approximately 58 percent of all known prehistoric resources. For Historic era resources, those postdating A.D. 1912, or around the time of New Mexico's statehood, are the most common on the Gila National Forest. Archaeological sites dating to this time period compose roughly 79 percent of known Historic era resources on the Gila National Forest.

Table 220. Number of archaeological site within each Ranger District that date to the specified time period.

Time Period	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
Recent	10	16	5	2	13	13
Statehood to WWII	17	70	21	6	24	41
Statehood to WWII – Recent	18	52	39	11	81	54
U.S. Territorial – Recent	39	16	36	9	6	18
U.S. Territorial – WWII	16	12	21	8	16	90
U.S. Territorial	12	18	18	14	12	25
Spanish/Mexican – WWII			1		1	1
Spanish/Mexican - U.S. Territorial						1
Historic Unspecified	20	23	13	14	20	18
Late Pueblo		96	2	1	41	5
Early Pueblo – Late Pueblo	7	352	60	86	246	37
Early Pueblo	8	497	206	255	317	350
Late Pithouse – Late Pueblo		46	3	29	25	12
Late Pithouse – Early Pueblo	2	39	19	41	29	65
Late Pithouse	14	53	12	36	55	36
Early Pithouse – Late Pueblo	1	23	4	2	9	5
Early Pithouse – Early Pueblo		7	6	7	10	13
Early Pithouse – Late Pithouse	4	25	8	16	27	18
Early Pithouse	3	3	9	27	22	15
Late Archaic – Early Pueblo		4	9		6	6
Late Archaic – Late Pithouse		2	5		6	12
Late Archaic – Early Pithouse	3	1		1	2	4
Late Archaic	70	112	89	61	108	116
Middle Archaic – Late Archaic	2	5	1	1	5	
Middle Archaic		3	3		3	
Early Archaic – Late Archaic	1	2	1		4	
Early Archaic – Middle Archaic	1					
Early Archaic		2			1	
Archaic Unspecified	13	16	15	1	11	3
Paleoindian			1		1	
Prehistoric Unspecified	33	197	172	247	238	127

There are few Native American resources on the Forest that date to after A.D. 1600. The exceptions to this are a number of known Apache battlefield locales on the Black Range and Wilderness districts that date to time of the Apache Wars (ca. A.D. 1849-1886). To date, investigations have been conducted along Las Animas Creek searching for the location of the Massacre Canyon battlefield that took place in September of 1879, along the Palomas River where Victorio's forces were ambushed in May of 1880, along Sapillo Creek where Apache forces under the leadership of Geronimo were attacked by Apache Scouts in May of 1885, and a 17th century Apache Rancheria along the East Fork of the Mimbres River.

Similarly, there are a few locales where culturally scarred trees are present. These resources are generally located in higher elevation areas and likely represent the collecting of inner cambium tissues by Native American populations during times of extreme socio-economic stress. Two known clusters of these peeled trees are known in the Plan Area. One is located in the Wilderness district and the other is located in the Reserve district. The scars on the peeled trees in the Wilderness Ranger District have been dated by dendrochronology to around A.D. 1865 (Swetnam 1984) and the peeled trees on the Reserve Ranger District were dated by similar means to around A.D. 1890. Both sets of peeled trees are believed to represent the utilization of this inner bark by Native groups as an emergency food source or for medicinal purposes.

There are a few locales that contain traditional historic Native American architecture. These resources generally consist of the remains of wikiups or sweat lodges. These remains are usually composed of a number of sticks/logs arranged as spokes radiating from a center point. The remains of these structures are conical in shape and enclose a circular space of roughly four square meters. Few artifacts are associated with these structures. Some Native American rock art has also been identified as probably dating to post A.D. 1600. Finally, there are a number of resources that are likely misclassified as other socio-cultural phenomena that could date to historic times. For instance, a number of resources that consist solely of lithic artifact scatters were classified as dating to the Late Archaic period. These sites could easily represent areas utilized by historic Native American inhabitants as opposed to the Late Archaic period inhabitants of the Plan Area. However, no further diagnostic artifacts were encountered at these sites.

Archaeological sites with a Euro-American affiliation account for roughly 16 percent of all known resources on the Forest. Sites dating to this period range from simple artifact scatters associated with a range of activities (e.g. logging camps, mining camps, etc.), to artifact scatters and associated simple features (e.g. sawmills, mines, camp sites, etc.), to single log cabins associated with homesteading, to large residential communities associated with mining. Roughly 18 percent of known Historic era sites in the Plan Area are composed simply of artifact scatters (often representing trash dumps). The remaining 82 percent of known Historic era sites contain features (e.g. habitation structures, mine adits, windmills, etc.). These resources are fairly evenly distributed across districts with each district containing, on average, roughly 17 percent of all known Historic era sites.

Resources associated with Governmental functions are located across the Gila National Forest. These usually are associated with either the C.C.C. or with Forest Service activities. Resources associated with the Civilian Conservation Corps range from the remnants of old camps, to simple erosion control features, to numerous features associated with roads constructed by the C.C.C. Archaeological resources associated with Forest Service activities range from the remnants of old Ranger stations to fire lookout towers still used to manage Forest Service holdings.

There remain significant data gaps concerning the nature and distribution of archaeological sites in the Plan Area. As mentioned previously, a fair number of lithic scatters were classified as Late Archaic period resources. It is likely that these and similar sites were occupied for a vast span of the prehistoric era but lack other attributes that are diagnostic. These coupled with the resources whose socio-temporal

affiliation is unknown demonstrate that roughly 11 percent of the archaeological sites on the Forest have no known socio-temporal affiliation. Additional research at these sites, including archaeological excavations and radiometric dating of surface remains, could shed additional light on these site types.

There are many portions of the Gila National Forest that have seen little inventory for archaeological resources, but where the likelihood of there being numerous and important cultural resources is high. Based on the data presented earlier concerning the distribution of known archaeological sites in relation to different physical characteristics of the surrounding landscape (e.g. elevation, slope, distance from water, landform classification, land productivity, etc.), it is possible to determine the different arrangement of these natural phenomena where archaeological resources are known to be present. These data can then be used to determine where similar physical characteristics are present in the natural landscape. This provides a proxy measure for where sites have a high probability of being located. Based on analyses using this line of evidence, there are portions of the Plan Area that were deemed to be similar to where known archaeological sites are located which have not been adequately inventoried.

The initial analyses conducted at the Forest level discussed above were heavily biased towards the arrangement of physical characteristic present on the northern Ranger Districts (i.e. Reserve and Quemado). For instance, if the model were to be conducted at the Forest level, the analysis would be biased towards higher elevations (>6,000 ft amsl) based on the high proportion of sites located in these environs on the Reserve and Quemado Ranger Districts. If this model was extrapolated to each district, large portions of the Silver City and Glenwood Ranger Districts would be shown to have a low probability of containing archaeological sites because they are below the 6,000 foot threshold established by the Forest wide model. To alleviate the potential for sampling biases, each Ranger District was analyzed separately.

The results of these analyses demonstrated that certain environs were favored for archaeological site location within each Ranger District though some environs were common between districts (Table 221, Figure 228). For instance, roughly four percent of archaeological sites on the Quemado, Glenwood, Reserve, and Silver City Ranger Districts were located on marginally productive lands at 7,000 to 8,000 feet in elevation on mesas with a 0 to 5 degree slope that were 300 to 400 meters from a stream. Landforms with a similar combination of characteristics (and others) were chosen as high probability regions for these districts. While resources were found in similar areas on the Black Range and Wilderness Ranger Districts, the proportion of resources located in these areas differed from those present on the Quemado, Glenwood, Reserve, and Silver City Ranger Districts. Additional results and the methodology employed in these analyses are presented in a supporting document to the assessment report.

There are also several important types of resources that have been under-recorded across the Forest (e.g. historic artifact scatters post-dating 1945, high elevation shrine locations, logging roads, etc.) either due to a lack of inventory in the areas where they are likely to occur, or due to the past research biases of individuals conducting the inventory.

There has been no systematic attempt to inventory traditional cultural properties (TCPs) across the Gila National Forest. There are many previously recorded and unrecorded archaeological sites within the Plan Area that may be eligible to the National Register of Historic Places (NRHP) as TCPs. Property types that are potential TCPs may include, but are not limited to: village sites, shrines, rockshelters, caves, rock art sites, springs, mountains and mountain top localities, geological formations, quarries, plant collection areas, trails, and irrigation works (i.e. acequias).

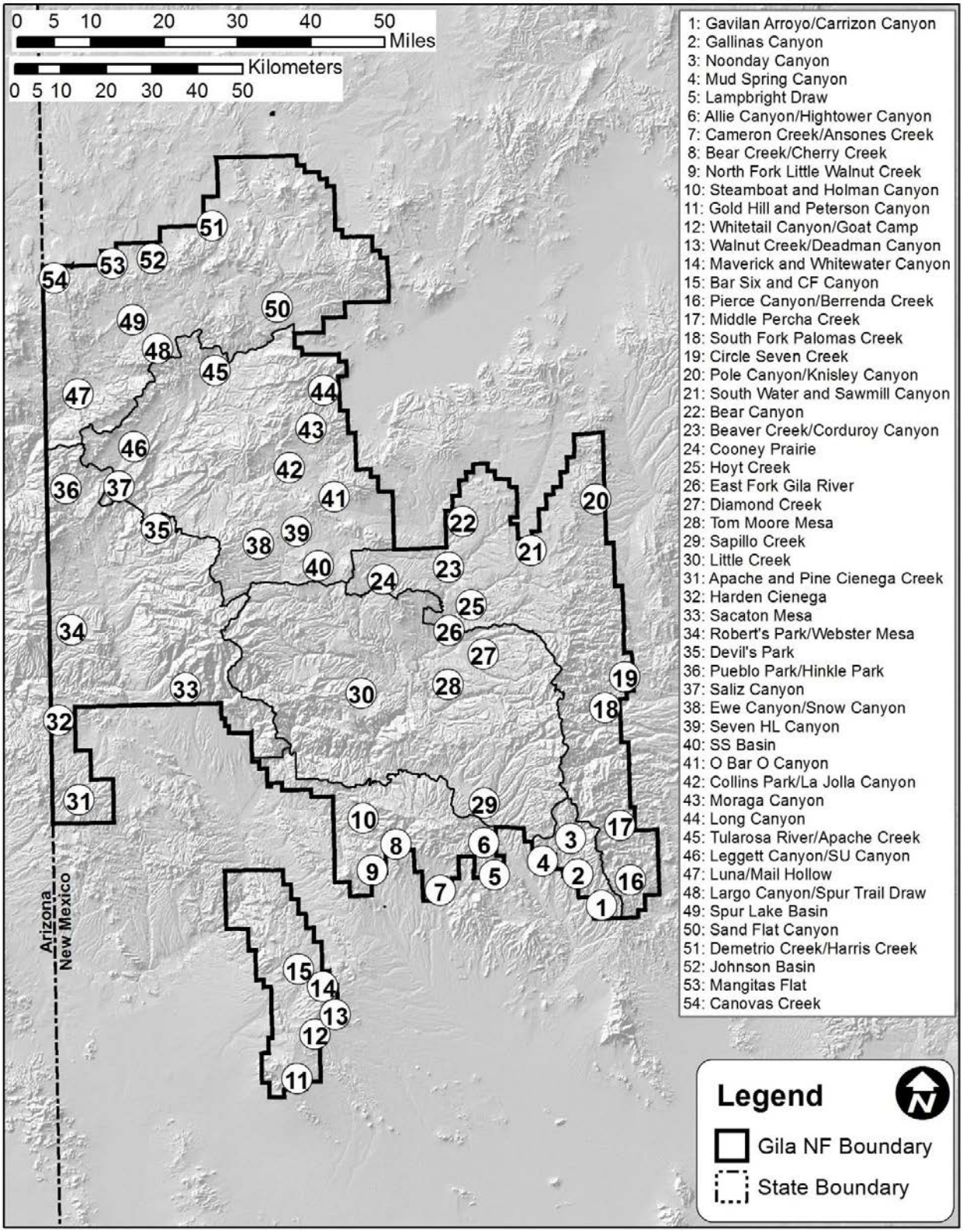


Figure 228. Location of some areas determined to have a high probability of site location.

Table 221. Distribution of areas deemed to contain a high probability of site location across Ranger Districts and the amount of these high probability areas covered by archaeological survey activities.

Ranger District	District Size (ac)	High Prob. Acreage	High Prob. Survey Acres
Black Range	557,572	125,807	8,904
Quemado	603,382	155,437	42,442
Glenwood	525,448	69,591	8,911
Wilderness	686,171	92,866	5,095
Reserve	613,118	104,427	28,398
Silver City	406,766	67,452	7,813

Characteristics of Cultural and Historic Resources

The Gila National Forest contains characteristics that are of cultural and historic importance to both Native American and Euro-American peoples. Those characteristics of the Forest that are of cultural and historic importance to Native Americans are described in the assessment for Areas of Tribal Importance.

Inventory for characteristics of importance to non-Native traditional communities has been limited within the Plan Area. This is in part due to the fact that use of the Forest by non-Native traditional communities was likely limited to sheep ranching activities associated with early Spanish/Mexican settlements to the north and east along the Rio Grande. A number of archaeological sites relating to use of the Forest by Spanish/Mexican sheep herders are present on the Quemado District and likely relate to sheep herders bringing their flocks into the Mogollon Highlands for seasonal forage. It is likely that members of these non-Native traditional communities valued, and were concerned for, many of the characteristics in the Plan Area which modern community members using the Forest value. The most common resources cited by community members were water and forage for wildlife and livestock, wild game for food, solitude, wilderness values, scenery, and visual and physical access to the Plan Area.

Current Conditions of Known Cultural and Historic Resources, and Trends Affecting their Condition and Use

The current condition of cultural and historic resources can be characterized by examining the numbers of archaeological sites that have been placed or have been determined eligible for inclusion in the NRHP and by examining data and other information on impacts to historic properties and other archaeological resources. If a historic property is listed or is eligible for inclusion in the NRHP, this reflects that it retains the integrity of the characteristics that make it significant to American history, and thus implies that the property has not been so severely impacted by disturbances to affect its ability to contribute to either the national patrimony or affect its value to researchers. Other archaeological resources may be found not to be eligible for inclusion in the NRHP because they area in poor condition, but such a determination may also be made because the property has no intrinsic significant historic value.

Eligibility of Archaeological Resources to the National Register of Historic Places

There are eight historic properties that are listed on the National Register of Historic Places (NRHP) in the Plan Area (Figure 229, Table 222). In order for a property to be listed on the NRHP, the resource must be formally nominated through completion of official nomination forms. The completed nomination forms are then reviewed by the State Historic Preservation Office, Federal Preservation Officer, and Keeper of the Register (NPS).

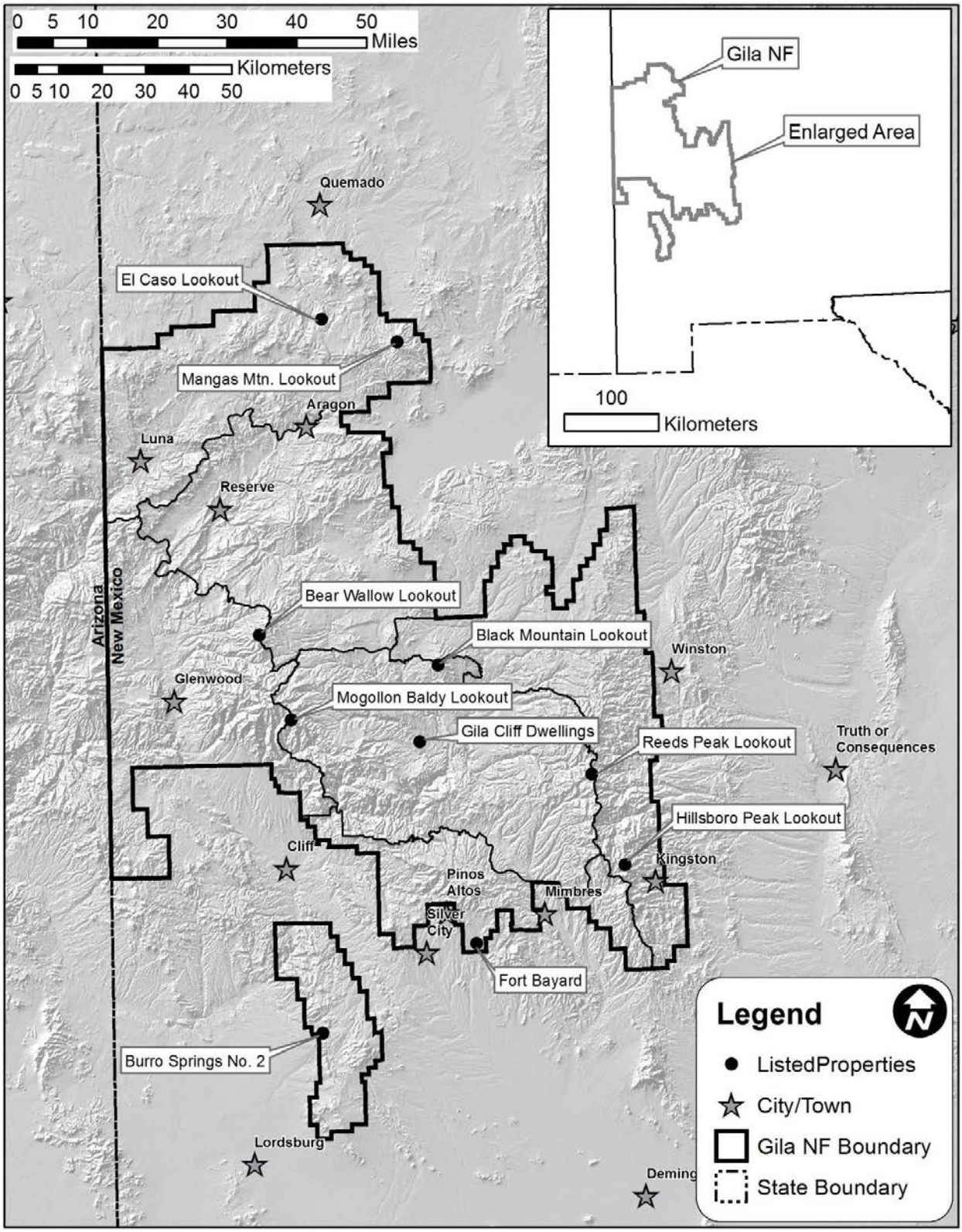


Figure 229. Location of archaeological sites within the Plan Area that are listed in the NRHP.

Table 222. Number of archaeological sites on each district with the specified determination of eligibility for inclusion in the National Register of Historic Places.

Determination of Eligibility	Black Range	Quemado	Glenwood	Wilderness	Reserve	Silver City
Designated/Listed	1	2	1	3		1
Eligible	79	454	232	320	425	506
Undetermined	222	1,103	471	569	855	439
Not Eligible	28	117	107	22	62	114
Total Evaluated	330	1,676	811	915	1,342	1,061
No Data	8	9		7	2	7
Total	338	1,685	811	922	1,344	1,068

For the Forest Service, formal listing in the NRHP does not affect how the property is managed and all archaeological sites determined to be eligible for inclusion in the NRHP and those resources whose eligibility for inclusion in the NRHP is undetermined are treated as if they are listed. The main difference is that the formal nomination and review process for these resources has not been conducted. Because formal listing does not affect how the Forest Service manages eligible and undetermined resources, many archaeologists simply do not have the time to complete the necessary nomination forms. Likewise, if projects are reliant on consultation before implementation, the additional time needed for completion of the nomination forms as well as the following review process would push implementation dates for projects back to upwards of three months (and often for over a year). For many Forest Service programs, this additional time needed for consultation prior to project implementation would be unacceptable, especially in emergency situations or when funding cycles necessitate quick turnaround times for consultation.

The vast majority of archaeological sites listed on the NRHP (n=7) represent the historic fire lookout complexes located throughout the Plan Area. There is a single prehistoric archaeological site, Burro Springs No. 2, listed on the NRHP. Burro Springs No. 2 represents the remains of a large Pithouse period site containing in excess of 200 pitstructures. The site covers a minimum of 15 acres and aside from numerous pithouse depressions, tens of thousands of artifacts are present on site. Based on the limited testing of the site, Fitting (1973b) postulated that the site likely dated to the San Francisco phase and/or the Three Circle phase of the Late Pithouse period.

Two historic properties listed in the NRHP (not reflected in the numbers above) are located adjacent to the Plan Area and are currently managed by different agencies. The Gila Cliff Dwellings National Monument is administered by the United States Department of Interior, National Park Service, and the Fort Bayard Historic District is currently administered by the State of New Mexico. Both of these cultural resources have been administered by the Gila National Forest in the past and the Forest Service maintains records on some resources associated with these listed properties. Similarly, there are three National Register Districts which are located on, or near, the Gila National Forest. These three districts (Pinos Altos Historic District, Mogollon Historic District, and the Socorro Mines Mining Corporation Mill) are either located on private inholdings within the Plan Area, or are located adjacent to the Plan Area. Archaeological resources associated with these historic districts are present within the Gila National Forest but have not been formally nominated as contributing elements.

Of the 6,168 archaeological sites recorded on the Forest, roughly 40 percent have had evaluations made on their eligibility (Table 222). The high number of resources that have been recorded but never evaluated is because prior to 1995 ("undetermined" and "no data" resources in Table 222), the Forest Service in the

Southwestern Region did not consistently make evaluations of eligibility for archaeological sites. In some instances an "undetermined" determination of eligibility (DOE) represents the DOE established by archaeologists conducting survey for various projects, in other instances this DOE actually represents a DOE generated by the State for those archaeological resources without formal determinations of eligibility which were migrated from the State database. For management purposes, the Forest Service treats undetermined and unevaluated resources as if they are eligible for inclusion in the NRHP. Of those archaeological sites that have been evaluated, the vast majority (ca. 82 percent) have been determined to be eligible for inclusion in the NRHP (or are listed or designated National Historic Landmarks). The remaining 18 percent of evaluated resources were determined to be not eligible for inclusion in the NRHP.

Condition of Cultural and Historic Resources and Trends Affecting their Use

The evaluation of the condition of cultural resources, including historic properties, is problematic. For archaeological resources, objective criteria such as the evaluation of impacts from natural and human forces can be used to generate statements regarding their condition. However, the nature, intensity, and quality of the evaluation of impacts to archaeological resources have changed over the past half-century. Until 1977, archaeological sites within the Plan Area were largely recorded on the State of New Mexico's Laboratory of Anthropology (LA) forms. From 1977 to 1990, the Forest's Cultural Resources Automated Information System (CRAIS) forms were used, after which recording was accomplished using a newer version of New Mexico's LA form. We anticipate being directed to use the "new" Forest Service form in the near future.

All of these forms used different methodologies for assessing site condition. The data from three forms has been normalized in the state of New Mexico's NMCRIS database and the Forest Service's INFRA database, despite categorical equivalence, differences in the level of detail and quality of the data persist. As such, any determination of the condition of archaeological sites will necessarily be qualitative and judgmental. For cultural resources and characteristics of importance to traditional communities, their condition is a reflection of the perceptions of those traditional communities of that condition, regardless of the objective condition of those resources and characteristics, assuming such objective conditions can be measured (for example, the availability of natural resources for collection, or the quality of noise- and viewsheds).

Data on current conditions and trends for archaeological resources can be examined from the recording and monitoring of cultural resources over the past 50 years (Table 223). Overall, water erosion (including sheetwash erosion, rill erosion, drainage formation, and arroyo down-cutting) is the most prevalent impact observed at archaeological sites. Water erosion has been noted as impacting deposits at nearly one-third of all resources visited.

Table 223. Number of sites on each Ranger District exhibiting the specified disturbances during distinct time spans

Ranger District	Time Span	No. of Visits	Bio.	Const./LD	Vand.	Water	Wind	Other
Black Range	2000-Present	122	38	38	18	69	12	32
	1990-1999	80	34	41	39	27	5	
	1980-1989	28	7	21	5	10	1	
	1960-1979	2		1	1			
	Total	232	79	101	63	106	18	32
Quemado	2000-Present	601	259	306	207	366	99	175
	1990-1999	271	158	150	78	215	89	45
	1980-1989	130	38	110	32	67	10	8
	1960-1979	91	18	57	48	55	3	6
	Total	1093	473	623	365	703	201	234
Glenwood	2000-Present	161	72	53	28	133	34	18
	1990-1999	139	50	67	36	121	35	1
	1980-1989	60	10	50	10	27	1	2
	1960-1979	4	1	2	1	1		
	Total	364	133	172	75	282	70	21
Wilderness	2000-Present	156	56	55	85	95	19	23
	1990-1999	125	60	42	66	66	17	5
	1980-1989	72	15	36	56	22	3	2
	1960-1979	74	9	6	63	18	1	3
	Total	427	140	139	270	201	40	33
Reserve	2000-Present	380	321	198	133	314	116	177
	1990-1999	152	53	140	66	106	17	22
	1980-1989	163	39	144	83	80	14	33
	1960-1979	82	27	50	43	58	6	23
	Total	777	440	532	325	558	153	255
Silver City	2000-Present	464	147	133	169	399	102	37
	1990-1999	138	42	86	56	212	20	4
	1980-1989	68	25	41	20	41	8	
	1960-1979	19	7	9	9	9	1	
	Total	689	221	269	254	661	131	41

Note: Disturbance sources are bioturbation (Bio.), construction/land development (Const./LD), vandalism (Vand.), water erosion (Water), wind erosion (Wind), and other disturbance sources (Other).

Construction, which also includes land development activities such as mining and logging in addition to road construction and other activities, has been noted during slightly more than one-fifth of all site visits. Land development impacts can be slight, but construction activities involving heavy equipment often results in severe impacts to sites. Bioturbation, which includes impacts from cattle grazing in addition to damage from rodents, insects, and other wildlife, was noted during roughly 17 percent of all visits. This seems to indicate that grazing, despite its prevalence on all of the districts, is not a major impact to archaeological resources. However, due to recording strategies this number is likely under-reported (as with other impact data). Intensive grazing in the past contributed to watershed degradation and soil deflation that would have affected sites but wouldn't be considered related to current grazing practices.

Vandalism, a category that includes looting, the defacement of standing structures and other features (i.e. rock art panels), arson, and the collection of surface remains such as pottery sherds, arrow and spear points, and bottles was noted during roughly 16 percent of site visits.

There are significant differences between Ranger Districts with regard to the prevalence of different categories of impacts to archaeological resources. Specifically, the Glenwood and Silver City Ranger Districts contain more than the expected proportion of resources affected by wind and water erosion when compared to other districts. Similarly, the Wilderness Ranger District contains more than the expected frequency of resources affected by vandalism when compared to other districts. Finally, the Reserve Ranger District contains a high proportion of resources affected by bioturbation when compared to other districts.

If we assume that different archaeologists were systematically recognizing all disturbances to cultural resources objectively across Ranger Districts, then there is a general trend towards increasing disturbance through time (which, may be more about recording trends than on-the-ground conditions). This is true for all districts in relation to all disturbance sources. Thus, disturbances brought about by bioturbation, construction/land development, vandalism, water erosion, and wind erosion increases through time on all districts. The exceptions to this are the decrease in vandalism disturbances on sites in the Black Range District from 2000 through the present when compared to earlier years; the decrease in disturbances associated construction/land development, vandalism, and wind erosion on the Glenwood District from 2000 through the present when compared to earlier years; the decrease in disturbances associated with bioturbation on the Wilderness Ranger District from 2000 through the present when compared to earlier years; and the decrease in disturbances associated with construction/land development on the Reserve Ranger District from 1990 through 1999 when compared to earlier years.

There have been no consistent efforts to record impacts to resources and characteristics important to traditional communities, other than those observed traditional cultural properties and/or sacred sites. For the general consideration of resources and characteristics important to Native Americans, please see Chapter 18: Areas of Tribal Importance. There has been no assessment of the condition of resources and characteristics important to traditional Hispanic and Anglo-American communities. However, the information collected by Raish and McSweeney (2008) has some bearing on current resource conditions and recent trends for traditional Hispanic communities. In particular, there is a perception that there have been declines in the condition of range land and timber resources. The perception is that these resources are currently insufficient to maintain community needs, and their availability has been declining over the past 50 years.

Contribution of Cultural and Historic Resources to Social, Economic, and Ecological Sustainability

Cultural and historic resources used in the Gila National Forest/Plan Area are critical to the social, economic, and ecological sustainability of the immediate area, the Southwestern Region, and the Nation. Archaeological sites within the Forest are a record of historic processes and events important to the identity of local communities, the State of New Mexico, the Region, and the Nation. Contemporary uses of resources in the Gila National Forest by Native American, Hispanic, and Anglo-American traditional communities are critical to maintaining the identity of these communities. Cultural tourism is a significant component of the surrounding regional economy. Tourists are attracted by the nature and significance of archaeological resources and by the character of traditional communities, a character maintained by resources and uses of the Gila National Forest. Archaeological resources contain a wealth of information for scientific researchers regarding ecological conditions and changes over the past twelve millennia, and human adaptations to these changing socio-cultural and environmental conditions. This information is of

value to managers making decisions regarding the contemporary ecological management of the Forest. This information is also of value for educating the public about ecological sustainability.

Archaeological resources are a major source of information regarding the history of the human occupation and use of the Forest. For the first 12,000 years of human occupation, the remains found at archaeological sites are the only source of information pertaining to the socio-cultural adaptations of various social groups to changing environmental conditions in the Plan Area. Scientific researchers, professional organizations, and cooperating groups that have provided input for this assessment have emphasized the value of archaeological resources in the Gila National Forest for providing information about American history.

The Gila National Forest also contains individual resources that are important to the traditional history of Native Americans, to the military history of the Nation, and to the history of the Nation's westward expansion.

The use of archaeological resources to generate information about the history of the Plan Area, the Region, and of the Nation is vital to maintaining cultural identity at each of these levels. The importance of history to maintaining social sustainability has been cited by members of Hispanic traditional communities (Raish and McSweeney 2008) and scientific researchers and professional organizations cite strong interest among Native American communities in the historical information generated by researchers that study archaeological resources. Interpreted archaeological sites also afford an opportunity to educate children and the public at large about the history of the Forest, the Southwest Region, and the Nation.

The importance of historic and cultural places and characteristics of the Gila National Forest for maintaining the identity of traditional communities is well documented. For their importance to Native American traditional communities, please see the assessment for Areas of Tribal Importance. Hispanic traditional communities have identified the traditional use of the Plan Area for subsistence economic activities as central to their cultural identity. This includes access to land for grazing, wood for fuel and construction, water for the irrigation of crops, plants used in folk medicine, and areas of traditional religious significance (Raish and McSweeney 2008). While there has been little written research, district personnel report that access to resources and characteristics are also important to the maintenance of traditional Anglo-American communities, in particular access to land for grazing, hunting, and recreation. Community input during community meetings during this Forest Plan Assessment process has also identified these values as important.

Cultural and historic resources and uses serve as a driver of economic sustainability in the vicinity of the Gila National Forest by fueling cultural tourism. Archaeological sites are a major attraction for cultural tourism. Indeed, from 2008 through 2011, roughly 37,000 people on average visited the Gila Cliff Dwellings National Monument per year (Mitchell et al. 2014). Visitors to this and other interpreted cultural resources in New Mexico generated roughly 137 million dollars for State and local governments, with the Gila Cliff Dwellings generating roughly 17 million dollars alone (Thomas et al. 2015). In the Plan Area, there are a few cultural resources that are interpreted and readily available for visitation to the public. These include:

- The Trail to the Past on the Reserve Ranger District that includes a trail and interpretive placards at the remains of the Tularosa Ranger Station and a Reserve style petroglyph panel.
- The Apache Creek Rock Art trail on the Reserve Ranger District that includes a trail and interpretive placards at a small Reserve Phase pueblo and near a series of Reserve style petroglyph panels.
- The Trail to the Past in Pueblo Park on the Glenwood Ranger District includes an information kiosk where brochures are available that provide information concerning a series of Reserve and Tularosa phase pueblos located along the trail.

- The Lake Roberts Vista site on the Wilderness Ranger District includes a trail and interpretive placards at the remains of a small Classic period pueblo and Late Pithouse period structural remains.
- The Lower Scorpion campground trail on the Wilderness Ranger District includes a short trail and interpretive placards at a Mogollon Red pictograph panel.
- The Arrastra Site on the Silver City Ranger District includes a short trial leading to placards at a reconstructed arrastra used around the turn of the century.
- The Big Tree Trail on the Silver City Ranger District includes a brochure interpreting the history of the area.
- The Chloride Canyon trail on the Black Range Ranger District passes a number of Mogollon Red pictograph panels which are in the process of being formally interpreted for the public.
- The Dragonfly trail on the Silver City Ranger District passes a number of Jornada Style petroglyph panels that are in the process of being formally interpreted for the public.

Similarly, there are a number of interpreted resources adjacent to the Gila National Forest which provide information on the history of occupation of the area's inhabitants. These include the Fort Bayard National Historic Landmark, the Mogollon Mining district, the Gila Cliff Dwelling National Monument, the West Fork ruin near the Gila Cliff Dwellings, a number of sites along the Trail of the Mountain Spirits, the Santa Rita Mines, and the Geronimo Trail at Kingston.

Scientific information generated from the studies at archaeological sites has provided a wealth of information important to the ecological sustainability of the Forest. Places of past human settlements and use contain faunal remains, macrobotanical materials, microbotanical remains, soils, and other remains relevant to the reconstruction of ecological patterns over the past 12000 years, and have been vital for reconstructing patterns of environmental change within the region. Scientific investigation of archaeological resources can also provide an understanding of how humans have successfully adapted to a changing environment, or when they have failed to do so (Dean 2007; Gregory and Nials 2007; Minnis 1985; Wills 1988).

Climactic fluctuations tend to correspond to time periods when significant cultural transformations took place in prehistory. Usually, these time periods in the archaeological record are marked by substantial changes in mobility patterns, subsistence practices, and technological adaptations (e.g. the introduction of groundstone technology, the introduction of new projectile point types, the introduction of cultigens into the Southwest, the abandonment of the Four-Corners area, etc.) that likely emerged as groups responded to changing conditions.

Perhaps the most often cited process used in analyzing how prehistoric populations responded to changing environmental conditions is variability in precipitation. As anyone living in the southwestern United States today can testify, precipitation varies in the region both temporally and spatially. Thus, there are times when more precipitation is present when compared to earlier or later periods, and there are geographic areas which receive more precipitation than others during the same time period. Using tree-ring data in tandem with modern and historic records pertaining to rain fall totals, researchers have been able to reconstruct prehistoric precipitation values for different regions in the Southwest. The most commonly used annual precipitation reconstruction for the Plan Area was constructed by Grissino-Mayer and colleagues (1997) based on their analyses of the tree-ring sequence present in areas from the Magdalena Mountains near Socorro, New Mexico; south to the Organ Mountains near Las Cruces, New Mexico; east to the Sacramento Mountains near Tularosa, New Mexico; and west to the Mimbres River near Mimbres, New Mexico. This precipitation reconstruction spans from near modern times back to roughly 1,300 years

ago and provides the most robust record of changing micro-scale environmental processes for the Plan Area.

Based on this precipitation reconstruction (Figure 230), one can deduce that some of the extreme variation from long term trends corresponds to rather significant changes in the archaeological record. For instance, many of the divisions associated the time-space systematics for the Mogollon area corresponds to rather long periods of less than average precipitation. The transition from the Georgetown phase to the San Francisco phase coincides with a rather lengthy drought that lasted from around A.D. 690 through A.D. 710. Similarly, the transition from the San Francisco phase to the Three Circle phase is marked by extreme variability in annual precipitation from around A.D. 790 through A.D. 820. This time span witnessed less than average precipitation from A.D. 790-800, greater than average precipitation from A.D. 800-808, and less than average precipitation from A.D. 809-819. The transition from the Three Circle to the Classic Period witnessed a series of less than average precipitation events from A.D. 978-985, A.D. 990-1014, and A.D. 1026-1042. The transition from the Classic period to the Black Mountain phase witnessed an initial increase in precipitation from roughly A.D. 1085-1124. This upward trend was followed by a significant decrease in precipitation from A.D. 1125-1150. The transition from the Black Mountain phase to the Cliff/Salado phase is characterized by a series of years that experienced less than normal precipitation from A.D. 1246-1260 and A.D. 1269-1297. The end of the Pueblo period in the Plan Area was characterized by extreme variability in precipitation beginning with more than average precipitation throughout A.D. 1370-1389. This was followed by less than average precipitation from A.D. 1407-1423, greater than average precipitation from A.D. 1426-1435, and less than average precipitation from A.D. 1445-1465. Finally, annual precipitation from roughly A.D. 1650 through to the present is characterized by increased variability. During this time span there are multiple instances where periods of less than average precipitation is followed by periods of greater than average precipitation. Less time elapses between these episodes of fluctuating precipitation values than in previous years suggesting that precipitation became less predictable for the inhabitants of the Plan Area.

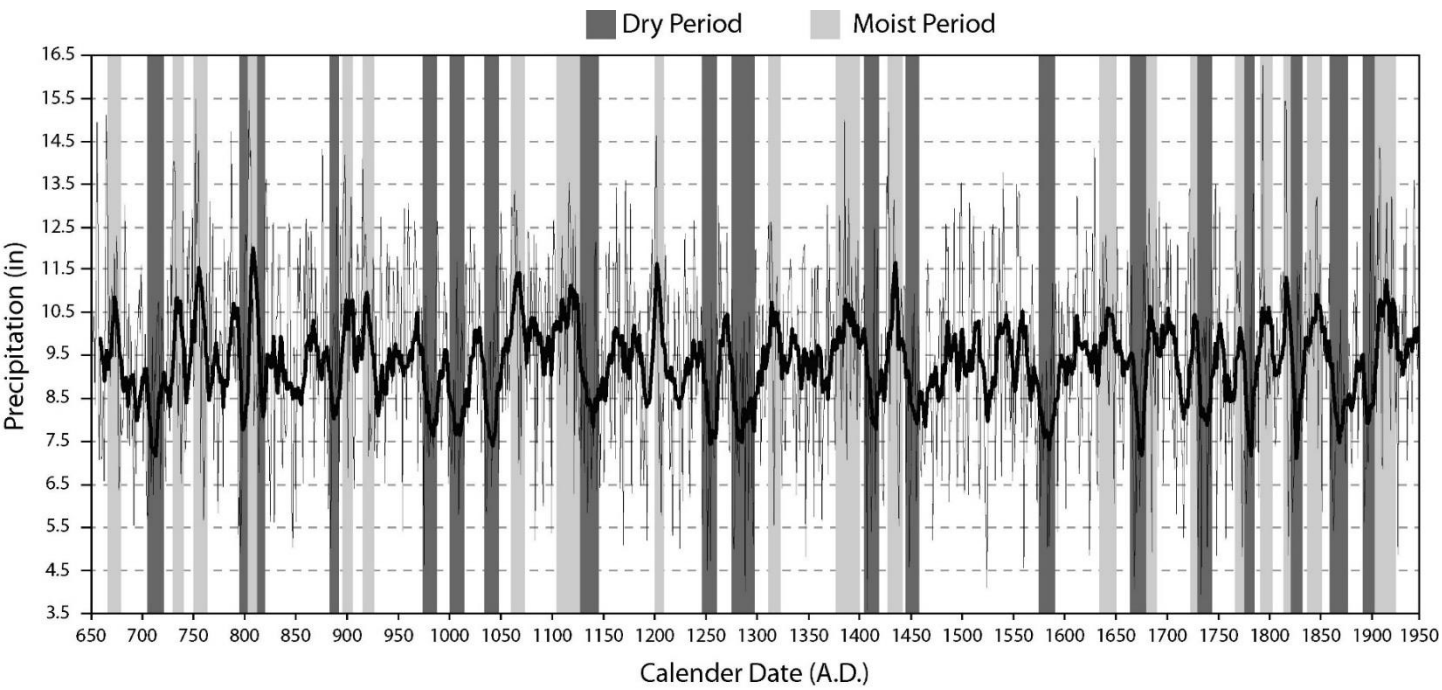


Figure 230. Precipitation reconstruction for A.D. 650-1950 depicting dry and moist periods.

Note: The bold line represents the 10 year moving average of reconstructed yearly precipitation values.

While certain aspects of changing environmental conditions are, to some extent, outside the control of prehistoric human populations, other aspects of environmental change responded directly to pressure exerted by prehistoric human populations. With respect to the Gila National Forest, researchers have demonstrated that the distribution of specific natural resources fluctuated as a result of population pressure. Specifically, researchers have demonstrated that, in some portions of the Plan Area, timber resources and wild game resources became increasing denuded as populations grew (Creel et al. 2010; Creel and Speakman 2012; Minnis 1985; Schoolmeyer 2009). These processes were likely exacerbated by the climactic fluctuations described above and increased, or created new, stressors on the overall social system.

As one can imagine, the combination of temperature fluctuations, precipitation fluctuations, and changes in the amount and type of vegetation present in areas along floodplains increased the potential for severe erosion. Such erosion in floodplains would have proven detrimental to prehistoric peoples especially if they were heavily invested in agriculture for their subsistence needs. As a result, archaeologists have long been interested in how cycles of erosion affected human populations. Perhaps the most in depth study of floodplain erosion processes was conducted for areas in northern New Mexico along the Colorado Plateau (Dean 1988, 1996; Dean and Funkhouser 1995; Gregory and Nials 2007). For areas along the Colorado Plateau, researchers have demonstrated that there are long term cycles of floodplain aggradation and degradation. Specifically, periods of aggradation, or those times of higher water tables and soil deposition in floodplains, were present from A.D. 350-750, A.D. 925-1250, and A.D. 1450-1880. Conversely, periods of floodplain degradation, or those times of lower water tables and soil erosion, were present from A.D. 750-925 and A.D. 1250-1450 (Dean 1988, 1996; Dean and Funkhouser 1995; Gregory and Nials 2007). As Gregory and Nials (2007) show, the aggradation/degradation episodes correspond to periods of variable El Nino frequencies. Similar studies conducted for areas along the Gila River in the Gila River Indian Reservation south of present day Phoenix, demonstrate that similar processes occurred (Waters and Ravesloot 2000).

The above examples show that there is substantial variability throughout the Southwest with respect to floodplain and stream channel dynamics. As of yet, no such studies of aggradation/degradation cycles has been conducted for stream channels and floodplains within the Gila National Forest. However, using the studies conducted by other researchers as proxy measures, it is possible to interpret the precipitation data presented above in a new manner. Briefly, the periods of stream channel and floodplain degradation/erosion episodes recognized in the Colorado Plateau and middle Gila River correspond to periods of precipitation that are preceded by periods of declining effective moisture. This is usually followed by shorter intervals of above average precipitation before returning to precipitation levels approximating long-term trends (Dean 1988, 1996; Grissino-Mayer et al. 1996; Waters and Ravesloot 2000)(Figure 231). In analyzing the precipitation data along these lines, it is possible that in certain areas surrounding the lower Rio Grande, including the Plan Area, that an additional period of floodplain instability is present in the area when compared to the Colorado Plateau and the middle Gila River. This additional period of floodplain degradation covers the time span form roughly A.D. 1600-1700. It should be noted that more nuanced temporal controls and sedimentological analyses were conducted in the Colorado Plateau and middle Gila River examples. Thus, this interpretation should be taken as anecdotal until similar analyses can be conducted in the Plan Area.

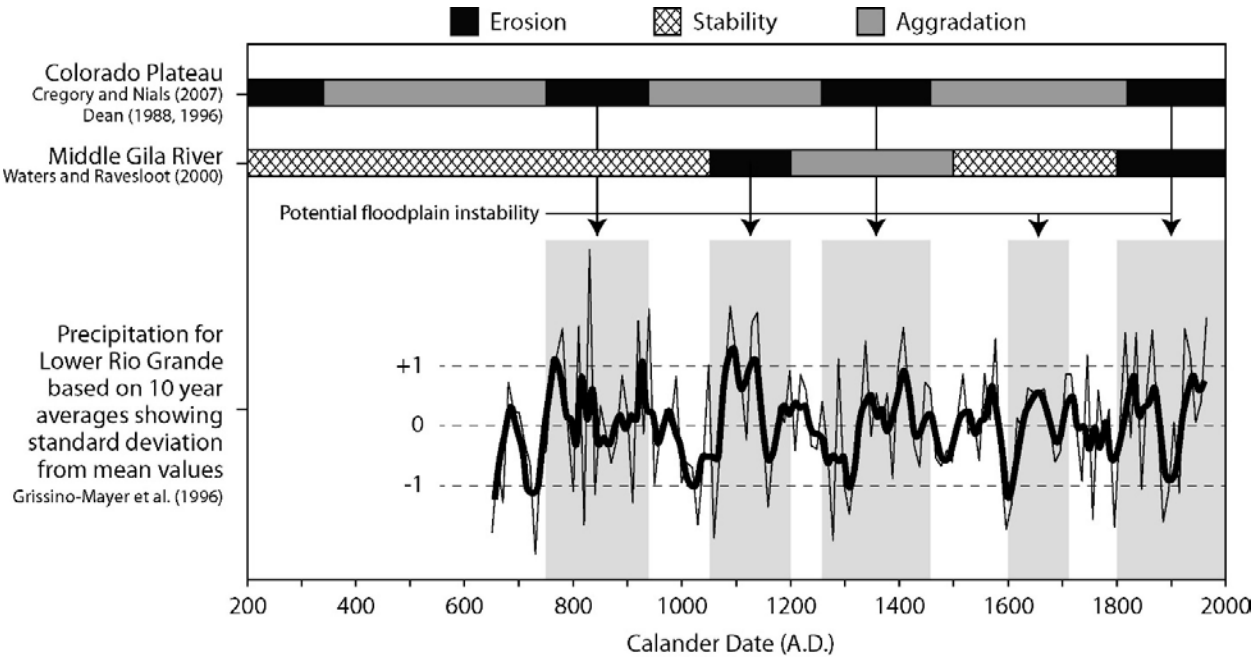


Figure 231. Stream channel dynamics for Colorado Plateau and Middle Gila River areas and possible stream channel dynamics for Plan Area based on yearly precipitation reconstruction.

Periods of floodplain degradation could have possibly been disastrous for groups practicing floodplain agriculture, especially if irrigation canals were used to transport water to irrigated fields. Such episodes could incise/down-cut channels and/or shift channel courses, both of which could render the irrigation canals practically useless if not destroy the canals and agricultural fields themselves.

For the Mimbres Mogollon, and likely other Mogollon groups inhabiting the Gila National Forest, the socio-ecological systems implemented by Mogollon groups were relatively resilient when compared to other contemporaneous groups inhabiting the Southwest (Hegmon et al. 2008; Nelson et al. 2012; Redman and Kinzig 2003). As the above data demonstrates, there were time periods when ecological stressors appear to correlate with periods of transformation/reorganization in the Mimbres/Mogollon cultural sequence. Whether these changing environmental conditions caused the potential reorganization events is unknown. However, the precipitation reconstruction demonstrates that nearly every transitional period associated with the Mimbres/Mogollon sequence is characterized by departures from long-term ecological trends.

The Intergovernmental Panel on Climate Change posits that the environmental changes presented above will likely continue to escalate over the coming years (IPCC 2014). Specifically, it is believed that if emission of greenhouse gasses (e.g. carbon dioxide, methane, nitrous oxide, etc.) continues along its current trajectory, that global temperatures will continue to rise (IPCC 2014). This will lead to a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels, and an increase in the number of heavy precipitation events in some regions of the world. In some portions of the world, heat waves are expected to increase in frequency and duration and precipitation events are expected to increase in intensity though will become sporadic in their frequency of occurrence (IPCC 2014). All of these general trends have the potential to adversely affect cultural resources in the Plan Area.

Perhaps the greatest threat that climate change poses to cultural resources is the increased threat of erosion. As temperatures rise, vegetation communities are likely to be affected. Elevational shifts in

vegetation communities and/or "extreme" fire events could lead to reduced canopy cover available to intercept precipitation and reduce raindrop impact energies and loss of vegetative ground cover (basal area + litter). This loss of vegetative ground cover combined with more of the precipitation falling in higher intensity storms increases the risk of erosion (see the Soil and Water Chapters for more details). This erosion risk can lead to increased sediment delivery to stream channels and potentially altered flow regimes and stream channel dynamics such as degradation (i.e. downcutting) or aggradation. Channel down cutting events, increased arroyo formation, and shifts in stream channel dimension or location have the potential to destroy or damage cultural resources located in the Plan Area.

As Nelson and colleagues espouse, while archaeological studies of past adaptations to changing climactic regimes "do not help us predict the future, they do provide natural experiments by which we can come to better understand the relationships between vulnerabilities and change and examine assumptions used to make contemporary decisions about managing for change versus managing for stability" (Nelson et al. 2012: 201). With respect to future management of actions for Forest sustainability, these studies demonstrate that change is the only constant, and that attempts must be made to incorporate this into management activities. The best strategy for managing for change is one that is flexible in design and where this flexibility includes feedback for monitoring system component vulnerability.

Input Received at Community Meetings

During 2015 the Gila National Forest held a series of public meetings, in communities where ranger districts are located, regarding Forest Plan Revision. Participants were asked what assessment topics were most important to them, about conditions and trends they had seen, and what opportunities they saw. One assessment topic was "cultural and historical resources." However, it should be noted that participants discussing other assessment topics also mentioned cultural resources. Overlapping responses were found in discussions of "areas of tribal importance, recreation, and multiple uses and the benefits people obtain from the Forest." Both positive and negative responses were collected.

Community input regarding cultural resources fell into four major categories (listed in order of frequency): concerns about looting and protection; interest in interpretation of cultural resources (often combined with an interest in recreation); negative feelings about the process of cultural resource management; distrust of management of cultural resources by the Forest Service.

The vast majority of responses displayed a concern for cultural resources. Six responses focused on how to best protect sites. Five responses could be classified as interested in interpretation of cultural resources by the Forest Service and/or interest in accessing these sites for recreational purposes. These comments were generally positive about current management and wanted to make sure that cultural resources are preserved for future generations. Two responses indicated some distrust of Forest Service management. One of these read, "Cultural and historical resources need to be preserved and safeguarded from/for public and FS employees." The other also displayed a concern that the Forest not damage or destroy cultural resources. Overall, many participants recognized the national significance of the cultural resources found on the Gila National Forest.

Four comments expressed frustration with the process of cultural resource management, some referencing the amount of time and money that is spent protecting and/or identifying cultural resources. One read, "Maintain significant cultural and historic resources and let nature take care of the tens of thousands of inconsequential ones."

Current Management and Regulation

The 1986 Gila National Forest Plan (USDA FS Gila NF 1986) established a series of management prescriptions for cultural resources and required that management of cultural resources follow State and Federal laws for cultural resource protection. Significant changes in how cultural resources are managed on the Forest since 1986 include the adoption and use of the Region 3 Programmatic Agreement and meeting new laws and directives that have been established. The Forest currently follows the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities Among New Mexico State Historic Preservation Officer And Arizona State Historic Preservation Officer And Texas State Historic Preservation Officer And Oklahoma State Historic Preservation Officer And The Advisory Council on Historic Preservation And United States Department of Agriculture Forest Service Region 3* (USDA FS 2010i) in meeting NHPA Section 106 responsibilities. Programmatic agreements are well established ways to apply systematic approaches for implementing Section 106 of NHPA that take into account the effects of FS undertakings on historic properties, provide for appropriate tribal consultation and public participation, minimize redundant documentation, and reduce the need for case-by-case review of routine land management activities when historic properties will not be affected or when standard protocols and treatments can be applied.

Additionally, new Federal and State laws have come into existence that dictate how agencies manage cultural resources. 36 CFR 79 (1990) established regulations for how archaeological artifacts would be curated; these regulations formally established how to meet the requirements of NHPA. Curation on-Forest remains a challenge on the Gila, as within many Forest Service units; planning into the future needs to consider these requirements. The Native American Graves Protection and Repatriation Act (NAGPRA) was enacted on November 16, 1990, to address the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to Native American cultural items, including human remains, funerary objects, sacred objects, and objects of cultural patrimony. NAGPRA regulations affect both how collections are treated and how human remains are handled when they are discovered.

Additionally, two executive orders (EO), which have the force of laws, have been added that affect treatment of cultural resources (or resources that can be cultural resources). Executive Order 13006 (1996) encourages locating federal facilities on historic properties in our central cities; this has little direct application on the Gila National Forest and reiterates similar requirements laid out in NHPA. Executive Order 13007 Indian Sacred Sites (1996) is designed to protect and preserve Indian religious practices, this EO directs each federal agency that manages federal lands to "(1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites." This executive order can apply to many geographical areas and sites on forests, including but not limited to traditional cultural properties (TCPs under NHPA). Additionally, the Forest Service 2360 Manual has been modified and the 2309 Forest Service Handbook is new; standard measures of Heritage Program management (Heritage Program Managed to Standard) have changed. This shift in Heritage Program Managed to Standards (HPMtS) has established a different set of targets for Heritage Programs to meet than was present under the previous Forest Plan. Changed laws, direction, and standards need to be incorporated into new planning documents.

Consultation with Tribes is an ongoing process and enriches our understanding of resources we manage. Tribal consultation is also a requirement both of Manual and Handbook Direction and many laws. Within Cultural Resource Management, Tribal consultation is imperative not from only a legal perspective but also in order to better identify and address the concerns of communities who still are connected to sites. Native communities have a vested interest in many locations which may be seen as (still) inhabited by the ancestors, have value as sacred places, or be important for other reasons. Working with tribes as we manage these resources enriches our understanding, management, and interpretation of many sites.

Summary

Archaeological resources on the Gila National Forest (the Plan Area) reflect a 12,000 year occupation of the area. These resources remain important to descendant populations (Tribal and non-tribal), Forest visitors, and our National heritage. Tribal, local, and academic outreach during plan assessment attests to the importance of these resources as sacred places, important destinations for visitors, and as scientific resources.

Of the 3.4 million acres encompassed by the Gila National Forest, roughly 17 percent (ca. 580,000 acres) have been inventoried for cultural resources. However, only 12 percent (ca. 400,000 acres) have been inventoried to current standards. These inventory endeavors have recorded 6,168 archaeological sites across the six Ranger Districts comprising the Plan Area. Analyses demonstrate that the vast majority of these resources are located in areas below 8,000 feet in elevation; are located on gently sloping landforms with less than a ten degree gradient; are located in either piñon-juniper woodland or ponderosa pine woodland biotic provinces; are located within 200 meters of a stream; are located in areas modeled to be non-productive from a modern agricultural perspective; and are located on landforms classified as mountain tops/high ridges, canyon/deeply incised streams, U-shaped valleys, and/or local ridges/hills in valleys. Roughly 84 percent of all known cultural resources contain a prehistoric component. Of these, the vast majority date to the Early to Late Pueblo period or represent Late Archaic period occupations. The remaining 16 percent of all known cultural resources contain a historic component. Of these, the majority date from New Mexico Statehood to recent times.

Of the 6,168 archaeological sites on the Forest, only eight have been formally listed in the NRHP. Roughly 33 percent of all cultural resources in the Gila National Forest have been recommended as being eligible for inclusion in the NRHP, and only seven percent of all resources have been recommended as being not eligible for inclusion in the NRHP. The eligibility of the remaining 59 percent of known cultural resources for inclusion in the NRHP is currently undetermined. While the data should be treated as anecdotal, disturbances brought about by bioturbation, wind and water erosion, construction/land development, and vandalism increases through time on all districts comprising the Plan Area.

Data derived from studies conducted on archaeological sites in the Plan Area and in surrounding areas indicate that past environmental conditions fluctuated through time. There were time periods when ecological stressors, or deviations from long-term trends, appear to correlate with periods of transformation/reorganization in the Mogollon cultural sequence. However, many of these transitional periods are not associated with relatively extreme variability in the archaeological record. Using these and similar data, researchers have shown that the Mogollon socio-ecological system was fairly resilient and able to accommodate environmental change without substantially reorganizing the social system.

Current changes in climatic and environmental conditions, if left to continue along their current trajectories, pose substantial problems for cultural resources on the Forest. Threats include those posed by uncharacteristic fire events and the increased threat of erosion. Channel down cutting events, increased arroyo formation, and shifts in stream channel dimension or location have the potential to destroy or damage cultural resources located in the Plan Area. The best way of managing for these potential future conditions is to implement a strategy that is flexible in design and where this flexibility includes feedback for monitoring system component vulnerability.

The cultural resources present within the Plan Area have the potential to elucidate information on the varied lifeways of the region's inhabitants for the past 12,000 years. Such information could be used to address issues vital to the changing concerns of the Nation by providing examples of how historic and prehistoric social groups adapted to changing socio-ecological conditions (i.e. climate change, sustainability, pan-regional interaction, etc.). Similarly, cultural resources throughout the Forest are likely

to increase in importance with respect to cultural tourism. These phenomena (increased research, increased tourism, and climate change) all have the potential to increase the risk of loss of archaeological resources. Through establishing new partnerships with interested stakeholders, and maintaining existing ones, the Gila National Forest will be better able to reduce existing risks to cultural resources and mitigate new risks as they arise.

Chapter 18. Areas of Tribal Importance

Introduction

This chapter identifies and evaluates available information on areas of tribal importance relevant to the plan area, including tribal rights, areas of known tribal importance within the plan area affected by management, and conditions and trends of resources that affect areas of tribal importance and tribal rights.

Ecosystem Services of Areas of Tribal Importance

The Forest provides many ecosystem services from its lands that are important to tribes. Among them are *cultural* ecosystem services in the form of opportunities for religious pilgrimages to place offerings at sacred sites and visits to shrines and springs. *Provisioning* services are also produced by Forest lands to tribes in the form of game and fish for sustenance, fresh water for drinking, and wood and fiber for heating, cooking and construction. *Supporting* services provided to tribes from Forest lands include plants for gathering for food and medicine, plant pigments, and stone and minerals for tools and agriculture. Tribes also benefit from *regulating* services produced by Forest lands, including climate regulation, water purification, and flood regulation.

Indian Tribes Associated with the Plan Area

The Gila National Forest routinely consults with 10 federally recognized tribes that are based in New Mexico, Arizona, Oklahoma, and Texas. These tribes include: the Pueblos of Acoma, Laguna, Zuni, Ysleta Del Sur Pueblo, the Navajo Nation, the Hopi Tribe, the San Carlos Apache Tribe, the Ft. Sill Apache Tribe, the Mescalero Apache Tribe, and the White Mountain Apache Tribe. These tribes have all expressed some level of interest in the resources and management of the Forest, and sometimes provide input to the Forest pursuant to Section 106 of the National Historic Preservation Act and the National Environmental Policy Act. These tribes recognize the lands managed by the Gila National Forest as part of their aboriginal or traditional use areas, and many acknowledge contemporary use of these lands for traditional cultural and religious activities.

No tribally held land abuts the Forest (Figure 232). All government centers for tribes and pueblos are located over an hour from the Forest by vehicle, with many over two hours from the Forest boundary. The physical distance between the Forest and tribal lands reduces the day-to-day use of the Forest by Native peoples and poses a logistical challenge. However, these factors do not reduce the Forest's importance as a traditional homeland and a significant and sacred place to tribal people.

The Forest maintains a governmental relationship with 10 federally recognized tribes, and routinely consults with these tribes on policy development, and proposed plans, projects, programs, and Forest activities that have a potential to affect tribal interests or natural or cultural resources of importance to the tribes. The Forest strives to build and enhance its working relationship with these tribes.

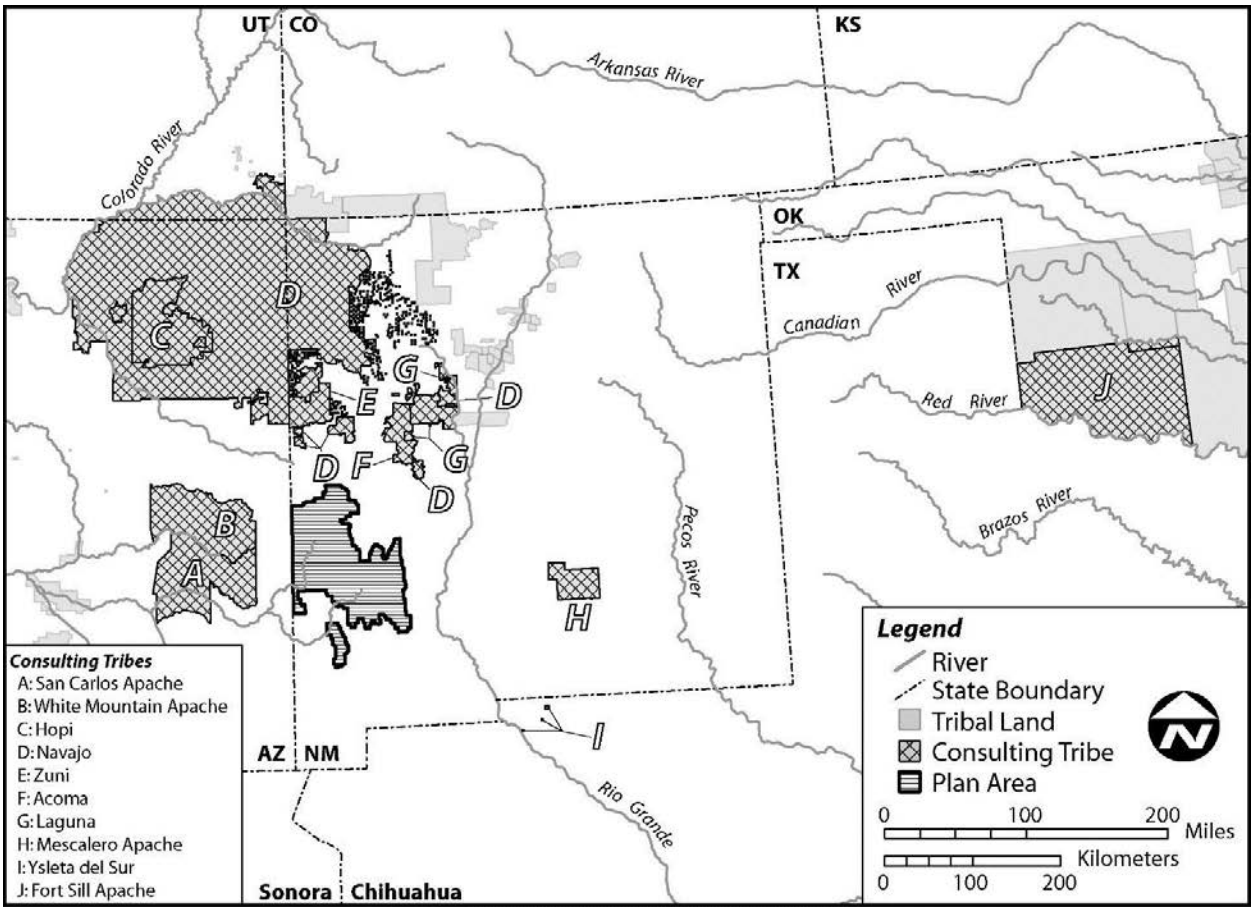


Figure 232. Location of the Gila National Forest (plan area) in relationship to consulting tribes.

Existing Tribal Rights

The federal government has certain trust responsibilities, and a unique legal relationship with federally recognized Indian tribes, defined by history, treaties, statutes, and court decisions. The span of responsibilities and nature of the relationships can vary between federal agencies.

The federal trust responsibility is summarized by Pevar (2004: 33) as "Broadly, the trust doctrine requires the federal government to support and encourage tribal self-government and economic prosperity, duties that stem from the government's treaty guarantees to "protect" Indian tribes and respect their sovereignty. In 1977, a Senate report expressed this obligation as follows:

> The purpose behind the trust doctrine is and always has been to ensure the survival and welfare of Indian tribes and people. This includes an obligation to provide those services required to protect and enhance Indian lands, resources, and self-government, and also includes those economic and social programs which are necessary to raise the standard of living and social well-being of the Indian people to a level comparable to the non-Indian society.

Under this broad approach, the federal government's trust duty "is owed to all Indian tribes", including those that did not enter into treaties with the United States. The trust doctrine "transcends specific treaty promises and embodies a clear duty to protect the native land base and the ability of tribes to continue their ways of life."

The Forest Service's policy regarding tribal relations is defined primarily by the authorities listed in Forest Service Manual part 1563.03-Policy (Effective Date 3/9/2016).

The agency's policy focuses on fourteen key points:

- Sovereignty. Respect and uphold the sovereignty of all federally-recognized Tribal governments.
- Government-to government relationship. Maintain government-to-government relationship with federally recognized Tribes.
- Consultation. Consult with Indian tribes and Alaska Native Corporations on matters that may affect their rights and interests.
- Accountability. Maintain an accountable process to ensure regular and meaningful consultation with Tribal officials in the development of policies or actions that may have Tribal implications.
- Tribal Summary Impact Statement. Prepare tribal summary impact statements in an identifiable portion of the preamble to each regulation that has tribal implications to be issued in the Federal Register.
- Certification. Provide certification of compliance with Executive Order 13175 to OMB when transmitting a draft final regulation that has tribal implications.
- Negotiated Rulemaking. On issues relating to tribal self-governance, tribal self-determination, tribal trust resources, or tribal treaty and other rights, the Forest Service should explore use of consensual mechanisms for developing regulations, including negotiated rulemaking.
- Tribal Relations Training. Forest Service employees shall complete tribal relations training.
- Confidentiality. Forest Service employees shall protect the confidentiality of culturally sensitive and proprietary information.
- Sharing Information. The Forest Service shall assist Indian Tribes and tribal organizations by providing technical, educational, financial, and other information, and establish information exchanges where mutually agreed to and authorized by law.
- Reducing Impediments. Wherever possible, the Forest Service should reduce or remove legal or administrative program impediments that inhibit the Agency's and Indian tribes' capacity to work directly and effectively with each other.
- Repatriation. Repatriation of Native American human remains and associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony is consistent with the requirements of the Native American Graves Protection and Repatriation Act (NAGPRA).
- Reburial. Support, where appropriate, shall be provided for request(s) for reburial of human remains and cultural items on Forest Service-administered lands.
- Education. The Forest Service shall help improve educational opportunities provided to all American Indian and Alaska Native students.

The Forest carries out its trust responsibilities under a variety of authorities. Some of the laws that address the agency's requirement for government to government consultation include: the American Indian Religious Freedom Act (AIRFA); the Archaeological Resources Protection Act (ARPA); the National Forest Management Act (NFMA); the Native American Graves Protection and Repatriation Act (NAGPRA); the National Environmental Policy Act (NEPA); the National Historic Preservation Act (NHPA) -Sections 106 and 110; 36 CFR Part 800 Protection of Historic Properties, and the Religious Freedom Restoration Act (RFRA). Executive Orders, such as EO 13175 Consultation and Coordination with Indian Tribal Governments and EO 13007 Indian Sacred Sites, also speak to the agency's responsibilities.

Other more recent authorities, directives and/or guidance relevant to Forest management, collaboration, and consultation include the Tribal Forest Protection Act (2004), the Food Conservation and Energy Act of 2008 (The Farm Bill), Report to the Secretary of Agriculture-USDA Policy and Procedures Review and Recommendations: Indian Sacred Sites (December 2012), Memorandum of Understanding Among the Department of Defense (DOD); Department of Interior (DOI); U.S. Department of Agriculture (USDA); Department of Energy (DOE), and ACHP Regarding Interagency Coordination and Collaboration for the Protection of Indian Sacred Sites (December 2012), and FSH 2409.18-Trees, Portions of Trees, or Forest Products Free of Charge for Indian Tribes for Non-Commercial Traditional and Cultural Purposes.

The U.S. Forest Service Tribal Relations Strategic Plan (2010) outlines three basic goals around Tribal Rights, Partnerships and Program Development:

- American Indian and Alaska Native Rights: Ensure the agency redeems its trust responsibility and protects American Indian and Alaska Native reserved rights as they pertain to Forest Service programs, projects, and policies.
- Partnerships: Leverage partnerships to maximize mutual success.
- Program Development: Promote integration and utility of the Tribal Relations Program throughout the agency.

The strategy targets specific outcomes, and delineates the Tribal Relations Program, mission, goals and objectives. The Region's First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities (December 2003) addresses project-level consultation pursuant to the National Historic Preservation Act (as amended).

Under the current administration, there has been an increased emphasis on work with American Indian tribes within USDA and the agency. Both the revisions to Forest Service Manual Chapter 1560, part 1563, and Forest Service Handbook 1509.13 (Chapter 10, American Indian and Alaska Native Relations Handbook) became effective on March 9, 2016. Direction within this further clarifies who may conduct government-to-government consultation with Tribes. The Handbook now states "Government-to-government consultation may only occur between Forest Service Line Officers and tribal leaders who have authority to consult on behalf of their Tribe…Tribal consultation may not be delegated from line to staff in the field." The handbook also supports the development and use of memoranda of understandings (MOUs) between Forests and Tribes.

Areas of Known Tribal Importance Affected by Management of the Plan Area

Lands managed by the Gila National Forest have been used, and continue to be used, by many tribes for a variety of traditional cultural and religious activities. Over time, these activities have included, but are not limited to: collection of plants, stone, minerals, pigments, feathers, soil, catching eagles, hunting game, and conducting religious pilgrimages to place offerings and to visit shrines and springs.

Places and properties valued and used by the tribes for a variety of purposes have been identified on every District of the Gila National Forest. Properties can possess traditional cultural or religious significance for a number of reasons. Some of these reasons include locations with long-standing cultural use, locations of buried human remains repatriated under NAGPRA, locations where ceremonial objects have been retired, locations of contemporary ceremonies, and locations where specific forest products are gathered for ceremonial use. Some locations such as shrines, springs, caves, and resource collection areas have long-standing and ongoing historical, cultural, and religious significance.

In addition to specific noted locations, peaks and entire mountain ranges are frequently regarded as sacred, and viewed as an integral part of a tribe's cultural landscape. Multiple peaks on the Forest have been identified as sacred to one or more tribes. Many have place names tied to tribes' oral traditions. Cultural and traditional use of specific mountains is ongoing, dictated by the cycle of cultural activities.

Existing information regarding sacred sites is based on published sources as well as the results of project-level consultation conducted by the Forest. To date, approximately 30 locations of cultural and religious significance have been identified Forest-wide.

Certain locational types (e.g., caves & springs) tend to be considered sacred, once identified. The importance of natural water sources to Tribes is underscored by their interest in having the Forest Service do a better job of protecting and enhancing them.

Certain archaeological site types including battlefields, ceremonial sites, and rock art sites are frequently identified as sacred. For example, oral histories, which continue to be passed down about battlefields, convey the events and sacrifices that ensured community survival and cultural transmission. Rock art can be found across the Forest in the form of petroglyphs and pictographs. Recent consultation with multiple tribes indicates these resources played an important role in instruction and ritual. Some images depict the story of emergency and migration. Other images are associated with specific rites or activities. Areas where rock art is found are often considered sacred. There is ongoing tribal visitation to some rock art sites (Figure 233).

The locations and ongoing tribal uses of sacred locations generally remains confidential in order to best protect these resources and their ongoing use.

Under the National Historic Preservation Act (NHPA) some identified archaeological sites can be designated as TCPs. This designation has not been applied to all locations that tribes consider sacred. The Forest, together with tribes, has formally documented one location as a traditional cultural property (a petroglyph site); it has been determined eligible for the National Register of Historic Places, though not formally nominated to the National Register in order to protect its anonymity. Additional sites, landscape-level properties, and historic districts, containing a number of historically or functionally related properties, remain minimally documented but clearly meet the criteria of a TCP. As an example, several, if not all, historic Apache battlefields located on the Forest could qualify as TCPs.

It is important that traditional practitioners have access to TCPs and other sites of spiritual or traditional significance and that they are afforded privacy to conduct ceremonies as requested.

Cultural resources (e.g., archaeological sites) are often of importance to tribes and it is important that tribes are consulted regarding management of these resources, particularly when it comes to interpretation, excavation, and the treatment of human remains. The Forest uses a proactive approach in protecting cultural resources from adverse impacts and conducts outreach to educate the public on the history of the Gila NF and historic preservation issues. Working in partnership with federally recognized tribes helps us protect ancestral sites and manage cultural resources through meaningful collaboration. The Forest also recognizes that there are important tribal sacred sites, ethnographic resources, and traditional use areas that may not meet the definition of a historic property. The Forest works to protect these resources using existing authorities in collaboration with federally recognized tribes. For a discussion of Cultural Resources see Chapter 17.

Figure 233. The Zuni Cultural Resource Advisory Team visiting a rock art site on the Gila National Forest.

Forest Product Collection

Although gathering forest products for personal, commercial, and ceremonial uses is limited to some extent due to distance, there is tribal use of and interest in forest products. Distance does not reduce the significance of the area in tribal memory, although it can make daily use less common. Zuni sources have identified at least 15 areas of importance for gathering and hunting. Tribal members from multiple groups have hunted on the Forest. Firewood is a forest product that is of interest to tribal members for personal and ceremonial use. This includes juniper, piñon, oak, and ponderosa pine. However, due to travel distance, only a few groups have been known to collect these resources on the Gila National Forest. Collection of forest products for "special" uses seems more common than for heating. For example, there have been instances of tipi pole collection. There is use of the National Forest for collecting forest products for traditional and cultural purposes. Some examples include soils/minerals, yucca, willow, cactus, grasses, osha root, Douglas fir, ponderosa pine, and oneseed juniper. Due to distance, most tribal use of forest products on the Gila focuses on ceremonial, medicinal, or artistic products. The act of procuring certain products is a sacred activity, requiring preparation on the part of participants. Traveling to collect these materials can be a sacred activity with deeper meaning and importance to participants. The Forest recognizes that tribal forest product collection within our boundaries helps maintain and reinforce sacred connections to the land for tribal individuals.

Multiple authorities provide for tribal use of forest products. These include:

- FSM 1563.03 directs Forests to "assist Tribal members in securing ceremonial and medicinal plants.
- Food, Conservation, and Energy Act of 2008, Sec 8105 provides authority to provide, free of charge, to federally recognized Indian Tribes trees, portion of trees or forest products from National Forest System lands or noncommercial, traditional and cultural purposes.

- FSH 2409.18 Chapter 80 provides authority to grant trees, portion of trees, or forest products to federally recognized Indian Tribes for a wide variety of noncommercial uses that serve to promote traditional native culture, activities and practices, and may be used where treaty reserve rights may be absent or ambiguous.

Conditions and Trends of Resources that Affect Areas of Tribal Importance and Rights

Conditions and trends that are social and/or economic based are influencing tribal use of the Forest and affecting areas of tribal importance. Some of these include: changes in land ownership, degradation of forest health and watershed conditions, changing technologies and energy development, population growth, expanding recreation use, and the development of private lands.

Change in Land Ownership and Access to Land and Resources

Tribal access and use of the lands and resources now managed by the Gila National Forest, as well as the general landscape, have been altered over time due to a number of factors. The primary factor is the change in land ownership and jurisdiction. Historically, resources on the land were more widely available to tribes, and they had nearly unfettered access to these lands for hunting, acquiring construction material, gathering firewood, and collecting resources for food, medicine, and ceremony. There were often well-established travel routes between communities, and prescribed routes to specific locations of tribal importance. As the Spanish, Mexicans, and later the Americans moved into the area, recognition of land ownership became increasingly important. Access to and use of resources continued to change with the establishment of the National Forest in the early 20th century, and the gradual progression of environmental policy, resulting in the passage of federal laws and regulations, and greater federal oversight.

In some cases, access to culturally significant locations has been severely restricted or eliminated altogether in places where land has gone into private ownership. Although the Forest Service has the ability, under a variety of authorities, to assure tribes access to sacred sites and privacy to conduct cultural activities, few tribes have exercised these rights on the Gila National Forest. There have been few requests for temporary closure, through authorities such as the 2008 Farm Bill, for these purposes. There seems to be a pervasive lack of awareness about the options and the process for securing these types of closures. There is also some confusion about the process of obtaining free use permits for the collection of forest products, and under what situations a permit is needed. Nevertheless, the Forest is very responsive to tribal requests, although the Forest lacks a consistent procedure to authorize for the collection of forest products for ceremonial use.

The process of preparing for and travelling to an area to conduct traditional and cultural activities is often as significant as the activity itself. The construction of fences, installation of gates, and checkerboard land ownership patterns, has contributed to complicating the tribes' ability to do resource collection and to visit areas of traditional cultural and religious significance. Land ownership can affect how tribes approach areas of tribal importance, and conflicts have been known to arise with landowners or with Forest Service personnel who are unfamiliar with tribal rights on National Forest land. Ownership and development of private land has led to a greater reliance on National Forests. Still, there is only limited use of the Gila National Forest by tribes for traditional, cultural and religious activities. Instead, they will opt, where they can, to obtain these resources on their own lands, or will travel to National Forest lands that are closer to their reservations.

When tribes do go to important places on National Forests, their methods of travel and their activities often have to be adjusted for factors such as road development, fences, gates, mixed land ownership, and other permitted or recreational uses of Forests.

Degradation of Forest Health and Watershed Conditions & Restoration

There are a number of factors that have led to compromised watersheds and forest ecosystems. Broadly speaking, historic agency fire suppression policies, timber harvesting, logging practices, livestock grazing and localized mining practices have all contributed to the compromised watersheds and forest ecosystems that the Forest is managing today (see Water Chapter). Much of this occurred during a period in the agency's history when output was a top priority, in response to the social demands of the time. Ground-disturbing permitted activities and dispersed recreation have also contributed to the disturbance and degradation of some resources (see Recreation Chapter).

For example, the Navajo believe that if plants are misused, they will move away. Drilling or digging into the earth is an example that the Navajo use to describe misuse. The effect that drilling and digging have upon plants is one reason these activities are viewed as negative. Digging into the earth is also believed to alter the otherwise beneficial effect of activities such as prescribed burning. Generally burning is considered positive, because it tends to bring about a re-growth of plants.

Many Tribes view large landscape scale restoration as a way to restore and enhance the resources. There is an understanding from Tribes that a healthy functioning resilient ecosystem is a healthy sacred place.

The Tribal Forest Protection Act of 2004 (Public Law 108-278) allows tribes to propose projects on National Forest System lands to protect their own trust resources. The Tribal Forest Protection Act (TFPA) basically authorizes the Secretaries of Agriculture and Interior to give special consideration to tribally proposed Stewardship Contracting or other projects on Forest Service or Bureau of Land Management (BLM) land bordering or adjacent to Indian trust land to protect the Indian trust resources from fire, disease, or other threats originating from Forest Service or BLM land. Given the proximity of the Gila National Forest to tribal lands; these types of projects have not been proposed. However, in 2012, the Gila NF entered into a three year Collaborative Forest Restoration Project (CFRP) grant with the New Mexico Forest Industry Association. This grant provided job training and work (some on-Forest) marking timber to the local Alamo Navajo.

Additional discussion on vegetation management can be found in Chapter 2. Vegetation-related ecosystem characteristics are analyzed: vegetative structure, fire regime, patch size, invasive species, coarse woody material, climate, snags, insects and disease.

Climate Change

Climate change, discussed in Chapter 9, is affecting the environment in multiple ways. Catastrophic floods, increased fire activity, species becoming less viable in their native ranges, and the expansion of invasive plants and animals have all been associated with climate change. Environmental degradation that occurs has the potential to change the character of sacred places and the availability of traditionally used resources. Traditionally used plants may shift range or become unavailable in some areas due to climate change; these changes can affect the availability of products desired by tribes. Forests, with large land bases, may prove somewhat more resilient due to less environmental fragmentation and other factors, rendering Forests increasingly important sources of forest products for tribes. Impacts to specific sites will also have the potential to cause tribal concern as resources such as shrines, rock art, and sites where the ancestors still reside could be disturbed by fire or flood (see discussion of impacts of climate change to archaeological resources Chapter 17).

Changing Technology and Energy Development

As a multiple use agency, the Forest Service permits a wide variety of activities on National Forest System lands. Activities such as the development of communication sites, mineral exploration and extraction, and construction and maintenance of transmission or utility corridors have affected, and continue to affect, areas of tribal importance.

In recent years, there has been a greater emphasis on alternative forms of energy development such as wind, solar, and nuclear power. While many tribes support the development and use of wind and solar power, there is also recognition that these types of energy development result in a large footprint on the landscape, and often impact the viewshed. Evidence of past mineral exploration is still evident today on Districts of the Forest, and the agency has only recently begun to address the remediation of older mines on the Forest. In the aftermath of the 2015 Gold King Mine waste water spill originating in Colorado, and subsequent response of the Navajo Nation and other tribes in the region, we can anticipate heightened tribal interest in the successful remediation of mines on the Forest.

Changes in telecommunication technology over the past century resulted in a proliferation of communication sites developed on the Forest, most located on high points such as mountain tops. These constructed features are a mixed blessing for tribal communities. While communication sites make certain technologies readily available to all, they are perceived to cause impacts to the landscape, wildlife, and traditional tribal use of the land. For example, radio communication sites contain towers that can be seen for great distances, and if greater than 200 feet in height, will be lit at night per Federal Aviation Administration (FAA) requirements. Those tribes that have expressed opposition to the development of new communication sites have encouraged co-location of communication infrastructure to the maximum extent feasible.

Impacts created by the presence of towers or any other highly visible anthropogenic objects, obstruct the "line of sight" from the physical location of the ceremony to a given location (e.g., a peak). This can interfere with the practitioner's accuracy of diagnosis and proper treatment of patients. These visible impacts represent an intrusion to the traditional experience and the ability to properly conduct prescribed cultural practices.

The continued permitting and development of electronic facilities and mines on the Forest, particularly on or near the higher mountains, disallows the meditative atmosphere, quietness, and privacy necessary for traditional cultural activities. The additional vehicular traffic associated with the use, maintenance, and/or expansion of these types of facilities is also a concern from the standpoint of intrusion and interference with traditional and religious practices.

Places of tribal importance have an integral relationship with a tribe's beliefs and traditional cultural practices, and are viewed as critical to the maintenance of a tribe's cultural identity and transmittal of their beliefs and practices. Practitioners sometimes engage in certain traditional activities that can only be conducted in a specific place. Tribes have expressed concern that as development continues in areas of tribal importance, it forces these individuals to alter their cultural activities, and in time, is seen as a cumulative impact to their cultural activities. Development does not always stop the cultural activities and practices, but is perceived to degrade the traditional practices and diminish their value.

Large and intrusive development has the potential to affect a tribe's relationship with an area of traditional and cultural significance, and risks the disruption and/or alteration of traditional cultural activities that are critical to the continuity of cultural beliefs and practices. In the view of the tribes, impacts to a traditional practitioner's ability to conduct traditional cultural activities in the area will render the overall effectiveness of medicine and healing ceremonies less effective.

Title V, Section 503 of the Energy Policy Act of 2005 (Public Law 109-58) and Indian Mineral Development Act of 1982 (Public Law 97-382) provide increased flexibility for tribes to develop energy resources. A number of tribes in the region are currently developing energy under the provisions of the Energy Act of 2005. According to the Department of Energy, Tribal Energy Program website (http://apps1.eere.energy.gov/tribalenergy/projects_state.cfm/state=NM), there are 18 energy related projects in New Mexico, virtually all of which focus on renewable energy. Renewable energy can be developed to meet a tribe's needs for sovereignty, energy independence and diversification, environmental sustainability, and to strengthen the tribal economy.

The Forest does not share a common boundary with any tribe. Despite this, it is possible that the Forest could receive requests for special use permits to cross National Forest land. This would include requests to transmit electricity or natural gas across National Forest land by the Department of Energy and the Department of Interior, working on behalf of tribes to develop their resources. Additional discussion on energy and mineral development can be found in Chapter 16.

Population Growth, Development, and Expanding Recreation Use

Recreational use of the Forest is on the rise. Some popular activities involve day use (such as picnicking, hiking, mountain biking, and horseback riding), driving for pleasure and scenic beauty, and wildlife viewing. Located away from urban areas, hunting, backpacking, and camping represent important activities that are enjoyed by locals and bring visitors and resources into the area. As a Forest with three Wilderness Areas, including the Gila Wilderness, the first designated Wilderness in the Nation, longer trekking (including backpacking and packing with horses) is also popular and draws visitors from around the world to the Forest. See the Recreation and Designated Areas Chapters for more details.

The Pueblo of Acoma has expressed concern regarding dispersed motorized use of the Forest and the proliferation of motorized trails and roads. They are concerned that too much motorized use degrades watersheds, displaces plants, disturbs animals, and reduces the sense of solitude. They, and other tribes, have been supportive of the Forest's efforts to regulate motorized travel via the Travel Management Plan. As recreation increases on the Forest, conflicts between traditional practitioners and other Forest visitors can be expected to increase.

Development of Private Land

There are inholdings of private land within every District of the Forest. In some cases, these properties contain strategic and culturally significant features such as springs. Most of these lands have not been subdivided. However, development of subdivisions within or adjacent to the Forest can create concerns for a variety of reasons including: changes to the visual characteristics of the landscape, construction of new transmission lines and other utilities on Forest, concerns for wildlife, introduction of new species, degradation of watershed condition, increased fire risk, and when residents who live immediately adjacent to the National Forest and/or wilderness areas establish informal trail systems for their personal use (see the Lands Chapter).

Input Received at Community Meetings

Community meetings were held across the Forest in 2015; over 200 individuals participated in these meetings. One assessment topic posed to participants was "Areas of Tribal Importance." Given the location of these meetings in communities with District Offices, responses do not represent input from tribal communities. Only 5 responses directly discussed the importance of the Forest to Tribes and these reflected different levels of understanding. Responses to the assessment prompt ranged from "none" to "everywhere." The "none," which presumably indicates the respondent doesn't recognize there are any areas of tribal importance, is concerning. One response stated that "cultural and historic resources are [should be] protected and tribal areas respected." This response and another on the desirability of signing

archaeological sites) reflect the general community understanding that archaeological sites can be important to tribal communities. Another participant responded: "manage for the recreational purposes while being aware of local customs and cultures (fuelwood collection, cultural herb use, etc.)." This response reflects and understanding that a broad range of values can be important to tribes. Ongoing interpretation has been designed to help inform the public on the ongoing significance of the Forest to tribal communities. Efforts by Tribes and the Forest can help enhance community understanding of the Forest as a traditional tribal area.

Tribal Consultation During Plan Revision Assessment Phase

The Gila National Forest maintains a governmental relationship with ten federally recognized Indian tribes, also directly contacting specific bands within those tribes that live nearby. All of these groups have been contacted by mail and by phone in regards to Forest Plan Revision. Face-to-face consultation has occurred with four tribes so far during the assessment phase. We hope that as the Forest Plan Revision process progesses that we will have substantive conversations with all ten tribes, developing a growing understanding of their vision of how we can best partner with them and how this landscape should best be managed into the future.

Topics of conversation with tribes during this phase covered a range of topics. Tribes discussed concerns about climate change, the importance of forest restoration, and an appreciation of recent travel management efforts, which hopefully reduce resource degradation and habitat fragmentation. There was some discussion of hunting and gathering on-Forest. Cultural resource management issues discussed included: research interests and concerns, and opportunities for tribal involvement in interpretation of cultural sites for Forest visitors. Another major topic was opportunities for tribal youth to be exposed to the traditional lands that are now part of the Gila National Forest, either through educational activities (on the ground or virtual), through working with other researchers, or as employees. Other Forests have solicited the tribes regarding their concerns and interests in forest management; comments they have received have reflected similar concerns and interests. Specific comments have been received by other Forests about concerns over increased development, impacts to resources from off-road travel, the environmental and cultural impacts of mining, chemical treatments of native plants, and protection of agave. We anticipate continued tribal involvement throughout the plan revision process and anticipate that the revised plan will emphasize mutually beneficial relationships between the Forest and Tribes.

Summary of Conditions, Trends, and Risks

The Gila National Forest maintains a governmental relationship with ten federally recognized Indian tribes, and routinely consults with these tribes on policy development, plans, and projects, programs, or activities proposed on the Forest that have a potential to affect tribal interests or natural or cultural resources of importance to the tribes. Lands managed by the Gila National Forest have been used, and continue to be used by many tribes, for a variety of traditional cultural and religious activities. Places and properties valued and used by the tribes for a variety of purposes have been identified on every District of the Gila National Forest. To date, approximately 30 locations of cultural and religious significance have been identified Forest-wide.

It is hard to characterize the trends associated with tribal use of the Gila National Forest. Some changes tend to reduce access and use: (1) changes in adjacent land ownership and development of private lands affecting access, (2) degradation of forest health and watershed conditions affecting plant collections, (3) changing technologies and development interfering with traditional ceremonies, and (4) recreation use contributing to conflicts with traditional practitioners. However, within these challenges there is also room for optimism. Despite being located a distance from tribal populations, programs are being established (by tribes with Forest participation) which bring youth onto the forest to reconnect with traditional lands. Landscape restoration provides an opportunity for tribes and the Forest Service to work together towards

common goals. The Forest strives to build and strengthen relationships with tribes and hear and incorporate tribal input into a broad range of activities.

Tribal uses occur on every District of the Gila National Forest and are at risk from change in land ownership, access to land and resources, degradation of forest health and watershed conditions, changing technology, energy development, population growth, expanding recreation use, development of private land, and management activities on sacred places. Maintaining and developing a strong government to government relationships with Tribes is important to the Gila National Forest; these relationships inform management of the Forest. Facilitating meaningful access to the Forest for tribal members enhances connections.

Chapter 19. Social, Economic and Cultural Sustainability Integrated Risk

The Gila NF has identified several risks to ecological integrity and sustainability for terrestrial, riparian and aquatic ecosystems (see Section I: Ecological Integrity and Sustainability). These risks may impact the Forest's ability to contribute to some of the social, cultural and economic benefits desired and enjoyed by people in local communities, surrounding areas and visitors to the area. These risks are a direct result of ecological condition and impact available water, forage for livestock grazing, timber, and hunting and wildlife viewing. Addressing these risks will require balancing ecological sustainability and the management of ecosystems for public benefit. Additional areas at risk for non-ecological reasons are: recreation programs and use, infrastructure, and economic and social conditions. These risks and their causes are discussed below, followed by a discussion of how future management approaches and plan direction could make use of opportunities that might mitigate risk.

Water

The ability of the Gila NF to continue to supply the quantity of surface and groundwater to meet existing needs of local counties and communities is at high risk of being unsustainable. Although drought is a common occurrence, climate change is expected to increase the frequency and severity of drought and alter the timing, duration and magnitude of streamflow. Many areas at high elevation that are important to streamflow and groundwater recharge have experienced large extents of high and moderate severity fire resulting in loss of forest cover, vegetative groundcover and soil. In these areas, the ability of the watershed to capture, store and release water is reduced. Water quality has also been negatively impacted.

The Gila NF contributes the majority of water to the Upper Gila, Upper Gila-Mangas, and Mimbres subbasins and is a significant contributor to the San Francisco subbasin. The Forest contributes a smaller portion to seven other subbasins, including Elephant Butte Reservoir and Caballo. A large proportion of the population in the assessment area resides within the Mimbres, San Francisco, Elephant Butte and Caballo subbasins. To reduce this risk to water availability and quality, the Forest can improve watershed health and function to maintain or recover water retention and infiltration. Vegetation and soil management that focuses on the restoration and maintenance of terrestrial and riparian ecological integrity is required to reduce this risk.

Forage for Livestock Grazing

The ability for the Gila NF to provide adequate forage to contribute to opportunities for livestock grazing in southwestern New Mexico is at risk of being unsustainable. The encroachment of conifer tree species has reduced the size of grassland openings and the quantity of available grasses that are necessary to provide sustainable forage on the Forest. Recent drought has contributed to the decrease in quality and quantity of available forage in some areas on the Forest. Climate change in general creates risk of invasive species establishment.

Recent drought and voluntary livestock reductions due to market conditions have resulted in the fluctuation of authorized (actual) livestock numbers in the last several years, while permitted numbers have remained constant. The Forest has utilized adaptive management to work with permittees to adjust authorized livestock numbers to maintain and protect forage, which has been stressed from recent drought conditions. Vegetation management that focuses on the restoration and maintenance of ecological integrity is required to address this risk.

Hunting and Wildlife Viewing

The ability for the Gila NF to sustain habitat for many terrestrial and aquatic species are at risk of being unsustainable. Wildlife and fish habitat faces threats from uncharacteristic wildfire, woody species encroachment, drought, climate change, and invasive species. Habitats may become fragmented causing terrestrial and aquatic populations to become isolated which may result in increasing competition and decreasing population numbers. Aquatic species may be impacted by decreasing stream flows and associated increase temperatures. Habitat and population changes may decrease hunting and wildlife viewing opportunities for certain species, while possibly increasing opportunities for other species. Management that focuses on the restoration and maintenance of ecological integrity of terrestrial, aquatic and riparian ecosystems is required to address this risk.

Timber

Current stands contain more small trees, and fewer large trees than existed in the past, increasing the amount of ladder fuels. Relatively drier climatic conditions and slow decomposition rates, combined with the interruption of historical fire return intervals, have resulted in large accumulations of burnable materials. Current tree growth rates are commonly slow, and stand vigor is declining as competition for water, nutrients, and growing space has increased as a result of higher tree density. The low level of tree and stand vigor makes trees more susceptible to insect attack and disease mortality, combined with increased density of vegetation and continuity of fuels coalesces in an increased risk of severe effects from wildfire. Timber management activities on the Gila National Forest are trending toward targeting improvements to forest structure and function. Addressing mid- and overstory conditions is critical to these restorative efforts, as this affects overstory species composition, stand structure, potential crown fire starts and spread, stand density, and influences on understory conditions.

This approach includes selective cutting methods paired with prescribed burning, intended to develop and maintain uneven-aged forest conditions that are considered more resilient to natural disturbance, and thus more sustainable long-term. However, their extent covers only a small fraction of the landscape. Treatments are limited in part by workforce capacity and current forest plan standards that are very prescriptive, restraining management options across broad extents. The magnitude of prescribed burning accomplishments is affected by weather and other environmental factors that can be highly variable year to year, and is limited by air quality regulations, and to a lesser degree, workforce capacity and concerns over public safety and values at risk (i.e. water quality, wildlife habitat, soil productivity). Long-term benefits to ecosystem resilience, disturbance regime, nutrient cycling, biodiversity and food webs, old-growth condition, overall hydrologic function, wood products, and aesthetics and recreation can outweigh short-term negative impacts. Across the nation and in the Southwest, there is broad public support for actively managing forests to be more resilient to threats. In response, the Gila National Forest is generally shifting planning and implementation efforts to encompass larger landscapes. This work will be completed within the agency as well as with the assistance of partners that would include Federal, State, and local government agencies, conservation groups, businesses, and any other interested stakeholders. The Gila NF's primary contribution of timber and forest products is to local communities around the Forest for logs, firewood, and other forest products. An increased emphasis on land restoration projects should allow for the continued ability to contribute to this demand.

Recreation Programs and Use

The ability for the Gila NF to remain relevant and responsive to changing recreation user trends, adapting to fluctuations in budget, and ability to adequately maintain existing recreation infrastructure are at risk of being unsustainable. Many of the Forest recreation programs and opportunities are not aligned with current visitation trends and demands. The Forest has many developed recreation facilities that have been heavily impacted by fires and floods; are in declining condition due to an increased backlog of deferred

maintenance; and/or not properly designed to provide the desired services. The Forest cannot adequately maintain all of its facilities to standard. Many of developed recreation sites are currently being managed to accommodate many different uses within the same site, which can result in a site not properly functioning to meet the need of any of the desired uses. In addition, many developed sites are located within floodplains which poses safety hazards and limits the opportunity to redesign the site to better meet the needs of the public

The Gila NF has a total of 1,927 miles of system trails. The perception of trails across the Forest is that there are more miles of trail than can be maintained by the Forest. This combined with the Forest trail system being heavily impacted by many recent large, high severity fires has resulted in the decline of trail conditions. Several popular trails receive regular maintenance which provides users a quality trail experience, but the majority of system trails are less traveled and tend to be in need of significant maintenance. The large percentage of trails needing significant maintenance combined with having more miles of trails than that can be maintained is causing a trend of losing many miles of trail over time. Another trend is increased conflicts on trails occurring between hikers, equestrian users, and mountain bikers near urban trail systems in certain parts of the Forest.

The ability of the Gila NF to provide meaningful recreation opportunities and experiences is an important social and economic contribution to local communities and businesses. The Gila NF has developed a Sustainable Recreation Strategy Action Plan to move towards a more flexible and efficient organization that can better align opportunities that meet the needs of current users, are economically feasible, and can be adapted to future changing recreation trends. A sustainable recreation program may require closing underutilized recreation sites, the planning and development of new sites, and/or upgrading existing sites to meet user needs and desires. The current trail system needs to be assessed to create a more manageable trail system that better meets the needs of trail users while reducing the potential for user conflicts.

Infrastructure

The ability of the Gila NF to maintain its current infrastructure is at risk of being unsustainable. Over the last 20 years, the Gila NF has invested millions in mission critical and non-critical facilities. Money has been spent to upgrade facilities to be more energy efficient, abate hazardous materials and other health hazards as well as decommission and demolish facilities no longer needed for service. The Forest's trail system is in fair to poor condition, and its roads and bridges are currently safe for visitor travel. Much of the infrastructure on the forest is old and in continual need of routine maintenance. The backlog of required large maintenance repairs has perpetually increased, and is currently valued at several million dollars. Funding levels have decreased in recent years, while the cost to perform maintenance has increased. The inability to adequately maintain existing infrastructure could result in negative impacts on the management of the Forest resources. The expectation is that future funding will not increase, resulting in a decline in the condition infrastructure across the Forest. This will force decisions on the possibility of consolidating, decommissioning, limiting future development, and / or relocating infrastructure to create a sustainable program.

The Gila NF's transportation system is integral to supporting the many uses and opportunities enjoyed by the public. Local businesses and communities benefit from visitors who want to use the Forest because they can safely access and experience the Forest on NFS roads and trails. Gaining access to the Forest through roads and trails are important for local residents to continue their traditional uses, which are integral in maintaining the social and cultural fabric of many Forest communities. Recreation infrastructure (i.e., trails, roads, campgrounds, and toilet facilities) allow for recreation opportunities, which support communities directly (e.g., outfitter guide jobs) and indirectly (e.g., increased tourism in community lodges, shops, and restaurants). Infrastructure contributes to ecological sustainability when it

is properly designed, integrated within the landscape, and well maintained. The wildlife guzzlers provide fresh drinking water in times of low rainfall and when natural water sources are scarce.

Negative economic and social contributions could include having to close sites, because funds are inadequate to provide appropriate maintenance to keep sites safe for human use. Closures would reduce or limit opportunities to access and gain enjoyment of recreational resources and experiences. Negative ecological sustainability would result from a key dam failure, major road or trail erosion, or issues with septic systems.

Economic and Social Conditions

The ability of the Gila NF to continue contributing the social and economic benefits (e.g., recreation programs and use, infrastructure, ranching and grazing, and recreational hunting) desired by local communities, families, and the visiting public is at risk. These Forest uses contribute to the many benefits for communities and families (i.e., local traditional uses, social and family traditional values) and the economic opportunity within the assessment area. The ability to recreate on the Forest provides intrinsic values, such as a connection to nature, family togetherness, and improved physical and mental health. Infrastructure provides the ability to access and use the Forest. Without safe, available infrastructure Forest users would be limited in their ability to maximize the many benefits the Forest contributes. For some forest users grazing and ranching are their primary source of income, or an important supplement to their income. Grazing and ranching provide strong cultural and family connections for many communities and families around the Forest. Hunting contributes to the economic opportunity for local sportsman, businesses, and outfitters. The State of New Mexico and local communities receive important revenue from sales of licenses, taxes, and other economic activity resulting from wildlife associated recreation including hunting, fishing, and trapping. Hunting provides a strong social and cultural connection for families, to each other and to the land.

The Gila NF is a Forest surrounded by many small towns, communities, and people who rely upon the Forest to provide resources and uses important to their social and cultural traditions and way of life, and as a means of contributing economic opportunity. Forest management that focuses on contributing to these needs, while maintaining the ecological integrity of the Forest, is required to address this risk.

The Gila NF is an integral part of the local cultures and communities it serves. Relationships with local communities and groups are vital in Forest management and in providing services to local and visiting Forest users. Poor or ineffective communication with the public and the inability to establish partnerships for completing work on the Forest were two issues identified by the public, when the Forest Service held community meetings in 2015. Given the future potential for declining budgets and workforce, the Gila NF will need to engage other public and private entities to effectively manage the Forest resources to continue to provide for the needs and desires of the public. The Forest is engaging with private and public entities to acquire funding for watershed restoration work and working with partners on forest restoration projects through the Collaborative Forest Restoration Program. The Forest will need to be creative in accomplishing other work related to recreation, minor maintenance, and education programs. The challenge for the Forest will be in developing the capacity and expertise to identify, plan, and manage new partners and volunteers. For the new Gila forest plan to be successful, the public and the Forest Service will need to share ownership and implementation of the new forest plan.