Apache-Sitgreaves National Forests Land Management Plan

Socioeconomic Resource Report

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Introduction

Currently, the 2000 National Forest System Land and Resource Management Planning Rule (2000 rule) guides the revision effort for the Apache-Sitgreaves National Forests (Apache-Sitgreaves NFs). The Forest Service is following the provisions of the 1982 National Forest System Land and Resource Management Planning Rule (1982 rule) through the 2000 rule transition language (36 CFR 219.35(b)). This report provides social and economic analysis, including past and current conditions and the environmental consequences of the four alternatives on the social and economic environment.

The Apache-Sitgreaves NFs are located in eastern Arizona and encompass a vast landscape with a wide range of elevations and vegetation types.

The earliest inhabitants of the area comprising the present-day Apache-Sitgreaves NFs and surrounding lands trod lightly upon the land at least 13,000 years ago. They followed the migrating mammoth and later the buffalo, leaving only spear points to mark their presence. As early as 2,000 years ago, the Ancestral Puebloans arrived and shared the White Mountains with the Mogollon people already there. By the time the Apache, Navajo, and Yavapai arrived in the 1400s, the Puebloans were gone. After the mid-1500s, the Spanish continued a modest forest use, although they used the forests for fuel, structures, and fence posts more than the Native Americans did.

From 1821 to 1848, the Mogollon Rim forests were part of the Republic of Mexico. When the United States acquired the territory from Mexico, those lands became a part of the "public domain" if they were not owned by private individuals, including earlier Spanish and Mexican land grants. The land was opened under various laws to settlement, purchase, and use. Only after the American Civil War and the completion of the railroads did a great change in public land use begin in Arizona. Domestic enterprises like cutting timber, mining, and raising cattle were to become corporate enterprises with national and international markets.

The territory of Arizona urged the sale of all of the territorial timberlands at public auction in 1879. In 1880, Congress authorized the citizens of Arizona to "fell and remove timber from the public domain for mining and domestic purposes." Timber production in Arizona and New Mexico, estimated at 8 million board feet in 1879, rose to 22 million in 1889 and 67 million in 1900. Cattle grazed on the forests' open ranges in ever-greater numbers, increasing from 172,000 head in 1880 to 1.5 million by 1890. In 1891, Congress authorized the President to designate particular areas of forested public domain as "reserves," to be set aside for future use. The reserves were, by law, completely closed to public use and there was no management or supervision of the land. Congress restricted the President's authority in 1897, authorizing him to establish reserves only to preserve timber, protect watersheds, and provide lumber for local use.

On August 17, 1898, the Black Mesa Reserve (North and South) was established. By 1900, once-lush grasslands could no longer support large numbers of livestock. It was becoming painfully clear to Southwesterners that the renewable and nonrenewable resources of the Southwest were being depleted. The Secretary of Agriculture announced in 1905 the transfer of the Forest Reserves to the Department of Agriculture, as authorized by Congress. Some 21 million acres of public lands, almost one-eighth of the land area of Arizona and New Mexico, were now to be administered by a regional subdivision of the Forest Service. The Forest Service was charged to maintain the permanence of national forest resources, while providing for their use. In 1907, Black Mesa Reserve was made a national forest with its headquarters in Show Low, Arizona. In 1908, Theodore Roosevelt established the Sitgreaves NF from parts of the Black Mesa North Reserve and the Tonto NF. The Apache NF was established the same year from portions of the Black Mesa South Reserve and other neighboring forest reserves.

Arizona's population increased dramatically following World War II, but little changed in the rural communities surrounding the Apache and Sitgreaves NFs. Logging, grazing, and mining were important

economic factors in the local communities and the forests provided employment where few jobs were available. In 1974, the Apache NF was combined administratively with the Sitgreaves NF to become the Apache-Sitgreaves NFs.

The study areas for the economic analysis are consistent with the areas defined in the Economic and Social Sustainability Assessment (U.S. Forest Service 2009). Affected environment analysis uses all of Apache, Navajo, Coconino, and Greenlee Counties in Arizona and Catron and Grant Counties in New Mexico. The environmental consequences analysis uses zip code-level data to better capture the economic links between the forests and the surrounding communities. Table 22 in Appendix A: IMPLAN Study Area provides the zip codes used in the economic impact analysis. The northern sections of Apache and Navajo Counties, and most of Coconino County, are excluded from the environmental consequences analysis due to their physical distance from the forests. The forests' land-base lies in the Arizona counties; however, the New Mexico counties were included because of use patterns and economic trade flows. Table 1 reports the number of Apache-Sitgreaves NFs acres by county. Greenlee County has the most acres at 751,619.

Table 1. Apache-Sitgreaves NFs Acres by County

County, State	Acres
Apache County, AZ	493,481
Coconino County, AZ	285,693
Greenlee County, AZ	751,619
Navajo County, AZ	487,257
Catron County, NM*	--
Grant County, NM	--

Source: U.S. Forest Service 2008
*Note: Apache NF lands in Catron County are administered by the Gila NF and are not considered in this analysis

Affected Environment

The affected environment section is split into three parts: population and demographics, employment and income, and environmental justice.

Population and Demographics

This section highlights population and demographic trends in the study area. Population is an important consideration in managing natural resources. In particular, population structure (size, composition, density, etc.) and population dynamics (how the structure changes over time) are essential to describing the consequences of forest management and planning on a social environment (Seesholtz et al. 2004). Population increases may lead to conflicts over land use, travel management, recreation activities, and values. These are conflicts that Forest Service managers attempt to balance when making management decisions.

Population Growth

The study area counties are home to 355,064 people (U.S. Census Bureau 2010). Table 2 displays population data for the counties, their respective states, and the Nation in 1990, 2000, and 2010.

Table 2. Population Change, 1990-2000 and 2000-2010

	1990	2000	% Growth, 1990-2000	2010	% Growth, 2000-2010
Apache County, AZ	61,591	69,423	12.7%	71,518	3.0%
Coconino County, AZ	96,591	116,320	20.4%	134,421	15.6%
Greenlee County, AZ	8,008	8,547	6.7%	8,437	-1.3%
Navajo County, AZ	77,658	97,470	25.5%	107,449	10.2%
Catron County, NM	2,563	3,543	38.2%	3,725	5.1%
Grant County, NM	27,676	31,002	12.0%	29,514	-4.8%
Study Area Total	274,087	326,305	19.1%	355,064	8.8%
Arizona	3,665,228	5,130,632	40.0%	6,392,017	24.6%
New Mexico	1,515,069	1,819,046	20.1%	2,059,179	13.2%
United States	248,709,873	281,421,906	13.2%	308,745,538	9.7%

Source: U.S. Census Bureau 1990, 2000, and 2010

The data reveal substantial diversity between counties. The counties range in size from 134,421 residents in Coconino County, AZ (which accounts for more than one-third of total study area population) to 3,725 in Catron County, NM. Both Coconino and Navajo Counties (AZ) have more than 100,000 residents, while Greenlee County, AZ and Catron County, NM both have fewer than 10,000 residents.

In addition to population size, the counties are diverse in terms of growth rates. All study area counties experienced population growth between 1990 and 2000. However, growth slowed between 2000 and 2010. Indeed, two counties (Greenlee County, AZ and Grant County, NM) lost population during the latter decade. In both periods, the population growth rate in the study area was below the population growth rates in Arizona and New Mexico.

Rapid population growth may signal expanding economic opportunities and/or desirable amenities. On the other hand, slow or negative population growth may signal an aging population (deaths exceed births) and low net migration (or out-migration). Forest Service management can affect both natural amenity provision and economic opportunities. Areas with large populations or rapid population growth are less likely to be acutely affected by Forest Service management, while areas with small populations or stagnant/negative growth are likely more vulnerable to Forest Service actions that may affect community appeal.

Population Density

Population density can serve as an indicator of a number of socioeconomic factors of interest: urbanization, availability of open space, socioeconomic diversity, and civic infrastructure (Horne and Haynes 1999). More densely populated areas are generally more urban, diverse, and offer better access to infrastructure. In contrast, less densely populated areas provide more open space, which may offer natural amenity values to residents and visitors. Table 3 displays the number of people per square mile for each of the counties of interest.

Despite population growth in most of the counties, the number of people per square mile remains quite low. Every study area county is less dense than its respective state and the Nation as a whole. Catron County, NM has the lowest population density, with only one person for every two square miles. Even the most densely populated county (Navajo County, AZ) has many fewer people per square mile than either the state (Arizona) or the Nation.

These findings suggest that most of the study area is quite rural. Low population density also points to high levels of public ownership. In all of the Arizona counties included in the analysis, a minority of the land is privately owned. Navajo County, AZ has the highest private ownership rate at 30 percent, but the majority of land is publicly owned (Forest Service, BLM, and State lands) or American Indian reservation land. In Greenlee County, AZ only 8.1 percent of the land is privately owned, which accounts for the low population density in the county (Arizona Department of Commerce 2008).

Table 3. Population Density

	People/Sq. Mile
Apache County, AZ	6.4
Coconino County, AZ	7.2
Greenlee County, AZ	4.6
Navajo County, AZ	10.8
Catron County, NM	0.5
Grant County, NM	7.4
Arizona	56.3
New Mexico	17.0
United States	87.1
Source: U.S. Census Bureau 2010	

Age and Gender

As with other population characteristics, the median age varies substantially between counties. Apache, Coconino, Greenlee, and Navajo Counties (AZ) are all relatively young with median ages below the state and national medians. In contrast, the New Mexico counties (Catron and Grant) exceed the state and national median ages by nearly a decade in Grant County and almost 20 years in Catron County. A high median age generally indicates that a relatively large number of retirees reside in the area. An area with a large percentage of retirees will earn income primarily from investments and transfer payments (e.g., dividends and Social Security), rather than salaries and wages.[1]

Table 4. Median Age

	Median Age
Apache County, AZ	32.4
Coconino County, AZ	31.0
Greenlee County, AZ	34.8
Navajo County, AZ	34.7
Catron County, NM	55.8
Grant County, NM	45.9
Arizona	35.9
New Mexico	36.7
United States	37.2
Source: U.S. Census Bureau 2010, Table DP-1	

[1] This prediction is borne out in the non-labor income data presented in Table 10. More than 50 percent of the income in Catron and Grant Counties (NM) comes from non-labor sources.

Age data may be relevant for forest management decisions. A population's age may affect community values and uses associated with National Forest System (NFS) lands. For example, older populations are more likely to desire easily accessible recreation opportunities.

Gender disparities in counties (i.e., deviations from a 50/50 split) may have numerous explanations, including (1) the significant presence of an industry that is often dominated by one gender (e.g., forestry or mining; (2) a large number of single-parent households; (3) a large retiree population, which due to differences in life expectancy often leads to a higher concentration of women; and (4) a combination of the above and other unnamed factors.

Table 5 displays the gender breakdown for the study area counties, the states, and the Nation. Most of the counties have gender distributions similar to the national distribution. Greenlee County, AZ and Catron County, NM, however, diverge from these trends. In these counties, the male population exceeds the female population by three percentage points or more.

Table 5. Gender Distribution

	Females (% Total Population)	Males (% Total Population)
Apache County, AZ	50.1	49.9
Coconino County, AZ	50.4	49.6
Greenlee County, AZ	47.9	52.1
Navajo County, AZ	50.0	50.0
Catron County, NM	47.7	52.3
Grant County, NM	50.9	49.1
Arizona	50.3	49.7
New Mexico	50.6	49.4
United States	50.8	49.2
Source: U.S. Census Bureau 2010, Table DP-1		

Educational Attainment

Educational attainment, the measure of people with at least a high school diploma or bachelor's degree, is an important indicator of an area's social and economic opportunities and its ability to adapt to change. Table 6 lists the percentage of the adult population with at least a high school diploma and a bachelor's degree.

Thirty percent of Coconino County, AZ residents have at least a bachelor's degree, a rate that exceeds the rate in any other study area county, either state, and the Nation. Catron and Grant Counties (NM) have educational attainment rates that are comparable to state and national averages. Greenlee County (AZ) has a high percentage of high school graduates, but the percentage of adults with at least a bachelor's degree is approximately half of state and national averages. Apache and Navajo Counties (AZ) have the lowest educational attainment rates in the study area. Both counties fall below state and national educational attainment rates.

Table 6. Educational Attainment, Percent of Persons Age 25+

	High School Graduate	Bachelor's Degree or Higher
Apache County, AZ	72.1%	10.3%
Coconino County, AZ	87.0%	31.1%
Greenlee County, AZ	89.8%	13.4%
Navajo County, AZ	80.5%	14.4%
Catron County, NM	86.0%	21.3%
Grant County, NM	85.3%	24.1%
Arizona	85.0%	26.3%
New Mexico	82.7%	25.5%
United States	85.0%	27.9%
Source: U.S. Census Bureau 2010, Table DP02		

High educational attainment rates generally exist in areas with plentiful employment opportunities for working-age adults with high levels of education. The presence of highly educated adults may be self-reinforcing: a highly educated population is a signal that an area provides economic and cultural opportunities, which attracts additional college-educated adults to the area. This process leads to further economic development and job creation. In contrast, areas with low levels of educational attainment are less able to adapt to economic change (Florida 2002). Areas with lower educational attainment (i.e., Apache and Navajo Counties) are less resilient to change. As a result, land management actions are more likely to adversely affect social and economic well-being in these counties.

Forest Visitors

Table 7 reports Apache-Sitgreaves NFs visitor activity participation. Relaxing, viewing natural features, viewing wildlife, hiking/walking, driving for pleasure, and fishing are activities in which more than half of forest visitors engage. Relaxing is the most common main activity (i.e., the primary purpose of the forest visit), followed by fishing, hiking/walking, and camping in developed sites.

Table 7. Forest Activity Participation

Activity	Percent Participation (more than one activity could be checked)	Percent Who Indicated as Primary Activity
General-relaxing, escaping noise and heat	84.2	41.3
Viewing natural features (scenery) on NFS lands	79.3	3.5
Viewing wildlife on NFS lands	73.5	1.0
Hiking or walking	62.2	8.7
Driving for pleasure on roads	53.3	3.2
Fishing-all types	50.5	19.6
Picnicking and day gatherings in developed sites	47.8	1.5
Camping in developed sites	35.7	7.2

Activity	Percent Participation (more than one activity could be checked)	Percent Who Indicated as Primary Activity
Gathering mushrooms, berries, firewood, etc.	27.6	0.2
Primitive camping	19.4	3.3
Visiting nature center or visitor information services	18.3	0.5
Resorts and cabins on NFS lands	13.7	0.0
Bicycling, including mountain bikes	11.5	0.3
Off-highway vehicle travel	11.3	4.0
Visiting historic and prehistoric sites	11.0	0.1
Other non-motorized activities (swimming, sports)	6.9	0.9
Motorized water travel (boats, jet skis)	6.8	0.2
Non-motorized water travel (canoe, raft)	6.4	0.0
Nature study	4.8	0.0
Backpacking and camping in unroaded areas	4.0	0.1
Horseback riding	3.4	0.4
Hunting-all types	3.0	1.3
Other motorized land/air activities (plane, other)	1.1	0.0
Downhill skiing or snowboarding	0.1	0
Snowmobile travel	0	0
Cross-country skiing, snowshoeing	0	0
Source: U.S. Forest Service 2001		

Employment and Income

The previous section assessed demographic trends in the study area relative to the state and national averages. This section focuses on economic conditions and trends. This discussion provides additional information on the social and economic environment in the study area.

Per Capita Income

Per capita income is a key indicator of the economic well-being of a county. High per capita income may signal greater job opportunities, highly skilled residents, greater economic resiliency, and well-developed infrastructure. Table 8 provides data on per capita income in 2010 for the counties, states, and Nation.

Coconino County, AZ has the highest per capita income in the study area, which is consistent with the demographic data presented above. Coconino County has the highest proportion of college-educated adults (Table 6) and its population grew nearly 40 percent between 1990 and 2010 (Table 2). However, all counties in the study area have lower levels of per capita income than their respective states and the Nation.

Table 8. Per Capita Income, 2010 US Dollars

	Per Capita Income
Apache County, AZ	$12,294
Coconino County, AZ	$22,632
Greenlee County, AZ	$21,281
Navajo County, AZ	$16,745
Catron County, NM	$20,895
Grant County, NM	$21,164
Arizona	$25,680
New Mexico	$22,966
United States	$27,334
Source: U.S. Census Bureau 2010, Table DP03	

Apache and Navajo Counties (AZ) have the lowest per capita income in the study area. Per capita income in Navajo County, AZ is approximately $10,000 less than per capita income in Arizona. In Apache County, AZ per capita income is less than half of statewide per capita income. Apache County is the 16th poorest county in the nation, based on per capita income (Navajo County is the 192nd poorest) (U.S. Census Bureau 2009). The per capita income data, grouped with demographic data, suggest that many residents of Apache and Navajo Counties (AZ) are socially and economically vulnerable. This is discussed in greater detail in the Environmental Justice section.

Per capita income considers all sources of income including wages and salary payments, transfer payments, investment earnings, dividends, and rents. The poorest counties likely receive much of their income in the form of transfer payments, such as unemployment insurance and Supplemental Nutrition Assistance Program payments. These findings are borne out in the non-labor income and employment sections that follow.

Median Earnings

Per capita income offers an incomplete picture of the economic well-being of an area. Table 9 presents data on median earnings for workers. Whereas per capita income considers all sources of income: median earnings considers only wage and salary earnings.

Table 9. Median Earnings for Workers, 2010 US Dollars

	Median Earnings for Workers
Apache County, AZ	$22,541
Coconino County, AZ	$22,473
Greenlee County, AZ	$35,068
Navajo County, AZ	$22,524
Catron County, NM	$24,375
Grant County, NM	$21,711
Arizona	$29,573
New Mexico	$25,115
United States	$29,701
Source: U.S. Census Bureau 2010, Table DP03	

When only median earnings for workers are considered, the economic conditions in Apache and Navajo Counties (AZ) do not seem to meaningfully diverge from the rest of the counties in the study area. Comparing per capita income and median earnings data for Apache and Navajo Counties (AZ) suggests that the residents who are employed in these counties work in similarly remunerative occupations as residents of other study area counties, but that a smaller proportion of Apache and Navajo County (AZ) residents are employed. The employment characteristics of individuals in these counties are addressed further in the two subsequent sections – non-labor income and unemployment. The higher median earnings for Greenlee County reflect the wages paid by the mining industry.

Income and earnings data are incomplete without a discussion of cost of living. The topic is addressed further in the Housing section of this report.

Non-Labor Income

Table 10 displays the role of labor and non-labor income in total personal income for 2000 and 2009. Non-labor income is any income derived from investments, dividends, rents, or transfer payments. In contrast, labor income is salary and wage disbursements from employment. During this past decade, the percentage of total income derived from non-labor sources increased in all considered areas.

Non-labor income is not directly tied to employment; therefore, it can be more resistant to economic downturns. However, as the most recent recession demonstrated, asset markets can be quite volatile, and non-labor income that depends on investment returns may be unstable.

An increase in non-labor income may reflect changing demographic characteristics. Older populations rely largely on non-labor income, including rents, dividends, and transfer payments (e.g., Social Security). High percentages of non-labor income likely indicate higher concentrations of retirees.

Table 10. Contribution of Labor and Non-Labor Income to Total Personal Income, 2000 and 2009

	2000		2009	
	Labor %	**Non-Labor %**	**Labor %**	**Non-Labor %**
Apache County, AZ	56%	44%	47%	53%
Coconino County, AZ	64%	36%	62%	38%
Greenlee County, AZ	74%	26%	61%	39%
Navajo County, AZ	58%	42%	47%	53%
Catron County, NM	46%	54%	42%	58%
Grant County, NM	55%	45%	47%	53%
Arizona	68%	32%	62%	38%
New Mexico	66%	34%	62%	38%
United States	69%	31%	64%	36%
Source: U.S. Bureau of Economic Analysis 2011				

The finding that in 2009 Apache and Navajo Counties (AZ) derive more than half of total personal income from non-labor sources seems incongruent with assumption that a high percentage of non-labor income indicates a large retiree population. As Table 4 shows, both Apache and Navajo Counties (AZ) have low median ages, below the state and national medians, which suggests a relatively small retiree population. However, as Table 8 presents, these counties have low per capita income and Table 11 shows that these

counties also have the highest unemployment rates in the study area. These findings suggest that residents of these counties are dependent on government transfer payments (e.g., unemployment insurance) for income.

The high proportion (exceeding 50 percent) of non-labor income in Catron and Grant Counties (NM) is likely the result of large retiree populations. These counties have the highest median ages (Table 4) in the study area. In these counties, non-labor income likely comes from both personal investments (e.g., dividends and rent) and government transfers (e.g., Social Security).

The distribution of labor and non-labor income in Coconino and Greenlee Counties (AZ) mimics the state and national distributions.

Unemployment

The unemployment rate provides insight into the correspondence between residents' skills and employment opportunities. The "natural" rate of unemployment is said to be around 5 percent. This is the so-called "natural" rate because this is a level that allows for movement between jobs and industries, but does not signal broad economic distress. Recently, the national unemployment rate has hovered between 9 and 10 percent. Table 11 provides the 2010 annual unemployment rate for the US, Arizona, New Mexico, and the study area counties.

Table 11. Unemployment Rate, 2010 Annual, Not Seasonally Adjusted

	Unemployment Rate
Apache County, AZ	16.4%
Coconino County, AZ	8.9%
Greenlee County, AZ	11.1%
Navajo County, AZ	15.7%
Catron County, NM	9.5%
Grant County, NM	10.9%
Arizona	10.0%
New Mexico	8.4%
United States	9.6%
Source: U.S. Bureau of Labor Statistics 2011	

As was suggested above, the discrepancies between per capita income and median earnings in Apache and Navajo Counties (AZ) can be partially explained by high unemployment rates in these counties. Apache and Navajo Counties (AZ) had the highest unemployment rates among study area counties, and they exceeded state and national rates. As a result, many residents in Apache and Navajo Counties (AZ) likely rely on unemployment insurance and other transfer programs targeting low-income individuals and families. The other counties have unemployment rates that are closer to state and national rates.

Housing

The above comparisons of per capita income and median earnings between the study area, states, and the Nation are incomplete. Data on local cost of living offer additional context. Of the contributions to cost of living, housing costs are among the most substantial. Table 12 presents median home values in 2010. Except for Coconino County (AZ), the study area counties have relatively low home values, below state and national medians. Therefore, although income is low in many study area counties, they also have relatively low living costs.

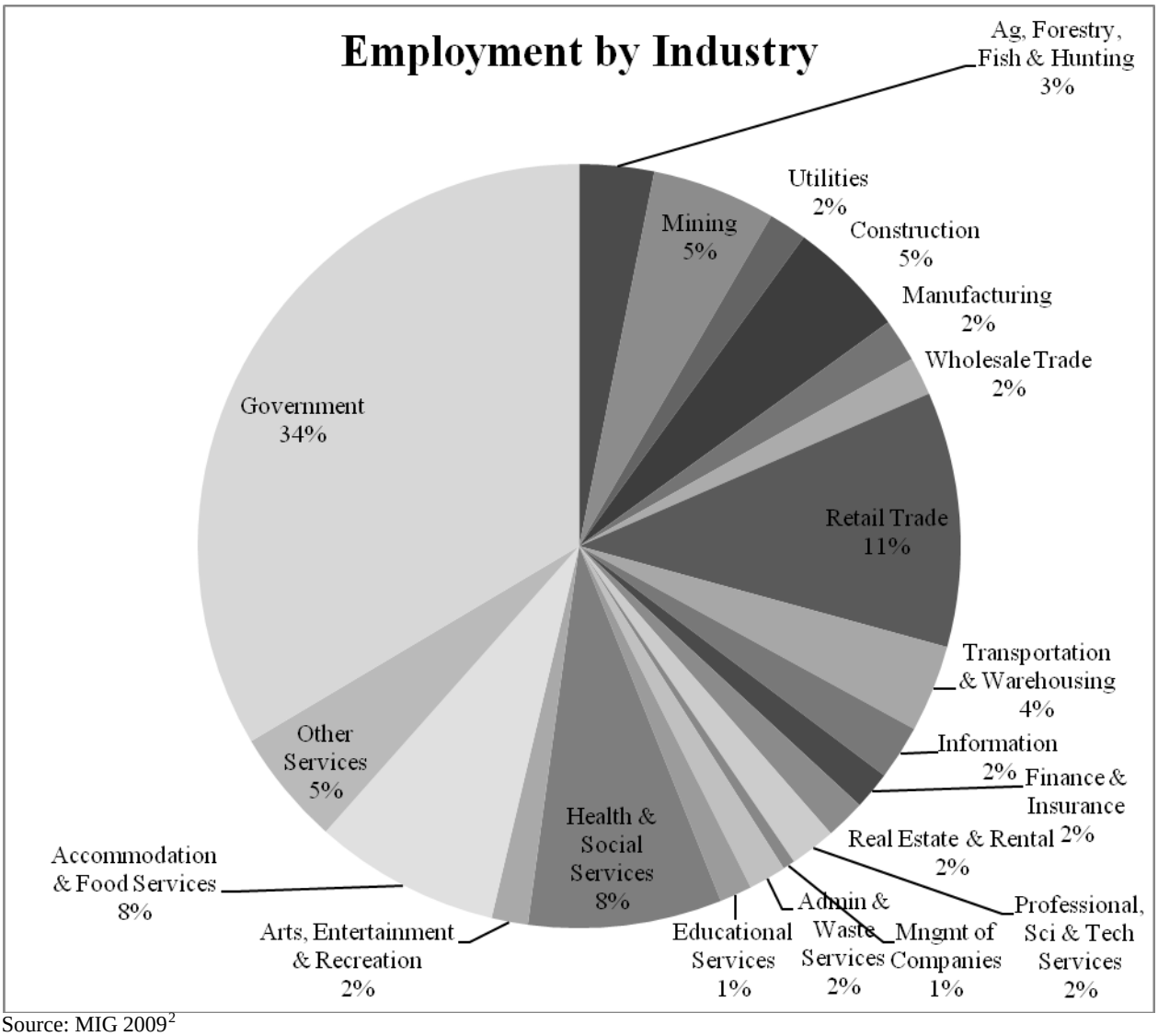
Table 12. Median Value of Owner-Occupied Homes, 2010 US Dollars

	Median Home Value
Apache County, AZ	$80,900
Coconino County, AZ	$257,700
Greenlee County, AZ	$65,800
Navajo County, AZ	$134,300
Catron County, NM	$129,400
Grant County, NM	$125,000
Arizona	$215,000
New Mexico	$158,400
United States	$188,400
Source: U.S. Census Bureau 2010, Table DP04	

Economic Diversity

Economic diversity generally promotes stability and offers greater employment opportunities. Highly specialized economies (i.e., those that depend on very few industries for the bulk of employment and income) are prone to cyclical fluctuations and offer more limited job opportunities. Determining the degree of specialization in an economy is important for decisionmakers, particularly when the dominant industry can be affected by changes in policy. For Forest Service decisionmakers, this is likely to be the case where the forest products industry or the tourism and recreation industries, for instance, are reliant on the local national forests.

Figure 1 provides a breakdown of employment by industry in the study area (this includes only the zip codes identified in Appendix A: IMPLAN Study Area). Government is the dominant sector: approximately one-third of the area jobs are in government. Retail trade, health and social services, and accommodation and food services each account for at least eight percent of local employment. These industries are consistent with findings discussed in the demographic section; namely, a substantial government presence due to public land management, a retiree population that consumes health and social services, and amenities that attract tourists who support the retail trade and accommodation and food services sectors.



Source: MIG 2009[2]

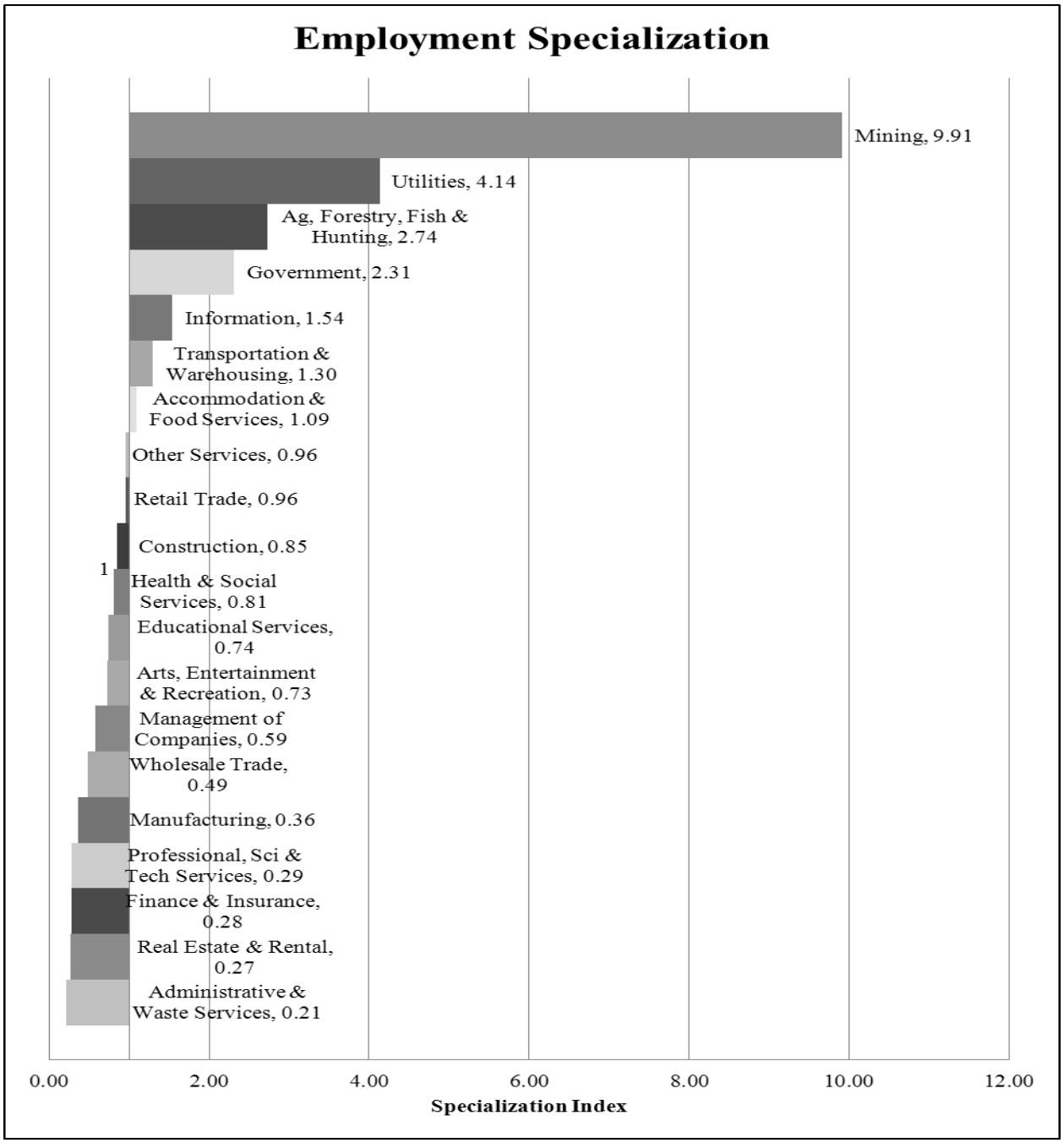
Figure 1. Employment by Industry in the Study Area

Figure 2 provides the employment specialization index (ratio of the percent employment in each industry within the study area to an average percent of employment in that industry for the State of Arizona). Within the agriculture sector (3 percent of study area employment), commercial logging accounts for 35 percent of employment and 29 percent of output, while cattle ranching accounts for 28 percent of employment and 40 percent of output (MIG 2009). Both of these activities occur on the forests.

The Interior Columbia Basin Ecosystem Management Project identified communities that were specialized with respect to employment. This method is applied here using the ratio of the percent employment in each industry in the region of interest (study area zip codes) to an average percent of employment in that industry for a larger reference area (the state of Arizona). For a given industry, when the percent employment in the analysis region is greater than in the reference area, local employment specialization exists in that industry (U.S. Forest Service 1998). Using this criterion applied with 2009 data, the study area can be characterized as

[2] The agriculture, forestry, fishing, and hunting sector includes crop and animal farming/ranching, commercial logging, commercial fishing, commercial hunting and trapping, and agricultural support activities.

specialized with respect to several industries, particularly mining, utilities, and agriculture, forestry, fishing and hunting (MIG 2009).



Source: MIG 2009

Figure 2. Employment Specialization

Whereas Figure 1 considers the study area in isolation, Figure 2 compares industry concentration in the study area to the state as a whole. The numbers on the x-axis of Figure 2 show the degree of specialization in the local economy. A score of one indicates that the study area and the state (Arizona) are equally specialized in the sector. A score above one indicates that the study area is more specialized in the sector than the state. A score below one indicates that the study area is less specialized in the sector than the state.

As the two figures demonstrate, these two methods of data analysis suggest quite different results. Mining accounts for 5 percent of employment in the study area, a relatively modest figure until it is put in the context of the state. A resident of study area is nearly 10 times more likely to be employed in the mining sector compared to residents of Arizona as a whole. Similarly, although government employment dominates Figure 1, the study area is only somewhat specialized in government employment compared to the state. Across Arizona, government employment provides a substantial percentage of total employment. Public lands (national forests, national parks, BLM-managed public lands, and state-owned lands), military installations, and tribal lands are common across the state. All of these features, in addition to the large share of state and local government employment, contribute to a sizeable government presence in Arizona. The large role that government plays in the Arizona economy makes it more likely that Forest Service decisions would affect economic activity and well-being. Since the study area is specialized in economic sectors that have direct links to public lands – particularly mining and agriculture, forestry, fishing and hunting – Forest Service management actions may have a more pronounced economic influence relative to an area with smaller natural resource sectors.

Payments to States and Counties

As mentioned previously, the forests encompass of approximately 2.1 million acres of eastern Arizona. The Forest Service makes payments to states and counties that contain NFS lands. These payments fall into two categories: Payments in Lieu of Taxes (PILT) and Secure Rural Schools and Community Self-Determination Act payments (SRSCS). Table 13 displays the payments to counties from the Apache-Sitgreaves NFs.

Federal agencies do not pay property taxes; therefore, PILT is distributed to counties to compensate for the local services that support activities on federal lands, such as law enforcement and road maintenance.

SRSCS payments are intended to improve public schools, maintain infrastructure, improve the health of watersheds and ecosystems, protect communities, and strengthen local economies.

Table 13. Payments to states and counties from the Apache-Sitgreaves NFs

	SRSCS (FY09)	PILT (FY10)	Total FS Payments
Apache County, AZ	$1,373,662	$1,183,201	$2,556,863
Coconino County, AZ	$392,119	$94,408	$486,527
Greenlee County, AZ	$903,978	$625,620	$1,529,598
Navajo County, AZ	$1,626,447	$274,601	$1,901,048
TOTAL	$4,296,206	$2,177,830	$6,474,036
Source: U.S. Forest Service 2010 and DOI 2010.			

Environmental Justice

In 1994, President Clinton issued Executive Order (EO) 12898. This order directs federal agencies to focus attention on the human health and environmental conditions in minority and low-income communities. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Environmental justice (EJ) is the fair treatment and meaningful involvement of people of all races, cultures, and incomes, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The goal of environmental justice is for Federal agency decisionmakers to identify impacts that are disproportionately high and adverse with respect to minority and low-income populations and identify alternatives that would avoid or mitigate those impacts. According to USDA DR5600-002 (USDA 1997), EJ, minority, minority population, low-income, and human health and environmental effects, are defined as follows:

> **Environmental Justice** means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment.
>
> **Minority** means a person who is a member of one or more the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black, or Hispanic.
>
> **Minority Population** means any readily identifiable group of minority persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities.
>
> **Low-Income Population** means any readily identifiable group of low-income persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities. Low-income populations may be identified using data collected, maintained and analyzed by an agency or from analytical tools such as the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty.
>
> **Human Health and/or Environmental Effects** as used in this Departmental Regulation includes interrelated social and economic effects.

The emphasis of environmental justice is on health effects and/or the benefits of a healthy environment. The Council on Environmental Quality (CEQ) has interpreted health effects with a broad definition: “Such effects may include ecological, cultural, human health, economic or social impacts on minority communities, low-income communities or Indian Tribes …when those impacts are interrelated to impacts on the natural or physical environment” (CEQ 1997).

According to US Census data reported in Table 14, study area counties differ substantially in their racial and ethnic composition.

Table 14. Race and Ethnicity, Counties, States, and Nation

	White	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races	Hispanic or Latino
Apache County, AZ	23.3%	0.2%	72.9%	0.3%	0.0%	1.3%	2.0%	5.8%
Coconino County, AZ	61.7%	1.2%	27.3%	1.4%	0.1%	5.2%	3.1%	13.5%
Greenlee County, AZ	77.2%	1.1%	2.3%	0.5%	0.1%	15.0%	3.8%	47.9%
Navajo County, AZ	49.3%	0.9%	43.4%	0.5%	0.1%	3.4%	2.5%	10.8%
Catron County, NM	89.8%	0.4%	2.7%	0.2%	0.0%	3.8%	3.1%	19.0%
Grant County, NM	84.9%	0.9%	1.4%	0.4%	0.1%	9.6%	2.8%	48.3%
Arizona	73.0%	4.1%	4.6%	2.8%	0.2%	11.9%	3.4%	29.6%
New Mexico	68.4%	2.1%	9.4%	1.4%	0.1%	15.0%	3.7%	46.3%
United States	72.4%	12.6%	0.9%	4.8%	0.2%	6.2%	2.9%	16.3%

Source: U.S. Census Bureau 2010, Table DP-1

Note: Totals do not sum to zero because Hispanic and Latino individuals may be of any race.

Apache and Navajo Counties (AZ) have very high concentrations of American Indian residents (73 and 43 percent, respectively). The Navajo Nation and the Fort Apache Indian Reservation are in both counties. The Hopi Indian reservation is in Coconino and Navajo Counties (AZ). Coconino County (AZ) also has a relatively large percentage (27 percent) of American Indian residents, resulting from the five reservations in the county.[3] Forty-three percent of the land in the study area is Native American land (U.S. Forest Service 2009). Grant County (NM) and Greenlee County (AZ) have higher percentages (48 percent in each county) of Hispanic/Latino residents than Arizona (30 percent), New Mexico (46 percent), and the Nation (16 percent).

Table 15 lists the poverty rates for the counties, states, and Nation. Apache and Navajo Counties (AZ) have the highest percentage of residents living in poverty. As with much of the other social and economic data presented for these counties, this finding suggests that Apache and Navajo Counties may be particularly vulnerable to changes that could affect livelihoods.

Apart from Apache and Navajo Counties (AZ), the study area counties have poverty rates that are roughly consistent with state and national rates. As of 2009, Apache County, AZ has the 35th highest poverty rate in the Nation (U.S. Census Bureau 2009).

Based on the minority status and poverty data presented above, Apache and Navajo Counties (AZ) appear most at risk for environmental justice issues. However, even in counties with relatively small minority populations and low poverty rates, disproportionate impacts to vulnerable groups may occur. The impact analysis considers the potential for Forest Service management actions to adversely affect all area residents, with a particular attention to any potential disproportionate impacts on minority and/or low-income residents.

[3] Coconino County contains all or part of the Navajo Indian Reservation, Hualapai Indian Reservation, Hopi Indian Reservation, Havasupai Indian Reservation, and Kaibab Indian Reservation.

Table 15. Percent of Persons Living in Poverty

	Poverty Rate
Apache County, AZ	34.4%
Coconino County, AZ	18.6%
Greenlee County, AZ	13.5%
Navajo County, AZ	24.4%
Catron County, NM	15.3%
Grant County, NM	14.8%
Arizona	15.3%
New Mexico	18.4%
United States	13.8%
Source: U.S. Census Bureau 2010, Table DP03	

Environmental Consequences

The previous sections assessed past and current social and economic conditions. The following section considers the potential consequences of alternative management scenarios on the social and economic environment. Section 219.12(h) of the 1982 rule directs the planning team to **"**evaluate the significant physical, biological, economic, and social effects of each management alternative that is considered in detail. The evaluation shall include a comparative analysis of the aggregate effects of the management alternatives and shall compare present net value, social and economic impacts, outputs of goods and services, and overall protection and enhancement of environmental resources." This section partially fulfills the evaluation requirements. The Data Sources section below describes the analysis procedures employed in this document.

Methodology and Assumptions

Data Sources

Economic impacts were modeled using IMPLAN Professional Version 3.0[4] with 2009 data. Data on use levels under each alternative were collected from the forests' resource specialists. In most instances, the precise change is unknown. Therefore, the changes are based on the professional expertise of the forests' resource specialists (1982 rule, 219.12(g)).

Financial efficiency analysis was conducted with QuickSilver Version 6. Data on program revenues and program expenditures were provided by the Apache-Sitgreaves NFs budget staff and resource specialists (1982 rule, 219.12(e)).

[4] IMPLAN is an input-output model, which estimates the economic impacts of projects, programs, policies, and economic changes on a region. IMPLAN analyzes the direct, indirect, and induced economic impacts. Direct economic impacts are generated by the activity itself, such as the value of cattle grazed on the Apache-Sitgreaves NFs. Indirect employment and labor income contributions occur when a sector purchases supplies and services from other industries in order to produce their product. Induced contributions are the employment and labor income generated as a result of spending new household income generated by direct and indirect employment. The employment estimated is defined as any part-time, seasonal, or full-time job. In the economic impact tables, direct, indirect, and induced contributions are included in the estimated impacts. The IMPLAN database describes the economy in 440 sectors using Federal data from 2009.

Social impacts use the baseline social conditions presented in the affected environment section, National Visitor Use Monitoring (NVUM) visitor profiles (U.S. Forest Service 2001), and information from the Economic and Social Sustainability Assessment (U.S. Forest Service 2009) to discern the primary values that the forests provide to area residents and visitors. Social effects are based on the interaction of the identified values with estimated changes to resource availability and uses.

Assumptions and Limitations

1. The financial efficiency analysis is from the vantage point of the forests - the only benefits considered are program revenues (i.e., forest receipts) and the only costs considered are direct forest expenditures. Therefore, the figures presented do not include all social costs and benefits of management decisions.

2. The economic impact of grazing was estimated using authorized levels. However, actual use is permitted annually based on various factors, such as current forage conditions. Therefore, the estimated economic impact of grazing is likely to overstate the jobs and income provided.

3. Changes in use levels were estimated using professional judgment. However, actual changes in use are difficult to predict and frequently depend on factors outside the control of the Forest Service.

4. The framework for the social analysis employs generalities. Area residents and forest visitors have diverse preferences and values that may not be fully captured in the description of social consequences. Nevertheless, the general categories are useful for assessing social impacts based on particular forest-related interests.

Summary of Effects

Economic Impact Analysis

Economic impact analysis estimates the employment and labor income consequences of forest management actions. Table 16 provides employment estimates, by alternative. Table 17 provides labor income estimates, by alternative. These tables are be referenced in the alternative-specific descriptions of economic impacts.

Data on use levels under each alternative were collected from the forests' resource specialists. In most instances, the precise change is unknown. Therefore, the changes are based on the professional expertise of the forests' resource specialists (1982 rule, 219.12(g)).

Regional economic impacts are estimated based on the assumption of full implementation of each alternative. The actual changes in the economy would depend on individuals taking advantage of the resource-related opportunities that would be supported by each alternative. If market conditions or trends in resource use are not conducive to developing some opportunities, the economic impact would be different than estimated here.

Wood products jobs, labor income, revenues, and present net value (Tables 16, 17, 20, and 21) are shown as ranges for Alternatives B, C, and D because low and high mechanical treatment acres were modeled. Mechanical vegetation treatment acres also vary by alternative theme (most acres cut in Alternative C, followed by Alternatives B, D, and A). Alternatives A and B use a mix of mechanical and fire to accomplish restoration treatments, while Alternative C emphasizes mechanical treatments and Alternative D uses primarily fire treatments. Acres that are mechanically treated (cut) result in wood products that could be offered to individuals and local and regional markets (see Table 18 for forest product volumes) and would affect the number of jobs created, labor income created, and NFS program expenditures and revenues.

Across many program areas, the employment estimates do not vary substantially between alternatives. Changes in forest product removal drive most of the expected difference in employment between alternatives, with Alternative C offering the highest expected wood products-related employment. Wood products employment is presented as a range to capture the high and low mechanical treatment objectives.

Although recreation management emphasis varies between alternatives, none of the alternatives is expected to change the economic impact of recreation. The alternatives may change how and where people choose to recreate (e.g., an increase in one type of activity and a decrease in another) but none of the changes are expected to lead to a net economic change. However, changes in recreation management emphasis may have social consequences that are not captured in employment and income data. The possible social consequences are discussed later in this document.

Table 16. Employment by Program Area, by Alternative

Program Area	Number of Jobs Contributed			
	Alternative A	Alternative B	Alternative C	Alternative D
Recreation	2,939	2,939	2,939	2,939
Grazing	120	120	120	120
Minerals	0	0	0	0
Wood Products	287	113-511	164-1,113	60-198
Payments to States and Counties	58	58	58	58
FS Expenditures	364	364	364	364
TOTAL	3,768	3,594 – 3,992	3,645 – 4,594	3,541 – 3,679
Source: IMPLAN 2009				

As with the employment estimates, labor income is not expected to differ substantially between alternatives. Most of the difference is driven by wood products-related labor income, which is estimated to be highest under Alternative C due to greater volumes of forest product removal.

Table 17. Labor Income by Program Area, by Alternative

Program Area	Labor Income Contributed			
	Alternative A	Alternative B	Alternative C	Alternative D
Recreation	$86,629,000	$86,629,000	$86,629,000	$86,629,000
Grazing	$1,296,000	$1,296 ,000	$1,296,000	$1,296,,000
Minerals	$19,000	$19,000	$19,000	$19,000
Wood Products	$9,562,000	$3,757,000 - $17,010,000	$5,454,000 - $37,035,000	$2,011,000 - $6,597,000
Payments to States and Counties	$2,588,000	$2,588,000	$2,588,000	$2,588,000
FS Expenditures	$17,520,000	$17,520,000	$17,520,000	$17,520,000
TOTAL	$117,614,000	$111,809,000 - $125,062,000	$113,506,000 - $145,087,000	$110,063,000 - $114,649,000
Source: IMPLAN 2009				

Table 18 provides the estimated annual forest product volumes available, by alternative. These volumes are used to estimate the economic impact of forest product-related activities on the forests. This table is referenced in alternative-specific descriptions of the economic consequences of forest product removal.

Table 18. Estimated Annual Forest Product Volumes, by Alternative

Forest Product	Alternative A Annual Volumes	Alternative B Annual Volumes	Alternative C Annual Volumes	Alternative D Annual Volumes
Harvest-Softwood 9+" Sawtimber (CCF)	57,382	22,544 – 102,082	32,733 – 222,253	12,786 – 68,056
Harvest-Softwood 5-9" Pulp (CCF)	19,155	4,805 – 31,318	7,349 – 63,959	1,985 – 15,802
Poles (CCF)	339	339	339	339
Posts (CCF)	137	137	137	137
Fuelwood (CCF)	25,445	55,029 -93,921	18,581 – 51,891	40,430 – 73,475
Biomass (TONS)	348,124	142,184 – 585,799	141,811 – 1,324,767	66,026 – 246,798
Source: Apache-Sitgreaves NFs Silviculture Staff				

Alternatives A and B would support approximately the same employment and income in the local economy. Alternative C would support the highest levels of Forest Service-related employment and income in the local economy. Alternative D would support the lowest levels of employment and income in the local economy.

Financial Efficiency Analysis

Financial efficiency analysis compares forest expenditures and revenues throughout the life of a land management plan. Present net value (PNV) is used as an indicator of financial efficiency and presents one tool to be used in conjunction with many other factors in the decisionmaking process. PNV combines benefits and costs that occur at different times and discounts them into a sum. A four-percent discount rate was used in the PNV calculations. Inflation can affect PNV, but is left at zero for this analysis in accordance with OMB Circular A-94. A positive PNV indicates that the alternative produces more than one dollar of value (revenues) for each dollar spent (expenditures). Financial efficiency analysis is not intended to be a comprehensive analysis that incorporates monetary expressions of all known benefits and costs. Many of the values associated with natural resource management are best handled apart from, but in conjunction with, a more limited financial efficiency framework.

Table 19 presents annual forest expenditures, by program area. These figures are based on average expenditures over three fiscal years (FY 2007 to FY 2009). Only the wood products expenditures are expected to vary in Alternatives C and D because of the greater and lesser, respectively, amounts of mechanical vegetation treatments proposed.

Table 19. Annual Apache-Sitgreaves NFs Program Expenditures, by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Range	$470,000	$470,000	$470,000	$470,000
Recreation	$1,371,000	$1,371,000	$1,371,000	$1,371,000
Minerals	$105,000	$105,000	$105,000	$105,000
Wood Products	$1,335,000	$1,335,000	$1,602,000	$1,068,000
Source: Apache-Sitgreaves NFs Budget Staff				

Table 20 shows annual forest revenues, by program area. Where available, these figures are based on average revenues over three fiscal years (FY 2007 to FY 2009). When three years of data were unavailable, the most recent year has been used. The wood products estimates are based on average inflation-adjusted wood products value per CCF. Grazing and mineral revenues are not expected to vary by alternative; there are no foreseeable changes. The only factor that could change grazing revenue is if the charge per head month or animal unit month is increased or decreased; however, that figure is set at the national level and is beyond the control of the Forest Service. Recreation revenues are not expected to change because most of this money is associated with recreation special use permits. The large campgrounds on the Apache-Sitgreaves NFs are under permit to concessionaires, with fees generally offset by maintenance of and improvements to the facilities. The wood products revenue figures are based on the outputs from the vegetation modeling.

Table 20. Annual Apache-Sitgreaves NFs Program Revenue by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Range	$175,500	$175,500	$175,500	$175,500
Recreation	$152,049	$152,049	$152,049	$152,049
Minerals	$15,963	$15,963	$15,963	$15,963
Wood Products	$722,382	$260,999 - $1,255,757	$380,434 - $2,689,133	$143,017 - $791,053
Source: Apache-Sitgreaves NFs Budget Staff				

Table 21 lists present net value (PNV) by program area and alternative. PNV is the difference between program revenues (benefits) and program expenditures (costs). The annual expenditures presented in Table 19 were summed over 15 years using a 4 percent discount rate (so that one dollar today is valued higher than one dollar in ten years). The sum of the discounted annual expenditures represents the present value of costs. The same exercise was conducted using the annual program revenues presented in Table 20. The sum of the discounted annual revenues represents the present value of benefits. The difference between the present value of costs and the present value of benefits is present net value. The higher the present net value, the more financially efficient the alternative. For example, Alternative B has a total PNV of approximately negative $20 million that is higher than the negative $27 million in Alternative A.

Table 21. Present Net Value (PNV) by Alternative and Program Area (15-year Period)

	Alternative A	Alternative B	Alternative C	Alternative D
Range	($3,568,865)	($3,568,865)	($3,568,865)	($3,568,865)
Recreation	($14,771,720)	($14,771,720)	($14,771,720)	($14,771,720)
Minerals	($1,078,985)	($1,078,985)	($1,078,985)	($1,078,985)
Wood Products	($7,423,943)	($13,015,166) – ($960,299)	($14,803,410) - $13,174,304	($11,209,304) – ($3,356,1526,985,946)
Total PNV	($26,843,513)	($32,434,737) – ($20,379,869)	($30,987,371) – ($3,009,657)	($33,628,874) – ($22,775,722)

Source: QuickSilver6 2010

*Note: Figures in parenthesis indicate a negative number

The range of values in the PNV (Table 21) in Alternatives B, C, and D reflects the range between the high and low mechanical treatment objectives. Alternative A is based on the average mechanical treatment objective.

The differences in PNVs between alternative**s** arise primarily from changes in the expected volume of forest product removal from the Apache-Sitgreaves NFs (Table 21). The wood product-related revenues and expenditures vary by alternative because of the different vegetation treatment acres.

The expected value (average) PNV of Alternative A would be approximately equivalent to the PNV of Alternative B. Therefore, these alternatives are expected to be similar in financial efficiency. The potential PNV range of Alternative C would be much greater than the range of PNVs under the other alternatives due to the large difference between high and low treatment objectives. The expected value PNV of Alternative C would be the highest (most financially efficient) of any considered alternative. The expected value PNV of Alternatives A, B, and D is approximately equivalent.

Social Consequences

Area residents and visitors attach numerous values to the Apache-Sitgreaves NFs. For some, NFS lands provide economic opportunities in rural communities. To others, the forests are valued for leisure. This binary classification ignores the nuances of peoples' values. Furthermore, many individuals are likely to rely on the forests for both economic opportunities and leisure pursuits.

The Economic and Social Sustainability Assessment (U.S. Forest Service 2009) identified social values associated with the Apache-Sitgreaves NFs, including (1) preservation of open space, (2) protection of ecosystem services and other forest-related amenity values, (3) economic opportunities from both commodity and non-commodity sources, (4) accessible and varied outdoor recreation opportunities, and (5) traditional tribal uses, such as gathering boughs and visiting sacred sites. Wood products management and lands recommended for wilderness are the main sources of potential social and economic consequences between alternatives.

As the Affected Environment section describes, the study area has very low population density, relatively low earnings and income, high dependence on transfer payments, and an economy dominated by government employment. These factors suggest that Forest Service decisions, and other Federal actions, may have a substantial effect on social and economic well-being in the study area. The range of employment and labor

income consequences (presented in Table 16 and Table 17) do not differ dramatically (based on the ranges, it is possible that Alternatives B, C, and D provide equivalent levels of employment and income). However, Alternative C has the highest expected values of employment and income. For individuals who primarily value the forests for economic opportunities, Alternative C is likely to be favored. Alternative A is expected to provide the second-highest levels of employment and labor income to the local economy, followed by Alternative B, then Alternative D.

Individuals who value resource protection above resource use are likely to derive benefit from the recommendation of additional lands for wilderness, regardless of intention to recreate in the wilderness. Under current management (Alternative A), approximately 1.5 percent of visits to the Apache-Sitgreaves NFs are to designated wilderness areas (U.S. Forest Service 2001). Although wilderness visits account for a relatively small percentage of total visits, wilderness areas also have non-recreation values, such as the promotion of forest health and ecosystem services. Alternative D is expected to appeal to people and groups who seek additional primitive recreation opportunities and/or the protection of forest resources Alternatives A, B, and C are likely to be favored among individuals who primarily value resource protection and wilderness recreation opportunities.

Recreation management varies between alternatives. While the economic impact analysis finds no change resulting from recreation management changes, social consequences are expected. Alternative C emphasizes motorized and developed recreation opportunities, and therefore is likely to provide the most value (consumer surplus) to individuals who participate in motorized recreation activities. There would also be decreases in nonmotorized and dispersed recreation opportunities that could displace users to other areas or result in fewer users who prefer those types of recreation. Alternative D, with a greater emphasis on nonmotorized and dispersed recreation opportunities, may attract those who prefer nonmotorized and/or dispersed recreation activities, while not encouraging those with motorized/developed preferences. Therefore, recreation management would lead to distributional consequences related to visitor satisfaction and quality of life related to forest leisure activities.

Alternatives B and C would increase vegetation treatment. Increases in prescribed burns would create the potential for social consequences related to smoke emissions. Language barriers and cultural differences make communicating about burn plans more difficult, which can reduce the ability of individuals to engage in behavior to avoid smoke. Non-native English speakers and recent immigrants may be unable to understand or know where to find information about planned burns or other Forest Service activities that may affect their communities. Individuals who are sensitive to smoke - children, the elderly, asthmatics, and those with illnesses – would be most affected by the increase in smoke from prescribed burns.

The Environmental Justice analysis finds that the study area has large percentages of American Indian and Hispanic/Latino residents, as well as high poverty rates. These findings raise the likelihood of observing disproportionate adverse effects to low income and/or minority residents. However, analysis of the decisions to be made under the alternatives finds no environmental justice consequences. Since all alternatives continue to support similar levels of employment and income, none of the decisions is expected to exacerbate the poverty rate or disproportionately worsen the economic well-being of low-income individuals. Under all alternatives**,** American Indian residents would be able to gather forest products and visit sacred sites. None of the alternatives is expected to disproportionately adversely impact racial and/or ethnic minority individuals.

Recreation: Approximately 2.1 million visitors recreate on the Apache-Sitgreaves NFs annually (based on NVUM Round 1 estimates). These visitors support approximately 2,939 (full and part-time) jobs and $86.6 million in labor income in the local economy on an average annual basis. None of the alternatives is expected to change the economic impact of recreation. The social impact of recreation, including consumer surplus (the value of recreation above what is paid for the experience), is discussed above. The number of recreation visits is expected to increase by 3 percent annually as a result of outside factors. The management decisions

to be made may affect the experience of recreation users. Recreation participation may change as a result of population growth, demographic change, and recreation preferences (e.g., a growth in OHV use). None of these trends is expected to be affected by Forest Service management decisions.

Minerals: Stone, sand, and gravel are removed from the forests. The quantities removed are not expected to differ under all alternatives. Since most of the firms that extract stone, sand, and gravel exist outside of the IMPLAN study area (ADMMR 2007), the extraction of minerals from the forests is not expected to support employment and income in the local economy. However, these activities would have economic impacts outside of the study area.

Grazing: Under all alternatives, grazing would support approximately 120 jobs and $1.3 million in labor income, annually. However, these figures assume that available animal unit months (AUMs) are fully utilized. Based on current use levels, approximately 66 jobs and $713,000 in labor income are supported by grazing on the forests.

The benefit to permittees of public forage, below the market price, is approximately $994,500. The average private land grazing fee per AUM in Arizona is $9, compared to the $1.35 public land grazing fee (USDA NASS 2011). If the forests' grazing permittees had to replace their public land forage with private land forage, the annual cost of grazing would be $1,170,000 (130,000 AUMs at $9 per AUM). With Forest Service forage, permittees pay $175,500 (130,000 AUMs at $1.35 per AUM). Therefore, the economic benefit to ranchers is not fully captured in the employment and labor income figures presented above. However, the surplus to the ranchers can also be seen as a cost to providers of private forage.

Wood Products: The number of jobs and labor income supported by the availability of forest products can be found in Tables 16 and 17. Alternative C would provide the highest number of wood products jobs and income, followed by Alternatives B and A. Alternative D would provide the smallest number of wood products jobs and income.

Cumulative Effects – All Alternatives

Cumulative effects result from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR § 1508.7). Social and economic cumulative effects result from cumulative effects identified in the analysis of other resources (e.g., range and recreation). The social and economic cumulative effects analysis describes how past, present, and reasonably foreseeable future actions on lands throughout the region may affect the social and economic environment.

The geographic scope for the social and economic cumulative effects analysis is the six-county region[5] identified in the Affected Environment section. This analysis considers how past, present, and reasonably foreseeable future actions on lands throughout the region may interact under all alternatives to affect the social and economic environment. The social and economic analysis of all alternatives is unique among the resources and uses in that the effects occur primarily off the forests. In this way, the indirect effects described above are cumulative in nature; they evaluate the effects of all alternatives both on and off the Apache-Sitgreaves NFs. However, the indirect effects analysis does not address how actions taken on adjacent lands would affect the social and economic consequences of all alternatives.

All alternatives emphasize ecosystem restoration. Current and future activities on adjacent NFS lands also emphasize ecosystem restoration. The scale of the proposed treatments (on the Apache-Sitgreaves NFs and adjacent lands) is expected to draw new forest product harvesting and processing firms to the region. The wood products and ecosystem restoration estimates presented in the Environmental Consequences section are

[5] Apache, Navajo, Coconino, and Greenlee Counties in Arizona and Catron and Grant Counties in New Mexico.

based on a static model of the economy. However, if additional firms locate in the area due to regionwide restoration efforts, the local economic impact of activities to occur under the proposed forest plan would increase.

The recreation-related effects identified in the social and economic environmental consequences section may be influenced by trends and activities that occur off the forests. In fiscal year 2010, Arizona State Parks closed 13 of its 28 parks. Although most of these parks have reopened, a number are open on a reduced schedule. Furthermore, the possibility of future closures remains because of ongoing budget uncertainty. The reduction in recreation opportunities in local state parks may slightly increase demand for recreation on the forests. All alternatives support diverse recreational opportunities on the forests. Increased recreational use of the Apache-Sitgreaves NFs would lead to a slightly higher economic impact than predicted in the indirect effects discussion. However, other adjacent lands (BLM, NPS, other NFS lands, and undeveloped state lands) continue to provide recreation opportunities.

Under all alternatives, portions of the Apache-Sitgreaves NFs may provide a corridor to support reasonably foreseeable alternative energy development in the region. This could facilitate alternative energy development in the region, which would support local area employment.

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Appendix A: IMPLAN Study Area

Table 22. IMPLAN Assessment Area Zip Codes for the Apache-Sitgreaves NFs

Apache County, Arizona								
85920	85924	85925	85927	85930	85932	85936	85938	85940
Coconino County, Arizona								
85931				86024				
Greenlee County, Arizona (all of county included)								
85533			85534			85540		
Navajo County, Arizona								
85901	85911	85926	85928	85929	85933	85934		
85935	85937	85941	85942	86025	86032	86047		
Catron County, New Mexico (all of county included)								
87820	87821	87824	87827	87829	87830			
Grant County, New Mexico								
88025			88051			88055		
Source: U.S. Forest Service 2009								