

Manti – La Sal National Forest Plan Revision Assessments

Topics 6, 7, 8 - Plan area contributions to social, cultural, economic conditions; Benefits people obtain from plan area (ecosystem services and multiple uses)

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for:

The Manti – La Sal National Forest

December 14, 2016



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Table of Contents

Topics 6, 7, 8 - Plan area contributions to social, cultural, economic conditions; Benefits people obtain from plan area (ecosystem services and multiple uses)	1
Scales:	1
Indicators:	1
Existing Conditions:.....	2
Trends:	28
Data Gaps.....	32
Literature Cited.....	33

Tables

Table 1. North Zone Rural-Urban Designations	2
Table 2. South Zone Rural-Urban Designations	2
Table 3. North Zone Age Structure.....	3
Table 4. South Zone Age Structure.....	3
Table 5. North Zone Income and Poverty.....	4
Table 6. South Zone Income and Poverty.....	4
Table 7. Payments to States and Counties, North Zone, 2015	5
Table 8. Payments to States and Counties, South Zone, 2015	5
Table 9. Race and Ethnicity, North Zone, 2014.....	7
Table 10. Race and Ethnicity, South Zone, 2014.....	7
Table 11. Trends in Permitted and Authorized AUMs, 1986-2015	11
Table 12. Authorized Livestock Grazing on the Manti-La Sal NF.....	11
Table 13. Forest Product Harvesting on the Manti-La Sal NF	14
Table 14. Wood as Primary Home Heating Source, North Zone, 2015.....	17
Table 15. Wood as Primary Home Heating Source, South Zone, 2015.....	17
Table 16. Social Cost of CO ₂ , 2015-2050, Average Scenario, 3% Discount Rate (2007 USD)	23
Table 17. Employment by Program Area	24
Table 18. Labor Income by Program Area	25
Table 19. Current Contribution of the Manti-La Sal National Forest to the Regional Economy	25
Table 20. Economic Diversity Index, North Zone, by County	27
Table 21. Economic Diversity Index, South Zone, by County	27
Table 22. North Zone Population Change, by County.....	28
Table 23. South Zone Population Change, by County.....	28

Figures

Figure 1. Change in Farm and Non-Farm Employment, North Zone	12
Figure 2. Farm Jobs as a Percent of Total Employment, North Zone, 2015	12
Figure 3. Change in Farm and Non-Farm Employment, South Zone	13
Figure 4. Farm Jobs as a Percent of Total Employment, South Zone, 2015	13
Figure 5. Percent of Total Private Employment in Timber Sectors, North Zone	15
Figure 6. Percent of Total Private Employment in Timber Sectors, South Zone	16
Figure 7. Percent of Total Private Employment in Travel and Tourism Sectors, North Zone.....	18
Figure 8. Percent of Total Private Employment in Travel and Tourism Sectors, South Zone.....	19

Figure 9. Percent of Total Private Employment in Mining, North Zone	20
Figure 10. Percent of Total Private Employment in Mining, South Zone	21
Figure 11. Unemployment Trends, North Zone.....	29
Figure 12. Unemployment Trends, South Zone.....	30
Figure 13. Land Ownership North Zone, Percent of Land Area.....	30
Figure 14. Land Ownership South Zone, Percent of Land Area.....	31

Topics 6, 7, 8 - Plan area contributions to social, cultural, economic conditions; Benefits people obtain from plan area (ecosystem services and multiple uses)

Scales:

Political and administrative designations (e.g., county or forest boundaries) do not necessarily correspond with economically-meaningful units. Therefore, the appropriate scale for addressing the social and economic environment will differ from the scales used to address other topics in the assessment. Reliable demographic and economic data are available at the county-level. Sub-county (e.g., towns and cities) data are limited and have large margins of error, particularly in rural areas. The economic modeling software, IMPLAN, uses county-level datasets. Functional economic areas are the primary scale for the social and economic analysis. Typically, these areas are a group of counties.

Due to the Manti-La Sal National Forest's geographic distribution, the forest is divided into two functional economic areas. The North Zone includes six counties in central Utah: Carbon, Emery, Juab, Sanpete, Sevier, and Utah counties. The South Zone includes two counties in southeastern Utah and two counties in southwestern Colorado: Grand and San Juan counties in Utah and Mesa and Montrose counties in Colorado. These two zones are used throughout the baseline demographic and economic data in this report. However, the economic contribution analysis, which estimates employment and labor income attributable the Manti-La Sal National Forest, uses a single economic region that encompasses all 10 counties in both the North and South zones. The need for a single zone for the economic contribution analysis results from the inability to differentiate some of the data inputs, such as recreation visits, because North and South zones. Recreation data are reported at a forest-level and estimating district-level use is not plausible with existing information.

Indicators:

Measuring the human relationship with the ecological environment requires two types of indicators: those that help to understand social and economic conditions in communities near the Manti-La Sal National Forest and those that measure human uses of the forest's lands and resources. Relevant indicators to understand social and economic conditions include: population size, age structure, racial and ethnic composition, income and poverty, and economic diversity.

Relevant indicators to measure human uses and values of the Manti-La Sal NF's land and resources include: recreation visits, timber cut and sold, mineral removal, authorized AUMs, payments to states and counties, and Forest Service expenditures.

Baseline demographic and economic data are drawn from federal sources, such as the U.S. Census Bureau and the Bureau of Economic Analysis. The Forest Service collects resource use data, such as recreation visits and animal unit months. The economic contribution analysis combines baseline economic data with Forest Service resource data to estimate employment and labor income associated with Forest Service programs, resources, and uses.

Existing Conditions:

Demographic Conditions

Urban-Rural Designation

The U.S. Department of Agriculture's Economic Research Service classifies all counties along a rural-urban continuum, which describes the degree of urbanization in a county. This is one measure of the degree to which human populations may act as a stressor on forest lands and resources. Most of the counties in the forest's two functional economic areas are rural. However, Juab and Utah counties in the North Zone make up the Provo-Orem Metropolitan Statistical Area (U.S. Census Bureau 2016).

Table 1. North Zone Rural-Urban Designations

Location	Rural-Urban Designation
Carbon County	Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area
Emery County	Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area
Juab County	Metro - Counties in metro areas of 250,000 to 1 million population
Sanpete County	Nonmetro - Urban population of 2,500 to 19,999, adjacent to a metro area
Sevier County	Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area
Utah County	Metro - Counties in metro areas of 250,000 to 1 million population

Source: USDA ERS 2013

The South Zone is also predominantly rural. The South Zone contains the Grand Junction Metropolitan Statistical Area in Mesa County, but the population centers in Mesa County are not immediately adjacent to the National Forest System lands in the county.

Table 2. South Zone Rural-Urban Designations

Location	Rural-Urban Designation
Grand County, UT	Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area
San Juan County, UT	Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area
Mesa County, CO	Metro - Counties in metro areas of fewer than 250,000 population
Montrose County, CO	Nonmetro - Urban population of 20,000 or more, adjacent to a metro area

Source: USDA ERS 2013

These data suggest that urbanization is not a stressor in most of the areas immediately surrounding the Manti-La Sal NF. However, urbanization outside the immediate planning area (e.g., along the Wasatch Front) can drive demand for forest resources and uses. Most of Utah's population lives along the Wasatch Front (U.S. Census Bureau 2014). Given the proximity of the planning area to the Wasatch Front, growth in this area can cause, for example, increased demand for recreational opportunities on the Manti-La Sal NF.

Age Structure

The 2012 planning rule directs the Forest Service to consider and engage youth in forest planning. The typical visitor to a national forest or grassland is more likely to be white, male, and older than the population overall (USFS 2016a). Population structure in communities near the Manti-La Sal NF is relevant for understanding local stakeholders. For instance, communities with large numbers of retirees are likely to have different recreational preferences than those populated with young families.

Table 3. North Zone Age Structure

Location	Median Age	% Population 0-19	% Population 19-65	% Population 65 and Older
Carbon County	34.3	30.8%	54.9%	14.3%
Emery County	34.0	33.3%	53.3%	13.3%
Juab County	30.0	39.2%	49.7%	11.1%
Sanpete County	29.8	34.5%	53.3%	12.2%
Sevier County	33.7	33.7%	51.3%	15.1%
Utah County	24.5	39.3%	53.9%	6.8%
North Zone	31.2	38.4%	53.8%	7.8%
Utah	29.9	34.2%	56.3%	9.5%
United States	37.4	26.3%	59.9%	13.7%

Source: U.S. Census Bureau 2014

Like Utah overall, North Zone counties have a median age well below the national average. In addition, nearly 40 percent of the North Zone's population is 19 years of age or younger. In contrast, this age group accounts for just over a quarter of the national population. The share of the population over the age of 65 in North Zone counties is small relative to the state and nation. These data suggest that engaging youth in national forest programs is an essential element of ensuring that national forests continue to provide benefits to the public.

Youth account for a much smaller share of the population in South Zone counties. The population in Grand County, UT and Mesa County, CO have age distributions are similar to the United States as a whole. San Juan County, UT has a much younger median age and Montrose County, CO has a much older median age. Montrose County also has a large 65 and older population and a small 0 to 19 population.

Table 4. South Zone Age Structure

Location	Median Age	% Population 0-19	% Population 19-65	% Population 65 and Older
Grand County, UT	38.9	23.7%	62.1%	14.2%
San Juan County, UT	30.7	36.9%	51.7%	11.4%
Mesa County, CO	38.2	26.0%	58.1%	15.9%
Montrose County, CO	43.5	25.4%	55.1%	19.6%
South Zone	37.8	26.6%	57.2%	16.2%
Colorado	36.2	26.5%	61.7%	11.8%
Utah	29.9	34.2%	56.3%	9.5%
United States	37.4	26.3%	59.9%	13.7%

Source: U.S. Census Bureau 2014

Due to the prevalence of older residents in South Zone counties, recreational preferences of local forest visitors are likely to differ from the North Zone.

Economic Conditions

Median Household Income

Household income and poverty rates can influence how nearby residents and visitors relate to National Forest System lands. Low household incomes and high poverty rates can make people more vulnerable to changes in resource availability and forest management. Low median household incomes and high rates of poverty can indicate that communities have fewer resources to adapt to change. These are two indicators of an area's vulnerability to ecological change. Communities and households with fewer resources will have fewer opportunities to engage in substitute behavior (e.g., travel to another recreation site or replace lost forage for livestock).

Table 5. North Zone Income and Poverty

Location	Median Household Income	People Below Poverty Line
Carbon County	\$46,366	14.1%
Emery County	\$50,653	11.3%
Juab County	\$56,976	*14.1%
Sanpete County	\$48,305	16.1%
Sevier County	\$46,327	14.7%
Utah County	\$60,830	13.8%
Utah	\$59,846	12.8%
United States	\$53,482	15.6%

Source: U.S. Census Bureau 2014

*Indicates data that is less reliable and should be interpreted with caution

The smaller and more rural counties of Carbon, Sanpete, and Sevier have below average incomes and higher poverty rates, however, only Sanpete has a poverty rate above the national average.

Table 6. South Zone Income and Poverty

Location	Median Household Income	People Below Poverty Line
Grand County, UT	\$44,239	*16.3%
San Juan County, UT	\$41,411	28.1%
Mesa County, CO	\$48,610	15.8%
Montrose County, CO	\$44,885	17.2%
Colorado	\$59,448	13.1%
Utah	\$59,846	12.8%
United States	\$53,482	15.6%

Source: U.S. Census Bureau 2014

*Indicates data that is less reliable and should be interpreted with caution

Median household income is below the national and state averages in all South Zone counties. Additionally, poverty rates exceed national and state averages in all four counties. These data indicate that communities surrounding the Manti-La Sal National Forest, particularly the communities near the southeastern portion of the forest, experience relatively high rates of economic insecurity. This suggests that these communities may be more dependent on forest resources and more vulnerable to changes in resource availability (Lynn et al 2011).

Payments to States and Counties

The Manti-La Sal NF makes payments to states and local governments through several programs. The Payments-in-lieu-of-taxes (PILT) program compensates local governments for the lack of property taxes on federal lands. Local governments provide a variety of services that support the use and enjoyment of the Manti-La Sal NF, including road maintenance and emergency services. The Secure Rural Schools (SRS) program also provides funding to local governments to support schools, roads, and ecosystem restoration. Table 7 and Table 8 display the Forest Service's SRS and PILT payments to North and South zone counties.

Table 7. Payments to States and Counties, North Zone, 2015

Location	Manti-La Sal NF Acres	SRS Payment	PILT Payment	Total Payment
Carbon County	30,236	\$ 30,314.75	\$ 75,983.07	\$ 106,297.82
Emery County	212,299	\$ 238,269.50	\$119,312.04	\$ 357,581.54
Sanpete County	369,335	\$ 603,396.94	\$901,916.07	\$ 1,505,313.01
Sevier County	30,409	\$ 36,527.67	\$ 59,662.46	\$ 96,190.13
Utah County	93,323	\$ 98,920.28	\$230,694.46	\$ 329,614.74

Source: DOI 2016 and USFS 2016c

Note: Juab County does not receive payments from the Manti-La Sal NF.

Table 8. Payments to States and Counties, South Zone, 2015

Location	Manti-La Sal NF Acres	SRS Payment	PILT Payment	Total Payment
Grand County, UT	57,235	\$ 39,380.30	\$ 37,717.87	\$ 77,098.17
San Juan County, UT	450,122	\$ 879,787.23	\$216,958.80	\$ 1,096,746.03
Mesa County, CO	4,512	\$ 3,612.74	\$ 9,601.54	\$ 13,214.28
Montrose County, CO	22,513	\$ 21,522.82	\$ 50,789.33	\$ 72,312.15

Source: DOI 2016 and USFS 2016c

Payments to states and local government support public services in communities near the Manti-La Sal NF and contribute to employment and labor income in the counties that surround the forest. Some of the least affluent areas – San Juan and Sanpete counties, in Utah – receive the largest payments from the Manti-La Sal NF. Forest Service payments to local governments in sparsely populated and low-income areas are likely to be particularly meaningful, since these areas typically get less revenue from property, sales, and income taxes to fund local government operations.

The employment and labor income contributions of PILT and SRS payments are estimated in the economic contribution analysis section of this report.

Environmental Justice

Environmental Justice Definition and Criteria

In 1994, President Clinton issued Executive Order 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 Executive Order 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 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 decision-makers to identify impacts that are disproportionately high and adverse with respect to minority and low-income populations and identify alternatives that will avoid or mitigate those impacts. According to USDA DR5600-002 (USDA 1997), environmental justice, 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 the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; 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 include interrelated social and economic effects.

The emphasis of environmental justice is on health effects and/or the benefits of a healthy environment. The 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).

Minority Population

Overall, the North Zone counties are less diverse than both the state and nation. Table 9 displays the share of the population in each racial/ethnic group. All North Zone counties have a larger share of non-Hispanic white residents than either Utah or the United States. Furthermore, Utah as a whole is more racially and ethnically homogenous than the nation. This finding suggests that North Zone counties do not

contain environmental justice populations. However, this does not preclude the possibility that Manti-La Sal NF management actions could have disproportionate and adverse effects on particular groups. For instance, although the American Indian population is small in all six North Zone counties, forest plan decisions may have the potential to affect resources and uses that are of particular value to American Indian populations.

Table 9. Race and Ethnicity, North Zone, 2014

Race/Ethnicity	Carbon County	Emery County	Juab County	Sanpete County	Sevier County	Utah County	Utah	USA
White	83.6%	91.8%	93.1%	86.4%	92.4%	83.6%	79.8%	62.8%
Hispanic or Latino (any race)	12.8%	6.1%	4.3%	9.5%	4.7%	11.0%	13.3%	16.9%
Black or African American	*0.6%	*0.7%	*0.2%	1.0%	*0.5%	0.5%	1.0%	12.2%
American Indian	*0.5%	*0.9%	*0.8%	*1.0%	*1.0%	*0.4%	1.0%	0.7%
Asian	*0.7%	*0.2%	*0.3%	*0.4%	*0.2%	*1.4%	2.1%	4.9%
Hawaiian of Pacific Islander	*0.1%	*0.0%	*0.3%	0.6%	0.2%	0.8%	0.9%	0.2%
Other	*0.1%	*0.0%	*0.0%	*0.0%	*0.0%	*0.2%	*0.2%	0.2%
Two or More Races	*1.7%	*0.4%	*1.1%	*1.1%	*0.9%	2.0%	1.8%	2.1%

Source: U.S. Census Bureau 2014

Grand County, Utah and Mesa County, Colorado are similar to the North Zone counties. They have less racial and ethnic diversity than either state or the nation. In contrast, San Juan County, UT and Montrose County, CO have relatively high shares of minority residents. The plurality of residents of San Juan County identify as American Indian. This share is approximately 50 times greater than the share of American Indians in Utah and the United States. While Montrose County, CO is overall less diverse than Colorado and the United States and has a similar share of Hispanic/Latino residents as Colorado, the proportion of Hispanic/Latino residents is greater than the national share.

Table 10. Race and Ethnicity, South Zone, 2014

Race/Ethnicity	Grand County, UT	San Juan County, UT	Mesa County, CO	Montrose County, CO	Colorado	Utah	USA
White	83.5%	45.5%	82.4%	76.8%	69.4%	79.8%	62.8%
Hispanic or Latino (any race)	9.9%	4.8%	13.7%	20.1%	20.9%	13.3%	16.9%
Black or African American	*0.2%	*0.2%	*0.7%	*0.5%	3.8%	1.0%	12.2%
American Indian	*5.0%	47.5%	*0.4%	*0.4%	0.5%	1.0%	0.7%
Asian	*0.7%	0.6%	0.6%	0.5%	2.8%	2.1%	4.9%
Hawaiian of Pacific Islander	*0.2%	*0.2%	*0.1%	*0.2%	*0.1%	0.9%	0.2%
Other	*0.0%	*0.2%	*0.2%	*0.1%	*0.2%	*0.2%	0.2%
Two or More Races	*0.5%	*1.0%	2.0%	*1.4%	2.3%	1.8%	2.1%

Source: U.S. Census Bureau 2014

Therefore, the South Zone contains environmental justice populations based on minority status.

Low-Income Population

Poverty data are presented above, in Table 5 and Table 6. The highest poverty rates across all 10 counties in the planning area are in San Juan County, UT and Montrose County, CO. These data reveal the overlap between minority status and poverty. San Juan County, UT, in which minority residents make up the majority of the population, has by far the highest poverty rate in the planning area. Nearly 30 percent of San Juan County residents live in poverty. This is approximately double the poverty rate in the state and nation (U.S. Census Bureau 2014). While the poverty rate in Montrose County, CO is somewhat elevated relative to the state and nation, the difference is small.

These data suggest the existence of environmental justice populations in the South Zone of the Manti-La Sal NF, based on both minority and low-income status.

Benefits to People (including multiple uses, ecosystem services, operations and infrastructure)

This section addresses the social and economic dimensions of forest resources, uses, and management. Based on the planning rule's definition of ecosystem services – benefits to people from national forests – ecosystem services may be seen as an umbrella that includes multiple uses. Multiple uses are among the benefits people obtain from national forests. Multiple uses include outdoor recreation, range, water, timber, and wildlife and fish. Separation of ecosystem services from multiple uses in the assessment is not required. Given the overlap between the two topics, they are addressed together in this report. Providing multiple uses and other ecosystem services from forest lands is essential to the Forest Service's mission. The necessity of multiple use management is enshrined in law and regulation, including the Multiple-Use Sustained-Yield Act of 1960 and the National Forest Management Act of 1976.

The 2012 planning rule directives define key ecosystem services as those that are (1) important in the area of influence and broader landscape and (2) likely to be influenced by plan decisions. The Manti-La Sal NF plan revision interdisciplinary team identified key ecosystem services to include: the five multiple uses (outdoor recreation, range, timber, water, and wildlife and fish) as well as carbon sequestration and storage.

Additionally, this section also addresses the contribution of mining, forest operations, and forest infrastructure to economic activity and quality of life. Forest operations and infrastructure include, for example, the benefits to people of access, recreation facilities, and fuel treatments.

Livestock Grazing

Permittees graze cattle, horses, sheep and goats on the Manti-La Sal National Forest. Livestock grazing has both social and economic dimensions. Ranching provides an income for some individuals, but it also has sociocultural value. In the West, ranching cannot be entirely understood through a commercial agriculture (i.e., economic impact) lens. Indeed, in the western U.S. most ranchers have an off-ranch job. Ranching provides noneconomic benefits, such as support for tradition and heritage (Smith and Martin 1972, Raish and McSweeney 2003).

Historic Conditions of Range Resources

The stocking rates for sheep and cattle on most if not all of the Forest allotments were much higher prior to the establishment of the Manti Forest Reserve in 1903 and the La Sal National Forest Reserve in 1906. Historical records estimate that there may have been as many as 100,000 animals (cattle, sheep and horses) grazing the Moab and Monticello districts in the late 1800s, though an accurate number has proven difficult to determine (U.S. Research Inc 2000). On the Wasatch Plateau, there are estimates of nearly 1 million sheep grazing the area. After the establishment of the Manti Forest Reserve, there are

records that indicate the Forest issued permits for 300,000 sheep and about 15,000 head of cattle. After complaints from the cattle ranchers that sheep were given preference the permitted numbers were recorded as 200,000 sheep and 28,000 head of cattle (Prevedel et al 2005). The lands that make up the Manti-La Sal National Forest today was severely overgrazed during the 1800s and into the 1900s resulting in depleted rangelands and loss of soils due to erosion. The resulting floods and landslides in the communities below the mountain ranges prompted citizens to petition the Federal Government to establish reserves (Prevedel et al 2005, Hindley et al 2000, U.S. Research Inc, 2000).

It took several years for the Forest Service to gain control of the grazing practices which had prevailed for decades. The seasons of use were also much more liberal than they are today (MLNF 2210 & 2230 files). In a broader context, in the territory of Utah, it is estimated that at the turn of the century there were over 400,000 head of cattle and 3.8 million sheep (Hindley et al 2000).

The 1986 Forest Plan identified 144 grazing allotments, 482 permits, and 175,334 permitted animal unit months (AUMs). This was about 20,700 head of cattle and close to 85,000 sheep. Permit obligation was estimated to be 20 percent higher than carrying capacity at the time of Forest Plan implementation (USFS 1986).

Existing Conditions of Range Resources

We have implemented the Rescissions Act (1995) allotment management plan process (P.L. 104-19 1995). Currently, permit obligations and estimated grazing capacity are close to balancing. As part of this process, we monitor range conditions in key areas on all allotments. We use this information to identify use patterns, species composition and ground cover. This information has contributed to aligning permitted numbers to carrying capacity. Annual monitoring data and reports on most allotments show that livestock grazing is ecologically sustainable at current levels (USFS 2011). We now manage the majority of the allotments under an adaptive management philosophy that allows us to modify the intensity (stocking level), duration, or timing of grazing in response to variations in forage production, water availability, and precipitation patterns. We have used adaptive management to respond to extended drought conditions and wildfires (MLNF 2210/2230 files).

Structural range improvements (fences and water developments) are key to successful implementation of allotment management plans and annual operating instructions. Throughout the Forest, there are improvements that no longer function due to age, weathering, falling trees and fires. We have prioritized these improvements for reconstruction or replacement as funding allows (MLNF 2210/2230/2240 files).

There are also many areas on the Forest that are decreasing in forage production due the encroachment of pinyon-juniper into sage/grass areas and increases in shrub density in many other areas due to lack of fire or some poor grazing management practices. There have been projects implemented to improve forage for both wildlife and livestock on the Forest but it continues to be a need in many areas.

Water has always been a limiting factor, but has appeared to become more so in recent years as springs go dry and streams run for a shorter period of time. The development of water on some allotments have helped in improving management but also continues to be a need for range management on the Forest.

Rangeland health condition is discussed in the Terrestrial Ecosystem portion of the assessment in length. Briefly here, many conditions that exist today are the remaining impacts of the severe overgrazing that occurred prior to the establishment of the Forest Reserves in the early 1900s. However, Forest Service range trend studies and photos (MLNF 2060 files) and other published documents comparing historical conditions on the Forest to more recent conditions (USFS 1993, Prevedel et al 2005, Prevedel and Johnson 2005, Hindley 2000) have shown immense improvements and that most areas are continuing to show upward trends in ground cover and in species composition (USFS 2011). Noxious weeds are a

growing threat to rangeland conditions as uses continues to expand and increase (see Invasive stressor/driver report).

Rangeland Capability and Suitability

Rangeland capability addresses the ability of the land to support livestock; suitability addresses whether or not livestock grazing should occur and whether other uses should take precedence.

Rangeland capability is defined by the Forest Service as the physical attributes or characteristics of the landscape that are conducive to livestock grazing under an assumed set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices. The landscape level capability determination is based on physical/biological attributes to support long-term sustained grazing. This definition varies from those traditionally used by the Forest Service in managing the rangeland resource. In past planning activities, capability was usually combined with the term suitability.

Rangeland suitability is established either to provide prescriptive management direction for project-level analysis and subsequent NEPA decisions, or as a decision to not graze specific designated areas. Typically, areas are reviewed for the purpose to see if livestock grazing is compatible with management area emphasis, uses, and values identified. Suitability also looks at what uses are foregone with livestock grazing. Landscape scale suitability is a management determination that is based upon on Forest Plan prescriptions where grazing is compatible use with other uses/activities and resource management objectives (i.e. land exchanges, ESA restrictions, conflict with other uses). Suitable lands may contain areas that do not meet capability criteria. In other words, it can include both capable and non-capable lands.

The 1986 Forest Plan established 15 Management units (MU) all of which contains management prescriptions that include livestock grazing as being a suitable and compatible use under certain conditions. Livestock may still be and have been excluded under certain conditions in each MU. The establishment of the Dark Canyon Wilderness in 1989 included an exclusion of grazing from 33,000 acres from the wilderness and about 11,600 are excluded from grazing as part of the Blanding/Monticello Municipal watershed. The Forest has identified approximately 1,294,700 acres on the Manti-La Sal National Forest as suitable for livestock grazing. This does not mean that livestock grazing occurs on 1.3 million acres, it simply means that there is not a landscape scale decision to specifically exclude grazing on these 1.3 million acres. As mentioned above, this doesn't include areas that have been closed to grazing on a site specific basis such as campgrounds, RNAs, areas closed for watershed protection, study exclusions, etc.).

The 1986 Forest Plan did not differentiate between capable and suitable rangeland acres or between capable rangeland acres for cattle and capable rangeland acres for sheep as per current classification systems of Forest Service manuals and handbooks. In addition, the original suitability analysis did not have the data and analytical capability now available in the Forest's geographic information system. Also, they limited suitable as only including capable acres. This explains why the 1986 plan gives 651,481 as suitable/capable acres while currently we describe 1,294,700 acres as suitable and about 714,500 acres as capable rangeland acres for cattle and 878,700 capable rangeland acres for sheep (USDA 2016d). See Topic 2 assessment Range Section for information on rangeland conditions of capable acres on the Forest.

Current Levels of Grazing

Annual authorized livestock numbers can vary substantially due to precipitation patterns and yearly forage production. Currently, the grazing program consists of 119 allotments, 169 permits, and 137,986 permitted AUMs (USFS 2016b). Table 11 shows that the number of permitted AUMs declined by 37,348 AUMs between 1986 and 2016. This reduction occurred as capacities were adjusted through evaluation of long-term trend and use studies, range improvement efforts, adjustments of livestock permits, and overall improved range management systems and practices. A number of factors contribute to the reduction in permitted numbers; extended period of drought (7-10 years), and multiple resources competing for public land use. (USFS 2011). The reduction in the number of allotments and permits since 1986 has resulted from the consolidation of allotments or consolidation of permits per allotment.

Table 11. Trends in Permitted and Authorized AUMs, 1986-2015

Fiscal Year	Permitted AUMs	Authorized AUMs
1986	175,334	151,686
2004	146,606	108,616*
2010	143,138	140,219
2013-2015 Average	137,986	124,697

Source: U.S. Forest Service 2016b

*Authorized numbers were reduced largely due to prolonged drought conditions from 1999-2003 (USGS 2003)

The Manti-La Sal NF provides forage for approximately 70,000 cattle and horse animal unit months (AUMs) and 50,000 sheep and goat AUMs. Table 12 displays authorized AUMs by animal type in fiscal years 2013, 2014, and 2015. Livestock grazing on the forest during this period has been stable.

Table 12. Authorized Livestock Grazing on the Manti-La Sal NF

Fiscal Year	Cattle and Horse AUMs	Sheep and Goat AUMs
2013	70,691	52,869
2014	73,015	54,830
2015	72,162	50,525
2013-2015 Average	71,956	52,741

Source: U.S. Forest Service 2016b

Trends in Agriculture Sectors

In both the North and South zone counties, farm-related employment (including ranching) has been flat while non-farm employment grew rapidly between 1970 and 2015.

In the North Zone, farm employment added only 300 jobs between 1970 and 2015. In contrast, non-farm employment grew by approximately 287,000 jobs. As a result, the relative importance of agriculture to the economy declined dramatically over this period. In 1970, farming/ranching accounted for approximately 9 percent of employment in the North Zone. By 2015, its share of total employment had declined to less than 2 percent.

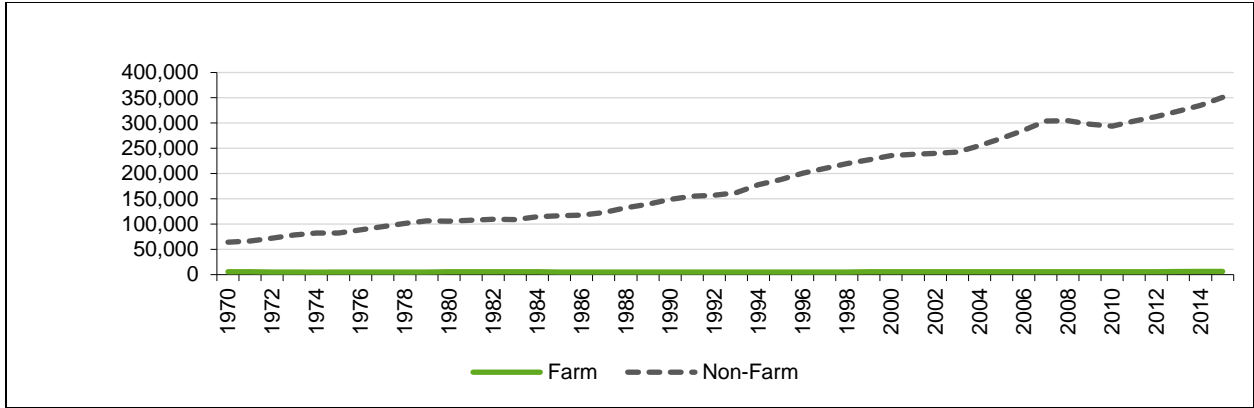


Figure 1. Change in Farm and Non-Farm Employment, North Zone

Source: U.S. Census Bureau 2016

However, there is a great deal of variation among counties in the North Zone in terms of the share of farm employment. Nearly 12 percent of jobs in Emery County are in agriculture, while only 1 percent of jobs in Utah County (the most populous county) are in agriculture. Figure 2 reveals the economic variation among North Zone counties.

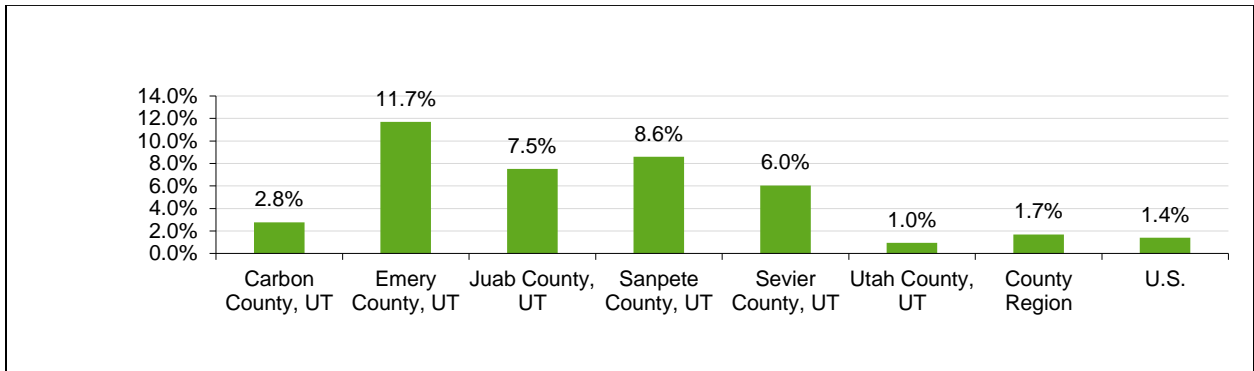


Figure 2. Farm Jobs as a Percent of Total Employment, North Zone, 2015

Source: U.S. Census Bureau 2016

While farm employment grew by approximately 1,400 in the South Zone over this period, non-farm employment grew by approximately 86,000. In other words, farm employment accounted for 10 percent of South Zone employment in 1970 and less than 4 percent in 2015 (U.S. Census Bureau 2016).

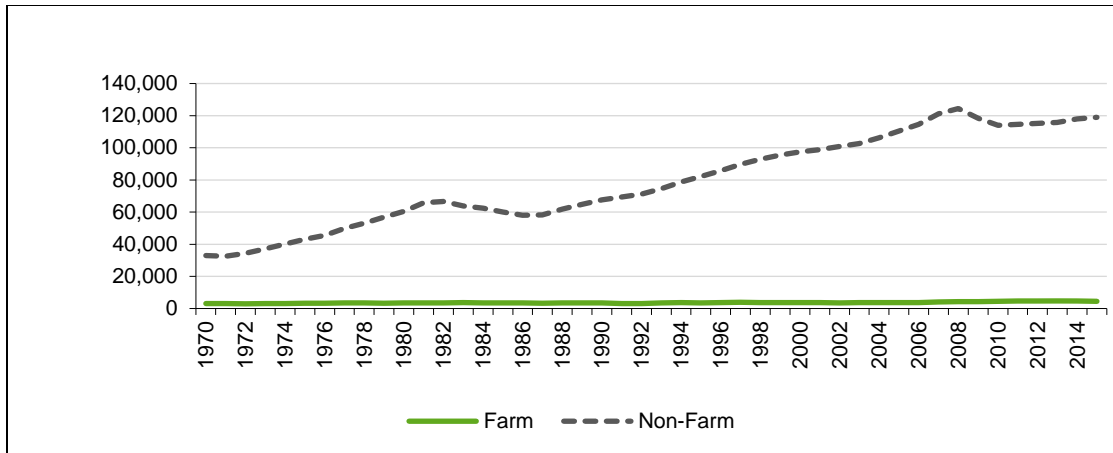


Figure 3. Change in Farm and Non-Farm Employment, South Zone

Source: U.S. Census Bureau 2016

Overall, farm/ranching employment remains relatively more important to economic activity in the South Zone compared to the North Zone. San Juan County, in particular, has a high share of farm employment.

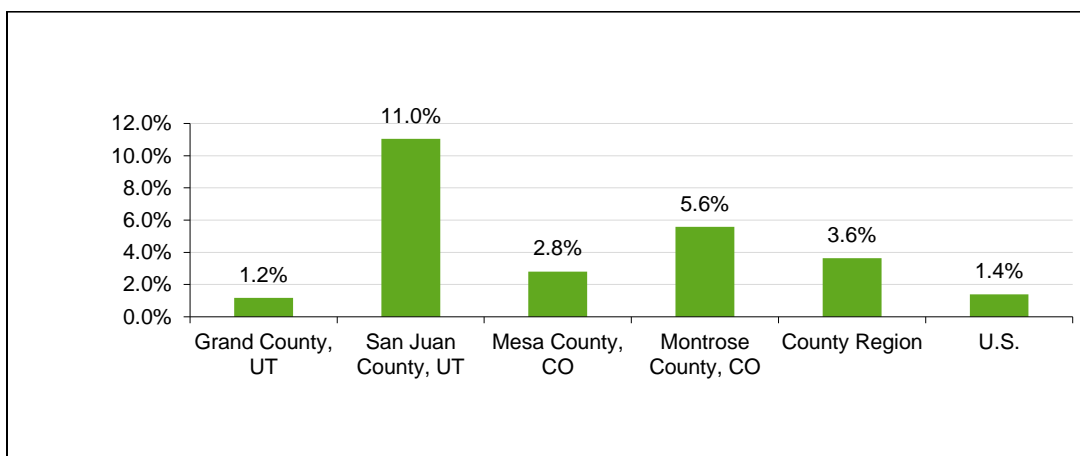


Figure 4. Farm Jobs as a Percent of Total Employment, South Zone, 2015

Source: U.S. Census Bureau 2016

The employment and labor income associated with livestock grazing on the Manti-La Sal NF is estimated in the economic contribution analysis section of this report.

Value of Ranching

As mentioned above, noneconomic factors influence the persistence of ranching in the West. Over the past 20 years, academic literature has addressed the shift from the “Old West” – a rural economy based on extractive natural resources – to the “New West, which is characterized by tourism development and amenity migration (Winkler et al 2007). This change has contributed to economic diversification (discussed in a subsequent section), but has also led to cultural conflict (Ooi et al 2015).

Ranch ownership can strengthen ties to the community, fellow ranchers, and families. Research has found that many ranchers identify the value of ranching as being closer to the earth, providing a desirable place to raise a family, and providing a satisfying way of life (Smith and Martin 1972). Interaction with

other ranchers builds networks and social capital (Ooi et al 2015). Such interpersonal relationships contribute to a sense of belonging and quality of life.

The maintenance of ranches in the planning area contributes to the preservation of open space. Without access to allotments on the Manti-La Sal NF, some ranches may no longer be economically viable. The sale of ranches often leads to conversion of rangeland to subdivided developments that reduce the availability of open space (Brunson and Huntsinger 2008).

Livestock grazing has been an important part of the local economy and culture for over a century. Grazing was directly related to the establishment of the Forest. The establishment of the Forest has led to many changes to grazing over the years (Prevedel et al 2005, Prevedel and Johnson 2005, Hindley et al 2000, U.S. Research Inc. 2000). Ecological integrity and sustainability are important parts of the grazing program today. Livestock grazing is likely to be sustained within the planning area over the next 20 years based on recent past site-specific range analyses. Projects have been successful in improving livestock management. Additionally, the emphasis of ecological restoration at the watershed scale will contribute to the direct and indirect sustainability of grazing on the Manti-La Sal NF. Managing grazing for intensity, duration and timing of grazing should continue to improve overall rangeland conditions. (Reed et al 1999). These principles will allow for productive lands which are capable of sustaining grazing and other multi-use activities into the future and will continue to be an important part of the local economy and culture.

Forest Products

Current Levels of Forest Product Harvesting

Softwood sawtimber, poles and posts, fuel wood, and a variety of special forest products are harvested from the Manti-La Sal NF. Table 13 displays the quantity of various forest products harvested between fiscal years 2013 and 2016. Annual sawtimber harvests varied substantially between 2013 and 2016. Ranging from no sawtimber harvesting in 2013 to approximately 44,000 ccf in 2016.

Table 13. Forest Product Harvesting on the Manti-La Sal NF

Fiscal Year	Sawtimber (ccf)	Christmas Trees (#)	Fuelwood (cords)	Poles (#)	Posts (#)	Ornamentals (#)	Nuts/Seeds (lbs.)
2013	0	3,487	7,036	1,425	872	15	31,270
2014	9,460	3,311	5,820	1,110	839	0	18,910
2015	13,226	3,489	5,922	1,000	1,360	10	13,520
2016	44,070	4,107	6,055	1,100	1,280	21	10,180
Average	16,689	3,599	6,208	1,159	1,088	12	18,470

Source: U.S. Forest Service 2016b

See Topic 2 assessment report for information on forest conditions, ecological capacity and land suitability for timber harvest, and the ecological sustainability of timber production.

Trends in Forest Products Sectors

Figure 5 displays the trend in the share of employment in timber-related sectors in the North Zone. Employment in these sectors was erratic between 1998 and 2014. It grew between 1998 until the start of the Great Recession, at which point it decline again to the 1998 level. Nationally, the housing crash associated with the recession collapsed housing starts and dramatically decreased demand from the construction industry for timber (Keegan et al 2012). Post-recession recovery saw growth in the sector, but it again lost most of those gains in 2014 (U.S. Census Bureau 2016). Timber accounts for a very

small share of private employment in the North Zone – approximately one-half of one percent at its peak in 2006. Therefore, the erratic trends in this sector do not indicate substantial changes in the economic fortunes of the region overall.

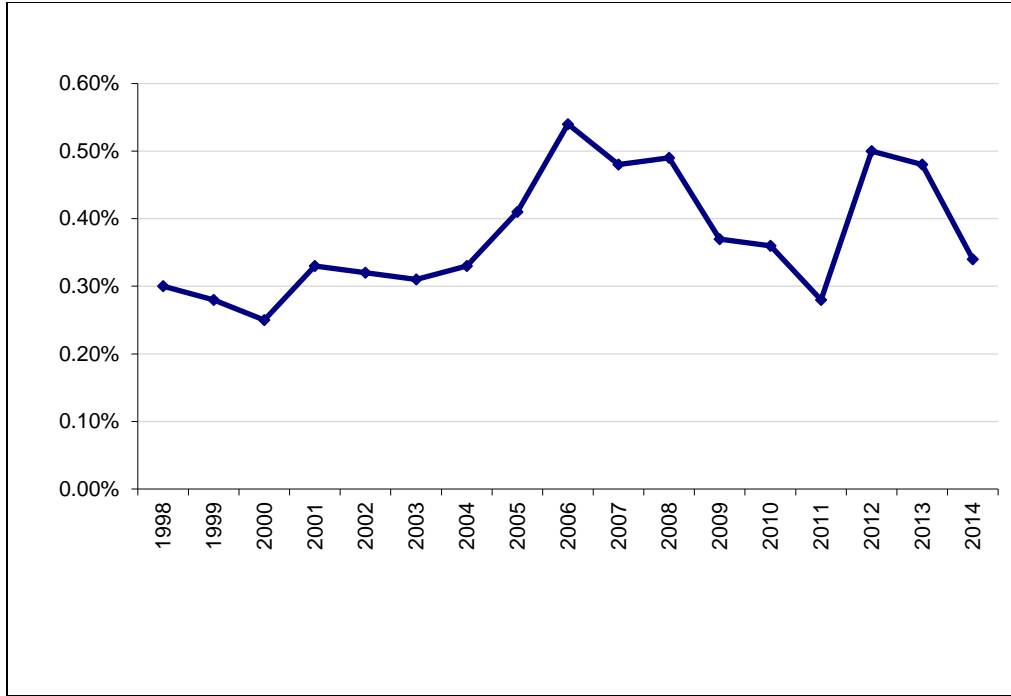


Figure 5. Percent of Total Private Employment in Timber Sectors, North Zone

Source: U.S. Census Bureau 2016

Employment in timber sectors declined by nearly two-thirds between 1998 and 2014 in the South Zone. However, at no point during this period was timber a sizeable sector. At the peak in 1998, less than one percent of private employment was in timber-related industries (U.S. Census Bureau 2016). Unlike the North Zone, the Great Recession and subsequent recovery in the housing market did not appear to affect the steady downward trend of the timber sector in the South Zone.

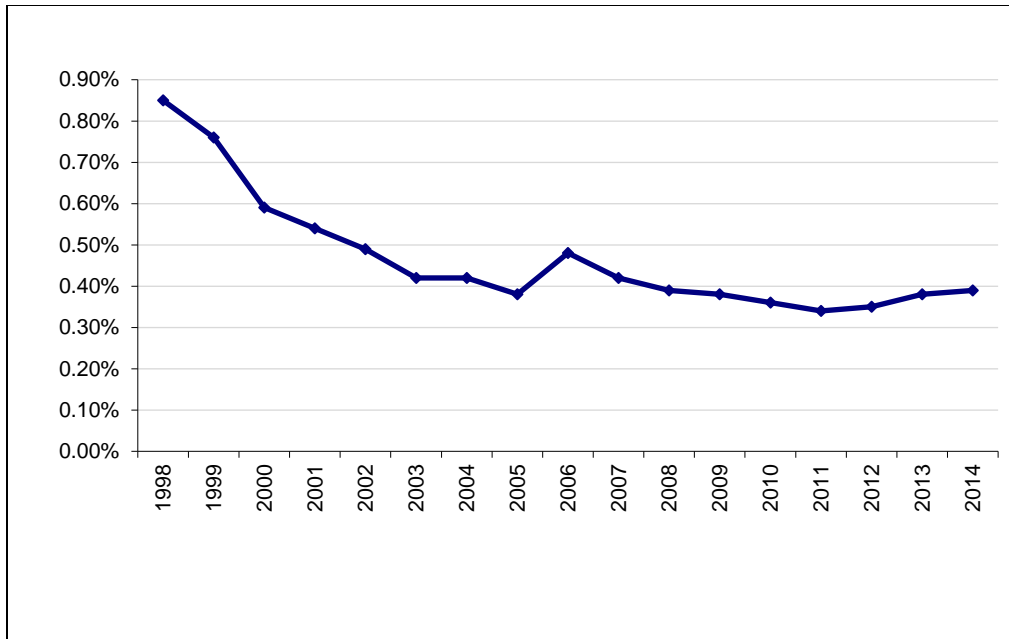


Figure 6. Percent of Total Private Employment in Timber Sectors, South Zone

Source: U.S. Census Bureau 2016

The employment and labor income associated with timber harvested from the Manti-La Sal NF is estimated in the economic contribution analysis section of this report.

Value of Forest Products

The previous section provided data on the contribution of timber to economic activity in the counties surrounding the Manti-La Sal NF. These contributions arise chiefly from commercial logging and wood processing facilities. Therefore, this section focuses on the values of other forest products – fuelwood, Christmas trees, and food and seeds.

Households may use wood for home heating for both cultural and economic reasons. When gas prices are high, wood offers an affordable fuel source. In particular, low-cost or free fuelwood collection permits from the Manti-La Sal NF provide affordable home heating for households near the forest. As shown in Table 13, approximately 6,200 cords of fuelwood are removed from the dependent on wood for home-heating. Assuming a typical household reliant on wood heating uses five cords a winter, fuelwood removed from the Manti-La Sal NF enables approximately 1,200 households to affordably heat their homes (Bonislowski 2014).

Table 14 and Table 15 show the proportion of households in the North and South zones, respectively, that use wood as their primary home heating source.

Table 14. Wood as Primary Home Heating Source, North Zone, 2015

Location	Share of Households with Wood as Primary Home Heating Source
Carbon County	1.7%
Emery County	8.0%
Juab County	6.5%
Sanpete County	5.2%
Sevier County	4.8%
Utah County	0.5%
Utah	1.2%

Source: U.S. Census Bureau 2015

Except for the urban Utah County, all counties in the North Zone are more reliant on wood for home heating than residents of the state overall. Emery and Juab counties have the highest share of households using wood as their primary heating source. According to that data in Table 5, these counties have median incomes similar to the nation overall and do not experience elevated rates of poverty. This suggests that wood heating in these areas may be more tied to culture and preference, rather than economic necessity.

Wood heating is more dominant in the South Zone, particularly in San Juan County, UT. More than one-third of households in San Juan County rely on wood as their primary home heating source. As shown in Table 6, San Juan County also has the lowest median household income and highest poverty rate among all ten counties in the planning area. This indicates that affordable and available fuelwood is important to well-being in San Juan County. Montrose County, CO is also much more reliant on wood heating than the state or planning area average. More than one-tenth of households in Montrose County use wood as their primary home heating source. Montrose County has the second lowest median household income and second highest poverty rate among the ten planning area counties (U.S. Census Bureau 2014).

Table 15. Wood as Primary Home Heating Source, South Zone, 2015

Location	Share of Households with Wood as Primary Home Heating Source
Grand County, UT	4.5%
San Juan County, UT	35.0%
Mesa County, CO	3.1%
Montrose County, CO	11.2%
Colorado	2.1%
Utah	1.2%

Source: U.S. Census Bureau 2015

Other non-timber forest products gathered on the Manti-La Sal NF, such as nuts, seeds, and Christmas trees support livelihoods and traditions in the communities near the forest. In the South Zone, gathering piñon nuts is culturally and economically valuable. Cutting Christmas trees provides a family activity that preserves tradition. Local seed companies benefit from ecological diversity on the Manti-La Sal NF. Farmers and ranchers use poles and posts from the forest for range improvements. Many of these

activities are not captured in market transactions, or are captured in non-timber sectors. Therefore, the employment shares shown in Figure 5 and Figure 6 do not provide a complete picture of the importance of forest products to communities that surround the Manti-La Sal NF.

Outdoor Recreation

Current Recreation Visitor Use

There are approximately 350,000 visits to the Manti-La Sal NF annually (USFS 2016a). The majority of visitors to the Manti-La Sal NF are white (97%), male (64%), from Utah (87%), with annual household income between \$50,000 and \$74,999 (33%). Youth (under 16) make up the largest share of visitation (25%) among any age class (USFS 2016).

Hunting and fishing are among the most common motivations for people to visit the Manti-La Sal NF. Only “viewing natural features” has a higher share of participants reporting it as their main activity during their visit (17.5%). Hunting is identified as the main activity by 11.2 percent of visitors and fishing by 8.6 percent of visitors. Motorized trail activity, developed camping, and driving for pleasure are other highly-reported main activities, with more than 7 percent of visitors selecting each as the primary purpose of their visit (USFS 2016a).

Detail on recreational settings, opportunities, and access are contained in the report for topic 9.

Trends in Recreation Sectors

Figure 7 displays the trend in the share of employment in travel and tourism-related sectors in the North Zone. Since 1998, the share of employment in travel and tourism sectors has been relatively flat, around 12 percent of private employment (U.S. Census Bureau 2016).

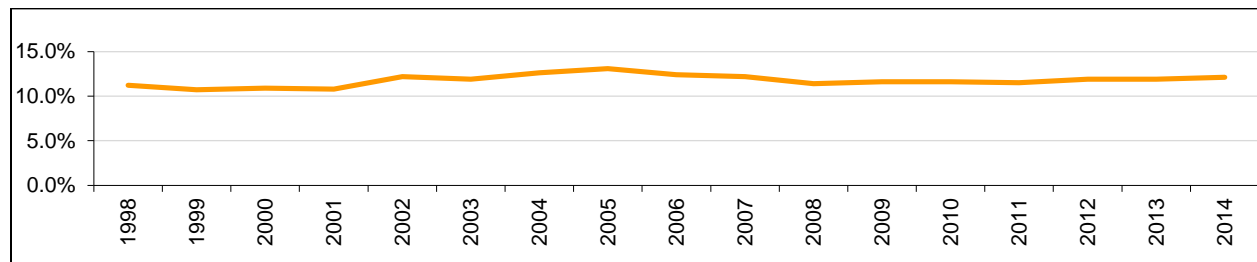


Figure 7. Percent of Total Private Employment in Travel and Tourism Sectors, North Zone

Source: U.S. Census Bureau 2016

Travel and tourism is a more dominant economic driver in the South Zone, with approximately 20 percent of jobs in these sectors. Figure 8 displays the trends in travel and tourism-related employment in the South Zone. The share of employment in these sectors increased steadily between 1998 and 2014 (U.S. Census Bureau 2016).

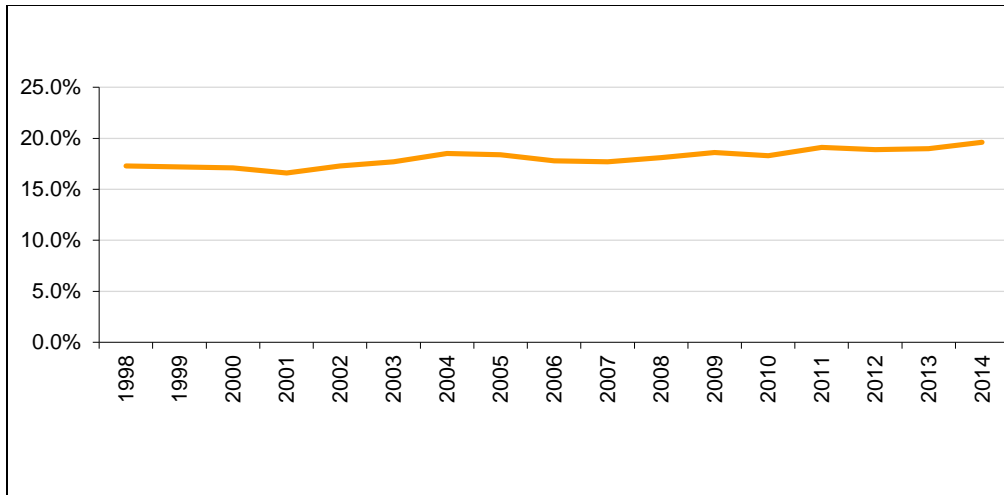


Figure 8. Percent of Total Private Employment in Travel and Tourism Sectors, South Zone

Source: U.S. Census Bureau 2016

Recreation on the Manti-La Sal NF contributes to employment in travel and tourism sectors, however, much of the employment in these sectors is attributable to other outdoor recreation opportunities and tourist attractions in the region. For example, Arches and Canyonlands national parks are in the South Zone and receive nearly 2 million visits each year (compared to 350,000 to the Manti-La Sal NF) (NPS 2016). The concentration of outdoor recreation opportunities in the South Zone, particularly near Moab, Utah, makes travel and tourism industries major economic drivers. In Grand County, Utah (which contains Moab), nearly half of private employment in the county is in travel and tourism sectors (Headwaters Economics 2015). Therefore, Manti-La Sal NF recreation management actions have the potential to influence a key economic sector, particularly in the South Zone.

Value of Recreation

Outdoor recreation visitors spend money on food, fuel, lodging, and souvenirs during their trips to the Manti-La Sal NF. Average visitor spending ranges from \$33 for local day visitors to \$514 for non-local overnight visitors staying off the national forest (White et al 2013). These visitor expenditures support employment and labor income in recreation-related sectors in the communities that surround the forest. The economic contribution of visitor expenditures is estimated in the economic contribution analysis section of this report.

Visitor expenditures are only one measure of the economic aspects of outdoor recreation. Visitors to public lands benefit from free or low-cost recreation opportunities. The value of an outdoor recreation experience to a visitor is not typically captured in market transactions. In other words, while some recreation visitors pay fees to access a site or purchase hunting licenses, the values of those experiences often exceed the amount that is spent for the experience. The difference between what visitors spend and what they would be willing to spend in order to access outdoor recreation opportunities is called consumer surplus. Consumer surplus is not captured in an economic contribution analysis and the survey data necessary to accurately estimate consumer surplus are not available. However, the inability to quantify consumer surplus associated with recreation does not indicate that these values do not exist.

Outdoor recreation opportunities on the Manti-La Sal NF contribute to visitors' quality of life. The forest provides an area for friends and family to gather, to pass on traditions, and to strengthen relationships. Some activities, such as hunting and fishing, serve a dual purpose of recreation/leisure and supporting household well-being through the provision of food.

Mineral and Energy Production

Multiple uses and ecosystem services refer to renewable natural resources. Therefore, these categories do not typically include minerals. However, due to the economic importance of mining in the counties surrounding the Manti-La Sal National Forest, it is addressed as part of the “benefits to people” analysis in this report.

Current Mineral Removal

Coal is the largest source of mining activity on the Manti-La Sal NF. Approximately 8 million short tons of coal are removed from the forest annually (Salow 2016). In Utah, the average sales price per short ton of coal is \$35 (EIA 2016a). Therefore, approximately \$280 million worth of coal are removed from the Manti-La Sal National Forest annually.

Natural gas wells on the forest also contribute to economic activity in the region. Approximately 450,000 mcf (thousand cubic feet) of natural gas is produced from 13 wells on the Manti-La Sal NF (Salow 2016). The wellhead price of natural gas is approximately \$3 per mcf. Therefore, natural gas production from the Manti-La Sal National Forest is worth approximately \$1.4 million annually.

Trends in Mining Industry

Figure 9 displays the trend in mining employment in North Zone counties. Since 1998, employment in the mining sector has declined from approximately 1.5 percent to approximately 0.8 percent of total private employment in 2014 (U.S. Census Bureau 2016).

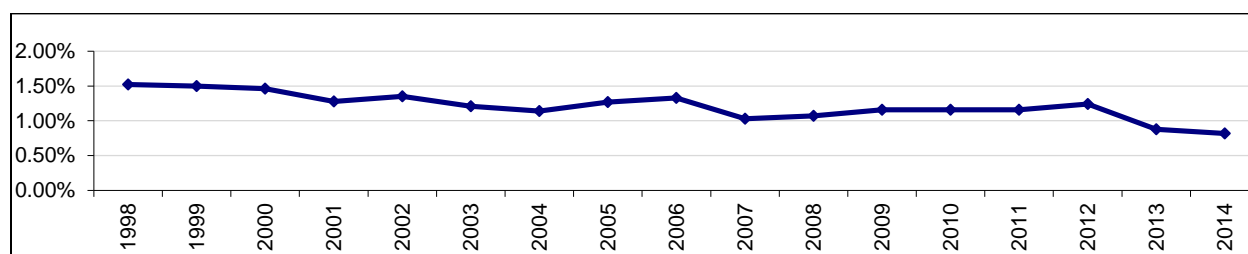


Figure 9. Percent of Total Private Employment in Mining, North Zone

Source: U.S. Census Bureau 2016

In contrast, the share of mining employment in South Zone counties grew substantially between 1998 and 2014 – from approximately 1 percent to nearly 5 percent. However, the growth in mining employment in the South Zone is driven by Mesa County, Colorado, where the oil and gas industry grew substantially over the period. The boom in oil and gas production in Mesa County did not occur on the Manti-La Sal NF lands in the county.

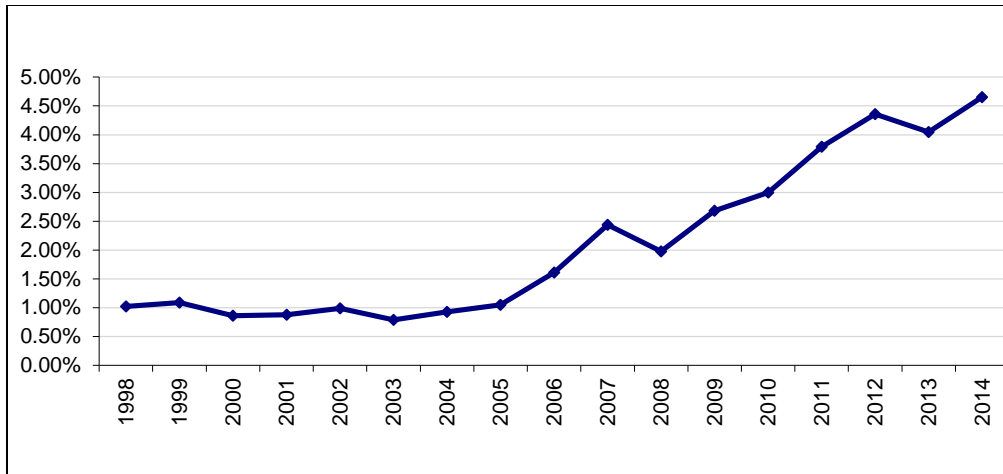


Figure 10. Percent of Total Private Employment in Mining, South Zone

Source: U.S. Census Bureau 2016

Since 2014, oil and gas prices have declined dramatically (EIA 2016b and EIA 2016c). In 2013, crude oil prices in Utah and Colorado were approximately \$90 per barrel. By 2015, the price of a barrel of oil had more than halved, to approximately \$40 (EIA 2016c). Unfortunately, employment data beyond 2014 are not available. However, the decline in oil and gas prices has likely reduced the share of mining-related employment in the South Zone.

These figures provide insight into the mining sector throughout the 10-county area. However, they do not reveal how mines on NFS lands in the planning area contribute to economic activity. The contributions of mining on the Manti-La Sal NF are addressed in the economic contribution analysis in a subsequent section.

Water Provision

The Manti-La Sal NF contributes to the provision of clean water for a variety of human uses. Since water is not traded in markets the way that other multiple uses (e.g., timber), this section is organized to qualitatively address: who benefits from water, how they benefit, and changes in demand for water provision. The hydrology and watersheds section in the topics 1 and 2 report describes conditions and trends in water quality, water quantity, watershed function, and stressors that are affecting watersheds in the planning area. Water is an essential input to nearly all human activities. Human health, agriculture, and industrial production are reliant on clean and plentiful water.

Clean water provided by the Manti-La Sal NF is essential for agricultural producers in the planning area. As shown in Figure 2 and Figure 4, agriculture is a major source of employment in some of the North and South zone counties. Agriculture is of particular economic importance in Emery, Juab, Sanpete, Sevier, and San Juan counties in Utah and Montrose County, Colorado (U.S. Census Bureau 2016). Utah is among the driest states in the nation. Therefore, irrigation is essential for agricultural production. Reservoirs on the Manti-La Sal NF store snowmelt for irrigation.

Municipalities and individual households also rely on the Manti-La Sal NF for clean drinking water. Both municipalities and individual wells withdraw water from watersheds that overlap with the Manti-La Sal NF. Forest uses and management actions, such as grazing, mining, and recreational use, have the potential to affect drinking water quality. The hydrology and watershed section of the topics 1 and 2 report describes threats to drinking water quality in detail.

Surface water on the Manti-La Sal NF contributes to recreational use and enjoyment of the forest. Boaters, anglers, and other water-based recreation users are heavily affected by water quantity and quality on the Manti-La Sal NF. Nearly 10 percent of visitors to the Manti-La Sal NF report fishing as their primary trip purpose and nearly 25 percent report fishing as one of their activities during their visit to the forest. Smaller shares of visitors report participating in other motorized and non-motorized water activities during their visit to the forest (USFS 2016a).

The value of water is not captured in market transactions, therefore, the type of economic contribution analysis done for other multiple uses (range, recreation, and timber) cannot be done for water. However, the absence of water as an independent category in the economic contribution analysis does not reflect a lack of economic importance, rather that water is an input to all economic activity.

Wildlife and Fish

The Manti-La Sal NF provides habitat for a diverse range of wildlife and fish. The protection of wildlife and fish habitat contributes to social and economic well-being in the planning area counties and in the broader landscape. The reports for topics 1, 2, and 5.

People benefit from wildlife and fish in myriad ways. Anglers and hunters rely on wildlife and fish for recreational enjoyment, sustenance, and to preserve heritage. Tiger Muskie in particular draw anglers to the Manti-La Sal NF. Big game habitat on the Manti-La Sal NF draws hunters to the forest. According to the Manti-La Sal NF's National Visitor Use Monitoring survey, approximately 20 percent of recreational visitors report hunting or fishing as their primary trip purpose and about 40 percent report hunting or fishing as part of their trip. Furthermore, 28 percent of visitors report wildlife viewing during their trip to the forest (USFS 2016a). These survey results indicate that the protection of fish and wildlife habitat on the Manti-La Sal NF is essential to recreational use and enjoyment.

Recreation visitors to the Manti-La Sal NF are a source of economic activity in communities near the Manti-La Sal NF. Local communities that provide goods and services to hunters and anglers rely on their spending. Recreation visitor expenditures support employment and labor income in communities near the Manti-La Sal NF. Furthermore, state governments rely on hunting and fishing license and permit revenue to fund state government operations. The contributions of wildlife and fish-related recreation to economic activity are captured in the economic contribution analysis in this report.

People also value wildlife and fish on the Manti-La Sal NF for non-recreational purposes. The existence value of wildlife and fish – i.e., the value of knowing that wildlife and fish are present on the Manti-La Sal NF, even if no future use such as hunting or wildlife view is intended. These sorts of values for wildlife and fish are not captured in market transactions. Although these value are difficult to fully capture and monetize, they are a real source of social and economic contributions from the Manti-La Sal NF to people in the planning area counties and across the United States.

Carbon Sequestration and Storage

Climate change threatens human well-being across the world. In 2010, a federal interagency working group was established to estimate the social benefits of reducing carbon dioxide emissions (SCC 2015). Costs to humans associated with climate change influence infrastructure damage due to sea level rise, increased frequency and intensity of wildfire, increased building cooling costs, and effects to agricultural productivity and human health. These costs are global in nature. Therefore, carbon emissions or carbon storage associated with the Manti-La Sal NF has costs and benefits that extend far beyond the 10-county analysis area used in this report.

Table 16 displays the estimated cost of damages associated with the emission of a metric ton of carbon dioxide in a given year. These estimates can also be interpreted as the costs avoided from the sequestration and storage of a ton of carbon dioxide.

Table 16. Social Cost of CO₂, 2015-2050, Average Scenario, 3% Discount Rate (2007 USD)

Year	Social Cost of Carbon (per metric ton)
2015	\$36
2020	\$42
2025	\$46
2030	\$50
2035	\$55
2040	\$60
2045	\$64
2050	\$69

Source: SCC 2015

The role of the Manti-La Sal NF in contributing to carbon storage and sequestration is covered in the report for topic 4.

Forest Operations and Infrastructure

Manti-La Sal NF operations and infrastructure include personnel, program activities, roads, and facilities that contribute to the use and enjoyment of the forest.

Salary and Non-Salary Expenditures

The Manti-La Sal NF's annual budget is approximately \$11 million. Two-thirds of this is spent on salaries. One-third is spent on equipment and other non-salary expenditures that contribute to forest management. The Manti-La Sal NF's operational expenditures contribute to economic activity in the communities that surround the forest. Forest Service employees live in these communities and spend their income on housing, food, and a variety of other local goods and services. The forest's non-salary expenditures generate economic activity in businesses that supply goods and services to support Forest Service programs. The economic contributions of the Manti-La Sal NF's expenditures are captured in the economic contribution analysis in this report.

Forest Infrastructure

Infrastructure on the Manti-La Sal NF includes National Forest System roads, trails, bridges, public utilities, private infrastructure, recreation facilities, drinking water systems, dams, and administrative facilities. Forest infrastructure is an essential input in economic activity in the region. Recreational use of the Manti-La Sal NF relies on accessible roads, trails, and developed sites. Households and industries rely on cellular towers, water developments, pipelines, and transmission lines to conduct their business. Like water, forest infrastructure is not a separate category in the economic contribution analysis because it is embedded in nearly all market transactions associated with forest uses. Timber cannot be removed from the forest for processing without National Forest System roads. Recreational visitors will not spend money in communities near the Manti-La Sal NF if they cannot access preferred recreational sites. New families and businesses will not move to the communities surrounding the forest if they lack access to infrastructure essential to modern life.

The condition, trends, and stressors affecting infrastructure on the Manti-La Sal NF are addressed in detail in the report for topic 11.

Economic Contribution Analysis

The economic contribution analysis estimates the role of Forest Service resources, uses, and management activities on employment and income in the communities that surround the Manti-La Sal National Forest.

The role of the Manti-La Sal National Forest in the regional economy was modeled with IMPLAN Professional 3.1 software using 2014 data. IMPLAN is an input-output model, which estimates the economic consequences 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. Accommodation and food service businesses buy supplies from other businesses. The employees of these firms spend their earnings on a variety of goods and services. These transactions result in direct, indirect, and induced effects in the regional economy, respectively. IMPLAN uses Forest Service data on expenditures and resource uses to estimate the economic consequences of Manti-La Sal National Forest management.

Employment by Program Area

Table 17 shows the number of jobs attributable to various Forest Service programs. Livestock grazing, mining, Forest Service expenditures contribute the most to employment in the regional economy, each contributing approximately 300 jobs on an average annual basis. The Forest Service expenditures category captures both salary and non-salary expenditures. Therefore, this category includes Manti-La Sal NF employees, forest contractors and suppliers, as well as employees of businesses where forest employees spend their household income.

Table 17. Employment by Program Area

Program Area	Current
Recreation: non-local only	41
Wildlife and Fish: non-local only	21
Grazing	337
Timber	78
Minerals	321
Payments to States/Counties	88
Forest Service Expenditures	284
Total Forest Management	1,171

Source: IMPLAN 2014

The recreation and wildlife and fish contributions capture only the expenditures of non-local visitors (i.e., traveled more than 50 miles to the Manti-La Sal NF). This is because non-local visitors bring “new money” to communities near the Manti-La Sal NF. If recreational or wildlife and fish-related opportunities were no longer available on the Manti-La Sal NF, non-local visitors would not be expected to spend money in the counties that surround the forest. They may travel to another area or spend money in their home county. In contrast, most local visitors would continue to spend money on another activity in the local area if recreational or wildlife and fish-related opportunities were no longer available on the Manti-La Sal NF.

Labor Income by Program Area

Table 18 displays labor income attributable to various Forest Service programs. The jobs estimates, presented above, offer an incomplete picture of the Manti-La Sal NF’s contributions to the 10-county economy. Not all jobs are equivalent. Labor income estimates help to clarify the role of forest management in supporting livelihoods in communities near the Manti-La Sal NF.

Table 18. Labor Income by Program Area

Program Area	Current
Recreation: non-local only	\$1,181
Wildlife and Fish: non-local only	\$615
Grazing	\$6,435
Timber	\$3,426
Minerals	\$18,624
Payments to States/Counties	\$3,590
Forest Service Expenditures	\$10,778
Total Forest Management	\$44,650

Source: IMPLAN 2014

Whereas Table 17 indicated that livestock grazing, mining, and Forest Service expenditures were roughly equivalent in terms of their contributions to regional employment, Table 18 demonstrates that mining on the Manti-La Sal NF contributes substantially more to labor income than livestock grazing and Forest Service expenditures. This finding reveals that jobs associated with mining on the forest pay more than jobs associated with livestock grazing or Forest Service expenditures.

Economic Importance of the Manti-La Sal NF

Table 19 displays the contribution of activities on the Manti-La Sal NF to regional employment and labor income. These sectors do not align with the program area categories in Table 17 and Table 18 because the employment and income associated with each program area occur in a variety of sectors. For example, the mining program on the Manti-La Sal NF supports 321 jobs and \$18.6 million in labor income on an average annual basis. Table 19 shows that the Manti-La Sal NF supports 130 jobs and \$10.7 million in labor income in the mining sector. This discrepancy is because mining activity on the Manti-La Sal NF supports jobs and labor income in a number of non-mining sectors, particularly construction, retail trade, finance and insurance, professional, scientific, and technical services, and health care.

Table 19. Current Contribution of the Manti-La Sal National Forest to the Regional Economy

Industry	Employment (jobs)		Labor Income (Thousands of 2014 dollars)	
	Area Totals	FS-Related	Area Totals	FS-Related
Agriculture	10,807	309	\$215,278	\$4,724
Mining	8,128	130	\$667,523	\$10,739
Utilities	1,438	2	\$163,415	\$233
Construction	33,526	25	\$1,533,504	\$1,170
Manufacturing	27,546	24	\$1,679,845	\$1,056
Wholesale Trade	12,385	26	\$836,607	\$1,954
Transportation & Warehousing	50,282	18	\$1,412,761	\$1,461
Retail Trade	9,136	79	\$531,512	\$2,315
Information	13,681	9	\$1,068,445	\$588
Finance & Insurance	23,867	41	\$663,698	\$1,098
Real Estate & Rental & Leasing	22,198	33	\$361,146	\$837
Prof, Scientific, & Tech Services	36,813	56	\$1,978,581	\$2,407
Mngt of Companies	3,441	5	\$107,987	\$174
Admin, Waste Mngt & Rem Serv	22,428	27	\$665,278	\$826
Educational Services	17,101	11	\$761,125	\$517

Health Care & Social Assistance	44,192	57	\$1,998,723	\$2,835
Arts, Entertainment, and Rec	8,952	14	\$101,320	\$175
Accommodation & Food Services	31,100	61	\$606,731	\$1,178
Other Services	17,287	24	\$729,290	\$1,063
Government	53,282	219	\$2,718,713	\$9,302
Total	447,591	1,171	\$18,801,480	\$44,650
FS as Percent of Total	---	0.26%	---	0.24%

Source: IMPLAN 2014

Market transactions attributable to activities on the Manti-La Sal NF support an estimated 1,171 jobs and \$44.7 million in labor income in the regional economy. Forest Service activities on the Manti-La Sal NF are responsible for approximately 0.26 percent of total employment and 0.24 percent of labor income in the ten-county area. The Manti-La Sal NF contributes the most employment and labor income to the (1) agriculture, (2) government, and (3) mining sectors. All of these sectors are linked to the Manti-La Sal NF, including forest product removal, mining, livestock grazing, and payments to states and counties. The agriculture sector is the most reliant on Forest Service activities. Approximately 2.9 percent of employment and 2.2 percent of labor income in the agriculture sector is attributable to activities on the Manti-La Sal NF.

The above analysis considers only the market transactions that result from activities on the Manti-La Sal National Forest. 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.

Social and Economic Sustainability

Definition of Social and Economic Sustainability

36 CFR §219.19 in the 2012 Planning Rule defines sustainability as the capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs. Economic sustainability refers to the capability of society to produce and consume or otherwise benefit from goods and services including contributions to jobs and market and nonmarket benefits; and social sustainability refers to the capability of society to support the network of relationships, traditions, culture, and activities that connect people to the land and to one another, and support vibrant communities.

The Manti-La Sal NF provides opportunities to use and enjoy natural resources. Reports for topics 1 and 2 address the ecological sustainability of Forest Service resources and uses. This report addresses the Manti-La Sal NF's relationship to social and economic sustainability in the counties that surround the forest.

Social and Economic Sustainability Measures

Diversified economies – those with employment in a variety of industries – are more resilient to changes in a single sector. While some individuals will still experience periods of unemployment, economic diversification helps to lessen the potential of economic collapse due to the decline of one industry. One measure of economic diversity is the Shannon-Weaver index, which is based on the number of sectors present in an economy and the size of those sectors. In the 10-county economic area, the diversity index is 0.76 out of 1. For comparison, Utah's economic diversity index is 0.77 (IMPLAN 2014). Therefore, the planning area is approximately as economically diverse as the state overall. The county-level diversity indices reveal a substantial amount of variation within the planning area counties. Economic diversity is

strongly correlated with population size. The three largest counties in the planning area – Utah County, UT in the North Zone and Mesa and Montrose counties, CO in the South Zone – are the most economically diverse. Table 20 and Table 21 display the economic diversity indices for counties in the North and South zones, respectively.

Table 20. Economic Diversity Index, North Zone, by County

Location	Shannon-Weaver Diversity Index
Carbon County	0.69
Emery County	0.62
Juab County	0.66
Sanpete County	0.68
Sevier County	0.67
Utah County	0.74

Source: IMPLAN 2014

Table 21. Economic Diversity Index, South Zone, by County

Location	Shannon-Weaver Diversity Index
Grand County, UT	0.66
San Juan County, UT	0.64
Mesa County, CO	0.73
Montrose County, CO	0.72

Source: IMPLAN 2014

Contribution of Forest Programs, Resources, and Uses to Social and Economic Sustainability

Extractive natural resource-based economies are often subject to boom and bust cycles. Boom and bust cycles threaten social and economic sustainability. As described above in the mining and energy section, oil and gas prices have declined dramatically in recent years (EIA 2016b and EIA 2016c). During a boom period, population typically grows rapidly, which strains public services (e.g., policing and schools) and causes housing prices to increase. A bust period then leads to a dramatic decline in public revenues, out-migration, and high unemployment. Natural resource-based economies that are not diversified in other industries are particularly affected by boom and bust cycles.

The economic contribution analysis revealed that the Manti-La Sal NF makes the largest contributions (in terms of employment and labor income) to the agriculture, mining, and government sectors. Mining and agriculture sectors (including, e.g., commercial logging and cattle ranching) are susceptible to boom and bust cycles. For example, a fall in energy prices or a slow-down in housing starts will affect employment in these sectors. The 2007-2009 recession and the recent drop in energy prices affected these sectors. The Forest Service does not control business cycles or other macroeconomic conditions. However, Forest Service management does interact with the broader economy. Sustainable management is at the core of the Forest Service’s mission. The Multiple-Use Sustained-Yield Act of 1960 enshrined in law a requirement to manage national forests to provide benefits to present and future generations.

The “benefits to people” section, above, describes the channels through which the Forest Service contributes to social and economic well-being through the provision of outdoor recreation opportunities, forage for livestock, a sustainable flow of timber, watershed services, and fish and wildlife habitat.

Additionally, the Manti-La Sal NF serves as a carbon sink. The Manti-La Sal NF's operations and infrastructure ensure that people have access to the goods and services that they value.

Trends:

Population Change

From 2000 to 2010 North Zone counties saw significant population growth, especially for the more metropolitan Utah County. From 2010 to 2014 growth slowed across the North Zone, Utah, and the United States as a whole, however, Utah County continued to grow at an above average pace. The rural counties of Carbon, Emery, and Sevier saw much less population growth from 2000 to 2010, and zero to negative growth between 2010 and 2014.

Table 22. North Zone Population Change, by County

Location	Population 2000	Population 2010	% Change 2000-2010	Population 2014	% Change 2010-2014
Carbon County	20,422	21,403	4.8%	21,118	-1.3%
Emery County	10,860	10,976	1.1%	10,834	-1.3%
Juab County	8,238	10,246	24.4%	10,349	1.0%
Sanpete County	22,763	27,822	22.2%	28,129	1.1%
Sevier County	18,842	20,802	10.4%	20,812	0.0%
Utah County	368,536	516,564	40.2%	540,425	4.6%
North Zone	449,661	607,813	35.2%	631,667	3.9%
Utah	2,233,169	2,763,885	23.8%	2,858,111	3.4%
United States	281,421,906	308,746,065	9.7%	314,107,084	1.7%

Source: Table DP-1, 2000 Census; 2010 Census; 2014 from EPS, calculated from ACS and represents average characteristics

South Zone counties also experienced rapid population growth from 2000 to 2010. Growth was led by the two Colorado counties, Mesa and Montrose, which saw growth at twice the national rate. Population growth slowed significantly for South Zone counties between 2010 and 2014. Montrose County's population declined slightly over this period.

Table 23. South Zone Population Change, by County

Location	Population 2000	Population 2010	% Change 2000-2010	Population 2014	% Change 2010-2014
Grand County, UT	8,485	9,225	8.7%	9,348	1.3%
San Juan County, UT	14,413	14,746	2.3%	14,944	1.3%
Mesa County, CO	116,255	146,723	26.2%	147,509	0.5%
Montrose County, CO	33,432	41,276	23.5%	40,885	-0.9%
South Zone	172,585	211,970	22.8%	212,686	0.3%
Colorado	4,301,261	5,029,196	16.9%	5,197,580	3.3%
Utah	2,233,169	2,763,885	23.8%	2,858,111	3.4%
United States	281,421,906	308,746,065	9.7%	314,107,084	1.7%

Source: Table DP-1 2000 Census; 2010 Census; 2014 from EPS, calculated from ACS and represents average characteristics

These data indicate that human population pressure on Manti-La Sal National Forest’s lands and resources have increased considerably since the Manti-La Sal Forest National Forest Land and Resource Management Plan was published in 1986.

Unemployment

Unemployment trends are a measure of economic resilience. All counties in the planning area had similar unemployment trends between 2000 and 2015.

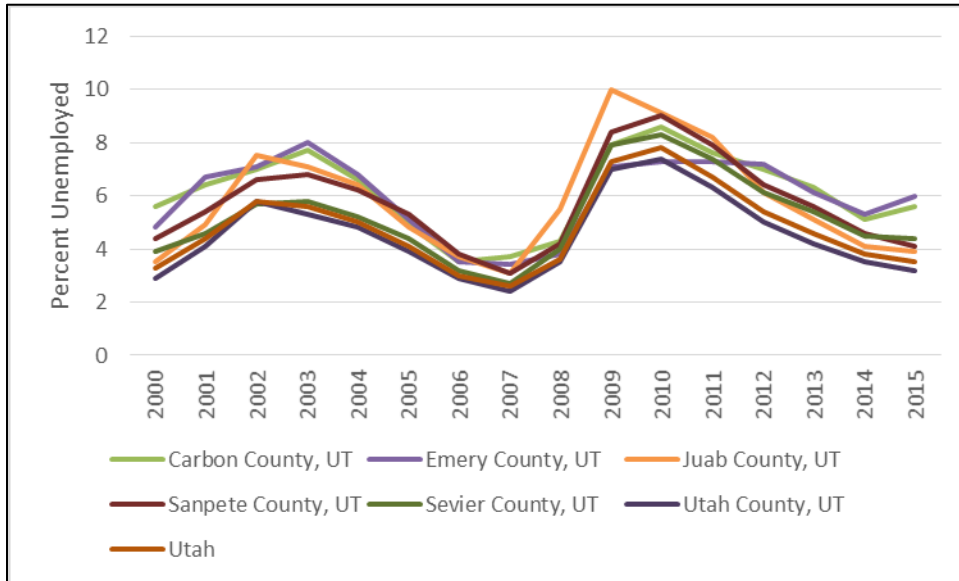


Figure 11. Unemployment Trends, North Zone

Source: BLS 2016

In the North Zone, Utah County, UT had the lowest unemployment rate – below even the statewide unemployment trend. Utah County is an urban and economically diverse area with a variety of employment opportunities. In contrast, the more rural and natural resource-dependent counties of Carbon and Emery had above-average unemployment rates in the North Zone. Agriculture is a major economic driver in Emery County and mining is in Carbon County. These are commodity industries, which are susceptible to dramatic changes in price due to global supply and demand forces.

Overall, the North Zone is currently at or near full-employment, which economists define as a five percent unemployment rate. However, the trend data indicate the potential for sizeable changes in employment prospects due to business cycles.

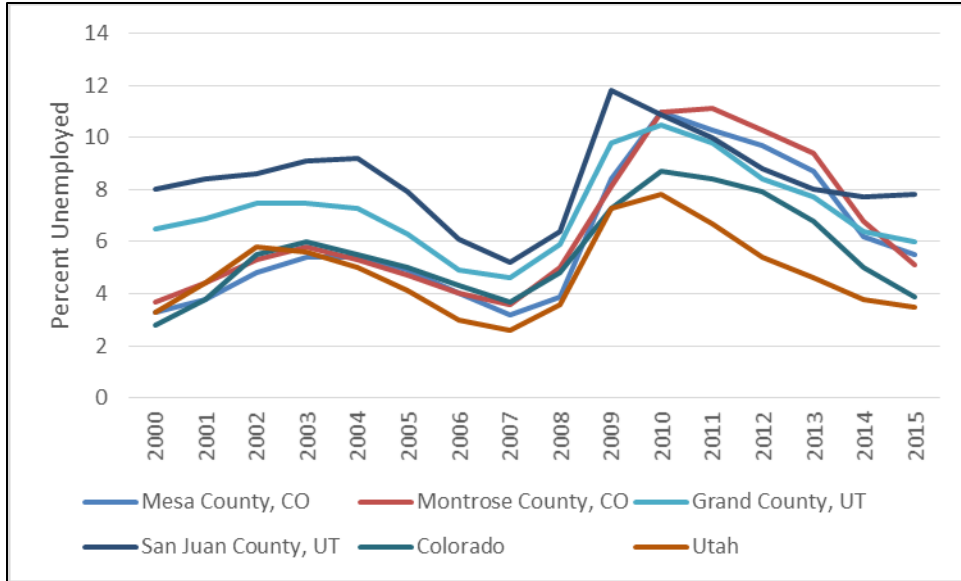


Figure 12. Unemployment Trends, South Zone

Source: BLS 2016

The South Zone counties have had higher unemployment rates than their respective states throughout most of the 2000 to 2015 period. San Juan County, UT, which has the highest share of minority residents and the highest poverty rate among all 10 counties in the planning area has also experienced very high unemployment. Unemployment in San Juan County, UT peaked in 2009 near 12 percent and still remains elevated at approximately 8 percent. Mesa County, CO experienced a high degree of volatility in unemployment rates over this period. In some periods, the unemployment rate was below the Colorado average, but it spiked dramatically during the Great Recession and remains elevated. Mesa County, CO has a large oil and gas industry, where production has slowed due to the recent drop in prices.

Land Use and the Wildland-Urban Interface

Land ownership patterns in the North Zone are similar to Utah overall. In all counties, a minority of lands are privately owned. Federally-managed lands, primary Bureau of Land Management or National Forest System lands, account for two-thirds of all lands in the North Zone. BLM-managed lands are more prevalent across North Zone counties, with approximately 4.4 million acres compared to 2 million acres of National Forest System lands (not just the Manti-La Sal National Forest) in North Zone counties.

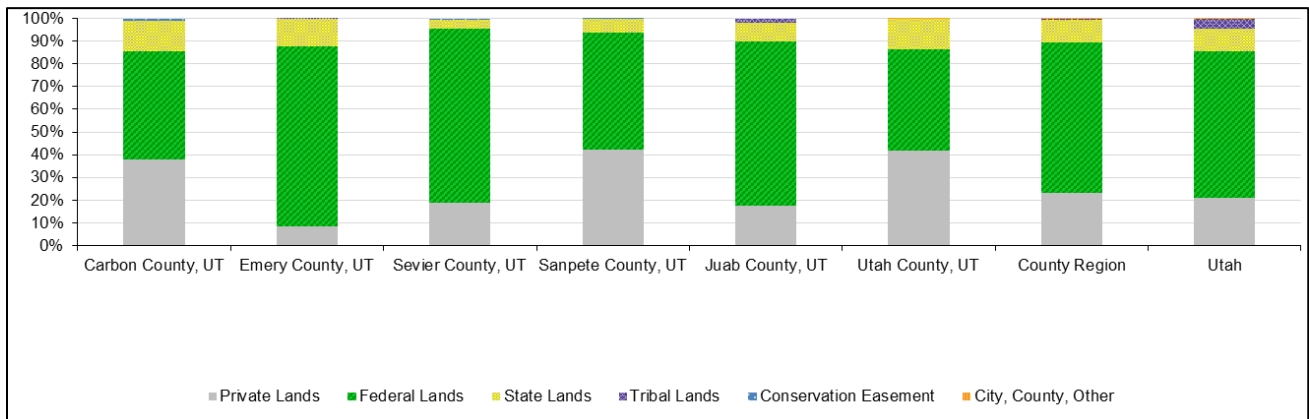


Figure 13. Land Ownership North Zone, Percent of Land Area

Source: USGS 2012

In the South Zone, tribal lands account for a larger share of the land base, particularly in San Juan County, Utah. Privately owned lands are even less prevalent in the South Zone than the North Zone. In particular, the two Utah counties in the South Zone have less than 10 percent private land ownership. Like the North Zone, BLM-managed lands are more prevalent than National Forest System lands across South Zone counties, with approximately 5.2 million acres compared to 1.4 million acres of National Forest System lands (not just the Manti-La Sal National Forest) in South Zone counties.

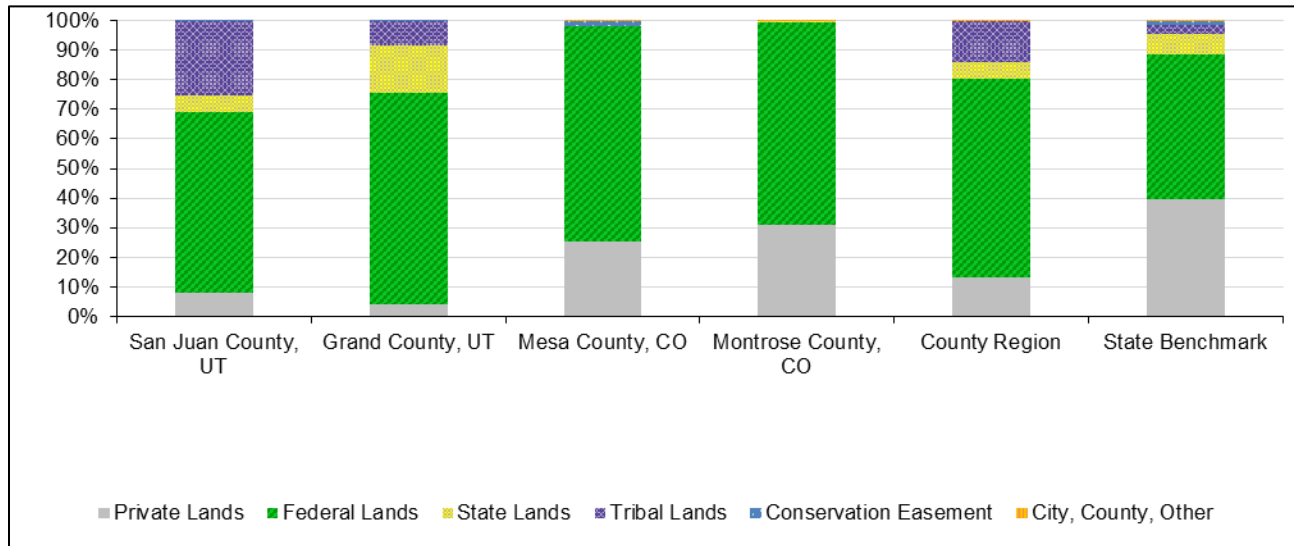


Figure 14. Land Ownership South Zone, Percent of Land Area

Source: USGS 2012

Note: "State Benchmark" is the aggregate of Colorado and Utah.

Federal land management actions are more likely to influence social and economic conditions in places with large shares of public lands.

The conversion of land for residential development contributes to habitat fragmentation and the loss of open space. As noted above, the North Zone population has grown rapidly since 2000. Population growth increases demand for residential development. In the North Zone, most of the residential development between 2000 and 2010 occurred in exurban areas, where lot sizes are relatively large (Theobald 2013). Exurban residential development is more likely to contribute to habitat fragmentation and the loss of open space compared to residential development in urban and suburban areas. Although the population in the South Zone has grown less rapidly, the counties have experienced similar trends in residential development. Most of the residential development in South Zone counties has occurred in exurban areas (Theobald 2013).

Exurban residential development increases the size of the wildland-urban interface. Residential development adjacent to wildlands increases the cost and complexity of national forest management due to the need for fire suppression to protect human life and property. Residents who live near forest lands are also more likely to be affected by smoke emissions associated with forest restoration activities.

In the South Zone, residential development in the wildland-urban interface is minimal. In 2010, less than 2 percent of the wildland-urban interface in South Zone counties contained homes (Gude et al 2008, U.S. Census Bureau 2010, and U.S. Census Bureau 2011). The North Zone has slightly higher residential development in the wildland-urban interface: 2.5 percent of the wildland-urban interface contained homes in 2010. This is driven by Sevier and Utah counties, where 5 percent and 8 percent, respectively, of the

wildland-urban interface had residential development (Gude et al 2008, U.S. Census Bureau 2010, and U.S. Census Bureau 2011). Overall, these trends suggest that residential development in the wildland-urban interface in both North Zone and South Zone counties is modest and not driving increased fire suppression costs.

Data Gaps

Federal and state agencies collect a variety of demographic and economic data. However, data at fine geographic scales (e.g., sub-county) are typically unreliable or unavailable. This data gap prevents an assessment of community-level conditions and trends.

The Forest Service collects a variety of data on the use of forest resources (e.g., National Visitor Use Monitoring, Cut and Sold). These data enable the consideration of current uses and trends. However, resource use data are not synonymous with demand for forest resources and uses. The distinction between use and demand is relevant considering the role of increased human populations as an ecological stressor. If current resource availability is not satisfying demand, then there is potential for increased pressure on national forest lands regardless of population growth.

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