

Appendix C

Social and Economic Overview

Introduction

The relationship between the Grand Mesa-Uncompahgre-Gunnison (GMUG) National Forests and local lifestyles and economies is highly interdependent and complex. Hunting, downhill skiing, wilderness areas, livestock grazing, coal mining, a haven for off-highway vehicles (OHV), and timber for local industry are characteristics of this large national forest in west central Colorado. This report examines the present conditions and forecasts of counties and communities that both influence and are influenced by the GMUG National Forests.

Area of Analysis

The GMUG National Forests is located in portions of ten Colorado counties, seven of which have important social and economic ties to the GMUG National Forests: Delta, Gunnison, Hinsdale, Mesa, Montrose, Ouray, and San Miguel. The seven-county area is quite diverse, and can be subdivided into three distinct sub-areas. Mesa County includes Grand Junction, which is the regional service center for the entire western half of Colorado. It stands apart from the more rural counties that are connected to the GMUG National Forests. Gunnison and Hinsdale Counties share the eastern half of the Forests, and are more geographically separate distinct. They are characterized by a substantial tourism-based economy. Coal mining in Gunnison County is located in the far northwestern corner of this area, but it economically and culturally connected with Delta County. The balance of the counties – Delta, Montrose, Ouray, and San Miguel – is quite diverse, yet they share strong ties to the small regional center of Montrose. Throughout the much of this report, counties and their municipalities are discussed separately. In the economic portion, however, the counties are discussed as three economically-connected sub-areas.

This document is separated into a main report with three sections – *Demographics*, *Economics*, and *Local Governments*. Following it are three industry reports – *Timber*, *Livestock*, and *Energy*.

Conditions and Trends

Demographics

POPULATION

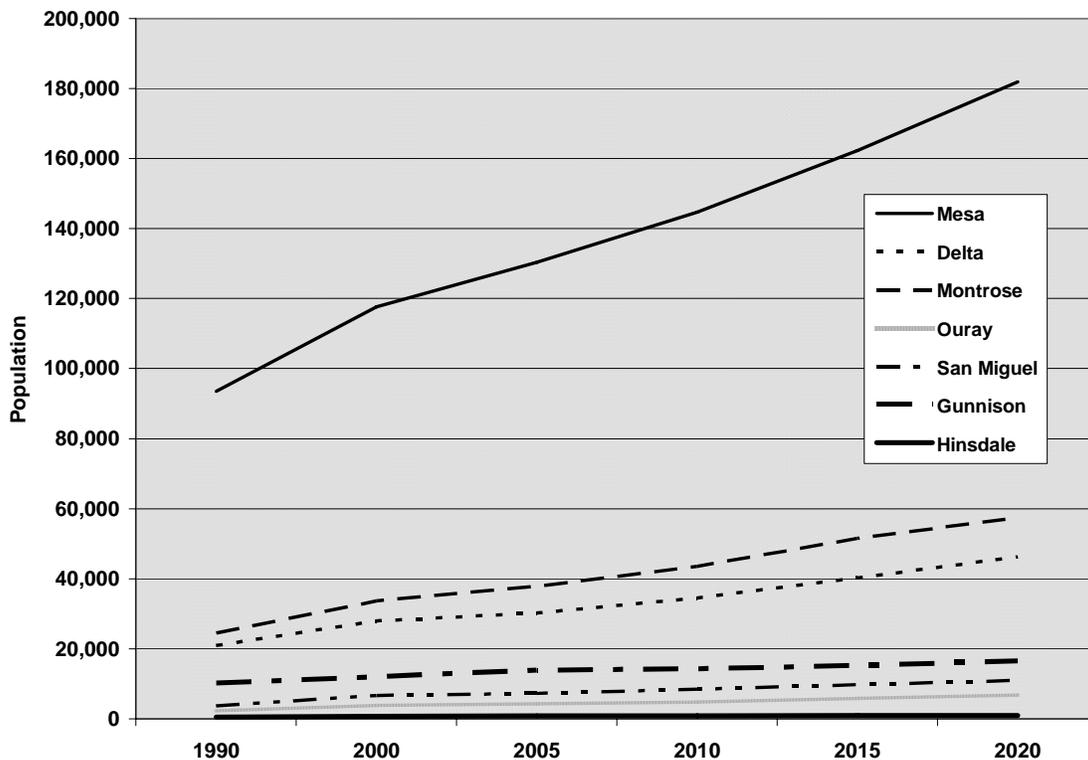
In the first half of the 1990s, weak economies on both coasts of the U.S., technological advances in communications, and changing preferences of baby boomers were some of the factors that prompted a migration to the central Rocky Mountains. A very robust U.S. economy in the second half of the 1990's fueled the continuation of these trends. The migration slowed in the early parts of this decade, but energy markets have again boosted the stock of western Colorado. Energy-based growth and retiring baby boomers are expected to keep growth rates steady in West Slope communities in the foreseeable

future. Since 1990, population in the seven-county area has increased 47 percent and is expected to increase another 35 percent by 2020.

Figure 1 shows actual and projected changes in population from 1990 to 2020 based on recent data from the Colorado State Demographers Office. Mesa County shows the highest growth rate in the next 15 years, followed by Delta and Montrose Counties. Other counties are forecasted to grow steadily in the next 15 years, but not as dramatically. The larger communities of Delta, Montrose, and Grand Junction offer medical facilities and economic diversity that may be more attractive to retirees, and they are expected to attract more of the energy-based growth.

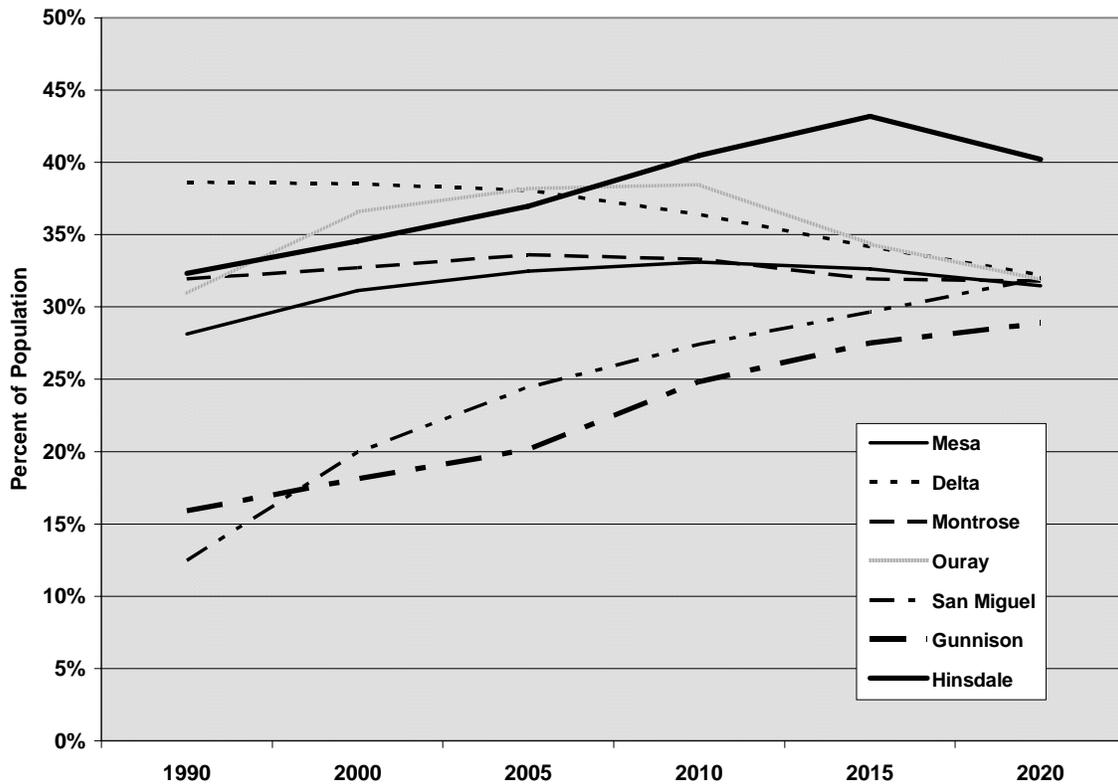
Figure 2 isolates the forecasted retirement effect on GMUG-area counties. Mesa and Montrose Counties are likely to continue their current share of citizens over 50 years old. Delta and Ouray Counties should expect a slightly reduced share of older citizens, dropping from current levels in the high 30 percent range to the low 30's. It is the more rural counties that can expect significant shifts in their older population. Gunnison, San Miguel, and Hinsdale Counties will all see shares of those over 50 increase by 5 to 8 percent in the next 15 years. These population shifts will manifest themselves in many ways, from preferred recreation activities on public lands to services provided by local governments to business mixes on main street.

Figure 1. Population by county in the GMUG National Forests area, 1990–2020



Source: Colorado State Demographers Office, December 2005

Figure 2. Share of total population age 50+ in the GMUG National Forests area, 1995–2020



Source: Colorado State Demographers Office, December 2005

Population statistics only account for permanent residents. However, seasonal fluctuations, particularly from recreation and tourism, are important in many of these counties. Temporary populations from tourism in Gunnison, Hinsdale and San Miguel Counties can dramatically increase the number of persons driving, using water, calling upon emergency services, and shopping at local stores. In addition, seasonal workers, often missed in April census counts, are temporary residents who affect the demand for housing and local government services. So while permanent populations have and will expect to register dramatic increases, they are only a portion of the real impacts of growth upon communities.

ETHNICITY

Tables 1 and 2 provide demographic statistics for identifying the ethnic component of counties and communities in the analysis area. This part of Colorado is not ethnically diverse, and did not change dramatically between 1990 and 2000. By almost every measure, GMUG-area counties have been and still are racially more homogeneous than the state as a whole. However, non-white populations in the area more than doubled in those 10 years, growing faster than the Colorado average.

Table 1. Racial component change of population by county, 1990–2000

County	Total Population		White		Black		American Indian		Asian or Pacific Islander		Other Race / Multi-Race		Hispanic, Any Race	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
Delta	20,980	27,834	96.0%	92.3%	0.3%	0.5%	0.6%	0.8%	0.3%	0.3%	2.8%	6.1%	9.1%	11.4%
Gunnison	10,273	13,956	97.4%	95.1%	0.6%	0.5%	0.7%	0.7%	0.5%	0.6%	0.8%	3.2%	3.6%	5.0%
Hinsdale	467	790	99.1%	97.3%	0.2%	0.0%	0.6%	1.5%	0.0%	0.3%	0.0%	0.9%	0.9%	1.5%
Mesa	93,145	116,255	94.7%	92.3%	0.4%	0.5%	0.7%	0.9%	0.7%	0.6%	3.5%	5.7%	8.1%	10.0%
Montrose	24,423	33,432	95.8%	90.0%	0.3%	0.3%	0.6%	1.0%	0.3%	0.5%	3.0%	8.2%	11.2%	14.9%
Ouray	2,295	3,742	98.0%	96.3%	0.0%	0.1%	0.4%	0.9%	0.1%	0.4%	1.5%	2.2%	4.5%	4.1%
San Miguel	3,653	6,594	98.8%	93.6%	0.1%	0.3%	0.4%	0.8%	0.3%	0.8%	0.4%	4.5%	2.8%	6.7%
Colorado	3,294,394	4,301,261	88.2%	82.8%	4.0%	3.8%	0.8%	1.0%	1.8%	2.3%	5.1%	10.0%	12.9%	17.1%

Source: Colorado State Demographers Office, August 2001

Table 2. Population by race and Hispanic origin by county and municipality in 2000, percent of total

County	Total Population	Non-Hispanic					Multi Race	Hispanic, Any Race
		White	Black	American Indian	Asian or Pacific Islander	Other Race		
Gunnison Basin								
Gunnison County								
Crested Butte	1,529	95.4%	0.1%	0.7%	0.7%	0.0%	0.4%	2.7%
Gunnison	5,409	89.7%	0.6%	0.6%	0.5%	0.1%	1.6%	6.9%
Marble	105	99.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%
Mt Crested Butte	707	94.5%	0.0%	1.6%	0.0%	0.1%	0.3%	3.5%
Pitkin	124	75.0%	0.0%	0.0%	4.8%	0.0%	0.0%	20.2%
Hinsdale County								
Lake City	375	96.8%	0.0%	0.3%	0.5%	0.3%	0.5%	1.6%
North Fork Valley/Uncompahgre Plateau								
Delta County								
Cedaredge	1,854	91.9%	0.1%	0.2%	0.6%	0.0%	1.8%	5.4%
Crawford	366	96.2%	0.0%	0.0%	0.0%	0.0%	1.6%	2.2%
Delta	6,400	75.3%	0.2%	0.5%	0.3%	0.1%	1.0%	22.5%
Hotchkiss	968	88.5%	0.0%	0.3%	0.4%	0.1%	1.2%	9.4%
Orchard City	2,880	89.6%	0.0%	0.7%	0.5%	0.0%	1.2%	7.9%
Paonia	1,497	93.7%	0.1%	0.5%	0.2%	0.3%	0.9%	4.5%
Montrose County								
Montrose	12,344	80.0%	0.3%	0.6%	0.6%	0.0%	1.0%	17.4%
Naturita	635	90.4%	0.0%	2.4%	0.2%	0.0%	2.0%	5.0%
Nucla	734	92.1%	0.0%	1.1%	0.1%	0.0%	3.0%	3.7%
Olathe	1,573	62.4%	0.1%	0.5%	0.3%	0.0%	1.5%	35.2%

Table 2. Continued

County	Total Population	Non-Hispanic					Multi Race	Hispanic, Any Race
		White	Black	American Indian	Asian or Pacific Islander	Other Race		
San Juan Mountains								
Ouray County								
Ouray	813	91.8%	0.4%	0.1%	0.7%	0.1%	0.5%	6.4%
Ridgway	713	90.3%	0.0%	1.8%	0.3%	0.0%	2.8%	4.8%
San Miguel County								
Mountain Village	978	75.5%	0.4%	1.1%	2.0%	0.5%	1.0%	19.4%
Norwood	438	92.2%	0.0%	1.6%	0.0%	0.0%	0.7%	5.5%
Ophir	113	94.7%	0.0%	0.0%	0.0%	0.9%	1.8%	2.7%
Sawpit	25	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Telluride	2,221	89.6%	0.2%	0.8%	0.7%	0.5%	1.1%	7.2%
Grand Mesa								
Mesa County								
Collbran	388	94.8%	0.0%	0.3%	0.0%	0.0%	0.8%	4.1%
De Beque	451	97.3%	0.0%	0.7%	0.0%	0.0%	0.0%	2.0%
Fruita	6,478	85.3%	0.4%	0.7%	0.3%	0.2%	1.2%	11.9%
Grand Junction	41,986	85.9%	0.5%	0.6%	0.8%	0.1%	1.2%	10.9%
Palisade	2,579	90.1%	0.1%	0.9%	0.7%	0.0%	1.9%	6.2%

Source: Colorado State Demographers Office, December 2005

Hispanics of any race grew by 65 percent between 1990 and 2000. The largest increase in number occurred in Delta, Montrose, and Mesa Counties.

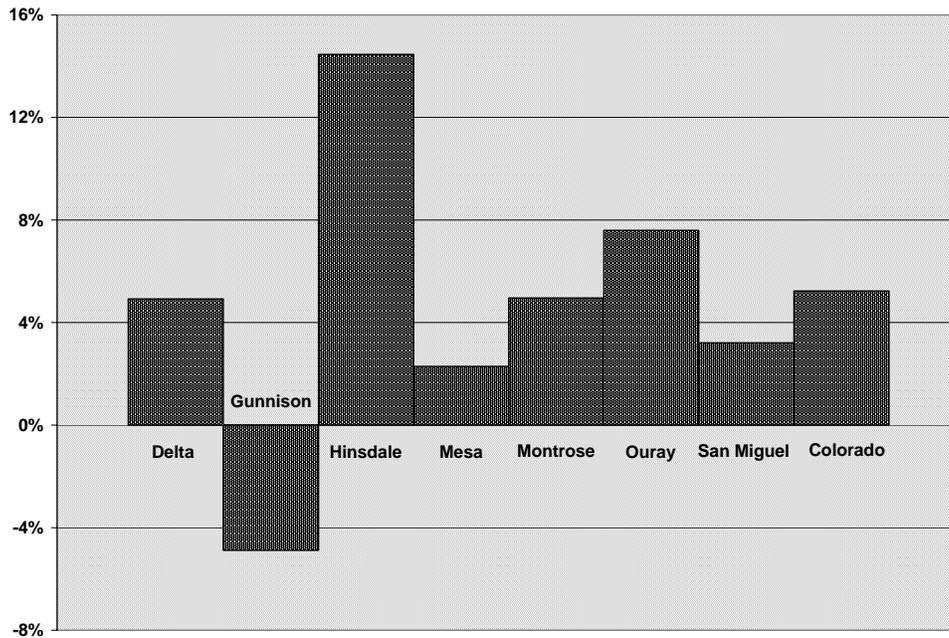
At the community level, Hispanic populations are more notable. The largest concentrations of Hispanics are found in two locations: Montrose-Olathe-Delta has the largest Hispanic share of local population, and Grand Junction-Fruita has the largest number. Two mountain towns -- Pitkin (Gunnison County) and Mountain Village (San Miguel County) -- also show sizeable Hispanic communities. Olathe, at 35.2%, ranks 44th out of 269 municipalities in Colorado for its share of Hispanic residents. The median share for Colorado communities in 2000 was 10.3%.

SCHOOL ENROLLMENT

Demographic changes in any area are often detected first in local schools. School enrollment in the GMUG area has changed recently in terms of both total students and in their ethnicity. Figure 3 shows how total enrollment has changed by county from 2001 to 2005, and how they compare with Colorado as a whole. The most notable counties are both on the east end of the GMUG area. Gunnison County saw school enrollment drop by nearly 5 percent, possibly in response to flat population growth. In contrast, Hinsdale County saw the greatest increase in the area with 14.5 percent growth. Hinsdale is a small county with 2001 total enrollment of only 83 students. An increase of 12 students by 2005 meant a very large percentage increase. Most school districts in the area grew at less than the statewide average of 5 percent.

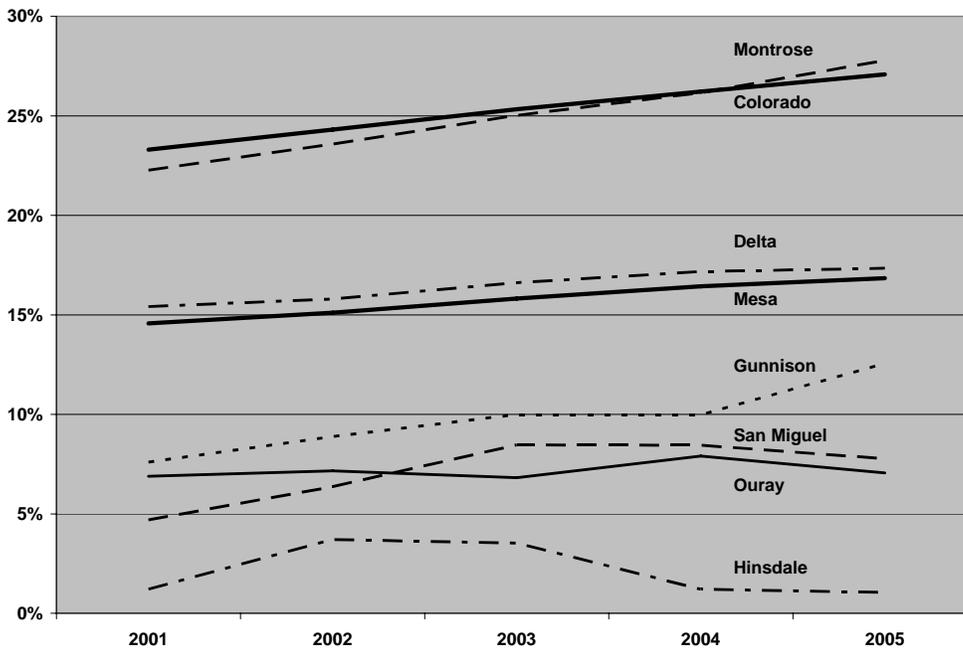
Hispanic students generally are growing in number in the GMUG area, but make up a smaller share of the student body locally than they do statewide. Figure 4 shows that only Montrose County exceeds the statewide share of 27 percent Hispanic students. While most counties have experienced a growing share of Hispanic students since 2001, Hinsdale and Ouray --the two smallest districts-- have seen a net decline.

Figure 3. Growth of student enrollment in GMUG National Forests area counties and Colorado, 2001–2005



Source: Colorado Department of Education, 2006

Figure 4. Hispanic share of total student enrollment in GMUG National Forests area counties and Colorado, 2001–2005



Source: Colorado Department of Education, 2006

Hispanic students make up a smaller share of the student body in the GMUG area than they do statewide. Figure 4 shows that only Montrose County exceeds the statewide share of 27 percent Hispanic students. Only Hinsdale and Ouray Counties have seen a relative decline in Hispanic students since 2001.

HOUSING

Housing has become an important issue in many parts of western Colorado. With large population growth and increasing demand for service workers, housing can become a serious problem. Parts of the GMUG area are experiencing housing difficulties.

Table 3 displays the change in population, households, housing units, and vacancy rates between 1990 and 2000. Large increases in population are often accompanied by a tight housing market, but not always.

Out of 28 area municipalities, half had household growth that exceeded housing unit growth. In these cases, housing generally becomes increasingly scarce, dropping vacancy rates and putting upward pressure on prices. This phenomenon occurred mostly in Delta, Montrose, and Hinsdale Counties. The other 14 municipalities showed housing unit growth keeping pace with or exceeding household growth. Gunnison, Ouray, and Mesa Counties experienced these changes. San Miguel County and its municipalities generally saw housing keep pace with household growth. One possible explanation that such a balance would occur in San Miguel County is that housing is already extremely expensive and only those who could afford housing would provide it before moving. Sawpit and Ophir were exceptions to the general balance found in San Miguel County.

The relationships displayed in Table 3 are general in nature, and do not apply equally across all types of housing. These data give only a simple indication of housing conditions in the analysis area. Apartments versus single family homes, high end versus modest housing, in town locations versus a long commute all have their particular characteristics that cannot be captured in this general picture of community housing. It is not possible to see housing shortages that may be very critical in certain price ranges within communities and counties __ e.g., 'affordable' housing for many service and retail workers in high tourist locations.

Table 3. Percent change in population, household, housing units, and vacancy rates between 1990 and 2000 in area counties and municipalities.

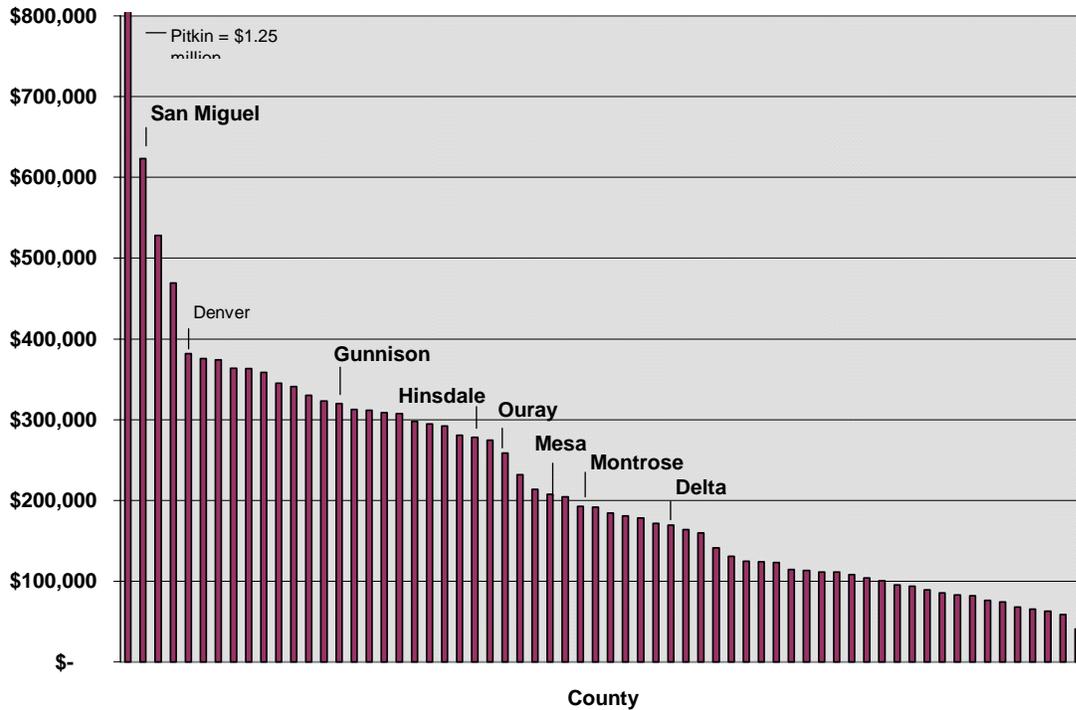
Area	Total Population	Total Households	Total Housing Units	Vacancy Rate
Colorado	8%	8%	12%	44%
Gunnison Basin				
Gunnison County	2%	2%	10%	11%
Crested Butte	1%	4%	5%	2%
Gunnison	-2%	-2%	6%	80%
Marble	-2%	0%	5%	8%
Mt Crested Butte	5%	5%	13%	3%
Pitkin	-6%	-6%	2%	3%
Hinsdale County	6%	7%	4%	-1%
Lake City	6%	7%	4%	-2%
North Fork Valley/Uncompahgre Plateau				
Delta County	8%	8%	2%	-53%
Cedaredge	18%	18%	12%	-51%
Crawford	8%	8%	2%	-27%
Delta	26%	26%	19%	-77%
Hotchkiss	6%	6%	0%	0%
Orchard City	7%	8%	1%	-68%
Paonia	9%	10%	3%	-53%
Montrose County	10%	11%	10%	-13%
Montrose	24%	23%	21%	-28%
Naturita	4%	3%	4%	0%
Nucla	0%	0%	0%	0%
Olathe	6%	7%	6%	-6%
San Juan Mountains				
Ouray County	12%	11%	18%	16%
Ouray	4%	4%	10%	10%
Ridgway	14%	14%	20%	44%
San Miguel County	10%	9%	10%	0%
Mountain Village	16%	16%	16%	0%
Norwood	10%	10%	10%	1%
Ophir	10%	8%	9%	10%
Sawpit	40%	33%	6%	-53%
Telluride	5%	5%	5%	0%
Grand Mesa				
Mesa County	10%	10%	14%	51%
Collbran	64%	27%	26%	-11%
De Beque	10%	11%	13%	14%
Fruita	31%	32%	35%	30%
Grand Junction	15%	15%	19%	79%
Palisade	9%	9%	12%	35%

Source: Colorado State Demographers Office, December 2005

Just as the GMUG area is diverse in population and housing growth, it is also diverse in the cost of housing. In a report prepared for the Colorado Division of Housing (ValueWest, 2004), the typical price of three home sizes for each county in Colorado was estimated for January 2004. The results of that study for a 2,000-square-foot home are shown in Figure 5. Prices in the GMUG area range from San Miguel County with a price of \$623,000 to Delta County with a price of \$170,000. With the exception of San Miguel County, housing in the GMUG area is very reasonable for Colorado. Generally, less expensive housing is found in the San Luis Valley and Eastern Plains. The mountain counties of San Miguel, Gunnison, Hinsdale, and Ouray are more expensive than equivalent properties in Mesa, Montrose, and Delta. They are also more expensive than equivalent properties in the Denver metro area.

According to a study published by the Colorado State University Cooperative Extension (Garner, 2003), the cost of housing largely determines the cost of living in an area. Consistent with housing prices, the study shows that Mesa, Montrose, and Delta counties have costs of living that range from 5 to 8 percent less than the state average. The cost of living in Hinsdale, Gunnison, and Ouray counties ranges from 1 to 5 percent more than the average Colorado county. Living in San Miguel County costs over 20 percent more than the statewide average. Generally, the Front Range of Colorado defines average costs for the state.

Figure 5. Cost of a 2,000 square foot home by county, 2002



Source: Cost of Housing Analysis, ValueWest, Inc.

COMMUTING

Disparities between wages and cost of living, job opportunities and available skills, small community amenities and regional business centers, all create the need to commute between home and work. Travel time to the workplace, good highways, and winter weather also become factors in commuting patterns. Commuting can be a significant part of life affecting families, community organizations, local government fiscal health, and business development.

As shown in Table 4, commuting is an important part of life throughout much of the GMUG area. Commuting helps define the economic connections between communities. The three economic sub-areas used in the Economics section of this report emerge from a review of commuting data.

Grand Junction offers job possibilities not found in other parts of the area, and thus draws commuters from Delta and Montrose – even Ouray County.

Montrose is a small regional service center with important commuting patterns to and from three other counties in the area – Delta, Ouray, and San Miguel. Delta and Ouray Counties are easy commutes to and from Montrose. High housing costs in San Miguel County excludes many of the service workers needed for Telluride and Mountain Village. With more affordable costs of living in Montrose and Ridgway, commuting is the only option for much of the Telluride workforce. Although the drive from Montrose to Telluride can be treacherous in the winter, a stream of headlights can be seen along Colorado 62 and 145 every morning and evening during ski season.

Gunnison and Hinsdale Counties, being geographically separate from the rest of the area, do not have significant commuting patterns with other GMUG counties. Most commuting by these residents occurs in locations where overnight stays are required, such as the San Juan Basin and out of state. Gunnison does have one notable exception, explained by coal mines in the North Fork Valley. These mines are located in the northwest corner of Gunnison County, far from the population centers of Gunnison and Crested Butte and without year-around access. The mines have strong connections economically and culturally to Paonia, Hotchkiss, and other parts of Delta County.

Mesa County is a very large population center that does not have significant commuting into or out of the area. Although it draws some workers from Delta, Montrose, and Ouray Counties, the numbers are quite small relative to the total Mesa County workforce. This pattern could change in the future as recent improvements to US 50 make the commute between Delta and Grand Junction faster and safer.

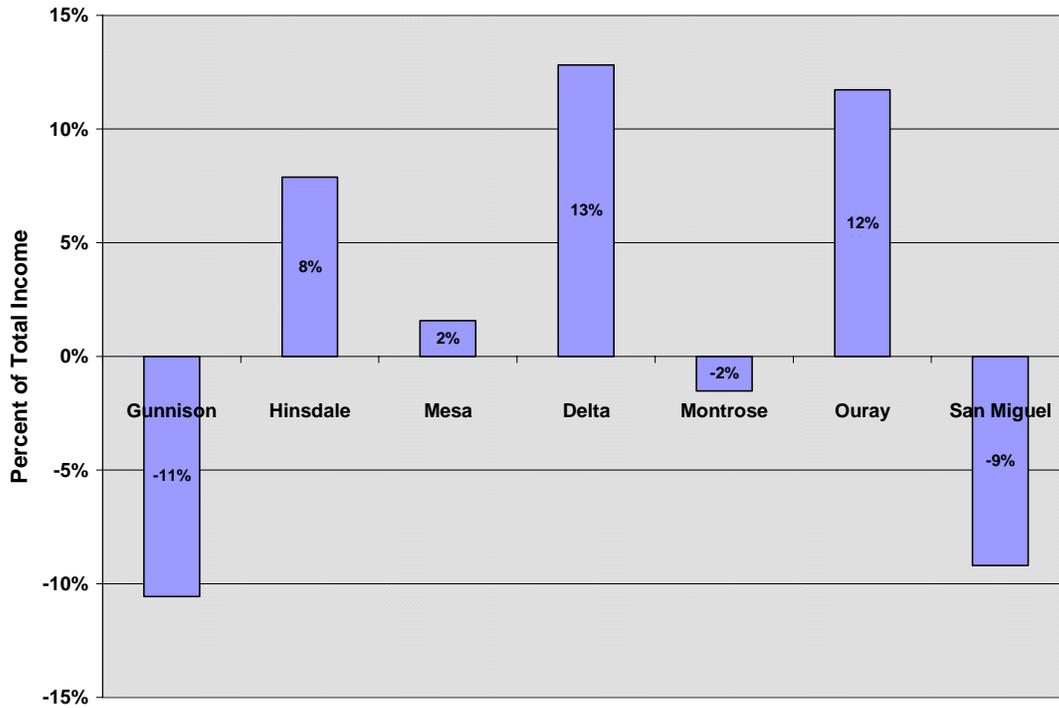
Figure 6 offers another picture of commuting for GMUG counties. This chart shows the portion of total income received by county residents that is earned outside the county. When the percent is negative, it indicates that a share of total income was earned by residents of other counties. These shares are net of earnings by both county residents and non-residents. A good example is coal mining in Gunnison County. Nearly all mine employees live in Delta County, thus Delta County shows a net 13 percent of total income that is earned outside the county. Conversely, Gunnison County shows a net 11 percent of total income that is earned in, but leaves the county. A similar relationship exists for the tourism industry between San Miguel and Ouray Counties.

Table 4. Workforce commuting by place of residence, 2000

Work Location	Residence Location						
	Gunnison	Hinsdale	Delta	Montrose	Ouray	San Miguel	Mesa
Gunnison	96%	3%	5%	0%	0%	0%	0%
Hinsdale	0%	85%	-	0%	0%	-	0%
Delta	0%	-	79%	4%	0%	0%	0%
Montrose	-	-	9%	85%	12%	1%	0%
Ouray	0%	-	0%	2%	72%	1%	0%
San Miguel	0%	-	0%	5%	12%	95%	0%
Mesa	0%	-	4%	1%	1%	0%	96%
Out of State	1%	4%	1%	1%	2%	2%	1%
I-70 Resort Area	2%	0%	1%	0%	0%	0%	2%
San Juan Basin	-	6%	0%	0%	0%	1%	0%
Front Range	0%	-	1%	0%	0%	0%	0%
Other CO	0%	1%	0%	0%	-	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Source: Colorado State Demographers Office, June 2006

Figure 6. Earning adjustment for place of residence, 2004



Source: Bureau of Economic Analysis, June 2006

Economics

INTRODUCTION

Exports and sales to government are regarded as basic economic engines for a local area. These sales bring in new money to an area, providing employment and income to local businesses and residents. Some sectors generate a large share of economic activity locally, while others provide little. In this section, employment, income, and the dependency of local economies is portrayed and discussed.

The GMUG area is separated into three sub-areas. Based largely on knowledge of labor flows (commuting patterns) and trade between counties, the following areas have been identified and modeled: Gunnison-Hinsdale, Delta-Montrose-Ouray-San Miguel, and Mesa County. Dependency assessments, including the contribution of GMUG National Forests to each sub-area, are displayed using these model areas.

Two models have been adjusted to better reflect the relationship of coal mining to other parts of the local economy. Although some of the coal mines are located in Gunnison County, all coal mining is shown as part of Delta County. Nearly all workers and economic trade flow between the mines and Delta County. There is a small remnant of mining activity in Gunnison County, but this is not coal activity.

EMPLOYMENT

Employment data presented here were prepared by the State of Colorado in conjunction with county governments and the Forest Service. They include economic conditions in 2003 as well as projections to 2020.

The economy around the GMUG National Forest is quite balanced as a whole, but it varies tremendously when observing individual counties. Table 5 shows that employment in Delta, Montrose, and Mesa Counties is well distributed with important employment centers in agriculture, mining, manufacturing, and government. Mesa County, with Grand Junction and surrounding communities as a regional center, accounts for over half of area employment. This regional center employs more than twice as many as Delta and Montrose combined. Ouray, San Miguel, Gunnison, and Hinsdale Counties are more rural and display characteristics typical of tourism-based economies. Major employment centers include trade, lodging and food service. Construction and real estate are especially large in these counties, indicating a healthy amount of growth in businesses and second homes. Gunnison and San Miguel Counties also have a significant recreation industry, reflecting the Crested Butte and Telluride ski areas.

While 2003 is the latest year for which employment estimates are available across all industries, energy industry data are available for 2005. As part of production reporting requirements for severance tax purposes, coal, oil, and natural gas companies must identify the number of employees and their residence. Figure 7 shows this data and the consequences of high energy prices. Renewed interest in Piceance Basin oil and gas has more than doubled industry employment between 2004 and 2005, most of whom live in and around Grand Junction. Coal production and employment has been relatively steady over this period, with most employees of the three area coal mines residing in Delta County.

Figure 8 shows that employment is expected to grow steadily over the next 15 years. The forecast is intended to provide general trends rather than year-by-year detail. Consequently, recent changes resulting from energy development in Delta, Montrose, and Mesa Counties are not part of the forecast. Boom-and-bust patterns typical of energy development could substantially change the forecast, but it is still early in the current energy price cycle to know for sure. A very significant second factor in economic growth of the region is the migration of retirees. A moderate climate with ever-increasing services and relatively low cost-of-living make this region very attractive. Although some retirees may work, their spending is reflected in Figure 8 by steady growth in employment of younger residents.

Table 5. Employment by major industry and county, 2003

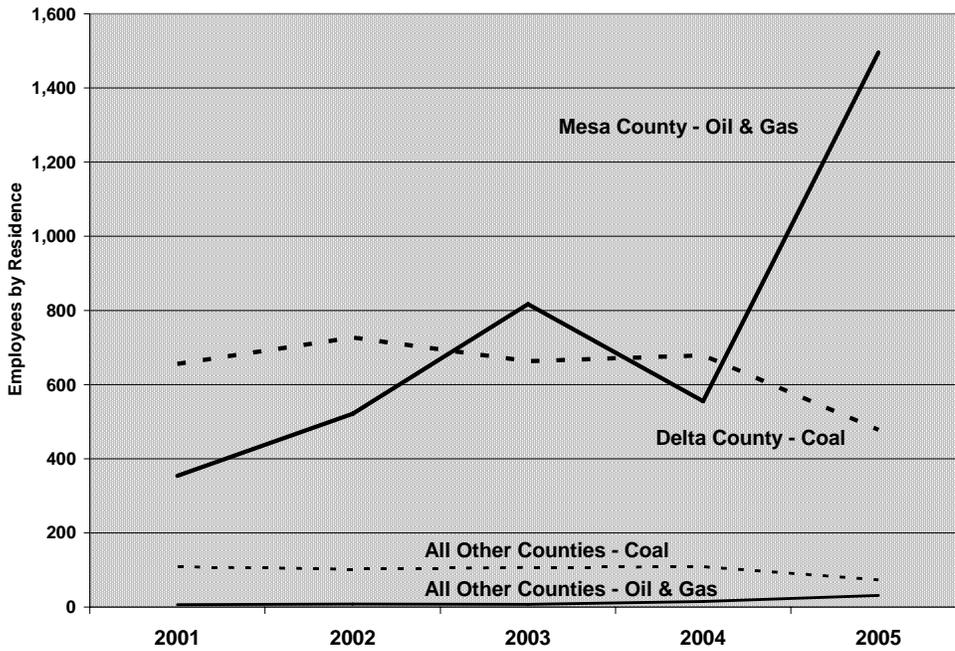
Sector	Delta*	Gunnison*	Hinsdale	Mesa	Montrose	Ouray	San Miguel	Total
Agriculture	1,451	342	-	1,681	1,490	100	90	5,154
Mining	941	2	-	597	114	10	28	1,692
Construction & Utilities	990	1,000	60	6,312	2,175	378	965	11,880
Manufacturing	618	162	5	3,628	1,642	56	107	6,218
Transp & Warehousing	210	187	3	3,053	634	49	71	4,207
Trade	1,720	1,138	57	11,292	2,878	213	556	17,854
Finance, Insur, & Real Estate	554	769	48	4,455	1,107	176	783	7,892
Prof, Scient, & Admin Svcs	971	721	61	7,004	1,480	177	586	11,000
Health, Social, & Ed Svcs	992	508	9	8,872	1,735	77	282	12,475
Arts, Enter, & Recreation	94	725	16	1,040	106	126	505	2,612
Lodging & Food Services	717	1,456	67	5,658	1,113	430	1,150	10,591
Other Services	921	689	42	5,162	1,183	187	482	8,666
Government	2,095	1,621	92	8,011	2,743	291	725	15,578
Total	12,274	9,320	460	66,765	18,400	2,270	6,330	115,819

Source: Colorado State Demographers Office, December 2005

Despite a national recession that exhibited slow job growth recovery, the GMUG area has not been troubled with severe unemployment in recent years. As shown in Figure 9, annual unemployment rates have been at or less than the statewide average since 2002. Hinsdale County has had the lowest rate in the area with remarkable unemployment rates at or below 3% since 2001. Full employment is usually associated with an unemployment rate of about 4 percent. Gunnison County has had the highest rates, but no higher than the Colorado average.

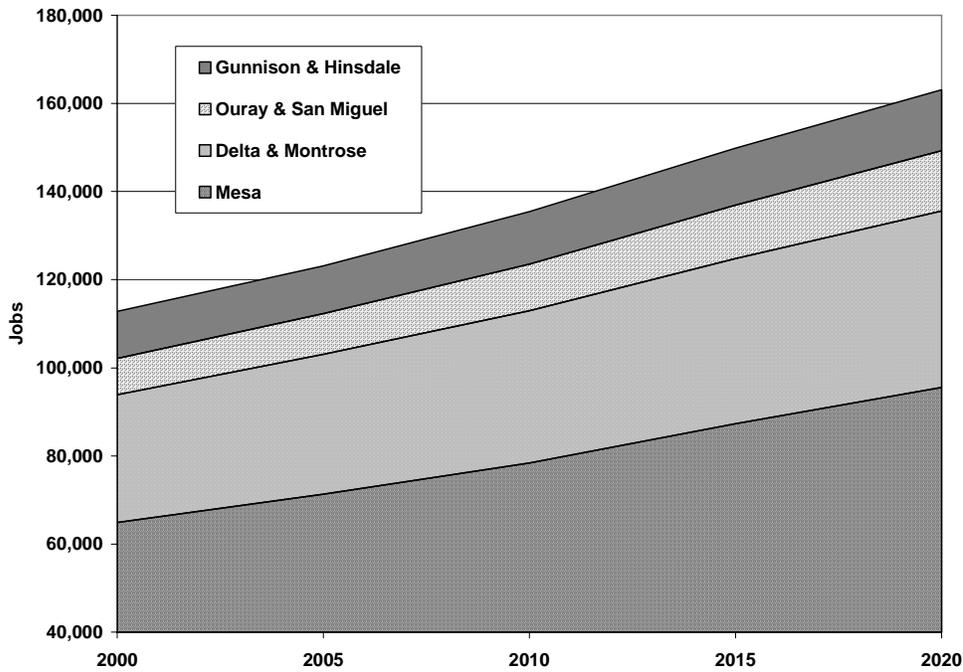
Seasonal patterns of unemployment are usually evident in tourist economies, but only San Miguel County strongly exhibits this pattern in the GMUG area (Figure 10). Some seasonal variations can be detected for Gunnison, Hinsdale, and Ouray counties, but they are somewhat muted. Even with some seasonal variation, a strengthening Colorado economy is reflected in a steadily dropping unemployment rate for most GMUG counties in 2005.

Figure 7. Employment by residence for energy industries in the GMUG National Forests area, 2002-2006



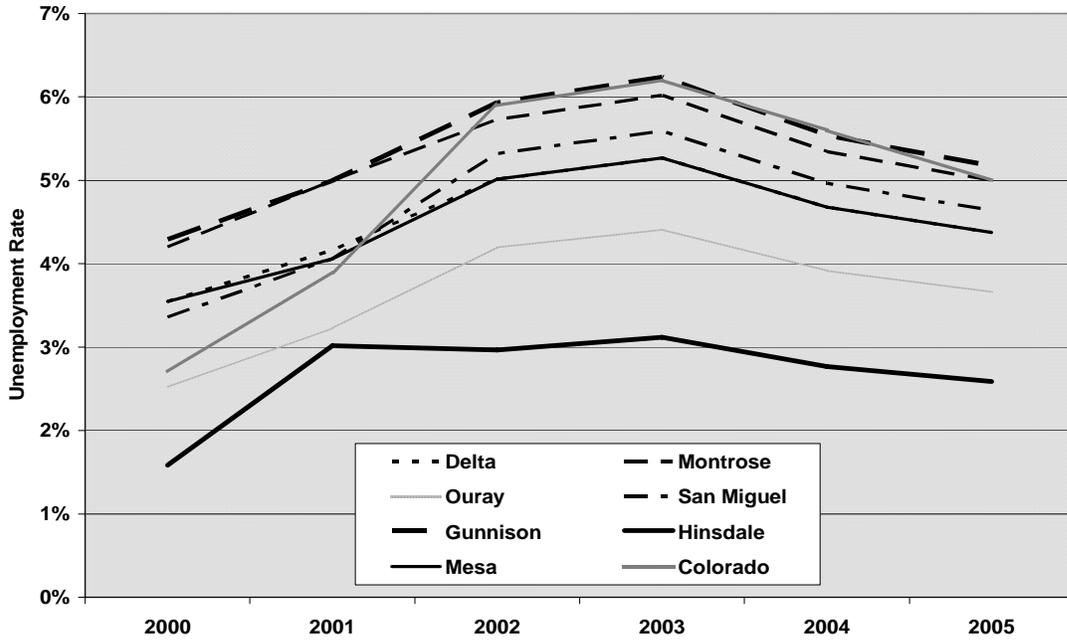
Source: Colorado Department of Local Affairs, Energy Mineral Impact Reports.

Figure 8. Employment in the GMUG National Forests area, 1990–2020



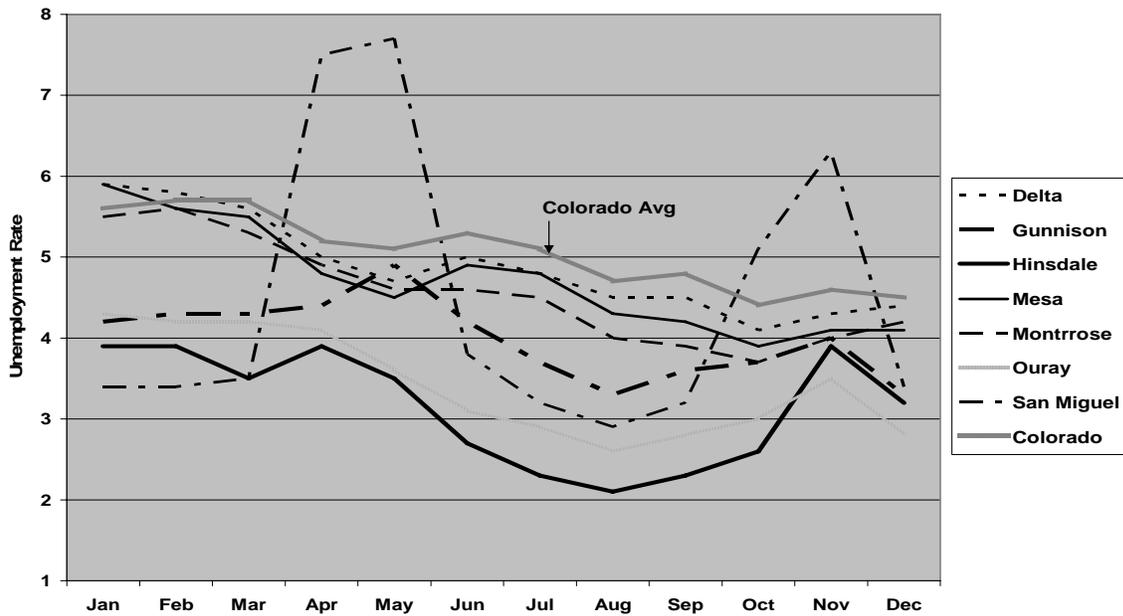
Source: Colorado State Demographers Office, December 2005

Figure 9. Unemployment rate in the GMUG National Forests area and state, 2000-2005



Source: Colorado Dept of Labor & Employment, Labor Market Information, June 2006

Figure 10. Unemployment rate, by month, in the planning area and state, 2005



Source: Colorado Dept of Labor & Employment, Labor Market Information, June 2006

INCOME

Per capita personal income in the area is generally lower than the Colorado average (\$36,113). Table 6 shows that Mesa, Montrose, Gunnison, and Hinsdale counties had very similar per capita personal income in 2004. They ranged from 73 to 78 percent of the statewide average. Delta County had the lower income per capita in the area, while San Miguel and Ouray counties had per capita incomes that were close to the Colorado average. The modest San Miguel per capita income combined with extremely high housing costs supports claims that most residents cannot afford to live in or around Telluride.

Sources of personal income also provide insight into the economy in the GMUG National Forest area. Earnings (income received by business owners and employees) account for the largest share of income in every county. But it is the other components that tell an interesting story. Income from dividends, interest, and rent range from 19 percent of total income in Mesa County to nearly double that in Hinsdale County. The mountain counties have the highest shares of income from these sources. This part of mountain county incomes help supplement low wages often experienced in tourism-based economies. This portion of income will likely grow rapidly throughout the GMUG area in the years to come as retirees move to the area, bringing their investment incomes.

Transfer payments (income received from government sources, such as welfare and social security) are the final source of personal income. Transfer payments in the area range from 8 percent in Gunnison County to a high of 24 percent in Delta County. An older population that relies upon social security and a higher incidence of welfare payments combine to make transfer payments a critical piece of income in Delta County. The lowest share of transfer payments occurs in the mountain counties. Younger residents or a greater reliance upon investment income by older residents explains why transfer payments are not as prominent in these counties.

Table 6. Personal income by source and county, 2004 (in dollars and percent)

Income & source	Delta	Gunnison	Hinsdale	Mesa	Montrose	Ouray	San Miguel
Total (millions of \$)	\$680,463	\$400,877	\$21,281	\$3,487,491	\$965,891	\$141,400	\$263,953
Per capita income (\$)	\$22,844	\$28,309	\$26,938	\$27,400	\$26,352	\$34,097	\$37,093
Percent of total income							
Net earnings @ residence	56%	64%	49%	63%	62%	58%	65%
Dividends, interest, rent	20%	28%	37%	19%	21%	31%	30%
Transfer payments	24%	8%	13%	18%	17%	11%	5%
Total*	100%						

Note: *May not add due to rounding

Source: Bureau of Economic Analysis, REIS, June 2006

ECONOMIC DEPENDENCY AND NATIONAL FOREST CONTRIBUTIONS

Every economy has one or more ‘engines’ that ultimately provide residents with jobs and income. In a real sense, area jobs and income depend on the size and vitality of these engines.

The economic dependency of the area can be discerned by breaking down employment into three components: basic industries, indirect basic industries, and local resident service (sometimes called induced) industries. *Basic industries* are those that bring money in from outside the area. This is done by exporting goods and services, or selling them to non-residents and government. Traditional tourism, mining, agriculture, and manufacturing are some of the major export industries of the area. *Indirect basic industries* are those that support the basic industries. These commonly include local suppliers of goods and services to basic industries. Wholesale trade and trucking would be examples of indirect basic industries. The third component is *local resident services*. These industries provide local residents, who receive income from the basic or indirect industries, with services such as grocery stores and medical care. Indirect basic and local resident services combined are often labeled as “secondary” effects.

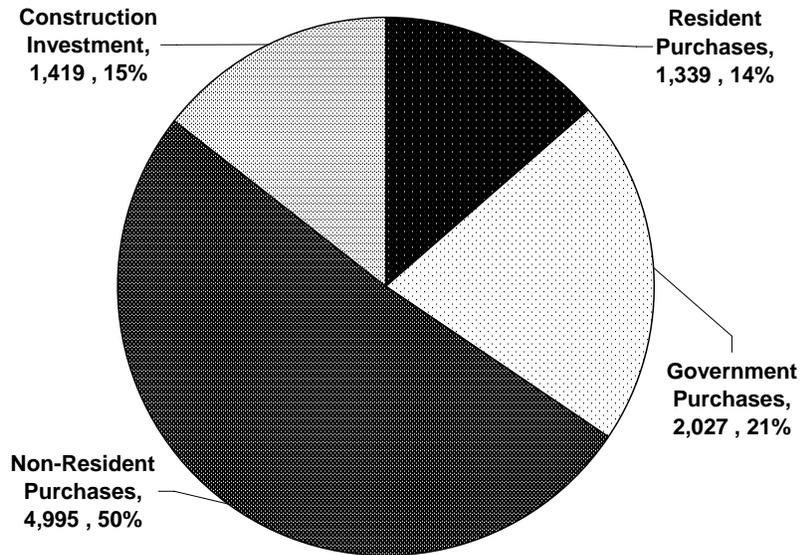
By incorporating the concept of economic multipliers to basic industries throughout each of the three sub-areas, a picture of economic dependence emerges. Three figures are provided for each model area. The first gives a picture of employment that is generated by sales to four categories of customers: residents, non-residents, government, and construction investments. Earlier in this section, employment was displayed by industry. Here employment is displayed according to the customers that generated it. Each slice includes all the secondary employment created by sales to that customer.

Sales to exports (non-residents) and to governments (Federal, state, and local) were mentioned above. Sales for the purpose of construction investments include homes, buildings, roads, and other infrastructure. These are separated because they become a production factor in future economic activity. Second home construction is a part of this category. The actual sale of second homes by real estate agents, and the purchase of goods and services by second home owners once they occupy the property are not part of construction, but captured within the non-resident slice. Details on second homes will be forthcoming in future updates of this report. Employment generated by sales to residents is the remainder of total employment not otherwise captured in the three other categories.

Figures 11, 12, and 13 portray the basic engines of each economy. Exports (sales to non-residents) generate the largest share of jobs in each economy, but the share drops slightly as the economy gets bigger. Fifty percent of all jobs are generated in some way by exports in the Gunnison-Hinsdale area. That share drops to 45 percent in the Delta-Montrose-Ouray-San Miguel area and in Mesa County. While exports do not support 100 percent of area jobs, non-residents are by far the most important customers. Construction investment generates a steady 15 or 16 percent of all jobs in each sub-area, indicating that all parts of the GMUG area are economically healthy and growing. The role of government as an economic engine is apparent in each of the areas, with the largest share in Gunnison-Hinsdale and the four-county areas (20-21%) and a somewhat smaller share in Mesa County (17%). The proportion of jobs generated by sales to residents varies the most from smaller economies to larger ones. As an economy

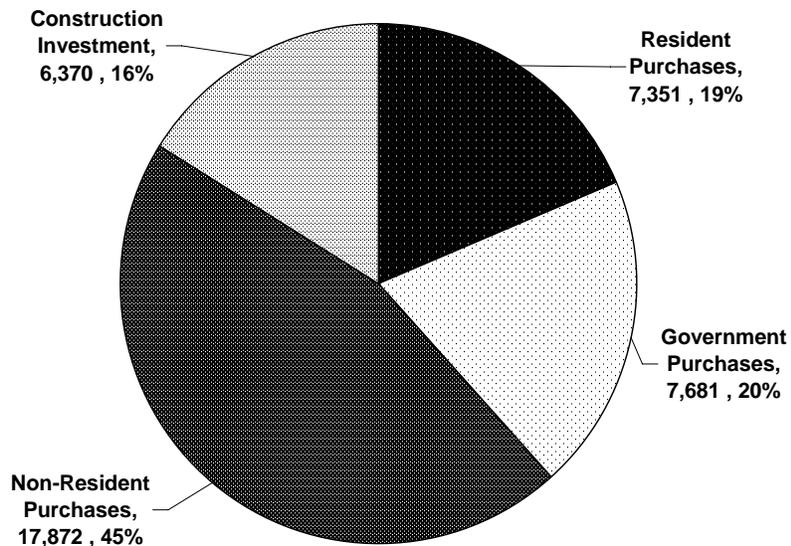
grows larger and more diverse, markets within the economy become more substantial and less reliance is placed on sales to non-residents and governments. Only 14 percent of all jobs are credited to residents alone in the Gunnison-Hinsdale area. That share grows to 19 percent in the larger Delta-Montrose-Ouray-San Miguel area, and finally peaks at 23 percent in much larger Mesa County.

Figure 11. Jobs generated by spending source in the Gunnison-Hinsdale economy, 2003



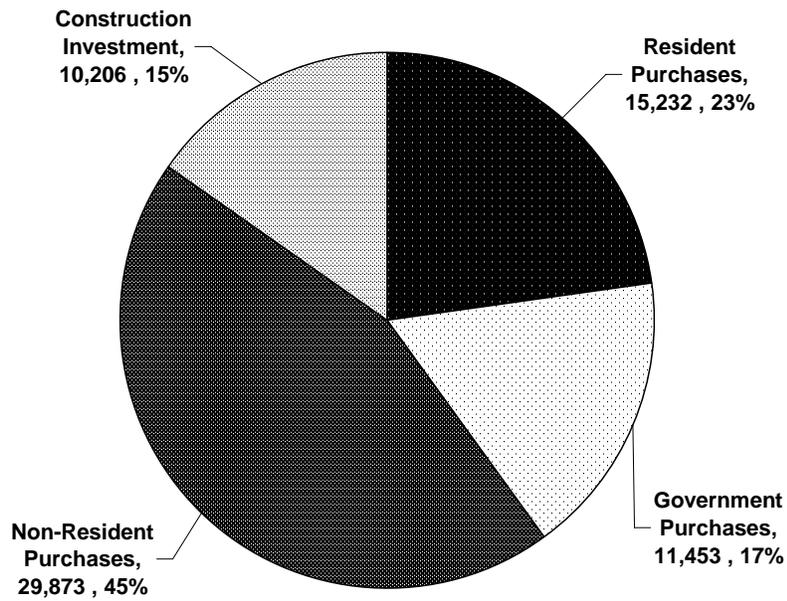
Source: Colorado State Demographers Office and USDA Forest Service

Figure 12. Jobs generated by spending source in the Delta-Montrose-Ouray-San Miguel economy, 2003



Source: Colorado State Demographers Office and USDA Forest Service

Figure 13. Jobs generated by spending source in the Mesa County economy, 2003

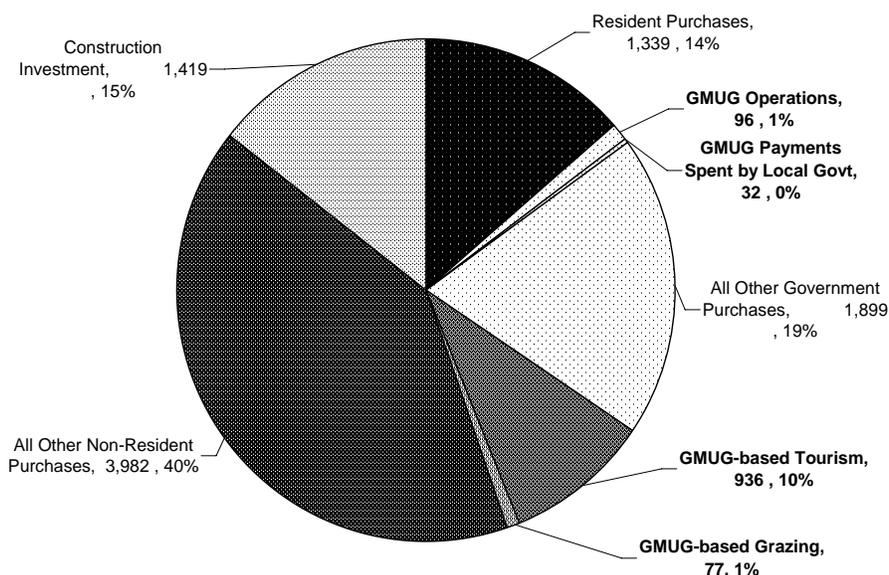


Source: Colorado State Demographers Office and USDA Forest Service

Figures 14, 15, and 16 identify contributions of the GMUG National Forests to local area employment. Uses of the forest--such as tourism, livestock grazing, mining, and timber—are generally regarded as sales to non-residents. The GMUG Forest is also a government consumer, bringing new money into the area through local purchases and Federal employee salaries. The final piece of GMUG contributions is attributed to payments made from the Federal government to local governments because of GMUG lands in the county. (See the next section in this report for details on forest payments to local governments.) The payments are spent by local governments, increasing the size of the government category. These slices, individually and combined, indicate how dependent the local economy is on the management of the GMUG National Forests.

Because the Gunnison-Hinsdale area is economically smaller, GMUG contributions play a bigger role in area employment. About 12 percent of all jobs in the area are supported by GMUG forest use and management. Tourism is the largest piece at 10 percent, providing significant support to an economy that is fundamentally tourism-based. Livestock grazing, forest operations, and forest payments together provide the other two percent.

Figure 14. Jobs generated by spending source with GMUG National Forests operations in the Gunnison-Hinsdale economy, 2003



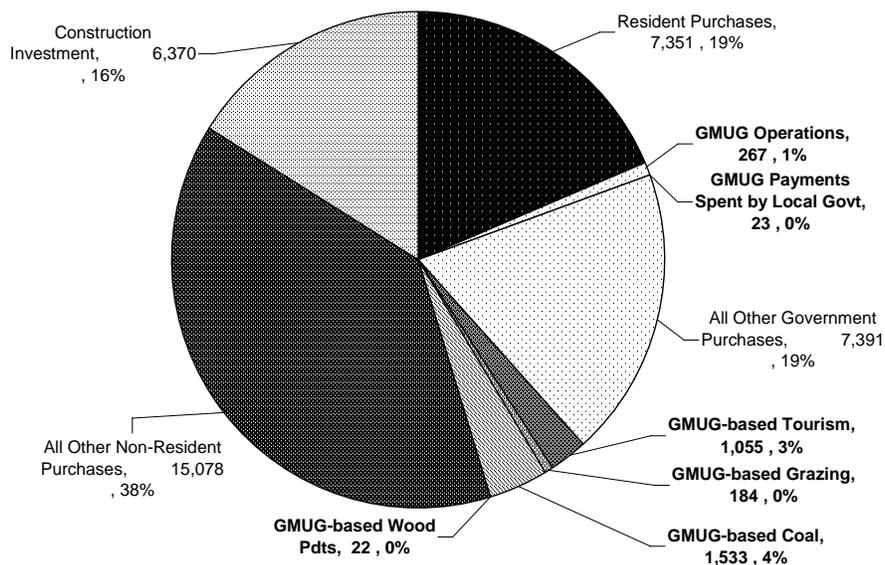
Source: Colorado State Demographers Office and USDA Forest Service

In the Delta-Montrose-Ouray-San Miguel area, GMUG use and management supports 8 percent of local employment. All coal mining is under GMUG lands, and provides the largest portion of GMUG-related employment. Over 1,500 jobs are generated by mines in the North Fork Valley, affecting primarily Delta County. Forest-based tourism is the next largest slice in the area, providing over 1,000 jobs. Although tourism jobs can be found throughout the area, over half are generated through downhill skiing at Telluride. Hunting and fishing account for the next largest piece, supporting over 200 jobs in the area.

Commodity production of renewable resources on the GMUG primarily affects the Delta-Montrose-Ouray-San Miguel area. Agriculture is a very important and historically significant part of this economy. The GMUG provides just under 200 jobs through livestock grazing use of the forest. The wood products industry is often associated with national forests, and this area is regarded by some as the center of the Colorado industry. The GMUG contribution to timber-based employment, however, is very small. This is attributed to a very small timber program on the forest in recent years.

Forest operations and payments provide a greater economic boost to the area than livestock grazing and timber harvest combined. Almost 300 jobs are generated through Federal employee spending, forest purchases, and local government spending of national forest-based Federal payments. Because most employees live in either Delta or Montrose, these areas receive the largest economic benefit of forest operations.

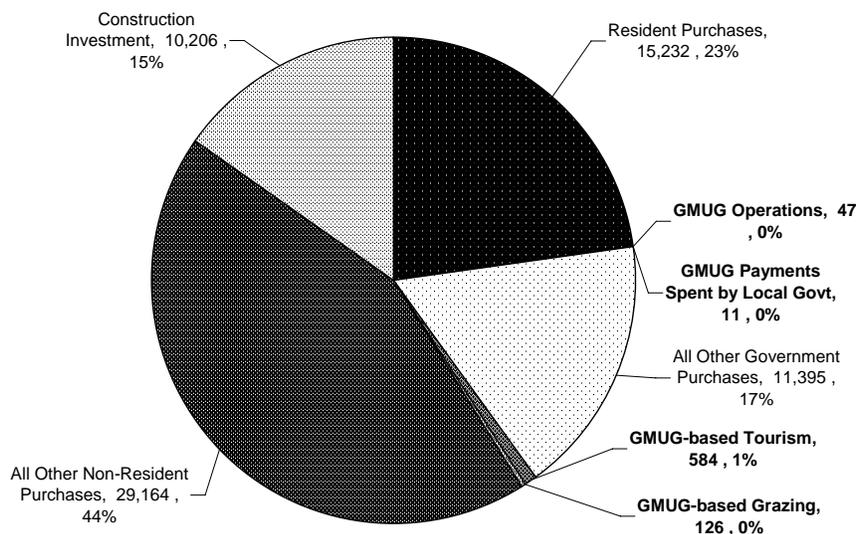
Figure 15. Jobs generated by spending source with GMUG National Forests operations in the Delta-Montrose-Ouray-San Miguel economy, 2003



Source: Colorado State Demographers Office and USDA Forest Service

The GMUG National Forests contribute the least to Mesa County of all three areas, both in number and share of total jobs. Tourism is by far the largest contributor, providing nearly 600 jobs in the area. Over half of these jobs are credited to wildlife-related activities – hunting, fishing, and viewing on the Grand Mesa. Another 135 jobs are generated through winter activities on the forest – downhill skiing at Powderhorn, snowmobiling, and cross-country skiing. Livestock grazing on this part of the forest supports 130 jobs. Finally, forest operations and payments add another 60 jobs to the Mesa County economy. All GMUG contributions combined support about one percent of area jobs.

Figure 16. Jobs generated by spending source with GMUG National Forests operations in the Mesa County economy, 2003

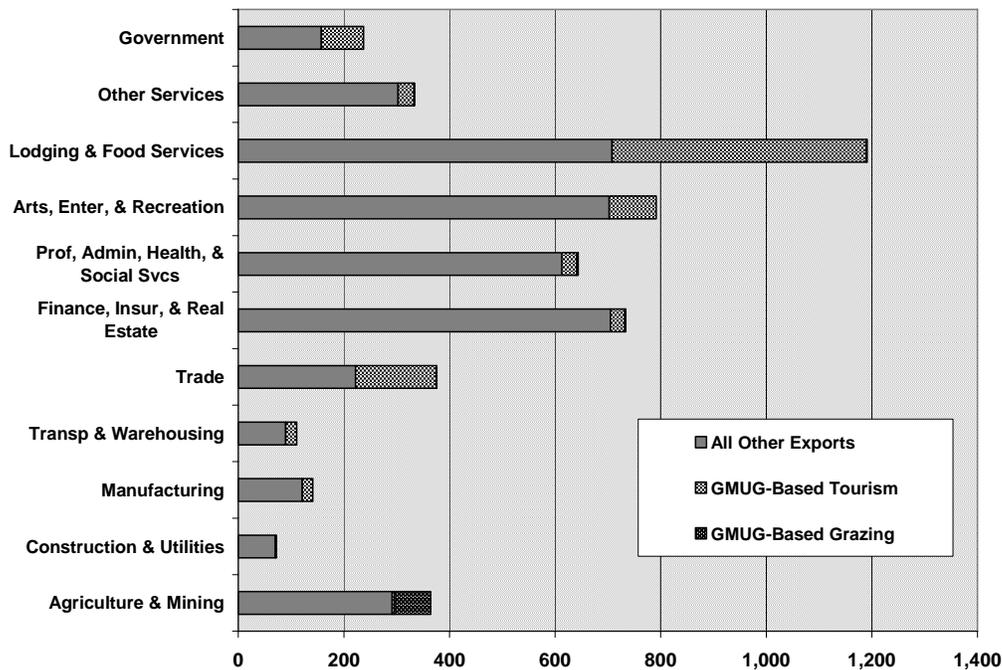


Source: Colorado State Demographers Office and USDA Forest Service

Figures 17, 18, and 19 offer a more detailed perspective on where GMUG-based jobs can be found in the economy. These charts show the number of jobs in each major industry supported by exports, i.e. sales to non-residents. These are jobs supported by use of the GMUG National Forests. Jobs supported by forest operations and payments are not part of exports, and thus they are not included in the figures below.

The Gunnison-Hinsdale economy is fundamentally tourism-based, and GMUG contributions follow suit. Industries most affected by GMUG tourism are Lodging & Food Services, Trade (wholesale and retail), and Arts, Entertainment, and Recreation. Sales of lift tickets and ski lessons at the Crested Butte Ski Area are part of this last category. Other tourism-based employment is found distributed throughout the remaining industries. Jobs generated from livestock grazing are mostly located in the Agriculture sector.

Figure 17. Jobs by industry supported by GMUG National Forests operations and other export-based activities in the Gunnison-Hinsdale economy, 2003

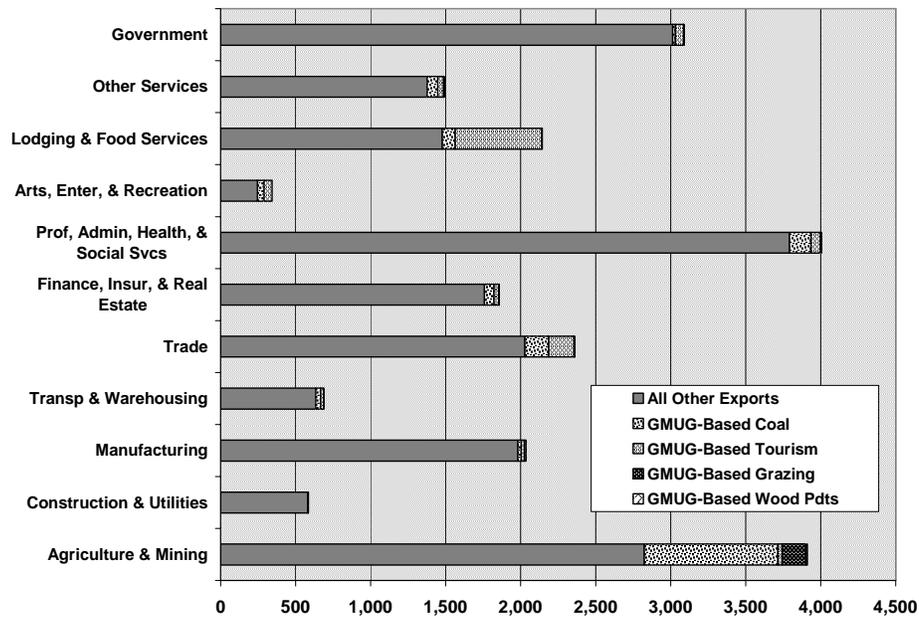


Source: Colorado State Demographers Office and USDA Forest Service

Although GMUG forest uses do not provide as large a share of employment in the Delta-Montrose-Ouray-San Miguel area, the jobs are more evenly distributed across industries. Jobs generated by coal mining are found in every major sector of the area, with large pieces in Agriculture & Mining; in Professional, Administrative, Health, and Social Services; and in Trade. Tourism jobs are distributed in a way similar to those in the Gunnison-Hinsdale area, since both are largely dependent upon downhill skiing. Livestock grazing jobs are primarily located in the Agriculture sector. When combined, uses of the GMUG National Forests provide nearly 30 percent of all export-based jobs in Agriculture and Mining; Lodging & Food Services; and Arts, Entertainment, and Recreation.

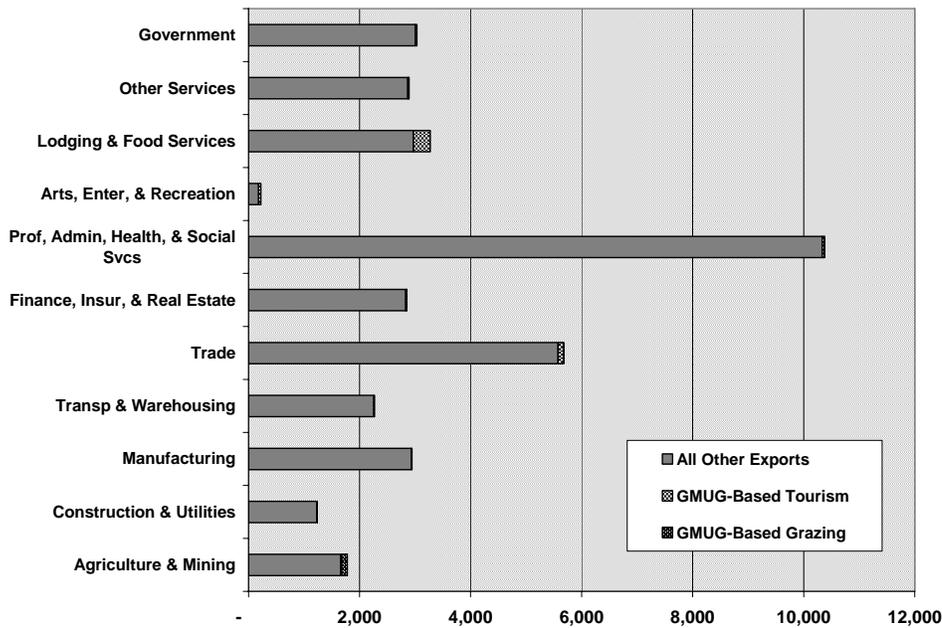
GMUG forest uses provide the smallest contribution to Mesa County export industries. About 20 percent of the Arts, Entertainment, and Recreation are supported by forest uses. Nearly 10 percent of employment in the Lodging & Food Services sector is generated by GMUG-based tourism.

Figure 18. Jobs by industry supported by GMUG National Forests operations and other export-based activities in the Delta-Montrose-Ouray-San Miguel economy, 2003



Source: Colorado State Demographers Office and USDA Forest Service

Figure 19. Jobs by industry supported by GMUG National Forests operations and other export-based activities in the Mesa County economy, 2003



Source: Colorado State Demographers Office and USDA Forest Service

Local Governments

INTRODUCTION

The fiscal condition of local governments in an area that has a significant National Forest presence can be affected in several ways. Tourism, energy development, livestock grazing, and timber all may increase the demands on counties, municipalities, and special districts. For instance, revenue sources from a national forest presence can include sales and lodging taxes from area visitors, property taxes from real estate developments, and payments for public lands from federal land management agencies. Costs include higher demand for police, fire, and search-and-rescue services; increased needs for roads, sewer and water systems, and public buildings; and more calls upon social services such as day care, welfare, schools, and medical facilities. Local officials generally recognize the relationships among tourism (including second homes), energy development, revenues, and costs. Looking at only the tax revenue side of nearby public lands is an incomplete viewpoint that can be misleading. Nonetheless, it is recognized that the burden of public lands in general can be multi-faceted and sizable.

The following section examines federal payments and the role they play in local revenues. While the payments are intended to offset costs borne by local governments for the presence and use of public lands, there is no specific data to determine the extent to which such costs are offset for GMUG National Forest counties.

PAYMENTS TO LOCAL GOVERNMENTS

Counties that contain National Forest System lands receive payments from the federal government to compensate the county for two costs. The first cost is that borne by local governments for serving visitors to the national forests. It is compensated by Forest payments. The second cost is the loss of property tax revenues, which is compensated by Payment in Lieu of Taxes (PILT) payments.

Forest payments. The costs borne by local governments for serving visitors to the national forests includes law enforcement and judicial services, rescue and other emergency services, and wear on local public infrastructures (such as parks, streets, and water and sewer systems). The long-standing method for compensating local governments for these costs is the 25 Percent Fund Act. This act required payments equal to a 25 percent share of annual revenues coming from the sale of forest products, user fees, and special use permits (such as livestock grazing) on each national forest. These payments were made to states, then distributed to the counties, with the restriction that they could be expended only on education or roads. The remaining 75 percent was not retained by the Forest Service, but rather deposited in the U.S. Treasury. These 25% Fund payments are not limited by annual congressional appropriations.

Revenue generated by the sale of leasable minerals (oil, gas, and coal) on National Forest System lands is collected by the Mineral Management Service in the Department of the Interior and administered through the Bureau of Land Management. Mineral revenues, therefore, are not shared locally through the Forest Service 25% Fund.

During the last decade, revenue-generating programs of the Forest Service have diminished. This reduction in turn reduced the payments made to counties wherever National Forest System lands were present. In 2000, counties were offered another method for determining Forest payments that do not fluctuate with national forest revenues. The Secure Rural Schools and Community Self-Determination Act of 2000 offered counties a fixed amount annually based on historical payment amounts. Under this option, counties receive the average of the three highest 25% Fund payments during the period of fiscal years 1986 through 1999. This option, often referred to as the Full Payment Amount, provides stability of payments but removes the opportunity for larger payments. GMUG area counties electing fixed payments under this law are Delta, Gunnison, Hinsdale, Montrose, and Ouray. Mesa and San Miguel continue with the 25% payments.

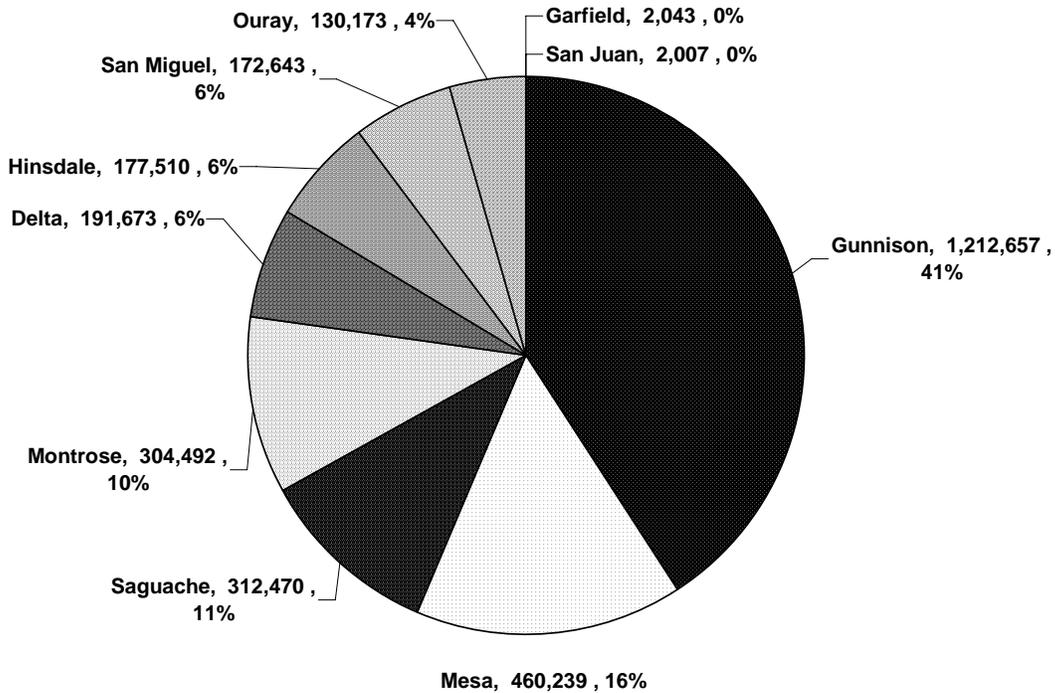
The amount a county receives from the GMUG National Forests 25% Fund is determined by the percent of national forest land located in that county. The GMUG National Forest is located in 10 counties. Table 7 shows the acreage of national forest lands, by National Forest for all counties in which the GMUG National Forests are located. Although the Full Payment Amount does not vary by annual changes in acreage or revenues, it was established using historic 25% Fund payments and is therefore strongly correlated with national forest lands within each county. Table 7 shows that payments are made to three counties outside of the economic area discussed in this report – Saguache, San Juan, and Garfield. Figure 20 displays the shares of GMUG National Forest lands by county in Colorado.

Table 7. GMUG counties and national forest acreage, 2003

County	National Forests							Total
	GMUG	Manti-La Sal	Rio Grande	San Isabel	Routt	San Juan	White River	
Delta	191,673							191,673
Gunnison	1,212,657						61,008	1,273,665
Hinsdale	177,510		201,979			179,349		558,838
Mesa	460,239	4,542					83,069	547,850
Montrose	304,492	22,563						327,055
Ouray	130,173							130,173
San Miguel	172,643							172,643
Saguache	312,470		590,447	24,779				927,696
San Juan	2,007		23,679			147,695		173,381
Garfield	2,043				35,267		478,608	515,918
Total	2,965,907	27,105	816,105	24,779	35,267	327,044	622,685	4,818,892

Source: USDA Forest Service

Figure 20. GMUG National Forests lands by county, 2003



Source: USDA Forest Service

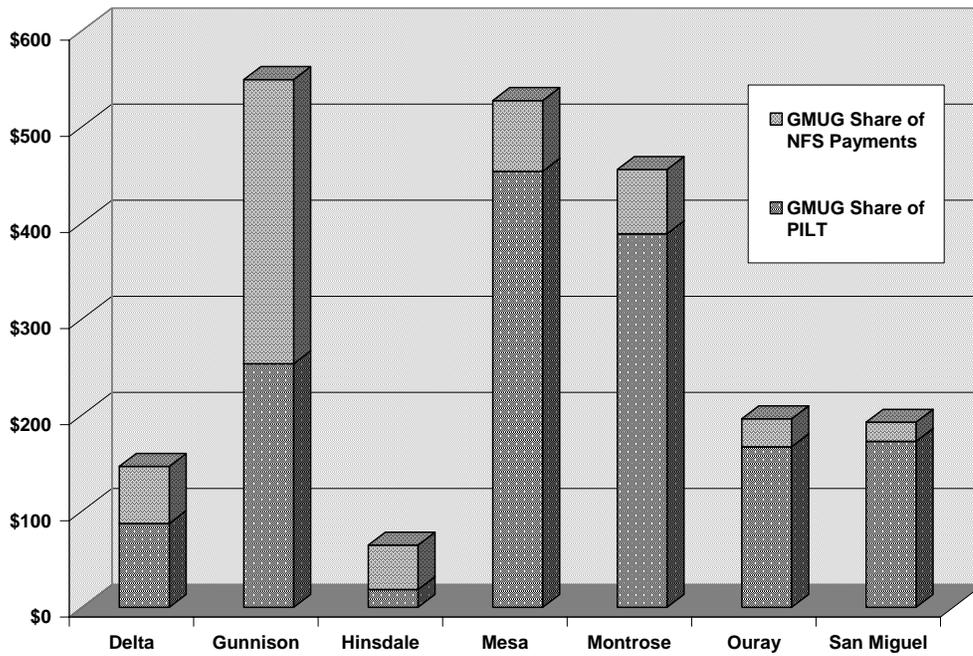
PILT Payments. *Payment in Lieu of Taxes* (PILT) is a payment determined by formula in the Payments in Lieu of Taxes Act of 1976. PILT is a federal revenue-sharing program designed to compensate local governments for the presence of tax-exempt federal lands within their jurisdictions. The formula takes into account such factors as other forms of revenue sharing, acreage, and population. These payments are made directly to counties and may be used for any purpose. PILT payments can be and recently have been limited by Congress through the appropriations process. Congress has not appropriated sufficient funds to fully pay counties since 1994.

Because PILT payments are determined in part by other revenue sharing, it is important to understand the relationship for each county. Throughout Colorado it is common for PILT payments to adjust inversely and equally to changes in the Forest Service 25% Fund payments. For counties electing the steady Full Payment Amount, PILT also becomes a more steady amount.

Because PILT and Forest payments are largely based on acreage, the best portrayal of federal payments related to the Forest Service is to combine payments from the Forest Service – be they 25% fund payments or Full Payment Amounts -- and PILT. Figure 21 shows the total revenues attributable to the Forest Service by county in 2003. Only those counties discussed in the report are shown. Gunnison, Mesa, and Montrose receive about three-quarters of all payments made to these counties – consistent with their share of GMUG lands.

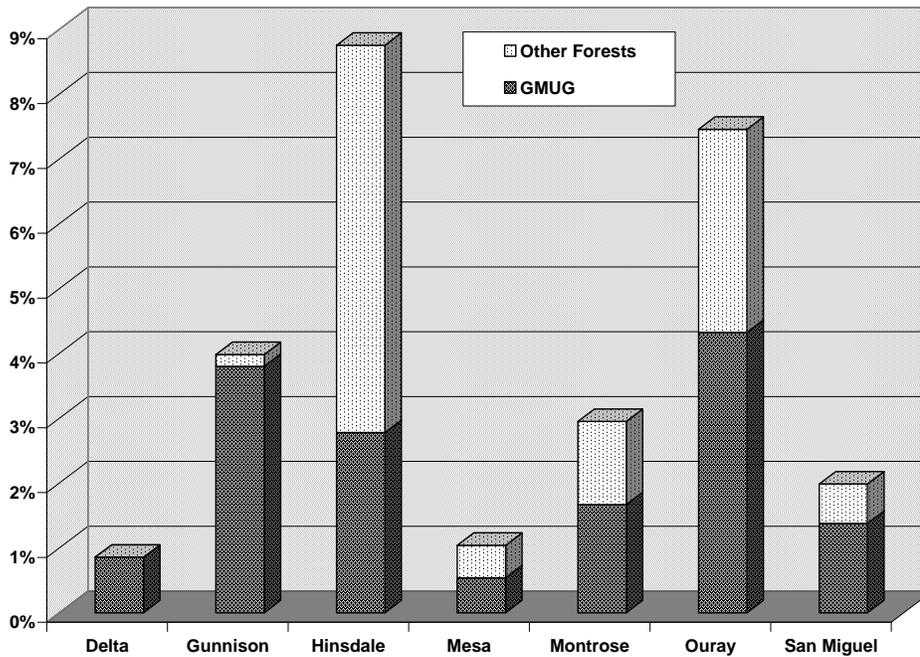
Although more recent data is available, 2003 was selected because it is the latest year for which county revenue data is available from the State of Colorado, Division of Local Governments. Figure 22 displays the GMUG National Forests-based share of these Federal payments compared with total county revenues. This chart offers a perspective on the importance of these Federal payments in light of county fiscal status. Ouray County, while receiving a fairly modest payment from GMUG lands, relies very heavily upon it. Hinsdale County is the most dependent upon all NFS-based Federal payments. In contrast, Mesa receives a substantial payment, yet it is not as dependent upon these funds as other counties in the area. Although these funds do not constitute a large share of Mesa County revenues, payments based on GMUG National Forests lands may still be important elements of county budgets at the margin.

Figure 21. GMUG National Forests-based payments to economic area counties, 2003 (\$1,000)



Source: USDA Forest Service & USDI Bureau of Land Management

Figure 22. GMUG and other national forest-based payments as a share of county revenues, 2003



Source: USDA Forest Service, USDI Bureau of Land Management, Colorado Dept of Local Affairs

Energy mineral payments. Another source of revenues to local governments is based on energy minerals extracted from under GMUG National Forest lands. When mining companies lease federal lands to remove coal, oil, and natural gas, they agree to pay the Federal Government a portion of the mineral value extracted. By law, half of those revenues must be paid back to the states from which the minerals originated. In Colorado, a portion of the Federal energy mineral funds received by the state is distributed back to local governments. The method for calculating payment shares to local governments was revised in 2005. While the method was being revised, no payments were made to local governments. Using the new method, funds designated for distribution to local governments in 2005 were added to 2006 payments. Table 8 shows how Federal energy mineral funds were distributed to GMUG-area local governments from 2002 through 2006.

In addition to royalties on Federal energy minerals, the state of Colorado levies a severance tax. A portion of severance tax receipts are distributed back to local governments, based on the share of energy industry employees statewide that reside in their jurisdiction. Severance tax receipts paid back to GMUG-area local governments are also displayed in Table 8.

Over the last four years, severance tax and Federal payments attributable to energy mineral production on or under the GMUG National Forest have increased fivefold or more. In the last two years, these payments were six times larger than PILT and NFS payments combined. It is important to note that many local jurisdictions receive no PILT or NFS payments, but may receive very large minerals payments. For small municipalities that do not receive PILT or NFS payments, mineral payments represent a significant windfall. For counties that do receive PILT and NFS payments, the mineral payment share is not especially large. Because energy industry employees generally live within municipalities rather than unincorporated parts of the county, the counties receive only a small portion of total energy mineral payments.

Severance tax and Federal mineral payments can be quite volatile with tremendous highs in some years followed by lows in subsequent years. This volatility stems from strong correlations with energy prices and production. For more on energy prices and production, see the Energy Minerals section later in this appendix.

Table 8. GMUG counties and municipalities receiving severance tax and Federal mineral payments from coal, oil, & natural gas production, 2002-2006.

		Severance Tax Payments					Federal Payments				
County	Municipality	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Delta	Cedaredge	\$8,103	\$10,607	\$14,518	\$34,588	\$8,925	\$0	\$766	\$5,766	\$0	\$22,273
Delta	Crawford	\$11,992	\$14,038	\$12,695	\$7,993	\$10,621	\$0	\$1,014	\$6,105	\$0	\$17,818
Delta	Delta	\$57,128	\$40,867	\$44,787	\$77,627	\$62,946	\$0	\$2,951	\$21,539	\$0	\$126,212
Delta	Hotchkiss	\$39,864	\$37,435	\$40,202	\$33,855	\$17,419	\$0	\$2,703	\$19,334	\$0	\$41,576
Delta	Orchard City	\$0	\$0	\$0	\$11,067	\$29,002	\$0	\$0	\$0	\$0	\$56,424
Delta	Paonia	\$75,191	\$72,687	\$70,530	\$77,509	\$32,887	\$0	\$5,249	\$33,919	\$0	\$90,576
Delta	Unincorporated	\$22,363	\$51,161	\$56,836	\$229,375	\$144,205	\$0	\$3,695	\$26,118	\$0	\$387,546
Gunnison	Gunnison	\$101	\$0	\$0	\$9,916	\$3,444	\$0	\$0	\$24,675	\$0	\$1,485
Gunnison	Unincorporated	\$5,510	\$4,367	\$7,406	\$5,534	\$3,367	\$0	\$0	\$180,949	\$0	\$10,394
Mesa	Collbran	\$4,063	\$0	\$11,522	\$0	\$27,550	\$0	\$0	\$0	\$0	\$11,879
Mesa	De Beque	\$18,282	\$12,444	\$60,490	\$9,916	\$127,418	\$0	\$0	\$0	\$0	\$54,939
Mesa	Fruita	\$30,059	\$21,316	\$145,434	\$0	\$550,998	\$0	\$0	\$0	\$0	\$237,576
Mesa	Grand Junction	\$478,871	\$183,579	\$1,861,657	\$151,813	\$1,675,072	\$0	\$0	\$0	\$0	\$733,516
Mesa	Palisade	\$2,355	\$1,868	\$26,277	\$1,114,808	\$96,389	\$0	\$0	\$0	\$0	\$43,061
Mesa	Unincorporated	\$201,014	\$200,361	\$264,531	\$1,471,782	\$2,695,233	\$0	\$0	\$0	\$0	\$1,207,183
Montrose	Montrose	\$4,334	\$1,872	\$2,821	\$18,445	\$9,178	\$0	\$0	\$0	\$0	\$23,758
Montrose	Naturita	\$2,680	\$3,735	\$5,761	\$15,449	\$2,847	\$0	\$0	\$0	\$0	\$2,970
Montrose	Nucla	\$3,241	\$2,808	\$3,174	\$1,230	\$1,222	\$0	\$0	\$0	\$0	\$1,485
Montrose	Olathe	\$1,296	\$1,560	\$2,116	\$4,304	\$2,078	\$0	\$0	\$0	\$0	\$4,455
Montrose	Unincorporated	\$12,576	\$9,350	\$14,284	\$35,321	\$20,662	\$0	\$0	\$0	\$0	\$8,909
Ouray	Ridgway	\$324	\$0	\$0	\$0	\$1,592	\$0	\$0	\$0	\$0	\$1,485
Total		\$979,347	\$670,055	\$2,645,040	\$3,310,531	\$5,523,057	\$0	\$16,378	\$318,405	\$0	\$3,085,518

Source: Colorado Department of Local Affairs, Energy Mineral Impact Reports.

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Timber Industry

Introduction and Area of Analysis

Timber markets have changed dramatically in recent years, and especially since the Forest Plan was first approved (Sept 29, 1983). This is true at all scales -- international, national, regional, and local. This report provides an overview of timber industry in the GMUG area and its position in a larger Colorado context. This report also provides a brief summary of timber supplies used by these firms, including timber provided by the GMUG NF.

Timber markets in Colorado have been studied and documented by a variety of sources and authors. One particularly helpful report is The Four Corners Timber Harvest and Forest Products Industry, 2002, prepared by Morgan Dillon, Keegan, Chase, and Thompson (Morgan, 2006). Another source of information is a database of forest products firms in Colorado prepared by the Office of Community Services, Fort Lewis College in Durango, CO (Harper, 2004-5). The Forest Inventory and Analysis unit of the USDA-Forest Service Rocky Mountain Research Station provided important timber growth information (Forest Inventory Mapmaker, 2005). Conversations with timber industry representatives, local mill owners, and Forest Service personnel also provided valuable insights into timber supply and demand for the GMUG area.

The GMUG area for economic and social analysis purposes is defined as the following counties: Mesa, Delta, Montrose, San Miguel, Ouray, Gunnison, and Hinsdale. Timber supply also includes the northern portion of Saguache County. The southern portion of Saguache County, where virtually all businesses and communities in the county are located, is economically and socially connected with the San Luis Valley, not the GMUG area.

Condition and Trends

Timber Industry

In decades past, each national forest typically had timber purchasers that were locally situated. Timber was rarely sold to purchasers located more than two hours drive from the forest. These mills were relatively large, very limited in the kinds of products they produced, and very dependent upon sawlogs coming from one or two national forests. As a result, large lumber mills could be found in many communities on the West Slope. These mills often had a large workforce that handled every aspect of harvest and processing. Wages and benefits were the best in town. It was not unusual for entire communities to be economically dependent upon a single mill. Today the timber industry in Colorado bears little resemblance to its predecessor of not so many years ago.

Since 1982, total timber harvested and processed in Colorado has dropped 40 percent. National timber markets have become more competitive and production efficiencies have risen with new technologies (Rideout, 2000; Keegan, 2005/2006). These factors squeezed and re-shaped the Colorado timber industry. Since 1992, two oriented strand board mills – one in Olathe and the other in Kremmling – have closed. A large sawmill in Walden also closed in 1994. Mills

owned by large corporations, such as Louisiana Pacific, no longer exist in Colorado. A large independently-owned mill at South Fork ceased operation in 2001 after 50 years of operation. Nine other medium-sized mills have closed their doors since 1982. Most firms supporting these mills, such as independent loggers and truckers, have ceased operations as well. The timber industry in Colorado today is composed of two large independent timber processors and dozens of very small mills.

Intermountain Resources Inc. (Intermountain), located in Montrose, operates the last large sawmill in Colorado. Originally purchased from Blue Mesa Lumber in 1996, it has been updated and now has the capacity to produce 100 million board feet (LT) annually when running two 8-hour shifts. Intermountain currently employs 100 workers that process about 40 million board feet (LS) annually (Thompson, 2005). In addition to its own workforce, Intermountain utilizes over a 100 subcontractors for logging, hauling, and acquiring timber supply (Fishing, 2005). (See discussion of small firms below.) Although the Montrose mill is significantly larger than any other in Colorado, it is relatively small by national standards (Random Lengths, 2004). In 2002, Intermountain processed about half of all timber milled in Colorado creating a variety of construction products from green and dead conifer logs. Some of these products are sold to Colorado firms, mostly serving the high population centers along the Front Range.

Western Excelsior Corporation is the other large processor of timber in Colorado, located in Mancos. The mill produces a wide array of products from aspen, wheat straw and coconut fiber including erosion control blankets, evaporative cooler pad media, erosion control logs and wattles, packaging materials, and decorative excelsior for the crafts and floral industry. These products are sold throughout the continental United States, Alaska, and Mexico. Western directly employs 130 persons and processes 1.8 million cubic feet of aspen annually. Western subcontracts its logging and hauling to three firms employing another 24 persons. They also purchase a significant quantity of their aspen as gatewood from other mills and loggers (Harper, 2004-5).

As the large mills closed down across Colorado, many workers with only timber industry experience became unemployed. Some of the displaced workers chose to stay in Colorado, acquire small-scale equipment, and launch small mills. A few of these new firms made it, while others did not. Some of the existing small firms—especially those that were well established--have modified their operations, products, and marketing in tenacious attempts to survive. In many cases, families with a history in the timber business adapted and continued their natural resource heritage. In the absence of many large mills, small operations have become either more diversified, producing a greater variety of products from a small facility, or more specialized, producing unique products for small, niche markets (Harper, 2004-5). Products include dimension lumber, panelling, houselogs, log furniture, and posts/poles. The typical small mill employs 5 workers and operates at less than 50% of equipment capacity (Keegan, 2005-6).

Another structural change in the forest products industry has been the degree of interdependence among firms. In contrast to the large “stand alone” mills of past decades, all of Colorado’s mills – large and small -- rely upon each other today. Driven by increased specialization and scarce timber supplies, logs of all types and sizes criss-cross the state as mills seek to maintain financial viability. In addition, there is a functional market for chips and other mill residues across the

state. Although chips and residues are not typically high-value products in Colorado, prices are generally sufficient to compensate producers and provide a small, but important component to business viability. These conditions have prompted the Colorado timber industry, including firms in the GMUG area, to become connected with industry in neighboring areas of northern New Mexico, southern Wyoming, and eastern Utah (Morgan, 2006).

Data from the Four Corners study are shown below, and offer a reasonable picture of small forest products firms in the southern Rockies.

Table T1. Attributes of a typical forest products firm processing less than 1.5 MMCF in the Four Corner states by type of facility, 2002

Attribute	Saw Mills	House Logs	Saw Mill/ House Logs	Log Furniture	Posts-Poles
Annual Capacity (MCF input)	311	99	316	37	201
Annual Capacity (MBF input)	1,834	616	1,894	55	301
% of Total Industry Capacity	68%	17%	12%	1%	1%
Annual Input (MCF)	131	61	126	26	95
Annual Input (MBF)	773	379	757	39	142
% Capacity Utilized	42%	62%	40%	71%	47%
% Sales in Home State	59%	57%	86%	44%	49%
Employees	5	6	4	5	14
% of Total Industry Employment	37%	34%	5%	6%	2%

Source: (Keegan, 2006)

Some implications of these industry characteristics are notable. First, the average sawmill, sawmill with houselog capability, and post-pole operation are running at less than half of their facility design. This indicates that firms are probably not able to cover all operating (fixed and variable) costs, and therefore cannot be profitable in the long run. Further shrinkage of the industry can be expected if current supply and other market conditions persist. When a single firm closes operations, others are at risk as well. Given the high interdependence among timber processors in Colorado, the loss of even a single small firm is likely to be magnified within the industry and threaten the viability of others. Second, 85 percent of the forest products industry workforce is employed by small firms with about 5 employees each. Employee specialization, high wages, and significant benefits are unlikely for these workers, while seasonality is highly likely. In this regard, the forest products industry has become more like the tourism industry to which it is often compared.

The GMUG area contains a third of all forest products firms in Colorado (Harper, 2004-5). More significantly, three quarters of Colorado's mill capacity and over half of its mill production occur in the GMUG area (Keegan, 2005-6). Timber processing is no longer simply cutting logs into boards, but includes a variety of new products. Colorado has become the third leading producer of log homes in the western U.S. behind Montana and Idaho, and 40 percent of Colorado log home firms are located in the GMUG area. Almost 60% of secondary wood manufacturers, such as furniture and cabinet makers, in Colorado are also located in the GMUG area.

Figure T1. Number of small forest products firms in Colorado, 2002-2004

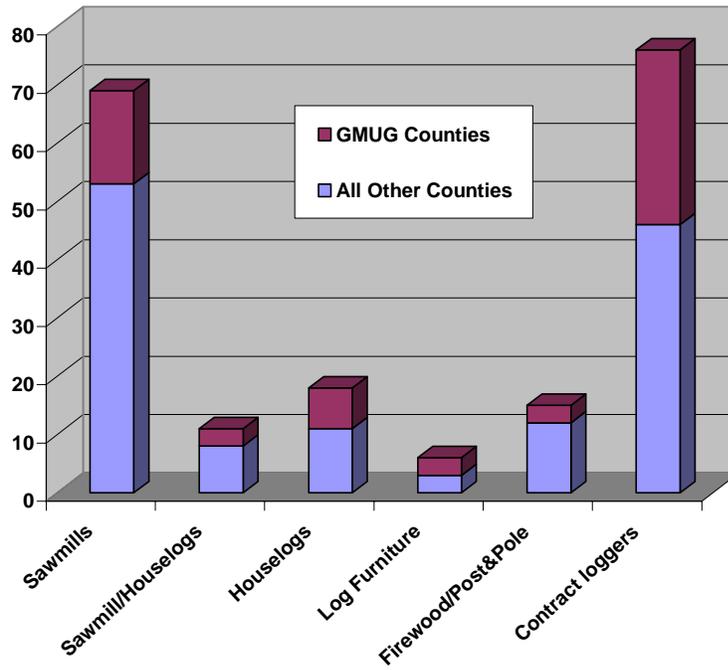
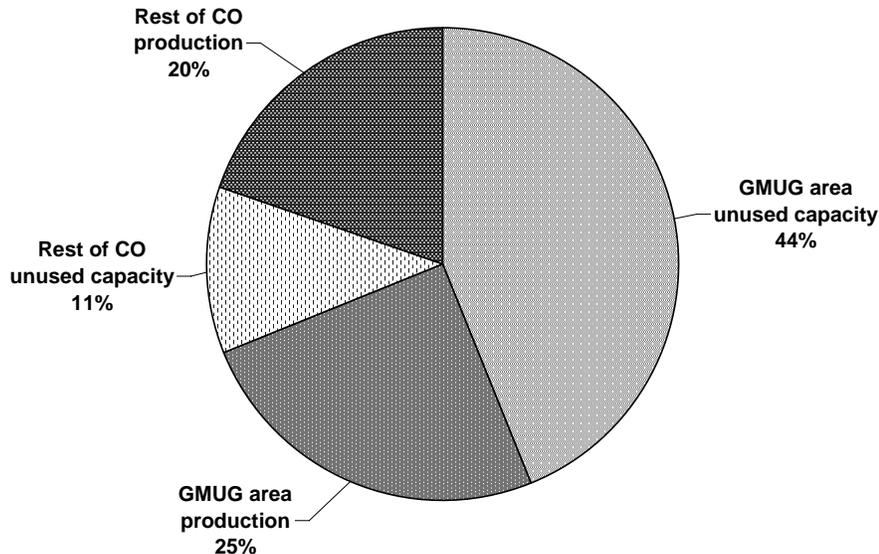


Figure T2. Timber industry production and unused capacity in the GMUG area and Colorado, 2002



The GMUG area is an important center of a changing timber industry in Colorado. New firms may have located in the GMUG area because of the potential timber supply (see below), but even more importantly, their location may be attributable to growing local and state demand for their products and affordable, attractive communities within which to locate.

Timber Supply

Over the last 5 years, about 40 purchasers have harvested about 10 million board feet (mmbf) of GMUG National Forest timber annually (Anderson, 2004-5). Frequently, small loggers purchase the timber, then market the logs to mills across Colorado. Because of propriety disclosure restrictions and limited survey data, knowledge of log flows from one part of Colorado to another is uncertain. It appears, however, that most of the timber harvested in the GMUG area is processed in mills located in the GMUG area counties.

By all measures, timber growth across the U.S. is vibrant. Since the 1950's, total timber growth has far exceeded harvest. Softwood inventory on all timberlands in the Rocky Mountain region (Montana to New Mexico) has followed the national pattern, growing by 31 percent since 1953 (Smith, 2001). Net timber growth, calculated by subtracting natural mortality from total growth, is a good general indicator for timber supply. Net growth per acre averaged 34 cubic feet annually in 1996, nearly double the rate in 1952 (Smith, 2001). This net growth rate is a slight decrease from 1986 because of a notable increase in natural mortality. Timber in the Rocky Mountain region is dying from insects, disease, fire, and windthrow at the fastest rate in 40 years.

In Colorado, net timber growth on nonreserved timberlands is estimated to be just over 250 million cubic feet per year (Forest Inventory Mapmaker, 2005). Nonreserved timberlands are those where trees grow at a rate of 20 cubic feet per acre per year (potentially commercial), and have not been administratively or legislatively withdrawn (Smith, 2001). Withdrawals include such areas as Wilderness, Research Natural Areas, and Wild and Scenic Rivers. Figure T3 shows that national forests account for nearly 80 percent of Colorado's net growth, while private lands are second with 13 percent. The GMUG NF accounts for nearly a fifth of total net growth in the state and a quarter of all growth on national forests.

The sustainability of Colorado timber supplies can be determined by comparing annual timber net growth with removals. Figures T4 and T5 compare these measures by ownership for 1982 and 2002, respectively. A quick glance at the pie charts shows that harvest was very small compared with net growth. Total removals were 8.2 percent of total net growth in 1982 and 6.3 percent in 2002. Expressed differently, net growth exceeded removal in 1982 by 11 to 1, and in 2002 by 14 to 1. These patterns follow and exceed those in the entire Rocky Mountain region where annual net growth was greater than annual removal by nearly 5 to 1 in 1996 (Smith, 2001).

A closer look at Figures T4 and T5 reveals a shift in harvest by ownership over time. In 1982, harvest on national forests were about 7 percent of statewide net growth while harvest on private lands were just over 1 percent. In 2002, their relative positions were reversed. Harvest on private lands exceeded that on national forests. Although the figures are only snapshots in time, they confirm stories among timber industry experts and observers: private lands have become the primary source of Colorado timber supplies for Colorado mills.

Figure T3. Annual net timber growth on nonreserved timberlands in Colorado by ownership (mmcf)

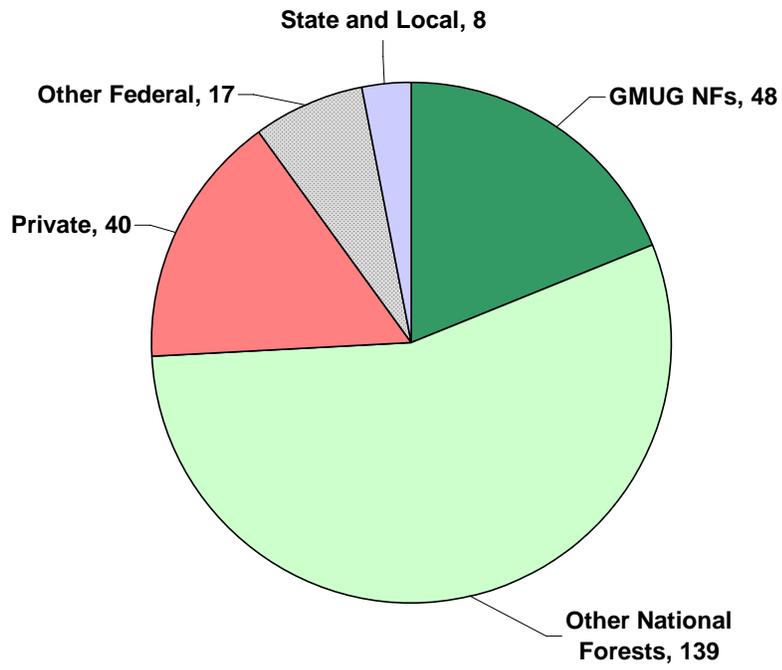


Figure T4. Net timber growth and harvest on nonreserved timberlands in Colorado by ownership, 1982

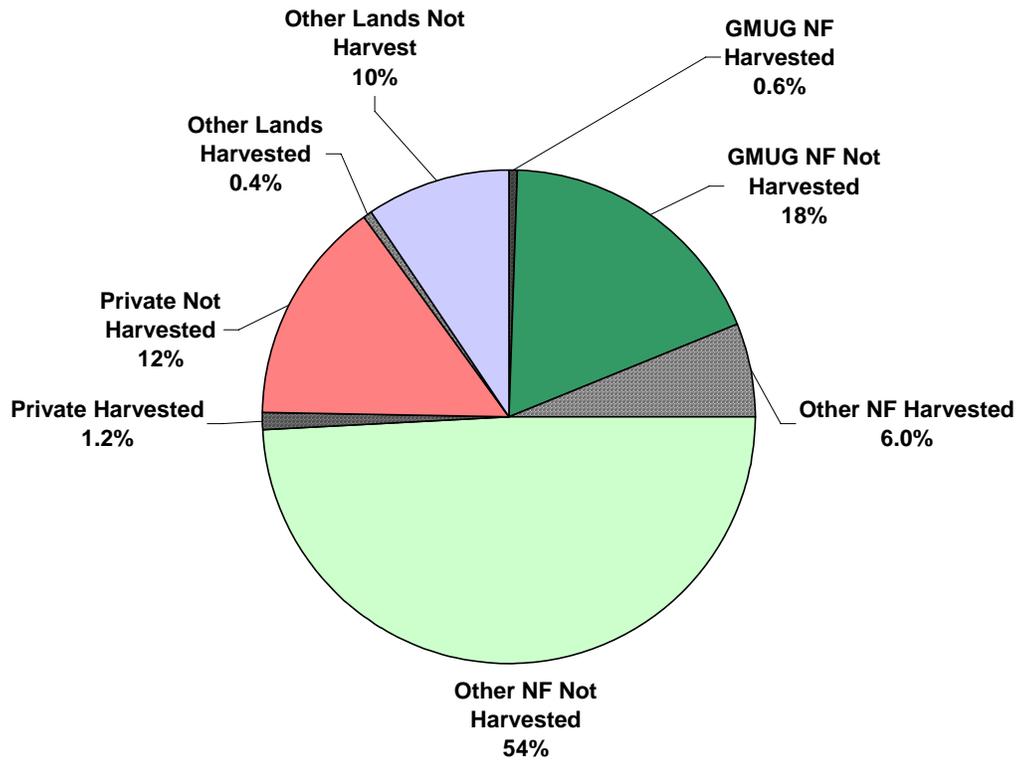


Figure T5. Net timber growth and harvest on nonreserved timberlands in Colorado by ownership, 2002

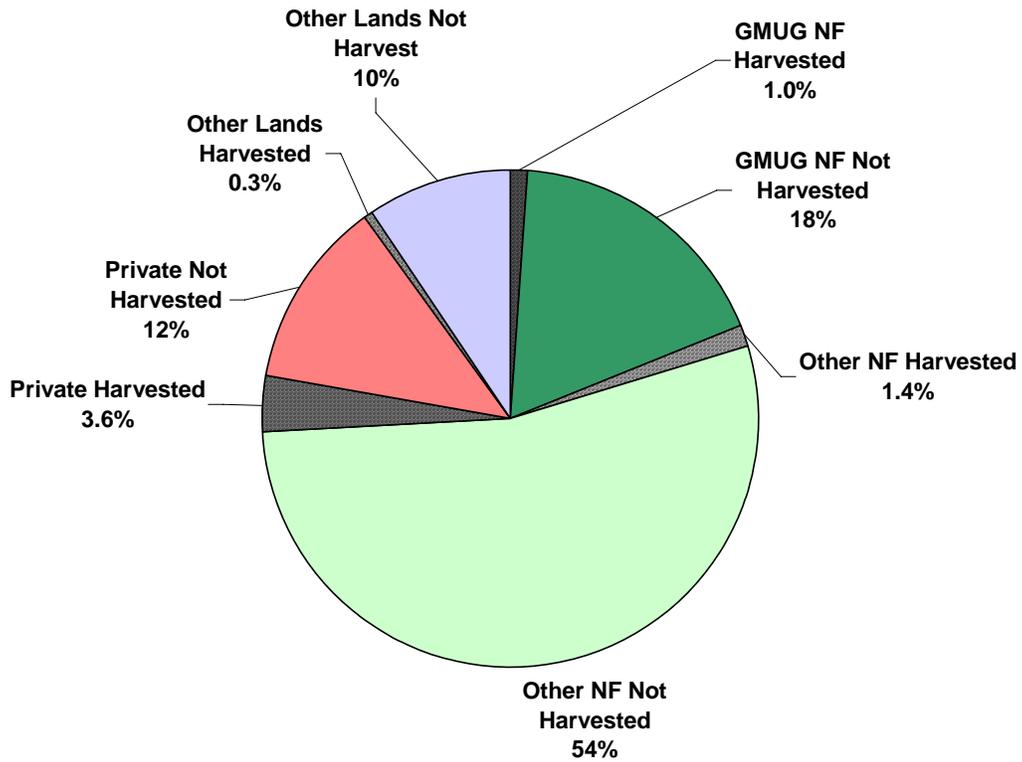
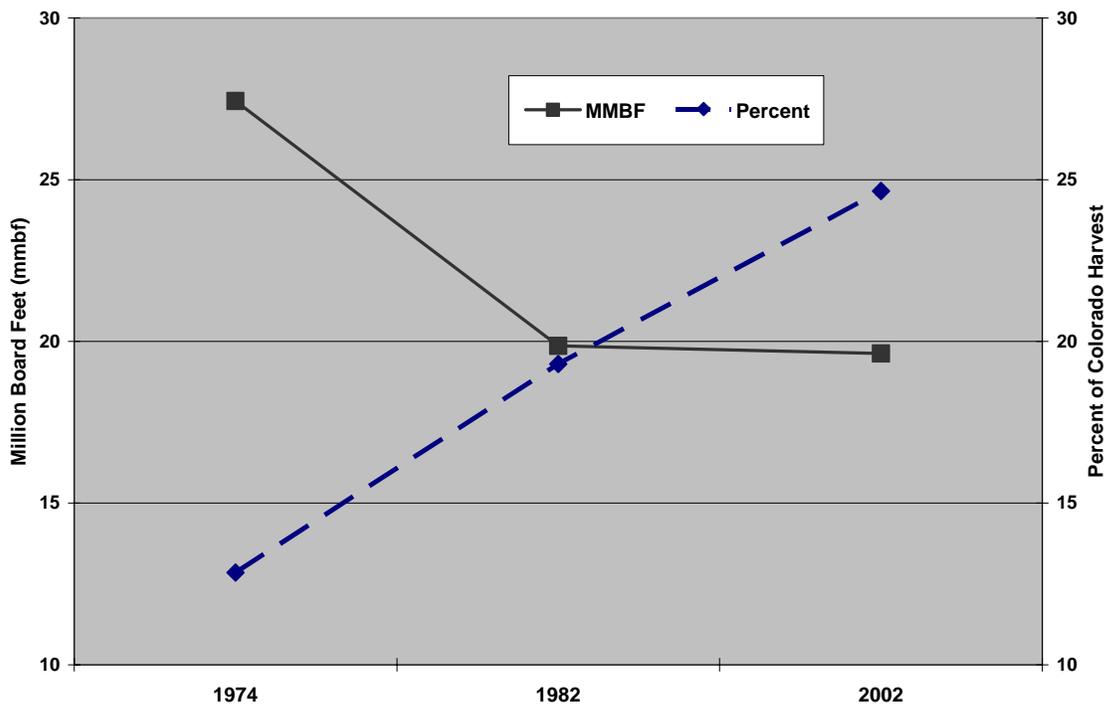


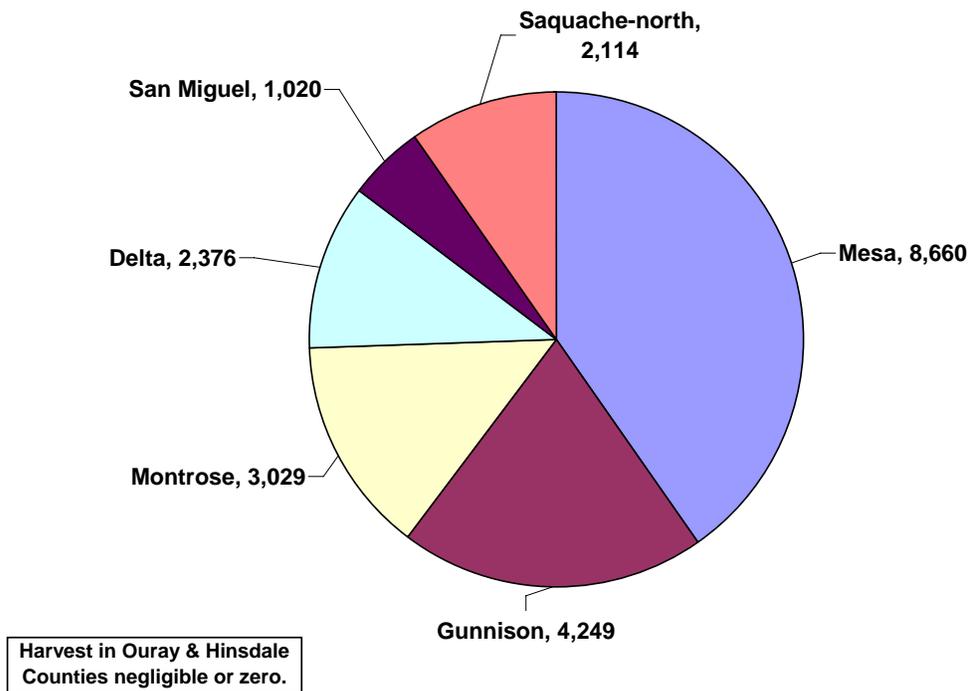
Figure T6. Total Timber Harvest on All Lands in GMUG Counties, Selected Years



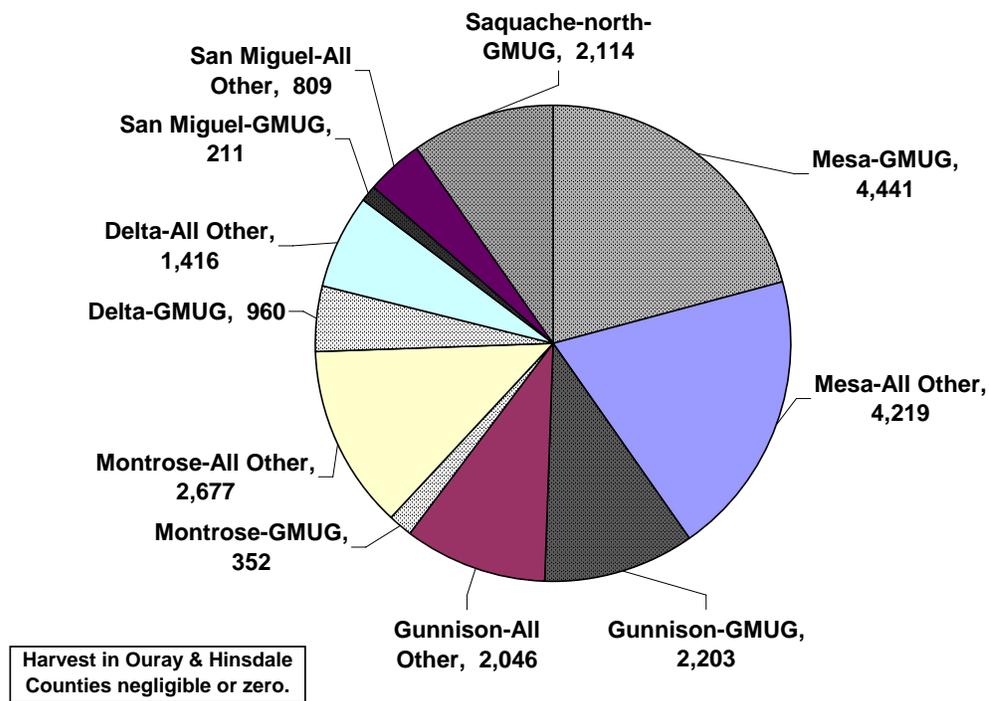
While timber harvest throughout Colorado has been decreasing over the last two decades, GMUG area counties have become an increasingly important source of timber. Figure T6 indicates that harvest on all lands in GMUG area counties now accounts for a quarter of all Colorado harvest. Figures T7 and T8 reveal that Mesa and Gunnison Counties were the largest contributors to timber supply in 2002. In those counties, the GMUG NF supplied half of the harvest and all other ownerships provided the other half. The northern half of Saquache County was another key source of timber supply, all coming from GMUG NF lands.

Historically, the GMUG NF has been a major source of timber supplies among all national forests in Colorado. Over the last decade, the GMUG NF has averaged a quarter of total national forest harvest. While maintaining its share of total national forest harvest in Colorado, GMUG volumes have dropped significantly in recent years. Harvest from Colorado national forests has dropped from historic highs in the late 1980's to levels roughly a fifth of that today (USDA-Forest Service, 2005). Changing public values and policies, constrained budgets, and legal challenges have resulted in significant reductions of timber harvest on public lands. Current harvest levels approximate those of wartime in the 1940's. Table T2 and Figure T9 provide perspectives on GMUG harvest since 1982.

Figure T7. Total Timber Harvest on All Lands in GMUG Counties, 2002 (thousand board feet)



**Figure T8. Total Timber Harvest by County and Ownership in GMUG Counties, 2002
(thousand board feet)**

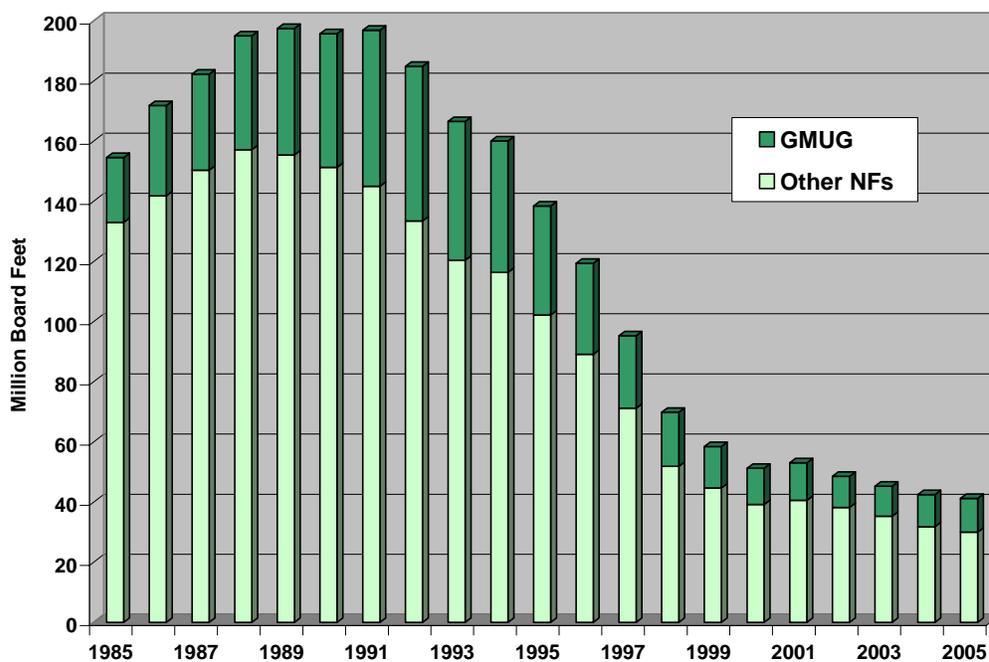


**Table T2. GMUG NF timber volume harvest by species group and product, 1980-2005
(million board feet).**

Fiscal Year	Conifer Sawtimber	Conifer Products-other-than-Logs	Aspen	Total
1980	12.35	3.02	0.39	15.76
1981	23.43	2.98	1.29	27.70
1982	10.42	1.58	0.17	12.17
1983	11.07	4.42	2.32	17.82
1984	13.83	3.88	0.92	18.64
1985	19.84	13.29	4.58	37.71
1986	24.93	17.99	3.08	45.99
1987	14.74	8.74	2.06	25.54
1988	25.01	7.14	9.73	41.88
1989	27.12	8.48	19.09	54.70
1990	30.14	7.27	18.31	55.72
1991	26.81	9.43	19.14	55.38
1992	14.87	6.72	18.28	39.87
1993	15.95	7.40	10.30	33.64
1994	21.24	8.53	16.09	45.85
1995	12.36	4.35	8.77	25.48

Fiscal Year	Conifer Sawtimber	Conifer Products-other-than-Logs	Aspen	Total
1996	6.67	3.95	5.53	16.14
1997	4.04	3.46	1.49	8.98
1998	9.70	3.51	8.09	21.30
1999	4.20	2.70	1.97	8.88
2000	4.74	2.29	2.08	9.11
2001	5.83	2.08	2.45	10.36
2002	8.37	1.73	2.99	13.09
2003	4.15	2.11	0.92	7.17
2004	6.63	1.95	3.20	11.78
2005	8.63	2.04	1.94	12.61

Figure T9. Timber harvest on national forests in Colorado, four year running average, 1985-2005



Timber Use

Given the regular transport of logs across Colorado today, local timber supplies do not directly affect the fortunes of local mills as they once did. Nonetheless, local timber supplies provide a critical profit base because of low hauling costs, and then allow a financially viable mix using timber from distant sources. Figure T10 illustrates that mix for small GMUG area firms in 2002 (Keegan, 2005-6). Surprisingly, a third of all timber processed came from local counties and another

third from outside of Colorado – some of it from Canada. Using information from Figure T8, it is estimated that half of local timber processed was provided by the GMUG NF. If true, then roughly a sixth of all timber processed locally came from the GMUG NF.

Figure T10. Geographic source of timber processed by small GMUG area firms, 2002

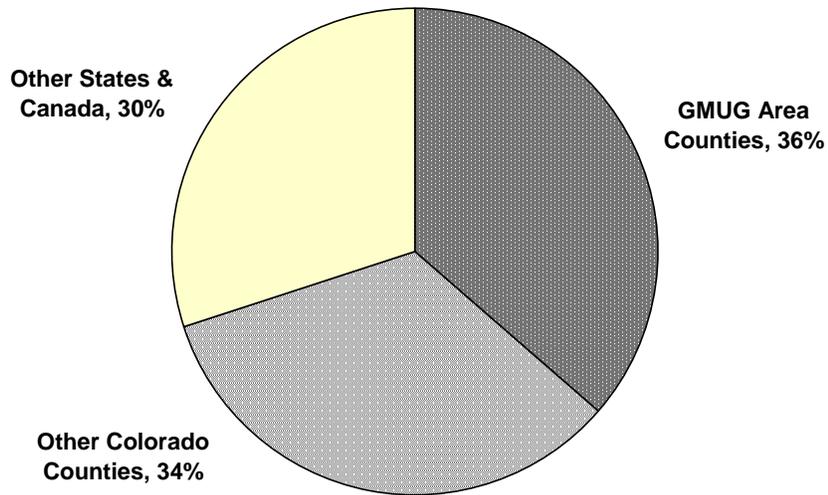
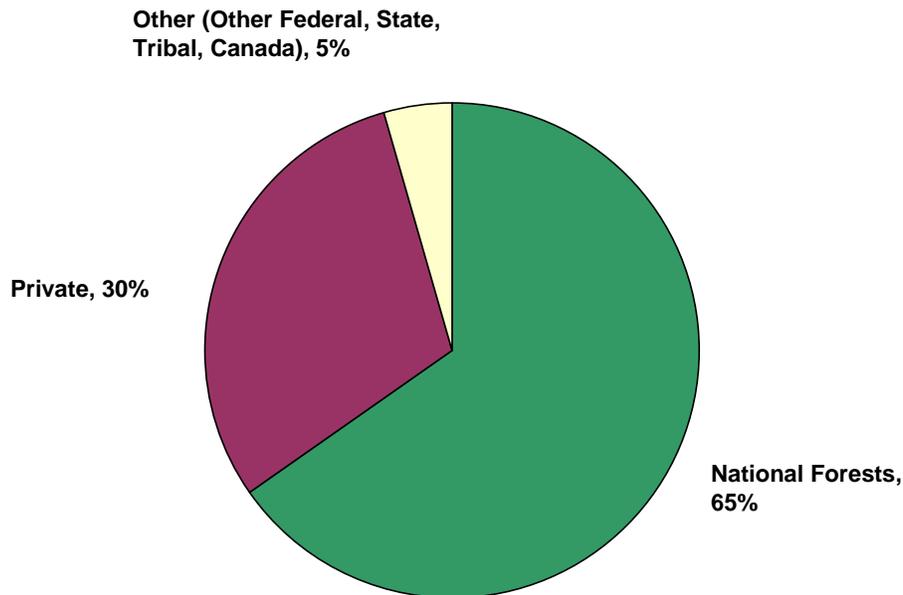


Figure T11. Ownership source of timber processed by small GMUG area firms, 2005



The GMUG NF is not the only national forest providing timber for firms in the GMUG area. Figure T11 shows that 65 percent of timber processed by small GMUG area firms in 2002 came from the national forest system (Keegan, 2005-6). When considering large and small firms, the percent drops somewhat but national forests still provide well over half of the timber processed in the area.

Local mills obtain a third of their timber supplies from private land, with a good portion of that coming locally. As noted above, private lands in Colorado now provide more timber than all national forests statewide. Despite harvest levels that clearly fall below net growth, reliance upon private sources is not likely to be sustainable. Colorado's private timber supplies are often associated with operational ranches, where the land is actively managed for a sustainable flow of products. The amount of land committed to agriculture is decreasing in Colorado, as development pressures mount from retirees, resorts, and energy growth. New owners of open space are often not receptive to vegetative management. It is this cultural shift among owners of private timberlands that has effectively reduced the private land share of statewide timber supplies.

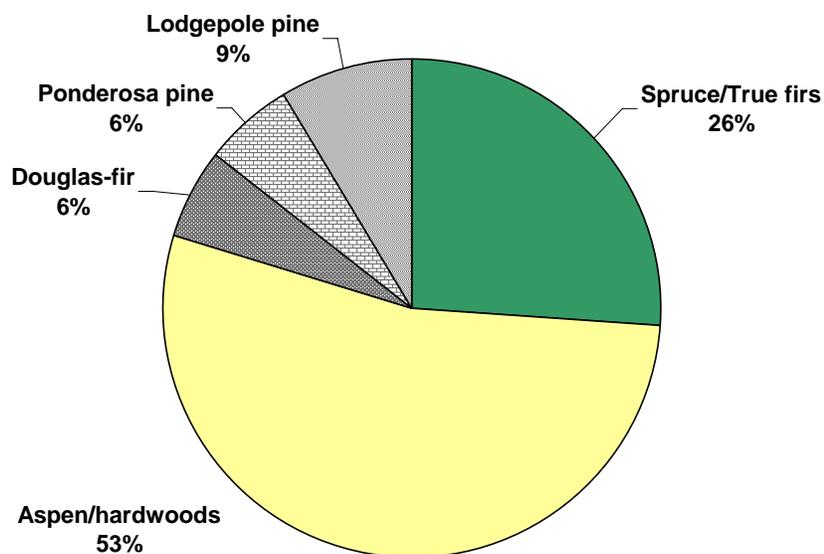
A natural cycle of pest infestations across Colorado, however, may have started to change the opinions of new owners with regard to active vegetation management. Large scale pest infestations threaten the scenic and recreational value of private lands and increase the risk of catastrophic fires. Owners within infested areas now recognize the merits of vegetative management within the dynamics of ecosystem operations. Once the infestations run their course, however, it is uncertain whether changed opinions will persist. In the interim, an increased harvest of dead or dying trees may compensate for a reduced harvest of live trees. Local mills, especially those producing house logs, will benefit from

the infestations. The timber industry believes that recent harvest levels of live trees on private lands, however, cannot be sustained (Fishing, 2005).

Over the years, spruce has been the Colorado species most desired by markets and consequently by mills. Lodgepole and ponderosa pine are also highly desired. The GMUG NF has large quantities of spruce and lodgepole, but only small amounts of ponderosa. Thus, many local mills focus on these species. See Figure T12.

The demand for aspen has waxed and waned over the years, since aspen is not suitable for studs and other construction grade lumber. However, aspen is currently in high demand for a variety of non-traditional timber products (Sorenson, 2005). Both large and small mills participate in the aspen market. Delta Timber -- considered a small mill, but the second largest mill in Colorado and located in the town of Delta -- and Western Excelsior Corporation in Mancos, CO both focus exclusively on aspen products. Figure T12 shows that aspen is the leading species currently processed by small mills in the GMUG area.

Figure T12. Species processed by small GMUG area firms, 2005



Sustainability

- OF THE FOREST PRODUCTS INDUSTRY.

The forest products industry in the GMUG area – indeed the industry throughout Colorado -- is not financially healthy. As noted above, existing capacity is currently being utilized at about 40 percent. As a result, it is not likely that costs are being fully covered by revenues. Small firms are generally more vulnerable than large mills. If this condition existed in decades past, the risk of failure would be limited to individual mills. Because of strong interdependence among small and large mills statewide today, the risk of failure is not just high, but distributed among a larger share of the industry.

What is the relationship between the timber industry and national forest management? There are two aspects that stand out. First, industry is dependent upon public land timber in the long run. Decreasing timber harvest on national forest lands over the past fifteen years has had a profound effect on the condition of the timber industry. Not only has the industry contracted, but it has structurally changed in terms of product mix and size of firm. With the last large sawmill in the state located in Montrose, the GMUG NF and surrounding area is at the center of this change. Many of the new firms in the industry, such as those specializing in house logs, do not rely strongly upon timber from Colorado public lands but are here because of demand by Colorado residents for their products. It is not clear whether increased availability of public land timber would substantially change their timber source mix.

Second, treatment options for national forest management are dependent upon a viable local timber industry. Whether treatments are designed to contain bug infestations, reduce fire fuels in the urban interface, improve wildlife habitat, or simply provide timber for market, timber industry can often provide cost-effective options. A highly vulnerable timber industry, however, subjects Forest Service vegetative management programs to a higher risk of ineffectiveness. Without a viable timber industry, the public must pay the complete cost of vegetative removals. Higher treatment costs place the Forest Service at greater risk of reduced or ineffective forest management, especially with the prospect of declining Federal budgets that must respond to a variety of domestic and international demands.

Because of the connection between a viable timber industry and effective forest management, the Forest Service has invested in various economic development techniques to design a new timber industry for Colorado. In recent years, economic development specialists have come to see traditional development techniques as mostly ineffective. Some Federal institutions no longer support traditional techniques, but seek economic vibrancy by encouraging entrepreneurial growth within existing industries (Federal Reserve Bank). Drawing on this information, it appears that sustaining the existing timber industry, albeit ever changing in response to new market forces, rather than trying to invent a new one is good for cost-effective forest management as well as local economic development.

Some timber processors will always come and go. However, timber harvest on the GMUG and other national forests must be sufficient to provide opportunities for a financially viable industry and to ensure cost-effective forest treatment

options. Further reductions of timber harvest on the GMUG and other national forests may jeopardize both.

- OF COMMERCIAL TIMBER SUPPLIES.

It is clear that commercial timber supply on the GMUG NF is not close to being overcut. Figure T4 above shows that harvest on nonreserved timberlands of the GMUG NF 20 years ago, even though approaching historic highs, was a very small share of total net growth. Figure T5 shows approximately the same situation in 2002. Although these two figures are snapshots in time, it is clear that commercial timber harvests could be increased greatly without any risk to long run sustainability of supply. Whether the supply is made available, however, is one of the decisions made in this forest plan revision.

The same two figures (T4 and T5) also show that current timber harvest on private lands is theoretically sustainable in the long run. What the figures do not show, however, is whether the net growth on private lands is available for harvest. That constraint, as discussed above, is crucial for assessing supply from private timberlands. Thousands of private timberland owners across Colorado make independent decisions regarding the availability of their timber. Many do not embrace active forest management, thus removing their net growth from potential supplies. For this reason, it is much less clear whether private timber supplies can be sustained at current harvest levels. Industry observers suggest that the available supply is very limited. If true, this puts additional emphasis on supplies from public lands.

Anticipated Harvest and Processing

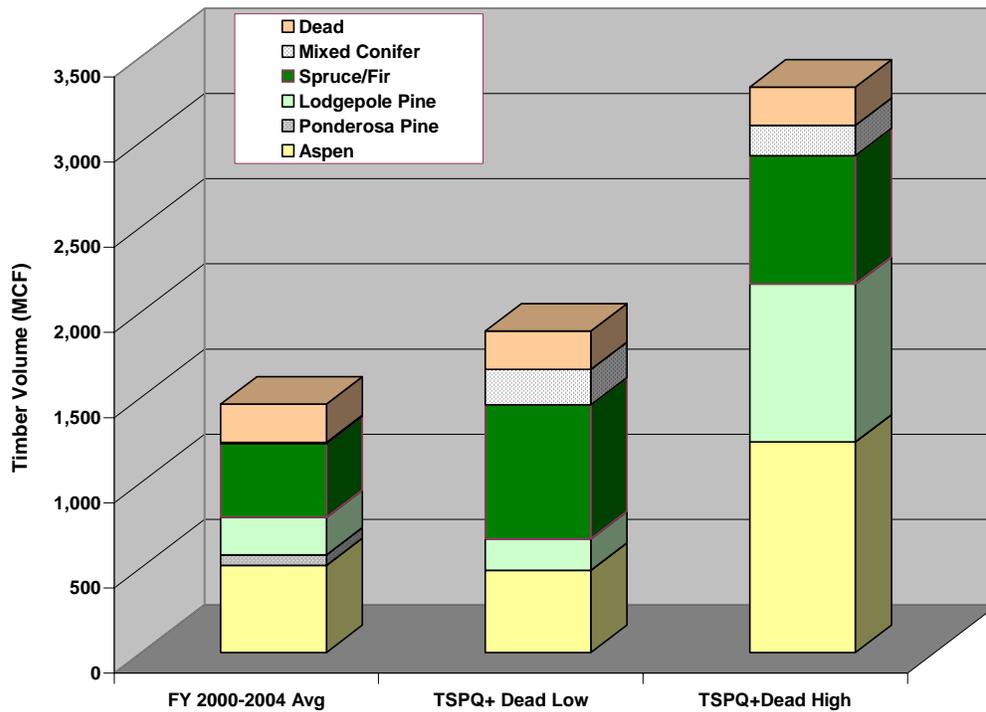
As a ceiling on timber sold from suitable timber lands, allowable sale quantity (ASQ) under the 1982 planning rule was not a reliable predictor of actual harvest levels. Annual budgets, project appeals, litigation, market conditions, natural disasters, and changes in national policies affecting resource management all combined historically to reduce timber harvest on the GMUG National Forest. Timber Sale Program Quantity (TSPQ) accounts for these factors and should offer more realistic expectations of timber harvest. In this section, TSPQ and its probable effects on GMUG area timber industry is estimated.

TSPQ in the GMUG proposed forest plan is a range. Forest Service costs and budgets have been varied within a realistic range to provide low end and high end estimates. Details regarding the cost and budget assumptions can be found in the timber modeling appendix of the Comprehensive Evaluation Report.

The salvage harvest of dead trees is not a component of TSPQ in the proposed plan. However, dead material has been an important part of the GMUG timber harvest program over the last decade, providing high value products to the Colorado timber industry. Because dead material has been about 14 percent of the GMUG timber program between 2000 and 2004, and because substantial dead volume is expected to continue over the next decade, the recent average volume of 224 MCF per year has been added to TSPQ.

TSPQ plus dead will increase annual harvest on the forest from 1,458 MCF in recent years to 1,887 MCF in the next decade. This 29 percent increase is the low end estimate. On the high end, annual harvest will increase 128 percent to 3,321 MCF. See Table T13.

Figure T13. Timber Sale Program Quantity in decade 1 compared to average annual timber harvest, 2000-2004 (mcf)



Figures T14 through T16 show that the species mix of each end is expected to vary from the mix experienced between 2000 and 2004. At the low end, aspen, lodgepole pine, and ponderosa pine show small decreases in volume, while spruce/fir and mixed conifer show large increases. The spruce/fir sawtimber component would expand by 63 percent. Under the high end scenario, aspen shows a 140 percent increase in volume, and a larger share of total harvest. Lodgepole harvest expands greatly, increasing by over 700 mcf and increasing its share of total harvest. In contrast, spruce/fir expands 74 percent yet accounts for a smaller share of total harvest. Differing species mixes between the low and high end estimates result from higher volumes achieved under lower cost timber harvest activities, such as clear cut. Details can be found in the timber modeling appendix of the Comprehensive Evaluation Report.

Figure T14. Average annual timber harvest by product and species, 2000-2004 (mcf)

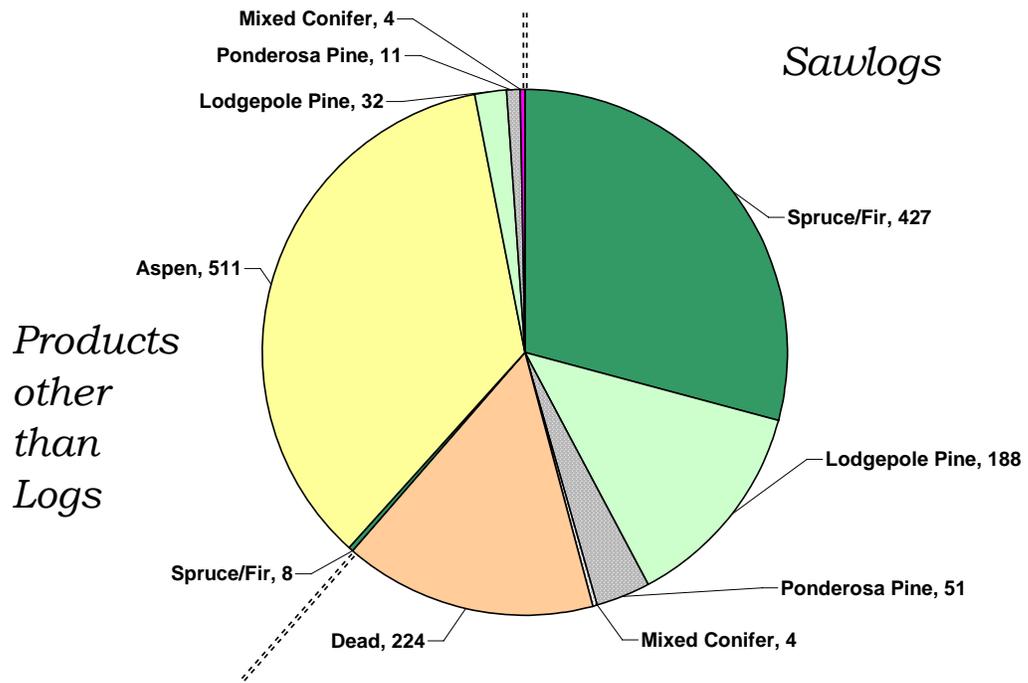


Figure T15. Average annual Total Sale Program Quantity – Low End plus dead by product and species, decade 1 (mcf)

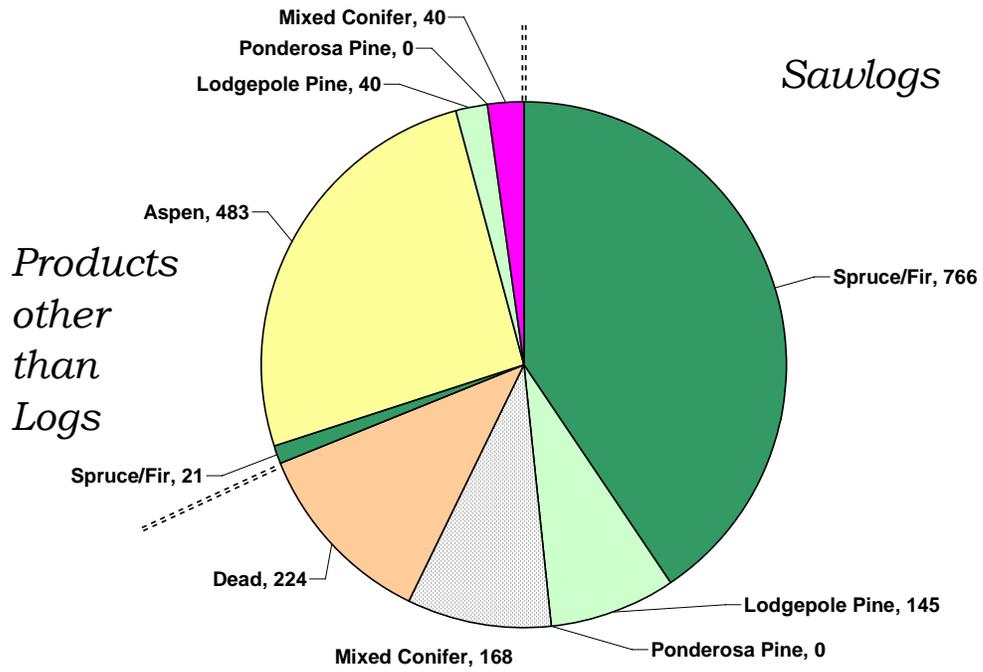
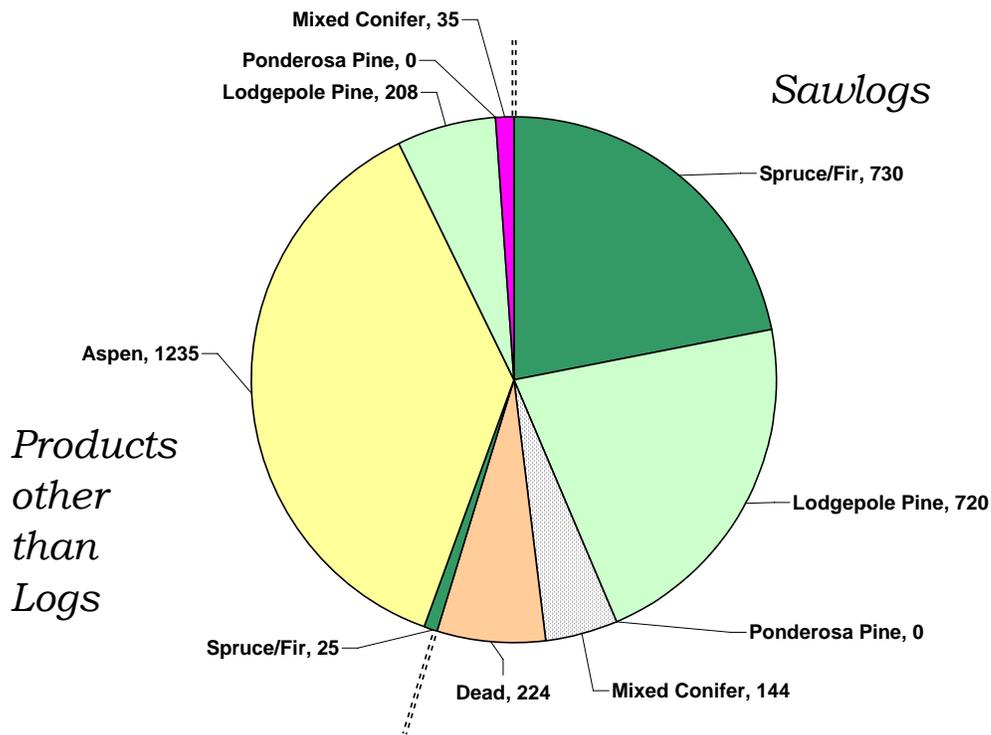


Figure T16. Average annual Total Sale Program Quantity – High End plus dead, decade 1 (mcf)



As noted earlier, local timber industry is utilizing only a third of its productive capacity. Increases in GMUG timber harvest under both the low and high end estimates, can easily be absorbed by local timber processors. The profitability of each estimate, however, is likely to vary substantially. Because the highly profitable spruce/fir component of TSPQ is nearly identical in both estimates, some mills may not fare better under the high end TSPQ. Aspen processors will not see a substantial change under the low end estimate, but can be expected to prosper if the high end is realized.

Using current timber source patterns, Figures T17 and T18 show possible impacts to various types of timber processors. With one exception, all types of processors will increase their mill input of GMUG sawtimber and POL. The exception is a virtually unchanging input of POL by sawmills under the low end estimate.

Despite the unused capacity of mills in the GMUG area, the interconnectedness of timber industry in Colorado and other Four Corners states will still cause some GMUG timber to flow beyond the local area. The final column in Tables T17 and T18 reflect the outflow of timber under each scenario, based upon current timber patterns. The extent of timber moving beyond GMUG counties will increase and decrease depending upon national and regional market factors.

Employment changes resulting from varying timber harvest levels are shown in the Communities/Economics section of this report.

Figure T17. Estimated average annual mill input of GMUG sawtimber by scenario and type of processor (mcf)

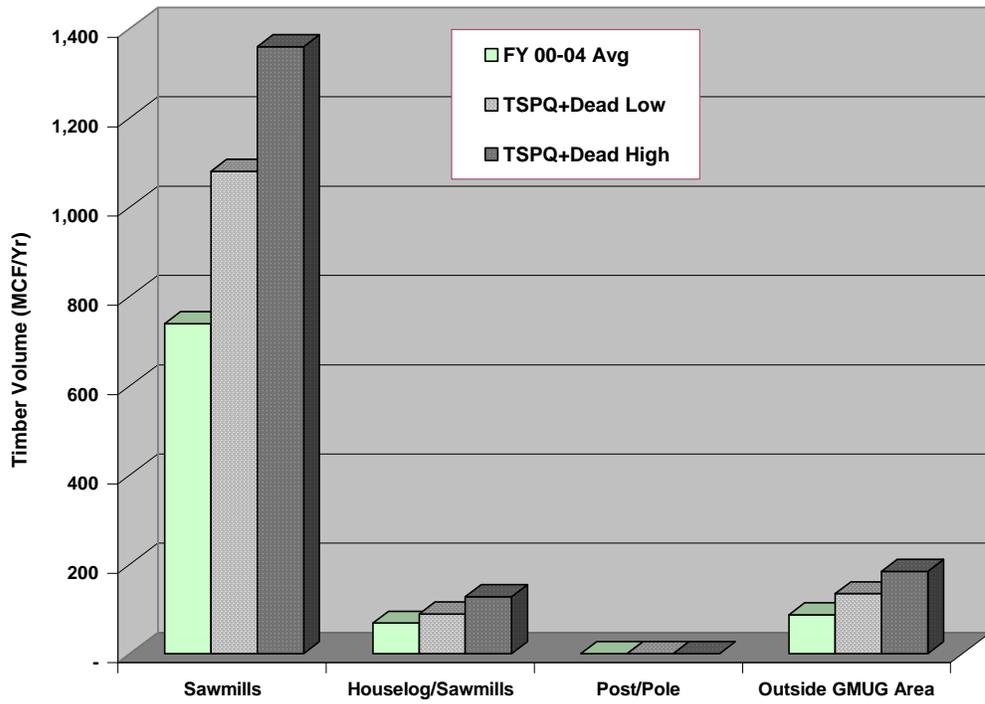
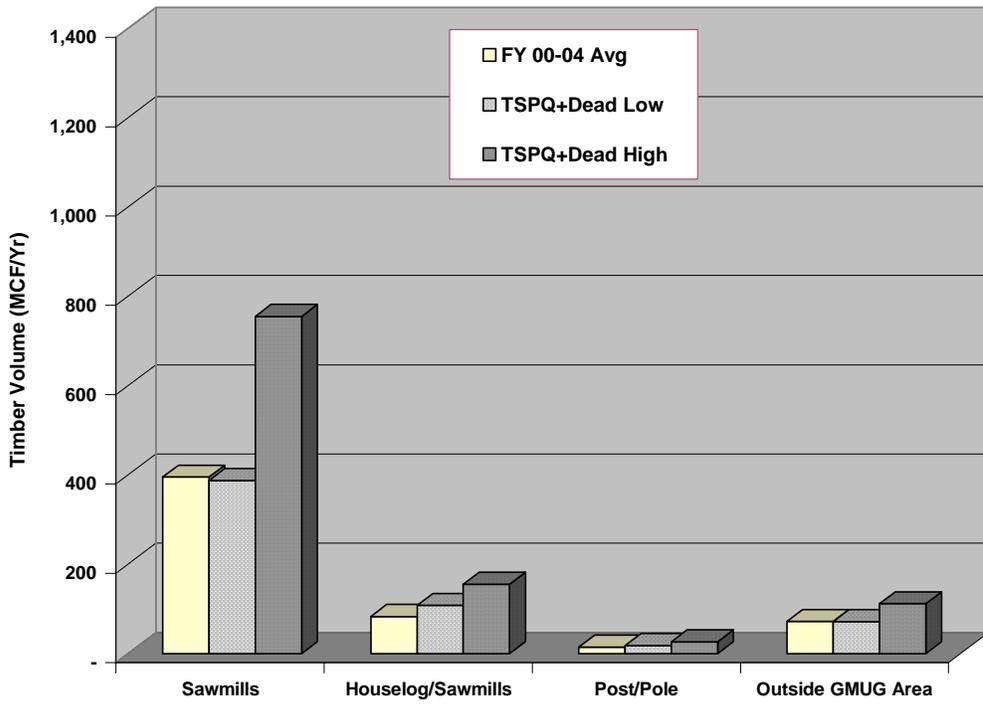


Figure T18. Estimated average annual mill input of GMUG timber products-other-than-logs (POL) by scenario and type of processor (mcf)



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Livestock Industry

Introduction and Area of Analysis

Changes to conditions within the GMUG National Forest can impact economic sustainability as it relates to (1) the financial health of agriculture and the livestock industry in particular, and (2) levels of non-market benefits and social amenities resulting from the interaction between agriculture, communities, and other industry sectors. The conditions, trends, and ecological sustainability of rangeland health within the GMUG National Forest are linked to grazing and stewardship activities associated with the livestock industry but are discussed in a separate section.

Several scales were considered in evaluating information concerning the livestock industry and its relationship to livestock management on the GMUG. Permitted and authorized livestock use information was evaluated for NFS land at the Forest and Geographic Area scale. A study of the relationship of private land ownership to permitted livestock grazing on public lands considered private lands owned by livestock permittees within Delta, Gunnison, Mesa, Montrose, Ouray and San Miguel counties surrounding the GMUG National Forest. Available information was gathered on lands owned by livestock permittees on both BLM-managed and NFS land in and around the GMUG NF. (Parcel data was unavailable for portions of Ouray county. Hinsdale and Saguache counties were not included in the study because negligible amounts of private land associated with livestock permittees on the GMUG occurred in these counties).

County-level information from the US Department of Agriculture¹ and other agencies is the primary source of information used to describe the economic conditions and trends of agriculture for the GMUG area, assumed to consist of Delta, Gunnison, Mesa, Montrose, Ouray, and San Miguel counties; data for Hinsdale and Saguache counties are excluded for reasons stated above. County-level information is supplemented or qualified using available reports and journal articles. Social conditions attributable to agriculture are described using a combination of published reports and ethnographic studies completed by the Forest Service, as well as stakeholders and partners within the GMUG area.

Identifying ‘margins of financial and infrastructure viability’ for agriculture has been proposed as a means for measuring potential for impacts and/or providing a benchmark from which to measure economic and social vulnerability (e.g., Sullins and Jones, 2005), but there is no simple, discrete, or definitive set of criteria that can be used to characterize margins of viability. The following sections present conditions and trends associated with grazing on national forest and private lands, the economics of the agriculture sector, regional economic impacts, and non-market social impacts associated with agriculture within the GMUG area. The factors or indices discussed in conditions and trends can be adopted, in part or whole, to describe marginal viability and/or provide a benchmark for characterizing future impacts and economic sustainability. The final section discusses economic and social sustainability of the livestock industry.

¹ In cases where USDA withholds county-level data to avoid disclosing information about individual farms, this report assumes a value of zero.

Conditions and Trends

Grazing on Forest Service Lands

Grazing allotments have long been established in areas with physical (slopes < 60 %) and biological conditions (available forage) suitable for livestock use. Large areas that are too steep, or that lack available forage are not included in allotments. Other areas where livestock grazing is not a compatible use are also excluded from allotments (private land, some Research Natural Areas, areas near communities). Table L1 below lists the percent of each Geographic Area and the total GMUG NF that are currently within a grazing allotment. Figure L1 is a map showing allotment boundaries.

Table L1. Percent of Geographic Areas and GMUG Forest within Grazing Allotments for 2003.

Geographic Area	% within Allotments
Grand Mesa	92
Gunnison Basin	89
North Fork Valley	80
San Juans	78
Uncompahgre Plateau	94
GMUG National Forests	88

Source: USDA Forest Service

Figure L1. Grazing Allotments on the Grand Mesa, Uncompahgre and Gunnison National Forests.

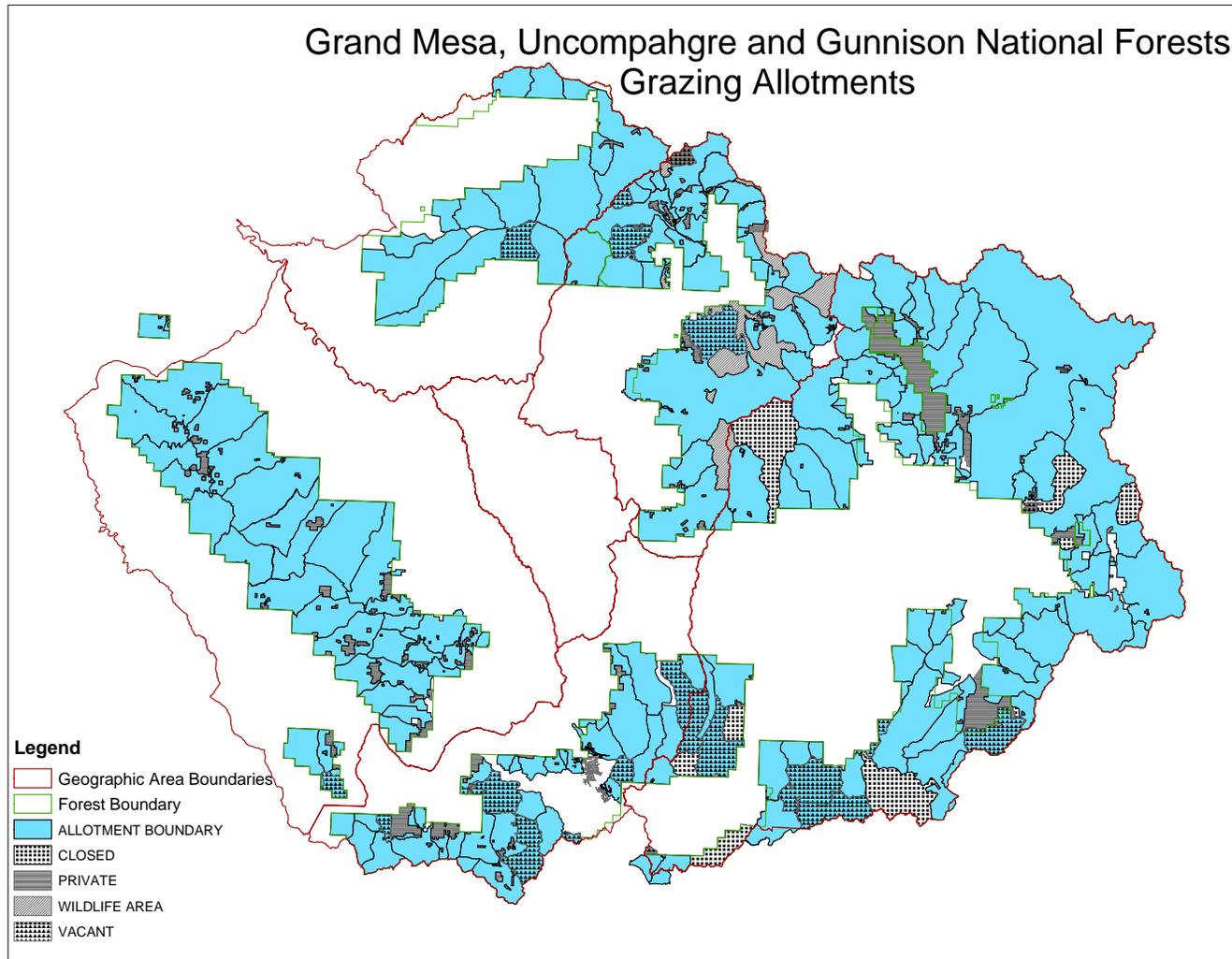


Table L2 compares levels of permitted grazing within the GMUG National Forest in 1991 and 2004. In 1991 there were 242 livestock grazing allotments on the GMUG: 183 cattle, 59 sheep, 8 of which were dual use by cattle and sheep. Allotment consolidations have reduced the number of allotments to 174 by 2005. Table L3 lists the current distribution of allotments across geographic areas. Changes between 1991 and 2005 have occurred for a variety of reasons: allotments have been combined to improve livestock management, allotments have been left vacant after permits expired and/or operators went out of business in areas where resource conflicts exist, or class of livestock has been changed.

Total acreage associated with vacant allotments increased from 132,542 to 268,239 acres from 1996 to 2005, accounting for 5% and 9% of total allotment acreage in these respective years (see Table L4). Vacancies are most commonly due to closure of ranching operations, in particular sheep (21 of 31 current vacancies were grazed by sheep) (USDA Forest Service, 2005a). Currently, vacant allotments are often combined with neighboring allotments to increase land management options on a larger area.

Table L2. Summary of Grazing on GMUG NFS Lands

	1991 ¹	2005 ²
Permittees (number)	----	246 ³
Grazing Allotments	242	174 ⁴
Vacant ⁵	----	31 ⁴
Grazing Allotment acreage		3,003,516
Permitted Animals		
Cattle	64,000	57,000
Sheep	53,000	29,000
Horse	5,000	300
Permitted AUMs	340,000	290,000

1. Information from Amended Land and Resource Management Plan for the Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG), 1991 (USDA Forest Service, 1991).
2. Information from INFRA report – Annual Grazing Statistical Forest/Grassland at Forest Level (GMUG) for 2005 (USDA Forest Service, 2005) unless noted otherwise.
3. Paid Permittees
4. GMUG NF 2210 Allotment Files (USDA Forest Service, 2005a)
5. Vacant allotments have no grazing permits presently assigned. Allotments remain vacant until environmental assessments are completed to determine need for permanent closure, combination with other allotments, or re-assignment to another permittee.

Table L3. Current Allocation of Grazing Allotments by Geographic Area

Area	Cattle	Sheep	Cattle & Sheep	Vacant
Grand Mesa	14	1		
Gunnison Basin	49	3	1	2
North Fork Valley	12	9	7	
San Juans	19	5		12
Uncompahgre Plateau	37	3		
GMUG	131	21	8	14

Table L4. Allotment Acreage and Vacant Allotments – 1996, 2005

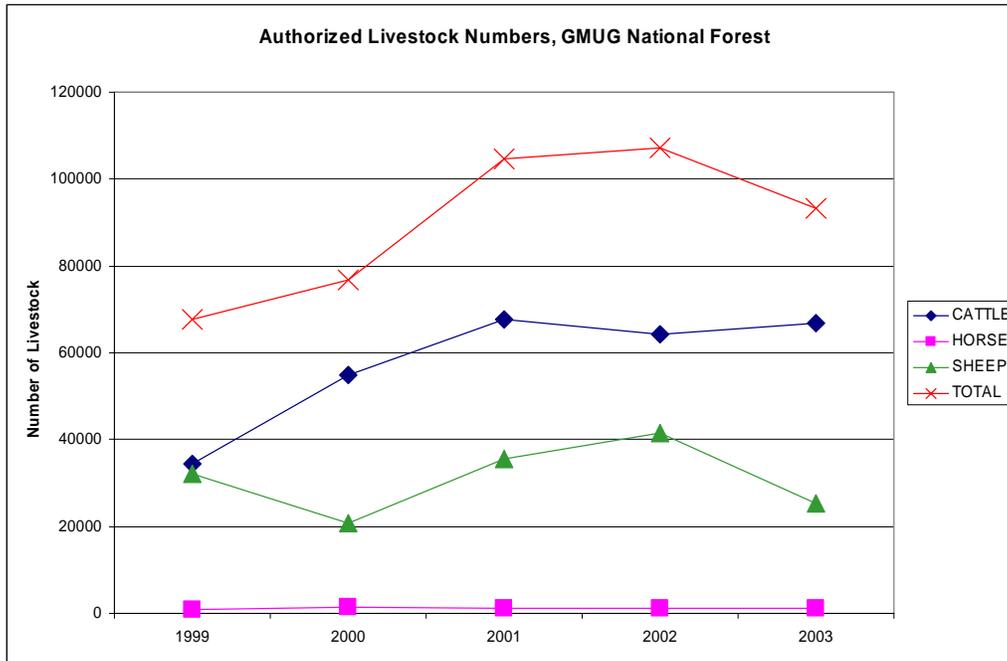
District	1996 Allotments				2005 Allotments			
	Total	Total Acres	Vacant	Vacant Acres	Total	Total Acres	Vacant	Vacant Acres
Grand Valley	31	510,267	0	0	25	564,344	0	0
Norwood	37	330,601	8	53,533	26	340,752	11	72,659
Ouray	37	391,023	5	45,278	24	396,988	7	58,184
Paonia	30	400,707	3	31,503	28	423,283	4	32,056
Gunnison	66	1,182,419	1	2,228	71	1,278,149	9	105,340
TOTAL	201	2,815,017	17	132,542	174	3,003,516	31	268,239

Source: USDA Forest Service, 2005a

Domestic livestock grazing is allowed on NFS lands under special permit. Permits are issued to individual livestock operators that meet specific requirements (FSM 2200). Permits specify the class and number of livestock that can be grazed and the season of use. Permits are issued for up to 10 years. In 1991, approximately 64,000 cattle, 5,000 horses and 53,000 sheep were annually permitted to graze on the GMUG. Currently permitted numbers are approximately: 57,000 cattle, 300 horses and 29,000 sheep. Cattle numbers have fluctuated over time and are currently slightly less than in 1991. Horse numbers have dropped the most and reflect changes in livestock management. Sheep numbers have decreased significantly due to reductions in sheep ranching operations.

Annual adjustments in livestock use are made on an allotment by allotment basis through Annual Operating Instruction. Adjustments are made based on various considerations including: previous grazing use and management, vegetation conditions and trends, drought conditions, permittee requests for adjustments. The resulting annual authorized livestock numbers fluctuates over time. Figure L2 below shows the recent trend in authorized livestock numbers.

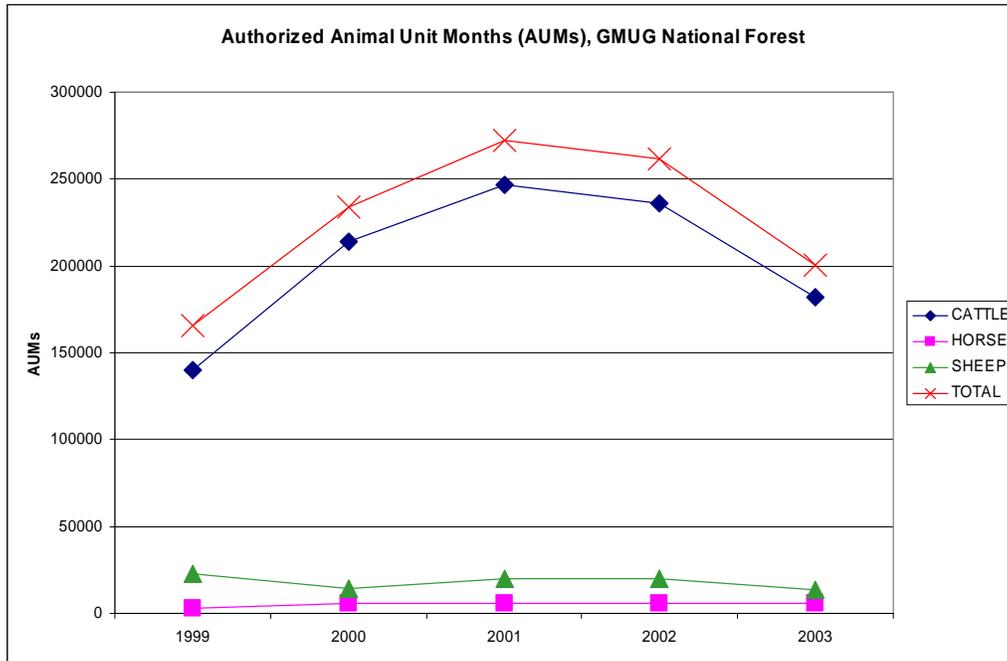
Figure L2. Authorized Livestock Numbers, GMUG National Forests



Livestock numbers are only part of the picture. Livestock use is measured in animal unit months (AUMs), which are calculated based on the class of livestock and length of time they spend on the Forest. In 1991 the permitted livestock use was 340,000 AUMs. Current permitted livestock use is 290,000 AUMs (cattle 269,000 AUMs, horse 1,400 AUMs, sheep 19,800 AUMs). Changes in permitted AUMs reflect, in part, efforts to improve rangeland condition by addressing the timing, duration, distribution, frequency and intensity of grazing use. These adjustments may translate into changes in length of grazing season and/or numbers of animals.

Authorized livestock use also fluctuates annually. Figure L3 shows the recent trend in authorized AUMs. The authorized AUMs are a reflection of reduced numbers, reduced seasons of use, and adjustments for drought conditions that have occurred since 1991.

Figure L3. Authorized Animal Unit Months (AUMs), GMUG National Forests



Grazing on Private Lands

There are economic and social relationships between livestock grazing on federal public lands (both BLM-managed and NFS lands) and open space in surrounding areas. A study specific to Delta County determined that 15 percent of the private land in the county was owned by livestock permittees on the GMUG, which accounted for 50 percent of the private land in the North Fork Valley (Bradford et al., 2002). A study by Ferriday (2004) examined acreages of base ranch operations within the six county area (Delta, Gunnison, Mesa, Montrose, Ouray, San Miguel) and identified 1320 parcels covering 370,000 acres of private land owned by approximately 200 holders of GMUG grazing permits. Base ranches are estimated to range in size from 40 to 70,000 acres (average of 1700 acres/base ranch). The distribution of base ranches is skewed toward a size category of 100-1000 acres (see Table L5).

Table L5. Distribution of Base Ranch Sizes for GMUG Grazing Permit Holders for 2003

Base Ranch Size (Acres)	Number of Base Ranches
0-100	30
100 – 1,000	106
1,000 – 10,000	59
10,000 – 100,000	7

Source: Ferriday, 2004

Ferriday determined that over 16 percent of the private land in counties surrounding the GMUG may be economically tied to permitted livestock grazing on NFS lands, and approximately 24 percent of the private land is associated with permitted livestock grazing on both BLM-management and NFS lands. (Note: Data availability at the time Ferriday did his work was incomplete, resulting in an under representation of private land

associated with federal grazing permits.) Table L6 displays the percent of private land associated with both BLM and NFS livestock permits, and GMUG permits alone, by county. Although GMUG-area counties have not all been mapped by the USDA-National Resource Conservation Service, it is likely that much of the private acreage listed below would be classified as prime agricultural land.

Table L6. Percent of Private Land Associated with Federal Grazing Permits, by County.

County	% of Private Land in County Associated with Federal Grazing Permits	% of Private Land in County Associated with GMUG Grazing Permits
Delta	20.7%	13.8%
Gunnison	27.1%	16.3%
Mesa	32.3%	11.4%
Montrose	19.4%	22.0%
Ouray*	20.0%	12.4%
San Miguel	19.0%	18.5%
Total	23.5%	16.2%

* Ouray county parcel data was incomplete for this evaluation.

Source: Ferriday, 2004

Each Geographic Area lies within more than one county. Table L7 lists the percent of private land within each county that is associated with permittees on allotments on a given Geographic Area. Most of this land is considered prime agricultural land by the National Conservation and Resource Service. Permittees on the Uncompahgre Plateau Geographic Area own land in five of the six counties evaluated in Ferriday's study. Montrose County includes lands owned by permittees on all five Geographic Areas.

Table L7. Percent of Private Land Associated with GMUG Permits, by County and Geographic Area.

GA	Delta	Gunnison	Mesa	Montrose	Ouray	San Miguel
Grand Mesa	5.3%		5.0%	0.1%		
Gunnison Basin	0.5%	9.7%	0.1%	2.1%		0.3%
North Fork Valley	7.3%	3.3%	0.2%	3.6%		
San Juans				2.5%	12.0%	5.5%
Uncompahgre Plateau	0.7%		1.0%	13.1%	0.4%	12.8%

Source: Ferriday, 2004

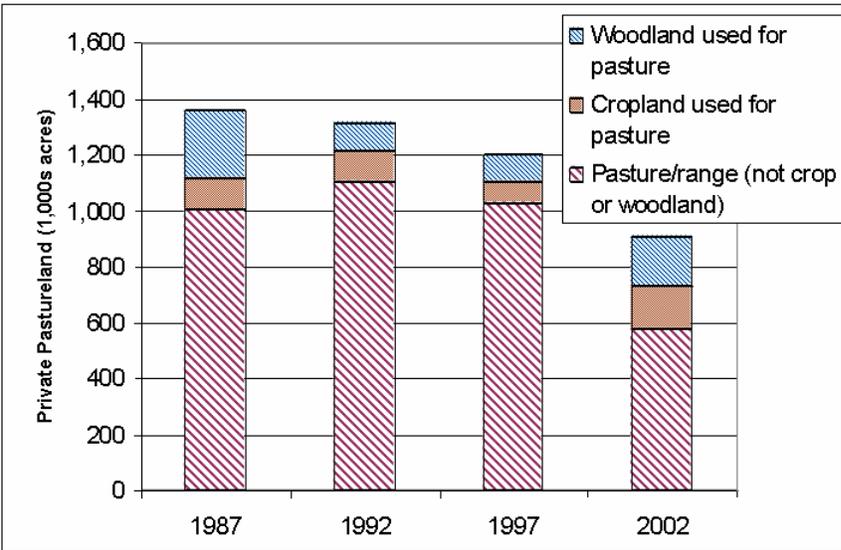
Economic Conditions

Information summarized below is frequently county-level data drawn from national databases, and therefore is not directly representative of livestock operations with GMUG grazing permits. However, the information serves as an index for conditions associated with sectors of agriculture directly and indirectly affected by GMUG National Forest management decisions.

Land in agriculture has decreased slightly from 1.5 million acres to 1.4 million acres from 1987 to 2002 within the surrounding six counties (Delta, Gunnison, Mesa, Montrose, Ouray, and San Miguel) based on Census of Agriculture data for Land in Farms (USDA, 2002). The decrease in agricultural land is more significant (almost 300,000 fewer acres) when comparing acreage from 1982 to 2002 (Sullins and Jones, 2005). Agriculture land that is classified as pastureland has declined to a greater extent over the same period for the six counties (25% decrease in pastureland acreage) as indicated in Figure L4. There is no clear trend in the type of land used for pasture, but Figure L4 indicates that the proportion of pastureland derived from cropland and woodland has increased since 1997, implying that more land that could have been used to harvest crops is used only for pasture by 2002.

The average number of pasture acres per farm, for farms with pastureland, has decreased from 633 in 1987 to 380 acres per farm in 2002 (USDA, 2002). The number of farms with pastureland increased slightly during this time (2143 to 2413 farms), but acres designated as pasture decreased to a greater extent (1,356,741 to 910,687 acres). This trend mirrors the decreasing average farm size for all agricultural production in the six county area for the period 1982 to 2002 noted by Sullins and Jones (2005).

Figure L4. Private Pastureland within Six GMUG Counties, by Land Type

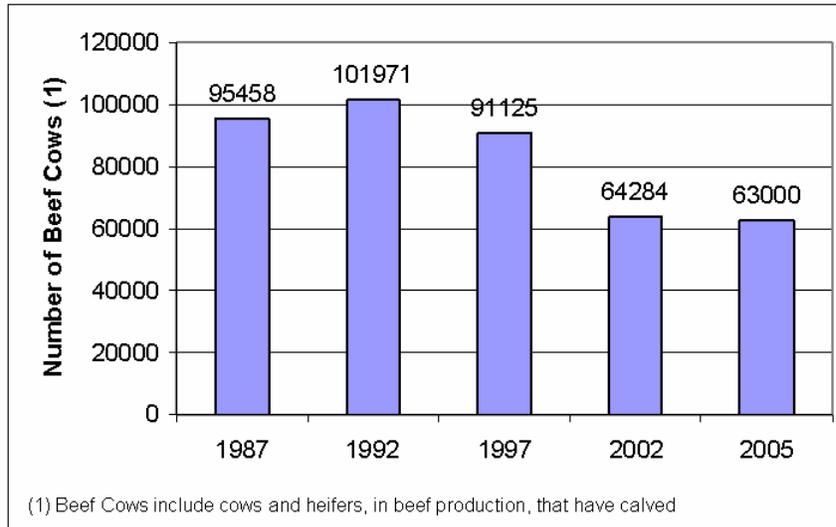


Source: USDA Census of Agriculture, Land in Farms (USDA, 2002)

The number of beef cows increased from 1987 to 1992, but then decreased through 2005 for an overall decline of 34% (Figure L5). Beef cow inventories appear to be stabilizing after 2002. Beef cow numbers decreased from approximately 100,000 to 63,000 due to a combination of factors, including drought and market conditions, while permitted cattle

showed little change (64,000 to 57,000) between 1992 and 2005. Based on these estimates, approximately 90 percent of all cattle in the GMUG counties graze on the national forest. Beef cows in GMUG counties accounted for approximately 10 percent of all beef cows in Colorado in 2005 (USDA, 2002).

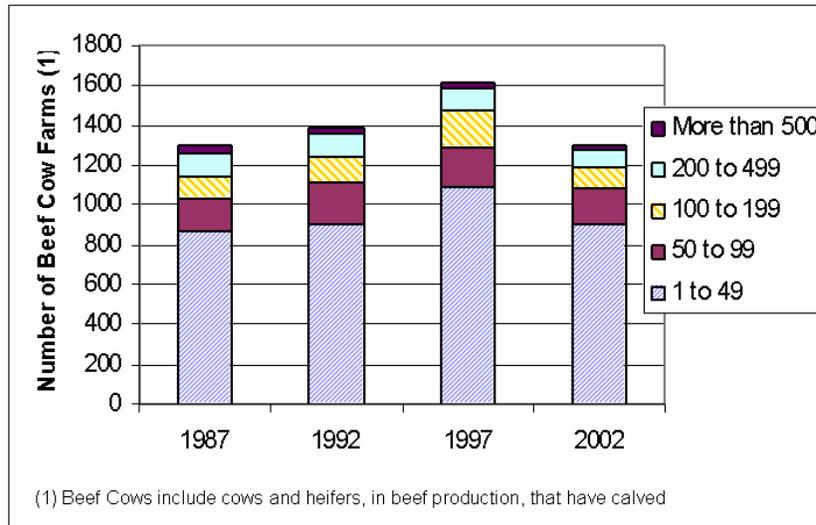
Figure L5. Inventory of Beef Cows for Six GMUG Counties



Source: USDA Census of Agriculture, Cattle and Calf Inventory (USDA, 2002); USDA Quick Stats (county livestock data for 2005)

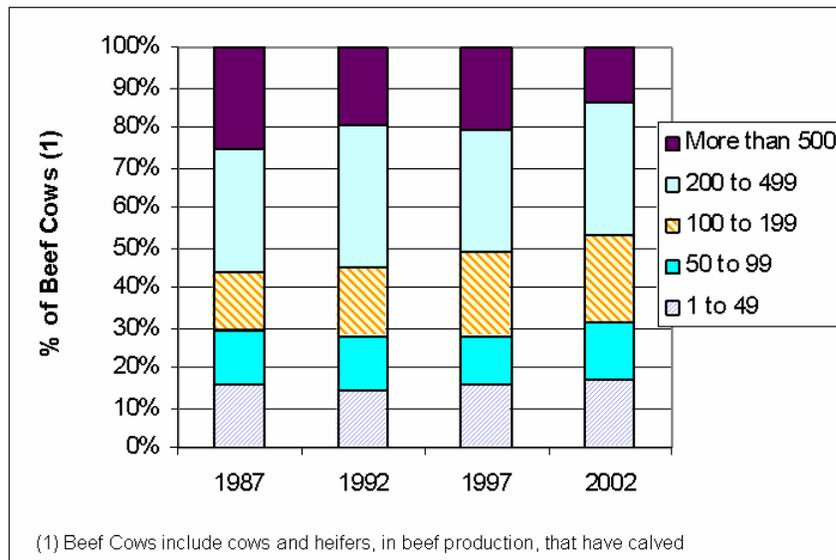
The number of farms with beef cows increased between 1987 and 1997 but then declined to 1987 levels by 2002 (Figure L6). However, the number of large farms (> 500 beef cows) declined from 33 to 19 during that period while numbers of beef cows on large farms also decreased from 25 percent to 14 percent (Figure L7). These numbers do not indicate that consolidation is occurring, but more recent information is needed to confirm this. Recall that these numbers represent all operations with cattle (i.e., not restricted GMUG grazing permit holders, of which there are currently about 200 as discussed in the previous section). About two thirds of operations with 100 or more cattle have permits to graze on the GMUG.

Figure L6. Number of Beef Cow Farms and Distribution by Farm Size for Six GMUG Counties



Source: USDA Census of Agriculture, Cattle and Calf Inventory (USDA, 2002)

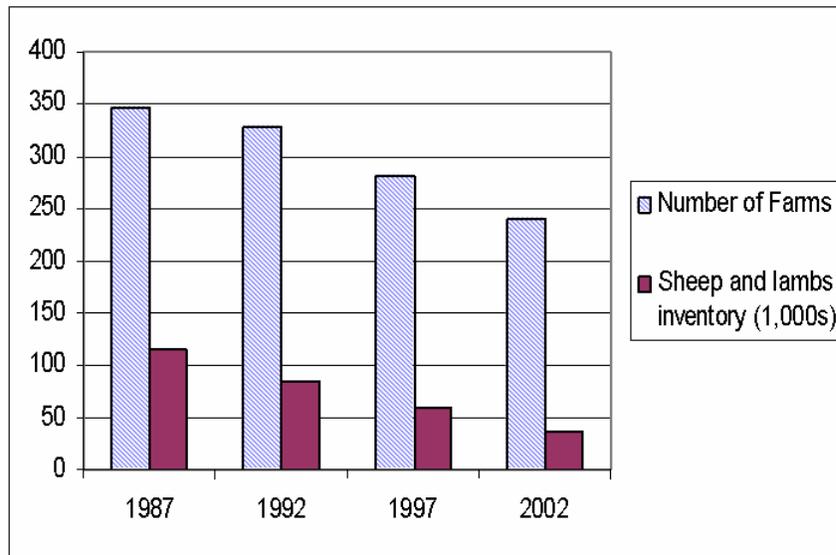
Figure L7. Distribution of Beef Cows by Farm Size for Six GMUG Counties



Source: USDA Census of Agriculture, Cattle and Calf Inventory (USDA, 2002)

Census of agriculture results also indicate that the number of sheep, as well as the number of operations handling sheep, have decreased consistently between 1987 and 2002 (see Figure L8). Based on Table L2 and the results below, about 90 percent of all sheep in the 6-county area graze on the GMUG NF.

Figure L8. Inventory of Sheep and Number of Sheep Operations within the Six GMUG Counties

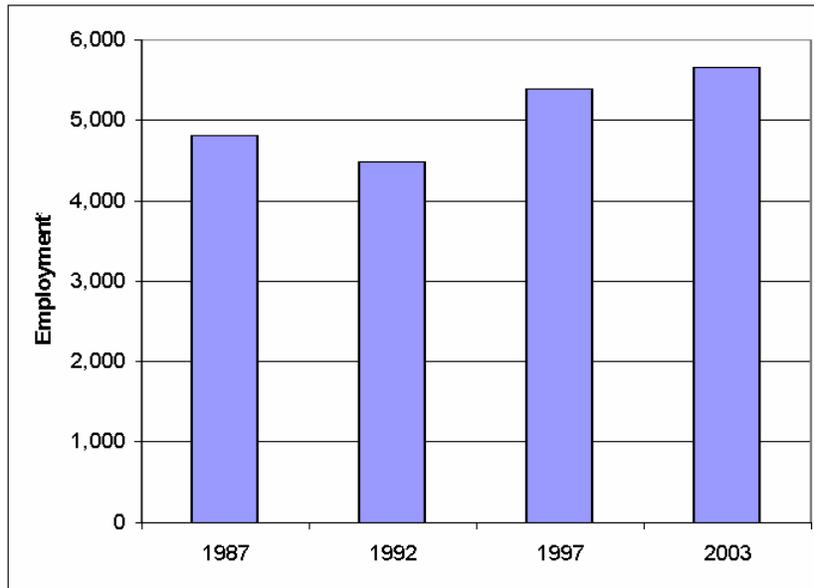


Source: USDA Census of Agriculture, Sheep and lambs Inventory (USDA, 2002)

Farm earnings, after a spike in 1992, had decreased substantially by 2003 (Figure L10), in contrast to significant increases (90%) in total earnings, across all industries, for the six county area between 1987 and 2003. Farm earnings as a percent of total earnings decreased from 1.2% in 1987 to 0.3% by 2003 (BEA, 2003; adjusted to 2004\$ with CPI-U). Farm employment has increased since 1992 (Figure L9), but farm proprietary income has decreased substantially during the same period, accounting for the noted decrease in farm earnings. Agriculture continues to be an important source of employment, comprising 10% and 7% of all jobs in Delta and Montrose counties respectively, and 4% of all jobs in the six county area in 2003 (BEA, 2003). Almost \$30 million (2004\$) was being spent on hired farm and contract labor in 2002 (USDA, 2002).

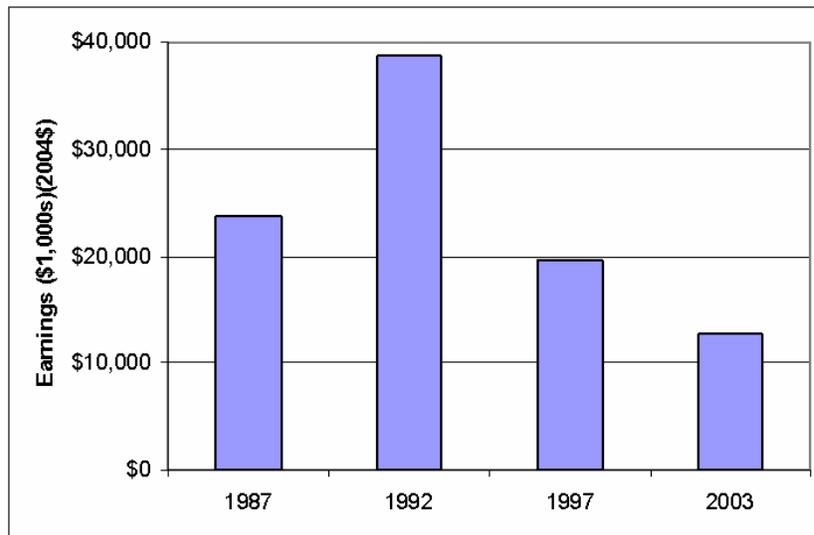
Growth in non-labor income between 1982 and 2002 indicates that more people may be moving to the area, and this may be due to rural or agriculture landscape amenity values (Sullins and Jones, 2005). Colorado's population of people aged 55-64 year is projected to double by 2020, driving markets for land with scenic, recreation, and open space amenities, including land within Montrose County (Westkott, 2005). This type of demographic transition may present challenges to maintaining agriculture, and ranches in particular, as incentives for development change. New residents may have different perceptions and preferences regarding landscape and social amenities associated with ranching.

Figure L9. Farm Employment for Six GMUG Counties



Source: Farm Employment (K0070), (BEA, 2003)

Figure L10. Farm Earnings for Six GMUG Counties (2004\$)

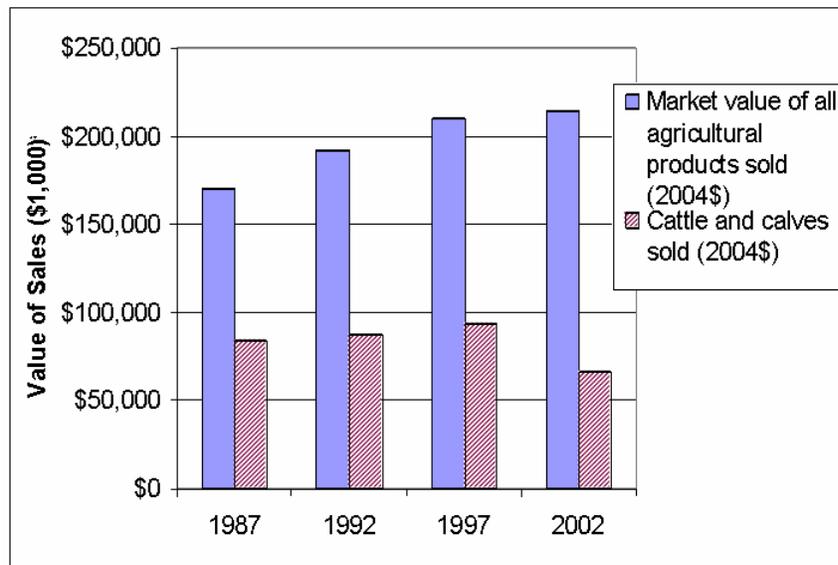


Source: Earnings by place of work (wages, salary disbursements, supplements to wages, proprietors income) (BEA, 2003)(adjusted to 2004\$ using CPI-U (BLS, 2005a)

Sales of cattle and calves continue to be a substantial portion of all agricultural product sales but value of cattle and calf sales have not kept pace with growth in value of all agriculture products sold since 1987 (Figure L11). However, stabilizing inventories of beef cattle (Figure L5) and rebounding price indices for beef and sheep (Figure L14) indicate strengthening markets. National commercial beef production and cattle inventories have shown signs of stabilizing as of 2004, providing additional evidence of market improvements (LMIC, 2005).

Income from farm-related sources from recreational services (e.g., hunting, fishing, etc.) is listed as \$1.5 million (2002\$) in addition to total market value of all agricultural products sold of \$172 million (2002\$) across the six counties (USDA, 2002)². This, along with visitor use information for the GMUG national forest, suggests the increasing importance of farm-related recreational services (Sullins and Jones, 2005).

Figure L11. Market Value of Cattle and Calves versus All Agricultural Products Sold within the Six GMUG Counties (2004\$).



Source: USDA Census of Agriculture, Market Value of Products Sold (USDA, 2002)
PPI for Farm Products (013) (BLS, 2005) used to adjust values to 2004\$.

Total farm production expenses across all agriculture sectors in the six GMUG counties increased by 20% from 1987 (\$166 million, 2004\$) to 1997 (\$199 million, 2004\$), but then decreased by 12% by 2002 (\$176 million, 2004\$) (USDA, 2002)³. Livestock and poultry purchases were the largest component of expenses in 1987 and 1992. This expense increased during that period and then decreased by 39% between 1992 and 2002 (Figure L12). Feed and hired labor expenses also increased between 1987 and 1992 but continued to increase by 1997, overtaking livestock purchases (see Figure L13 for distribution of all agriculture production expenses for 2002). Feed and hired labor expenses then decreased by 2002, possibly reflecting a lagged response to declining livestock purchases. Labor as a fraction of total expenses has increased since 1987. Other substantial decreases occur in expenses associated with interest payments (secured and non-secured by real estate) between 1987 and 2002.

Shifts in the relative magnitude and proportion of different expense components may be the result of shorter term responses to changes in market or operating conditions. Past studies (Taylor et al., 2004) have relied on models (linear programming) to project the operational and financial impacts of reducing federal AUMs on cattle ranches in Nevada and Wyoming. Federal AUM reductions ranging from 25% to 100% on a representative 300-cow case study ranch that relies on permits to graze Forest Service land during the summer season, resulted in progressive reductions in cattle inventories, increasing

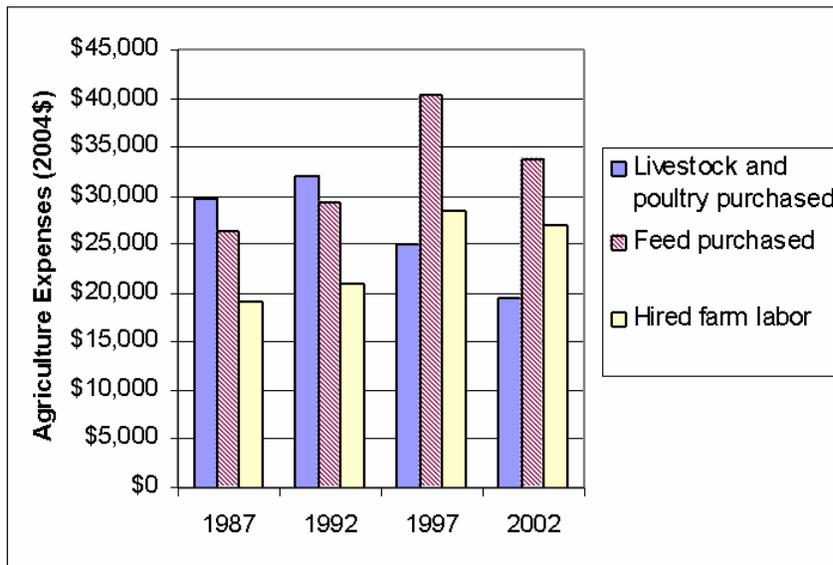
² Data regarding income from recreational services is not available prior to 2002 Census of Agriculture.

³ Expenses adjusted to 2004\$ using PPI (All commodities)(BLS, 2005)

amounts of hay acreage converted to summer pasture, and declines in net income (Van Tassell and Richardson, 1998). In other examples summarized by Van Tassell and Richardson (1998), model ranches are able to substitute irrigated pastures, deeded rangeland, and other federal rangeland for lost AUMs. If opportunities are limited for substituting rangeland, then reductions in federal AUMs were projected to cause reductions in number of cows and labor used, in addition to increases in off-farm sales of hay (i.e., shift focus from producing feed to selling hay).

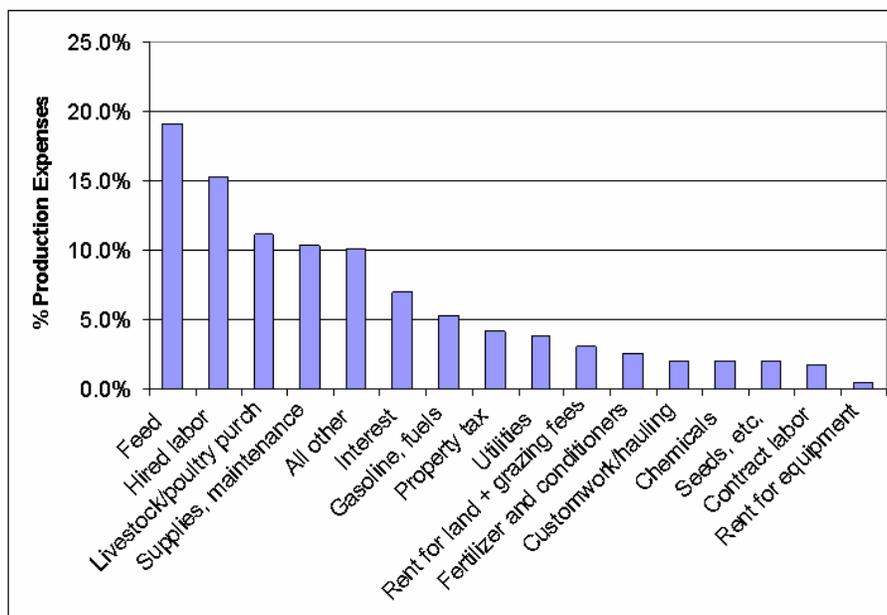
In some cases, cost-per-cow increased as labor requirements increased. The size of ranch operations and corresponding fixed costs are often established based on availability of federal AUMs, and reductions in these AUMs implies that, in the short term, fixed costs and debt must still be covered as animal units decrease. Net farm income and equity therefore decreases, and there is incentive for owners to consider selling and/or subdividing land for development, particularly given land prices in many areas surrounding national forests.

Figure L12. Total Farm Production Expenses Associated with Livestock, Feed, and Hired Labor.



Source: USDA Census of Agriculture, Farm Production Expenses (USDA, 2002)
PPI for All Commodities (00) (BLS, 2005) used to adjust values to 2004\$.

Figure L13. Distribution of Total Farm Production (all products) Expenses for Farms in the Six GMUG Counties, 2002.



Source: USDA Census of Agriculture, Farm Production Expenses (USDA, 2002)

The expenses of running operations were significant concerns among ranchers in New Mexico (Raish and McSweeney, 2003), noting in particular high costs of feed and hay, limited private land to hold animals, occurrence of drought, fluctuating beef prices, transport of livestock for sale, variable availability of water across allotments, and repairs associated with vandalism. Other concerns included possibility of losing permits, increases in permit fees, changes in AUMs, and damage from and competition for forage from wild game (e.g., elk). Despite high expenses, and potential for losing money, a number of the operators surveyed considered the ranch a source of increasing asset value, a form of savings, and/or a tradition that can be maintained by additional investment in land and ranch improvements.

Depreciation expenses claimed are not included as a component of agriculture production expenses, but it is reported in the 2002 Agriculture census and is equal to \$28 million (2002\$) or 16% of 2002 total production expenses (\$175 million (2002\$)) for the six county area. Depreciation can be questionable index for capital replacement, given the different depreciation schedules that can be followed, as well as the uncertainty regarding where and how tax credits are re-invested, but depreciation amounts may none the less be indicative of the potential magnitude of capital expenditures associated with agriculture in this area. Depreciation was not measured for prior Agriculture Census year.

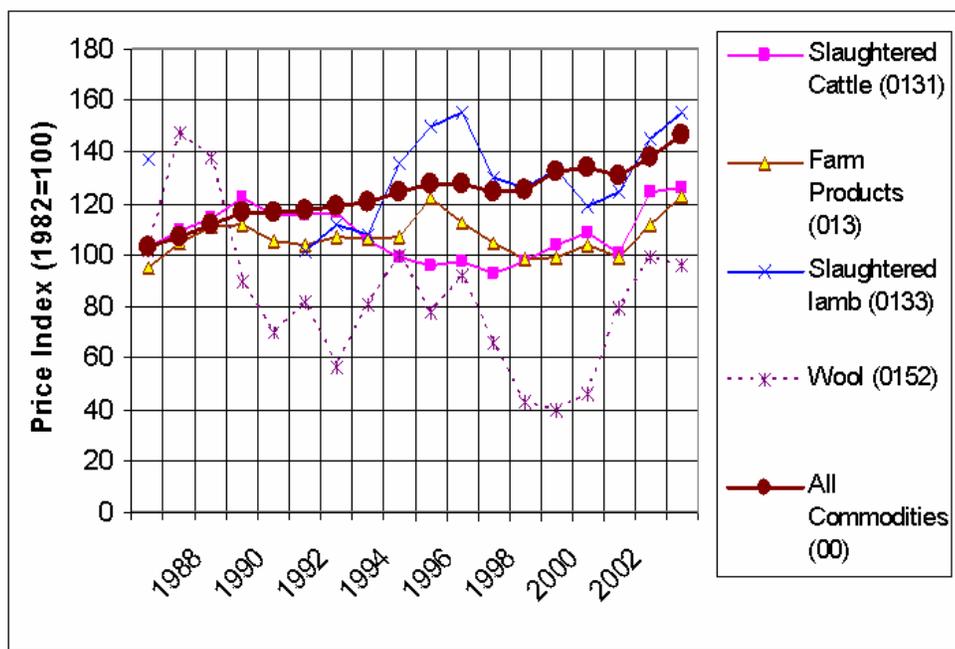
The financial health of livestock operations or GMUG grazing permit holders is difficult to quantify for the GMUG area, given the absence of facility-specific balance sheets, cash flow, or net income information for operations potentially affected by the GMUG National Forest. Net cash farm income⁴ is available through the USDA Census of Agriculture, but data is aggregated by county for all agriculture operations. Total net cash

⁴ Net cash farm income = (sales + government payments + other farm related income)-(total farm expenses + farm related expenses)

income for all farm operations is positive in 2002 (USDA, 2002), but a majority of farms in the six GMUG counties report negative net cash income. These results are not unexpected given that many operations are small and can be considered enterprises 'subsidized' by non-farm or off-farm sources of income.

There is little apparent overall trend in producer price indices⁵ for agricultural products, cattle, or sheep (see Figure L14) since 1987, other than that these indices have lagged behind the overall producer price index for all commodities with the exception of lamb. Figure L14 indicates that selling prices for slaughtered cattle have kept pace with farm products in general, but wool prices have lagged the most. All indices show signs of rebounding to various extents between 2001 and 2004.

Figure L14. Producer Price Indices (1987 to 2004)



Source: BLS, 2005 (not seasonally adjusted)

Cattle price cycles are expected to occur (e.g., every 10 years), but the consistency of these cycles is affected by unexpected events (e.g., drought in 2000-2001) and longer-term changes in market conditions, including decreases in beef demand from the late 1970's through the late 1990s (Purcell, 2002; Hughes et al., 2002). Decreases in demand was cause for disinvestment and downsizing of the beef industry, followed by closures of operations, and these conditions, in addition to drought, are likely to have impacted producers in the GMUG area as well. However, growth in beef demand between 1997 and 2002 is evidence that demand is recovering (Purcell, 2002), which, in combination with rebounding or stabilizing price indices (Figure L14) and inventories (Figure L5), suggests improved market conditions.

⁵ PPIs measure the average change over time in actual selling prices received by domestic producers and can be used to deflate revenue streams to measure real growth in output.

Regional Economic Impacts

Agriculture has indirect and induced economic effects across the GMUG area (i.e., regional economic impacts) that derive from expenditures on products and services that support agriculture as well as changes in personal consumption expenditures associated with agriculture output. The regional multiplier for ranching sales and employment is estimated to be 1.7.

Non-market Social Impacts

Agriculture, and ranching associated with grazing permits in particular, has been linked to a variety of social conditions and non-market amenities that extend beyond the economic or financial conditions associated with the agriculture sector (Sullins and Jones, 2005; Burns, 2005; Burns et al., 2004), including:

- Land stewardship, derived from a history of interaction with the land, providing:
 - Wildlife habitat,
 - Threatened and endangered species protection,
 - Wetland/riparian preservation, and
 - Rangeland improvement.
 - Cultural heritage and traditional lifestyles, and
 - Open space and scenic/rural landscapes valued by residents and non-residents.
- Many of these goods and services are public goods for which quantitative values cannot be easily determined, but are nevertheless significant contributors to social welfare, especially at the local level (Loomis et al., 2000).

Land Stewardship, Cultural Heritage, and Traditional Lifestyles

Ranching is fundamentally attached to the land, providing a community asset in the context of land stewardship and helping sustain natural resources through on-the-ground knowledge (Burns et al., 2004). A survey of ranches in New Mexico (Raish and McSweeney, 2003) shows that operators consider ranching a way of life vital to maintaining their cultural heritage and passing on to future generations. As a consequence of efforts to improve rangeland conditions through changes in allotment management plans and collaborative stewardship services and opportunities, ranchers have demonstrated capacity to adjust practices and remain resilient.

Sustained partnerships between ranching and public land managers have been acknowledged as a key element of rangeland management and stewardship in the GMUG area, due in part to efforts to satisfy previous forest plan objectives, but ranchers have expressed the need for greater community awareness of stewardship activities and benefits. The ranching community also emphasizes the need to build upon existing cooperative efforts to take advantage of rancher's experience with and knowledge of the land (Burns et al., 2004; Sullins and Jones, 2005). Willingness by recent range conservation officers to ride with permittees and jointly learn how to improve range practices is evidence of recent cooperation between ranchers and management agencies. Bradford et al (2002) cites the success of the Colorado State University Cooperative Extension Service's Range Management Schools for Ranchers as further evidence of collaboration. Rancher's knowledge of the land is reflected in livestock management that

revolves around seasonal patterns of grazing, where cattle are summered on public lands at higher elevations, and wintered on private base ranches in the valleys.

Stewardship services provided by ranchers may be more cost-effective than equivalent services provided directly by government. Bradford et al. (2002) note that livestock grazing can be used as vegetation treatment; “cattle have been used to treat areas where native plants, such as mulesear, have increased beyond the range of natural variability”. This study also emphasizes how use of the National Forest for summer range enables ranchers within the North Fork of the Gunnison river valley to maintain base ranches as hay meadows, serving as large blocks of open space. These areas provide opportunities for maintaining large undeveloped and unfragmented land for wildlife habitat. There are concerns that these opportunities could be threatened if ranches are sold and subdivided for development. Given that private agriculture lands, including base ranches, often include river bottom and riparian areas, as well as other ecologically sensitive areas that protect wildlife, it is argued that management programs should focus on maintaining and collaborating with land owners to protect these environments (Taylor, 2003).

In recent decades, ranching and stewardship activities have become threatened as base ranch property tied to public land allotments with the GMUG declines (Burns et al., 2004). This is supported by declining pastureland acreage and average pasture acreage per farm discussed in the previous section (Economic Conditions). Ranching, dating back to the 1880’s, has a long history in the GMUG area and is regarded as a significant, if not irreplaceable, cultural value. Burns et al. (2004) characterizes ranching as a “living history” that merits protection like other resources “in an independent social and physical world”.

OPEN SPACE AND RURAL LANDSCAPE VALUES

Open space, much of it sustained by agriculture in large un-fragmented sections, helps determine the character of land surrounding communities. Rosenberger (1998) surveyed residents of and visitors to Routt county CO (location of Steamboat Springs resort) about their preferences for different attributes associated with agriculture land and found that environmental (natural environment recreation) and open space amenities ranked highest, ahead of agrarian amenities (e.g., cultural assets) and urban/tourism development amenities.

A number of studies discuss the impact of livestock and agriculture operations on rural lifestyle amenity values, including open space, and property values. Bradford et al (2002) note that a “rural, green, agriculture landscape...appeals to many and attracts them to...western valleys”. Open space preservation programs, funded in part by taxes, is additional evidence of the public’s value for open space. Examples offered include the City of Boulder’s purchase of 30,000 acres of land for \$100 million. Loomis et al., (2000) estimated average price per acre of land purchased by state and private land trusts in Colorado, and they found prices to vary substantially by region (\$1,889/acre West Slope; \$26,582/acre, Front Range). The benefits of open space and viewsheds were considered in 33 to 54 percent of the transactions.

A non-market study, using a contingent valuation survey, estimated that households in Routt county, CO, were willing to pay between \$1 to \$14 per year for 1,000 acre increments of ranchland, depending on the total amount and location of ranchland protected in the county (Rosenberger and Walsh,1997). Park et al. tentatively linked high residential property values to proximity of the property to ‘small, diversified or unconcentrated livestock operations’, but they conclude that ‘it is not easy to detect the

interaction... between the housing market and the location of the livestock industry'. These transactions and studies suggest substantial public willingness to pay to preserve rural or open space, but they also demonstrate the difficulty associated with quantifying values or establishing correlations between property value and rural landscape amenities.

Summary of Conditions and Trends

The following bullets summarize major observations regarding grazing conditions and trends:

- Number of livestock grazing allotments decreased from 242 to 174 between 1991 and 2004 due to allotments having been combined to improve livestock management, left vacant after permits expired and/or operators went out of business in areas where resource conflicts exist, or class of livestock has been changed. However, allotment acreage increased from approximately 2,700,000 to 3,000,000 acres between 1996 and 2005.
- Number of vacant allotments increased from 17 to 31 from 1996 to 2005, and acreage associated with vacant allotments increased from 132,542 to 268,239 acres from 1996 to 2005, accounting for 5% and 9% of total allotment acreage in these years. Vacant allotments are most often due to business closure, in particular sheep (21 of 31 current vacancies were grazed by sheep) and often combined with other allotments to maintain grazing opportunities.
- Permitted cattle numbers have fluctuated over time and are currently slightly less than in 1991 (63,000 versus 57,000). Sheep numbers have decreased significantly due to reductions in sheep ranching operations.
- Permitted AUMs have decreased from 340,000 (1991) to 290,000 (2004) in response to efforts to improve livestock rangeland conditions through adjustments to timing, duration, distribution, frequency, and intensity of grazing as environmental conditions change. These adjustments translate into changes in length of grazing season and/or numbers of animals on allotments.
- Currently, base ranches are a significant percentage of private lands and average approximately 1700 acres per base ranch (range 40 to 70,000 acres). Approximately 16 percent of private lands are associated with base ranch operations with permits for livestock grazing on GMUG National Forest land. That number increases to 24 percent when considering both BLM and GMUG National Forest land.

The following bullets summarize major observations regarding economic conditions and trends (note that data represent a six-county GMUG area and are not restricted to GMUG grazing permit holders):

- Total agriculture land within the six-county area, and particularly agriculture land classified as pastureland, declined between 1987 and 2002 (25% decrease in pastureland acreage), with increasing use of cropland as pastureland since 1997. Average pastureland per farm has decreased from 633 in 1987 to 380 acres per farm in 2002.
- Number of beef cows increased from 1987 to 1992, but then decreased through 2005 for an overall decline of 34%. Beef cow numbers appear to be stabilizing after 2002. Beef cow numbers decreased from approximately 100,000 to 63,000 due to drought and market conditions, while permitted cattle showed little change

(64,000 to 57,000) between 1992 and 2005. The number of farms with beef cows increased between 1987 and 1997 but then declined to 1987 levels by 2002. The number of large farms (> 500 beef cows) declined from 33 to 19 during that period.

- Number of sheep, and operations handling sheep, have declined consistently between 1987 and 2002, reflecting trends associated with sheep permitted to graze on the GMUG National Forest.
- Agriculture continues to be an important source of employment for the area (accounting for 4% of all employment), but farm proprietary income has decreased substantially since 1992, contributing to decreases in overall farm earnings by 2003. Earnings and employment are not available for the livestock sector.
- Sales of cattle and calves continue to be a substantial portion of all agricultural product sales but value of cattle and calf sales have not kept pace with growth in value of all agriculture products sold since 1987. However, stabilizing inventories of beef cattle and rebounding demand and price indices for beef and sheep indicate strengthening markets.
- Growth in non-labor income between 1982 and 2002 indicates that more people may be moving to the area, and this may be due to agriculture landscape amenity values. Paradoxically, this demographic transition may be a threat to the viability of ranching as a consequence of economic incentives to sell and subdivide agriculture land.
- Data indicating that recreational services provided income of \$1.5 million to farms in 2002, as well as increasing visitor use days within the GMUG National Forest, suggests that the importance of farm-related recreational services.
- Purchases of livestock and poultry, feed, and hired labor are the largest components of agriculture production expenses. Purchases of livestock and poultry increased from 1987 to 1992, and then decreased by 39% by 2002. Feed and hired labor expenses increased from 1987 to 1997, then decreased by 2002, possibly reflecting a lagged response to declining livestock purchases. These observations mirror changes in pastureland, cattle and sheep inventories, and number of agriculture operation handling livestock, and most likely reflect industry response to drought, shifts in demand, and cyclic market conditions.
- Labor as a fraction of total expenses has increased since 1987, while expenses associated with interest payments (secured and non-secured by real estate) decreased between 1987 and 2002, indicating limited restocking and/or re-investment by the livestock industry. Depreciation expenses (claimed by farmers), a tenuous index for capital replacement, amounted to \$28 million for all of agriculture in 2002 (compared to \$175 million in total production expenses).

The following bullets summarize major observations regarding other regional and social conditions:

- Livestock sales have indirect and induced economic impacts within the communities, as exemplified by regional multipliers (e.g., \$1.70 impact associated with \$1 livestock sales)
- Ranching is fundamentally attached to the land, helps sustain natural resources, and is a community asset in the context of land stewardship, including vegetation

treatments; stewardship may be a cost-savings to the National Forests. Operators consider ranching a way of life, vital to maintaining their cultural heritage, and are therefore not driven solely by economic returns, though the need to seek off-farm employment may affect adoption of innovative stewardship practices. Stewardship may be more challenging for small operators, but small operators are a vital component of traditional ranching communities.

- Ranchers have demonstrated capacity to adjust practices and remain resilient in efforts to improve rangeland health, but they also emphasize the need to improve community awareness of stewardship and increase collaborative efforts and to build upon existing cooperation to take advantage of rancher's knowledge of the land.
- Dating back to the 1880's, ranching is felt to be of significant heritage and cultural value that is irreplaceable and has been characterized as a 'living history' that merits protection, not unlike other resources. Others argue that recent demographic shifts are due to appealing attributes provided by agriculture and ranching landscapes, with evidence being development trends and open space protection programs.
- Ranching and stewardship activities or services may become threatened as base ranch operations, tied to public land allotments, decline (evidence being other economic and grazing conditions and trends), due in part to sales and subdivision of ranch land.

Economic and Social Sustainability

Ranching, the sector of agriculture most directly affected by the GMUG National Forest, has experienced the following, since 1987:

- Challenging market conditions (e.g., lagging prices) for livestock that likely reflect cyclic expectations, compounded by drought and changes in demand, but that have also shown signs of rebounding in recent years,
- Evolving operational conditions related to drought and corresponding adjustments to grazing management on Forest land, and
- Demographic transitions that create incentives or pressures for altering the use or maintenance of agricultural land.

The separate effect of each of these conditions on agriculture and ranching is not clear, but aggregate impacts may include:

- Decreases in livestock inventories that appear to be stabilizing,
- Decreases in private pastureland acreage, along with a relative increase in use of cropland for pasture,
- Decreases in total agriculture production expenditures accompanied by relative increases in expenses associated with feed and hired labor,
- Decreases in the number of large farms (>500 beef cows), along with decreasing percentage of livestock on large farms,
- Decreases in farm proprietor earnings, and

- Increases in number of vacant allotments (and subsequent merging of allotments).

Overall these observations do not indicate immediate concern about the financial health of the livestock industry within the GMUG area. However, these observations suggest that the long-term sustainability of the livestock industry may be vulnerable as the risks associated with cyclic market and uncertain environmental conditions are weighed against changing land values in the context of ongoing demographic trends. Another challenge to long-term sustainability is that GMUG area ranches may need to follow national trends by increasing in size to improve profitability, yet large operations have been decreasing in numbers. Incentives to remain in ranching or enter into ranching in the future may diminish as a consequence of these tradeoffs as well as other social trends.

Potential long-term changes in the livestock industry will create indirect and induced economic effects, as well as other social impacts associated with the availability of rangeland stewardship services, open space benefits, rural/agriculture lifestyle amenities, and bequest values derived from the ranching community's experience with and knowledge of the land. Loss of base ranch property may reduce wildlife corridors and increase the potential for habitat fragmentation. Some of these amenities are likely to be responsible, in part, for the influx of new residents and changing demographics, the existence of which may threaten the sustainability of these same amenities.

Stewardship and collaboration between the livestock industry and the GMUG National Forest has helped improve rangeland conditions under the existing management plan. Rangeland health conditions are appropriate indicators for tracking and verifying the beneficial outcomes associated with stewardship and collaboration, but there is a need to establish other indicators to monitor the stewardship/collaborative process itself. These indicators may (1) reveal the role of stewardship in rangeland health and conservation, including at the site-specific level, (2) increase awareness of collaboration, (3) verify factors motivating stewardship practices, and (4) identify the need for additional collaboration to cost-effectively design and implement best management practices and other management decisions on grazing allotments. Collaboration and stewardship programs, and related incentives for conservation, are expected to help offset potential negative pressures on livestock industry sustainability.

Other factors associated with management of the GMUG National Forest that affect the vulnerability or viability of the livestock industry include AUMs, allotment numbers and acreage, fate of vacant allotments, and requirements within allotment management plans. Availability of allotments, allotment acreage, and numbers of permitted animals have been relatively stable, while vacant allotments have often been combined with other allotments to help maintain grazing opportunities. Number of permitted AUMs have declined somewhat since 1987 due in part to drought, but it is not evident that these declines have created significant constraints for the livestock industry.

Continued monitoring of factors such as private pasture and base ranch acreage, as well as livestock inventories, will help verify trends and clarify questions about the economic sustainability of the livestock industry. Some of the aggregate impacts noted above are consistent with model ranch projections that reveal similar short-term responses and impacts for ranches that may be transitioning to long-term changes in scale of operation (and fixed costs) or land ownership as they adjust to new costs and sources of revenue. Continued monitoring of attributes such as farm size and/or base ranch size distribution (e.g., number of large farms), agriculture expenses and relative amount of farm labor employed, cattle sales, and other farm-related sources of income (e.g., hunting and fishing) will reveal trends in scale and nature of ranch operations. These attributes, in

combination with a better understanding about the interdependence between ranching, National Forest land, and other industry sectors in the GMUG area, may provide a means for defining ‘margins of financial or infrastructure viability’ as benchmarks for the sustainability of economic and social benefits derived from the livestock industry.

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Energy Minerals Industry

Introduction and Area of Analysis

Markets for energy minerals – coal, oil, and gas – have a history of boom and bust cycles. With the war on terrorism, emergence of more energy-consuming Asian economies, and hurricanes disrupting US refining capacity, markets for energy supplies have responded with skyrocketing prices. US dependence on foreign energy supplies has invigorated both the demand for and debate over energy resources from public lands. This report provides an overview of energy industry in the GMUG area and its position in a larger Colorado and US context. This report also provides a brief summary of energy resources available on or under the GMUG NF, and their contribution to meeting national energy demand.

The GMUG area is defined as the following counties: Mesa, Delta, Montrose, San Miguel, Ouray, Gunnison, and Hinsdale.

Conditions and Trends

Worldwide Energy Markets

World demand for energy has risen sharply in recent years in response to the expanding economies of China, India, and Russia, along with increases from Europe and the U.S. In 2004, the U.S. ranked first among all countries with 25% of worldwide energy consumption. China was second with 9%, followed by Japan with 7% and Germany with 5%. With population and economic growth in the next 5 years, it would not be unreasonable to find China increasing its consumption by 60 percent. Similar expectations for India and Russia would result in historic demand levels for worldwide energy resources. Given recent uncertainties with terrorism based in the oil-rich Middle East, political unrest in Venezuela, and recent natural disasters, supplies will only meet this high demand under new market conditions.

Natural Gas

NATURAL GAS SUPPLIES & PRODUCTION

Activity by the U.S. energy industry is commensurate with expectations of persistently high energy prices. U.S. energy companies are stepping up exploration for and development of natural gas in the continental U.S., fueling a development boom in regions that contain high potential in large, untapped reserves. These relatively abundant reserves are not found in regions of long-developed oil deposits, such as Texas and Oklahoma, but in the “unconventional” gas fields of the Rocky Mountains. Unconventional natural gas sources includes those where gas is trapped in formations of tight sands, shale, and coal. Although these reserves have been known for decades, the energy industry is banking on emerging technologies to recover natural gas from formations that heretofore could not be tapped economically. High energy prices now make these ventures economically viable.

Rocky Mountain natural gas production is projected to increase from 3.7 trillion cubic feet in 2003 to 5.6 trillion cubic feet in 2025. In 2003, Rocky Mountain production was 27 percent of total lower 48 onshore production. The Rocky Mountain region's share of lower 48 onshore production is projected to increase to 38 percent in 2025. Unconventional gas production in the continental U.S. is expected to grow from 6.6 trillion cubic feet in 2003 to 8.6 trillion cubic feet in 2025. That is 35 percent of total production in the lower 48 states in 2003 to 44 percent in 2030.

The transportation of Rocky Mountain natural gas to US markets has been slow and costly. New pipelines affecting western Colorado, such as the Rockies Express being developed by Kinder Morgan, are projected for completion within several years. When these pipelines are finished, the role and value of Colorado natural gas to midwestern and other markets will be greatly enhanced.

Colorado has the fourth largest reserves of natural gas in the U.S. behind New Mexico, Texas, & Wyoming. Including conventional and unconventional gas fields, Colorado is the sixth largest producer of natural gas in the U.S. Two prominent areas of known and high potential unconventional natural gas in Colorado are the Piceance and Paradox Basins. Independent energy producers, such as EnCana Corporation, have been active in these gas fields, developing new and refined technologies for gas recovery. A portion of each basin resides under the GMUG National Forest. The potential for oil and gas under the GMUG, as determined by the Bureau of Land Management, is shown below.

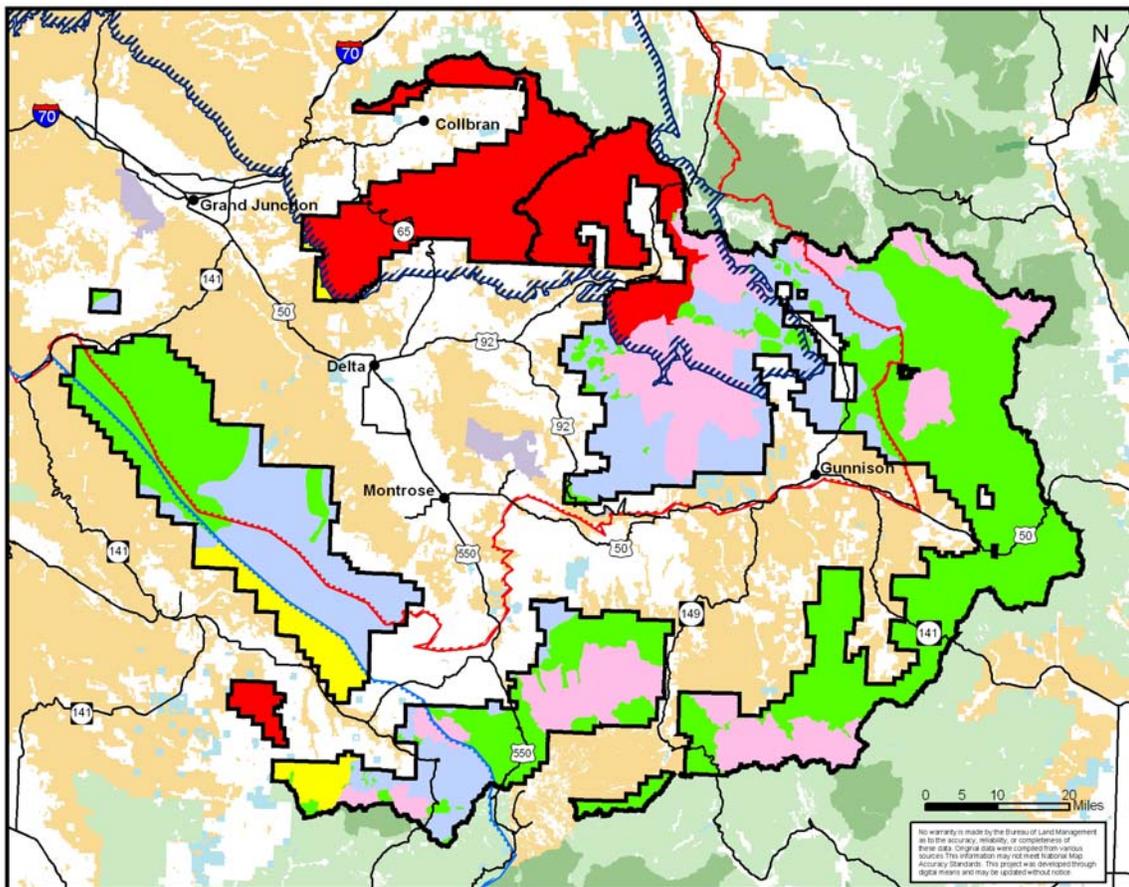


Figure 10
Oil and Gas Occurrence Potential of the Grand Mesa, Uncompaghre, and Gunnison National Forests

• Cities	Potential within the GMUG	Land Ownership outside of the GMUG
— Highways	High (Red)	Private Property (White)
— GMUG Boundary (Black outline)	Medium (Yellow)	National Forest Service (Light Green)
— Piceance Basin (Red hatched)	Low (Light Blue)	Wilderness Areas (Dark Green)
— Paradox Basin (Blue hatched)	* (Green)	Bureau of Land Management (Orange)
— Mesaverde Outcrop (Blue hatched)	Private lands with no USFS jurisdiction (White outline)	National Park Service (Purple)
* No Currently Recognizable Potential	Wilderness lands withdrawn from mineral entry (Pink)	State Lands (Light Blue)

This map was produced by the Grand Junction Field Office, Bureau of Land Management /gis/giswork/project/gmug_rfd/maps_042004/gmug_rfd_potential.mxd -- April 2004

Source: Oil & Gas Potential and Reasonable Forseeable Development Scenarios in the GMUG NFs. Bureau of Land Management, Colorado State Office. August 27, 2004.

Natural gas production on the GMUG has been a very small share of statewide production. In 2004, Colorado wells produced 3 billion cubic feet of natural gas per day. In that same year, GMUG production was just under 3 thousand cubic feet per day. In 2002, production on the West Slope was 1.7 billion cubic feet per day. While energy production anywhere in the U.S. is important to the nation, especially under current international and domestic market conditions, the GMUG has not been a sizable provider of natural gas. The small volume of past production, however, appears to not be a reliable indicator of current potential and future production for a variety of reasons. In general, production on the GMUG has been sporadic in the past 3 years due to pipeline owner/well operator disputes. Recent changes in operating companies appears to indicate that production will stabilize and grow in the coming years.

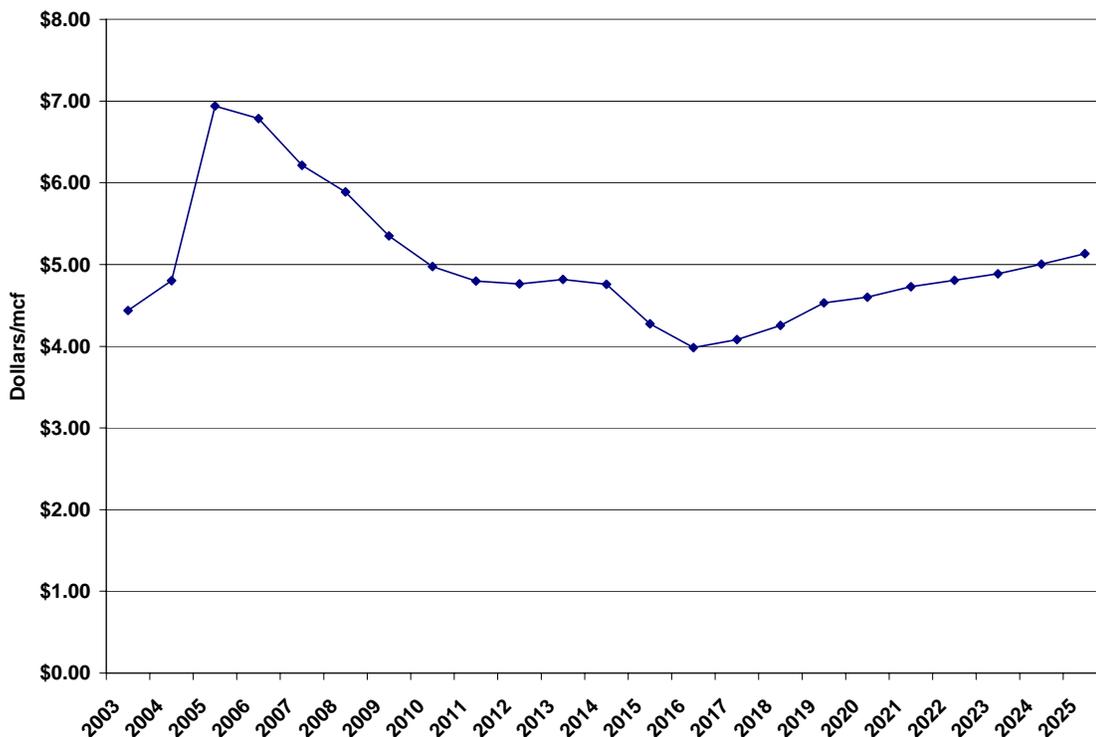
Long-term forecasts of energy production and prices are notoriously uncertain. It is not unusual to find widely divergent forecasts of production and prices by knowledgeable sources within the oil and gas industry. Each party in the industry -- such as well owners, well operators, consolidators, pipeline owners, Federal agencies, and state agencies -- holds a unique understanding of energy reserves, production and market risk, and embraces a particular style for managing it. These factors strongly influence a party's views on production and price forecasts. Given the current volatility of the energy market, such forecasts can be even more divergent than normal. Forecasts of production quantity and value for natural gas from the GMUG vary from quite conservative estimates by the Department of Energy to more generous ones by some the energy industry. None are outside the range of reasonable consideration.

A 15-year forecast of natural gas development on and adjacent to the GMUG has been prepared by the Bureau of Land Management. In response to rapidly changing energy markets, this forecast -- called a Reasonable Foreseeable Development (RFD) scenario -- has been updated in December 2005 and amended in February 2006. Using correlations with energy prices, historical patterns of drilling activity in the Piceance and Paradox Basins, price projections by DOE, and discussions with GMUG lease holders, about 88 new wells are anticipated by 2020.

If all 88 new wells were fully producing at a 95% success ratio, additional natural gas production on the GMUG is expected to reach about 1.3 billion cubic feet annually by 2020. This would increase production on the GMUG by more than 14 times compared with 2003.

As shown in Figure E1, natural gas prices at the wellhead peaked in 2005 at an average of \$7 per mcf. Over the planning horizon, prices are expected to drop and remain in the \$4 range between 2010 and 2023.

Figure E1. Wellhead Price Projections in the Rocky Mountain Region.



Source: Energy Industry Administration-Department of Energy. Annual Energy Outlook 2006. Table 72. November 19, 2005.

Although the 2005 average price for natural gas was approximately \$7.00 per mcf, December 2005 spot prices for natural gas appeared to have peaked near \$16 per mcf. Gas prices have moderated somewhat during early 2006. Because of strong international competition and the limited availability of imports, some view natural gas prices as remaining escalated for years to come.

U.S. DEMAND FOR NATURAL GAS

Natural gas and coal consumption in the US is projected to grow by 40 percent over the next 20 years. Natural gas heats most American homes and generates 18 percent of the nation's electricity.

Fifty percent of the increase in natural gas consumption is driven by electric power generation. Electric generation is also expected to account for most of the growth in coal consumption. Electricity is expected to remain the fastest growing source of delivered energy. The increase in natural gas consumption for electricity generation results from both the construction of new gas-fired generating plants and higher capacity utilization at existing plants. Most new electricity generation capacity is expected to be fueled by natural gas, because natural-gas-fired generators are projected to have advantages over coal-fired generators that include lower capital costs, higher fuel efficiency, shorter construction lead times, and lower emissions.

Total energy use in the U.S. is projected to increase at an average annual rate of 1.1 percent out to 2025.

NATURAL GAS PRICES

Since August 2005, natural gas prices have been hovering at levels more than four times their level in 2000. Although energy prices are highly volatile, especially in the short run, recent trends suggest that long term prices will stay high for many years. Energy prices have a history of volatility, with periods of high prices followed by steep reductions. The Department of Energy projects that current high prices will peak in 2006, then drop and bottom out in about 2010. Although this pattern of volatility has historic precedent and it is reasonable to expect the pattern to persist, the peak of natural gas prices in 2005 has already exceeded the Department of Energy's most recent forecast for this year. By mid-summer 2005, energy prices had dropped from two peaks in the previous nine months. Many experts were anticipating a gradual decline, but the hurricane season propelled oil prices to record highs. Slow declines in energy prices are expected over the next few years, but the lows will not deviate from recent upward price trends. Improved technology, new finds, foreign supplies, and the market for energy substitutes all will impact real and forecasted pricing of natural gas.

NATURAL GAS INDUSTRY IN THE GMUG AREA

Local employment and income impacts of oil and gas production are typically quite small in comparison to the production value generated. Of the four companies that have operations on the GMUG (EnCana Corporation; Gunnison Energy Corporation; SG Interests I, Ltd.; and Riveria Drilling and Exploration), there are just a handful of local employees. Most of the operations work is done by contractors.

Although there is a small employee presence in Delta, Montrose, and San Miguel Counties, this is not the case in Grand Junction. Grand Junction is becoming an important center for oil and gas activities to the north of the GMUG, where more of the Piceance Basin is located and increased drilling activity is happening. Halliburton, CalFrac, and other energy corporations are increasing their presence in Grand Junction.

Federal royalties provided to the State of Colorado and local governments is the largest economic impact from Federal natural gas production. Royalties from natural gas production are 12% of total revenues, and half of this is distributed back to Colorado and local governments. Recent payments from well production on the GMUG to local counties are less than \$50,000 per year.

SUSTAINABILITY

- OF THE NATURAL GAS INDUSTRY AND GAS SUPPLIES.

Current and projected demand for natural gas bodes well for the natural gas industry in Colorado and the West Slope. If pipelines connecting western Colorado with markets to the east become realities in the near future, the natural gas industry will thrive. Several major energy companies have become more active in the Rocky Mountains in response to domestic markets, joining smaller independents that have been in Colorado for years. Such industry activity is expected to increase in the short and mid terms.

What is the relationship between the natural gas industry and GMUG management? The RFD prepared by the BLM, noted above, indicated that well exploration and drilling activity on the GMUG was about 11% of the study area – an area defined as the Forest and a 6-mile buffer around it. Most of the natural gas activity in the study area occurs

just north of the Grand Mesa in the Piceance Basin. Although difficult to predict, the BLM assumes that this relationship between nearby activity and on-Forest activity will continue into the future. If this assumption holds true, the GMUG may not become a sizable player in natural gas production on the West Slope. Under more generous assumptions, wells on the GMUG may be highly productive. Even then, GMUG wells are still not likely to become major natural gas producers relative to nearby lands. The industry will be defined – and sustained -- more by activity on BLM and private lands than on the GMUG National Forest.

Unconventional gas, such as that found in the Piceance and Paradox Basins under the GMUG, is currently viewed as the most promising source of natural gas in the U.S. Reserve estimates are very large. The key to tapping these reserves will be making new extractive technologies -- some still experimental – operational coupled with prices sufficient to make extraction economically viable. So natural gas reserves may be viewed as having economic limitations as much as physical limitations. If technologies and prices remain advantageous to gas production, western Colorado natural gas supplies will be important to the nation for decades.

Coal

COAL SUPPLIES & PRODUCTION

Coal has been a vital energy source throughout the history of this county. Abundance of coal in the eastern US was linked to America's early economic progress. Since the early 1960's, coal has fueled this country's increased demand for electricity generation, driven by exceptional growth in industry and consumer consumption.

In the last 30 years, coal production has shifted from traditional eastern states to abundant coalfields in the western United States. Starting in the 1970's, increasingly more stringent restrictions on atmospheric emissions of sulfur dioxide at power plants made western coal often the most cost effective choice for meeting sulfur dioxide limits without the installation of expensive equipment retrofits. In the last few years, vast reserves in Wyoming and Colorado have been viewed as a safety net for US energy demand, especially as foreign oil and domestic natural gas supplies become more tenuous and expensive.

In a matter of a few decades, western coal has grown to more than half of all U.S. production, from just over 60 million short tons in 1973 to 585 in 2005. This growth was accomplished through the deployment of long distance coal haulage in unit trains (of more than 100 railcars moving coal only, to a single destination) and technological changes that have made surface and undermine coal deposits economically viable. Of the new technologies, longwall underground mining has been critical to the emergence of Colorado coal in overall national production. Nationally, longwall mining accounted for just over half of all U.S. coal production in 2005. Over 97 percent of Colorado coal is mined using longwall technology. Longwall mining has also provided Colorado with the second highest productivity level (short tons per employee per hour) of any state in the union.

Colorado ranks seventh nationally among coal-producing states. Coal production in the state is dominated by mines in four counties: Routt, Moffat, Delta and Gunnison. In the last decade, statewide production has doubled, growing from 20 to 40 million tons. About 70 percent of statewide coal is shipped out of state, most to mid-western and

southern parts of the US. The balance of state production stays in Colorado, supplying several coal-fired electric generation plants.

The value of Colorado coal production in 2005 was over \$850 million dollars. Of this amount, nearly \$106 million was paid to Federal, state, and local governments in the form of taxes, fees, and royalties.

DEMAND FOR COAL

Fundamentally, U.S. coal production is driven by demand for electricity generation. As demand for electricity grows in the USA, domestic coal demand grows. The AEO2006 projects that U.S. coal production will increase at an average rate of 1.6 percent per year out to 2030. Much of the projected growth in national coal consumption is projected to occur after 2015 when natural gas becomes a more expensive fuel for electricity generation. At that point, coal will become increasingly desired for new coal-fired electric plants.

Because Western subbituminous coal is cleaner than coal found in the eastern US, the demand for coal from Colorado and Wyoming may be expected to claim a larger share of the national coal market. Not everyone agrees. The following excerpt from the Colorado Mineral and Energy Industry Activities, 2005 offers a different perspective on the future of Colorado coal:

“At the February 2006 National Western Mining Conference in Denver, Bob Burnham of Hill & Associates discussed the current and future status of the Colorado coal market. He suggested that Colorado coal production level has peaked and may remain at this level for the next ten years. By 2015, demand for compliance coal will probably decrease because of implementation of the Clean Air Interstate Regulations (CAIR II and III) rules. At that time, all of the U.S. power plants will have air pollution controls and emissions technologies retrofitted to their boilers and high-sulfur coal allowances will be used again. Long-term forecast for Colorado coal production is 43 million tons per year by 2012, but may decline thereafter. EIA suggests that the maximum productive capacity at Colorado’s coal mines today is 43.9 million tons.” (p.23)

Should this forecast prove correct, coal production from the North Fork Valley may stabilize at current levels for the next decade.

COAL PRICES

Coal is the most cost-effective fossil fuel for electricity generation. In 2003, one million Btu of coal sold for \$0.87 on average, compared to \$4.41 for natural gas and \$4.75 for crude oil. With significantly higher prices for oil and natural gas in 2005 and 2006, coal is an even better value.

Coal prices have been relatively steady over the last 15 years, fluctuating between \$17 and \$20 per ton for Colorado coal. In DOE’s Annual Energy Outlook for 2006 (AEO2006), coal prices are expected to increase slightly over the next 10 years. A peak in 2010 of 10% over today’s prices is followed by a modest decline out to 2020.

COAL INDUSTRY IN THE GMUG AREA

The coal mining industry is a large and important part of the GMUG area. There are four large mines under the GMUG, all located up the North Forest Valley of the Gunnison

River near the towns of Paonia and Somerset. Basic information on the four mines is shown in Table E1.

Table E1. Production and employment by coal mines operating within the GMUG National Forests, selected statistics.

Name	County	Local Mine Operator	Parent Company	Employees (number)	Production (million tons)	
					2004	2005
Bowie No. 2&3	Delta	Bowie Resources, LLC	Colorado Energy Investments, LLC (KY)	250	4.6	4.1
Elk Creek	Gunnison	Oxbow Mining, LLC	Oxbow Carbon & Minerals Holdings, Inc. (FL)	304	6.5	6.5
West Elk	Gunnison	Mountain Coal Company, LLC	Arch Coal Inc. (MO)	325	6.6	5.6
Area Mine Totals				879	17.7	16.2

Source: Colorado Coal Directory, 2005. Colorado Mineral and Energy Industry Activities, 2005.

These operations are among the largest underground coal mines in the county. Based on 2005 productions levels, the Elk Creek and West Elk mines rank ninth and fourteenth, respectively.

Most of the coal from North Fork Valley mines (93%) is shipped by rail to the South and Midwest where it is used in electricity generation. The balance (7%) remains in Colorado where a third is used for industrial purposes and two-thirds is used for electricity generation, all along the Front Range.

In 2005, coal from North Fork Valley mines accounted for 43% of all coal production in Colorado and 1.4% in the US. Like other coal in Colorado, coal from this area is highly valuable because of its high energy and low sulfur content. This coal is classified as “supercompliant” for electric generation because of these characteristics. Typically, it is mixed with coal from other parts of the country to meet air quality standards at electricity generation plants.

The coal industry in the GMUG area constitutes a sizeable share of the local economy. In addition to employment at the mines, the industry generates another 600 jobs in the area, primarily in Delta County. It also generates over \$110 million in labor income, nearly 9 percent of all labor income in the Delta-Montrose-Ouray-San Miguel area. Another \$13 million is paid in Federal royalties that are returned to the state, some of which are returned to Delta and Gunnison Counties. Given that Delta County is not as wealthy as its neighboring counties, contributions of the coal industry may in fact be more substantial to the local area than described in these statistics.

Local governments and some community leaders often look to current industry as a means to expand the local economy. At times, the coal mining industry in the North Fork Valley has been explored for its local economic development potential. One factor has often been cited as the most limiting for expanding production levels – rail haul capacity. While this has been true in the past, it is no longer. Early in 2005, Union Pacific

completed a \$50 million investment to raise its sustainable annual capacity for the North Fork Branch by about five percent. Union Pacific now estimates its daily capacity at between 4.7 and 4.8 trains per day, up from 4.5 trains prior to the improvements. The average train consists of 105 cars, and can carry 11,400 tons of coal (Schroder, 2006). Assuming that trains are available to operate every day of the year, this equates to an annual capacity of 19.5 million tons. North Fork Valley mines have never produced more than 17.7 million tons. On any given day, week, or month, mine production could exceed rail capacity, but annual totals offer a realistic indicator of sustainable production.

SUSTAINABILITY

- OF THE COAL INDUSTRY AND COAL SUPPLIES.

Current and projected demand for energy, especially electricity, combined with US dependence upon foreign energy sources bodes well for the coal industry in Colorado. A more environmentally-friendly product than found in other parts of the US and market factors that favor price stability should offer a bright future for Western coal.

What is the relationship between the coal industry, coal resources, and GMUG management? Large coal deposits found under national forest lands is unique in the National Forest System. High quality coal that is environmentally-compliant makes the situation even more unique. Coal coming from these mines provides half of all Colorado production and more than 1 percent of all production in the US. The low-sulfur characteristics of this coal, however, make it relatively more important nationally. Coal from the North Fork Valley extends national coal supplies by allowing non-compliant coal to be used in electric generation plants across the county while maintaining high air quality standards.

Mineral stocks always limit the duration of mining operations. It is no different for coal mines in the North Fork Valley. The question for this Forest Plan is whether some or all Federal coal reserves beneath the Forest will be acceptable for further consideration for lease. The extent of these reserves is one factor that determines the duration of mine operations in the North Fork Valley. Table E2 offers some insight into the likely duration of mine operations based upon current coal reserves. Based on recent annual production rates, these mines will exhaust current reserves between 2012 and 2019. Using a maximum Forest Plan life of 15 years, all mines would deplete their 2004 reserves within this planning period. Additional Federal coal is believed to exist under 45,350 acres under National Forest land in the North Fork Valley area. It is reasonable to expect that each mine will seek to lease a portion of this additional Federal coal within the next decade, especially when it is adjacent to current operations. Oxbow Mining has recently done this, applying for 1,400 acres, some of which lies under National Forest System lands. It is clear, therefore, that Federal coal that lies beneath the GMUG National Forests is likely to provide reserves for North Forest Valley mines during and after the planning period covered by the revised Forest Plan. What is uncertain is the timing and extent to which these reserves will be sought by any or all of the mines.

Table E2. Coal reserves and forecast depletion for mines operating within the GMUG National Forests.

Name	Local Mine Operator	2004 Reserves (millions)	2004-05 Average Production (millions)	Year Current Reserves Depleted
Bowie No. 2 & 3	Bowie Resources, LLC	43	4.4	2014
Elk Creek	Oxbow Mining, LLC	47.9	6.5	2012
West Elk	Mountain Coal Company, LLC	90	6.1	2019

Source: Colorado Coal Directory, 2005. Colorado Mineral and Energy Industry Activities, 2005.

Coal production in the North Fork Valley will be limited by the leasing of Federal coal reserves. Such leasing, however, will not be precluded by management of the GMUG under a decision revising this Forest Plan. Because revised Forest Plans are designed to be aspirational in nature, project-level decisions on the Forest will ultimately control access to unleased coal reserves. The sustainability of the coal industry in the North Fork Valley could be affected by GMUG project-level management decision. Firm trade-offs between coal production and surface resource values that are not analyzed as part of planning under the 2005 rule today will be considered when specific resource and/or mine proposals are brought forward in the years ahead.

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