Socioeconomic Assessment

of The Lincoln National Forest

Submitted to the United States Forest Service
Region 3 Office

July 2007

University of New Mexico
Bureau of Business and
Economic Research

Acknowledgements

A project of this scope can only be completed with the cooperation and collaboration of many individuals. The efforts of Bureau of Business and Economic Research (BBER) staff are recognized in the Credits.

BBER would like to thank the Region 3 Office of the USDA Forest Service for permitting BBER to take on this important project. We hope that the information and analysis provided in this report will contribute to the development of a forest plan that continues to benefit all New Mexico residents. Specifically, we would like to thank Dr. Richard Periman for his patience, support, and willingness to answer an innumerable number of questions from our staff.

This work was supported by many people at the Forest Service, including representatives of the Regional Office, the Supervisor's Office, and district offices. Thanks to Ron Hannon, Johnny Wilson, Larry Cosper, and many others of the Lincoln National Forest Supervisor's Office.

Errors and omissions in this report are the responsibility of the Principal Authors.

Gwendolyn Aldrich and Jeffrey Mitchell

Credits

Principal Authors	Gwendolyn A. Aldrich, M.S. and Jeffrey Mitchell, Ph.D.
Principal Investigators	Lee A. Reynis, Ph.D. and Jeffrey Mitchell, Ph.D.
Chapter 2 (Demographic Patterns and Trends)	Richard Zimmerman
Chapter 7 (Economic Impacts)	Nicholas Potter, MA.
Database Development	Vicky Morris-Dueer, M.A. Jeremy Cook, M.A. Bob Grassberger, Ph.D. Kevin Kargacin, M.A. Karma Shore Larry Compton, M. Ed.
Cartography & GIS	Michael McDaniel
Editing	Molly Bleecker, M.A. Teresa Watson, M.A.
Students	Joshua Akers Austin Duus Erica Freese Sophie Hammett Ricardo Leo Lucinda Sydow, M.A.
Administration	Michael Byrnes, M.B.A. Betsy Eklund Betty Lujan

Table of Contents

Table of Tables

Table of Figures

Abbreviations

AUM	Animal Unit Month
BLM	Bureau of Land Management
CFRP	Collaborative Forest Rehabilitation Program
DOD	Department of Defense
ESA	Endangered Species Act
FS	Forest Service
IRA	Inventoried Roadless Area
MSA	Metropolitan Statistical Area
NF	National Forest
NLCD	National Land Coverage Data
NMDOT	New Mexico Department of Transportation
NVUM	National Visitor Use Monitoring
OHV	Off-Highway Vehicle
RD	Ranger District
ROW	Right-of-Way
VMS	Visual Management System

Executive Summary

This report is an assessment of the socioeconomic and cultural relationships between the three ranger districts (RDs) of Lincoln National Forest (NF) and their neighboring communities. This assessment was commissioned by the Southwestern Regional Office of the United States Department of Agriculture Forest Service (FS), and serves as a source of information for the development of a revised plan for Lincoln NF.

The assessment is based primarily on secondary data sources, including the United States Bureau of the Census, the Bureau of Land Management, the United States Geological Survey, the United States Federal Highway Administration, the New Mexico Department of Transportation, offices of wildlife management, and county governments. The most important source of data was FS records, including the FS infrastructure database (INFRA) and geographic information system (GIS) databases. In many cases, specific information was not available in a form appropriate to this analysis, requiring the Bureau of Business and Economic Research to make estimates, using the best available data. In other cases, data was not available at all and the analysis was limited. Information sources and analysis methods are thoroughly documented throughout the report.

The **principal findings** of this study include the following:

- Over the past decades, uses of the Lincoln NF have shifted along with broader patterns of national and even global restructuring. Resource-based industries (mining and oil and gas, ranching, and timber) have declined in importance while amenity-based activities (recreation and residential development) have emerged as the predominate use in and around the Lincoln NF. In total, activities on the Lincoln NF directly and indirectly account for about 2.8 percent of all employment in the four county assessment area (Otero, Lincoln, Chaves, and Eddy Counties).
- Economic change is closely associated with changes in the demographic and social profile of forest users and communities that neighbor the Lincoln NF. These changes are again consistent with national demographic and social patterns but, while uneven across counties, are somewhat more pronounced. The population in the Lincoln NF assessment area is becoming older; ethnically, racially, and economically more diverse; better educated; and, on average, wealthier.
- These trends are much more pronounced in the assessment areas of the northern ranger districts (RDs) (Sacramento and Smokey Bear RDs, including Otero and Lincoln Counties) than in the corresponding areas of the Guadalupe RD (including Eddy and Chaves Counties). In the southern area, resource-based activities remain relatively more important, the development of amenity-based uses is tempered by the remoteness of the area, and demographic change is limited by the slow and declining rate of population growth.
- The checkerboard pattern of public and private landownership complicates the work of the FS – environmental management practices as regards wildlife protection, invasive species eradication, and fire and fuel management are more difficult and the provision of access and right-of-way (ROW) require greater investment where FS-owned land is not contiguous. However, the checkerboard pattern of landownership also provides a greater opportunity for the FS to fulfill its mission to demonstrate sustainable, multiple-use management strategies. Lincoln NF has been effective in undertaking land conveyances to mitigate problems of access and ROW.

- The remote location of the Lincoln NF has the effect of concentrating forest impacts among the local communities. However, technology, the growth of recreation and tourism activities, and the national and even global character of advocacy means that the FS managers also must be responsive to a broader constituency. This raises challenges, but also opportunities, for Lincoln NF managers.
- Lincoln NF has been very successful in fostering collaboration with private citizens, federal, state, local, and tribal governments, non-governmental organizations, schools, and many other entities. In light of the many changes in the socioeconomic conditions affecting the forest, collaboration can play a key role in the leveraging of resources, the exchange of ideas, and the negotiation of potential conflict.

The following is a brief review of information presented in this report.

Lincoln National Forest Overview

Lincoln NF has 1.1 million acres of publicly owned land and consists of three RDs (Sacramento, Smokey Bear, and Guadalupe) and two wilderness areas (Capitan Mountain Wilderness and the White Mountain Wilderness). Lincoln NF spans four counties located in south-central New Mexico: Lincoln, Otero, Chaves, and Eddy Counties. All four are rural counties. The largest incorporated areas are Roswell, Alamogordo, Carlsbad, and Artesia; all other incorporated areas had populations of less than 10,000, as of the 2000 census. The Sacramento and Smokey Bear RDs share borders with the Mescalero Apache tribe, which has historical ties to Lincoln NF land and continues to make use of Lincoln NF.

Demographics and Socioeconomic Trends

The populations of all four of the assessment area counties grew between 1980 and 2000, and are projected to continue to grow. Population growth was strongest in Lincoln County, which experienced population growth of 70 percent between 1980 and 2000; population growth in Otero County was 41 percent, roughly equivalent to that of New Mexico as a whole; growth in Eddy and Chaves Counties was somewhat lower than the state average. Similar patterns are projected for the 2000-2030 period, although growth will begin to moderate in Lincoln during the latter half of the forecast period. This growing population base implies that the FS can expect a continued increase in the use of Lincoln NF and an increase in the number of homes built within and adjacent to it.

The age of the area's population is expected to increase during the next two decades, as the percentage of individuals age 65 and older is expected to increase from 14 percent to 25 percent between now and 2030. The size of this cohort is expected to be especially large in Lincoln County, comprising 35 percent of the population by 2030.

Poverty varies with race and ethnicity. Assessment area poverty percentages by race are: Whites (63 percent), African Americans (3 percent), American Indians (5 percent), Asians (0 percent), and "Other" (29 percent). Assessment area poverty percentages by ethnicity are: non-Hispanic (41 percent) and Hispanic (59 percent).

Access

Although Lincoln NF is relatively remote, there are well-developed transportation routes that link Lincoln NF to major population centers. Growing populations in Las Cruces, El Paso, and Lubbock suggest that there are more people seeking out recreation opportunities offered by Lincoln NF. The higher and cooler mountainous regions of the Sacramento and Smokey Bear RDs are especially appealing to visitors from west Texas. Ongoing and future transportation infrastructure improvement projects will improve visitors' ability to access Lincoln NF.

Forest roads and trails provide important access for both forest users and FS officials. Access for FS officials is important for maintenance, rehabilitation, and fire management purposes. In addition to the many official forest roads and trails, numerous illegal user-created routes exist that have primarily been created by individuals driving off-highway vehicles (OHVs) off-road.

An influx of newcomers to the area has resulted in new subdivisions and housing developments both within and adjacent to the forest. Ranchers have found that newcomers are frequently willing to pay many times the value of the land for farming or ranching practices. This change in land use has the potential to create management problems for the FS, both in the form of future access problems for forest users and in the need to provide improved access to additional homes located within the forest.

Land Cover and Wildlife

Of the roughly 1.3 million acres in Lincoln NF, approximately 167 thousand acres (13 percent) are privately owned; the remaining 1.1 million acres (87 percent) are publicly owned. There is a checkerboard pattern of land ownership within Lincoln NF, which poses challenges for effective and efficient land management, as various landowners are likely to have dissimilar management interests and priorities. Land conveyances and exchanges can decrease such management problems, but the frequency of changes in land ownership has declined in recent decades due to a lack of funds available for purchases, the time consuming nature of exchanges, and decreased interest by private landowners as the value of their land for subdivision purposes has increased.

The predominant land cover in Lincoln NF as a whole is evergreen forest (58 percent), followed by herbaceous grasslands (22 percent) and shrub land (19 percent). Lincoln NF has several endangered and threatened plants and animals, including the Sacramento prickly poppy, the Texas Madrone, the Mexican spotted owl, and the bald eagle. There are also numerous invasive species present on the NF, especially in the Sacramento and Smokey Bear RDs.

Continued drought conditions combined with high fuel loads have created severe fire danger within parts of Lincoln NF. During the past several years there have been a number of fires in Lincoln NF, the most severe of which was the May 2004 lightning-caused Peppin Fire that burned 65,000 acres within the Capitan Mountain Wilderness (Smokey Bear RD). The FS is facing increased urgency to reduce the hazardous fuel loads and reduce the likelihood of crown fires near adjacent communities. Although a number of measures can be taken to progress toward this goal, some residents and environmentalists have concerns with the methods used.

Users of Lincoln NF

Recreation is one of the primary uses of Lincoln NF; FS data indicates that more than 780,000 people visited between 1999 and 2000. The majority of visitors (98 percent) engaged in recreational activities, while only 2 percent engaged in wildlife activities. A unique cave system and two ski areas attract many visitors to the area.

Grazing has been ongoing in the Lincoln NF area since the 1800s. Although the importance of grazing has since declined, grazing still has a significant economic impact (second only to recreation). Current economic and social conditions typically require ranchers to supplement grazing with additional sources of income. Local ranchers assert that access to grazing on Lincoln NF land is critical to the continued survival of the area's ranching culture.

Logging has occurred in the area since the early 1900s. As with grazing, the economic importance of the timber industry has declined over time, and this way of life has needed to be supplemented with additional income sources. Saw timber and fuel wood were the two most valuable forest products harvested in 2004, with sales values of approximately $2.6 million and $404 thousand, respectively.

Most special-use permits granted in Lincoln NF are for the purposes of recreation, communications, and transportation. Two of the special-use permits granted in Lincoln NF are for operation of the ski hills located within the NF. With respect to illegal uses, the most common was leaving a fire without properly extinguishing it. Other common violations related to sanitation, damaging natural features and other U.S. property, cutting or damaging timber products without the proper permit, and the abandonment of personal property.

Special Places

Lincoln NF features 70 designated recreational sites, most of which are located in the Sacramento and Smokey Bear RDs. There are also two wilderness areas located within Lincoln NF – the Capitan Mountain (approximately 35,000 acres) and White Mountain (roughly 49,000 acres) Wilderness areas, both located in the Smokey Bear RD. Inventoried roadless areas also exist in Lincoln NF, mostly within these two wilderness areas.

It is estimated that Lincoln NF contains between 12,000 and 15,000 sites of cultural, archeological, or historical interest. During 2003, the FS surveyed 12,000 acres, resulting in the documentation of 67 new sites. Four sites have been listed on the National Register of Historic Places: the Cloudcroft Trestle, the Bonito pipeline, Wizard's Roost (a prehistoric solar observatory), and the Jicarilla Schoolhouse.

Economic Impact of Lincoln NF

The principal economic activities on Lincoln NF include ranching, timber harvesting, recreation, and FS operations. The direct and indirect impacts of these activities indicate that visitor spending and ranching are the largest contributors to the economic impact of Lincoln NF on the regional economy. Visitors and recreationists contributed almost $137 million of direct and indirect economic impacts to the local economy in 2004, while ranching contributed nearly $23 million and FS operations contributed slightly more than $16 million. The relevance of these activities is

slightly different for employment and income contributions, for which recreation is again the largest contributor, followed by FS operations and then ranching.

Lincoln and Otero Counties, which contain nearly 90 percent of Lincoln NF, are likely to experience the majority of the economic benefits from the forest.

Community Partnerships

Lincoln NF benefits from the efforts of many volunteers and works with a variety of partners and collaborators on a wide range of projects. Volunteers have helped with recreation site and trail maintenance, business and finance activities, heritage resource protection, and other activities. Lincoln NF benefited from the efforts of nearly 600 volunteers during 2005, whose efforts have an estimated value of over $166 thousand.

In 2005, Lincoln NF maintained more than 200 partnerships and collaborations on projects that ranged from education to forest health and sustainability. The Collaborative Forest Rehabilitation Program (CFRP), which provides funding in the form of cost-share grants for the purposes of collaborative forest restoration projects on public lands, is just one example of the many collaborative efforts in which Lincoln NF is involved.

1. Introduction

1.1 Statement of Purpose

This report provides information about and analysis of the socioeconomic environment of the Lincoln National Forest (NF), including the relationships between Forest Service (FS) managed land, visitors, and surrounding communities. Specifically, this report:

- Documents and analyzes the current contributions of Lincoln NF to the socioeconomic and cultural vitality of the communities neighboring the public land;
- Identifies and evaluates national, regional, and local trends that may shape these contributions during the coming years; and
- Explores opportunities and risks that the FS and the public confront as they work to broaden and deepen relationships between forest, visitors, and neighboring communities.

The purpose of the report is to assist the FS and the public in developing a forest management plan.

1.2 Sources of Information, Analytical Methods, and Levels of Analysis

The Lincoln NF is comprised of three ranger districts (RDs): Smokey Bear, Sacramento, and Guadalupe; includes two wilderness areas: the Capitan Mountain Wilderness (roughly 35,000 acres) and the White Mountain Wilderness (nearly 49,000 acres); and encompasses portions of four mountain ranges: the Jicarilla Mountains, Sacramento Mountains, Guadalupe Mountains, and Capitan Mountains.

Information in this assessment is largely drawn from secondary data sources. Specifically, data for this report comes from:

- Demographic and economic data sets, including those available from the United States Census Bureau and the Bureau of Economic Analysis;
- Administrative, land management, and resource data, mostly provided by the FS and the Bureau of Land Management; and
- Contextual and historical information, obtained from archival sources such as newspapers, internet sites, and trade journals.

Throughout this report, an effort is made to undertake analysis on the local scale, for example, considering differences among communities within individual counties. However, the structure of data sources often constrains this effort. Demographic and economic data sets are in many cases available only on the county level; it is not possible to disaggregate this data to the community level. Similarly, administrative data provided by the FS is often at the forest level (for Lincoln NF as a whole), and it is likewise impossible to further disaggregate the data to the RD level.

1.3 Assessment Area

Lincoln NF is located in Lincoln, Otero, Chaves, and Eddy Counties in south-central New Mexico. The forest encompasses roughly 1.3 million acres, of which approximately 1.1 million

acres (87 percent) are publicly owned; the remaining 167 thousand acres (13 percent) are privately owned. Lincoln NF is the smallest of the five national forests located within New Mexico. **Figure 1.1** provides a map of Lincoln NF and the surrounding vicinity – county boundaries, urban areas, Indian reservations, and major roads and airports are all detailed on the map.

Although the socioeconomic characteristics of the four counties vary, all are predominately rural counties. The communities within the four-county assessment area with the largest populations as of 2000 are Roswell in Chaves County (population 45,293), Alamogordo in Otero County (population 35,582), Carlsbad in Eddy County (population 25,625), and Artesia in Eddy County (population 10,692). All other communities within the assessment areas had populations of less than 10,000 people as of 2000.

Much of the statistical information used for this report, including demographic and economic data sets, is available only on a county level. Thus, county boundaries define the parameters of much of the data and determine the assessment area – the area includes only those New Mexico counties that are contained or touched by the four RDs of Lincoln NF. The assessment area is comprised of four New Mexico counties – Otero, Lincoln, Eddy, and Chaves Counties – and includes 21,716 square miles or 13,898,495 acres.

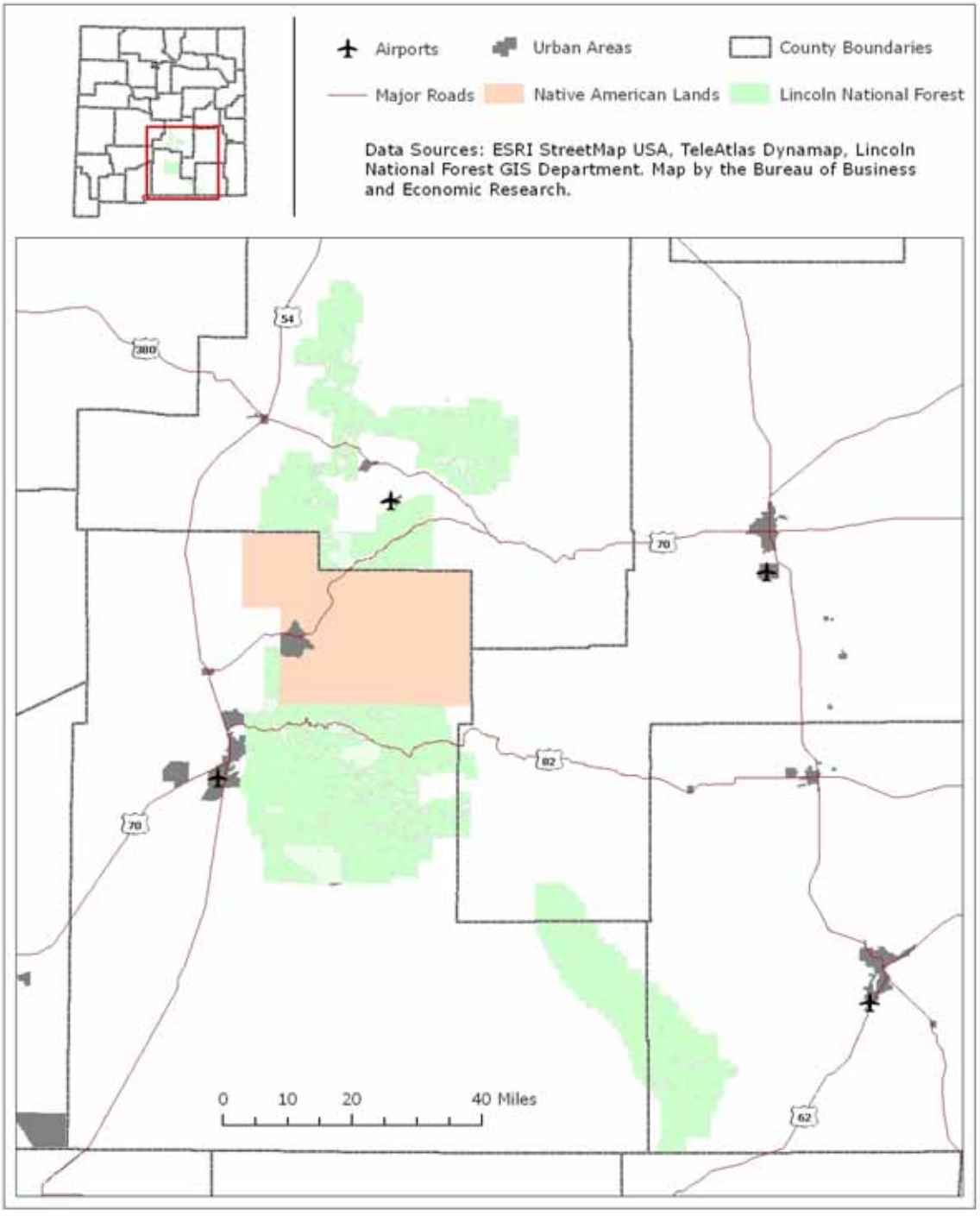


Figure 1.1: Lincoln NF Assessment Area

Table 1.1 lists the counties in the assessment area and shows the amount of FS-owned land in each county, total Lincoln NF acres in each county, and the amount of land within Lincoln NF that is owned by other entities. To place Lincoln NF in a regional context, the last two columns provide data on the total acres in each county and the percent of these acres covered by Lincoln NF.

Table 1.1: Forest-Owned Land by County (Acres)

	USFS Owned	Other Owned	Total Lincoln NF	Total Land in County	Forest as % of County
Otero	**559,562**	**98,276**	**657,838**	**4,238,704**	**15.5%**
Lincoln	**360,599**	**62,742**	**423,341**	**3,089,791**	**13.7%**
Eddy	**133,541**	**4,191**	**137,732**	**2,684,638**	**5.1%**
Chaves	**40,504**	**1,378**	**41,882**	**3,885,361**	**1.1%**
Total	**1,094,206**	**166,587**	**1,260,793**	**13,898,495**	**9.1%**

Sources: Lincoln NF GIS Department and ESRI ArcGIS Street Map USA 2004; Calculations by UNM-BBER.

The largest portions of Lincoln NF are located in Otero and Lincoln Counties. Forest land comprises a far greater percentage of land in these counties (16 percent and 14 percent, respectively) than in Eddy and Chaves Counties (5 percent and 1 percent, respectively). Significantly, in Otero and Lincoln Counties, more than 17 percent of Lincoln NF land is owned by other entities (primarily private landowners), whereas only 3 percent of Lincoln NF land is owned by other entities (again, primarily private landowners) in Eddy and Chaves Counties.

1.4 Brief History of Lincoln NF and its Assessment Area

It is unclear when humans first inhabited the area that comprises Lincoln NF, although much of the Southwest was occupied by 10,000 B.C. The prehistoric peoples who occupied south-central New Mexico initially depended upon hunting, although climatic changes to a drier climate later caused a transition to dependence upon both hunting and gathering. Evidence of their camps (extinct fauna and human artifactual material) has been found in caves in the Guadalupe Mountains. Rock shelters and campsites have been located in both the basin and mountain regions.

Eventually, dependence upon agriculture becomes more prevalent. By approximately 700 A.D., pit house villages were established and inhabited. The people who inhabited the pit house villages were part of the Jornada Mogollon Culture, one of numerous distinctive cultural traditions that had developed in the Southwest between 300 B.C. and 700 A.D. By 1200 A.D., pit houses were replaced with above-ground dwellings. Artifacts have suggested that the Jornada people were in contact with other parts of the Southwest and northern Mexico. A reliance on bison from the plains is also evident. For reasons that remain the subject of debate among scholars, the area encompassed by the forest was largely abandoned in the late 1300s or early 1400s.

The area remained unpopulated for 200 years. By the 1700s, the area had become the homeland of the Mescalero Apache, a people whose subsistence depended upon hunting, gathering, and raiding. Mescal, datil, piñon, and mesquite were the four plant foods of primary importance to the Mescalero. The mid 1800s brought about the start of the Anglo occupation. The Anglos made numerous attempts to end Apache raiding through the use of military campaigns, farming projects for the Mescaleros, and the establishment of Ft. Stanton. In 1874, a reservation was established for the Mescalero Apache. The reservation lies between what are now the Smokey Bear and

Sacramento RDs. Apache use of Lincoln NF essentially ended by the late 1800s, as settlement on the Mescalero reservation increased and permanent Anglo occupation occurred. Due to the Apache's historic ties with Lincoln NF land, there are Apache sites within the forest, although the sites are often difficult to identify.

The area became a popular settlement area in the late 1800s, as it was a good place for raising stock and had large tracts of land available. The FS began playing a role in the area in the early 1900s. The land that now comprises Lincoln NF was originally part of five national forests or forest reserves. Consolidation of the various forests occurred in 1917, and the area became known as Lincoln NF.

Lincoln NF is the home of the famous Smokey the Bear, the tiny black bear cub found after a human-caused forest fire in 1950. Smokey was later housed at the National Zoo in Washington, D.C. and became the well-known figure used to warn and educate the public about the dangers of forest fires. The burial site of Smokey the Bear is located at the Smokey Bear State Park in Capitan, New Mexico.

Many who live in the assessment area have families who go back several generations, having supported themselves as ranchers, miners, or in the timber industry. In recent years, the area has attracted second home investments and a growing number of retirees and families and individuals who have opted for a rural lifestyle. The population is therefore a diverse mix of individuals with varied demographic characteristics, cultural backgrounds, and values, attitudes, and beliefs. Different groups of residents have various, and often opposing, expectations of the services and management obligations of the FS. Later chapters of this report examine these differences and the management challenges they pose.

1.5 Lincoln National Forest Ranger Districts

The following sections describe each of the three RDs, including a discussion of historical land uses, using information from the Lincoln NF website (http://www.fs.fed.us/r3/lincoln/) and other sources.

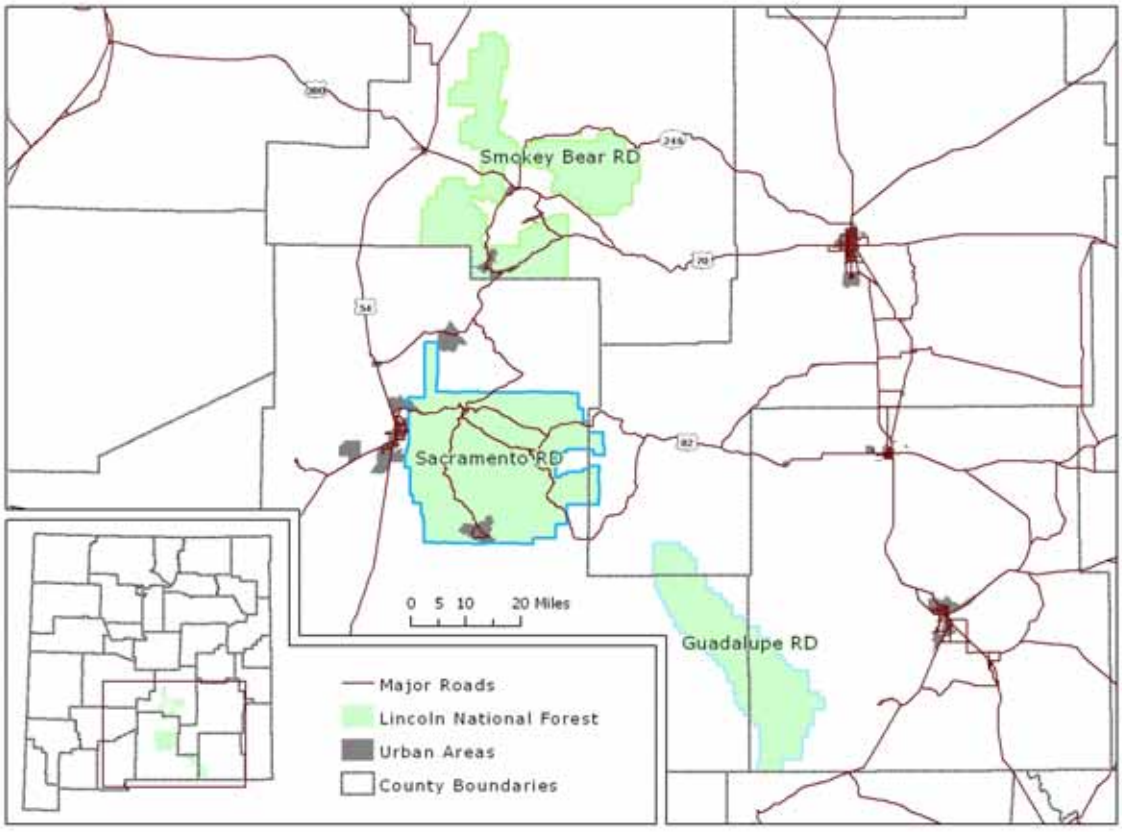


Figure 1.2: Lincoln NF Ranger Districts

1.6 Sacramento Ranger District

The Sacramento RD is the largest of the three RDs, with about 450,000 acres or 41 percent of Lincoln NF-owned land under its management. The RD is contained entirely within Otero County, with its headquarters in Cloudcroft. The Sacramento Mountain Range is located in the Sacramento RD, resulting in elevations that range from 4,600 to 9,695 feet. The district features a wide variety of habitats, from scrublands and grasslands to evergreen forests at higher elevations.

The only highway tunnel in southern New Mexico is on U.S. Highway 82, which bisects the Sacramento RD between Cloudcroft and Alamogordo. Just west of the tunnel is a parking area with a magnificent view of White Sands National Monument, Fresnal Canyon, and the Tularosa Basin. Also located within the Sacramento RD is the National Solar Observatory at Sacramento Peak, managed by the Association of Universities for Research in Astronomy (AURA) with funding from the National Science Foundation; and the Apache Point Observatory, owned by the Astrophysical Research Consortium and managed by New Mexico State University. Both are located in Sunspot, New Mexico and can be accessed via Scenic By-Way NM 6563. The National Solar Observatory is open to the public May 1 through October 1.

Grazing and timber made the area popular for settlement in the late 1800s. Grazing opportunities led to the establishment of Tularosa on the west side of the Sacramento Mountains in the 1860s and Weed and Mayhill on the eastern slopes of the Sacramento Mountains in the 1880s.

Alamogordo was established as a railroad town in 1898 and had a line running directly into the mountains to acquire timber. The presence of the railroad led to the establishment of High Rolls, Mountain Park, and Cloudcroft, as well as that of Russia and Marcia (both now deserted). The railroad tracks were removed in 1959 as a result of rising logging costs and the construction of highways.

During recent years, the region has experienced rapid development, raising concerns for fire management, water availability, and threatened and endangered species preservation. Two major ecosystems intersect in the area, creating much diversity. A number of protected, endangered species are found in the forest, including the Mexican spotted owl.

1.7 Smokey Bear Ranger District

The Smokey Bear RD is located mostly within Lincoln County, with a smaller portion in Chaves County. The RD manages roughly 375,000 acres, about one-third of the Lincoln NF total, and has its headquarters in Ruidoso. The Sacramento, Jicarilla, and Capitan Mountain Ranges (the last being the birthplace of Smokey the Bear), with elevations ranging from 5,400 to 11,580 feet, are located in the Smokey Bear RD. Both of Lincoln NF's wilderness areas (Capitan Mountain and White Mountain Wilderness areas) are located within Smokey Bear RD. Elevation also plays an important role in the climate, as temperatures can vary from exceptionally hot in the desert areas to quite cool in the mountain regions. Vegetation varies from semi-desert plants to spruce, fir, and high-elevation grasses and forbs.

Two towns of particular historical interest – Lincoln and Capitan – are both located near Smokey Bear RD. Lincoln is the site of one of the famous Billy-the-Kid shoot-outs, while Capitan is the resting place of Smokey the Bear. Lincoln was established in 1849 by families engaged in farming and raising cattle and sheep. Grazing opportunities also led to settlement of the Hondo and Ruidoso Valleys. Range conflicts have long played a role in the region's history, the most famous of which is the Lincoln County War, begun in 1878.

In the 1870s, gold was discovered in the area, leading to the establishment of the towns of Nogal and White Oaks in the late 1870s. Many other mining camps sprang up in the Jicarilla Mountains. When the railroad was built northward from El Paso but bypassed White Oaks, a decline in mining development occurred in the Smokey Bear RD region.

Today the Smokey Bear RD is characterized by well-established communities such as Ruidoso, Ruidoso Downs, Alto, and Glencoe, and the growing presence of more affluent constituencies. Important stakeholders include developers marketing to Texas-based markets, ski resorts, and Mescalero Apache tribe casinos. Development issues are less pressing in the Smokey Bear RD than in the Sacramento RD, as the Ruidoso area has largely been built out already. The towns of Capitan and Alto are now experiencing the greatest development pressures in the area. Because much of the market for these developments includes Texans, development patterns often follow fluctuations in the oil and gas markets that generate wealth in Texas.

1.8 Guadalupe Ranger District

The Guadalupe RD, located in portions of Otero, Eddy, and Chaves Counties, comprises the remainder of the Lincoln NF. From its headquarters in Carlsbad, the RD manages about 280,000

acres, roughly one-quarter of all Lincoln NF-managed land. The landscape of the Guadalupe RD consists of gently rolling hills and steep canyons atop the Guadalupe Mountain Range. Vegetation varies from that characteristic of the Chihuahuan Desert to piñon, juniper, and ponderosa woodlands. The Guadalupe Mountains are an exposed portion of the ancient and geologically significant Capitan Barrier Reef, which include many caves, unique and diverse ecosystems, and sedimentary formations rich with Permian Age fossils. Elevations range from 3,500 in the northern part of the district to 7,500 feet in the southern portion of the district along the Texas border with New Mexico.

The landscape of the northern two-thirds of the district consists of rolling hills and canyons. Sitting Bull Falls Recreation Area, Rim Road, and Last Chance Canyon Trail are all popular destination areas located within the northern two-thirds of the district. Sitting Bull Falls Recreation Area is one of the most spectacular and popular destinations within the district. The Sitting Bull Falls is a 150-foot waterfall that cascades to natural pools.

The landscape of the southern third of the district consists of deep canyons with sheer cliffs. Unusual plant life for this part of New Mexico is found throughout this portion of the district, including Chinkapin oak and Douglas-fir trees. The endangered Texas Madrone tree with its shedding bark can also be seen in this area. This portion of the district provides many breathtaking views, but is remote and primitive with no drinking water or available services. Most of the district's 130 primitive caves, classified as "Nationally Significant Caves" by the National Park Service, are located in the steep and rugged canyons of the district's southern third. Permits are required to enter all caves (within the Guadalupe RD and other Lincoln NF districts). Some caves require a guide due to sensitive cave formations or on-going restoration work. Carlsbad Caverns National Park abuts the southeastern edge of the Guadalupe RD, and contains more than 100 known caves, including Lechuguilla Cave – the nation's deepest limestone cave and fourth longest.

The Guadalupe RD area of New Mexico is largely uninhabited and devoid of modern day conveniences. Carlsbad is the closest town of any significant size, about 30 miles to the west as the crow flies. Queen is a small village about 40 miles southwest of Carlsbad that was abandoned during the 1930s but which has recently been resettled. The area's isolation causes there to be few land development issues.

There is a large controversy around oil and gas development on Bureau of Land Management land in this area of New Mexico. Controversy has arisen because the area is also North America's largest and wildest Chihuahuan Desert grassland on public land. There are numerous concerns regarding the effects of oil and gas development on the ecosystem, groundwater, ranching operations, and wildlife. A variety of environmental and conservation organizations are working to halt oil and gas development in the Greater Otero Mesa area. However, pressures from the oil and gas industry have increased as energy prices have risen.

1.9 Organization of the Report

The organization of this assessment is based on the collection and analysis of data pertinent to each of the assessment topics. Chapter 2 provides information on demographic trends and economic characteristics of the counties within the assessment area. Chapter 3 discusses access and travel patterns within the area. Chapter 4 examines the forest's land cover, ownership and

management. Chapter 5 examines the different uses of Lincoln NF and the policies impacting these different uses. Chapter 6 examines specially designated areas in the forest, including recreational and heritage sites. Chapter 7 provides an assessment of the economic impacts Lincoln NF has on surrounding communities. Chapter 8 discusses relationships between Lincoln NF and various communities at the local and regional levels and discusses partnerships on specific projects. Chapter 9 identifies key issues facing the forest lands and their management. Finally, Chapter 10 provides a summary of principal findings and recommendations.

2 Demographic and Socioeconomic Trends

This section examines the demographic and socioeconomic patterns of those living in or near Lincoln National Forest (NF). The principal source of information is the U.S. Census Bureau's decennial censuses for the years 2000, 1990, and 1980. The geographical scope of this review includes the four counties in which Lincoln NF is located (Chaves, Eddy, Lincoln, Otero Counties); data is presented on the county scale and, where available, for census places.

2.1 Population Growth

Table 2.1 shows population density is relatively sparse in the assessment area, ranging from four persons per square mile in Lincoln County to 12.3 in Eddy County. This is well below the New Mexico statewide population density of 16 persons per square mile, but consistent with patterns found in the state's rural areas.

Table 2.1: 2000 Population Density (sq. mile)

	Population Density
Chaves	10.1
Eddy	12.3
Lincoln	4.0
Otero	9.4

Source: US Census Bureau, 2000 Decennial Census.

Note: Population Density calculated as per square mile of land area.

Table 2.2 shows that during the period 1980-2000 the four counties that comprise the assessment area added about 40,000 persons to their population, an increase from about 155,000 to 195,000. The 26 percent increase was slightly below that of the U.S. as a whole, and significantly below the 40 percent increase experienced by the state of New Mexico during the same period.

Population growth in the four-county assessment area was highly uneven, generally favoring the more sparsely populated areas of Lincoln and Otero Counties, where the largest swaths of national forest land are located. During the period 1980-2000, these two counties added 26,000 persons (net) to their populations, an increase of about 47 percent. By comparison, Chavez and Eddy Counties grew by 14,000 persons, an increase of only 14 percent. Moreover, while the growth of the population accelerated rapidly from the 1980-1990 period to the 1990-2000 in Lincoln and Otero Counties, growth of the population in Chaves and Eddy Counties slowed. The rapid population growth of Otero and Lincoln Counties is at least partially explained by the relocation of retirees or partial retirees attracted by recreational amenities and the mountains.

According to Census Bureau projections, it is expected that 233,000 residents will live in the assessment area by 2030. This represents an increase of 11 percent, or over 22,000, between 2010 and 2030. Population growth will continue to favor Lincoln County (a projected 40 percent increase) during 2000-2010 but the other three counties will lag behind the state's growth rate. Following the state trend, growth is projected to diminish in all four counties after 2010.

Table 2.2: Historical & Projected County Population, 1980-2030

	Historical			Projected		
	1980	**1990**	**2000**	**2010**	**2020**	**2030**
Chaves	51,103	57,849	61,382	64,864	67,591	69,251
Eddy	47,855	48,605	51,658	55,274	58,514	61,066
Lincoln	10,997	12,219	19,411	23,792	27,100	29,715
Otero	44,665	51,928	62,298	67,018	70,508	73,348
TOTAL LINCOLN COUNTIES	**154,620**	**170,601**	**194,749**	**210,948**	**223,713**	**233,380**
TOTAL NM	1,303,303	1,515,069	1,819,046	2,112,986	2,383,116	2,626,553

	Percent Change				
	1980-1990	**1990-2000**	**2000-2010**	**2010-2020**	**2020-2030**
Chaves	13%	6%	10%	4%	2%
Eddy	2%	6%	13%	6%	4%
Lincoln	11%	59%	40%	14%	10%
Otero	16%	20%	13%	5%	4%
TOTAL LINCOLN COUNTIES	**10%**	**14%**	**8%**	**6%**	**4%**
TOTAL NM	16%	20%	16%	13%	10%

Source: US Census Bureau, Decennial Census, 1980, 1990, 2000. Calculations done by UNM - BBER.

Table 2.3 displays a complete list of communities and their populations in the assessment area, as reported by the U.S. Census Bureau.[1] The growth of the population of Roswell, in Chaves County, was flat during the 1990-2000 period. With a population of about 45,000, Roswell is the largest city and home to nearly one-quarter of the total population of the assessment area. Likewise, Carlsbad and Artesia in Eddy County, the third and fourth largest communities in the assessment area, saw little population gain. By contrast, Alamogordo in Otero County, the second largest city in the area, grew 29 percent. The three fastest growing communities in the area were Ruidoso (up 3,100), Ruidoso Downs (up 900), and Capitan (up 600), all of which are located in Lincoln County and abut the Lincoln NF. A loss of nearly 4,000 persons at Holloman Air Force Base CDP in Otero County offset the otherwise rapid gains among communities in Otero and Lincoln Counties. The decline in the population was a result of Air Force policies and was not indicative of the broader patterns evident in the two-county area.[2]

[1] This listing includes both incorporated and unincorporated census designated places (CDPs).
[2] The decline in the Holloman AFB was the result of a change in the base's mission and a decision to move personnel off base for housing rather than renovate existing housing or build new housing.

Table 2.3: Population in Places, 1990-2000

Lincoln Places	County	1990	2000	Change	% Change
Alamogordo city	Otero	27,596	35,582	7,986	29
Artesia city	Eddy	10,610	10,692	82	1
Boles Acres CDP	Otero	1,409	1,172	-237	-17
Capitan village	Lincoln	842	1,443	601	71
Carlsbad city	Eddy	24,952	25,625	673	3
Carlsbad North CDP	Eddy	1,167	1,245	78	7
Carrizozo town	Lincoln	1,075	1,036	-39	-4
Chaparral CDP	Otero	2,962	NA	NA	NA
Cloudcroft village	Otero	636	749	113	18
Corona village	Lincoln	215	165	-50	-23
Dexter town	Chaves	898	1,235	337	38
Hagerman town	Chaves	961	1,168	207	22
Holloman AFB CDP	Otero	5,891	2,076	-3,815	-65
Hope village	Eddy	101	107	6	6
Lake Arthur town	Chaves	336	432	96	29
La Luz CDP	Otero	1,625	1,615	-10	-1
Loving village	Eddy	1,243	1,326	83	7
Mescalero CDP	Otero	1,159	1,233	74	6
Roswell city	Chaves	44,654	45,293	639	1
Ruidoso village	Lincoln	4,600	7,698	3,098	67
Ruidoso Downs village	Lincoln	920	1,824	904	98
Timberon CDP	Otero	NA	309	NA	NA
Tularosa village	Otero	2,615	2,864	249	10
TOTAL LINCOLN PLACES		**136,467**	**144,889**	8,422	6

Source: US Census Bureau, Decennial Census, 1980, 1990, 2000. Calculations by UNM-BBER.

2.2 Racial/Ethnic Composition

New Mexico was the first state in the United States in which the White/non-Hispanic population comprises a minority of the state's total. The four county assessment area is an exception to this pattern, though the trends suggest a notable shift.

Table 2.4 shows the population increased for most race-ethnic groups in the assessment area between 1990 and 2000. The White population increased 6,000, but much of that increase was among White Hispanic persons. The White/non-Hispanic population grew by only 3 percent during the period, while the Hispanic population, both White and non-White, grew by nearly 33 percent. The assessment area had an increase of 17,000 in the number of people who self-reported as "other" when asked about racial identity. This "other" includes individuals who self-identify with more than one racial group, but it also includes those, fairly numerous in New Mexico, who self-identify with some racial group not listed. Many of those who so identify are Hispanic.

American Indians increased as a percent of the New Mexico population between 1990 and 2000. During the same period, the American Indian population in the assessment area increased about 1,600. American Indians constituted 6 percent of the 2000 population in Otero County, home of the Mescalero Apache. The African American population fell about 300 in the assessment area. African Americans constituted 4 percent of the population in Otero County. Otero County has the most diverse population in the area.

Table 2.4: Race / Ethnicity by County, 1990 & 2000

	WHITE (NON-HISPANIC)	HISPANIC	AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN OR PACIFIC ISLANDER	OTHER	TOTAL
Year 1990							
Chaves	34,792	21,271	1,197	375	282	8,205	66,122
Eddy	30,236	17,145	826	249	201	7,732	56,389
Lincoln	8,585	3,427	65	132	28	819	13,056
Otero	33,268	12,380	2,755	2,984	966	3,910	56,263
TOTAL LINCOLN COUNTIES	**106,881**	**54,223**	**4,843**	**3,740**	**1,477**	**20,666**	**191,830**
Year 2000							
Chaves	31,970	26,904	1,209	694	357	14,955	76,089
Eddy	29,797	20,023	805	646	278	10,491	62,040
Lincoln	13,763	4,975	68	379	65	2,671	21,921
Otero	34,728	20,033	2,440	3,614	810	9,515	71,140
TOTAL LINCOLN COUNTIES	**110,258**	**71,935**	**4,522**	**5,333**	**1,510**	**37,632**	231,190

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM - BBER.
Note: Hispanic can be of any race. The "Other" group includes two or more races.

Table 2.5 presents the percentages of the race-ethnic groups represented in each county in the assessment area. Between 1990 and 2000, the Hispanic share of the total population in New Mexico rose from 32 percent to 37 percent. The Hispanic share also increased from 32 percent to 37 percent in the assessment area, while the non-Hispanic share fell commensurately. The Hispanic share of the total population slipped in Lincoln County but increased in the other three counties. While not shown in the table, White/non-Hispanics added about 3,500 people overall. White/non-Hispanics increased over 5,000 in Lincoln County and in Otero County but they declined in Eddy County and Chaves County. The White/non-Hispanic share of the total population decreased 6 percentage points to 57 percent in the assessment area.

As indicated above, population trends for race and ethnicity varied by county. These shifting demographics have social and political implications that may affect interactions between the Lincoln NF and the surrounding communities. The implications are discussed at the conclusion of this section of the report.

Table 2.5: Race / Ethnicity by County, Percentage, 1990 & 2000

	WHITE (NON-HISPANIC)	HISPANIC	AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN OR PACIFIC ISLANDER	OTHER	TOTAL
Year 1990							
Chaves	53%	32%	2%	1%	0%	12%	100%
Eddy	54%	30%	1%	0%	0%	14%	100%
Lincoln	66%	26%	0%	1%	0%	6%	100%
Otero	59%	22%	5%	5%	2%	7%	100%
TOTAL LINCOLN	**56%**	**28%**	**3%**	**2%**	**1%**	**11%**	**100%**
TOTAL NM	50%	38%	2%	8%	1%	0%	99%
Year 2000							
Chaves	42%	35%	2%	1%	0%	20%	100%
Eddy	48%	32%	1%	1%	0%	17%	100%
Lincoln	63%	23%	0%	2%	0%	12%	100%
Otero	49%	28%	3%	5%	1%	13%	100%
TOTAL LINCOLN	**48%**	**31%**	**2%**	**2%**	**1%**	**16%**	**100%**
TOTAL NM	45%	42%	2%	9%	1%	1%	100%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM - BBER.
Note: Hispanic can be of any race. The "Other" group includes two or more races.

2.3 Age of Population

Table 2.6 presents the age of the population by county in the assessment area. Shown are the percentages of those within each cohort as derived from the 2000 census; these are followed by projections of each age cohort in 10-year increments until 2030. The patterns evident in these data are consistent with the national trends, as the 'Baby Boomer' generation reaches the age of retirement and the working population declines in relative proportion.

The ages 15 to 64 cohort represents those of working age, but its share of the area total is expected to shrink from 63 percent to 58 percent between 2000 and 2030. All counties will experience the trend of proportionally fewer working age people. Three of the counties have mid-sized populations and cities (for New Mexico) but they also have less economic activity and diversity than urban centers in the state. With limited opportunities for employment, some younger people migrate to larger cities with more diversified economic bases.

The share of 65 and older cohort is projected to increase from 14 percent to 25 percent in the assessment area during the 30-year period. Three counties will see approximately 10 percentage point increases in this cohort's share of the total. This cohort will reach a quarter of the total In Chaves and Eddy Counties, one-fifth in Otero County, and will nearly double to about 35 percent of the population In Lincoln County.

Aging populations will present new challenges for governments at all levels as those retiring from the workforce expect to receive services funded by revenues from a workforce that is a shrinking portion of the total population. These retirees will compete for federal and state funds as they seek services such as Medicaid and Social Security. The consequence for the FS may be twofold: increased competition for federal funding in an era of flat or declining government revenues, and an increased demand for services as longer-living retirees settle in rural areas such as the Lincoln assessment area.

Table 2.6: Age Distribution by County, 2000-2030

		Percent Distribution				
County	**Age**	**1990**	**2000**	**2010**	**2020**	**2030**
Chaves	0 - 14	25.8	23.5	20.8	19.8	18.6
	15 - 64	59.9	61.8	63.2	60.0	56.7
	65 yrs. & over	14.3	14.7	15.9	20.1	24.7
Eddy	0 - 14	25.9	23.5	20.1	19.1	18.1
	15 - 64	58.9	61.8	64.4	61.3	57.7
	65 yrs. & over	15.2	14.7	15.4	19.6	24.2
Lincoln	0 - 14	21.4	18.5	13.9	13.7	13.2
	15 - 64	62.8	63.7	60.8	55.0	52.0
	65 yrs. & over	15.8	17.9	25.2	31.4	34.8
Otero	0 - 14	26.4	24.3	19.8	18.4	17.7
	15 - 64	64.8	64.0	66.3	64.6	60.8
	65 yrs. & over	8.8	11.7	13.9	17.0	21.5
Total Lincoln Counties	0 - 14	25.7	23.3	19.6	18.4	17.5
	15 - 64	61.3	62.7	64.2	61.2	57.7
	65 yrs. & over	13.0	14.0	16.2	20.4	24.9

Source: New Mexico County Population Projections: July 1, 2000 to July 1, 2030; UNM-BBER, April 2004.

2.4 Income and Poverty

Table 2.7 depicts per capita income in real 2000 dollars by county in the assessment area for 1990 and 2000. Real per capita income in the area measured $12,596 in 2000, nearly $1,500 below the New Mexico average. Between 1990 and 2000, real per capita income nearly doubled in the state but increased by only 21 percent in the assessment area. Real per capita income was higher than the state average for all counties in 1990, but only Lincoln County remained above the state average in 2000.

Table 2.7 also shows the number and percent of persons living below the federal poverty level for each county. Over 36,000 persons lived in poverty in the assessment area in 2000, an increase of 3,000 despite overall improvement in the national and state economy from the 1989 recession. Much of the gain in the number of persons living in poverty was in Otero County.

Table 2.7: Per Capita Income and Persons in Poverty, 1989 & 1999

	1989			1999		
	Per Capita Income	Persons Below Poverty	% Persons Below Poverty	Per Capita Income	Persons Below Poverty	% Persons Below Poverty
Chaves	$7,232	12,621	22%	$14,990	12,778	21%
Eddy	$8,154	9,755	20%	$15,823	8,769	17%
Lincoln	$7,665	2,384	20%	$19,338	2,855	15%
Otero	$8,136	8,404	16%	$14,345	11,737	19%
TOTAL LINCOLN COUNTIES	**$7,801**	**33,164**	**19%**	**$15,438**	**36,139**	**19%**
TOTAL NM	$9,788	305,934	21%	$17,261	328,933	18%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM - BBER.
Note: The poverty line is the federal established poverty level. Per capita income is in 2000 dollars.

Poverty in the assessment area, as in other parts of the state, tracks racial and ethnic patterns. **Table 2.8** shows that over 36,000 persons in 2000 live in poverty in the assessment area. Poverty percentages by race in the assessment area are: Whites (63 percent), African Americans (3 percent), American Indians (5 percent), Asians and Pacific Islanders (0 percent), and Other (29 percent). American Indians comprise a higher share (11 percent) of the number of persons in poverty in Otero County than in other counties.

In the assessment area, the poverty rate differs by ethnicity for non-Hispanics (41 percent) and Hispanics (59 percent). Hispanics are the majority in all counties except Lincoln County. Over two-thirds of those in poverty in Chaves County are Hispanics. Generally, Hispanics are more likely than non-Hispanics to live in poverty in rural counties in the state. Not shown in the table is the White/non-Hispanic poverty rate (32 percent) in the assessment area.

Table 2.8: Poverty by Race and Ethnicity, 2000

	RACIAL GROUP					ETHNICITY		
	WHITE	AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN & PACIFIC ISLANDER	OTHER	NON-HISPANIC	HISPANIC	TOTAL
Chaves	7,463	410	268	26	4,611	4,228	8,550	12,778
Eddy	5,675	280	112	20	2,682	3,581	5,188	8,769
Lincoln	2,040	3	74	0	738	1,585	1,270	2,855
Otero	7,490	398	1,242	56	2,551	5,435	6,302	11,737
TOTAL LINCOLN COUNTIES	**22,668**	**1,091**	**1,696**	**102**	**10,582**	**14,829**	**21,310**	**36,139**
Percent of Total Group								
Chaves	58%	3%	2%	0%	36%	33%	67%	100%
Eddy	65%	3%	1%	0%	31%	41%	59%	100%
Lincoln	71%	0%	3%	0%	26%	56%	44%	100%
Otero	64%	3%	11%	0%	22%	46%	54%	100%
TOTAL LINCOLN COUNTIES	**63%**	**3%**	**5%**	**0%**	**29%**	**41%**	**59%**	**100%**

Source: US Census Bureau, Decennial Census, 2000. Calculations done by UNM - BBER.
Note: Ethnicity can be of any race. The "Other" group includes two or more races.
The poverty line is the federal established poverty level. Per capita income is in 1990 dollars.

2.5 Household Composition

Table **2.9** presents household composition by type of household for 1990 and 2000. Households in the assessment area are exhibiting the same trend as seen in the US, as there are proportionally more single households and female-headed households. Total households in the area grew about 12,000, numbering over 73,000 in 2000**.**

Single households are non-family households headed by a single person. Female-headed family households are households that are headed by a female with children or other dependents and no husband is present. For example, Lincoln County has 4,761 total households, of which 1,176 (25 percent) are single households and 398 (8 percent) are female-headed family households.

Female-headed family households increased nearly 2,150, totaling about 8,400 in 2000. The proportion of female-headed households in the assessment area (10 percent) is lower than the state (13 percent) in 2000. Female-headed households increased in all counties and had similar shares of total households in 1990 and 2000. These types of households are an increasingly important market and part of the nation's demographic landscape.

Similarly, households of people who live by themselves have become increasingly common. Single households continue to grow in part because of a trend in marrying at later ages and longer life expectancy. Roughly, one-third of single person households are over 65 years of age in the state. In the assessment area, single households increased about 4,500, totaling 18,000 in 2000. The percent of single households in the assessment area (24 percent) was similar to the state (25 percent) in 2000. The increase in both single households and female-headed family households (both 34 percent) outstripped total households (20 percent) between 1990 and 2000.

Table 2.9: Type of Household, 1990 & 2000

	Number of Households			Percent of Total Households	
	Total	Single	Female Headed, Family	Single	Female Headed, Family
Year 1990					
Chaves	20,572	4,670	2,321	23%	11%
Eddy	17,447	3,784	1,733	22%	10%
Lincoln	4,761	1,176	398	25%	8%
Otero	18,139	3,640	1,787	20%	10%
TOTAL LINCOLN COUNTIES	**60,919**	**13,270**	**6,239**	**22%**	**10%**
Year 2000					
Chaves	22,559	5,600	2,797	25%	12%
Eddy	19,410	4,685	2,164	24%	11%
Lincoln	8,206	2,196	777	27%	9%
Otero	22,984	5,317	2,654	23%	12%
TOTAL LINCOLN COUNTIES	**73,159**	**17,798**	**8,392**	**24%**	**11%**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

Note: Single households are non-family households headed by a single person. Female headed family households include children.

2.6 Educational Attainment

Table 2.10 presents educational attainment for the 25-year and older population in 1990 and 2000. Attainment levels have generally advanced in 2000 compared to a decade earlier as the share of the population with at least some college or with a college degree increased while those with high school or less declined.

Table 2.11 shows the share of the population in the assessment area with at least some college education increased from 41 percent to 48 percent between 1990 and 2000. On the other hand, the proportion of adults without a high school degree or equivalent improved from 28 percent to 23 percent in the assessment area and in all counties except Otero County.

Educational attainment is closely tied to one's ability to generate income. The average earnings of a college degree holder are almost twice that of an adult with a high school diploma. As educational attainment increases, the likelihood of poverty decreases. This correlation usually holds in the assessment area.

Table 2.10: Educational Attainment by County

	Less than 9th Grade	9th to 12th Grade	HS Grad or GED	Some College; No Degree	Assoc., BA. Or More	Total
Year 1990						
Chaves	5,725	5,643	9,479	6,987	6,889	34,723
Eddy	4,698	5,188	9,994	5,723	4,613	30,216
Lincoln	794	1,110	2,694	2,065	1,658	8,321
Otero	2,288	3,287	9,971	8,182	6,511	30,239
TOTAL LINCOLN COUNTIES	**13,505**	**15,228**	**32,138**	**22,957**	**19,671**	**103,499**
Year 2000						
Chaves	5,343	5,035	9,998	9,014	8,421	37,811
Eddy	3,519	4,634	11,188	7,147	6,084	32,572
Lincoln	691	1,449	3,905	3,800	4,004	13,849
Otero	2,940	4,282	11,096	10,634	9,109	38,061
TOTAL LINCOLN COUNTIES	**12,493**	**15,400**	**36,187**	**30,595**	**27,618**	**122,293**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

Table 2.11: Educational Attainment Percentage by County

	Less than 9th Grade	9th to 12th Grade	HS Grad or GED	Some College; No Degree	Assoc., BA. Or More	Total
Year 1990						
Chaves	16%	16%	27%	20%	20%	100%
Eddy	16%	17%	33%	19%	15%	100%
Lincoln	10%	13%	32%	25%	20%	100%
Otero	8%	11%	33%	27%	22%	100%
TOTAL LINCOLN COUNTIES	**13%**	**15%**	**31%**	**22%**	**19%**	**100%**
TOTAL NM	11%	14%	29%	21%	25%	100%
Year 2000						
Chaves	14%	13%	26%	24%	22%	100%
Eddy	11%	14%	34%	22%	19%	100%
Lincoln	5%	10%	28%	27%	29%	100%
Otero	8%	11%	29%	28%	24%	100%
TOTAL LINCOLN COUNTIES	**10%**	**13%**	**30%**	**25%**	**23%**	**100%**
TOTAL NM	9%	12%	27%	23%	29%	100%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

2.7 Housing

Table 2.12 illustrates the number of housing units and the occupied status of these units in each county in the assessment area. As would be expected, the number of dwellings in all counties increased as the population grew.

Table 2.12: Housing Units and Occupation of Housing

	1990			2000		
	Housing Units: Total	Housing Units: Occupied	Housing Units: Vacant	Housing Units: Total	Housing Units: Occupied	Housing Units: Vacant
Chaves	23,177	18,155	5,022	29,272	22,984	6,288
Eddy	12,622	4,789	7,833	15,298	8,202	7,096
Lincoln	20,134	17,472	2,662	22,249	19,379	2,870
Otero	23,386	20,589	2,797	25,647	22,561	3,086
TOTAL LINCOLN COUNTIES	**79,319**	**61,005**	**18,314**	**92,466**	**73,126**	**19,340**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

The housing stock expanded by over 13,000 units during 1990-2000, increasing 17 percent in the assessment area. **Table 2.12** shows nearly one in five houses are vacant in the assessment area in 2000 compared to about one in four in 1990. Nearly half of the housing is vacant in Eddy County but more vacant housing has been occupied since 1990 when nearly two-thirds of housing was vacant and the economy suffered. In contrast, the proportion of vacant housing is much lower in both Lincoln and Otero Counties as depicted in **Table 2.13** and **Table 2.14**. In the assessment area nearly half of the total vacant homes are for seasonal or recreational use. This ranges from low seasonal or recreational use in Chaves and Eddy Counties, to over one-third in Otero County, and to 85 percent in Lincoln County. One in five vacant houses is for rent in the assessment area. At least one-third of vacant housing is for rent and another one-third classified as other vacant in Eddy and Chaves Counties. The large proportion of vacant housing for rent indicates stressed economies in these counties, although the Chaves County economy improved in the 1990's.

Table 2.13: Vacant Housing by Type Of Vacancy

	For rent	For sale only	Rented or sold, not occupied	Seasonal or rec use	For migrant workers	Other vacant	Total vacant
Year 1990							
Chaves	1,317	396	83	69	65	867	2,797
Eddy	899	352	340	103	30	938	2,662
Lincoln	377	438	150	6,364	20	484	7,833
Otero	1,315	346	188	2,495	8	670	5,022
TOTAL LINCOLN COUNTIES	**3,908**	**1,532**	**761**	**9,031**	**123**	**2,959**	**18,314**
Year 2000							
Chaves	1,021	501	278	260	18	1,008	3,086
Eddy	1,099	424	115	284	28	920	2,870
Lincoln	339	272	70	6,021	14	380	7,096
Otero	1,491	556	284	2,451	7	1,499	6,288
TOTAL LINCOLN COUNTIES	**3,950**	**1,753**	**747**	**9,016**	**67**	**3,807**	**19,340**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

Table 2.14: Percent of Total Vacant Housing

	For rent	For sale only	Rented or sold, not occupied	Seasonal or rec use	For migrant workers	Other vacant	Total vacant
Year 1990							
Chaves	47%	14%	3%	2%	2%	31%	100%
Eddy	34%	13%	13%	4%	1%	35%	100%
Lincoln	5%	6%	2%	81%	0%	6%	100%
Otero	26%	7%	4%	50%	0%	13%	100%
TOTAL LINCOLN COUNTIES	**21%**	**8%**	**4%**	**49%**	**1%**	**16%**	**100%**
Year 2000							
Chaves	33%	16%	9%	8%	1%	33%	100%
Eddy	38%	15%	4%	10%	1%	32%	100%
Lincoln	5%	4%	1%	85%	0%	5%	100%
Otero	24%	9%	5%	39%	0%	24%	100%
TOTAL LINCOLN COUNTIES	**20%**	**9%**	**4%**	**47%**	**0%**	**20%**	**100%**

Source: 2000 US Census Bureau, Decennial Census, 1990 and 2000. Calculations by UNM-BBER.

As demonstrated in **Table 2.15**, the housing stock in the assessment area is 29.5 years old in 2000, ranging from a low of 23.5 years old in Eddy County to 34 years old in both Lincoln and Otero Counties. Also shown is the percentage of households that lack complete plumbing. There is usually a correlation between counties of high poverty and the lack of plumbing in a dwelling. All counties (except Lincoln County) saw small gains in the percent of houses without plumbing

between 1990 and 2000. In contrast, the state's average age of housing rose from 22 to 27 years and the proportion of households without plumbing remained at 3 percent. In the assessment area, housing that lacked plumbing facilities increased by over 600 units between 1990 and 2000, less than 2 percent of total housing units.

Table 2.15: Age of Housing Stock and Plumbing Availability

	Average Age of Housing Stock		Lacking Complete Plumbing Facities	
	1990	2000	1990	2000
Chaves	23.0	26.0	0.8%	1.3%
Eddy	22.3	23.5	0.9%	1.7%
Lincoln	28.4	34.4	0.9%	0.9%
Otero	28.6	34.2	1.7%	2.6%
TOTAL LINCOLN COUNTIES	**25.6**	**29.5**	**1.1%**	**1.6%**
TOTAL NM	22.2	27.0	3.0%	3.0%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations by UNM BBER.

2.8 Net Migration

Table 2.16 illustrates the net migration into the assessment area at the county level. In each decennial census, respondents are asked about their county and state of residence five years previous. Shown in **Table 2.16** are only those in New Mexico who are five years of age or older. For the assessment area in 2000, 46 percent of those in the area were movers (had changed addresses in the past five years). Of these 84,172 movers, 41,836, or about half, moved within the same county. Also, 12,264 moved from other places in New Mexico. A small decline in movers came from other states from a decade earlier, as 24,203 persons, or over one of four movers, came to the area from other states in 2000. This compares to 24,977, or one of three movers, from other states in 1990. And of those who moved from other states, the region of origin in 2000 (as a percent of the total) was Northeast (0 percent), Midwest (2 percent), South (7 percent), and West (5 percent) -- (Texas is in the South region and California dominates the West region). Many movers from another state originated in Texas. There was little difference in these percentages between the 1990 and 2000 census.

Table 2.16: Net Migration by County

	CHAVES COUNTY				EDDY COUNTY			
	1990	2000	Percent of Total 1990	Percent of Total 2000	1990	2000	Percent of Total 1990	Percent of Total 2000
TOTAL	53,134	56,978	100%	100%	44,875	47,952	100%	100%
Same House	27,326	31,668	51%	56%	25,564	28,287	57%	59%
Different House	25,808	25,310	49%	44%	19,311	19,665	43%	41%
in the United States	25,001	24,355	47%	43%	19,071	19,329	42%	40%
Same County	14,218	14,763	27%	26%	11,894	12,386	27%	26%
Different County	10,783	9,592	20%	17%	7,177	6,943	16%	14%
Same State	4,070	3,723	8%	7%	2,429	2,667	5%	6%
Different State	6,713	5,869	13%	10%	4,748	4,276	11%	9%
Northeast	355	207	1%	0%	171	70	0%	0%
Midwest	963	865	2%	2%	433	338	1%	1%
South	3,164	2,451	6%	4%	2,899	2,205	6%	5%
West	2,231	2,346	4%	4%	1,245	1,663	3%	3%
Puerto Rico	0	0	0%	0%	0	0	0%	0%
Elsewhere	807	955	2%	2%	240	336	1%	1%

	LINCOLN COUNTY				OTERO COUNTY			
	1990	2000	Percent of Total 1990	Percent of Total 2000	1990	2000	Percent of Total 1990	Percent of Total 2000
TOTAL	11,420	18,448	100%	100%	47,051	57,857	100%	100%
Same House	5,882	9,268	52%	50%	20,054	27,840	43%	48%
Different House	5,538	9,180	48%	50%	26,997	30,017	57%	52%
in the United States	5,466	8,870	48%	48%	23,937	25,749	51%	45%
Same County	2,509	3,549	22%	19%	9,830	11,138	21%	19%
Different County	2,957	5,321	26%	29%	14,107	14,611	30%	25%
Same State	1,156	2,205	10%	12%	2,392	3,669	5%	6%
Different State	1,801	3,116	16%	17%	11,715	10,942	25%	19%
Northeast	22	99	0%	1%	744	506	2%	1%
Midwest	100	354	1%	2%	1,736	1,542	4%	3%
South	1,219	1,910	11%	10%	5,181	5,411	11%	9%
West	460	753	4%	4%	4,054	3,483	9%	6%
Puerto Rico	0	0	0%	0%	15	58	0%	0%
Elsewhere	72	310	1%	2%	3,045	4,210	6%	7%

	NEW MEXICO				TOTAL LINCOLN COUNTIES			
	1990	2000	Percent of Total 1990	Percent of Total 2000	1990	2000	Percent of Total 1990	Percent of Total 2000
TOTAL	1,390,048	1,689,911	100%	100%	156,480	181,235	100%	100%
Same House	719,628	919,717	52%	54%	78,826	97,063	50%	54%
Different House	670,420	770,194	48%	46%	77,654	84,172	50%	46%
in the United States	645,519	731,488	46%	43%	73,475	78,303	47%	43%
Same County	345,469	400,128	25%	24%	38,451	41,836	25%	23%
Different County	300,050	331,360	22%	20%	35,024	36,467	22%	20%
Same State	107,289	126,093	8%	7%	10,047	12,264	6%	7%
Different State	192,761	205,267	14%	12%	24,977	24,203	16%	13%
Northeast	14,311	15,329	1%	1%	1,292	882	1%	0%
Midwest	28,270	29,457	2%	2%	3,232	3,099	2%	2%
South	73,548	72,497	5%	4%	12,463	11,977	8%	7%
West	76,632	87,984	6%	5%	7,990	8,245	5%	5%
Puerto Rico	110	398	0%	0%	15	58	0%	0%
Elsewhere	24,791	38,308	2%	2%	4,164	5,811	3%	3%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations by UNM BBER.

2.9 Challenges and Opportunities for Forest Management

The demographic data developed in this chapter for the four Lincoln NF assessment counties generally follow the demographics of the U.S. as a whole – the population is aging, more racially diverse, with higher educational attainment, and increasing per capita incomes. More households are headed by women and are single person households.

To focus on these demographic similarities between the U.S. and the Lincoln NF counties would mean missing some important developments in the Lincoln NF area over the past two decades. This is an area of profound economic change, and some of the changes relate to the natural resources of the area and to changing policies regarding the use of national forests. Over the last two decades, the logging and grazing activities on public lands have declined, as much a result of changing market conditions as of FS policies to balance uses.[3] Furthermore, grazing on public lands has been curtailed and ranchers are seeing hard times (see Chapter 5). Oil drilling in Eddy County and Chaves County has declined and experienced volatility. Due to Canadian competition, the potash mines in Eddy County have mostly been closed, employing less than half of its former level.

On the positive side, White Sands National Monument attracts many tourists to the Alamogordo area. Holloman Air Force Base is a mainstay of the local landscape. Also there are military facilities and operations at White Sands Missile Range and Fort Bliss in Otero County. A substantial cheese processing industry, capitalizing on the many herds of dairy cows, has developed in Chaves County. The Waste Isolation Project (WIPP) provides a pillar of the Eddy County economy. Carlsbad Caverns National Park brings in many visitors and is an important driver of the local economy. Even in Artesia, a microbrewery/restaurant draws in travelers and is a larger employer.

The Lincoln NF has an increasing number of recreational uses. As a result, the local tourism industry expanded, as has amenity migration into the area by retirees and others investing in vacation and second homes. There was little change in the number of people who had lived in a different state when comparing the 1990 and 2000 censuses. The housing stock expanded by about 13,000 units during 1990-2000 as the stock increased by 17 percent in the assessment area. The 2000 census found a significant number of vacant houses in the assessment area. Almost half of the vacant houses in the assessment area are seasonal or vacation homes and most of the vacant houses in Lincoln County are in this category. Lincoln County has many natural amenities, including camping, hiking, skiing, fishing, boating, and hunting. The Mescalero Apache operate the Inn of the Mountain Gods and Casino, a destination resort, perched above a gorgeous lake. The Mescalero Apache also own a large amount of land in Otero County.

The population increased in all counties between 1980 and 2000. Real per capita income rose in the four counties between 1990 and 2000. More people with more income in the assessment area may be expected to impact forest uses. In rural economies more dependent on agriculture and other land uses that involve extraction from the forest lands (e.g., grazing, wood gathering, piñon harvesting, etc.), management decisions could have lasting impacts on the wealth and well-being

[3] The Lincoln Forest has actively worked to minimize these impacts. An example is the reopening and retooling of an Otero County sawmill by the Mescalero tribe with support of a Forest Service Community-Forest Restoration Grant.

of certain populations. Increasingly important will be a more diverse populace that is represented in decisions about Lincoln NF.

The nation is aging and life spans are increasing. With the leading edge of the Baby Boomers reaching age 60 this year, this massive cohort likely will spend more leisure time in the country's national forests. As discussed in a subsequent chapter, there is already evidence of retirees choosing to live within or near Lincoln NF. As the healthier and wealthier Boomers retire, more demand for recreation could further stress the forest. Further, aging populations may require new infrastructure. Yet Boomers have indicated that they will seek alternatives to retirement that include volunteering, from which Lincoln NF could benefit. Older Americans also desire cultural and heritage tourism, so they would take advantage of these offerings in the forest. The retired and semi-retired, therefore, may add to workloads of Lincoln NF personnel but also could be a target market for interpretive events. Aging Boomers will place heavy demand on federal benefits and entitlements, such as Medicare and Social Security, and therefore intensify competition for federal dollars. This could mean flat or reduced funding levels for federal agencies, including the FS.

Finally, those seeking to live or retire in more peaceful forest surroundings are increasingly choosing to build houses within or adjacent to national forests. This is clearly happening in Lincoln NF. These homeowners may seek to block the access of other forest users or enterprises. Housing at the wild land interface also impacts Lincoln NF policies about fire and the reduction of fuel loads. Strategies for fighting fires when there are dwellings in the forest now must devote additional resources to the protection of those houses and the lives of their residents. Residents at the forest's edge may oppose thinning and thinning methods. Housing in the forest also can alter access and impact forest use. New roads built to developments can impact forest health by creating runoff problems, air pollution problems, and access to new areas where unmanaged recreation can occur.

Diversity does not only mean different races but changes in the mix of people in the area. A conflict brews between wealthier newcomers and old-timers or long time landholders. This conflict occurs in growing places throughout the West (and nation). The newcomers have different expectations and less traditional ties to the land, which impacts land use and land values. These issues impact access to national forest properties as well.

3 Access and Travel Patterns

This chapter discusses current and potential access issues in each of Lincoln National Forest's ranger districts. The analysis considers the existing transportation networks that serve Lincoln National Forest (NF), current traffic patterns along major routes, and planned investments that may improve access to the NF. The analysis also looks at the existing roads and trails within the various Ranger Districts (RDs) and discusses developments impacting forest access. The analysis is based primarily on secondary data, including information from the New Mexico Department of Transportation (NMDOT).

3.1 Location of Major Transportation Routes

The purpose of this section is to describe the transportation networks that serve Lincoln NF, providing visitor access to and from the forest. Examining transportation and traffic patterns can offer insight into where visitors may be coming from and identify major access obstacles.

Figure 3.1 presents the major highways that serve as primary thoroughfares for the state and which encircle Lincoln NF. Interstate 40 (I-40), which runs east-west, and Interstate 25 (I-25), which runs north-south, are both major cross-national shipping routes that support high levels of heavy truck traffic. Lincoln NF may be accessed from either of these Interstates. From the Albuquerque area, one may access the Smokey Bear RD via I-25 and U.S. 380, or via I-40, NM 3, and U.S. 54. To access the Sacramento RD from the Albuquerque area, one may use I-25 and U.S. 70 or I-40, NM 3, and U.S. 54. Access to the Guadalupe RD is most easily made from the El Paso area, using U.S. 54.

Table 3.1 provides a list of roadways around the three ranger districts.[4] Two scenic byways (Billy the Kid and Sunspot) are popular routes for visitors who want to enjoy the aesthetic resources of south-central New Mexico.

Table 3.1: Roadways Around Lincoln NF

	Smokey Bear	Sacramento	Guadalupe
US Route	54	54	62
	70	70	285
	380	82	
State Road	37	24	137
	48	130	396
	220	244	

Source: ESRI StreetMap USA 2004.

[4] Geographical data on national roads is obtained from the ESRI Streetmaps USA 2004.

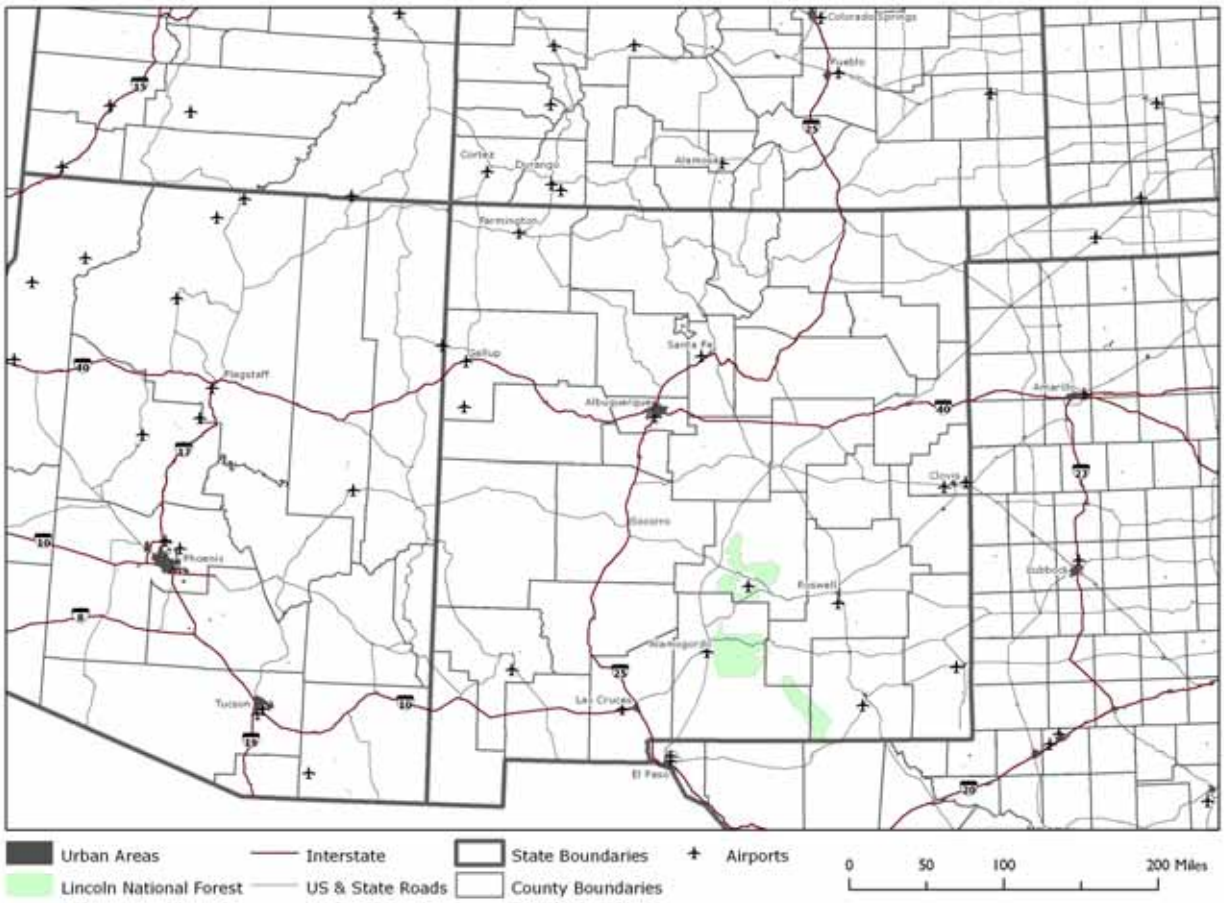


Figure 3.1: Map of Principle Highways and Airports in Region

Table 3.2 shows the distance from each of the three Lincoln NF ranger districts to the major metropolitan statistical areas (MSAs) in the southwestern region of the United States. Overall, Lincoln NF is closest to Roswell, with travel distances of less than 130 miles to all three districts. Las Cruces and El Paso (both with travel distances of less than 200 miles) are two other nearby MSAs. Because many of the MSAs listed below have a national forest located closer to them than Lincoln NF, travelers' first destination choice may not be Lincoln NF.

Table 3.2: Distance from Major MSAs to the Lincoln NF Ranger Districts

City	Smokey Bear	Sacramento	Guadalupe
Albuquerque, NM	191	241	320
Amarillo, TX	331	389	334
Denver, CO	551	610	625
El Paso, TX	186	126	162
Farmington, NM	373	432	500
Las Cruces, NM	164	105	194
Lubbock, TX	263	283	250
Phoenix, AZ	552	501	582
Pueblo, CO	437	496	511
Roswell, NM	66	126	119
Santa Fe, NM	452	311	311
Tempe, AZ	550	499	580
Tucson, AZ	438	387	468

Source: http://www.mapquest.com

Table 3.3 shows lane miles in each county in the assessment area by road classification of the NMDOT. The assessment area is primarily rural. NMDOT defines rural areas to be areas where the population is under 5,000 persons; any area with more than 5,000 persons is defined as an urbanized area.[5] In the four counties, there are only 1,675 miles of urban road and over 17,000 miles of rural road. Most roads in the assessment area are collector and local roads, which provide access to homes and businesses.

[5] Bureau of Transportation Statistics: http://www.transstats.bts.gov/Tableinfo.asp?Table_ID=1102

Table 3.3: Lane Miles of Road by County and Classification

Rural					
		Other Principal			
County	Interstate	Arterial	Minor Arterial	Collector & Local	County Total
Chaves	0	459	162	4,293	4,914
Eddy	0	376	129	3,981	4,486
Lincoln	0	294	113	2,845	3,252
Otero	0	461	91	4,311	4,863
Total	0	1,591	494	15,431	17,516
Urban					
		Other Principal			
County	Interstate	Arterial	Minor Arterial	Collector & Local	County Total
Chaves	0	81	68	643	793
Eddy	0	112	40	575	726
Lincoln	0	0	0	0	0
Otero	0	61	26	70	156
Total	0	254	134	1,288	1,675

Source: US Department of Transportation HPMS Database.

3.2 Traffic Flows

Table 3.4 shows estimated daily vehicle miles traveled (VMT) and VMT per lane-mile by county for all counties in the assessment area. VMTs are calculated by multiplying the average annual daily traffic (AADT)[6] by road length in an area. VMT per lane-mile offers a useful measure of the intensity of road traffic, and is strongly correlated with population density. The measure is also useful for comparing traffic density among geographical areas.

Table 3.4: Vehicle Miles Traveled and VMT Per Lane Mile

County	Estimated VMT	VMT per Lane-Mile
Chaves	181,859	48
Eddy	1,130,199	217
Lincoln	651,357	200
Otero	1,398,900	279

Note: VMT is calculated as AADT*Section_Length

Source: US Department of Transportation (2001), HPMS Database. Calculations by UNM-BBER.

[6] The daily flow of motor traffic is averaged over the year to give average annual daily traffic (AADT) flows, a useful and simple measurement of how busy a road is. Data comes from the Highway Performance Monitoring System (HPMS), maintained by the Federal Highway Administration (FHWA) and can be accessed online from the Bureau of Transportation Statistics. http://www.bts.gov/

As the Lincoln NF counties are rural and relatively sparsely populated, the VMTs and VMT per lane-mile are quite low. Traffic is especially light in Chaves County, where there are on average only 48 vehicles traveling any given stretch of road on a typical day. Traffic is heaviest in Otero County, but is still quite low relative to the rest of the state. By contrast, the 2001 VMT for Bernalillo County totaled 11.9 million, with a VMT per lane-mile of over two thousand.

3.3 Airports

The largest airport in the vicinity of Lincoln NF is the El Paso International Airport in El Paso, Texas. The El Paso International Airport is located within 190 miles of each of the three ranger districts. The Albuquerque International Sunport in Albuquerque, New Mexico is another large airport that is also within approximately 190 miles of the Smokey Bear RD, but is 241 and 320 miles from the Sacramento and Guadalupe RDs, respectively. There are also numerous municipal airports that are near the ranger districts. Alamogordo-White Sands Regional Airport, located 5 miles west of Alamogordo, has regularly scheduled flights to Albuquerque. Although Sierra Blanca Regional Airport (located northeast of Ruidoso), Cavern City Air Terminal (located in Carlsbad), and Roswell Industrial Air Center (located in Roswell) have no scheduled services, these municipal airports are also available for use. Refer to **Figure 3.1** to see the airport locations on a map.

3.4 Capital Outlays and Transportation Infrastructure Improvements

As part of Governor Richardson's Investment Partnership (GRIP), monies have been programmed for transportation infrastructure improvements throughout New Mexico. Below is a list and description of some of the more major projects located in the vicinity of Lincoln NF. See **Table A.1** of the Appendix for a complete list.[7]

I 10, Texas State Line to Las Cruces

This project involves reconstruction of existing lanes and expansion from a four-lane to a six-lane highway to accommodate high commuter and commercial traffic from El Paso. This is a major corridor for east to west coast transport of goods and services. Construction is scheduled to take place from August 2007 to May 2009.

U.S. 380, Capitan to Hondo

Project objectives are shoulder widening and pavement and drainage structure replacement along the existing two lanes. Emphasis will be placed on the cultural, natural and historic resources of the area. The project will improve the mobility of people and goods in the area. Construction is scheduled from June 2007 to October 2008.

U.S. 62, Texas State Line to Carlsbad

The existing two-lane highway will be reconstructed and enhanced with widened shoulders and periodic passing opportunities. This route accommodates tourists going to

[7] GRIP project information comes from the GRIP website: http://nmgrip.com/

Carlsbad Caverns National Park, which is the most visited park in New Mexico. The project will run from June 2006 to February 2008.

In addition to the major improvements discussed above, the GRIP program is also involved in investment to improve and expand the traffic capacity of I-40 and of I-25 near population centers like Albuquerque. These improvements could mean more people accessing Lincoln NF. Finally, the NMDOT Aviation Division's 5-year Capital Improvement Plan provides funding for projects at municipal and other airports serving Lincoln NF.

3.5 Forest Roads and Trails

Forest roads provide access for both forest users and FS officials to areas of interest in Lincoln NF. These roads are essential because they provide the only access to certain areas, permitting maintenance and rehabilitation activities. Access to the forest becomes critical in the event of a forest fire or other catastrophic event. An ongoing trend of increased recreational use (discussed in Chapter 5) can have implications for an increased need for additional trails.

Table 3.5 presents roadway information for Lincoln NF as a whole and for each RD individually. Lincoln NF contains nearly 3,400 miles of roadways.[8] Eighty-two percent of the roadways are single lane roads; only 18 percent are double lane roads. Three quarters of all roads are covered with "native materials," in most cases meaning a dirt road. Throughout the entire Lincoln NF, there are only 2 miles of FS-maintained paved roads. Sacramento RD has more miles of roadways than the other two RDs, whereas Guadalupe RD has fewer miles of roadways than the other RDs. This pattern of roadway prevalence can at least in part be explained by the pattern of private ownership of land within Lincoln NF. Sacramento RD has the greatest percent of privately owned land, whereas Guadalupe RD has the lowest percent of privately owned land. The presence of privately owned land requires the presence of roadways for access purposes. Land ownership is discussed in greater detail in Section 4.1.

[8] Forest road estimates are based on data in the FS infrastructure (INFRA) database. Any estimation errors inherent in the data (such as missing records) are not accounted for in this report. Duplicates were removed.

Table 3.5: Length of Forest Roads and Road Types in Lincoln NF

Sacramento	Surface Type	Segment Length (Miles)
SINGLE LANE	Asphalt	0
	Crushed Aggregate	41
	Bituminous Surface	9
	Improved Native	136
	Native Material	1266
	Paved	1
Single Lane Total		1,453
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	24
	Bituminous Surface	180
	Improved Native	2
	Native Material	8
	Paved	1
Double Lane Total		215
TOTAL		1,668

Smokey Bear	Surface Type	Segment Length (Miles)
SINGLE LANE	Asphalt	0
	Crushed Aggregate	9
	Bituminous Surface	1
	Improved Native	21
	Native Material	801
	Paved	0
Single Lane Total		832
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	51
	Bituminous Surface	170
	Improved Native	40
	Native Material	60
	Paved	0
Double Lane Total		321
TOTAL		1,153

Guadalupe	Surface Type	Segment Length (Miles)
SINGLE LANE	Asphalt	0
	Crushed Aggregate	11
	Bituminous Surface	0
	Improved Native	49
	Native Material	434
	Paved	0
Single Lane Total		494
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	16
	Bituminous Surface	54
	Improved Native	6
	Native Material	0
	Paved	0
Double Lane Total		76
TOTAL		570

Lincoln NF Total	Surface Type	Segment Length (Miles)
SINGLE LANE	Asphalt	0
	Crushed Aggregate	61
	Bituminous Surface	10
	Improved Native	206
	Native Material	2501
	Paved	1
Single Lane Total		2,779
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	91
	Bituminous Surface	404
	Improved Native	48
	Native Material	68
	Paved	1
Double Lane Total		612
TOTAL		3,391

Source: USDA Forest Service INFRA Roads Database. Calculations done by UNM-BBER.

The FS maintains designated areas of forest wilderness and additional inventoried roadless areas, where roads cannot be constructed or reconstructed. This land use is discussed in Chapter 6.

Table 3.6 provides data on the type and length of trails found within each of the three Lincoln NF RDs. According to the FS infrastructure database (INFRA), Lincoln NF contains more than 500 miles of trail. For a complete list of trails located within Lincoln NF, see **Table A.2** in the Appendix.

The roads and trails information given in **Tables 3.5** and **3.6** does not include roads and trails created by individuals driving motorized vehicles (typically off-highway vehicles [OHVs] [9]) off road, either for purposes of recovering an animal carcass, loading firewood, or recreating. OHVs and ATVs are becoming increasingly popular but unfortunately can have adverse effects, particularly in drier climates where vegetative recovery may take years.

[9] Off-highway vehicles (OHVs), off-road vehicles (ORVs) and all terrain vehicles (ATVs) are used interchangeably. For consistency, this document uses the term off-highway vehicles (OHVs)

Table 3.6: Length of Forest Trails and Trail Types in Lincoln NF

Trail Type	Segment Length (Miles)	Trail Type	Segment Length (Miles)
Sacramento		**Smokey Bear**	
Native Natural	26	Native Natural	62
Unidentified Type	211	Unidentified Type	152
TOTAL	237	**TOTAL**	214
Guadalupe		**Total Lincoln**	
Native Natural	10	Native Natural	98
Unidentified Type	57	Unidentified Type	420
TOTAL	67	**TOTAL**	518

Source: USDA Forest Service INFRA Trails Database. Calculations done by UNM-BBER.

3.6 Right-of-Way and Other Access Issues

The checkerboard pattern of landownership that exists within the Lincoln NF boundaries complicates both public access to the forest and access of landowners to private property within the NF boundaries. Lincoln NF is currently able to provide reasonable access to its lands for multiple purposes, including timber harvesting, fire management, recreation, and hunting activities. This access is, however, threatened over the long term by the fact that many of the access routes (both trails and roads) cross private or other lands where perfected (deeded or purchased) right-of-ways (ROWs) have not been acquired, and are therefore subject to potential closure by present or future landowners. As a result, the FS has identified high-priority ROWs (those most frequently used, those most likely subject to closure, and those required as escape routes for fire evacuations). Efforts are being made to acquire these high-priority ROWs through purchase at fair market value. Since 1990, Lincoln NF has acquired ROWs in the following areas:

- Road and Trail access to Trestle Recreation Site
- Weed
- Mayhill Administrative Site
- Access to Cloudcroft school land

The FS is also working with and encouraging county and state public road agencies to acquire ROWs for public use, especially on arterial roads that access smaller roads. In addition, the New Mexico Game and Fish Department is working with the FS both to identify certain parts of the NF where hunting is limited due to access problems and to acquire ROWs (mostly in the form of roads). Re-routing roads and/or trails around non-FS land is another possible solution to access problems that is also considered.

Access is also a concern as it pertains to the ability of private landowners to access their land within forest boundaries. As a result of these access needs, Lincoln NF uses considerable resources (personnel time, etc.) to analyze the many requests placed for special use permits for roads. (Special use permits are further discussed in Chapter 5.)

During the next four years, all national forests will be working to develop new travel management policies. The process will entail examining designated travel routes open for motorized vehicles and determining whether the existing transportation system needs to be revised – whether changes need to be made to which roads and trails are open and closed. The FS will also re-assess

what type(s) of motorized travel will be allowed on the various motorized trails. In addition, illegal user-created routes will be considered for inclusion in the new transportation system and ROW needs will be reconsidered. Significant public involvement will be sought next year.[10]

The pattern of land ownership that surrounds Lincoln NF, and therefore existing and potential access issues, differs across the three RDs. Smokey Bear RD is surrounded primarily by Indian reservation, private, and State lands. Sacramento RD is surrounded also primarily by Indian reservation, private, and State lands, as well as by Bureau of Land Management (BLM) and Department of Defense (DOD) lands. Guadalupe RD is surrounded almost entirely by BLM and national park lands. Private and State lands are those most likely to pose access problems. Private landowners have the most clearly defined rights, and therefore have the more control over access to their property than do other landowners. State laws and regulations exist that govern State lands (public trust lands) and create difficulties for gaining access to Lincoln NF across State lands. State lands' leaseholders (typically grazing, oil, and gas entities) have the right to say whether individuals can have access. Access to DOD lands is restricted to hunting purposes only; a system is currently in place for hunters to gain hunting licenses for DOD lands. BLM, national parks, and Indian reservation lands currently do not pose access problems. Lincoln NF presently has access across Mescalero Apache Tribe land in all areas where access is needed. Access across National Parks land is not an issue as such access has not yet been necessary. Access across BLM has not posed a challenge; there are presently no high priority ROW needs across BLM land, and it is part of the BLM program to allow access for public use. However, problems can arise when access to FS land first requires access across private or State lands and subsequently across Indian, BLM, or national parks land.[11]

As discussed in Chapter 4, the significant portion of land within the Sacramento and Smokey Bear RDs that is privately owned is not consolidated in one area, but rather creates a checkerboard pattern of landownership. This intermingling of public and private lands has caused access problems that are becoming more crucial as recreation use of the forest increases. Private ownership has created insufficient access in some areas, thereby causing areas of the forest to be unavailable for public use. This is especially true for the Smokey Bear RD.[12]

3.7 Challenges and Opportunities for Forest Management

Lincoln NF is located in a remote location. The four county region in which the forest is located is predominately rural, with a population density well below that of New Mexico as a whole. The forest is also a considerable distance from the principal metropolitan areas in Southwestern U.S.; El Paso is the only large MSA within a two-hour drive from the forest boundaries. Likewise, Lincoln NF is a considerable distance from a large airport; all RDs are between 120 and 190 miles from the nearest airport, in El Paso. There are a number of smaller, municipal airports in the area, but flight schedules may be too limited for tourist use.

Because of the remoteness of the forest, traffic is quite light. Indeed, population and traffic forecasts suggest that it is unlikely that there will be any significant increase in traffic through the area.

[10] Personal communication with Johnny Wilson (Lincoln NF Recreation/Lands/Minerals Staff Officer).
[11] Ibid.
[12] U.S. Forest Service. 1986. *Environmental Impact Statement for Lincoln National Forest Plan*.

Yet, the remoteness of the region, combined with the checkerboard pattern of landownership in the area, means that access to and through NF land is critical to the transportation dynamics of the area. Forest officials and local residents use forest roads and trails as the primary way of accessing various points of interest in the forest and, in many cases, public and private land both within and neighboring the forest boundaries. As such, it is imperative that these roads and trails remain in good condition.

All evidence suggests that the FS and other public agencies have acted assertively to meet access and transportation challenge. A number of federal and state roads surrounding the forest are slated for significant improvements over the next few years. Further, the FS has undertaken a large number of collaborative projects and acquired high-priority ROWs to ensure continued access forest resources.

4 Land Cover and Ownership

This chapter examines land cover and ownership in Lincoln National Forest (NF) and discusses related emerging management issues. The first section examines the various types of land cover and ownership within each of the ranger districts (RDs). The second section discusses recent land exchanges and the policy environment around future conveyances. The third section discusses endangered and invasive species, both of which relate to land cover.

The geographic data for this section is taken from the United States Geological Survey National Land Coverage Data set (NLCD), a raster based Landsat imagery. The data is obtained for each county with a 30-meter resolution making the data fairly accurate. ESRI Desktop GIS[13] software is used to extract the necessary data for each contextual geographic area. The Forest Service (FS) provided land exchange and conveyance data. Endangered and invasive species information was obtained from archival sources.

4.1 Land Cover on Lincoln National Forest

Table 4.1 provides land cover classifications for each ranger district based on data compiled in the NLCD. (Land cover information is also provided in map form – see **Figure 4.1**.) The predominant land cover in Lincoln NF as a whole is evergreen forest (58 percent), followed by herbaceous grasslands (22 percent) and shrub land (19 percent). Land cover patterns vary across ranger districts. Evergreen forest accounts for 73 percent and 72 percent of land cover in the Sacramento and Smokey Bear RDs, respectively, but only 11 percent in the Guadalupe district. Shrub land and herbaceous grasslands are dominant in the Guadalupe district, accounting for 48 percent and 39 percent of land cover, but are less prevalent in Sacramento and Smokey Bear RDs. The Sacramento RD is 15 percent herbaceous grasslands and 11 percent shrub land, whereas the Smokey Bear RD is 18 percent herbaceous grasslands and 8 percent shrub land. Because Guadalupe RD provides the greatest amount of herbaceous grasslands and shrub land, this district is well suited for grazing purposes.[14]

[13] http://www.esri.com.

[14] The more open and less-forested southern regions of the LNF in the Guadalupe were cited as a particularly rich grass resource. A participant in discussion sessions conducted by Russell and Adams-Russell stated, “We don’t have a lot of trees, but we have some of the best grass for grazing you will find anywhere. The blue and black gramma grass we have here is just about some of the best you will find.” Source: Russell, J.C. and Adams-Russell, P.A. 2006. *Values, Attitudes and Beliefs toward National Forest System Lands: The Lincoln National Forest* (Draft).

Table 4.1: Land Cover on Lincoln NF (Acres)

	Sacramento	Smokey Bear	Guadalupe	Total Lincoln NF
Bare Rock/Sand/Clay	0	21	92	114
Commercial/Industrial/Transportation	124	604	83	811
Deciduous Forest	5,532	5,094	4,809	15,435
Emergent Herbaceous Wetlands			2	2
Evergreen Forest	398,024	304,556	31,262	733,841
Fallow	3	0		3
Grasslands/Herbaceous	83,589	76,746	113,876	274,212
High Intensity Residential		2		2
Low Intensity Residential	66	870	1	938
Open Water	27	56	2	86
Pasture/Hay	4	154	0	158
Quarries/Strip Mines/Gravel Pits		172		172
Row Crops	56	771		828
Shrubland	61,421	34,219	138,457	234,096
Small Grains	51	75		126
Urban/Recreational Grasses	21	125		146
Total	548,920	423,464	288,585	1,260,969

Note: Small errors in calculations are the result of 'edge rounding' associated with the use RASTER based NLCD.

Source: USGS EROS, National Land Cover Data (NLCD), Date 1992 (New Mexico). Calculations by UNM-BBER.

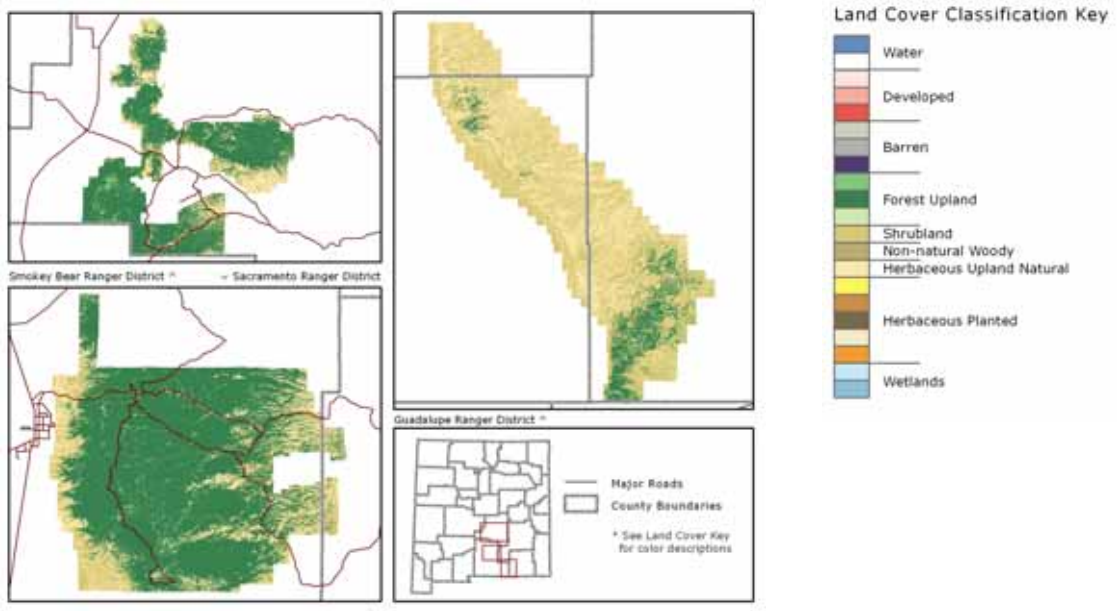


Figure 4.1: Land Cover on Lincoln NF

Land ownership is an important consideration in formulating appropriate policies regarding land use. Of the roughly 1.3 million acres within the boundaries of the Lincoln NF, approximately 167 thousand acres (13 percent) are privately owned; the remaining 1.1 million acres (87 percent) are publicly owned. The amount of privately owned land on Lincoln NF is consistent with patterns in other National Forests in New Mexico: Gila, Carson, and Santa Fe National Forests are 4, 7, and 8 percent privately owned, respectively, while Cibola NF is 24 percent privately owned. **Figure 4.2** provides a map of land ownership in Lincoln NF and the surrounding areas. As this figure shows, there is a checkerboard pattern of land ownership within Lincoln NF. The lack of

contiguous ownership has implications for effective and efficient land management, as various landowners are likely to have dissimilar management interests and priorities.

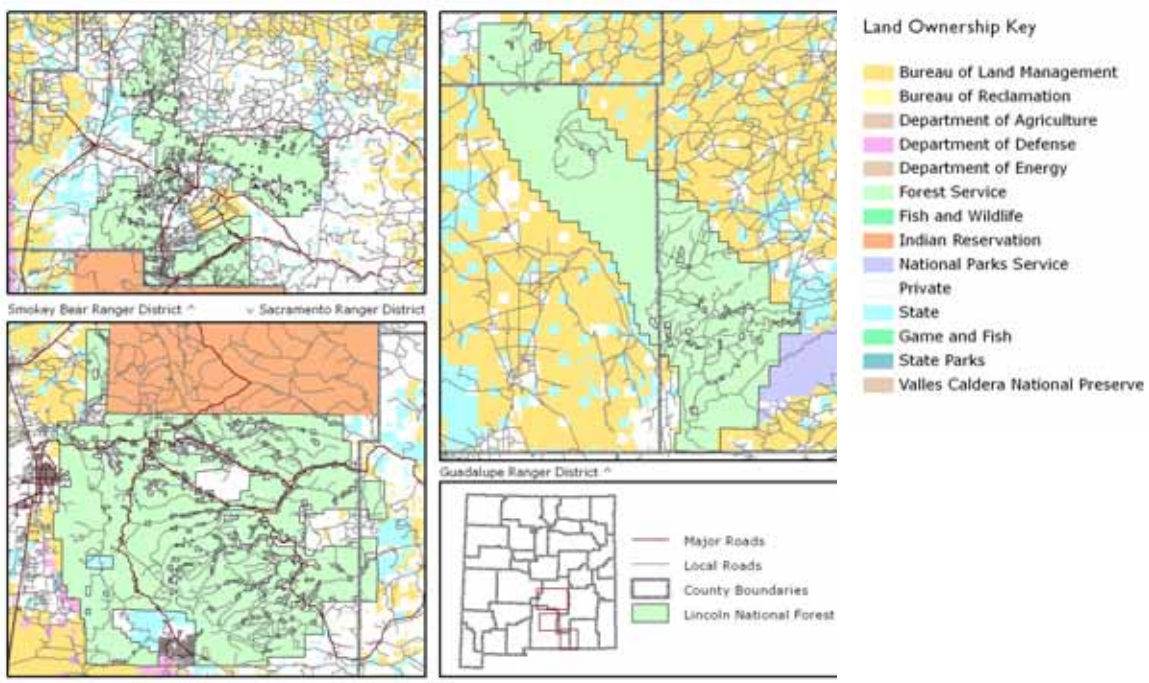


Figure 4.2: Land Ownership in Lincoln NF and Vicinity

Table 4.2 compares land cover on private and FS-owned lands on Lincoln NF by district. In general, privately owned lands within Lincoln NF consist of a greater proportion of evergreen forest and open water, and commensurately fewer shrub lands than FS-owned lands. However, this trend does not hold for all ranger districts. For example, the FS owns a greater proportion of evergreen forest acreage within the Smokey Bear RD and a greater proportion of open water acreage within the Sacramento RD than do private landowners do. Across districts, private parties hold a greater proportion of herbaceous grasslands acreage – lands more suited for grazing purposes – than does the FS. Note that a much greater percent of Lincoln NF is privately owned within the Sacramento and Smokey Bear RDs (18 and 15 percent, respectively) than in the Guadalupe RD (2 percent).

Table 4.2: Land Cover of Publicly and Privately Owned Land in Lincoln NF

	Sacramento			Smokey Bear		
	USFS	Private	Total	USFS	Private	Total
Bare Rock/Sand/Clay		0	0	12	9	21
Commercial/Industrial/Transportation	38	86	124	9	595	604
Deciduous Forest	3,435	2,097	5,532	4,783	311	5,094
Evergreen Forest	326,510	71,521	398,031	267,608	36,913	304,521
Grasslands/Herbaceous	66,830	16,760	83,590	60,107	16,640	76,747
Low Intensity Residential	6	61	66	1	870	870
Open Water	25	2	27	0	56	56
Pasture/Hay	2	2	4		154	154
Quarries/Strip Mines/Gravel Pits				76	96	172
Row Crops		56	56	25	746	771
Shrubland	53,560	7,852	61,413	27,997	6,205	34,202
Small Grains		51	51	9	65	75
Urban/Recreational Grasses		21	21	17	109	126
Total	450,406	98,514	548,920	360,644	62,770	423,414

	Guadalupe			Total Lincoln NF		
	USFS	Private	Total	USFS	Private	Total
Bare Rock/Sand/Clay	92		92	104	10	113
Commercial/Industrial/Transportation	75	8	83	122	689	811
Deciduous Forest	4,705	115	4,820	12,922	2,523	15,446
Evergreen Forest	30,566	699	31,265	624,684	109,133	733,817
Grasslands/Herbaceous	111,470	2,422	113,893	238,407	35,822	274,230
Low Intensity Residential	1		1	7	931	938
Open Water	2		2	28	58	86
Pasture/Hay	0		0	2	156	158
Quarries/Strip Mines/Gravel Pits			-	76	96	172
Row Crops			-	25	803	828
Shrubland	136,316	2,041	138,356	217,872	16,098	233,971
Small Grains			-	9	116	126
Urban/Recreational Grasses			-	17	129	146
Total	283,229	5,286	288,515	1,094,278	166,571	1,260,848

Note: Small errors in calculations are the result of 'edge rounding' associated with the use RASTER based NLCD.

Source: USGS EROS, National Land Cover Data (NLCD), Date 1992 (New Mexico). Calculations by UNM-BBER.

Table 4.2, Continued

	Sacramento			Smokey Bear		
	USFS	Private	Total	USFS	Private	Total
Commercial/Industrial/Transportation					1%	
Deciduous Forest	1%	2%	1%	1%	0%	1%
Evergreen Forest	72%	73%	73%	74%	59%	72%
Grasslands/Herbaceous	15%	17%	15%	17%	27%	18%
High Intensity Residential						
Low Intensity Residential					1%	0%
Row Crops					1%	
Shrubland	12%	8%	11%	8%	10%	8%
Total	100%	100%	100%	100%	100%	100%

	Guadalupe			Total Lincoln NF		
	USFS	Private	Total	USFS	Private	Total
Commercial/Industrial/Transportation		0%		0%	0%	0%
Deciduous Forest	2%	2%	2%	1%	2%	1%
Evergreen Forest	11%	13%	11%	57%	66%	58%
Grasslands/Herbaceous	39%	46%	39%	22%	22%	22%
Low Intensity Residential				0%	1%	0%
Row Crops				0%	0%	0%
Shrubland	48%	39%	48%	20%	10%	19%
Total	100%	100%	100%	100%	100%	100%

Note: Small errors in calculations are the result of 'edge rounding' associated with the use RASTER based NLCD.

Source: USGS EROS, National Land Cover Data (NLCD), Date 1992 (New Mexico). Calculations by UNM-BBER.

4.2 Land Conveyance and Exchanges

Land exchange is a key strategy for mitigating the management issues associated with the checkerboard pattern of landownership created by privately owned lands scattered within and around the NF. Changes in land ownership have occurred through land-for-land exchanges, land-for-timber exchanges, fee purchases, and land sales. Exchanges have been the most commonly used means of consolidating ownership. Efficient and effective management of forest areas in general increases as the contiguity of the forest area increases. The FS may therefore choose to trade isolated parcels of FS land for privately held land located either within the forest boundary or along the forest periphery. Land may also be acquired for numerous other reasons, including the support of threatened and endangered species, access provision, and research.

Although still ongoing, the frequency of changes in land ownership has declined in recent decades due to a lack of funds available for purchases, the time consuming nature of exchanges, and decreased interest by private landowners as the value of their land for subdivision purposes has increased.

Table 4.3 summaries three land exchanges that have taken place within the Lincoln NF during the past 10 years. Information in the table include federal acres and federal values: the number of acres transferred to private ownership and the associated dollar value; and non-federal acres and non-federal value: the number of acres transferred from private ownership to the FS and the associated dollar value. The Lessentine and Patterson land exchanges resulted in the transfer of 80 acres (values at $147,500) of NF land to private ownership in exchange for 78.22 acres

(valued at $354,400). From the Cloudcroft School conveyance the FS exchanged 40 acres valued at $214,000 for a cash payment of equivalent value.

Table 4.3: Land Conveyance and Exchanges for Lincoln NF

Case Name	Federal Acres	Federal Value	Plus Cash	Non-Federal Acres	Non-Federal Value	Fiscal Year
Cloudcroft Schools		Cash in lieu of land	$214,000	40.000	$214,000	1997
Lessentine, Richard	40.000	$103,500		38.220	$96,500	1989
Patterson, Karl	40.000	$44,000		40.000	$44,000	1990
Total	80.000	$147,500	$214,000	118.220	354,500.000	

Source: USDA Forest Service Exchanges and Conveyances Database

The Secure Rural Schools and Community Self-Determination Act of 2000 (commonly known as Payments to States) has introduced another aspect of land adjustment of concern for Lincoln NF. Nearly 100 years ago, legislation was created to give counties a percentage of the revenues raised through timber sales and grazing fees on public lands. Revenues received by counties were to be used for schools, roads, and planning. This worked well for many schools until the 1980s when timber harvests declined. The Secure Rural Schools Act was passed into law in 2000 with the intent of addressing the revenue declines; payments to counties for years 2001-2006 were to be based upon the state's top three years of payments from timber and grazing receipts.[15] The FY 2007 President's budget proposes to reauthorize the Secure Rural Schools program for another five years. To help fund this initiative the Administration recommends selling a limited number of acres of National Forest System lands around the nation. Potentially eligible lands have been identified and are displayed in a table as Lands Potentially Eligible for Sale by State and National Forest.[16] Of the 7,373 acres of New Mexico NF lands identified as potentially eligible for sale, nearly 1,780 acres are located within Lincoln NF (1,072 acres in Otero County and 708 acres in Lincoln County).

Lands eligible for exchange are often justified as "suitable for conveyance because they are isolated or inefficient to manage."[17] Critics of the plan argue that it is "a dollar of forest for a dime of education,"[18] implying that it is inappropriate to sell the land to address an ongoing need.

4.3 Endangered and Invasive Species

Lincoln NF is home to several plant and animal species listed as either threatened or endangered under the Endangered Species Act (ESA). ESA-listed plants located within Lincoln NF include the Sacramento prickly poppy, Sacramento Mountain thistle, Texas Madrone, and Kuenzler hedgehog cactus. Threatened or endangered animals include the Mexican spotted owl, the Chiricahua leopard frog, and the bald eagle.[19] Lincoln NF also provides habitat suitable for numerous threatened and endangered species.[20]

[15] http://wwwnotes.fs.fed.us:81/r4/payments_to_states.nsf.
[16] http://www.fs.fed.us/land/staff/rural_schools.shtml.
[17] Oversight Field Research before the Subcommittee on Forests and Forest Health.
[18] Hananela, S. March 19, 2006. The Associated Press.
[19] Information accessed online: http://www.fws.gov/ifw2es/NewMexico/ES_bio_op.cfm.
[20] For a complete list see: U.S. Forest Service. 1986. *Environmental Impacts Statement for the Lincoln National Forest Plan*.

The presence of threatened or endangered species has had implications for conducting prescribed burns and the treatment of overgrown woodlands. For example, the presence of a high number of Mexican spotted owls (more than 100), in conjunction with management requirements stipulated by the Basin & Range – East Recovery Unit Plan, have challenged the ability of the FS to meet two of the primary goals defined by Region 3 under the Healthy Forests Restoration Act of 2003: protection of communities adjacent to NF land and restoration of the ecological functionality of fire-adapted ecosystems.[21]

Non-native, invasive plants and insects can cause major disruptions in ecosystem function. Wildlife habitat can be compromised when weeds take over native plant communities – palatable forage decreases as weeds like thistle, leafy spurge, and yellow toadflax take over, and weeds such as black henbane, poison hemlock, and yellow star thistle can be poisonous to animals.[22] Invasive or noxious weeds are common along roads, trails, and riparian areas, and can be spread by OHVs, grazing animals, visitors, and water flow. Drought conditions can affect the spread of both noxious weeds and invasive insect species.

Invasive plant species present on Lincoln NF include Russian knapweed, musk thistle, Canada thistle, bull thistle, leafy spurge, teasel, Dalmatian toadflax, whitetop, poison hemlock, and burdock.[23] With the exception of the musk thistle, these weeds are primarily prevalent on the Sacramento RD; the musk thistle is evenly distributed on both the Sacramento and Smokey Bear RDs. Weeds are not a significant problem in the Guadalupe RD as this district is much drier and more remote. Fewer roads, traffic, and visitors translate into fewer vectors to bring weeds into the area.

Roughly 2,000 acres of weeds are treated with herbicides each year. Funding and weather conditions both cause fluctuations in the number of acres treated. In some areas herbicidal treatments are causing a reduction in the number of infested acres, while in other areas treatments are only keeping the extent of the weed infestation from increasing. The presence of weeds on private lands can hinder FS efforts to treat weeds. Because private landowners are not required to treat weed infestations, the presence of weeds on private lands (both within and abutting FS land) often serve as a seed source for weeds on FS land.

In addition to herbicidal treatments, the FS is also moving toward requiring the use of certified weed-free hay by horse groups, hunters, outfitters, guides, etc. Progress in this direction is dependent upon a reliable supply of such feed.

Bark beetles are native to the southwest United States and traditionally play a key function in the forests' ecosystems. However, exceptionally high population levels have in recent years led to excessive numbers of tree deaths, and therefore higher fuel levels and increased fire danger. Bark beetle populations "crashed" in 2004, but the forest is at risk for a new infestation due to the recent drought conditions in the area[24] – bark beetles only reach infestation levels when tree health has already been compromised by other factors, such as drought or overcrowding. According to FS officials, the beetle infestation will continue until drought conditions subside and

[21] *Forest Plan Monitoring and Evaluation Summary: Lincoln National Forest Fiscal Year 2004,* http://www.fs.fed.us/r3/lincoln/contact/planning/2004_LNF_monitoring_report.pdf.
[22] U.S. Forest Service, Final Environmental Impact Statement – *Invasive Plan Control Projec*t.
[23] Information regarding invasive plants comes from personal communication with Larry Cosper (Lincoln NF Range/Wildlife/Watershed Staff Officer).
[24] Tom Sharpe, "Preparing for the Worst," *The Santa Fe New Mexican*, February 21, 2006.

trees recover their vigor. In order to reduce the impacts of future outbreaks, forest health must be improved by thinning overcrowded stands of trees.

4.4 Fire and Fuels

Much of the West has been under drought conditions over the last several years. Continued drought conditions combined with high fuel loads have created dangerous conditions for much of the West. Some 26 million acres in the West have been identified as fuels treatment "hot spots" or high priority areas. The Cree and Scott-Able Fires both occurred during 2000 and burned a total of 22,500 acres, the majority of which were FS lands. Both were human-caused fires. In May of 2004, the lightning-caused Peppin Fire burned 65,000 acres within the Capitan Mountain Wilderness (Smokey Bear RD). In addition to drought and elevated fuel loads, high winds, low humidity, and steep and rugged terrain complicated fire-fighting efforts.[25]

The Peppin Fire has resulted in New Mexicans' increased awareness of fire and the contentious issues and difficulties inherent in forest and fire management. Due to the steep and rugged terrain in which the Peppin Fire burned, the FS originally took an "indirect" containment approach, constructing fire lines well away from the fire. However, after a week's time the fire blew up – within a short amount of time the fire had rapidly spread and destroyed numerous homes.[26]

High fuel loads and subsequent high severity burns are the result of years of active fire suppression, and can hamper the ability to restore ecological functionality through the use of fire. The FS is facing increased urgency to reduce the hazardous fuel loads and reduce the likelihood of a crown fire near the adjacent communities. Reduced fuel loads also provide safer conditions for firefighters and allow them greater access to protect homes in and around the forest. However, some residents and environmentalists are concerned with the methods used in reducing fuel loads. Common treatments to reduce fuels include thinning, prescribed burning, and clearing the forest of debris. In some cases, the FS uses herbicides to kill invasive weeds that become fire fuel.[27]

4.5 Challenges and Opportunities for Forest Management

The key issues regarding land cover and ownership that confront the Lincoln NF pertain to ecological diversity and the management of invasive species, and fire and fuels management. Directly or indirectly, each of these issues is shaped by patterns of landownership – specifically the checkerboard pattern of public-private landownership. This factor plays a greater role in the two northern RDs, where about 17 percent of the land within the forest boundaries is privately owned, than in the southern Guadalupe RD, where only 2 percent of land within the boundaries is privately owned.

The fragmented pattern of landownership can be both problematic and beneficial to FS efforts to maintain ecological diversity, protect endangered and threatened species and manage the spread of invasive species. The challenge posed by this fragmented pattern of landownership is that public and private land managers, given different priorities, objectives and resources allocations, often implement dissimilar land management programs, undermining the contiguous application

[25] USFS Lincoln National Forest. Monitoring and Evaluation Summary—FY2004: Lincoln National Forest.
[26] Adam Burke. "As Fire Season Ignites, Smokey Bear's Legacy Lingers", *High Country News*, June 21, 2004.
[27] Associated Press, "Environmentalists Want Alternatives for Killing Weeds," January 12, 2006.

of management practices that are essential to the success of such programs. For instance, programs to eradicate an invasive species must be consistent in its application or improvements will be only temporary. Likewise, programs to protect endangered and threatened species must be enacted on an ecosystem-wide basis to be effective over the long term.

Yet, the checkerboard pattern of landownership also represents a valuable opportunity for Lincoln NF managers to demonstrate alternative and sustainable management practices to private landowners; the diffusion of information and technology can be facilitated by the existence of non-contiguous land ownership. This enables the FS to better achieve its land management objectives and fulfill in broadest mission to "demonstrate the sustainable multiple-use management concept."[28]

A second challenge to the Lincoln NF regards fire and fuels management. Years of fire suppression policy have caused forests to become much more densely populated than under historical and natural conditions. The effects of dense forests for fire management have been immense – whereas historically fires would burn cool and serve to rejuvenate the forest, today's dense tree stands cause fires to burn hot and more destructively.[29] Again, the presence of private development within and along NF boundaries complicates this management issue, increasing the risks of fire while exposing persons and private property to the hazards of forest fire. Yet, the presence of private landowners can contribute to better fire management programs, contributing to the knowledge and awareness of FS managers, and advocating for sustainable fire management policies.

[28] The USDA Forest Service Mission, Motto, Vision, and Guiding Principles. http://www.fs.fed.us/aboutus/mission.shtml.
[29] The concept of an increase in tree density resulting in an increase in the likelihood for catastrophic fire is discussed and alluded to in numerous reports published by the FS. For example, see Forest Plan Monitoring and Evaluation Summary: Lincoln National Forest Fiscal Year 2004, http://www.fs.fed.us/r3/lincoln/contact/planning/2004_LNF_monitoring_report.pdf

5 Forest Uses and Users

The purpose of this chapter is to describe how different parts of the Lincoln National Forest (NF) are used and by whom. The mission of the Forest Service (FS) is to allow the land to be accessed for multiple uses including: recreation, tourism, subsistence, and grazing, as well as maintaining scenic resources for the community and visitors. The groups of people who use NF resources are diverse, and they interact with the forest environment in a broad assortment of ways that have significant consequences for forest ecosystems and the people who depend on them.[30]

The multiple-use mandate poses a fundamental management challenge. Increased usage by diverse and growing populations inevitably runs up against the constraint of limited resources. As a result, one type of use begins to impinge on another, raising challenges for FS management. The coordination of multiple land uses is a major challenge for FS officials because it is involved in practically every forest planning decision. While philosophically many forest users are hesitant to limit access, increasing attention is being given to how some users are degrading the land and the experiences of other users.

Historically, the Lincoln assessment area had a resource-based economy. The makeup of the economy changed over time as recreation and tourism uses became more prominent. Tensions are caused by the fact that visitors and new residents increase the variety and amount of demands placed on forest resources, impinging on traditional uses. The overall rise in recreational demand has caused an increased concentration of users, which subsequently has increased the likelihood of conflicts among users and uses. The nature and intensity of these land use conflicts varies substantially among the three Lincoln NF ranger districts (RDs).

5.1 Recreation

Recreation is one of the major uses of the Lincoln NF. **Table 5.1** summarizes data on recreational users provided by the FS. The data included in this table are estimates based on the National Visitor Use Monitoring (NVUM) surveys conducted by the FS. The NVUM database classifies visits as either recreation-related (e.g. hiking, picnic, camping) or wildlife-related (e.g. hunting, fishing, wildlife watching).

The data estimates that 780,000 people visited Lincoln NF during 1999 and 2000. Unfortunately the data is not delineated by RD. Visitors may access most forest areas without charge, although there are some “fee areas” at sites that have developed recreation facilities.

The majority of visitors (71 percent) were locals, though nearly a third of visitors were non-locals.[31] The vast majority of visitors (98 percent) engaged in recreational activities, compared to only 2 percent in wildlife activities. More than one-half of visitors to Lincoln NF (52 percent) spent at least one night within the forest.

[30] Dwyer, J.F. 1995. Integrating social sciences in ecosystem management: People-forest interactions in the urban forest, in H.K. Cordell (Ed.), *Integrating Social Sciences and Ecosystem Management: A National Challenge*. Athens, GA: USDA, Forest Service, Southern Research Station.

[31] Local users are defined as those visiting for day use only, returning to residence at the end of the day.

Table 5.1: Number of Recreational & Wildlife Visitors to Lincoln NF

	Recreation	Wildlife	Total	%
Non-local Day Travel to Forest	**116,759**	**2,383**	**119,142**	**15%**
Non-local Overnight Stay on Forest Land	**100,079**	**2,042**	**102,122**	**13%**
Local Day travel to Forest	**225,178**	**4,595**	**229,774**	**29%**
Local Overnight With Stay on Forest Land	**300,237**	**6,127**	**306,365**	**39%**
Local Overnight Without Stay on Forest Land	**25,020**	**511**	**25,530**	**3%**
NonPrimary	**33,360**	**681**	**34,041**	**4%**
Total	**767,273**	**15,659**	**782,932**	**100%**

Lincoln NF is home to a unique cave system, two wilderness areas, and two ski areas. The higher and cooler elevations of Lincoln NF and the fact that Lincoln NF is an easy two-hour drive from west Texas communities such as El Paso and Lubbock make it an attractive destination for many Texans. In this manner especially Lincoln NF is a resource that serves to attract many tourists and their money to the surrounding communities.

The Southern Guadalupe Mountains contain some of the most unique and scenic cave formations in the world, the product of what is generally considered the best-preserved Permian-aged fossil reef in the world.[32] There are more than 100 caves known to exist within the three ranger districts, nearly all in the Guadalupe RD.[33] Although some caves are open to the public, others have been closed for restoration, research, or to protect threatened and endangered species.[34] The Sitting Bull Falls Recreation Area, located in the Guadalupe RD, is a primary attraction for locals and visitors to southeastern New Mexico. The recreation area is one of the fee areas within the Lincoln NF, where 50 percent of operation and maintenance costs are funded with user fees. The area provides 26 miles of trails, a picnic area, and is the location of Sitting Bull Falls Cave.

There are numerous developed recreation sites – including campgrounds, picnic areas, snow play areas, and interpretive centers – located throughout Lincoln NF. In addition, many visitors come to hunt, backpack, hike, horseback ride, and otherwise enjoy the vast tracts of roadless and relatively undisturbed areas found within the Lincoln NF. These areas include inventoried roadless areas, most notably within the White Mountain and Capitan Mountain Wilderness areas, both located within the Smokey Bear Ranger District. In addition to numerous trails available for cross-country ski purposes, two downhill ski areas are partially located on Lincoln NF land – Ski Apache and Ski Cloudcroft. Downhill skiing opportunities contribute significant dollars to the economies of both Ruidoso and Cloudcroft.

Visitor spending is the single most important contributor to the economic impact of Lincoln NF. Information regarding the spending profiles of different kinds of recreational users is discussed in Chapter 7.

[32] GEOLOGY 101 – Permian reef to limestone mountains, cave dissolution to cave decoration. http://www.nps.gov/cave/geology.htm.
[33] U.S. Forest Service. 2004. *Lincoln National Forest Stakeholder's Report for 2003*.
[34] FS efforts to inventory and manage the caves continue, but have been limited due to low funding levels.

Hunting and Wildlife

Numerous visitors, especially hunters and wildlife viewers, are attracted by the diversity of wildlife in Lincoln NF. The statewide importance of wildlife is illustrated by the fact that almost 600 thousand New Mexico residents participated in hunting, fishing, or wildlife watching during 2001, contributing nearly $1 billion to the State's economy.[35]

Under federal mandate, wildlife and hunting are regulated by states, which are responsible for issuing permits and licenses, although wildlife habitat is managed by the appropriate land management agency. In New Mexico, permits for elk, deer, and antelope are issued on a lottery basis to New Mexico residents and non-residents by the state Department of Game and Fish. The seasons and hunting dates are highly regulated. A full description of elk and deer hunting regulations specific to Lincoln NF can be found in **Table A.3** of the Appendix.

Hunting occurs during the autumn months in the form of both guided and unguided hunts, although the majority of permits and licenses are issued to outfitters and guides. In New Mexico, small geographical areas in the national forests are designated as hunting management "units." The units are used to designate hunting areas, as regulations regarding hunting dates and limits are set at the unit-level. **Table 5.2** provides hunting management unit information for large game (primarily elk and antelope) within the Lincoln NF.

Table 5.2: Management Units in Lincoln NF

Management Unit	Elk and Big Game	Antelope
Lincoln NF	36,37,38	34,37
Chaves	32,33	32,33,34
Otero	28,29,43,45	29,35
Eddy	30	28,30

Source: New Mexico Department of Game and Fish

The Capitan Mountain Wilderness is well known for hunting, especially for deer, bear, and turkey. White Mountain Wilderness provides opportunities to hunt deer, elk, bear, and turkey. According to a FS report (1986), Lincoln NF is home to 235 bird species and thus provides opportunities for wildlife watchers. As a whole, fishing opportunities within Lincoln NF are rather limited. However, fishing opportunities are of an especially high quality in the Southern Sacramento Mountains.[36] Fishing opportunities in the Capitan Mountain Wilderness are limited to a couple of small streams on the northern side, and are limited in the White Mountain Wilderness to small stretches of the Rio Bonito and Three-Rivers Creek.

5.2 Grazing

Grazing has been ongoing in the area surrounding the Lincoln NF since the mid- to late-1800s, when a large cattle industry developed in the area.[37] Although historically the area was home to multi-generational ranching families, economic and social changes have meant that these

[35] U.S. Department of the Interior, Fish and Wildlife Service, 2001 *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: State Overview*. http://library.fws.gov/Pubs/State_overview01.pdf
[36] http://www.fs.fed.us/r3/lincoln/.
[37] Spoerl, P.M. 1983. *Thousands of Years of Use: Prehistory and History on the Lincoln National Forest.*

lifestyles must be supplemented with additional sources of income. Despite this fact, ranching continues because it is part of the area's heritage and culture. Local ranchers assert that access to grazing on Lincoln NF is critical to the continued survival of the area's ranching culture.[38]

Seven hundred thousand of Lincoln NF's 1.1 million acres (64 percent) are considered suitable for rangeland.[39] **Table 5.3** lists the number of grazing permits issued during the past several years[40] by each ranger district within Lincoln NF. It is interesting to note that the Smokey Bear and Sacramento RDs provide a much higher number of grazing allotments than does the Guadalupe RD. Ranching activities associated with Lincoln NF have a significant impact on the area's local economy. Because almost all permittees are local residents,[41] it is reasonable to assume that local residents receive the majority of the economic impacts from grazing activities that occur within Lincoln NF. The magnitude of economic impacts stemming from ranching is second only to those stemming from recreation and Lincoln NF visitors.

Table 5.3: Number of Grazing Permits Sold in Lincoln NF

	# Permits	# Allotments			
		Active	Closed	Vacant	Other/ Combined
Guadalupe	**11**	**16**	**1**	**0**	**0**
Sacramento	**45**	**43**	**6**	**2**	**1**
Smokey Bear	**52**	**45**	**7**	**1**	**2**
District Total	**108**	**104**	**14**	**3**	**3**

Source: USDA Forest Service Grazing Permits and Grazing Allotment Databases

Table 5.4 shows the legal address of the 117 holders of grazing permits to Lincoln NF. With few exceptions, permittees are local to the Lincoln NF area; only three permittees (in Dallas and Fort Worth) are not in close proximity to the forest, suggesting a strong relationship between ranchers and the NF allotments. Furthermore, the data indicates that there is no particular concentration of permits. Residents of Capitan, adjacent to the Smokey Bear RD, hold the greatest number of permits (14), and residents of no other community hold even 10 percent of all permits.

Grazing fees are charged per animal unit month (AUM) and are subject to change. The AUM is the amount of forage needed to sustain one cow and her calf, one horse, or five sheep or goats for a month. The grazing fee for Western public lands was raised to $1.43 per AUM from $1.35 in 2003.[42] The 2005 fee is $1.79 per AUM.[43]

[38] Russell, J.C. and Adams-Russell, P.A. 2006. *Values, Attitudes and Beliefs toward National Forest System Lands: The Lincoln National Forest (Draft)*.
[39] U.S. Forest Service. 1986. *Environmental Impact Statement for the Lincoln National Forest Plan*.
[40] FS staff indicated the data covered "the past several years," personal communication 03/27/2006.
[41] Residency of holders of grazing permits is summarized in **Table 5.4**, and reviewed below.
[42] U.S. Forest Service News Release: FS-0406 February 20, 2004
[43] http://www.blm.gov/nhp/efoia/wo/fy05/im2005-067.htm.

Table 5.4: Location of Lincoln NF Grazing Permittees

	Guadalupe	Sacramento	Smokey Bear	Total Lincoln NF
Alamogordo		10		10
Artesia	1	5	1	7
Capitan			14	14
Carlsbad	8	1		9
Carrizozo			10	10
Cloudcroft		5		5
Glencoe			5	5
Hagerman		1		1
Hobbs			1	1
Hope	2	1	1	4
Las Cruces		4	2	6
Lincoln			1	1
Mayhill		9		9
Nogal			7	7
Pinon		3		3
Portales		1		1
Rio Rancho			1	1
Roswell			3	3
Ruidoso			1	1
Ruidoso Downs			3	3
Tinnie			2	2
Tularosa		2		2
Weed		3		3
Clint, TX		1		1
Dallas, TX	1		1	2
El Paso, TX	2	1		3
Fort Worth, TX			1	1
Sudan, TX	2			2
Total	16	47	54	117

Source: USDA Forest Service, INFRA Grazing Database.

Table 5.5 lists the number of AUMs on Lincoln NF. Note that the number of AUMs has generally been lower in recent years than a decade ago. The table also shows the Bureau of Business and Economic Research (BBER) estimates of the number of full-time ranching and agricultural workers supported by each year's level of grazing.[44] Within the assessment area, the

[44] The number of ranch and agricultural workers is an estimate based on based upon estimates of man-hours derived from the IMPLAN® mode

number of employment opportunities created by grazing is second only to that created by the FS itself. This will be analyzed in greater detail in Chapter 7. Although the FS infrastructure database (INFRA) also contains data indicating the acreage of grazing allotments, BBER was informed that the data represented "ballpark estimates" of acreage and may include additional acreage such as BLM, private land, and in-holdings. For this reason, BBER was unable to determine the number of acres used for grazing purposes within each RD.

Table 5.5: Animal Unit Months on Lincoln NF, 1986-2002

Year	AUM's	Employees
1986	142,070	108
1987	139,821	106
1988	107,750	82
1989	120,090	91
1990	118,804	90
1991	131,863	100
1992	NA	NA
1993	134,201	102
1994	135,214	103
1995	133,694	101
1996	136,819	104
1997	137,215	104
1998	105,429	80
1999	120,692	92
2000	144,254	109
2001	128,840	98
2002	121,020	92

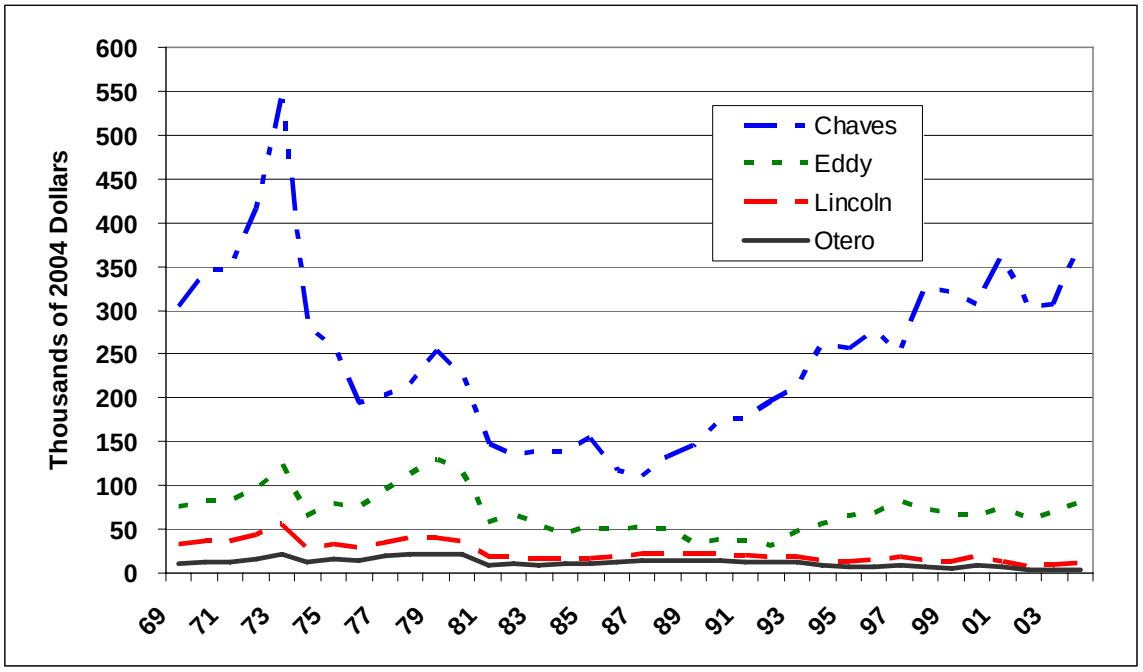
Source: USDA Forest Service Grazing INFRA Database

Ranchers face numerous challenges and frustrations. Population growth and an increase in the number of vacation homes have created a demand for land, which has led to the sale of ranch land for subdivision purposes. There is a frustration among ranchers with visitors and newcomers who wish to alter the way the land is used and change the area's culture (Russell and Adams-Russell 2006). Another difficulty faced by both ranchers and wildlife managers is the competition for forage that occurs between elk and livestock, which is exaggerated by the area's current and ongoing drought conditions. Competition is most severe in big game unit 34. The New Mexico Department of Game and Fish and Lincoln NF together coordinate the monitoring of elk and livestock.[45]

Figure 5.1 presents information regarding trends in cash receipts from livestock and products for years 1969 through 2004 (the latest year for which information was available in 2004 dollars), adjusted for inflation using the price index for personal consumption expenditures from the Department of Commerce Bureau of Economic Analysis. As depicted in the figure, cash receipts have in general declined over the last three decades. Chaves County faired better than the other

[45] U.S. Forest Service. 2005. *Forest Plan Monitoring and Evaluation Report:* Lincoln National Forest, Fiscal Year 2004.

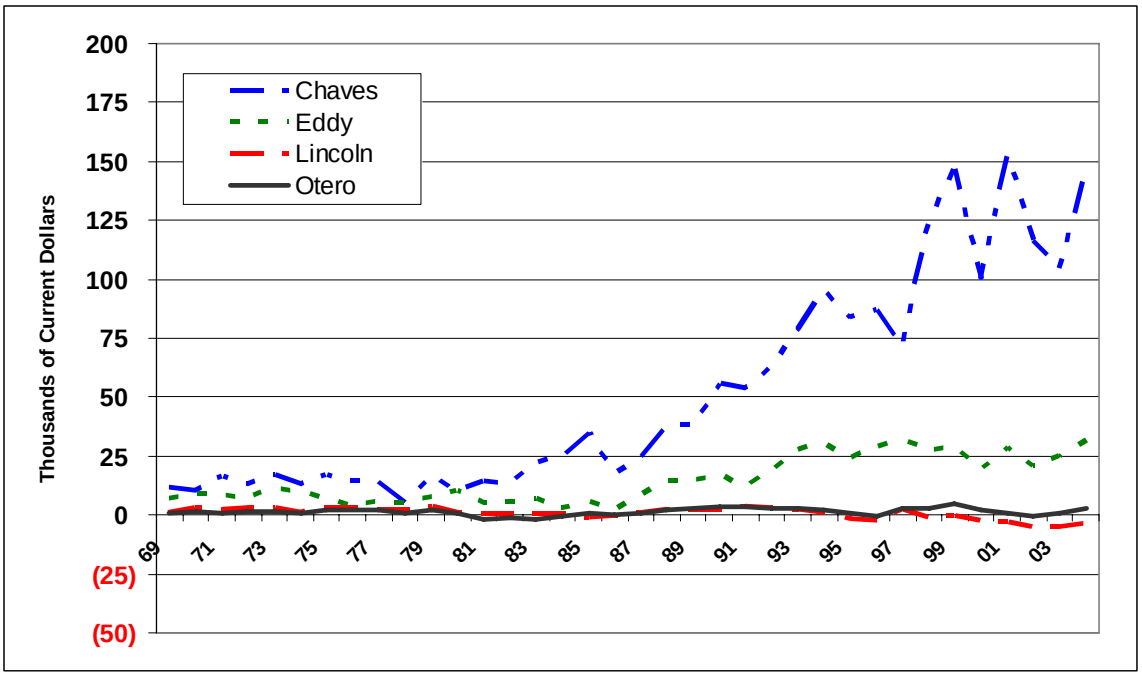
three counties, as cash receipts in Chaves County have experienced an upward trend since the mid- to late-1980s, as the dairy industry has grown in importance.



Source: U.S. Bureau of Economic Analysis

Figure 5.1: Cash Receipts From Livestock and Products, 1969-2004

Figure 5.2 presents incomes generated by agricultural sector, including ranching, for each of the four counties from 1969 through 2004. Chaves County is again the anomaly, with farm income showing a steady increase since the mid- to late-1980s. Note that the data indicate occasional losses to proprietors in Lincoln and Otero Counties. This is significant but should not be overstated, as many New Mexican ranchers accept low or negative operating incomes as part of a broader interest in developing long-term equity.



Source: U.S. Bureau of Economic Analysis

Figure 5.2: Farm Proprietors and Employee Income, 1969-2004

Figures 5.1 and **5.2** attest to some problems in ranching. Ranchers have been challenged by the drought conditions that exist across the Southwest as well as by legal developments that have changed how the FS must manage the grazing program for Lincoln and other national forests. Federal legislation, including the Endangered Species Act and the Water Quality Protection Act, as well as regulatory structure of the National Environmental Protection Act, has had significant impacts on grazing practices. Commonly, these measures either limit the number of animals on the forest land or otherwise force changes in livestock practices. In some cases, regulatory changes force ranchers to adopt new strategies to remain viable, while in other cases ranchers respond by selling land (both within the forest and on its perimeter) for residential development.

5.3 Timber

Logging has occurred in the area of Lincoln NF since the early 1900s, when spur lines were added to the local railroad to access valuable timber country. The area along the summit of the Sacramento Mountains was heavily logged, as this was where some of the area's best timber was located. By the mid-1900s increased logging costs and construction of highways made railroad logging unproductive, so the tracks were taken up. Throughout this time, grazing rather than logging was the dominant industry on Lincoln NF; most timber harvesting occurred on private lands in the surrounding area.[46] As with grazing, the assessment area was historically home to multi-generational families associated with timber harvesting. However, recent economic and social changes have necessitated that this lifestyle be supplemented with additional sources of income.[47]

[46] Spoerl, P.M. 1983. *Thousands of Years of Use: Prehistory and History on the Lincoln National Forest*.
[47] Russell, J.C. and Adams-Russell, P.A. 2006. *Values, Attitudes and Beliefs toward National Forest System Lands: The Lincoln National Forest* (Draft).

According to the FS (1986) there are nearly 260 thousand acres within Lincoln NF classified as tentatively suitable for timber harvest.[48] Harvested species are primarily Douglas fir, white fir, ponderosa pine, southwestern white pine, and aspen. Relative to other areas of the Southwest, productivity on Lincoln NF is average to high.

Table 5.6 presents the revenues from timber sold by Lincoln NF between 2000 and 2004. The purchase of a contract to harvest timber allows an entity access to the forest for a specified period of time, typically one year. To determine the value of the harvested timber (values displayed in the "Actual Cut" column), the same per board foot values used in the permit are applied to the quantity of harvested timber.

Table 5.6: Timber Sales on Lincoln NF, 2000-2004

Year	Contracts Sold	Actual Cut
2000	**$74,540**	**$53,028**
2001	**$132,549**	**$109,509**
2002	**$66,554**	**$72,766**
2003	**$136,205**	**$149,203**
2004	**$144,757**	**$80,892**
Lincoln Total	**$554,606**	**$465,398**

Source: USDA Forest Service TIMS Database

Due to its location near large and growing population centers in both Texas and New Mexico, Lincoln NF faces a growing demand for timber products. Saw logs are primarily processed into building materials. Current production levels are insufficient to meet the needs of local mills. To keep local mills operating, saw logs have in the past been hauled from as far away as the Gila NF.[49]

Summary statistics on Lincoln NF from the Timber Information Manager database[50] are provided in **Table 5.7**. The data clearly illustrate that the most valuable forest product is saw timber, with a sales value of more than $2.6 million (82 percent of the value of all timber products harvested from Lincoln NF in 2004). This is in contrast to many other national forests within New Mexico (such as Gila, Cibola, and Carson NFs) where fuel wood is the most valuable forest product. The second most valuable forest product is fuel wood; 2004 fuel wood harvests are valued at nearly $404 thousand (13 percent of the value of all timber products). Fuel wood harvesting can be used as a means of cleaning up slash from logging and thinning activities, and serves to reduce fire dangers. Future demand for fuel wood is expected to increase as populations grow and energy prices increase. The "FS Permit Value" for Christmas trees is $13,525 and the "Sold Value" for soft poles is $147,319. These dollar figures indicate that poles and Christmas trees are also important forest products.

[48] To be classified as tentatively suitable for harvest, the area must meet the following criteria: the area must 1) be located outside wilderness boundaries, 2) be capable of being logged without causing irreversible damage to resources, and 3) reforestation must be possible within 5 years of harvest.
[49] U.S. Forest Service. 1986. *Environmental Impact Statement for the Lincoln National Forest Plan*.
[50] The TIM is a set of computer systems and databases used by the FS and the U.S. Department of Agriculture for managing technical and financial data about the sale of forest products and timber on FS lands.

As discussed in an Otero County Economic Development Council newsletter (2004), the economic viability of Lincoln NF as a source of wood products has declined in recent years, in part as a result of the Endangered Species Act. The Mescalero Apache Tribe operates two of the state's few remaining sawmills, and finds it difficult to obtain adequate timber from Lincoln NF. Efforts are underway to formulate a plan to harvest more timber from Lincoln NF (Otero County Economic Development Council 2004).[51] Further evidence of the currently small impact of the timber industry on the region's economy is provided and discussed in Chapter 7.

Table 5.7: Timber and Non-Timber Product Activity on Lincoln NF, 2004

Type	Actual Cut Volume (MBF)	Actual Sales Volume (MBF)	USFS Permit Values ($)	Market Price (Dollars per MBF or Cord)*	Cut Value (Dollars)	Sold Value (Dollars)[d]
Soft Sawtimber[a]	1,960	6,624	$104,653	$397	$778,993	$2,632,876
Hard Sawtimber[a]	0	0	$0	$425	$0	$0
Soft Pulpwood[b]	0	445	$700	$62	$0	$27,375
Hard Pulpwood	0	0	$0	$62	$0	$0
Soft Poles	270	265	$899	$557	$150,035	$147,319
Hard Poles	0	0	$0	$557	$0	$0
Soft Posts[c]	5	4	$157	$4	$22	$19
Hard Posts[c]	0	0	$0	$4	$0	$0
Fuelwood	1,206	1,262	$18,451	$320	$385,760	$403,680
Total Timber	3,440	8,599	124,860	2,387	1,314,809	3,211,268
Misc. Convert	293	300	$1,542	$0	$0	$0
Christmas Trees	2,700	2,705	$13,525	$0	$0	$0
Misc. Not Convert	0	0	$0	$0	$0	$0
Transplant	0	0	$0	$0	$0	$0
Total Non-Timber	2,993	3,005	15,067	0	0	0
Lincoln Total	6,433	11,604	139,927	2,387	1,314,809	3,211,268

[a] Montana delivered prices
[b] Texas Timber Price Trends, 2002
[c] Missouri/MBF
[d] Sold Value reflects use of estated market prices, except for non-timber, where the forest services fees are used.

Source: USDA Forest Service TIMS Database

5.4 Mining

The northern portions of Lincoln NF have a long history of mineral exploration and development, although extractive uses have declined dramatically over time. Most locatable minerals occur in the Smokey Bear RD; although some are located within the Sacramento RD. Sources of actual and potential mineral production include gold (discovered in the 1870s), silver, lead, copper, tungsten, uranium, molybdenum, and iron.[52] **Table 5.8** documents the mineral activity on or near Lincoln NF. At present, though there are numerous active mining claims and oil and gas leases on Lincoln NF, only one oil and gas lease is currently producing and no mines are known to be in production.

Controversy exists pertaining to the issue of oil and gas development on a parcel of BLM land, known as Otero Mesa, which lies in the same general vicinity as the Guadalupe RD. Controversy has arisen because the area is also North America's largest and wildest Chihuahuan Desert grassland on public land. There are numerous concerns regarding the effects of oil and gas development on the ecosystem, groundwater, ranching operations, and wildlife. Various

[51] Otero County Economic Development Council Report. April 2004. http://www.ocedc.com/newsletter/Newsletter_April04.pdf.
[52] U.S. Forest Service. 1986. *Environmental Impact Statement for the Lincoln National Forest Plan*.

environmental and conservation organizations are working to halt oil and gas development in the Otero Mesa area. However, pressures from the oil and gas industry have increased as energy prices have risen.

Table 5.8: Mining Industry Control of Public Lands on or near Lincoln NF

Lincoln National Forest Control Summary:	Controls inside the boundary	Controls within 5 miles of boundary
Tier 1 control: Active drilling and pumping		
Oil & gas leases - active drilling and pumping	1	11
Tier 2 control: land controlled by industry		
Mining claims - current land claims by mining industry	236	22
Oil & gas leases - active leases not yet producing	6	56
Tier 3 control: abandoned or defunct operations		
Closed or abandoned mines/plans/notices	27	15
Mining patents - mineral-rich public lands titled to mining industry	82	60
Oil & gas leases - formerly drilled and pumped	50	48
Tier 4 control: sited refused or abandoned		
Mining claims - land formerly claimed by industry	5,800	592
Oil & gas leases - lands formerly leased by industry	498	689

Source: EWG analysis of the Bureau of Land Management's Land and Mineral Records 2000 (LR2000) database (BLM 2004), the United States Geological Survey's Mineral Availability and Mineral Industry Location records (USGS 1998), and various industry sources. Land use records are current through October 15, 2004.

http://www.ewg.org/reports/losingground/sitedetail.php?place_name=Gila+Forest+Roadless+Area

5.5 Land Use Authorizations, Leases and Easements

The FS requires specific approval, in the form of written authorization, for a variety of different uses of national forest lands. Uses that require such authorization include water transmission, agriculture, outfitting and guiding, commercial recreation, telecommunications, research, photography and video-productions, and road and utility rights-of-way. Uses are authorized if they provide a benefit to the general public, if they protect public and natural resource values, and if the overall needs of the individual or business applying for the permit cannot be met on nonfederal land. As shown in **Table 5.9**, the distribution of special-use permits varies across districts within Lincoln NF. In general, special-use permits are authorized in Lincoln NF for recreation; communications; non-power generating water transmission; and feasibility, research, training, cultural resources, and historical use purposes. The number of active permits is far greater on the Smokey Bear and Sacramento RDs than on the Guadalupe RD.

Table 5.9: Special Use Permits on Lincoln NF (1952-2005)

	Smokey Bear			Sacramento			Guadalupe		
Permit Category	# Active	# Closed	Rent Total	# Active	# Closed	Rent Total	# Active	# Closed	Rent Total
Recreation	69	17	$36,843	30	29	$6,253	3	0	$0
Agriculture	2	0	$121	0	0	$80	0	0	$0
Community/Public Information	2	0	$61	6	2	$161	3	0	$0
Feasibility, Research, Training, Cultural Resources, & Historical	10	5	$425	20	4	$318	4	0	$0
Industry	6	1	$0	0	0	$0	2	0	$0
Energy Generation/Transmission	4	0	$61	1	0	$0	3	0	$0
Transportation	40	2	$313	23	1	$1,140			$0
Communications	32	1	$17,000	46	0	$20,281	8	0	$3,848
Water (Non-Power Generating)	14	0	$731	42	1	$2,240	2	0	$0
TOTAL SPECIAL USE PERMITS	179	26	$55,555	168	37	$30,473	25	0	$3,848

Notes: 1). Permits issued encompass those from 1952-2005. 2). The number of active permits were calculated as "the number of issued minus the number of closed and revoked permits for each district."

Source: USDA Forest Service 2005 Special Use Permit Database (SUDS). Calculations by UNM-BBER.

Within the Smokey Bear RD, a greater portion of permits (39 percent) has been authorized for recreational purposes than for any other special use. Similarly, recreation permits account for a greater portion of rents (66 percent) than does any other permit category. Ski Apache, located in part within the Smokey Bear RD, is operated under a special-use permit.[53] Transportation permits account for another large portion of special-use permits within the Smokey Bear RD (22 percent), but constitute only $313 (less than 1 percent) of the district's rents. In contrast, there are 32 permits (20 percent of all permits) for communications purposes that account for $17,000 (30 percent) of the total rents for the district.

On the Sacramento RD, communications special-use permits are most common (27 percent of permits) and generate a greater portion of rents (66 percent of rents) than do other types of special-use permits. Ski Cloudcroft, operated by the village of Cloudcroft and located in part on the Sacramento RD, is operated under a special-use permit. There are 42 active water (non-power generating) permits (25 percent of permits) on the Sacramento RD, which create $2,240 in rents. Although the number of recreation permits on the district is lower (only 30 permits), recreation permits have yielded more than $6,000 in rents.

Guadalupe RD has fewer special-use permits than the two northern RDs; only 25 permits have been issued, compared to 179 and 168 on the Smokey Bear and Sacramento RDs, respectively. Communications special-use permits, the most common permit type (32 percent of permits), are the only special-use permits that generate rents on the Guadalupe RD.

Cost recovery programs are to be implemented beginning in 2007 requiring applicants for land-use authorizations to pay for the analysis, issuance and administration, in addition to existing rent payments.

[53] Ibid.

5.6 Illegal Uses

Table 5.10 lists all violations that occurred on Lincoln NF during 2005. In total, there were 192 violations. Of those violations that were categorized, the most commonly occurring offense (31 violations) was leaving a fire without properly extinguishing it. Sanitation is another frequent problem, with 18 occurrences of possessing or leaving refuse in an exposed or unsanitary condition. Damaging natural features and other U.S. property, cutting or damaging timber products without the proper permit, and the abandonment of personal property are other common problems in Lincoln NF.

Table 5.10: Violations on Lincoln NF, 2005

Offense Code	Incidents	Violation Categories
Other	38	No codes available
36CFR2615D	31	Leaving a fire without completely extinguishing it
36CFR26111B	18	Possessing or leaving refuse in an exposed and unsanitary condition
36CFR2619A	15	Damaging any natural feature or other property of the United States
36CFR2616A	11	Cutting or otherwise damaging any timber product without permit
36CFR26110E	9	Abandoning any personal property
36CFR26111E	9	Dumping of any refuse from privately owned land
36CFR26156	7	Use of vehicles off National Forest System roads
36CFR2619B	6	Removing any natural feature or other property of the United States
36CFR26111D	5	Failing to dispose of all garbage either by removal or proper receptacle disposal
36CFR26117	5	"No Code Provided"
36CFR26115H	4	Failure to pay any established fee for use
36CFR26158BB	4	Possessing a beverage which is defined as an alcoholic by state law
36CFR2616H	4	Removing any timber, tree or other forest product without permit
36CFR26112C	3	Damaging and leaving in a damaged condition any such road, trail, or segment
36CFR26152A	3	Building, maintaining, attending or using a fire, campfire, or stove fire
36CFR2617A	3	Placing or allowing unauthorized livestock to enter or be in lands under FS control
36CFR26110B	2	Taking possession of, occupying, or otherwise using FS lands for residential use without permit
36CFR26158A	2	Camping for a period longer than allowed by the order
18USC641	1	Embezzling, stealing, or otherwise defrauding US Government Agency
36CFR26110A	1	Constructing, placing, or maintaining any kind of road, trail, or structure on FS land without permit
36CFR26116B	1	Possessing or using a hang glider or bicycle
36CFR26116C	1	Landing of aircraft, or dropping or picking up of any material or person in aircraft
36CFR26116M	1	"No Code Provided"
36CFR26153E	1	Public health or safety
36CFR26154A	1	Using any type of vehicle prohibited by the order
36CFR26154D	1	Operating a vehicle in violation of the speed, load, weight, or height than specified by permit
36CFR2615A	1	Carelessly or negligently throwing or placing any ignited substance that may cause fire
36CFR2615E	1	Allowing a fire to escape from control
36CFR2615F	1	Building, attending, maintaining, or using a campfire without removing flammable material
36CFR2618A	1	Hunting, trapping, fishing, catching, molesting, killing or having in possession any wild animal
36CFR2618D	1	Possessing a dog not on a leash or otherwise confined
TOTAL	192	

Source: USDA Forest Service LEIMARS Database, 2005

5.7 Challenges and Opportunities for Forest Management

Lincoln NF use patterns have undergone significant changes, creating new challenges for forest managers. Recreational demand is increasing and becoming more diverse while traditional uses around which much of the regulatory structure of forest management was established are experiencing growing environmental, economic and social pressure. Yet, opportunities to develop strategies to mitigate conflicts among these uses are emerging as new users, new technologies and new priorities come to the fore.

The increase in demand for recreational use has many aspects. Local and regional tourism brings new users to the forest, with interests ranging from hunting to solitude to motorized recreation. Likewise, developments catering to retirees and second homeowners, particularly in Otero and

Lincoln Counties, bring new users; often using more concentrated and developed sites and facilities. The increased level of recreational activity has caused an increase in the concentration of users, making it more likely that users will encounter one another. In some areas use levels are so high that during peak use times the use level exceeds the area's theoretical capacity. In some areas, there is little time for a given site to rest and rehabilitate during the peak season.[54] This poses a challenge to FS managers, especially since recreational demand is expected to continue to rise. To further complicate matters, the FS does not receive sufficient funding to adequately address the issues that stem from heavy recreational use. Rising recreation use has also created a need for additional facilities and trails.[55]

Management issues pertaining to recreation use have become more complicated as the composition of recreational activities has become motorized. The speed and noise associated with motorized and mechanized recreational equipment has resulted in conflicts between the users of such equipment and other recreational visitors, including hikers, horse riders, and skiers. Some perceive quiet to be an under-managed resource. Additionally, more areas have become accessible with the use of such equipment, increasing the number of non-system trails. Approximately 1,360 miles of travel ways have been created and perpetuated by off road vehicles, with approximately 50 additional miles created each year.[56] Management of this sprawling system is a daunting task.

The FS has recognized unmanaged recreation (particularly that in the form of OHV use) as one of four primary threats to the national forests. As a result, on November 2, 2005 the FS announced new rules (implemented December 9, 2005) regarding OHV recreation in national forests and grasslands. The policy revisions require the re-designation of trails and routes, and the provision of better maps to show which trails are designated for which specific purposes.[57]

Related to the overall increase in recreational uses is the growing demand for land for development, for tourism, retirement communities and second homes. Although much of this demand is focused outside the boundaries of Lincoln NF, its effects on forest land management are direct and significant. Ranchers, for instance, face increased grazing costs and argue that access to Lincoln NF is vital to the continued existence of ranching in the region.[58] Likewise, cost pressures encourage ranchers to increase stocking levels, raising concerns as to the sustainability ranching in the region. Other issues regarding grazing uses on forest land are the competition for forage that occurs between elk and cattle, soil compaction and erosion, and water quality.

The Endangered Species Act and legal action by environmental advocates have changed the conditions under which traditional grazing and logging industries must operate. Restrictions imposed on these two industries have greatly increased since passage of the Endangered Species Act, resulting in decreased revenues and increased costs. There has been a concurrent increase in the demand for land as a result of the influx of retirees and other newcomers. As a consequence

[54] Ibid.
[55] Russell, J.C. and Adams-Russell, P.A. 2006. *Values, Attitudes and Beliefs toward National Forest System Lands: The Lincoln National Forest* (Draft).
[56] U.S. Forest Service. 1986. *Environmental Impact Statement for the Lincoln National Forest Plan*.
[57] http://www.fs.fed.us/projects/four-threats/, http://www.fs.fed.us/recreation/programs/ohv/, and http://www.fs.fed.us/recreation/programs/ohv/final.pdf.
[58] Russell, J.C. and Adams-Russell, P.A. 2006. *Values, Attitudes and Beliefs toward National Forest System Lands: The Lincoln National Forest* (Draft).

of declining ranch profits and rising land prices, ranchers are more likely to sell their land for development purposes. The change in land use from ranching to subdivision can affect issues of access and travel patterns, as discussed in Chapter 3.

Although timber is not a major industry in the assessment area, timber products still offer a potential source of economic growth. Some creative individuals have worked to take advantage of viable market niches for products made from small diameter wood (for example Sherry Barrow Strategies, which makes wood shavings for animal bedding using small diameter wood). With energy prices continuing to rise, alternative energy sources are becoming more attractive and the markets for fuel wood and wood pellets (which also may be made from small diameter wood) are growing. Not only do these niche markets provide opportunities for economic development in small rural communities, but they also provide a use for the small diameter trees that are currently so thick that they create fire hazards. Risks to increasing the harvest and use of small diameter wood include 1) the need to ensure a regular supply of wood required for business development, and 2) the concern of some individuals that harvesting of small-diameter trees will set a precedent for the harvest of larger-diameter trees.

6 Special areas

This chapter describes special areas on the Lincoln National Forest (NF), such as sites of historical and archeological interest, recreational sites, special management sites, inventoried roadless areas (IRAs), research neutral areas, and scenic byways.

Lincoln NF contains two wilderness areas – White Mountain and Capitan Mountain Wilderness Areas – that encompass approximately 84,000 acres. There are various restrictions that apply to formally designated wilderness areas, including no mechanized travel (including bicycles), a prohibition against the discharge of firearms, and no camping within 100 feet of wilderness lakes and waterways.

The Forest Service (FS) maintains information on scenery resources, which have a formal rating system (Visual Management System, VMS) and special regulations regarding their management. Unfortunately, the Bureau of Business and Economic Research (BBER) was unable to obtain any information regarding heritage and scenery resources from the FS. As a result, this analysis is limited in regards to understanding qualitative relationships between the FS managed land and its surrounding communities. Many of the special sites in the area are undoubtedly linked to tribal groups and other communities whose connections to the area date back before the FS.

6.1 Recreational Sites in Lincoln National Forest

Lincoln NF has 70 designated developed recreational sites. For a complete list, see **Table A.4** in the Appendix. **Table 6.1** lists the type and number of designated recreation sites in each district, according to the FS infrastructure database (INFRA). Almost all of Lincoln NF's designated recreational sites (97 percent) are located within Sacramento and Smokey Bear Ranger Districts (RDs). Trailheads and campgrounds are the most commonly occurring types of recreational site and comprise more than half of the designated sites – there are 19 trailheads and 21 campgrounds.

Table 6.1: Developed Recreation Site Type by Ranger District in Lincoln NF

	Guadalupe	Sacramento	Smokey Bear
Campground		9	6
Cua Interpretative Site		1	3
Cua Trailhead		1	8
Group Campground		5	1
Interpretive Site		2	1
Observation Site		5	2
Organization Site (Privately Owned)		4	
Other Winter Sports Site		1	
Picnic Site	1	3	2
Playground Park Specialized Sport			1
Recreation Residence			2
Ski Area Alpine		1	1
Trailhead	1	4	5
Total	2	36	32

Source: U.S. Forest Service INFRA Database.

Recreational sites are classified as either developed or dispersed sites. A developed site is a discrete place containing a concentration of facilities and services used to provide recreation opportunities to the public. Developed sites include campgrounds, picnic areas, shooting ranges, visitor centers, and historic sites. Dispersed recreation involves activities that occur outside of developed recreation sites such as boating, hunting, fishing, hiking and biking. In other words, dispersed sites are popular areas that have no facilities or services. **Figure 6.1** shows the approximate location of developed recreational sites in the Lincoln NF (location information for dispersed sites is not readily available).[59]

The enjoyment of scenic resources is another form of recreation often enjoyed by visitors to Lincoln NF. The FS maintains information on scenery resources, has a formal rating system for scenic resources (VMS), and has special regulations regarding their management. Unfortunately, BBER was unable to obtain information regarding scenery resources from the FS.

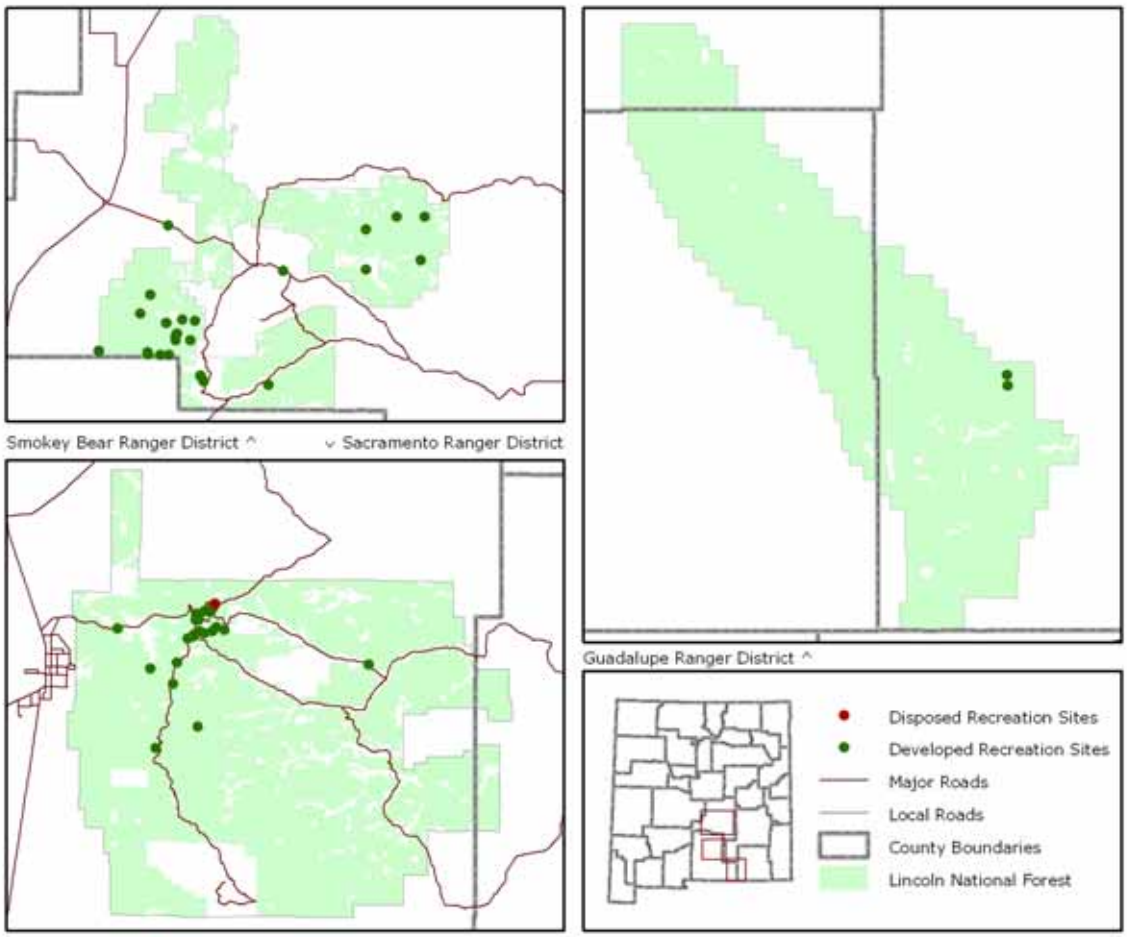


Figure 6.1: Developed Recreational Sites in Lincoln NF

[59] Data was obtained from the FS infrastructure (INFRA) database. The data was unclear as to which sites were developed and dispersed, so the map shows approximations.

6.2 Heritage Sites

Much of Lincoln NF includes or abuts areas that were inhabited by native tribes for hundreds of years. The Smokey Bear and Sacramento RDs share common borders with the Mescalero Apache Tribe (see **Figure 1.1**). Formal boundaries designated by the FS do not change the sanctity of areas that have been traditional tribal use areas. The identity and other information regarding these areas are kept secret to honor the privacy of tribal activities and uses; information is not provided to visitors on brochures or maps, nor is it shared freely among local communities. However, the FS does maintain information on areas such as "heritage resources," which often include these special areas. The fact that many of these sites are unknown complicates implementation of the multiple-use management mandate.

The FS is currently working to inventory, evaluate, protect, interpret, and stabilize sites of archeological, cultural, or historical interest. It is estimated that the Lincoln NF contains between 12,000 and 15,000 sites, of which roughly 500 sites had been documented as of 1986.[60] During 2003, the FS surveyed 12,000 acres, resulting in the documentation of 67 new sites. In addition, recommendations were made pertaining to the management of 271 archeological sites.[61] Four sites have been listed on the National Register of Historic Places: the Cloudcroft Trestle, the Bonito pipeline, Wizard's Roost (a prehistoric solar observatory), and the Jicarilla Schoolhouse.[62]

6.3 Special Management Areas

There are two wilderness areas within Lincoln NF – the Capitan Mountain and White Mountain Wilderness areas, both located in the Smokey Bear RD (see **Figure 6.2**). The approximately 35,000-acre Capitan Mountain Wilderness Area was created in 1980. The White Mountain Wilderness Area was originally 25,000 acres and became part of the Wilderness System in 1964; the Wilderness Area now contains roughly 49,000 acres.

[60] U.S. Forest Service. 1986. *Environmental Impact Statement for the Lincoln National Forest Plan*.
[61] U.S. Forest Service. 2004. *Lincoln National Forest Stakeholder's Report for 2003*.
[62] U.S. Forest Service. 1986. *Environmental Impact Statement for the Lincoln National Forest Plan*.

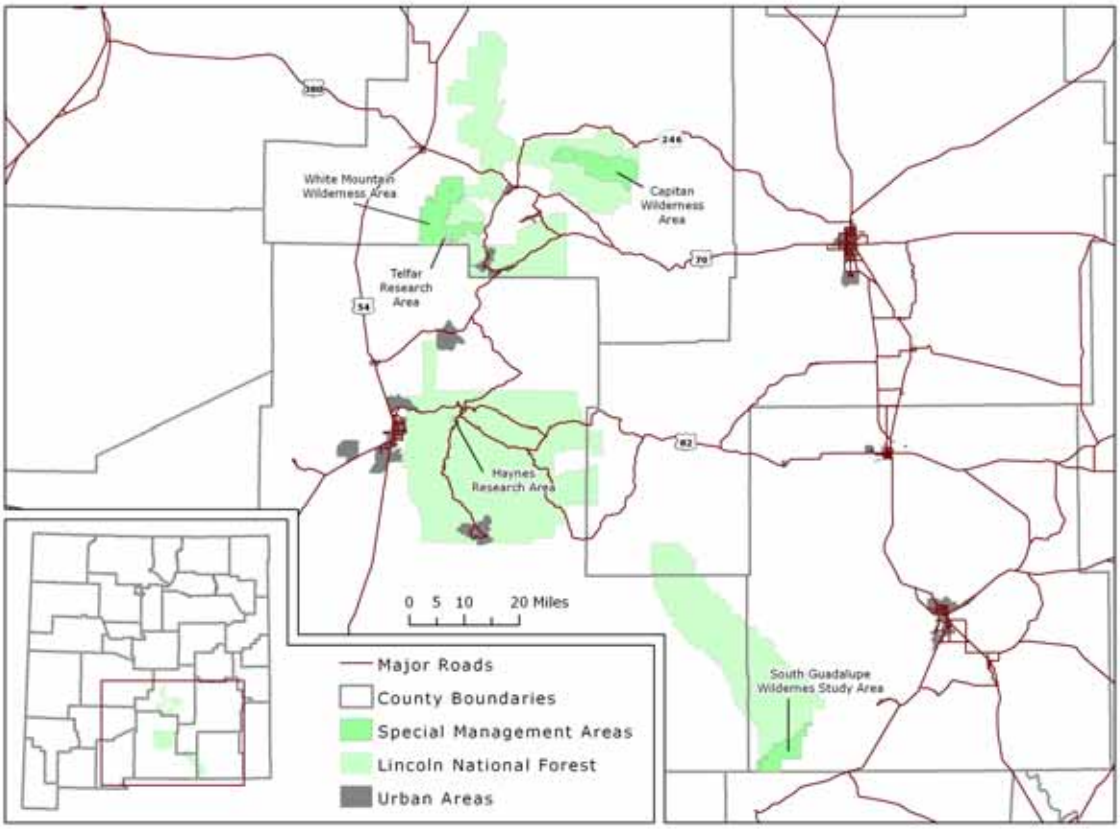


Figure 6.2: Special Management Areas

Wilderness areas were established under the Wilderness Act of 1964 and later acts. Wilderness areas are part of a system of wild lands that contribute significantly to the ecological, educational, and social health of its users and surrounding communities. Wilderness provides clean air and water, a shelter for endangered species, sacred places for indigenous peoples, and a living laboratory for research. The Wilderness Act describes a wilderness as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."[63]

6.4 Inventoried Roadless Areas

In January 2001, the Clinton administration enacted the Roadless Area Conservation Rule ("The Roadless Rule"), protecting 58.5 million acres of wild national forest land from most commercial logging and road building.[64] In July 2004, the Bush administration announced a plan that would eliminate the Roadless Rule. The plan creates a petition process for governors who want to keep the areas protected. They may also petition to open the area to mining and logging. In other words, protections are eliminated from the IRAs. Governors may petition to have the protections re-instated, but they may also petition to have the areas developed. If a governor does not

[63] The Wilderness Society, http://www.wilderness.org/OurIssues/Wilderness/act.cfm.
[64] NM PIRG Education Fund.

petition, the area is still vulnerable to development. New Mexico Governor Bill Richardson is on record as opposing elimination of the Roadless Rule.[65]

Critics argue that the bureaucratic requirements involved in the petition process provide little incentive for governors to participate, which may result in the opening of IRA lands to commercial interests.[66] Supporters of the plan argue that roads allow access necessary for firefighters and offer additional recreational opportunities. The interim direction regarding IRAs was issued in July 2004 and scheduled to expire on January 16, 2006, but has been reissued/extended for an additional 18-month period.

In New Mexico, there are 1,597,000 acres of IRAs, making up about 12% of the NF system land in the state. Of this 1.6 million acres, 66,000 acres have been recommended designation as wilderness by the federal forest plan.[67] Much of the inventoried roadless areas on Lincoln NF exist in the Capitan Mountain and White Mountain Wilderness areas (shown in **Figure 6.2** above). **Figure 6.3** shows the inventoried roadless areas within Lincoln NF.

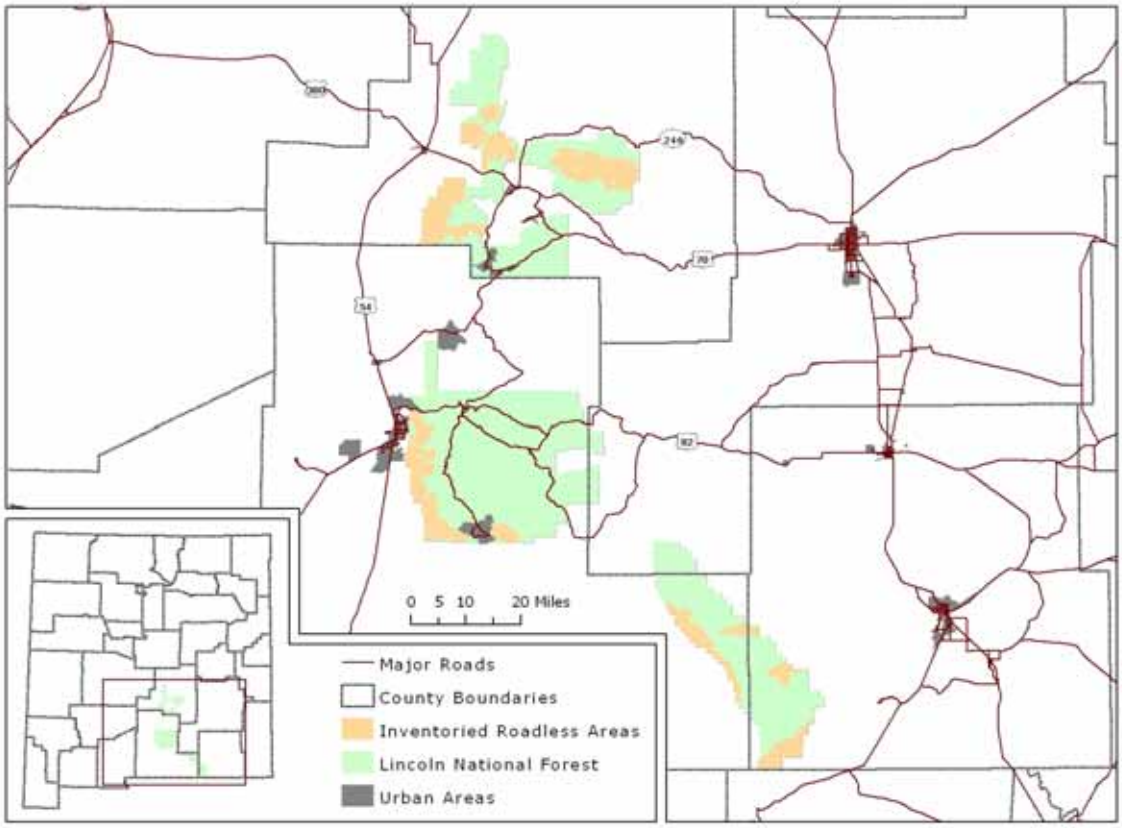


Figure 6.3: Inventoried Roadless Areas in Lincoln NF

[65] New Mexico Governor Bill Richardson joined eight other governors on November 12, 2004 to send a comment letter opposing the Administration's draft rule and supporting the Roadless Rule. Wilderness Society's Chronology of the Roadless Area Conservation Policy, http://www.wilderness.org/OurIssues/Roadless/chronology.cfm?TopLevel=Chronology.
[66] Ibid.
[67] U.S. Department of Agriculture Forest Service. (2001, January). Inventoried Roadless Area Acreage, Categories of NFS Lands Summarized by State. Retrieved March 27, 2006, from http://roadless.fs.fed.us/documents/feis/data/sheets/acres/appendix_state_acres.html.

6.5 Challenges and Opportunities for Forest Management

Elimination of the Roadless Rule and the new policy involving inventoried roadless areas has raised concern among NF users that forest lands are being opened up to provide more access to motorized vehicles, including access to areas that have been historically protected as wilderness areas. Critics argue that the new federal plan will exploit wilderness areas and make them vulnerable to commercial activities of various types, such as logging and mining. As indicated in Chapter 5, there are a number of mining claims in or near the IRAs in Lincoln NF. Increased vehicular access (especially increased off-highway vehicle access) also raises concerns about the continued integrity and health of forest landscapes. The situation is further complicated by privacy concerns of local tribes, as tribal uses of FS land can conflict with non-tribal users. In the Smokey Bear RD the presence of wilderness areas further complicates matters.

The presence of an estimated thousands of sites of archeological, historical, and cultural interest creates a situation in which the FS must determine how best to allocate resources for the preservation and protection of both known and unknown sites. Protecting sites can easily come in conflict with other forest uses, as it may require restrictions of use, including outright bans or fencing off areas. On the other hand, the need to protect sites grows as forest visitation numbers increase. Trails bring people into the forest where they may discover sites of interest, taking home arrowheads and potshards, and vandalism can be a problem. Lincoln NF is such a vast area that policing what happens at remote sites throughout the forest is simply not practical.

At the heart of many debates regarding land use and especially the use of special areas, is a conflict over who has more or “prior” rights to the land. While the forest is public land, some believe they should have privileged status when it comes to forest planning and decision-making. For example, some ranchers are frustrated by the ability of “non-local” environmental groups to influence planning and decision-making pertaining to grazing on Lincoln NF when ranchers are the individuals who possess an intimate knowledge and understanding of the land. Residents may perceive large numbers of visitors as potentially harmful to the integrity of the area. Another example is Native American groups who identify with the area as their “homeland.” Some tribal groups perceive they have a permanent attachment to the land that is very different from relationships other users have with the forest.

7 Economic impacts

7.1 Lincoln National Forest and the Regional Economy

The Lincoln National Forest (NF) assessment area is largely rural, with only three communities with populations greater than 15,000 persons (Roswell, Alamogordo, and Carlsbad). The area's economy depends heavily on primary industries, military and civilian governmental spending and, increasingly, land development and amenity services. There are significant differences across the four county assessment area: the northern Otero and Lincoln Counties benefit from high levels of government spending, while the southern Chaves and Eddy Counties feature a well diversified oil and gas economy.

As rural counties, incomes in the Lincoln NF assessment area are generally lower than those of New Mexico's more urban counties, including Bernalillo, Santa Fe, and Los Alamos Counties. Yet, by standards of rural New Mexico, incomes are comparatively high and unemployment and poverty rates are relatively low in the four counties. All four counties rank among the top half of all counties in New Mexico in terms of per capital income and, with the exception of Chaves County, all four are among the 15 (of 33) counties with the lowest poverty rates, Chaves ranks 21st.

Table 7.1 shows employment and per capita income for the Lincoln NF region. The overall patterns reflect the rural character of the region. As compared with the state as a whole, the Lincoln NF region has fairly low levels of employment and a relatively poor population. However, as noted above, compared to other rural regions in the state, the Lincoln NF region is fairly well off.

Table 7.1: Total Employment and Income by County, 2003

	Employment (#)	Percent of Region	Per Capita Income ($)	Relative to US
Chaves	28,025	30%	21,852	0.69
Eddy	26,196	28%	25,085	0.80
Lincoln	11,379	12%	20,472	0.65
Otero	27,756	30%	19,196	0.61
Lincoln Region	93,356	100%	21,651	0.69
New Mexico	1,015,365	--	24,892	0.79
United States	167,488,500	--	31,484	1.00

Source: Bureau of Economic Analysis, 2003

The industrial composition of employment in each county from 1980 to 2000 is shown in **Table 7.2**. In keeping with the other regions in New Mexico and the economic trends of the state and the United States as a whole, the Lincoln NF region is characterized by the increasing proportion of employment made up by retail and services, and decreases in government and primary industries. However, some counties still retain unusually high proportions of military and civilian government as well as manufacturing and other primary industries.

Table 7.2: Total Employment in Primary Sectors by County in 1980, 1990, and 2000

Chaves	1980	1990	2000	1980%	1990%	2000%	Change in % 1980-1990	Change in % 1990-2000
TOTAL	23,088	27,098	28,017	100%	100%	100%	0%	0%
Farm Employment	1,673	1,445	1,561	7%	5%	6%	-2%	0%
Non-farm Employment	21,415	25,653	26,456	93%	95%	94%	2%	0%
Private Employment	17,240	20,346	21,534	75%	75%	77%	0%	2%
Agricultural services	248	425	643	1%	2%	2%	0%	1%
Mining	869	1,325	1,094	4%	5%	4%	1%	-1%
Construction	1,170	1,216	1,351	5%	4%	5%	-1%	0%
Manufacturing	2,763	3,753	2,342	12%	14%	8%	2%	-5%
Transportation and utilities	1,090	930	926	5%	3%	3%	-1%	0%
Wholesale trade	929	1,063	995	4%	4%	4%	0%	0%
Retail trade	4,090	4,882	5,608	18%	18%	20%	0%	2%
Services	4,493	5,152	6,933	19%	19%	25%	0%	6%
Government	4,175	5,307	4,922	18%	20%	18%	2%	-2%
Federal, civilian	407	377	390	2%	1%	1%	0%	0%
Military	252	304	211	1%	1%	1%	0%	0%
State and local	3,516	4,626	4,321	15%	17%	15%	2%	-2%
State government	1,381	1,584	1,758	6%	6%	6%	0%	0%
Local government	2,135	3,042	2,563	9%	11%	9%	2%	-2%

Eddy	1980	1990	2000	1980%	1990%	2000%	Change in % 1980-1990	Change in % 1990-2000
TOTAL	21,689	22,143	25,530	100%	100%	100%	0%	0%
Farm Employment	954	785	817	4%	4%	3%	-1%	0%
Non-farm Employment	20,735	21,358	24,713	96%	96%	97%	1%	0%
Private Employment	18,114	18,206	21,067	84%	82%	83%	-1%	0%
Agricultural services	159	287	354	1%	1%	1%	1%	0%
Mining	4,399	3,649	3,029	20%	16%	12%	-4%	-5%
Construction	1,587	1,038	1,451	7%	5%	6%	-3%	1%
Manufacturing	1,077	802	997	5%	4%	4%	-1%	0%
Transportation and utilities	1,248	1,722	2,017	6%	8%	8%	2%	0%
Wholesale trade	689	527	586	3%	2%	2%	-1%	0%
Retail trade	3,398	3,659	4,593	16%	17%	18%	1%	1%
Services	4,548	5,486	6,788	21%	25%	27%	4%	2%
Government	2,621	3,152	3,646	12%	14%	14%	2%	0%
Federal, civilian	307	407	517	1%	2%	2%	0%	0%
Military	222	247	170	1%	1%	1%	0%	0%
State and local	2,092	2,498	2,959	10%	11%	12%	2%	0%
State government	329	463	719	2%	2%	3%	1%	1%
Local government	1,763	2,035	2,240	8%	9%	9%	1%	0%

Lincoln	1980	1990	2000	1980%	1990%	2000%	Change in % 1980-1990	Change in % 1990-2000
TOTAL	5,970	7,219	10,536	100%	100%	100%	0%	0%
Farm Employment	523	440	476	9%	6%	5%	-3%	-2%
Non-farm Employment	5,447	6,779	10,060	91%	94%	95%	3%	2%
Private Employment	4,423	5,590	8,719	74%	77%	83%	3%	5%
Agricultural services	85	126	172	1%	2%	2%	0%	0%
Mining	47	143	(D)	1%	2%	(D)	1%	-
Construction	560	510	843	9%	7%	8%	-2%	1%
Manufacturing	117	191	336	2%	3%	3%	1%	1%
Transportation and utilities	190	213	332	3%	3%	3%	0%	0%
Wholesale trade	51	66	(D)	1%	1%	(D)	0%	-
Retail trade	1,023	1,768	2,390	17%	24%	23%	7%	-2%
Services	1589	1965	3,235	27%	27%	31%	1%	3%
Government	1,024	1,189	1,341	17%	16%	13%	-1%	-4%
Federal, civilian	171	133	135	3%	2%	1%	-1%	-1%
Military	51	62	64	1%	1%	1%	0%	0%
State and local	802	994	1,142	13%	14%	11%	0%	-3%
State government	286	363	197	5%	5%	2%	0%	-3%
Local government	516	631	945	9%	9%	9%	0%	0%

Table 7.2 Continued

Otero	1980	1990	2000	1980%	1990%	2000%	Change in % 1980-1990	Change in % 1990-2000
TOTAL	22,977	25,322	27,278	100%	100%	100%	0%	0%
Farm Employment	512	561	555	2%	2%	2%	0%	0%
Non-farm Employment	22,465	24,761	26,723	98%	98%	98%	0%	0%
Private Employment	10,543	13,407	16,321	46%	53%	60%	7%	7%
Agricultural services	96	162	(D)	0%	1%	(D)	0%	-
Mining	17	42	(D)	0%	0%	(D)	0%	-
Construction	774	870	1,514	3%	3%	6%	0%	2%
Manufacturing	1,029	825	872	4%	3%	3%	-1%	0%
Transportation and utilities	674	1,163	1,166	3%	5%	4%	2%	0%
Wholesale trade	180	307	332	1%	1%	1%	0%	0%
Retail trade	3,191	3,816	4,286	14%	15%	16%	1%	1%
Services	3,565	5290	6,223	16%	21%	23%	5%	2%
Government	11,922	11,354	10,402	52%	45%	38%	-7%	-7%
Federal, civilian	2,718	2,315	2,025	12%	9%	7%	-3%	-2%
Military	6,934	5,917	4,090	30%	23%	15%	-7%	-8%
State and local	2,270	3,122	4,287	10%	12%	16%	2%	3%
State government	521	975	993	2%	4%	4%	2%	0%
Local government	1,749	2,147	3,294	8%	8%	12%	1%	4%

Notes: (D) Non-disclosure of confidential information, but included in totals, (L) Less than 10 jobs, and (N) Data not available for this year.
Source: Bureau of Economic Analysis

Aside from the usual high makeup of retail and services, Chaves County has a strong farm sector (dominated by dairy) that made up roughly the same percent of the county's total employment in 2000 as it did in 1980, with small decreases. It is not as heavily dependent on retail and services to supply jobs as the tourist-based economies in New Mexico such as Taos County. The service sector made up 6 percent more of the county's employment in 2000 than in 1990, and while most other industries show little change, manufacturing makes up ten percentage points less of total employment in 2000 than in 1990, showing a significant decrease in employment in that sector. Despite this, the manufacturing sector still accounted for 8 percent of total employment in 2000, which is quite high for New Mexico. The county also contains only a small portion of the Lincoln NF in its southwestern-most tip, a fair distance from Roswell, its largest settlement, so beyond the usual fuel wood and food uses by poorer residents, the county itself is not likely to depend on the forest as a job or money provider. This is especially true since the Lincoln NF allows only a small amount of fuel wood gathering.

Eddy County is similar to Chaves is many ways, also depending largely on retail and services for employment, but containing a fair number of farm sector jobs and getting almost 15 percent of jobs from the government sector. Compared to many other counties in New Mexico, this is a comparatively small percent for the government sector. Eddy County also has a strong mining sector, accounting for 12 percent of total employment, though it has suffered some employment loss and its contribution to the county's total employment was 9 percent lower in 2000 than in 1990.[68] Some other less important but still present sectors include transportation and utilities and construction. The relative size of industry sectors has remained mostly unchanged in the past twenty years, with the exception of the noted losses in the mining industry.

Lincoln County has much lower employment levels than the other counties in the Lincoln NF region, reflecting the small size of its population. It exhibits trends in line with most of the counties in New Mexico: a decline in the importance of farming and government, and an increase in the importance of retail and services. However, its industrial composition differs from the others in that the service and construction sectors make up a larger share of total employment.

[68] Mining has since recovered slightly since 2000, with a total employment of 3,362 in 2004

This is due to the development of second and retirement homes (mostly from Texas) in the Ruidoso and Ruidoso Downs area and tourist activities. Furthermore, contrary to the shrinking primary industries in most counties, the relative size of manufacturing and some other primary industries in Lincoln County are increasing, albeit slowly.

Otero County contains the majority of the Lincoln NF, as well as the Mescalero Indian Reservation and the Fort Bliss Military Reserve. It is no surprise then that government made up 38 percent of the county's employment in 2000, and much higher figures in previous years. Retail, services, and government together made up almost 80 percent of the county's employment in 2000. The relative size of other industries is correspondingly smaller, with only small percentages of employment in construction, manufacturing, and transportation and utilities, and negligible amounts in other industries. However, the trend in Otero County has been a decreasing role of government and an increasing role in retail, services, and other private industries. As retail and services employment has grown steadily since 1980, government employment has been slowly decreasing, while other private sectors have seen small gains and losses.

Table 7.3 shows the occupational structure of private employment for each county and the region as a whole.[69] The occupation data supports the data from previous tables, showing a large percent of jobs in management, sales and services occupations, though construction and production represent a substantial portion as well.

Table 7.3: Private Employment by Occupation for Region Counties in 2000

	Chaves County	Eddy County	Lincoln County	Otero County	Lincoln Region
Management and Professional	28%	25%	28%	28%	27%
Professional and related	16%	15%	16%	17%	16%
Education, training, and library	7%	6%	6%	7%	7%
Healthcare practitioners and technical	4%	4%	3%	3%	4%
Service	16%	17%	20%	19%	18%
Sales and office	25%	25%	28%	22%	24%
Farming, fishing, and forestry	4%	2%	2%	1%	2%
Construction, extraction, and maintenance	11%	16%	14%	16%	14%
Production and transportation	16%	14%	9%	13%	14%
Total Private Employment	**23,028**	**20,591**	**8,539**	**21,934**	**74,092**

Source: US Census 2000. Calculations by UNM-BBER.

Finally, **Table 7.4** shows the unemployment rates for each of the counties and the region as a whole from 1995 to 2004. The region as a whole is generally in line with unemployment trends in New Mexico, though it seems to have made steady progress in reducing its rates below the New Mexico average. Lincoln County seems to have made large strides in reducing unemployment rates, going from having the highest rates in the region in 1995 to having the lowest rates by 2004. In contrast Chaves County has maintained fairly level unemployment rates (with small fluctuations), and by 2004 it has the highest unemployment rates of the region and the only rates that are above the New Mexico average.

[69] The difference in total employment between **Table 7.2** and **Table 7.3** is primarily due to the inclusion of self-employment in the BEA data in the latter table.

Table 7.4: Average Annual Unemployment Rate for Region Counties, 1995-2004

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Chaves	7.6	8.2	5.4	9.7	5.5	5	5.6	7.5	7.1	6.1
Eddy	7.9	6.8	6.6	6.2	6.8	4.8	5.2	5.6	5.4	4.7
Lincoln	10.7	8.3	6.4	4.5	4.1	4.3	3.9	4	3.9	4
Otero	7.1	8.5	6.4	4.8	4.4	5.1	4.6	6.2	4.9	4.7
Lincoln Region	**8.3**	**8.0**	**6.2**	**6.3**	**5.2**	**4.8**	**4.8**	**5.8**	**5.3**	**4.9**
NM TOTAL	**6.4**	**7.4**	**7.1**	**6.3**	**6**	**5.2**	**4.8**	**5.2**	**5.8**	**5.9**

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics (LAUS).

The data presented in this section show that, like the rest of New Mexico, the region is significantly oriented toward retail and service industries. However, in this case perhaps more than in any other forest region, farming and private sector industries aside from retail and services are an important segment of the region's total employment. As with other regions, the impacts from forest visitor spending, which support the retail and services sectors, are the most important. However, in this case, the use of forest resources in supporting other industries may play a larger role.

7.2 Methodology and Organization of Lincoln National Forest Impact

In estimating the contribution of the Lincoln NF to the regional economy, we consider both the operations of the Forest Service (FS) in the region as well as the various uses of forest-related products. IMPLAN software is used to determine the total economic value of each activity and the operations of the FS.[70] IMPLAN uses county-level input-output (I-O) data to determine the extent to which these activities contribute to the local economy. In doing so, IMPLAN distinguishes between direct, indirect, and induced impacts, where:

> **Direct impacts** include the economic value generated by the activity itself, such as the value of cattle grazed on Lincoln NF land.
>
> **Indirect impacts** include the value generated by purchases to support that activity and the corresponding purchases to support those activities, in perpetuity. For example, indirect impacts would include the value of fencing purchased for ranching, the value of steel purchased to make the fencing, and so on.
>
> **Induced impacts** capture the value of economic activity generated from spending by employees that produce the direct and indirect goods. The ranch employees will purchase food, pay for electricity, etc…all of which generates additional value from the purchases, as well as sparking new rounds of indirect and induced value.

The IMPLAN region is the same region used throughout this report, consisting of all counties containing or bordering any of the Lincoln NF districts. These counties include Chaves, Eddy, Lincoln, and Otero Counties. This single region, containing the above four counties, makes up the

[70] IMPLAN® is a PC-based regional economic analysis system; originally developed by the Forest Service, it is now used by multiple federal agencies. The current IMPLAN database and model is maintained and sold by Minnesota IMPLAN Group, Inc., http://www.implan.com.

area considered as “local,” and the results shown from IMPLAN are for this region of four counties as a whole.

As discussed in Chapter 5 (Uses and Users), the principal value-generating activities related to the Lincoln NF land itself include ranching, recreation and wildlife related activities, and wood harvesting. Oil and gas production was present in small amounts before 2004, but the data show no extraction of oil and gas on forest land from 2004 on. In addition, two astronomy observatories located on forest land make a significant economic contribution, as do impacts that arise directly from FS purchases and the spending of wages by FS employees. For each activity, we estimate the direct impact, and use IMPLAN to estimate the total economic value by direct, indirect, and induced impacts. The FS and the observatories are unusual in that they do not produce a measured output, and so there is no easy measure of its direct economic value. Instead, we look at expenditures and salaries and wages to estimate the first round of indirect and induced impacts, and the corresponding economic activity generated by each. The indirect activity is captured by FS and observatory expenditures and the induced activity is captured by the disposable income of employees. In examining the contribution of the FS, we also consider direct employment by the FS.

This analysis draws on a wide range of data and information sources. Data on the structure of the local economies and characteristics of the workforce comes largely from the 2000 decennial census Summary File 3 and United States Department of Labor Local Area Unemployment Statistics. The FS provided data on the specific activities that occurred on the forest. Specific sources included the Forest Service infrastructure (INFRA) database (grazing), National Visitor Use Monitoring (NVUM) survey (recreation and wildlife), and the Region 3 Office (procurement, wages & salaries). The United States Department of Agriculture National Agricultural Statistics Service was the source of data on agricultural land values and cattle stocking rates. Oil and gas production values are from the ONGARD database provided by the Oil Conservation Division at the New Mexico Energy, Minerals and Natural Resources Department and the New Mexico Taxation and Revenue Department, while oil and gas prices are from GO-TECH at New Mexico Institute of Mining and Technology. Both the National Solar Observatory at Sacramento Peak and the Apache Point Observatory were very helpful in providing the data used to estimate their economic contributions.

7.3 Direct Impact of the Lincoln National Forest on the Regional Economy

The principal economic activities on the Lincoln NF include ranching, recreation and wildlife visits, astronomy observatories (the National Solar Observatory at Sacramento Peak and Apache Point Observatory), timber harvests, and the operational activities of the FS. Some of these activities are quite large economically, though their benefit to the local region can vary substantially. Additionally, there are activities such as skiing, discussed as a sub-category of recreation and wildlife visitors, and wildlife suppression activities by the FS that are somewhat unique and warrant extra consideration. There may also be additional tangible benefits from luxury recreational activities. Finally, intangible but extremely important impacts in terms of the reduction of heat and water evaporation as well as the contribution of the forest to regional aesthetic and, hence, tourist value are nearly impossible to measure, but should be considered in any analysis of the benefits of the forest to the surrounding region.

To maintain consistency, data for 2004 was used wherever possible. However, if data for that year did not exist, or more recent data was more easily available, we used that instead, adjusting values back to 2004 to account for price inflation. Data for FS salaries and wages is from fiscal year 2005 adjusted to 2004 dollars. Data on grazing land is from 2002. Visitor estimations are derived from the 2003 NVUM survey. Observatory data is from 2006 and projected 2007 budgets. All other data is from 2004 unless noted.

The FS provided data on cattle grazing from the INFRA database in terms of Animal Unit Months (AUMs), and we estimated the number of employees needed per AUM. Together these values provide an estimated number of employees needed to produce the 2002 AUMs. Using the IMPLAN value for output per employee, we derive a ranching output for grazing on the Lincoln NF. This is the direct value of ranching on Lincoln NF land.

Similarly, timber-harvesting data was derived from the Timber Information Manager database[71] provided by the FS. We use 2004 timber prices to derive the total value of timber cut, which measures the direct value of timber harvested in Lincoln NF in 2004.

For recreation and wildlife visitors, we use estimates of visitors from NVUM data, broken out into several categories based on locality (local or non-local), the type of trip (day, overnight on the forest, overnight off the forest), and the reason for the visit (recreation or wildlife). The FS provided an average expenditure profile for each type of visitor, which estimates the direct economic value of visitor spending to the local economy. The impacts of ski visitors are measured based on the suggested percent of recreational forest visitors who indicated that their primary activity is downhill skiing, as shown in the NVUM data. As such, the impacts of ski visitors should only be taken as a rough estimate, since the actual number of visitors may vary substantially.

Rock and mineral extraction data was provided by the FS, and the market value of the production was calculated using an average of prices from relevant surveyed New Mexico businesses. However, in this case, the value of mineral extraction is quite small (permit value of roughly $56,000), and is not included in this analysis.

Two observatories, the National Solar Observatory at Sacramento Peak, and the Apache Point Observatory, lie within the Lincoln NF, and represent an important economic contribution. Both observatories provided payroll and overall budget data as well as the number of employees. The National Solar Observatory also runs a visitor center in conjunction with the FS, and they provided estimates of visitors and typical visitor spending. In estimating the visitor impacts, we use the corresponding visitor spending profiles synthesized from the NVUM data.

Finally, for FS operations, the FS provided data on salaries and wages for its employees and total spending with an associated expenditure profile for use in IMPLAN. Since the direct economic value associated with the FS is unknown, we use expenditures to capture the first round indirect impacts and salaries and wages to capture the first round induced impacts. In both cases, the associated later round indirect and induced impacts are calculated by the IMPLAN model.

[71] The TIM is a set of computer systems and databases used by the FS and the U.S. Department of Agriculture for managing technical and financial data about the sale of forest products and timber on FS lands.

Table 7.5 is a summary of the output, employment and labor incomes directly associated with these activities.[72] These direct impacts are, in effect, 'what you see' – a measure of activities and their economic value as they actually occur on the Lincoln NF. For example, that table indicates that there is the equivalent of 7 full-time annual jobs harvesting lumber from the Lincoln NF and 92 jobs in the ranching industry. "FS operations" includes the direct employment and labor income of the FS. Output for the FS and the observatories is actually spending on operations, and the FS data does not include the costs of fighting wildfires, which is broken out separately.

Table 7.5: Direct Inputs of Lincoln NF, 2004
(000s of 2002 $, Except Employment)

	Output	Employment	Labor Income
Ranching	**13,154**	**92**	**4,882**
Timber Harvesting	**1,204**	**7**	**195**
Visitors & Recreation	**92,864**	**--**	**--**
Skiers	**16,288**	**--**	**--**
NSO/Sac Point[1]	**818**	**45**	**1,745**
Apache Point[1]	**645**	**31**	**1,349**
Forest Service Operations[1]	**9,202**	**244**	**7,202**
Wildfire Suppression[1]	**6,214**	**--**	**2,177**

[1] Forest service operations output is actually the first round of indirect spending, while labor income is disposable employee income.

7.4 Economic Impacts and Multipliers

The direct activities associated with the Lincoln NF create indirect and induced impacts as businesses and workers make expenditures and purchases, and these funds cycle through the local economy. The sum of the direct, indirect, and induced expenditures constitutes the total impact that the Lincoln NF has on the economies of the neighboring communities. These impacts, in terms of employment, income and total output, are summarized in **Table 7.6**. Economic multipliers are shown in **Table 7.7**. Economic multipliers, equal to the total impact divided by the direct impact, indicate the effectiveness of the industry in generating growth in the local economy.

In total, the Lincoln NF contributes directly or indirectly an estimated 2,618 jobs and $69.5 million in income to the economies of the four counties included in this study. This is equivalent to about 2.8 percent of the 93,356[73] jobs in these areas in 2003. Visitor spending is by far the largest source of activity, contributing a total of 71.4 percent of the employment and 58.9 percent of the labor income impacts. The FS is the second largest contributor in terms of both employment and income, while ranching also contributes significantly and the impacts of timber harvesting and the observatories are much smaller. While 2.7 percent of the region's employment is a substantial amount, the contribution does not make up as large a portion of the region's employment as is the case in Carson NF, primarily because the Carson NF is a large attractor of visitors in the Carson NF region, and less so for Lincoln NF. One noticeable difference from

[72] Labor income is the sum of employee compensation and proprietor income.
[73] 2003 employment for the region as a whole from Table 7.1.

other forests is that the size of the ranching impacts is fairly large. While not as large as some other forests, the relative size of these impacts is much larger, indicating that the region makes significant use of the forest as a source of grazing land more so than in other forests in the state.

Table 7.6: Direct, Indirect, and Induced Impacts of Lincoln NF, 2004

TOTAL OUTPUT IMPACTS (000s of 2002 $)

	Direct	Indirect	Induced	Total
Ranching	13,154	6,278	3,204	22,636
Timber Harvesting	1,204	543	160	1,907
Visitors & Recreation	81,847	18,484	15,487	115,819
Skiers	15,041	3,056	3,023	21,120
NSO/Sac Point	--	569	1,923	2,492
Apache Point	--	425	1,509	1,934
Forest Service Operations	--	10,474	5,680	16,154
Wildfire Suppression	--	6,618	1,618	8,236
Total	96,205	43,390	29,581	169,176

TOTAL EMPLOYMENT IMPACTS (#)

	Direct	Indirect	Induced	Total
Ranching	92	46	43	181
Timber Harvesting	7	4	2	13
Visitors & Recreation	1461	197	210	1869
Skiers	281	35	41	357
NSO/Sac Point	45	4	15	65
Apache Point	31	5	12	48
Forest Service Operations	244	66	78	387
Wildfire Suppression	--	39	17	56
Total	1,880	361	377	2,618

TOTAL LABOR INCOME IMPACTS (000s of 2002 $)

	Direct	Indirect	Induced	Total
Ranching	4,879	2,136	1,024	8,040
Timber Harvesting	195	155	51	402
Visitors & Recreation	30,489	5,485	4,950	40,923
Skiers	6,109	920	966	7,996
NSO/Sac Point	1,745	119	350	2,213
Apache Point	1,349	144	277	1,770
Forest Service Operations	7,202	2,822	1,801	11,824
Wildfire Suppression	2,177	1,765	400	4,341
Total	48,034	12,626	8,852	69,512

Based on NVUM spending rates, Ski visitors generated a total of $21.8 million in revenues, 357 jobs, and $7.9 million in additional labor income. This sub-category of visitor impacts is larger than the impacts of ranching and timber harvesting, and almost as large in terms of employment as the FS employment itself. The relevance of these impacts for the local economy is somewhat uncertain. In addition to the uncertainty surrounding the estimated number of ski visitors, there is some question as to the degree that the NVUM data accurately captures the number of ski visitors. While this is less of a problem in Lincoln NF than in Carson NF, it still implies that the number should only be applied with some degree of skepticism.

An important note is that the impact estimates for the National Solar Observatory do not include their visitor impacts. Visitors to the FS-run visitor center should be represented by the NVUM data (to the extent that the data is correct), and hence, including those impacts would cause some degree of double counting. However, there are some visitors to the observatory for conferences and professional use that are not captured by the NVUM data. These visitors contribute approximately $225,000 in output, 4 jobs, and $75,000 in labor income that is not included in the above numbers.[74] Significantly, a recently completed national review of astronomy facilities by the National Science Foundation, the organization that funds the Sacramento Peak Observatory, recommends the phased withdrawal of funding for the facility as new technologies in other locations come on line.[75] As with changes in the administration of other federal facilities, advocates are pursuing alternative missions for the existing structures, although at this point the future economic contribution of the facilities remains uncertain.

For FS wildfire suppression spending, we have to consider both expenditures on equipment and contractors and employee compensation. In the case of employee compensation, it is suspected that a large degree of the take home income of fire fighters is spent locally, in part because of the long periods of intensive work followed by a large paycheck and a few days of free time. Thus a large fraction of the estimated $2.1 million in disposable income is likely spent locally. In the impacts shown for wildfire suppression in **Table 7.8**, we assume that 100 percent of this income is spent locally, which generates an impact of $2.6 million in output, 22 jobs, and $528 thousand in additional labor income.[76] If one has an estimate of the portion of income that is spent within the local region, it is a simple matter to share these impacts down to their appropriate amounts.

One additional benefit not captured above is revenues received by counties under the Title I and Title III distribution laws. Though these revenues total only slightly more than $116,000, they contribute to the maintenance of roads and school buildings in each county. The large majority of these funds are distributed to Lincoln and Otero Counties, with Chaves and Eddy receiving only very small distributions.

The economic multipliers shown in **Table 7.7** offer additional insights into the economic dynamics of the Lincoln NF. Most of the multipliers are well within logical range. As we might expect, the multipliers indicate that the gains from the service sector oriented visitor spending generate relatively lower impacts than the ranching and timber harvesting. The FS also has strong multipliers, largely due to the pay scales of FS employees and their corresponding spending patterns.

[74] These numbers are based on $500 spending per visitor – a number that, considering that a visitor may remain for several days as part of work or a conference, is probably a good approximation.
[75] National Science Foundation, Division of Astronomical Sciences, Senior Review Committee, October 22, 2006. "*From the Ground Up: Balancing the NSF Astronomy Program*".
[76] These employee wage impacts are included in the wildfire suppression impacts in Table 7.7.

Table 7.7: Economic Multipliers for Lincoln NF, 2004

	Output	Employment	Income
Ranching	**1.72**	**1.97**	**1.65**
Timber Harvesting	**1.58**	**1.84**	**2.06**
Visitors & Recreation	**1.42**	**1.28**	**1.34**
Skiers	**1.40**	**1.27**	**1.31**
NSO/Sac Point	**--**	**1.43**	**1.27**
Apache Point	**--**	**1.55**	**1.31**
Forest Service Operations	**--**	**1.59**	**1.64**
Wildfire Suppression	**--**	**--**	**1.99**

7.5 Challenges and Opportunities for Forest Management

According to the estimates outlined in this report, activities on Lincoln NF represent about 2.7 percent of all employment in the assessment region. Recreation, by large, generates the greatest impact; ranching and FS operations are also significant.

The impact of the forest on the local economy varies substantially between the four counties, although the data and methodology used in this report do not allow for precise quantification of impacts on the county scale. In absolute terms, Otero County likely receives the greatest benefit. Otero County contains the largest portion of FS-owned land of any county in the region (slightly more than one-half); it is closest to the largest nearby population centers (El Paso, Texas and Las Cruces, in Dona Ana County, New Mexico); and it is the location of Lincoln NF headquarters (in Alamogordo), where FS operations are concentrated. Lincoln County also receives substantial economic benefits from the forest; in relation to its relatively small economy, the impact is probably the greatest of the four counties in the assessment area. More than one-third of FS-owned land is in Lincoln County; development that favors proximity to protected forest resources has been intense in Lincoln County, particularly in and around Ruidoso and Ruidoso Downs in the southern edge of the county; and much of the tourism and recreation activity associated with the forest, including skiing, is in Lincoln County.

By contrast, the economic benefits of Lincoln NF to Chaves and Eddy Counties are relatively marginal. Together, the two counties contain less than 17 percent of FS-owned land, although the forest's relatively rich grazing land in the area does create jobs and generate revenues. Population centers that provide visitors to the Lincoln NF are relatively far from forest land in the two county area, in particular in the Guadalupe RD; and FS operations have a small presence in the two county area. More importantly, the relatively large regional economy in the area, driven in large part by the oil and gas industry, means that the local economy is proportionately less dependent on forest-based activities.

Resource and tourism-based economies are highly volatile. This represents a major challenge to the FS in managing its role in the local economy. The oil and gas industry is perhaps most volatile, and while it has a very marginal presence within the Lincoln NF, its indirect impact is very significant as it is the source of much of the money that flows into region's tourism and development markets. Likewise, the ranching industry is subject to wide swings in market prices.

The volatility of these sectors makes it difficult for communities in the assessment area to develop and implement effective, long-term policy.

Another challenge facing the FS and other managers of regional economy are the restrictions of limited resources and the conflicts that arise in their various uses. Much of the recent growth in the region, particularly in Lincoln County, has been associated with land development and related recreational activities, mainly in and around Ruidoso. However, by most accounts the area is approaching build out. As the construction phase of development reaches its conclusion, revenues decline while costs continue to rise. Local governments must find new, more sustainable revenue sources. Similarly, the recent increase in energy prices is encouraging policymakers to intensify exploitation of region's rich oil and gas resources, particularly in southern Otero County. While this may help the local economy offset loses in other sectors and other areas, it may also exacerbate rather than counterbalance the volatility of the regional economy. Further, increasing the exploitation of natural resources may compromise the vibrancy of the recreation and tourism economy, which accounts for two-thirds of the total contribution of the Lincoln NF to the local economy.

A critical function of the Lincoln NF, particularly the mountain districts, is the generation and retention of water that supply areas beyond the forest boundaries. A complete analysis of the economic role of water sources in the forest is beyond the scope of this report, but it is evident that the viability of many communities in the assessment area depend on the substantially of this crucial resource.

Another challenge facing the regional economy is the expected closing of the observatories located on NF land at Sunspot, New Mexico. The total impact of these facilities is estimated to be about $4.5 million. It is possible that officials will identify an alternative use for the facilities, but it is likely that this use will contribute less to the local economy than do the observatories, and that any alternative use may be only temporary.

8 Community Relationships

This chapter describes the relationships between the Forest Service (FS) and the communities surrounding the Lincoln National Forest (NF). The FS has an extensive history of working with local communities on various projects ranging from economic development to forest health and sustainability. Partnerships are an indispensable method of managing operations and conducting business. They are a vital means of achieving goals that might not be met by the FS alone.

8.1 Lincoln National Forest Communities

Chapter 2 provided a demographic profile of the four counties that comprise the Lincoln NF assessment area. Information pertaining to the major communities within these four counties was also presented. **Table 8.1** provides links to socio-economic information from the 2000 census for each of the major communities in the area.

Table 8.1: Lincoln NF Communities: Socioeconomic Profiles, Census 2000

County/Community	Link to Socio-Economic Information
Chaves County	http://www.unm.edu/~bber/census/sample/05035005.pdf
Dexter town	http://www.unm.edu/~bber/census/sample/1603520620.pdf
Hagerman town	http://www.unm.edu/~bber/census/sample/1603531330.pdf
Lake Arthur town	http://www.unm.edu/~bber/census/sample/1603537840.pdf
Roswell city	http://www.unm.edu/~bber/census/sample/1603564930.pdf
Eddy County	http://www.unm.edu/~bber/census/sample/05035015.pdf
Artesia city	http://www.unm.edu/~bber/census/sample/1603505220.pdf
Carlsbad city	http://www.unm.edu/~bber/census/sample/1603512150.pdf
Hope village	http://www.unm.edu/~bber/census/sample/1603533290.pdf
Loving village	http://www.unm.edu/~bber/census/sample/1603544420.pdf
Lincoln County	http://www.unm.edu/~bber/census/sample/05035027.pdf
Capitan village	http://www.unm.edu/~bber/census/sample/1603511800.pdf
Carrizozo town	http://www.unm.edu/~bber/census/sample/1603512500.pdf
Ruidoso village	http://www.unm.edu/~bber/census/sample/1603565210.pdf
Ruidoso Downs village	http://www.unm.edu/~bber/census/sample/1603565280.pdf
Otero County	http://www.unm.edu/~bber/census/sample/05035035.pdf
Alamogordo city	http://www.unm.edu/~bber/census/sample/1603501780.pdf
Cloudcroft village	http://www.unm.edu/~bber/census/sample/1603516280.pdf
Tularosa village	http://www.unm.edu/~bber/census/sample/1603579980.pdf

8.2 Partnerships

Data provided by the FS shows that over 200 businesses and community and governmental organizations partner with the Lincoln NF on various projects. **Table 8.2** lists the number of organizations, agencies, tribes, businesses, and educational institutions that partnered with the Lincoln NF during 2005, and provides a specific example of each partner type.

Table 8.2: Partnership Types for Lincoln NF, 2005

Partner Type	Example	Number of Partnerships
Federal	Bureau of Land Management	15
State Government	NM Department of Game and Fish	22
Local Government	Otero County Administration	38
Tribal	Mescalero Apache Tribe	19
Non-Governmental Org.	Rocky Mountain Elk Foundation	48
Private	Geo-Marine, Inc.	36
Universities/Public Schools	New Mexico State University	28
Total		206

Source: USDA Forest Service

As indicated in **Table 8.2**, collaborations between the Lincoln NF and non-governmental organizations occur more frequently than collaborations between the forest and other entities. Partnerships are beneficial to the forest itself, users of the forest, the FS, and the collaborators. A list of all grants and agreements between Lincoln NF and other organizations is provided in Appendix **Table A.5**. The list details the partner name and contribution amounts (from both the FS and the partner, and in the form of both dollar contributions and in-kind contributions), but does not provide project descriptions or information pertaining to other collaborators (many projects are collaborations among numerous organizations).

The FS has a wide variety of collaborative projects with numerous partners. A selection of these collaborative projects is discussed briefly below; a complete discussion is not feasible due to the large number of partnerships. Lincoln NF works on vegetative treatments and water development projects with a variety of wildlife organizations such as the Rocky Mountain Elk Foundation, Quail Unlimited, and the Mule Deer Foundation. Wildlife studies (pertaining to such species as the Cloudcroft checkerspot butterfly, the Sacramento Mountain salamander, elk, and goshawks) are conducted with a variety of organizations, including New Mexico State University, the New Mexico Game and Fish Department, and Hawks Aloft.

Many collaborative efforts are ranger district-specific. Collaborations on the Smokey Bear Ranger District (RD) include the following: FS personnel and the Lincoln County Bird Club have worked on bald eagle and osprey surveys; presentations and field trips were provided for the NASA and Eastern New Mexico University science camps (presentation and field trips pertained to a variety of subjects, including bats, endangered species, and riparian areas); and efforts have been made to coordinate watershed and fuel reduction projects with the Upper Hondo Watershed Coalition.

On the Sacramento RD collaborations include a collaborative project with the New Mexico Rails to Trails Association to convert old railroad grades to trails, trail maintenance, and the creation and installation of interpretive signs; priority setting, coordination of access, and fuel reduction activities have been conducted with the Otero County Wildland-Urban Interface Committee; and biological surveys and wildlife work has been conducted with the aid of the Student Conservation Association and Furman University students, among others.

Collaborative efforts specific to the Guadalupe RD include cave restoration, bat counts, rescue training, and biological surveys conducted jointly with the High Guads Restoration Project; trail

maintenance and cave maintenance with the Cloudcroft Youth Conservation Corps crew; and training of boy scouts in caving techniques and cave conservation, preservation, and restoration.

8.3 Collaborative Forest Rehabilitation Program (CFRP)

The Community Forest Restoration Act of 2000 (Title VI, Public Law 106-393) established in New Mexico the Collaborative Forest Restoration Program (CFRP). The CFRP provides funding in the form of cost-share grants for the purposes of collaborative forest restoration projects on public lands. A diversity of stakeholders is required to be involved in the design and implementation of CFRP projects, which should be designed to address such issues as wildfire threat reduction, ecosystem restoration (including non-native tree species reduction), reestablishment of historic fire regimes, reforestation, preservation of old and large trees, increased utilization of small diameter trees, and the creation of forest-related local employment.[77] An amount of $5 million is appropriated annually to support the CFRP. A variety of public and private entities – including (but not limited to) local and tribal governments, educational institutions, landowners, non-profit organizations, and conservation organizations – may apply for funds.[78]

Throughout New Mexico there were thirteen CFRP projects funded during 2005 at a total cost of roughly $4.3 million. One of the 13 projects (the Cedar Creek restoration project) was located in the Lincoln NF. The project accomplished forest and watershed restoration on 252 acres within the Smokey Bear RD. A low-impact forwarder harvesting system was used, with the resulting harvested material used in value-added products.

8.4 New Mexico Fire Plan Collaborative Efforts

A collaborative effort between state, local, and federal agencies, industry, and environmental organizations has made significant headway in addressing fire-related issues and is working to accomplish the following goals:[79]

- Restore the natural fire cycles and ecological processes of watersheds across all ownerships.
- Provide support for the development of economically viable uses of resources derived from forest and rangeland restoration projects on all ownerships.
- Promote awareness and accelerate work to reduce the risk of catastrophic wildfires to communities and private lands.

In 2004, more than 91 thousand acres were treated statewide using prescribed fire, fire use, and machinery. Treated acres were located within numerous wildland-urban interface areas, particularly those associated with the "20 Communities Most at Risk" identified by the New Mexico State Forestry Division.[80] Treatment and community protection costs were $3.6 million.

[77] http://www.fs.fed.us/r3/spf/cfrp/.
[78] http://www.southwestareagrants.org/nm/cfrp.php.
[79] Discussion is based on "*New Mexico Fire Plan/National Fire Plan 2004 Accomplishment Report: Southwestern New Mexico*."
[80] The twenty communities identified as most at-risk by the New Mexico State Forestry Division are Pinos Altos, Reserve, Apache Creek, Pine Cienega, Little Walnut, Poverty Creek, Kingston, Agua Fria, Black

Funds came from a variety of sources: $1.7 million in federal non-grant dollars, $177 thousand in state dollars, $1.3 million in grant dollars, and $435 thousand in matching dollars. In addition to the treatment of many thousands of acres, the collaborative process resulted in numerous other accomplishments during 2004:

- Chips, firewood, saw logs, board lumber, and round wood were among the by-products that resulted from the treatment process.
- More than 120 jobs were created through contracting with local workers to help with the treatment process.
- More than 700 individuals were certified to participate and help with treatment.

In 2003, the village of Ruidoso received a grant for $335 thousand under the National Fire Plan, and a participating agreement with Lincoln NF for an additional $150 thousand to work on fuels reduction in the area of the village.

In accordance with the Healthy Forests Restoration Act of 2003 (aimed at implementing portions of the National Fire Plan), collaborative Wildlife-Urban Interface working groups have formed and developed community wildfire protection plans. The working groups are collaborative efforts between state, local, tribal, and federal agencies, as well as fire departments, private landowners, insurers, and local businesses. The groups work to address hazard mitigation, structure protection, and community preparedness, and are the primary channel for coordinating funding and grants requests, fuels management projects, and interagency/business relationships. More specifically, the groups establish geographical boundaries where priorities and treatments are applied. Forest health and watershed management issues are also addressed. Working groups use public awareness campaigns to educate homeowners and communities about structural ignitability.

8.5 Rio Peñasco Watershed Restoration Project

Initiated in 1999, the Rio Peñasco Watershed Restoration Project is an on-going partnership effort originally designed to restore ecological integrity and biodiversity, improve water quality and supply, and create an economic base for local businesses dependent on forest resources. The Rio Peñasco Watershed Restoration Project is one of only 16 such projects nationwide. The project's development stems from recognition that former activities and resource use practices have resulted in poor current watershed conditions, including reduced surface water availability, poor water quality, increased presence of invasive non-native plants, and unhealthy forests at high risk for catastrophic wildfires and insect and disease infestations. The project was subsequently refocused on reducing fire susceptibility, although watershed restoration continues to be integrated into the project's new focus.

The Upper Rio Peñasco is a 120,000-acre watershed that drains into the Pecos River. The Sacramento RD covers two-thirds of the watershed, which is also home to several communities (including Cloudcroft and Mayhill) and subdivisions.

The partnership is community-based and involves both local and regional interests. Current partners include Lincoln NF, assorted local, state, and federal agencies, private industry, and various non-governmental organizations. On-the-ground accomplishments to date include

---

Mountain, Devil's Peak, Rancho Grande, Elk Springs, Silver City, Pie Town, Datil, Beaverhead, Davenport Lookout, Mimbres, Lake Roberts, Hanover, Santa Clara, Arenas Valley, and Caballo Mountain.

thinning of small-diameter trees, replacing culverts, resurfacing roads, and improving drainage ditches. Additional accomplishments include the preparation of documentation required for the use of prescribed fire and thinning on several thousand acres, establishment of a slash disposal pit for use by private citizens conducting thinning, and holding seminars and workshops. Future efforts will include the development of fuels reduction and water quality improvement projects, strengthening and expanding the partnership, exploration of new ways to commercially use restoration by-products, and funds acquisition.

8.6 Volunteers

Data obtained from the FS indicates that during 2005 Lincoln NF gained from the efforts of more than 585 volunteers. Volunteers are a valuable resource and enable Lincoln NF to undertake more projects than would be possible without the aid of volunteers. Volunteers have helped with a variety of projects, including recreation site and trail maintenance, business and finance activities, and heritage resource protection. Clearly, the FS benefits from relationships with volunteers, but volunteers also benefit, as they have the opportunity to learn about the forest and its wildlife and heritage resources.

Table 8.3 provides details regarding the ethnicity of Lincoln NF volunteers over the past 6 years. Over the past several years, there have generally been more non-Hispanic volunteers than minority volunteers. **Table 8.4** describes Lincoln NF volunteers according to their age and gender characteristics. On average, 75 percent of volunteers are male. Volunteers tend to be young to middle-aged; 32 percent are 18 or younger, 52 percent of volunteers are between the ages of 18 and 54, and 16 percent are 55 or older.

Table 8.3: Ethnicity and Gender of Lincoln NF Volunteers, 2000–2005

2005

Race/Ethnicity	Male	Female	Total
White (Non-Hispanic)	27%	31%	28%
Black (Non-Hispanic)	0%	2%	0%
Hispanic	36%	33%	36%
Native American/Alaskan Native	0%	0%	0%
Asian/Pacific Islander	0%	0%	0%
Total Minorities	36%	35%	36%
TOTAL	432	153	585

2004

Race/Ethnicity	Male	Female	Total
White (Non-Hispanic)	72%	84%	75%
Black (Non-Hispanic)	0%	0%	0%
Hispanic	14%	8%	13%
Native American/Alaskan Nativ	0%	0%	0%
Asian/Pacific Islander	0%	0%	0%
Total Minorities	14%	8%	13%
TOTAL	113	38	151

2003

Race/Ethnicity	Male	Female	Total
White (Non-Hispanic)	89%	90%	89%
Black (Non-Hispanic)	2%	3%	2%
Hispanic	4%	3%	4%
Native American/Alaskan Native	0%	0%	0%
Asian/Pacific Islander	0%	0%	0%
Total Minorities	6%	5%	6%
TOTAL	124	39	163

2002

Race/Ethnicity	Male	Female	Total
White (Non-Hispanic)	55%	59%	56%
Black (Non-Hispanic)	0%	1%	1%
Hispanic	22%	20%	21%
Native American/Alaskan Nativ	0%	0%	0%
Asian/Pacific Islander	0%	0%	0%
Total Minorities	23%	21%	22%
TOTAL	275	97	372

2001

Race/Ethnicity	Male	Female	Total
White (Non-Hispanic)			
Black (Non-Hispanic)			
Hispanic			
Native American/Alaskan Native			
Asian/Pacific Islander			
Total Minorities			
TOTAL	NA	NA	NA

2000

Race/Ethnicity	Male	Female	Total
White (Non-Hispanic)	68%	92%	73%
Black (Non-Hispanic)	1%	3%	2%
Hispanic	15%	1%	12%
Native American/Alaskan Nativ	0%	0%	0%
Asian/Pacific Islander	0%	0%	0%
Total Minorities	16%	4%	13%
TOTAL	517	151	668

Notes: Column percentages may not sum to 100% due to non-reporting by some individuals. NA = not available.

Source: USDA Forest Service Volunteer Data, Human Resource Department

Table 8.4: Age and Gender of Lincoln NF Volunteers, 2000–2005

2005

	Under 18	18-54	Over 55	Total
Male	82%	77%	60%	77%
Female	18%	23%	40%	23%
TOTAL	164	138	55	357

2004

	Under 18	18-54	Over 55	Total
Male	90%	68%	71%	73%
Female	10%	32%	29%	27%
TOTAL	29	72	31	132

2003

	Under 18	18-54	Over 55	Total
Male	92%	69%	71%	75%
Female	8%	31%	29%	25%
TOTAL	38	85	31	154

2002

	Under 18	18-54	Over 55	Total
Male	74%	72%	75%	73%
Female	26%	28%	25%	27%
TOTAL	116	138	36	290

2001

	Under 18	18-54	Over 55	Total
Male				
Female				
TOTAL	NA	NA	NA	NA

2000

	Under 18	18-54	Over 55	Total
Male	92%	69%	74%	75%
Female	8%	31%	26%	25%
TOTAL	138	357	84	579

Source: USDA Forest Service Volunteer Data, Human Resource Department

Table 8.5 provides detailed information regarding the number of volunteer hours, the associated appraised value, and the number of person years associated with volunteer activities in each of a number of broad categories for each of the past 6 years. The FS has estimated that 16,437 hours of volunteer work were donated in 2005; the Bureau of Business and Economic Research (BBER) estimates that these contributions of volunteer time are worth $166,165. BBER's appraisal of the value of the donated volunteer hours is assessed by accounting for the volunteers' skill levels and adjusting the appraised value to the government pay grade scale. The "person years" column specifies the number of years' worth of work that was subsidized by volunteers' efforts.

The area that benefits most significantly from volunteer efforts is recreation (trail maintenance). Other areas that benefit substantially include the Heritage Program; wildlife, fish, and rare plants; and business and finance. During the past 6 years, volunteers have donated an average of 15,605 hours of their time per year, valued at $176,828 and equivalent to 9 person-years worth of work. The FS has received the most benefit from volunteer efforts related to recreation activities.

Table 8.5: Value of Volunteers on Lincoln NF, 2000-2005

	2005			2004			2003		
Resource Category	Accum. Hours	Appraised Value (Dollars)*	Person Years**	Accum. Hours	Appraised Value (Dollars)*	Person Years**	Accum. Hours	Appraised Value (Dollars)*	Person Years**
Recreation	15,989	$158,678	8.88	12836	$127,659	7.13	13,088	$168,336	7.27
Heritage Program				469	$6,344	0.28	240	$4,000	0.13
Wildlife, Fish & Rare Plants	360	$6,648	0.20				64	$950	0.04
Business & Finance	40	$412	0.02	736	$7,117	0.41	32	$475	0.02
Other	48	$427	0.03						
TOTALS	16,437	$166,165	9.13	14,041	$141,120	7.82	13,424	$173,761	7.46

	2002			2001			2000		
Resource Category	Accum. Hours	Appraised Value (Dollars)*	Person Years**	Accum. Hours	Appraised Value (Dollars)*	Person Years**	Accum. Hours	Appraised Value (Dollars)*	Person Years**
Recreation	14,196	$155,690	7.89				18,657	$233,879	10.37
Heritage Program	90	$1,035	0.05				0	$0	0.00
Wildlife, Fish & Rare Plants							800	$7,775	0.44
Business & Finance	124	$1,984	0.07				48	$438	0.03
Other	208	$2,295	0.12						
TOTALS	14,618	$161,004	8.13	NA	NA	NA	19,505	$242,092	10.84

*Appraised Value estimated according to Government Pay Grade
* *Person Years = Accum. Hours/1800 Hours

Source: USDA Forest Service Volunteer Data, Human Resource Department

8.7 Challenges and Opportunities for Forest Management

Direct benefits of Lincoln NF are concentrated mostly in the communities surrounding the forest areas. This is illustrated in part by the fact that with few exceptions, grazing permittees are local to the Lincoln NF area – only three permittees do not live in close proximity to the forest.[81] In addition, locals comprise more than 70 percent of those who use Lincoln NF for recreational purposes.[82] The communities and economies of Ruidoso and Cloudcroft benefit from the operation of Ski Cloudcroft and Ski Apache, both of which are located in part on FS land.

[81] Information on grazing permittees is summarized in **Table 5.4**.
[82] Information on recreational use is summarized in **Table 5.1**.

Formal working agreements with community partners (such as CFRP grants) enable the FS to introduce and facilitate innovative projects designed to improve forest health and reduce future threats to forest health (such as fire and disease). Recent fires (such as the 2004 Peppin Fire) have highlighted to area residents the importance of forest health for both the forest itself and for the health of surrounding communities. This has hopefully created an atmosphere in which the FS can form new and effective partnerships with community members and organizations to address issues such as forest health. The Rio Peñasco Watershed Restoration Project is an excellent example of how the FS and the surrounding communities can work together to reach common goals that benefit not only the FS and the communities, but also the forest itself and its visitors. The FS has received support in these efforts both through formal collaborations and through the aid of volunteers.

Although a number of collaborative projects have been highlighted, the list is by no means comprehensive – numerous other collaborative projects have been undertaken for a variety of purposes, including fire rehabilitation, road construction, and wildlife habitat improvements. In addition, the FS has worked with the village of Cloudcroft and the Mescalero Apache tribe to ensure that the Ski Cloudcroft and Ski Apache ski areas remain operational.

Collaboration is a valuable tool to the FS, and its value is likely to grow as the pace of economic, social, and cultural change accelerates in communities that neighbor the forest. The efficiencies of collaboration are obvious – it allows the FS to leverage its resources to get more done. But there is an indirect benefit that may be more important. Economic, social, and cultural change in communities that neighbor Lincoln NF are associated with broader changes in the interests and needs of forest users, and in knowledge and values about land ethics and use. For the FS to be effective in its mission, it must be well informed as these changes unfold. Collaboration offers the FS a unique opportunity to maintain strong community relationships, to learn of the changing needs and views of its constituents. Equally, collaboration provides an opportunity for communities and constituents to understand the concerns and strategies of forest managers. An example is partnerships with organizations such as off-highway vehicle (OHV) clubs. Such partnerships would provide opportunities for both the FS and OHV users to understand each other’s concerns and needs, leading to strategies that are workable and sustainable.

9 Principal Findings, Challenges, and Opportunities

9.1 Economic Restructuring and Changes in Forest Uses

The economic impact of the Lincoln NF reflects a national (and global) pattern of economic restructuring that has been underway since at least the 1970s. During this period, the value of primary resources, including rangeland, timber, minerals, and oil and gas, have declined sharply (notwithstanding 2006 increases in oil and gas prices), while values based on amenity-based uses, particularly residential and recreational development, have increased commensurately. Few expect this pattern of economic restructuring to change significantly in coming years, so it should serve as the baseline for planning.

- According to estimates outlined in Chapter 7 of this report, recreational activities had the largest economic impact of all activities on the Lincoln NF in the 2004 study year, accounting for about two-thirds of the total economic impact of forest-related activities. Recreational activities in the Lincoln NF directly and indirectly generated an estimated $115.8 million in output (roughly equivalent to revenues), created 1,869 jobs, and funded $40.9 million in labor income (including wages, benefits, and profits).
- Activities directly associated with FS operations – including salaries, contracts, and other expenditures – also contribute substantially to the local economy; the impact is still greater when activities associated with fire suppression are tallied. These activities account for an estimated $24.3 million in output, 413 jobs, and $16.1 million in labor payments.
- The combined value of resource-based activities – primarily ranching, but also including timber harvesting – account for about 5 to 8 percent of the economic impact of all forest-based activities. These activities account for 99 jobs and $5.1 million in labor payments. Trends in the local agricultural sector suggest that the impact of these activities may be flat or declining, while recreational activities are almost certain to continue to increase.
- Other activities include the solar observatories at Sunspot, within the Sacramento ranger district (RD) south of Cloudcroft. These employ about 115 persons and pay about $4.0 million in labor income. The uncertain future of these facilities may result in a diminished impact.

9.2 Social and Demographic Change

Economic restructuring and the associated shift from resource- to amenity-based uses of forest resources are associated with changes in the demographic and social profile of forest users and constituents. These changes generally track national demographic and social patterns, but, while uneven across counties, are somewhat more pronounced. The population in the Lincoln NF assessment area is becoming older, ethnically, racially and economically more diverse, better educated, and, on average, wealthier.

- Between the 1990 and 2000 censuses, the total population in the four county assessment area (Lincoln, Otero, Eddy and Chaves) grew from 154,620 to 194,749. The 14 percent increase was well below the statewide 20 percent increase. Forecasts indicate that the growth of the regional population will continue to lag behind the statewide pattern during the next two or three decades.
- Over the same ten-year period, the share of Hispanics in the four county

assessment area increased sharply, from 35 percent to 42 percent, while the share of the White/non-Hispanic population declined from 50 percent to 45 percent.

- Between 1990 and 2000, the share of the four county population 65 years old or older increased slightly, from 13 percent to 14 percent, slightly higher than the New Mexico statewide average. According to forecast estimations, the age of this population will increase significantly, well beyond that of the state or national populations.
- The economic circumstances of residents of the four county assessment region are increasingly divided. While real per capita income for the total population increased by 98 percent between 1990 to 2000, compared to a 76 percent increase for the state, the share of the four county population living in poverty remained unchanged, at 19 percent. During the same period, the share of the statewide population fell from 21 percent to 18 percent.

9.3 Differences between the Northern and Southern Segments of the Assessment Area

The northern part of the assessment area (Sacramento and Smokey Bear RDs) is growing much more rapidly than the southern part of the assessment area (by more than 47 percent during the 1980-2000 period, compared to only 14 percent during the same period in the Guadalupe RD). This trend is expected to continue: population in the northern counties for the period 2000 to 2030 is projected to grow by 26 percent, compared to 15 percent in the southern areas.

- Population growth in the northern assessment area, particularly in Lincoln County, is driven largely by the influx of older, better educated, White/non-Hispanic persons, including a large number of retirees. In Lincoln County, one in four residents will be 65 years old or older by 2010; one in three will be of that age by 2030. In the other counties, only about 15 percent of the population will be over 65 years of age by 2010, and the senior population will remain slightly less than one-quarter by 2030. Likewise, the population of the northern assessment area is much more likely to be made up of recent arrivals than their counterparts in the southern assessment area. In 2000, about 26 percent of Lincoln and Otero County residents had moved into the county during the preceding five-year period. By contrast, about 16 percent of Chaves and Eddy County residents had moved into the county during the same period.
- These demographic patterns reflect and create differences in use patterns of forest resources. Although the Lincoln NF issues far more permits for grazing in the northern than the southern RDs, overall, the area is less dedicated to ranching. In 2004, labor and proprietors' income from the livestock industry in Chaves and Eddy Counties was 30 times greater than the corresponding income generated in Otero and Lincoln Counties. Further, oil and gas exploration and extraction is a principal economic engine of the southern assessment area. The northern assessment area has no comparable resource-based industry.
- To the same extent that resource industries drive the economies of the southern assessment area and shape use within the forest, recreation, residential development, and government activities are the main drivers of the northern assessment area and uses of forest land. Ruidoso, in Lincoln County, is

characteristic of the expansion of amenity and recreational uses of the Sacramento and Smokey Bear RDs. Land development occurs at the fringe of forest land, but is clearly shaped by the value that Lincoln NF brings to community residents.

9.4 Fragmented Patterns of Landownership within the Lincoln National Forest

Within the boundaries of the Lincoln NF, about 166,571 acres or 13 percent of the land area is under private ownership. Far from consolidated, privately owned land is widely distributed in relatively small parcels throughout the three RDs, creating a fragmented or checkerboard pattern of land ownership. This fragmented pattern of land ownership poses both challenges and opportunities to the management of the Lincoln NF.

- Fragmented landownership generates difficult issues regarding access and rights of way. FS-maintained roads are part of the road network used by local residents, and in some cases, these roads provide exclusive access to private land. Conversely, there are many situations where access to FS-owned land requires right-of-way consent of private landowners. In this respect, public-private relationships are critical to the functioning of the region.
- Often, effective ecological management requires consistent application across large contiguous areas, yet managers of public and private land often have different priorities and different resources, undermining FS management goals. For example, threatened and endangered species habitats often cross boundaries of landownership, but effective management must be carried out on the same scale in all parts of the habitats. Similarly, strategies to eradicate or manage invasive species must be applied evenly over areas because areas where these strategies are not applied may harbor these invasive species. Finally, fragmented landownership makes fire and fuel management more difficult by both limiting the capacity of the FS to apply good practice, and putting private property in the path of dangerous forest fires.
- On the positive side, the checkerboard pattern of landownership also provides a valuable opportunity for Lincoln NF managers to demonstrate alternative and sustainable management practices to private landowners that neighbor FS-owned land. This enables the FS to better achieve its land management objectives and fulfill its broadest mission to demonstrate the sustainable multiple-use management concept.
- Lincoln NF has been effective in enacting land exchanges and adjustments during recent years, reducing the problems associated with land fragmentation. To date, the principal objective of land adjustments on the Lincoln NF have been to ensure access to FS-owned land. Unfortunately, increasing land prices associated with land development, especially in Lincoln and Otero Counties, is likely to increase the cost of efforts to consolidate landownership in the future.

9.5 Localized Impacts Versus National Constituencies

Lincoln NF is located in a relatively remote area – the assessment area is thinly populated and it is located a considerable distance from larger metropolitan areas. A consequence is that the forest

tends to have a strong and, some may say, nearly exclusive impact on local communities.[83] However, new transportation and communication technologies, the expansion of recreation and tourism economies, and the national and even global character of advocacy means that FS managers also must be responsive to an ever-widening constituency. This raises challenges, but also opportunities, for Lincoln NF managers.

- The four county assessment area of the Lincoln NF is populated by 194,749 persons over 21,708 square miles – an average population density of only 9 persons per square mile. The forest is also located 120 miles from the closest major metropolitan area and large airport, in El Paso, Texas.
- The geographical distribution of permits to graze livestock on Lincoln NF land is a useful indicator of the concentration of forest benefits. Of the 117 permittees to the forest, only 9 are held by persons not within the immediate vicinity of the forest. All others are held by persons living in small towns within miles of the forest boundaries. Grazing permits are not only critical to ranching operations, but they are also integral to the equity value of ranching businesses.
- The forest and forest management impact local communities in a number of other ways. Forest roads are common to the travel patterns of local residents; fire and environmental management on the forest directly affects local residents; the forest provides fuel wood to local communities; recreational opportunities are enjoyed largely by those living closest to the forest; and open space and other amenities associated with the forest support property values of local residents.
- Yet, the mandate of the FS is to support and protect all public interests and uses associated with the forest, not just those in closest proximity or with the longest historical ties to the forest. Preservation for future use, protection of threatened and endangered species, maintenance of wilderness areas and similar concerns are fundamental to the mission of the FS. This is very true of the Lincoln NF, which provides habitat for threatened and endangered species, includes two designated wilderness areas, and provides recreational opportunities to a growing number of persons outside the area.
- Opportunities exist to weave together these potentially conflicting interests. As the data in this report indicate, the economic benefits of Lincoln NF stem overwhelmingly from recreation use. The recreational value of the forest, in turn, depends on protecting the quality of the resources. By creating industries and business that bring the economic benefits of recreational and other amenity-based activities to a wider segment of the local population, some conflicts may be averted.

9.6 The Benefits of Collaboration in Forest Management

Lincoln NF administration has been very successful in fostering collaboration with the local constituents. As documented in Chapter 8, Lincoln NF has engaged in collaborative work with federal, state, and local government; tribal governments; non-governmental organizations; private

[83] Shumway J.M. and S.M. Otterstrom. 2001. *Spatial Patterns of Migration and Income Change in the Mountain West: The Dominance of Service-Based, Amentity-Rich Counties*. Professional Geographer. Vol. 53(4): 492-502.

individuals; and universities and public schools. Collaboration will likely continue to be important as the FS addresses many challenges that lie ahead.

- Collaborative efforts, involving both financial and in-kind commitments, allow the FS to stretch increasingly scarce public resources. The same is true for other public and private parties, which also seek to leverage their resources for greater impact.
- As the demographic and economic profiles of the communities neighboring Lincoln NF continue to change during coming years, collaboration offers forest managers a unique opportunity to learn of the concerns and demands of its new users. Likewise, collaboration provides an opportunity for forest managers to educate the community about their mission, objectives, and effective environmental practice.
- Perhaps most importantly, as uses of forest resources change and the potential for conflict among uses and users inevitably arises, collaboration between the FS and its constituents may serve as a productive arena for communication and conflict resolution.

Works Cited

Adams-Russell, P.A. and Russell, J.C. Values, Attitudes and Beliefs toward National Forest System Lands: The Lincoln National Forest.

Associated Press. (2006, January 12). "Environmentalists Want Alternatives for Killing Weeds."

Bureau of Transportation Statistics. http://www.transstats.bts.gov/Tableinfo.asp?Table_ID=1102.

Burke, Adam. "As Fire Season Ignites, Smokey Bear's Legacy Lingers," High Country News, June 21, 2004.

Dwyer, J.F. (1995). Integrating Social Sciences and Ecosystem Management: A National Challenge. Athens: USDA, Forest Service, Southern Research Station.

Forest Plan Monitoring and Evaluation Summary. Lincoln National Forest. http://www.fs.fed.us/r3/lincoln/contact/planning/2004_LNF_monitoring_report.pdf

National Science Foundation. Division of Astronomical Sciences, Senior Review Committee. (2006, October 22). "From the Ground Up: Balancing the NSF Astronomy Program."

Otero County Economic Development Council Report. http://www.ocedc.com/newsletter/Newsletter_April04.pdf

Otterstrom, S.M. and Shumway J.M. (2001). Spatial Patterns of Migration and Income Change in the Mountain West: The Dominance of Service-Based, Amentity-Rich Counties, Professional Geographer V53(4) p492-502.

Sharpe, Tom. "Preparing for the Worst," The Santa Fe New Mexican, February 21, 2006.

Spoerl, P.M. (1983). Thousands of Years of Use: Prehistory and History on the Lincoln National Forest.

US Department of Agriculture Forest Service. (1986). Environmental Impact Statement for Lincoln National Forest Plan.

US Department of Agriculture Forest Service. Final Environmental Impact Statement – Invasive Plan Control Project.

US Department of Agriculture Forest Service. (2005). Forest Plan Monitoring and Evaluation Report: Lincoln National Forest, Fiscal Year 2004.

US Department of Agriculture Forest Service. (2004). Lincoln National Forest. Stakeholder's Report for 2003.

US Department of Agriculture Forest Service. (2005). News Release. FS-0406. http://www.blm.gov/nhp/efoia/wo/fy05/im2005-067.htm

US Department of Agriculture Forest Service. (2001, January). Inventoried Road less Area Acreage, Categories of NFS Lands Summarized by State. http://roadless.fs.fed.us/documents/feis/data/sheets/acres/appendix_state_acres.html

US Department of Agriculture Forest Service. Mission, Motto, Vision, and Guiding Principles. http://www.fs.fed.us/aboutus/mission.shtml

US Department of the Interior. Fish and Wildlife Service. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: State Overview. http://library.fws.gov/Pubs/State_overview01.pdf

US Forest Service. (2004). Lincoln National Forest. Monitoring and Evaluation Summary. Lincoln National Forest.

Appendices

Table A.1: Capital Outlays and Transportation Infrastructure Improvements

I 10, Texas State Line to Las Cruces

This project involves reconstruction of existing lanes and expansion from a four-lane to a six-lane highway to accommodate high commuter and commercial traffic from El Paso. This is a major corridor for east to west coast transport of goods and services. Construction is scheduled to take place from August 2007 to May 2009.

U.S. 380, Capitan to Hondo

Project objectives are shoulder widening and pavement and drainage structure replacement along the existing two lanes. Emphasis will be placed on the cultural, natural and historic resources of the area. The project will improve the mobility of people and goods in the area. Construction is scheduled from June 2007 to October 2008.

U.S. 62, Texas State Line to Carlsbad

The existing two-lane highway will be reconstructed and enhanced with widened shoulders and periodic passing opportunities. This route accommodates tourists going to Carlsbad Caverns National Park, which is the most visited park in New Mexico. The project will run from June 2006 to February 2008.

U.S. 62, Texas State Line to Lea/Eddy County Line

The project will reconstruct and improve the existing two-lane highway and will widen shoulders to 8 feet. Improvements include replacement of pavement structure, drainage structures, guardrail, permanent signing, and striping. The roadway is a main corridor for oil field truck traffic. The project began in September 2004 and is scheduled for completion in July 2007.

NM 128, Jal to Texas State Line

The first ten and one-half miles will be realigned and reconstructed to relocate the roadway away from salt lakes. Reconstruction and improvement of the remainder of the route will address severely deteriorated surfacing and poor sub grade. Improvements will include widened lanes and shoulders. The project began March 2005 and is scheduled for completion in December 2008.

NM 8, Eunice N. to Jct U.S. 62 W. of Hobbs

Project objectives are to reconstruct and rehabilitate the existing lanes and add 8-foot shoulders. Improvements include replacement of drainage and pavement structures. This roadway is a main corridor for oil field traffic and is vital to the local economy. The project is scheduled from April 2010 to April 2011.

NM 83, Lovington E. to NM 132

The existing two lanes will be reconstructed and rehabilitated, and 8-foot wide shoulders will be added. Improvements will include replacement of pavement structure, drainage structures, guardrail, permanent signing, and striping. This facility is a main corridor for

oil field traffic and is vital to the local economy. Construction is scheduled from April 2007 to January 2008.

U.S. 380, Tatum to Texas State Line

The project will reconstruct the existing two lanes – shoulders will be widened and drainage structures replaced. This will improve the mobility of people, goods, and oil field truck traffic. The project began August 2004 and is scheduled for completion January 2008.

Table A.2: Trails on Lincoln NF

Name	Segment Length
TELEPHONE CANYON	1
PEACOCK	2
SITTING BULL FALLS	3
ALAMO PEAK	3
LAST CHANCE CANYON	6
OSHA	2
OSHA	0
CEDAR CREEK	2
CABALLERO CYN	4
ALAMO CYN	7
SOUTH BASE	12
SUMMIT	8
PADILLA	3
MITT AND BAR	1
MITT AND BAR	1
MITT AND BAR	3
PIERCE CANYON	4
PIERCE CANYON	2
PANCHO CANYON	4
COPELAND CANYON	1
CAPITAN PEAK	5
CAPITAN PEAK	1
NORTH BASE	6
SEVEN CABINS	4
THORIUM CANYON	2
GRAND VIEW	1
GRAND VIEW SPUR	0
GRAND VIEW SPUR	0
UPPER DRY CYN	3
"A"	5
DRY CYN	5
UPPER DRY CYN ALT	1
HELL'S HOLE	1
RIM	1
RIM	27
DOG CYN	6
ROUNDUP GROUND	3
PIPELINE	2
ATKINSON FIELD	2
WILLIE WHITE SPUR	1
WILLIE WHITE	5
GOAT SPRINGS	2
MONUMENT CYN	2
MONUMENT CYN	1
SAN ANDRES CYN	2

Name	Segment Length
DARK CYN	6
NELSON CYN	0
PRESTRIDGE W.	1
PRESTRIDGE E.	1
RANCHARIO	3
ROAD CYN ALT	1
INDIAN WELLS	1
PINES N. TRAIL	1
CHIPPEWAY SPUR	1
BAILEY S.	1
OSHA SPUR	1
FIR	2
LOWER SAN ANDRES	2
SUNSPOT	1
PINES BYPASS	1
DEERHEAD CYN	1
CAMP WILDERNESS RID	4
SILVER CROSS-COUNTR	1
LITTLE APACHE	3
APACHE NATURE	1
LA PASADA ENCANTADA	0
ESCONDIDO RIDGE	3
ESCONDIDO RIDGE	1
HEART ATTACK CYN	1
GOBBLER KNOB	3
CHIPPEWAY	3
WILLS/HAY CYN	3
WAYLAND CYN	4
CORRAL CYN	1
CLOUD-CLIMBING TRES	1
VILLAGE SPUR	0
OVERLOOK	0
OVERLOOK	0
OVERLOOK	0
OLD CLOUDCROFT HWY	3
BENSON CYN	4
BENSON CYN ALT	2
BENSON CYN S.	2
TAYLOR CYN	2
SCENIC	1
SCHOFIELD CYN	2
SHORTCUT	1
SCHOFIELD/BENSON CY	2
SCHOFIELD/TAYLOR CY	0
OLD SUNSPOT HWY TRA	1

Name	Segment Length
SOUTHFORK	5
SOUTHFORK	1
APPLE TREE CYN	5
APPLE TREE CYN II	1
RODAMAKER CANYON	3
PUMPHOUSE RIDGE I	1
PUPMHOUSE RIDGE II	1
PUMPHOUSE RIDGE III	3
PUMPHOUSE RIDGE IV	0
PUMPHOUSE RIDGE V	1
THOUSAND MILE CYN	2
HUBBELL CYN	4
MILLS CANYON	5
UPPER WILLS CYN	4
UPPER WILLS CYN ALT	0
DRY MILLS	1
CREST	18
CREST	2
SPRING CANYON	3
PERK RIDGE TRAIL	3
BLUEFRONT	4
BLUEFRONT	2
NORMAN CANYON	2
GRINDSTONE TRAIL (M	4
FITNESS TRAIL	1
LOOKOUT MOUNTAIN	1
ASPEN	2
ASPEN	0
BARBER SPRINGS TRAI	7
JOHNNIE CANYON TRAI	4
BIG BONITO	5
CARRIZO PEAK	3
TUCSON MOUNTAIN	2
PATOS MOUNTAIN	3
LITTLE BONITO	1
CHURCH MOUNTAIN	2
TORTOLITA CANYON	9
WATER CANYON	4
CUT ACROSS	1
ARGENTINA CANYON	3
GAYLORD CANYON	2
DOHERTY RIDGE	3
NOGAL CANYON	1
THREE RIVERS	6
SKULL SPRINGS	2

Name	Segment Length
TURKEY CANYON	3
PENNSYLVANIA CANYON	4
INDIAN	4
NORTH MCKITRICK CAN	6
LONESOME RIDGE	3
USSERY	2
CCC TRAIL	2
OVERLOOK TRAIL	2
WHITE OAKS	2
HORSE SPRING SPUR	1
ANDERSON CANYON	1
GILSON SPRING TRAIL	2
HORSE SPRING TRAIL	2
HORSE CANYON	3
HORSE CANYON	1
CAMP WILDERNESS RID	2
FRANK'S SPRING	0
BLACK RIVER SPRING	2
MUNSON TRAIL	2
JUNIPER WELLS TRAIL	1
CAVE CANYON	3
TELEPHONE RIDGE	2
PACK TRAIL	2
SLAUGHTER	1
WILSON CANYON	1
ROBERT'S CANYON	1
BENSON RIDGE/BLUFF	1
BENSON RIDGE/BLUFF	0
SACRAMENTO N.	1
SACRAMENTO N.	0
BENSON RIDGE/BLUFF	1
LICK CYN	4
MINERAL SPRINGS	2
MINERAL SPRINGS	1
TOBOGGAN CYN	1
BRADFORD CYN	1
LITTLE APACHE	3
ZINKER CYN TRAIL	2
SPILLER CYN	1
LOST LODGE	1
SUNSHINE VALLEY	1
TOBOGGAN CYN S.	1
LICK RIDGE N.	1
LICK RIDGE N.	0

Name	Segment Length
LONG RIDGE	2
LONG RIDGE	0
MULE CYN	2
MULE CYN	1
BRIDGE CYN	2
SILVER CROSS-COUNTR	1
APPLE TREE SPUR	1
PINES	0
MOONSHINE	2
LUCAS CYN	5
SCOTT ABLE	4
ELK CYN	3
WILLIE WATSON CYN	1
APACHE NATURE	1
SADDLE NATURE	1
SILVER NATURE	0
DEVIL'S DEN	4
BARBER RIDGE	6
MINER'S ROAD	2
CLEAR WATER	1
NORTH EAGLE CREEK	2
SANDER'S RIDGE	2
PHANTOM	1
MAVERICK	1
OAK RIDGE	2
DRY CANYON	3
GOAT CANYON	2
COYOTE CANYON	2
SAND WASH	3
WARNER GULCH	2
NOGAL PEAK	1
PIERCE ALTERNATE TR	1
TRAIL CANYON	2
SWITCHBACK	3
CROSSOVER	0
WILLS CYN	4
COURTNEY MINE	2
CATHEY CYN	2
LITTLE LEWIS CYN	4
SBF SHORT CUT	0
GUNSIGHT CANYON	1
COTTONWOOD TRAIL	1
LOST TRAIL	1

All trail types are listed as Standard/Terra Trail

Table A.3: Hunting Regulations for Management Units in Lincoln NF

Big Game

Species	License/Permit Type	Hunt Dates	Special Arms	Units	Permits
Deer	Public Draw	Varies per unit 10/28-11/22	Any Legal Sporting Arm	Units 29, 30, 32, 33, 36 - 38, 43, 45	25-1500
Deer	Public Draw	Varies per unit 9/1-1/15	Bows Only	Units 29, 30, 32, 33, 36 - 38, 43, 45	50-350
Deer	Public Draw	Varies per unit 9/23-11/26	Muzzleloaders	Units 29, 32, 36, 38, 43, 45	50-200
Deer	Public Draw	10/21-10-25	Restricted Muzzleloaders	Units 30, 33, 37	50-500
Elk	Private Land	Varies per unit 9/30-1/31	Any Legal Sporting Arm	Units 36, 37, 43, 45	
Elk	Private Land	9/1-9/22	Bows Only	Units 36, 37, 45	
Elk	Private Land	9/30-12/31	Muzzleloaders	Units 36, 37, 45	
Elk	Public Draw	Varies per unit 9/30-10/25	Any Legal Sporting Arm	Units 36, 37, 43, 45	25-140
Elk	Public Draw	9/1-9/22	Bows Only	Units 36, 37, 45	40-170
Elk	Public Draw	Varies per unit 9/30-11/15	Muzzleloaders	Units 36, 37, 45	25-140
Elk	OTC	Varies per unit 11/11-12/13	Bows Only	Units 37, 43	TBD
Antelope	Public Draw	Varies per unit 9/9-9/17	Any Legal Sporting Arm	Units 29, 32-34, 37	10 or 300
Antelope	Public Draw	8/19-8/23	Bows Only	Units 32-34, 37	200
Antelope	Public Draw	9/9-9/10	Muzzleloaders	Unit 29	50
Antelope	Public Draw	8/5-8/7	Mobility Impaired	Units 28, 32-34, 37	45
Bighorn Sheep	Public Draw	8/26-9/8	Restricted	Unit 45	8
Javelina	Public Draw	1/15-3/31	Any Legal Sporting Arm	Unit 30	600
Barbary Sheep	Public Draw	2/1-2/28	Any Legal Sporting Arm	Units 28-30, 32, 33, 36, 37	
Bear	OTC	Varies per unit 8/16-11/30	Restricted	Units 36-38, 43, 45	Until harvest is reached
Cougar	OTC	10/1-3/31	Restricted	Units 28-30, 32, 33, 36-38, 43, 45	Until harvest is reached
Furbearer	OTC	Varies per furbearer 9/1-4/1	Dogs, firearms, bows, traps/snares	Not well-specified; certain areas closed	n/a

Small Game/Waterfowl

Species	License/Permit Type	Hunt Dates	Special Arms	Units/Counties/Zones	Permits
Quail	OTC	11/15-2/15	Any Legal Sporting Arm	Statewide	n/a
Quail	OTC	9/1-9/30 & 12/1-12/30	Any Legal Sporting Arm	South Zone	n/a
Dove	OTC	Varies per unit 9/1-12/30	Any Legal Sporting Arm	Statewide	n/a
Band-Tailed Pigeon	OTC	9/1-12/16	Any Legal Sporting Arm	Statewide (except Southwest)	n/a
Squirrel	OTC	9/1-10/31	Any Legal Sporting Arm	S-3	n/a
Sandhill Crane	OTC	10/31-1/31	Any Legal Sporting Arm	Eastern Hunt (Chaves and Eddy County)	n/a
Pheasant	OTC	12/8-12/11	Any Legal Sporting Arm	Statewide (except Valencia County)	n/a
Pheasant	OTC	12/3 & 12/10	Any Legal Sporting Arm	Seven Rivers & Huey WMA	n/a
Duck/American Coot	OTC	10/26-1/29	Any Legal Sporting Arm	Central Flyway South Zone	n/a
Moorhen	OTC	10/8-12/16	Any Legal Sporting Arm	Central Flyway South Zone	n/a
Sora/Virginia Rail	OTC	9/17-11/25	Any Legal Sporting Arm	Central Flyway South Zone	n/a
Light Goose	OTC	10/17-1/31	Any Legal Sporting Arm	Central Flyway South Zone	n/a
Dark Goose	OTC	10/17-1/31	Any Legal Sporting Arm	Central Flyway South Zone	n/a
Common Snipe	OTC	10/8-1/22	Any Legal Sporting Arm	Central Flyway South Zone	n/a
Pintail Canvasback	OTC	10/8-12/16	Any Legal Sporting Arm	Central Flyway South Zone	n/a

Source: New Mexico Department of Game and Fish, *Big Game & Trapper Rules & Information 2006-2007 License Year* and *2005-2006 Small Game & Waterfowl Rules & Information*. http://www.wildlife.state.nm.us/recreation/hunting/ind

Bag Limit definitions: Deer definitions: APRD (antler point restrictions) one deer with at least 3 points on one antler. Elk definitions: MB - one male bull; A - one antlerless elk; ES - one elk, any sex; ARPE - elk with 5 or more points on on buck Antelope.

License/Permit Type definitions: OTC - Over the Counter Permit.

Wildlife Management Unit designations: S-3 (includes Lincoln, Otero, Chaves, & Eddy). Central Flyway South Zone (includes Lincoln, Otero, Chaves, & Eddy). Antelope Units: Lincoln - 34, 37; Chaves - 32, 33, 34; Otero - 29, 35; Eddy - 28 Chaves - 32, 33; Otero - 28, 29, 43, 45; Eddy - 30.

Table A.4: Designated Areas of Lincoln NF

Site Name	Site Type	Operational Status	ROS Class
Guadalupe District			
Sitting Bull F Fpg	Picnic Site	Open	Roaded Natural
Last Chance Cyn Th	Trailhead	Open	Roaded Natural
Sacramento District			
Apache Fc	Campground	Open	Rural
Apache Pt Obs Ospo	Organization Site Privately Owned	Open	Roaded Natural
Aspen Gc	Group Campground	Open	Rural
Black Bear Gc	Group Campground	Open	Rural
Bluff Springs Th	Trailhead	Open	Roaded Natural
Camp Dale Res Ospo	Organization Site Privately Owned	Open	Rural
Cathey Vista Os	Observation Site	Open	Roaded Natural
Deerhead Fc	Campground	Open	Rural
Fir Lower Gc	Group Campground	Open	Rural
Fir Upper Gc	Group Campground	Open	Rural
Haynes Cyn Vist Os	Observation Site	Open	Roaded Natural
James Canyon Fc	Campground	Open	Rural
Karr Canyon Lower Fp	Picnic Site	Open	Rural
Karr Canyon Upper Fc	Campground	Open	Roaded Natural
La Pasada Encan Th	Trailhead	Open	Rural
Nelson Cyn Vist Is	Cua Interp/Info	Open	Roaded Natural
Osha Th	Trailhead	Open	Roaded Natural
Pines Fc	Campground	Open	Rural
Rim Th	Cua Trailhead	Open	Roaded Natural
Sacramento Rd Is	Interpretive Site (Admin)	Open	Rural
Saddle Fg	Campground	Open	Rural
Scott Able 4H Osp	Organization Site Privately Owned	Open	Rural
Sierra Blanca Vista Os	Observation Site	Open	Roaded Natural
Silver Amp Is	Interpretive Site (Minor)	Open	Rural
Silver Fc	Campground	Open	Rural
Silver Overflow Fc	Campground	Open	Rural
Silver Snowplay Ow	Other Winter Sports Site	Closed	Roaded Natural
Ski Cloudcroft Sa	Ski Area Alpine	Closed	Roaded Natural
Sleepy Grass Fc	Campground	Open	Rural
Sleepy Grass Fpg	Picnic Site	Open	Rural
Slide Gc	Group Campground	Open	Rural
Sunspot Observ Osp	Organization Site Privately Owned	Open	Urban
Trestle Fpg	Picnic Site	Open	Rural
Trestle Th	Trailhead	Open	Roaded Natural
Trestle Vista Os	Observation Site	Open	Roaded Natural
Tunnel Vista Os	Observation Site	Open	Roaded Natural

Site Name	Site Type	Operational Status	ROS Class
Smokey Bear District			
Argentin/Bonito Th	Trailhead	Open	Primitive
Baca Fc	Campground	Open	Roaded Natural
Cedar Cr Fpg	Picnic Site	Open	Rural
Cedar Cr Ftns Th	Trailhead	Open	Rural
Crest Trailhead North	Cua Trailhead	Open	Rural
Crest Trailhead South	Cua Trailhead	Open	Rural
Dry Mills Trailhead	Cua Trailhead	Open	Rural
E Capitan Vista Is	Cua Interp/Info	Open	Roaded Natural
E Carizzo Vista Is	Cua Interp/Info	Open	Roaded Natural
Eagle Rr	Recreation Residence	Open	Urban
Lookout Mtn Os	Observation Site	Open	Rural
Mills Cyn Th	Trailhead	Open	Roaded Natural
Monjeau Fc	Campground	Open	Roaded Natural
Oak Grove Fc	Campground	Open	Roaded Natural
Pancho Trailhead	Cua Trailhead	Open	Roaded Natural
Pine Lodge Rr	Recreation Residence	Open	Rural
Pine Lodge Trailhead	Cua Trailhead	Open	Roaded Natural
Ruidoso Gun Rng Pp	Playground Park Specialized Sport	Open	Rural
S Capitan Vista Is	Cua Interp/Info	Open	Roaded Natural
Sam Tobias Memorial Gc	Group Campground	Open	Rural
Scenic Trailhead	Cua Trailhead	Open	Roaded Natural
Schoolhouse Fpg	Picnic Site	Open	Rural
Seven Cabins Trailhead	Cua Trailhead	Open	Roaded Natural
Ski Apache Sa	Ski Area Alpine	Open	Roaded Natural
Skyline Fc	Campground	Open	Roaded Natural
South Fork Fc	Campground	Open	Rural
South Fork Th	Trailhead	Open	Roaded Natural
Summit Trailhead	Cua Trailhead	Open	Roaded Natural
Three Rivers Fc	Campground	Open	Rural
Three Rivers Th	Trailhead	Open	Roaded Natural
W Capitan Vista Is	Interpretive Site (Minor)	Open	Roaded Natural
Windy Pt Vista Os	Observation Site	Open	Roaded Natural

Table A.5: Grants and Agreements Contracts for Lincoln NF

Grant & Agreement Number	Cooperator Cash Contibution	Cooperator Other Contribution	Cooperator Total Contribution	FS Cash Contribution	FS Other Contribution	FS Total Contribution	Total G&A Amount
02-CO-11030800-031	$66,852.00	$0.00	$66,852.00	$0.00	$0.00	$0.00	$66,852.00
	Cooperator/ Contributors:	NEW MEXICO GAME AND FISH, ROCKY MTN. ELK FOUNDATION					
02-CS-11030800-016	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	STEVE WEST					
02-CS-11030800-018	$0.00	$7,700.00	$7,700.00	$0.00	$0.00	$0.00	$7,700.00
	Cooperator/ Contributors:	NATL. WILD TURKEY FEDERATION					
02-IA-11030800-037	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	HOLLOMAN AIR FORCE BASE					
02-JV-11030800-019	$12,000.00	$0.00	$12,000.00	$0.00	$0.00	$0.00	$12,000.00
	Cooperator/ Contributors:	STATE OF NM, EMNRD					
02-MU-11030800-008	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	WAL-MART SUPERCENTER					
02-MU-11030800-009	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	WAL-MART SUPERCENTER					
02-MU-11030800-010	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	WAL-MART SUPERCENTER					
02-MU-11030800-011	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	WAL-MART SUPERCENTER					
02-MU-11030800-014	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	GEO-MARINE, INC.					
02-PA-11030800-040	$20,000.00	$12,800.00	$32,800.00	$0.00	$4,450.00	$4,450.00	$37,250.00
	Cooperator/ Contributors:	OTERO COUNTY ADMINISTRATION					
03-CO-11030800-015	$12,000.00	$0.00	$12,000.00	$0.00	$0.00	$0.00	$12,000.00
	Cooperator/ Contributors:	NATIONAL WILD TURKEY FEDERATION					
03-DG-11030800-032	$1,000.00	$0.00	$1,000.00	$0.00	$0.00	$0.00	$1,000.00
	Cooperator/ Contributors:	VILLAGE OF RUIDOSO					
03-IA-11030800-021	$69,712.00	$0.00	$69,712.00	$0.00	$0.00	$0.00	$69,712.00
	Cooperator/ Contributors:	BUREAU OF INDIAN AFFAIRS (BIA), NATIONAL PARKS SERVICE					
03-LE-11030800-007	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO COUNTY SHERIFF'S DEPT.					

03-PA-11030800-030	$57,620.00	$5,929.00	$63,549.00	$0.00	$0.00	$0.00	$63,549.00
	Cooperator/ Contributors:	SOUTH CENTRAL MOUNTAIN RC&D COUNCIL, INC.					
04-CO-11030800-001	$234,995.00	$0.00	$234,995.00	$0.00	$0.00	$0.00	$234,995.00
	Cooperator/ Contributors:	DALE HALL					
04-DG-11030800-011	$50.00	$0.00	$50.00	$0.00	$0.00	$0.00	$50.00
	Cooperator/ Contributors:	MIKE E. EOFF					
04-LE-11030800-003	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	D. KENT WALLER					
04-LE-11030800-004	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	JOHN BLANSETT					
04-LE-11030800-005	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	TOM SULLIVAN					
05-CO-11030800-001	$227,356.00	$0.00	$227,356.00	$0.00	$0.00	$0.00	$227,356.00
	Cooperator/ Contributors:	NM DEPT. OF GAME AND FISH					
05-CO-11030800-002	$10,500.00	$0.00	$10,500.00	$0.00	$0.00	$0.00	$10,500.00
	Cooperator/ Contributors:	ROCKY MTN. ELK FOUNDATION					
05-IA-11030800-016	$0.00	$0.00	$0.00	$6,000.00	$0.00	$6,000.00	$6,000.00
	Cooperator/ Contributors:	BUREAU OF INDIAN AFFAIRS, USDI, BUREAU OF INDIAN AFFAIRS					
05-LE-11030800-015	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	NM MOUNTED PATROL TROOP 5					
05-LE-11030800-017	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO COUNTY NARCOTICS ENFORCEMENT UNIT					
05-MU-11030800-009	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	NEW MEXICO STATE UNIVERSITY					
05-PA-11030800-024	$0.00	$0.00	$0.00	$33,875.00	$0.00	$33,875.00	$33,875.00
	Cooperator/ Contributors:	ECOSERVANTS DBA SIERRA BLANCA SERVICE CORPS					
94-CA-11030801-009	$10,000.00	$0.00	$10,000.00	$5,000.00	$0.00	$5,000.00	$15,000.00
	Cooperator/ Contributors:	VILLAGE OF RUIDOSO, VILLAGE-RUIDOSO					
01-MU-11030801-002	$0.00	$24,760.00	$24,760.00	$0.00	$0.00	$0.00	$24,760.00
	Cooperator/ Contributors:	BUREAU OF THE PUBLIC DEBT					

Grant & Agreement Number	Cooperator Cash Contibution	Cooperator Other Contribution	Cooperator Total Contribution	FS Cash Contribution	FS Other Contribution	FS Total Contribution	Total G&A Amount
02-CO-11030801-012	$46,064.00	$19,727.00	$65,791.00	$0.00	$0.00	$0.00	$65,791.00
	Cooperator/ Contributors:	UPPER HONDO WATERSHED COALITION					
02-CO-11030801-013	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	MTD, INC.					
02-DG-11030801-001	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	SHERRY BARROW STRATEGIES					
02-DG-11030801-005	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	VILLAGE OF RUIDOSO					
02-DG-11030801-006	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	RUIDOSO MUNICIPAL SCHOOL DIST.					
02-IA-11030801-020	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	BUREAU OF THE PUBLIC DEBT					
02-LE-11030801-003	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	LINCOLN COUNTY SHERIFF'S DEPT.					
02-PA-11030801-028	$0.00	$10,000.00	$10,000.00	$0.00	$0.00	$0.00	$10,000.00
	Cooperator/ Contributors:	CITY OF ALAMOGORDO					
03-DG-11030801-025	$131,995.00	$0.00	$131,995.00	$358,699.00	$0.00	$358,699.00	$490,694.00
	Cooperator/ Contributors:	SOUTH CENTRAL MOUNTAIN RC&D COUNCIL, INC., SOUTH CENTRAL MTN RC&D, SOUTH CENTRAL MTN. RC&D COUNCIL					
03-LE-11030801-019	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	VILLAGE OF RUIDOSO POLICE DEPT.					
03-PA-11030801-028	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	VILLAGE OF RUIDOSO					
04-CA-11030801-029	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	LINCOLN COUNTY BOARD OF COMMISSIONERS					
04-CO-11030801-031	$27,164.00	$0.00	$27,164.00	$0.00	$0.00	$0.00	$27,164.00
	Cooperator/ Contributors:	UPPER HONDO WATERSHED COALITION					
04-DG-11030801-020	$0.00	$9,500.00	$9,500.00	$0.00	$0.00	$0.00	$9,500.00
	Cooperator/ Contributors:	CITY OF RUIDOSO DOWNS					
04-DG-11030801-022	$0.00	$1,250.00	$1,250.00	$0.00	$0.00	$0.00	$1,250.00
	Cooperator/ Contributors:	SOUTH CENTRAL MOUNTAIN RC&D COUNCIL					

04-DG-11030801-023	$0.00	$1,250.00	$1,250.00	$0.00	$0.00	$0.00	$1,250.00
	Cooperator/ Contributors:	SOUTH CENTRAL MOUNTAIN RC&D COUNCIL					
04-DG-11030801-025	$130,000.00	$0.00	$130,000.00	$360,000.00	$0.00	$360,000.00	$490,000.00
	Cooperator/ Contributors:	SOUTH CENTRAL MTN RC&D					
04-IA-11030801-027	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	DOT-FAA, SW REGION HEADQUARTERS					
04-IA-11030801-034	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	TREASURY FRANCHISE FUND/ADMIN. RESOURCE CENTER					
04-IA-11030801-037	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	NATIONAL PARK SERVICE					
04-MU-11030801-017	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	LINCOLN COUNTY COOPERATIVE WEED MANAGEMENT AREA					
04-MU-11030801-024	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	WILDLAND FIREFIGHTER MUSEUM					
05-CA-11030801-029	$0.00	$0.00	$0.00	$26,163.60	$0.00	$26,163.60	$26,163.60
	Cooperator/ Contributors:	LINCOLN COUNTY ROAD DEPARTMENT					
05-CA-11030801-035	$0.00	$0.00	$0.00	$5,000.00	$0.00	$5,000.00	$5,000.00
	Cooperator/ Contributors:	VILLAGE OF RUIDOSO, VILLAGE-RUIDOSO					
05-DG-11030801-022	$0.00	$0.00	$0.00	$360,000.00	$0.00	$360,000.00	$360,000.00
	Cooperator/ Contributors:	SHERRY BARROW STRATEGIES					
05-LE-11030801-003	$0.00	$0.00	$0.00	$22,500.00	$0.00	$22,500.00	$22,500.00
	Cooperator/ Contributors:	LINCOLN COUNTY SHERIFF, LINCOLN COUNTY SHERIFF'S DEPT.					
06-LE-11030801-006	$0.00	$0.00	$0.00	$22,500.00	$0.00	$22,500.00	$22,500.00
	Cooperator/ Contributors:	LINCOLN COUNTY SHERIFF'S DEPT.					
00-CA-11030802-011	$0.00	$0.00	$0.00	$33,000.00	$0.00	$33,000.00	$33,000.00
	Cooperator/ Contributors:	SOUTH CENTRAL MOUNTAIN RC&D COUNCIL INC, USDA, NRCS					
01-CA-11030802-009	$0.00	$0.00	$0.00	$100,000.00	$0.00	$100,000.00	$100,000.00
	Cooperator/ Contributors:	RIO GRANDE BIRD RESEARCH, RIO GRANDE BIRD RESEARCH, INC					
01-CA-11030802-015	$0.00	$0.00	$0.00	$62,300.00	$0.00	$62,300.00	$62,300.00
	Cooperator/ Contributors:	HAWKS ALOFT INC, HAWKS ALOFT, INC.					

Grant & Agreement Number	Cooperator Cash Contibution	Cooperator Other Contribution	Cooperator Total Contribution	FS Cash Contribution	FS Other Contribution	FS Total Contribution	Total G&A Amount
01-IA-11030802-008	$0.00	$0.00	$0.00	$126,858.09	$0.00	$126,858.09	$126,858.09
	Cooperator/ Contributors:	US GEOLOGICAL SURVEY					
01-MU-11030802-001	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	CLOUDCROFT NORDIC SKI PATROL					
02-CO-11030802-030	$6,000.00	$0.00	$6,000.00	$0.00	$0.00	$0.00	$6,000.00
	Cooperator/ Contributors:	NATIONAL WILD TURKEY FEDERATION					
02-CO-11030802-041	$190,861.00	$0.00	$190,861.00	$0.00	$0.00	$0.00	$190,861.00
	Cooperator/ Contributors:	NM DEPT. OF GAME AND FISH					
02-DG-11030802-007	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO SOIL AND WATER CONS. DIST.					
02-IA-11030802-024	$347,398.00	$0.00	$347,398.00	$0.00	$0.00	$0.00	$347,398.00
	Cooperator/ Contributors:	FEDERAL HIGHWAY ADMINISTRATION					
02-IA-11030802-026	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	T.E.A.M.S.					
02-IA-11030802-036	$52,075.04	$0.00	$52,075.04	$0.00	$0.00	$0.00	$52,075.04
	Cooperator/ Contributors:	OTERO SWCD					
02-LE-11030802-002	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO COUNTY SHERIFF'S DEPT.					
02-PA-11030802-017	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	STUDENT CONSERVATION ASSOC.					
02-PA-11030802-021	$0.00	$320,000.00	$320,000.00	$0.00	$0.00	$0.00	$320,000.00
	Cooperator/ Contributors:	OTERO COUNTY					
02-PA-11030802-022	$0.00	$320,000.00	$320,000.00	$0.00	$0.00	$0.00	$320,000.00
	Cooperator/ Contributors:	NM STATE HIGHWAY & TRANSPORTATION					
02-PA-11030802-023	$0.00	$15,500.00	$15,500.00	$0.00	$2,000.00	$2,000.00	$17,500.00
	Cooperator/ Contributors:	REGENTS OF NEW MEXICO STATE UNIVERSITY					
02-PA-11030802-027	$1,000.00	$13,900.00	$14,900.00	$0.00	$4,700.00	$4,700.00	$19,600.00
	Cooperator/ Contributors:	SNMYC/CHINS					
02-PA-11030802-035	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	HARVEY E. YATES, JR.					

02-PA-11030802-039	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	COLEMAN CATTLE COMPANY, INC.					
03-CA-11030802-035	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO COUNTY ADMINISTRATION					
03-DG-11030802-026	$13,400.00	$0.00	$13,400.00	$0.00	$0.00	$0.00	$13,400.00
	Cooperator/ Contributors:	DERAL LEE BOOKOUT, JR.					
03-IA-11030802-024	$290,585.00	$0.00	$290,585.00	$0.00	$0.00	$0.00	$290,585.00
	Cooperator/ Contributors:	FEDERAL HIGHWAY ADMINISTRATION					
03-IA-11030802-036	$12,500.00	$0.00	$12,500.00	$0.00	$0.00	$0.00	$12,500.00
	Cooperator/ Contributors:	U.S. ARMY CORPS OF ENGINEERS					
03-LE-11030802-020	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	CLOUDCROFT POLICE DEPARTMENT					
03-PA-11030802-033	$0.00	$7,374.00	$7,374.00	$40,000.00	$0.00	$40,000.00	$47,374.00
	Cooperator/ Contributors:	COLLEGE OF AGRICULTURE, NEW MEXICO STATE UNIVERSITY					
04-CA-11030802-030	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO COUNTY ADMINISTRATION					
04-CO-11030802-009	$4,000.00	$0.00	$4,000.00	$0.00	$0.00	$0.00	$4,000.00
	Cooperator/ Contributors:	HAROLD MCCULLOUGH					
04-CS-11030802-014	$0.00	$7,700.00	$7,700.00	$0.00	$2,550.00	$2,550.00	$10,250.00
	Cooperator/ Contributors:	NATIONAL WILD TURKEY FEDERATION					
04-DG-11030802-035	$20,000.00	$0.00	$20,000.00	$0.00	$0.00	$0.00	$20,000.00
	Cooperator/ Contributors:	TURKEY CREEK FORESTRY SERVICES, INC.					
04-IA-11030802-013	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	T.E.A.M.S.					
04-MU-11030802-026	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO COUNTY ADMINISTRATION					
04-MU-11030802-036	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	CARLSBAD SOIL AND WATER CONSERVATION DISTRICT					
04-PA-11030802-010	$35,000.00	$0.00	$35,000.00	$55,000.00	$0.00	$55,000.00	$90,000.00
	Cooperator/ Contributors:	OTERO COUNTY					

Grant & Agreement Number	Cooperator Cash Contibution	Cooperator Other Contribution	Cooperator Total Contribution	FS Cash Contribution	FS Other Contribution	FS Total Contribution	Total G&A Amount
04-PA-11030802-015	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	STUDENT CONSERVATION ASSOCIATION					
04-PA-11030802-016	$1,500.00	$0.00	$1,500.00	$0.00	$276.00	$276.00	$1,776.00
	Cooperator/ Contributors:	FURMAN UNIVERSITY					
05-CA-11030802-006	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	OTERO COUNTY ADMINISTRATION					
05-CA-11030802-028	$0.00	$0.00	$0.00	$30,864.60	$0.00	$30,864.60	$30,864.60
	Cooperator/ Contributors:	OTERO COUNTY ADMINISTRATION					
05-CS-11030802-019	$0.00	$0.00	$0.00	$2,000.00	$0.00	$2,000.00	$2,000.00
	Cooperator/ Contributors:	NATL. WILD TURKEY FEDERATION					
05-CS-11030802-025	$0.00	$0.00	$0.00	$4,556.39	$0.00	$4,556.39	$4,556.39
	Cooperator/ Contributors:	DR. PAT BARLOW-IRICK					
05-LE-11030802-004	$0.00	$0.00	$0.00	$24,000.00	$0.00	$24,000.00	$24,000.00
	Cooperator/ Contributors:	OTERO COUNTY SHERIFF'S DEPT.					
05-PA-11030802-010	$0.00	$0.00	$0.00	$5,950.00	$0.00	$5,950.00	$5,950.00
	Cooperator/ Contributors:	STUDENT CONSERVATION ASSOC, STUDENT CONSERVATION ASSOCIATION, INC.					
05-PA-11030802-011	$0.00	$0.00	$0.00	$2,975.00	$0.00	$2,975.00	$2,975.00
	Cooperator/ Contributors:	STUDENT CONSERVATION ASSOC, STUDENT CONSERVATION ASSOCIATION, INC.					
05-PA-11030802-012	$0.00	$0.00	$0.00	$2,975.00	$0.00	$2,975.00	$2,975.00
	Cooperator/ Contributors:	STUDENT CONSERVATION ASSOC, STUDENT CONSERVATION ASSOCIATION, INC.					
05-PA-11030802-020	$0.00	$0.00	$0.00	$2,500.00	$0.00	$2,500.00	$2,500.00
	Cooperator/ Contributors:	NMSU DEPT OF BIOLOGY					
06-LE-11030802-007	$0.00	$0.00	$0.00	$24,000.00	$0.00	$24,000.00	$24,000.00
	Cooperator/ Contributors:	OTERO COUNTY SHERIFF'S DEPT.					
01-MU-11030803-003	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	BLM/NPS					
02-IA-11030803-015	$4,352.78	$0.00	$4,352.78	$0.00	$0.00	$0.00	$4,352.78
	Cooperator/ Contributors:	USDA/FAS/ICD/DRD					
02-LE-11030803-004	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	EDDY COUNTY SHERIFF'S DEPT.					

04-CA-11030803-006	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	ROBERT FORREST					
04-IA-11030803-033	$0.00	$12,000.00	$12,000.00	$70,000.00	$15,750.00	$85,750.00	$97,750.00
	Cooperator/ Contributors:	BLM/CARLSBAD FIELD OFFICE, BUREAU OF LAND MGMT					
04-MU-11030803-007	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	USDI-NPS (GUADALUPE MTNS.NATL PARK)					
04-MU-11030803-018	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	USDI-BLM CARLSBAD FIELD OFFICE, USDI-BLM ROSWELL FIELD OFFICE					
05-CA-11030803-014	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	ROBERT FORREST					
05-LE-11030803-005	$0.00	$0.00	$0.00	$16,000.00	$0.00	$16,000.00	$16,000.00
	Cooperator/ Contributors:	EDDY COUNTY SHERIFF DEPT, EDDY COUNTY SHERIFF'S DEPT.					
06-LE-11030803-008	$0.00	$0.00	$0.00	$16,000.00	$0.00	$16,000.00	$16,000.00
	Cooperator/ Contributors:	EDDY COUNTY SHERIFF DEPT					
Grand Totals:	**$2,035,979.82**	**$789,390.00**	**$2,825,369.82**	**$1,818,716.68**	**$29,726.00**	**$1,848,442.68**	**$4,673,812.50**

G&A Count: 112