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Ozark-Ouachita Highlands Assessment

Social and Economic Conditions



REPORT

4

OF 5

Cover photo: Hot Springs, AR, one of several communities in the Highlands that relies heavily on tourism.

Photo by A.C. Haralson, Arkansas Department of Parks and Recreation, Little Rock, AR.

Natural resource specialists and research scientists worked together to produce the five General Technical Reports that comprise the *Ozark-Ouachita Highlands Assessment*:

- Summary Report
- Air Quality
- Aquatic Conditions
- Social and Economic Conditions
- Terrestrial Vegetation and Wildlife

For information regarding how to obtain these Assessment documents, please contact: USDA Forest Service, P.O. Box 1270, Hot Springs, AR 71902 or telephone 501-321-5202.

To limit publication costs, few color maps and figures were used in the Assessment reports. For color versions of some of the Assessment figures and supplemental material, please see the Assessment's home page on the Internet at <<http://www.fs.fed.us/oonf/ooha/welcome.htm>>. The Assessment reports will be online for about 2 years after the date on this publication; then they will be archived.

Please note: When "authors" are agency or business names, most are abbreviated to save space in the citations of the body of the report. The "References" at the end of the report contain both the full name and abbreviations. Because abbreviations sometimes are not in the same alphabetical order as the references, for clarifications of abbreviations, consult the "Glossary of Abbreviations and Acronyms."

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Ozark-Ouachita Highlands Assessment:

Social and Economic Conditions

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Preface

Change is evident across the Ozark and Ouachita Highlands. Whether paying attention to State and regional news, studying statistical patterns and trends, or driving through the Highlands, one cannot escape signs that growth may be putting strains on the area's natural resources and human communities. How people regard these changes varies widely, however, as does access to reliable information that might help them assess the significance of what is happening in the Highlands. The Assessment reports provide windows to a wealth of such information.

The *Social and Economic Conditions* report is one of five that document the results of the Ozark-Ouachita Highlands Assessment. Federal and State natural resource agency employees and university and other cooperators worked together to produce the four technical reports that examine air quality; aquatic conditions; terrestrial vegetation and wildlife; and social and economic conditions. Dozens of experts in various fields provided technical reviews. Other citizens were involved in working meetings and supplied valuable ideas and information throughout the process. The *Summary Report* provides an overview of the key findings presented in the four technical reports. Data sources, methods of analysis, findings, discussion of implications, and links to dozens of additional sources of information are included in the four technical reports.

The USDA Forest Service initiated the Assessment and worked with other agencies to develop a synthesis of the best information available on conditions and trends in the Ozark-Ouachita Highlands. Assessment reports emphasize those conditions and trends most likely to have some bearing on the future management of the region's three national forests—the Mark Twain, Ouachita, and Ozark-St. Francis. People who are interested in the future of the region's other public lands and waters or of this remarkable region as a whole should also find the reports valuable.

No specific statutory requirement led to the Assessment. However, data and findings assembled in the reports will provide some of the information relevant for an evaluation of possible changes in the land and resource management plans of the Highland's three national forests. The National Forest Management Act directs the Forest Service to revise such management plans every 10 to 15 years, which means that the national forests of Arkansas, Missouri, and Oklahoma should have revised plans in the year 2001. Due to restrictions in the appropriations bills that provide funding for the Forest Service, it is uncertain when these revisions can begin.

The charter for the Ozark-Ouachita Highlands Assessment established a team structure and listed tentative questions that the teams would address. Assembled in mid-1996, the Terrestrial, Aquatic and Atmospheric, and Human Dimensions (Social-Economic) Teams soon refined and condensed these questions and then gathered and evaluated vast quantities of information. They drafted their key findings in late 1997 and refined them several times through mid-1999. In addition to offering relevant data and key findings in the reports, the authors discuss some of the possible implications of their findings for future public land management in the Highlands and for related research. The Assessment reports, however, stop well short of making decisions concerning management of any lands in the Highlands or about future research. In no way do the reports represent “plans” or land management decisions. Instead, the findings and conclusions offered in the Assessment reports are intended to stimulate discussion and further study.

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Executive Summary

This Assessment of the Ozark-Ouachita Highlands area began in May of 1996. It was designed as an interagency effort led by the USDA Forest Service to collect and analyze ecological, social, and economic data concerning the Highlands of Arkansas, Missouri, and Oklahoma. The information compiled will facilitate an ecosystem approach to management of the natural resources on public lands within the Ozark Highlands, the Boston Mountains, the Arkansas Valley, and the Ouachita Mountains. The Social-Economic Team studied a variety of topics related to the people who live in the Highlands and who use, have an interest in, or otherwise are affected by the area's public lands.

The Social-Economic Team, with input from scientists, forest planners, and concerned citizens, identified 16 questions that needed to be addressed in order to understand the social and economic conditions and trends in the Ozark-Ouachita Highlands. Following is a summary of the team's findings.

Chapter 1: Archeological and Historical Background

What is the historical background of the Ozark-Ouachita Highlands?

What are the area's archeological resources and their characteristics?

What are the history and current status of public lands in the Highlands?

- People have lived in the Highlands for over 11,000 years; the earliest known inhabitants were the Paleo-Indians.
- The principal prehistoric cultural periods that characterize human occupation of the Highlands prior to European exploration are as follows: Paleo-Indian (11,500 B.P. [years before the present date] to 10,500 B.P.), Archaic (9,900 B.P. to 2,000 B.P.), Woodland (2,000 B.P. to 1,150 B.P.), and Mississippian (1,150 B.P. to A.D. 1650).
- The Spanish expedition of Hernando de Soto (1539 to 1543) marked the first European exploration of the Highlands. French explorers and fur traders came to the region in the late 1600's.

- The people who moved into the Highlands in the late 18th and early 19th centuries were attracted by opportunities to acquire timberland and by the availability of free open range on unclaimed public land. Land acquisition records indicate that many of the rough upland areas were settled between the 1880's and the 1930's.
- Federal lands within the Highlands include over 164,000 acres (ac) of lands managed by the National Park Service, over 66,000 ac of national wildlife refuges, about 673,000 ac of lakes managed by the U.S. Army Corps of Engineers, two military bases, and 4.4 million ac of national forests.
- State lands include 65 State parks, 32 wildlife management areas, 5 State historic sites, 5 conservation areas, and 2 National Guard areas.
- Approximately 14,000 archeological sites have been documented on the three national forests in the Highlands.

Chapter 2: Social and Demographic Conditions and Trends

What are the social trends and changes taking place in the Highlands area that will affect or be affected by national forest (or other public land) management?

What is the social profile (e.g., age, education, and racial-ethnic characteristics) of individuals who live in the Assessment area?

- The Assessment area has grown rapidly in recent decades, and continues to do so. Between 1970 and 1996, its population increased 48 percent, while Missouri, Oklahoma, Arkansas, and the Nation as a whole grew by 15, 29, 31, and 31 percent, respectively.
- Recent (1990 to 1996) population growth seems to be most strongly associated with metropolitan status, presence of national forest lands, and high rates of in-migration. In-migration of new residents contributed nearly 80 percent of the estimated population growth in the Assessment area as a whole and 83 to 98 percent of the estimated growth in groups of nonmetropolitan counties containing lands of one or more of the Highlands' national forests.

- Retirement-aged adults make up a significant segment of the population of the Assessment area. Retirement pensions and Social Security income provide a slightly larger portion of total income in the Assessment area than in the three States; these sources of income are most important in nonmetropolitan counties with national forest lands.
- The racial and ethnic composition of the Assessment area changed little between 1970 and 1990, remaining predominantly (91 percent) White. One special census showed that the Hispanic-American population of Washington County, AR, grew 435 percent between 1990 and 1996.
- Overall, educational levels are relatively low in the Assessment area. In nonmetropolitan counties in 1990, 37 percent of adults 25 years and older had not completed high school (or its equivalent), and 13 percent of teenagers (ages 16 to 19) were high school dropouts. In 14 nonmetropolitan Assessment area counties clustered mainly on the eastern side of the Highlands, at least 45 percent of the adult population had less than a high school diploma.
- Assessment area workers, especially those living in nonmetropolitan counties with national forest lands, face higher unemployment rates than the Nation as a whole. Workers living in nonmetropolitan counties with Mark Twain National Forest lands face the highest incidence of full-time, but seasonal (i.e., part-year) work.
- The overall level of socioeconomic well-being in the Assessment area is relatively low. Median household incomes in the area were \$19,208 in 1989, compared to \$20,360 in Oklahoma, \$20,832 in Missouri, and \$30,056 in the Nation.
- Thirty-seven counties in the Assessment area experience “persistent poverty” (47 percent of the 49 nonmetropolitan “national forest counties” and 33 percent of the 42 nonmetropolitan counties with no national forest lands). Persistent poverty in nonmetropolitan counties appears most common in southeastern Missouri (15 counties), north-central Arkansas (9 counties), and southeastern Oklahoma (6 counties). The 24 “persistent poverty” counties in southeastern Missouri and north-central Arkansas include 12 of the 14 counties in which 45 percent or more of the adult population have less than a high school education; 19 of these 24 “persistent poverty” counties include national forest lands.

- As of 1990, 16 Assessment area counties were termed “retirement destinations.” Most of these counties are in the heart of the Assessment area—9 of the 16 retirement-destination counties have national forest lands and 8 include large lakes.

Chapter 3: Communities

What kinds of community planning take place in the Assessment area, and how is such planning related to national forest planning?

- The communities of the Highlands include 695 municipalities plus numerous unincorporated communities and neighborhoods. These communities range from rapidly developing metropolitan areas and associated suburban communities to small, rural, natural resource-dependent communities. In 1990, 97 percent of the municipalities had populations of 10,000 or fewer.
- More than half of the population of the Assessment area lives in the open country and relies principally upon county governments for essential services; about 23 percent live in municipalities of less than 10,000 people.
- The Assessment area had major population increases in the 1970’s and grew again in the 1990’s; however, the ongoing loss of the most highly educated young people from the area’s rural communities is a concern.
- The Federal assistance available to counties and municipalities has declined greatly since the middle 1970’s; local governments have obligations to provide services that previously were not required of them.
- Arkansas communities of the Highlands that depend upon the timber industry show no clear pattern of disadvantage in levels of poverty or investment in human capital through education.
- Annual 25 percent reimbursements from national forest gross revenues to Arkansas counties and school districts apparently compensate for most effects of the reduced tax base attributable to the presence of significant amounts of Federal land.
- Many municipalities engage in land use planning and zoning. While a few counties plan for land use, they seldom use zoning. States are beginning to require various forms of local planning, including planning for capital improvements and public health. Some counties are becoming more involved in public land management planning; the recent passage in the Highlands of at least nine “county land use plans” may be an important trend.

- At the local level, the following planning groups are available in the Assessment area: Planning and Development Districts, Metropolitan Planning Organizations, and Resource Conservation and Development councils. There are also community development specialists in the three States' Extension Services, utility companies, and other institutions.
- National forest planning efforts have had little connection with local planning activities. Generally, neither long-range national forest planning, more immediate project planning, nor forest management issues are included in the agendas of community planning efforts.
- National forest ranger districts help sustain a wide variety of partnerships with local communities. Some of the most important ones result from the Rural Community Assistance program, but many relate to other aspects of the stewardship responsibilities of the ranger districts.
- The Assessment area accounts for approximately 2.4 percent of the total U.S. output of forest products and 1 percent of the U.S. industrial output generated by the minerals industry.
- In the Assessment area, 5.1 percent of the industrial output, 2.9 percent of the employment, and 3.4 percent of the employee compensation are directly attributable to the forest products industry. The minerals industry accounts for 5.0 percent, 2.2 percent, and 3.7 percent of the Assessment area's output, employment, and employee compensation, respectively. The travel industry supports 5.7 percent of the output, 7.0 percent of the employment, and 4.6 percent of the employee compensation in the Arkansas and Missouri sections of the Assessment area. (Equivalent travel industry data for Oklahoma were not available.)
- Thirty-five of the 107 Assessment area counties had at least double the Assessment area average percentage output, employment, and/or employee compensation from the forest products industry. These counties derived an average 15.7 percent of their output, 8.0 percent of their employment, and 11.0 percent of their employee compensation from the forest products industry.
- Twenty-one counties in the Assessment area had at least double the Assessment area average percent of output, employment, and/or employee compensation in the minerals industry. These counties had an average 14.4 percent of their output, 6.0 percent of their employment, and 12.1 percent of their employee compensation provided by the minerals industry.
- Twenty three of the 93 counties in the Arkansas and Missouri portion of the Assessment area were identified as having at least double the average percent of output, employment, and/or employee compensation in travel-related business. In these counties, travel-related business accounted for an average of 25.5 percent of their output, 28.9 percent of their employment, and 24.7 percent of their employee compensation.
- In 1996, the Gross Regional Product (GRP) for the Highlands was \$61,601 million. National forest programs, payments to counties, and expenditures accounted for less than 1 percent (\$572.9 million) of the area's GRP.
- The national forests influence nearly 17,000 jobs, about 0.9 percent of the Highlands' overall employment (1.9 million jobs).

Chapter 4: Economic Profile

What are the principal industrial sectors of the Ozark-Ouachita Highlands, and how do they influence the Highlands' economy?

What contributions do national forest programs make to the Highlands' economy?

- Compared to the other major economic sectors, manufacturing accounts for the largest share (approximately one third) of the Assessment area's total output and also leads other sectors in total employee compensation.
- The service and trade sectors employ more people than other sectors, but the jobs tend to be lower paying than the average job in the Assessment area or in the manufacturing sector.
- The Assessment area economy accounts for about one-fourth of the total industrial output and one-third of the employment and employee compensation of the tri-state area (Arkansas, Missouri, and Oklahoma).
- Between 1977 and 1993, the total industrial output in the Assessment area grew (after adjusting for inflation) 53 percent, and employee compensation grew 40 percent. The construction sector had the greatest increase in total industrial output.
- The number of jobs in the Assessment area increased 44.3 percent between 1977 and 1993, which parallels the 48 percent increase in population over approximately the same time period.

- Of the three principal national forest programs affecting the Highlands' economy (timber, minerals, and recreation), timber has the greatest overall influence on employment, employee compensation, and total income when all three forests are considered together. However, the relative economic importance of each resource program varies significantly among the three forests. For the economic sectors affected by the national forests, the minerals program has the highest average annual income per job and the recreation program has the lowest.

Chapter 5: Recreation

What are the current supply of and projected demands for outdoor recreation in the Ozark-Ouachita Highlands, and what is the economic importance of recreation?

- Approximately 58 million people (21 percent of the U.S. population) live within a 1-day drive of outdoor recreation opportunities in the Ozark-Ouachita Highlands.
- In 1996, travel expenditures in the Assessment area counties of Arkansas and Missouri totaled over \$9 billion and accounted for nearly 167,000 jobs. A 1995 study for Oklahoma indicated that statewide, travel-related expenditures totaled over \$3 billion. Public lands, by providing many of the settings for outdoor recreation, are important to maintaining and enhancing a strong tourism industry. Private lands that dominate the forested landscape and influence scenic quality in a large part of the Highlands are also important to the region's tourism industry.
- State and national parks, national forests, national wildlife refuges, and U.S. Army Corps of Engineer lands and waters account for 13 percent of the Highlands' area and provide the principal settings for many kinds of outdoor recreational activities that are based on natural resources. National forests total 4.4 million ac, more than any other public land category.
- The three national forests provide recreation opportunities principally in roaded-natural (75 percent) and semi-primitive (20 percent) settings. There is very little national forest land in the primitive setting class.
- The U.S. Army Corps of Engineers provides 51 percent and State parks provide 30 percent of the developed campsites in the Assessment area. National forests account for only 6 percent of the area's campsites, while the private sector makes up 12 percent.
- Among the public land-managing agencies, the USDA Forest Service is the principal provider of dispersed recreation opportunities (e.g., primitive camping, hunting, trails). Approximately 63 percent of the trail miles in the Assessment area are located in the national forests.
- Nonindustrial private forest (NIPF) lands dominate the forested landscape of the Highlands. These lands account for between 65 and 85 percent of the forests (timberland) in three of the Highlands' four ecological sections—the Ozark Highlands, Boston Mountains, and Arkansas Valley. In the Ouachita Mountains, forest ownership is almost evenly split among industrial forest lands, national forests, and NIPF lands.
- There are 238,012 ac of federally designated wilderness in the Highlands that represent 5 percent of the land area managed by the Forest Service, USDI National Park Service, and the U.S. Fish and Wildlife Service. Wilderness accounts for 4.4 percent of all national forest lands. Wilderness areas occur in all four ecological sections of the Highlands.
- Approximately 523 miles (mi) of rivers in the Highlands have received Federal designations based on their exceptional scenic and recreational value. More than 2,000 additional mi of rivers may merit a special designation for their recreational values but lack either complete studies to determine their suitability for inclusion in the National Wild and Scenic Rivers System or legislative action to formalize State designation.
- Annually, more than 7 million people travel over the 9 national forest and State scenic byways in the Assessment area.
- Residents of the Highlands' "draw area" exceed the national average in percent of population participating in every major category of outdoor recreation available in the Highlands. More than 90 percent of the draw area population participates in activities associated with viewing and learning about nature and human history, such as sightseeing, bird watching, and visiting historic sites. Approximately 40 percent participate in fishing, 41 percent participate in outdoor adventure activities (such as hiking or off-road driving), about 35 percent participate in boating, 31 percent participate in camping, and 14 percent participate in hunting.
- Nationally, demand for nearly all categories of recreational activities is expected to increase in the next

decade. For the southern Renewable Resources Planning Act (RPA) region, participation in most recreational activities is projected to increase significantly more than the Nation as a whole and/or the northern RPA region.

- Because of their age and heavy use, many public recreational facilities are deteriorating. Lack of funds to maintain and repair these facilities is a widespread concern among land managers in the Assessment area.
- Recreation overuse, particularly off-road vehicle driving, dispersed (primitive) camping, and river use, is occurring in some areas, resulting in resource damage and conflicts among users.

Chapter 6: Timber Resources

What are the supply and demand conditions for timber in the Highlands?

- The Highlands Assessment area contains 12 percent of the South's timberland, but only 5 percent of southern softwood volume and 9 percent of southern hardwood volume. However, relatively low removals rates (3 percent of southern softwood and 6 percent of southern hardwood removals) will continue to attract new and expanded wood-using industries to the area.
- Largely due to the decline in timber harvests from western forests, national forest timber sold in the Highlands represents an increasing percentage of total U.S. national forest timber sales. Between 1991 and 1995, the Highlands' share of total national forest "green" timber sales increased from 3 percent to 10 percent.
- In general, inflation-adjusted prices for Highlands' timber rose between 1988 and 1994, implying an increasing scarcity of timber resources.
- National forests account for 41 percent of softwood sawtimber inventory but only 20 percent of sawtimber removals in the Assessment area. In contrast, forest industry accounts for 20 percent of softwood sawtimber inventory but 40 percent of removals.
- Average annual timber sale volume per suitable acre varies by national forest ranger district, with Ouachita districts generally higher than the districts on the Ozark and Mark Twain National Forests.
- Nonindustrial private forest (NIPF) landowners hold 69 percent of the timberland in the Highlands. National forests account for nearly 15 percent, forest industry holds almost 12 percent, and 5 percent of the timberland is located on other public lands.
- In terms of timber volume, the forests of the Highlands are predominantly hardwoods (over 14 billion cubic feet of growing stock and over 38 billion board feet of sawtimber), although softwood volumes are substantial (about 7 billion of growing stock and over 24 billion board feet of sawtimber). More than two-thirds of the hardwood volume occurs on NIPF lands, while softwood volume is fairly evenly distributed among timber industry, national forest, and NIPF lands.
- Both growing stock and sawtimber inventories have increased in the Arkansas and Oklahoma portions of the Highlands over the last decade. (Comparable data for Missouri were not available.)
- Across all subregions of the Assessment area except Oklahoma, NIPF lands have the largest proportion of higher grade hardwoods relative to the other ownership categories while the national forests have the greatest share of the higher grade softwood sawtimber volume in comparison to other ownership categories.
- Sawtimber-size stands account for 58 percent of national forest timberlands in the Assessment area and from 28 to 48 percent of timberlands in other ownership categories.
- The majority (64 percent) of large diameter (greater than 20 inches diameter at breast height (d.b.h.)) hardwood volume occurs on NIPF lands. Most of the large diameter softwood volume occurs on NIPF (42 percent) and national forest (38 percent) lands.
- Up to 15 percent of the potentially harvestable volume of timber on private land may be unavailable due to physical constraints such as wet sites, steep slopes, and low volumes.
- On the three national forests, from 59 to 79 percent of the land is classified as suitable for timber production based on current suitability definitions, which exclude acres for wilderness, administrative sites, areas of low productivity, and areas allocated to other resource management categories.
- The three Highlands' States increased their share of total U.S. lumber production from 5.5 percent to 6.8 percent between 1992 and 1995. Since 1988, these three States also claimed an increasing proportion of U.S. investments in the furniture and lumber industries.
- New hardwood chip mills have recently led to increased hardwood pulpwood removals—a 135 percent increase between 1994 and 1995—particularly in Arkansas. Due to fluctuating demand over the preceding decade, the overall percentage increase in average annual removals

since 1988 was 65 percent. These increases should lead to higher prices, providing income to local landowners, but possibly forcing other competing industries to pay more or seek alternate input sources.

- Favorable growth to removal ratios indicate that softwood inventory in the Highlands is increasing. Projections to 2020 show increasing softwood harvest on private lands in the Highlands—more than double the rate experienced in 1990. Total softwood harvests in the Highlands are projected to increase at rates greater than the South as a whole.
- The currently favorable growth-to-removal ratio for hardwoods in the Highlands is projected to narrow and be about equal by 2020 as growth remains stable and removals increase. Nonetheless, by 2020 hardwood inventory is still projected to be greater than current levels.

Chapter 7: Minerals Resources

Historically, which Highlands minerals have been important to whom and why?

In Assessment area communities, what are the current reliance on and projected demands for Highlands minerals and mining?

What are current national and global uses of and reliance on the mineral resources in the Assessment area, and what are the projected demands for them?

What are the current and projected recreational and educational uses for Highlands minerals?

- Sixty percent of the mineral resource extraction operations (mining and processing plants) within Arkansas, Missouri, and Oklahoma occurs within the Assessment area, accounting for approximately \$1.2 billion in mineral value in 1996.
- Of 76 known minerals and mineral materials within the Assessment area, 33 are currently being mined.
- In terms of United States production volume, the Assessment area contains the top 10 production sites for 14 of the numerous mineral commodities produced throughout the United States.
- The portion of Missouri within the Assessment area contains the largest concentration of lead mineralization in the world. Mines located in the Assessment

area are the number one producers of lead in the United States and until recently were also the world's major lead producers. Between 75 and 80 percent of U.S. lead production comes from the Mark Twain National Forest—it is a primary source of the world's lead production.

- The Assessment area contains three world-class lead and zinc producing districts (in Missouri) and was a past world leader in zinc (Oklahoma) and barite (Arkansas and Missouri) production.
- The Ouachita Mountains are the only source for electronic grade, high quality quartz in North America. All of the U.S. production is from the Ouachita National Forest in Arkansas.
- The Ouachita Mountains and the Ouachita National Forest are a major world producer and the leading U.S. producers of quartz crystal for aesthetic and jewelry uses.
- Missouri is the leading U.S. producer of fire clay, much of which is mined from within the Assessment area.
- Coal from the Oklahoma portion of the Assessment area is used to generate power for 150,000 homes in eastern Oklahoma.
- The Ozark National Forest has 66 producing gas wells in areas that have a high potential for additional exploration and development.
- In 1996 alone, extraction of mineral resources from the three national forests within the Assessment area generated almost \$6 million in Federal revenue.
- The national forests within the Assessment area have a high potential for discovery of additional reserves of the minerals currently being mined on them and in some cases those mined in the past as well. The demand to access the national forests for mineral exploration is expected to continue and increase.
- The Assessment area and the three national forests within the Assessment area have unique geologic features that attract people from across the United States and throughout the world for research, education, rockhounding, and mineral collecting.

Chapter 8: Range Resources, Special Forest Products, and Special Uses

What are the nature and magnitude of the range resources, special forest products, and special uses programs on the national forests of the Ozark-Ouachita Highlands?

- There are approximately 13,600,000 ac of non-Federal grazing land in the Highlands; the national forests provide an additional 743,000 ac of grazing land. More than 90 percent of the national forest range is grazed woodlands (principally on the Ouachita National Forest) that have low forage value.
- In the decade 1987 through 1996, the number of individuals holding permits to use the national forest range in the Highlands declined 67 percent, and the number of animal unit months (AUM's) of range use dropped 63 percent.
- There is a large and increasing demand for forest plants used for herbal dietary supplements and medicines. Arkansas accounts for 2 percent and Missouri accounts for 3 percent of total U.S. production of wild ginseng. The Ozark National Forest permits the limited harvesting of ginseng; otherwise, the three national forests have not been a significant source for these forest products.
- Firewood is in demand on all Highlands' national forests. While the national forests have traditionally been a source of firewood, its availability on the Ouachita National Forest has declined by 62 percent since 1992.
- The total revenue generated by the sale of all special forest products on the three national forests in 1996 was approximately \$32,000.
- Many varied special uses are permitted on the Highlands' national forests to accommodate community needs, including economic development. In 1996, there were more than 2,000 special uses under permit, generating fee revenues of nearly \$330,000.

Chapter 9: Attitudes, Values, and Public Opinions

What are the attitudes, values, and opinions of people in the Highlands (including interest groups and forest inholders) regarding national forests and the Forest Service?

- There is a high level of public support for maintaining healthy forests and environmental quality, although the concept of a healthy forest is subject to a variety of interpretations.
- Generally, the public accepts the idea that forests fulfill a variety of roles—from pristine wilderness to intensive

tree farms—and that forest management objectives will differ among and within landowner categories.

- Most respondents in public opinion surveys support the following: (1) forests should be managed for multiple uses; (2) forests should provide a range of goods, services, experiences, and values; and (3) public forests should not provide goods and services at the expense of long-term forest health and environmental quality.
- There is widespread agreement that different uses of national forests should be balanced (e.g., among recreation, timber management, mining, wilderness, wildlife); however, there is no consensus about what that balance should be.
- In various surveys, 40 to 50 percent of the respondents disapproved of timber cutting for wood products on public lands; if environmental protection measures were listed as conditions or the management objective included benefits to wildlife and/or scenery, as many as 70 percent of the respondents tended to be in favor of such timber harvests.
- The public expects the USDA Forest Service to take a scientific approach to management of the national forests, but they also want the agency to encourage public participation in decisionmaking and monitoring.
- Although some segments of the public have a strong interest in environmental issues and public land management, few people have a good grasp of land management principles and practices or even know which agencies are responsible for managing public land.
- Results of an Arkansas survey indicated that NIPP landowners have strong interests in a variety of environmental issues. Their stated reasons for owning forest lands seem heavily weighted in favor of esthetic and environmental values.
- Although it is difficult to estimate how many people in the Highlands believe private property owners face imminent threats of “takeovers” by United Nations-sponsored groups and/or government entities, those who hold such beliefs do so with great conviction. The public opinions voiced most often during Ozark-Ouachita Highlands Assessment Team working meetings in 1996 and 1997 were those having to do with perceived threats to private property and U.S. sovereignty.



Figure 1.1—Counties included in the Ozark-Ouachita Highlands Assessment area.

Chapter 1: Archaeological and Historical Background

Question 1.1: What is the historical background of the Ozark-Ouachita Highlands?

Question 1.2: What are the area's archeological resources and their characteristics?

Question 1.3: What are the history and current status of public lands in the Highlands?

Archeological sites and historic records attest to the rich, 12,000 year history of human activity in the Ozark-Ouachita Highlands. From the early nomadic hunters at the end of the Ice Age (12,000 to 15,000 years ago) to the homesteaders of the early 20th century and up to the present, humans have continuously adapted to and shaped the landscapes of the Highlands (Harmon and others 1996).

Information about the history of the human occupation of the Highlands lies, in large part, in the archeological record. Within the Assessment area (fig. 1.1), archeological surveys have located thousands of historic and prehistoric sites (fig. 1.2). Public lands, in particular, serve as storehouses of the evidence of human activity—evidence that speaks to us from the distant past about the lives and cultures of those living in the Highlands. In general, more is known about the presence of archeological sites on public lands because of laws and agency policies that call for their protection.

This chapter begins with a brief description of the prehistoric cultural groups that occupied the Highlands. Following is a discussion of the movement of Native American groups from the northern and eastern portions of North America into the Highlands region. The chapter continues with brief descriptions of historic European and Anglo-American settlement in the region and the early

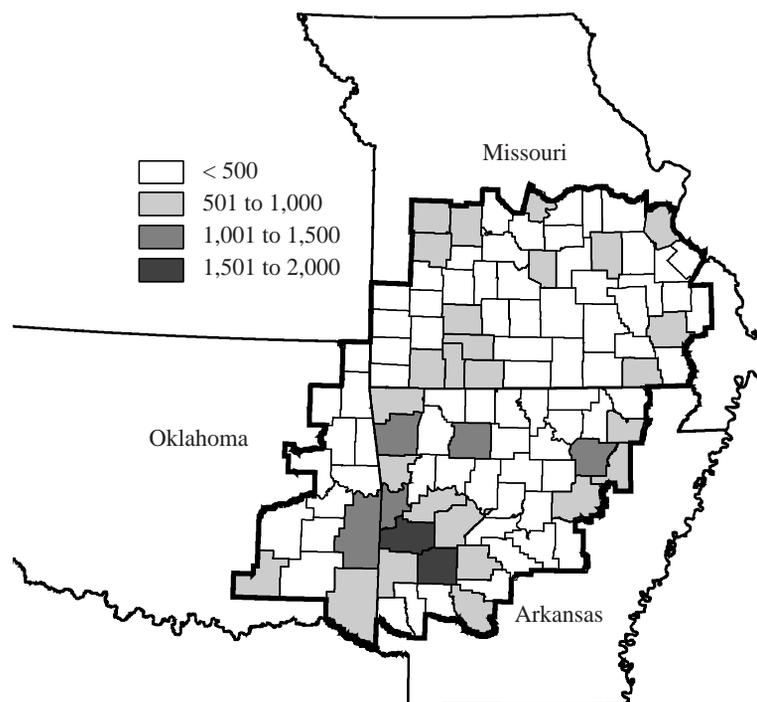


Figure 1.2—Number of documented archeological sites in the Assessment area, by county.

exploitation of the area's rich timber, agricultural, and mineral resources. A following section tabulates the Federal and State lands that are present within the Highlands Assessment area. The final sections of this chapter describe interpretive and research opportunities as well as management implications and opportunities.

Key Findings

1. People have lived in the Highlands for over 11,000 years; the earliest known inhabitants were the Paleo-Indians.
2. The principal prehistoric cultural periods that characterize human occupation of the Highlands prior to European exploration are as follows: Paleo-Indian (11,500 B.P. [years before the present date] to 10,500 B.P.), Archaic (9,900 B.P. to 2,000 B.P.), Woodland (2,000 B.P. to 1,150 B.P.), and Mississippian (1,150 B.P. to A.D. 1650).
3. The Spanish expedition of Hernando de Soto (1539 to 1543) marked the first European exploration of the Highlands. French explorers and fur traders came to the region in the late 1600's.
4. The people who moved into the Highlands in the late 18th and early 19th centuries were attracted by opportunities to acquire timberland and by the availability of free open range on unclaimed public land. Land acquisition records indicate that many of the rough upland areas were settled between the 1880's and the 1930's.
5. Federal lands within the Highlands include over 164,000 acres (ac) of lands managed by the National Park Service, over 66,000 ac of national wildlife refuges, about 673,000 ac of lakes managed by the U.S. Army Corps of Engineers, two military bases, and 4.4 million ac of national forests.
6. State lands include 65 State parks, 32 wildlife management areas, 5 State historic sites, 5 conservation areas, and 2 National Guard areas.
7. Approximately 14,000 archeological sites have been documented on the three national forests in the Highlands.

Data Sources

The Social-Economic Team extracted data from a number of overviews and discussions of the region's cultural history prepared by various authors including Chapman (1975, 1980), Sabo and others (1982, 1990), Schambach (1970), Wyckoff and Brooks (1983), Bell (1984), and Wood and others (1995). The historical material about the Ozark-St Francis and Ouachita National Forests is taken largely from Strausberg and Hough (1997); Erickson (n.d.) provided the data about the Mark Twain National Forest. In addition, the Social-Economic Team used numerous reports prepared by State agencies and Forest Service archeologists including Avery (1992), Pfeiffer (n.d.), and Erickson (n.d.).

Human Use and Settlement Through the Early 20th Century

Early Inhabitants

The earliest known inhabitants of the Highlands were the Paleo-Indians who occupied the region from about 11,500 B.P. (years before the present date) to about 10,500 B.P. (See fig. 1.3 for a timeline of the general prehistoric cultural history of the Highlands area.) Evidence of these people includes the presence, although rare, of Clovis and Folsom projectile points as well as other large lanceolate projectile points. Items such as tools and weapons found at the Blakely Mountain Dam site on the Ouachita River (near Hot Springs, AR) and on a high terrace near Caddo Gap (in Montgomery County, AR) indicate that Paleo-Indians lived in the Ouachitas, at least for short periods of time (Early and Limp 1982). Similar evidence occurs in the Ozark uplands. The people likely lived in groups of two or more nuclear families inhabiting small territories. They hunted large game animals, now extinct, such as the mammoth, mastodon, and a species of bison. It is also likely that, within the Ozark-Ouachita Highlands, the Paleo-Indians relied heavily on small game (such as squirrels and rabbits) and plant foods.

By about 10,500 B.P., Dalton people were living on high, upland sites and in river valley locations in the Ouachita Mountains and in alluvial valleys in the

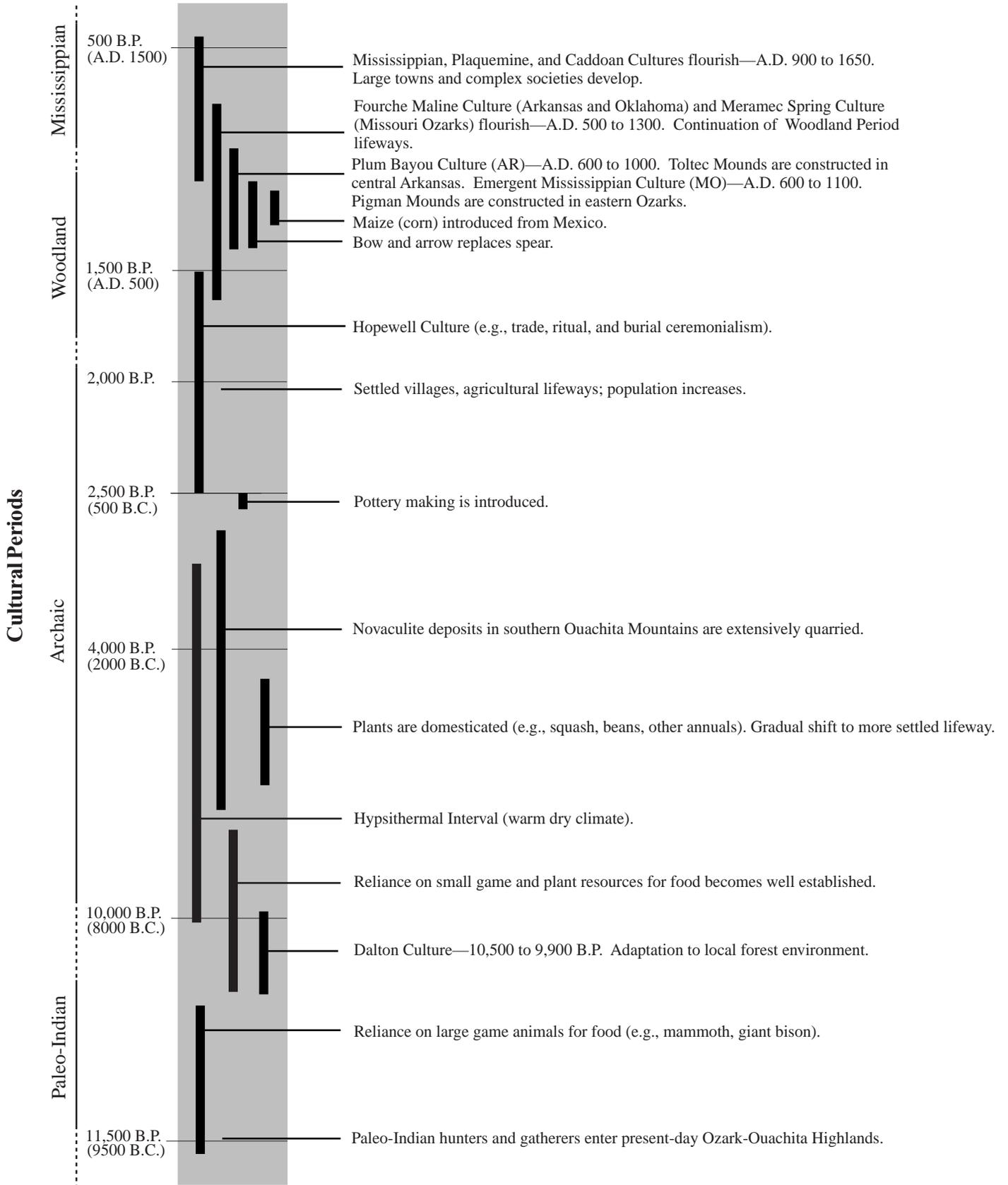


Figure 1.3—Chronology of the prehistoric cultural history of the Highlands area. (Broken line segments near left margin indicate that ending and beginning dates of transitions between cultural periods are approximate.)

Ozarks. They were the first humans to regularly occupy the Assessment area. Discoveries of bone needles, awls, scrapers, and chipped stone perforators suggest that clothing and other items were fashioned from deer hides. The Dalton people also foraged intensively for plant foods such as nuts and berries that they processed with grinding stones or mortars and pestles. Dalton people were highly mobile; sites from this period include base camps and smaller “resource extraction” camps used during hunting and gathering forays. They are also known to have buried their dead in cemeteries (Morse 1997).

The Archaic Period, dating from about 9,900 to about 2,000 B.P., saw a growing population with more complex forms of social organization and a less migratory lifestyle. According to Sabo and others (1990), “It is a period during which many innovations were developed and many distinctive cultural complexes emerged.” While the Archaic people relied more heavily on plant foods, they supplemented their diet with small game, birds, fish, turtles, and mussels. There is also extensive evidence that Archaic people quarried massive amounts of chert (flint-like rock) from sources in both the Ouachita Mountains and the Ozark Plateaus. Sabo and others (1990) provide a comprehensive and detailed cultural history for the Ozark Plateaus, the Arkansas River Valley, and the Ouachita Mountains.

During the Early and Middle Archaic times, rapid technological changes occurred among inhabitants of the Ozarks; they also adapted to riverine environments. Facts concerning the peoples of the Ouachita uplands are less well known, but similar changes are likely to have occurred. One major change was in the proliferation of styles of projectile points (or stemmed bifaces). The bifaces during this period were likely to have been used for other purposes including specialized cutting and slicing and heavy duty cutting. Other types of artifacts commonly found on these Early and Middle Archaic sites include grinding stones, pitted stones, grooved axes, and celts (axe or chisel-shaped implements made of polished stone). Twined fiber fabrics first appeared and were used in the manufacture of sandals, bags, and mats. Decorated bone and shell ornaments have also been found in these sites. A dog burial from Rodgers Shelter (in the Missouri Ozarks) also may indicate domestication of the dog at this time.

Sabo and others (1990) have suggested that the climatic conditions were warmer and dryer after 8,000 B.P. Faunal materials from several sites and the pollen record tend to support this hypothesis.

The Assessment area contains remains of the Late Archaic Period, including base camps with features such as hearths, middens (trash dumps) with a great deal of lithic debris (waste flakes resulting from making stone tools), human and dog burials, pits, post molds, and burned clay concentrations (Williams and others 1993). Within the Ouachita Mountains, several sites from this period include what appear to be burned rock middens. These large concentrations of burned sandstone may indicate the former presence of roasting ovens. In the Ozarks, Late Archaic people cultivated plants on a small scale, growing non-native vegetables such as squash and bottle gourds that were probably introduced by migratory people passing through the area. In the Missouri part of the Ozark Plateaus, the manifestation of Late Archaic traits continues into the Early and Middle Woodland times until around A.D. 400.

During the Woodland Period (about 2,000 B.P. to 1,150 B.P.), the number of hamlets in the larger river valleys increased and were occupied on a more permanent basis than before. Sabo and others (1990) note that Woodland people used sites at higher elevations above stream valleys for quarries, short-term hunting, and collecting camps. During this period, the bow and arrow and ceramics appeared for the first time. Important social changes occurred as people began to participate in social networks outside their own regions. By the Late Woodland Period, a higher level of social complexity was beginning to emerge and people began to cultivate maize. In some areas of the Ozarks, Late Woodland peoples began to bury their dead in cairns (rounded or pyramidal heaps of stones made as a monument or memorial), piling rocks on top of the bodies. The construction of burial mounds and the presence of exotic materials interred with the cultural elite indicate a more complex social order. Late in the period, a pattern of small, dispersed farmsteads prevailed.

The Mississippian Period (1,150 B.P. to A.D. 1650) saw the widespread appearance of heredity-based political and religious hierarchies. Elite members of society, for example, were buried in platform mounds,

their bodies accompanied by high-status “grave goods.” The regional Mississippian people lived in scattered farming hamlets often surrounding a large mound center, the construction of which indicates at least some degree of organized labor. Two such centers can be found in Yell and Logan Counties near the Ouachita National Forest. New vessel forms appeared at this time as well, including bottles, plates, jars, and nonutilitarian pieces such as human and animal effigies. An exception occurs in the northern Ozarks, where the only evidence for social stratification and mound centers are present at what is termed the Emergent Mississippian culture in the eastern Missouri Ozarks and other fringe Ozarks areas. Sites here may represent the earliest manifestation of the Mississippian, as evidenced by archeological investigations at Pigman Mound in southeast Missouri (Price 1980, Lynott 1982).

While Mississippian cultures flourished in much of the southern part of the Assessment area up until the arrival of European explorers in the 16th and 17th centuries (fig. 1.4), the northern Ozarks seem to have been largely abandoned after A.D. 1200 to 1400. No resident populations were present in the northern Ozarks at the time of European contact, although the Osage are thought to have used this region for hunting and gathering, primarily during historical times.

Toward the end of the 18th century, a few Delaware Indians moved into southeastern Missouri at the invitation of the Spanish Government (Wood and others 1995). By 1818, they had relocated on the James River in southwestern Missouri; by 1831, most of them had moved to a reservation in northeastern Kansas. Following the Civil War, they moved into what is now Oklahoma.

In the late 18th century, Cherokee Indians were hunting in the Arkansas, White, and St. Francis River Valleys of Spanish Louisiana (Sabo 1992). By the early 19th century, they had moved into the St. Francis River Valley in southeastern Missouri and northeastern Arkansas. A few years later, many Cherokees were living along the Illinois Bayou and the Arkansas River Valley in west-central Arkansas. In 1805, a U.S. trading post was established at Spadra to trade with the Cherokees, and a reservation was in existence in the southern

Ozark Plateaus between 1817 and 1828. Pressure from European settlers began forcing the Cherokees to move further west. In 1838, the Eastern Cherokees were moved into Indian Territory (present-day Oklahoma) through portions of today’s national forests in Missouri and Arkansas; this removal is known as the “Trail of Tears” (Davis n.d., Myers 1997).

The Quapaw Tribe, whose ancestral home was in present-day Arkansas, ceded their lands south of the Arkansas River to the U.S. Government by treaties in 1818 and 1824. In 1833, a third treaty provided them with 150 square miles (mi²) of land in the northeastern part of Indian Territory. Many of the lands ceded to the Government, as well as lands they acquired in Indian Territory, were in the Highlands (Sabo 1992).

Prior to European contact, all of the Osage Indians are believed to have lived in southwestern Missouri (Wood and others 1995). In 1808, 1818, and 1825, the Osage Tribe ceded lands in the Highlands of present-day Arkansas, Missouri, and Oklahoma. In exchange, they were granted reservation lands in southern Kansas in 1825 (fig. 1.4). In 1865, the Government arranged for the sale of the Kansas lands, and the Osage Tribe was moved into Indian Territory (Sabo 1992, Wood and others 1995).

Due to various pressures from European settlement and American Indian groups in the late 18th and early 19th centuries, and also in the wake of the U.S. Government’s removal policies of the 1830’s, more American Indians came to be located within the Highlands: the Muscogee (Creek), Choctaw, Peoria, Kickapoo, Kaskaskia, Piankashaw and Wea (Miami), Sauk, Modoc, Ottawa, Shawnee, Wyandotte, and Seneca Tribes. Descriptions of the removal of the Choctaw, Creek, Chickasaw, Cherokee, and Seminole Tribes into Indian Territory can be found in Foreman (1986).

Before removal to eastern Oklahoma, the Quapaw and Cherokee Indians were farmers living in log houses similar to their European neighbors; their economy was also similar to that of the European settlers. They cultivated grains, vegetables, cotton, and tobacco and raised cattle, horses, hogs, goats, and fowl (Williams and others 1993).

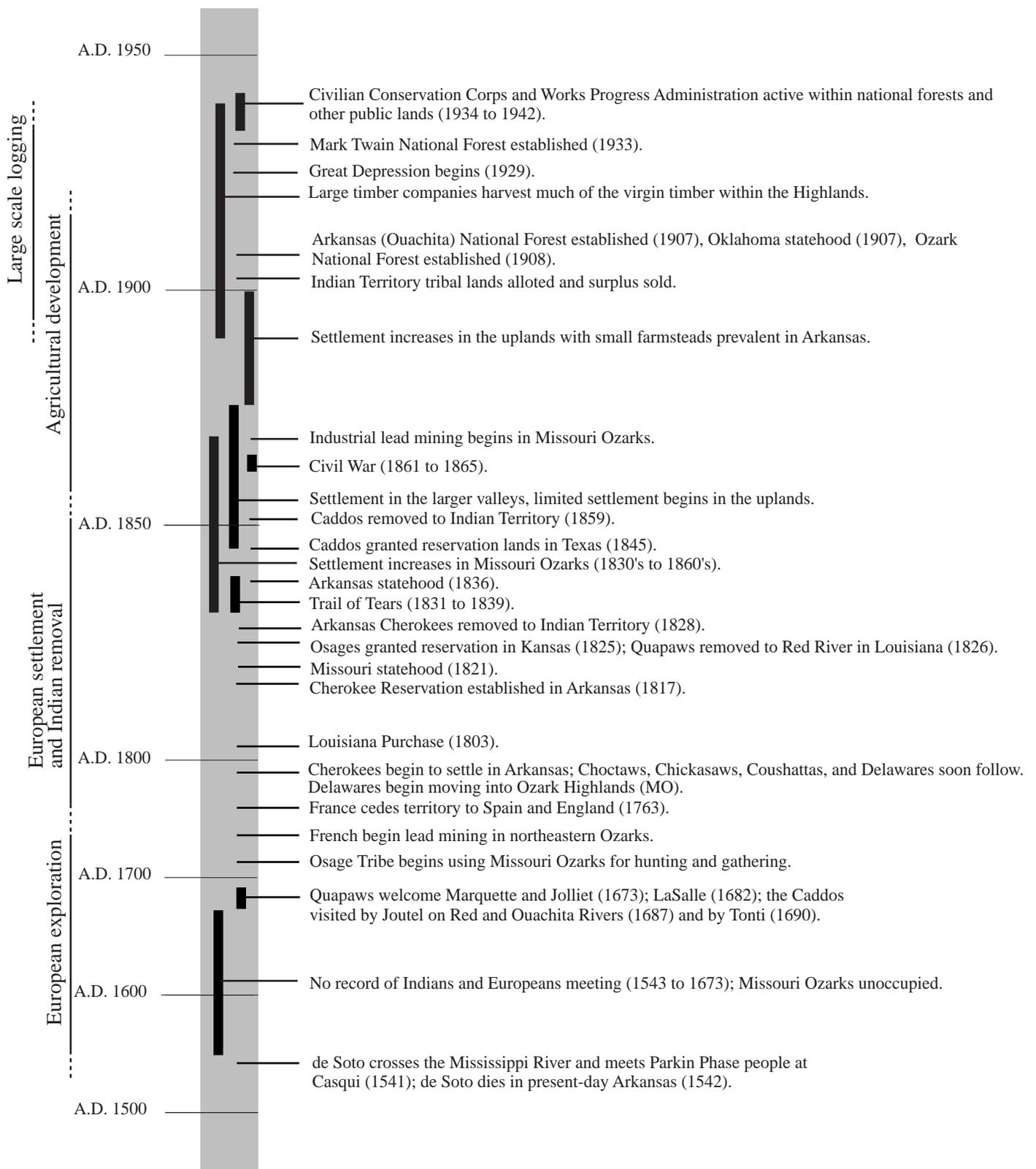


Figure 1.4—Chronology of the history of the Highlands (from 1500 through 1950). (Broken line segments indicate transitions between historic periods.)

European Exploration and Settlement

The Spanish expedition of Hernando de Soto (1539 to 1543) marked the first European exploration of the Highlands (fig. 1.4). Although de Soto's exact route is not known, archeologists believe that he journeyed along the eastern edge of the Ozark Plateaus and possibly into the plateau for short distances (Morse 1993). The expedition then moved upstream, probably along the Arkansas River, between the Ozark Plateau and the Ouachita Mountains. It is believed that de Soto may have crossed a portion of the Ouachitas as the expedition headed back toward the mouth of the Arkansas River (Early 1993).

French explorers and fur traders came to the region in the late 1600's. The earliest permanent European settlements in either Missouri or Arkansas were the French settlements at Ste. Genevieve, MO, and Arkansas Post, AR; both of these settlements are outside of the current Assessment area. The extent to which the French settlers utilized uplands to the west of these settlements is not known; however, it is likely that hunters and trappers exploited resources in these areas. In addition, minerals such as lead began to play a significant role in the French economy. The Mine la Motte, located in what is now Madison County, MO, was established probably as early as 1720 and by 1730 was employing "several hundred laborers, along with Afro-American and Indian slaves" (Wood and others 1995).

These expeditions and the rich mineral and timber resources helped spark an increase in European settlement in the region that intensified in the late 18th century and continued through the 19th century. In the Missouri Ozarks, in particular, during the early part of the 18th century, the rich deposits of mineral resources were a driving force in some of the settlements.

According to the Arkansas Historic Preservation Program (AR HPP n.d.), the population of Arkansas grew dramatically between 1840 and 1860—from 96,000 to 430,000. The population remained steady during the Civil War but was seriously affected and displaced by military action and acts of lawlessness. By 1880, the population of Arkansas had reached approximately 800,000 and was estimated to be over 1 million in 1900. Settlers were slow to move into the Highlands, however. As might be expected, the areas first settled were northwestern Arkansas and the rich bottomlands

along the larger streams throughout the Highlands area (AR HPP n.d.). Until the interstate railroad system reached the Ouachitas and Ozarks, the mountains remained very sparsely populated despite the availability of land under the Homestead Act of 1862. Railroads brought access to new markets, farmers began to grow cash crops for export, and more settlers moved into the area. Land acquisition records indicate that many of the rough upland areas were settled between the 1880's and the 1930's. Many of these settled upland areas were subsequently abandoned, and the lands typically were purchased by timber companies or the Forest Service between 1910 and 1940 (USDA FS n.d.).

Those who moved into the Highlands in the late 18th and early 19th centuries were mostly from the South or lower Midwest. Specifically, migrants to the Ouachitas were generally from the Southeastern States of Tennessee, Georgia, and Alabama; those moving into the Ozarks were largely of Scotch-Irish ancestry from the Appalachian regions of Kentucky and Tennessee (AR HPP n.d.). They were attracted to the area not only by opportunities to acquire timberland, but also because it was one of the few areas in the Eastern United States where large tracts of unclaimed public land still remained. Free, open range for livestock, principally cattle and hogs, was widely available (Jurgelski and others 1996). Albert Pike, an early Arkansas resident in the 1830's, gave the following description of a typical settler and his "hardscrabble" existence:

He goes into the Arkansas bottom, cuts a few logs, and his neighbors help him raise a hut with a wooden chimney, daubed with mud. If it is summer, he leaves the crannies open; if it is winter, he chunks them with wood, and daubs them with mud. . . [He] hires himself out for a month or two, till he earns some corn and two or three hogs, and then "turns in to work" on his own farm. He cuts his hogs' ears in some mark or other, turns them out to root for themselves and goes resolutely to work, chopping timber, grubbing up cane, and performing the various operations necessary to clearing up land (Schwaab 1973).

Beginning in the 1880's, railroads spurred a region-wide lumbering boom, although some large-scale lumbering activity took place earlier in the 19th century in the Ozarks. Speculators competed for timber resources,

sometimes using unscrupulous practices to acquire land from the public domain. From 1906 to 1909, unprecedented timber harvesting took place in Arkansas, which contained the last extensive virgin forest east of the Rocky Mountains (Smith 1986). Concurrently, railroads improved market access in the region, leading to the expansion of agricultural industry in some sectors.

During the late 19th and early 20th centuries, farms of 160 acres (ac), interspersed by land holdings of speculators, dominated the landscape. In 1929, folklorist W. A. Browne described traditional farm life as follows:

It is not uncommon for the buildings to be of . . . logs taken from the forest . . . Spring work consists of plowing the land and planting corn and a few oats . . . Everyone has access to . . . free range . . . and much of the stock . . . is pastured on this land . . . Hog raising is quite universal (Browne 1929).

Ultimately, low agricultural potential, overgrazing, overfarming on highly erodable soils, and distance from markets resulted in widespread deprivation. In Missouri, there was additional decline in forest resources from uncontrolled burning and from the State's logging and mining heyday, along with the relentless demand for charcoal for iron and lead furnaces, railroad ties, and sawmill lumber.

In the economically turbulent decade of the 1930's, many rural folk, primarily south of the Missouri Ozarks, emigrated to cities for employment. In Missouri, the trend was toward repopulation of the Ozarks as many made their way home to familiar surroundings to weather the bad times. Bankrupt farmers and defunct lumber companies sold large blocks of unwanted and cut-over land to the Forest Service. Under President Franklin D. Roosevelt's New Deal Program, the Civilian Conservation Corps (CCC) constructed recreation facilities and other improvements on the Federal and State lands in the region, paving the way for future economic opportunity. Coupled with highway improvement projects and the introduction of electricity (not available in remote parts of Arkansas until the 1940's), new recreation facilities on national forests helped expand economic opportunity in the region. More detailed discussion of mining history can be found in Chapter 7 of this report.

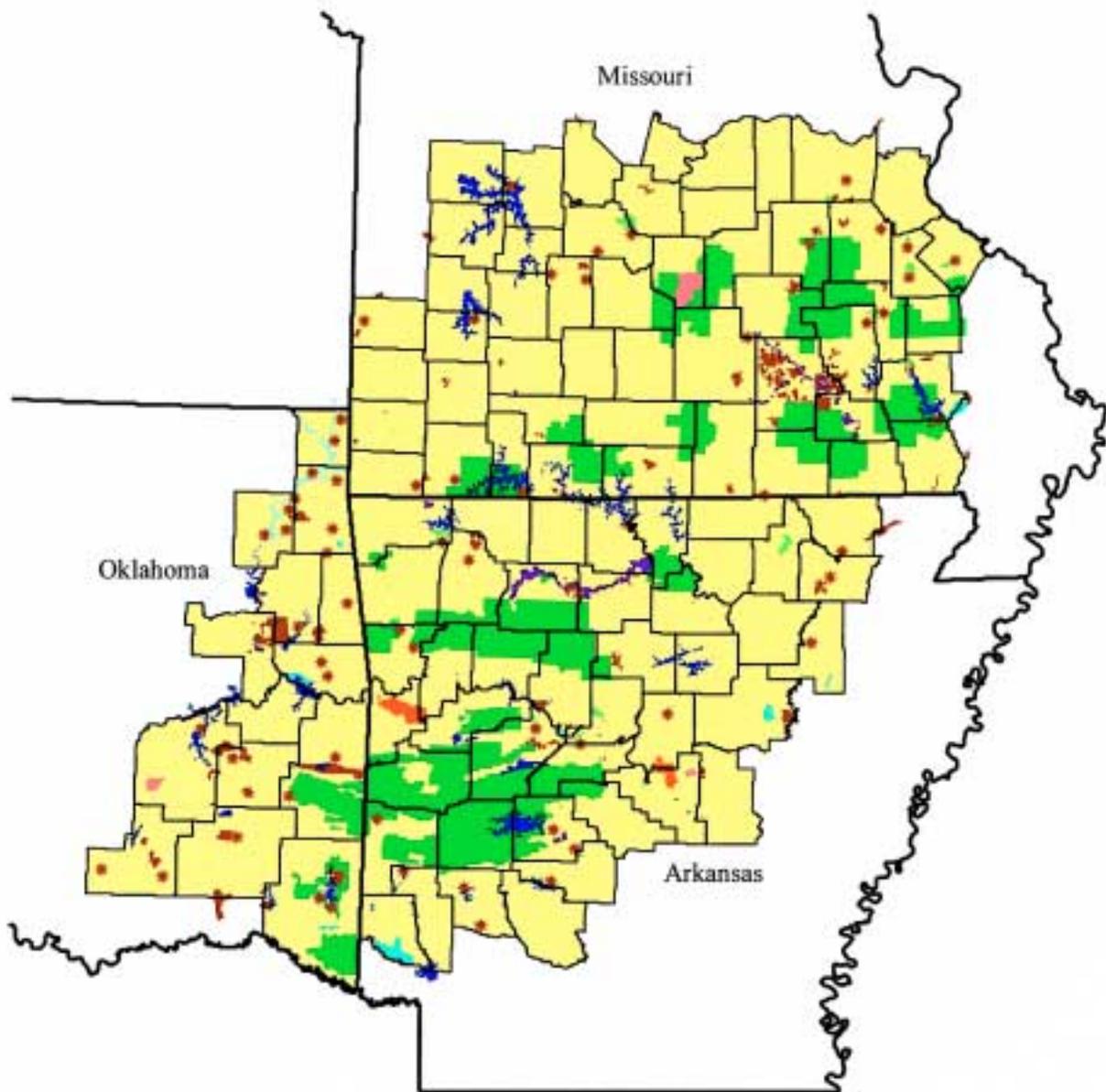
History and Current Status of Public Lands

Federal land in the United States is owned in common by its citizens and is intended to be managed for their common benefit. This concept of common (public) land was first asserted in the Declaration of Independence and later in the Articles of Confederation and in the Treaty of Paris (CSU n.d.).

Federal lands have been part of the Highlands since 1803, when France sold 523 million ac of land known as the Louisiana Purchase to the United States. The Louisiana Purchase and all other lands acquired by the United States through 1867—nearly 1.8 billion ac in all—made up the lands contained within the “public domain.” The U.S. Constitution gave Congress full power to sell, give away, or retain public domain lands: “Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States” (Article IV, Section 3).

Congress, in fact, has given away, sold, or otherwise disposed of nearly two-thirds of the public domain. Together, Congress and several U.S. Presidents reserved the remainder—more than 715 million ac—for a variety of purposes, including national forests and national parks. Interestingly enough, the oldest Federal reserve in the country is in the Ozark-Ouachita Highlands. Congress created the Hot Springs Reservation in 1832 to protect the springs' recharge area in the central Ouachita Mountains. The reservation was later named Hot Springs National Park. Public domain lands also formed the original Arkansas (later renamed Ouachita) and Ozark National Forests in 1907 and 1908, respectively. Figure 1.5 displays most of the large tracts of Federal and State lands in the Assessment area.

The States west of the Mississippi River and most of those around the Great Lakes were created from public domain lands. Those States admitted to the Union before 1848 (including Missouri in 1821 and Arkansas in 1836) received a section of land (1 mi² or 640 ac in area) in each township (36 mi² in area, made up of 36 sections); those admitted later (including Oklahoma in 1907) received as many as 4 sections per township. This report does not address how much former public domain land remains in State ownership, but table 1.1 lists many of the current State-owned or managed areas



- | | | | |
|---|---------------------------------------|---|--------------------------------------|
| Federal | | Arkansas | |
| ■ | Forest Service | ■ | National Guard |
| ■ | Fish and Wildlife Service | ■ | Game and Fish Commission |
| ■ | National Park Service | ■ | Department of Parks and Tourism |
| ■ | Army Corps of Engineers | ● | State Parks |
| ■ | Other Military | | |
| Missouri | | Oklahoma | |
| ■ | Department of Conservation | ■ | Grand River Dam Authority |
| ■ | Department of Natural Resources (DNR) | ■ | Department of Wildlife Conservation |
| ● | DNR (State Parks) | ● | Department of Tourism and Recreation |

Figure 1.5—Principal Federal and State lands and water bodies in the Ozark-Ouachita Highlands Assessment area, by managing agency. (Green areas are lands within national forest “proclamation boundaries;” private lands are intermingled with Federal lands within these boundaries.)

Table 1.1—Partial listing of State-managed areas in the Ozark-Ouachita Highlands

Arkansas	Missouri	Oklahoma
State parks	State parks	State parks
Bull Shoals	Bennett Spring	Adair
Daisy	Elephant Rocks	Arrowhead
Devil's Den	Grand Gulf	Beavers Bend/Hochatown
Jacksonport	Ha-ha Tonka	Bernice
Lake Catherine	Harry S. Truman	Boggy Depot
Lake Charles	Huckleberry Ridge	Cherokee
Lake Dardenelle	Johnson's Shut-In	Cherokee Landing
Lake DeGray	Katy Trail	Clayton Lake
Lake Fort Smith	Lake of the Ozarks	Disney/Little Blue
Lake Ouachita	Lake Wappapello	Greenleaf
Mt. Nebo	Mastodon	Heavener Runestone
Old Davidsonville	Meramec	Honey Creek
Petit Jean	Montauk	Lake Eucha
Queen Wilhelmena	Onondaga	Lake Wister
Withrow Springs	Pomme de Terre	McGee Creek
Wooly Hollow	Roaring River	Pine Creek
	St. Francois	Robbers Cave
Wildlife management areas	St. Joe	Rocky Ford
Beryl Anthony/Lake Ouachita	Sam A. Baker	Sallisaw/Brushy Lake
Blue Mountain	Stockton	Sequoyah/Western Hills
Bull Shoals	Table Rock	Snowdale
Camp Robinson	Taum Sauk Mountain	Spavinaw
Caney Creek	Trail of Tears	Talimena
Dardanelle	Washington	Tenkiller
Gene Rush/Buffalo River		Twin Bridges/Spring River
Jamestown/Independence Co.	State historic sites	
Lake Greeson	Battle of Carthage	Wildlife management areas
Madison County	Dillard Mill	Atoka
Mount Magazine	Fort Davidson	Broken Bow
Muddy Creek	Missouri Mines	Cherokee
Nimrod	Nathan Boone	Cookson Hills
Norfolk		Gary Scerrer
Petit Jean	Conservation areas	James Collins
Pigeon Creek Game Refuge	Alley Spring	McCurtain County Wilderness
Sylamore	Coldwater	McGee Creek/Stringtown
White Rock	Deer Run	Ouachita
Winona	Indian Trail	Pine Creek
	Missouri	Pushmataha
Arkansas National Guard		Robber's Cave
Fort Chaffee		Spavinaw Hills
Camp Robinson		

within the Ozark-Ouachita Highlands. State lands include 65 State parks, 32 wildlife management areas, 5 State historic sites, 5 conservation areas, and 2 National Guard areas.

Lands Managed by the National Park Service

The mission of the USDI National Park Service is to protect natural, historical, and cultural resources while providing opportunities for recreation. Within the Ozark-Ouachita Highlands, the National Park Service manages seven areas totaling 164,337 ac (table 1.2). All but two were established in the latter half of the 20th century. The largest National Park Service management units in the Highlands are scenic riverways; together the Buffalo National River and Ozark National Scenic Riverways cover over 153,000 ac. Congress established the Ozark National Scenic Riverways in 1964 to protect 134 miles of the Current and Jacks Fork Rivers in southeastern Missouri; this unit was the first of the nation’s “scenic riverways,” established 4 years before Congress passed the Wild and Scenic Rivers Act. After a decade of struggle between competing proposals to dam or preserve the Buffalo River in the Arkansas Ozarks, Congress designated it as the Buffalo National River in 1972.

National Wildlife Refuges

The mission of the National Wildlife Refuge System—managed by the U.S. Fish and Wildlife Service—is “to preserve a national network of lands and waters for the conservation and management of the fish, wildlife, and plants of the United States for the benefit of present and future generations” (USDI FWS 1998). The most important uses of the system are wildlife-dependent recreational activities—hunting, fishing, wildlife observation, photography, and environmental education. There are eight national wildlife refuges in the Highlands (66,368 ac), all relatively small (table 1.3).

Reservoirs and Adjacent Lands

From the 1940’s through the early 1980’s, the U.S. Army Corps of Engineers constructed 29 lakes and reservoirs in the Ozark-Ouachita Highlands. Built for flood control, domestic water supplies, and recreation, these water bodies (see table 1.4) have a combined surface area of about 673,000 ac (at the top of their combined “conservation pools,” i.e., their normal water levels). The Corps manages campgrounds, boat launch areas, and other recreational facilities near many of these water bodies.

Table 1.2—National Park Service management units in Assessment area counties

Management unit	Size	State	Year authorized
	<i>Acres</i>		
Buffalo National River	91,827	AR	1972
Fort Smith National Historic Site	35	AR	1961
George Washington Carver National Monument	210	MO	1943
Hot Springs National Park	4,868	AR	1921 ^a
Ozark National Scenic Riverways (includes Round Spring, Alley Spring, Big Spring)	61,368	MO	1964
Pea Ridge National Military Park	4,279	AR	1956
Wilson’s Creek National Battlefield	1,750	MO	1960
Total	164,337		

^a Established as a Federal reserve in 1832 to protect the hot springs, designated a national park in 1921.

Table 1.3—National wildlife refuges in Assessment area counties

Refuge	Size	State	Year
	<i>Acres</i>		
Holla Bend	6,428	AR	1957
Logan Cave ^a	124	AR	1989
Bald Knob	14,760	AR	1993
Mingo	21,676	MO	1945
Ozark Cave Fish ^b	40	MO	1991
Pilot Knob ^b	90	MO	1987
Sequoyah	20,800	OK	1970
Ozark Plateau ^c	2,450	OK	1985
Total	66,368		

^a Managed as part of Holla Bend.

^b Managed as part of Mingo.

^c Managed as part of Sequoyah.

Military Bases

Military bases provide large areas of public land representing a diversity of ecological conditions that contribute to the habitat needs of wildlife, can serve as protected areas for sensitive and endangered species, and offer some opportunities for outdoor recreation. The two Federal military bases in the Assessment area are Fort Leonard Wood (U.S. Army) in Missouri and Little Rock Air Force Base (U.S. Air Force). Camp Robinson and Fort Chaffee are Arkansas Army National Guard facilities.

National Forests

National forests are the most extensive type of public land in the Assessment area, accounting for more than 4 million ac or about 10 percent of the total area. They also constitute the most extensive holdings owned or managed by a single entity in the Highlands. For these reasons and because this Assessment is designed to provide some of the context needed for revising the land and resource management plans of the Highlands' three national forests, this section goes into more detail than the immediately preceding ones. See table 1.5 for summary information about the Mark Twain, Ouachita, and Ozark-St. Francis National Forests. (The St. Francis National Forest, which is joined with the Ozark National Forest administratively, is not within the Highlands).

Table 1.4—Assessment area water bodies managed by the U.S. Army Corps of Engineers

Reservoir	State	Year completed	Surface area
			<i>Acres</i>
Beaver Lake	AR	1963	28,220
Blue Mountain Lake	AR	1947	2,910
Dardanelle Lake	AR	1969	34,300
DeGray Lake	AR	1972	13,800
Dierks Lake	AR	1975	1,360
Gillham Lake	AR	1972	1,370
Greers Ferry Lake	AR	1962	31,500
Lake Greeson	AR	1949	2,500
Lake Ouachita	AR	1953	40,060
Nimrod Lake	AR	1942	3,550
McClellan-Kerr navigation pools	AR	1969	24,440
Ozark Lake	AR	1969	10,660
Bull Shoals Lake	AR, MO	1951	45,440
Norfolk Lake	AR, MO	1944	22,000
Table Rock Lake	AR, MO	1958	43,100
Clearwater Lake	MO	1948	1,600
Harry S. Truman	MO	1979	55,600
Pomme de Terre Lake	MO	1961	7,720
Stockton Lake	MO	1969	24,632
Wappapello	MO	1941	8,400
Broken Bow Lake	OK	1969	14,200
Eufala Lake	OK	1965	105,500
Fort Gibson Lake	OK	1953	19,900
Grand Lake O' the Cherokees	OK	1941	46,500
Pine Creek Lake	OK	1969	4,980
Robert S. Kerr Res.	OK	1970	43,800
Sardis Lake	OK	1983	14,360
Tenkiller Ferry	OK	1953	12,900
Wister Lake	OK	1949	7,333
Total			672,635

Two of these national forests were established by President Theodore Roosevelt more than 90 years ago. William Logan Hall traveled to Arkansas in 1906 at the request of Gifford Pinchot, first Chief of the Forest Service, to select the areas that became the Ouachita and Ozark National Forests. Based on Hall's recommendations, Roosevelt designated about 1.7 million ac of public domain lands (all in Arkansas) as national forests. The Arkansas National Forest was described at that

Table 1.5—National forests within the Highlands or Assessment area States, with establishment dates, locations, and acres (as of September 30, 1998)

National forest	Date established	Location (State)	NF lands within Highlands	NF lands in AR, MO, or OK but outside Highlands	NF total
			----- <i>Acres</i> -----		<i>Million acres</i>
Mark Twain	1933	MO	1,478,248	15,929	1.49
Ouachita	1907	AR, OK	1,746,861	16,913	1.76
Ozark-St. Francis	1908	AR	1,134,228	21,201	1.16
Total			4,359,337	54,043	4.41

NF = National forest.

time as the only major shortleaf pine forest under Federal Government protection; similarly, the Ozark National Forest was described as the only major hardwood timberland under Government protection.

Early Forest Service activity centered on attempting to curb wildfire and timber theft and setting up ranger outposts and telephone systems. In 1909, the Ouachita and Ozark National Forests were subdivided into ranger districts; each district ranger managed an average of 160,000 ac.

In 1911, the Weeks Act authorized the Forest Service to acquire non-Federal land through purchase or exchange where such lands are within the watersheds of navigable waterways. The Clarke-McNary Act of 1924 broadened the authorization of the Weeks Act to include lands valuable for timber production. In 1933, the Missouri Legislature approved establishment of national forests in that State, and the Forest Service began purchasing cut-over lands there. In 1939, the agency divided these lands into two national forests: the Mark Twain in the west and the Clark in the east. The forests were consolidated and administered from Rolla in 1952, with two of the Clark's units assigned to the Shawnee National Forest in Illinois. Then in 1962, The Mark Twain and Clark were again separated, and the two units administered by the Shawnee were returned to join the Clark. The forests were again joined under a single Supervisor's Office located in Rolla in 1973 and called the National Forests in Missouri. In 1976, the 1.49 million-acre forest became the Mark Twain National Forest that remains today (McConnell 1963).

A large segment of the southwestern portion of the Arkansas National Forest was proposed as the Ouachita National Park in 1926 (Strausberg and Hough 1997, ONPFS 1926). President Calvin Coolidge pocket-vetoed the legislation in the same year and then re-named the Arkansas National Forest the Ouachita National Forest. In 1930, President Herbert Hoover ordered the purchase of 53,000 ac of cut-over timberlands in Le Flore County, OK, thus expanding the forest into another State. The following year, the forest expanded in Oklahoma by adding lands within the Canadian and Poteau River watersheds.

A complex history of land purchases, reductions (lands were at times returned to the public domain for disposal), exchanges, and transfers underlies the present-day holdings of the national forests of the Ozark-Ouachita Highlands (Bass 1981, Strausberg and Hough 1997, Steen 1977). Today, each of these forests continues to add and lose acreage through purchase and land exchanges. These adjustments to the national forest land base occur for a variety of reasons, including public acquisition of tracts for recreation, heritage resources, recovery of threatened and endangered species, and wildlife values; acquisition of inholdings (private lands within the boundary of public land) initiated by private landowners; and disposal of small, isolated national forest tracts. The largest land exchange in Forest Service history—one involving the Ouachita National Forest, Weyerhaeuser Company, and the U.S. Fish and Wildlife Service—was completed in 1996.

Among the most important laws guiding national forest management, the Multiple-Use Sustained Yield Act of 1960 declares that “. . . national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes.” The National Forest Management Act of 1976 added wilderness to the list of multiple uses and directed that land and resource management plans for each forest reflect effective coordination among outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness values and uses. Other laws guide mineral exploration and development and protection of historic and cultural (“heritage”) resources.

Many of the roads, buildings, and recreation areas on the national forests in the Assessment area owe their existence to the Civilian Conservation Corps (CCC). President Franklin D. Roosevelt created the corps in 1933 along with the Civilian Works Administration and the Works Progress Administration to provide work for unemployed youth, to construct recreation areas, and to better manage the nation’s natural resources. During its 9-year existence, the CCC—also known as Roosevelt’s Tree Army—planted nearly 50 million trees in Missouri alone. The Corps enrollees also constructed fire lookout towers, lakes for swimming, fish hatcheries, all-weather roads, and rustic camps with architectural style that complemented the natural environment.

The nationwide depression that helped spawn the CCC also changed the pattern of land ownership in the Highlands. During the 1930’s, large timber companies and the Forest Service were able to purchase cut-over timberlands at low prices from bankrupt farmers and defunct lumber companies. Since World War II, however, the land ownership patterns in the Highlands have become more stable. Now, farmers own the best agricultural land, private timber companies own the largest part of the better timberlands, and the national forests encompass most of the more rugged upland areas (Smith 1988).

Heritage Resources on National Forest Lands

The Highlands portions of the national forests, encompassing over 4.4 million ac, contain an abundance of prehistoric (predating written history) and historic sites. Between the mid-1970’s and 1997—in compliance with the 1966 National Historic Preservation Act—the three national forests conducted archeological surveys on about 900,000 ac. This act requires Federal agencies to inventory archeological sites and historic buildings under their jurisdiction and to consider the effect of any planned actions on those resources that are eligible for listing or are actually listed on the National Register. Approximately 18 percent of the Ouachita National Forest (306,000 ac), 21 percent of the Ozark-St. Francis National Forests (235,400 ac), and 23 percent of the Mark Twain National Forest (300,000 ac) were surveyed by 1997. The types and numbers of sites documented are displayed in table 1.6.

There are over 14,000 documented archeological sites on the national forests. Prehistoric sites range from small, isolated finds of a single artifact to extensive scatters of lithic debris and from large, semi-permanent habitation sites to extensive chert quarries. Dates of these sites range from as early as 12,000 years ago to about 450 years ago.

Historic sites are also highly varied. Some are the remains of isolated, one-time events. Others, such as townsites or farmsteads, represent many events involving large populations over long periods of time. The significance of many of these sites remains unknown.

For both the prehistoric and historic resources, individual sites may not yield much information by themselves. However, when combined with information from other similar sites and information from other resource areas (e.g., geology, soils, botany, biology, paleoclimatology, pollen studies) they may add significantly to our understanding of the people and historic environments of the Highlands.

Table 1.6—Types and numbers of documented heritage resource sites and acres surveyed for heritage resources on the Ouachita, Ozark-St. Francis, and Mark Twain National Forests through 1997^a

Heritage resource survey sites	Ouachita NF	Ozark-St. Francis NF's ^b	Mark Twain NF
Prehistoric sites and components			
Cave or rock shelter	30	NA	236
Open or lithic scatter	3,016	NA	1,719
Cairn	0	NA	40
Quarry	72	NA	7
Mound	0	NA	3
Rock art	1	NA	2
Isolated finds	1,276	NA	0
Historic sites and components			
Road or trace of a path	46	NA	58
Land grant or improvement	0	NA	83
Civil War or other military	0	NA	9
Late domestic (e.g., farmstead)	1,642	NA	1,911
Rock inscription	0	NA	1
Logging related	26	NA	23
Mills (unspecified)	70	NA	47
Stage station	0	NA	1
Railroad	32	NA	56
Mining or quarry	239	NA	619
Kiln or charcoal	0	NA	36
Town	3	NA	75
Store or post office	2	NA	41
School	4	NA	230
Church or cemetery	55	NA	295
Hotel or resort	0	NA	23
Ferry	0	NA	4
Bridge and State highway shed	0	NA	2
Dam	16	NA	3
Mineral water bottling plant	0	NA	1
Still	140	NA	8
Gauging station	0	NA	1
Fish hatchery	0	NA	1
CCC related	66	NA	138
Isolated find	53	NA	9
Unidentified	23	NA	55
GLO markers	22	NA	0
Towers	18	NA	0
Dipping vats	13	NA	0
Other	257	NA	0
Total prehistoric sites ^c	3,862	710	2,007
Total historic sites ^c	2,206	1,329	3,730
Total sites with prehistoric and historic components ^c	519	159	0
Total^c	6,587	2,198	5,757

CCC = Civilian Conservation Corps, GLO = General Land Office, NA = not available.

^a Includes some survey area and sites located outside the Highlands.

^b No data were available for number of sites by specific categories.

^c Some sites contain more than one component; therefore, the totals shown here do not equal the sums of totals listed in the rest of the table.

Areas of Special Historical and Archeological Interest

There are some archeological sites and centers of information about human history in the Highlands that have special significance because of their research and interpretive value and availability to the public. Visiting historic sites is one of the most popular outdoor activities of people in the Highlands and nation (Cordell and others 1997a, D.K. Shifflet 1998). (See Chapter 5 for further discussion.) The following sites are particularly noteworthy:

- Three State agencies—the **Arkansas History Commission** located in Little Rock, the **Oklahoma Historical Society** in Oklahoma City, and the **Missouri Department of Archives** in Jefferson City—maintain large collections of primary documents, original photographs, and microfilmed documents relating to the history of each of the three States, including when they were territories. Many of these documents are directly relevant to the studies concerning 18th, 19th, and early 20th centuries in the Highlands.
- The **Arkansas Territorial Restoration**, located in Little Rock, maintains buildings dating from the Arkansas Territory (pre-1836) and original documents dating from the same period. One highlight is the Hinderliter Tavern, a meeting place of the territorial legislature. The Old State House, also in Little Rock, was constructed between 1833 and 1840 and served as the State capitol between 1836 and 1911. Exhibits pertaining to the State’s early history are maintained at these historic sites (AR AS 1997).
- There are a number of areas of interest open to visitors along the **Buffalo National River** in northern Arkansas. These include shelters that contain prehistoric archeological remains and petroglyphs (rock art), such as Cob Shelter and the Indian Rock House, and historic sites such as the old Rush Mining Town where zinc was mined in the 1880’s (AR AS 1997).
- **Fort Smith National Historic Site**, located in the Arkansas River Valley of northwestern Arkansas, is managed by the National Park Service and includes the remains of two historic forts and the Federal Court for the Western District of Arkansas: “Commemorating a significant phase of America’s westward expansion, it stands today as a reminder of 80 turbulent years in the history of Federal Indian policy” (USDI NPS 1989).
- **The George Washington Carver National Monument**, located in southwest Missouri, highlights the life and work of an individual who was born into slavery, yet accomplished many great things. George Washington Carver attained national prominence by age 55 through his extensive research (especially about peanuts) and work as an “educator, botanist, agronomist, ‘cookstove chemist,’ and artist” (USDI NPS 1990b).
- The **Gilcrease Museum** in Tulsa, OK, contains important collections of North American Indian artifacts, including some items recovered from the looting at Spiro Mounds during the 1930’s. These collections provide excellent research opportunities for those wishing to understand prehistoric cultural development within the Highlands (AR AS 1997).
- **Hot Springs National Park**, located in the eastern Ouachita Mountains of central Arkansas, was the first reservation set aside by the Federal Government for the protection of resources (in 1832). Named a national park in 1921, the park features interpretive exhibits on the historic use of the hot springs and the bathing facilities that developed around them, local archeology, geology, and history.
- The **Museum of the Red River**, located in McCurtain County, OK, highlights the prehistoric and historic American Indian cultures that have lived (and whose descendants currently live) in southeastern Oklahoma. This museum includes exhibits of Caddo Tribal history. The prehistoric homeland of the Caddo Tribe covered all of what is now the Ouachita National Forest as well as northwestern Louisiana and northeastern Texas.
- The **Ozark National Scenic Riverways**, located in south-central Missouri, and managed by the National Park Service, primarily showcases the natural environment. However, several historic sites, including CCC facilities, can also be found in the park (USDI NPS 1990a).
- **Pea Ridge Military Park**, which is also under National Park Service management, preserves a

portion of the battlefield on which Union forces gained control of much of northwestern Arkansas and parts of southwestern Missouri in March 1862 (USDI NPS 1965).

- **Prairie Grove Battlefield State Park**, located in northwest Arkansas, was the site of an important battle on December 7, 1862, in the western campaign of the Civil War (AR AS 1997).
- **Spiro Mounds Archeological Park** is a large Caddoan ceremonial center consisting of a village and 11 earthen mounds in Le Flore County, OK. Although looters took many artifacts from the mounds during the 1930's, the site has provided extensive information about eastern Oklahoma and western Arkansas. "Spiro's inhabitants developed political, religious and economic institutions with far-reaching influence on societies from the Plains and Mississippi Valley to much of what is now the Southeastern United States" (Wyckoff and Peterson 1985). Some of the original artifacts as well as reproductions are exhibited at the park, and nearby museums have additional holdings of artifacts.
- The **Toltec Mounds State Park**, located north of the Arkansas River in central Arkansas, was the center for the Plum Bayou culture. Dating from about A.D. 600 to 1000, people of the Plum Bayou culture inhabited the Mississippi and lower Arkansas River alluvial valleys. Originally at Toltec, there were 18 mounds surrounded by a ditch and an embankment, but today only 5 mounds and a portion of the embankment are visible. Although outside the Highlands, current research at the site attests to the importance and use to the indigenous people of upland resources in the adjacent Highlands, a short distance to the west (AR AS 1997, Rolingson and Howard 1997).
- The **University of Arkansas Museum** in Fayetteville features important exhibits dealing with the development of Indian cultures from 10,000 B.P. to the 1800's. Additional exhibits describe the historical, geological, and biological features of the State (AR AS 1997).
- **Wilson's Creek National Battlefield**, located in southwestern Missouri and operated by the National Park Service, provides protection for an important Civil War battlefield. The battle, a bitter struggle

between the Union and Confederate forces for control of Missouri, was fought on August 10, 1861 (USDI NPS 1991).

Implications and Opportunities

Research and Interpretive Opportunities

Experts have estimated that the over 14,000 documented archeological sites on the Highlands national forests represent only 25 to 30 percent of what actually exists. If this estimate is accurate, there may be more than 50,000 heritage sites on the Ouachita, Ozark, and Mark Twain National Forests. Research and interpretive opportunities are constrained only by time, money, and imagination.

The Highlands' national forests have the ability to protect from damage or destruction heritage resources that hold significant information about human and environmental history. Similar resources on adjacent private lands are more readily subject to accidental destruction through land development, industrial activity, and vandalism. Similar to endangered species, once archeological sites are lost, they are gone forever. Public lands are therefore extremely important in protecting and archiving heritage resources for future researchers. Descriptions of some of the research and interpretive opportunities available on the national forests in Arkansas, Oklahoma, and Missouri follow.

Caddoan Archeology

Most of the Ouachita National Forest and part of the southern fringes of the Ozark National Forest are located within the Caddoan Indian cultural area. These public lands offer excellent research opportunities to study the prehistoric lifeways of the Caddoan people and their use of upland areas. There has been a great deal of archeological research about the Caddoans, but it has centered on sites outside the uplands. Current research resulting from a major land exchange between the Ouachita National Forest and Weyerhaeuser Company is concentrated in extreme southeastern McCurtain County, OK, on the Gulf Coastal Plain (Etchieson 1997a).

Within the Ouachitas themselves, research into Caddoan lifeways has been rather limited. Researchers routinely find and document sites that may contain a Caddoan component, but since they do not recover artifacts that can be directly associated with the Caddo Indians from many of these sites, they cannot confidently identify them as Caddoan. Limited archeological work during the early to mid-20th century centered on the broad valley of the Ouachita River. More extensive work was done in the mid-1960's in the valley of the Mountain Fork River in southeastern Oklahoma (Wyckoff 1967a, 1967b, 1968) and in the mid-1970's at a small mound site in the valley of the Caddo River (Early 1988).

Research undertaken more recently at a small Caddoan hamlet in the southern Ouachita Mountains in Montgomery County, AR, is providing new information about how they constructed buildings, new environmental data on the distribution of bois d'arc (Osage orange, often used as bow wood), and basic data on late Caddoan use of mountain environments (Early 1997b).

Major opportunities exist for continued research into upland Caddoan archeology within the Ouachita Mountains. National forest land managers can play a major role in this research, including preserving sites for future research.

Late Woodland and Emergent Mississippian Archeology

The early archeological work in the Missouri Ozarks focused on the study of caves and shelters in the western Ozarks. Little was known about late prehistoric settlement in the eastern Ozarks until a 1975 study in which Price and others (1975) postulated an Emergent Mississippian occupation they called the Naylor Phase. Before their study, this southeastern region was thought to be primitive when compared with other Mississippian sites, owing to a lack of mortuary goods, burial mounds, or ceremonial centers.

In 1979, Ozark National Scenic Riverways archeological studies in the Upper Current River Valley substantiated their findings. By 1980, three Emergent Mississippian site types were defined in the eastern Ozarks (Price 1980, Lynott 1982): a possible temple mound and ceremonial center at Pigman Mound; small villages recognized at the Gooseneck, Shell Lake, and

Shawnee sites; and special activity sites. These populations thrived in the eastern Ozarks between A.D. 700 and 1000. The Mississippian period populations in the Current River area developed with minimal immigration of other people. In contrast, the Mississippian populations in the northeastern and eastern Ozarks were significantly influenced by the people from Cahokia (Wettstaed 1996).

Similar developments took place in the American Bottoms, the Mississippi Alluvial Valley, southeast Missouri, northeast Arkansas, and southwest Missouri. By A.D. 1100, classic Mississippian traits were present in adjacent areas, and by A.D. 1300, much of the Ozarks region had been abandoned. Prior to A.D. 700, the Ozarks had been inhabited by Late Woodland people, and this tradition continued into Mississippian times throughout much of the Ozarks. Notably in the northeast Ozarks, the Meramec Spring Phase was dominated by Late Woodland characteristics, with the exception of shell-tempered pottery, indicative of interaction with adjacent Mississippian populations but not of an Emergent Mississippian occupation (Wettstaed 1996).

Despite the presence of Emergent Mississippian traits along some peripheries of the Missouri Ozarks, a Late Woodland tradition continued in most of the region. Additional research within the Mark Twain National Forest will undoubtedly provide important information on the divergent development of these two cultures and the nature of their interactions.

Civilian Conservation Corps Camps and Other Features

There is a significant amount of public interest in the life and activities of Civilian Conservation Corps (CCC) members. The camps in which the CCC lived while assigned to the national forests are now considered historic archeological sites themselves, even though they were of temporary construction and retain few structural elements of corps buildings (other than foundations). The sites of these camps represent opportunities for the Forest Service to construct self-guided interpretive trails fairly inexpensively.

Enrollees in the CCC constructed many buildings, roads, and recreation areas across the Highlands forests. Many of these works exhibit excellent craftsmanship and

are still in use. The Mark Twain National Forest currently has several interpretive panels at CCC-constructed buildings and has identified opportunities for the interpretation of specific CCC-constructed features such as spring tanks, roadside stonework, trails, and fire lookout towers. Construction of interpretive sites for the Hollis and Jessieville CCC camps on the Ouachita National Forest will be completed in 1999. The national forests also have opportunities to rehabilitate and interpret the history and significance of some of the CCC-constructed and -operated fire towers and could develop educational materials describing Government work programs of the 1930's and 1940's, challenges facing enrollees, and the accomplishments of the CCC.

Stock Ranching and Grazing

The glade-rich central portion of the White River Hills in southwestern Missouri contains a mosaic of open and grassy dolomite glades, cedar groves, and broadleaf deciduous hardwood stands. The glades are also dotted with archeological sites, both prehistoric and historic. Historic occupation and use of the glades began sometime during the 19th century and ended with the U.S. Government acquisition of lands in this region. Nineteenth and early 20th century settlement was mostly agriculturally based. Livestock ranching, rather than row-crop farming, was the principal agricultural activity. Archeological sites include farmstead core areas containing the remains of domestic structures and outbuildings, isolated outbuilding areas, and limited activity areas. The remains of rock walls, field clearing piles, and old field clearings dot the landscape.

Since the Federal acquisition of lands in the area starting in the 1940's, various grazing allotments have continued the traditional historic use of the glades. Related to the ongoing stock grazing are stock ponds, spring impoundments, fences, and woods roads. The landscape remains much as it has since the early years of this century, and the archeological sites are relatively undisturbed (Price 1996).

Early in the 20th century, Arkansas and most of the Southeastern States participated in a tick eradication effort by the U.S. Department of Agriculture. Initiated in response to "Texas fever," a tick-borne illness that jeopardized the region's cattle industry, the program endorsed the widespread construction of dipping vats.

Cattle were immersed in an arsenical solution to destroy ticks. Such a broad-scale intergovernmental program was unprecedented at that time (Coleman and others 1996). Dipping vats associated with this important episode in U.S. history are a finite heritage resource. Researchers have documented only 12 vats on the Ouachita and Ozark National Forests, and the Forest Service is actively preserving them for future research. Archeological investigation of these dipping stations should reveal information about early concrete construction and may help to assess the effects of arsenic on forest surroundings.

Late Rural Domestic Sites (1880's to 1930's)

Homesteads represent the most abundant historic site type on the national forests in Arkansas and Missouri. To date, archeologists on the national forests have documented approximately 3,800 19th- and early 20th-century homesteads (acquired under the Weeks Law of 1911 and the Clarke-McNary Act of 1924).

Historic photographs show that the typical homestead claim consisted of a one-room log house or a small frame structure, and frequently included a simple log outbuilding on the edge of a small clearing and a split-rail fence surrounding the claim. These surviving examples of frontier construction from as late as the 1930's appear in the Highlands and comprise a distinctive agrarian landscape represented nowhere else in Arkansas or Missouri. However, in the Missouri Ozarks, several other types of landscape variants occur that represent post-Civil War to World War II years.

Ironically, because of the common historic Forest Service practice of removing homestead improvements (e.g., barns and houses that the agency could not afford to maintain) after acquiring the tracts on which they were located, most of the remaining evidence of this landscape exists only in the archeological record—a situation that underscores the importance of protecting and studying late historic archeological sites. As of 1997, Forest Service archeologists had formally excavated only four such homesteads across the Ozark and Ouachita National Forests. Each of the four sites, however, has contributed new information about this little-known chapter of history (Coleman 1993, 1995; Coleman in press; Coleman and Guendling 1999). Additional, non-Forest Service investigations are

described by Stewart-Abernathy (1986), and Stewart (1995); still others are identified in the Sponsored Research Program (1995). Within the Missouri Ozarks, research has been conducted at the Herrygers Site (Price 1993) and the Nevins Farmstead (Sloan 1989).

Novaculite Quarries

A hard, dense rock used extensively in the manufacture of prehistoric tools, novaculite occurs along ridge tops across the entire extent of the southern Ouachita Mountains. According to Holmes (1891, 1919), Jenny (1891), Baker (1974), Stewart and others (1995), and Etchieson (1997b), researchers have examined the prehistoric quarries that probably date back to the mid-late Archaic Period (7,500 to 500 B.P.). No intensive research has been conducted at any single quarry; in 1996, however, the Ouachita National Forest together with the Arkansas Archeological Survey began developing a research design for the study of novaculite quarries in Arkansas (USDA FS 1996). Research results will include a process to prepare detailed maps of quarry sites and trail systems, studies of a particular artifact's source and place of manufacture, environmental changes resulting from massive quarry activity, and information on extraction techniques or mining methods (Etchieson 1997b). In addition, selected quarry sites within the national forest would be ideal public interpretive sites for either guided or self-guided tours.

Prehistoric Use of Upland Areas

The Ouachita, Ozark-St. Francis, and Mark Twain National Forests have an opportunity to provide baseline data on the prehistoric use of upland areas. Within the Highlands' national forests, most work has been accomplished as a result of compliance with the National Historic Preservation Act of 1966. Federal land-managing agencies such as the Forest Service, National Park Service, Natural Resources Conservation Service, and the Corps of Engineers have largely restricted their investigations to this type of "compliance study." Even this basic work, however, contributes significantly to the baseline data for the Ozark-Ouachita Highlands. Over the past decade, the national forests in the Highlands have contributed the greatest volume of data within the region, more than most other agencies and entities combined.

Although large acreages have been surveyed and several thousand archeological sites documented, the researchers have hardly "scratched the surface" in understanding the prehistoric use of upland areas within the Highlands.

Historical Logging and Mining Sites

Logging has long been an important aspect of the economy of the Highlands. Certain sawmill locations are now documented as historic archeological sites, and other associated logging resources (such as railroad trams and trestles) are being inventoried across the national forests. This inventory will make it possible to complete detailed research into past logging activities in the upland areas. Similar documentation and research have recently been conducted in the western edge of the Highlands (McGuff and others 1993). These sites, along with associated archival records (such as land acquisition records, timber company records and maps, timber railroad maps) are very useful in documenting land use and changes in historic vegetation patterns.

Some logging and grist mills remain intact on the Mark Twain National Forest as historic sites and others are represented as historic archeological sites on the Ozark and Ouachita National Forests. Documentation of these site types and archival research will provide additional information regarding historic land use and local and regional economies.

Historic mining resources provide great potential for research and interpretation of industrial archeological resources, how these resources affected historic land use, and their importance in the local economies. The historic exploitation of mineral resources within the Highlands has occurred from at least the early 19th century and from the early 1700's in the Missouri Ozarks (Schoolcraft 1819, Wettstaed n.d.). Many abandoned mines and mining towns (with some original structures remaining) occur throughout the Ouachita Mountains and the Ozark Plateaus. The mining towns of Palmer (lead with later barite mines), Silvermines (tungsten and silver), and the ironworks mining town of Nova Scotia are represented in Missouri's Ozarks (Wettstaed in press). The turn-of-the-century historic mining town site of Slatington (slate mines) is located in the central Ouachita Mountains (Purdue 1909). Other minerals historically mined in the Ouachita Highlands

include barite, manganese (Pfeiffer 1995), quartz, and novaculite. Each of these mineral sources and processing areas occur today as historic archeological sites. Other minerals such as silver are reported to have been mined in various places in the central Ouachita Mountains and historic mine pits are rumored to have contained silver. Geological records suggest that although silver may occur, it is in such small quantities it would not be commercially feasible to mine. For further information regarding the actual geology and mineral resources of the Highlands, see Chapter 7, “Mineral Resources,” in this report.

Civil War

The Civil War from 1861 to 1865 had a major effect on each of the three Ozark-Ouachita Highlands States. Not only were thousands of families affected, but each State experienced significant economic losses. The hardships of war caused a loss of revenue and the loss and failure of many family farms and businesses. Military campaigns were conducted within the Ozark Plateaus and, to a lesser extent, within the Ouachita Mountains. Civil War encampments have been identified within the Mark Twain National Forest at the forest administrative sites in Rolla and Van Buren. Although specific sites have not been identified on Forest Service lands on either the Ozark or Ouachita National Forests, it is highly likely that they do exist.

Rock Shelter Sites

Each of the three forests contain geological strata (layers) that have allowed the development of rock shelters and caves. Such sites may contain archeological deposits rich with information about the people who lived in the forests, whether they were 19th-century settlers trying to eke out a living in a poor upland farming environment or members of a hunting and gathering culture of 6,000 years ago. Information contained in these shelters provides research opportunities not readily found in open (unsheltered) sites on ridge tops or near streams.

Dry shelters in the Ozark Plateaus (the Ozark and Mark Twain National Forests) often contain perishable items such as fragments of cords or baskets that are recovered only in charred form (if at all) from open

sites. Such shelters sometimes yield other perishable remains such as foods, pollen, or wood that can provide important information about diet, climate, and the environment. In the Ouachita Mountains, the bedrock is not conducive to formation of large, dry shelters, and therefore such perishables are less often preserved.

Shelters may also display prehistoric rock art that took two forms: petroglyphs—symbols carved into rock surfaces—and pictographs—symbols painted on protected rock surfaces. Rock art is nearly nonexistent in the Ouachita Mountains but does occur occasionally in shelters near the Arkansas River. It is more commonly found in shelters in the Ozark Plateaus. Several shelters within the Assessment area are open for visitors interested in viewing rock art.

Shelter sites are often the target of souvenir hunters and others who collect artifacts for personal collections or for profit. Such digging is damaging or destructive to the site and the specimens found within it since it is often done without regard to the context of the specimens (e.g., the association of one specimen with another, deposits surrounding the specimen, and soils in the area). Shelters located on public lands within the study area are better protected than those on private land, and it is these sites that will be available for future research and interpretation.

Additional Subjects

Additional heritage subjects that warrant research and interpretation within the Highlands area include:

- Archaic and Fourche Maline settlement patterns and utilization of the upland environments,
- Black midden mounds and their distribution within the Ouachitas,
- Exploitation of chert resources in the Ozark Plateau,
- Historic American Indian sites associated with the Trail of Tears,
- Historic Choctaw Indian settlement within the western Ouachita uplands in the early 19th century,
- Comparison of Choctaw late rural domestic farmsteads with those of European-Americans,
- Distribution of Dalton period sites within the upland areas,
- Investigation of Paleo-Indian use of the upland areas,
- Prehistoric mining, collection and use of quartz crystals,

- Historic mining of quartz crystals, and
- Historic land use and vegetation patterns based on national forest land acquisition records.

Maximizing Partnerships

In times of ever-shrinking budgets, State and Federal agencies must make the maximum use of partnerships. Through partnerships with groups such as the Arkansas and Missouri Archeological Societies, the Arkansas Historic Preservation Program, the Arkansas Archeological Survey, and the Oklahoma Anthropological Society, the Forest Service has been able to undertake a number of projects that might not have been funded otherwise.

Through joint efforts, researchers have evaluated sites near the Shady Lake (Stewart and others 1995) and Winding Stair Recreation Areas (Davis 1995), in the Spradley Hollow area (Cande 1995, 1998), and at Huckleberry Pond (Stewart 1995). They have also developed a research design for novaculite quarries, processed artifact collections from the Hicks Site, completed evaluation testing of a prehistoric site damaged by road building and logging, undertaken research on late historic rural domestic sites, and prepared National Register nominations for historic CCC buildings and structures.

Forest Service personnel, volunteer archeologists, and historians on all three forests have undertaken many other projects as well, including similar field and laboratory projects. The national forests thus provide recreational and educational opportunities for the volunteers, who in turn provide labor, expertise, and enthusiasm.

The Mark Twain National Forest has been actively engaged in partnerships with various entities in Missouri. Several Passport-in-Time projects have been completed with universities and consultants as partners, including work at the Nova Scotia Ironworks sites and town, open air, and cave sites. In addition, the forest has prepared an overview for sites associated with Archaic cultures and written a thematic nomination for the National Register for the Big Creek/Central Glade area. Other examples of partnerships include interpretation of the Thaxton Barn and Rolla CCC-era Administrative Sites (with local governments); mitigation work conducted on

the Civil War and prehistoric components at the Van Buren Administrative site (with the National Park Service); archeological survey and site evaluations on national forest lands used for military training (with Fort Leonard Wood); evaluations of prehistoric archeological sites and training of paraprofessionals (with the Natural Resources Conservation Service); and presentations on Missouri archeology, as well as archeological surveys and excavation projects (with State agencies such as the Missouri Department of Natural Resources, Missouri Department of Conservation, and the Missouri Department of Transportation).

Future Mark Twain National Forest partnership opportunities include a study of prehistoric and historic use of the glades region in western Missouri that will focus on differences between the glades and forested environments along with site patterning. Other opportunities include frontier settlement studies of plantations, early sawmills, cabins, hunter and trapper structures, subsistence farms, and commercial activity localities.

In addition, staff from all forests work with the American Indian tribes whose ancestors in both prehistoric and historic times may have occupied or utilized the lands within the Ozark-Ouachita Highlands. These partnerships include joint heritage resource technician training, Native American Graves Protection and Repatriation Act coordination, Archeological Resource Protection Act coordination, symposium on Choctaw archeology and ethnology, and the Caddo Archeological Conference. Tribes with whom partnerships are currently in place include: the Caddo, Choctaw, Muscogee (Creek), Osage, Cherokee, Kiowa, Chickasaw, Seminole, Comanche, Quapaw, and Delaware.

The Ozark-St. Francis, Ouachita, and Mark Twain National Forests have excellent opportunities to help protect prehistoric and historic sites in the Assessment area. These nonrenewable resources are becoming increasingly important as population growth, vandalism, and development take their toll on resources in other areas of non-Federal lands. The heritage resources on public lands are becoming the reserve for future research. They can yield a wealth of significant information on the Highlands and the people who have inhabited them over the centuries.

Chapter 2: Social and Demographic Conditions and Trends

Question 2.1: *What are the social trends and changes taking place in the Highlands area that will affect or be affected by national forest (or other public land) management?*

Question 2.2: *What is the social profile (e.g., age, education, and racial-ethnic characteristics) of individuals who live in the Assessment area?*

The purpose of this chapter is to describe some of the changes taking place in the human population of the Ozark-Ouachita Highlands Assessment area. Data presented describe general social trends within the Assessment area and the three States in which it lies. These broad trends can be used to help anticipate future demands on the region's public lands, especially its national forests. Equally importantly, these patterns can be used to better understand the social context in which public land management takes place. The chapter also presents a variety of county- and individual-level indicators of socioeconomic stress or hardship that may have more general implications for Federal policymaking and decisionmaking.

This chapter is divided into two major sections. The first presents the results of demographic and socioeconomic analyses of the counties within the Assessment area. The second section provides a more detailed analysis of various categories of individuals based on their age, education, and racial characteristics.

The county-level analyses begin with a description of the major population settlement patterns and trends in the region, followed by a summary of some key characteristics of the population. A large portion of the county-level analyses is used to examine the ways Assessment area residents make a living. The section concludes with a description of the socioeconomic well-being of the people of the Assessment area.

The individual-level analyses are used to compare differences in social and economic status between older and younger residents of the Assessment area, between more highly educated and less-educated residents, and among three racial categories. To ensure confidentiality, data concerning individuals living in specific counties are not available. Instead, these analyses are presented for people living within the larger region.

Key Findings

1. The Assessment area has grown rapidly in recent decades, and continues to do so. Between 1970 and 1996, its population increased 48 percent, while Missouri, Oklahoma, Arkansas, and the Nation as a whole grew by 15, 29, 31, and 31 percent, respectively.
2. Recent (1990 to 1996) population growth seems to be most strongly associated with metropolitan status, presence of national forest lands, and high rates of in-migration. In-migration of new residents contributed nearly 80 percent of the estimated population growth in the Assessment area as a whole and 83 to 98 percent of the estimated growth in groups of nonmetropolitan counties containing lands of one or more of the Highlands' national forests.
3. Retirement-aged adults make up a significant segment of the population of the Assessment area. Retirement pensions and Social Security income provide a slightly larger portion of total income in the Assessment area than in the three States; these sources of income are most important in nonmetropolitan counties with national forest lands.
4. The racial and ethnic composition of the Assessment area changed little between 1970 and 1990, remaining predominantly (91 percent) White. One special census showed that the Hispanic-American population of Washington County, AR, grew 435 percent between 1990 and 1996.
5. Overall, educational levels are relatively low in the Assessment area. In nonmetropolitan counties in 1990, 37 percent of adults 25 years and older had not completed high school (or its equivalent), and 13 percent of teenagers (ages 16 to 19) were high school dropouts. In 14 nonmetropolitan Assessment area counties clustered mainly on the eastern side of the Highlands, at least 45 percent of the adult population had less than a high school diploma.
6. Assessment area workers, especially those living in nonmetropolitan counties with national forest lands, face higher unemployment rates than the Nation as a whole. Workers living in nonmetropolitan counties with Mark Twain National Forest lands face the highest incidence of full-time, but seasonal (i.e., part-year) work.

7. The overall level of socioeconomic well-being in the Assessment area is relatively low. Median household incomes in the area were \$19,208 in 1989, compared to \$20,360 in Oklahoma, \$20,832 in Missouri, and \$30,056 in the Nation.
8. Thirty-seven counties in the Assessment area experience “persistent poverty” (47 percent of the 49 nonmetropolitan “national forest counties” and 33 percent of the 42 nonmetropolitan counties with no national forest lands). Persistent poverty in nonmetropolitan counties appears most common in southeastern Missouri (15 counties), north-central Arkansas (9 counties), and southeastern Oklahoma (6 counties). The 24 “persistent poverty” counties in southeastern Missouri and north-central Arkansas include 12 of the 14 counties in which 45 percent or more of the adult population have less than a high school education; 19 of these 24 “persistent poverty” counties include national forest lands.
9. As of 1990, 16 Assessment area counties were termed “retirement destinations.” Most of these counties are in the heart of the Assessment area—9 of the 16 retirement-destination counties have national forest lands and 8 include large lakes.

Definitions and Data Sources

For purposes of this analysis (and throughout most of this report), the Ozark-Ouachita Highlands Assessment area consists of 107 counties in western and northern Arkansas, southern Missouri, and eastern Oklahoma. (For a map showing county names, see fig. 1.1.) Among these counties are several that either partially lie within or are almost entirely outside the Ozark-Ouachita Highlands. Rather than exclude some of these counties by applying an arbitrary rule, the Social-Economic Team elected to include all of them in the study area.

The Assessment area includes most of three national forests—the Mark Twain, the Ouachita, and the Ozark portion of the Ozark-St. Francis National Forests. About half of the counties in the region contain at least some national forest land (fig. 2.1). Parts of the Ozark National Forest are found in 16 counties in Arkansas, while the Mark Twain National Forest occupies parts of 27 Missouri counties south of the Missouri River. The Ouachita National Forest covers portions of 12 counties

in Arkansas and 2 in Oklahoma. Two counties (Logan and Yell, both in Arkansas) include parts of both the Ozark and Ouachita National Forests. To simplify the analyses in this chapter, the national forest lands in these two counties were treated as if they were all within the Ouachita National Forest. Many of the following analyses are presented for counties with and without national forest lands.

The team excluded five additional counties that contain parts of the Mark Twain (Boone and Callaway Counties, MO), Ouachita (Ashley County, AR), or Ozark-St. Francis National Forests (Lee and Phillips Counties, AR) from these analyses because they lie outside the Ozark-Ouachita Highlands. Some comparable information about these outlying counties is available on the Assessment Web site (<www.fs.fed.us/oanf/ooha/welcom.htm>).

The Assessment area encompasses five small- to medium-sized metropolitan areas—Fayetteville-Springdale-Rogers, Fort Smith, and Little Rock-North Little Rock, AR; and Springfield and Joplin, MO—and part of one major metropolitan area, St. Louis, MO (fig. 2.2). More than 80 percent of the counties in the region are nonmetropolitan (not part of a metropolitan area). Because of the many social and economic differences between cities and rural areas, this chapter presents many social patterns and trends for both metropolitan and nonmetropolitan counties as well as for the study area as a whole. (See the “Glossary of Terms” for definitions of “metropolitan county” and “nonmetropolitan county.” The tabulation presented under “Population Growth, 1970 to 1996” lists the metropolitan counties in the Assessment area.)

Most of the county-level data in this chapter came from the U.S. Department of the Commerce’s (USDC) *1990 Census of Population and Housing* (USDC BC 1993). Additional county-level data are from the *Regional Economic Information System* (USDC BEA 1996), *USA Counties: 1996* (USDC BC 1996), *The Revised ERS County Typology: an Overview* (Cook and Mizer 1994), and the *1992 National Resources Inventory* (USDA NRCS 1992). Population figures for 1996 are from the *County Population Estimates* Web site (USDC BC 1997a). Historical data came from the *Assembled Data Base from the 1970, 1980, and 1990 Censuses of Population and Housing* (USDA FS SR 1996). Information sources for specific items are listed below.

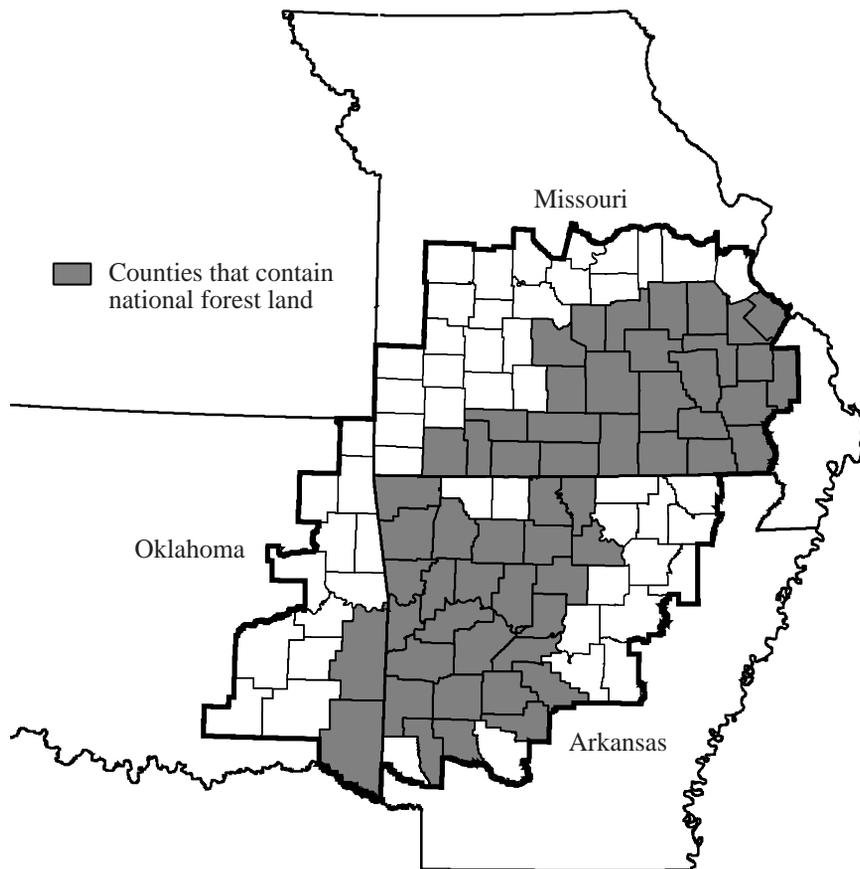


Figure 2.1—Assessment area counties containing national forest lands. (National forest acres per county range from less than 1,000 to more than 360,000 acres.)

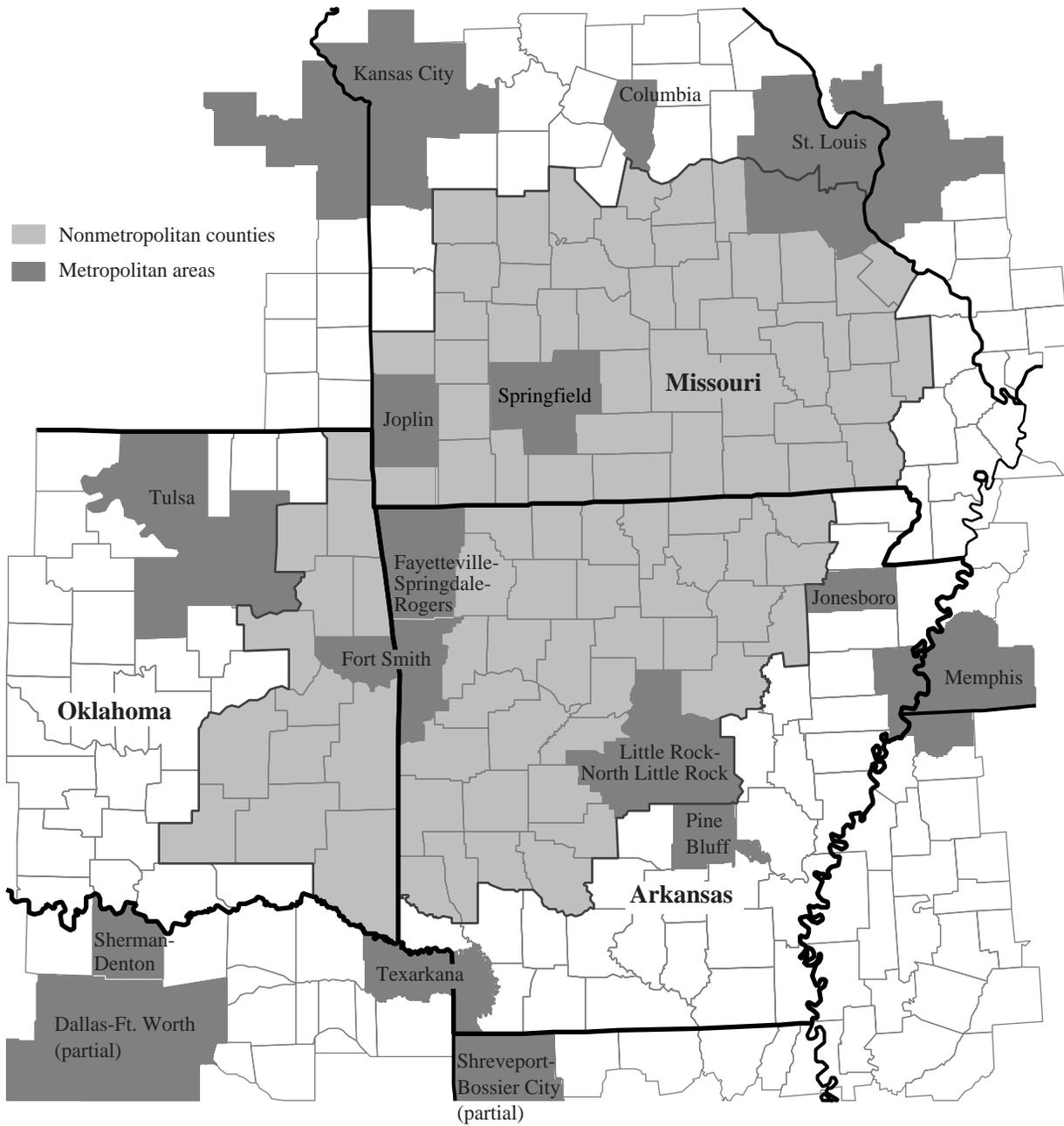


Figure 2.2—Metropolitan areas in and near the Assessment area (USDC BC 1993).

Population Distribution and Land Use Patterns

Population

Almost 4 million people lived in the Assessment area counties in 1996 (table 2.1). Within the Assessment area, the population is fairly evenly split between metropolitan and nonmetropolitan counties (46 percent and 54 percent of the population, respectively). The distribution of people living in counties with and without national forest lands is also fairly even: 43 percent of the population reside in counties that have national forest lands.

Among the 55 counties containing national forest lands (6 metropolitan and 49 nonmetropolitan counties), those with Mark Twain National Forest lands appear to be the most rural; about 92 percent of the nearly 600,000 people in this part of the Highlands live in nonmetropolitan counties (fig. 2.3). The population in the “Ouachita National Forest counties” is also predominantly rural, with nearly two-thirds (63 percent) of the 483,000 residents living outside of a metropolitan area. Residents of counties containing parts of the Ozark National Forest are more likely to be in a metropolitan area as are residents of Assessment area counties with no national forest lands.

Table 2.1—Estimated Assessment area population, population density, and percent population growth (1970–1996) plus projected population in 2010 and projected population growth from 1996 to 2010

Geographic area	Estimated population, 1996	Estimated population density, 1996	Estimated population growth, 1970–96	Projected population, 2010	Projected population growth, 1996–2010
		<i>Persons per mi²</i>	<i>Percent</i>		<i>Percent</i>
Counties with NF	1,605,047	39	—	1,906,808	19
Metropolitan	535,267	127	88	660,641	23
Mark Twain NF	44,871	80	197	60,204	34
Ozark NF	310,014	130	102	377,635	22
Ouachita NF	180,382	143	56	222,802	24
Nonmetropolitan	1,069,780	29	42	1,246,166	16
Mark Twain NF	552,051	30	38	599,627	9
Ozark NF	214,232	29	64	285,492	33
Ouachita NF	303,497	29	37	361,047	19
Counties without NF	2,159,378	62	—	2,480,720	15
Metropolitan	1,185,916	170	46	1,395,722	18
Nonmetropolitan	973,462	35	40	1,084,948	11
Assessment area	3,764,425	50	48	4,387,527	17
States					
Arkansas	2,509,793	48	31	2,547,800	2
Missouri	5,358,692	78	15	5,508,989	3
Oklahoma	3,300,902	48	29	3,619,850	10

Mi² = square mile; NF = national forest; — = not calculated.

Source: USDC BC (1997a), USDA FS SR (1996), IEA (1998), MO OA (1998), OK DC (1998).

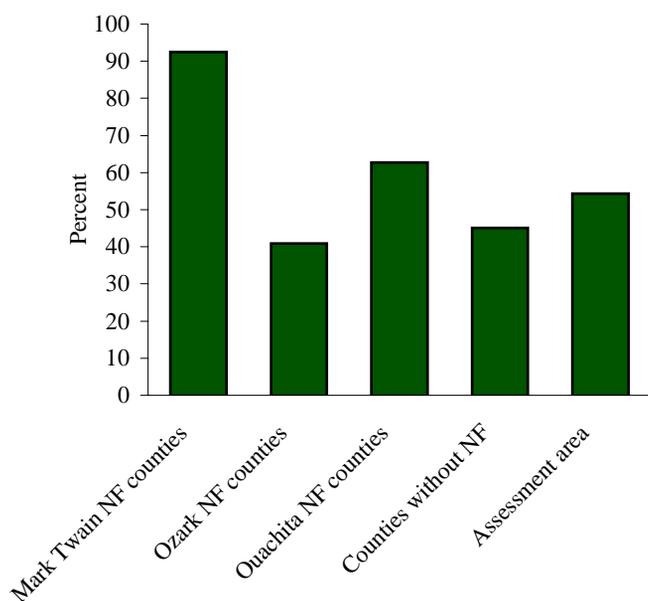


Figure 2.3—Percent of the population living in a nonmetropolitan county (USDC BC 1993).

Throughout the region, the population is relatively sparsely and unevenly settled. Population densities (measured by the number of persons per square mile) tend to be higher on the perimeter of the Assessment area and along developed transportation corridors. Naturally, metropolitan counties are much more densely populated, on average, than nonmetropolitan counties (table 2.1).

The most sparsely settled counties tend to be nonmetropolitan with national forest lands, but considerable variation in population density exists even among these counties (fig. 2.4). For example, nonmetropolitan Garland County (which includes 108,000 acres (ac) of

the Ouachita National Forest) has more than 100 people per square mile (mi^2), while nearby Montgomery County (with more than 300,000 ac of national forest land) has 10 people/ mi^2 .

Nonmetropolitan counties that include parts of the Ozark National Forest exhibit less variation in population settlement patterns. Newton County, AR, in the heart of the Ozark Mountains, is similar to Montgomery County in that it has fewer than 10 residents/ mi^2 . The most densely populated nonmetropolitan counties with Ozark National Forest lands (Baxter and Pope Counties) have 56 to 57 persons/ mi^2 .

Population densities in the 26 nonmetropolitan counties with Mark Twain National Forest lands range from a low of 8 persons/ mi^2 in isolated Shannon County, MO, to highs of 76 in Pulaski County, MO (home of Ft. Leonard Wood), and 109 in St. Francois County (on the outskirts of the St. Louis metropolitan area and containing less than 1,000 ac of national forest land).

Among the 42 nonmetropolitan counties in the Assessment area that do not contain national forest lands, population densities in Arkansas range from 16 persons/ mi^2 in Fulton County (a predominantly farming county on the Missouri border) to 53 persons/ mi^2 in White County (northeast of Little Rock). Population densities in the Oklahoma counties without national forest lands range from less than 8 persons/ mi^2 in Pushmataha County to almost 84 persons/ mi^2 in Muskogee County. With the exception of Cole County (home of Jefferson City, Missouri's State capital) and its relatively dense concentration of more than 162 persons/ mi^2 , all nonmetropolitan study area counties in Missouri that lack national forest lands have population densities of less than 50 persons/ mi^2 .

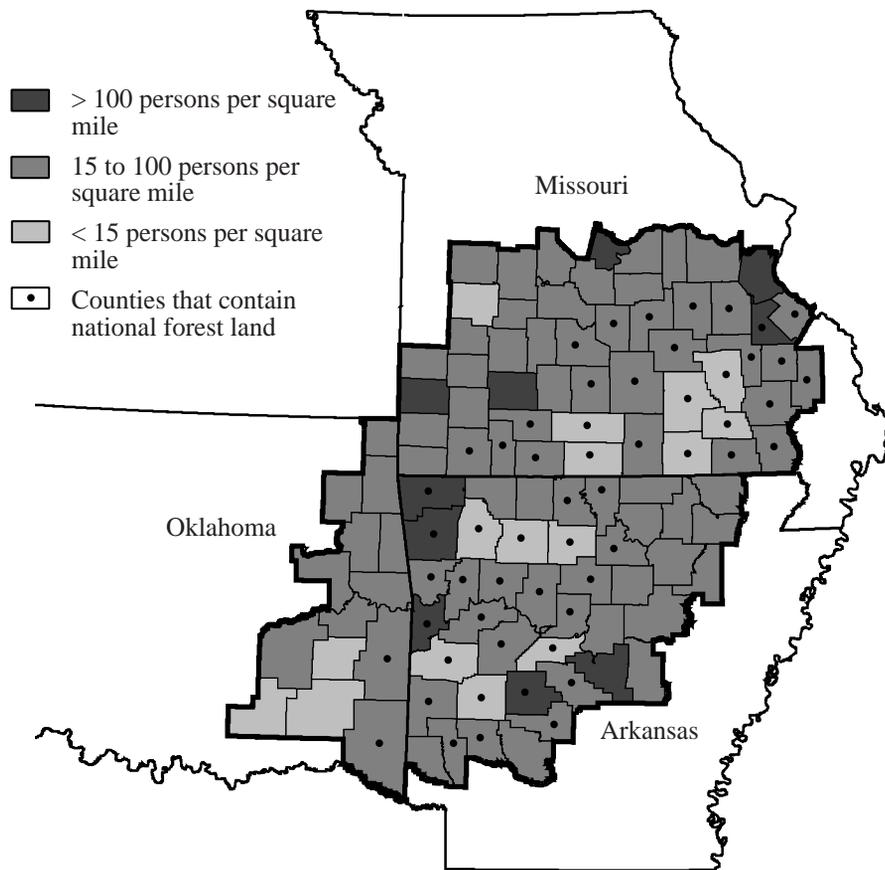


Figure 2.4—Population densities in the Assessment area, 1996 (USDC BC 1997a).

Population Growth, 1970 to 1996

The Assessment area grew by more than 1.2 million people between 1970 and 1996—a 48 percent growth rate (table 2.1). By comparison, Missouri, Arkansas, and Oklahoma grew 15, 31, and 29 percent, respectively, and the population of the Nation as a whole grew 31 percent during the same period. The most rapid growth was during the decade of the 1970's, especially in nonmetropolitan counties containing parts of the

Ozark National Forest and metropolitan counties containing national forest lands (35 percent growth or more) (fig. 2.5). Eight counties (Benton, Washington, Faulkner, and Lonoke Counties, AR, and Jasper, Newton, Christian, and Webster, MO) that are metropolitan today were nonmetropolitan in 1970. Le Flore County, OK, on the other hand, was listed as part of the Fort Smith standard metropolitan statistical area (SMSA) in 1970 but as a nonmetropolitan county in 1990. These changes are summarized in the tabulation below:

Metropolitan areas, 1990	SMSA's, 1970
Fayetteville-Springdale-Rogers Benton County, AR Washington County, AR	
Fort Smith Crawford County, AR Sebastian County, AR Sequoyah County, OK	Fort Smith Crawford County, AR Sebastian County, AR Sequoyah County, OK Le Flore County, OK
Joplin Jasper County, MO Newton County, MO	
Little Rock-North Little Rock Pulaski County, AR Saline County, AR Faulkner County, AR Lonoke County, AR	Little Rock-North Little Rock Pulaski County, AR Saline County, AR
Springfield Christian County, MO Greene County, MO Webster County, MO	Springfield Greene County, MO
St. Louis (portion within Assessment area) Franklin County, MO Jefferson County, MO	St. Louis (portion within Assessment area) Franklin County, MO Jefferson County, MO

Some of the nonmetropolitan counties that grew most rapidly from 1970 to 1996 (fig. 2.6) are home to well-established tourist attractions. Baxter County, AR (which includes the recreation and retirement community of Mountain Home), for example, grew by more than 137 percent during this period. Similarly, Stone and Taney Counties in Missouri (home to the tourism community of Branson) grew by 161 and 155 percent,

respectively, during the same period. Although much of this population growth occurred during the 1970's, these counties continue to be among the most rapidly growing in the three States. Other more rural counties—such as Lawrence, Jackson, and Searcy Counties, AR, and Ottawa County, OK—grew during the 1970's but lost population during the 1980's and 1990's. Pulaski County, MO, lost population during the past 25 years.

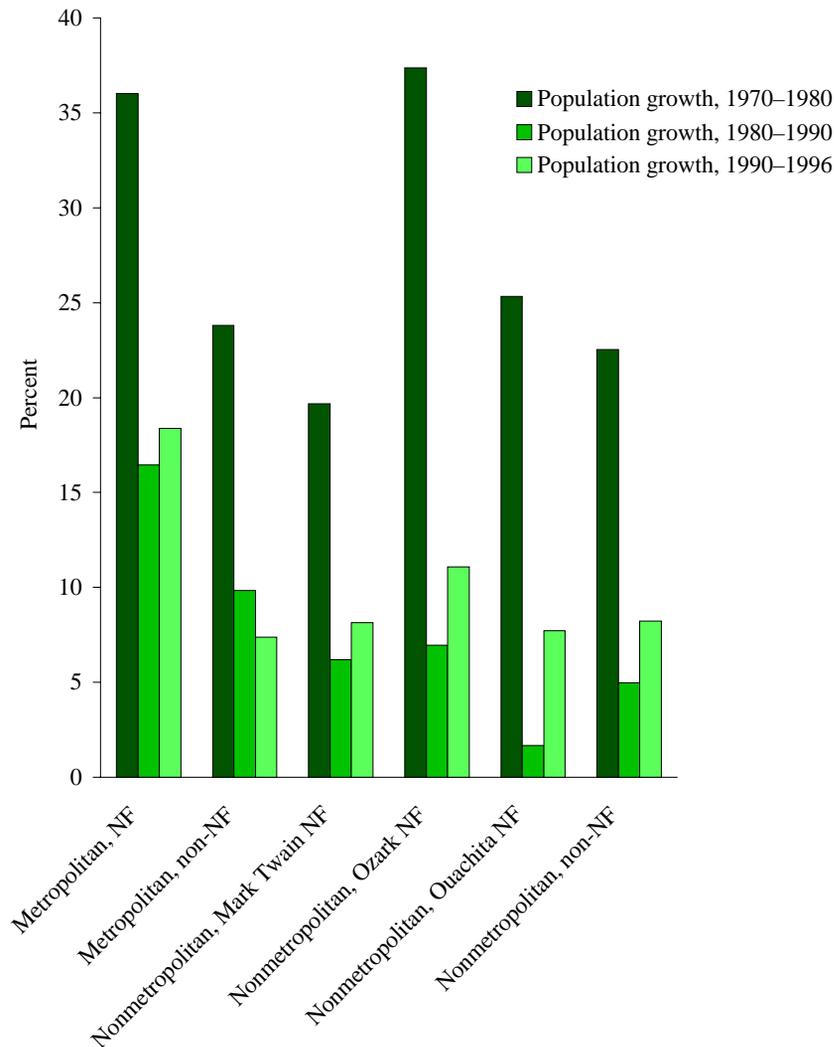


Figure 2.5—Population growth in the Assessment area, 1970 to 1996 (USDA FS SR 1996, USDC BC 1997a).

Between 1990 and 1996, many metropolitan counties in the Ozark-Ouachita Highlands continued to grow considerably faster than the States of Arkansas, Missouri, and Oklahoma (table 2.2) and the Nation as a whole (all with a population growth of 7 percent or less). Metropolitan counties containing parts of the Ozark or Mark Twain National Forest grew 22 and 36 percent, respectively (on average), while metropolitan counties with Ouachita National Forest lands grew by 10 percent, on average. Population growth rates in nonmetropolitan counties in the Assessment area also exceeded State and national rates during the 1990's, but less dramatically; for example, nonmetropolitan counties

with Ozark National Forest lands grew 11 percent between 1990 and 1996.

Based on Bureau of the Census estimates of population growth from 1990 to 1996 in cities of 10,000 or more people (USDC BC 1997b), it appears that the 12 fastest-growing cities in Arkansas (with estimated growth ranging from 16 to 56 percent) are all within the Highlands. In Missouri and Oklahoma, however, the most rapid population growth is not taking place in the heart of the Highlands but on the fringes (e.g., greater St. Louis, Kansas City, Tulsa) or even further away (Oklahoma City).

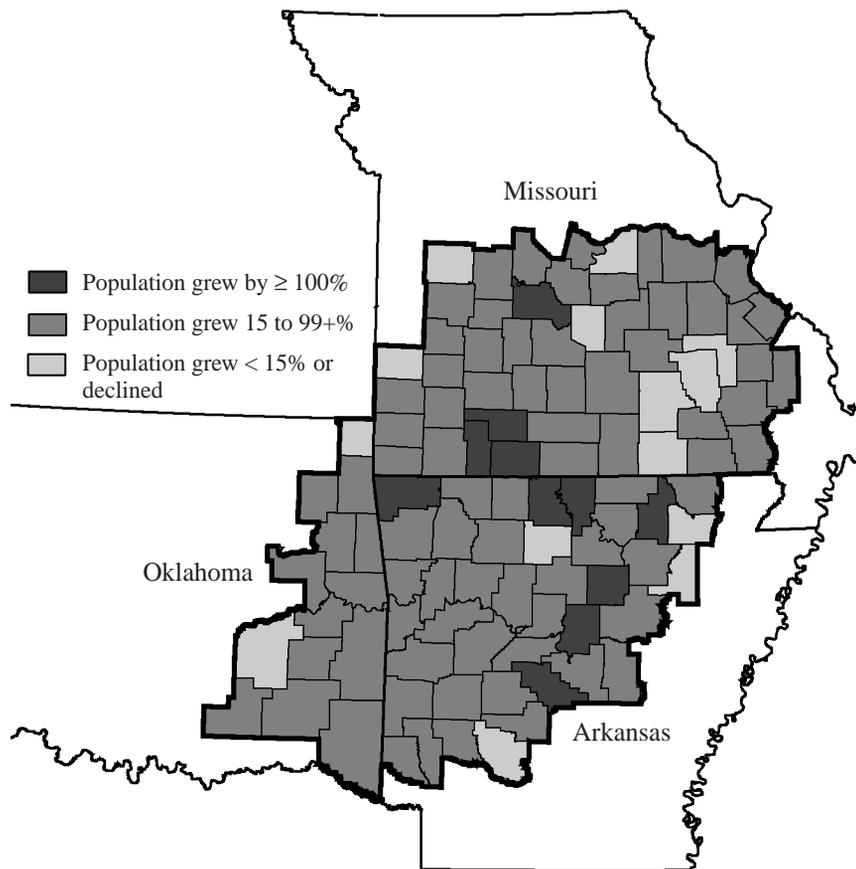


Figure 2.6—Population changes in Assessment area counties, 1970 to 1996 (USDA FS SR 1996, USDC BC 1997a).

Nearly 80 percent of the recent (1990 to 1996) estimated population growth in the area was due to net in-migration (more people moving into the area than moving out) (table 2.2). Natural increase (more births than deaths) accounted for about 20 percent of the growth (2.1 percent of the Assessment area total population growth of 9.4 percent) (fig. 2.7). These numbers are especially remarkable when compared to the relative importance of net migration versus natural increase to the population growth in Missouri and Oklahoma, where natural increases contributed to well over half of their recent population growth.

In-migration of new residents during the 1990's contributed 98 percent of the growth in nonmetropolitan counties with Ozark National Forest lands (the population of which grew 11 percent), 95 percent of the growth in nonmetropolitan counties containing parts of

the Ouachita National Forest (8 percent growth), 93 percent of the growth in nonmetropolitan Assessment area counties with no national forest lands (8 percent growth), and 83 percent of the growth in the nonmetropolitan "Mark Twain counties" (also 8 percent growth). The contribution of net in-migration to the population growth was nearly as high (81 and 86 percent, respectively) in metropolitan counties with Ozark or Mark Twain National Forest lands (which grew by 22 and 36 percent, respectively).

Thirty-five counties in the Assessment area (15 with and 20 without national forest lands) lost population due to natural decrease (number of deaths exceeded number of births). Most of these counties more than made up for the losses by drawing migrants from other counties. For example, Baxter and Marion Counties in northern Arkansas had more deaths than births, but they

Table 2.2—Sources of recent (1990–1996) population growth in the Assessment area

Geographic area	Population growth	Net in-migration ^a	Natural increase ^b
	----- Percent ^c -----		
Counties with NF			
Metropolitan	19	15	4
Mark Twain NF	36	31	5
Ozark NF	22	18	4
Ouachita NF	10	7	3
Nonmetropolitan	9	8	1
Mark Twain NF	8	7	1
Ozark NF	11	11	< 1
Ouachita NF	8	7	1
Counties without NF			
Metropolitan	7	4	4
Nonmetropolitan	8	8	1
Assessment area	9	7	2
States			
Arkansas	7	4	2
Missouri	5	2	3
Oklahoma	5	2	3

NF = national forest.

^a Net gain due to movement of people moving into the region.

^b Rate at which births exceed deaths.

^c Percentages were rounded to the nearest whole number.

Source: USDC BC (1993, 1997a).

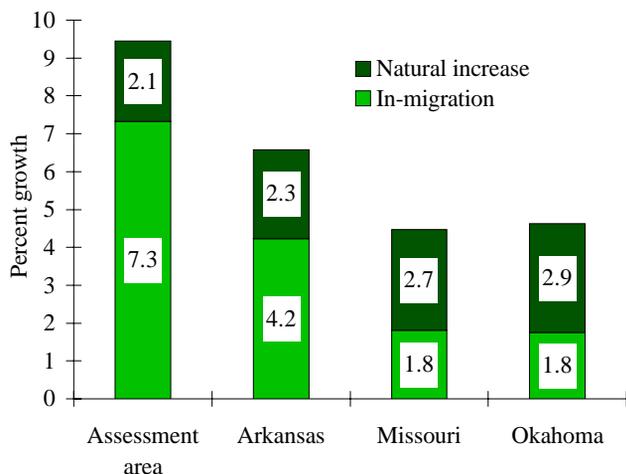


Figure 2.7—Population growth in the Assessment area and three States due to natural increase and in-migration, 1990 to 1996 (USDC BC 1993, 1997a).

also experienced high rates of in-migration, resulting in some of the highest population growth rates in the region. Since many of the new residents are older people (with much lower fertility rates and higher death rates), future population growth in these counties in all likelihood will continue to depend upon in-migration.

Five counties in the Assessment area experienced net out-migration (more people left during the 1990's than migrated in). Natural population increase (more births than deaths) took place in two of these counties (Pulaski, AR, and Pulaski, MO), but only Pulaski County, AR, experienced enough natural increase to result in net population growth. Despite a 7 percent natural increase in population, out-migration from Pulaski County, MO, resulted in the loss of almost 30 percent of the county's population. The remaining three counties (Latimer and Ottawa Counties, OK, and Jackson County, AR) experienced population losses due to both out-migration and natural decrease.

Projected Population Change, 1996 to 2010

The population of the Assessment area is projected to grow by 17 percent (623,000 people) between 1996 and 2010 (table 2.1). This growth rate is much higher than that projected for any of the three States (10 percent for Oklahoma, 2 or 3 percent for the other two States). Counties with national forest lands, on average, are projected to have population increases of 19 percent during this period, while those counties without national forest lands, on average, should grow by 15 percent. In general, metropolitan counties are expected to grow at a faster rate than nonmetropolitan counties. However, nonmetropolitan counties that include lands of the Ozark National Forest are projected to grow by 33 percent during this period, which is significantly higher than the average for either metropolitan or nonmetropolitan counties.

Projections for Baxter, Cleburne, Faulkner, Marion, and Sharp Counties in Arkansas and Christian County in Missouri suggest that these counties will have exceptionally high rates of population increase (averaging 3 to 5 percent per year through 2010). Some counties are projected to decline in population, including Haskell County in Oklahoma and Cent, Maries, Oregon, Osage, and Reynolds Counties in Missouri.

Land Use Patterns

Almost half of the land in the Assessment area counties is forested. (Approximately 64 percent of the Highlands proper is forested; see the companion technical report *Ozark-Ouachita Highlands Assessment: Terrestrial Vegetation and Wildlife* (USDA FS 1999b).) Privately owned forests (both industrial and nonindustrial) cover 39 percent of the land, and publicly owned forests occupy another 10 percent (table 2.3). Thirteen counties, all nonmetropolitan and all containing national forest lands, have more than 75 percent forest cover. Perry and Montgomery Counties, AR, and Reynolds County, MO, each have more than 80 percent forest cover. Forest cover generally is higher in nonmetropolitan counties than metropolitan counties and is especially high in those nonmetropolitan counties that

include parts of the Ouachita National Forest. Interestingly, nonmetropolitan counties with national forest lands have a greater percentage of privately owned forested acres, on average, than nonmetropolitan counties that lack national forest lands—43 versus 38 percent.

Crops and pastures occupy about 38 percent of the land in the Assessment area. Farm acreage accounts for a significantly greater percentage of land use in Missouri as a whole (57 percent), but Arkansas and Oklahoma (both at 40 percent) are roughly identical to the Assessment area. Crops and pastures occupy more than half of the surface in 27 percent of the Assessment area counties, including prominent blocks along the eastern edge of the Highlands (most of these counties have more land in the Mississippi Alluvial Plain than in the Highlands) and in southwestern Missouri (fig. 2.8). These land uses occupy less than one-quarter of the

Table 2.3—Land use in the Assessment area, 1992

Geographic area	Crops and pastures	Range-lands	Private forests	National forests	Other public forests	Other Federal lands	Water	Roads and railroads	Urban areas	Miscellaneous
----- Percent ^a -----										
Counties with NF										
Metropolitan	37	0	38	9	1	3	2	2	6	2
Mark Twain NF	47	0	29	14	3	0	0	2	4	1
Ozark NF	45	0	34	7	0	1	3	2	5	2
Ouachita NF	19	2	49	8	1	8	2	2	9	2
Nonmetropolitan	30	1	43	17	2	3	2	1	2	1
Mark Twain NF	36	1	42	12	2	2	1	2	2	1
Ozark NF	27	1	41	19	1	4	3	1	2	1
Ouachita NF	21	0	45	24	0	2	3	1	2	1
Counties without NF										
Metropolitan	49	0	30	0	2	1	3	2	8	5
Nonmetropolitan	47	3	38	0	1	2	3	2	2	3
Assessment area	38	1	39	9	1	2	3	2	2	2
States										
Arkansas	40	0	41	7	1	2	3	2	2	2
Missouri	57	0	25	3	1	1	2	2	3	5
Oklahoma	40	31	15	1	1	2	3	2	2	4

NF = national forest.

^a Some row totals do not equal 100 due to rounding.

Source: USDA NRCS (1992).

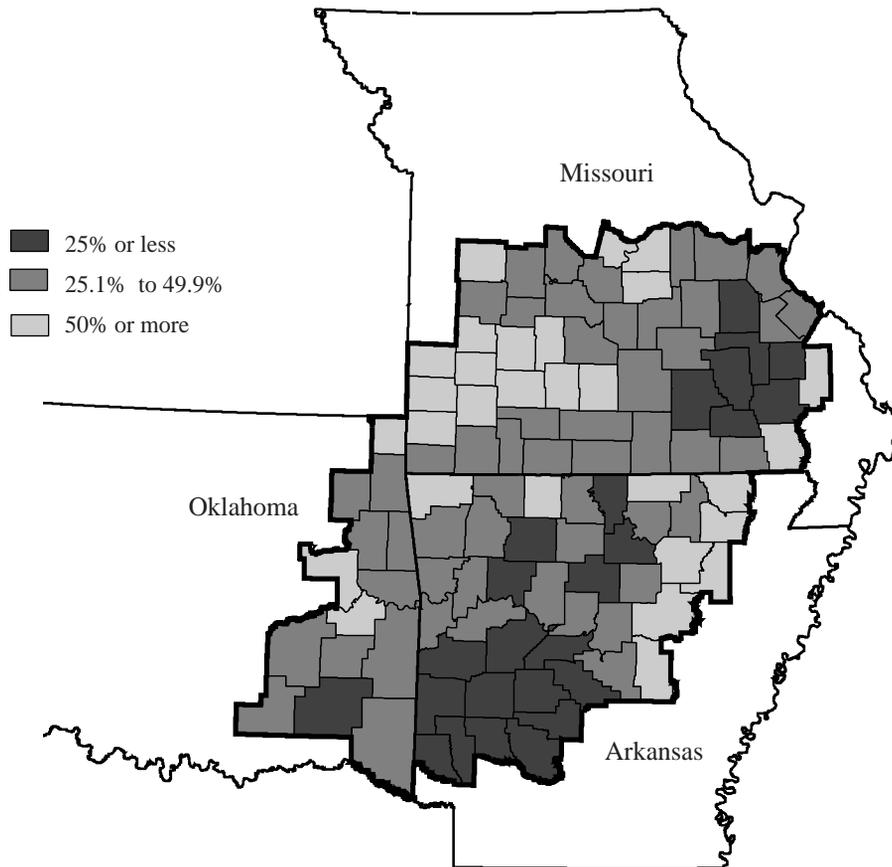


Figure 2.8—Farmland use as a percent of total acreage, 1990 (USDA NRCS 1992).

surface area in 23 percent of the counties, including large blocks of counties in the Ouachita Mountains and eastern Missouri Ozarks. Farmlands account for approximately 25 to 50 percent of the land use in the remaining counties (nearly half of the total).

Not surprisingly, “farmland” is a significantly larger land use in nonmetropolitan counties that have no national forest lands than in those that do: 47 percent of total acreage in counties with no national forest lands is in crops and pastures, compared to 36 percent in “Mark Twain” counties, 27 percent in “Ozark” counties, and 21 percent in “Ouachita” counties (table 2.3). Crops and pastures make up more than 85 percent of Jackson County, AR, on the eastern edge of the Assessment area (and containing very little land in the Highlands). In sharp contrast, Montgomery County, AR, where the

Ouachita National Forest occupies more than 63 percent of the land, has crops and pastures on less than 9 percent of the land.

Lakes and streams occupy less than 3 percent of the Assessment area. Water covers more than 5 percent of the surface in 17 counties, and more than 10 percent in 2 of these—Garland County, AR, and Stone County, MO.

Urban areas account for about 2 percent of the total land use in the Assessment area. Five counties, including nonmetropolitan Garland County, have urban areas that occupy more than 10 percent of their total acreage. Six counties (Fulton, Howard, Newton, and Perry, AR, and Dent and St. Clair, MO) have urban areas on less than 0.1 percent of the total county area.

Characteristics of the Population

In this section, data from the *1990 Census of Population and Housing: Summary Tape File 3C* (USDC BC 1993) show that the population of the Assessment area was older and less racially or ethnically diverse than the three States and had completed fewer years of schooling than the average U.S. resident. Data from earlier censuses (USDA FS SR 1996) show that between 1970 and 1990, the area's population aged slightly and became significantly better educated. The area also became slightly more diverse in its racial-ethnic composition.

Age

When compared to the three States, the Assessment area population is slightly older, with more people ages 45 and older and a higher median age (table 2.4). Within the region, residents in nonmetropolitan counties tend to be slightly older than residents of metropolitan counties, regardless of whether or not the counties contain national forest lands. For example, the median age of the population living in the seven metropolitan counties containing national forest lands (33.2) is 3 to 5 years less than the median ages of residents of nonmetropolitan counties containing national forest land. Metropolitan counties with no national forest lands also have

Table 2.4—Age characteristics of the population in the Assessment area, 1990

Geographic area	Less than age 20	Ages 20 to 44	Ages 45 to 64	Ages 65 and older	Median age	Dependency ratio ^a	Change in population age 65+ 1970–90
	----- Percent of population ^b -----				Years		Percent
Counties with NF							
Metropolitan	29	38	19	13	33.2	0.69	17
Mark Twain NF	31	39	19	11	32.6	0.70	-15
Ozark NF	29	38	19	14	33.1	0.70	17
Ouachita NF	29	38	20	13	33.6	0.69	22
Nonmetropolitan	28	33	21	17	36.8	0.79	18
Mark Twain NF	29	34	21	16	36.3	0.78	19
Ozark NF	27	33	21	19	38.3	0.80	21
Ouachita NF	28	33	21	18	36.4	0.81	12
Counties without NF							
Metropolitan	30	40	18	12	32.5	0.67	15
Nonmetropolitan	28	33	21	17	37.5	0.79	13
Assessment area	29	36	20	15	36.4	0.74	15
States							
Arkansas	30	36	19	15	35.7	0.75	20
Missouri	29	38	19	14	36.0	0.70	17
Oklahoma	30	38	19	13	35.5	0.71	15

NF = national forest.

^a Derived by dividing the number of people most likely to be dependent (those under age 19 plus those older than age 64) by the number of people in the working age population (ages 19 through 64); provides estimate of number of dependents per worker.

^b Some row totals do not equal 100 due to rounding.

Source: USDC BC (1993), USDA FS SR (1996).

younger populations (median age 32.5 years compared to 37.5 years in nonmetropolitan counties).

The age structure of various groupings of nonmetropolitan counties in the region varies little. Children under age 20 make up 28 percent of the population. Working-aged adults 20 to 44 make up one-third, older working-aged adults 45 to 64 comprise 21 percent, and older residents (age 65 and over) represent about 17 percent of the population, regardless of the presence of national forest lands (fig. 2.9 and table 2.4).

Some Assessment area counties have relatively young or relatively old populations (fig. 2.10). In four nonmetropolitan counties (Baxter, Sharp, and Izard Counties, AR, and Hickory County, MO), residents age 65 and older make up more than one-quarter (26 to 29 percent) of the population. At the other extreme, children under 20 make up at least a third of the population in four other nonmetropolitan counties—Pulaski, MO (35 percent), Washington, MO (33 percent), Adair, OK (34 percent), and McCurtain, OK (33 percent).

Another way to measure differences in the age structure of the Highlands counties is to compare the number of working-aged adults (people 20 to 64) with the number of children and older adults. This measure is known as the “dependency ratio” because it roughly indicates the likelihood that working-aged adults will be caring for children or aging parents or both. The region’s dependency ratio of 0.74 indicates that for every 100 working-aged adults, there are 74 people (children and/or older residents) who are not likely to be in the labor force. Dependency ratios are somewhat lower in Missouri and Oklahoma. Nonmetropolitan counties have slightly higher dependency loads.

Between 1970 and 1990, the average age of the region’s population increased. Adults 65 and older represented 13 percent of the Assessment area population in 1970 but accounted for 15 percent by 1990. The growth of the elderly population was similar in Oklahoma but was greater in Arkansas (20 percent) and Missouri (17 percent). Within the Assessment area, counties

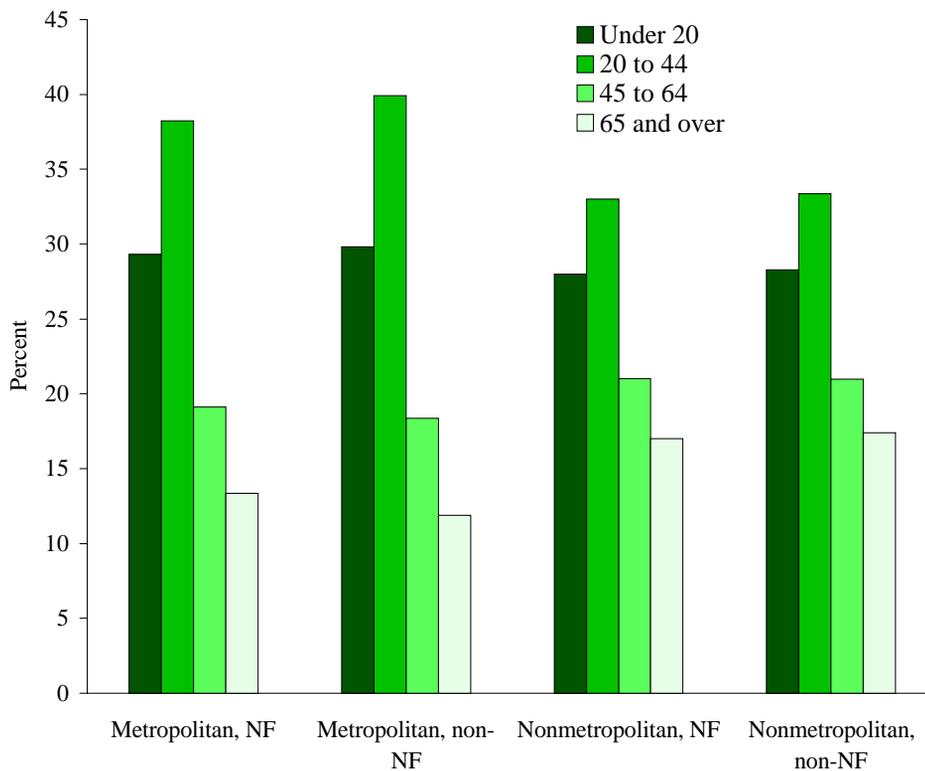


Figure 2.9—Age structure of the population in the Assessment area, 1990 (USDC BC 1993).

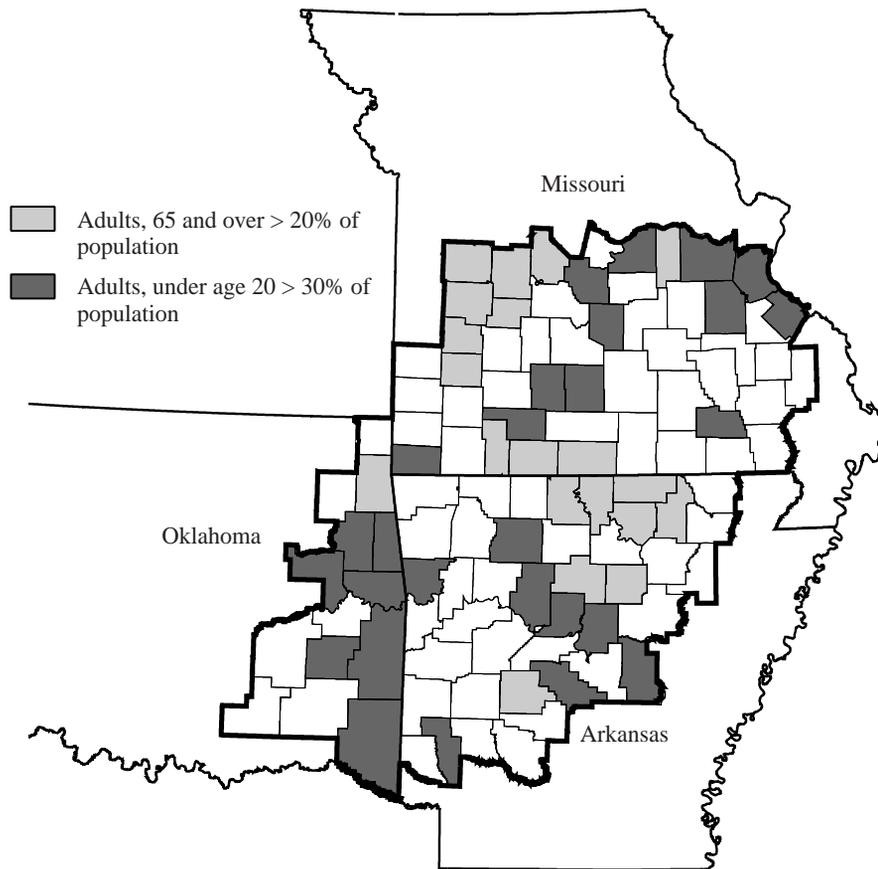


Figure 2.10—Assessment area counties with relatively young or relatively old populations, 1990 (USDC BC 1993). (Unshaded counties fit neither category.)

containing national forest lands generally experienced a larger percentage growth rate of older residents than did counties without national forest lands (table 2.4). The major exception was Christian County, MO, the only metropolitan “Mark Twain county,” which had a 15 percent decline in population. The greatest increases of older residents occurred in metropolitan counties containing Ouachita National Forest lands (22 percent) and in nonmetropolitan counties containing parts of the Mark Twain or Ozark National Forest (19 and 21 percent, respectively).

Race and Hispanic Origin

This section uses the same categories as those used by the U.S. Bureau of the Census during the 1990 census (the race categories of White, Black, American Indian and Alaska Native, and Asian and Pacific

Islander and the ethnicity categories of Hispanic and non-Hispanic). According to the Bureau of the Census (USDC BC 1999), “These classifications are not intended to be scientific in nature, but are designed to promote consistency in Federal record keeping and data presentation.” Participants in the U.S. Census are asked to identify the racial and Hispanic origin categories with which they identify. Individuals of Hispanic (or Latino) origin are included in each of the four racial categories.

In 1990, 91 percent of the people living in the Assessment area were White, representing a much higher proportion of residents than in Arkansas (82 percent), Missouri (87 percent), Oklahoma (81 percent), or the Nation as a whole (76 percent). Generally, racial composition tends to be more homogeneous in counties containing national forest lands than in the other Assessment area counties (table 2.5).

Table 2.5—Racial makeup of Assessment area residents and percent Hispanic-American, 1990

Geographic area	Racial category					Change in White population 1979–90 ^c
	White	Black	American Indian	Other American ^a	Hispanic-American ^b	
	----- <i>Percent of population^d</i> -----					<i>Percent</i>
Counties with NF						
Metropolitan	94	2	1	2	1	+2.2
Mark Twain NF	98	0	1	0	1	+1.0
Ozark NF	96	1	1	1	1	+2.3
Ouachita NF	92	4	1	3	1	+2.8
Nonmetropolitan	94	3	2	1	1	-1.1
Mark Twain NF	96	2	0	1	1	-1.3
Ozark NF	96	2	1	0	1	0.0
Ouachita NF	89	6	4	1	1	-1.7
Counties without NF						
Metropolitan	88	10	1	1	1	-2.7
Nonmetropolitan	89	3	7	1	1	-3.4
Assessment area	91	5	3	1	1	-2.3
States						
Arkansas	82	16	1	1	0	+1.6
Missouri	87	11	0	1	1	-2.0
Oklahoma	81	7	8	2	1	-7.9

NF = national forest.

^a Includes Asians and Pacific Islanders and several other racial categories included in the 1990 census data.

^b Hispanic-Americans can belong to any of the various racial categories; therefore, some row totals exceed 100.

^c Change in percent of total Assessment area population that Whites represent. Changes in other racial or ethnic categories are not shown because their populations are so small that they change little relative to the Assessment area population.

^d Rounded.

Source: USDC BC (1993), USDA FS SR (1996).

Among those counties that do contain national forest lands, those with Ouachita National Forest lands appear to have the greatest degree of racial diversity: together, American Indians and Black Americans make up 5 percent of the metropolitan population and 10 percent of the nonmetropolitan population in “Ouachita counties.” However, some of the nonmetropolitan “Ouachita counties” have very little diversity. The higher numbers of American Indians and Black Americans in the Ouachitas as a whole largely reflect the racial diversity of two southeastern Oklahoma counties (Le Flore and McCurtain) and three Arkansas counties (Hot Spring, Howard, and Garland—the first

two of which lie partially in the West Gulf Coastal Plain and contain less than 1,900 national forest ac) (fig. 2.11).

Although the population of the Assessment area grew rapidly between 1970 and 1990, its racial and ethnic composition changed very little. The White total declined slightly as a percentage of the population, from 93 percent in 1970 to 91 percent in 1990. Black American totals also declined slightly (5.3 percent in 1970 to 5.2 percent in 1990). Other groups grew from 1.4 percent of the Assessment area population in 1970 to 3.6 percent in 1990. Most of this growth occurred between 1970 and 1980.

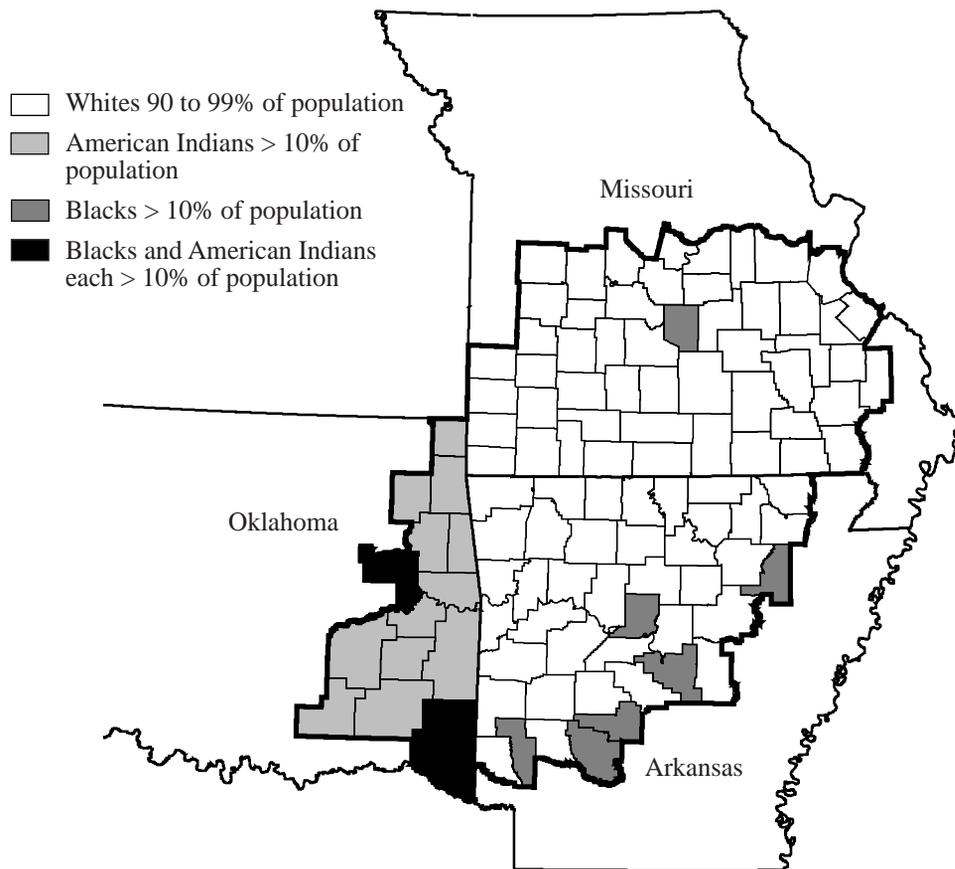


Figure 2.11—Racial composition of Assessment area counties, 1990 (USDC BC 1993).

There is evidence, however, that the ethnic diversity of the Assessment area increased in the 1990's. For example, the Bureau of the Census (USDC BC 1998a) estimates that the Assessment area Hispanic population grew 52 percent between 1990 and 1996. Arkansas apparently has the fastest Hispanic growth rate in the Nation (an estimated 127 percent between 1990 and 1997) (Green 1998). Finally, a special census of Washington County, AR, in 1996 showed a 435 percent growth in the Hispanic-American population between 1990 and 1996 (from 1,526 to 8,164 individuals) (USDC BC 1998b).

Households and Families

In 1990, the 3.8 million residents of the Assessment area lived in 1.3 million households. As shown on table 2.6, nearly three-fourths of these households consisted of "families"—defined by the Census Bureau as two or

more persons living in the same household who are related to the householder by birth, marriage, or adoption (USDC BC 1992). The remaining population lived alone or with nonrelatives.

Women are more likely than men to live alone in the Assessment area (15 percent of households consist of women living alone; 9 percent of households consist of men living alone). There is a possible correlation between the concentration of elderly population in a county and the percent of households represented by single women: 3 of the counties with the highest percentages of women living alone (Cedar, St. Clair, and Barton Counties, MO) are also among the 10 counties with the highest percentage of the population over age 64.

On average, families in the Assessment area contain three members. Average family size varies slightly across the region, and differences between the Assessment area and the three States are negligible (table 2.6). On average, family sizes are lower in the

Table 2.6—Household and family characteristics in the Assessment area

Geographic area	Household composition				Family composition				Average family size
	Families	Single males	Single females	Other	Married couples with children ^a	Single parents	Married couples without children ^a	Other	
-----Percent ^b -----									Members
Counties with NF									
Metropolitan	74	9	13	4	41	10	44	5	3.05
Mark Twain NF	80	7	11	3	44	9	43	4	3.07
Ozark NF	74	9	13	4	40	9	46	5	3.03
Ouachita NF	74	9	14	3	42	11	42	5	3.07
Nonmetropolitan	74	9	15	2	38	10	47	5	3.00
Mark Twain NF	74	8	15	3	39	10	46	5	3.01
Ozark NF	75	8	14	2	37	9	49	5	2.96
Ouachita NF	74	9	16	2	37	11	46	6	3.02
Counties without NF									
Metropolitan	72	9	15	4	40	12	41	6	3.11
Nonmetropolitan	73	9	16	2	38	10	47	5	2.98
Assessment area	73	9	15	3	39	11	45	6	3.06
States									
Arkansas	73	9	15	3	38	13	43	6	3.07
Missouri	70	10	16	4	38	12	42	6	3.02
Oklahoma	71	10	16	3	39	13	42	7	3.04

NF = national forest.

^a Children under 18 years of age.

^b Some row totals do not equal 100 due to rounding.

Source: USDC BC (1993).

nonmetropolitan counties with Ozark National Forest lands (2.96 members) and in nonmetropolitan counties without national forest lands (2.98 members). The largest average family sizes tend to be in metropolitan counties without national forest lands (3.11 members).

Families with children under age 18 (especially married couples with children) are somewhat more prevalent in metropolitan areas of the region. These metropolitan/nonmetropolitan differences are greatest in those counties with no national forest lands, although two of the counties with the highest percentages of families with children (Pulaski and Washington Counties, MO, at 63 and 57 percent, respectively) include parts of the Mark Twain National Forest. Neither of these counties is a typical “national forest county,” however. Pulaski County, MO, also contains a large military base,

and Washington County, MO, is an exurb of the St. Louis metropolitan area. Other nonmetropolitan counties with relatively large concentrations of families with children tend to be located on the outskirts of national forest lands in Oklahoma.

Education and Schooling

Adults living in the Assessment area tend to have somewhat less formal education than adults in Missouri or Oklahoma (table 2.7) and the Nation as a whole. As shown in table 2.7, 13 percent of Assessment area adults (25 years and older) had received at least a 4-year college degree as of 1990 compared to 18 percent of Missouri and Oklahoma adults and 20 percent of all adults in the Nation (USDC BC 1993).

Table 2.7—Educational characteristics of Assessment area adults 25 years and older, 1990 dropout rates, and percent increase from 1970 to 1990 of adults with college degrees

Geographic area	Less than high school diploma	High school diploma or GED	Some college/ associate's degree	Bachelor's or higher college degree	Dropout rate ^a	Increase in adults with college degrees, 1970–90
----- <i>Percent</i> ^b -----						
Counties with NF						
Metropolitan	28	34	24	15	11.1	103
Mark Twain NF	23	40	24	12	9.3	165
Ozark NF	28	33	23	16	11.0	86
Ouachita NF	28	34	25	14	11.5	110
Nonmetropolitan	37	35	18	10	12.9	97
Mark Twain NF	38	36	17	9	12.8	80
Ozark NF	36	34	19	11	12.1	135
Ouachita NF	37	34	19	10	13.7	106
Counties without NF						
Metropolitan	26	33	25	17	11.0	100
Nonmetropolitan	35	35	19	11	11.0	88
Assessment area	32	34	21	13	11.6	94
States						
Arkansas	34	33	20	13	11.4	97
Missouri	26	33	23	18	11.4	85
Oklahoma	26	31	26	18	10.5	80

GED = General Educational Development; NF = national forest.

^a Percent of all individuals 16 to 19 years of age who were not enrolled in school and were not high school graduates in 1990.

^b Some row totals (of first 4 columns) do not equal 100 due to rounding.

Sources: USDC BC (1993), USDA FS SR (1996).

As is typical throughout the United States, adults living in metropolitan areas within the Assessment area are more likely to be college educated than adult residents of nonmetropolitan areas (fig. 2.12 and table 2.7). Seventeen percent of the residents of metropolitan counties without national forest lands had completed at least a 4-year college program, followed by 15 percent of residents of metropolitan counties with national forest lands, 11 percent of residents of nonmetropolitan counties with no national forest land, and 10 percent of residents of nonmetropolitan counties with national forest lands.

Not surprisingly, counties with the most educated populations are home to 4-year colleges—Pulaski County, AR; Cole and Greene Counties, MO; and Cherokee County, OK, have 21 to 24 percent college-educated populations. Pulaski County, AR, and Cole

County, MO, are also home to State capitals. At the other end of the spectrum, 45 percent or more of the adults in 14 nonmetropolitan counties have not completed high school (fig. 2.13). Twelve of these counties lie along the eastern edge of the Assessment area, near or partially within the Mississippi Alluvial Plain (sometimes referred to as the “Delta”).

The geographic pattern of low-education levels shown in figure 2.13 does not appear to correspond to the presence of large elderly populations, even though educational attainments tend to be less in older populations. Nor does the pattern correspond to the presence or absence of national forest lands in Arkansas or Oklahoma. The geographic distribution of lower educational levels does seem to overlap with the presence of national forest lands in Missouri, however.

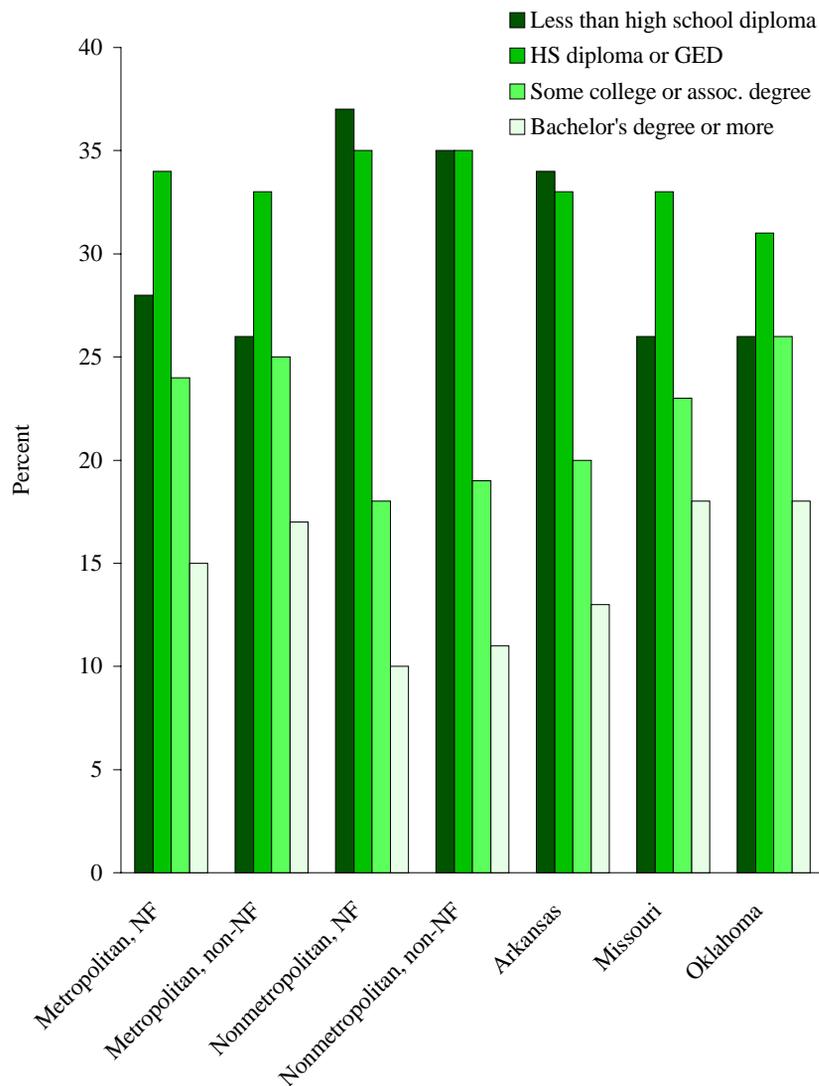


Figure 2.12—Educational achievements of adults (25 years and older) in Assessment area counties and three States, 1990 (USDC BC 1993).

The dropout rates of teenagers (16 to 19 years old) provide another perspective on the educational achievements of Assessment area residents. Dropout rates were approximately the same in the Assessment area as they were in Arkansas, Missouri, and Oklahoma, ranging from 11.6 percent in the Assessment area to 10.5 percent in the State of Oklahoma (table 2.7). Metropolitan counties as a whole and nonmetropolitan counties without national forest lands had identical dropout rates (11 percent). Teenagers in nonmetropolitan counties that contain national forest lands, where

the average dropout rate was nearly 13 percent, were somewhat more likely to drop out of high school than those in any other category.

There is little if any correlation between dropout rates among teenagers and schooling completion rates of adults. Of the 14 counties where more than 45 percent of the adult population had not completed high school, only 3 had dropout rates above 5 percent. Garland County, AR, had a relatively high dropout rate (over 15 percent) and a relatively high percentage of college-educated adults (14 percent). One hypothesis is

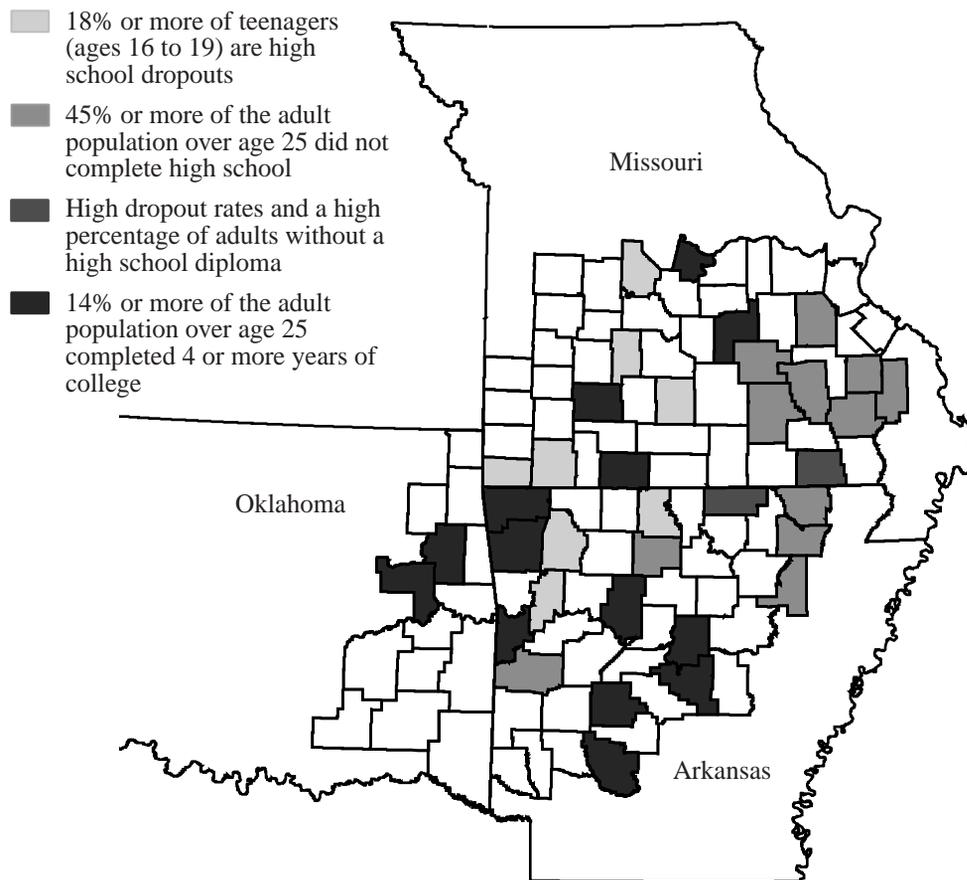


Figure 2.13—Counties in which residents have relatively high or relatively low educational achievements, 1990 (third category represents combination of first two; unshaded counties fit none of the categories) (USDC BC 1993).

that teenagers are more likely to drop out of school in areas where low-skill employment opportunities abound. This hypothesis is supported by the relatively high dropout rates in nonmetropolitan counties near growing cities in northwestern Arkansas and southwestern Missouri (fig. 2.13).

The number of adults in the Assessment area with a college education rose between 1970 and 1990 (table

2.7). Comparing numbers of adults with college degrees in 1990 versus 1970 shows that percentage increases were substantial in all types of counties, but tended to be greatest in metropolitan areas. However, nonmetropolitan “Ozark National Forest counties” had a greater relative increase in population with college degrees (135 percent) than did the metropolitan “Ozark National Forest counties” (86 percent).

Predominant Means of Making a Living

The primary means by which individuals make a living in almost any region is through employment in the labor force. This section uses data from the *1990 Census of Population and Housing: Summary Tape File 3C* (USDA BC 1993) and the *Regional Economic Information System: 1969 to 1994* (USDC BEA 1996) to examine labor market participation patterns in Assessment area counties. The authors employ a variety of measures to describe the extent and type of labor market participation in 1990, as well as the kinds of industries and occupations found in the local labor market. The section then reports on other important means of making a living within Assessment area counties, including retirement incomes, governmental assistance, and land ownership using data from USDA BC (1993) and USDA NRCS (1992).

When compared to national patterns, these data display higher unemployment rates, more part-time and/or seasonal work, and more self-employment among Assessment area workers. Assessment area employees were more likely to be employed in farming or manufacturing industries and less likely to be employed in white-collar occupations. These data also indicate a weaker reliance on labor markets as a source of aggregate county income and a stronger reliance on social security and other retirement incomes. County-by-county comparisons within the Assessment area reveal clusters of counties where these differences are even greater.

Extent of Labor Market Participation, 1990

In 1990, the Assessment area had higher unemployment rates than Missouri or Oklahoma (table 2.8) and the Nation (7.4 percent, 6.5 percent, 6.1 percent, and

Table 2.8—Unemployment rate and extent and type of labor force participation in the Assessment area, 1990

Geographic area	Unem- ployment rate	Extent of work				Class of worker			
		Full-time, full year	Full-time, part-year	Part-time, full-year	Part-time, part-year	Private wage/ salary	Self- employed	Govern- ment	Unpaid family worker
----- Percent ^a -----									
Counties with NF									
Metropolitan	5.7	60	19	7	13	80	8	12	1
Mark Twain	5.8	60	19	8	13	79	11	10	1
Ozark	5.3	59	20	7	14	79	9	11	1
Ouachita	6.3	63	18	7	12	81	6	12	0
Nonmetropolitan	7.8	54	25	8	14	72	12	14	1
Mark Twain	8.2	53	25	8	14	72	12	15	1
Ozark	7.4	54	24	8	14	73	13	13	1
Ouachita	7.3	55	24	8	13	73	11	14	1
Counties without NF									
Metropolitan	6.8	59	19	8	14	79	7	14	0
Nonmetropolitan	7.2	55	24	8	14	70	12	17	1
Assessment area	7.4	57	22	8	14	75	10	14	1
States									
Arkansas	7.7	58	22	7	13	75	9	15	1
Missouri	6.5	59	19	9	14	78	8	13	1
Oklahoma	6.1	57	21	8	14	72	9	18	1

NF = national forest.

^a Some row totals for extent of work and class of worker do not equal 100 due to rounding.

Source: USDC BC (1993).

6.3 percent, respectively). By 1994, the unemployment rate in the Assessment area had dropped to 6.3 percent (USDC BC 1997a) but was still slightly higher than the national rate of 6.1 percent (USDC BC 1997d).

Unemployment rates and part-time or seasonal work rates were higher in nonmetropolitan counties and highest of all in nonmetropolitan counties with Mark Twain National Forest lands (where the average was 8.2 percent). Workers in nonmetropolitan “Mark Twain” counties were also the least likely to be employed in full-time, year-round jobs (53 percent worked full-time, full-year, 4 percentage points less than the average for Assessment area nonmetropolitan counties). Counties with the highest unemployment rates were most con-

centrated along the eastern edge of the study area and in southeastern Oklahoma.

High unemployment combined with large numbers of seasonal or part-time jobs can indicate a serious lack of good employment opportunities. In addition to having some of the highest unemployment rates in the region (historically 9 percent or more), Washington, Wayne, and Taney Counties, MO; Van Buren County, AR; and Haskell and Latimer Counties, OK, also had more than half of their work force employed in seasonal and/or part-time jobs, suggesting areas where large numbers of workers (and potential workers) may be struggling to make ends meet (darkest shaded counties in fig. 2.14).

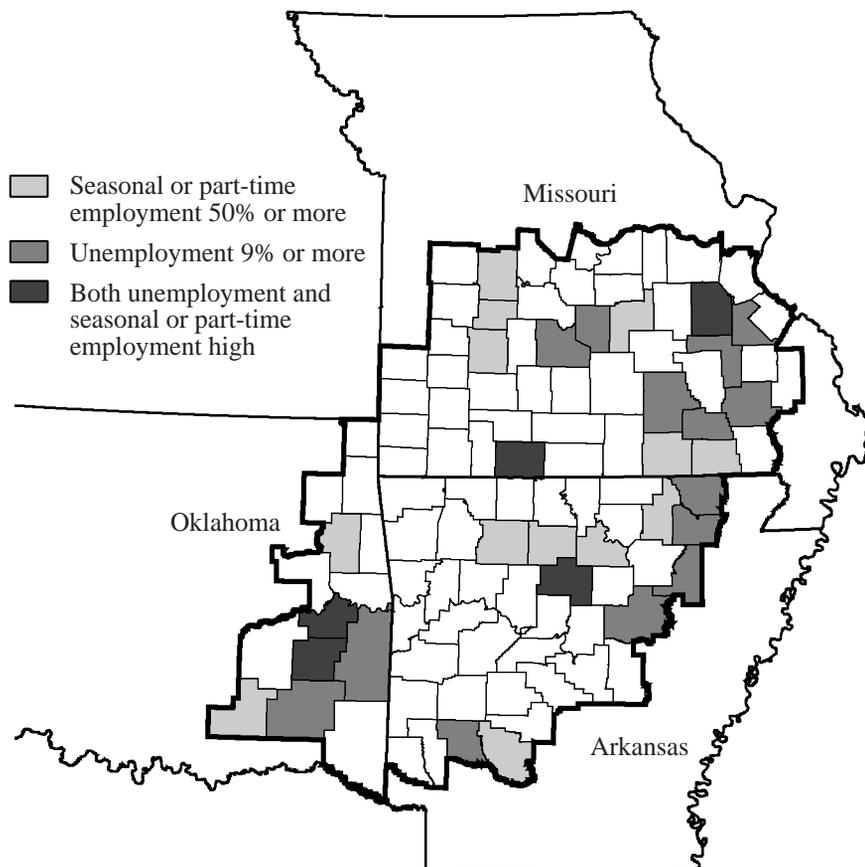


Figure 2.14—Unemployment and seasonal employment patterns in Assessment area counties, 1990 (third category represents the combination of the first two; unshaded counties fit none of the categories) (USDC BC 1993).

Types of Jobs

There are two usual ways to describe types of jobs in an area: by industrial sectors and by occupations.

Researchers use industrial sectors to classify commercial establishments, governmental agencies, and other entities according to the commodities produced or the services provided. Often, they also use a set of occupational categories to summarize the kinds of activities that workers do on a regular basis.

The two different indicators of the types of jobs in an area are somewhat independent. For example, a paper mill (in the industrial sector called “manufacturing”) may employ workers in a variety of occupations, including perhaps a manager, a secretary, an accountant, several machine operators, and a custodian. At the same time, many of these occupations may also be found in an establishment within the retail trade industry. In general, larger establishments tend to make use of a wider variety of occupations, while smaller businesses tend to combine multiple work activities into a single employee’s job description.

At times, the labels of the industrial sectors and the occupational categories seem identical when they actually differ in important ways, which can be confusing. For example, the industrial “service sector” includes businesses or firms that provide a service (or services), whereas the occupational category called “services” refers to workers who actually provide a service, regardless of what kind of business they work in. Likewise, the industrial sectors distinguish between “farming” establishments and establishments involved in “agricultural services/forestry/fishery.” In contrast, the occupational category of “outdoor jobs” combines farming with forestry and fishing occupations.

Industrial Sectors

In this section, the authors examine the distribution of workers across the following 12 industrial sectors (see U.S. OMB 1987 for a complete listing of the industries included in each sector):

- Farming—includes establishments primarily engaged in the commercial production of crops or livestock (e.g., farms, orchards, greenhouses, dairies, ranches, feedlots, and broiler facilities).
- Agricultural services/forestry/fisheries—includes establishments primarily engaged in providing soil preparation services, veterinary services, and landscape and horticultural services. The sector also includes establishments primarily engaged in the operation of timber tracts, tree farms, forest nurseries, the gathering of forest products, commercial fishing, fish hatcheries, hunting, trapping, and game propagation.
- Mining—includes establishments primarily engaged in the extraction of naturally occurring minerals (solid, liquid, or gas) as well as establishments involved in the exploration and development of mineral properties.
- Construction—includes establishments primarily engaged in the construction of residential, farm, industrial, commercial or other buildings, heavy construction other than buildings (such as highways, streets, bridges, and sewers), and special trade contractors (such as masonry, carpentry, roofing, siding, electrical, plumbing, and heating and air-conditioning).
- Manufacturing—includes establishments (usually referred to as plants, factories, mills, and so forth) engaged in the mechanical or chemical transformation of materials or substances into new products: manufacturers of food and kindred products (e.g., meat packing plants), textile mill products (e.g., cotton fabric mills), apparel and other textile products (e.g., blue jeans manufacturers), lumber and wood products (e.g., sawmills), furniture and fixtures, paper and allied products (e.g., paper mills), printing and publishing (e.g., newspaper companies), chemicals and allied products (e.g., fertilizer plants), petroleum and coal products (e.g., refineries), rubber and miscellaneous plastic products (e.g., tire factories), leather and leather products (e.g., shoe factories), stone, clay, and glass products (e.g., concrete companies), primary metal products (e.g., steel mills), fabricated metal products (e.g., makers of metal cans or barrels), industrial machinery and equipment (e.g., makers of internal combustion engines), electronic and other electric equipment (e.g., semiconductor assembly plants), transportation equipment (e.g., automobile makers), and instruments (e.g., manufacturers of surgical and medical instruments).

- Transportation and public utilities—includes businesses that provide transportation, communication services, or electricity, gas, steam, water, or sanitary services.
- Wholesale trade—includes establishments primarily engaged in selling merchandise to retailers, industrial or commercial users, or other wholesalers.
- Retail trade—includes establishments primarily engaged in selling merchandise for personal or household consumption.
- Finance/insurance/real estate—includes depository institutions, credit companies, investment companies, and insurance and real estate agencies.
- Services—includes hotels and other lodging places, establishments providing personal services (e.g., dry cleaners, beauty shops, shoe repair shops), business services (e.g., advertising agencies, data processing), repair services (e.g., auto body shops and television

repair), amusement and recreation services (e.g., movie theaters and golf courses), health services (e.g., hospitals and dental laboratories), legal services, engineering and other professional services, educational institutions, and membership organizations.

- Federal Government—includes both civilian and military agencies of the Federal Government.
- State and local government—includes all State and local governmental agencies and offices.

The Regional Economic Information System, part of the USDC Bureau of Economic Analysis, annually provides information about employment in these 12 industrial sectors for all counties in the United States. These data offer a look at the relative importance of different types of economic activities in the Assessment area (table 2.9). Chapter 4 of this report provides additional information about the economic effects of

Table 2.9—Assessment area employment in 12 industrial sectors, 1994^a

Geographic area	Farming	Agric. services, forestry, fishery	Mining	Construction	Manufacturing	Transportation/public utilities	Wholesale trade	Retail trade	Finance, insurance, real estate	Services	Federal Govt. civilian and military	State and local govt.
----- Percent ^b -----												
Counties with NF												
Metropolitan	4	1	1	5	23	6	3	18	5	22	2	10
Mark Twain NF	7	1	0	7	17	3	3	17	5	23	2	13
Ozark NF	5	1	0	5	23	7	3	19	5	19	2	10
Ouachita NF	1	0	2	5	26	5	4	16	5	25	3	8
Nonmetropolitan	10	1	1	6	19	4	2	16	4	20	6	10
Mark Twain NF	10	1	1	5	17	4	2	16	4	20	9	10
Ozark NF	10	2	0	6	21	5	2	15	4	21	3	10
Ouachita NF	8	2	1	7	20	4	2	15	4	21	4	11
Counties without NF												
Metropolitan	3	1	0	6	14	6	6	18	7	27	4	10
Nonmetropolitan	11	1	1	5	15	5	3	16	5	19	3	15
Assessment area	7	1	1	5	17	5	4	17	5	23	4	11
States												
Arkansas	6	1	1	5	20	6	4	16	5	22	4	11
Missouri	4	1	0	5	15	6	5	17	7	26	4	10
Oklahoma	5	1	5	4	11	5	4	16	6	24	6	13

NF = national forest.

^a Industrial sectors used by the Bureau of Economic Analysis (BEA).

^b Some row totals do not equal 100 due to rounding.

Source: USDC BEA (1996).

employment (using a slightly modified set of industrial sectors).

In 1994, farming provided 7 percent of total employment in the Assessment area (11 percent in nonmetropolitan counties, 3 percent in metropolitan counties). This sector is somewhat larger in the Assessment area than in the three States within which the Highlands lie, and significantly larger than in the Nation as a whole (where farming accounts for 2 percent of all employment). Mining industries and construction provided approximately 1 and 5 percent, respectively, of total Assessment area employment. There was little consistent variation in the size of the construction sector among the various groups of counties in the Assessment area.

Despite increasing competition from overseas, manufacturing continues to be a significant source of employment (17 percent) in the Assessment area. Counties containing national forest lands (especially lands of the Ozark or Ouachita National Forests) rely more heavily on manufacturing than do those without national forest lands. Retail sales establishments also employ large numbers of Assessment area workers (17 percent of the work force in 1994), varying slightly across the metropolitan/nonmetropolitan categories. The presence of national forest lands does not appear to be associated with the size of the retail trade sector.

The services sector is the largest sector in the Assessment area, employing 23 percent of area workers. Metropolitan counties, especially those without national forest lands, tend to have the largest services sectors. National trends show this industrial sector continuing to grow.

Looking at the representation of industrial sectors across the Assessment area in more detail, farm employment accounts for more than 20 percent of all jobs that earn wages and salaries in 18 of the study area counties. In Maries and Dade Counties, MO, the farm sector employs more than 30 percent of the work force. Construction is typically associated with a growing economy, and a few counties stand out with relatively large construction sectors, namely Jefferson County, MO (10.5 percent), Hot Spring County, AR (10 percent), Le Flore County, OK (14 percent), and Camden County, MO (10 percent).

Over 45 percent of the workers in Howard County, AR, at the southern edge of the Highlands, are in manufacturing. Something of a manufacturing cluster

appears to be developing around Yell, Johnson, and Logan Counties near the Arkansas River, where 27 to 35 percent of the workers are employed in that sector. Another potential manufacturing cluster is located in the southwestern corner of Missouri, where 32 to 38 percent of the workers in Barry and McDonald Counties are employed in manufacturing.

Six counties in the region have more than 20 percent of their work force in retail sales. Two of these are metropolitan counties, and the remaining four are widely recognized retirement and recreation counties: Garland County, AR (which includes Hot Springs and Hot Springs Village), and Benton (which includes a large part of the Harry S. Truman Reservoir, Camden (home of the Lake of the Ozarks), and Taney (including Branson) Counties in Missouri. Four retirement and recreation counties (Garland, AR, and Stone, Taney, and Camden, MO) have more than 30 percent of their workers in the service sector.

Occupations

In this section, the authors examine the distribution of workers across six broad occupational categories that they selected and named. See USDC BC 1992, Appendix H, for a complete listing of occupations included under the occupational codes listed below.

- White-collar I (occupational codes 000–242)—this category includes managers, executives and administrators, engineers, scientists, physicians, pharmacists, teachers, lawyers, health technicians, science and engineering technicians, airplane pilots, and computer programmers.
- White-collar II (occupational codes 243–402)—this category includes finance, business or commodity sales representatives, retail sales workers, administrative support, computer equipment operators, secretaries, information clerks, receptionists and reservation agents, record processing clerks, bookkeepers, office machine and telephone operators, and mail clerks.
- Service occupations (occupational codes 403–472)—this category includes private household workers, police, firefighters, restaurant staff, nurse's aides, janitors, barbers/hairdressers, and child care workers.
- Outdoor occupations (occupational codes 473–502)—this category includes farm operators and

managers, farm laborers, nursery workers, forestry and logging workers, fishers, hunters, and trappers.

- Blue-collar I (occupational codes 503–702)—this category includes mechanics and repairers, brickmasons, carpenters, electricians, plumbers, precision machinists, and plant operators.
- Blue-collar II (occupational codes 703–902)—this category includes machine operators and tenders, welders, assemblers, inspectors, truck drivers, bulldozer operators, stock handlers, and other general laborers.

The white-collar I and blue-collar I occupations typically require greater skills and education than do white-collar II and blue-collar II occupations. As a rule of thumb, workers in both categories of white-collar jobs as well as workers in the blue-collar-I jobs receive higher wages and benefits and enjoy greater job security

than do workers in service occupations. However, service occupations are among the fastest growing jobs in the national economy. The outdoor occupations have declined significantly over the course of the 20th century.

The occupations of workers in the Assessment area differ somewhat from the occupations of workers in Missouri and Oklahoma (table 2.10). For instance, 34 percent of Assessment area workers are employed in blue-collar (I or II) occupations compared to 27 percent of workers in these two States. Assessment area workers are less likely to be employed in white-collar occupations (48 percent compared to 56 percent in Missouri and Oklahoma). Service and outdoor occupations represent approximately the same percentages of the work forces in the Assessment area and the three States.

Table 2.10—Percent employment in the Assessment area, 1990, by occupational category^a

Geographic area	White-collar I	White-collar II	Service occupations	Outdoor occupations	Blue-collar I	Blue-collar II
----- <i>Percent^b</i> -----						
Counties with NF						
Metropolitan	24	27	12	3	14	21
Mark Twain NF	20	26	13	5	15	22
Ozark NF	24	26	11	4	13	22
Ouachita NF	25	28	11	1	14	20
Nonmetropolitan	20	21	14	7	14	24
Mark Twain NF	20	21	15	6	13	25
Ozark NF	21	20	14	7	14	25
Ouachita NF	20	22	15	7	14	23
Counties without NF						
Metropolitan	26	29	13	2	12	17
Nonmetropolitan	22	23	14	7	13	21
Assessment area	23	25	14	4	13	21
States						
Arkansas	23	25	13	5	13	21
Missouri	28	28	14	3	11	16
Oklahoma	28	28	14	4	12	15

NF = national forest.

^a See “Occupations” in text for explanations of occupational categories.

^b Some row totals do not equal 100 due to rounding.

Source: USDC BC (1993).

Within the Assessment area, workers in metropolitan counties are more likely to work in white-collar occupations (fig. 2.15). Service as well as outdoor occupations are more common in nonmetropolitan counties, regardless of the presence of national forest lands. Blue-collar workers are most prominent in nonmetropolitan counties containing national forest lands.

White-collar workers make up 50 percent or more in 14 counties (fig. 2.16). These counties include four metropolitan areas: the retirement and recreation counties of Garland, AR, and Camden and Taney, MO; and the government-specialized counties of Cole, Phelps, and Pulaski, MO, and Cherokee, OK.

Blue-collar workers constitute 45 percent or more of the work force in 13 nonmetropolitan counties (fig. 2.16); all but 5 of these are in Missouri in the northeastern section of the Assessment area (Bollinger, Carter,

Crawford, Gasconade, Reynolds, Shannon, Washington, and Wayne Counties, MO). Randolph County in northeastern Arkansas, Newton and Searcy Counties in the Arkansas Ozarks, and Logan and Yell Counties in the Arkansas Valley and Ouachita Mountains also have particularly high numbers of blue-collar workers.

Service workers are most strongly represented in the retirement and recreation counties of Garland and Baxter, AR; and Benton and Taney, MO; and in the counties of Atoka, Latimer, Pittsburg, and Pushmataha, OK; and Pulaski, MO; which have relatively high employment in government jobs. Outdoor occupations make up more than 12 percent of the work force in three counties in Arkansas (Madison, Montgomery, and Scott) and in nine counties in Missouri. One Missouri cluster is located in the northwestern part of the Assessment area, while the other is located in south-central Missouri.

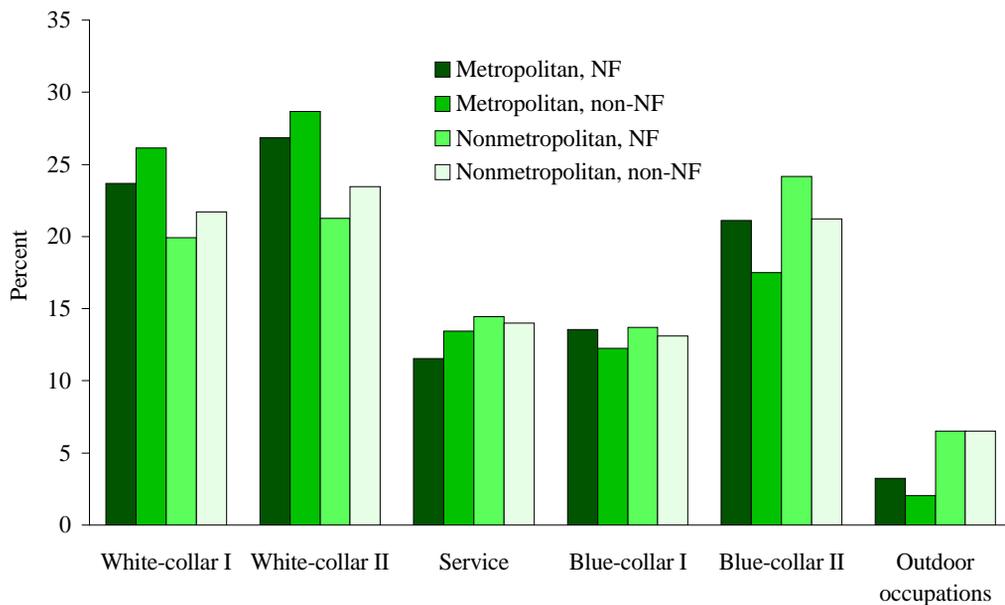


Figure 2.15—Occupational employment patterns in metropolitan and nonmetropolitan counties within the Assessment area, 1990 (USDC BC 1993).

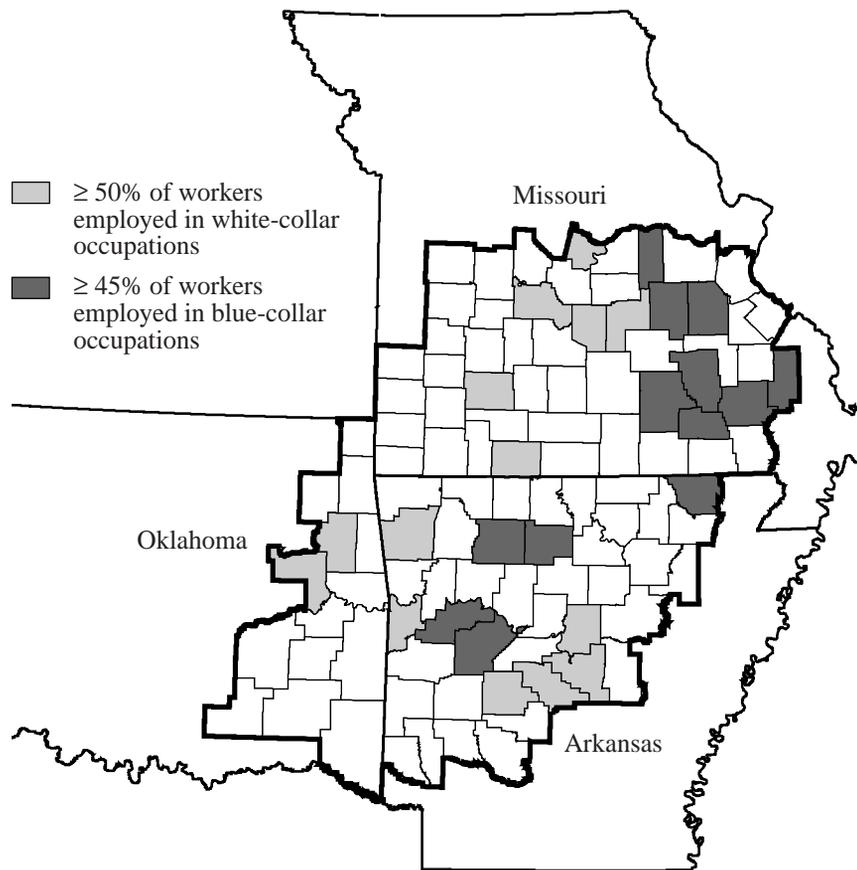


Figure 2.16—Assessment area counties in which the proportion of white-collar or blue-collar jobs is relatively high, 1990 (USDC BC 1993). (Unshaded counties fit neither category.)

Other Means of Making a Living

The above analyses focused on the labor market as the major means of making a living. About 70 percent of the total household income in the Assessment area is from the labor market in the form of wages and salaries (table 2.11). Self-employment (farm and nonfarm) contributes another 7 percent of household income. The relative contribution of wages and salaries is highest in metropolitan counties of the Assessment area (72 to 76 percent of total income) Self-employment incomes are generally somewhat more important in nonmetropolitan counties than in metropolitan ones.

The remaining 23 percent of household income in the region does not come directly from current labor market

participation. Interest, dividends, and net rental income (7 percent), Social Security income (8 percent), and retirement pensions or disability income (5 percent) are especially important sources of income among retired households and contribute a combined 20 percent of the total income in the region. “Public assistance” income and “other income” provide the final 3 percent of the total household income in the Assessment area.

One of the largest differences within the Assessment area is the relative importance of Social Security and retirement and disability incomes in nonmetropolitan versus metropolitan counties (fig. 2.17). When combined, these sources of income contributed 11 and 10 percent, respectively, of total income in “metropolitan, national forest” and “metropolitan, non-national forest”

Table 2.11—Sources of household income in the Assessment area, 1990

Geographic area	Wages and salaries	Self-employment		Interest, dividends, and rent	Social Security	Retirement and disability	Public assistance	Other income
		Nonfarm	Farm					
----- <i>Percent of aggregate household income^a</i> -----								
Counties with NF								
Metropolitan	72	6	1	7	7	4	1	1
Mark Twain NF	72	9	2	6	6	4	0	1
Ozark NF	70	6	1	8	7	5	1	1
Ouachita NF	75	6	0	6	7	4	1	1
Nonmetropolitan	64	7	2	8	11	6	1	2
Mark Twain NF	64	7	2	7	10	5	1	2
Ozark NF	62	7	3	8	12	6	1	2
Ouachita NF	64	7	2	8	11	6	1	2
Counties without NF								
Metropolitan	76	5	1	6	6	4	1	1
Nonmetropolitan	65	7	2	8	10	5	1	2
Assessment area	70	6	1	7	8	5	1	2
States								
Arkansas	70	6	2	7	8	4	1	2
Missouri	74	5	1	8	7	4	1	1
Oklahoma	72	6	1	8	7	5	1	1

NF = national forest.

^a Some row totals do not equal 100 due to rounding.

Source: USDC BC (1993).

counties. By comparison, combined Social Security and retirement incomes contributed 17 percent to the total income in nonmetropolitan counties with national forest lands and 15 percent in nonmetropolitan counties without national forest lands (table 2.11).

Four nonmetropolitan counties in the region—Hickory County, MO, and Sharp, Van Buren, and Baxter Counties, AR—rely on current local labor market activities for less than 60 percent of their total income. At the other extreme, wages, salaries, and self-employment income contribute more than 80 percent of county income in 18 counties, of which 7 are nonmetropolitan. Incomes important to retired households (including interest, dividends, and rent; Social Security; and

pensions) contribute more than 28 percent of the total income in 19 nonmetropolitan counties (fig. 2.18).

Additional insights into the predominant means of making a living in the Assessment area can be gained by examining land ownership patterns for 1992 (table 2.12 and fig. 2.19). The majority (84 percent) of land in the Assessment area is privately owned; however, there are considerable differences among counties. The greatest concentrations of privately owned land (more than 90 percent, on average) are in the counties without national forest lands. Among nonmetropolitan counties with national forest lands, those in Missouri (with parts of the Mark Twain National Forest) tend to have the most privately owned land. Nonmetropolitan counties

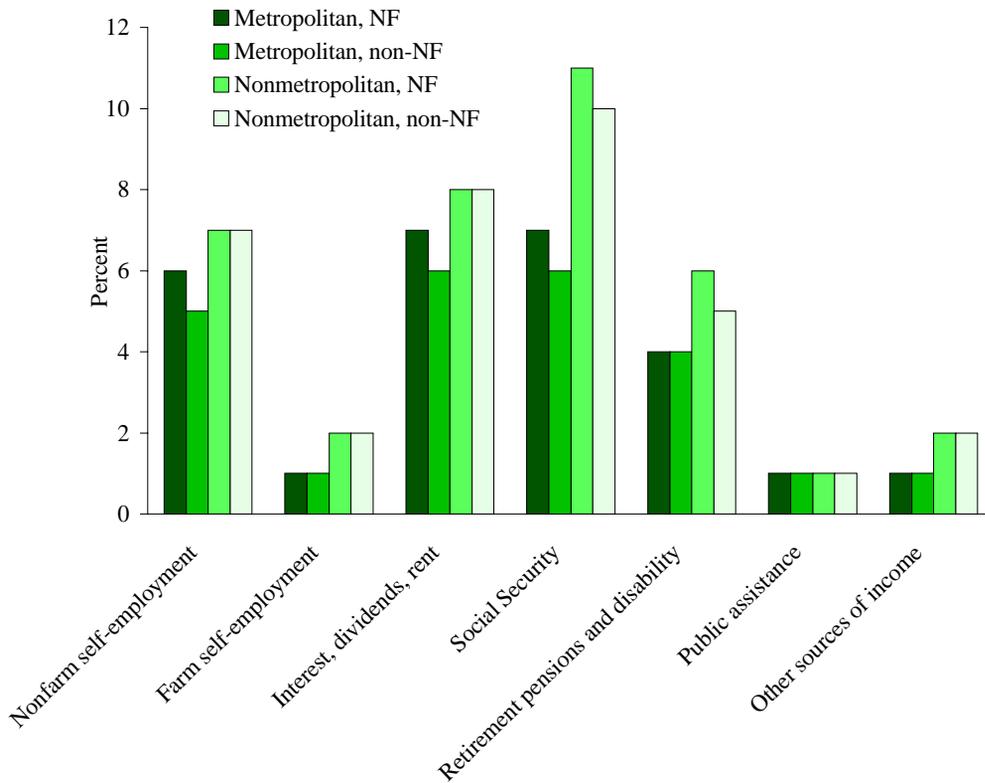


Figure 2.17—Sources of household income in the Assessment area other than wages and salaries, 1990 (USDC BC 1993).

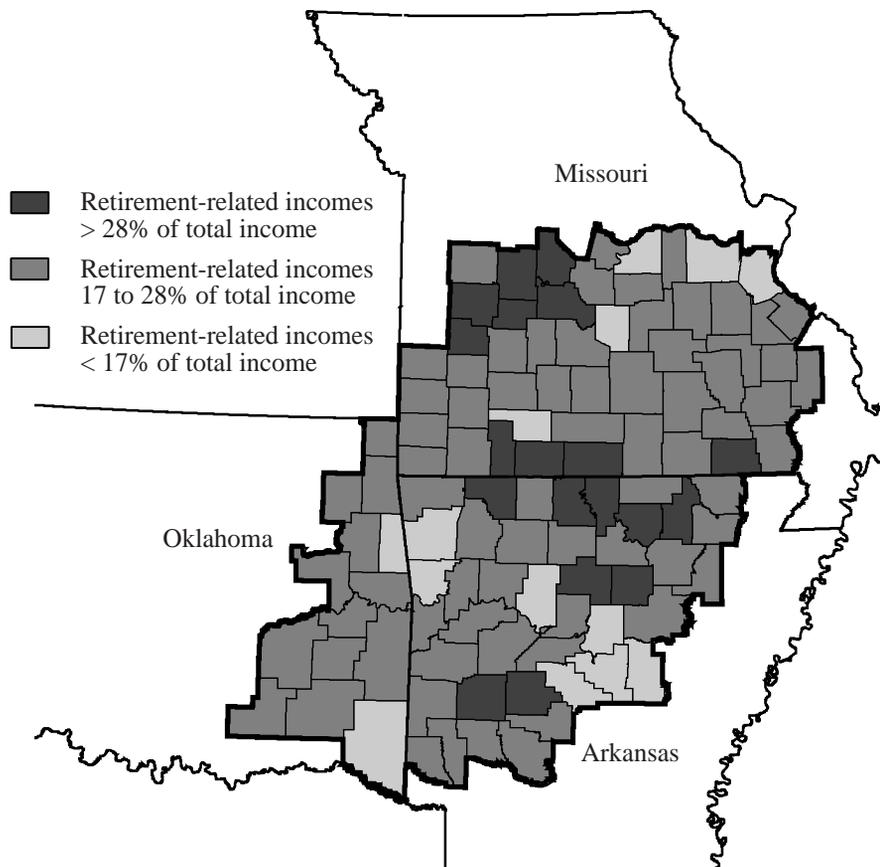


Figure 2.18—Relative contribution of retirement-related incomes to total incomes in Assessment area counties, 1990 (USDC BC 1993).

Table 2.12—Land ownership patterns in the Assessment area and States, 1992

Geographic area	Private and corporate	State and local government	Indian tribes	Federal Government	Water acres ^a
----- Percent of total land ^b -----					
Counties with NF					
Metropolitan	85	2	0	11	2
Mark Twain NF	81	4	0	14	0
Ozark NF	88	1	0	8	3
Ouachita NF	80	2	0	16	2
Nonmetropolitan	76	2	0	19	2
Mark Twain NF	81	3	0	14	1
Ozark NF	72	2	0	23	3
Ouachita NF	70	1	0	26	3
Counties without NF					
Metropolitan	93	3	0	1	3
Nonmetropolitan	91	3	0	2	3
Assessment area	84	3	0	11	3
States					
Arkansas	86	2	0	9	3
Missouri	91	3	0	5	2
Oklahoma	91	3	1	3	3

NF = national forest.

^a Water acres are not allocated to specific owners in the 1992 Natural Resources Inventory.

^b Some row totals do not equal 100 due to rounding.

Source: USDA NRCS (1992).

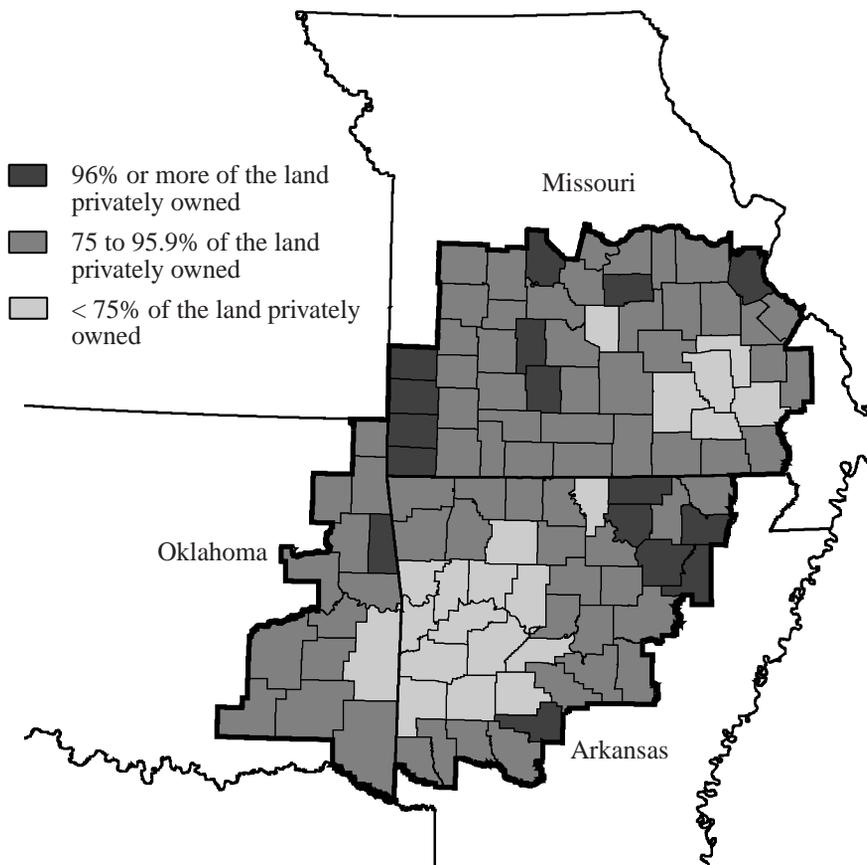


Figure 2.19—Land ownership patterns in the Assessment area, 1992 (USDA NRCS 1992).

with Ouachita National Forest lands have the least privately owned land (70 percent). In three counties—Montgomery and Scott in the heart of the Ouachita National Forest and Newton County in the heart of the Ozark National Forest—private citizens and corporations hold less than half of the land. State and local (municipal and county) governments own a relatively small and consistent share of the land in the Assessment area (ranging from 1 to 4 percent, but averaging 3 percent, which is very similar to State and local government ownership in the three States). Tribal governments own very little land in the Assessment area; almost all of it is located in Oklahoma counties without national forest lands. Half of the 42,000 ac owned by tribal governments is located in Delaware County, OK.

The Federal Government owns the largest share of land in nonmetropolitan counties containing parts of the Ouachita and/or Ozark National Forests (26 percent and 23 percent, respectively) and metropolitan counties with Ouachita National Forest lands (16 percent). The Forest Service manages about 4.4 million ac in the Ozark-Ouachita Highlands. Counties with the highest concentration of national forest lands are the nonmetropolitan counties encompassing the Ouachita National Forest (24 percent of the total acreage in these counties is national forest land), the Ozark National Forest (19 percent), and the Mark Twain National Forest (12 percent). In the Arkansas portion of the Ouachita Mountains, over 60 percent of the land in rural Montgomery and Scott Counties is in Federal ownership. The Forest Service manages more than 35 percent of the land in rural Johnson and Newton Counties in the Arkansas Ozarks and more than 25 percent of the land in rural Carter and Iron Counties in the Missouri Ozarks.

Socioeconomic Well-Being

Historically, the Ozark-Ouachita Highlands region has had a relatively low standard of living when compared to other regions of the country. This section uses data from USDC BC (1993) to examine a variety of measures of socioeconomic well-being. Given the above differences in the characteristics of the Assessment area's population and in the means by which residents earn their livings, it should not be too surprising to find that incomes in the region tend to be lower and poverty

rates higher than national averages. Housing quality, which is more difficult to define, also appears to be somewhat lower than the national average.

Income and Poverty

In general, incomes in the Assessment area are much lower and poverty rates are higher than those in the Nation. The median household income in the Assessment area in 1989 was \$10,000 lower (\$19,208 compared to \$30,056 in the Nation); median family income was approximately \$12,000 lower (\$23,008 compared to \$35,225 in the Nation); and per capita income was \$5,000 lower (\$9,448 compared to \$14,420 in the Nation). The poverty rate for individuals was 3 percentage points higher (17 percent compared to 14 percent in the Nation) (USDC BC 1993).

As shown in table 2.13, median household (\$19,208) and family (\$23,008) incomes in the Assessment area also fell short of median incomes in Missouri (household = \$20,832; family = \$25,286) and Oklahoma (household = \$20,360; family = \$24,823). Assessment area incomes did surpass those in Arkansas (median household = \$18,847; median family = \$22,783), however. Personal poverty rates (17 percent in the Assessment area) followed a similar pattern: lower in Missouri (13 percent), the same in Oklahoma (17 percent), and higher in Arkansas (19 percent).

Throughout the country, people living in cities generally have higher incomes than do people living in small towns and rural areas, and fewer city dwellers have incomes below the poverty level. This common metropolitan-nonmetropolitan gap in incomes and poverty rates exists within the Ozark-Ouachita Highlands area as well (fig. 2.20). Using median household income in 1990 as a measure, the 14 wealthiest counties in the Assessment area include 2 that are part of the St. Louis metropolitan area and 9 (of 16) counties that make up all or part of the remaining metropolitan areas (fig. 2.21). Three nonmetropolitan counties in Missouri are also counted among the richest counties: one is an outer suburb of St. Louis, the others lie near or contain Jefferson City, the State capital.

The poorest counties in the region, again using median household income in 1990, are all nonmetropolitan and tend to be relatively isolated from urban centers. Six of the poorest counties form a noticeable

Table 2.13—Family and household income and poverty rates in the Assessment area

Geographic area	Median household income	Median family income	Per capita income, 1990	Change in per capita income 1970–90 ^a	Poverty rate ^b					Change in personal poverty rates 1970–90
					All persons	All families	Female-headed families	Related children under 18	Persons 65 and older	
----- Dollars ----- Percent -----										
Counties with NF										
Metropolitan	24,836	28,721	11,415	57	12	9	28	15	15	-6
Mark Twain NF	25,995	28,855	10,862	54	10	8	28	12	20	-11
Ozark NF	23,573	27,516	11,196	62	13	9	27	16	14	-6
Ouachita NF	26,150	30,461	12,019	52	12	9	30	15	15	-4
Nonmetropolitan										
Mark Twain NF	17,994	21,484	8,921	49	20	16	43	26	22	-6
Mark Twain NF	17,857	21,358	8,908	44	21	16	45	26	22	-3
Ozark NF	17,732	21,094	8,774	61	19	15	39	25	21	-11
Ouachita NF	18,534	22,114	9,082	51	21	16	44	27	24	-8
Counties without NF										
Metropolitan	24,172	28,655	11,042	48	13	10	31	16	16	-3
Nonmetropolitan	18,637	22,626	9,403	46	19	15	41	24	22	-6
Assessment area	19,208	23,008	9,448	49	17	13	37	21	20	-5
States										
Arkansas	18,847	22,783	9,281	54	19	15	41	25	23	-9
Missouri	20,832	25,286	10,081	38	13	10	31	17	15	-1
Oklahoma	20,360	24,823	10,120	40	17	13	38	21	18	-2

NF = national forest.

^a To control for inflation, per capita incomes in 1970 and 1990 were adjusted to 1982–1984 constant dollars.

^b Percent below poverty level; area and State poverty rates calculated using simple aggregations.

Source: USDC BC (1992), USDA FS SR (1996).

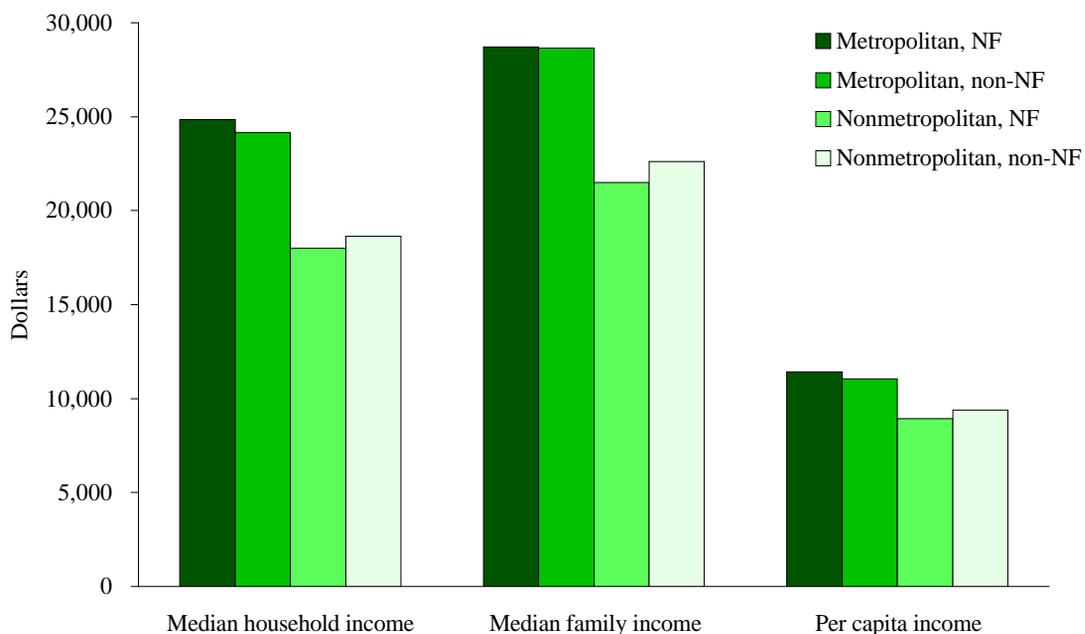


Figure 2.20—Incomes within the Assessment area, 1990 (USDC BC 1993).

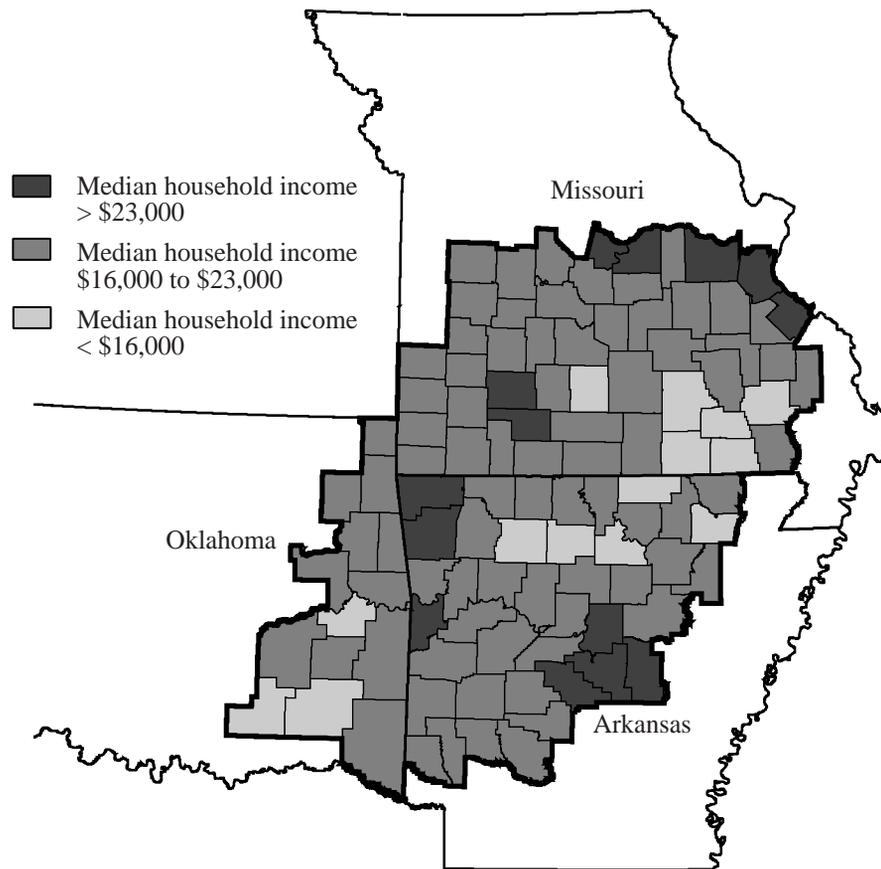


Figure 2.21—Median household incomes in the Assessment area, 1990 (USDC BC 1993).

cluster in southeastern Missouri and adjacent Arkansas (fig. 2.21). Also among the poorest counties in the region are one other county in Missouri, three in Oklahoma, and four others in north-central Arkansas.

The highest poverty rates in the region are among families headed by females, especially those families living in nonmetropolitan areas (fig. 2.22 and table 2.13). In 1990, 43 percent of female-headed families living in nonmetropolitan counties containing national forest lands had incomes below poverty. More than half of all female-headed families in 23 nonmetropolitan counties were living with incomes below the poverty line. In Cherokee County, OK, 60 percent of families with female heads were in poverty.

Children (ages 18 and younger) and persons 65 and older also face significantly higher poverty than the

general population within all types of counties. More than one-third of all children aged 18 and under lived in poverty in 14 nonmetropolitan counties. Ripley County, MO, had the highest child poverty rates (42 percent). At the other extreme, poverty rates among children were less than 10 percent in Jefferson, Osage, and Cole Counties, MO. Several pockets of poverty among elderly residents exist within the Highlands, including 20 counties in which 28 percent or more of these residents are in poverty (fig. 2.23). The five counties with the highest percentage of residents ages 65 and older living in poverty were Searcy (39 percent) and Newton (34 percent) Counties, AR; Atoka (35 percent) and McCurtain (35 percent) Counties, OK; and Carter County (33 percent), MO.

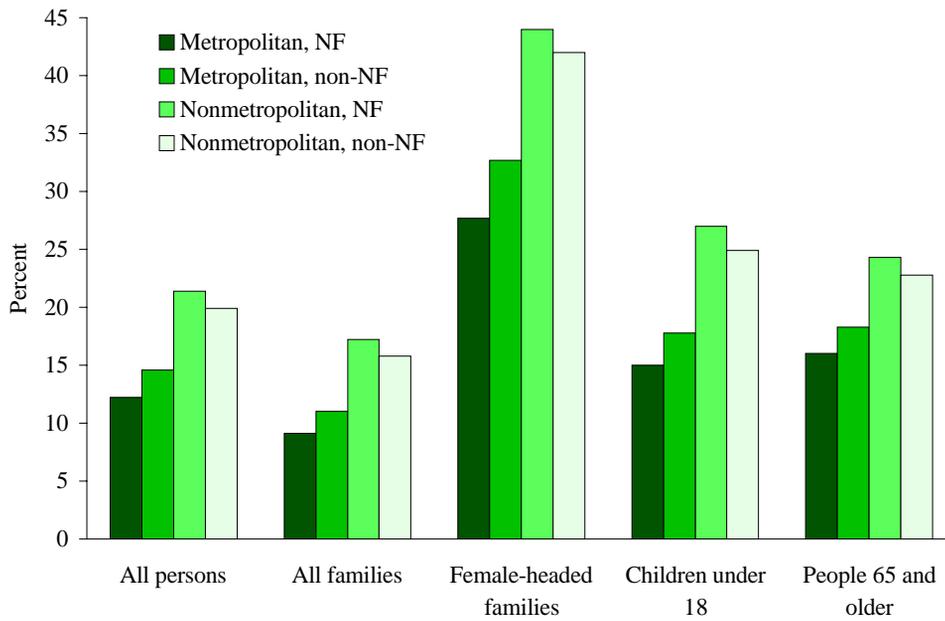


Figure 2.22—Poverty rates in Assessment area counties, 1990 (USDC BC 1993).

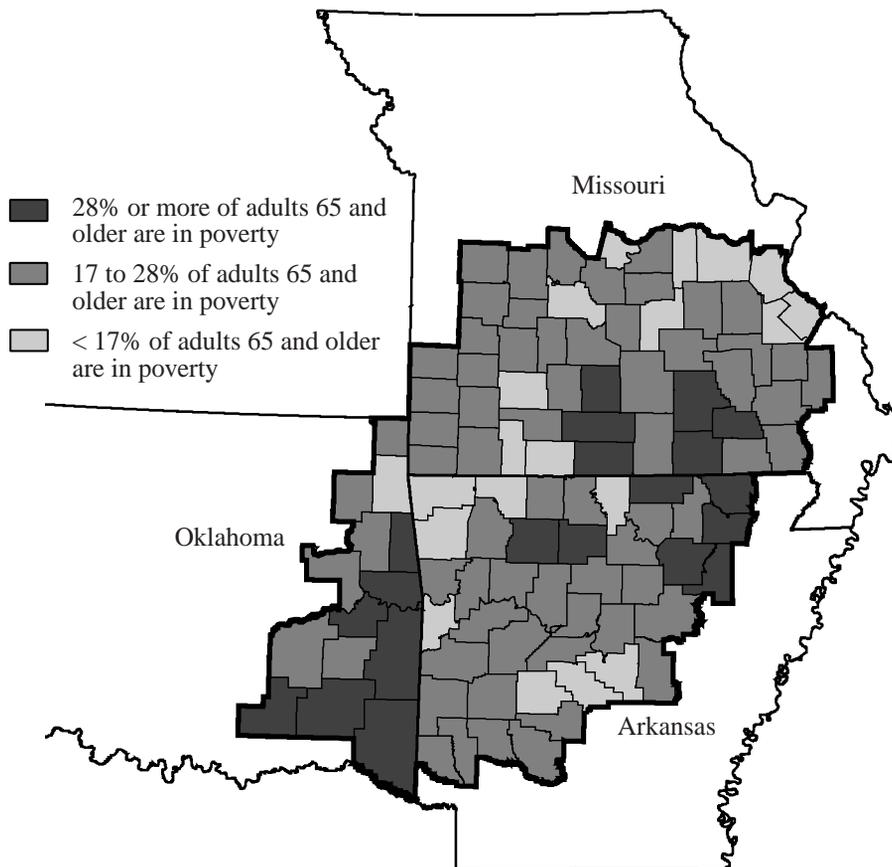


Figure 2.23—Poverty rates among older persons in Assessment area counties, 1990 (USDC BC 1993).

Housing Characteristics

The characteristics of housing in an area can also be used to compare variations in the quality of life. If housing quality can be defined in terms of higher dollar values, more recent construction, and higher owner tenancy, then Assessment area housing units compare favorably with housing in the larger three-State area (table 2.14). National comparisons are less favorable. Average housing values were \$39,943 in the Assessment area, \$39,252 in Arkansas, \$38,888 in Missouri, \$36,617 in Oklahoma and \$78,500 in the Nation. The average housing unit in the Assessment area and Arkansas was constructed in 1970, compared to 1966 in Oklahoma and 1965 in Missouri and the Nation. Similarly, owner-occupancy was 64 percent in the Assessment area, 62 percent in Arkansas, 61 percent in Missouri, and 58 percent in Oklahoma and the Nation.

On the other hand, if housing quality can be defined as having “modern conveniences” (e.g., having complete

plumbing facilities and a telephone), then Assessment area housing does not appear to stack up as well. Four percent of Assessment area housing units did not have complete plumbing facilities, and 11 percent were without a telephone. By comparison, housing units in Missouri, Oklahoma, and the Nation were more likely to have such equipment. Arkansas had a percentage of housing units without a phone that was similar to that in the Assessment area, but units were more likely to have plumbing.

Within the Assessment area, the metropolitan-nonmetropolitan housing differences follow a familiar pattern, with almost all measures of housing quality indicating more favorable housing conditions in the metropolitan counties. Housing differences correlated with the presence of a national forest tend to be much smaller than differences based on metropolitan status. Within the metropolitan category, however, “national forest counties” do tend to have somewhat higher priced homes than metropolitan counties without national forest lands.

Table 2.14—Housing characteristics in the Assessment area, 1990^a

Geographic area	Average housing value	Average year of construction	Owner-occupied	Renter-occupied	Vacant	Incomplete plumbing facilities	No telephone
	<i>Dollars</i>	<i>Year</i>	----- <i>Percent</i> -----				
Counties with NF							
Metropolitan	54,017	1973	67	25	8	1	9
Mark Twain NF	58,600	1977	74	19	7	1	6
Ozark NF	52,700	1974	64	27	9	2	10
Ouachita NF	53,700	1971	67	25	8	1	9
Nonmetropolitan	37,476	1970	65	20	15	5	12
Mark Twain NF	37,354	1970	63	21	16	4	11
Ozark NF	39,509	1972	67	18	15	6	11
Ouachita NF	35,875	1971	66	20	14	3	13
Counties without NF							
Metropolitan	50,960	1971	66	25	9	2	9
Nonmetropolitan	38,188	1969	62	20	18	4	11
Assessment area	39,943	1970	64	21	15	4	11
States							
Arkansas	39,252	1970	62	27	11	2	11
Missouri	38,888	1965	61	28	11	1	5
Oklahoma	36,617	1966	58	27	14	1	9

NF = national forest.

^a All area values are averages of county values.

Source: USDC BC (1993).

In nonmetropolitan counties, the presence of national forest lands is not correlated with better housing (table 2.14). However, average nonmetropolitan housing values are highest in counties with land in the Ozark National Forest (\$39,509) and lowest in counties with land in the Ouachita National Forest (\$35,875). Nonmetropolitan counties without national forest lands tend to have the oldest housing units and the highest vacancy rates. And despite the relatively expensive housing in the nonmetropolitan “Ozark National Forest counties,” this is the category of counties most likely to have homes without complete plumbing facilities.

Ten of the 19 counties with the most expensive housing are located in metropolitan areas (fig. 2.24). Of the nine remaining counties with average housing values over \$50,000, six have been described as retirement-

destination counties by the Economic Research Service (see “Policy-Sensitive Counties” below); another is home to Ft. Leonard Wood, the region’s largest military base; another is home to Jefferson City, Missouri’s State capital; and the remaining one is on the outer edge of St. Louis, the largest metropolitan area in the region.

The distribution of counties with significantly low housing values (less than \$30,000) is very similar to the distribution of counties with high rates of poverty. Counties with the lowest housing values tend to cluster in three relatively isolated, nonmetropolitan counties in southeastern Oklahoma (Latimer, McCurtain, and Pushmataha) and five relatively isolated nonmetropolitan counties in southeastern Missouri (Bollinger, Oregon, Ripley, Shannon, and Wayne).

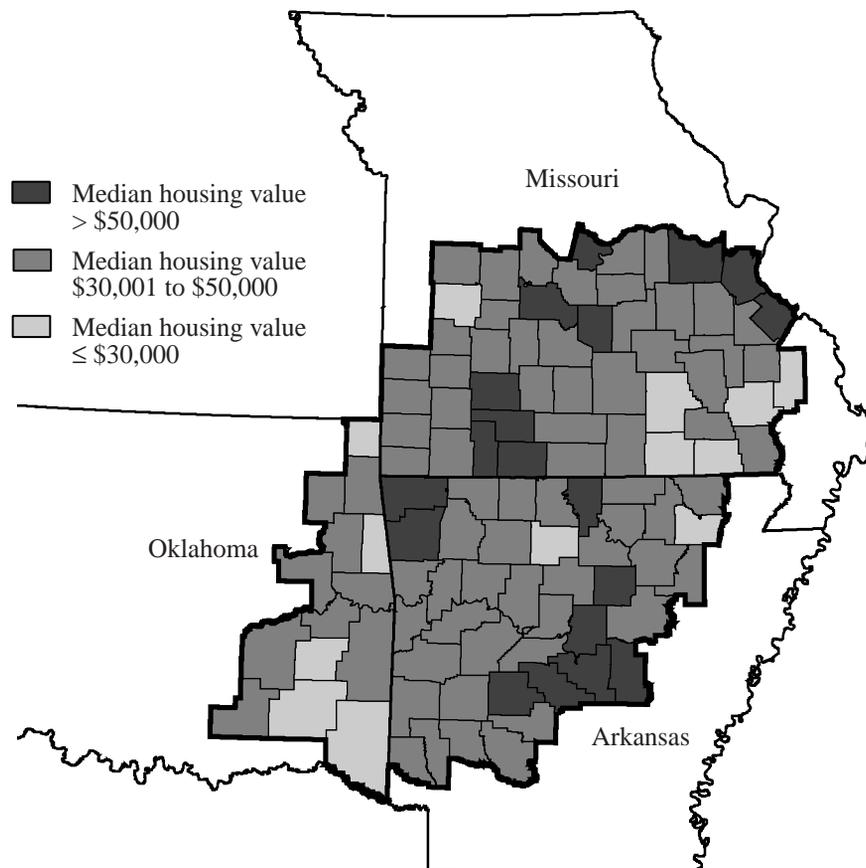


Figure 2.24—Median housing values in Assessment area counties, 1990 (USDC BC 1993).

Changes in Socioeconomic Well-Being

Most of the indicators of socioeconomic well-being presented above imply that standards of living are lower in the Assessment area than in Missouri and Oklahoma. Changes in several of these indicators, however, suggest that conditions in the Highlands are improving at a faster pace than in the two States (USDA FS SR 1996). For example, per capita incomes in the Assessment area region grew by 49 percent, adjusted for inflation, between 1970 and 1990 (table 2.13). By comparison, incomes in Arkansas grew by 54 percent, in Missouri by 38 percent, and in Oklahoma by 40 percent.

The same general pattern exists for changes in poverty rates. Using percentage point declines to measure improvement in poverty rates, Arkansas showed the most progress, dropping from a poverty rate of 28 percent in 1970 to 19 percent 20 years later. Personal poverty rates declined by 5 percentage points in the Assessment area, from a county-level average of

22 percent in 1970 to 17 percent in 1990. Missouri had the smallest percentage decline in poverty, with a decrease of slightly less than 2 percentage points over the course of the two decades.

Within the region, incomes grew fastest between 1970 and 1990 in counties containing parts of the Ozark National Forest, where both metropolitan and nonmetropolitan per capita incomes grew by more than 60 percent. Personal poverty rates declined the most (11 percentage points) in nonmetropolitan counties with Ozark National Forest lands and metropolitan counties with Mark Twain National Forest lands.

A map of the percent change in per capita incomes in Assessment area counties (fig. 2.25) shows the most rapid improvements occurring in a band of metropolitan and nonmetropolitan counties (with and without national forest lands) through the heart of Arkansas' Ozark Mountains. The slowest rates of growth in income tend to be clustered on the outer edges of metropolitan areas in Missouri.

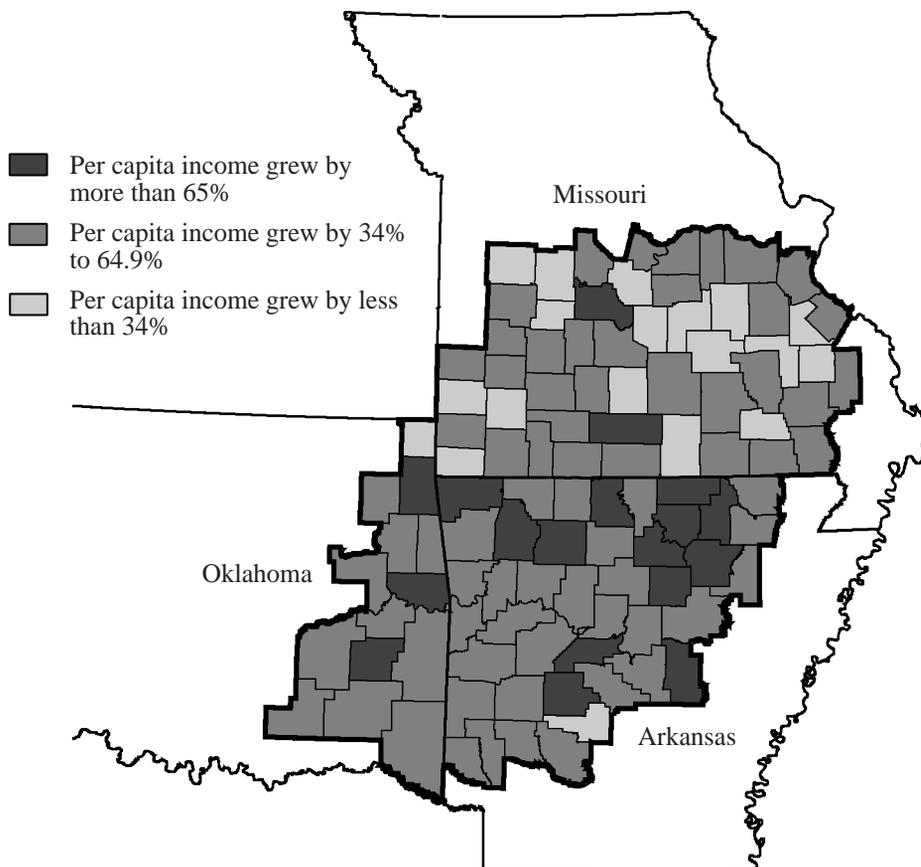


Figure 2.25—Per capita income growth in Assessment area counties (USDA FS SR 1996).

Reductions in county-level personal poverty rates follow a similar pattern (fig. 2.26). The majority of counties with the most dramatic reductions in poverty occurred in nonmetropolitan areas in the Ozark Mountains. For example, personal poverty declined in Stone and Cleburne Counties, AR, by more than 20 percentage points between 1970 and 1990. At the other extreme, most of the counties where poverty rates fell by less than 2 percentage points are on the outer edges of cities in Missouri.

Policy-Sensitive Counties

The Economic Research Service (Cook and Mizer 1994) uses “policy-sensitive” designations to classify

socioeconomic conditions in counties. This system identifies nonmetropolitan counties that may be particularly sensitive to policies and decisions made external to the county, e.g., by Congress, by State or Federal agencies, or by neighboring communities. Based on an extended analysis of all nonmetropolitan counties in the United States, social scientists at the Economic Research Service specified five types of policy-sensitive counties:

- Persistent poverty—counties in which persons with poverty-level incomes in the preceding year were 20 percent or more of the population in 1960, 1970, 1980, and 1990.
- Retirement-destination—counties in which the population aged 60 years and over in 1990 increased by 15 percent or more from 1980 to 1990 through the in-migration of people.

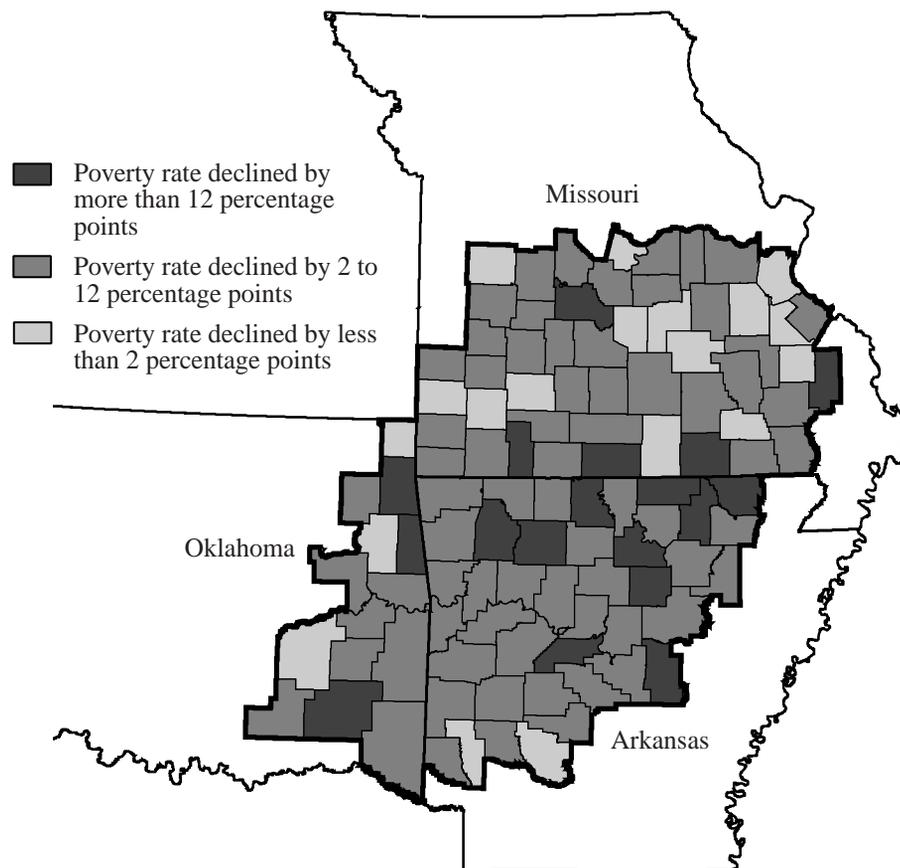


Figure 2.26—Reductions in poverty rates in Assessment area counties, 1970 to 1990 (USDA FS SR 1996).

- Transfers-dependent—counties in which the income from transfers payments (Federal, State, and local) contributed a weighted annual average of 25 percent or more to total personal income over the 3 years from 1987 through 1989; transfer payments consist of income from (1) retirement and disability programs, (2) medical programs, (3) income maintenance programs, (4) unemployment insurance, (5) veteran’s programs administered by the U.S. Department of Veteran’s Affairs, and (6) education and training programs.
- Federal lands—counties in which Federal lands made up 30 percent or more of the area in 1987.
- Commuting—counties in which 40 percent or more of the workers aged 16 and older commuted to jobs outside their county of residence in 1990.

Using this classification scheme, three-fourths of the 91 nonmetropolitan counties in the Assessment area are rated as “policy-sensitive.” Nonmetropolitan counties with national forest lands are more likely to be vulnerable to outside policy decisions: 82 percent (40 of 49) of the nonmetropolitan counties with national forest lands are sensitive to at least 1 type of policy, compared with 67 percent (28 of 42) of the nonmetropolitan counties without national forest lands (table 2.15).

Twenty-three (47 percent) of the nonmetropolitan “national forest counties” and 14 (33 percent) of the nonmetropolitan “non-national forest” counties experienced significantly high poverty rates in 1960, 1970, 1980, and 1990 (fig. 2.27). The “persistent poverty” designation is most common among counties containing land in the Mark Twain National Forest (15 counties). Other prominent clusters appear in north-central Arkansas (nine counties) and southeastern Oklahoma (six counties). Changes in welfare policy might be expected to have strong effects on residents and communities in these counties. Since many of the counties designated as persistent poverty counties had high rates of unemployment, relatively low levels of full-time and full-year work, relatively higher rates of self-employment, and a less-educated work force, residents of these areas could be extremely vulnerable to any job losses.

Regardless of the presence or absence of national forest land, almost half of the counties in the Assessment area relied on transfer payments for 25 percent or more of residents’ total personal income from 1987 through 1989. The Economic Research Service’s definition of transfer payments includes a wide range of income sources, from retirement incomes and veteran and health benefits to unemployment insurance and educational and training grants. Although transfer payments include

Table 2.15—Policy-sensitive nonmetropolitan counties in the Assessment area

Policy type ^a	Counties with NF lands		Counties without NF lands	
	<i>Number</i>	<i>Percent^b</i>	<i>Number</i>	<i>Percent^b</i>
Policy-sensitive	40	82	28	67
Persistent poverty	23	47	14	33
Retirement-destination	9	18	7	17
Transfers-dependent	25	51	20	48
Federal lands	9	18	0	0
Commuting	7	14	7	17
Not policy-sensitive	9	18	14	33

NF = national forest.

^a Defined and assigned by the USDA Economic Research Service; see text (“Policy-Sensitive Counties”) for explanations.

^b Designations are not mutually exclusive; therefore, total percentages of counties assigned to one or more of the five policy types exceed 100 percent in some cases.

Source: USDA ERS (1997).

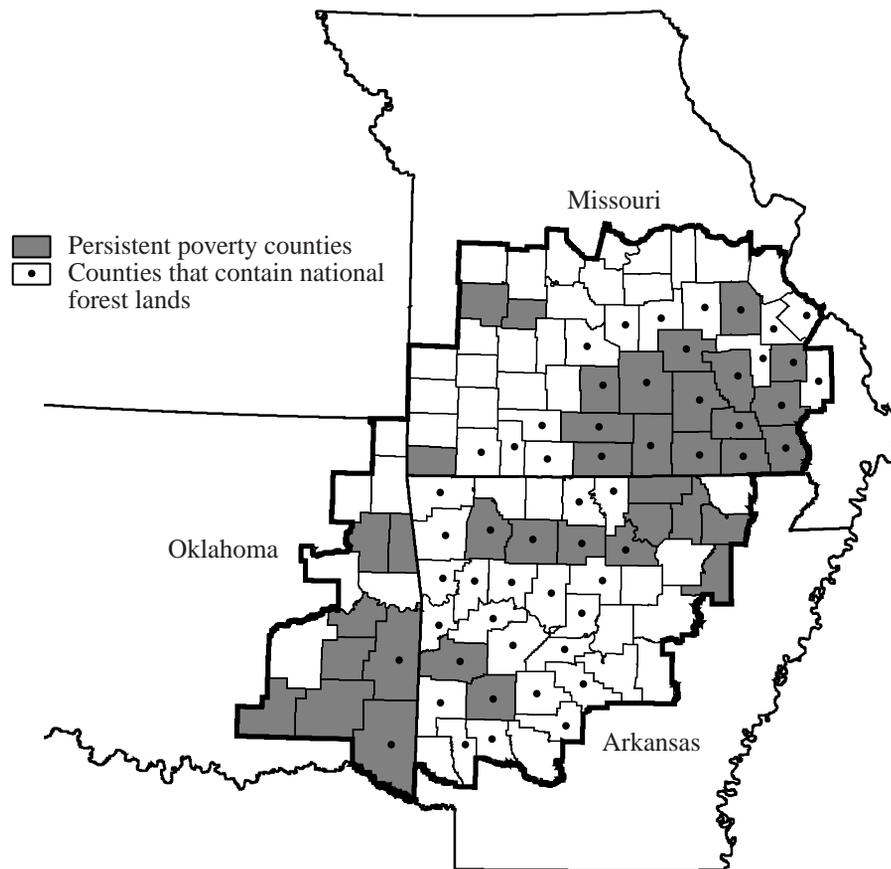


Figure 2.27—Persistent poverty counties in the Assessment area, 1960 to 1990 (Cook and Mizer 1994).

money from State and local governments, Federal programs provide the majority of the income. Decisions to balance the Federal budget, overhaul the Social Security system, and/or reform health care could be expected to have a significant effect on a large number of residents of the Assessment area.

Not surprisingly, all of the nonmetropolitan counties in the study area that are sensitive to decisions made about Federal lands contain national forest lands. Eight “Federal lands” counties are concentrated in Arkansas and include lands of the Ozark or Ouachita National Forests (Franklin, Johnson, Montgomery, Newton, Pope, Polk, Scott, and Yell). The ninth county especially sensitive to Federal lands policies is Carter County, MO, which includes part of the Mark Twain National Forest. These are the counties where decisions by the Forest Service or Congress (affecting national forest manage-

ment) could be expected to have the most direct and immediate effects.

Finally, the Economic Research Service identifies 16 retirement-destination counties in the Assessment area (fig. 2.28). In general, these retirement-destination counties appear to be located in areas with considerable scenic beauty; nine of the counties contain national forest lands and eight contain relatively large bodies of water. These retirement-destination counties have fared rather well over the past two decades in terms of both population and income growth. At the same time, residents in these counties could be vulnerable to large fluctuations in interest rates and/or the stock market and to significant changes in the Social Security system. This vulnerability could extend not only to “retirees” but also to employees in the large retail trade and service sectors in these counties.

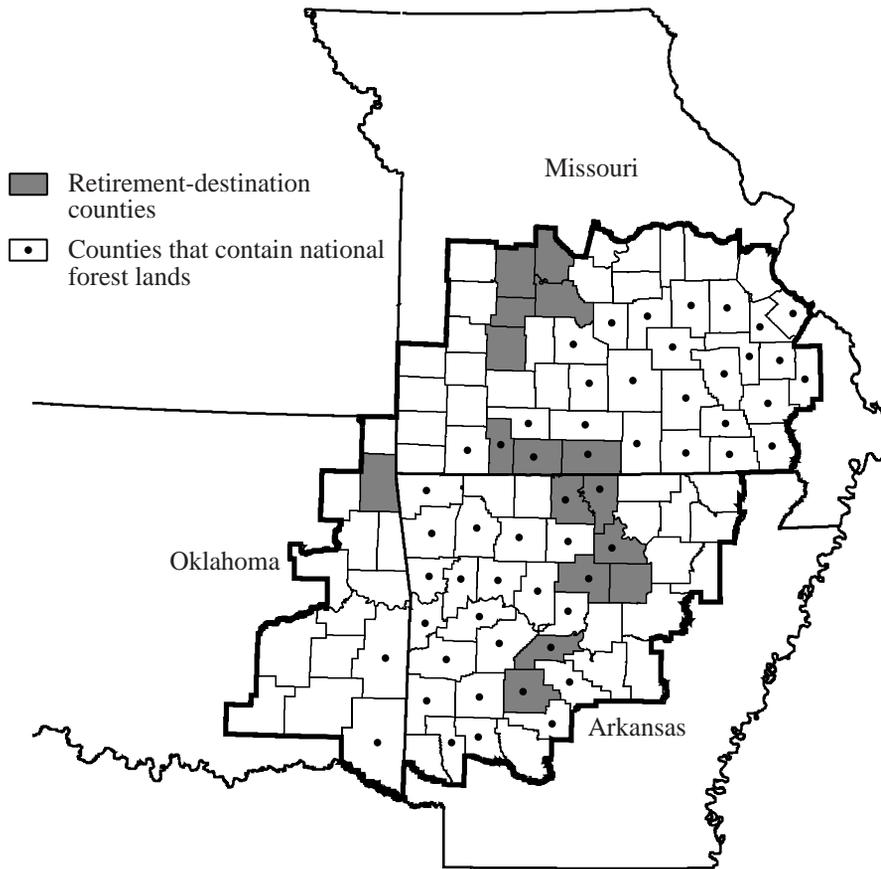


Figure 2.28—Retirement-destination counties in the Assessment area (Cook and Mizer 1994).

Environmental Justice

Presidential Executive Order No. 12898 (issued February 11, 1994) requires Federal agencies to respond to the issue of environmental justice by “identify(ing) and address(ing) disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations.” While the Assessment Team did not attempt to determine whether any particular communities were disproportionately affected by Federal actions, this chapter does provide information, based on the 1990 census, about locations (at the county level) of low income and minority populations that can be used in future analyses of environmental justice. Figure 2.23 identifies the 14 poorest counties of the Assessment area (those with average annual income less than \$16,000), and figure

2.27 identifies 38 counties that have been designated as “persistent poverty” counties by the Economic Research Service. Below the county level, there likely are individual communities and neighborhoods with much higher concentrations of poor and minority populations.

Individual-Level Analyses

The following individual-level analyses differ significantly from the preceding analyses of counties and county types. First, the individual-level analyses are based on data from the Public Use Microdata Sample-L (PUMS-L) from Tolbert and others (1995). Compared to the county-level data from USDC BC (1993), these PUMS-L data provide more detail about the social and economic characteristics of people; however, they provide significantly less detail about where people live.

This compromise between the individual-level and the county-level data is necessary in order to protect the confidentiality of everyone who responds to the decennial censuses. The Census Bureau *will* release some social and economic information about a random sample of individuals living within an area that has a minimum population of 100,000 residents. Since the sample data include only a small fraction of the population, the chance that a public-use microdata file contains the record of a given individual is very small.

Second, because it includes the St. Louis and Kansas City labor market areas, the geographic area covered in the individual-level analyses is slightly larger than the Assessment area. The sample population in the PUMS-L analysis area is slightly younger, more highly educated, and more heterogeneous in its racial-ethnic composition than the population in the Assessment area (table 2.16). Although these differences are not great, they should be taken into account when comparing numbers from the different analysis areas (i.e., the

PUMS-L analysis area vs. the county-based Assessment area).

Third, and most importantly, these two data sources answer different types of questions. For example, in earlier sections, county-level data answered questions such as “Which counties (or county types) have the highest concentration of older adults?” and “Which counties (or county types) have the lowest median household incomes?” (Tables 2.4 and 2.13, for instance, show that nonmetropolitan counties with Ozark National Forest lands tend to have both the oldest populations and the poorest households.) However, these county-level data cannot answer questions such as “Do older adults have the lowest household incomes?” or “What kinds of jobs do adults with college degrees hold?” The individual-level data from the PUMS-L can be used to answer these types of questions for the residents in the entire PUMS-L analysis area.

This section summarizes the social and demographic characteristics of residents in the PUMS-L analysis area for three age groups (called “cohorts”), four educational categories, and three racial categories. That is, the sample population of the PUMS-L analysis area was first grouped according to age: (1) younger “working-aged” adults (ages 20 to 44), (2) older “working-aged” adults (45 to 64 years old), and (3) “retirement-aged” adults (65 years old or older). These three cohorts were then compared in terms of their demographic characteristics, primary means of making a living, and general levels of socioeconomic well-being. Next, adults ages 25 and older in the PUMS-L sample were grouped according to educational attainments: (1) adults who had not completed high school, (2) adults who had a high school or General Educational Development (GED) certificate but no further education, (3) adults who had some college or post-high school technical training, and (4) adults who had at least a 4-year college degree. Again, the authors compared the demographic characteristics, primary means of making a living, and general levels of socioeconomic well-being of people with different educational attainments. The last set of individual-level analyses in this section examines social and demographic differences based on three racial categories: (1) White, (2) Black, and (3) American Indian. Except for table 2.16, which compares the population characteristics of the Assessment area and the PUMS-L area in 1990, the authors

Table 2.16—Demographic comparisons of the Assessment area and PUMS-L analysis area

Demographic category	Assessment area	PUMS-L analysis area
	----- <i>Percent</i> -----	
Age group		
20 to 44 years old	36	38
45 to 64 years old	20	19
65 and older	15	14
Schooling completion rates of adults 25 and older		
Did not complete high school	32	24
Have a high school diploma or GED	34	33
Have completed some college	21	24
Have a 4-year college degree	13	19
Racial or ethnic category		
White	91	85
Black	5	11
American Indian	3	2
Hispanic-American	1	2

GED = General Educational Development.
Source: Tolbert and others (1995).

did not include data on individuals of Hispanic origin (an ethnic, not a racial category) because they believed that the substantial in-migration of Hispanic individuals since 1990 might make meaningless an analysis based on the earlier data.

Characteristics of Working- and Retirement-Aged Residents

Population Characteristics

Although residents in the White category dominated the racial composition of all three cohorts, younger cohorts in the PUMS-L analysis area tend to be more diversified: while 85 percent of residents ages 20 to 44 were White, 89 percent of residents ages 45 to 64 and 90 percent of those 65 or older were White (table 2.17). The two older cohorts consisted primarily of longer term residents in their home States (80 and 85 percent of the respective totals), with the older cohort slightly more likely to have lived in the same State in 1985 and 1990.

Table 2.17—Population characteristics of three age groups in the PUMS-L analysis area

Characteristic	Ages 20 to 44	Ages 45 to 64	Ages 65 and older
	----- Percent ^a -----		
Racial category			
White	85	89	90
Black	11	9	8
American Indian	2	2	2
Migration status			
Lived in same State in 1985	58	80	85
Lived in different State in 1985	42	20	15
Schooling completion rates of adults 25 and older			
Did not complete high school	12	25	51
Have high school diploma or GED	34	36	26
Have completed some college	31	22	14
Have a 4-year college degree	24	17	9

GED = General Educational Development.

^a Sums of some subcolumns do not equal 100 due to rounding.

Source: Tolbert and others (1995).

Members of the younger, working-aged cohort were much more likely to be recent in-migrants.

Educational attainment also varied with age. In 1990, the oldest cohort had completed substantially less formal schooling than their working-aged neighbors did. Half of Assessment area residents 65 and older did not complete high school compared to 25 percent of those 45 to 64 and 12 percent of those 20 to 44.

Living Arrangements

Assessment area residents 65 and older were more than twice as likely to live alone as those in the two working-aged cohorts (46 percent versus 17 and 19 percent) (table 2.18). At the same time, members of both the oldest and the youngest cohorts were more likely to be living in multi-unit housing (duplexes or apartments) than were members of the 45-to-64 cohort.

Means of Making a Living

Dependence on current labor market conditions tends to decline with age. Almost 90 percent of the retirement-aged cohort was not in the labor force during the census week in 1990. Comparable percentages for the two working-aged cohorts were as follows: 33 percent

Table 2.18—Living arrangements among three age groups in the PUMS-L analysis area

Living arrangement	Ages 20 to 44	Ages 45 to 64	Ages 65 and older
	----- Percent -----		
Household type			
Married couple	61	69	45
Single adult living with children or other relatives	16	10	8
Single adult living with nonrelatives	5	2	1
Single adult	17	19	46
Dwelling type			
Detached houses	68	82	76
Multi-unit housing	22	9	17
Mobile homes	9	7	6
Other types of dwellings	1	1	1

Source: Tolbert and others (1995).

of residents aged 45 to 64 and 18 percent of residents between 20 and 44 were not in the labor force (table 2.19). Incidentally, 27 percent of the retirement-aged residents who were active in the labor market in 1990 worked full time throughout the year. An average of 17 percent of the incomes of those 65 and older came from labor market earnings (wages, salaries, or self-employment incomes). Their neighbors aged 45 to 64 derived an average 83 percent of their income from such earnings, and those aged 20 to 44 relied on earnings from employment for 95 percent of their total income.

The industrial sectors used in table 2.19 (and two other tables in this section) are similar but not identical to those used in the county-level analyses. Occupational types used here are identical to those in the county-level analyses except that military occupations were added. Most differences in employment by sector were not striking. However, less than 4 percent of the younger workers were employed in extractive industries (e.g., logging, mining, farming) compared to 11 percent of the oldest workers. Younger workers were somewhat more likely to be employed in manufacturing industries and in blue-collar I occupations than those in the other cohorts.

Socioeconomic Well-Being

Table 2.20 indicates that the median household income of older residents (\$12,000) is considerably lower than that of the other two groups (at \$25,000 and \$26,238). Poverty rates in households with a retirement-aged head (21 percent) are almost double those of households with a middle-aged head (11 percent). Income and poverty differences between the two working-aged cohorts are small by comparison.

When compared to their working-aged neighbors, older heads of households are much more likely to own their own homes free and clear of any mortgage or other loans (65 percent compared to 35 percent among household heads aged 45 to 64 and 8 percent among the younger heads of households). Most households in the youngest cohort either hold a mortgage for or rent their home (49 percent and 40 percent, respectively).

Table 2.19—Means of making a living among three age groups in the PUMS-L analysis area, 1990

Characteristic	Ages 20 to 44	Ages 45 to 64	Ages 65 and older
	----- Percent ^a -----		
Labor force participation			
In the labor force	82	67	11
Not in the labor force	18	33	89
Unemployment rate (percent)	6.0	4.0	5.6
Sources of personal income			
Earnings	95	83	17
Retirement-related income	3	15	79
Other sources	2	2	4
Extent of labor force participation			
Full time-full year	64	67	27
Full time-part year	20	17	26
Part time-full year	7	8	21
Part time-part year	10	8	27
Industrial sector ^b			
Extractive industries	2	4	11
Construction	6	6	5
Nondurable manufacturing	9	8	5
Durable manufacturing	12	11	6
Transportation, communications, and public utilities	7	8	5
Wholesale trade	3	4	2
Retail trade	17	14	16
Finance, insurance, real estate, and misc. business services	8	8	10
Personal and recreational services	7	7	10
Education and job training services	14	15	12
Professional services (except education)	7	7	9
Public administration	3	4	5
Active duty military	5	5	3
Occupational type (working adults)			
White-collar I occupations	28	29	22
White-collar II occupations	27	27	31
Service occupations	13	12	15
Outdoor occupations	2	4	11
Blue-collar I occupations	11	13	8
Blue-collar II occupations	18	16	13
Military occupations	< 1	< 1	< 1

^a Some subcolumn totals do not equal 100 due to rounding.

^b Categories derived from PUMS-L industry codes. (Sectors are similar but not identical to those used by the Bureau of Economic Analysis that appeared earlier in this chapter in the "Types of Jobs" section.) Source: Tolbert and others (1995).

Table 2.20—Socioeconomic well-being among three age groups in the PUMS-L analysis area

Indicator of well-being	Ages 20 to 44	Ages 45 to 64	Ages 65 and older
Median household income	\$25,000	\$26,238	\$12,000
Household poverty rate (percent)	14.0	10.8	21.3
Housing tenure (percent)			
Owned outright	8	35	65
Owned with a mortgage or other loan	49	47	13
Rented for cash	40	16	19
Under another form of tenure	3	2	2
Average housing value	\$66,835	\$74,958	\$53,218

Source: Tolbert and others (1995).

Characteristics of More Highly and Less-Educated Residents

Population Characteristics

Almost half (46 percent) of the adult population with less than a high school diploma are 65 years old or older (table 2.21). According to the PUMS-L data, 91 percent of the adults having completed a 4-year college degree (or more) were White, about the same as the proportional representation of Whites in the population of the area. American Indians and Blacks made up 1 percent and 6 percent, respectively, of adults having completed a baccalaureate degree (or more), which was 1 to 5 percentage points less than their proportional representation in the PUMS-L area population. Educational attainment levels appear to correspond to migration status: in 1990, 38 percent of the more highly educated adult residents were fairly recent in-migrants, compared to 27 percent of adults with a high school education only.

Living Arrangements

The most highly educated heads of households were slightly more likely to be part of a married couple household (69 percent) than were heads with less education (52 and 61 percent) (table 2.22). The best educated heads of households were also less likely to be single adults living with children or other relatives (7 percent compared to 13 and 14 percent). Less-educated

heads of households were considerably more likely to live in a mobile home or trailer: 10 percent of households headed by a high school graduate lived in a mobile home or trailer, compared to 2 percent of those headed by an individual with a 4-year college degree.

Means of Making a Living

Less-educated residents of the Assessment area have lower participation rates in the labor force: 66 percent of high school-educated adults were active in the labor force during the 1990 census week compared to 81 percent of adults with a 4-year college education (table 2.23). Unemployment rates drop significantly with higher levels of education—from about 6 percent among the high school/GED adults to 2 percent among adults with the most education. The three groups with a high school education or more show minor differences in their reliance on earnings for their total personal income: the range is from 80 percent to 86 percent.

Compared to working adults with a 4-year college degree, working residents with a high school education were twice as likely to be employed in a manufacturing industry (24 percent compared to 12 percent); twice as likely to be employed in retail trade (17 percent compared to 8 percent); and less than half as likely to be employed in the education and job-training services industry (10 percent compared to 28 percent) or in other professional services (e.g., health care or legal services) (5 percent compared to 13 percent).

Table 2.21—Characteristics of people in the PUMS-L analysis area grouped according to four levels of educational achievement

Characteristic	Schooling completed			
	Less than high school	High school or GED	Some college	Baccalaureate degree or more
----- <i>Percent</i> ^a -----				
Age				
25–44	24	50	61	62
45–64	31	33	27	27
65 or older	46	17	13	11
Race				
White	84	88	88	91
Black	13	9	9	6
American Indian	2	2	2	1
Migration status				
Lived in the same State in 1985	78	73	66	62
Lived in a different State in 1985	22	27	34	38

GED = General Educational Development.

^a Some subcolumn totals do not equal 100 due to rounding.

Source: Tolbert and others (1995).

Table 2.22—Living arrangements of groups of people who have completed various levels of schooling (PUMS-L analysis area)

Characteristic	Schooling completed			
	Less than high school	High school or GED	Some college	Baccalaureate degree or more
----- <i>Percent</i> ^a -----				
Household type				
Married couple	52	61	61	69
Single adult living with children or other relatives	13	13	14	7
Single adult living with nonrelatives	1	3	4	3
Single adult	33	22	21	21
Dwelling type				
Detached house	74	75	76	80
Multi-unit housing	14	14	17	17
Mobile home	11	10	6	2
Other type of dwelling	1	1	1	1

GED = General Educational Development.

^a Some subcolumn totals for household type do not equal 100 due to rounding.

Source: Tolbert and others (1995).

Table 2.23—Means of making a living among groups of people who have completed various levels of schooling (PUMS-L analysis area)

Characteristic	Schooling completed			
	Less than high school	High school or GED	Some college	Baccalaureate degree or more
----- Percent ^a -----				
Labor force participation				
In the labor force	34	66	75	81
Not in the labor force	66	34	25	19
Unemployment rate	9.7	5.5	4.2	2.1
Sources of personal income				
Earnings	53	80	84	86
Retirement-related income	42	18	15	13
Other sources	5	2	2	1
Extent of labor force participation				
Full time-full year	51	65	70	68
Full time-part year	25	18	14	19
Part time-full year	9	9	7	6
Part time-part year	15	9	9	7
Industrial sector ^b				
Extractive industries	8	4	3	2
Construction	10	7	5	2
Nondurable manufacturing	10	10	8	6
Durable manufacturing	15	14	10	6
Transportation, communications, and public utilities	6	8	10	5
Wholesale trade	3	4	4	2
Retail trade	16	17	15	8
Finance, insurance, real estate, and misc. business services	3	8	10	11
Personal and recreational services	11	8	7	4
Education and job training services	9	10	12	28
Professional services, exc. education	5	5	6	13
Public administration	2	2	3	6
Active duty military	2	4	6	7
Occupational type				
White-collar I occupations	6	13	30	70
White-collar II occupations	14	29	35	20
Service occupations	21	13	10	4
Outdoor occupations	9	3	2	1
Blue-collar I occupations	18	16	12	2
Blue-collar II occupations	32	24	10	2
Military occupations	< 1	< 1	< 1	1

GED = General Educational Development.

^a Some subcolumn totals do not equal 100 due to rounding.

^b Categories derived from PUMS-L industry codes. (Sectors are similar but not identical to those used by the Bureau of Economic Analysis that appeared earlier in this chapter in the "Types of Jobs" section.)

Source: Tolbert and others (1995).

The occupations of working residents also varied by educational achievement. Seventy percent of 4-year, college-educated workers in the region had white-collar I occupations compared to 13 percent of those who finished their formal schooling with a high school degree (or its equivalent). Twenty-four percent of the high school-educated labor force worked in blue-collar II occupations compared to 2 percent of the college-educated labor force.

Socioeconomic Well-Being

Table 2.24 illustrates contrasts in socioeconomic well-being among groups defined by level of schooling completed. The median household income of high school-educated heads of households (\$23,000) is considerably lower than that of heads with baccalaureate degrees (\$41,200). Just as striking, the poverty rate for households with a less-educated household head (13.1 percent) is almost 5 times higher than poverty rate for households with a head who has a 4-year degree (2.8 percent).

The percentage of households with high school- and college-educated heads who own their homes varies

little (71 and 75 percent, respectively). But the average home owned by a household head with a baccalaureate degree is almost \$47,000 more expensive than the average home owned by a high school graduate (\$105,842 compared to \$58,975).

Characteristics of White, Black, and American Indian Residents

Population Characteristics

Compared to the White population, the Black and American Indian populations in the Assessment area were younger (table 2.25). Among these three groups, American Indians had the largest percentage (39 percent) of children and teenagers, followed by Blacks (36 percent) and Whites (27 percent).

The percentage of Black adults in the region who had a post-high school education was somewhat lower than those for the other two racial categories. The dropout rate among Black teenagers (ages 16–19) was 14.8 percent; White teenagers had a 9.5 percent dropout rate; and American Indian teenagers had a 7.4 percent dropout rate. Blacks were slightly more likely

Table 2.24—Socioeconomic well-being of groups of people who have completed various levels of schooling (PUMS-L analysis area)

Indicator of well-being	Schooling completed			
	Less than high school	High school or GED	Some college	Baccalaureate degree or more
Median household income	\$12,000	\$23,000	\$28,121	\$41,200
Household poverty rate (percent)	29.0	13.1	8.5	2.8
Housing tenure (percent)				
Owned outright	50	32	23	18
Owned with mortgage or other loan	21	41	48	57
Rented for cash	26	25	27	24
Another form of tenure	3	2	2	1
Average housing value	\$41,235	\$58,975	\$69,738	\$105,842

GED = General Educational Development.
Source: Tolbert and others (1995).

Table 2.25—Population characteristics associated with three racial categories (PUMS-L analysis area)

Characteristic	Racial category		
	White	Black	American Indian
	-----Percent-----		
Age			
19 or younger	27	36	39
20–44	38	38	36
45–64	20	15	15
65 or older	15	11	10
Schooling completion rates			
Did not complete high school	23	34	27
Have a high school diploma or GED	33	31	34
Have completed some college	25	23	27
Have a 4-year college degree	19	12	12
Dropout rate, 16–19 year olds	9.5	14.8	7.4
Migration status			
Lived in the same State in 1985	64	62	69
Lived in a different State in 1985	36	38	31

GED = General Educational Development.
Source: Tolbert and others (1995).

(38 percent) and American Indians less likely (31 percent) to be recent in-migrants compared to Whites (36 percent).

Living Arrangements

As shown in table 2.26, Black households were least likely to consist of married couples (36 percent compared to 59 percent of American Indian and 62 percent of White households). The percentage of single heads of families was notably high among Black households (37 percent), lower among American Indians (13 percent), and even lower among Whites (10 percent).

Means of Making a Living

Table 2.27 illustrates that differences in participation rates in the labor force among racial categories are relatively small, ranging from 61 to 65 percent participation. For Assessment area residents in the civilian labor force, unemployment rates vary by racial category;

Blacks and American Indians experience unemployment rates (13.5 and 10.6 percent, respectively) at least twice as high as that of Whites (5.3 percent). Eighty to 84 percent of all those living in this area rely on earnings as the main source of their personal incomes. The percentages of White, Black, and American Indian workers in manufacturing are nearly equal (18 or 19 percent). One of the few race-related differences in employment is in the percentages working in the educational and job-training sector. More than 20 percent of employed Blacks, compared to 14 and 12 percent of employed American Indians and Whites, respectively, work in this sector.

Fifty-five percent of employed Whites work in white-collar occupations compared to 44 to 45 percent of Blacks and American Indians, respectively. Whites are also somewhat more likely to be employed in the more highly skilled, blue-collar (I) occupations (12 percent), at least when compared to Blacks (7 percent). In contrast, close to one-fourth of employed American Indians and

Table 2.26—Living arrangements associated with three racial categories (PUMS-L analysis area)

Living arrangement	Racial category		
	White	Black	American Indian
	----- Percent ^a -----		
Household type			
Married couple	62	36	59
Single adult living with children or other relatives	10	37	13
Single adult living with nonrelatives	4	3	3
Single adult	25	25	25
Dwelling type			
Detached houses	75	62	69
Multi-unit housing	15	35	18
Mobile homes	8	2	13
Other types of dwellings	1	1	1

^a Some subcolumn totals do not equal 100 due to rounding.
Source: Tolbert and others (1995).

Blacks (22 percent and 26 percent) work in service occupations, while little more than one-eighth (13 percent) of White workers are in service occupations.

Socioeconomic Well-Being

Employment differences among the racial categories are reflected in differences in socioeconomic well-being (table 2.28). Average household incomes in households headed by Blacks or American Indians (\$13,000 and \$15,562, respectively) are about 60 to 70 percent of average household incomes of White heads of households (\$22,000). Differences in household poverty rates are even greater: American Indian and Black poverty rates of 28 percent and 33 percent, respectively, are more than two times higher than the household poverty rate among White heads of households (13 percent). A similar gap exists in the values of homeowners' dwellings.

Implications and Opportunities

The metropolitan population of the region is increasing at nearly twice the rate of the nonmetropolitan

population. As the above analyses have shown, the metropolitan population differs in significant ways, including younger median age, greater per capita income, and higher educational achievement than the nonmetropolitan population. If current trends continue, social and economic differences between the metropolitan and nonmetropolitan areas of the Highlands are likely to increase. Of course, several nonmetropolitan counties (and some of the cities within them) also have impressive growth rates and seem destined eventually to become new metropolitan areas or part of existing ones.

Most of the population growth in the Assessment area in recent decades is due to in-migration. In-migrants may bring with them ideas, values, and expectations that differ substantially from those who are longer term residents. More detailed analysis of migration flows (especially source areas from which in-migrants are coming) could provide useful insights into the kinds of demands and expectations that may be placed on the national forests in the region.

Although data are limited, racial and ethnic diversity appears to be increasing in the region, especially in the metropolitan areas. Little is known, however, about the

**Table 2.27—Means of making a living associated with three racial categories
(PUMS-L analysis area)**

Characteristic	Racial category		
	White	Black	American Indian
	----- Percent ^a -----		
Labor force participation			
In the labor force	63	61	65
Not in the labor force	37	39	35
Unemployment rate	5.3	13.5	10.6
Sources of personal income			
Earnings	80	84	82
Retirement-related income	19	11	14
Other sources	2	5	4
Extent of labor force participation			
Full time-full year	59	56	54
Full time-part year	19	22	26
Part time-full year	9	6	5
Part time-part year	13	16	14
Industrial sector ^b			
Extractive industries			
Construction	6	3	8
Nondurable manufacturing	8	9	11
Durable manufacturing	11	9	8
Transportation, communications, and public utilities	7	6	4
Wholesale trade	3	2	1
Retail trade	19	18	19
Finance, insurance, real estate, and misc. business services	5	3	5
Personal and recreational services	10	11	8
Education and job training services	12	21	14
Professional services, exc. education	8	5	10
Public administration	3	2	1
Active duty military	4	9	8
Occupational type			
White-collar I occupations	27	21	19
White-collar II occupations	28	23	26
Service occupations	13	26	22
Outdoor occupations	3	2	3
Blue-collar I occupations	12	7	10
Blue-collar II occupations	17	22	19
Military occupations	< 1	1	1

^a Some subcolumn totals do not equal 100 due to rounding.

^b Categories derived from PUMS-L industry codes. (Sectors are similar but not identical to those used by the Bureau of Economic Analysis that appeared earlier in this chapter in the “Types of Jobs” section.) Source: Tolbert and others (1995).

Table 2.28—Socioeconomic well-being associated with three racial categories (PUMS-L analysis area)

Characteristic	Racial category		
	White	Black	American Indian
Median household income	\$22,000	\$13,000	\$15,562
Household poverty rate (percent)	13.0	32.5	28.1
Housing tenure (percent)			
Owned outright	40	30	36
Owned with mortgage or other loan	32	19	25
Rented for cash	26	50	34
Under another form of tenure	2	2	5
Average housing value	\$67,431	\$42,609	\$42,069

GED = General Educational Development.
Source: Tolbert and others (1995).

growing Hispanic-American population living in the Highlands region. Their numbers are poorly documented in most counties, and even less is known about their actual or potential use (for work and recreation) of the national forests and other public lands of the area.

Federal land managers can use Assessment information about the location of poor and minority communities as a starting point for ensuring that the issue of environmental justice is adequately addressed in policy, program, and project planning. Public involvement strategies can be designed to ensure that these communities are included and have meaningful opportunities to participate in agency decisions that may affect them. While Assessment data are based on the 1990 census, more up-to-date estimates or surveys may be available at the time national forests revise their land management plans.

With regard to the fastest-growing nonmetropolitan counties, concerns exist about the tradeoffs that local residents are experiencing in terms of congestion, part-time or seasonal jobs, and an aging population. For example, a local economy dependent upon tourism and recreation requires roads that are adequate to carry heavy traffic during peak seasons. The local area also needs an adequate supply of affordable housing for seasonal and/or part-time workers, who tend to receive

relatively low wages and few benefits. Aging populations in retirement areas may also place unique demands on local services.

People living in nonmetropolitan counties that include national forest lands are likely to feel the greatest and most immediate effects of any changes in national forest management. Aging residents in nonmetropolitan areas who are less educated and/or are living in or near poverty tend to be especially vulnerable to outside forces. These forces range from cuts in Social Security to decisions or conditions that limit firewood cutting in the national forest. When clusters of these populations are close neighbors of national forests, their vulnerability to forest management policy decisions is likely to be greater.

On several measures, the presence of national forest lands appears to be associated with growth and general prosperity in metropolitan areas. Rates of population and income growth are highest and unemployment rates are lowest, for instance, in metropolitan counties with national forest lands. These relationships suggest that the co-occurrence of metropolitan advantages (such as transportation networks, colleges or universities, and employment opportunities) and national forest amenities (including scenic beauty and recreational opportunities) may be part of the attraction to people and industries

moving into the Ozark-Ouachita Highlands. However, national forest lands represent less than 5 percent of the county acreage in three of the metropolitan counties that have national forest lands and 11 to 22 percent of the other three metropolitan counties that have national forest lands. Further study (e.g., multivariate analyses) is necessary to determine whether such a relatively small presence is an independent factor in local growth and prosperity. It may also be worthwhile to study the relationships between the proximity of growing metropolitan areas to national forests rather than co-occurrence in the same counties.

Proximity to national forests also appears to benefit some retirement- and recreation-oriented communities in nonmetropolitan counties within the Assessment area. Here again, additional (more sophisticated) analyses might shed light on the relative contributions of proximity to national forests and access to lakes toward the growth and development of these communities.

Equal caution is necessary when interpreting the patterns of persistent poverty, high rates of unemploy-

ment, and relatively low levels of educational achievement in the Assessment area. Although the occurrence of these socioeconomic indicators appears to be strongly correlated with the presence of national forest lands in many counties, it would be a mistake to assume (without additional analyses) that there is a causal relationship between presence of national forest lands and poverty. Many other factors are at play, including relatively low investment in education (compared to many other parts of the country).

Still, a key question that needs to be reexamined when the process of revising the national forests' management plans begins is how national forests can best contribute—if indeed they can contribute—to improving socioeconomic conditions. Dialogue and analyses are needed to determine whether some management scenarios are more likely than others to contribute to sustainable economic development, reduced unemployment, and higher quality of life in impoverished areas (especially in those 23 nonmetropolitan counties that have both persistent poverty and national forest lands).

Chapter 3: Communities

Question 3.1: What kinds of community planning take place in the Assessment area, and how is such planning related to national forest planning?

Public land managers work with two kinds of communities: geographic communities and interest communities. Geographic communities (communities of place) include cities, towns, neighborhoods, and even counties. Interest communities (or communities of interest) include local, State, tribal, regional, national, and international organizations that represent particular concerns or agendas rather than places per se (although organizations obviously also represent part of one or more geographic communities). American Indian nations may represent a third type of community, one in which a particular place or places (e.g., tribal lands) and the interests of the residents or owners of that place coincide.

This chapter emphasizes communities of place and the major factors affecting them, the kinds of local and subregional planning activities in which they engage, and the potential for greater linkages between local planning and Federal land management planning. The communities of interest in the Assessment area are discussed briefly, but more research is needed before social scientists can thoroughly characterize them. Many other chapters in this report provide information relevant to understanding the various kinds of communities in the Highlands. The demographic profile in Chapter 2, for example, shows that in the 14 Oklahoma counties in the Assessment area, more than 10 percent of the population are American Indians; however, this group makes up less than 10 percent of the population in all other Assessment area counties. The “Public Opinions Expressed about the Assessment” section of Chapter 9 deals broadly with the kinds of communities of interest that get involved in public land management planning. Linkages with other chapters are noted throughout Chapter 3.

Key Findings

1. The communities of the Highlands include 695 municipalities plus numerous unincorporated communities and neighborhoods. These communities range from rapidly developing metropolitan areas and associated suburban communities to small, rural, natural resource-dependent communities. In 1990, 97 percent of the municipalities had populations of 10,000 or fewer.
2. More than half of the population of the Assessment area lives in the open country and relies principally upon county governments for essential services; about 23 percent live in municipalities of less than 10,000 people.
3. The Assessment area had major population increases in the 1970's and grew again in the 1990's; however, the ongoing loss of the most highly educated young people from the area's rural communities is a concern.
4. The Federal assistance available to counties and municipalities has declined greatly since the middle 1970's; local governments have obligations to provide services that previously were not required of them.
5. Arkansas communities of the Highlands that depend upon the timber industry show no clear pattern of disadvantage in levels of poverty or investment in human capital through education.
6. Annual 25 percent reimbursements from national forest gross revenues to Arkansas counties and school districts apparently compensate for most effects of the reduced tax base attributable to the presence of significant amounts of Federal land.
7. Many municipalities engage in land use planning and zoning. While a few counties plan for land use, they seldom use zoning. States are beginning to require various forms of local planning, including planning for capital improvements and public health. Some counties are becoming more involved in public land management planning; the recent passage in the Highlands of at least nine “county land use plans” may be an important trend.

8. At the local level, the following planning groups are available in the Assessment area: Planning and Development Districts, Metropolitan Planning Organizations, and Resource Conservation and Development councils. There are also community development specialists in the three States' Extension Services, utility companies, and other institutions.
9. National forest planning efforts have had little connection with local planning activities. Generally, neither long-range national forest planning, more immediate project planning, nor forest management issues are included in the agendas of community planning efforts.
10. National forest ranger districts help sustain a wide variety of partnerships with local communities. Some of the most important ones result from the Rural Community Assistance program, but many relate to other aspects of the stewardship responsibilities of the ranger districts.

Data Sources and Methods of Analysis

The data sources for this section include 1990 census data on the population sizes of the incorporated places in the region (see Chapter 2 for further detail); a wide variety of published documents and World Wide Web sites; and extensive mail and telephone contacts with numerous informed individuals, including local officials. The Social-Economic Team also drew upon the results of a Master's thesis on the relationships between timber or forest dependency and community investment in education (Vasquez 1994). In addition, they consulted some preliminary findings from the Ozark-Ouachita Highlands Communities Project (coordinated by the lead author of this chapter), which included data collection on plans and planning activities and relationships with the USDA Forest Service in some 30 communities in the Assessment area. Finally, the team gained information from informal interviews with community leaders, Extension Service personnel, and district rangers on the three national forests of the Highlands.

The methods of analysis varied greatly and depended upon the data source. They ranged from interpreting descriptive statistics based upon Census Bureau and other secondary data sources to compiling systematic lists about planning institutions.

Communities of Interest

In political theory, interest communities play a crucial role as a "third force" representing the citizen in the face of the powerful State and market. Such communities are the concrete expressions of the vital role of voluntary associations (and volunteerism in general) in the Nation's democratic system, one of the things that most impressed Alexis de Toqueville about the United States (de Toqueville 1973). "Civil society" is sustained, in large part, by the plethora of independent, private, organized groups that serve as buffers or mediators between the individual citizen and the polity. Interest communities represent citizens and, at the same time, educate and inform them. In the context of public land management (and certainly in many other arenas), it is through membership in these communities that the average citizen's interests are represented, regardless of whether he or she lives near the lands in question. Participation by these communities in the processes that lead to decisions about public land management is, therefore, essential.

However, interest communities often have a tendency toward ideological purity; toward conflict and advocacy for its own sake and for the sake of generating publicity and membership; and, finally, toward using local communities as battlegrounds for their issues. Kemmis (1990), in a widely recognized analysis of various "policy gridlocks," has shown that many issues that appear to be irreconcilable in situations where national interests compete with each other can be resolved in local communities in which people have very practical reasons to pursue dialogue, compromise, and resolution. The interface between interest communities and geographic communities, then, may be a very fruitful place to explore opportunities for creative problem solving.

Many different kinds of interest communities are active in public land planning and management in the Highlands. Fendley and others (1997) identified three broad groups involved in various planning efforts and programs of the Ouachita National Forest: (1) environmental organizations, (2) timber-related organizations, and (3) groups and organizations that promote recreation. The same kinds of interest communities function in the other parts of the Highlands. However, groups

such as the Ozark Society, the various State and local branches of the Wildlife Federation, and perhaps others fit readily into two or more of the above categories.

Recently, a fourth group of interest communities has emerged in the Highlands—organizations that advocate for property rights, resist additional environmental regulations and controls, and promote the traditional, resource-based economic sectors of the Highlands. Thus, even a preliminary assessment of the relevant interest communities in the Assessment area would have to include the four types just named but also recognize that interest communities resist easy classification and represent considerable diversity.

Communities of Place

Geographic communities represent the most common and most concrete notion of “community,” because they represent specific places in which groups of people live. But geographic communities include a very wide variety of places; furthermore, communities may be “nested”

within other communities. Thus, people may identify more than one of the following as communities to which they belong: counties, municipalities, school districts, and/or neighborhoods; other places within counties; neighborhoods and school districts within municipalities; and so forth.

One of the most common ways people define “community” operationally is as an incorporated place (or area). Only about half of the population of the Assessment area, however, resides in its 695 incorporated areas (table 3.1). The other half lives in unincorporated areas, including “open country,” where communities are not necessarily less real but may be more difficult to identify, name, or count.

The incorporated areas of the Assessment area—306 in Missouri, 281 in Arkansas, and 108 in Oklahoma—range in size from 5 to 176,000 people. Almost 97 percent (671) of the incorporated areas had less than 10,000 people in 1990 (when the last complete census was taken); 20 had populations of 10,000 to 49,999, and 4 had populations of 50,000 or more. Nearly 11 percent of the people in the Assessment area lived in incorporated

Table 3.1—Assessment area communities and 1990 population by community size class and State

State or area	Community size class					Open country	Total
	Under 500	500–2,499	2,500–9,999	10,000–49,999	Over 50,000		
Arkansas							
Incorporated areas	139	95	32	12	3	NA	281
Population	33,046	107,753	168,380	262,074	310,334	657,386	1,538,973
Population (%)	2.1	7.0	10.9	17.0	20.2	42.7	100
Oklahoma							
Incorporated areas	49	41	15	3	0	NA	108
Population	12,487	49,925	64,261	39,910	0	242,122	408,705
Population (%)	3.1	12.2	15.7	9.8	0.0	59.2	100
Missouri							
Incorporated areas	149	111	40	5	1	NA	306
Population	33,214	126,667	194,440	94,392	140,494	894,167	1,483,374
Population (%)	2.2	8.5	13.1	6.4	9.5	60.3	100
Assessment area							
Incorporated areas	337	247	87	20	4	NA	695
Population	78,747	283,345	427,081	396,376	450,828	1,794,675	3,431,052
Population (%)	2.3	8.3	12.4	11.6	13.1	52.3	100

NA = not applicable.
Source: USDC BC (1993).

areas of less than 2,500, and 23 percent lived in incorporated areas of less than 10,000 people. Twelve and 13 percent of the population, respectively, resided in the 2 larger categories of incorporated areas (10,000 to 49,999 and 50,000+ people). Population projections (USDC BC 1997b) show that 4 cities in the Arkansas portion of the Highlands (Cabot, Harrison, Mountain Home, and Siloam Springs) and 2 cities in the Missouri Ozarks (West Plains and Lebanon) are very likely to currently have more than 10,000 people. Fayetteville, AR, already has a population over 50,000. Thus, rather than having 24 cities with populations over 10,000, the Highlands area likely now has 30 such communities of place. But at least 96 percent of the cities and towns still have populations that are lower and, in most cases, far lower than 10,000.

County seat towns have special economic, political, and social significance. With some minor exceptions (counties that still maintain two county seats), one county seat town serves each county. Even though county seat towns may be quite small, generally they boast relatively stable economies because of the government employment associated with being a county seat. Twenty-four of 32 national forest district offices and all 3 forest supervisors' offices are located in county seats.

This statistical portrayal, however, masks the variety of communities one finds in the region. Two metropolitan areas lie partially in the Highlands: Little Rock/North Little Rock, AR and St. Louis, MO. Four others lie fully within the Highlands: Fayetteville/Springdale/Rogers, AR; Fort Smith, AR and OK; and Springfield and Joplin, MO. The Highlands also include smaller, but often rapidly growing suburban communities at the edges of the metropolitan areas—communities noted for tourism and recreational attractions such as Branson, MO, and Eureka Springs and Hot Springs, AR; designed communities such as Cherokee Village, Bella Vista, and Hot Springs Village, AR, and the new Cooper Communities development at Branson; and hundreds of small, rural communities (including 337 incorporated areas having less than 500 people).

Discussions with national forest district rangers about their perceptions of communities of place (see Ozark-Ouachita Highlands Communities Project below) revealed a consistent pattern. In general, the rangers perceive the relevant communities to be: (1) the larger towns or business centers, frequently county seats, in

which the ranger district office might be located but which are not considered heavily dependent upon forestry or the Forest Service for their economies in most cases (e.g., Booneville, Paris, Danville, Ozark, Clarksville, Mena, or Waldron, AR, and Salem, Houston, Doniphan, Poplar Bluff, or Potosi, MO); (2) the entire county as the relevant community, especially in cases where the ranger district and the county roughly coincide; (3) smaller, rural communities, (such as Lamar, Oark, Oden, and Mansfield, AR, and Elsinore, MO) many of which are considered to be more dependent upon and likely to be interested in forest management and/or mining, and (4) the larger communities that are not dependent upon forestry at all, but in which live many active members of the major interest communities with which the Forest Service interacts (e.g., Fayetteville, Hot Springs, Little Rock, Oklahoma City, and St. Louis). It is among the smaller, rural communities that one finds communities still highly dependent upon forestry, the timber industry, the mining industry, and/or, in some cases, upon recreation and tourism opportunities made available by the national forests and other public lands and waters.

Major Factors Affecting Geographic Communities

One of the most important factors affecting communities of place in the Ozark-Ouachita Highlands is the transformation of the area's economy, especially the rural economy, from one based on diversified agriculture to one based more on poultry, light manufacturing, recreation and tourism, and retirement. Other important factors are migration and population growth trends; emerging transportation patterns; the changing role of government, especially the Federal Government; and the changing and sometimes conflicting values and preferences of residents of the Highlands.

Transformation of the Economy

The Highlands area has a long history of poverty. The economy has been heavily based upon natural resource use and management, including agriculture and forestry, both of which have been radically transformed during the last three decades. Agriculture, which was never very prosperous in this region, has declined in relative economic importance but has experienced a

rapid expansion in the food production and processing areas, mostly poultry. Poultry production and processing have reinvigorated some of the small, rural communities that previously depended upon forestry and diversified agriculture. Many people in rural communities perceive that, relative to other industries in their communities, the timber industry is declining in economic importance as it grows more capital intensive and employs fewer people than in the past. Certainly perception is reality in places that no longer have active saw mills or from which loggers have moved away. Another factor that may be contributing to timber seeming less important in some local economies is that timber sales from the national forests have declined somewhat from a peak in the 1980's, and dramatically so in a few locales (see Chapter 6).

The northern part of the Assessment area led the Nation in the "rural renaissance" that began in the middle 1960's. Very rapid population growth occurred in some of what were formerly very rural counties; Baxter County, AR, for example, underwent a 60 percent increase from 1970 to 1980. Light manufacturing increased substantially in the region. Then came the rural crisis of the early 1980's—a time when international markets fell due to the rising value of the dollar—and many rural counties actually lost population.

Some light manufacturing has returned. But many of the smaller, rural communities are now looking to tourism and attracting retirees as feasible options for economic development. These communities are responding to growing demand (especially from nearby urban areas such as the Dallas/Ft. Worth metropolitan area) for better access to amenities and for improved services. And in-migration has again emerged as an important trend in the Highlands.

Major public investments (in lakes, for example) and the appealing natural environment of the region have made it attractive for in-migration, especially of retirees and families seeking refuge from the stresses of urban life. Not only does the region boast a vast complex of lakes attractive for both water-based recreation and fresh water supplies, it also has a very large network of parks, public forests, and other recreation settings (see Chapter 5); a large number of institutions of higher education (in 42 communities); and a vigorous retirement "industry."

Recent work by Nord and Cromartie (1997) demonstrates both the recent pattern of in-migration and its correlation with natural amenities. The Social-Economic Team's analysis of the results of this nationwide study revealed that 43 percent of the counties in the Assessment area have a Natural Amenities Index that places them in the top quartile of U.S. counties; 87 percent of the counties in the Assessment area rank in the top half. Rankings for Assessment area and surrounding counties are shown in figure 3.1.

Transportation Patterns

Historically, the Highlands area has been rather isolated, with only two Interstate highways crossing the region (I-44, formerly U.S. 66, crosses east-west in the north and I-40, much of which was formerly U.S. 64, crosses east-west along the Arkansas River). Until very recently, driving through the Highlands from north to south or vice versa meant a beautiful but slow and winding trip. Recent and continuing improvements to U.S. highways 65, 69, and 71 are now making motor vehicle access easier. Ongoing expansion of U.S. 60 to a four-lane road east of Springfield, MO; improvement of the road system into and around Branson, MO; establishment and improvement of U.S. 412 crossing the Ozarks in northern Arkansas; and highway improvements in southeastern Oklahoma will soon further improve access to the region. A new regional airport in northwestern Arkansas may improve access to air transportation for that part of the Ozarks.

Demands Placed on Local Governments

Since the first major consolidation of Federal programs designed to assist localities under the New Federalism of the middle 1970's, Federal Government support for rural communities has declined almost continuously. Federal programs available in the 1960's for local communities in areas such as infrastructure development, law enforcement, and combating poverty are now extremely limited. At the same time, the demands placed upon local communities, often as direct mandates from Federal or State Governments, for good streets and roads, clean water, and effective sewage treatment, among other things, have not declined, leaving most rural communities in severe financial straits.

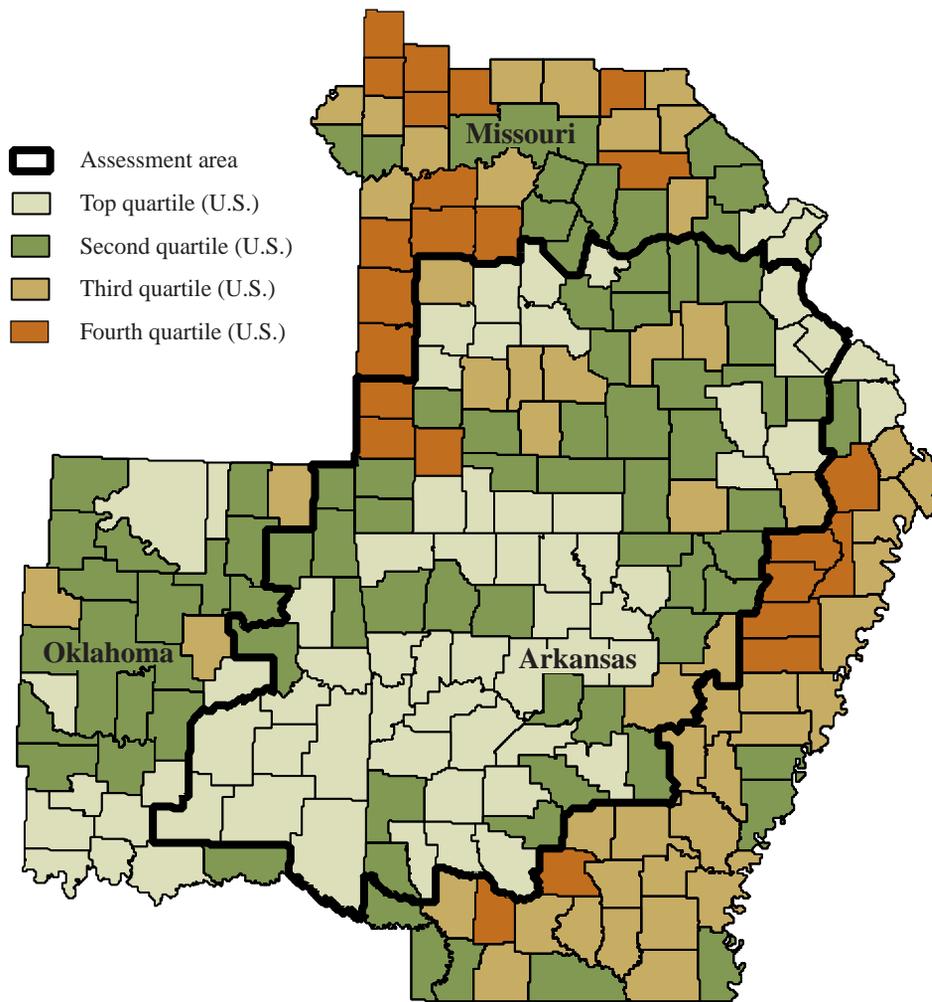


Figure 3.1—Natural Amenities Index for the Assessment area and surrounding counties (Nord and Cromartie 1997).

Community Leadership

Some issues are characteristic of rural communities almost everywhere. Migration from these communities typically has drained away many of the most highly skilled young men and women and, with them, much potential local leadership. This trend has prevailed even when net in-migration was positive. Hence, a major concern of rural communities in the region is how to retain their most talented young people. Another important issue is that public administration is mostly part-time and typically is conducted by people without professional training in this field. Few small communities have the resources to employ professional administrators, and leadership frequently is in short supply.

Community Conflicts

Conflicts over natural resource management and goals and objectives for communities appear to be persistent features in some parts of the Highlands. Several communities have become battlegrounds for interest groups that represent seemingly irreconcilable national policy conflicts. In others, the conflicts are more local, but no less paralyzing. Conflicts range from simple disagreements about desired futures for communities undergoing rapid change (with some residents committed to retaining a traditional, small-town atmosphere and others seeking economic development and other changes) to long-standing resentment over matters such as past condemnation of private land for public

purposes (e.g., national rivers), management practices of Federal or State agencies, and/or the perceived domination of public agencies by (variously) an environmental agenda or a commodities agenda.

Natural Resource-Dependent Communities

Social scientists hypothesize that people who live in resource-dependent rural communities are likely to be poor and “inherently disadvantaged.” Much has been written recently about these relationships, especially about the role of resource dependency in the persistence of rural poverty (Humphrey and others 1993; Freudenberg and Gramling 1994; Peluso and others 1994; West 1994; Nord 1994; Johnson and Stallman 1994; Cook 1995; Overdeest and Green 1995; Humphrey 1994a, 1994b, 1994c, 1995).

Forest-dependent communities are among those believed most likely to be disadvantaged. Cook (1995) presents information on poverty in western Washington during the 1980’s that clearly supports this generalization. Howze and others (1994) found similar patterns in Alabama. In Arkansas, however, the highest rates of rural poverty are in the Lower Mississippi Delta region, not in timber-dependent or forest-dependent communities (Vasquez and others 1996). Overdeest and Green (1995) have shown a similar pattern in Georgia, where the timber industry actually is associated with higher levels of well being in some places.

Vasquez (1994) examined these questions for all school districts in Arkansas. She focused upon the schools as key community institutions and upon funding for education as an indicator of community investment in its human capital. Vasquez (1994) and Vasquez and others (1996) also examined a key relationship between the Forest Service and local communities—the “25 percent returns” from gross national forest revenues that go to local schools (and county road funds) each year. They compiled detailed data in 2-year intervals from 1980 to 1990 for all school districts. Some data were available at the school district level and some only at the county level. Vasquez and her colleagues measured two indices of resource dependency—timber dependency and forest dependency.

Using data from the U.S. Bureau of Economic Analysis, Vasquez (1994) calculated “timber dependency” as the percentage that timber-related earnings (Standard Industrial Classification (SIC) codes 08 and 24) represented of all earnings (farm and nonfarm) in the county. To classify counties and school districts unambiguously over the study period, she calculated averages of these percentages for each county. Vasquez calculated forest dependency directly from the Forest Service payments made to States for use by school districts in the counties, divided by the number of students in the counties and adjusted for inflation; hence, the actual measure used was the inflation-adjusted payment per student. Forest dependency, then, refers to dependence upon national forest revenues for a portion of school budgets. These values were averaged for each school district across the six 2-year periods.

Vasquez (1994) also classified the nonmetropolitan counties of Arkansas into three regions—the Coastal Plain, the Highlands, and the Delta—and treated the metropolitan counties as a fourth category. This study concluded that differences among regions in average expenditures per student were not great and did not point to any “rural disadvantage.” The authors did show a small disadvantage for timber-dependent communities but no clear pattern of disadvantage for national forest-dependent communities. The capacity to invest in education appeared to be at least as high, perhaps higher, in rural communities, and the average per pupil investment of timber-dependent communities was higher than that of the average rural community. These differences were small, but there was no evidence that timber-dependent communities in Arkansas have lower capacity for investment in human capital (at least in terms of per pupil expenditures through elementary and secondary schools).

Interestingly, school districts most dependent on 25 percent returns from the national forests had the highest per student expenditures in each of the 2-year periods studied (table 3.2). Thus the reimbursements that such communities receive from the Forest Service appear to compensate on average for what they lack in assessed land base.

Table 3.2—Average biennial CPI-adjusted expenditures per student by Arkansas communities that have various levels of dependency on national forests

Forest dependency ^a	1980–81	1982–83	1984–85	1986–87	1988–89	1990–91
----- <i>Dollars expended per student</i> -----						
None	1,457	1,519	1,718	2,000	2,064	2,068
Low	1,398	1,469	1,659	1,949	2,005	1,995
Moderate	1,449	1,525	1,734	2,024	2,101	2,109
High	1,500	1,571	1,836	2,087	2,120	2,157

CPI = Consumer Price Index.

^a See “Glossary of Terms” for definition.

Source: Vasquez (1994).

Local Planning in the Ozark-Ouachita Highlands

Rarely do local governments and public land managing agencies in the Highlands coordinate their planning processes, even though there is great potential for their efforts to complement and enrich one another. Obviously, differences in the scale of planning efforts (city and county to multi-county and even multi-State scales) can be barriers, and local efforts often have to be more narrowly focused (e.g., on infrastructure improvements or economic development) than, for example, national forest planning (which must integrate multiple resources, uses, and values). Communities may not be able to devote sufficient resources to participate meaningfully in public land management planning. Still, to paraphrase one community specialist, “Wherever possible, community planning and national forest planning should be viewed as interdependent, interlinked processes.” Understanding and trying to link planning activities at various scales should yield benefits for communities and public land managers alike. This section offers a summary of local and subregional planning efforts and capacities in the Assessment area.

Some of the earliest comprehensive planning in the Ozark-Ouachita Highlands occurred in the 1930’s as part of the “New Deal” efforts to address the virtual collapse of the country’s economy during the Great Depression and associated problems such as resource depletion and the Dust Bowl. The documents prepared then, often under the auspices of the Works Progress

Administration (WPA), still serve as good examples of comprehensive analysis. They are, in many respects, quite similar to the Ozark-Ouachita Highlands Assessment. The 244-page Arkansas document (AR SPB 1936), for example, includes a detailed analysis of public and private forest lands, their disposition and use, and recommendations concerning their management.

However, the political acceptability of planning and related activities such as zoning and growth management has always been very low in the Ozark-Ouachita Highlands. Although Arkansas, Missouri, and Oklahoma laws allow counties to plan and zone, very few do either. Those that have initiated planning activities usually avoid zoning, the major instrument available for implementing plans. Opposition to planning has been especially strong when the Federal Government promoted it. Thus, several counties of the Assessment region strongly resisted the “regionalism” of the federally supported Planning and Development Districts of the 1960’s. Several jurisdictions refused to join the new regional organizations, and even now some of the Missouri counties do not participate in such organizations. Seligman, MO, near the western Missouri-Arkansas border, hosted an organization opposed to “regionalism” and dedicated to support for the kinds of propositions known in the 1970’s as “county supremacy” (the view that county government is—or should be—the supreme government authority).

Community development specialists believe that local residents will favor development strategies that extend to include other communities or even multi-county areas or regions only if they can (1) see the benefits of

economies of scale due to working together (rather than individually) and (2) be assured that the planning effort is not an attempt to replace county/city autonomy. In addition, local officials must feel that such efforts enhance their ability to better serve those who elected them.

Several types of local planning activities currently are taking place in the Highlands region. These include standard land use planning, economic development planning, broad-based strategic planning, and more narrowly defined planning associated with special agencies and programs.

Land Use Planning by Local Governments

The major instruments available for people to influence the physical growth, development, and use of their community are land use planning and its associated tools such as zoning and building codes. Municipalities and counties in all three States in the Assessment area can engage in land use planning. Land use planning draws upon the expressed goals and objectives of the citizenry to develop a plan to guide the physical development of the community. Such plans deal not only with the general pattern of land use, but also with the character and location of public buildings, streets, transportation systems, controls over land uses, and facilities that promote economic development, comfort, convenience, and general welfare.

Each State has its own set of regulations for implementing land use planning by municipal and county governments. In Arkansas, for example, cities and counties are not required to engage in land use planning (UA DCA 1972). If they choose to do so, though, they must (1) have a planning commission, (2) generate a plan or planning document, and (3) adopt a zoning ordinance that specifies the allowable uses of different parts of the community. The minimal goals of land use planning are to reduce conflict resulting from incompatible uses and to exercise some control over growth and expansion. Doing so protects local governments (and their constituents) from the burdens of maintaining substandard developments or too rapid growth.

To be able to control their “growth areas,” municipalities usually have the right to exercise some control over development outside their boundaries (extra-territorial authority). Still, there is little in traditional community land

use plans or in their ordinary land use planning processes that has implications for national forest planning, other than that the processes pursued are somewhat similar. Communities and public agencies certainly could forge linkages between community planning and national forest planning, however, and some counties are beginning to explore this avenue (see below).

The Social-Economic Team was able to obtain relatively complete information about municipal planning activity in 86 of the 107 counties in the region. In these 86 counties, 222 (35 percent) of 593 municipalities engage in land use planning. Naturally, larger communities are more likely to engage in planning than smaller ones, and few of the smallest conduct any land use planning.

Among the Assessment area’s 107 counties, only 24 (including 6 in Oklahoma that deal only with solid waste) engage in some explicit form of planning. Other than work done by Regional Planning Commissions and Economic Development Districts (or Planning and Development Districts) there has been very little county planning in Arkansas. Cleburne County, AR, and Heber Springs (a municipality within that county) initiated a joint city/county planning and zoning effort in the 1970’s. Recently, Washington County, AR, hired a planner and began to engage in some planning activity. County planning activity is more common in Missouri but seldom includes any form of zoning or land use control. In Oklahoma, counties are now required by State law to prepare capital improvement plans.

Some county governments in the Highlands recently began developing “interim county land use plans.” During the course of this Assessment, the county quorum courts of Montgomery, Newton, Pike, Polk, Searcy, and Stone Counties in Arkansas and Dent County in Missouri adopted such plans. Similar efforts have been initiated in other counties in the Highlands, and others likely will emerge in still more counties, including some that have significant blocks of public land. Typically, the stated purpose of these interim plans is to help direct uses of public resources and public lands in a county as well as to protect the rights of private landowners (e.g., this was the purpose of an ordinance in Newton County, AR, in 1997).

Local governing bodies, however, cannot mandate or direct the actions of Government agencies charged with implementing Federal land management policies.

Although local elected officials do not have the authority to manage Federal lands, they can express the interests of those they represent and participate actively in decisionmaking affecting those lands. Several Federal laws and regulations, in fact, encourage coordination among Federal, State, and local agencies and governments. For example, the regulations for implementing the National Forest Management Act of 1976 state that the Forest Service “shall coordinate regional and national forest planning with the equivalent and related planning efforts of other Federal agencies, State and local governments, and Indian tribes” (36 CFR 219).

Multijurisdictional Planning and Development

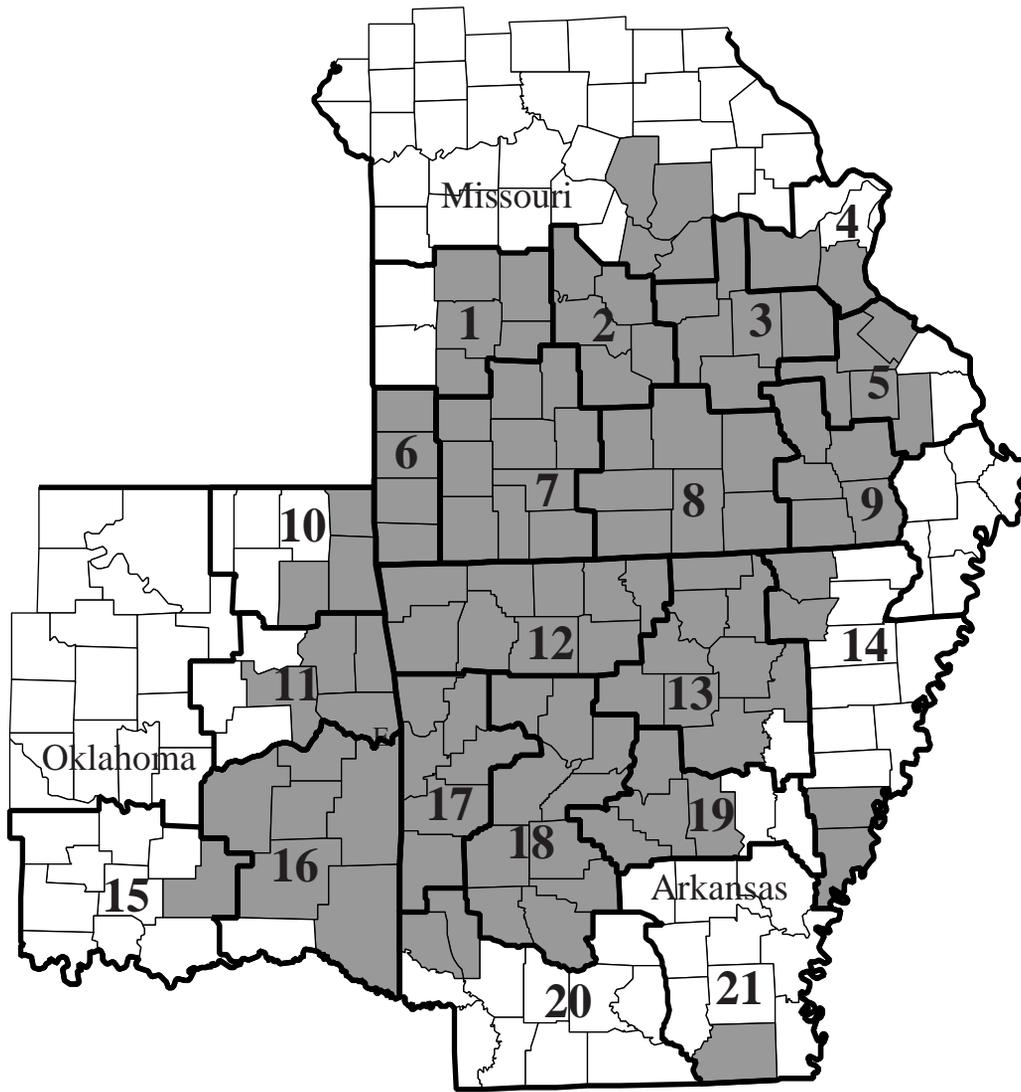
A variety of multijurisdictional planning and development organizations exist in the Ozark-Ouachita Highlands area. Councils of government represent the earliest form of multijurisdictional collaboration; they are based entirely upon local initiative. In the 1960’s, Federal initiatives led to Planning and Development Districts (P&DD’s) (or Economic Development Districts) in nonmetropolitan areas (fig. 3.2) and Metropolitan Planning Organizations (MPO’s) in urban areas (fig. 3.3). Both kinds of organizations exist today in the Ozark-Ouachita Highlands, where they play important roles in planning. The Oklahoma portion of the Assessment area has four Economic Development Districts and one MPO (part of the Arkhoma Regional Planning Commission). The Arkansas portion of the Highlands has seven P&DD’s and three MPO’s (including the Arkhoma Regional Planning Commission jointly with Oklahoma). In Missouri, Regional Planning Commissions accomplish the same functions as P&DD’s (or Economic Development Districts) in Arkansas and Oklahoma. There are nine Regional Planning Commissions in the Missouri portion of the Assessment area and three MPO’s. The St. Louis Metropolitan Planning Organization functions also as a Regional Planning Commission.

Multijurisdictional planning and development organizations are quasi-governmental agencies, governed by boards of directors made up of public officials representing the counties and municipalities they serve as well as representatives of the private sector. There are two fundamental reasons for their existence: (1) govern-

ments need to work together on a regional basis to address shared needs and challenges and (2) certain organizations have the flexibility to do long-range planning and development and provide technical assistance (grant applications, for example) to members. These organizations do some planning themselves and frequently serve as a repository of socioeconomic information on the regions they serve. In some cases, they also administer programs within their areas.

In the Ozark-Ouachita Highlands, 19 P&DD’s help formulate overall economic development plans and solid waste plans for their districts (fig. 3.2). (Note that development districts numbered 14 and 21 are adjacent to the Assessment area but include small units attached administratively to two of the Highland’s national forests.) In addition, they participate in the planning and implementation of transportation plans, recreation plans, and water and sewer projects for individual communities within their jurisdictions. In some places where county and municipal planning is rare, such as in the Ozark Foothills District of Missouri, the P&DD’s serve as the primary planning organizations for the area.

Resource Conservation and Development (RC&D) councils are responsible for multicounty areas and are dedicated to conserving resources and developing economic health. The USDA Natural Resources Conservation Service directly oversees these councils, but their full range of programs usually includes partnerships with other Federal, State, and private agencies. Some of the most extensive interagency cooperation comes from within the USDA through the Forest Service, the partially USDA-funded Cooperative Extension Service, and Rural Development. Most RC&D councils aim to develop local land and water resources for farming and industrial use, expand recreation and employment opportunities, and promote rural development. The RC&D program’s function is to put the planning process in motion but allow local efforts to monitor plan implementation (USDA NRCS 1997c). In the Assessment area, 13 RC&D councils (fig. 3.4) are responsible for projects such as planning for forest product and poultry waste management, promoting alternative crop and pasture management, monitoring water quality, and establishing rural fire protection for previously vulnerable areas (USDA NRCS 1997b). (Note that those areas numbered 8 and 15 on figure 3.4



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Kaysinger Basin Regional Planning Commission 2. Lake of the Ozarks Council of Local Governments 3. Meramec Regional Planning Commission 4. East-West Gateway Coordination Council 5. Southeast Missouri Regional Planning & Economic Development Commission 6. Harry S. Truman Coordination Council 7. Southwest Missouri Advisory Council of Governments 8. South Central Ozarks Council of Governments 9. Ozark Foothills Regional Planning Commission 10. Grand Gateway Economic Development Association | <ol style="list-style-type: none"> 11. Eastern Oklahoma Development District Association 12. Northwest Arkansas Economic Development District 13. White River Planning & Development District 14. Eastern Arkansas Planning & Development District 15. Southern Oklahoma Development Association 16. Kiamichi Economic Development District of Oklahoma 17. Western Arkansas Planning & Development District 18. West Central Arkansas Planning & Development District 19. Central Arkansas Planning & Development District 20. Southwest Arkansas Planning & Development District 21. Southeast Arkansas Planning & Development District |
|---|--|

Figure 3.2—Planning and Development (or Economic Development) Districts in the Assessment area (all shaded counties except two southernmost counties in District 14 and one in District 21 that include national forest lands attached administratively to the Ozark and Ouachita National Forests, respectively) and adjacent areas.

1. Little Rock/North Little Rock Metroplan
2. East-West Gateway Coordination Council
3. Springfield Area Transportation Study Organization
4. Joplin Area Transportation Study Organization
5. Northwest Arkansas Regional Planning Commission
6. Arkhoma Regional Planning Commission

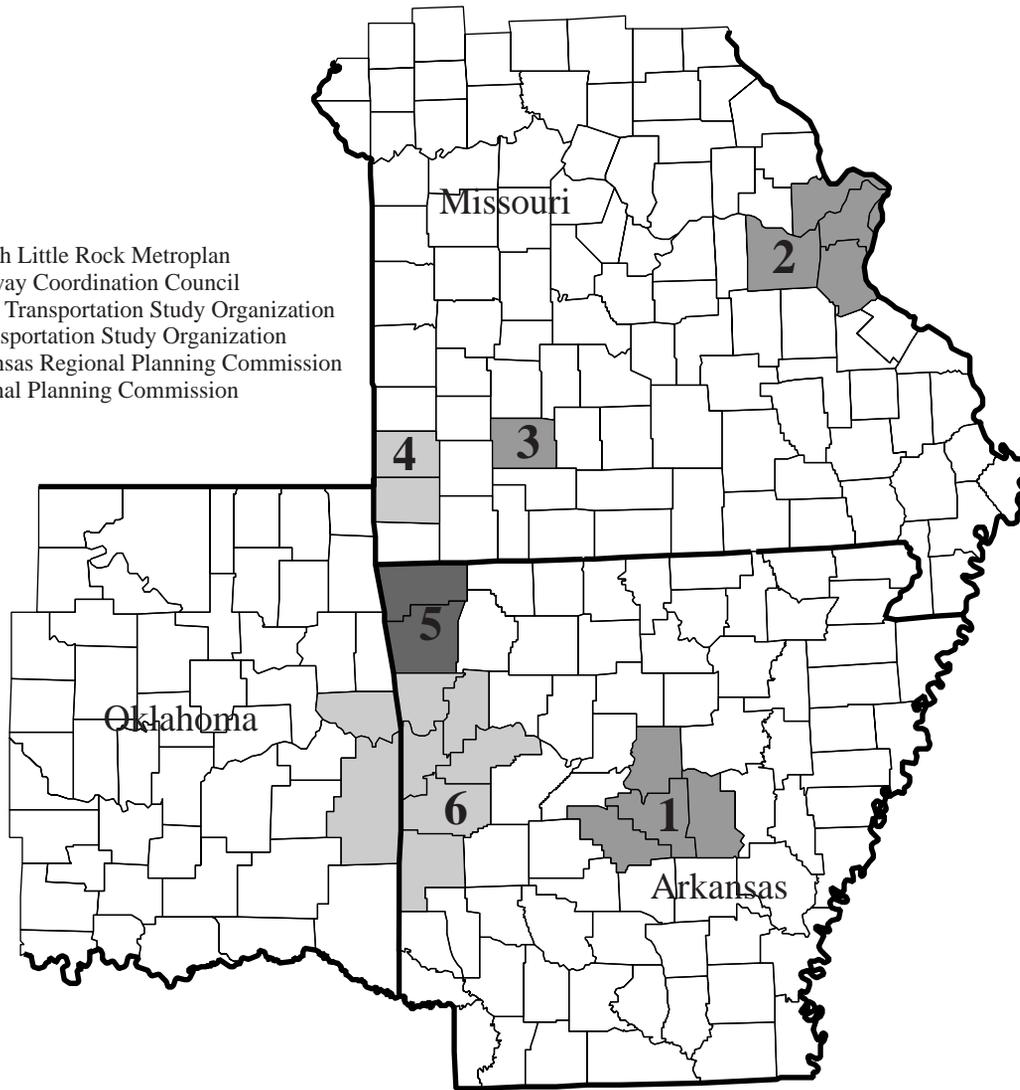


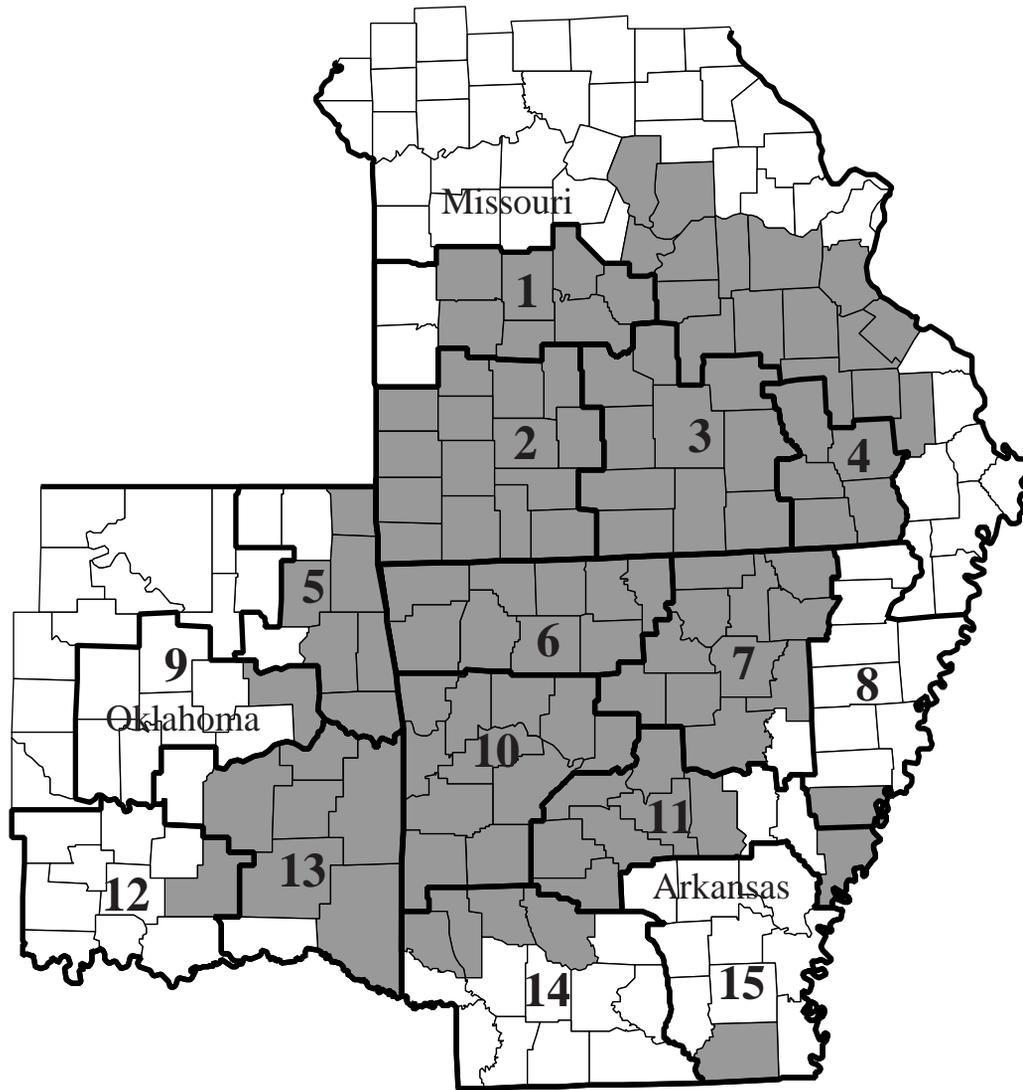
Figure 3.3—Metropolitan Planning Organizations (shaded counties) in the Assessment area and adjacent portions of Arkansas, Missouri, and Oklahoma.

are outside the Assessment area but include small units attached administratively to two of the Highland’s national forests.)

Community Development Block Grant Program

In 1974, several Federal assistance programs were consolidated under a program administered by the U.S. Department of Housing and Urban Development (HUD) called the Community Development Block Grant Program (CDBG). This program now serves two kinds of communities: (1) “entitlement communi-

ties” receive funding automatically as long as they adhere to the program’s guidelines; (2) “nonentitlement communities” may compete annually for grants administered by the States. The program targets low-income communities, with an emphasis on economic development, and funds are used primarily for infrastructure improvements. To be eligible for funding, competing communities usually must demonstrate a concentration of residents with low to moderate incomes in the entire community or in target areas. For more information about the CDBG, see the following Web site: <<http://www.communitychange.org/cdbg.html>>.



- | | |
|-------------------------------|--------------------------------|
| 1. Osage Valley RC&D | 9. Cross Timbers RC&D |
| 2. Southwest Missouri RC&D | 10. Arkansas River Valley RC&D |
| 3. Top of the Ozarks RC&D | 11. Central Arkansas RC&D |
| 4. Big Springs RC&D | 12. Fun Country RC&D |
| 5. Cherokee Hills RC&D | 13. Ouachita Mountains RC&D |
| 6. Northwest Arkansas RC&D | 14. Southwest Arkansas RC&D |
| 7. Ozark Foothills RC&D | 15. Southeast Arkansas RC&D |
| 8. East Arkansas RC&D Council | |

Figure 3.4—Resource Conservation and Development (RC&D’s) areas in the Assessment area (all shaded counties except those in RC&D areas 8 and 15) and adjacent portions of Arkansas, Missouri, and Oklahoma; shaded counties in RC&D areas 8 and 15 include national forest lands attached administratively to the Ozark and Ouachita National Forests, respectively.

Empowerment Zone and Enterprise Community (EZ/EC) Program

In December 1994, 105 areas were designated as Empowerment Zones (EZ's) or Enterprise Communities (EC's) in the national EZ/EC program. Six urban Empowerment Zones (EZ's) received grants of \$100 million each; 3 rural EZ's received \$40 million each; and 60 urban and 30 rural EC's received \$2.95 million each. In addition, two supplemental EZ's and four enhanced EC's received funding. Finally, those that competed to become part of the EZ/EC program but were not selected were called "Champion Communities" and were promised preferential treatment in both Federal and State assistance programs. The USDA administers the rural portion, and HUD administers the urban portion of the program. Most of the funds actually come from the Department of Health and Human Services. Congress made funds available for the EZ/EC initiative by modifying the Social Service Block Grants Program administered by Health and Human Services, which previously funded State government social service activities. The EZ/EC effort resulted in a large amount of intense planning during the first 6 months of 1994, with a total of 500 rural and urban communities competing, including 7 in the Ozark-Ouachita Highlands region.

Newton County, a Fort Smith group, and a four-county area containing the community of Marianna (well outside the Assessment area but near the St. Francis National Forest) applied for EZ or EC status in Arkansas. The Marianna group succeeded and was designated an Enterprise Community. Newton County and the Fort Smith group were designated "Champions." In Oklahoma, Choctaw and McCurtain Counties (including Idabel and Broken Bow in the latter) applied for and received Enterprise Community status. In Missouri, Salem applied for EC status and was designated a Champion Community. Thus there are no Enterprise Communities in the Highlands, but there are three Champions (USDA and HUD 1997).

Various efforts are underway to support the Champion Communities, including assistance in updating, expanding, and implementing their plans. Even though Champions were not funded in the original competition, the Kellogg and Levi Strauss Foundations now support a major "Arkansas Champion Communities Initiative." This funding is being used to build cooperation among

Champion Communities and to assist them in community planning and organizational development (Nonprofit Resources, Inc. 1997).

The positive results of the EZ/EC program are being used widely as evidence that a community-based approach, one in which community leaders and residents identify their own priorities and design their own solutions, is effective for both rural and urban development. The report of the President's Council on Sustainable Development (PCSD 1996) endorses this strategy. For more information on the EZ/EC Initiative, see the following Web site: <<http://www.hud.gov/cpd/ezec/ezecstat.html>>.

Forest Service Assistance Programs

The Rural Community Assistance and Economic Recovery programs are two of the most important forms of partnerships that the Forest Service has with local communities. They emerged in their current form from a large package of rural development provisions in the 1990 "Farm Bill." In the past, the Forest Service always had a stated objective of contributing to the economic stability of communities near or dependent upon national forests. Except for a policy of "non-declining even flow of timber," however, there was never a clearly defined mechanism for achieving this objective, and many would argue that national forest management seldom actually contributed to community economic stability (e.g., Vasquez 1994).

The 1990 Farm Bill gave the Forest Service broad authority to assist rural development in communities affected by national forests. The RCA programs that emerged fall into two categories: Economic Recovery Grants and Cooperative Forestry Assistance. Economic Recovery Grants provide assistance to communities in economic distress that are located near a national forest and are dependent on forest resources. To be eligible, 15 percent or more of the labor and retail income in a county must come from forestry and forest-related industries and the county must lie no more than 100 miles from a national forest. Communities applying for this type of assistance must have a population of less than 10,000 and be represented by a local government or a nonprofit corporation. The Federal Government can contribute up to 80 percent of the total cost of a community's plan. This program provided assistance to 185 communities in 1992 and more than 1,583 in 1996 (U.S. GSA FDACS 1997).

Cooperative Forestry Assistance is a broad-based program that supports management of forest resources on non-Federal lands. It provides communities with programs for better utilization of wood products, forest stewardship and planning, fire control technology, technology transfer, and several other applications. State and local agencies and governments as well as private landowners are eligible to apply for grants. These grants require 20 percent matching funds by State governments (U.S. GSA FDACS 1997).

Communities are normally required to organize a local “Action Team” that represents the various interests of the community (e.g., local and regional government, businesses, schools, recreation, environmental quality), and frequently these grants have been used to support community strategic planning, usually for economic development. Despite very limited resources, the new programs have contributed in many instances to very strong partnerships between national forests and local communities. A good example is Iron County, MO, where the Forest Service initiated a major county-wide community development effort that continues to move ahead with strong local leadership and support from county government and the University of Missouri Extension Service.

From 1990 to 1995, the Forest Service awarded 40 RCA Grants to benefit communities in the Highlands of Arkansas and Oklahoma (table 3.3). In addition, during fiscal years 1994 and 1995, Iron County in the Missouri Highlands received four grants that focused primarily on tourism and marketing. Typically, implementation of the RCA grant program has occurred independently of national forest land management planning efforts.

State Rural Development Councils

A renewed interest in rural development arose from the agricultural and rural crisis of the early 1980’s. In 1988, the National Governor’s Association urged the Federal Government to streamline programs that serve rural America and make them more flexible. The Federal Government’s response was to create State Rural Development Councils, coordinated by the USDA. The resources and leadership from several Federal agencies and State and local governments support the councils (USDA 1990, NRDP 1998). As of this writing, there are 36 State Rural Development

Councils, a National Rural Development Council, and a National Rural Development Partnership to support the State Councils. The major objectives of these councils are to bring together all of the major players with an interest in rural development at the State level—Federal agencies, State agencies, and the private sector—to coordinate programmatic activities and to both stimulate and support rural development in the State. The State Rural Development Councils are formally charged with the following four major tasks: (1) to serve as a catalyst for cooperation among partner members, (2) to involve the private sector in public and private sector collaboration, (3) to affect a broad range of rural life and people by sharing the benefits of rural development, and (4) to undertake a comprehensive, long-term, strategic approach to rural development (MO ROC 1998).

Missouri and Oklahoma have Rural Development Councils. In spite of several efforts to do so, Arkansas has not yet established its own, largely because the Arkansas State Legislature established its own Office of Rural Advocacy (which was to serve functions similar to the councils’ tasks) at about the same time the Rural Development Council initiative emerged at the Federal level.

By virtue of their structure and function, the State councils can and frequently do exert a strong positive influence by integrating and coordinating rural development and planning efforts. The Missouri Rural Opportunities Council, for example, has been an active player in several successful county-wide rural development and strategic planning efforts and was the initiating agency in an ongoing effort in Stone County, which is also one of the communities selected by the Ozark-Ouachita Highlands Communities Project (see p. 96).

Community-Development Activities of the Cooperative Extension Service

Since the late 1950’s when the Cooperative Extension Service was regarded as USDA’s “lead agency” in rural development, the Cooperative Extension Service has engaged in some form of local planning. During the late 1950’s and early 1960’s, planning included broad-based community development efforts in which local volunteers performed needs analyses, conducted strategic planning, and attempted to implement local development plans. Through the 1960’s, when a variety

Table 3.3—Rural Community Assistance (RCA) grants awarded to communities in the Highlands of Arkansas and Oklahoma in fiscal years 1990 through 1995^a

State and county	Community	Project	Fiscal year(s)
Arkansas			
Clark	County-wide	Pellet Manufacturing Feasibility	1994
Conway	Morrilton	New Wood Products	1993
Faulkner	County-wide	Hilltop Dry Hydrants and Ponds	1995
Independence	County-wide	Small Sawmills	1990
Independence	County-wide	Forest Biomass Education	1995
Johnson	Clarksville	Lamar School District	1994
Logan	Booneville	Booneville Development Corporation	1994
Logan	Booneville	Booneville Economic Development	1995
Montgomery	Mt. Ida	Hickory Products	1991
Montgomery	4 communities	Economic Stabilization: Oden	1994
Montgomery	Norman	Southern Montgomery Co. Development Council	1995
Newton	County-wide	Tree Project: Wood Caskets	1991
Newton	Jasper	Newton County	1992
Newton	Jasper	Newton County Rural Development	1992
Newton	Jasper	Rural Revitalization Through Forestry	1993
Perry	Perryville	Economic Development Specialist	1993
Pike	Glenwood	Railroad Depot Visitor Information Center	1994
Polk	Mena	Exploring Economic Diversification	1995
Polk	Mena	Promotion of Tourism in Ouachitas	1995
Saline	Crow	Crow Dry Hydrant	1995
Scott	Mansfield	City of Mansfield (two grants)	1993, 1995
Scott	Mansfield	Economic Development Specialist	1994
Van Buren	Shirley	Shiitake Mushroom Industry (three grants)	1993–95
Oklahoma			
Cherokee	County-wide	Vengence Creek Rock Quarry	1994
Cherokee	Tahlequah	Hardwood Concentration Yard (two grants)	1994–1995
Cherokee	Tahlequah	Eastern Oklahoma Utilization Forester	1995
Cherokee	Lake Tenkiller	Lake Tenkiller Ecotourism	1995
Cherokee	Lake Tenkiller	Plan for Sustainable Tourism	1995
Le Flore	County-wide	OK Wood Manufacturing Association	1994
Le Flore	Talihina	Economic Recovery Proposal	1994
Le Flore	Talihina	Community Economic Recovery	1994
McCurtain	Broken Bow	Broken Bow Rural Development	1992
McCurtain	3 communities	CPR for Rural Communities	1993
McCurtain	Broken Bow	Broken Bow Spirit Award	1994
Pushmataha	Albion	Cedar Oil Production	1993
Pushmataha	Kiamichi	Kiamichi Backroads	1994

^a Other grants have been made to communities near but outside the Highlands, and additional grants to communities within the Highlands have been made since 1995.

of Federally funded programs to assist localities was available, these groups were responsible for the development of the Overall Economic Development Plans required of all rural counties to be eligible for Federal development assistance.

Subsequently, local planning efforts of the Cooperative Extension Service reverted to more highly focused program planning, usually within the program areas of Agriculture, Home Economics, Rural (or Community) Development, and 4-H (or Youth). The Cooperative Extension Services of all three States now engage in comprehensive program planning at the county level, usually including substantial public involvement.

The Cooperative Extension Services in the three Assessment area States have specialists available to work with local communities. The University of Missouri Extension Service supports several community development specialists in the region, each of whom operates on a multicounty basis. Arkansas' community development specialists are based in Little Rock and Fayetteville. Oklahoma has community development specialists in Stillwater and Ada. In Oklahoma and Arkansas, the community development specialists in the Extension Service have a history of partnerships with the Forest Service, especially in the management and administration of the Rural Community Assistance program.

Local Community-Initiated Efforts

Support is available for a variety of local planning and development efforts. Institutional and financial support emerged from the USDA Rural Community Development efforts of the 1960's, as well as similar efforts supported by State governments and interested private sector organizations such as cooperative and privately owned utility companies and financial institutions. These efforts are usually initiated at the local level but may be carried out with technical or training assistance from community development specialists in the Extension Services, utility companies, and/or State agencies.

Typical efforts include local leadership training, community strategic planning, community economic impact analysis, community retail trade analysis, and community planning for recreation and tourism development. Locally initiated community development efforts frequently have led to other forms of community develop-

ment, including participation in the RCA program. Communities are most effective in achieving their objectives when they use a variety of different programs.

Specialized State Planning

Two forms of State-mandated local planning have emerged recently in the Assessment area. Oklahoma now requires counties to prepare capital improvement plans, and Missouri requires counties to prepare comprehensive health service plans. As part of the process of preparing the latter, countywide surveys that focus upon a broad range of human health-related issues have already been completed in a number of counties in Missouri.

Emerging transportation patterns are very important for the future of the region and the demands placed upon public land managers. One example of intensive, participatory transportation planning in a small, but highly stressed, part of the Assessment area is the effort that was carried out recently in the Branson, MO, area (Branson, City of, 1995). Under the leadership of the Branson/Lakes Area Chamber of Commerce, local governments and business groups organized a Pilot Committee of interested local citizens and government technical staff to direct and participate in the study. Professional consultants were engaged, and a highly participatory process was used. The objective of the study was to assess current transportation problems in the area and to offer solutions that balance needed economic growth with preservation of the Ozark Mountains lifestyle, the very reason that the area became so popular in the first place. A Key Leaders group of approximately 60 interested community members helped direct and gather public opinion via individual interviews; a survey collected input from some 1,000 visitors, residents, and area workers.

A number of organizations focus upon planning for and promotion of recreation and tourism in various parts of the Assessment area. All three States have their versions of Statewide Comprehensive Recreation Plans (SCORP's). Each State also has an agency that promotes recreation and tourism. One example of subregional planning for recreation and tourism was the effort carried out collaboratively among a variety of agencies in Northeastern Oklahoma to develop the *Lake Tenkiller Regional Plan* (Lake Tenkiller Association 1995).

The Ozark-Ouachita Highlands Communities Project

The Ozark-Ouachita Highlands Communities Project is a joint undertaking of the University of Arkansas Cooperative Extension Service and the Forest Service. The objectives of this project are to engage selected communities in the Highlands in ways that (1) strengthen communication between communities and the Forest Service prior to and during forest plan amendments and revisions and (2) encourage communities to assess their current and desired relationships with their natural resource base, including public lands. Cooperators are preparing public information and educational materials on Assessment topics, the forest planning process, public involvement opportunities, and conflict amelioration and resolution. Some communities may be stimulated to implement broad-based community development efforts. Assistance is provided to communities depending upon the nature and level of involvement they seek.

The project leaders initially identified 30 communities in the region, ranging in size from the tiny Lone Rock neighborhood of Baxter County (Sylamore District of the Ozark National Forest) to entire counties (e.g., Newton County in Arkansas and Stone and Iron Counties in Missouri). A preliminary evaluation showed that 19 of the 30 selected communities in the Assessment area had engaged in some local planning activity beyond basic land use planning (e.g., for economic development, health care, and/or tourism). Several of the Missouri counties in the Assessment area have already completed health plans, and in some instances, these have been based upon extensive surveys of health conditions, needs, services, and even general environmental conditions that might affect public health. In all, 19 of the communities have some kind of plan in place that addresses economic development or tourism.

Sixteen of the 30 communities have received RCA grants from the Forest Service since 1990. Some of these grants have been substantial and have helped to fund local strategic planning. In Arkansas, these grants have funded planning and development activity in Mansfield, Perryville, Booneville, Paris, Oden, Marianna (outside the Assessment area but close to the St. Francis National Forest), Newton County, and Lamar.

Of these, Newton County and Booneville were the only communities to receive grants directly for tourism planning. However, a \$30,000 RCA grant in 1995 funded regional ecotourism planning on a multicounty basis in northwest Arkansas. Newton County alone received over \$100,000 in RCA grants from 1990 to 1997. In Oklahoma, RCA grants have funded planning activity for Idabel (just outside the Highlands), Broken Bow, and Talihina, which together have received \$75,500 since 1992. In 1992 and 1993, Idabel received \$15,000 for a 3-year city improvement plan. Broken Bow and Talihina received a \$5,000 RCA grant in 1993 to identify overall visions and goals for their communities. USDA grants have funded a comprehensive, county-wide community development strategy that focuses heavily upon tourism in Iron County, MO. The Iron County group received nearly \$50,000 in RCA grants from 1994 to 1996 and requested about \$30,000 more in 1997.

In at least 3 of the 30 communities—Iron County, Stone County, and Salem, all in Missouri—major strategic planning for community development is underway. These efforts provide natural opportunities to engage the respective communities positively in upcoming forest plan revision, and to use the community-based effort to obtain input from the communities and their citizens.

Among these 30 communities, a wide variety of partnerships with the Forest Service exists. There is also a very wide range of relationships between local ranger districts and the communities with which they interact. It appears that the closest partnerships follow one of four basic patterns: (1) those in which ranger district leadership—usually the district ranger—is intimately involved with community leadership in roles like chairing the local Chamber of Commerce or participating actively (even chairing) local development organizations; (2) those in which there are “friends of” organizations dedicated to supporting the ranger district as a whole or supporting specific facilities; (3) those in which there are strong external organizations with objectives that are parallel to those of the Forest Service (e. g., the Scenic Rivers Watershed Partnership in Missouri); and (4) those in which the Forest Service has supported and stimulated local community development efforts through its RCA program (e. g., Iron County, MO).

Some types of partnerships are nearly universal (e.g., formal arrangements with rural fire districts for cooperative firefighting and with county governments for cooperative road maintenance and law enforcement). Other arrangements are specific to particular locales. The potential to develop new partnerships, including ones that help local communities participate in public land management planning, is great, and there appears to be strong support for such local participation (see the “Forest Service Values Poll” section of Chapter 9).

Implications and Opportunities

The array of programs designed to assist planning and development in the communities of the Ozark-Ouachita Highlands is impressive but also potentially bewildering. With so many players and so many programs, it is difficult to see how, or even if the various components mesh and, if they do, how well they complement one another. Communities and planners alike might benefit from having access to a Web site or sites that provide links among the various programs and agencies available to support community planning and development.

Several community specialists mentioned that, in their view, community planning and national forest planning ought to be viewed as a system, with interdependencies and linkages. With very few exceptions, though, neither long-range national forest planning, more immediate project planning, nor forest management issues in general are included in the agendas of community planning efforts. The greatest irony is that this is true even when such efforts are funded by and implemented in close cooperation with the Forest Service, as is the case with the Rural Community Assistance grant program.

In light of increased local interest in national forest management, affected communities increasingly may want to explore opportunities to link their local efforts with upcoming forest plan revision or amendment processes. Such opportunities may be especially attractive in communities undertaking strategic planning efforts of their own and/or in which local citizens and elected officials are increasingly interested in long-range national forest (or other public lands) planning. The

adoption of county “land use plans” may be an important new development in the Highlands, although not one having so much to do with local planning (as the document names imply) but with how strongly some people feel traditional lifestyles and the rights of private land ownership are threatened. If the intent of the county ordinances is not to assert superior authority over Federal lands but to express elected officials’ (or their electorates’) desire to be more involved in Federal land management planning, Federal land managers may find that these local initiatives provide opportunities to build stronger partnerships with local governments and communities.

As the introduction to this chapter suggested, a study of interest communities active in public land management issues in the Highlands would be worthwhile. Communities of interest certainly will continue to have a voice in Federal land management decisions and, in many instances, will consider their constituents’ interests to be at least as important as those of local communities of place. Just as clearly, some interests will continue to decry the degree of influence, real or imagined, that other communities of interest exert. Some individuals and groups will maintain that local communities of place should exert more influence over Federal land decisionmaking than individuals or groups who live or are headquartered far from the lands in question (even though Federal lands are owned, by definition, by all citizens of the United States).

The variety of interests and perspectives involved makes for “messy” decisionmaking processes at best, perpetual conflict and confusion at worst. Yet, as others have pointed out, “messy” decisionmaking is often a natural and necessary outgrowth of the kinds of liberties guaranteed by the U.S. Constitution and emphasized by many laws concerning Federal land management. Often, there simply are no easy solutions.

As Federal agencies continue to develop more ecosystem-based approaches to public land management (Kessler and others 1992, U.S. GAO 1994), they will face the ongoing challenge of fully integrating all of the “human dimensions” of ecosystem management. Understanding the behavior and needs of communities and managing public lands as cooperatively as possible with affected communities should become high priority objectives for every public land manager. Both

communities of interest and local communities of place will be important not only in terms of their ability to challenge, thwart, or disrupt agency activities, but as players in the entire goal setting, planning, and implementation process of public land management.

Nurturing the kinds of discourse and cooperation needed may require the development of a genuine community-based strategy, not only for the Forest Service (the agency that manages by far the largest amount of public land in the Highlands), but for all other

agencies of USDA and perhaps other Federal and State agencies as well. Better interagency coordination of community development programs would be a good starting point. Finally, a greater focus on using community resources and community-based institutions has the potential to supplement the increasingly limited human resources available to Federal and State agencies. Such an approach offers at least some potential for resolving what may otherwise be irreconcilable conflicts over natural resource management.

Chapter 4: Economic Profile

Question 4.1: What are the principal industrial sectors of the Ozark-Ouachita Highlands, and how do they influence the Highlands' economy?

Question 4.2: What contributions do national forest programs make to the Highlands' economy?

This chapter begins with an analysis of the direct economic effects of the 10 principal industrial sectors that make up the economy of the Ozark-Ouachita Highlands. The forest products and minerals industries are analyzed in more detail than other industries because of their partial dependence on public lands (national forests in particular) for their supply of raw materials. In addition, the travel industries of Arkansas and Missouri are analyzed in detail because they include significant components of the tourism and outdoor recreation-based economy that are partially dependant on recreational opportunities provided on public lands. Equivalent travel data for Oklahoma were not available.

The second section of this chapter focuses on the role that national forests play in the Assessment area's economy, specifically the economic effects of national forest timber harvesting, mining, recreation use, Forest Service expenditures, and "25 percent returns" to States. The analysis includes calculations of the secondary impacts or "ripple" effect in the economy of these programs and an estimate of the amount that national forest programs contribute to the Assessment area's Gross Regional Product (GRP).

Key Findings

1. Compared to the other major economic sectors, manufacturing accounts for the largest share (approximately one-third) of the Assessment area's total output and also leads other sectors in total employee compensation.
2. The service and trade sectors employ more people than other sectors, but the jobs tend to be lower

paying than the average job in the Assessment area or in the manufacturing sector.

3. The Assessment area economy accounts for about one-fourth of the total industrial output and one-third of the employment and employee compensation of the tri-state area (Arkansas, Missouri, and Oklahoma).
4. Between 1977 and 1993, the total industrial output in the Assessment area grew (after adjusting for inflation) 53 percent, and employee compensation grew 40 percent. The construction sector had the greatest increase in total industrial output.
5. The number of jobs in the Assessment area increased 44.3 percent between 1977 and 1993, which parallels the 48 percent increase in population over approximately the same time period.
6. The Assessment area accounts for approximately 2.4 percent of the total U.S. output of forest products and 1 percent of the U.S. industrial output generated by the minerals industry.
7. In the Assessment area, 5.1 percent of the industrial output, 2.9 percent of the employment, and 3.4 percent of the employee's compensation are directly attributable to the forest products industry. The minerals industry accounts for 5.0 percent, 2.2 percent, and 3.7 percent of the Assessment area's output, employment, and employee compensation, respectively. The travel industry supports 5.7 percent of the output, 7.0 percent of the employment, and 4.6 percent of the employee compensation in the Arkansas and Missouri sections of the Assessment area. (Equivalent travel industry data for Oklahoma were not available.)
8. Thirty-five of the 107 Assessment area counties had at least double the Assessment area average percentage output, employment, and/or employee compensation from the forest products industry. These counties derived an average 15.7 percent of their output, 8.0 percent of their employment, and 11.0 percent of their employee compensation from the forest products industry.

9. Twenty-one counties in the Assessment area had at least double the Assessment area average percent of output, employment, and/or employee compensation in the minerals industry. These counties had an average 14.4 percent of their output, 6.0 percent of their employment, and 12.1 percent of their employee compensation provided by the minerals industry.
10. Twenty three of the 93 counties in the Arkansas and Missouri portion of the Assessment area were identified as having at least double the average percent of output, employment, and/or employee compensation in travel-related business. In these counties, travel-related business accounted for an average of 25.5 percent of their output, 28.9 percent of their employment, and 24.7 percent of their employee compensation.
11. In 1996, the Gross Regional Product (GRP) for the Highlands was \$61,601 million. National forest programs, payments to counties, and expenditures accounted for less than 1 percent (\$572.9 million) of the area's GRP.
12. The national forests influence nearly 17,000 jobs, about 0.9 percent of the Highlands' overall employment (1.9 million jobs).
13. Of the three principal national forest programs affecting the Highlands' economy (timber, minerals, and recreation), timber has the greatest overall influence on employment, employee compensation, and total income when all three forests are considered together. However, the relative economic importance of each resource program varies significantly among the three forests. For the economic sectors affected by the national forests, the minerals program has the highest average annual income per job and the recreation program has the lowest.

Economic Overview

Data Sources and Methods of Analysis

All industries in the region were grouped by Standard Industrial Classification (SIC) codes to create 10 major sectors of the region's economy. More detailed analyses were developed of the forest products (timber), minerals, and travel industries, each of which include components of several industrial sectors. Timber-based industry includes portions of four SIC categories: forestry (SIC 8), lumber and wood products (SIC 24), furniture (SIC 25), and paper and allied products (SIC 26).

The minerals industry includes four components of the mining sector [primary metal mining (SIC 10), coal mining (SIC 12), natural gas and petroleum production (SIC 13), and mineral mining and quarrying (SIC 14)] and four components of the manufacturing sector [primary and fabricated metal products (SIC 33 and SIC 34, respectively), petroleum refining (SIC 29), and stone, clay, glass, and concrete products (SIC 32)].

Unlike the forest products and minerals industries, the travel industry is not classified separately in the Standard Industrial Classification system. The travel industry consists of portions of many sectors that are directly supported by the following expenditures (U.S. TDC n.d.):

- Automobile transportation expenditures—the prorated share of the fixed costs of owning an automobile, truck, camper, or other recreational vehicle and all of the variable costs of operating a vehicle on a trip;
- Entertainment/recreation expenditures—travel-related spending on facility user fees, admissions, and other forms of entertainment and recreation while traveling;
- Food expenditures—travel-related spending in commercial food preparation facilities and grocery stores;
- Incidental purchases—travel-related spending on retail trade purchases such as gifts for others, medicine, cosmetics, clothing, and personal services;
- Lodging purchases—travel-related spending at hotels, motels, camps, and other lodging sources;
- Public transportation expenditures—travel-related spending for air and ground transport, and
- Travel arrangement purchases—travel-related spending at such businesses as travel agencies and tour operations.

For the detailed analyses of the forest products, minerals, and travel industries, counties were defined as “significant” (relative to the economic importance of these industries in that county) if they had at least twice the Assessment area average percentage of industrial output, employment, and/or employee compensation from the industry in question. Data in each county of the Assessment area were summed and compared to tri-state totals (Arkansas, Missouri, and Oklahoma) and to counties that had significant amounts of timber-based, minerals-based, or travel-based output; employment; or employee compensation. (In this report, the term “output” means value of sales plus or minus inventory.)

The analysis was conducted using 1993 data generated by the Forest Service’s IMPact analysis for PLANing (IMPLAN) computer model. Results of IMPLAN analyses offer the best, most detailed, county-by-county economic data sets available. Census of Manufactures, County Business Patterns, and other government data are included in the IMPLAN data set (MN IMPLAN 1997a, b). The IMPLAN data set also includes estimates where data sources contain limitations on disclosures that prohibit their release. Such estimates are required to analyze the multi-county Assessment area adequately. IMPLAN data were used to analyze both the Assessment area and the tri-state area. For some analyses, 1977 and 1993 data were compared to identify trends and changes in the area’s economy.

For the analysis of the travel sector, IMPLAN data were combined with county level data on travel expenditures (total output), jobs, and employee compensation that were derived from separate studies conducted by the Arkansas Department of Parks and Tourism (AR DPT 1997) and Missouri Division of Tourism (Certec, Inc. 1997). Although the two State travel studies are designed differently and define person trips differently, they provide a good idea of the economic importance of the travel industry. The data in these studies were compiled for 1996, but the output and employee compensation data were adjusted to 1993 price levels to be comparable with other economic data presented in this analysis. Unfortunately, similar county level data were not available for Oklahoma; therefore, the travel sector for the Oklahoma portion of the Assessment area was not analyzed in detail.

All measures reported for this section of Chapter 4 consider only the direct “within industry” output, employment, and employee compensation associated with each sector or industry. No attempt was made to discover the interlinkages or interconnections within the economy (such as by using an input-output model). Nor were multipliers developed to calculate the secondary, “ripple” effects in the economy for any industry.

Major Industrial Sectors and Selected Industries

In 1993, the Assessment area produced nearly \$122 billion in goods and services (total industrial output), provided jobs for nearly 1.9 million workers (total employment), and paid over \$36 billion in employee compensation (table 4.1). The Assessment area has a large and diverse economy that is dominated by manufacturing, services, construction, finance, and trade when ranked according to total industrial output. With \$39.8 billion in total industrial output, the manufacturing sector accounts for the largest share (approximately one-third) of the Assessment area’s total economy. The Assessment area economy represents slightly more than one-fourth of the tri-state economy, using total industrial output as a measure.

Industrial sectors providing the most jobs are, in order, services, trade, manufacturing, and government. Assessment area employment makes up nearly one-third of the total employment in the tri-state area. In terms of total employee compensation, the ranking is slightly different: manufacturing is first, followed by government, services, and trade. Assessment area employers accounted for approximately one-fourth of all wages paid in the three States.

The Assessment area has a slightly higher proportion of output, employment, and employee compensation in the agriculture and construction industrial sectors than the tri-state area as a whole (table 4.2). The three States have somewhat higher proportions in mining, finance, and services, while manufacturing and trade are very comparable to the Assessment area.

The average 1993 employee compensation per job in the Assessment area (\$19,144) was 13 percent less than in the tri-state area (\$22,049) (table 4.3). The highest paid industrial sector was transportation, where the average wage was \$31,135; the lowest paid sector was agriculture, which likely includes a higher percentage of

Table 4.1—Total industrial output, employment, and employee income across 10 industrial sectors of the tri-state (AR, MO, OK) and Assessment areas, 1993

Industrial sector	Total industrial output		Employment (jobs)		Employee compensation	
	Tri-state	Assessment area	Tri-state	Assessment area	Tri-state	Assessment area
	----- Million \$ -----				----- Million \$ -----	
Agriculture and fisheries	14,372.8	5,813.0	317,682	127,527	1,051.4	422.4
Mining	9,171.4	912.4	49,814	4,886	1,467.0	144.0
Construction	42,283.8	14,114.6	416,147	139,972	7,713.3	2,259.9
Manufacturing	135,840.6	39,836.9	849,765	304,441	28,697.4	8,025.6
Transportation	36,653.5	9,349.6	307,591	89,604	10,714.1	2,789.8
Trade	44,206.2	12,725.7	1,283,850	397,244	21,855.2	6,065.0
Finance	52,929.9	13,388.7	347,032	85,422	8,282.6	1,728.4
Services	68,387.5	17,532.1	1,557,188	437,157	28,123.7	7,019.9
Government	28,450.2	8,093.4	940,314	284,981	26,683.2	7,568.3
Special industries ^a	57.2	14.1	49,133	14,850	319.8	84.5
Total	432,353.2	121,780.5	6,118,516	1,886,084	134,907.7	36,107.8

^a Scrap, used and secondhand goods, domestic services, and other minor sectors used to conduct the input-output analysis. Source: MN IMPLAN (1997a, b).

Table 4.2—Proportions of industrial output, employment, and employee income associated with 10 industrial sectors of the tri-state (AR, MO, OK) and Assessment areas, 1993^a

Industrial sector	Total industrial output		Employment (jobs)		Employee compensation	
	Tri-state	Assessment area	Tri-state	Assessment area	Tri-state	Assessment area
	----- Percent -----					
Agriculture and fisheries	3.3	4.8	5.2	6.8	0.8	1.2
Mining	2.1	0.7	0.8	0.3	1.1	0.4
Construction	9.8	11.6	6.8	7.4	5.7	6.3
Manufacturing	31.4	32.7	13.9	16.1	21.3	22.2
Transportation	8.5	7.7	5.0	4.8	7.9	7.7
Trade	10.2	10.4	21.0	21.1	16.2	16.8
Finance	12.2	11.0	5.7	4.5	6.1	4.8
Services	15.8	14.4	25.5	23.2	20.8	19.4
Government	6.6	6.6	15.4	15.1	19.8	21.0
Special industries ^b	0.0	0.0	0.8	0.8	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

^a Totals may differ from sum of columns due to rounding.

^b Scrap, used and secondhand goods, domestic services, and other minor sectors used to conduct the input-output analysis. Source: MN IMPLAN (1997a, b).

Table 4.3—Average annual wages by industrial sector for the Assessment and tri-state (AR, MO, OK) areas, 1993

Industrial sector	Average annual wage	
	Assessment area	Tri-state area
	----- Dollars -----	
Agriculture and fisheries	3,312	3,310
Mining	29,472	29,450
Construction	16,145	18,535
Manufacturing	26,362	33,771
Transportation	31,135	34,832
Trade	15,268	17,023
Finance	20,234	23,867
Services	16,058	18,061
Government and special industries ^a	25,524	27,291
Overall average	19,144	22,049

^a Available wage data combine government and special industries sectors in such a way that they could not be readily differentiated; special industries include scrap, used and secondhand goods, domestic services, and other minor sectors used to conduct the input-output analysis. Source: MN IMPLAN (1997a, b).

part-time and seasonal workers. Wages in the manufacturing sector were 38 percent higher than the overall average for the Assessment area. Although jobs were plentiful in the services sector, wages were low. The average wage in the services sector was 84 percent of the Assessment area average and 61 percent of the average wage for the manufacturing sector. The creation of transportation, manufacturing, mining, finance, and government jobs has more impact on the regional economy than the equivalent number of services sector jobs. Higher paying jobs, especially those that do not have a high educational requirement, support a larger number of additional workers, as ripple effects occur when workers spend their pay in the local economy. The average annual incomes of people working in industries affected by national forest programs are presented in a later section of this chapter.

Changes in the Economy, 1977 to 1993

Total industrial output, total employment, and total employee compensation in the Assessment area grew by 146.1 percent, 44.3 percent, and 133.1 percent, respectively, between 1977 and 1993 (table 4.4). The

Table 4.4—Industrial output, employment, and employee compensation across selected industrial sectors of the Assessment area, 1977 and 1993, and percent change in these measures from 1977 to 1993

Industrial sector	Industrial output			Employment (jobs)			Employee compensation		
	1977	1993	Change	1977	1993	Change	1977	1993	Change
	----- Million dollars -----		Percent	Percent		----- Million dollars -----		Percent	
Agriculture and fisheries	2,553.3	5,813.0	127.7	30,307	127,527	320.8	167.8	422.4	151.7
Mining	606.2	912.4	50.5	6,917	4,886	-29.4	192.0	144.0	-25.0
Construction	3,607.0	14,114.6	291.3	80,621	139,972	73.6	1,307.2	2,259.9	72.9
Manufacturing	18,941.8	39,836.9	110.3	314,490	304,441	-3.2	4,421.2	8,025.6	81.5
Transportation	3,830.9	9,349.6	144.1	65,939	89,604	35.9	1,154.2	2,789.8	141.7
Trade	5,452.1	12,725.7	133.4	236,291	397,244	68.1	2,347.1	6,065.0	158.4
Finance	5,436.6	13,388.7	146.3	49,744	85,422	71.7	657.7	1,728.4	162.8
Services	6,013.8	17,532.1	191.5	286,688	437,157	52.5	2,483.2	7,019.9	182.7
Government and special industries ^a	3,035.4	8,107.5	167.1	236,242	299,831	26.9	2,758.0	7,652.8	177.5
Total	49,477.1	121,780.5	146.1	1,307,239	1,886,084	44.3	15,488.4	36,107.8	133.1

^a Government and special industries sectors are combined due to differences in sector definitions between 1977 and 1993; only the combined totals of the two sectors are comparable. Source: MN IMPLAN (1997a).

increase due to inflation over this period was 93 percent. Thus, after inflation is considered, real growth in total output was 53.1 percent and real growth in employee compensation was 40.1 percent. Total output grew at an average annual rate of 1.5 percent and employee compensation grew at an average annual rate of 1.2 percent. In terms of total industrial output, the construction sector grew the most between 1977 and 1993: total output increased from \$3.6 billion to \$14.1 billion (291.3 percent). Manufacturing was the largest sector in both 1977 and 1993, but its growth in output and employee compensation (110.3 percent and 81.5 percent, respectively) was below the average increase in the Assessment area. The mining sector had the least growth (50.5 percent) of all sectors, while the construction, government, and services sectors had output gains greater than Assessment area averages. Output, jobs, and wages of the trade, finance, and services sectors increased significantly during the period, although average wages in these sectors lagged behind the growth in the transportation and manufacturing sectors.

The number of jobs in the Assessment area increased; 44.3 percent more people were employed in 1993 than in 1977. The percent increase in employment parallels the real increase in total industrial output and employee compensation over this 16-year period and is comparable to the 48 percent population increase in the Assessment area between 1977 and 1996 (see Chapter 2). During this period, construction, finance, and trade jobs grew about 70 percent. Mining and manufacturing jobs fell by 29.4 percent and 3.2 percent, respectively. The gain of 321 percent in the agricultural sector may be misleading. It is difficult to make estimates of agricultural employment, and changes in estimation techniques between the 1977 and 1993 data sets account for most of the difference.

The Forest Products Industry

In 1993, the forest products industry of the Assessment area accounted for 2.4 percent of total U.S. output from that industry (\$6.3 billion of \$266.6 billion) (table 4.5). In the tri-state area, approximately one-half of the total industrial output, employment, and employee compensation from the forest products industry occurred

in the Assessment area. Timber-related output represents 5.1 percent of total industrial output (fig. 4.1) in the Assessment area and 3.0 percent of total output in the three States. In the Assessment area, 2.9 percent of all jobs are timber related (fig. 4.2), whereas in the tri-state area, only 1.9 percent of all jobs are in the forest products sector. The timber industry provides 3.4 percent of all employee compensation in the Assessment area (fig. 4.3), compared to only 2.1 percent of employee compensation in the three States. In all three measures, the Assessment area is more dependent upon the forest products industry than the tri-state area as a whole.

The forest products industry plays a larger role in the economies of some counties than in others. Those counties where the forest products industry is especially important are here termed “timber significant.” Examining counties that have at least twice the Assessment area average percent of total output ($2 \times 5.1 \text{ percent} = 10.2 \text{ percent}$), employment ($2 \times 2.9 \text{ percent} = 5.8 \text{ percent}$), and/or employee compensation ($2 \times 3.4 \text{ percent} = 6.8 \text{ percent}$) yields 35 of the 107 Assessment area counties where the forest products industry

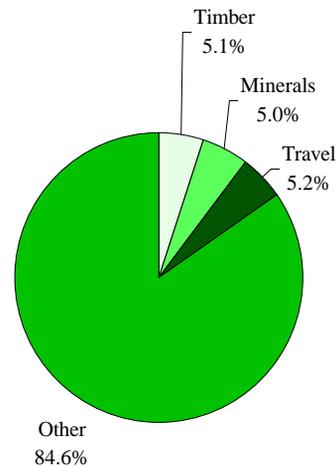


Figure 4.1—Percent of total industrial output by selected industries in the Assessment area (travel for AR and MO only) (from MN IMPLAN 1997a, b).

Table 4.5—Industrial output, employment, and employee compensation of the forest products industry and its share of total output, employment, and employee compensation for timber-significant counties in the Assessment area, the entire Assessment area, the tri-state area (AR, MO, OK), and the U.S.A., 1993

Geographic area	Industrial output		Employment (jobs)		Employee compensation	
	<i>Million \$</i>	<i>Percent of county/area</i>		<i>Percent of county/area</i>	<i>Million \$</i>	<i>Percent of county/area</i>
Arkansas						
Boone	103.7	11.7	1,116	6.9	28.4	10.2
Clark	146.3	21.6	1,424	12.0	33.5	16.5
Conway	59.6	9.8	348	3.9	12.0	7.8
Faulkner	737.7	30.0	3,775	11.1	107.1	16.6
Hot Springs	111.1	17.1	668	6.9	17.0	9.7
Howard	125.9	12.3	1,247	12.4	26.0	14.3
Izard	38.1	17.1	555	11.8	9.2	14.6
Madison	20.6	5.8	347	6.8	4.4	6.3
Montgomery	19.7	12.2	220	7.3	2.7	7.1
Newton	4.0	3.9	179	7.6	1.6	6.4
Pike	65.1	24.0	501	11.7	9.3	14.9
Polk	81.5	13.6	682	7.6	10.5	7.9
Randolph	44.4	9.4	745	9.7	11.7	9.4
Scott	40.4	11.1	569	11.9	8.6	11.9
Searcy	34.2	19.3	388	10.9	5.2	12.9
Sevier	91.0	13.3	582	8.1	12.9	10.4
Stone	24.4	10.6	337	7.7	4.3	7.9
Missouri						
Barton	124.6	36.1	1,690	25.7	43.8	44.0
Butler	103.4	8.8	1,242	6.2	27.1	7.1
Carter	27.9	21.0	258	11.2	4.4	11.3
Dade	9.7	6.9	328	9.4	4.1	12.0
Franklin	216.7	7.6	1,763	4.3	58.9	7.3
Madison	37.7	15.2	318	6.5	5.6	8.4
Newton	115.5	7.7	1,659	7.7	41.5	10.5
Oregon	21.7	10.2	240	5.9	2.9	5.3
Reynolds	49.0	23.7	487	16.7	7.0	14.2
Ripley	26.4	13.9	309	8.0	3.6	6.9
Shannon	37.0	20.7	452	12.6	5.4	11.9
Ste. Genevieve	40.1	7.2	452	5.8	10.1	7.4
Wayne	19.3	8.3	262	6.4	3.1	5.8
Oklahoma						
Atoka	17.0	7.8	246	4.9	5.6	7.9
Mayes	166.7	13.1	529	3.7	17.2	6.4
McCurtain	335.4	30.7	2,148	14.2	53.4	21.0
Muskogee	486.5	21.3	1,326	4.0	55.7	8.4
Pushmataha	32.6	15.9	210	4.6	3.2	5.7
Total (timber-significant counties)	3,614.9	15.7	27,602	8.0	657.1	11.0
Assessment area	6,261.7	5.1	55,450	2.9	1,220.9	3.4
Tri-state	13,100.0	3.0	115,891	1.9	2,776.7	2.1
U.S.A.	266,639.0	2.4	2,466,505	1.7	66,337.0	1.8

Source: MN IMPLAN (1997a, b).

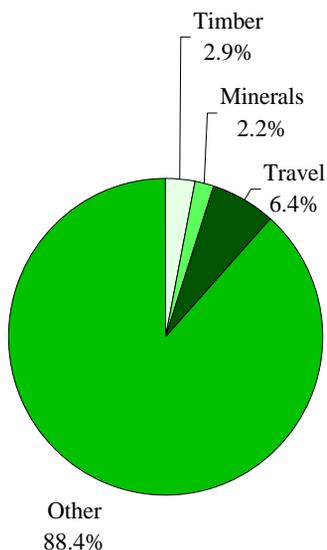


Figure 4.2—Percent of total employment by selected industries in the Assessment area (travel for AR and MO only) (from MN IMPLAN 1997a, b).

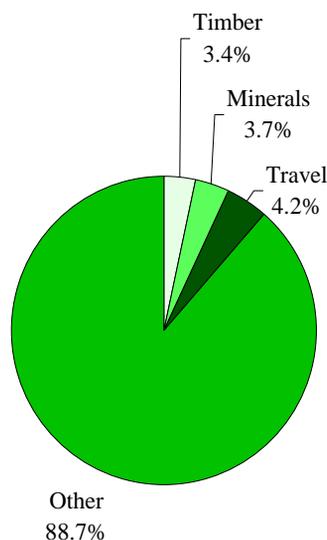


Figure 4.3—Percent of total employee compensation by selected industries in the Assessment area (travel for AR and MO only) (from MN IMPLAN (1997a, b).

represents a significant share of the economy (fig. 4.4, table 4.5). Faulkner Co., AR, Barton Co., MO, and McCurtain Co., OK, stand out as having more than 30 percent of their total industrial output generated by the forest products industry. In addition, Barton Co. has over 25 percent of its workforce in the forest products sector. The 35 timber-significant counties have a total production of approximately \$3.6 billion, which is about half the \$6.3 billion total forest products output in the Assessment area and a third of total forest products output in the tri-state area (table 4.5). About one-half of the jobs and employee compensation attributable to the forest products sector in the Assessment area are concentrated in the timber-significant counties.

The forest products industry can be subdivided into three subsectors—timber management and harvesting, primary forest products manufacturing, and secondary forest products processing. Timber management and harvesting includes forestry services and logging. Primary forest products manufacturing includes the initial stage of converting logs into wood products such as lumber, veneer, plywood, pulp, and bulk paper. Secondary forest products processing includes all further processing. Table 4.6 shows total industrial output, employment, and employee compensation represented in the three stages of production for the timber-significant counties. Most of the output, jobs, and employee compensation occurs in the manufacturing portions of the industry.

Timber management and harvesting account for averages of 0.3 percent, 0.7 percent, and 0.3 percent of total output, employment, and employee compensation, respectively, in these counties (table 4.7). Primary forest products manufacturing accounts for an average of 4.4 percent of the total output in these counties, significantly more than the 1.3 percent of total Assessment area output or the 1.0 percent of tri-state output. This is not to say that the forest products sector is unimportant in many other counties of the Assessment area. Twenty additional counties have forest product output, employment, or employee compensation shares greater than the Assessment area average for the industry, and some counties may have high output and employment values but represent a lower than average share of the counties' economy due to the greater importance of other industrial sectors.

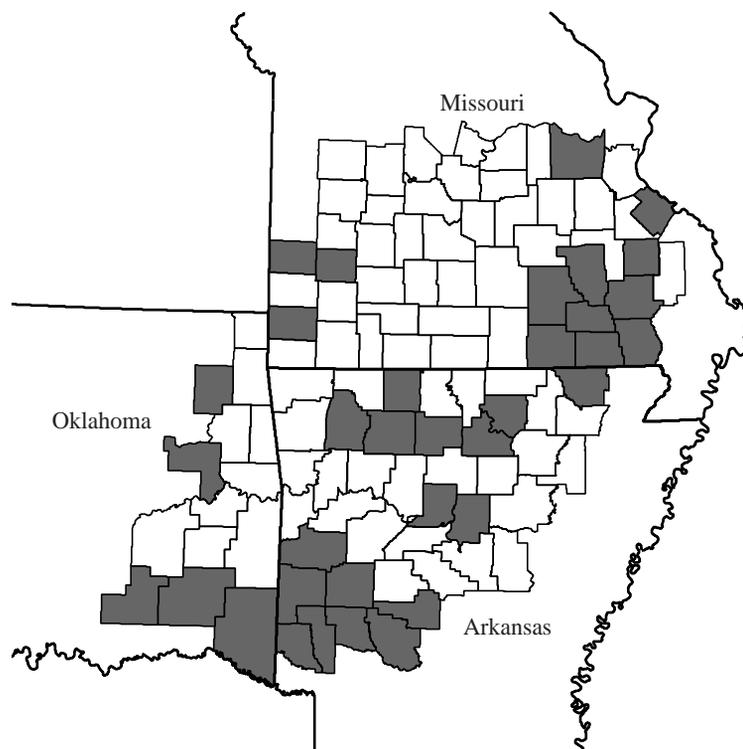


Figure 4.4—Timber-significant counties in the Assessment area (see “Glossary of Terms” for definition; data from MN IMPLAN 1997a, b).

Table 4.6—Total industrial output, employment, and employee compensation generated by components of the forest products industry in the tri-state (AR, MO, OK) and Assessment areas and in timber-significant counties in the Assessment area, 1993^a

Industry component	Unit of measure	Tri-state area	Assessment area	Timber-significant counties
Timber management and harvesting				
Total industrial output	Million \$	424.6	171.3	61.7
Employment	Jobs	19,981	7,507	2,474
Employee compensation	Million \$	169.4	59.5	18.8
Primary forest products manufacturing				
Total industrial output	Million \$	4,148.5	1,587.3	1,019.8
Employment	Jobs	31,402	13,727	9,014
Employee compensation	Million \$	860.4	284.5	185.8
Secondary forest products processing				
Total industrial output	Million \$	8,526.9	4,503.1	2,533.4
Employment	Jobs	64,508	34,216	16,114
Employee compensation	Million \$	1,746.9	876.9	452.5
Forest products (total)				
Total industrial output	Million \$	13,100.0	6,261.7	3,614.9
Employment	Jobs	115,891	55,450	27,602
Employee compensation	Million \$	2,776.7	1,220.9	657.1

^a See “Glossary of Terms” for definition of timber-significant county.
Source: MN IMPLAN (1997a, b).

Table 4.7—Relative contributions of components of the forest products industry to the total output, employment, and employee compensation of the timber-significant counties in the Assessment area, the Assessment area as a whole, and the tri-state area (AR, MO, OK), 1993^a

Industry component Geographic area	Total industrial output	Employment	Employee compensation
	----- <i>Percent</i> -----		
Timber management and harvesting			
Timber-significant counties	0.3	0.7	0.3
Assessment area	0.1	0.4	0.2
Tri-state area	0.1	0.3	0.1
Primary forest products manufacturing			
Timber-significant counties	4.4	2.6	3.1
Assessment area	1.3	0.7	0.8
Tri-state area	1.0	0.5	0.6
Secondary forest products processing			
Timber-significant counties	11.0	4.7	7.6
Assessment area	3.7	1.8	2.4
Tri-state area	2.0	1.1	1.3
Forest products industry (total)			
Timber-significant counties	15.7	8.0	11.0
Assessment area	5.1	2.9	3.4
Tri-state area	3.1	1.9	2.0

^a See “Glossary of Terms” for definition of “timber-significant county.”
Source: MN IMPLAN (1997a, b).

A discussion of the national forest role in the timber industry is presented later in this chapter, and Chapter 6, “Timber Resources,” provides additional discussion of the forest products industry.

The Minerals Industry

The minerals industry in the Assessment area produced almost \$6.1 billion in total industrial output and employed nearly 42,000 workers who were paid over \$1.3 billion in 1993 (table 4.8). These levels represented 5.0 percent of total industrial output, 2.2 percent of total jobs, and 3.7 percent of total employee compensation in the Assessment area (figs. 4.1, 4.2, 4.3 and table 4.9).

The largest extraction activity was nonmetallic mineral mining, which represents approximately two-thirds of the total output from extraction activities in the Assessment area (\$607.9 million of \$912.6 million). The total of all extraction activities (metal mining, coal mining, oil and gas extraction, and nonmetallic mineral mining) represents about one-seventh of the total minerals-related industrial output and one ninth of the total minerals-related employment and employee compensation in the Assessment area.

The minerals industry tends to be concentrated in certain parts of the Assessment area. Based on 1993 data, 21 counties have at least twice the Assessment area average percent of minerals-related output,

Table 4.8—Total industrial output, employment, and employee compensation in components of the minerals industry in the Assessment area, 1993

Industry component	Total industrial output	Employment	Employee compensation
	<i>Million \$</i>		<i>Million \$</i>
Extraction activities			
Metal mining	182.1	852	37.6
Coal mining	28.9	137	9.1
Oil and gas extraction	93.7	1,091	15.3
Nonmetallic mineral mining	607.9	2,806	82.8
Total	912.6	4,886	144.7
Minerals manufacturing			
Primary metal industries	1,608.6	8,763	316.2
Fabricated metal industries	2,087.7	17,147	536.7
Petroleum refining and related industries	318.4	979	44.9
Stone, clay, glass, and concrete products	1,004.6	8,592	252.2
Total	5,167.4	37,047	1,190.5
Total mineral industry	6,080.0	41,933	1,335.2

Source: MN IMPLAN (1997a, b).

Table 4.9—Percentage of total industrial output, employment, and employee compensation in the Assessment area produced by components of the minerals industry, 1993^a

Industry component	Total industrial output	Employment	Employee compensation
	----- Percent -----		
Extraction activities			
Metal mining	0.2	0.1	0.1
Coal mining	0.0	0.0	0.0
Oil and gas extraction	0.1	0.1	0.1
Nonmetallic mineral mining	0.5	0.1	0.2
Total	0.7	0.3	0.4
Minerals manufacturing			
Primary metal industries	1.3	0.5	0.9
Fabricated metal industries	1.7	0.9	1.5
Petroleum refining and related industries	0.3	0.1	0.1
Stone, clay, glass, and concrete products	0.8	0.5	0.7
Total	4.2	2.0	3.3
Total mineral industry	5.0	2.2	3.7

^a Totals may differ from sum of columns due to rounding.

Source: MN IMPLAN (1997a, b).

employment, and/or employee compensation (fig. 4.5, table 4.10). These counties produced a total of about \$2.4 billion of output, 15,500 jobs, and \$535 million in employee compensation (14.4 percent of total output, 6.0 percent of jobs, and 12.1 percent of employee compensation, respectively, in these counties). Particularly noteworthy are Iron, Reynolds, and Ste. Genevieve Counties in Missouri, which have between 33 percent and 52 percent of their total output attributed to the minerals industry. The employee compensation generated by the minerals industry in the minerals-significant counties is disproportionately high (12.1 percent) relative to the percentage of jobs the industry supports (6 percent), reflecting the generally high wages of the minerals industry.

Mineral extraction activities in the Assessment area account for over \$900 million in total industrial output, which is approximately one-tenth of the total mineral

extraction output of the tri-state area (table 4.11). Among other factors, oil and gas extraction in the tri-state area is considerably greater outside the Assessment area than inside. In the minerals-significant counties, output from extraction activities has a significantly higher share (1.9 percent) of total industrial output than the average for the Assessment area (0.7 percent) but a similar share compared to the three States together (2.1 percent) (table 4.12). The proportion of total output, employment, and employee compensation generated by the minerals industry as a whole in these counties is approximately two and three times greater than the comparable proportions in the tri-state area and the Assessment area, respectively.

A discussion of the national forest's role in the minerals industry is presented later in this chapter, and Chapter 7, "Mineral Resources," provides additional discussion of this industry.



Figure 4.5—Minerals-significant counties in the Assessment area in 1993 (see “Glossary of Terms” for definition; data from MN IMPLAN 1997a, b).

Table 4.10—Industrial output, employment, and employee compensation of the minerals industry, and its share of total output, employment, and employee compensation, for minerals-significant counties in the Assessment area, the entire Assessment area, the tri-state area (AR, MO, OK), and the U.S.A., 1993

Geographic area	Industrial output		Employment (jobs)		Employee compensation	
	<i>Million dollars</i>	<i>Percent of county/area</i>		<i>Percent of county/area</i>	<i>Million dollars</i>	<i>Percent of county/area</i>
Arkansas						
Boone	70.9	8.0	742	4.6	21.2	7.6
Crawford	150.1	10.9	857	4.5	27.7	8.0
Hot Springs	101.6	15.6	751	7.8	27.8	15.9
Jackson	113.6	19.7	563	6.8	23.0	15.7
Lawrence	77.6	15.5	436	5.5	11.0	9.3
Lonoke	104.8	12.3	835	6.0	29.6	13.7
Randolph	83.6	17.6	720	9.4	23.3	18.7
White	247.5	13.5	1,749	6.4	58.5	11.5
Missouri						
Barry	237.1	18.3	1,822	10.7	52.6	17.7
Iron	182.0	51.7	654	13.6	31.8	36.1
Jefferson	354.9	10.4	1,655	3.3	83.1	8.3
Morgan	27.2	8.3	266	4.2	6.4	8.1
Osage	32.1	7.9	342	6.2	7.0	8.1
Reynolds	68.5	33.1	322	11.0	12.2	24.9
Ripley	33.3	17.5	284	7.4	7.4	14.2
Ste. Genevieve	208.0	37.3	1,114	14.3	40.2	29.3
Webster	50.0	9.0	464	4.7	12.1	9.0
Oklahoma						
Atoka	37.8	17.4	325	6.4	7.9	11.1
Haskell	19.5	9.4	121	2.7	4.5	7.8
Mayes	123.1	9.7	977	6.9	34.6	12.9
Ottawa	112.3	15.0	458	3.5	13.1	6.6
All mining-significant counties	2,435.5	14.4	15,457	6.0	535.1	12.1
Assessment area	6,080.0	5.0	41,933	2.2	1,335.2	3.7
Tri-state	31,335.7	7.2	180,262	3.0	6,272.0	4.7
U.S.A.	595,127.0	5.4	3,129,550	2.2	114,686.0	3.0

Source: MN IMPLAN (1997a, b).

Table 4.11— Total industrial output, employment, and employee compensation generated by components of the minerals industry in the tri-state area (AR, MO, OK), the Assessment area, and the minerals-significant counties in the Assessment area, 1993^a

Industry component Economic measure	Unit of measure	Tri-state area	Assessment area	Minerals- significant counties
Extraction				
Total industrial output	Million \$	9,171.3	912.6	325.4
Employment	Jobs	49,814	4,886	1,494
Employee compensation	Million \$	1,467.0	144.7	49.1
Minerals manufacturing				
Total industrial output	Million \$	22,164.4	5,167.4	2,110.1
Employment	Jobs	130,448	37,047	13,963
Employee compensation	Million \$	4,805.0	1,190.5	486.1
Total industrial components				
Total industrial output	Million \$	31,335.7	6,080	2,435.5
Employment	Jobs	180,262	41,933	15,457
Employee compensation	Million \$	6,272.0	1,335.2	535.1

^a Totals may differ from sum of columns due to rounding.

Source: MN IMPLAN (1997a, b).

Table 4.12—Percentage that the minerals industry comprises of total output, employment, and employee compensation in the tri-state area (AR, MO, OK), the Assessment area as a whole, and the minerals-significant counties of the Assessment area, 1993^a

Industry component Economic measure	Tri-state area	Assessment area	Minerals- significant counties
Extraction			
Total industrial output	2.1	0.7	1.9
Employment	0.8	0.3	0.6
Employee compensation	1.1	0.4	1.1
Minerals manufacturing			
Total industrial output	5.1	4.2	12.5
Employment	2.1	2.0	5.5
Employee compensation	3.6	3.3	10.9
Total industry components			
Total industrial output	7.2	5.0	14.4
Employment	2.9	2.2	6.0
Employee compensation	4.6	3.7	12.1

^a Totals may differ from sum of columns due to rounding.

Source: MN IMPLAN (1997a, b).

The Travel Industry

Travel for recreation, business, entertainment, and other purposes is a significant industry in the Highlands. In this analysis, no attempt was made to differentiate among the variety of purposes for travel (e.g., business, recreation, visiting family) since data to make these distinctions were not available. In general, many of the trips within and to the Assessment area are multi-purpose. For example, people traveling mainly for business or to visit family often also participate in recreational activities and make recreational expenditures. It is difficult to categorize or separate these expenditures and economic effects. However, a study in Arkansas found that travelers in the State participated in the following outdoor recreation activities that depend to some extent on public lands: sightseeing (87 percent of travelers), camping (13 percent of travelers), fishing/hunting (10 percent of travelers), water sports (6 percent of travelers), and bird watching (3 percent of travelers) (AR DPT 1998).

Data for the Arkansas and Missouri counties of the Assessment area show that total travel expenditures were nearly \$6.4 billion in 1996 (adjusted to 1993 dollars), which is 5.7 percent of the total output for the Arkansas and Missouri portions of the Assessment area (table 4.13) and 5.2 percent of the output of the entire Assessment area (fig. 4.1). Travel expenditures in the Arkansas and Missouri portions of the Assessment area represented 48 percent of the \$13 billion travel-related expenditures of the two States combined.

Travel expenditures support more than 120,000 jobs and over \$1.5 billion in wages, which represents 7.0

percent of total jobs and 4.6 percent of total employee compensation for the Arkansas-Missouri portion of the Assessment area. The average annual wage of these travel-related jobs in 1996 was \$12,666 (AR DPT 1997, Certec, Inc. 1997).

Certain counties in the Highlands have high concentrations of output, employment, and income provided by the travel industry. Examining only the counties that have at least twice the Assessment area's average percent of total output (2×5.7 percent = 11.4 percent), employment (2×7.0 percent = 14.0 percent), and/or employee compensation (2×4.6 percent = 9.2 percent) yields 23 counties that have high concentrations of travel-related employment, output, or incomes (table 4.13, fig. 4.6). The travel industry's share of the economy in these counties averages 25.5 percent of industrial output, 28.9 percent of employment, and 24.7 percent of employee compensation. These counties—4 in Arkansas and 19 in Missouri—combined account for almost half the total travel-related output, employment, and employee compensation in the Arkansas-Missouri portion of the Assessment area. Taney County, MO, where Branson is located, has an incredible 83.7 percent of its jobs related to travel. Camden, Hickory, and Stone Counties in Missouri have more than 40 percent of their jobs associated with the travel industry; Carroll County, AR, has the highest percentage (20 percent) of travel-related employment in that State.

A discussion of the national forests' role in the recreation elements of the economy is presented later in this chapter; Chapter 5, "Recreation," provides additional discussion of recreation in the Assessment area.

Table 4.13—Industrial output, employment, and employee compensation of the travel industry and its share of total output, employment, and employee compensation for travel-significant counties of the Assessment area of Arkansas and Missouri, for the entire Arkansas-Missouri portion of the Assessment area, and for the two-State area (AR, MO)^a (1996 dollars adjusted for inflation to 1993 dollars)

Geographic area	Industrial output		Employment (jobs)		Employee compensation	
	<i>Million dollars</i>	<i>Percent of county/area</i>		<i>Percent of county/area</i>	<i>Million dollars</i>	<i>Percent of county/area</i>
Arkansas						
Carroll	126.2	13.9	2,590	20.0	25.1	12.8
Cleburne	67.1	12.8	976	11.3	10.6	7.9
Garland	291.1	12.4	5,143	12.9	52.9	7.8
Stone	36.7	15.9	612	13.9	6.6	12.1
Missouri						
Benton	81.2	30.7	1,672	30.5	22.5	33.6
Camden	458.1	46.7	9,446	53.8	126.8	45.5
Carter	23.0	17.3	476	20.6	6.3	16.3
Cedar	39.9	16.0	822	15.4	11.1	16.7
Crawford	54.9	10.7	1,138	13.0	15.2	10.8
Dade	14.7	10.5	302	8.7	4.1	12.0
Dallas	23.5	9.4	485	9.6	6.5	11.2
Dent	32.2	10.8	668	11.3	8.9	10.7
Douglas	24.6	8.9	506	9.7	6.8	10.3
Hickory	47.7	45.5	982	40.5	13.2	54.1
Laclede	93.0	9.5	1,917	12.8	25.8	10.3
Miller	142.1	24.7	2,928	29.5	39.3	24.6
Morgan	42.2	12.9	872	13.6	11.7	14.9
Ozark	39.7	25.2	808	22.9	11.0	31.3
Reynolds	26.4	12.8	546	18.7	7.3	14.9
Shannon	20.9	11.7	434	12.1	5.8	12.7
Stone	272.4	51.0	5,625	56.5	75.4	54.8
Taney	966.3	81.4	19,931	83.7	267.4	69.6
Wayne	37.8	16.3	782	19.2	10.4	19.2
All travel-significant counties	2,961.6	25.5	59,661	28.9	770.8	24.7
Assessment area of						
AR and MO	6,362.9	5.7	120,533	7.0	1,526.7	4.6
AR and MO (entire States)	13,248.3	4.2	258,683	5.9	3,358.5	3.4
U.S.A.	N/A		N/A		N/A	

N/A = not available.

^a Equivalent travel data for Oklahoma not available.

Source: MN IMPLAN (1997a, b), AR DPT (1997), Certec, Inc. (1997).

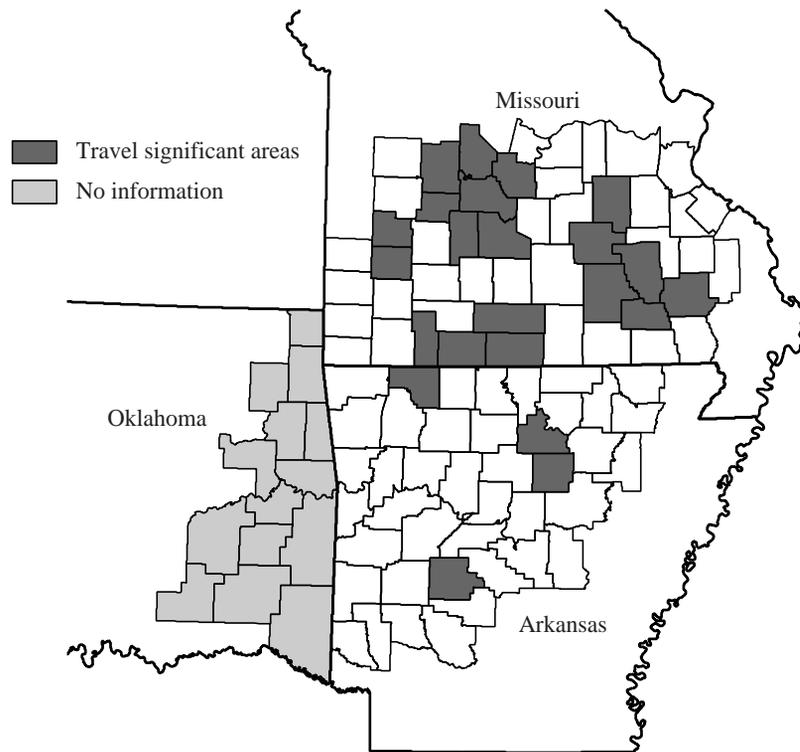


Figure 4.6—Travel-significant counties in the Assessment area (see “Glossary of Terms” for definition; data from MN IMPLAN 1997a, b; AR DPT 1997; Certec, Inc. 1997).

Contributions of National Forest Programs to the Economy

Data Sources and Methods of Analysis

The Social-Economic Team used data from each national forest about its annual programs of work, including volume of timber harvested, estimates of recreation use, value of minerals extracted, expenditures, and payments to States and counties. Using the IMPLAN computer model (an input-output model that estimates total effects of economic changes in an area; see “Glossary of Terms”) combined with detailed data on the local economy, the team estimated the effects of the three national forests on the overall Highlands’ economy. The economic multipliers (sometimes referred to as response coefficients) that represent the economic effects per unit of forest output were developed in consultation with the staff of the Forest Service’s Rocky

Mountain Research Station (Alward 1998). (For further information on the model and data, see MN IMPLAN 1997a, b.)

There are some special considerations and caveats to using this type of model. First, the model is designed to assess marginal changes (small changes in final demand from the current situation). Second, the model does not allow for substitution in production. For example, if labor becomes expensive, the model does not allow an industry to substitute machinery for labor. Also, the model assumes that the supply of raw materials and other inputs is unconstrained. Finally, the composition of the regions used in developing the model can have a significant effect on the model’s outcome. For instance, very small regions (e.g. single counties), will export most of their production and import most of the goods and services they consume. Larger regions will contain more secondary processing, causing more money to remain in the economy longer before “leaking” out. When considering the economic effects of national

forests, the larger the region analyzed, the less important the forests will appear.

The regions used in this analysis include (1) the timber market zones for the three national forests (for estimating contributions from timber-related programs) (fig. 4.7), (2) the counties that have national forest lands (for estimating effects of recreation, minerals, national forest

expenditures, and payments to counties) (Chapter 2, fig. 2.1), and (3) all the counties of the Assessment area (for estimating GRP) (fig. 1.1). The timber market zones represent the primary zone of influence for basic economic effects of the national forests on the wood processing sector. These zones are comprised of counties with national forest lands plus those counties that have

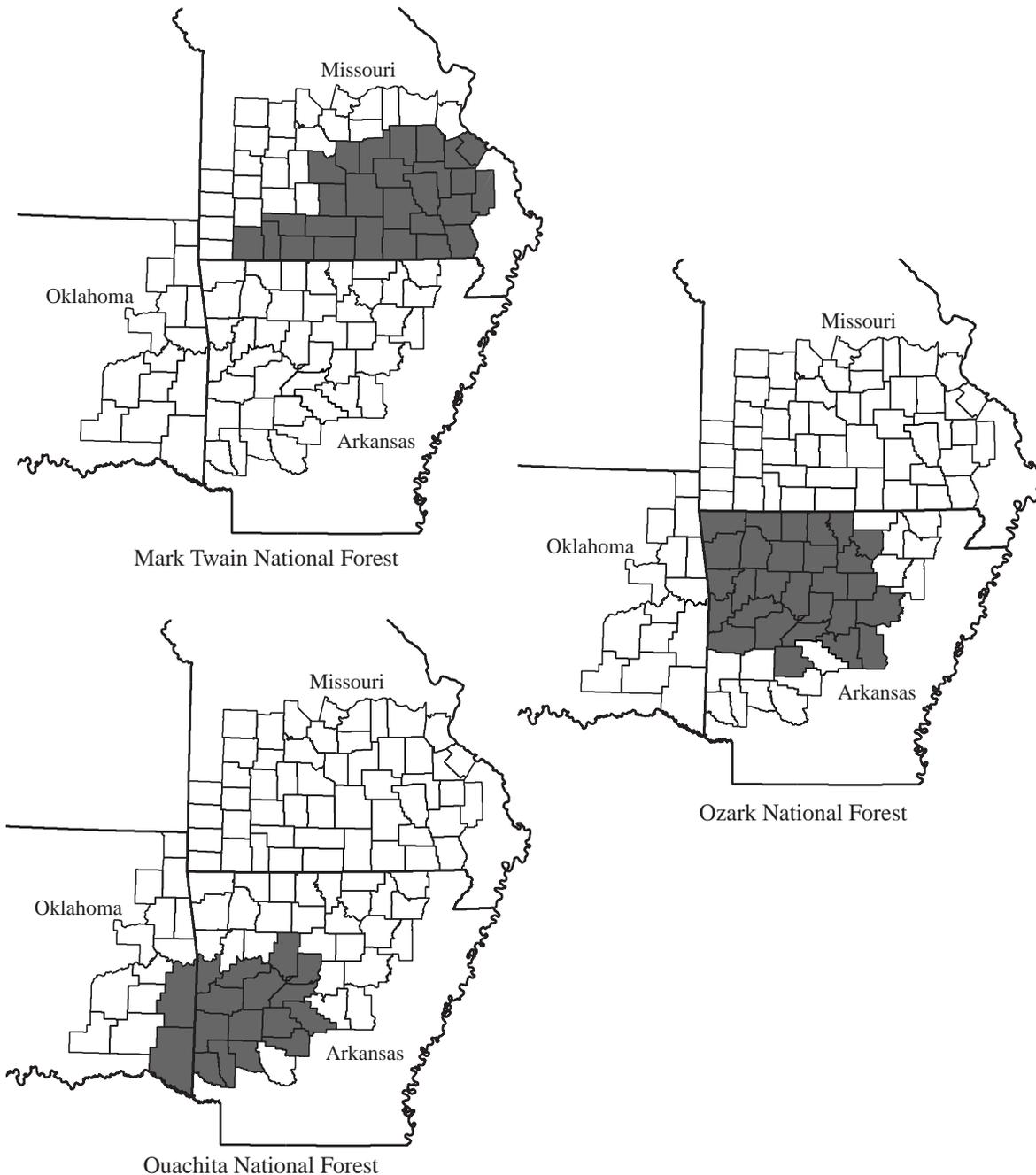


Figure 4.7—Timber market zones for Highlands' national forests.

mills that purchase national forest timber. Some mills purchase timber from the Ouachita and Ozark National Forests and, therefore, their market zones overlap. Additional information concerning data sources and methods of analysis is included below in the timber, recreation, and minerals subsections.

National Forest Programs That Affect the Economy

This section will discuss three ways in which national forest programs influence the regional and local economies: (1) through the production and provision of goods and services (e.g., timber, minerals, recreation), (2) through the return of a portion of receipts to counties with national forest lands, and (3) through expenditures the Forest Service makes for management and administration. The total effect of these three influences is the national forests' contributions to regional employment and the GRP. The GRP, which is equivalent to total value added, measures total income to a particular area, including employee compensation, proprietary income (income from self-employment), and other property income plus indirect business taxes. GRP is the local equivalent of the national measure of economic growth, the gross domestic product.

Goods and services produced by the national forests have a direct effect on the economy, either through the industry that extracts the good (e.g., the logging or mining industry) or through the person who consumes the services (such as a camper or hunter). Indirect or secondary effects occur when the industries producing goods or services purchase goods or services from other producers who, in turn, also produce goods and services. Another effect, called an "induced" effect, occurs through the payment of wages to the employees of the directly and indirectly affected industries, which will then be spent in the local economy.

Production and Provision of Goods and Services

Timber, minerals, and recreation are the principal national forest programs that contribute to the Highlands' economy. The range program on the three forests is quite small (see Chapter 8) and was not included in this analysis. Timber outputs are expressed in million board feet; recreation use is expressed in recreation visitor days (RVD's); and minerals are in million dollars of extracted materials. The effects displayed for these programs include direct, indirect, and induced effects.

Timber. Calculations for timber impacts shown in table 4.14 are based on the 1996 harvest and timber

Table 4.14—Economic impacts of national forest timber harvesting for fiscal year 1996

National forest Timber product	Timber harvested ^a	Impacts per mmbf ^b			Total impact of 1996 harvest ^b		
		Employee compensation	Total income	Employment (jobs)	Employee compensation	Total income	Employment (jobs)
	<i>mmbf</i>	----- Dollars -----			----- Million \$ -----		
Ouachita							
Sawtimber	104.0	694,346	1,536,791	47.6	72.2	159.9	4,953
Roundwood	47.6	298,860	596,439	18.0	14.2	28.4	857
Ozark-St. Francis							
Sawtimber	28.4	392,459	1,062,926	27.7	11.2	30.2	787
Roundwood	16.9	203,356	381,904	10.8	3.4	6.5	183
Mark Twain							
Sawtimber	30.0	489,502	951,262	34.9	14.7	28.6	1,048
Roundwood	8.9	343,760	868,329	25.3	3.1	7.7	224
Total	235.8	—	—	—	118.8	261.2	8,052

mmbf = million board feet; — = not applicable.

^a Roundwood values were converted from cubic feet.

^b Impacts reported differ from those in respective 1996 annual reports of the national forests due to the Assessment Team's use of more recent (1993) input-output data; timber harvested represents actual figures for 1996.

Source: MN IMPLAN (1997a, b).

revenue data supplied by the national forests. For all 3 forests, the timber harvests in 1996 affected an estimated 8,052 jobs, yielding employee compensation of \$118.8 million and total income of \$261.2 million. The Ouachita National Forest had a larger timber program than the other two forests, accounting for 104 of the 162 million board feet of sawtimber harvested and 47.6 million board feet of roundwood. The Ouachita's timber harvest program supported 5,810 jobs, with resulting employee compensation of over \$86 million and total income of \$188.3 million.

The harvest on the Ozark-St. Francis National Forests affected 970 jobs and produced \$14.6 million in employee compensation and \$36.7 million in total income. The Mark Twain National Forest had the least harvest volume of the three forests but influenced 1,272 jobs and accounted for \$17.8 million in employee compensation and \$3.63 million in total income. The differences among the three forests result from differences in the size of their respective timber harvest

programs, type of timber removed, final processing used, and amount of material exported out of each forest's market zone.

When the three national forests are considered together, the timber program accounts for around half of their economic effects for all indicators—employee compensation, total income, and employment (fig. 4.8). However, there is considerable variation among the three forests. Notably, the timber program on the Ouachita National Forest accounted for about 81 percent, 87 percent, and 79 percent of that forest's 1996 contributions to employee compensation, total income, and jobs, respectively, in the Assessment area (table 4.15). In contrast, the timber program on the Mark Twain accounted for only 17 percent of employee compensation, 19 percent of total income and 22 percent of the jobs influenced by the forest's resource programs in that year.

Recreation. Recreation impacts occur through the purchase of goods and services by consumers (e.g.,

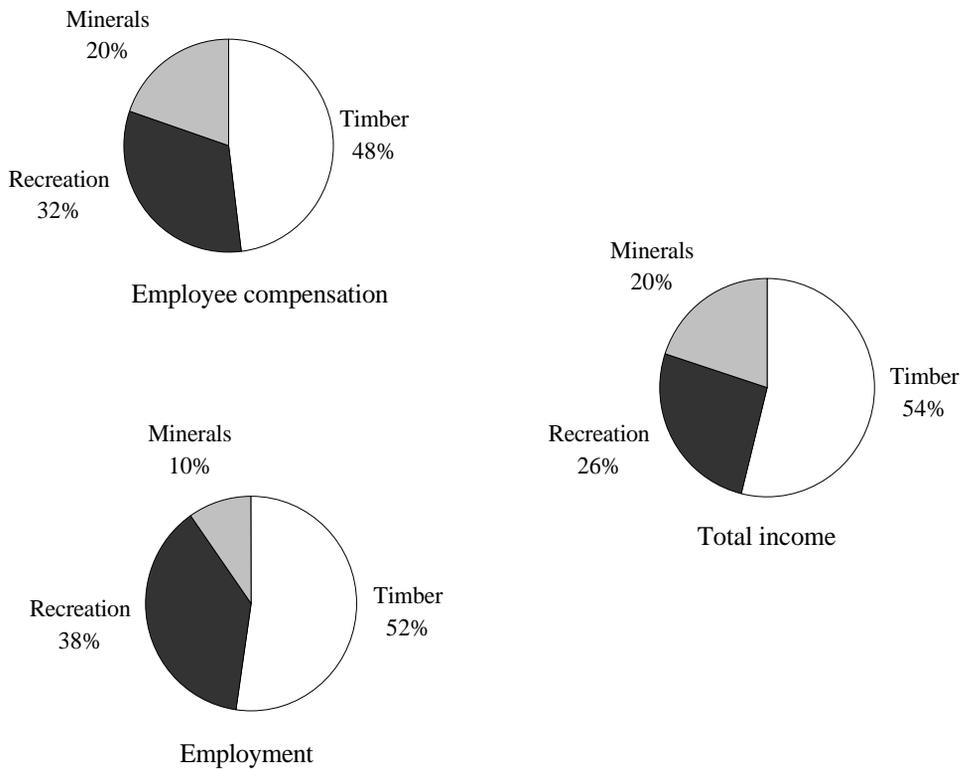


Figure 4.8—Percentages that the timber, recreation, and minerals programs comprise of employee compensation, total income, and employment generated by the production of goods and services on the Highlands' national forests (from MN IMPLAN 1997a, b).

Table 4.15—Economic impacts of national forest timber, recreation, and minerals programs by national forest and resource, fiscal year 1996^a

Economic indicator National forest	Timber		Recreation		Minerals		Total	
	<i>Million dollars</i>	<i>% of row total</i>	<i>Million dollars</i>	<i>% of row total</i>	<i>Million dollars</i>	<i>% of row total</i>	<i>Million dollars</i>	<i>Percent</i>
Employee compensation								
Ouachita	86.4	80.7	19.8	18.5	0.8	0.7	107.0	100.0
Ozark-St. Francis	14.6	43.6	18.4	54.9	0.5	1.5	33.5	100.0
Mark Twain	17.8	16.5	41.2	38.1	49.1	45.4	108.1	100.0
Total ^b	118.8	47.8	79.4	31.9	50.5	20.3	248.7	100.0
Total income								
Ouachita	188.3	86.6	27.7	12.7	1.5	0.7	217.5	100.0
Ozark-St. Francis	36.7	52.8	31.4	45.2	1.4	2.0	69.5	100.0
Mark Twain	36.3	18.5	67.2	34.2	93.2	47.4	196.7	100.0
Total ^b	261.3	54.0	126.3	26.1	96.0	19.9	483.6	100.0
	<i>Number</i>	<i>% of row total</i>	<i>Number</i>	<i>% of row total</i>	<i>Number</i>	<i>% of row total</i>	<i>Number</i>	<i>Percent</i>
Employment (jobs)								
Ouachita	5,810	79.3	1,477	20.2	35	0.5	7,322	100.0
Ozark-St. Francis	970	39.8	1,438	58.9	32	1.3	2,440	100.0
Mark Twain	1,272	22.1	2,933	51.1	1,535	26.7	5,740	100.0
Total	8,052	51.9	5,848	37.7	1,602	10.3	15,502	100.0

^a Values for timber and minerals are based on annual records of timber volume harvested and minerals receipts, respectively, while recreation values are based on estimates of recreation use; values shown here are based on tables 4.14, 4.16, and 4.17 of this chapter.

^b Totals may differ from sum of columns or rows due to rounding.

Source: MN IMPLAN (1997a, b).

equipment, food, lodging, and transportation). From studies of people engaging in outdoor recreation, researchers have determined the average expenditures associated with trips for different types of recreation activities. This information was used in the IMPLAN model together with estimates of recreation activity occurring on the national forests in 1996 to calculate the overall economic effects of national forest recreation use (table 4.16). While the estimates of national forest recreation activity (derived from annual reports of each forest) are not based on statistically reliable data, they represented the best information available to the authors of this chapter. More statistically reliable estimates of recreation use will be developed for the three national forests in the Highlands in the years 2000 through 2004.

Recreation on the national forests affected an estimated 5,848 jobs in the region. The Mark Twain National Forest had the largest impact (over 2,900 jobs), while the Ouachita and Ozark each affected over 1,400 recreation-related jobs. Wages totaled \$79.4 million and contributions to total income were \$126.3 million.

Overall, recreation use on the three national forests combined generates 32 percent of employee compensation, 26 percent of total income, and 38 percent of jobs attributable to national forest resource programs (fig. 4.8). Recreation accounts for the greatest effects of the three programs on the Ozark-St. Francis National Forests, influencing 55 percent of employee compensation, 45 percent of total income, and 59 percent of jobs (table 4.15). Relative to the other resource programs,

Table 4.16—Economic impacts of national forest recreation use in fiscal year 1996

National forest Recreation activity	RVD's ^a	RVD's per trip	Impacts per 10,000 trips			Total impact from recreation trips ^b		
			Employee compensation	Total income	Employ- ment (jobs)	Employee compensation	Total income	Employ- ment (jobs)
			----- Dollars -----			---- Million dollars ----		
Ouachita								
Developed site use	332,200	1.17	189,760	133,597	13.7	5.4	3.8	389
Mechanical travel	375,400	1.17	251,130	411,701	18.4	8.1	13.2	590
Trail use	143,400	1.17	209,335	345,228	15.0	2.6	4.2	184
Big game hunting	125,600	1.39	24,183	40,655	2.6	0.2	0.4	23
Small game hunting	150,500	1.39	13,666	23,387	1.4	0.2	0.3	15
Freshwater fishing	64,600	1.39	23,143	42,164	2.3	0.1	0.2	11
Viewing wildlife	19,800	0.96	22,819	39,860	2.4	< 0.1	< 0.1	5
All other recreation	96,800	0.96	321,578	551,473	25.7	3.2	5.6	259
Total						19.8	27.7	1,477
Ozark-St. Francis								
Developed site use	442,600	1.17	177,011	304,531	13.3	6.7	11.5	503
Mechanical travel	246,100	1.17	237,738	393,984	18.1	5.0	8.3	381
Trail use	67,200	1.17	198,633	331,634	14.7	1.1	1.9	84
Big game hunting	172,900	1.39	24,183	40,655	2.6	0.3	0.5	32
Small game hunting	124,300	1.39	13,666	23,387	1.4	0.1	0.2	13
Freshwater fishing	55,800	1.39	23,143	42,164	2.3	< 0.1	0.2	9
Viewing wildlife	18,100	0.96	22,819	39,860	2.4	< 0.1	< 0.1	5
All other recreation	159,100	0.96	304,154	526,042	24.8	5.0	8.8	411
Total						18.4	31.4	1,438
Mark Twain								
Developed site use	641,200	1.17	196,822	324,589	13.8	10.8	17.8	756
Mechanical travel	538,300	1.17	263,893	418,987	18.4	12.1	19.3	847
Trail use	216,300	1.17	219,498	350,548	15.0	4.1	6.5	277
Big game hunting	133,100	1.39	24,183	40,655	2.6	0.2	0.4	25
Small game hunting	145,200	1.39	13,666	23,387	1.4	0.1	0.2	15
Freshwater fishing	144,900	1.39	23,143	42,164	2.3	0.2	0.4	24
Viewing wildlife	19,800	0.96	22,819	39,860	2.4	< 0.1	< 0.1	5
All other recreation	378,000	0.96	344,799	570,338	25.0	13.6	22.5	984
Total						41.2	67.2	2,933
All forests						79.4	126.3	5,848

RVD = recreation visitor day; see "Glossary of Terms" for definition.

^a The Forest Service calculates RVD's annually for each national forest based on data from fee collections at developed sites and estimates of other recreation use.

^b Totals may differ from sum of columns due to rounding.

Source: IMPLAN impact model (using 1993 input-output data and 1996 forest estimates of recreation use), MN IMPLAN (1997a, b).

recreation has the lowest economic effect on the Ouachita National Forest, accounting for 20 percent or less of employee compensation, total income, and jobs.

Minerals. The economic effects of national forest minerals programs are based on the sales value of minerals extracted from the national forests. Except for quartz crystal on the Ouachita, the sales values were obtained from Forest Service records maintained in the regional offices in Milwaukee and Atlanta and were derived from annual production reports of the Minerals Management Service of the U.S. Department of the Interior (USDI). The estimated market value of quartz crystal extraction from national forest lands was developed from information maintained at the Ouachita National Forest Supervisor's Office.

The minerals program of the 3 national forests accounts for over \$50 million in employee compensation, \$96 million in total income, and more than 1,600 jobs in the Assessment area (table 4.17). Lead, zinc, and copper mining on the Mark Twain National Forest account for more than 95 percent of the total national forest impact from minerals for all three economic measures. The programs on the Ozark and Ouachita are much smaller and consist largely of mining quartz and common variety minerals on the Ouachita and oil and gas leases on the Ozark.

Relative to the other resource programs for all Assessment area national forests, the minerals program

accounts for 20 percent of employee compensation, 20 percent of total income, and 10 percent of employment (fig. 4.8, table 4.15). The economic contributions of the minerals industry are most significant on the Mark Twain National Forest where the minerals program generates 45 percent of employee compensation, 47 percent of total income, and about 27 percent of jobs. On the Ouachita and Ozark National Forests, the minerals program represents 2 percent or less of the national forest economic effects for all economic indicators (table 4.15).

Returns to Counties

The Federal Government pays a percentage of the revenues generated from the use of national forest lands and resources to States and counties rather than making property tax payments. The following are the principal Federal laws that provide authority for payments to States.

Twenty-Five Percent Fund Act, May 23, 1908 (P.L. 60-136, Ch. 192, 35 Stat. 260, as amended). This act requires that 25 percent of the revenues generated from national forest lands be returned to the States. States distribute these payments based on the acreage of national forest lands in each county and other factors that may vary from State to State. This money is restricted to use for county roads and schools, but the States determine how the money is divided between

Table 4.17—Economic impacts of mineral extraction from national forests in fiscal year 1996

National forest Minerals extracted	Minerals sales' value	Impacts per million dollars extracted			Total impact for mineral receipts		
		Employee compensation	Total income	Employment (jobs)	Employee compensation	Total income	Employment (jobs)
	<i>Million \$</i>	<i>----- Dollars -----</i>			<i>----- Million \$ -----</i>		
Ouachita							
Oil and gas	0.001	354,355	920,763	21.2	< .001	< .001	0
Quartz and common variety	1.524	544,040	951,427	22.7	.829	1.450	35
Ozark-St. Francis							
Oil and gas	1.503	348,050	919,386	21.3	.523	1.382	32
Mark Twain							
Lead, zinc, copper	161.604	303,882	576,559	9.5	49.109	93.174	1,535
Total	164.632				50.461	96.007	1,602

Source: IMPLAN impact model (using 1993 input-output data and 1996 minerals data from the national forests), MN IMPLAN (1997a, b).

these uses. This act applies to most revenues generated on a national forest, including revenues from the sale of forest products, fees for special use permits, range permits and use of recreation areas, and the sale of leases for extraction of some but not all minerals, as described below.

Payments in Lieu of Taxes Act, October 20, 1976 (P.L. 94-565, 90 Stat. 2662; and P.L. 97-258, 96 Stat. 1031, Ch. 69). This law provides for payments to counties that contain most categories of Federal lands, including national parks, national wildlife refuges, and national forests. Payments in lieu of taxes (PILT) are limited to the funds available from the annual Interior appropriations bill. The PILT rates for national forest lands are determined by a formula that accounts for the 25 percent fund payments, other Federal grants and payments, and county population. PILT payments help reduce variations caused by year-to-year changes in 25 percent fund payments. However, neither PILT rates nor payments are made through the Forest Service, and these payments will not be further analyzed in this report.

Mineral Materials Act of 1947, July 31, 1947 (P.L. 80-291, Ch. 406, 61 Stat. 681, as amended). This law provides that any revenues generated from the sale from national forests of common variety minerals, such as sand, gravel, and building stone, be distributed to the States in accordance with the Twenty-five Percent Fund law.

Mineral Leasing Act, February 25, 1920 (P.L. 66-146, 41 Stat. 437, sect. 35, as amended). This act requires 50 percent of the revenues generated from oil, gas, coal, and other energy mineral leases on national forest lands that was reserved from the public domain to be paid back to the States for planning, construction, and maintenance of public facilities and provision of public services.

Mineral Leasing Act for Acquired Lands, August 7, 1947 (P.L. 80-382, Ch. 513, 61 Stat. 913, sect. 6, as amended). This law provides that any revenues generated from the sale of leases for the extraction of hard rock minerals (i.e., not common variety), oil, gas, and coal from national forests be distributed to the States in accordance with the Twenty-Five Percent Fund Law.

Quartz Contracts on the Ouachita National Forest in Arkansas, September 27, 1988 (P.L. 100-446, sect. 323). This act requires that 50 percent of the revenues generated from the sale of quartz on the Ouachita National Forest in Arkansas be returned to the State of Arkansas.

Tables 4.18a and 4.18b show the payments (in actual year dollars) from Highlands' national forests to counties with national forest lands for fiscal years 1987 through 1996. Payments are distributed to the counties according to the amount of national forest acreage within the county. The values in table 4.18a do not reflect PILT or payments made by the Minerals Management Service to counties that have lands of the Ozark-St. Francis and/or Ouachita National Forests. Similarly, table 4.18b does not include PILT, but it does reflect payments from the Minerals Management Service to counties that include parts of the Mark Twain National Forest.

Payments from individual forests to counties have varied somewhat from fiscal year 1987 through 1996, particularly for the Ouachita National Forest (fig. 4.9). Such variability can be caused by changes in agency policies, fluctuations in national forest program levels, and market variations that affect the value of national forest resources. For example, payments to counties

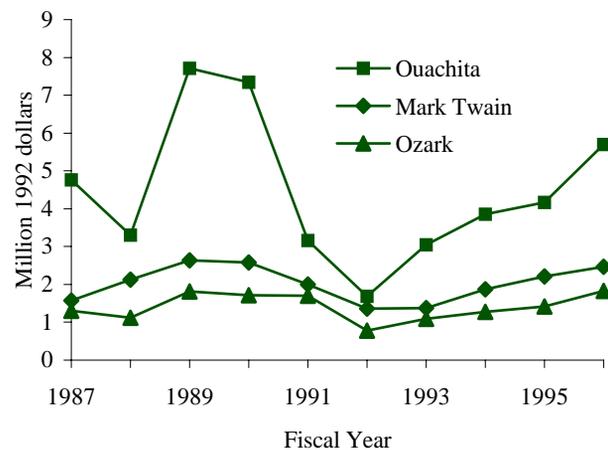


Figure 4.9—Payments to counties by national forests for fiscal years 1987 through 1996 (not adjusted for inflation).

Table 4.18a—Payments to Arkansas and Oklahoma counties with national forest land, fiscal years 1987 through 1996^a

Geographic area	NF land ^b	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
	<i>Acres</i>	<i>Dollars</i>									
Arkansas											
Ashley ^c	1,675	5,007	3,468	8,063	7,669	3,277	1,752	3,098	3,920	4,227	5,770
Baxter	62,990	69,419	60,725	95,890	89,663	92,723	43,053	56,502	68,226	75,575	99,774
Benton	8,197	9,226	8,070	12,582	11,625	12,037	5,617	7,353	8,878	9,835	12,984
Conway	6,954	7,844	6,861	10,697	9,884	10,234	4,635	6,135	7,532	8,343	11,015
Crawford	86,184	95,766	83,773	130,774	120,998	125,212	59,182	77,377	93,433	103,403	136,512
Franklin	103,962	116,230	101,674	159,268	147,331	152,611	71,073	93,254	112,604	124,733	164,672
Garland	114,632	319,814	212,093	519,781	489,461	211,403	113,032	210,100	266,829	289,280	394,931
Hot Spring	320	957	662	1,540	1,465	626	334	592	749	808	1,102
Howard	1,246	3,725	2,579	5,998	5,705	2,438	1,303	2,304	2,916	3,144	4,292
Johnson	180,802	198,354	173,513	271,233	250,615	260,510	120,479	160,007	195,680	216,739	286,383
Lee ^c	11,653	23,316	7,805	53,775	63,160	27,213	4,887	40,067	24,205	29,042	21,503
Logan	86,264	131,398	104,838	192,863	180,620	135,390	65,660	95,079	116,803	128,100	171,222
Madison	48,001	54,397	47,585	73,328	67,811	70,214	33,035	43,097	52,040	57,645	76,032
Marion	3,360	3,760	3,289	5,096	4,709	4,934	2,302	3,014	3,639	4,031	5,322
Montgomery	334,014	919,039	643,573	1,509,630	1,447,775	631,506	337,650	617,794	781,595	842,903	1,151,050
Newton	197,523	221,225	193,519	301,856	279,696	289,607	135,174	177,711	213,943	236,987	303,743
Perry	98,179	279,237	193,621	450,244	428,216	182,979	97,834	178,935	226,449	247,760	338,214
Phillips ^c	9,548	19,259	6,447	44,418	52,170	22,297	4,004	32,829	19,833	23,796	17,619
Pike	2,778	6,861	4,751	11,048	12,531	5,355	2,863	5,140	6,502	7,010	9,570
Polk	202,392	591,527	410,302	958,231	912,828	390,208	208,634	373,671	473,708	510,747	697,891
Pope	191,762	206,013	180,213	281,033	259,671	269,223	126,633	166,935	207,636	230,001	303,743
Saline	53,703	159,740	110,676	257,366	244,774	104,593	55,923	99,321	125,695	135,522	185,000
Scott	363,926	1,068,140	742,381	1,728,080	1,645,182	703,252	376,011	670,751	851,795	918,387	1,253,673
Searcy	31,326	35,029	30,642	47,771	44,140	45,821	21,438	28,064	33,887	37,537	49,619
Sebastian	14,888	44,506	30,820	71,669	68,163	29,126	15,573	27,534	34,846	37,571	51,287
Stone	61,315	69,228	60,558	94,409	87,232	90,324	42,026	54,964	66,455	73,613	97,120
Van Buren	32,256	35,452	31,012	48,348	44,673	46,256	21,835	28,709	34,937	38,701	51,092
Washington	21,921	36,602	22,837	35,602	32,896	34,062	14,912	19,555	23,613	26,301	34,722
Yell	221,743	585,088	418,801	950,201	902,361	413,779	217,934	377,483	477,638	516,430	703,399
Total	2,553,514	5,316,159	3,897,098	8,330,794	7,913,024	4,367,210	2,204,788	3,657,375	4,535,986	4,938,171	6,639,256
Oklahoma											
Le Flore	212,541	616,390	427,184	993,292	944,836	402,873	215,257	390,091	494,445	534,709	734,907
McCurtain	43,270	129,054	89,370	207,503	197,333	83,998	44,880	79,482	100,598	108,858	148,509
Total	255,811	745,444	516,554	1,200,795	1,142,169	486,871	260,137	469,573	595,043	643,567	883,416

NF = national forest.

^a Not included are payments in lieu of taxes (PILT) and payments made by the Minerals Management Service.

^b NF acres do not include lands acquired since mid-1996.

^c These counties are outside the Assessment area but are presented to provide a complete picture of national forest payments.

from the Ouachita National Forest were high in fiscal years 1989 and 1990 because revenues from oil and gas leases (“minerals”) on that forest were exceptionally high in those years (fig. 4.10). Variations in the value of lead-zinc ore mined on the Mark Twain National Forest caused the fluctuations in minerals receipts from 1987 through 1996 from a high of slightly more than \$2 million to a low of \$0.5 million (fig. 4.11). Recreation receipts

are a relatively steady component of the 25 percent fund payments from the Ozark-St. Francis National Forests (fig. 4.12), due primarily to fees charged for visiting Blanchard Springs Caverns, but receipts from timber harvests on the Ozark National Forest varied widely in these years.

Based on the 10-year (1987 through 1996) average for all three forests combined, the sale of national forest

Table 4.18b—Payments to counties with national forest land in Missouri and total for the tri-state area (AR, MO, OK), fiscal years 1987 through 1996^a

Geographic area	NF land ^b	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
	<i>Acres</i>	<i>Dollars</i>									
Missouri											
Barry	54,751	58,159	78,881	97,598	95,888	74,288	50,655	50,694	68,296	80,413	90,350
Bollinger	1,566	1,684	2,284	2,821	2,770	2,142	1,461	1,476	1,969	2,315	2,592
Boone ^c	3,762	572	776	959	950	735	501	2,149	3,655	4,912	5,862
Butler	48,307	51,489	69,819	86,222	85,249	65,921	44,912	44,949	60,755	71,589	80,094
Callaway ^c	12,167	1,528	2,072	2,560	2,664	2,119	1,519	7,559	13,096	17,666	19,959
Carter	91,018	96,728	131,558	162,733	160,715	124,453	84,873	84,883	114,383	134,560	150,671
Christian	51,692	55,172	74,830	92,449	90,771	70,190	48,073	48,196	64,951	76,436	85,576
Crawford	49,824	53,161	72,043	89,006	87,390	67,786	46,231	46,383	62,570	73,657	82,474
Dent	72,291	73,122	99,327	122,682	120,525	94,292	65,815	66,426	90,350	106,753	119,671
Douglas	40,946	44,284	60,063	74,205	72,435	56,012	38,192	38,184	51,467	60,542	67,783
Howell	49,276	52,731	71,520	88,363	86,620	66,981	45,672	45,682	61,549	72,399	81,315
Iron	94,746	104,080	141,256	174,515	169,976	130,397	88,420	88,458	119,190	140,216	156,921
Laclede	28,769	30,847	41,838	51,689	50,827	39,299	26,834	26,828	36,162	42,537	47,625
Madison	50,448	53,144	72,955	90,132	88,496	68,529	46,728	46,752	63,104	74,367	83,420
Oregon	105,553	105,528	143,128	176,828	173,705	134,320	91,734	95,798	131,125	155,806	174,603
Ozark	38,512	41,726	56,594	69,919	68,649	53,084	36,215	36,232	48,804	57,409	64,015
Phelps	64,782	67,847	92,065	114,606	112,908	87,620	59,988	60,016	81,162	95,664	107,224
Pulaski	47,824	50,329	68,320	84,406	82,716	64,669	44,586	44,591	60,082	70,694	79,163
Reynolds	89,768	95,682	129,683	160,216	157,355	121,838	83,078	83,118	112,254	132,432	148,528
Ripley	96,552	102,283	138,727	171,219	168,091	129,913	88,825	89,010	120,240	142,186	159,669
St. Francois	813	960	1,302	1,608	1,580	1,112	758	781	1,022	1,203	1,346
Ste. Genevieve	10,254	11,025	14,593	18,474	18,139	14,026	9,564	9,568	12,889	15,160	16,974
Shannon	83,385	90,130	121,886	150,584	147,428	114,063	77,776	77,803	104,811	123,291	138,038
Stone	15,595	17,486	23,717	29,258	28,240	21,837	14,886	14,896	20,061	23,598	26,119
Taney	64,266	68,471	92,868	114,734	113,040	87,410	59,640	59,551	80,199	94,685	106,277
Texas	48,807	51,652	70,058	86,842	85,188	66,399	45,524	45,537	61,349	72,165	80,796
Washington	82,304	88,985	120,723	148,480	145,784	111,609	76,252	76,404	102,971	121,170	135,955
Wayne	88,061	93,029	126,272	155,927	153,923	119,077	81,325	81,432	110,150	129,833	145,632
Wright	7,159	7,526	10,207	12,610	12,664	9,793	6,678	6,686	8,998	10,585	11,851
Total	1,493,198	1,569,360	2,129,365	2,631,645	2,584,686	1,999,914	1,366,715	1,380,042	1,867,614	2,204,243	2,470,503
Total (AR, MO, OK)	4,302,523	7,110,370	7,063,601	12,133,234	11,639,879	6,853,995	3,831,640	5,506,990	6,998,643	7,785,981	9,993,175

NF = national forest.

^a Values reported here include payments made by the Minerals Management Service to counties that include lands of the Mark Twain National Forest but do not include payments in lieu of taxes (PILT); the latter are reported in annual reports of the Mark Twain National Forest.

^b NF acres do not include lands acquired since mid-1996.

^c These counties are outside the Assessment area but are presented to provide a complete picture of national forest payments.

timber generates 69 percent of the payments to counties, and the sale and leasing of minerals generates 28 percent (see table 4.19). Recreation fees generate slightly more than 2 percent of the payments, and grazing and special uses account for less than 1 percent. The percentage distribution varies by forest with recreation accounting for nearly 10 percent of payments on the Ozark National Forest, minerals accounting for

57 percent of payments on the Mark Twain, and timber accounting for 79 percent on the Ouachita.

Similar to the production of goods and services, payments to local governments also have a multiplying effect in the economy. The economic multipliers (impacts) and the total impacts for 1996 payments to counties are shown in table 4.20. As described above, counties use their share of payments for improvements

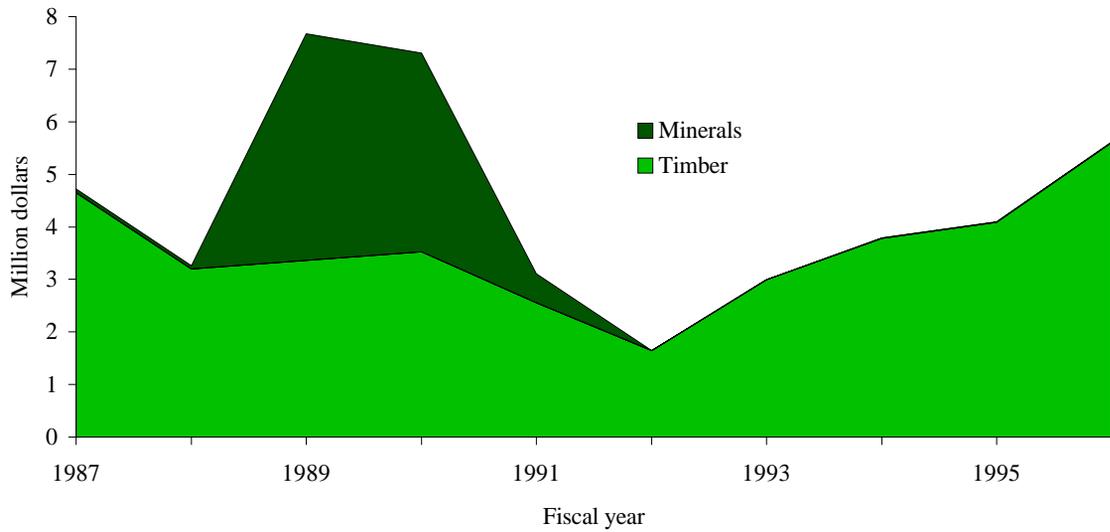


Figure 4.10—Payments to counties from the Ouachita National Forest by revenue generating resource program for fiscal years 1987 through 1996 (not adjusted for inflation). (Payments from grazing, recreation, and special land uses totaled less than \$75,000 per year and are not shown.)

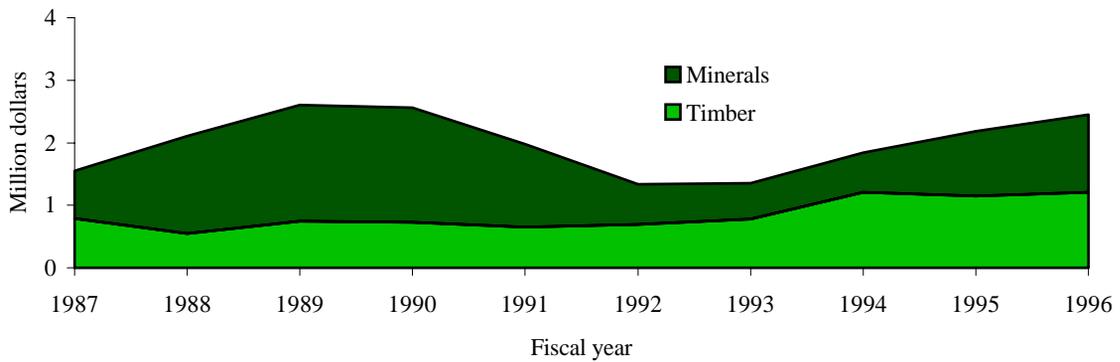


Figure 4.11—Payments to counties from the Mark Twain National Forest by revenue generating resource program for fiscal years 1987 through 1996 (not adjusted for inflation). (Payments from grazing, recreation, and special land uses totaled less than \$30,000 per year and are not shown.)

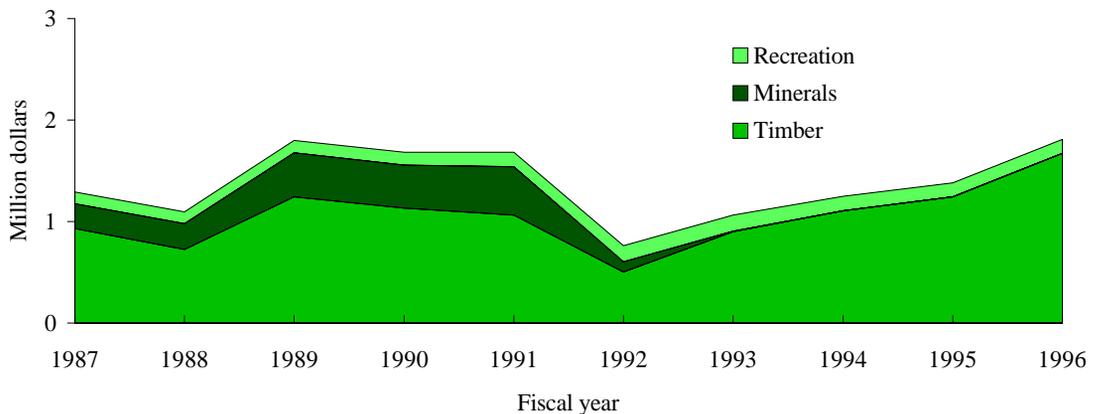


Figure 4.12— Payments to counties from the Ozark-St. Francis National Forests by revenue generating resource program for fiscal years 1987 through 1996 (not adjusted for inflation). (Payments from grazing and special land uses totaled less than \$30,000 per year and are not shown.)

Table 4.19—Average payments to counties by revenue-generating resource program and national forest, 1987–1996

Program	Ozark-St. Francis NF's		Ouachita NF		Mark Twain NF		Total	
	<i>Dollars</i>	<i>Percent</i>	<i>Dollars</i>	<i>Percent</i>	<i>Dollars</i>	<i>Percent</i>	<i>Dollars</i>	<i>Percent</i>
Timber	1,052,330	74.98	3,542,065	79.23	849,699	42.03	5,444,095	68.95
Grazing	6,259	0.45	2,443	0.05	5,664	0.28	14,366	0.18
Special land uses	15,608	1.11	20,325	0.45	6,845	0.34	42,778	0.54
Minerals	193,013	13.75	879,194	19.66	1,144,803	56.63	2,217,010	28.08
Recreation	136,251	9.71	26,839	0.60	14,461	0.72	177,551	2.25
Total	1,403,462	100.00	4,470,866	100.0	2,021,472	100.00	7,895,800	100.00

NF = national forest.

Table 4.20—Economic impacts of national forest payments to counties for fiscal year 1996

National forest County program	Payments to counties ^b	Impacts per million dollars			Total impact for 1996 payments ^a		
		Employee compensation	Total income	Employment (jobs)	Employee compensation	Total income	Employment (jobs)
	<i>Million \$</i>	<i>----- Dollars -----</i>			<i>----- Million \$ -----</i>		
Ouachita							
County roads	1.81	335,094	611,195	19.8	.606	1.106	36
County schools	3.88	1,059,696	1,236,451	47.7	4.112	4.797	186
Ozark-St. Francis							
County roads	.46	353,345	641,897	20.2	.162	.294	9
County schools	1.37	1,076,659	1,263,618	46.1	1.478	1.735	63
Mark Twain							
County roads	.62	354,258	631,324	19.3	.219	.390	12
County schools	1.85	969,067	1,142,791	45.6	1.796	2.117	84
Total	9.99				8.372	10.440	390

^a Due to rounding, some totals may differ from the product of “payments to counties” times “impacts per million dollars,” and totals may differ from sum of columns.

^b In 1996, counties in Arkansas and Missouri allocated 75 percent of the payments for schools and 25 percent for roads. In Oklahoma, the allocation was 25 percent for schools and 75 percent to roads, except that in 1996, 81 percent of the payments in McCurtain County were allocated as follows: 67 percent to schools and 33 percent to roads.

Source: IMPLAN impact model (using 1993 input-output data and 1996 national forest data); MN IMPLAN (1997a, b).

to roads and operation of schools. Funds used to operate schools have a much higher multiplying effect in the economy than those used for road improvements. In 1996, the payments to counties of nearly \$10 million affected about \$8.4 million in wages, \$10.4 million in total income, and 390 jobs.

National Forest Expenditures

Expenditures by the three national forests in the Assessment area for salaries, supplies, utilities, contracts, and other costs associated with the operation and maintenance of the forests put \$49.6 million into the economy in 1996. Figures 4.13, 4.14, and 4.15 show the

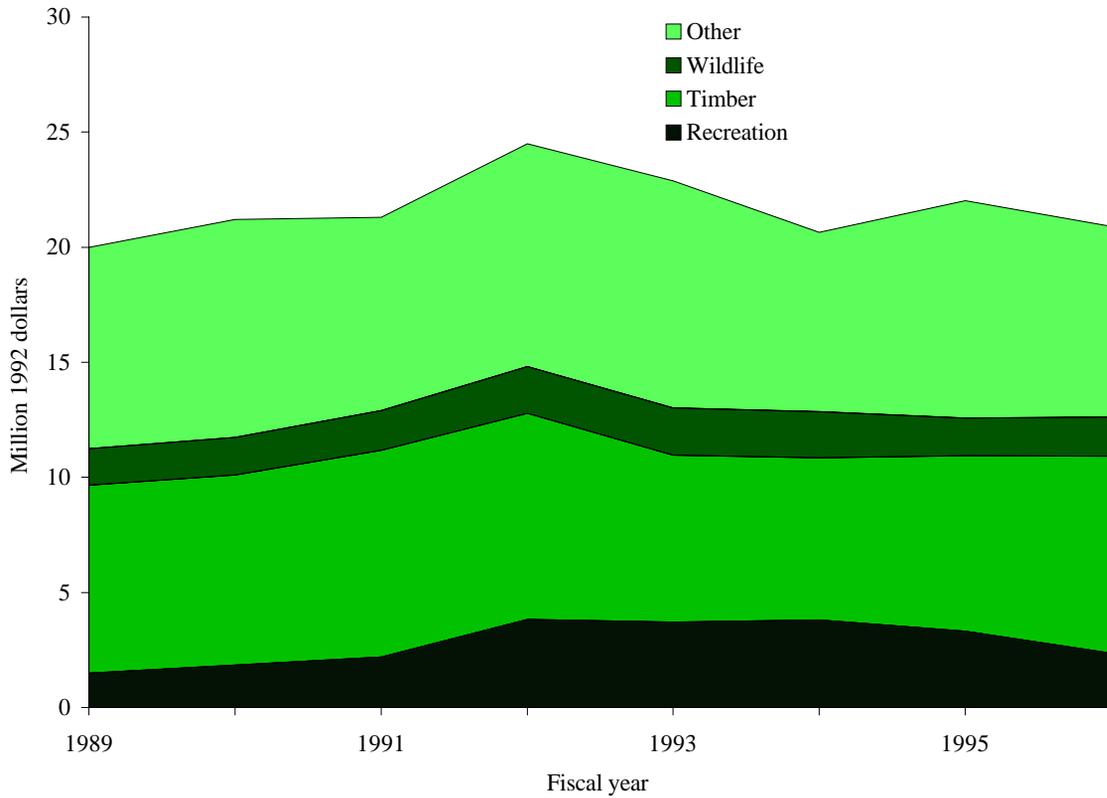


Figure 4.13—Expenditures by program categories of the Ouachita National Forest for fiscal years 1989 through 1996 (adjusted to 1992 dollars). (“Other” category includes land uses, range, soil, water, air, minerals, construction, fire, law enforcement, and ecosystem management.)

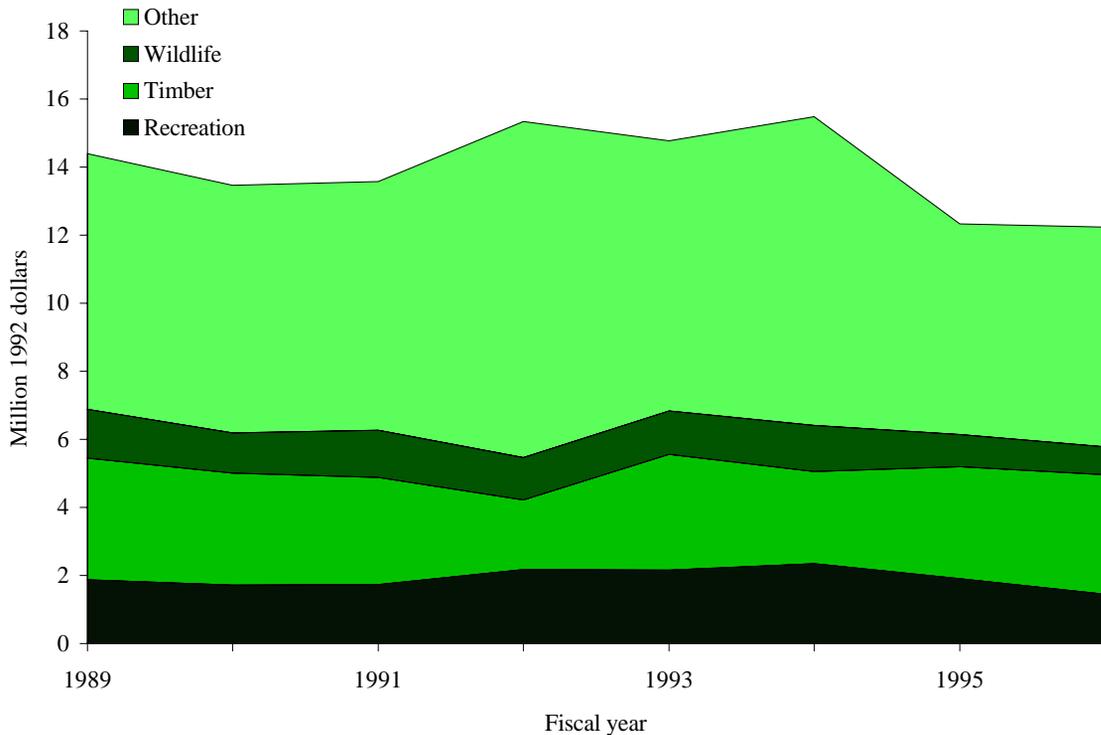


Figure 4.14—Expenditures by program categories on the Mark Twain National Forest for fiscal years 1989 through 1996 (adjusted to 1992 dollars). (“Other” category includes land uses, range, soil, water, air, minerals, construction, fire, law enforcement, and ecosystem management.)

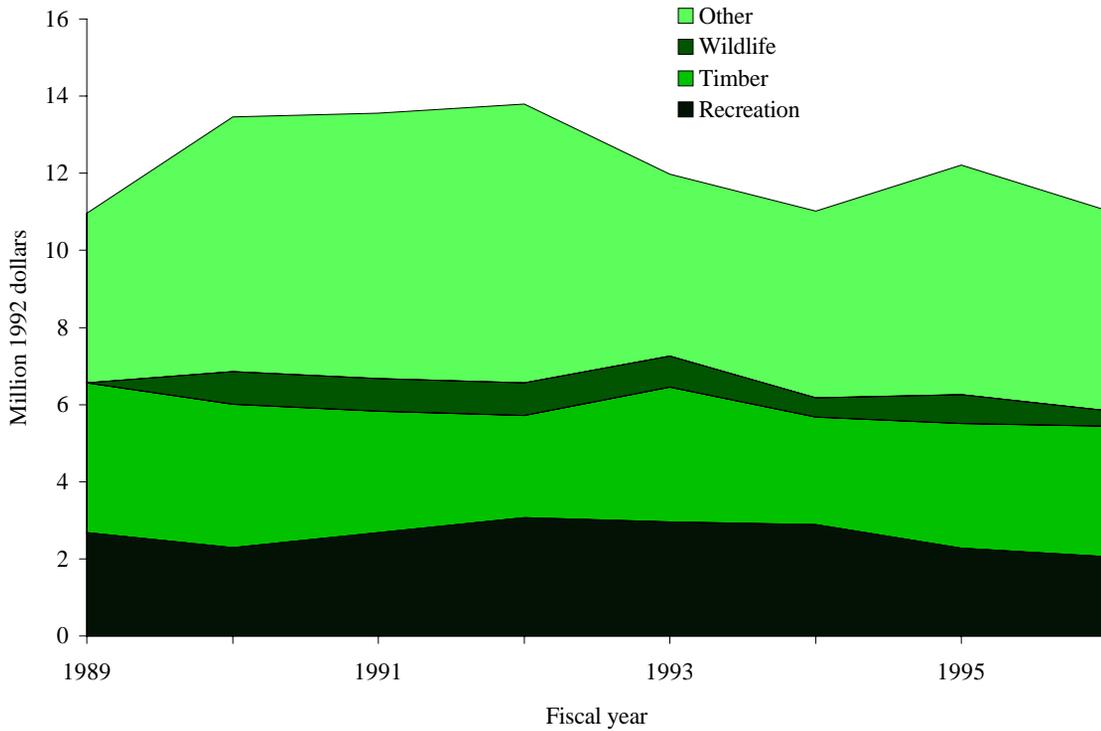


Figure 4.15—Expenditures by program categories on the Ozark-St. Francis National Forests for fiscal years 1989 through 1996 (adjusted to 1992 dollars). (“Other” category includes land uses, range, soil, water, air, minerals, construction, fire, law enforcement, and ecosystem management.)

expenditures (adjusted to 1992 dollars) by major program categories for the three forests in fiscal years 1989 through 1996. Note that expenditures are more stable than receipts for all the forests. These expenditures affected the region’s economy by supporting 978 jobs (including approximately 780 employees of the three national forests) and generating \$16.06 million in employee compensation, and \$27.54 million in total income (tables 4.20 and 4.21).

Average Annual Income

The average annual income for each employment category (based on the analysis areas described previously, i.e., timber market zones and counties with national forest lands) is presented in figure 4.16. Relative to other program areas, jobs influenced by the national forest minerals program stand out as the highest paying. This high income level for “minerals jobs” related to national forests is consistent with the high income rates throughout the Assessment area for the mining sector (presented earlier in this chapter, also see table 4.3).

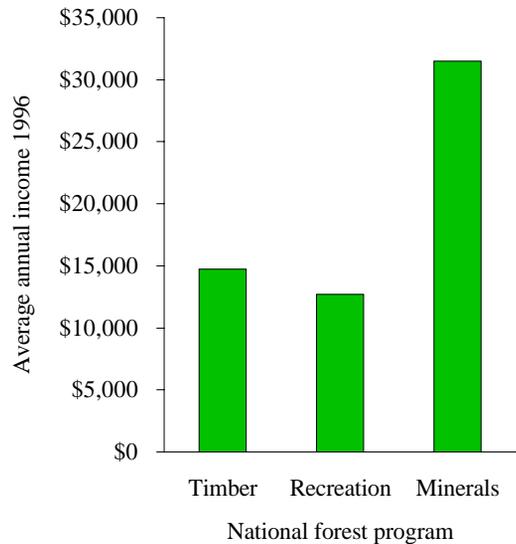


Figure 4.16—Average annual wages of workers affected by each national forest program in fiscal year 1996 (from MN IMPLAN 1997a, b).

Table 4.21—Economic impacts of national forest expenditures for fiscal year 1996^a

National forest	1996 expenditures	Total impacts from 1996 NFS expenditures		
		Employment (jobs)	Employee compensation	Total income
	<i>Million \$</i>		----- <i>Million dollars</i> -----	
Ouachita	24.7	490	8.18	14.04
Ozark-St. Francis	11.8	218	3.55	6.21
Mark Twain	13.1	270	4.34	7.29
Total	49.6	978	16.06	27.54

NFS = National Forest System.

^a National forest expenditures impact numerous industrial sectors; economic multipliers developed for this table (but not shown here) are included in the IMPLAN model.

Source: IMPLAN impact model (using 1993 input-output data and 1996 expenditures from the USDA National Finance Center), MN IMPLAN (1997a, b).

Overall Contributions to the Highlands' Economy

The overall contributions to the Highlands' economy from the goods and services the national forests provide, the payments to States, and the forests' expenditures are measured in terms of both employment and the GRP (table 4.22). The forests influence nearly 17,000 jobs or 0.9 percent of total employment

in the Assessment area of nearly 1.9 million. This influence is concentrated in the counties closest to the forests; county-level proportions will be much greater than average in many counties. In 1996, the Highlands' national forests and their programs generated a GRP of about \$572 million. This equals approximately 0.9 percent of the total GRP of the Assessment area (\$61,601 million).

Table 4.22—Economic contributions of national forests to the Assessment area economy in 1996

Economic contribution	Employment (jobs)		Gross regional product	
		<i>% of area economy</i>	<i>Million \$</i>	<i>% of area economy</i>
National forest goods and services				
Timber	8,052	0.43	290.21	0.47
Recreation	5,848	0.31	138.81	0.23
Minerals	1,602	0.09	101.77	0.17
Total	15,502	0.83	530.79	0.86
Payments to counties	390	0.02	10.90	0.02
National forest expenditures	978	0.05	30.28	0.05
Total national forest contribution^a	16,870	0.90	571.97	0.93
Assessment area economy	1,875,503	100.00	61,600.70	100.00

^a Totals may differ from sum of column due to rounding.

Source: IMPLAN impact planning model (using 1993 input-output data and 1996 national forest data); MN IMPLAN (1997a, b).

Implications and Opportunities

The economic growth of the Assessment area, which outpaced inflation in almost all industrial sectors between 1977 and 1993, contributes to the attractiveness of the Highlands as an area for population growth. This positive economic situation is likely one reason for and, to a certain extent, is generated by the high in-migration rate of people that the Highlands has experienced over the past decade. As described in Chapter 2, nearly 80 percent of the area's population increase between 1990 and 1996 was due to people moving to the region from some other part of the country. Continued economic growth coupled with an increase in population will place additional demands on public land managers to supply goods and services.

Although national forest programs are a small part of the total regional economy, their effects are significant in counties that (1) are nearest the national forests, (2) have mills or processing plants, and/or (3) are tourist destinations. Thus, while decisions made about national forest management may have only a small impact on the overall regional economy, they take on much more significance at local levels and in certain market sectors. For example, fluctuations in a national forest's annual timber sale program will have a minimal effect on the overall economy of the Highlands but could significantly affect the production of a particular sawmill and the associated jobs and incomes from that sawmill. Individual national forests may need to evaluate these local effects of national forest timber, recreation, and minerals programs during the revision of forest management plans.

Chapter 5: Recreation

Question 5.1: What are the current supply of and projected demands for outdoor recreation in the Ozark-Ouachita Highlands, and what is the economic importance of recreation?

Outdoor recreation plays important roles in American society. A 1994 survey found that people who participate in outdoor recreation lead more satisfying and fulfilling lives (Roper Starch, Inc. 1994). People engage in outdoor recreation because it is fun, relaxing, fosters good health, reduces stress, contributes to family togetherness, increases knowledge of the environment and, for many activities, is affordable, regardless of income level. Recreation-based business is a significant factor in national, regional, and local economies, and recreation amenities can be an advantage for communities interested in attracting new industry and creating jobs. This chapter addresses the economic importance, current supply, and projected demand for outdoor recreation in the Ozark-Ouachita Highlands. The report focuses on those natural-resource-based activities such as camping, hiking, fishing, and hunting that typically take place on public lands but occur on private lands as well.

The Ozark-Ouachita Highlands provide outstanding resources for outdoor recreation and tourism. The natural scenic beauty and the culture and folklore of the inhabitants contribute to the region's charm. The Highlands contain the only mountainous terrain in the Midwestern United States. The large areas of public lands within the Highlands have long been important recreation settings for the inhabitants of the Midwest and the lowlands of Texas, Louisiana, and Mississippi (Rafferty 1980). One consultant to the State of Arkansas recommended that the State market itself as a park "in the middle of" Chicago, St. Louis, Kansas City, Dallas, and other major Middle Western, Southwestern, and Southern metropolitan areas (NABFCB 1998).

The Highlands are within a day's drive of approximately 58 million people—21 percent of the Nation's population (USDC BC 1993, 1997c)—that live in rural settings as well as the metropolitan areas of Des Moines, IA; Omaha, NE; St. Louis and Kansas City, MO; Memphis, TN; Little Rock, AR; New Orleans and Shreveport, LA; Houston, Dallas, and Ft. Worth, TX; Tulsa and Oklahoma City, OK; Kansas City, Topeka, and Wichita, KS; and Chicago, IL. Many inhabitants of these cities and surrounding areas look to the public lands of the Ozark-Ouachita Highlands to provide settings for outdoor recreation.

The national forests, national and State parks, and U.S. Army Corps of Engineers' lakes, combined with the mild climate and scenic quality of the Highlands region, attract tourists and people looking for a place to retire or to have a vacation home. As described in Chapter 2, the population of the Highlands has increased dramatically over the last three decades. From 1970 to 1996, the population grew by 1.2 million people (48 percent); most of this increase was due to in-migration, i.e., people moving into the Highlands. Some of the fastest growth occurred in counties with major tourist attractions, such as Taney County, MO (Branson music and tourism community), and retirement communities such as Baxter County, AR (Mt. Home recreation and retirement community). Sixteen counties in the Highlands, including eight with national forest land, have been designated "retirement-destination" counties by the Economic Research Service (see Chapter 2).

Individuals moving to the area bring with them expectations for recreation activities other than (or in addition to) the traditional hunting and fishing that have been a part of the lifestyle of many of the lifelong inhabitants. Developers have built golf courses, marinas, and resorts across the region, and demand for such facilities continues to grow.

Key Findings

1. Approximately 58 million people (21 percent of the U. S. population) live within a 1-day drive of outdoor recreation opportunities in the Ozark-Ouachita Highlands.
2. In 1996, travel expenditures in the Assessment area counties of Arkansas and Missouri totaled over \$9 billion and accounted for nearly 167,000 jobs. A 1995 study for Oklahoma indicated that statewide, travel-related expenditures totaled over \$3 billion. Public lands, by providing many of the settings for outdoor recreation, are important to maintaining and enhancing a strong tourism industry. Private lands that dominate the forested landscape and influence scenic quality in a large part of the Highlands are also important to the region's tourism industry.
3. State and national parks, national forests, national wildlife refuges, and U.S. Army Corps of Engineer lands and waters account for 13 percent of the Highlands' area and provide the principal settings for many kinds of outdoor recreational activities that are based on natural resources. National forests total 4.4 million acres (ac), more than any other public land category.
4. The three national forests provide recreation opportunities principally in roaded-natural (75 percent) and semi-primitive (20 percent) settings. There is very little national forest land in the primitive setting class.
5. The U.S. Army Corps of Engineers provides 51 percent and State parks provide 30 percent of the developed campsites in the Assessment area. National forests account for only 6 percent of the area's campsites, while the private sector makes up 12 percent.
6. Among the public land-managing agencies, the USDA Forest Service is the principal provider of dispersed recreation opportunities (e.g., primitive camping, hunting, trails). Approximately 63 percent of the trail miles in the Assessment area are located in the national forests.
7. Nonindustrial, private forest lands dominate the forested landscape of the Highlands. These lands account for between 65 and 85 percent of the forests (timberland) in three of the Highlands' four ecological sections—the Ozark Highlands, Boston Mountains, and Arkansas Valley. In the Ouachita Mountains, forest ownership is almost evenly split among industrial forest lands, national forests, and non-industrial, private lands.
8. There are 238,012 ac of federally designated wilderness in the Highlands that represent 5 percent of the land area managed by the Forest Service, USDI National Park Service, and the U.S. Fish and Wildlife Service. Wilderness accounts for 4.4 percent of all national forest lands. Wilderness areas occur in all four ecological sections of the Highlands.
9. Approximately 523 miles of rivers in the Highlands have received Federal designations based on their exceptional scenic and recreational value. More than 2,000 additional miles of rivers may merit a special designation for their recreational values but lack either complete studies to determine their suitability for inclusion in the National Wild and Scenic Rivers System or legislative action to formalize State designation.
10. Annually, more than 7 million people travel over the 9 national forest and State scenic byways in the Assessment area.
11. Residents of the Highlands' "draw area" exceed the national average in percent of population participating in every major category of outdoor recreation available in the Highlands. More than 90 percent of the draw area population participates in activities associated with viewing and learning about nature and human history, such as sight-seeing, bird watching, and visiting historic sites. Approximately 40 percent participate in fishing, 41 percent participate in outdoor adventure activities (such as hiking or off-road driving), about 35 percent participate in boating, 31 percent participate in camping, and 14 percent participate in hunting.
12. Nationally, demand for nearly all categories of recreational activities is expected to increase in the next decade. For the southern Renewable Resources Planning Act (RPA) region, participation in most recreational activities is projected to increase significantly more than the Nation as a whole and/or the northern RPA region.

13. Because of their age and heavy use, many public recreational facilities are deteriorating. Lack of funds to maintain and repair these facilities is a widespread concern among land managers in the Assessment area.
14. Recreation overuse, particularly off-road vehicle driving, dispersed (primitive) camping, and river use, is occurring in some areas, resulting in resource damage and conflicts among users.

Economic Importance of Outdoor Recreation

Data Sources and Methods of Analysis

Data were not available to quantify the full economic impact of all aspects of outdoor recreation occurring in the Highlands. However, to provide some idea of the magnitude and importance of the recreation-based economy, the Social-Economic team analyzed information related to economic aspects of travel and tourism, fish and wildlife activities, and retail sales. An additional analysis of the travel sector of the economy is provided in Chapter 4, which also focuses on the economic impact of recreation that occurs on national forest land.

The departments of tourism of the three Highlands' States provided data used in the analysis of tourism's economic importance. For Arkansas and Missouri, the availability of county-level travel data allowed estimates to be made specifically for the Assessment area. However, only statewide travel statistics were available for Oklahoma. The travel studies from the three States differ somewhat in their design as well as their definition of "person trip" (see "Glossary of Terms"). While not completely comparable, the studies provide a good idea of the economic importance of the travel industry, one component of which is tourist travel.

Information related to expenditures for fish and wildlife recreational activities was obtained from the U.S. Fish and Wildlife Service's *1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (USDI FWS 1997) and consists of statewide estimates for each of the three States. Information from the *Arkansas SCORP '95: Statewide Comprehensive Outdoor Recreation Plan* (Turner 1995) provided an

insight to the magnitude of retail sales for outdoor recreation products. Although tourism, activities associated with wildlife, and retail sales are discussed separately, there is some overlap among the three since many tourists participate in fishing, hunting, or wildlife viewing as part of their travel activities, and their expenditures include retail purchases associated with outdoor recreation pursuits.

Since many of the region's recreation participants come from outside the Highlands, the Social-Economic Team defined a larger "draw area" as the basis for analyzing some elements of the demand for outdoor recreation within the Assessment area. A number of studies and surveys show that most outdoor recreation activities take place within a day's drive (approximately 300 miles (mi)) of the participant's home (AR DPT 1997, SYNERGY Group 1996, MO DT 1995, Turner 1995). Therefore, the draw area for this Assessment includes all counties within approximately 300 mi of the outer boundaries of the Mark Twain, Ouachita, and Ozark-St. Francis National Forests (fig. 5.1). While the Highlands does have visitors from across the country and abroad, most people participating in outdoor recreation within the Assessment area reside within the draw area.

Tourism

The natural and cultural settings of the Highlands are important to the area's tourism industry, as suggested by the States' promotional logos: Arkansas—"The Natural State," Oklahoma—"Native America," and Missouri—"Where the river runs." In an assessment of tourism for Arkansas, Economic Research Associates concluded that the State's ". . . greatest tourism asset is clearly its natural beauty . . ." (NABFCB 1998).

The culture and folklore of the Highlands' people are part of the region's charm. The traditional music played on handmade instruments, the toys and children's games, the traditional clothing styles, and the native crafts—from basket-making to quilts—have become attractions for tourists. Craft fairs abound in the fall and spring, drawing thousands of tourists each year. There are music halls and craft shops along almost every major road (and many back roads) throughout the region. These give local inhabitants a source of income and tourists a place to absorb "mountain culture" and buy regional handicrafts (Rafferty 1980). The Ozark-Ouachita region is rich in

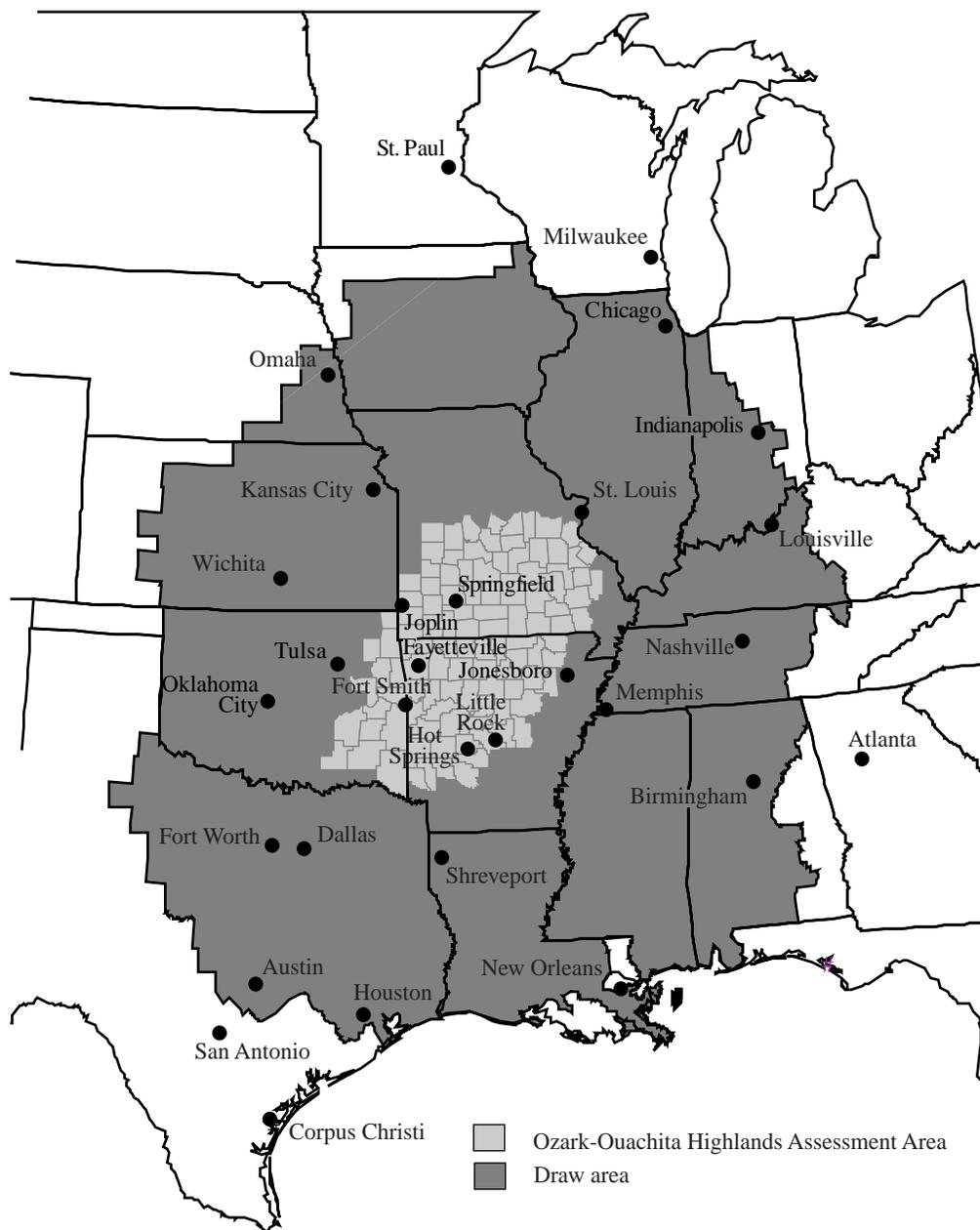


Figure 5.1—Ozark-Ouachita Highlands Assessment area and draw area (latter includes the Assessment area; selected cities shown for perspective).

historic and scenic sites, making it a prime area for auto tours. The agencies that manage public lands work with tourism associations to develop brochures, videos, self-guided auto tours, and maps that emphasize what to see and do while driving through the Highlands.

In 1996, nearly 35 million “person trips” (table 5.1) were taken in the Assessment area of Arkansas and

Missouri, accounting for 77 percent of all travelers visiting the entire State of Arkansas and 37 percent of those visiting Missouri. Travel expenditures in the Assessment area of these two States totaled over \$9 billion and generated over \$800 million in State and local taxes. More than 166,000 jobs are attributable to businesses related to travel generating over \$2 billion in

Table 5.1—1996 travel-related expenditures, payroll, tax receipts, jobs, and “person trips” in Arkansas, Missouri, and portions of those States lying within the Assessment area^a

Geographic area	Total travel expenditures	Travel-generated payroll	State tax receipts	Local tax receipts	Travel-generated jobs	Person trips ^b
----- Dollars -----						
Assessment area						
Arkansas portion	2,455,617,389	427,492,407	107,345,178	47,096,419	36,392	13,876,550
Missouri portion	6,783,241,577	1,877,614,014	426,848,970	226,452,318	130,166	20,894,290
Total	9,238,858,966	2,305,106,421	534,194,148	273,548,737	166,558	34,770,840
States (entire)						
Arkansas	3,153,293,000	542,366,000	141,898,000	59,913,000	46,774	18,066,000
Missouri	17,153,685,363	4,746,439,238	1,079,429,776	572,660,101	294,554	56,765,358
Total	20,306,978,363	5,288,805,238	1,221,327,776	632,573,101	341,328	74,831,358

^a Equivalent data were not available for Oklahoma.

^b See the “Glossary of Terms” for definitions of “a person trip” in the three Assessment area States.

Source: AR DPT (1997), Certec, Inc. (1997).

annual payroll in the Arkansas and Missouri portion of the Assessment area (AR DPT 1997, Certec, Inc. 1997). Equivalent county-level data were not available for Oklahoma, but a 1995 statewide study indicates that over 15 million person trips were taken in the State, accounting for approximately \$3 billion in expenditures (TIAA 1995). Not all travel is for purposes of tourism or outdoor recreation. As described in Chapter 4 of this report, a study in Arkansas found that travelers in the State participated in the following outdoor recreation activities: sightseeing (87 percent), camping (13 percent) fishing/hunting (10 percent), water sports (6 percent) and bird watching (3 percent) (AR DPT 1998). The 1995 Arkansas SCORP estimated that people participating in outdoor recreation account for as much as 40 percent of expenditures related to travel (Turner 1995).

The importance of public lands to the tourism industry is evident. A study by D.K. Shifflet and Associates (1998) found that visiting national and State parks, hunting, and fishing were among the top five most popular leisure activities of visitors in Arkansas and Oklahoma. Sightseeing and visiting historic sites were among the top five in all three Assessment area States. State tourism agencies have recognized the importance of public lands in maintaining and enhancing a strong tourism industry and have stressed the importance of protecting scenic quality and improving outdoor recreation facilities and amenities. One study in Arkansas

encouraged the development of joint public and private ventures on public lands such as national forests as a means of increasing the availability of recreation resources (NABFCB 1998).

Private lands also are important in maintaining a robust tourism industry, particularly through their influence on scenic quality and the recreation opportunities that are available on them. As is discussed later in this chapter, private lands dominate the forested landscape of most areas of the Highlands.

Ecotourism is a relatively recent form of recreation that involves visiting places to learn about the cultural and natural history of an area in ways that minimize effects on the land and ensures the maintenance of ecosystem integrity. The ecotourism concept includes providing economic opportunities for local people through tourism based on natural resources (Romund 1997). Public lands can play a role in the development of this industry by providing the settings and natural attractions for tourists to visit. Ozark Ecotours in Newton County, AR, is an example of a local business developing around ecotourism opportunities on nearby public land. Guided tours are provided that include hikes to natural areas, canoe trips, cave exploration, and visiting Native American sites. Most of the tours are conducted on public lands (the Buffalo National River and the Ozark National Forest) in cooperation with the National Park Service and the USDA Forest Service.

“Ecotourists” contribute to the local Jasper, AR, economy through their spending for lodging, food, crafts, and other travel-related items, and area residents are employed as tour guides (Romund 1997).

Fishing and Wildlife-Associated Recreation

The 1996 *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* indicates that over \$5 billion in expenditures were attributable to recreation related to wildlife in the three Highlands’ States (table 5.2) (USDI FWS 1997). Approximately 75 percent of these expenditures are due to hunting and fishing; the remainder are attributable to wildlife viewing activities such as bird watching. Missouri has 50 percent and 90 percent more expenditures for recreation related to wildlife than Arkansas and Oklahoma, respectively. These expenditures represent statewide values, but the public lands of the Highlands, managed, in part, to maintain and enhance wildlife habitats, provide some of the most significant opportunities and settings for viewing and photographing wildlife.

Table 5.2—1996 expenditures for wildlife-related recreation in Arkansas, Missouri, and Oklahoma by individuals 16 years old and older^a

State	Hunting and fishing	Wildlife watching	Total wildlife recreation
----- <i>Thousand dollars</i> -----			
Arkansas	1,038,109	579,845	1,617,954
Missouri	1,957,959	507,926	2,465,885
Oklahoma	1,090,143	201,797	1,291,940
Total	4,086,211	1,289,568	5,375,779

^a Includes expenses related to travel and equipment; values are for entire States (not the Assessment area alone).
Source: USDI FWS (1997).

Retail Sales for Outdoor Recreation

The 1995 Arkansas SCORP (Turner 1995) reported that 1993 retail sales of outdoor recreation products in the State totaled \$246 million. Of that total, sales of products used for typical activities on Federal and State public lands included \$79.8 million for boating, \$52.1 million for hunting and fishing, \$13.4 million for mountain biking, \$11.9 million for walking, and \$5.5 million for camping. County-level data were not available to allow an analysis of sales specifically for the Highlands area nor were equivalent data available for Oklahoma and Missouri.

Supply Status of Recreation Opportunities

Data Sources and Methods of Analysis

To characterize the nature and availability of recreational opportunities, the Social-Economic Team examined the following indicators: (1) acres of land available to the public, (2) acres of national forest land by Recreation Opportunity Spectrum (ROS) class, (3) scenic character, (4) number of developed and dispersed public recreation facilities, and (5) number of areas with special designations. Team members used the Southern Research Station’s Social, Economic, Environmental, Leisure, and Attitudes (SEELA) data set for information about the amount of public lands in the Highlands and their distribution among managing agencies (Cordell 1995c). Data from Forest Service records and the National Outdoor Recreation Supply Information System (NORSIS) were used to estimate the availability of recreation facilities, and the 1995 National Private Landowner Survey (NPLOS) was used to estimate the availability of private land for public use (Cordell 1995a, b). Data regarding timberland ownership, developed by the Southern Research Station’s Forest Inventory and Analysis (FIA) unit, were used to analyze forest ownership distribution (USDA FS 1997a).

Availability of Land for Public Recreation

State and national parks, national forests, national wildlife refuges, and Corps of Engineers’ lakes and surrounding lands provide the principal areas of public

lands and water available for outdoor recreation. (See fig. 1.5 and Chapter 1—tables 1.1 through 1.4—for displays and listings of public lands). These public lands comprise 6,487,000 acres (ac) or 13 percent of the Assessment area’s land base (Cordell 1995a). This acreage includes the 673,000 ac of water surface in the Corps of Engineers’ reservoirs, which, when combined with the Corps land area adjacent to reservoirs, accounts for 26 percent of the public lands. The national forests account for the largest area (4,359,337 ac or 67 percent) of all public lands managed by these agencies (fig. 5.2). Providing high-quality, natural-resource-based recreation is one of the missions of the agencies responsible for managing these public lands.

Private lands also play a role in the recreation setting through their influence on the scenic character of the landscape and their availability for recreational activities. Recreation opportunities available on private lands are a function of the landowners’ objectives and willingness to permit access. Some large tracts of industrial forest lands are open to the public for hunting and fishing; however, it is increasingly common for access to be restricted to lease holders. The 1995 NPLOS (Cordell 1995b) found that for all Highlands counties, at least 47 percent of an average tract of private land is either completely closed to public use for recreation or is open only to leaseholders or available only to family and friends of the landowners. Less than 8 percent of the private land in the Assessment area was identified by owners as available for use by the general public

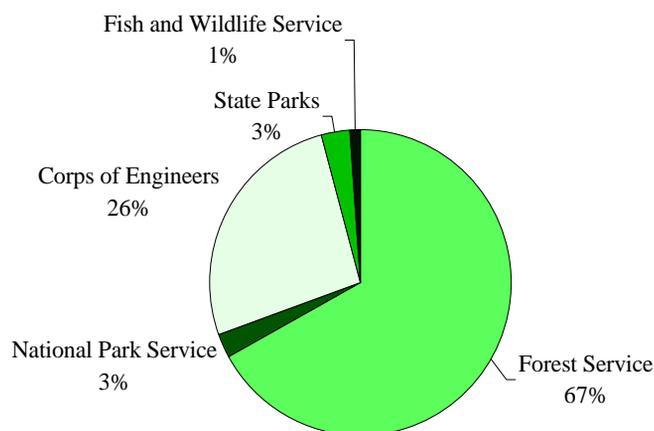


Figure 5.2—Percent distribution of public lands among managing agencies (Cordell 1995c).

(table 5.3), emphasizing the importance of public lands for meeting the demand for outdoor recreation.

Having vehicle access to public forest lands for recreation activities, such as hunting and fishing, is important to many people. An extensive road network provides access to a large part of the national forests. Sometimes it is necessary to close public roads to meet management objectives for wildlife and recreation and to control the cost of road maintenance. Proposals to close roads can be controversial when people who once used those roads are no longer able to drive to traditional public areas. This controversy becomes more acute as trends to close access to private land increase.

Table 5.3—Availability of private land for recreation expressed as a percent of an average private tract of land in the Assessment area

Geographic area	Reserved for family or friends	Closed to public	Open only to leaseholders	Open to public	Not designated
----- <i>Percent</i> -----					
Arkansas	35.7	7.7	6.0	6.1	44.5
Missouri	34.2	9.2	1.7	9.2	45.7
Oklahoma	33.8	8.7	5.2	7.1	45.2
Assessment area	34.6	8.6	3.9	7.7	45.2

Source: Cordell (1995b).

Recreation Opportunity Spectrum

People engage in a particular recreational activity in a specific surrounding or setting because they desire a certain experience. Recreation supply is defined in terms of opportunities to participate in a preferred recreation activity in a chosen setting to realize desired and expected experiences.

The Forest Service uses the Recreation Opportunity Spectrum (ROS) to categorize and inventory the variety of recreation settings in an area. ROS defines six recreation opportunity classes that characterize different settings for recreational use arranged along a continuum from heavily developed and maintained to undeveloped, natural settings. ROS is a tool to inventory and describe the existing recreational opportunities, as well as to plan for future management. For this Assessment, the Social-Economic Team used ROS strictly to inventory and describe current recreation settings on national forests in the Assessment area.

The ROS classes are based on seven indicators: (1) access, (2) remoteness, (3) naturalness, (4) facilities and site management, (5) social encounters, (6) visitor impacts, and (7) visitor management. Depending on the condition and combinations of these seven indicators, a specific land area is classified as (1) urban, (2) rural, (3) roaded-natural, (4) semi-primitive motorized, (5) semi-primitive nonmotorized, or (6) primitive. A brief description of these classes follows:

- **Urban**—high levels of human activity and concentrated development. Levels of recreation use vary and can be extremely high or condensed in a small area. There is a high amount of interaction with other people. Many conveniences are available to the user. Human-built structures dominate the landscape. City parks, play fields, cemeteries, and small undeveloped areas provide the only open space.
- **Rural**—often described as pastoral; sights and sounds of human activity are readily evident. Levels of use vary from moderate to high, with a moderate amount of interaction with others. While human-constructed features such as fields, pastures, and roads may dominate the landscape, there is still a strong sense of open space.
- **Roaded-natural**—predominantly natural-appearing settings, with moderate sights and sounds of human

activities and structures. While roaded-natural areas have a natural appearance, the amount of evidence of human activity varies from area to area and can include improvements such as highways, railroads, developed campgrounds, small resorts, livestock grazing, and timber harvesting. Roads and motorized vehicles and equipment are common in this setting. The density of use is moderate except at specific developed sites; interaction with others and user conveniences are less common than in the urban and rural classes.

- **Semi-primitive motorized**—also characterized by predominantly natural or natural-appearing landscapes and large enough to impart a strong feeling of remoteness. There are few, if any, facilities provided for user convenience. Roads are low standard and used primarily by four-wheel drive and off-highway vehicles. Interaction with other visitors is infrequent.
- **Semi-primitive nonmotorized**—in size and landscape features, this setting is similar to the semi-primitive motorized. The user has ample opportunities to practice outdoor skills and self-reliance. Roads are either closed or used only in case of emergencies and are visually unobtrusive. The user can expect few encounters with others. There are no user conveniences other than trails.
- **Primitive**—naturally evolving, unmodified environments. Their size and configuration ensure remoteness from the sights and sounds of human activity. The use of motor vehicles and equipment is forbidden except in extreme emergencies. The user is forced to be self-reliant and does not expect to encounter other people or evidence of human activity.

Table 5.4 shows the amount of land in each ROS class for the national forests in the Assessment area as listed in the existing forest plans. The three national forests principally provide recreational opportunities in roaded-natural (about 74 percent) and semi-primitive (about 20 percent) settings.

Data were not available to evaluate the ROS distribution on other lands in the Assessment area. However, most of the private lands in the region appear to have the characteristics of the roaded-natural or rural classes, with some scattered areas classed as urban. Most of the semi-primitive areas within the Assessment region are found on public lands.

Table 5.4—Acres^a and percent of national forest land by Recreation Opportunity Spectrum (ROS) class^b

ROS class	Mark Twain	Ozark-St. Francis	Ouachita	Total	Portion of NF land
	----- Acres -----				Percent
Primitive	64,000 ^c	0	0	64,000	1.5
Semi-primitive nonmotorized	4,000	71,000	63,245	138,245	3.3
Semi-primitive motorized	88,000	400,000	193,826	681,826	16.3
Roaded-natural	1,132,000	663,000	1,287,023	3,082,023	73.5
Rural	170,000	6,000	47,755	223,755	5.3
Urban	4,000	0	0	4,000	0.1
Total	1,398,000	1,140,000	1,591,849	4,193,849	100.0

NF = national forest.

^a Acres are from forest plans and generally do not reflect adjustments in land ownership since 1986 or in the case of the Ouachita NF, since 1990; 53,983 acres of national forest land outside the Highlands are included.

^b See the “Glossary of Terms” for explanations of the six ROS classes.

^c The forest plan for the Mark Twain National Forest classifies wilderness as primitive; the forest plans of the Ouachita and Ozark-St. Francis National Forests do not.

Source: USDA FS (1986a, b; 1990).

Scenic Character

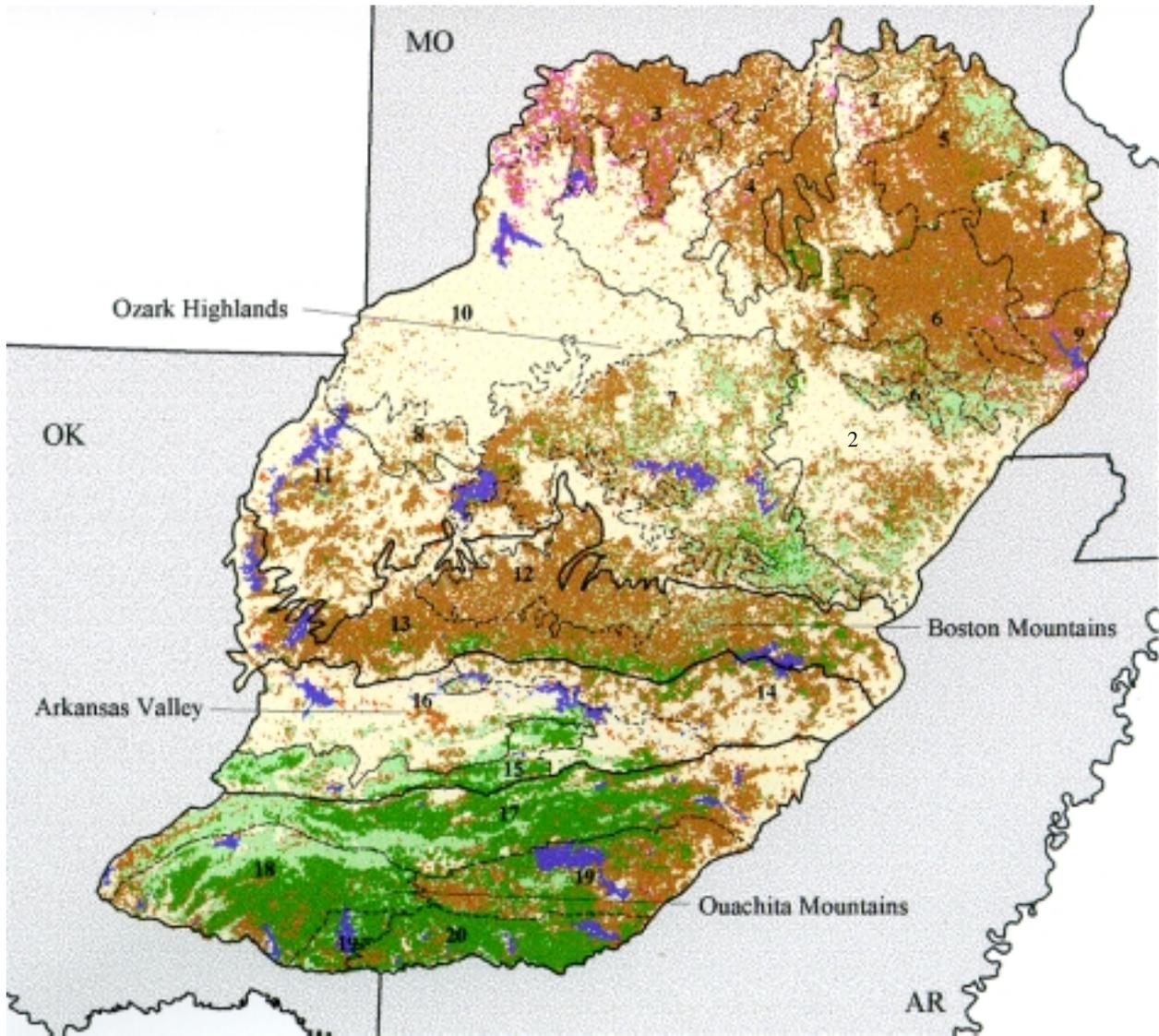
The natural beauty of the Highlands is a major factor in the region’s appeal to visitors. Mountainous terrain, upland hardwood and mixed pine forests, towering limestone bluffs, caves, clear mountain streams, and an abundance of lakes support a variety of recreation activities. The contrasting colors of hardwood and pine forests add scenic variety to the landscape. Pine forests tend to dominate more of the landscape in the southern part of the Highlands while hardwood forests are more common in the north (see fig. 5.3). The hardwood and mixed pine-hardwood forests draw tourists to the region during two seasons of the year: the spring, when white dogwood blossoms seem to cover the hills, and the fall, when the mountains blaze with color. Hundreds of thousands of visitors make special trips to view these natural displays of color.

Esthetic values within the Assessment area are based on scenic character. Scenic character is a casual description of the overall impression created by a landscape. Changes in one or more of the salient attributes that make up the character of a given landscape can have a predictable effect on the state of its scenery. The attributes used for assessing scenic character in the Assessment area are landform, vegetation, and water (USDA FS 1996).

Ecosystems provide the environmental context for characterizing scenery. By combining the environmental elements of an area with cultural attributes, one can develop a narrative “picture” of the existing scenery. The scenic character of the four ecological sections (Keys and others 1995) found in the Assessment area is described below. A more detailed description of forest vegetation by ecological subsection can be found in this Assessment’s “terrestrial” report (USDA FS 1999b).

Ouachita Mountains

Most of the Ouachita Mountains section appears as a naturally occurring forest where the landscape varies from low, rounded hills to steep mountains of 500 to 2,700 feet (ft) in elevation. Subsections range from 78 to 91 percent forested. Ridges predominantly run east and west, resulting in contrasting vegetation patterns on north- and south-facing slopes. The vegetation varies from continuous stands of pine (large plantations as well as natural stands) to mixed pine-hardwood and oak-hickory forests. The loblolly-short-leaf pine type is most common, but higher concentrations of oak-pine forests are found in the western part of this section and larger areas of oak-hickory forests are found in the eastern end, in the central Ouachita Mountains subsection (fig. 5.3). Stream courses, small



Ecological section	Map code	Subsection
Ozark Highlands	1	St. Francis Knobs & Basins
	2	Central Plateau
	3	Osage River Hills
	4	Gasconade River Hills
	5	Meramec River Hills
	6	Current River Hills
	7	White River Hills
	8	Elk River Hills
	9	Black River Ozark Border
	10	Springfield Plain
Boston Mountains	11	Springfield Plateau
	12	Upper Boston Mountains
Arkansas Valley	13	Lower Boston Mountains
	14	Eastern Arkansas Valley
Ouachita Mountains	15	Western Arkansas Valley Mountains
	16	Western Arkansas Valley
	17	Fourche Mountains
	18	Western Ouachita Mountains
	19	Central Ouachita Mountains
	20	Athens Piedmont Plateau

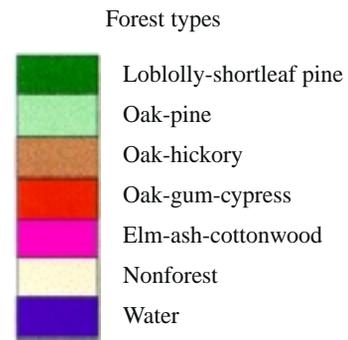


Figure 5.3—Ecological sections and subsections (modified from Keys and others 1995) and forest types of the Ozark-Ouachita Highlands.

lakes, several large reservoirs, pasturelands, and historic homesteads break the tree canopy. Although there is a diversity of deciduous tree and shrub species, they are intermixed to the point that the scenic effect is one of overall similarity. Vegetation density prevents most views beyond the immediate foreground except for panoramic vistas from ridgetop roads.

Small communities, rural areas, and agricultural lands occupy mainly valley bottoms, with natural appearing ridges and mountain landscapes acting as backdrops. Roads are commonly found in the valleys and along ridges throughout most of this area. Narrow ridges limit the amount of ridgetop development common to the other sections of the Assessment area.

Arkansas Valley

The Arkansas Valley ecological section (fig. 5.3) is made up of plains with low, tree-covered hills and isolated mountains reaching nearly 3,000 ft. This section is a mix of natural forest, agricultural lands, and urban areas. Geometric patterns due to pastures, croplands, roads, and other human influences dominate these lands. The three subsections making up this ecological section range from only 20 percent forested in the western Arkansas Valley (the largest subsection) to 77 percent forested in the western Arkansas Valley Mountains (the smallest subsection). The primary landscape feature is the Arkansas River and its major tributaries. Perennial streams are common, as are pastures and agricultural fields. The tree canopy is broken by stream courses, powerline corridors, pasturelands, and highway corridors throughout the valley. Rock bluffs are visible in many areas from travel routes. The forest vegetation is primarily a mixture of shortleaf pine stands and occasional loblolly pine plantations (both mainly in the western Arkansas Valley Mountains) and oak-hickory forests; prairie was once common in western portions of the Valley.

Agricultural, urban, and rural areas are more common throughout the valley than in the adjacent Ouachita Mountains or Boston Mountains sections. These areas range from small, developed areas with only a single store to larger towns and cities with gridded street patterns and commercial developments. Major Federal and State highway systems are located in this section.

Boston Mountains

The Boston Mountains (fig. 5.3) ecological section is made up of broad rounded ridges, benches or terraces, bluff tops, and rugged mountains with sharply defined narrow valleys. Most of the area appears as a natural forested landscape with little evidence of human development other than roads, pastures, and small towns. The tree canopy is broken only slightly by stream courses and rock bluffs. Subsections range from 65 to 85 percent forested. Vegetation density prevents most views beyond the immediate foreground. Extensive hardwood stands are broken by occasional pine forests formed on abandoned homesteads, where pastures regenerated naturally into pine. Oak-hickory is the most common forest type, but pine forests are found in slightly greater concentrations in the southern part of the Lower Boston Mountains subsection.

Rural areas and agricultural lands occur mainly in the valley bottoms and on benches within this area, but are not as common as in other ecological sections of the Highlands. Geometric patterns in the form of pastures, fence rows, and structures are generally seen as positive attributes contributing to the landscape character of the area.

Ozark Highlands

The Ozark Highlands ecological section (fig. 5.3) has a highly diverse mix of irregular plains and high, tree-covered hills with entrenched valleys and steep slopes. The 12 ecological subsections making up this area range from 10 percent forested in the Springfield Plain to 94 percent forested in the Current River Hills. Natural forest patterns are contrasted with agricultural patterns such as fences and pastures. Water features include large reservoirs, spring-fed streams, lakes, and ponds that contrast with the continuous canopy of soft-textured, rounded tree forms, creating a near natural-appearing landscape character. Vegetation varies from little bluestem grass plains to shortleaf pine stands to oak and hickory forests. Oak-hickory is the principal forest type throughout most of the forested area of this section. The viewer perceives a primarily natural landscape mixed with farmlands predominantly on the rounded ridge tops and flat valley bottoms. Pine forests are relatively open, interrupted by dense hardwood patches.

Croplands, pastures, and rural developments ranging from small communities to larger commercial centers occur in this area. Geometric patterns of development contrasted with natural-appearing forest lands add to the diversity of this landscape.

Ownership of Forest Landscapes

Using data from the Southern Research Station’s Forest Inventory and Analysis (FIA) (USDA FS FIA 1997), the Social-Economic Team reviewed the distribution of timberland among ownership categories and ecological sections (fig. 5.4). Timberland, as defined in the FIA survey (see “Glossary of Terms”), does not encompass all forest land but does include most of it and, for the purpose of this analysis, is an adequate measure of the distribution of the Highlands’ forests among landowner categories.

Nonindustrial private forest (NIPF) landowners, who own 65 to 87 percent of the timberland, control the scenic character of forested landscapes in three of the Highlands’ four ecological sections—the Ozark Highlands, Arkansas Valley, and Boston Mountains. In the Boston Mountains, national forests also account for a substantial portion (27 percent) of the timberland. In the Ouachita Mountains, while NIPF lands account for a significant portion of the area (34 percent), forest industry with 37 percent and national forests with 25 percent of the timberland also have a large influence on the scenic character of the forested landscape. Land management actions have greater potential to affect scenic character and esthetic values when they occur in areas of high visual sensitivity. Such areas include those lands within view of major tourist routes, Federal or State scenic byways, popular vista points, or high-use recreation areas such as Lake Ouachita.

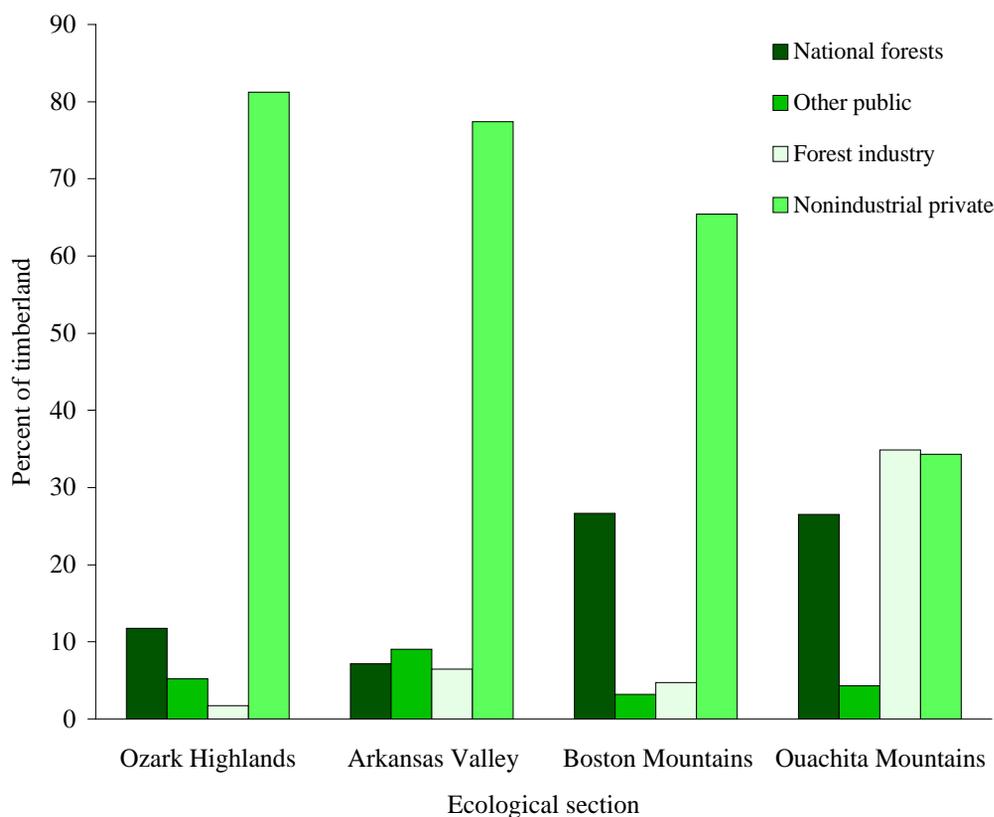


Figure 5.4—Percent distribution of timberland by ecological section and landowner category (USDA FS 1997a).

Developed Recreation Opportunities

Developed recreation activities are those supported by constructed facilities and usually involve frequent encounters with other users. Examples of developed recreation facilities include campgrounds, picnic areas, roadside vistas, observation sites, interpretive areas, and visitor centers. Figure 5.5 shows the distribution of the developed campsites among ownership categories (Cordell 1995a). The Corps of Engineers provides the most developed camping, managing 51 percent of the developed campsites in the Highlands. Private campgrounds account for about 12 percent of the campsites that complement those available on public lands. Only 6 percent of the area's developed campsites are on national forests and are managed by the Forest Service. Forty-two counties with national forest lands have national forest campgrounds or picnic areas in them as shown in table 5.5. Montgomery and Polk Counties, AR, Madison County, MO, and Le Flore County, OK, have the most camping opportunities; each has over 100 campsites and camping capacity for well over 500 "persons at one time" (PAOT—see "Glossary of Terms"). Thirteen "national forest" counties (not shown in table 5.5) have no national forest developed sites.

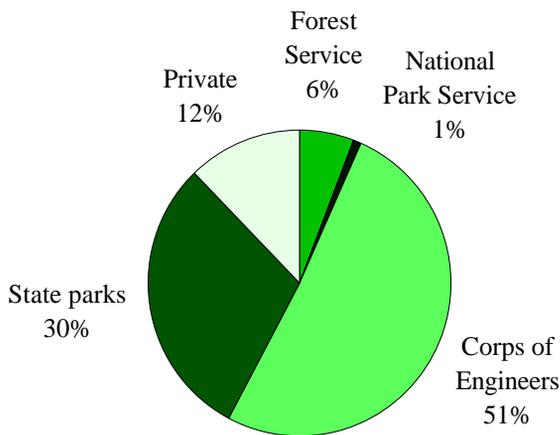


Figure 5.5—Percent distribution of developed campsites by ownership category (Cordell 1995a).

Table 5.5—Number and capacity of national forest campgrounds and picnic areas by State and county

Geographic area	Campgrounds		Picnic areas	
	Campsites ^a	Capacity ^b	Picnic sites ^a	Capacity ^b
Arkansas				
Crawford	0	0	5	25
Franklin	62	310	50	250
Garland	67	370	12	60
Johnson	33	165	8	40
Lee	44	305	13	65
Logan	51	255	45	225
Montgomery	104	520	22	110
Newton	11	55	7	35
Perry	37	215	0	0
Phillips	12	60	0	0
Polk	108	590	5	25
Pope	24	120	26	130
Scott	56	230	8	40
Searcy	12	60	0	0
Stone	70	350	22	110
Van Buren	6	30	0	0
Washington	18	90	22	110
Yell	13	65	24	120
Total	728	3,790	269	1,345
Missouri				
Barry	0	0	5	34
Callaway	15	106	4	32
Carter	35	198	57	338
Christian	27	210	5	25
Crawford	59	345	14	209
Dent	15	97	28	107
Douglas	29	158	29	280
Iron	66	420	0	0
Laclede	0	0	3	15
Madison	106	630	21	180
Oregon	46	230	37	228
Ozark	2	122	33	257
Phelps	39	164	50	310
Pulaski	0	0	2	8
Reynolds	35	175	17	70
Ripley	36	190	43	290
Shannon	41	229	17	65
Stone	38	244	18	111
Taney	0	0	3	27
Texas	26	145	24	120
Washington	27	135	11	55
Wayne	49	307	26	130
Total	691	4,105	447	2,891
Oklahoma				
Le Flore	125	685	56	280
McCurtain	0	0	7	35
Total	125	685	63	315
Total	1,544	8,580	779	4,551

^a Total number of campsites or picnic tables within developed campgrounds and picnic areas.

^b Measured as "persons at one time" (PAOT).

Most of the developed sites on national forests are products of the public works programs of the 1930's and 1960's and are characterized by rustic facilities in natural, forested settings. These aging facilities suffer from the wear and tear of many years of use. The increasing need for repair and maintenance of the basic infrastructure of these recreation areas is a serious concern to users, land managers, and those in the tourism industry. The most recent Statewide Comprehensive Outdoor Recreation Plans (SCORP's) of Missouri, Arkansas, and Oklahoma all identified inadequate funding for maintenance of existing recreation facilities as one of their most critical issues (OK TRD 1992, SYNERGY Group 1996, Turner 1995). Many agencies are concerned because the cost of maintaining recreation facilities increases with age, while available funds for this work are decreasing over time. Funding for national forest recreation programs in the Highlands declined by 35 percent (adjusted for inflation) between 1992 and 1996.

National forest recreation sites are often less developed than Corps of Engineers' sites, State parks, and private enterprise sites. In recent years, the trend on national forests has been to upgrade facilities to include conveniences such as hot showers, playgrounds, and longer campsite parking pads and utility hookups to accommodate modern travel trailers. The upgrading of facilities has not resulted in significant changes in overall availability of less-developed sites but could do so in the future if this trend continues.

To better serve the needs of people with disabilities and to comply with the Americans with Disabilities Act, State and Federal agencies are working to modify their developed recreation sites to provide barrier-free facilities. Approximately 5.5 percent (3 million people) of the draw area population have some form of mobility or self care limitation that might limit their access to recreation facilities (USDC BC 1993). The Arkansas Department of Parks and Tourism identified improving accessibility as one of their top priorities (Turner 1995), and public land-management agencies routinely include accessibility modifications when upgrading their developed sites. In spite of these efforts, insufficient funding has limited progress. The majority of developed sites managed by the Forest Service still do not provide adequate access for people with disabilities. The cost of modifying all national forest recreation facilities in the

Assessment area to meet accessibility standards is estimated to be \$15 million (Jerrels and Moore 1994, Talbert 1994, USDA FS 1994).

Dispersed Recreation Opportunities

Dispersed recreation activities are those that do not require constructed facilities, usually occur in more remote settings, and entail only occasional encounters with other people. Activities include primitive (dispersed) camping, sightseeing, canoeing, floating on rivers (in kayaks and on rafts), wildlife observation, rock climbing, hunting, and fishing. Hiking, horseback riding, mountain biking, off-road driving, and driving for pleasure are also considered dispersed activities, even though they are supported by constructed trails or roads. The Forest Service, with about 4.4 million ac open to public use, is the leading provider of land available for dispersed recreation in the Assessment area (Cordell 1995c).

Rock cliffs located on the national forests are popular sites for rock climbing and hang gliding. Sam's Throne on the Ozark National Forest is one of the leading climbing sites in the Highlands. Climbers travel from as far away as Kansas City, MO, and Dallas, TX, on a regular basis to climb this giant rock formation. Enthusiasts use Mt. Magazine in Arkansas and the western Ouachitas near Talihina, OK, as launch sites for hang gliding.

Of the approximately 3,000 mi of trails available on public lands in the Assessment area (Cordell 1995a), 63 percent are located on lands managed by the Forest Service (fig. 5.6). Opportunities for a variety of trail uses are available on national forests (table 5.6). Some

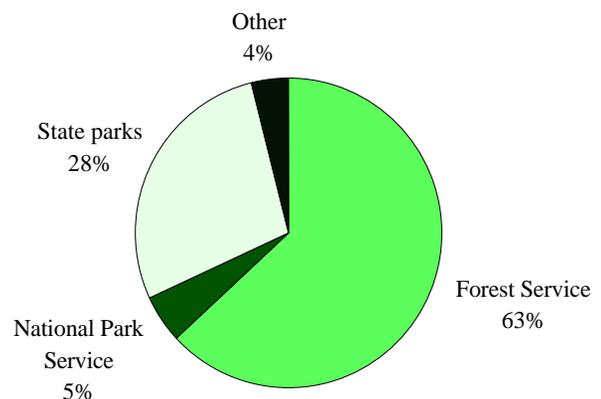


Figure 5.6—Percent of total trail system in the Assessment area by managing agency (Cordell 1995a).

Table 5.6—Miles of national forest trails in States of the Assessment area by trail-use category

State	All trails ^a	Hiking	Biking	Horseback-riding	Interpretive	Off-road vehicle	Accessible	Water
Arkansas	988	847	279	312	9	188	3	45
Missouri	708	669	464	461	1	145	2	0
Oklahoma	192	192	95	93	3	0	0	0
Total	1,888	1,708	838	866	13	333	5	45

^a Trails are counted under each use allowed; thus, trails serving multiple-use categories are counted more than once. Therefore, State totals are less than the sum of their respective rows.

trails serve multiple uses while others are restricted to foot travel. Nearly twice as many miles of national forest trails are available for hiking as are open to horses and mountain bikes.

National forests and, to a limited extent, Corps of Engineers' lands are the only public lands in Arkansas and Oklahoma where off-road vehicles (ORV's) are allowed (Turner 1995). In Missouri, national forests provide about two-thirds of the public lands available for ORV's. Lands managed by the Missouri Department of Natural Resources and Corps of Engineers provide the rest of the space for ORV use (SYNERGY Group 1996). Since ORV use is managed differently on the three national forests, there are some misunderstandings among forest users about where ORV's are allowed. The Ouachita National Forest is open for ORV travel everywhere except in areas specifically designated as closed to their use. With a few exceptions, trails on the Ouachita National Forest are closed to ORV's, however, most of the forest is open to cross country ORV travel. The Ozark and Mark Twain National Forests are closed to ORV use except in those areas specifically designated open for their use. Overall within the Assessment area, the number of trails open to ORV's is very limited.

The extensive system of trails requires regular maintenance, and many sections require reconstruction to keep them from deteriorating and causing resource damage. Land managers rely, in part, on the volunteer work of many individuals and user groups to maintain some trails at their present levels. As the Arkansas SCORP points out (Turner 1995) and as discussed above, declining funds available for recreation management limit agencies' ability to maintain their trail systems at acceptable levels.

Recreation Sites with National or State Significance

There are numerous opportunities for a great variety of outdoor recreation activities throughout the Assessment area. Some places such as Blanchard Springs Caverns are so extraordinary they stand out as areas with special recreational significance. Many of these areas have received Federal or State recognition through either legislative action or agency designation. Other areas are significant simply because of their uniqueness. These specially designated areas serve multiple purposes, with recreation an important goal. All together, specially designated areas make up only a small percentage of the public lands in the Highlands region, yet they contribute tremendously to the region's character and recreation opportunities.

Wilderness Areas

Federal wilderness areas, part of the National Wilderness Preservation System (NWPS), are managed under the guidance of the 1964 Wilderness Act, the Eastern Wilderness Act, and individual State acts. The 1964 Wilderness Act established guidelines for managing wilderness areas (1) for the use and enjoyment of the American people, (2) to assure the continuation of natural ecological processes, (3) to protect ecosystems, and (4) to preserve natural resources for scientific, educational, and historic purposes. Wilderness areas provide opportunities for solitude and primitive, unconfined recreation experiences where all motorized and mechanized vehicles are prohibited. Recreation facilities such as campgrounds, picnic areas, and interpretive sites are also prohibited within wilderness areas.

The Forest Service manages 194,319 ac of congressionally designated wilderness within the three national forests of the Highlands (table 5.7). The National Park Service and Fish and Wildlife Service manage 43,693 ac

Table 5.7—Federal wilderness in the Assessment area

Managing unit	Area
Wilderness name	<i>Acres</i>
Mark Twain National Forest (FS)	
Bell Mountain	8,977
Devil's Backbone	6,595
Hercules Glade	12,314
Irish	16,117
Paddy Creek	7,019
Piney Creek	8,087
Rock Pile Mountain	4,089
Total	63,198
Ozark-St. Francis National Forests (FS)	
East Fork	10,688
Hurricane Creek	15,307
Leatherwood	16,838
Richland Creek	11,801
Upper Buffalo	12,018
Total	66,652
Ouachita National Forest (FS)	
Black Fork Mountain	13,139
Caney Creek	14,460
Dry Creek	6,310
Flatside	9,507
Poteau Mountain	11,299
Upper Kiamichi	9,754
Total	64,469
Total NF wilderness	194,319
Buffalo National River (NPS)	
Lower Buffalo	22,338
Ponca	11,300
Upper Buffalo	2,200
Total NR wilderness	35,838
Mingo National Wildlife Refuge (FWS)	
Mingo ^a	7,855
Total Assessment area wilderness	238,012

FS = Forest Service; NF = national forest; NPS = National Park Service; NR = national river; FWS = U.S. Fish and Wildlife Service.

^a Mingo Wilderness is within an Assessment area county but lies just outside the Highlands.

of designated wilderness within the Assessment area counties (Mingo Wilderness in Missouri is outside the Highlands). These 238,012 ac represent 5 percent of the land that the three Federal agencies manage in the region. Wilderness accounts for 4.4 percent of all national forest lands in the Highlands. The State of Oklahoma manages the McCurtain County Wilderness (which has 14,087 ac) in the Ouachita Mountains. Since this area is not part of the NWPS, it is managed under the guidelines of the State of Oklahoma.

The Social-Economic Team analyzed the amounts and distributions of wilderness among Highlands' counties to respond to an interest expressed by citizens who attended the team's working meetings. Of the 56 Assessment area counties that have national forests, national parks, or national wildlife refuges, 24 include some area of designated wilderness (table 5.8). Wilderness accounts for 0.2 to 10.4 percent of national forest acreage in 11 counties and 11.6 to 21.2 percent in 8 more. Wilderness makes up 25.4 and 38.1 percent, respectively, of national forest lands in Logan and Sebastian Counties, AR (but Sebastian has relatively little national forest land). Almost all of the national forest land in Marion County (84.5 percent) is within the Leatherwood Wilderness. Relative to a county's total land base (public and private), nearly all counties have less than 4 percent of their land in designated wilderness. The exception is Newton County, AR, where over 12 percent of its land is designated as wilderness. An estimated 2,213 ac of private land inholdings—not subject to wilderness regulations—are located within the boundaries of designated wilderness areas.

There are 174 mi of trails in wilderness areas of the national forests, about 9 percent of all national forest trails. Not all wilderness areas contain developed trails, but those that do exist are usually maintained at primitive standards (e.g., they have few directional signs and paths are often not marked with tree blazes). Wilderness areas occur in all four ecological sections of the Highlands and in 11 of the 20 ecological subsections (table 5.9). The following subsections are especially well represented in the NWPS: White River Hills, Springfield Plateau, Upper Boston Mountains, Western Arkansas Valley Mountains, and Fourche Mountains. Of the 30 federally listed endangered and threatened species in the Highlands, four are in the region's wilderness areas (table 5.10). The aquatic and terrestrial

Table 5.8—Acres of Federal wilderness in the Assessment area by State, county, and managing agency

Geographic area	Managing agency				Total wilderness	NF land in wilderness ^b	Portion of county in wilderness ^c
	FS	NPS	FWS	Private inholdings ^a			
	----- Acres -----				----- Percent -----		
Arkansas							
Baxter	13,345	320	0	142	13,807	21.2	3.6
Johnson	5,703	0	0	120	5,823	3.1	1.3
Logan	4,730	0	0	0	4,730	25.4	1.0
Marion	2,841	2,218	0	0	5,059	84.5	1.2
Newton	31,021	33,300	0	17	64,338	15.7	12.2
Perry	3,042	0	0	0	3,042	3.0	0.8
Polk	21,333	0	0	80	21,413	10.4	3.8
Pope	11,332	0	0	0	11,332	6.0	2.1
Saline	6,465	0	0	0	6,465	11.6	1.3
Scott	6,675	0	0	0	6,675	1.8	1.1
Searcy	2,410	0	0	0	2,410	7.6	0.5
Sebastian	7,231	0	0	0	7,231	38.1	2.0
Yell	450	0	0	0	450	0.2	0.0
Total	116,578	35,838	0	359	152,775	4.6	—
Missouri							
Barry	6,965	0	0	37	7,002	12.7	1.3
Iron	8,977	0	0	50	9,027	9.4	2.5
Madison	4,089	0	0	42	4,131	8.1	1.2
Oregon	16,117	0	0	241	16,358	15.4	3.2
Ozark	6,595	0	0	0	6,595	17.1	1.3
Stoddard	0	0	3,669	0	3,669	0.0	0.6
Stone	1,122	0	0	18	1,140	7.1	0.3
Taney	12,314	0	0	1	12,315	19.1	2.9
Texas	7,019	0	0	40	7,059	14.3	0.9
Wayne	0	0	4,186	0	4,186	0.0	0.8
Total	63,198	0	7,855	429	71,482	4.3	—
Oklahoma							
Le Flore	14,543	0	0	1,425	15,968	6.6 ^d	1.5
Assessment area	194,319	35,838	7,855	2,213	240,225	4.4	—

FS = Forest Service; NPS = National Park Service; FWS = U.S. Fish and Wildlife Service; NF = national forest; — = not applicable.

^a Private land within wilderness boundaries (not subject to the restrictions of the Wilderness Act).

^b Percent of national forest land within a county or State that has been designated as wilderness.

^c Percent of all land within a county lying inside designated wilderness areas (includes privately owned land).

^d National forest wilderness in Le Flore County represents 4.1 percent of all NF land in the Assessment area portion of Oklahoma.

Source: National forest records, USDA NRCS (1992).

Table 5.9—Representation of Federal wilderness areas in ecological sections and subsections of the Assessment area

Section Subsection	Wilderness	Area <i>Acres</i>
Ozark Highlands		
St. Francis Knobs and Basins	Rock Pile Mountain	4,089
	Bell Mountain	8,777
Central Plateau	Irish	8,140
	Paddy Creek	2,000
Osage River Hills		0
Gasconade River Hills	Paddy Creek	5,019
Meramec River Hills		0
Current River Hills	Irish	7,977
	Bell Mountain	200
White River Hills	Piney Creek	8,087
	Hercules Glade	12,314
	Devil's Backbone	6,595
	Leatherwood	6,452
	Lower Buffalo	22,338
Elk River Hills		0
Black River Ozark Border		0
Springfield Plain		0
Springfield Plateau	Leatherwood	10,386
	Upper Buffalo (NF)	362
	Ponca	5,727
	Upper Buffalo (NR)	2,024
Total		110,487
Boston Mountains		
Upper Boston Mts.	Upper Buffalo (NR)	176
	Upper Buffalo (NF)	11,656
	Ponca	5,573
	Hurricane Creek	15,307
	Richland Creek	11,801
Lower Boston Mts.	East Fork	10,688
Total		55,201
Arkansas Valley		
Eastern AR Valley		0
Western AR Valley		0
Western AR Valley Mts.	Poteau Mountain	11,299
	Dry Creek	6,310
Total		17,609
Ouachita Mountains		
Fourche Mountains	Black Fork Mountain	13,139
	Upper Kiamichi	9,754
	Flatside	9,507
Western Ouachita Mts.		0
Central Ouachita Mts.	Caney Creek	14,460
Athens Piedmont Plateau		0
Total		46,860

NF = national forest; NR = national river.

Table 5.10—Endangered and threatened species found in wilderness areas in the Ozark-Ouachita Highlands

Species	Wilderness	Management unit
Bald eagle	Hercules	Mark Twain NF
Gray bat	Lower Buffalo	Buffalo National River
Gray bat	Ponca	Buffalo National River
Indiana bat	Ponca	Buffalo National River
Indiana bat	Irish	Mark Twain NF
Mead's milkweed	Bell Mountain	Mark Twain NF

NF = national forest.

reports of this Assessment provide further discussion of endangered and threatened species (USDA FS 1999a, b).

Wilderness areas are so well distributed throughout the Assessment area that only 7 of the 107 principal cities (those with a population of 50,000 or greater) within the draw area are more than 250 mi from a congressionally designated wilderness. These cities, all located in the northwestern portion of the draw area, are Omaha, NE, and Cedar Rapids, Council Bluff, Davenport, Des Moines, Iowa City, and Waterloo, IA.

Nationally Designated Trails

The National Trail System Act of 1968 established a system of trails designated as National Scenic, National Historic, and National Recreation Trails. There are no designated National Scenic Trails within the Assessment area.

The National Park Service manages the Trail of Tears, the only National Historic Trail that crosses the Assessment area. The trail commemorates the U.S. Army's forced relocation of the Cherokee Indians in the 1830's from their homelands in the Southeastern States. Thousands died on the long journey to lands west of the Mississippi River. The trail follows two routes: a water trail along the Tennessee, Ohio, Mississippi, and Arkansas Rivers, and an overland route from Chattanooga, TN, to Tahlequah, OK.

More than 800 trails across the United States are designated National Recreation Trails. The Assessment area includes 41 (590 mi) of these trails (table 5.11) (USDI NPS 1993). The two longest National Recreation Trails are the 165-mi Ozark Highlands Trail that runs north to south between Mountainburg, AR, and the

Table 5.11—National Recreation Trails in the Assessment area, their lengths, and respective administering agencies or units, by State

Trail name	Length	Administering unit or agency
	<i>Miles</i>	
Arkansas		
Alum Cove Natural Bridge	1.1	Ozark-St. Francis National Forests
Bona Dea	5.6	U.S. Army Corps of Engineers
Bridge Rock	1.0	U.S. Army Corps of Engineers
Buckeye	0.1	U.S. Army Corps of Engineers
Buckskin Nature	0.5	U.S. Army Corps of Engineers
Cedar Creek	1.5	Petit Jean State Park
Cedar Falls	2.2	Petit Jean State Park
Dam Mountain	4.5	Lake Catherine State Park
Devil's Den	1.5	Devil's Den State Park
Dripstone	0.7	Ozark-St. Francis National Forests
Falls Branch	2.0	Lake Catherine State Park
Feaster	1.1	Arkadelphia Parks and Recreation
Forest Hills	1.5	U.S. Army Corps of Engineers
Grand Promenade	0.5	Hot Springs National Park
Horseshoe Mountain	3.5	Lake Catherine State Park
Kingfisher	0.5	Pinnacle Mountain State Park
Lost Bridge Hiking	5.0	U.S. Army Corps of Engineers
Mossy Bluff	0.7	U.S. Army Corps of Engineers
Ouachita National Recreation ^a	225.0	State park agencies and Ouachita NF
Ouachita Geo-Float	16.0	U.S. Army Corps of Engineers
Ozark Highlands	165.0	Ozark-St. Francis National Forests
Prairie Creek Jogging	1.0	U.S. Army Corps of Engineers
River Bluff	1.0	U.S. Army Corps of Engineers
Robinson Point Nature	3.0	U.S. Army Corps of Engineers
Rocky Valley	2.0	Pinnacle Mountain State Park
Seven Hollows	3.5	Petit Jean State Park
Sugar Loaf Mountain	1.0	U. S. Army Corps of Engineers
Summit Park	1.7	Mount Nebo State Park
Tollantusky	1.4	U.S. Army Corps of Engineers
Woodpecker Hollow Nature	0.5	U.S. Army Corps of Engineers
Missouri		
Berryman	24.0	Mark Twain National Forest
Crane Lake	5.0	Mark Twain National Forest
Elephant Rocks Braille	1.0	Missouri Div. of Parks and Recreation
Johnson Tract	5.0	U.S. Army Corps of Engineers
Lost Creek	1.0	U.S. Army Corps of Engineers
Mingo Boardwalk Nature	1.0	Mingo National Wildlife Refuge (FWS)
Mudlick	10.2	Missouri Dept. of Natural Resources
Pine Ridge	0.5	U.S. Army Corps of Engineers
Ridge Runner	23.0	Mark Twain National Forest
Oklahoma		
Jean Pierre Choteau Hiking	64.0	U.S. Army Corps of Engineers
Struggle for Survival	0.7	Ouachita National Forest
Total	590.0	

NF = national forest; FWS = U.S. Fish and Wildlife Service.

^a Occurs in AR and OK; managed by Arkansas and Oklahoma State park agencies and the Forest Service.

Source: USDI NPS (1993).

Buffalo National River and the 225-mi Ouachita National Recreation Trail that runs east and west from Pinnacle Mt. State Park near Little Rock, AR, to Talimena State Park in Oklahoma.

Rivers with National and/or State Designations

Rivers provide some of the most enjoyable recreation settings in the Highlands. Viewing the spectacular scenery along the Buffalo National River, whitewater floating on the Cossatot and Big Piney Rivers, and smallmouth bass fishing on many Highland streams exemplify the variety of river-based recreation opportunities available and reflect the importance of river

corridors to the area’s recreation opportunities. Remarkably, some 523 mi of river have received Federal recognition for their exceptional scenic, recreational, geologic, cultural, and environmental values (see table 5.12 and fig. 5.7). Nine rivers totaling 254 mi in length are included in the National Wild and Scenic Rivers System (NWSRS). The Buffalo National River and the Ozark National Scenic Riverways add another 269 mi of nationally significant rivers.

State governments have also “designated” rivers to protect their recreational, scenic, and other values (table 5.13). The Oklahoma Legislature has designated about 169 mi of rivers within the Highlands as Oklahoma

Table 5.12—Assessment area streams having Federal legislative designation(s) by State, managing unit or agency, and length

Stream	State	Managing agency or unit	National Wild and Scenic Rivers System ^a			Other Federal designation	Total length
			Wild	Scenic	Recreational		
-----Miles-----							
Big Piney Creek	AR	Ozark NF		45.2			45.2
Buffalo River	AR	Ozark NF	9.4	6.4			15.8
Cossatot River	AR	Ouachita NF		11.3	4.2		15.5
Cossatot River	AR	U.S. Army Corps of Engineers		4.6			4.6
Cossatot River	AR	Cossatot State Park-Natural Area		10.7			10.7
Hurricane Creek	AR	Ozark NF	2.4	13.1			15.5
Little Missouri River	AR	Ouachita NF	4.4	11.3			15.7
Mulberry River	AR	Ozark NF		19.4	36.6		56.0
North Sylamore Creek	AR	Ozark NF		14.5			14.5
Richland Creek	AR	Ozark NF	5.3	11.2			16.5
Eleven Point River	MO	Mark Twain NF		44.4			44.4
Total			21.5	192.1	40.8		254.4
Buffalo River	AR	Buffalo NR (NPS)				135.0	135.0
Current River	MO	Ozark NSR (NPS)				100.0	100.0
Jacks Fork	MO	Ozark NSR (NPS)				34.0	34.0
Total						269.0	269.0
Total							523.4

NF = national forest; NR = national river; NPS = National Park Service; NSR = National Scenic Riverways.

^a See “Glossary of Terms” for definitions of wild, scenic, and recreational rivers.

Source: IWSRCC (1997), USDI NPS (1997a, b).

- | | | | |
|---|---------------------------|---|----------------------|
| A | Flint Creek | J | Buffalo River |
| B | Illinois River | K | Richland Creek |
| C | Barren Fork Creek | L | Big Piney Creek |
| D | Big Lee's Creek | M | Hurricane Creek |
| E | Little Lee's Creek | N | North Sylamore Creek |
| F | Upper Mountain Fork River | O | Strawberry River |
| G | Cossatot River | P | Eleven Point River |
| H | Little Missouri River | Q | Current River |
| I | Mulberry River | R | Jacks Fork River |



Figure 5.7—River segments with Federal and/or State legislative designation(s) for protection of their recreational values (IWSRCC 1997, OK SRC 1997, AR NSRC 1997, USDI NPS 1997a, b).

Table 5.13—Assessment area rivers with State legislative protection, by State classification and length

State-protected rivers	Length
	<i>Miles</i>
<i>Arkansas Natural and Scenic River^a</i>	
Cossatot	26.0
Little Missouri	29.0
Strawberry	43.0
Total	98.0
<i>Oklahoma Scenic River^a</i>	
Barren Fork	27.6
Big Lee	17.5
Flint	11.9
Illinois	70.5
Little Lee	15.3
Upper Mountain Fork	26.0
Total	168.8
Total	266.8

^a See “Glossary of Terms” for definitions of Natural and Scenic River and Oklahoma Scenic Rivers; in Arkansas, portions of the Cossatot and Little Missouri Rivers also have a Federal designation as part of the National Wild and Scenic Rivers System.
Source: AR NSRC (1997), OK SRC (1997).

Scenic Rivers and established restrictions on activities to preserve their scenic qualities (OK SRC 1997). The Arkansas General Assembly has designated 98 mi of rivers within the Highlands as part of the Arkansas System of Natural and Scenic Rivers. This designation protects these rivers from permanent dams or structures and actions that would harm their scenic and recreational qualities (AR NSRC 1997). Missouri has no State-designated rivers.

More than 2,000 mi of rivers in the Highlands may merit special designation but lack either complete studies to determine their suitability for wild and scenic status or legislative action to formalize a State designation (table 5.14). Forty-two of the Highlands’ rivers are listed in the National Park Service’s 1982 *Nationwide Rivers Inventory* (NRI) (USDI NPS 1982). The State of Arkansas lists 19 rivers in the Highlands on its registry of rivers qualifying for State system designation (AR NSRC 1997). In 1990, the Forest Service determined that sections of the Ouachita and Saline Rivers (North Fork, Alum Fork, and Middle Fork) were eligible for designation under the Wild and Scenic Rivers Act,

but, due to limited miles within the national forest boundary, deferred the suitability determination to the State of Arkansas or other agencies (USDA FS 1990). Through land exchange legislation in 1996, Congress added stretches of three NRI-listed rivers to the Ouachita National Forest—the Glover and the Mountain Fork Rivers in Oklahoma and a short section of the Little Missouri River in Arkansas. The Forest Service will study these rivers to determine whether they are eligible and suitable for inclusion in the NWSRS.

Some people are concerned that giving any kind of Federal or State designation to rivers will affect private property rights. This issue surfaced during the process of deciding the boundaries and appropriate width of corridors for Wild and Scenic Rivers on the Ozark National Forest. Some citizens expressed similar concerns in response to the President’s American Heritage Rivers Program that is aimed at providing Federal support to community efforts to restore or stimulate economic, environmental, and historic values focused on riverways. Ten rivers were selected for this designation; the Arkansas, Ouachita, and Osage Rivers in the Highlands were among the 126 that were nominated but were not among those selected.

Scenic Byways

The Forest Service has designated nine scenic byways to highlight and enhance opportunities for scenic viewing. The Forest Service’s designations apply only to those sections of highway passing through national forest lands. In addition, Arkansas has designated four State scenic byways: Scenic Highway 7 from Arkadelphia to Harrison, Mt. Magazine Highway (Highway 309) from Webb City to Havana, U.S. Highway 71 from Alma to Fayetteville, and Talimena Scenic Byway (Highway 88) from Mena to the Oklahoma border (table 5.15).

Sightseeing is one of the most popular outdoor recreational activities of people in the Assessment area as well as the Nation (AR DPT 1997; Cordell and others 1997a, b; D.K. Shifflet 1998; Turner 1995). The scenic byways that traverse 11 of the Highlands’ 20 ecological subsections provide access to much of the region’s diversity of landscapes and some of the area’s most scenic countryside (fig. 5.8). Scenic Highway 7, so designated by both the Forest Service and the State of

Table 5.14—Assessment area streams with potential for special designation but requiring further study and/or legislative action by State, length, and current status

Stream	Length	Status	Stream	Length	Status
	<i>Miles</i>			<i>Miles</i>	
Arkansas			Oklahoma		
Big Creek	37	NRI	Glover	32	NRI
Little Buffalo	27	NRI	Lee Creek	49	NRI
Cadron	59	NRI/R	Kiamichi	102	NRI
North Fork Cadron	29	NRI/R	Mountain Fork	25	NRI
East Fork Cadron	52	NRI/R	Total	208	
Eleven Point	35	NRI/R	Missouri		
Illinois Bayou	43	NRI/R	Spring	53	NRI
East Fork Illinois Bayou	15	NRI/R	Black	14	NRI
Middle Fork Illinois Bayou	29	NRI/R	Bourbeuse	74	NRI
Kings River	90	NRI/R	Bryant Creek	40	NRI
Little Red	30	NRI	Meramec	80	NRI
Middle Fork Little Red	77	NRI	Mineral Fork	14	NRI
Ouachita	70	NRI/R	Big Piney	85	NRI
Big Piney Creek	51	NRI/R	Cedar Creek	36	NRI
Richland and Falling Water	37	NRI/R	Gasconade	265	NRI
North Fork Saline	35	NRI/R	Huzzah Creek	30	NRI
Alum Fork Saline	44	NRI/R	St. Francis	63	NRI
Middle Fork Saline	51	NRI/R	North Fork White	62	NRI
South Fork Saline	26	NRI/R	Shoal Creek	69	NRI
Spring River and Warm Fork	81	NRI/R	Cedar Creek	45	NRI
N. Fork Sylamore/Cole Creek	58	NRI	Courtois Creek	21	NRI
War Eagle Creek	65	NRI/R	Total	885	
White River (upper)	48	NRI	Highlands total	2,352	
Black River	121	R			
Little Black River	12	R			
Total	1,258				

NRI = Nationwide Rivers Inventory; R = registry of the Arkansas Natural and Scenic Rivers Commission.
Source: USDI NPS (1982), AR NSRC (1997).

Arkansas, rates as one of the 10 most scenic highways in the United States (Turner 1995). Estimates from the highway departments of Arkansas, Oklahoma, and Missouri indicate that well over 7 million people travel these roads each year (AR SHTD 1995, MO HTD 1995, OK DT 1995). According to the Arkansas Department of Parks and Tourism (Turner 1995), the public needs more information about the opportunities available for scenic driving.

Lake of the Ozarks

Missouri's largest lake is a major recreation destination site. More than 200 resorts, ranging from luxurious

to rustic, surround the 58,000-ac lake. The area is popular for water-based outdoor recreation as well as shopping, crafts, and live performance shows.

Hot Springs National Park

The 47 hot springs in the Hot Springs National Park have attracted people since prehistoric times. Located within and surrounding downtown Hot Springs, AR, the park is one of the State's and the Highlands' top tourist destinations. The park features historic Bathhouse Row, hiking trails, roads for mountain driving, and a campground.

Table 5.15—National forest and State scenic byways by designating entity, traffic counts, and ecological subsection

Byway name	Highway number(s)	Designating entity	Thousands of vehicles per year (1994)	Ecological subsection(s)
Blue Buck	MO 181	Forest Service (MTNF)	120	White River Hills
Glade Top Trail	MO 147, 149	Forest Service (MTNF)	—	White River Hills
Mt. Magazine	AR 309	Forest Service (OzNF) and State of Arkansas	22	Western AR Valley Mountains and Western AR Valley
Ozark Highlands	AR 21	Forest Service (OzNF)	143	Upper Boston Mountains and Lower Boston Mountains
Pig Trail	AR 23	Forest Service (OzNF)	572	Upper Boston Mountains and Lower Boston Mountains
Scenic Highway 7	AR 7 ^a	Forest Service (OzNF and OuNF) and State of AR	1,158 ^b	Springfield Plateau, Upper Boston Mountains (Mts.), Lower Boston Mts., Eastern AR Valley, Western AR Valley, Fourche Mts., Central Ouachita Mts., and Athens Piedmont Plateau
Sugar Camp	MO 76, 86 MO 112, 197	Forest Service (MTNF) Forest Service (MTNF)	— —	Springfield Plain White River Hills
Sylamore	AR 5, 14	Forest Service (OzNF)	457	White River Hills
Talimena Scenic Drive	AR 88, OK 1	Forest Service (OuNF) and State of Arkansas	92	Fourche Mountains
U.S. 71	U.S. 71	State of Arkansas	<u>4,745</u>	Lower Boston Mountains and Upper Boston Mountains
Total			7,309	

MTNF = Mark Twain National Forest; OzNF = Ozark National Forest; OuNF = Ouachita National Forest; — = not available.

^a Entire length of Highway 7 from Arkadelphia to Harrison, AR, is designated a State scenic byway by the State of Arkansas; parts that run through the Ouachita and Ozark National Forests also are designated national forest scenic byways.

^b Does not include traffic counts within cities of Arkadelphia, Hot Springs, Russellville, and Harrison, AR.

Source: AR SHTD (1995), MO HTD (1995), OK DT (1995).

Winding Stair Mountain National Recreation Area

The Winding Stair Mountain National Recreation Area encompasses 83,422 ac of the Ouachita National Forest in eastern Oklahoma, one of many National Recreation Areas (NRA's) established by Congress in 1989 (PL-100-499) to enhance opportunities for recreation and wildlife. The following designated areas are included within the NRA: (1) Winding Stair Mountain National Recreation Area (26,445 ac), (2) Robert S. Kerr Memorial Arboretum, Nature Center and Botanical Area (8,026 ac), (3) Beech Creek Botanical Area (400 ac), (4) Beech Creek Scenic Area (7,500 ac), and (5) Indian Nations Scenic and Wildlife Area (41,051 ac). Since 1990, a major construction program has been

carried out to rehabilitate and enhance the NRA's recreational facilities. These include the new Cedar Lake Equestrian Campground that has quickly become a well-known attraction for horseback riders in the draw area.

Blanchard Springs Caverns

The Blanchard Springs Caverns, located on the Ozark National Forest, are one of the premier underground attractions open to the public in the United States. Discovered in the 1930's, Blanchard Caverns have been described as one of the most extraordinary cave finds of the century. Thousands of visitors go through the caves on guided tours each year.

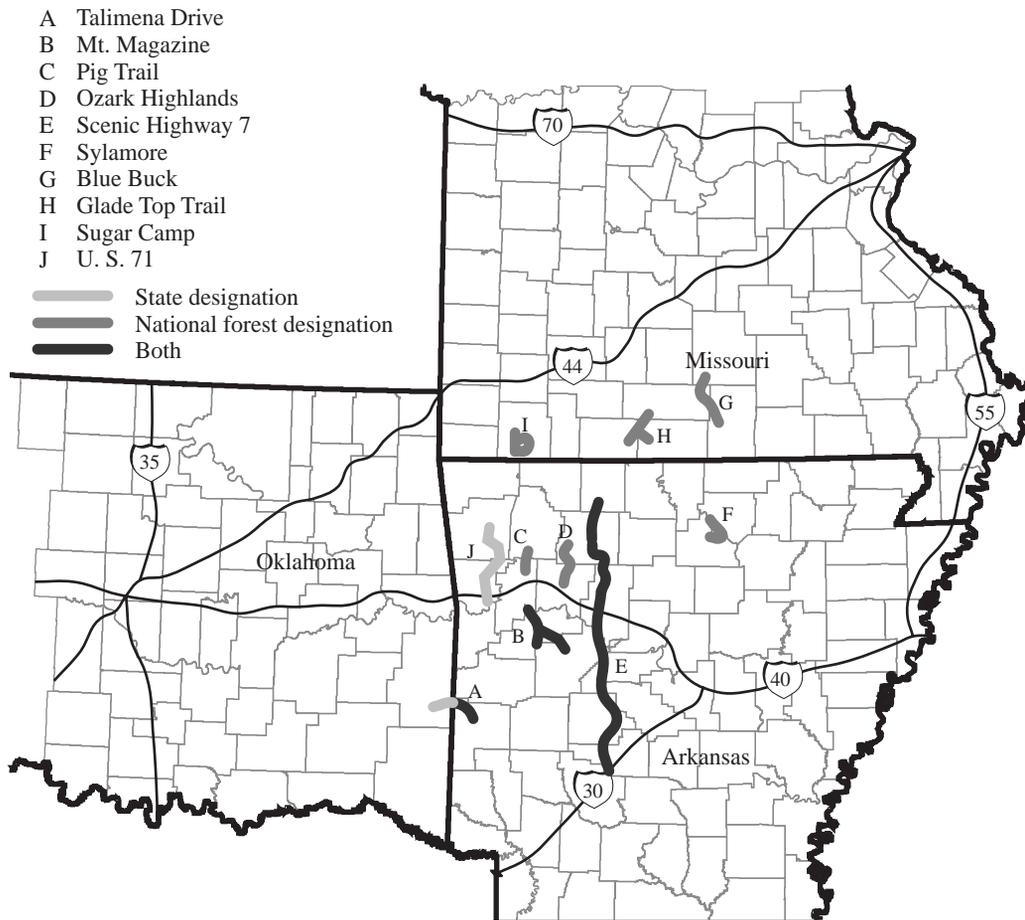


Figure 5.8—National forest and State scenic byways.

Special Interest Areas and Scenic Areas

The Ozark-St. Francis National Forests recognize 17 special interest areas totaling 23,100 ac. Similarly, the Mark Twain National Forest has 47 areas totaling 8,500 ac. These areas include sites with unique scenic, geological, botanical, or cultural values. The Ouachita National Forest manages five scenic areas, totaling 4,195 ac, where large, old-growth trees are preserved for their esthetic value.

Demand for Outdoor Recreation

Data Sources and Methods of Analysis

The Social-Economic Team used data from the 1994 to 1995 *National Survey on Recreation and the Environment* (NSRE) (Cordell and others 1997a, b) as

a source of information about current participation in recreational activities by residents of the Assessment area and Highlands draw area. The NSRE is the latest in a series of national recreation surveys the Federal Government has conducted since 1960. The Forest Service uses the information gained in these surveys to prepare the National Renewable Resources Planning Act (RPA) assessment every 10 years. This survey provides a method for determining demand for outdoor recreation in the Highlands that is consistent with national and regional assessments.

In conducting the NSRE in quarterly samples between January 1994 and April 1995, researchers surveyed approximately 17,000 individuals that were 16 years of age and older. The survey developed information about people's outdoor recreation activities and preferences, including (1) the amount of participation in over 80 recreational activities, (2) constraints on participation, (3) accessibility of facilities, (4) attitudes and values

toward outdoor recreation, (5) typical trip profiles, and (6) user characteristics. The Social-Economic Team analyzed the NSRE data for the Nation as a whole, for the draw area, and for the two RPA regions that encompass the Ozark-Ouachita Highlands. Missouri is in the northern RPA region, which is identical to the Eastern Region of the Forest Service, and Arkansas and Oklahoma are in the southern RPA region, which is identical to the Forest Service's Southern Region. It should be noted that, while the survey developed data about recreation activities of residents of different regions of the country, there is no information about where their activities actually took place, i.e., whether they took place in the residents' own region or in another (Cordell and others 1997a, b). The team also used recreation activity information from national forests, State tourism commissions, State wildlife agencies, and the private sector to supplement the NSRE data for addressing specific areas or issues within the Assessment area. National forest data includes estimates of annual recreation activity measured in recreation visitor days (RVD's). An RVD is equivalent to 12 hours of participation in an activity by one person. While the estimates of national forest recreation activity (derived from annual reports of each forest) are not based on statistically reliable data, they represent the best information available to the Social-Economic Team. More statistically reliable estimates of recreation use will be developed for the three national forests in the Highlands in the years 2000 through 2004.

The team analyzed attributes of 38 of the NSRE activities that typically occur on public lands within the Assessment area. (One activity not specifically included in the NSRE is mountain biking as separate from biking in general.) The attributes reviewed were (1) the number of people participating in specific recreation activities, (2) the average number of primary purpose trips per year by participants in an activity, and (3) the average number of days of participation. A trip is defined as a person traveling more than 15 minutes from home for the primary purpose of participating in a certain activity. The number of participation days represents the average number of days on which participants engaged in the activity for any length of time over the 12-month survey period.

Researchers at the Southern Research Station used NSRE data on recreation participation and available recreation opportunities combined with 1990 Census data on projected changes in population demographics

(age, income, race, percent males, and population density) to develop projections of future recreation demand (Bowker and others 1999).

Trends in Recreation Participation

In every major category of recreation activity available in the Highlands, the residents of the draw area exceed the national average in percentage of population participating in these activities (table 5.16). The most popular activities, with more than 90 percent of the draw area population 16 years and older participating (approximately 40 million people), are those associated with viewing and learning about nature and human history. Sightseeing, wildlife viewing, bird watching, and visiting nature centers and historic sites fall into this category. In the Highlands, public lands provide the landscape backdrop and, in many cases, the actual sites for these relatively low-impact, low-cost activities. Some outdoor recreation activities such as developed area camping, picnicking, and trail use require special sites or facilities most commonly found on public lands. Nearly 60 percent of the draw area population (about 25 million people) participate in picnicking, and about 40 percent (about 17 million people) participate in fishing; swimming in a lake, river, or ocean; or an outdoor adventure activity (e.g., hiking, off-road driving, and horseback riding). About 35 percent (15.5 million people) participate in some form of boating, especially motor boating. Approximately 31 percent (14 million people) participate in camping, and about 14 percent (6 million people) engage in hunting.

When considering the average number of trips typically taken per year by participants in an activity and the average number of days of participation, the draw area is equal to or lower than the national average for many activities (tables 5.17 and 5.18). However, the people of the draw area exceed the national average by at least one trip per year for visiting prehistoric sites, bird watching, sightseeing, primitive area (dispersed) camping, and fresh water and warm water fishing. The draw area also exceeds the national average by at least 2.5 days of participation per year for people that engage in hiking, visiting a prehistoric site, bird watching, fresh water and warm water fishing, and motor boating.

The magnitude, relative importance, and potential impact of different recreational activities can be seen by analyzing the total amount of time per year that all participants engage in different activities (table 5.19).

Table 5.16—Percent of population and number of people in the Nation and the draw area, 16 years of age and older, participating in selected outdoor recreation activities

Activity ^a	National participants		Draw area participants ^b	
	<i>Percent</i>	<i>Millions</i>	<i>Percent</i>	<i>Millions</i>
Outdoor adventure	36.8	73.6	41.4	18.2
Hiking	23.8	47.8	23.5	10.3
Orienteering	2.4	4.8	2.3	1.0
Backpacking	7.6	15.2	6.2	2.7
Rock climbing	3.7	7.5	4.0	1.8
Off-road driving	13.9	27.9	17.4	7.6
Horseback riding	7.1	14.3	10.1	4.4
Viewing activities	76.2	152.6	90.5	39.7
Visiting a nature center	46.4	93.1	56.8	24.9
Visiting a visitor center	34.6	69.4	42.2	18.5
Visiting a prehistoric site	17.4	34.9	19.6	8.6
Visiting a historic site	44.1	88.4	51.7	22.7
Bird watching	27.0	54.1	31.0	13.6
Wildlife viewing	31.2	62.6	36.8	16.2
Fish viewing	13.7	27.4	15.0	6.6
Sightseeing	56.6	113.4	67.0	29.4
Visit beach or waterside	62.1	124.4	69.8	30.6
Water-based nature study	27.6	55.4	28.5	12.5
Camping	26.3	52.8	31.3	13.7
Developed area	20.7	41.5	24.4	10.7
Developed area (vehicle)	8.6	17.2	9.9	4.3
Developed area (tent)	14.7	29.4	17.2	7.6
Primitive area	14.0	28.0	17.2	7.6
Primitive area (vehicle)	3.5	7.0	4.0	1.8
Primitive area (tent)	10.7	21.4	13.4	5.9
Hunting	9.3	18.6	14.0	6.1
Big game hunting	7.1	14.2	10.1	4.4
Small game hunting	6.5	13.0	10.3	4.5
Migratory bird	2.1	4.3	3.3	1.4
Fishing	28.9	57.8	39.3	17.3
Fresh water	24.4	48.8	35.6	15.6
Warm water	20.4	40.8	33.3	14.6
Cold water	10.4	20.8	8.1	3.6
Catch and release	7.7	15.5	11.5	5.0
Boating	29.0	68.1	35.2	15.5
Sailing	4.8	9.6	3.4	1.5
Canoeing	7.0	14.1	8.2	3.6
Kayaking	1.3	2.6	1.0	0.4
Rowing	4.2	8.4	3.1	1.4
Floating, rafting	7.6	15.2	9.0	4.0
Motor boating	23.5	47.0	30.2	13.3
Swimming (lake, river, ocean)	39.0	78.1	42.8	18.8
Social activities (picnicking)	49.1	98.3	57.1	25.1
Fitness activities (e.g., biking)	28.7	57.4	31.2	13.7

^a Summary categories, e.g., fishing, do not equal total of individual activities because many people participate in more than one activity and summaries also include activities not listed (e.g., salt-water fishing) that do not occur in the Assessment area.

^b See “Glossary of Terms” for a definition of draw area.

Table 5.17—Average number of trips per participant per year in the Nation and the draw area by activity

Activity	Nation	Draw area ^a
Outdoor adventure		
Hiking	9.1	7.9
Orienteering	—	—
Backpacking	4.5	3.8
Rock climbing	3.5	1.9
Off-road driving	13.2	13.7
Horseback riding	8.7	5.9
Viewing activities		
Visiting a nature center	3.5	—
Visiting a visitor center	—	—
Visiting a prehistoric site	2.8	4.1
Visiting a historic site	3.0	3.2
Bird watching	7.1	8.4
Wildlife viewing	10.7	11.6
Fish viewing	—	—
Sightseeing	9.1	10.1
Visiting a beach or waterside	11.6	9.1
Water-based nature study	5.8	5.3
Camping		
Developed area	4.7	5.2
Developed area (vehicle)	—	—
Developed area (tent)	—	—
Primitive area	4.8	6.4
Hunting		
Big game	8.1	9.1
Small game	8.8	7.8
Migratory bird	5.7	4.8
Fishing		
Fresh water	12.4	13.7
Warm water	11.9	13.8
Cold water	7.7	5.2
Catch and release	—	—
Boating	5.0	—
Canoeing	2.8	2.2
Kayaking	3.0	3.7
Rowing	2.3	1.7
Floating, rafting	3.1	3.8
Motor boating	7.3	8.0
Swimming (lake, river, ocean)	6.9	5.4
Social activities (picnicking)	5.3	4.8
Fitness activities (biking)	9.6	8.8

— = not available.

^a See the “Glossary of Terms” for a definition of draw area.

Participation in activities by residents of the draw area does not necessarily occur solely within the draw area.

Source: Cordell and others (1997a, b).

Table 5.18—Annual average number of participation days^a (per participant) in selected recreation activities by U.S. and draw area residents

Activity	Nation	Draw area ^b
Outdoor adventure		
Hiking	16.8	19.4
Orienteering	6.3	4.1
Backpacking	8.6	6.7
Rock climbing	5.1	4.4
Off-road driving	24.6	23.8
Horseback riding	23.6	18.2
Viewing activities		
Visiting nature center	—	—
Visiting visitor center	—	—
Visiting a prehistoric site	5.0	7.7
Visiting a historic site	5.5	5.5
Bird watching	87.8	92.7
Wildlife viewing	36.9	36.7
Fish viewing	—	20.3
Sightseeing	18.0	16.9
Visit a beach or waterside	25.6	18.8
Water-based nature study	24.4	21.1
Camping		
Developed area	10.7	9.8
Developed area (vehicle)	—	—
Developed area (tent)	—	—
Primitive area	9.2	10.6
Hunting		
Big game	14.3	12.6
Small game	13.8	11.2
Migratory bird	7.8	6.0
Fishing		
Fresh water	18.1	20.8
Warm water	17.8	21.1
Cold water	11.3	9.1
Catch and release	18.4	18.5
Boating		
Sailing	—	—
Canoeing	5.4	3.2
Kayaking	8.0	8.7
Rowing	5.3	3.9
Floating, rafting	5.1	5.8
Motor boating	14.9	17.7
Swimming (lake, river, ocean)	15.9	12.1
Social activities (picnicking)	8.8	8.7
Fitness activities (biking)	39.0	37.5

— = not available.

^a Average number of days a person participated in a particular activity for any length of time over the 12-month survey period.

^b See the “Glossary of Terms” for a definition of draw area.

Participation in activities by residents of the draw area does not necessarily occur solely within the draw area.

Source: Cordell and others (1997a, b)

Table 5.19—Estimated number of draw area residents^a 16 years of age and older participating in recreation activities, rate of participation, and total days of participation per year by activity

Activity	Participants	Participation rate ^b	Average total participation
	<i>Millions</i>	<i>Days/year</i>	<i>Days/year</i>
Outdoor adventure			
Hiking	10.3	19.4	199.8
Orienteering	1.0	4.1	4.1
Backpacking	2.7	6.7	18.1
Rock climbing	1.8	4.4	7.9
Off-road driving	7.6	23.8	180.9
Horseback riding	4.4	18.2	80.1
Viewing activities			
Visiting a nature center	24.9	—	—
Visiting a visitor center	18.5	—	—
Visiting a prehistoric site	8.6	7.7	66.2
Visiting a historic site	22.7	5.5	124.9
Bird watching	13.6	92.7	1,260.7
Wildlife viewing	16.2	36.7	594.5
Fish viewing	6.6	20.3	134.0
Sightseeing	29.4	16.9	496.9
Visit a beach or waterside	30.6	18.8	575.3
Water-based nature study	12.5	21.1	263.8
Camping			
Developed area	10.7	9.8	104.9
Developed area (vehicle)	4.3	—	—
Developed area (tent)	7.6	—	—
Primitive area	7.6	10.6	80.6
Primitive area (vehicle)	1.8	—	—
Primitive area (tent)	5.9	—	—
Hunting			
Big game hunting	4.4	12.6	55.4
Small game hunting	4.5	11.2	50.4
Migratory bird	1.4	6.0	8.4
Fishing			
Fresh water	15.6	20.8	324.5
Warm water	14.6	21.1	308.1
Cold water	3.6	9.1	32.8
Catch and release	5.0	18.5	92.5
Boating			
Sailing	1.5	—	—
Canoeing	3.6	3.2	11.5
Kayaking	0.4	8.7	—
Rowing	1.4	3.9	5.5
Floating, rafting	4.0	5.8	23.2
Motor boating	13.3	17.7	235.4
Swimming (lake, river, ocean)	18.8	12.1	227.5
Social activities (picnicking)	25.1	8.7	218.4
Fitness activities (biking)	13.7	37.5	513.8
Total (all activities)	NA	NA	6,300.1

— = not available; NA = not applicable.

^a See the “Glossary of Terms” for a definition of draw area. Participation in activities by residents of the draw area does not necessarily occur solely within the draw area.

^b Participation rate is the average number of days a person participated in a particular activity for any length of time over the 12-month survey period.

Source: Cordell and others (1997a, b).

Bird watching, with nearly 1.3 billion participation days per year stands out as an activity of great importance to draw area residents. Other important activities range from fishing (758 million participation days) to horseback riding (80 million participation days).

The Highlands' national forests have few large water bodies compared to some other public lands, but the area does have a large land base, an extensive road and trail network, and primitive campgrounds. Because of these differences, these national forests experience a slightly different mix of recreational uses than is indicated by the participation rates of the overall draw area residents. National forest participation estimates are not directly comparable to the draw area estimates because activity definitions and measures of participation are somewhat different. However, participation data for both national forests and residents of the draw area provide an idea of the different mix and relative importance of the various recreational activities. The tabulation below compares the most popular activities of residents of the draw area (based on total participation days) with the most popular activities taking place on national forests (as measured by total RVD's). Only those activities are compared that fall into roughly similar categories in the data bases of both the draw area and the national forests. The 12 most popular outdoor recreation activities in terms of total amount of participation days or RVD's, listed in order of popularity from most to least, are (see tables 5.19 and 5.20) as follows:

Draw area	National forests
Bird watching	Sightseeing
Fishing	Camping
Wildlife and fish viewing	Hunting
Biking	Fishing
Sightseeing	Hiking
Water-based nature study	Swimming
Motor boating	Picnicking
Swimming	Horseback riding
Picnicking	Canoeing
Hiking	Power boat use
Visiting historic or prehistoric sites	Nature study
Camping	Other watercraft use

This comparison shows that camping, hunting, hiking, horseback riding, and canoeing rank proportionally higher in relative amount of participation among users of national forests than among the population of the draw area as a whole. For the entire draw area, nature study activities (including bird watching, wildlife and fish viewing, and water-based nature study) and biking rank higher than similar activities on national forests. Fishing and sightseeing are high in relative participation for both the draw area participants and national forest users. Several activity categories with high participation were not comparable. Gathering forest products and traveling by motor cycle are very popular activities on national forests; visiting a beach or waterside rate relatively high in total participation among draw area participants.

Participation, in terms of percent change, in nearly all activities increased on national forests during the last decade, with the most dramatic increases occurring in bicycling (most likely mountain biking), horseback riding, and the use of ORV's (table 5.20). The Arkansas SCORP (Turner 1995) identified similar increases in these three activities, noting that Arkansas has the second highest per capita ownership of ORV's in the Nation. Although ORV use is relatively small compared to other activities, the vehicles have the potential to cause resource damage and conflict with other forest users if not managed appropriately. In fact, ORV use has increased so much in recent years on some areas of national forests (such as the southern part of the Ouachita NF) that user conflicts and resource damage are becoming severe. The limited funds for creating new trail systems coupled with increased horseback riding, mountain biking, and ORV use emphasize the need for agencies to work with the public to develop policies and shared goals that accommodate use while protecting forest resources.

Recreational overuse within some river corridors of the Highlands is a growing problem. The Arkansas SCORP (Turner 1995) identified this as a leading issue. The Spring River and Little Missouri River are examples of areas where excessive use by floaters (e.g., people using canoes or rafts), riverside campers, and/or ORV operators have adversely affected the very attributes that make these rivers attractive. Problems associated with recreational overuse are expected to become worse as recreation demands increase and may

Table 5.20—Estimates of recreation use in Highlands’ national forests for 1986, 1991, and 1996 and percent change from 1986 through 1996

	Recreation visitor days ^a			Change
	1986	1991	1996	(1986–96)
	<i>Percent</i>			
Hiking and mountain climbing	186,600	210,400	257,000	38
Horseback riding	68,800	86,700	170,400	148
Specialized landcraft travel (includes off-road vehicles) ^b	900	10,900	19,200	2,033
Biking	5,800	9,500	19,800	241
Total outdoor adventure	262,100	317,500	466,400	78
Viewing spectator events	8,100	8,900	15,300	89
Viewing interpretive signs, exhibits, constructed features	10,900	20,200	20,200	85
Nature study (wildlife, birds, fish), hobby, education	33,500	70,700	73,500	119
Attending talks, programs, and audio programs	4,300	7,000	8,600	100
Viewing scenery	90,300	141,400	160,500	78
Touring, guided and unguided	12,400	32,500	32,400	161
Automobile travel	738,800	794,600	873,700	18
Motorcycle travel	115,100	147,800	141,300	23
Touring by train, bus, and boat	1,400	17,600	22,300	1,493
Total viewing activities	1,014,800	1,240,700	1,347,800	33
Camping, general day	255,300	272,300	304,200 ^c	19
Camping, automobile	108,900	105,600	105,500	-3
Camping, trailer	147,100	155,400	185,800	26
Camping, tent	268,400	266,200	280,600	5
Organization camping, general day and night	13,500	19,200	34,700	157
Total camping	793,200	818,700	910,800	15
Hunting, big game	412,400	420,300	431,600	5
Hunting, small game	302,600	305,900	297,500	-2
Hunting, upland birds	94,400	100,700	105,600	12
Hunting, waterfowl	17,000	14,100	16,900	-1
Total hunting	826,400	841,000	851,600	3
Fishing, cold water	20,900	21,800	23,500	12
Fishing, warm water	224,780 ^d	214,700	241,800	8
Total fishing	245,680	236,500	265,300	8
Canoeing	123,200	124,100	170,000	38
Sailing	2,400	400	400	-83
Power boat	119,200	56,800	78,900	-34
Other watercraft	30,000	25,700	27,900	-7
Total boating	274,800	207,000	277,200	1
Swimming and water play	240,000	171,700	251,900	5
Water-skiing, diving, and other water sports	21,500	6,400	7,200	-67
Total water sports	261,500	178,100	259,100	-1
Social activities (e.g., picnicking)	197,700	181,100	219,600	11
Resort and community public service, general	1,500	5,000	4,700	213
Resort lodging and recreation cabin use	9,000	9,400	13,500	50
Walking, guided and unguided	22,100	14,600	16,200	-27
Sports and games	22,700	28,400	36,900	63
General information	4,800	9,400	14,600	204
Gathering forest products	117,400	121,700	127,700	9
Total recreation activities	4,221,500	4,209,100	4,811,400	14

^a A recreation visitor day (RVD) is the equivalent of 12 hours of participation in one activity by one person.

^b While there has been a large increase, the amount is inflated due to changes in reporting methods.

^c Does not include an estimated 300,000 RVD's of camping (included in forest use reports) by a large organization on the Mark Twain National Forest in 1996 because this major event was not representative of typical use.

^d The value provided reflects an adjustment to the reported 1986 estimate of participation in warm water fishing on the Ouachita NF. This adjustment allows for a change between 1986 and 1991 in estimation procedures and to make the value comparable with estimates for later years.

point to the need to strengthen public land management policies and education programs to ensure long-term protection of river values.

Recreational use of national forest wilderness areas in the Highlands has increased from approximately 94,000 RVD's in 1991 to 99,000 RVD's in 1996, about a 5 percent increase over a period of 5 years. Hiking, horseback riding, nature study, photography, and primitive camping are the most popular recreational activities in these areas. The relative unfamiliarity of the public with wilderness areas probably kept use from growing more rapidly (Cordell and others 1997b).

Data from the wildlife management agencies of the three States in the Assessment area indicate that, between 1986 and 1996, with some annual variations, the number of people buying hunting licenses increased slightly in Arkansas and Oklahoma and remained about level in Missouri (Sebren 1997, OK DWC 1997, Witter 1998, MO DC 1996a). Hunting has also increased slightly on the national forests (table 5.20). The 10-year trend in national forest hunting varies among forests; there were increases on the Ozark and Ouachita National Forests and a decrease on the Mark Twain National Forest (individual forest data not shown on table). If the trend to restrict public access to private land continues, more hunting pressure can be expected on public lands, and particularly on the national forests.

Forest Service data indicate an increase in the number of people fishing between 1986 and 1996 on the Highlands' national forests (table 5.20). Data from the Arkansas Game and Fish Commission indicate a slight decline in the number of people buying fishing licenses between 1986 and 1996—both statewide and for counties in the Assessment area. For the same time period, statewide data for Missouri and Oklahoma indicate that fishing license sales have leveled in recent years, although annual fluctuations have been significant.

Projections of Future Recreation Demand

The Social-Economic Team analyzed projections of changes in recreation participation by residents of the North and South RPA regions and for the Nation as a whole (table 5.21). At the time the Assessment reports were prepared, there were no available projection data specifically for residents of the Highlands draw

area. However, because the draw area is located largely within the North and South RPA regions, the team assumed that projections for the Highlands draw area would fall within the range of the two regional estimates.

Nationally, recreation use is projected to increase in nearly all activity categories. The largest projected increases are for activities involving visiting historic sites (14 percent), sightseeing (18 percent), visiting beaches or other water sites (15 percent) and biking (15 percent). Results of the NSRE show that, for the Nation as a whole, the number of people participating in outdoor recreation is increasing due both to a growing population and to an increase in the percentage of the population participating in activities (Cordell and others 1997a, Bowker and others 1999).

For the South Region, participation in most activities is projected to increase significantly more than the Nation as a whole and/or the northern region. The activities in the South Region with the largest projected percent increase by the year 2010 are visiting historic sites (28 percent), sightseeing (25 percent), developed camping (22 percent), picnicking (21 percent), and visiting beaches or other water sites (20 percent). The activities in the North Region with the greatest projected percent increase in participation are picnicking (21 percent), visiting beaches or other water sites (20 percent), visiting historic sites (13 percent), developed camping (11 percent), and biking (10 percent).

Activities showing slight decreases in number of participants by the year 2010 in both regions are hunting, primitive camping, and off-road driving. In the North Region, rock climbing, backpacking, and floating/rafting are also projected to decline slightly. These projected declines may be a reflection of a projected increase in the average age of the population.

These projections provide estimates of general trends over a large geographic area. While participation in most activities is projected to increase, some specific sites and areas will experience a greater increase in use than others will. The greater increase in activity and popularity could be the result of factors such as (1) limited opportunities on private land, (2) improved road access into an area, (3) a news article or brochure that raises the level of public awareness of an area, (4) significantly increased interest in a particular activity, or (5) an improvement to public recreation facilities. As

Table 5.21—1995 participation rates and projected changes in participation rates for recreation activities for the years 2000 and 2010, for RPA regions, the Nation, and the draw area

Activity	Area ^a	Million participants	Change index/year ^b		Activity	Area ^a	Million participants	Change index/year ^b	
			2000	2010				2000	2010
Biking	North	27.9	1.01	1.10	Developed camping	North	18.0	0.98	1.11
	South	15.2	1.07	1.22		South	10.7	1.06	1.22
	National	57.4	1.04	1.15		National	41.5	1.02	1.12
	Draw area	13.7				Draw area	10.7		
Hiking	North	20.6	0.99	1.04	Primitive camping	North	10.9	0.96	0.92
	South	11.3	1.05	1.17		South	8.0	0.98	0.98
	National	47.8	1.03	1.13		National	28.0	1.00	1.01
	Draw area	10.3				Draw area	7.6		
Backpacking	North	6.0	0.96	0.93	Hunting	North	8.4	0.98	0.97
	South	3.6	1.01	1.08		South	6.5	0.93	0.82
	National	15.2	1.00	1.04		National	18.6	0.97	0.93
	Draw area	2.7				Draw area	6.1		
Rock climbing	North	3.0	0.96	0.91	Fishing	North	25.6	1.00	1.05
	South	1.8	1.06	1.19		South	20.2	1.04	1.11
	National	7.5	1.03	1.10		National	57.9	1.03	1.09
	Draw area	1.8				Draw area	17.3		
Off-road driving	North	11.2	0.99	0.99	Canoeing	North	8.0	1.00	1.06
	South	9.0	1.00	0.99		South	4.2	1.03	1.07
	National	27.9	1.00	1.02		National	14.1	1.02	1.08
	Draw area	7.6				Draw area	3.6		
Horseback riding	North	5.6	1.00	1.07	Floating/rafting	North	6.9	0.97	0.94
	South	4.7	1.04	1.15		South	4.9	1.01	1.01
	National	14.3	1.02	1.12		National	15.2	1.00	1.02
	Draw area	4.4				Draw area	4		
Visiting historic sites	North	40.8	1.02	1.13	Motor boating	North	22.0	1.01	1.06
	South	26.9	1.08	1.28		South	15.5	1.04	1.13
	National	88.4	1.06	1.19		National	47.0	1.03	1.11
	Draw area	22.7				Draw area	13.3		
Sightseeing	North	52.3	1.02	1.11	Swimming	North	38.4	1.01	1.08
	South	33.9	1.08	1.25		South	23.3	1.05	1.15
	National	113.4	1.05	1.18		National	78.1	1.03	1.12
	Draw area	29.4				Draw area	18.8		
Visiting beach or other water sites	North	57.7	1.01	1.20	Picnicking	North	47.0	1.01	1.21
	South	37.7	1.07	1.20		South	27.4	1.06	1.21
	National	124.4	1.05	1.15		National	98.3	1.04	1.14
	Draw area	30.6				Draw area	25.1		

^a Projections are not available for the draw area; draw area participation numbers for 1995 are shown for comparison.

^b Projected increases or decreases in participation by the year 2000 and 2010; for example, an index of 1.10 implies a 10 percent increase in the number of people participating in that activity.

Source: Cordell and others (1997a).

described in the discussion of recreation settings, a recreation user looks for certain combinations of natural settings and facilities to elevate the enjoyment level of the experience. For many activities, such as rock climbing, off-road driving, and horseback riding, there are limited numbers of areas with the desired settings. This puts more demand on those areas where the opportunities are available, such as national forests.

A good example of how recreation elements combine to attract heavy use is the area between the Little Missouri and Cossatot Rivers on the Ouachita National Forest. This area contains a number of scenic elements: clear-flowing streams, high ridgelines and rugged topography, rock outcrops, and vegetation patterns with interesting contrasts in form, color, and texture—all in a natural setting relatively free from the influence of human civilization. There are a number of public recreation facilities in the area, including the Albert Pike, Bard Springs, and Shady Lake Campgrounds, the Little Missouri Falls Picnic Area, and the Cossatot River State Park. Numerous streamside areas are used for dispersed camping—one inventory on the Caddo Ranger District found over 96 dispersed campsites along 6 streams. There are more than 115 mi of trails popular for hiking, horseback riding, and ORV's, some of which receive the highest use of any trails on the Ouachita National Forest. This area is one of the few blocks of public land available within an easy day's drive of the Dallas-Fort Worth area, northeastern Texas and northern Louisiana. The combination of location, desirable settings, and facilities makes the area between the Little Missouri and Cossatot Rivers one of the most heavily used recreation areas in the Ouachitas. Heavy dispersed camping near streams has resulted in compacted soils, loss of vegetative cover, increased soil erosion and stream sedimentation. High levels of ORV use have caused some horseback riders to move to other trails; for example, use of the Caney Creek Wilderness trail system by horseback riders increased noticeably in 1997 (Ferguson 1997). This area on the Ouachita National Forest is illustrative of situations on the other national forests and public lands in general where the impacts on natural resources and management of recreation use will be especially significant as recreation use increases in the coming decades.

Implications and Opportunities

Current trends indicate that in the next decade, public land management agencies will be challenged to accommodate a rising demand for outdoor recreation with a limited resource base and limited (if not declining) budgets. The needs will be most evident in those recreation areas requiring capital investment for their maintenance and repair, such as campgrounds, picnic areas, and trails. The effects of increased demand will be more severe in areas such as the Little Missouri River watershed, described above, where the rise in use is likely to be greater than average. Addressing this issue will require creativity, developing partnerships with interest groups, and greater emphasis on coordinating and sharing resources among agencies. Land managers will need to consider a variety of options for stretching and more efficiently allocating available funds, including greater involvement of the private sector in operating public facilities through concessions, special-use permits, and public-private ventures. Establishing user fees for activities and uses of public lands that have traditionally been free may be appropriate in some situations to help offset the costs of providing the recreation opportunities. Difficult decisions may have to be made concerning whether or not some recreation areas that have been in place for many years can remain open and be maintained at acceptable levels.

National forests account for only a small percentage (6 percent) of the public developed campsites in the Highlands but provide a high percentage of the dispersed recreation opportunities, including 63 percent of the total miles of trails. This situation ought to be considered in deciding what recreation program areas to emphasize and what the appropriate recreation "market" niche should be for the Highlands' national forests.

Most developed recreation facilities do not meet minimum accessibility requirements for people with disabilities. Facility managers will need to address this shortcoming in all opportunities for recreation site improvement.

The current increase in demand for horseback riding, mountain biking, and ORV trails, added to a rising demand for traditional hiking trails, means that land managers must work with the public to develop trail management plans that minimize user conflicts and

existing resource impacts. Since limited funding makes significant additions to the current trail system unlikely, managers will need to pursue other means to address the demand, including allocating more trails to multiple use, prioritizing trail maintenance, closing little used trails, and sharing more trail maintenance responsibility with user groups. Coalitions (if formed) of trail user groups could be helpful in resolving trail management issues, with public land managers working as facilitators as well as partners in implementing solutions.

The recent addition of sections of the Glover, Mountain Fork, and Little Missouri Rivers to the Ouachita National Forest through a land exchange is significant. Sections of these rivers are considered to be free flowing and are included on the NRI. Forest Service managers will need to evaluate these stretches of river to determine their eligibility and suitability for inclusion in the NWSRS.

Excessive recreation activity, particularly ORV riding and dispersed camping in river corridors has resulted in serious resource damage and user conflicts in some areas. Managers will need to work in partnership with the public and user groups to develop management policies and education programs to alleviate these problems and strengthen resource protection measures.

Maintaining and enhancing the scenic quality of the Highlands' landscape will take on greater importance as the number of people visiting scenic and historic areas increases. These are the recreation activities projected to increase the most and are popular tourist activities. Scenic quality is especially critical within the viewing area of the most heavily traveled roads and those roads known for their scenic character, such as the Federal and State scenic byways. (Both public and private lands affect the scenic quality of the area's landscapes.)

The projected increase in number of people sightseeing, visiting historic sites, and studying nature emphasizes the importance of maintaining the road

system in good condition, providing easily accessible sites for historic and environmental interpretation, and making more information available to the public about the recreation opportunities in the Highlands.

Ecotourism provides one means of helping a community diversify its economic base. If both demand for this type of recreation and economic development increase, public land agencies are likely to be called upon to support these efforts by permitting use of the lands for guided hikes, interpretive programs, and other ecotourist activities.

Access to private land is declining while demand for outdoor recreation opportunities is projected to rise. Greater pressure will be placed on public lands to provide places for recreation due to the decline in open private land as well as the overall increase in demand. Where public and private lands are adjacent and management goals are complementary, there may be opportunities, such as through joint road management, shared law enforcement, combined user fees, or other cooperative agreements, for public and private partnerships to allow users wider access for recreation.

A variety of Federal and State agencies play large roles in the recreation and tourism business of the Highlands. They have similar missions for providing quality outdoor recreation opportunities, they face common challenges in managing outdoor recreation use of public lands, and they share many of the same customers. In spite of these commonalities, there is little, if any, coordination among the agencies for land use planning, sharing of staff and equipment, exchanging technological information, responding to regional issues, or marketing. Opportunities exist for improving coordination and communication among public land management agencies that could result in more efficient use of available resources, leveraging of limited funds, expanded partnerships with user groups, more effectively addressing common issues, and better promotion of the region's recreational opportunities.

Chapter 6: Timber Resources

Question 6.1: What are the supply and demand conditions for timber in the Highlands?

The timber resource plays significant roles in the economy and culture of the Highlands. These roles have changed over the years in response to changes in the timber resource itself, in the market demand for wood products, and in societal values. For example, the harvest of large diameter pine sawtimber played a dominant role in the timber industry of the early years of this century. Today, the increasing role of small diameter hardwoods for export markets is the subject of much public controversy.

This chapter describes the timber market through a discussion of the prices and production of various wood products and the factors that influence supply and demand. In addition, a model of timber supply provides projections of future inventory, growth, and harvest in the Highlands within the context of the southwide timber markets for hardwoods and softwoods. (The term southwide as used here means including or affecting all the Southern States of the United States.)

Key Findings

1. The Highlands Assessment area contains 12 percent of the South's timberland, but only 5 percent of southern softwood volume and 9 percent of southern hardwood volume. However, relatively low removals rates (3 percent of southern softwood and 6 percent of southern hardwood removals) will continue to attract new and expanded wood-using industries to the area.
2. Largely due to the decline in timber harvests from western forests, national forest timber sold in the Highlands represents an increasing percentage of total U.S. national forest timber sales. Between 1991 and 1995, the Highlands' share of total national forest "green" timber sales increased from 3 percent to 10 percent.
3. In general, inflation-adjusted prices for Highlands' timber rose between 1988 and 1994, implying an increasing scarcity of timber resources.
4. National forests account for 41 percent of softwood sawtimber inventory but only 20 percent of sawtimber removals in the Assessment area. In contrast, forest industry accounts for 20 percent of softwood sawtimber inventory but 40 percent of removals.
5. Average annual timber sale volume per suitable acre varies by national forest ranger district, with Ouachita districts generally higher than the districts on the Ozark and Mark Twain National Forests.
6. Nonindustrial private forest (NIPF) landowners hold 69 percent of the timberland in the Highlands. National forests account for nearly 15 percent, forest industry holds almost 12 percent, and 5 percent of the timberland is located on other public lands.
7. In terms of timber volume, the forests of the Highlands are predominantly hardwoods (over 14 billion cubic feet of growing stock and over 38 billion board feet of sawtimber), although softwood volumes are substantial (about 7 billion cubic feet of growing stock and over 24 billion board feet of sawtimber). More than two-thirds of the hardwood volume occurs on NIPF lands, while softwood volume is fairly evenly distributed among timber industry, national forest, and NIPF lands.
8. Both growing stock and sawtimber inventories have increased in the Arkansas and Oklahoma portions of the Highlands over the last decade. (Comparable data for Missouri were not available.)
9. Across all subregions of the Assessment area except Oklahoma, NIPF lands have the largest proportion of higher grade hardwoods relative to the other ownership categories while the national forests have the greatest share of the higher grade softwood sawtimber volume in comparison to other ownership categories.
10. Sawtimber-size stands account for 58 percent of national forest timberlands in the Assessment area and from 28 to 48 percent of timberlands in other ownership categories.
11. The majority (64 percent) of large diameter (greater than 20 inches diameter at breast height (d.b.h.)) hardwood volume occurs on NIPF lands. Most of the large diameter softwood volume occurs on NIPF (42 percent) and national forest (38 percent) lands.

12. Up to 15 percent of the potentially harvestable volume of timber on private land may be unavailable due to physical constraints such as wet sites, steep slopes, and low volumes.
13. On the three national forests, from 59 to 79 percent of the land is classified as suitable for timber production based on current suitability definitions, which exclude acres for wilderness, administrative sites, areas of low productivity, and areas allocated to other resource management categories.
14. The three Highlands' States increased their share of total U.S. lumber production from 5.5 percent to 6.8 percent between 1992 and 1995. Since 1988, these three States also claimed an increasing proportion of U.S. investments in the furniture and lumber industries.
15. New hardwood chip mills have recently led to increased hardwood pulpwood removals—a 135 percent increase between 1994 and 1995—particularly in Arkansas. Due to fluctuating demand over the preceding decade, the overall percentage increase in average annual removals since 1988 was 65 percent. These increases should lead to higher prices, providing income to local landowners, but possibly forcing other competing industries to pay more or seek alternate input sources.
16. Favorable growth to removal ratios indicate that softwood inventory in the Highlands is increasing. Projections to 2020 show increasing softwood harvest on private lands in the Highlands—more than double the rate experienced in 1990. Total softwood harvests in the Highlands are projected to increase at rates greater than the South as a whole.
17. The currently favorable growth-to-removal ratio for hardwoods in the Highlands is projected to narrow and be about equal by 2020 as growth remains stable and removals increase. Nonetheless, by 2020 hardwood inventory is still projected to be greater than current levels.

Data Sources and Methods of Analysis

Several Federal and State sources provided data for this analysis. Data on timber inventories were taken from the Forest Inventory and Analysis (FIA) program of the USDA Forest Service, which conducts periodic surveys of timber resources in every State. (For more information on the FIA, see the homepage at <http://www.srsfia.usfs.msstate.edu/wo/wofia.htm>.) Recent surveys were conducted in Oklahoma in 1986 and 1993, in Arkansas in 1988 and 1995, and in Missouri in 1989 (USDA FS FIA 1997, Hahn and Spencer 1991, Miller and others 1993, London 1997). (The Social-Economic Team deemed a 1972 survey of Missouri too out of date for this analysis.) These surveys provided measures of timber volume, growth, mortality, and removals. Removals data also are provided by the annual pulpwood reports (Hackett and Smith 1990; Hackett 1992; Hackett and Piva 1993, 1994; Piva 1995, 1996, 1997; Howell 1993; Miller 1994; Howell and Hartsell 1995; Johnson and Howell 1996; Johnson and Steppleton 1996), timber product output reports for Missouri (Piva and Jones 1997, Smith and Jones 1990) and severance tax data for Arkansas (Levins 1997).

Growing stock and sawtimber removals data represent harvests from the land (not receipts at the mill) and cultural treatments such as timber stand improvement, land clearing, or changes in land use. Pulpwood removals are measured in cords and represent roundwood (not wood residues) processed at the mill. These data were derived from different sources and methods and thus the conclusions drawn from them may not always agree. For example, the periodic FIA surveys collect the growing stock and sawtimber removals data, while the pulpwood data are collected annually by mill survey; the removals data for the State of Arkansas severance tax are collected annually by mill (in tons). The differences between volumes reported removed from the forest and received at the mill derive in part from logging waste and residue and, in part, from different types of measurements. These differences will change over time as harvesting and measurement technologies improve.

The Team used data on investments, production, and value added for the wood products industries from various Bureau of the Census reports: *Current Industrial Reports (MA24T)* (USDC BC 1987–1996), *Annual*

Survey of Manufactures (USDC BC 1988–1996), and the *Census of Manufactures* (USDC BC 1988, 1993). (The term “value added” represents the sum of all income derived from the industry, including wage and owner income, less indirect business taxes.) Data on national forests came from the Mark Twain *Annual Reports* (USDA FS MTNF 1987–1996), the Ouachita National Forest *Annual Reports* (USDA FS ONF 1987–1996), the Ozark National Forest *Annual Reports* (USDA FS OZ-SFNF 1987–1996), and personal communications (Nolan 1997).

Projections made for this analysis used the Subregional Timber Supply (SRTS) model developed by Robert C. Abt at North Carolina State University (Abt 1998). This model of timber supply and demand uses data from the FIA surveys and the 1993 Renewable Resources Planning Act (RPA) National Timber Assessment Update (Haynes and others 1995).

Timberland, as defined by the FIA, is forested land that (1) is capable of producing 20 cubic feet per acre per year and (2) has not been withdrawn from timber production. Standing merchantable timber volume, given in cubic feet, is referred to as growing stock, which includes all live trees greater than 5 inches (in.) in diameter at breast height (d.b.h.). Larger diameter stems form a subset of growing stock, measured in board feet, called sawtimber, which consists of all trees greater than 11 in. d.b.h. Smaller diameter products such as roundwood or pulpwood (which are measured in tons or cords) are used for chips or pulp production.

This analysis uses four broad ownership categories: (1) national forests; (2) other public lands—all Federal, State, and local government timberlands other than national forests; (3) forest industry owners—those that own, in addition to forest lands, a processing plant or mill; and (4) the largest ownership category—nonindustrial private forest (NIPF) owners, including farmers, corporations, and other nonindustrial forest landowners.

The Social-Economic Team subdivided the Highlands into four timber subregions for this analysis (fig. 6.1). The boundaries of these subregions follow county and State lines and are somewhat similar to the national forest timber market zones (see Chapter 4, fig. 4.7) and the FIA survey unit boundaries. (Market zones consist of counties with mills that purchase timber from the respective national forests.) Survey units are based on physiographic provinces and State boundaries. The Missouri



Figure 6.1—Timber subregions of the Highlands.

Ozarks form the northernmost subregion and the Arkansas Ozarks and Arkansas Ouachitas form the middle and southeastern subregions for this study. Oklahoma is designated here as a single subregion because its forested area is small relative to the other subregions.

Overview of the Timber Resource

The character of the forests of the Highlands differs significantly from the south to the north (see Chapter 5, fig. 5.3). The southernmost area—the Ouachita Mountains—is dominated by pine forests. As one moves north, the frequency and cover of upland hardwoods (e.g., oaks, hickories) increase. North of the Arkansas River, the forest consists predominantly of hardwoods. The Arkansas Ozarks have yielded substantial hardwood sawtimber harvests and recent increases in hardwood pulpwood harvests for chip exports. The Missouri Ozarks consist of hardwood forests predominantly, but a small amount of softwood production occurs on the Mark Twain National Forest and on NIPF lands. There is little pulpwood production at present, but the opening of a hardwood chip mill in Van Buren, MO, in 1998 may lead to increases in pulpwood harvest in this area (Vaughn 1997).

The following discussion focuses on the markets for timber products. The Highlands area is part of a larger market and must be considered in the context of southwide timber markets that are, in turn, part of national and international markets. The price and production trends observed in the area show this connection to the larger market. The Assessment area is at the northern and western edge of the primary timber-producing areas of the South. For this analysis, the South includes Virginia, North Carolina, South Carolina, Florida, Georgia, Alabama, Tennessee, Mississippi, Louisiana, Texas, Oklahoma, Arkansas, and southern Missouri.

The Highlands contain 12 percent of the South's timberland but only 5 percent of the softwood inventory and 9 percent of the hardwood inventory. The Highlands' share of the total southern timber harvest is even smaller, with 3 percent of southern softwood removals and 6 percent of hardwood removals. The low removals relative to inventory and land may have attracted new hardwood-using industries (e.g., hardwood chip mills) to the Highlands.

In contrast to the region's relatively small role in Southern timber production, Highlands' timber is very important to local economies (see Chapter 4). Moreover, the Highlands' national forests represent an increasing percentage of total U.S. timber sales from national forests (fig. 6.2). Prior to 1991, the Ozark-St. Francis, Ouachita, and Mark Twain National Forests provided about 3 percent of the total "green" (non-salvage) national forest timber harvest. Since 1991, the relative percentages of timber offered, sold, and cut on these three national forests have increased (as the harvests from western national forests have decreased), even though their harvest levels have not risen above historical levels. In the mid-1990's, the volume of green timber offered for sale by these three forests was approximately 10 percent of the U.S. total for national forests. The total timber volume (including salvage) cut and sold on the Highlands' national forests was slightly more than 6 percent of the U.S. national forest total.

This chapter describes the market through the prices and production of various timber products and discusses the factors that influence supply and demand. The effects of these components on timber markets are

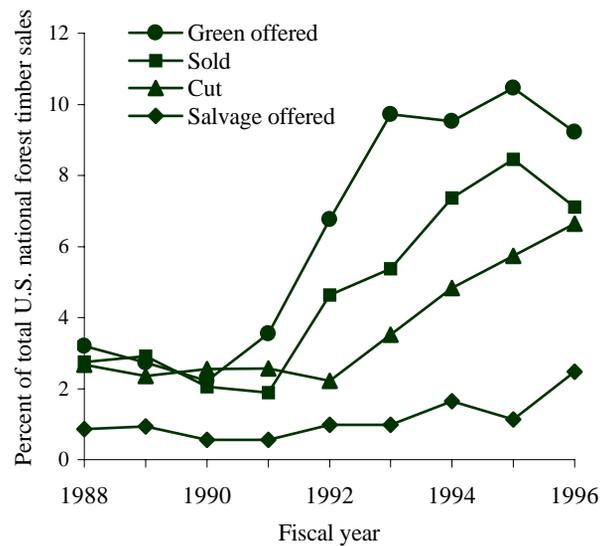


Figure 6.2—Highlands' national forest timber sales as a percentage of U.S. national forest timber offered, sold, and cut, 1988 through 1996.

well established in economic theory, and general conclusions are possible even without a complete statistical analysis. In addition, the SRTS model provided information on future harvest, growth, and inventory in subregions of the South within the context of the southwide market situation.

Market Outcomes: Prices and Production

The quantity of timber supplied is the amount of timber a landowner harvests at a given time for a given price, holding all other factors (e.g., harvesting costs and landowner objectives) constant. The standing volume of timber—referred to as "inventory"—should not be confused with timber supply. Standing volume is a physical measure, while supply is the volume that is actually traded in the market. The quantity of timber demanded represents the amount of timber a mill will buy at a given price, holding all other factors (e.g., labor and machinery costs) constant. Observed prices and production represent the equilibrium outcome of the interaction of market supply and demand forces.

Prices

Typically, as a product becomes scarcer, the real price of that product will rise. This relative scarcity can result from an increase in demand, a decrease in supply, or both. Prices are analyzed in constant 1992 dollars, called “real dollars,” to eliminate the effects of inflation. Only when product prices rise at a rate greater than the rate of inflation is scarcity indicated.

Since 1988, real timber prices in the Highlands have been stable to rising. Available data are somewhat limited, and represent an average of prices paid for stumpage and delivered logs in two regions in Arkansas, two regions in Oklahoma, and one region in Missouri. Timber Mart South (Norris Foundation 1988–1996) collected data for Oklahoma (1988–1994) and Arkansas (1988–1996).

Timber prices can be expressed in the form of stumpage prices (i.e., paid by a logger to a landowner) or delivered log prices (i.e., paid by a mill to a logger). Stumpage prices are averages for the region and do not include harvesting or transportation costs; delivered

prices represent an average of stumpage plus harvest plus transport costs. Stumpage prices are lower than delivered prices.

Southwide prices for both softwood and hardwood sawtimber have risen in recent years, with the sharpest increase occurring about 1992. Sawtimber prices in the Highlands follow this general trend. For pulpwood in the Highlands and South, the prices showed marked increases in about 1988, with more stable prices after that date. The price data for Missouri were too limited to conduct statistical tests. The prices vary considerably over the period collected and do not appear to be either consistently rising or falling.

Using linear regression, the prices were regressed on a time trend to determine if significant increases or decreases occurred in Arkansas and Oklahoma over the period. Table 6.1 shows the results of this trend analysis (as average annual percentage changes in real prices). Most price categories show significant trends, ranging from 1.5 to 7.4 percent real annual increases for stumpage prices and from -2.1 to 3 percent for delivered prices. The rising real prices imply increasing

Table 6.1—Average annual changes in prices of stumpage and delivered log prices for selected Timber Mart South regions from 1988 through 1994 (Oklahoma) and 1988 through 1996 (Arkansas)^a

Price type Timber category	Southern Arkansas	Northern Arkansas	Southern Oklahoma	Northern Oklahoma
----- <i>Percent change</i> -----				
Stumpage				
Pine pulpwood	0.6	2.6*	3.0*	5.5*
Hardwood pulpwood	6.3*	7.3*	1.3	2.8*
Mixed hardwood sawtimber	-0.1	1.5*	4.9*	4.8*
Oak sawtimber	1.7*	2.5*	4.1*	4.7*
Pine sawtimber	4.1*	7.4*	6.7*	—
Delivered				
Pine pulpwood	0.1	0.3	-1.2	—
Hardwood pulpwood	1.8*	1.7*	-6.9	—
Mixed hardwood sawtimber	-1.5*	-2.1*	—	—
Oak sawtimber	-0.6	0.9*	—	—
Pine sawtimber	2.8*	3.0*	2.9*	2.8*

* = statistically significant trend (95 per cent confidence); — = not available.

^a Price data for Missouri were too limited for statistical tests.

Source: Norris Foundation (1988–1996).

scarcity. The differences in the trends for delivered and stumpage prices occur because harvest or transportation costs (or both) have fallen, perhaps due to improved technology or lower energy costs.

National forest timber prices are represented by average high bid prices for stumpage sold in that fiscal year (fig. 6.3). In general, national forest stumpage prices have risen slightly over the last decade, but most

prices fell in fiscal years 1995 and 1996. For the Ouachita National Forest, bid prices for softwood sawtimber rose from 1988 to 1994, then declined in the last 2 years of the series. By contrast, softwood roundwood prices on the Ouachita National Forest have declined from over \$11 per 100 cubic feet to less than \$5 per 100 cubic feet in 9 years. The Ouachita National Forest sold little hardwood from 1988 through 1996.

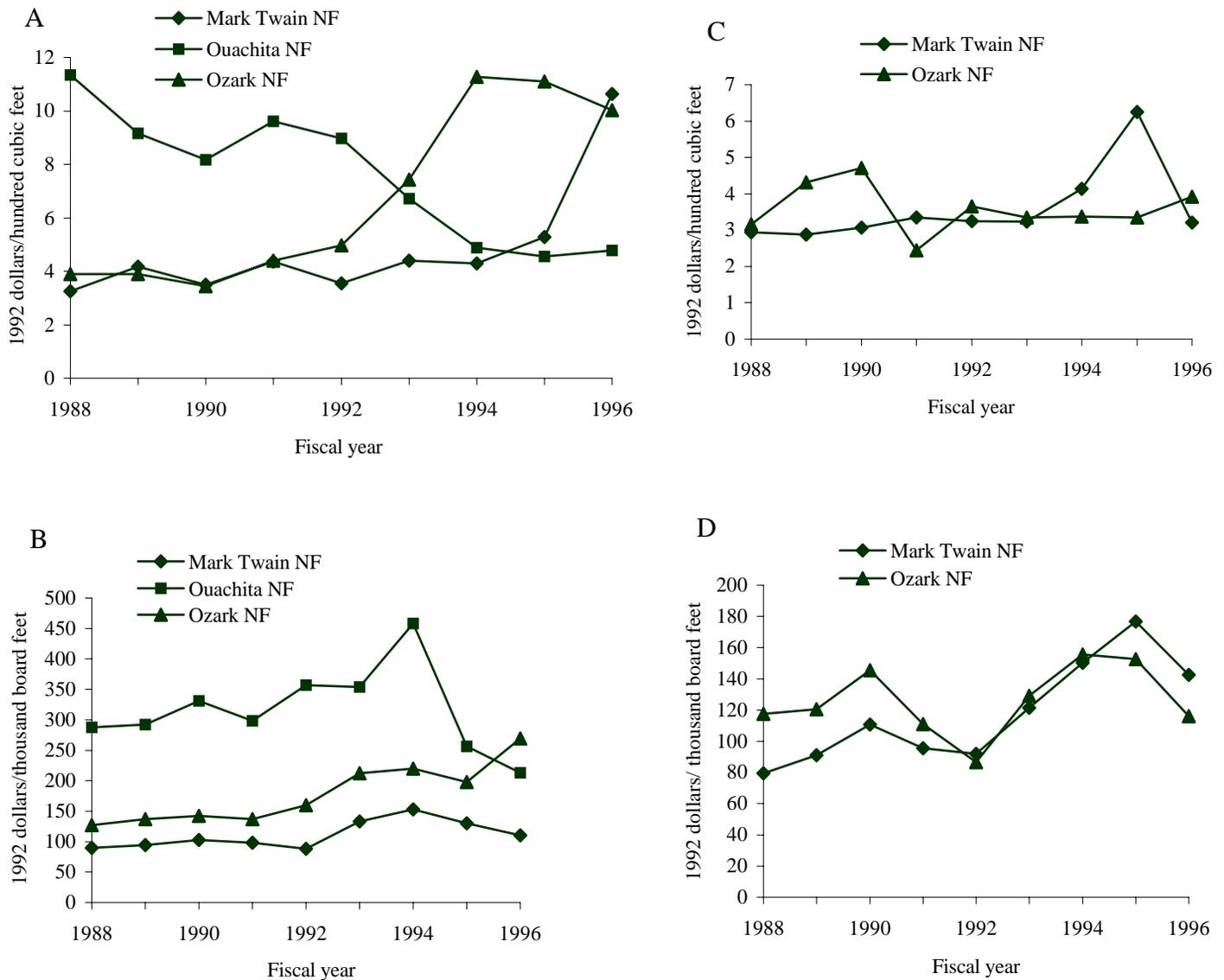


Figure 6.3—Average high bid prices for (A) softwood roundwood timber sales, (B) softwood sawtimber sales, (C) hardwood roundwood timber sales, and (D) hardwood sawtimber sales on national forests by fiscal year (1988 through 1996).

Softwood roundwood prices for the Mark Twain and Ozark-St. Francis National Forests rose over the period, as did prices for softwood sawtimber on the Ozark-St. Francis National Forests. On the Mark Twain National Forest, softwood sawtimber rose for the first 6 years of the series, then declined over the last 2 years. Hardwood roundwood prices on the Ozark National Forest varied considerably between 1988 and 1991 and leveled off between 1992 and 1996. In contrast, hardwood roundwood prices on the Mark Twain National Forest were steady until 1994 when a rapid rise occurred (peaking in 1995) followed by a dramatic drop in price to earlier levels in 1996. Hardwood sawtimber prices fluctuated on these predominantly hardwood forests, rising in 1990, falling in 1992, then rising to over \$160 per 1,000 board feet in 1995 and finally falling again in 1996.

Production

The FIA data concerning timber removals in Oklahoma and Arkansas represent survey period averages (1986 to 1993 for Oklahoma, 1988 to 1995 for Arkansas); more recent trends (increasing or decreasing) may not be discernible in these data. Other data, however, suggest that harvests have increased through the mid-1990's. Severance tax data for Arkansas (Levins 1997) show an increase in Arkansas Highlands' timber removals from 1991 to 1996. Missouri Timber Product Output reports (Piva and Jones 1997) show an increase in harvests in the Missouri Ozarks between 1991 and 1994.

In the most recent survey, timber removals were dominated by the NIPF category for hardwood removals (table 6.2a) and by NIPF and forest industry categories for softwoods (table 6.2b). National forests have a much higher share of inventory compared to removals, particularly for softwoods, accounting for 41 percent of softwood sawtimber inventory but only 20 percent of softwood sawtimber removals (fig. 6.4). In contrast, forest industry accounts for 20 percent of softwood sawtimber inventory but 40 percent of softwood sawtimber removals.

Growth/removals ratios are commonly used to assess the impact of timber harvesting on the sustainability of the forest resource. Although these ratios present a

static, limited view of the future harvest potential of timberlands, they do show the types of timber, subregions, and ownerships that have been most or least harvested over the last survey cycle (table 6.3). A ratio of 1.0 implies that removals are equal to growth. Land with a growth/removals ratio less than 1.0 experienced a higher rate of harvest than growth, while a ratio greater than 1.0 implies the opposite.

Growing Stock and Sawtimber Removals

Missouri Ozarks. Hardwood removals comprise 92 percent of total timber removals in the Missouri Ozarks subregion. In the most recent FIA survey of Missouri (1989), the Mark Twain National Forest contributed 16 percent of hardwood growing stock removals and 14 percent of hardwood sawtimber removals (table 6.2a). The largest share of inventory is held by NIPF owners, who also contribute the largest share of removals (over 77 percent). Forest industry harvests a larger percent of its sawtimber inventory annually (over 2 percent) than is harvested on lands in the three other ownership categories (over 1 percent).

Softwood growing stock comprises a small part of the total Missouri Ozarks inventory and removals (12 percent and 8 percent respectively); this subregion provides only about 3 percent of all softwood harvests in the Assessment area. Most of the softwood volume and removals take place on the Mark Twain National Forest and NIPF lands (table 6.2b).

Growth/removals ratios for all timber types and owners are significantly greater than 1.0 in this subregion, implying, at least for the previous survey period, a considerable excess of growth over removals in the Missouri Ozarks (table 6.3).

Arkansas Ozarks. Hardwood growing stock removals in the Arkansas Ozarks subregion are lower than in Missouri, but greater than in the Arkansas Ouachitas and Oklahoma, while softwood removals are higher than in Missouri and lower than in the Ouachitas (tables 6.2a and b). A small proportion of the hardwood growing stock removals in this subregion is from other public and forest industry lands, with over 90 percent from NIPF lands and about 8 percent from national forest lands. NIPF owners also remove the largest

Table 6.2a—Inventories and average annual removals of hardwood growing stock and hardwood sawtimber by subregion, timber category, and ownership category^a

Subregion or region Timber category	Measure	Ownership category				
		National forest ^b	Other public	Forest industry	NIPF	Total
Missouri Ozarks						
Growing stock	Inventory (mmcf)	842.8	286.9	125.2	4,508.8	5,763.8
	Removals (mmcf)	10.8	2.7	1.7	51.4	66.7
	Percent of removals in subregion	16.2	4.0	2.6	77.1	100.0
	Removals as percent of owner inventory	1.3	0.9	1.4	1.1	1.2
Sawtimber	Inventory (mmbf)	2,283.5	842.2	308.5	12,133.0	15,567.1
	Removals (mmbf)	29.4	9.5	7.5	157.6	204.0
	Percent of removals in subregion	14.4	4.7	3.7	77.3	100.0
	Removals as percent of owner inventory	1.3	1.1	2.4	1.3	1.3
Arkansas Ozarks						
Growing stock	Inventory (mmcf)	1,218.2	236.3	84.9	3,379.5	4,918.9
	Removals (mmcf)	4.3	0.7	0.4	50.2	55.6
	Percent of removals in subregion	7.7	1.3	10.7	90.3	100.0
	Removals as percent of owner inventory	0.4	0.4	0.3	2.3	1.6
Sawtimber	Inventory (mmbf)	3,898.1	789.7	143.2	8,425.7	13,256.7
	Removals (mmbf)	14.1	3.5	0.4	189.8	207.8
	Percent of removals in subregion	6.8	1.7	0.2	91.3	100.0
	Removals as percent of owner inventory	0.4	0.4	0.3	2.3	1.6
Arkansas Ouachitas						
Growing stock	Inventory (mmcf)	644.0	190.3	402.0	1,083.3	2,320.2
	Removals (mmcf)	2.3	1.1	18.1	27.6	49.1
	Percent of removals in subregion	4.7	2.2	36.9	56.2	100.0
	Removals as percent of owner inventory	0.4	0.6	4.5	2.6	2.2
Sawtimber	Inventory (mmbf)	1,409.4	594.4	1,608.5	2,967.7	5,979.9
	Removals (mmbf)	2.5	1.8	41.0	85.8	131.1
	Percent of removals in subregion	1.9	1.4	31.3	65.4	100.0
	Removals as percent of owner inventory	0.2	0.3	2.6	2.9	2.2
Oklahoma						
Growing stock	Inventory (mmcf)	65.8	148.2	173.4	1,034.3	1,421.6
	Removals (mmcf)	1.2	1.2	2.2	20.6	25.2
	Percent of removals in subregion	4.8	4.8	8.7	81.8	100.0
	Removals as percent of owner inventory	1.8	0.8	1.3	2.0	1.8
Sawtimber	Inventory (mmbf)	193.8	460.2	278.8	2,395.5	3,328.3
	Removals (mmbf)	2.9	2.2	3.5	57.5	66.1
	Percent of removals in subregion	4.4	3.3	5.3	87.0	100.0
	Removals as percent of owner inventory	1.5	0.5	1.3	2.4	2.0
Highlands						
Growing stock	Inventory (mmcf)	2,770.8	861.6	786.2	10,005.9	14,424.1
	Removals (mmcf)	18.5	5.7	19.5	149.8	193.5
	Percent of total removals	9.6	3.0	10.0	77.4	100.0
	Removals as percent of owner inventory	0.7	0.7	2.5	1.5	1.3
Sawtimber	Inventory (mmbf)	7,784.8	2,687.0	1,738.9	25,921.8	38,132.5
	Removals (mmbf)	48.9	17.1	52.4	490.7	609.0
	Percent of total removals	8.0	2.8	8.6	80.6	100.0
	Removals as percent of owner inventory	0.6	0.7	3.0	1.9	1.6

mmcf = million cubic feet; mmbf = million board feet; NIPF = nonindustrial private forest.

^a Inventories reflect 1989 data for Missouri, 1993 data for Oklahoma, and 1995 data for Arkansas; removals are averages for the previous cycle, meaning 1972 to 1989 for Missouri, 1986 to 1993 for Oklahoma, and 1988 to 1995 for Arkansas; some totals differ from the sum of row due to rounding.

^b Inventory and removals data for national forest lands in Oklahoma are based on few samples, making the standard errors very high and thereby leaving any changes between surveys statistically insignificant.

Source: USDA FS FIA (1997).

Table 6.2b—Inventories and average annual removals of softwood growing stock and softwood sawtimber by subregion, timber category, and ownership category^a

Subregion or region Timber category	Measure	Ownership category				
		National forest ^b	Other public	Forest industry	NIPF	Total
Missouri Ozarks						
Growing stock	Inventory (mmcf)	304.0	44.6	35.5	402.5	786.5
	Removals (mmcf)	3.9	0.0	0.1	1.5	5.6
	Percent of removals in subregion	70.0	0.0	2.0	27.0	100.0
	Removals as percent of owner inventory	1.0	0.0	0.0	0.0	0.7
Sawtimber	Inventory (mmbf)	1,058.5	130.1	134.8	1,176.6	2,500.0
	Removals (mmbf)	12.1	0.0	0.6	6.6	19.3
	Percent of removals in subregion	62.7	0.0	3.1	34.2	100.0
	Removals as percent of owner inventory	1.1	0.0	0.4	0.6	0.8
Arkansas Ozarks						
Growing stock	Inventory (mmcf)	300.2	32.6	115.0	730.2	1,178.0
	Removals (mmcf)	8.9	0.8	0.7	21.6	32.0
	Percent of removals in subregion	27.8	2.5	2.2	67.5	100.0
	Removals as percent of owner inventory	3.0	2.5	0.6	3.0	2.7
Sawtimber	Inventory (mmbf)	1,303.6	141.3	315.7	2,293.0	4,053.6
	Removals (mmbf)	44.6	3.1	3.0	77.8	128.5
	Percent of removals in subregion	34.7	2.4	2.3	60.6	100.0
	Removals as percent of owner inventory	3.4	2.2	1.0	3.4	3.2
Arkansas Ouachitas						
Growing stock	Inventory (mmcf)	1,483.1	94.2	1,074.8	835.2	3,487.3
	Removals (mmcf)	19.9	1.9	57.4	38.6	117.8
	Percent of removals in subregion	16.9	1.6	48.7	32.8	100.0
	Removals as percent of owner inventory	1.3	2.0	5.3	4.6	3.4
Sawtimber	Inventory (mmbf)	6,646.7	440.0	3,265.6	3,361.4	13,704.7
	Removals (mmbf)	90.5	9.3	234.3	158.1	492.3
	Percent of removals in subregion	18.4	1.9	47.6	32.1	100.0
	Removals as percent of owner inventory	1.4	2.1	7.2	4.7	3.6
Oklahoma						
Growing stock	Inventory (mmcf)	228.4	71.6	574.1	485.5	1,359.7
	Removals (mmcf)	6.1	0.1	29.5	20.9	56.6
	Percent of removals in subregion	10.8	0.0	52.1	36.9	100.0
	Removals as percent of owner inventory	2.7	0.0	5.1	4.3	4.2
Sawtimber	Inventory (mmbf)	929.8	258.8	1,256.0	1,596.7	4,041.4
	Removals (mmbf)	25.8	0.3	100.2	88.8	215.1
	Percent of removals in subregion	12.0	0.1	46.6	41.3	100.0
	Removals as percent of owner inventory	2.8	0.1	8.0	5.6	5.3
Highlands						
Growing stock	Inventory (mmcf)	2,315.7	243.0	1,799.4	2,453.4	6,811.5
	Removals (mmcf)	40.0	2.8	87.7	82.7	212.0
	Percent of total removals	18.0	1.0	41.0	39.0	100.0
	Removals as percent of owner inventory	2.0	1.0	5.0	3.0	3.0
Sawtimber	Inventory (mmbf)	9,938.6	970.2	4,963.1	8,427.8	24,299.8
	Removals (mmbf)	173.1	12.6	338.2	331.3	855.2
	Percent of total removals	20.0	2.0	40.0	39.0	100.0
	Removals as percent of owner inventory	2.0	1.0	7.0	4.0	4.0

mmcf = million cubic feet; mmbf = million board feet; NIPF = nonindustrial private forest.

^a Inventories reflect 1989 data for Missouri, 1993 data for Oklahoma, and 1995 data for Arkansas; removals are averages for the previous cycle, meaning 1972 to 1989 for Missouri, 1986 to 1993 for Oklahoma, and 1988 to 1995 for Arkansas; some totals differ from sum of row due to rounding.

^b Inventory and removals data for national forest lands in Oklahoma are based on few samples, making the standard errors very high and thereby leaving any changes between surveys statistically insignificant.

Source: USDA FS FIA (1997).

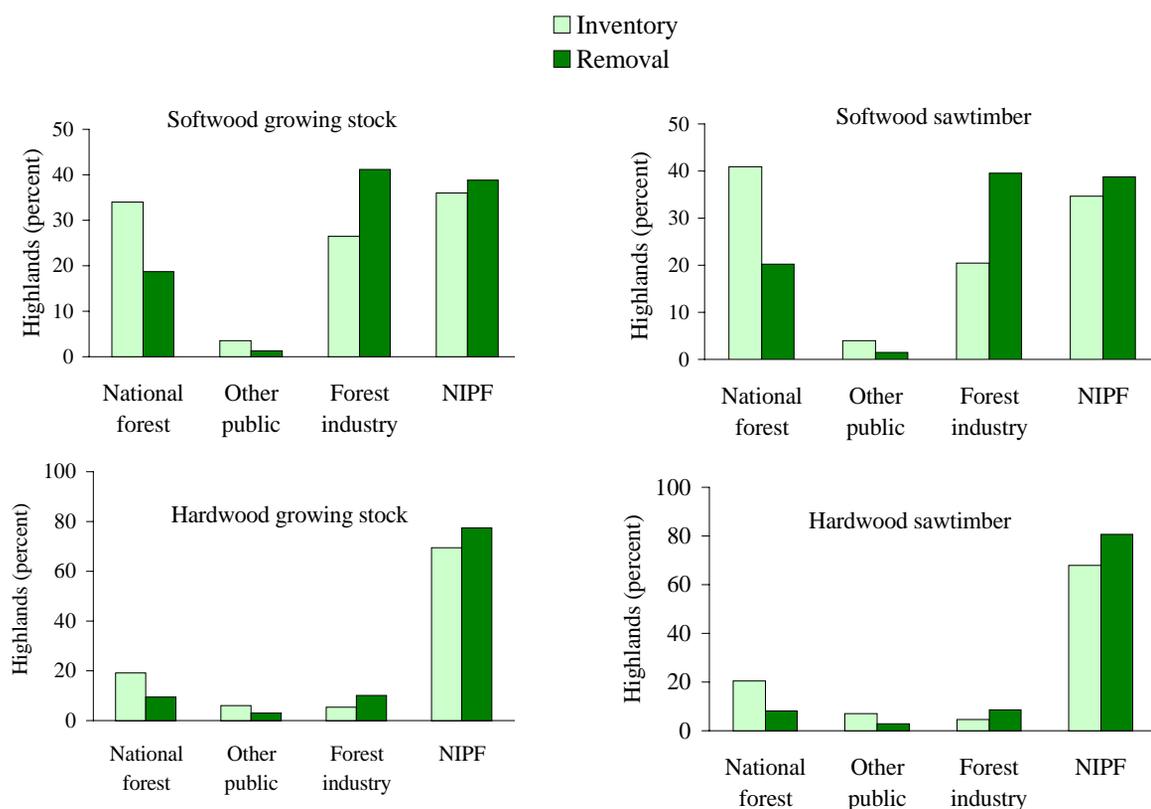


Figure 6.4—Inventory and removals of softwood and hardwood growing stock and sawtimber in the Assessment area, expressed as a percent of the Highlands' total by landowner category (USDA FS FIA 1997).

percent of hardwood inventory each year (2.3 percent of growing stock), while the other ownership categories remove less than 1 percent of inventory growing stock annually.

The Arkansas Ozarks, with more softwood growing stock and sawtimber inventory and removals than the Missouri Ozarks, still contribute only a small portion of the Highlands' softwood growing stock removals (15 percent). The national forests contribute 28 percent of softwood growing stock removals and 35 percent of softwood sawtimber removals in the subregion. Most of the softwood harvest, over 60 percent, occurs on NIPF lands. Both NIPF owners and national forests remove about 3 percent of their softwood growing stock and sawtimber inventory annually, while forest industry removes only 1 percent of their softwood sawtimber inventory annually.

Growth/removals ratios in this subregion are greater than 1.0 for all owners and timber types (table 6.3). National forest softwood and all NIPF timber categories have ratios from 1.1 to 1.9, indicating that removals are nearly equal to growth. The growth of hardwood growing stock significantly exceeds removals (ratio of 2.4).

Arkansas Ouachitas. In contrast to the Missouri and Arkansas Ozarks, the Arkansas Ouachitas have far more softwood growing stock and sawtimber than hardwood (tables 6.2a and b). Furthermore, hardwood growing stock and hardwood sawtimber volume and removals in the Arkansas Ouachitas are about half those in the Arkansas Ozarks. NIPF owners hold the largest percent of hardwood growing stock (47 percent) and provide the highest percent of hardwood sawtimber removals in this subregion (65 percent). The national

Table 6.3—Growth/removals ratios^a by subregion, timber category, and ownership category

Subregion Timber category	Ownership category				
	National forest	Other public	Forest industry	NIPF	Average
Missouri Ozarks					
Softwood growing stock	2.0	48.4	7.7	10.3	4.6
Softwood sawtimber	2.9	—	8.8	7.4	4.9
Hardwood growing stock	2.1	2.7	2.3	2.4	2.3
Hardwood sawtimber	2.5	2.5	1.9	2.5	2.5
Arkansas Ozarks					
Softwood growing stock	1.3	1.3	12.3	1.6	1.7
Softwood sawtimber	1.1	1.6	7.5	1.8	1.7
Hardwood growing stock	6.6	8.6	7.2	1.9	2.4
Hardwood sawtimber	7.0	4.8	10.7	1.4	1.9
Arkansas Ouachitas					
Softwood growing stock	1.7	2.5	1.8	1.2	1.6
Softwood sawtimber	2.0	2.7	1.0	1.3	1.3
Hardwood growing stock	6.9	4.3	0.7	1.4	1.5
Hardwood sawtimber	17.6	9.9	0.8	1.5	1.7
Oklahoma					
Softwood growing stock	2.0 ^b	36.6	2.0	1.6	2.0
Softwood sawtimber	2.1 ^b	37.1	2.1	1.2	1.3
Hardwood growing stock	2.0 ^b	3.6	2.0	2.4	2.5
Hardwood sawtimber	2.0 ^b	1.7	2.0	2.1	2.1
Highlands region					
Softwood growing stock	2.0	3.6	3.2	2.4	2.5
Softwood sawtimber	2.0	1.7	1.9	2.1	2.1
Hardwood growing stock	1.7	3.6	2.0	1.6	1.8
Hardwood sawtimber	1.9	3.6	1.1	1.5	1.5

NIPF = nonindustrial private forest; — = not available.

^a Obtained by dividing timber growth by timber removals during a particular time period, usually 1 year.

^b Inventory and removals data for national forest lands in Oklahoma are based on few samples, making the standard errors very high and thereby leaving any changes between surveys statistically insignificant. Source: USDA FS FIA (1997).

forests provide less than 5 percent of hardwood growing stock removals and about 2 percent of hardwood sawtimber removals in this subregion. Both forest industry and NIPF owners remove over 2 percent of their hardwood inventory per year, while less than 1 percent of the respective inventories are removed from national forests and other public lands.

While forest industry accounts for about 30 percent of the softwood growing stock inventory and 24 percent of the softwood sawtimber inventory, it dominates softwood removals with 49 percent of growing stock removals and 48 percent of all sawtimber removals. National forests account for 42 and 49 percent of softwood growing stock and sawtimber inventory,

respectively, but provide only 17 and 18 percent of all removals. NIPF owners contribute over 32 percent of both growing stock and sawtimber softwood removals. National forests remove only about 1 percent of inventory per year, while NIPF and forest industry owners remove 4 to 7 percent per year.

These high removals rates on forest industry lands are reflected in the growth/removals ratios (table 6.3), which range from 0.7 to 1.8 for forest industry in this subregion. The national forests show an excess of growth/removals in all species and size categories. Only a minor amount of hardwoods are harvested on the Ouachita National Forest, which is reflected in the especially high growth/removals ratios of 6.9 (growing stock) and 17.6 (sawtimber).

Oklahoma. The Oklahoma timber subregion includes the hardwood forests of northeastern Oklahoma as well as the pine forests of southeastern Oklahoma (tables 6.2a and b). Hardwoods make up about half of the inventory volume. Most of the hardwoods, however, are on NIPF lands, which contribute more than 80 percent of removals. The national forests account for less than 5 percent of total hardwood removals. NIPF lands remove the highest percent of hardwood inventory (2.4 percent of sawtimber), and other public lands remove the lowest (0.5 percent of sawtimber).

More than 70 percent of the softwood growing stock and sawtimber in this subregion is found on forest industry and NIPF lands. These two landowner categories account for nearly 90 percent of softwood removals (both growing stock and sawtimber). Approximately 16 percent of the softwood growing stock and 23 percent of the sawtimber are on national forest lands.

This subregion removes a larger percentage of softwood growing stock and sawtimber inventory each year (4 and 5 percent, respectively) than does any other subregion. Forest industry removes the highest percent of owner inventory (5 and 8 percent, respectively).

Table 6.3 shows consistent growth/removals ratios for NIPF, forest industry, and national forest ownership classes in Oklahoma, ranging from 1.2 to 2.4. Ratios for the "other public" lands are much larger, but this is not a major landowner category in this subregion, and these

values may not be important when evaluating the harvest potential of the area.

Trends. National forest and forest industry hardwood removals declined in Arkansas and Oklahoma between the late 1980's and early 1990's (tables 6.4a and b). The largest decline occurred on forest industry lands. The largest increase in hardwood removals occurred on NIPF lands, especially in the Arkansas Ozarks and Oklahoma. These data represent period averages and do not reflect more recent increases in hardwood pulpwood removals. In the Missouri Ozarks, hardwood roundwood and sawlog removals increased between 1987 and 1994 by 28 and 85 percent respectively (table 6.5).

Softwood harvest declines in the Arkansas Ouachitas were offset somewhat by increases in the other three subregions. Forest industry softwood removals declined in the three subregions. NIPF and national forest softwood removals declined in the Ouachitas. Other subregions had increased softwood removals of both growing stock and sawtimber.

National Forest Timber Sales

Data for the three national forests of the Highlands show that timber offered, sold, and cut varied significantly over the past decade, with a sharp decline from 1988 to 1991 and an increase and stabilization from 1991 to 1996 (fig. 6.5). Timber sold on the three forests declined from about 300 million board feet in 1988 to a low of about 121 million board feet in 1991. Since then, the volume sold has risen, but not to the 1989 and 1990 levels. The variations were largely caused by declines in the timber program of the Ouachita National Forest and to a lesser extent the Ozark-St. Francis National Forests. The timber program on the Mark Twain National Forest was more stable than the other two forests over this time period. It is important to note that the amount of timber volume offered, sold, and cut in any fiscal year (October 1 to September 30) will be different. Some timber that is offered will not be sold until the following year, and some timber that is sold will not be harvested until later years, depending on the length of the timber sale contract. Offered and sold volumes track closely, but the actual volume cut is quite different.

Table 6.4a—Trends in average annual removals of hardwood growing stock and hardwood sawtimber by ownership category and timber subregion

Ownership category Survey	Missouri Ozarks		Arkansas Ozarks		Arkansas Ouachitas		Oklahoma	
	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber
	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>
National forest ^a								
Previous survey ^b			9.1	27.3	5.2	3.8	1.6	3.4
Recent survey ^c	10.8	29.4	4.3	14.1	2.3	2.5	1.3	2.9
Percent change			-53	-48	-56	-35	-28	-15
Other public								
Previous survey ^b			0.9	3.5	0.6	1.4	1.0	1.7
Recent survey ^c	2.7	9.5	0.7	3.5	1.1	1.8	1.2	2.2
Percent change			-21	0	78	32	24	29
Forest industry								
Previous survey ^b			2.7	5.8	31.3	78.3	10.5	27.7
Recent survey ^c	1.7	7.5	0.4	0.4	15.1	41.0	2.2	3.5
Percent change			-84	-93	-52	-47	-79	-87
NIPF								
Previous survey ^b			37.2	116.9	25.4	71.1	9.3	27.8
Recent survey ^c	51.4	157.6	50.2	189.8	27.6	85.8	20.6	57.5
Percent change			35	62	12	21	121	107
All owners								
Previous survey ^b			49.9	153.5	62.5	154.6	22.5	60.6
Recent survey ^c	66.7	204.0	55.6	207.8	46.0	131.1	25.2	66.9
Percent change			10	35	-26	-14	9	8

mmcf = million cubic feet; *mmbf* = million board feet; NIPF = nonindustrial private forest.

^a Inventory and removals data for national forest lands in Oklahoma are based on few samples, making the standard errors very high and thereby leaving any changes between surveys statistically insignificant.

^b The previous survey for Missouri was not available, the previous survey for Arkansas was in 1988 (average removals from 1976–1988), and the previous survey for Oklahoma was in 1986 (average removals from 1972–1986).

^c The recent survey for Missouri was in 1989 (average removals from 1972–1989), the Arkansas survey was in 1995 (average removals from 1988–1995), and the Oklahoma survey was in 1993 (average removals from 1986–1993).

Source: USDA FS FIA (1997).

Table 6.6 presents a more detailed picture of national forest timber sales, showing the amount of timber sold by each national forest ranger district in the Assessment area for the years 1988 through 1996. This table and the succeeding one are presented primarily to respond to public interest in seeing such data. Although most districts sold more timber at the beginning of this period

than toward the end, few clear trends are apparent. Table 6.7 shows the amount of land on each district that was “suitable” for timber production and the average annual volume sold per suitable acre on each district. The Forest Service updates its determinations of suitable acres annually. The volume sold per suitable acre of land (and the proportion of suitable to unsuitable

Table 6.4b—Trends in average annual removals of softwood growing stock and sawtimber by ownership category and timber subregion

Ownership category Survey	Missouri Ozarks		Arkansas Ozarks		Arkansas Ouachitas		Oklahoma	
	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber
	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>
National forest ^a								
Previous survey ^b			2.9	11.8	32.0	135.6	3.0	10.4
Recent survey ^c	3.9	12.1	8.9	44.7	19.9	90.5	6.1	25.8
Percent change			209	278	-38	-33	105	148
Other public								
Previous survey ^b			0.9	1.2	0.9	4.5	1.0	2.4
Recent survey ^c	0	0	0.8	3.1	1.9	9.3	0.1	0.3
Percent change			-16	155	112	106	-92	-88
Forest industry								
Previous survey ^b			2.4	8.1	93.5	473.1	42.2	167.1
Recent survey ^c	0.1	0.6	0.7	3.0	57.4	234.4	29.5	100.3
Percent change			-73	-63	-39	-51	-30	-40
NIPF								
Previous survey ^b			12.1	37.7	47.6	208.5	10.1	35.6
Recent survey ^c	1.6	6.7	21.6	77.8	38.6	158.1	20.6	88.8
Percent change			79	106	-19	-24	107	149
All owners								
Previous survey ^b			18.3	58.8	174.0	821.7	56.4	215.4
Recent survey ^c	5.7	19.4	32.0	128.6	117.8	492.3	56.6	215.2
Percent change			83	11	-33	-40	2	0

mmcf = million cubic feet; *mmbf* = million board feet; NIPF = nonindustrial private forest.

^a Inventory and removals data for national forest lands in Oklahoma are based on few samples, making the standard errors very high and thereby leaving any changes between surveys statistically insignificant.

^b The previous survey for Missouri was not available, the previous Arkansas survey was in 1988 (average removals from 1976–1988), and the previous Oklahoma survey was in 1986 (average removals from 1972–1986).

^c The recent survey for Missouri was in 1989 (average removals from 1972–1989), the Arkansas survey was in 1995 (average removals from 1988–1995), and the Oklahoma survey was in 1993 (average removals from 1986–1993).

Source: USDA FS FIA (1997).

land per se) varies considerably among districts. Three ranger districts on the Ouachita National Forest—the Caddo, Cold Springs, and Poteau—had the highest average volume sold per suitable acre. The districts within the Highlands that had the lowest rates were the Buffalo on the Ozark-St. Francis National Forests and

the Ava-Cassville-Willow Springs and Houston-Rolla Ranger Districts on the Mark Twain National Forest. The differences in percent of suitable timberland and volume sold can be due to variations in factors such as site productivity, the number of timber sales offered, and annual funding levels.

Table 6.5—Removals of roundwood and sawlogs in the Missouri Ozarks, 1987 and 1994, for both hardwoods and softwoods

Product	Removals		Increase <i>Percent</i>
	1987	1994	
Roundwood			
Softwood (mcf)	7,422	10,578	43
Hardwood (mcf)	62,955	80,811	28
Sawlogs			
Softwood (mbf)	34,894	41,528	19
Hardwood (mbf)	230,229	426,141	85

mcf = thousand cubic feet; mbf = thousand board feet.
Source: Hahn and Spencer (1991), Piva and Jones (1997).

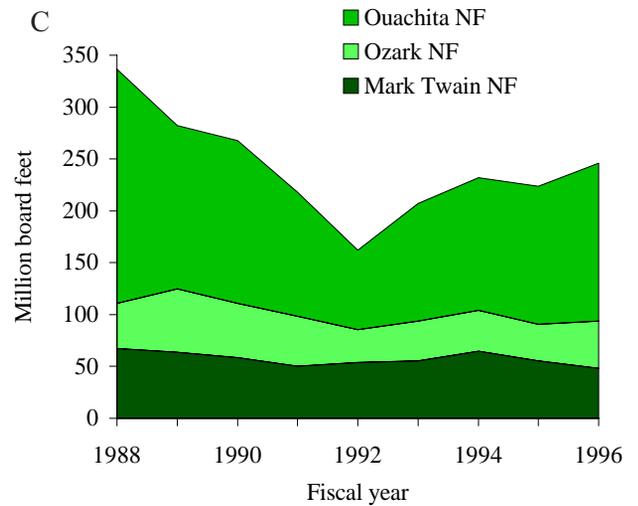
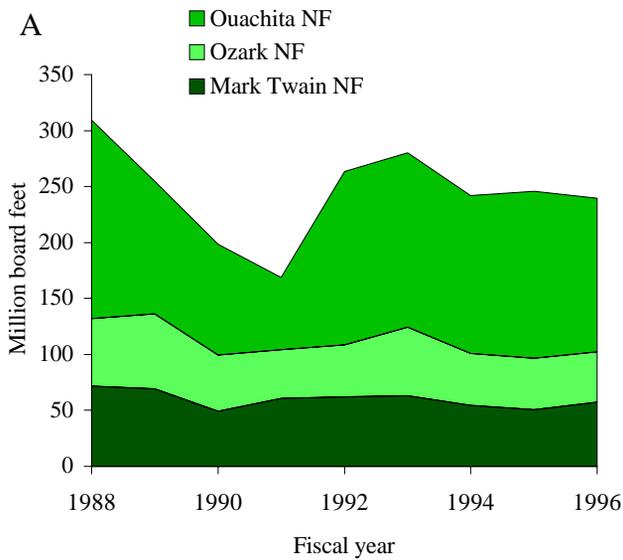
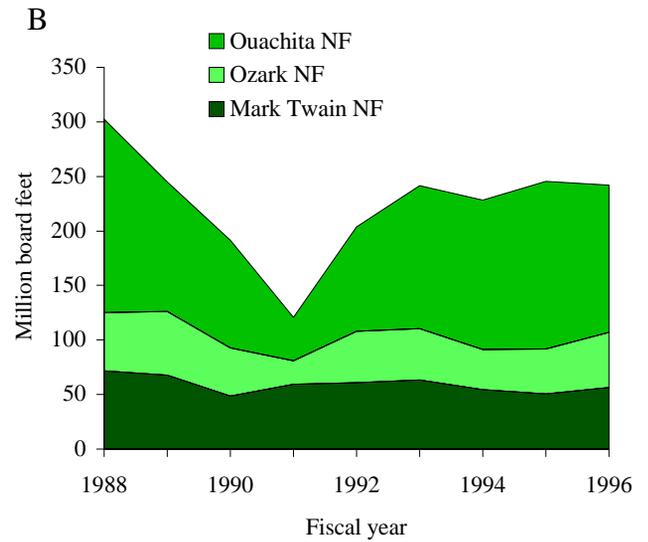


Figure 6.5—Timber volume (A) offered, (B) sold, and (C) cut on the Highlands' national forests by fiscal year, 1988 through 1996.

Table 6.6—Timber sold by fiscal year and national forest ranger district, 1988 through 1996^a

National forest Ranger district	Fiscal year									Average volume sold
	1988	1989	1990	1991	1992	1993	1994	1995	1996	
----- <i>Million board feet</i> -----										
Ozark-St. Francis NF's										
Bayou	11,409	14,494	9,977	4,805	15,686	15,691	1,269	13,322	12,620	11,030
Boston Mountains	13,630	9,121	9,208	7,353	4,268	6,725	6,704	6,020	16,435	8,829
Buffalo	8,796	9,271	6,966	2,087	8,600	0	2,593	2,218	1,011	4,616
Mt. Magazine	8,196	13,970	9,514	2,571	8,280	15,108	11,671	9,313	11,765	10,043
Pleasant Hill	7,683	7,585	6,258	2,391	8,005	4,748	6,980	6,529	4,572	6,083
St. Francis ^b	1,494	1,918	0	0	739	1,127	1,182	0	660	791
Sylamore	2,428	1,940	2,120	2,477	1,521	3,607	6,573	3,816	3,616	3,122
Total	53,636	58,299	44,043	21,684	47,099	47,006	36,972	41,218	50,679	44,514
Ouachita NF										
Caddo	12,388	16,479	6,984	1,706	3,034	9,348	11,361	19,796	17,179	10,919
Cold Springs	23,468	11,922	15,554	2,102	17,790	13,180	20,303	14,162	15,113	14,844
Fourche	20,871	8,625	9,980	171	9,295	8,587	14,600	12,548	16,080	11,195
Jessieville-Winona	21,696	10,247	8,137	8,490	10,602	15,824	18,434	15,855	17,032	14,035
Kiamichi-Choctaw	7,835	5,411	5,616	6,821	4,494	8,112	8,138	6,364	13,692	7,837
Mena	15,630	10,677	9,272	3,471	10,474	5,930	8,793	11,300	7,174	9,191
Oden	23,206	22,722	20,737	9,959	11,286	11,237	19,983	16,084	19,094	16,812
Poteau	29,649	12,243	9,931	5,570	17,724	28,370	11,714	24,935	17,642	17,531
Tiak ^b	11,085	10,140	6,826	79	2,892	21,219	14,232	8,234	2,446	8,573
Womble	11,561	10,263	5,751	1,433	8,215	9,459	9,617	24,307	12,229	10,315
Total	177,389	118,729	98,788	39,802	95,806	131,266	137,175	153,858	134,681	121,252
Mark Twain NF										
Ava-Cassville- Willow Springs	11,664	10,254	5,701	10,398	8,775	10,899	7,355	6,680	9,081	8,979
Cedar Creek ^b	213	231	418	442	228	165	334	156	247	270
Doniphan-Eleven Point	13,306	11,932	10,181	11,282	11,839	13,125	9,912	9,575	11,679	11,396
Houston-Rolla	6,485	6,706	4,262	5,079	5,700	5,385	4,985	4,833	4,771	5,356
Poplar Bluff	11,765	11,563	5,114	9,064	7,964	7,756	7,844	7,057	6,970	8,344
Potosi- Fredericktown	16,269	14,984	11,717	11,574	14,053	14,277	13,187	11,252	12,796	13,345
Salem	12,001	12,219	11,119	11,552	12,173	11,771	10,751	10,884	10,980	11,494
Total	71,433	67,889	48,512	59,391	60,732	63,378	54,368	50,437	56,524	59,184

NF = national forest.

^a Does not include volume the national forests reported as "salvage"; roundwood volumes were converted from cubic feet measurements.

^b Districts are outside the Assessment area but are included here to reflect total national forest programs.

Table 6.7—National forest acres suitable for timber production, total acres, percent suitable, average annual timber sale volume (1988 through 1996), and average volume sold per suitable acre, by national forest ranger district

National forest Ranger district	Suitable acres ^a	Total acres ^b	Percent suitable	Average	Avg. volume
				volume sold	sold per suitable acre
				<i>mmbf</i>	<i>mmbf/ac</i>
Ozark-St. Francis NF's					
Bayou	223,890	265,597	84.3	11,030	0.049
Boston Mountains	176,423	196,311	89.9	8,829	0.050
Buffalo	171,091	242,501	70.6	4,616	0.027
Pleasant Hill	162,316	196,311	82.7	6,083	0.037
Magazine	88,853	105,896	83.9	10,043	0.113
St. Francis ^c	18,131	21,128	85.8	791	0.044
Sylamore	82,707	127,024	65.1	3,122	0.038
Ouachita NF					
Caddo	70,277	147,606	47.6	10,919	0.155
Cold Springs	97,266	156,201	62.2	14,844	0.153
Fourche	99,985	144,510	69.1	11,195	0.112
Kiamichi-Choctaw	91,003	219,611	41.4	14,035	0.090
Jessieville-Winona	156,652	253,581	61.8	7,837	0.081
Mena	74,834	191,867	39.0	9,191	0.123
Oden	136,264	184,550	73.8	16,812	0.123
Poteau	108,901	177,638	61.3	17,531	0.161
Tiak ^c	—	126,538	—	8,573	—
Womble	111,902	159,997	69.9	10,315	0.092
Mark Twain NF					
Ava-Cassville-Willow					
Springs	222,905	314,545	70.9	8,979	0.029
Cedar Creek ^c	5,267	15,448	34.1	270	0.018
Doniphan-Eleven					
Point	248,876	331,441	75.1	11,396	0.034
Houston-Rolla	133,488	195,643	68.2	5,356	0.027
Poplar Bluff	127,390	156,436	81.4	8,344	0.053
Potosi-Fredericktown	209,429	285,471	73.4	13,345	0.047
Salem	165,838	191,446	86.6	11,494	0.060

mmbf = million board feet; ac = acre; — = not available.

^a See "Glossary of Terms" for definition.

^b Figures are approximate and include some areas of recently acquired land for which suitability determinations had not been made at the time this chapter was completed.

^c Districts outside the Assessment area; included here to reflect total national forest programs.

Factors Affecting Timber Supply

Factors that define the physical availability of timber include timberland area, volume of timber on site, growth and mortality of timber inventory, stand size class, and tree grade. In addition to these factors, other physical constraints may affect the availability of timber for harvesting, as discussed below.

Timberland

The FIA (USDA FS FIA 1997) classifies 26 million acres (ac) in the Highlands (53 percent of 49 million ac) as “timberland.” Because of the FIA’s definition of timberland as land that is both physically capable of producing at least 20 cubic feet/ac per year for harvest and is not withdrawn from timber production, some forest land is not classified as timberland—either the land is unproductive or it is legally off-limits to harvesting (e.g., national parks and wildernesses). The proportion of each county classified as timberland varies throughout the Highlands, as illustrated in figure 6.6.

Nonindustrial private forest lands account for 69 percent of the Highland’s timberland, ranging from a high of 80 percent of the Missouri Ozarks to a low of 37 percent in the Arkansas Ouachitas. National forest

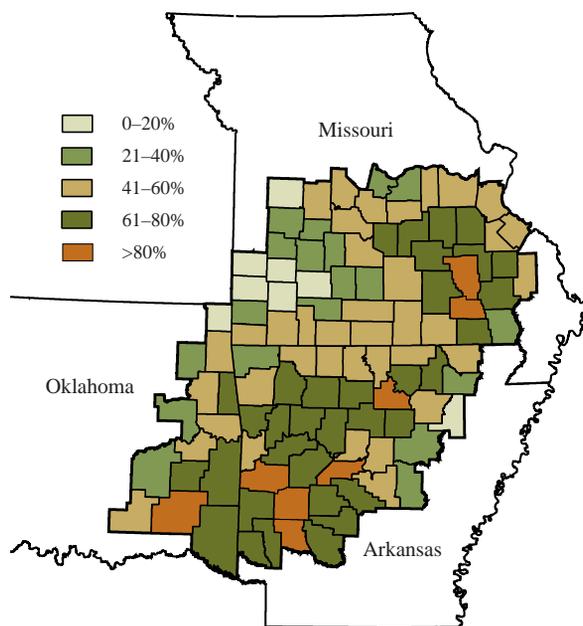


Figure 6.6—Percentage of county acres in timberland (USDA FS FIA 1997).

timberland (not including wilderness or unproductive land) comprises 15 percent of the timberland base of the Highlands area (table 6.8). The highest percentage is in the Arkansas Ouachitas subregion (24 percent), and the lowest (5 percent) is in the Oklahoma subregion. Forest industry holds 12 percent of the Highlands timberland, including significant portions of land in the Arkansas Ouachitas (35 percent of timberlands) and Oklahoma subregions (24 percent of timberlands). These two subregions have the most acreage occupied by planted pine (table 6.9). Upland hardwood forest types dominate in Oklahoma and the Ozarks, covering from 50 percent of the Oklahoma subregion to 86 percent of the Missouri Ozarks.

Nonindustrial Private Forest Lands

The NIPF ownership class is strongly represented in all parts of the Assessment area (fig. 6.7). By combining statewide data from the forest surveys for Arkansas (London 1997), Missouri (Hahn and Spencer 1991), and Oklahoma (Miller and others 1993) with the results of a 1994 national survey of private forest owners (Birch 1996), it can be estimated that there are 387,000 NIPF tracts in Assessment area counties; these tracts average about 43 ac in size.

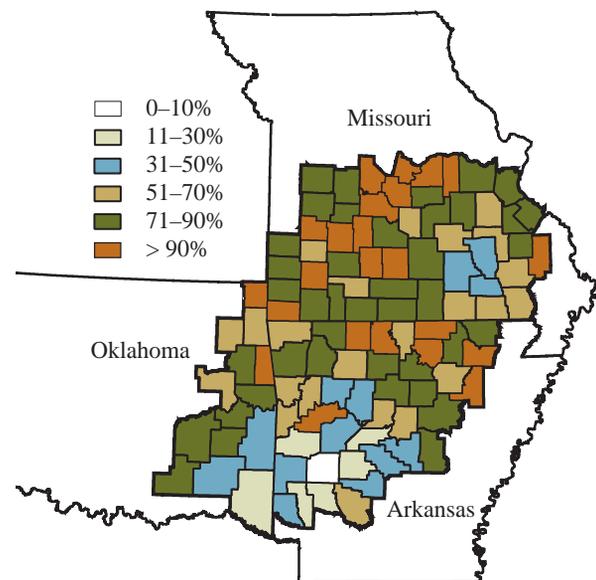


Figure 6.7—Percentage of county timberland acres owned by nonindustrial private forest (NIPF) owners (USDA FS FIA 1997).

Table 6.8—Timberland acres by ownership category and timber subregion

Ownership category	Timber subregion								
	Missouri Ozarks		Arkansas Ozarks		Arkansas Ouachitas		Oklahoma		Highlands
	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Percent</i>
National forest	1,312,800	13	941,240	15	1,302,940	24	222,652 ^a	5	15
Other public	487,900	5	222,536	4	221,207	4	373,006	9	5
Forest industry	214,700	2	173,861	3	1,578,052	35	1,047,322 ^a	24	12
NIPF	8,121,400	80	4,956,973	79	1,857,397	37	2,709,619	62	69
Total	10,136,800	100	6,294,610	101^b	4,959,596	100	4,352,599	100	101^b

NIPF = nonindustrial private forest.

^a Does not reflect land adjustment in 1996.

^b Totals exceed 100 percent due to rounding.

Source: USDA FS FIA (1997).

Table 6.9—Timberland acres by forest type and timber subregion

Forest type	Timber subregion								
	Missouri Ozarks		Arkansas Ozarks		Arkansas Ouachitas		Oklahoma		Highlands
	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Percent</i>
Pine plantation	92,100	1	221,068	4	1,055,427	21	560,314	13	8
Natural pine	364,600	4	450,067	7	1,093,245	22	613,366	14	10
Oak-pine	756,700	7	923,970	15	934,590	19	594,235	14	12
Upland hardwood	8,666,800	86	4,306,180	68	1,391,695	28	2,193,258	50	64
Bottomland hardwood	214,000	2	362,479	6	383,543	8	352,472	8	5
Unspecified	42,300	0	30,846	< 1	101,096	2	38,927	1	1
Total	10,136,500	100	6,294,610	100	4,959,596	100	4,352,572	100	100

Source: USDA FS FIA (1997).

Birch (1996) reported that the number of timberland acres in NIPF ownership increased nearly 10 percent in Missouri and nearly 30 percent in Oklahoma between 1978 and 1994, implying conversion of a significant amount of land from other rural uses to timberland. He also found that the average tract size decreased sharply in these two States over the same period, from more than 120 ac to less than 45 ac. This trend suggests that a rapid fragmentation of NIPF holdings is taking place. In contrast, NIPF timberland acreage and average tract size in Arkansas remained relatively unchanged between 1978 and 1994 (Birch 1996).

The characteristics and objectives of NIPF owners are highly diverse. Farmers hold the majority of the NIPF acres in heavily agricultural areas, including

floodplains and some parts of Missouri. But across the three States of the Assessment area, three-fifths of NIPF acres are owned by a variety of other individuals that include retirees, blue- and white-collar workers, and homemakers (Birch 1996).

While Birch's findings concerning the objectives of NIPF owners in Arkansas and Oklahoma are combined with other Southern States and those for Missouri are combined with other Central States, the results for the two regions are similar enough to summarize together. Over half of the owners considered their forest land as simply part of their residence or farm and/or as a source for such domestic products as firewood or fence posts (Birch 1996). Roughly one-fifth named esthetic enjoyment as their primary or secondary reason for owning

forest land, while smaller fractions named recreation or investment. Only about 5 percent of the owners named timber production as their primary or secondary reason for owning forest land, and those who did tended to own substantially larger-than-average holdings. Roughly half of the owners had never harvested timber on their land, and one-third had no plans to do so (Birch 1996).

Researchers in Arkansas, Missouri, and Oklahoma conducted statewide studies of NIPF owners in the late 1970's, early 1980's, and mid-1990's. Additional information on the characteristics, objectives, and forest management behavior of this important class of landowners can be found in the reports of those studies (Jones and Thompson 1981, Kurtz and Bradway 1981, Kurtz and Lewis 1981, Greene and Blatner 1986, Blatner and Greene 1989, Williams and others 1998).

National Forests

Like NIPF lands, national forests are managed for a wide variety of objectives. However, national forest management differs from that on NIPF lands in several important respects. National forest management occurs on a large scale, typically involving whole landscapes rather than the individual small tracts commonly associated with NIPF owners. National forest management typically involves a much higher level of participation by foresters, biologists, and other trained natural resource professionals than occurs in conjunction with private land management. In addition, national forest management typically involves a much higher level of public input—in the forms of public participation in decisionmaking and legislative and budgetary constraints set by Congress.

National forests are the easiest of the ownership classes to locate: all national forest acres are within the proclamation boundaries of one of the three national forests in the Assessment area (green areas in fig. 1.5). However, timberland ownership within national forest proclamation boundaries is not uniform; included within these boundaries is a substantial component of private lands (often referred to as “inholdings”) and public lands that are not managed as part of the National Forest System. Moreover, in the 36 counties in which national forest acreage comprises at least 11 percent of the total (fig. 6.8), less than one-third of the timberland acres are national forest lands. Half of the timberland is held by NIPF owners and one-eighth by forest industry, with the

remaining acreage in the “other public” category (Hahn and Spencer 1991, Miller and others 1993, London 1997).

The mixture of ownerships within and adjacent to national forest proclamation boundaries has a profound effect on all categories of forest landowners. National forest management practices implicitly influence the forest management options available to owners of neighboring private timberlands (as would the management practices of any large neighbor). At the same time, the presence of private holdings within and adjacent to national forest timberlands affects the extent to which national forest managers can implement desired management practices. The types and levels of forest management practiced on private inholdings may require ameliorative practices on national forest lands; private land management can also influence visitors' perceptions of national forest management.

Forest Industry

Most forest industry timberlands generally are held by large, integrated firms (sawmill and small forest industry firms typically own little timberland). The majority of forest industry lands are found in the southern part of

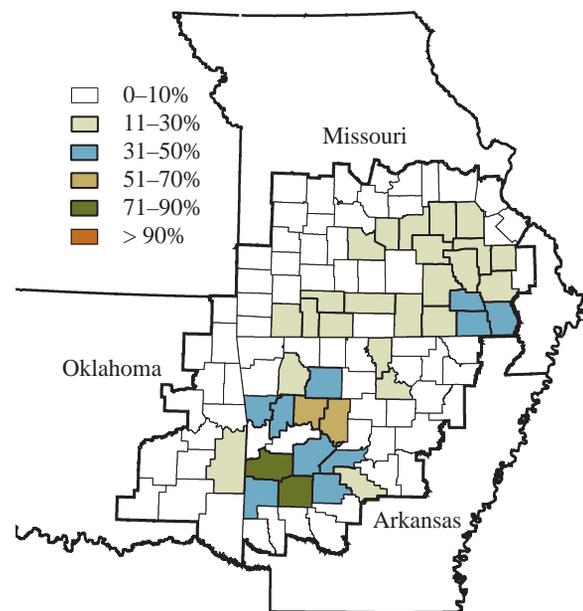


Figure 6.8—Percentage of county timberland acres in national forests (USDA FS FIA 1997).

the Assessment area in Arkansas and Oklahoma (fig. 6.9). Forest industry firms manage their holdings primarily for the production of timber products, but each firm favors a different type of product and employs a different timber management. As a result, forest industry holdings are diverse rather than monolithic. Forest industry timberlands remain an important source of non-timber forest products, particularly those related to air and water quality, wildlife habitat, and dispersed forms of recreation, including hunting and foraging.

Other Public Ownership Category

The “other public” category includes lands managed by State and local government and Federal agencies other than the Forest Service. State-managed timberlands are scattered throughout the Assessment area; they consist mainly of State parks and State wildlife management areas. Most “other Federal” lands in the Assessment area are part of military installations or wildlife refuges or are adjacent to reservoirs maintained by the U.S. Army Corps of Engineers.

The management objectives of State and local government and “other Federal” agencies tend to be more narrowly defined than management objectives for

national forests. However, frequently visited areas on holdings within or immediately adjacent to national forest timberland may act to constrain national forest timber management options.

Land Ownership Patterns

Thirty-two Assessment area counties with above average national forest acreage also have above average acreage for at least one other timberland ownership category. (In most cases, the other category class involved is NIPF owners.) This issue is raised because the need for dialogue, opportunities to prevent misunderstanding or conflict, and partnerships may be increased in areas with concentrations of two or more classes of timberland ownership.

Counties with above average acreage in both national forest and NIPF ownership classes include Crawford, Newton, Pope, and Stone Counties in Arkansas; Barry, Crawford, Dent, Douglas, Howell, Iron, Laclede, Madison, Oregon, Phelps, Reynolds, Ripley, Shannon, Taney, Texas, Washington, and Wayne Counties in Missouri; and Le Flore County in Oklahoma (fig. 6.10). In a smaller number of cases, the other ownership class is forest industry. Such counties include Garland, Perry, Polk, and Yell Counties in Arkansas; Carter, Oregon, Reynolds, Shannon, Texas, Washington, and Wayne Counties in Missouri; and Le Flore and McCurtain Counties in Oklahoma (fig. 6.11).

Although the acreages involved are usually small, there are numerous cases where counties with above average national forest acreage also have above average acreage for one of the three remaining ownership classes. No action may be necessary or possible where the other ownership class is “other corporate,” but the need for interagency communication clearly is heightened when the “other owner” is a State or Federal agency. Counties where the other ownership class is State and local include Garland, Montgomery, Newton, Perry, Polk, Pope, and Yell Counties in Arkansas; and Carter, Crawford, Dent, Howell, Reynolds, Shannon, Taney, Washington, and Wayne Counties in Missouri (fig. 6.12). Cases where the other ownership class is “other Federal” include Baxter, Franklin, Montgomery, and Yell Counties in Arkansas; Crawford, Pulaski, Reynolds, and Wayne Counties in Missouri; and Le Flore and McCurtain Counties in Oklahoma (fig. 6.13).

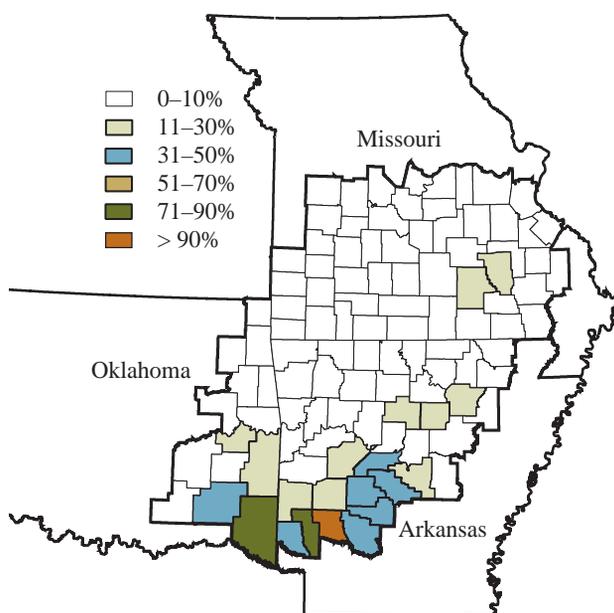


Figure 6.9—Percentage of county timberland acres owned by forest industry (USDA FS FIA 1997).

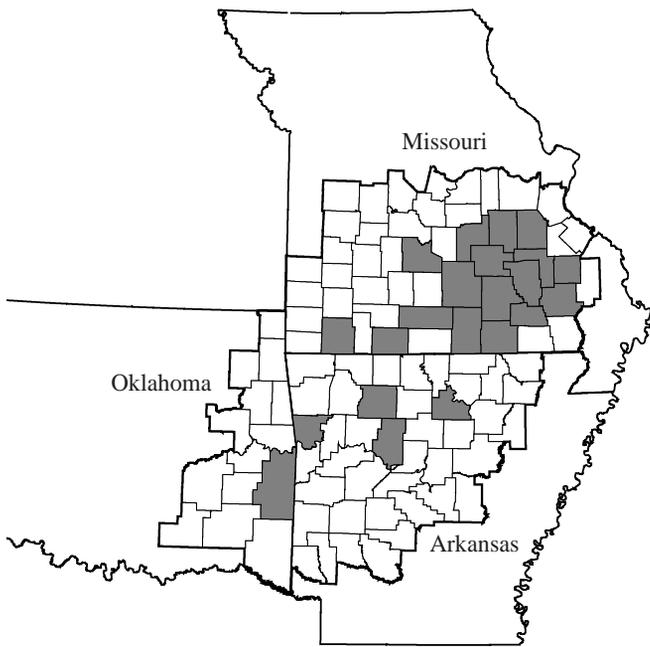


Figure 6.10—Shaded counties have above average acreage in both national forest and NIPF ownership classes (USDA FS FIA 1997).

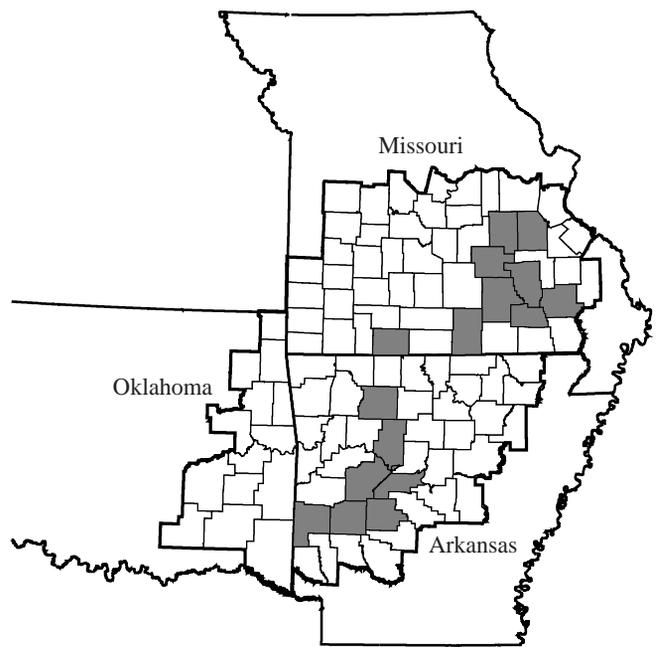


Figure 6.12—Shaded counties have above average acreage in both national forest and State and local ownership classes (USDA FS FIA 1997).

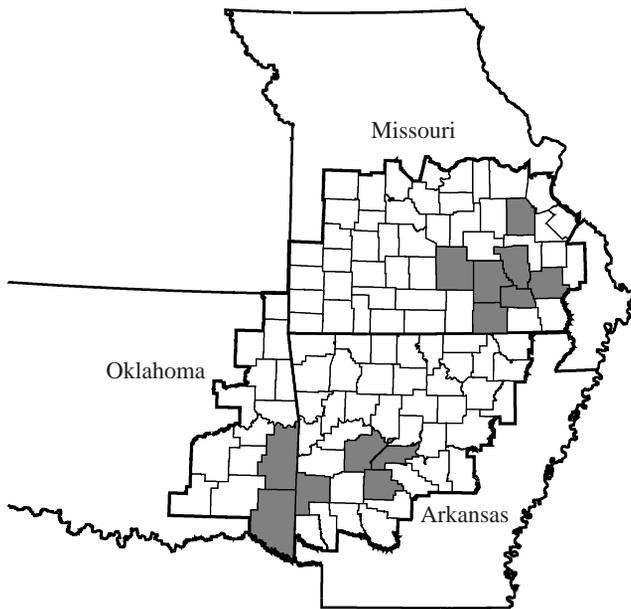


Figure 6.11—Shaded counties have above average acreage in both national forest and forest industry ownership classes (USDA FS FIA 1997).



Figure 6.13—Shaded counties have above average acreage in both national forest and other Federal ownership classes (USDA FS FIA 1997).

Volume, Growth, and Mortality

In terms of overall timber volume, hardwood predominates in the Highlands; there is about twice as much hardwood growing stock than softwood (14,424 and 6,811 million cubic feet, respectively) and more than one and one-half times as much hardwood sawtimber than softwood (38,132 versus 24,300 million board feet, respectively) (table 6.10). Approximately 96 percent of softwood growing-stock volume is distributed among forest industry (1,799 million cubic feet), NIPF (2,453 million cubic feet), and national forest lands (2,315 million cubic feet). While softwood

growing-stock volume per acre is highest on national forest and forest industry lands, growth of the timber inventory is much higher on forest industry lands. Softwood mortality is low for all ownerships for both sawtimber and growing stock. National forests manage more softwood sawtimber (9,939 million board feet) than any other ownership, with NIPF owners a close second (8,428 million board feet).

Approximately 68 percent of hardwood volume in the region is located on NIPF land and about 25 percent is found on public lands. Growth rates are similar among the ownerships for both sawtimber and growing stock, and mortality rates are low.

Table 6.10—Timber volume, growth, and mortality on timberland in the Highlands by timber resource and ownership category

Resource	Measure	Unit	Ownership category				
			National forest	Other public	Forest industry	NIPF	Total
All inventory							
Growing stock	Inventory	mmcf	5,086.496	1,104.602	2,585.559	12,459.257	21,235.914
	Inventory/acre	cf/ac	1,345.634	846.438	857.868	706.091	824.901
	Growth/acre/year	cf/ac	35.576	24.747	66.153	24.576	31.068
	Mortality/acre/year	cf/ac	5.699	7.594	4.001	4.089	4.493
Sawtimber	Inventory	mmbf	17,723.415	3,656.746	6,702.019	34,349.595	62,431.776
	Inventory/acre	bf/ac	4,688.734	2,802.104	2,223.678	1,946.661	2,425.137
	Growth/acre/year	bf/ac	143.611	83.765	145.195	79.417	96.766
	Mortality/acre/year	bf/ac	15.411	26.292	11.768	10.504	12.177
Softwood							
Growing stock	Inventory	mmcf	2,315.702	242.993	1,799.407	2,453.400	6,811.502
	Growth/inventory/year	cf/cf	0.028	0.041	0.097	0.053	0.056
	Mortality/inventory/year	cf/cf	0.003	0.005	0.003	0.005	0.004
Sawtimber	Inventory	mmbf	9,938.576	970.214	4,963.137	8,427.824	24,299.751
	Growth/inventory/year	bf/bf	0.032	0.047	0.076	0.059	0.051
	Mortality/inventory/year	bf/bf	0.002	0.005	0.004	0.005	0.004
Hardwood							
Growing stock	Inventory	mmcf	2,770.794	861.608	786.152	10,005.858	14,424.412
	Growth/inventory/year	cf/cf	0.025	0.026	0.032	0.030	0.029
	Mortality/inventory/year	cf/cf	0.005	0.010	0.008	0.006	0.006
Sawtimber	Inventory	mmbf	7,784.839	2,686.532	1,738.882	25,921.771	38,132.024
	Growth/inventory/year	bf/bf	0.028	0.024	0.034	0.035	0.033
	Mortality/inventory/year	bf/bf	0.005	0.011	0.009	0.005	0.006

NIPF = nonindustrial private forest; mmcf = million cubic feet; cf/ac = cubic feet per acre; mmbf = million board feet; bf/ac = board feet per acre; cf/cf = cubic feet of growth or mortality per cubic foot of inventory; bf/bf = board feet of growth or mortality per board foot of inventory.

Source: USDA FS FIA (1997).

Missouri Ozarks

Table 6.11 indicates that of the 6,550 million cubic feet of growing stock in the Missouri Ozarks, nearly 5,764 million cubic feet (88 percent of the total) is in hardwoods. NIPF lands account for about 4,911 million cubic feet (75 percent) of all growing-stock volume.

The Missouri Ozarks have the largest total timberland area of the four subregions (table 6.8) but have a relatively low inventory per acre (comparable to Oklahoma lands). This area is the least productive for timber outputs in all ownership categories, with average growth per acre for growing stock (all inventory—softwood and hardwood) of less than the timberland definition of 20 cubic feet/ac per year.

Arkansas Ozarks

In the Arkansas Ozarks, the 4,919 million cubic feet of hardwoods comprise more than 80 percent of the subregion's growing stock (table 6.12). The national forest hardwood growing stock inventory of 1,218 million cubic feet is higher than those of the other subregions and accounts for 43 percent of the total hardwood growing stock on national forests in the Assessment area.

The 4,110 million cubic feet of timber growing stock on NIPF lands constitute two-thirds of the total inventory in this subregion. Of all ownership classes, national forest lands have the highest inventory volume per acre (1,613 cubic feet/ac and 5,526 board feet/ac for all

Table 6.11—Timber volume, growth, and mortality on timberland in the Missouri Ozarks by timber resource and ownership category

Resource	Measure	Unit	Ownership category				Total
			National forest	Other public	Forest industry	NIPF	
All inventory							
Growing stock	Inventory	mmcf	1,146.794	331.465	160.756	4,911.311	6,550.327
	Inventory/acre	cf/ac	873.548	679.371	748.749	604.737	646.193
	Growth/acre/year	cf/ac	22.987	17.616	23.810	16.996	17.946
	Mortality/acre/year	cf/ac	6.054	5.826	4.118	4.001	4.365
Sawtimber	Inventory	mmbf	3,341.977	972.247	443.283	13,309.000	18,067.117
	Inventory/acre	bf/ac	2,545.687	1,992.719	2,064.664	1,638.832	1,782.329
	Growth/acre/year	bf/ac	82.336	60.267	91.818	53.821	58.629
	Mortality/acre/year	bf/ac	14.311	15.671	7.087	8.611	9.657
Softwood							
Growing stock	Inventory	mmcf	303.952	44.592	35.519	402.476	786.539
	Growth/inventory/year	cf/cf	0.026	0.030	0.030	0.039	0.033
	Mortality/inventory/year	cf/cf	0.004	0.004	0.003	0.003	0.004
Sawtimber	Inventory	mmbf	1,058.457	130.056	134.817	1,176.643	2,499.973
	Growth/inventory/year	bf/bf	0.033	0.040	0.040	0.041	0.037
	Mortality/inventory/year	bf/bf	0.003	0.002	0.002	0.003	0.003
Hardwood							
Growing stock	Inventory	mmcf	842.842	286.873	125.237	4,508.835	5,763.788
	Growth/inventory/year	cf/cf	0.027	0.025	0.032	0.027	0.027
	Mortality/inventory/year	cf/cf	0.008	0.009	0.006	0.007	0.007
Sawtimber	Inventory	mmbf	2,283.521	842.192	308.466	12,132.966	15,567.144
	Growth/inventory/year	bf/bf	0.032	0.029	0.046	0.032	0.032
	Mortality/inventory/year	bf/bf	0.007	0.009	0.004	0.006	0.006

NIPF = nonindustrial private forest; mmcf = million cubic feet; cf/ac = cubic feet per acre; mmbf = million board feet; bf/ac = board feet per acre; cf/cf = cubic feet of growth or mortality per cubic foot of inventory; bf/bf = board feet of growth or mortality per board foot of inventory.

Source: USDA FS FIA (1997).

Table 6.12—Timber volume, growth, and mortality on timberland in the Arkansas Ozarks by timber resource and ownership category

Resource	Measure	Unit	Ownership category				Total
			National forest	Other public	Forest industry	NIPF	
All inventory							
Growing stock	Inventory	mmcf	1,518.433	268.912	199.845	4,109.671	6,096.860
	Inventory/acre	cf/ac	1,613.226	1,208.397	1,149.453	829.069	968.584
	Growth/acre/year	cf/ac	42.220	31.672	63.832	25.952	29.633
	Mortality/acre/year	cf/ac	6.521	10.000	2.875	4.210	4.724
Sawtimber	Inventory	mmbf	5,201.703	931.004	458.865	10,718.699	17,310.272
	Inventory/acre	bf/ac	5,526.436	4,183.612	2,639.266	2,162.348	2,750.015
	Growth/acre/year	bf/ac	157.346	97.706	153.575	81.883	95.707
	Mortality/acre/year	bf/ac	19.320	32.839	3.097	10.025	12.030
Softwood							
Growing stock	Inventory	mmcf	300.209	32.610	114.974	730.207	1,178.000
	Growth/inventory/year	cf/cf	0.038	0.030	0.070	0.048	0.047
	Mortality/inventory/year	cf/cf	0.002	0.000	0.002	0.003	0.003
Sawtimber	Inventory	mmbf	1,303.581	141.285	315.692	2,293.036	4,053.594
	Growth/inventory/year	bf/bf	0.038	0.034	0.071	0.060	0.053
	Mortality/inventory/year	bf/bf	0.002	0.000	0.001	0.002	0.002
Hardwood							
Growing stock	Inventory	mmcf	1,218.224	236.302	84.871	3,379.464	4,918.860
	Growth/inventory/year	cf/cf	0.023	0.026	0.036	0.028	0.027
	Mortality/inventory/year	cf/cf	0.004	0.009	0.003	0.005	0.005
Sawtimber	Inventory	mmbf	3,898.122	789.720	143.174	8,425.663	13,256.678
	Growth/inventory/year	bf/bf	0.025	0.021	0.030	0.032	0.029
	Mortality/inventory/year	bf/bf	0.004	0.009	0.000	0.005	0.005

NIPF = nonindustrial private forest; mmcf = million cubic feet; cf/ac = cubic feet per acre; mmbf = million board feet; bf/ac = board feet per acre; cf/cf = cubic feet of growth or mortality per cubic foot of inventory; bf/bf = board feet of growth or mortality per board foot of inventory.

Source: USDA FS FIA (1997).

growing stock and sawtimber, respectively). The subregion's growing stock per acre is higher than in Missouri and Oklahoma, while growth per acre is lower than in Oklahoma and the Ouachitas. The highest growth rates are on forest industry lands, which have nearly 60 percent of their volume in softwoods.

Arkansas Ouachitas

The Arkansas Ouachitas have the largest timber production and the highest inventory and growth per acre in the Assessment area. Within this subregion, national forest lands have the largest total timber inventory, but NIPF and forest industry owners are not

far behind (table 6.13). The national forest lands have relatively low growth per acre. Forest industry growth rates, at least for softwoods, are quite high in comparison to the other ownership categories.

Nearly 3,500 million cubic feet of this subregion's growing-stock volume (approximately 60 percent of the total inventory) consists of softwoods. Most of the softwood growing stock inventory is on national forest (43 percent) and forest industry (30 percent) lands. National forest lands are even more dominant in the softwood sawtimber sector, containing nearly twice as much sawtimber volume as any other ownership category.

Table 6.13—Timber volume, growth, and mortality on timberland in the Arkansas Ouachitas by timber resource and ownership category

Resource	Measure	Unit	Ownership category				Total
			National forest	Other public	Forest industry	NIPF	
All inventory							
Growing stock	Inventory	mmcf	2,127.075	284.462	1,477.458	1,918.475	5,807.471
	Inventory/acre	cf/ac	1,632.519	1,285.956	936.254	1,032.884	1,170.956
	Growth/acre/year	cf/ac	38.165	42.500	60.443	435.351	48.002
	Mortality/acre/year	cf/ac	54.426	11.299	4.579	6.142	5.636
Sawtimber	Inventory	mmbf	8,056.104	1,034.451	4,265.077	6,329.065	19,684.696
	Inventory/acre	bf/ac	6,183.020	4,676.392	2,300.002	3,258.338	3,699.472
	Growth/acre/year	bf/ac	174.837	195.837	151.214	168.312	165.095
	Mortality/acre/year	bf/ac	15.565	36.798	13.457	24.983	19.151
Softwood							
Growing stock	Inventory	mmcf	1,483.188	94.193	1,074.807	835.192	3,487.310
	Growth/inventory/year	cf/cf	0.023	0.052	0.094	0.056	0.053
	Mortality/inventory/year	cf/cf	0.003	0.007	0.004	0.009	0.005
Sawtimber	Inventory	mmbf	6,646.730	440.040	3,256.587	3,361.397	13,704.748
	Growth/inventory/year	bf/bf	0.028	0.057	0.075	0.060	0.048
	Mortality/inventory/year	bf/bf	0.002	0.007	0.004	0.010	0.005
Hardwood							
Growing stock	Inventory	mmcf	643.960	190.270	402.652	1,083.283	2,320.161
	Growth/inventory/year	cf/cf	0.024	0.024	0.028	0.035	0.030
	Mortality/inventory/year	cf/cf	0.004	0.010	0.011	0.004	0.006
Sawtimber	Inventory	mmbf	1,409.380	594.410	1,008.490	2,967.668	5,979.948
	Growth/inventory/year	bf/bf	0.031	0.031	0.034	0.042	0.037
	Mortality/inventory/year	bf/bf	0.004	0.008	0.012	0.005	0.006

NIPF = nonindustrial private forest; mmcf = million cubic feet; cf/ac = cubic feet per acre; mmbf = million board feet; bf/ac = board feet per acre; cf/cf = cubic feet of growth or mortality per cubic foot of inventory; bf/bf = board feet of growth or mortality per board foot of inventory.

Source: USDA FS FIA (1997).

This subregion includes 64 percent of all national forest softwood growing stock and 66 percent of all national forest softwood sawtimber in the Assessment area. Approximately 47 percent of this subregion's total hardwood volume is on NIPF lands. Forest industry in the Arkansas Ouachitas owns more land and timber volume (nearly 1,500 million cubic feet) than the industry does in other subregions.

Oklahoma

The Oklahoma subregion has nearly equal volumes of hardwood and softwood growing stock but somewhat larger amounts of softwood than hardwood sawtimber (table 6.14). Forest industry and NIPF lands account for

most (78 percent) of the softwood volume while 73 percent of the hardwood growing stock is on NIPF land.

This subregion is apparently productive, judging from the high growth per acre (particularly on national forest and forest industry lands) and low mortality per acre values. In contrast, the inventory per acre values are low in comparison to the Arkansas Ozarks and Ouachitas. This may result from a forest age class structure skewed more to younger classes than in other subregions.

This subregion has the smallest timberland acreage of the four subregions. Similarly, the national forest acreage is lower than other subregions. National forests hold less than 6 percent of subregional hardwood volume and less than 23 percent of softwood volumes.

Table 6.14—Timber volume, growth, and mortality on timberland in the Oklahoma subregion by timber resource and ownership category

Resource	Measure	Unit	Ownership category				Total
			National forest	Other public	Forest industry	NIPF	
All inventory							
Growing stock	Inventory	mmcf	294.194	219.762	747.500	1,519.800	2,781.256
	Inventory/acre	cf/ac	1,321.320	589.165	713.725	560.891	638.988
	Growth/acre/year	cf/ac	66.630	19.437	67.873	30.548	40.423
	Mortality/acre/year	cf/ac	1.733	6.281	2.058	2.501	2.68
Sawtimber	Inventory	mmbf	1,123.631	719.044	1,534.794	3,922.222	7,369.691
	Inventory/acre	bf/ac	5,046.580	1,927.701	1,465.446	1,473.352	1,693.170
	Growth/acre/year	bf/ac	264.342	39.801	105.781	85.406	95.554
	Mortality/acre/year	bf/ac	5.003	30.073	8.072	6.342	8.724
Softwood							
Growing stock	Inventory	mmcf	228.422	71.598	574.108	485.525	1,359.653
	Growth/inventory/year	cf/cf	0.055	0.039	0.112	0.069	0.083
	Mortality/inventory/year	cf/cf	0.001	0.007	0.002	0.002	0.002
Sawtimber	Inventory	mmbf	929.811	258.837	1,256.041	1,596.747	4,041.437
	Growth/inventory/year	bf/bf	0.057	0.043	0.083	0.069	0.069
	Mortality/inventory/year	bf/bf	0.001	0.004	0.005	0.002	0.003
Hardwood							
Growing stock	Inventory	mmcf	65.772	148.164	173.392	1,034.276	1,421.60.
	Growth/inventory/year	cf/cf	0.035	0.030	0.041	0.048	0.045
	Mortality/inventory/year	cf/cf	0.003	0.012	0.005	0.006	0.006
Sawtimber	Inventory	mmbf	193.820	460.207	278.753	2,395.474	3,328.254
	Growth/inventory/year	bf/bf	0.030	0.008	0.023	0.050	0.041
	Mortality/inventory/year	bf/bf	0.003	0.022	0.010	0.006	0.008

NIPF = nonindustrial private forest; mmcf = million cubic feet; cf/ac = cubic feet per acre; mmbf = million board feet; bf/ac = board feet per acre; cf/cf = cubic feet of growth or mortality per cubic foot of inventory; bf/bf = board feet of growth or mortality per board foot of inventory.

Source: USDA FS FIA (1997).

Trends in Volume, Growth, and Mortality

Increases in inventory imply an increased capacity for harvests in the future. Past growth exceeding removals will lead to increasing inventories. Tables 6.15a and 6.15b show data from the most recent survey in Missouri and the two most recent forest surveys for the other three subregions. Previous (1972) survey data for Missouri were deemed too out of date to be meaningful as a basis for comparison with the 1989 survey, and thus no data are available to show trends in inventory for Missouri. (However, data from this earlier survey are discussed and presented in Chapter 3 of a companion report—*Terrestrial Vegetation and Wild-*

life—USDA FS 1999b.) For Arkansas, the survey years were 1988 and 1995 and for Oklahoma, 1986 and 1993. Data for Missouri came from the 1989 survey.

Hardwood sawtimber and growing stock inventories increased for all ownerships in the subregions of Arkansas and all but one (national forests) in Oklahoma. The hardwood inventories on NIPF lands (where the majority of hardwood is located) increased more than 50 percent in Oklahoma and more modestly in Arkansas.

Softwood volume increased in all four ownerships in the three regions, except for sawtimber volume owned by forest industry in Oklahoma. Increases in national forest softwood volume ranged from 9 percent in the Arkansas Ouachitas to 15 percent in the Arkansas

Table 6.15a—Trends in hardwood inventory by ownership category, subregion, and timber category

Ownership category Survey	Missouri Ozarks		Arkansas Ozarks		Arkansas Ouachitas		Oklahoma ^a	
	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber
	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>
National forest								
Previous survey ^b	—	—	1.105	3.108	5.29	1.064	77	250
Recent survey ^c	843	2.284	1.218	3.898	644	1.409	66	194
Percent change	—	—	10	25	22	32	-15	-22
Other public								
Previous survey ^b	—	—	207	687	143	403	83	313
Recent survey ^c	287	842	236	790	190	594	148	460
Percent change	—	—	14	15	33	47	79	47
Forest industry								
Previous survey ^b	—	—	55	74	392	956	163	356
Recent survey ^c	125	309	85	143	402	1.008	173	279
Percent change	—	—	56	93	3	5	6	-22
NIPF								
Previous survey ^b	—	—	3.307	7.209	925	2.407	668	1.471
Recent survey ^c	4.509	12.133	3.380	8.426	1.083	2.968	1.034	2.396
Percent change	—	—	2	17	17	19	55	63

mmcf = million cubic feet; mmbf = million board feet; — = not available; NIPF = nonindustrial private forest.

^a Inventory and removals data for national forest lands in Oklahoma are based on few samples, making the standard errors very high and thereby leaving any changes between surveys statistically insignificant.

^b Previous survey for Missouri not available; previous Arkansas survey was 1988; previous Oklahoma survey was 1986.

^c “Recent” survey for Missouri was in 1989; Arkansas in 1995; Oklahoma in 1993.

Source: USDA FS FIA (1997).

Table 6.15b—Trends in softwood inventory by ownership category, subregion, and timber category

Ownership category Survey	Missouri Ozarks		Arkansas Ozarks		Arkansas Ouachitas		Oklahoma ^a	
	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber	Growing stock	Saw- timber
	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>	<i>mmcf</i>	<i>mmbf</i>
National forest								
Previous survey ^b	—	—	262	1.177	1.361	5.852	200	849
Recent survey ^c	304	1.059	300	1.304	1.483	6.647	228	930
Percent change	—	—	15	11	9	14	14	10
Other public								
Previous survey ^b	—	—	32	115	52	226	55	186
Recent survey ^c	45	130	33	141	94	440	72	259
Percent change	—	—	1	23	83	94	30	39
Forest industry								
Previous survey ^b	—	—	50	150	791	3.013	355	1.280
Recent survey ^c	36	135	115	316	1.074	3.257	574	1.256
Percent change	—	—	132	111	36	8	62	-2
NIPF								
Previous survey ^b	—	—	579	1.660	693	2.832	396	1.419
Recent survey ^c	403	1.177	730	2.293	835	3.361	486	1.597
Percent change	—	—	26	38	20	19	23	13

mmcf = million cubic feet; mmbf = million board feet; — = not available; NIPF = nonindustrial private forest.

^a Inventory and removals data for national forest lands in Oklahoma are based on few samples, making the standard errors very high and thereby leaving any changes between surveys statistically insignificant.

^b Previous survey for Missouri not available, Arkansas survey was 1988, Oklahoma survey was 1986.

^c “Recent” survey for Missouri was in 1989, Arkansas in 1995, Oklahoma in 1993.

Source: USDA FS FIA (1997).

Ozarks. NIPF growing stock increases ranged from 23 percent in Oklahoma to 26 percent in the Arkansas Ozarks.

Tree Grade

Tree grade is important in determining the quality of the standing timber resource, particularly for hardwood forests. Different grades can command widely differing prices. FIA surveys estimate the grade of standing sawtimber trees, using a scale in which grade 1 is the highest and grade 3 is the lowest. Across all subregions except Oklahoma, NIPF lands have the largest proportion of higher grade hardwoods relative to the other ownership categories (table 6.16a). The greatest

amount of high grade hardwoods on national forest lands occurs in the Arkansas Ozarks. National forests account for nearly as high a percentage of this subregion's high grade hardwood (43 percent) as NIPF lands (48 percent).

In three timber subregions, the national forests have by far the greatest share of the grade 1 softwood sawtimber volume in comparison to other ownership categories (table 6.16b). In the Arkansas Ozarks, the national forests and NIPF lands have nearly equal shares (47 and 46 percent of the total, respectively). However, when the volume in grades 1 and 2 is combined, NIPF lands have the largest share in the Arkansas Ozarks. Note that much of Missouri's inventory has not been graded.

Table 6.16a—Hardwood sawtimber volume by FIA subregion, tree grade, and ownership category

Subregion Tree grade	Ownership category				Total
	National forest	Other public	Forest industry	NIPF	
----- Million board feet -----					
Missouri Ozarks					
Grade 1	7.13 (6) ^a	9.11 (8)	0 (0)	100.42 (86)	116.65 (100)
Grade 2	97.59 (19)	17.98 (3)	3.39 (1)	403.37 (77)	522.32 (100)
Grade 3+	2,140.77 (37)	173.95 (3)	76.82 (1)	3,400.28 (59)	5,791.82 (100)
Ungraded	38.04 (< 1)	641.15 (7)	228.26 (2)	8,222.88 (90)	9,130.33 (100)
Arkansas Ozarks					
Grade 1	965.85 (43)	175.49 (8)	10.98 (< 1)	1,084.96 (48)	2,237.29 (100)
Grade 2	999.98 (33)	214.57 (7)	41.94 (1)	1,744.74 (58)	3,001.23 (100)
Grade 3+	1,932.29 (24)	399.65 (5)	90.25 (1)	5,595.96 (70)	8,018.16 (100)
Ungraded	0	0	0	0	0
Arkansas Ouachitas					
Grade 1	106.88 (15)	114.99 (16)	150.55 (21)	360.47 (49)	732.90 (100)
Grade 2	254.66 (20)	108.19 (9)	231.66 (19)	650.86 (52)	1,245.37 (100)
Grade 3+	1,047.84 (26)	371.23 (9)	626.26 (16)	1,804.70 (45)	4,001.66 (100)
Ungraded	0	0	0	0	0
Oklahoma					
Grade 1	31.76 (7)	205.11 (46)	30.19 (7)	179.45 (40)	446.51 (100)
Grade 2	47.76 (8)	70.73 (12)	43.74 (8)	411.32 (72)	573.56 (100)
Grade 3+	114.29 (5)	184.37 (8)	204.82 (9)	1,804.70 (78)	2,308.18 (100)
Ungraded	0	0	0	0	0

FIA = Forest Inventory and Analysis; NIPF = nonindustrial private forest.

^a Percent (rounded) of grade held by ownership category within subregion (in parentheses); row totals may appear to be less than 100 due to rounding.

Source: USDA FS FIA (1997).

Table 6.16b—Softwood sawtimber volume by FIA subregion, tree grade, and ownership category

Subregion Tree grade	Ownership category				Total
	National forest	Other public	Forest industry	NIPF	
----- Million board feet -----					
Missouri Ozarks					
Grade 1	20.67 (70) ^a	1.23 (4)	0 (0)	7.72 (26)	29.62 (100)
Grade 2	221.22 (82)	6.17 (2)	4.17 (2)	37.46 (14)	269.02 (100)
Grade 3+	506.58 (68)	11.74 (2)	22.22 (3)	202.92 (27)	743.46 (100)
Ungraded	5.94 (1)	62.08 (10)	66.49 (11)	490.33 (78)	624.83 (100)
Arkansas Ozarks					
Grade 1	671.90 (47)	24.00 (2)	70.80 (5)	654.33 (46)	1,421.03 (100)
Grade 2	265.82 (30)	49.49 (6)	71.99 (8)	493.58 (56)	880.87 (100)
Grade 3+	365.86 (21)	67.79 (4)	172.90 (10)	1,145.13 (65)	1,751.69 (100)
Ungraded	0	0	0	0	0
Arkansas Ouachitas					
Grade 1	3,493.85 (61)	110.77 (2)	1,161.31 (20)	953.41 (17)	5,719.34 (100)
Grade 2	1,435.44 (52)	59.20 (2)	626.82 (23)	626.01 (23)	2,748.48 (100)
Grade 3+	1,717.43 (33)	270.06 (5)	1,467.49 (28)	1,782.01 (34)	5,236.99 (100)
Ungraded	0	0	0	0	0
Oklahoma					
Grade 1	325.55 (47)	25.30 (4)	167.567 (24)	168.778 (25)	687.20 (100)
Grade 2	176.60 (22)	64.06 (8)	265.41 (33)	286.75 (36)	792.83 (100)
Grade 3+	427.66 (17)	169.48 (7)	823.06 (32)	1,141.21 (45)	2,561.41 (100)
Ungraded	0	0	0	0	0

FIA = Forest Inventory and Analysis; NIPF = nonindustrial private forest.

^a Percent of grade (rounded) held by ownership category within subregion (in parentheses); row total may appear to be less than 100 percent due to rounding.

Source: USDA FS FIA (1997).

Diameter and Stand Size Class

In addition to tree grade, tree diameter or stand size class influences potential timber supply. Stands that are unstocked or in the seedling/sapling category are currently unavailable for harvest but may be harvestable in the future. Poletimber and sawtimber stands are currently harvestable, but for different products: poletimber is either left to grow or be harvested for pulp and posts, while sawtimber is harvested for lumber, veneer, or plywood production. Larger sawtimber is often a highly valued product. Management regimes on public land typically call for growing trees longer before

harvest than on forest industry lands. Due to this difference, large sawtimber reserves are often expected on public lands. In the national forests, 58 percent of the acres are in sawtimber-sized stands and only 14 percent in saplings. The other ownership categories have from 28 to 48 percent in sawtimber. These percentages imply that national forests have older stands, on average, than other ownerships (table 6.17).

In terms of volume, FIA data indicate that the large diameter softwood volume (greater than 20 in. d.b.h.) is distributed principally between the national forests (38 percent of the total) and NIPF lands (42 percent of the total) (table 6.18). Forest industry accounts for 12

Table 6.17—Timberland acres and percent of acres in various stand size classes, by ownership category^a

Stand size class	Ownership category							
	National forest		Other public		Forest industry		NIPF	
	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>
Sawtimber	2,173,312	58	629,299	48	829,674	28	6,932,111	39
Poletimber	1,094,251	29	355,699	27	1,344,120	45	6,309,246	36
Sapling	512,069	14	319,651	24	840,141	28	4,392,832	25
Unstocked	0	0	0	0	0	0	11,200	1

NIPF = nonindustrial private forest.

^a Percent columns do not add to 100 due to rounding.

Source: USDA FS FIA (1997).

Table 6.18—Percent growing-stock volume in trees greater than 20 inches in diameter by ownership category and timber type^a

Timber category	Ownership category			
	National forest	Other public	Forest industry	NIPF
	----- <i>Percent</i> -----			
Large softwood	38	7	12	42
All softwood	34	4	26	36
Large hardwood	17	14	5	64
All hardwood	19	6	5	69

NIPF = nonindustrial private forest.

^a Some rows do not add to 100 due to rounding.

Source: USDA FS FIA (1997).

percent of large diameter softwood, which is low in comparison to their share of total softwood growing stock (26 percent). NIPF lands have the majority (64 percent) of large diameter hardwood volume, which is proportionate to their share (69 percent) of total hardwood volume.

Physical Constraints to Harvesting

Wet sites, slope, and low stocking may (1) reduce inventory volume available for harvest or (2) raise harvesting costs. Table 6.19 presents estimates of the

reduction in available volume on private lands due to these factors. The first reduction applies to sites that have been classified as wet or moist. The next type of reduction applies to sites too steep to harvest and/or regenerate, i.e., sites with a slope greater than 35 percent. The latter standard corresponds to the breakpoint in harvesting technology, with slopes greater than 35 percent requiring cable systems (Worthington and others 1996). The final reduction applies to sites that were stocked below the level most loggers consider harvestable (Nolan 1997). These factors reduce available softwood volumes by only 10 percent but reduce hardwood volumes by more than 15 percent.

Constraints to timber harvesting on national forest and other public lands are evaluated using a different, more complicated process based on the determination of lands suitable for timber production during the land management planning process and annual forest inventories. Figure 6.14 shows the determination of suitable lands from the existing forest land management plans as updated through annual site-specific inventories. “Unproductive” refers to land incapable of producing 20 cubic feet/ac per year; “nonforest” is also incapable of timber production. “Lack of technology” represents sites with conditions that prevent harvest or regeneration but does not necessarily exclude land with slopes greater than 35 percent or land that is understocked. Some lands allocated to other resource uses to meet forest plan objectives—such as recreation sites, experimental forests, areas with threatened or endangered

Table 6.19—Reductions in timber volume available on private timberland due to physical constraints for growing stock and sawtimber and both softwood and hardwood

Timber category	All volume	Minus volume on wet sites	Minus volume on steep sites	Minus volume on understocked sites	Percent available
Growing stock (mmcf)					
Softwood	4,252	4,201	3,978	3,825	90
Hardwood	10,792	10,459	9,620	9,158	85
Sawtimber (mmbf)					
Softwood	13,391	13,184	12,318	12,108	90
Hardwood	27,661	26,606	24,265	23,632	85

mmcf = million cubic feet; mmbf = million board feet.
Source: USDA FS FIA (1997).

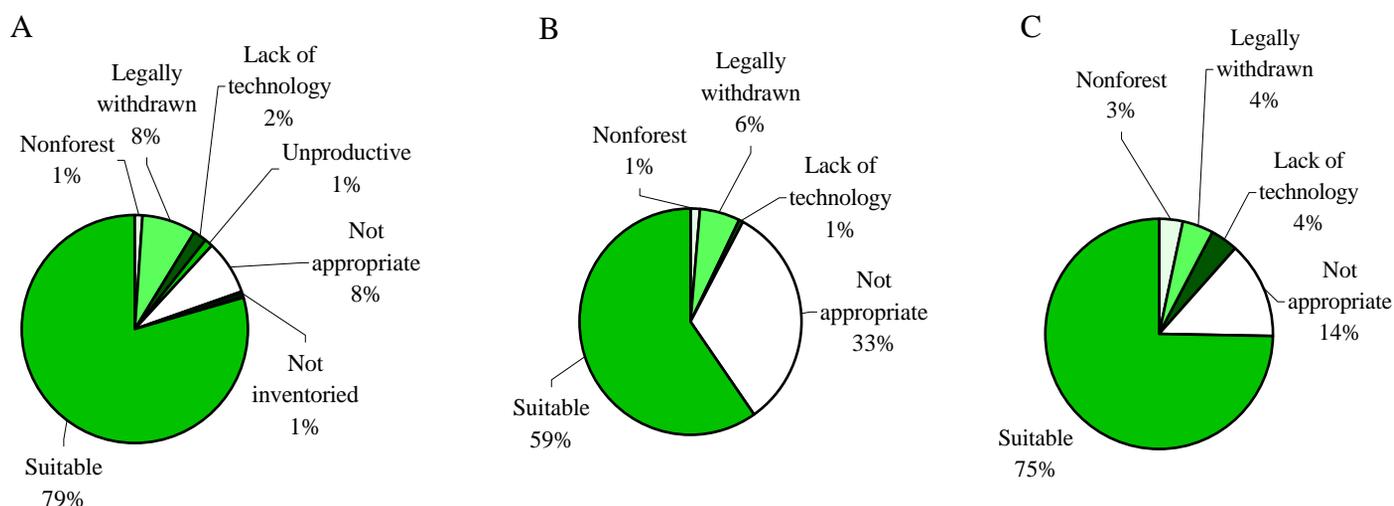


Figure 6.14—Percentages of the (A) Ozark-St. Francis, (B) Ouachita, and (C) Mark Twain National Forests in various land suitability classes, 1997. (Part B of this figure does not reflect a major land adjustment on the Ouachita National Forest in 1996.)

species, and areas not economically efficient for timber harvesting—are classified as “not appropriate” for timber production. “Withdrawn” lands are those that are legally unavailable for harvest, such as wilderness areas. Some land is classified as “not inventoried” and is currently excluded from suitable timberland. The remaining acreage is considered “suitable” for timber management, a category that ranges from 59 percent of total forest land on the Ouachita National Forest to 79 percent on the Ozark-St. Francis National Forests.

Land Management Objectives

Objectives for forest industry land are more likely to conform to profit-maximizing models of landowner behavior than are those of other ownership classes, although some public and NIPF landowners may also manage to maximize the perpetual income from a stand or forest. Land management objectives on public land (particularly national forests) and on some private land are broader and more difficult to characterize. These objectives often encompass the principles of multiple

use, land stewardship, or managing by optimizing for both profit and pleasure.

For national forest timberlands, management objectives will be reflected, in part, by the determination of acres available for timber harvest. This determination is made through the forest planning process using the above-mentioned suitability analysis, which considers the physical and economic constraints of the land and management objectives for other resources.

The decision process for private land managers is less explicit and more dynamic. This means that any analysis that adds static, price-insensitive physical constraints to land management objectives is likely to underestimate the timber volume available. Recent studies indicate that individuals who do not intend to harvest timber from their land own between 7 and 19 percent of forest land in the Highlands. For the three Assessment area States, this ownership ranges from 7 to 9 percent (Birch 1996). For the Ozarks, one estimate is that as many as 19 percent of NIPF owners do not intend to harvest timber (Gray and Guldin in press). What researchers do not know, however, is how much of the physically constrained volume these “non-harvesters” own. If the amount of timber under the control of the “nonharvesters” is added to the total amount of timber unavailable for harvest due to physical constraints, then about 66 percent of privately owned hardwood growing stock might be currently available for harvest in the Ozarks.

However, as land ownership and prices change through time, the supply picture can change dramatically without any underlying change in the resource. A large amount of the timber that may have been considered unavailable for harvest due to physical constraints may never have been available because of landowner objectives or intentions; excluding this volume will not affect the existing market. The complex model of supply and demand that is used in the following harvest scenarios incorporates both physical and management constraints on private land by using an econometrically estimated model based on current market conditions.

Factors Affecting Timber Demand

Timber demand in the Highlands is influenced by production of lumber, furniture, or paper and by exports of timber to other regions or countries. Detailed data on these three industries are not available at the county level; therefore, the following analysis focuses on the three Highlands’ States. State-level data must be used with caution because the relative importance of the industries may be higher or lower in the Highlands than in the three States. For example, the pulp and paper industry is less important to the Arkansas portion of the Highlands than to the State of Arkansas as a whole. All three States have timberland and wood products industries that are outside the Highlands.

National Trends

A national timber assessment update was conducted in 1993 in accordance with the Renewable Resources Planning Act (RPA). This national assessment projects rising consumption of pulp and paper products as well as increasing variability in timber growth and inventories (Haynes and others 1995). Between 1990 and 2040, national softwood harvests were projected to increase by 35 percent and hardwood harvests by 51 percent. Real sawtimber prices were projected to rise at a rate of 1 to 2 percent per year over this period. Other significant findings at the national level include:

- The nationwide effects of public timber harvest reductions in the West will be lessened by significant interregional substitution, including increased lumber imports from Canada. Over the projection period, western regions will continue to lose market share (in all products) to eastern regions because of rising relative wood costs. This trend will accelerate if public harvests decrease further, or if major public tree planting programs are undertaken on NIPF lands.
- The South will be the major source of any expansion in softwood timber supply for the next 50 years. If high planting rates in the South continue, which is likely, product and timber prices will stabilize and, in some cases, decline after 2020.
- Rising real prices for hardwood lumber are caused by declining inventory trends which, in turn, result from land conversion to softwoods, limited intensity of hardwood silviculture, and large increases in demands for pulpwood.

- Over the next five decades, the consumption of paper and paperboard will grow more rapidly than any other category of forest products (about 1.2 percent per year). Consumption of roundwood in the manufacture of these products will rise at about 0.7 percent per year. Uncertainty in the outlook related to this sector, such as rates of wastepaper recycling and use, are particularly critical to the roundwood use projection.
- Hardwoods will increase in importance relative to softwoods in total U.S. harvests because of increased use in lumber, fiber products, and fuelwood. In this expansion, the North has the potential to match the South in contributions of incremental fiber output. Hardwood area and inventory will drop, however, if past trends in softwood plantation establishment and limited hardwood management in the South continue (Haynes and others 1995).

Trends in the Highlands

The Highlands region produces timber for both softwood and hardwood lumber, furniture, pulp and paper, wood chips, and barrels. Lumber production from Arkansas, Oklahoma, and Missouri has generally followed national trends, with an overall increase in production over the last decade in spite of a drop in production in 1991 and 1992. Arkansas produces the majority of lumber in the Highlands (fig. 6.15), although

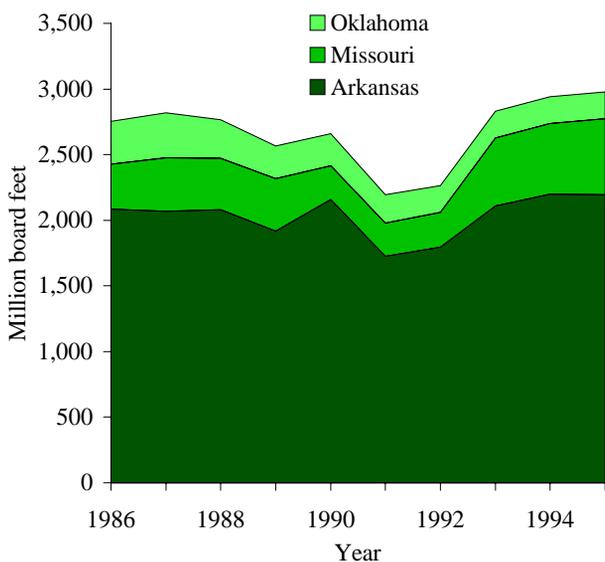


Figure 6.15—Lumber production in the Highlands' States, 1986 through 1995 (USDC BC 1987–1996).

Missouri has increased its share since 1992. Overall, these States increased their share of total U.S. lumber production from 5.5 percent in 1992 to 6.8 percent in 1995 (fig. 6.16). This increased production is similar to overall relative increases southwide, which have resulted partly from the decrease in Western U.S. timber harvests. The South, including the Highlands area, has taken up some of the slack as have increased imports from Canada (Haynes and others 1995).

Using “value added” (the sum of all income derived from the industry, including wage and owner income, less indirect business taxes) as a measure of economic contribution, the lumber, furniture, and pulp and paper industries of the Highlands' States are claiming an increasing share of total U.S. production (fig. 6.17). The pulp and paper industry has the largest share of national production (6 percent), while both the furniture and lumber industries have about 5 percent. These industries are growing throughout the South and the Nation, and this growth is mirrored in the Highlands.

Although it is not possible to predict the future of the wood products industry in the Assessment area, some trends can be observed. One of these trends is in investment, that is, the expenditures an industry makes for buildings and machinery. Investments tend to be large, periodic expenditures rather than continuous expenses and thus will be less stable for the three States than for the Nation. Even so, since 1988, the three Highlands' States claimed an increasing proportion of the U.S. investments in the furniture and lumber industries. In 1995, the last year of available data, a decline in the proportion of investment in the furniture industry and

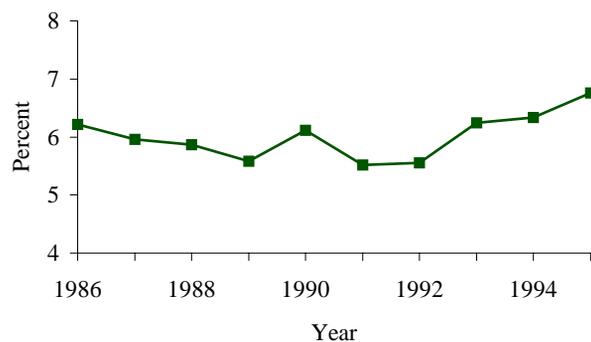


Figure 6.16—Annual Highlands' States lumber production as a percent of U.S. lumber production, 1986 through 1995 (USDC BC 1987–1996).

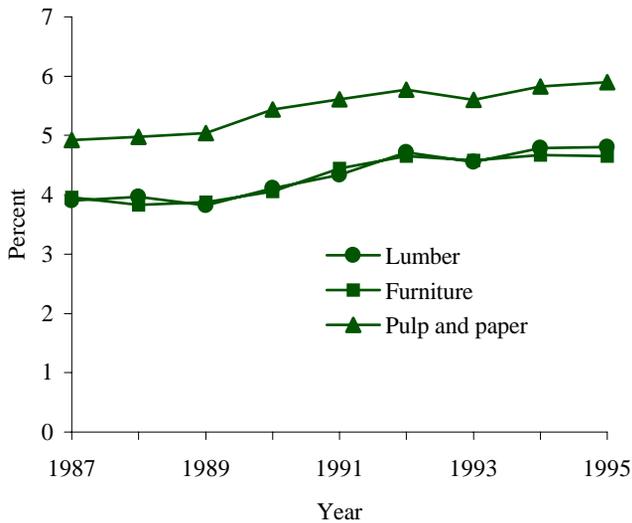


Figure 6.17—Annual Highlands’ States value added as a percent of U.S. value added for lumber, furniture, and paper industries, 1987 through 1995 (USDC BC 1988, 1993; USDC BC 1988–1996).

an increase in the proportion of investment in the lumber industry occurred. Between 1988 and 1995, the proportion of investment in the pulp and paper industry fluctuated, declining from 1992 to 1995 (fig. 6.18).

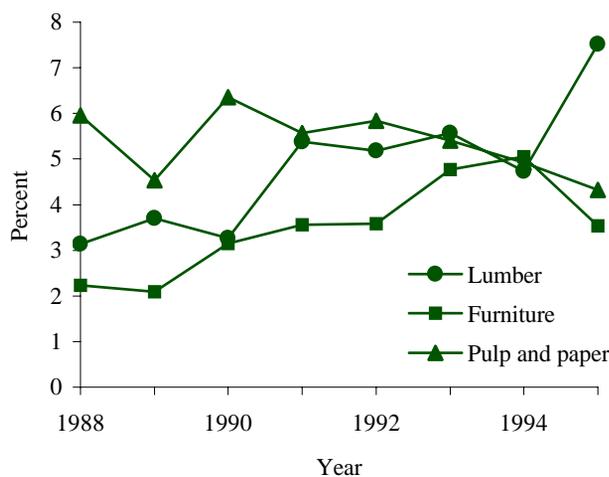


Figure 6.18—Annual Highlands’ States capital investment in wood products as a percent of U.S. capital investment for lumber, furniture, and paper industries, 1988 through 1995 (USDC BC 1988, 1993; USDC BC 1988–1996).

Another trend is increasing demand for pulpwood. There are four pulp and paper mills in the Highlands region, and the region itself serves as part of the wood supply area for all of the mills in Arkansas and Oklahoma. Between 1988 and 1995, total pulping capacity in the Highlands’ States dropped by 4 percent, resulting from a mill closure that was offset somewhat by expansions in other mills. This drop was accompanied by reduced hardwood pulpwood harvests from 1988 to 1994 and variable softwood pulpwood production, which had peaks in 1991 and 1995 and a low point in 1993.

In spite of the reduced mill capacity, demand for hardwood pulpwood (as measured by average annual removals) increased by 65 percent between 1988 and 1995, with the most dramatic increase—135 percent—occurring between 1994 and 1995. The opening of hardwood chip export mills in 1995 contributed to this increase. These mills represent a small part of the wood products sector but have generated considerable public comment.

Three of these mills, each with a processing capacity of approximately 300,000 tons of hardwood per year, will draw supplies from the Highlands Assessment area and export wood chips via the Arkansas River. A new

hardwood chip mill in Missouri also has a capacity of 300,000 tons per year but will transport chips via rail to a domestically owned pulp mill in Kentucky. These mills have affected and will continue to affect hardwood pulpwood production in the Highlands. However, as the price of hardwood pulpwood rises, industries will look for alternative sources of supply or ways to alter production technologies to use less of the scarce input. Thus, continued adjustment in the hardwood pulpwood industry is expected to continue.

Timber Supply Outlook

The national RPA timber assessment (Haynes and others 1995) includes projections of future harvests for the southeast and south central regions but does not indicate which subregions are expected to produce this harvest. The SRTS model (described earlier) can examine timber supply issues in the South by using a timber supply framework consistent with the RPA models (Abt 1998). The SRTS model tracks inventory and growth trends by individual FIA survey unit or subregion as well as by ownership category (forest industry and NIPF).

Using the latest FIA data as a starting point and applying RPA acreage and harvest trends, the SRTS model calculated the estimated stumpage price change as well as the shift in harvest among subregions and ownerships. The SRTS model assumes a harvest response to price; thus, it focuses only on private land (forest industry and NIPF) and does not include public land in the analysis or projections.

Calculations for both NIPF and forestry industry categories include all land, but inventory level and price elasticity are used to vary the responsiveness of the two owners. An elasticity of 1.0 indicates that a 1 percent increase in inventory or price leads to a 1 percent increase in harvest. Lower numbers, for example 0.3, are used to represent less responsive owners. Using elasticity ensures that all current constraints on harvest, including physical or cost constraints, are accounted for as price and inventory change over time. However, because these elasticities are constant throughout the projection, they will not incorporate the effects of changing attitudes, constraints, or costs.

The price calculations are based on the elasticities for the South developed for the national RPA timber assessment (Haynes and others 1995). The shifts among regions are based on the assumption that harvests will shift among survey units to equalize price pressure through time. The fact that historical price trends are similar for the Highlands region and the rest of the South gives some indication that they operate in the same market. Business cycles often cause short-term price fluctuations on the demand side; weather often interferes with harvests on the supply side. The SRTS model was not designed to predict short-term prices but to give some indication of the price pressure due to long-term changes in harvest and inventory.

The Southwide Outlook

The timber market assessments conducted for the RPA efforts focus on national and international markets. The most recent assessment shows a trend toward increased harvests in the South due to (1) reductions in national forest harvests in the Pacific Northwest and (2) increasing demand for pulp and paper (Haynes and others 1995). While U.S. harvests are projected to increase by 35 percent for softwoods between 1990 and 2040, analysts project a 53 percent rise in softwood harvests from private lands in the South. The South is expected to increase harvests of hardwoods by 54 percent, about the same as the projected increase nationally (51 percent).

This section examines the implications for the Highlands Assessment area of increased harvests from private lands in the South until the year 2020. The baselines for this comparison are the regional acreage and harvest trends for the South in the 1993 RPA Timber Assessment Update (Haynes and others 1995). The regional acreage trends assume that pine plantation acres will increase through the next decade. While the total area of timberland should remain relatively constant, there likely will be a gradual reduction in hardwood forest management types, including oak-pine, upland hardwood, and lowland hardwood forests. These reductions will occur as hardwoods are converted to pine plantations and to other (nonforest) land uses.

For forest management types other than pine plantations, growth rates were estimated by age class, management type, and ownership. This assumes that a

30-year-old stand (i.e., a given area of forest) today is representative of a 30-year-old stand in the future, which seems reasonable for natural stands. For pine plantations, however, this is a conservative assumption. Most industry foresters and researchers expect that improvements in genetics and silvicultural techniques will increase growth rates significantly on pine plantations. While extremely high growth rates are possible on some sites, the SRTS model is based on a regionwide average, and thus a 30 percent increase in growth (1 percent per year) was assumed for pine plantations over the projection period. The growth line in figure 6.19 shows the increase in softwood inventory due to (1) an increase in plantation acres and (2) growth rates associated with those acres. This growth increase will allow the softwood inventory to increase to above 1990 levels by the year 2020.

Figure 6.20 shows the importance of two different assumptions about productivity growth to the price forecast. Using current FIA growth rates, the increase in softwood harvests reduces the southwide timber inventory, causing prices (relative to 1990) to more than double from 2000 to 2020. Note that the SRTS model calculates the price required to achieve a given harvest level. In reality, price increases of that magnitude would lead to demand substitutions (e.g., aluminum studs) and supply substitutions (e.g., imported pulp). With a 30 percent increase in growth in plantations (1 percent

increase per year), however, prices would increase slightly between 1990 and 2000 but would then return to near current levels by 2020.

Figure 6.21 shows the hardwood inventory situation. The long-term gradual decline in growth is due mainly to decreased hardwood acreage. Projections assume that southwide hardwood removals on private lands would increase from 2.9 billion cubic feet to 4.5 billion cubic feet over the 30-year period. Growth currently exceeds removals for hardwoods, although this situation is projected to change in about 2003. Inventory will peak in that year, then begin to decline, but inventory in 2020 should be at about the same level as in 1990.

Projections show that real prices for hardwoods will increase at a rate of 4 percent per year between 1990 and 2020 (fig. 6.22). This price trend may not be realized if global hardwood fiber prices remain stable. From a southern perspective, however, there are currently fewer options for intensive management of hardwoods in the near future. Intensive hardwood silviculture is practiced in some areas, but the amount of land available for hardwood cultivation is likely to remain sparse in the short run. In addition, NIPF owners hold 90 percent of the hardwood resource. The technology and the capital traditionally associated with pine plantation management will probably not shift quickly to hardwoods. Increasing prices, however, do give landowners unprecedented incentives to manage hardwoods.

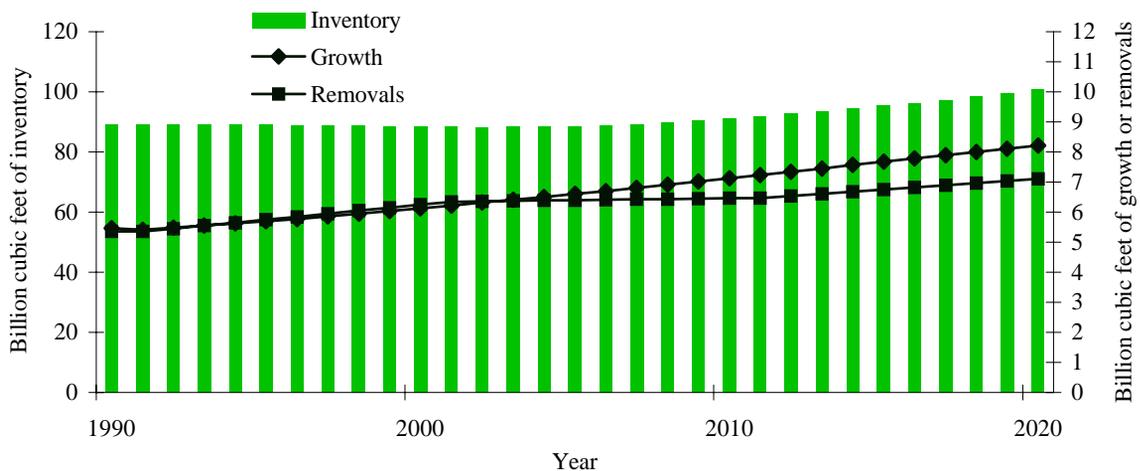


Figure 6.19—Projected southwide softwood inventory, growth, and removals on private lands using RPA acres and harvest trends and assuming plantation growth increase by 30 percent from 1990 through 2020 (developed from Abt 1998).

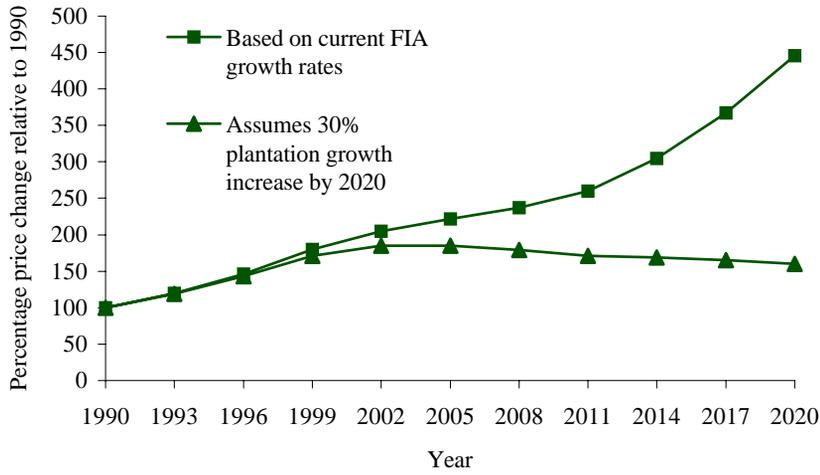


Figure 6.20—Projected southwide softwood price using RPA acres and harvest trends and two different assumptions about productivity (tree growth rates in plantations), 1990 to 2020 (developed from Abt 1998).

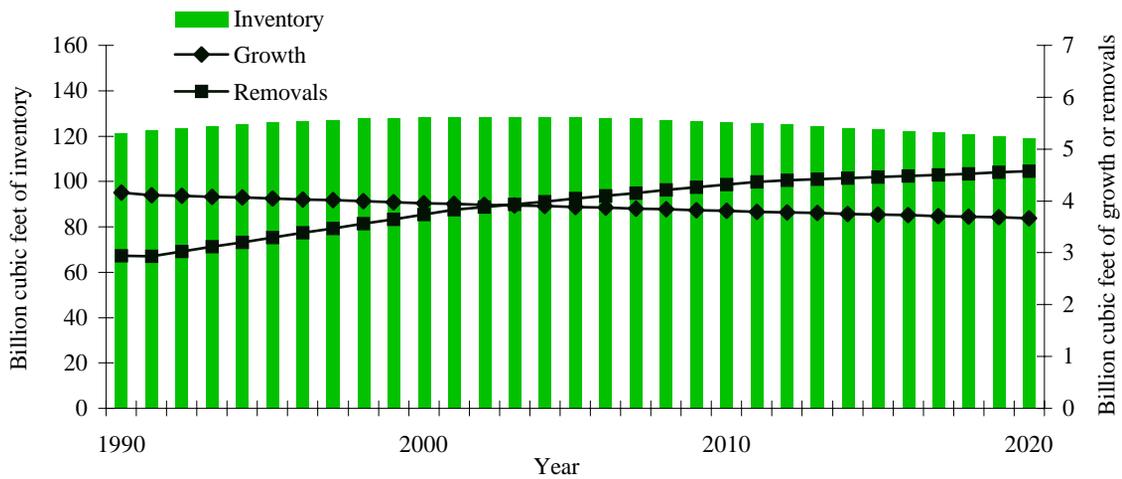


Figure 6.21—Projected southwide hardwood inventory, growth, and removals on private lands using RPA acres and harvest trends, 1990 to 2020 (developed from Abt 1998).

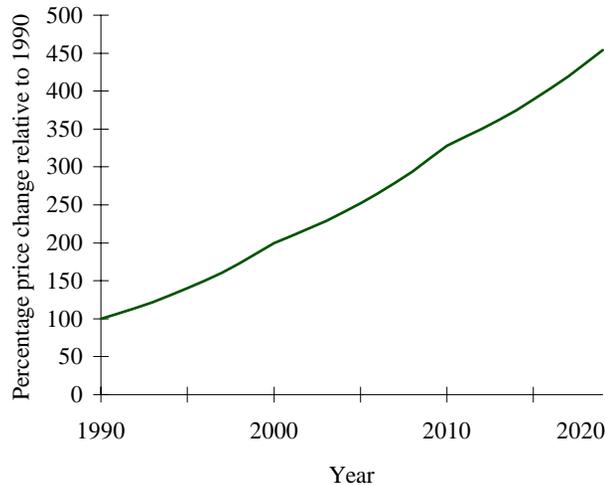


Figure 6.22—Projected southwide hardwood price trends using RPA acres and harvest trends, 1990 to 2020 (developed from Abt 1998).

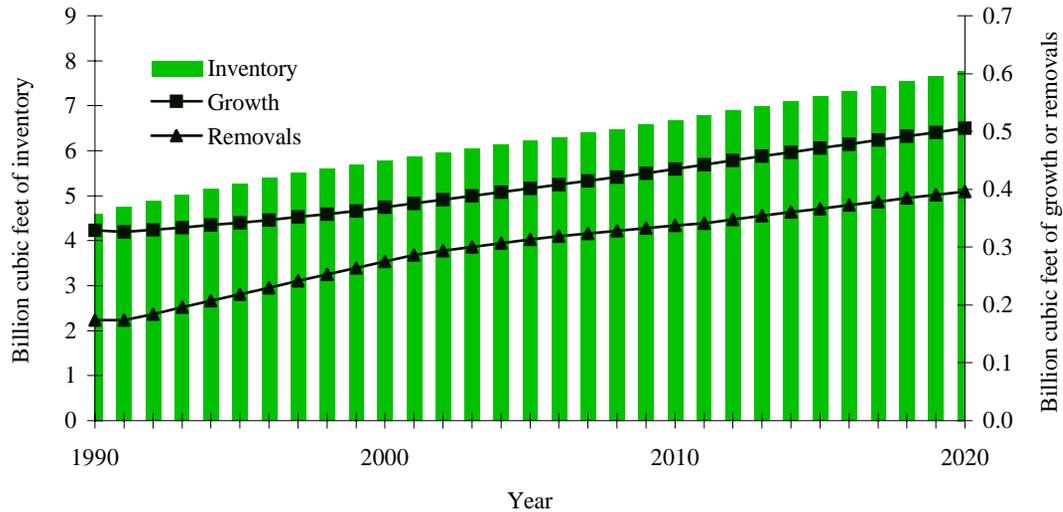


Figure 6.23—Projected softwood inventory, growth, and removals on private lands in the Highlands using RPA acres and harvest trends, 1990 to 2020 (developed from Abt 1998).

The Highlands Region Outlook

Figure 6.23 shows private (forest industry and NIPF) softwood inventory trends for the Highlands region based on the southwide projection model and assumptions. The favorable growth/removals ratios for the region’s softwoods imply that the inventory is increasing in the Assessment area. Because of the increase in the softwood inventory, harvests are expected to increase faster in the Highlands relative to other areas of the South. By 2020, the scale of softwood harvests in the Highlands is projected to be nearly double that of 1990 levels, somewhat higher than the projected southwide increase of 33 percent. Even with the increased removals, softwood inventories continue to rise. Softwood inventories are projected to increase in all four subregions, with the greatest increases in the Arkansas Ozarks and Ouachitas (fig. 6.24).

For hardwoods grown on private lands, the current favorable growth/removals ratio is projected to narrow as hardwood growth remains stable and removals increase (fig. 6.25). By the end of the projection period, hardwood removals and growth are expected to be nearly equal. Overall, hardwood inventories in the Highlands are projected to increase (fig 6.26). While inventories are projected to decline in the Arkansas Ouachitas, they are projected to increase in the other

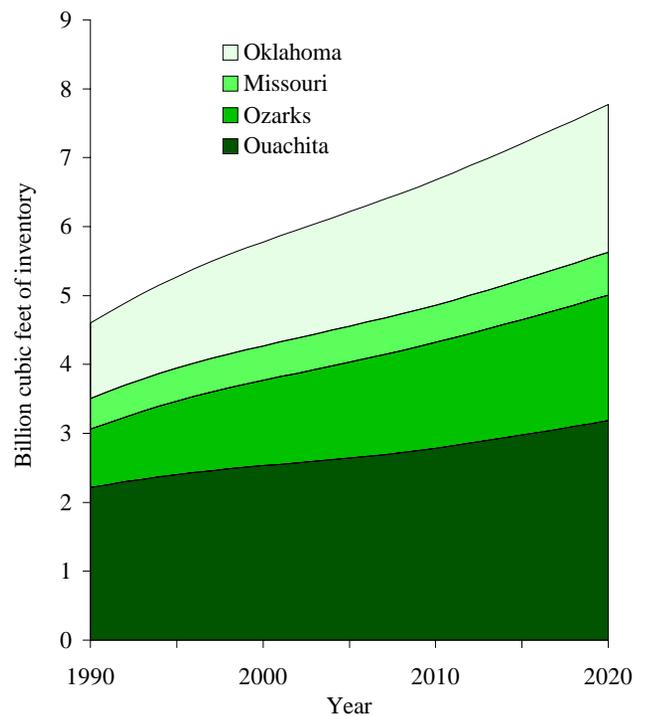


Figure 6.24—Projected total softwood inventory on private lands in the Highlands using RPA acres and harvest trends, 1990 to 2020, by timber subregion (developed from Abt 1998).

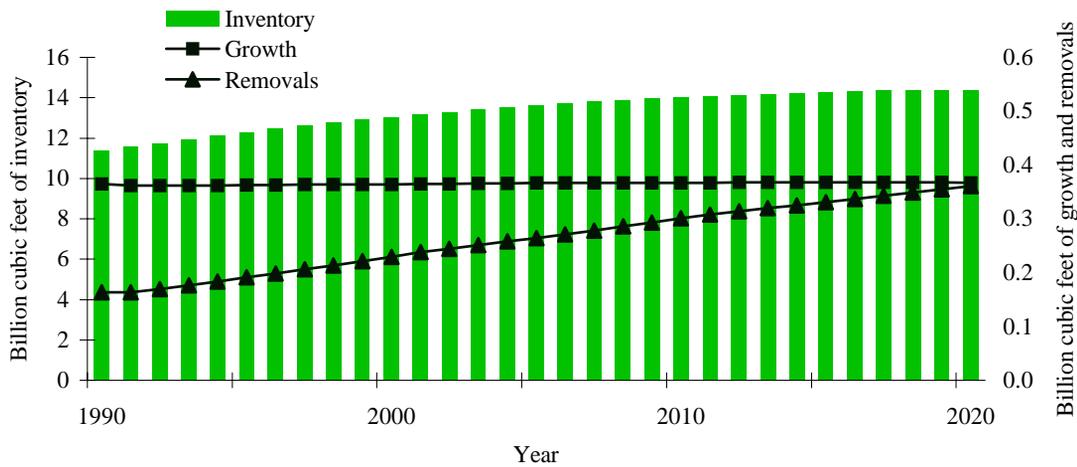


Figure 6.25—Projected hardwood inventory, growth, and removals on private lands in the Highlands using RPA acres and harvest trends, 1990 to 2020 (developed from Abt 1998).

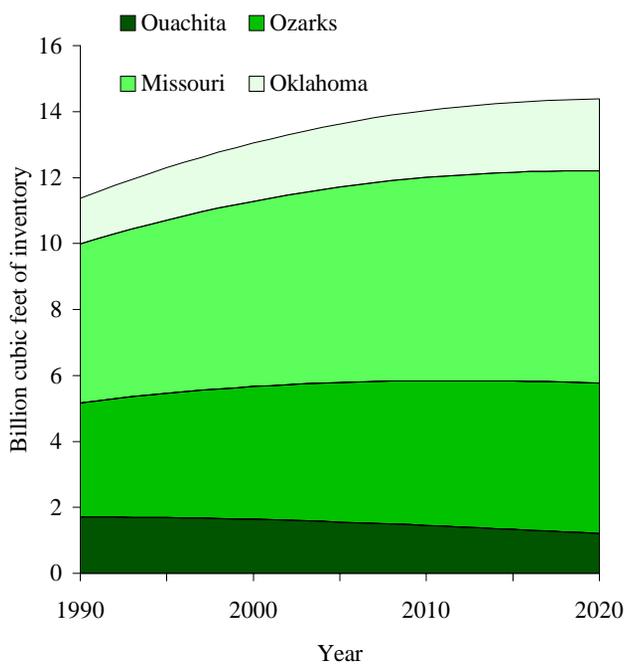


Figure 6.26—Projected total hardwood inventory on private lands in the Highlands using RPA acres and harvest trends, 1990 to 2020, by timber subregion (developed from Abt 1998).

three subregions. This implies that the Highlands’ role in southern hardwood timber markets will expand. Thus, as demand for both hardwood and softwoods increases, the Highlands’ ability to meet the demand in terms of inventory is expected to increase proportionately as well.

Relative rates of increase in southern softwood harvests are shown in figure 6.27. All parts of the South are projected to experience increasing softwood harvests, with the darker areas on the figure increasing harvests at rates greater than the southwide average and the lighter areas on the figure gaining harvests at rates less than the southwide average. The subregions of the Highlands are all projected to increase softwood harvests at rates greater than the southwide average. These projections can be misleading concerning areas where the total softwood harvest is small, such as Missouri, because a large percentage increase over a currently small harvest will still result in a small harvest.

The relative rates of increase in hardwood harvests in the South are shown in figure 6.28. With the exception of the Arkansas Ouachitas, hardwood harvests in the Highlands are projected to increase at rates higher than the average for the South. The Arkansas Ouachitas are also projected to increase hardwood harvests but at a slower rate than the regional average.

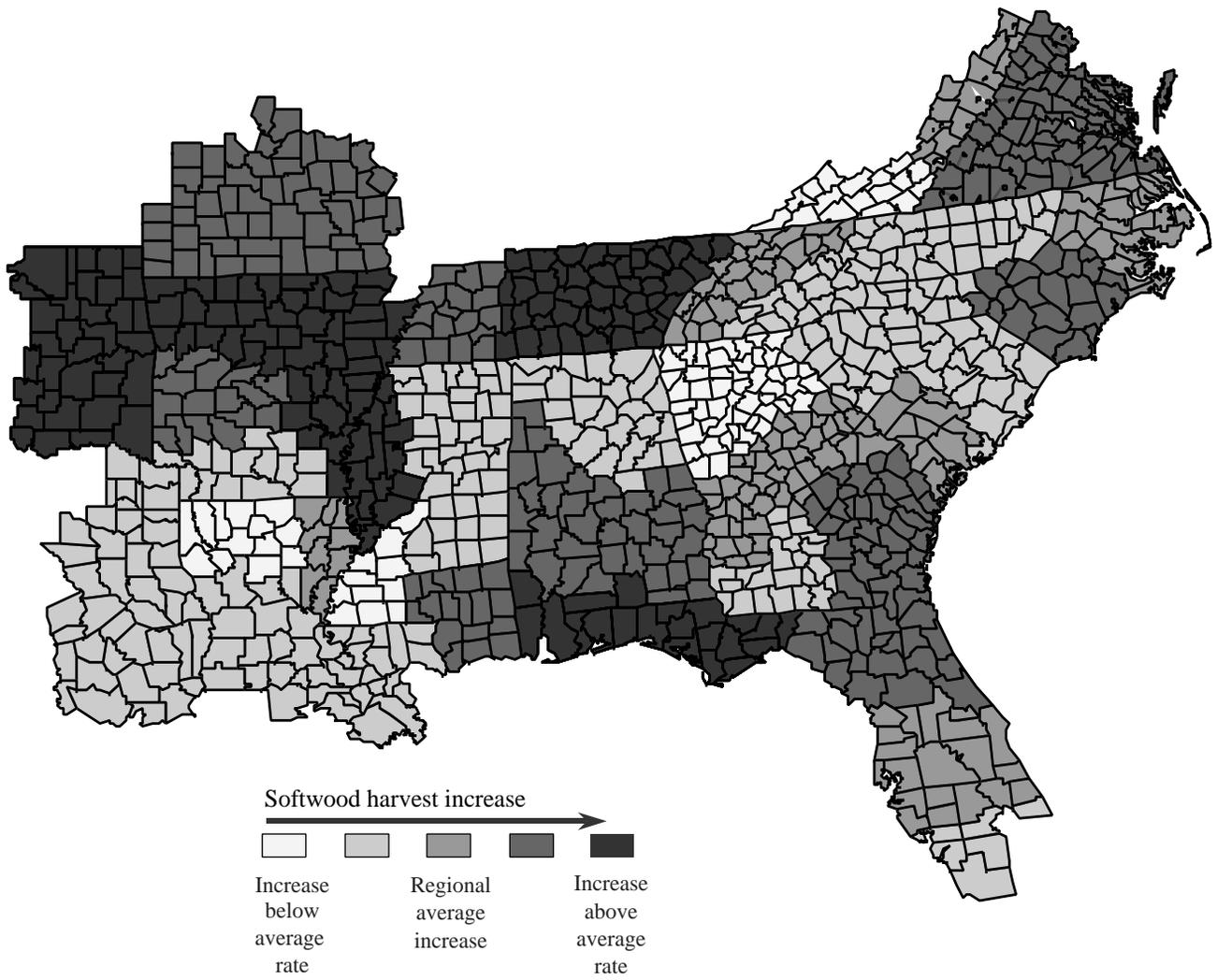


Figure 6.27—Projected shifts in southern softwood harvests on private lands between 1990 and 2020 (developed from Abt 1998).

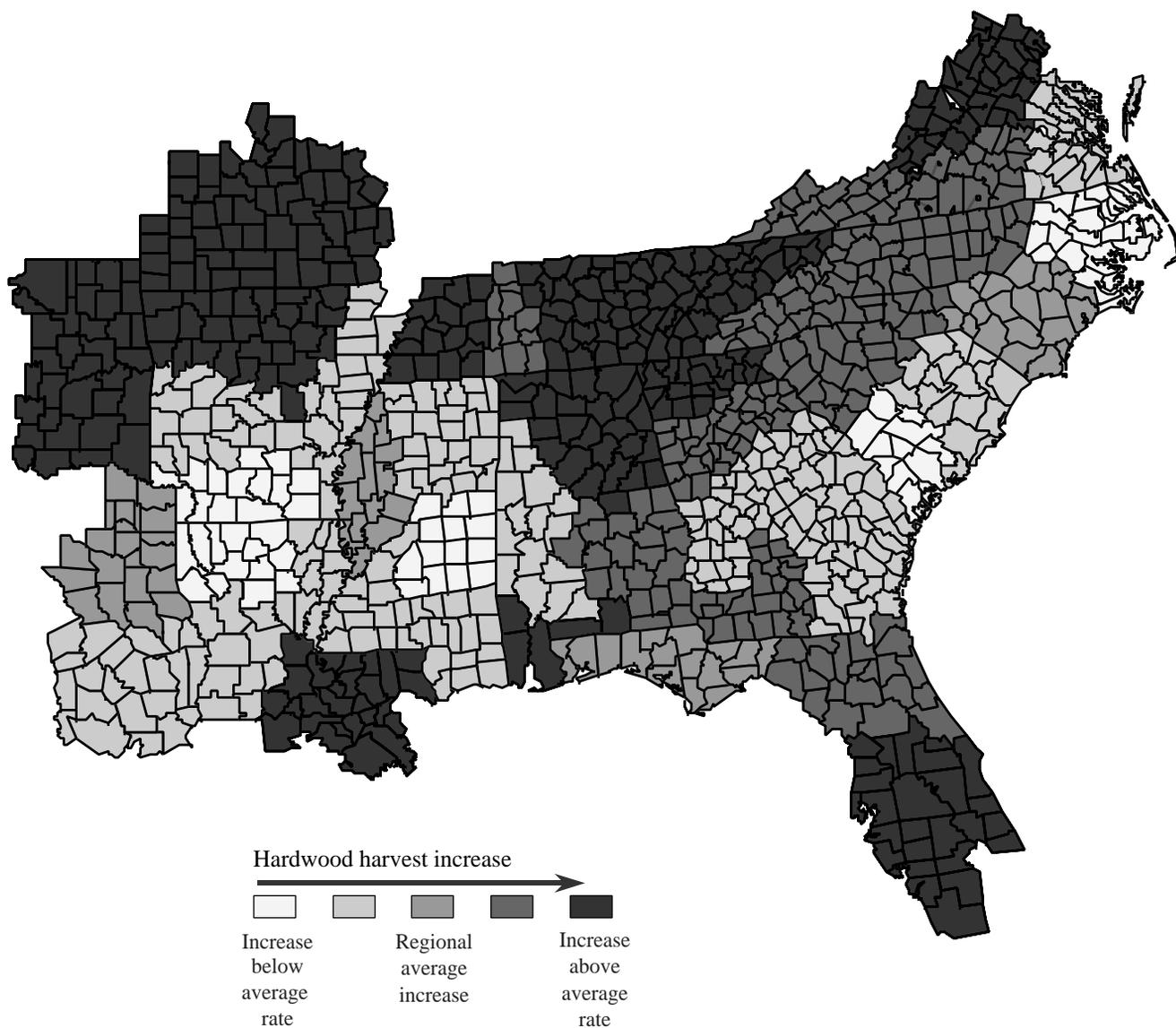


Figure 6.28—Projected shifts in southern hardwood harvests on private lands between 1990 and 2020 (developed from Abt 1998).

Implications and Opportunities

Current trends and projections indicate that over the next three decades the Highlands region will continue to increase in importance to both southern and national timber markets. This will be reflected in rising prices and increasing harvests from private lands. Simultaneously, the pressure to increase harvests from public

lands will continue. The higher graded, large-diameter softwood sawtimber that is more prevalent on national forests may be in especially high demand. Data for this report indicate that while national forests have about 41 percent of the Assessment area's softwood sawtimber inventory, they currently account for only 20 percent of the annual average removals of softwood sawtimber.

The rising demand for hardwood chips is expected to lead to increased clearcutting on private lands. Together with land subdivisions for housing and business development to accommodate a growing population, these activities likely will lead to increased forest fragmentation in some areas. Changes in management of private lands may increase the pressure for national forests to provide a “buffer” for maintaining or increasing desired environmental conditions at the expense of timber production.

In contrast to the South as a whole, where NIPF owners hold 90 percent of the hardwood resource, about 68 percent of the Highlands’ hardwood resource is found on NIPF lands and 25 percent on public lands. This difference suggests that public land management in the Highlands will have a strong influence on the future of its hardwoods and the esthetic, economic, wildlife, and recreational benefits they present.

National forests occupy a unique position in the timberland ownership pattern of the Highlands. In terms of acres held, the national forests stand a distant second to NIPF owners. The three national forests, however, represent the largest and most unified ownership pattern within the Assessment area. Timberland ownership within national forest proclamation boundaries is not uniform, but includes a substantial component of inholdings, both private and public. This ownership pattern affects the forest management options available to all categories of owners.

The need for dialogue, opportunities to prevent conflict, and possibilities for cooperative partnerships may be highest in the 32 counties within the Assessment area that are characterized by above average timberland acreage in the national forests and in one or more other timberland ownership classes—usually NIPF or forest industry. Often representing the largest single land category in these settings, national forests (or rather, the managers of the national forests) can play leadership roles in promoting cooperation, conflict

resolution, and understanding of the interests and values of neighboring private timberland owners or “inholders.” In some cases, the second largest ownership class includes lands managed by other Federal, State, and local agencies. “Other public” holdings typically are small in size, but they often are located within or immediately adjacent to national forest boundaries, and they typically are managed for a limited range of objectives and are heavily used by the public for a variety of outdoor recreation activities. Where such ownership patterns exist, there is a heightened need for interagency communication and cooperation.

The Highlands area exhibits low productivity relative to the rest of the South, with growth per acre and growth in timber inventory reflecting lower hardwood growth rates and the region’s geographic location at the north and west edge of the southern pine region. Low mortality rates and an excess of growth over removals, however, indicate that this region may continue to increase its contribution to southern and national timber supplies. Low volumes per acre may result in high harvesting costs per cubic foot, implying that some lands may be currently unavailable for harvest.

Projections indicate that there will be continued increases in both hardwood and softwood harvests, with relatively more southwide production occurring in the Highlands. These projections are based on past landowner objectives and behaviors and, while growth is projected to continue to exceed removals through 2020, changes in product demand or landowner behavior will influence the timber supply outlook for the Highlands. Continued investments in wood products processing indicate that a continuation of increased demands should be expected in the Assessment area. Consistent with landowners throughout the Nation, landowners in the Highlands are expected to continue to value a variety of benefits other than timber from their forests, thus potentially reducing the amount of timber available for harvest.

Chapter 7: Mineral Resources

Question 7.1: *Historically, which Highlands minerals have been important to whom and why?*

Question 7.2: *In Assessment area communities, what are the current reliance on and projected demands for Highlands minerals and mining?*

Question 7.3: *What are current national and global uses of and reliance on the mineral resources in the Assessment area, and what are the projected demands for them?*

Question 7.4: *What are the current and projected recreational and educational uses for Highlands minerals?*

Key Findings

1. Sixty percent of the mineral resource extraction operations (mining and processing plants) within Arkansas, Missouri, and Oklahoma occurs within the Assessment area, accounting for approximately \$1.2 billion in mineral value in 1996.
2. Of 76 known minerals and mineral materials within the Assessment area, 33 are currently being mined.
3. In terms of United States production volume, the Assessment area contains the top 10 production sites for 14 of the numerous mineral commodities produced throughout the United States.
4. The portion of Missouri within the Assessment area contains the largest concentration of lead mineralization in the world. Mines located in the Assessment area are the number one producers of lead in the United States and until recently were also the world's major lead producers. Between 75 and 80 percent of U.S. lead production comes from the Mark Twain National Forest—it is a primary source of the world's lead production.
5. The Assessment area contains three world-class lead and zinc producing districts (in Missouri) and was a past world leader in zinc (Oklahoma) and barite (Arkansas and Missouri) production.
6. The Ouachita Mountains are the only source for electronic grade, high quality quartz in North America. All of the U.S. production is from the Ouachita National Forest in Arkansas.
7. The Ouachita Mountains and the Ouachita National Forest are a major world producer and the leading U.S. producers of quartz crystal for aesthetic and jewelry uses.
8. Missouri is the leading U.S. producer of fire clay, much of which is mined from within the Assessment area.
9. Coal from the Oklahoma portion of the Assessment area is used to generate power for 150,000 homes in eastern Oklahoma.
10. The Ozark National Forest has 66 producing gas wells in areas that have a high potential for additional exploration and development.
11. In 1996 alone, extraction of mineral resources from the three national forests within the Assessment area generated almost \$6 million in Federal revenue.
12. The national forests within the Assessment area have a high potential for discovery of additional reserves of the minerals currently being mined on them and in some cases those mined in the past as well. The demand to access the national forests for mineral exploration is expected to continue and increase.
13. The Assessment area and the three national forests within the Assessment area have unique geologic features that attract people from across the United States and throughout the world for research, education, rockhounding, and mineral collecting.

Geologically, the Ozark-Ouachita Highlands are very diverse and complex—they contain at least 76 known mineral commodities. Thirty-three of these commodities are currently mined and processed at 692 mining and mineral processing operations within the Assessment area. Figure 7.1 displays the number of Assessment area mineral operations in existence during 1996 by commodity group. Figure 7.2 displays the distribution of hard rock and coal operations in the Assessment area by State. While the Assessment area accounts for only 40 percent of the land area and counties of Arkansas, Missouri, and

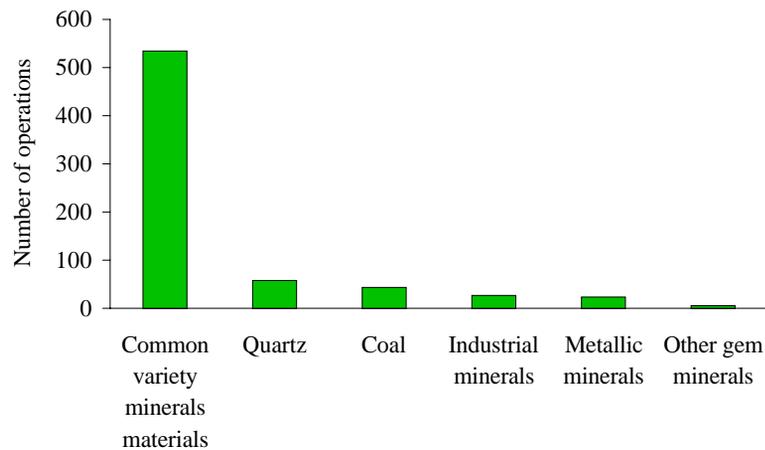


Figure 7.1—Operations within the Assessment area in 1996 by commodity groups (USDLM SHA 1997, AR DPCE MD 1997, MO DNR MD 1997, OK DM 1997, Gates 1997, Claxton 1997, USDA FS 1996b).

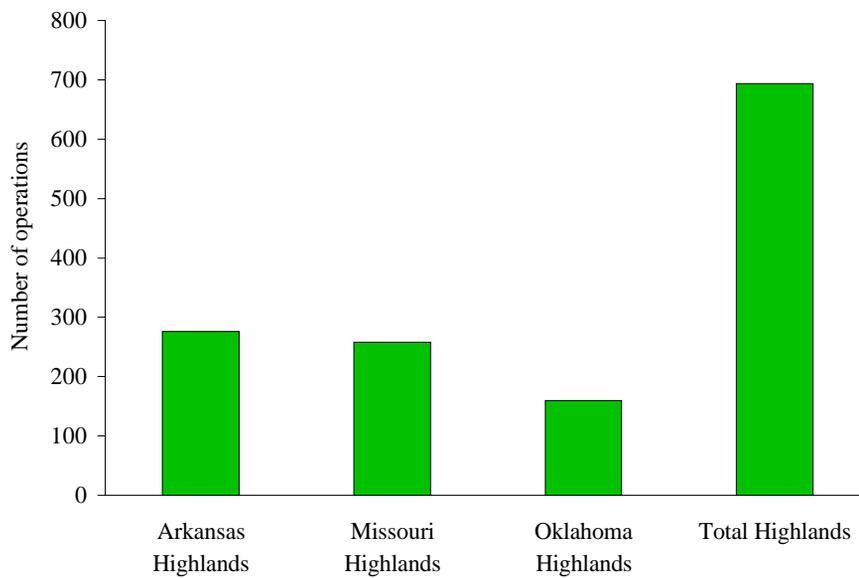


Figure 7.2—Distribution and number of hardrock mineral and coal operations within the Assessment area (USDLM SHA 1997, AR DPCE MD 1997, MO DNR MD 1997, OK DM 1997, USDA FS 1996b).

Oklahoma, it contains 60 percent of the mining activities within the three States. Figure 7.3 presents each State’s share of the mines, mineral industry employees, and land acres of the Assessment area.

Several internationally significant mineral deposits occur within the Assessment area on national forest and adjacent lands. These include lead on the Mark Twain National Forest in southern Missouri and quartz on the Ouachita National Forest in west-central Arkansas. In

terms of United States production volume, the Assessment area contains the top 10 production sites for 14 of the numerous mineral commodities produced throughout the United States (USDIGS 1997a, b, c). Another 8 mineral commodities from the 3 States that are, in part, from within the Assessment area also rank in the top 10 of national production. The location and development of some of these minerals have influenced settlement and land use patterns in several areas within the Highlands

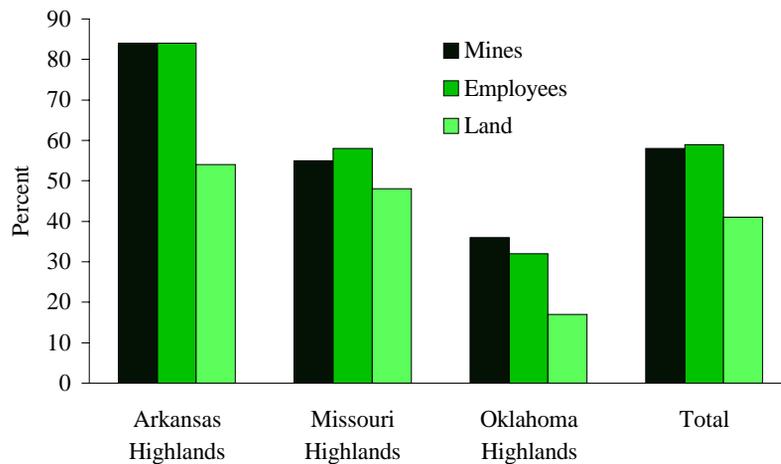


Figure 7.3—Assessment area mines, mineral industry employees, and acres by State as a percentage of total Highlands mines, employees, and land (USDL MSHA 1997).

area. However, their social importance and impact extends well beyond the Assessment area through national, and in several cases international, markets. Many of these mineral commodities serve vital human needs such as for energy, health, and communication. The mineral resources extracted from within the Assessment area also provide a significant tax base and employment for local communities and the States.

Historical Background

The mineral resources within the Assessment area have been vital to the people and the social systems that have occupied this area for thousands of years. Indigenous prehistoric cultures mined minerals for thousands of years prior to European settlement; in the Ouachita Mountains, prehistoric cultures extensively extracted novaculite for tools and weapons, developing what is now considered world class prehistoric rock quarries (Early 1997a). From the earliest societies through the European traders and settlers of the 18th and 19th centuries and to the present, the location of valuable mineral deposits has shaped the settlement patterns and trade routes of the area's people. Lead in Missouri, quartz and novaculite in Arkansas, and asphaltites and coal in Oklahoma were used by even the earliest occupants of these lands. With the exception of the asphaltites, these minerals are still being mined and used

by society today. For a thorough history of mining throughout Arkansas, see Stroud and others (1969).

The types of societies within the Assessment area have changed over time, and the uses for the mineral commodities have changed as well. The historic significance of mineral resources is illustrated by the following short history of three of the area's minerals:

- **Novaculite**—The American Indians who extensively quarried the novaculite ridges and outcrops in the Ouachita Mountains of west-central Arkansas were looking primarily for hard, dense homogeneous grades of novaculite that they could chip and flake into tools and weapons. In the 1800's and early 1900's, settlers who moved into the Ouachita Mountains prized primarily the softer grades of novaculite for their excellent tool sharpening capabilities. They mined and shipped novaculite whetstones and grinding wheels and materials throughout the country (Steuart and others 1984, Engel 1951). Today, novaculite continues to be mined in the Assessment area for a variety of products and uses including stable fillers for paints, plastics, and other products; abrasives; and the traditional whetstones for sharpening tools, knives, and surgical instruments.
- **Quartz crystal**—Prehistoric peoples sought and used quartz crystal from the Ouachita Mountains for tools, weapons, and ornamental purposes. In the 1800's to the 1930's, it was an eagerly sought, natural curiosity valued primarily for its aesthetic qualities. In the late

1930's and during World War II, this heretofore primarily museum, gem, and lapidary quality mineral was aggressively sought by the military for a totally new use: oscillators in military communications equipment. The quartz industry thrived in the Ouachita Mountains during the war years, providing jobs and producing tons of quartz crystal essential for the war effort. Many new prospects were found and developed during that time, some of which continue to be mined today (Engel 1951). After the war, the industry returned to mining specimen, gem, and lapidary quality quartz crystal primarily for its aesthetic values. In the mid-1980's to early 1990's the appeal in quartz crystal and jewelry grade quartz increased significantly, with more national and international markets being opened for Arkansas quartz. Quartz crystal continues to be mined for a variety of decorative, jewelry, aesthetic, lapidary, and other personal uses. Also, within North America, high quality quartz primarily for electronic and communication uses is presently mined only from the Ouachita National Forest.

- **Lead**—Southern Missouri has the richest lead deposits in the world (Seeger 1997). The lead comes from deposits of lead-rich galena ore. Prehistoric American Indians used the cubic and octahedral crystal forms of galena taken from Ozark Plateau outcrops. The soft ore was often carved for ceremonial purposes, and fashioned into beads that, in turn, were widely traded (Wettstaed 1997). Early explorers introduced the tribes to firearms and to methods of mining and smelting the galena to obtain lead for shot. The French used slaves in the early and mid-1700's to remove high grade ore from relatively shallow surface pits, then they shipped most of the ore to France. At the end of the 1700's into the early 1800's, underground mining commenced, drawing upon new mining methods and changing the life of the society there (Seeger 1997). Mining communities were established in support of the industry that now required long-term commitment from those who worked in it. Lead mining has occurred in three different locations within the Assessment area in southern Missouri (and into northeastern Oklahoma and southeastern Kansas). Today, production continues in the Viburnum Trend, the world's number one lead producer until recent years and still one of the world's main lead producers (Seeger 1997).

Many present day cities and communities within the Assessment area such as Viburnum, MO, Bauxite, AR, and Hartshorne, OK, were started as mining communities thriving on the various mineral resources of the region. Several communities annually celebrate the contributions that minerals and mining have made to their social structure and economies. Mt. Ida, AR, lays claim to the title of Quartz Crystal Capital of the World and hosts the Annual Mt. Ida Quartz Crystal Festival each October (Baldwin 1997). Viburnum, MO, celebrates its rich mining heritage with an annual Old Miners' Day festival (Seeger 1997). McAlester, OK, has dedicated a memorial to coal miners called the Pioneer Coal Miner (Suneson 1997). These commemorative actions highlight the influence that mineral resources have had on the history and heritage of communities within the Assessment area.

Data Sources and Methods of Analysis

The State geological agencies for Arkansas, Missouri, and Oklahoma provided reports specifically for the Assessment with detailed information on the mineral commodities, economics, social and historic significance of mining, and mineral resources within the respective States (Howard 1997, Howard and others 1997, Seeger 1997, Suneson 1997).

Another valuable and informative resource developed for the Assessment is the matrix "Mineral Commodities by Counties within the Ozark-Ouachita Highlands Assessment Area in Arkansas, Missouri, and Oklahoma." It was developed specifically for this Assessment with key input from the three State geological agencies. The matrix displays the 76 mineral commodities plus other minerals and geology related information for each of the 107 Assessment counties and 6 outlying counties. There are over 1,800 entries, each showing the past or present production and potential for future production, for each mineral commodity known to exist in a given Assessment area county.

The State oil and gas commissions for Arkansas and Oklahoma provided information on the Assessment area's producing gas and oil well locations by counties as well as the potential for future development of this resource. There are no producing gas or oil wells within the Missouri portion of the Assessment area.

The Social-Economic Team compiled information on mining operations and related activities within the Assessment area from the records of:

- The U.S. Department of Labor, Mine Safety and Health Administration (USDLMSHA 1997);
- State agencies responsible for permitting, regulating, and overseeing mining operations within each State;
- U.S. Department of Agriculture (USDA) Forest Service records for the Ouachita, Ozark-St. Francis, and Mark Twain National Forests; and
- Verbal communications with officials from various State and Federal agencies and reclamation specialists employed by several major mining companies in the Assessment area.

The team retrieved "Mining Accident and Injury Statistics" records for 1996 through the Internet at <<http://www.msha.gov>> (USDLMSHA 1997). This massive data base provides information on mine name, type, ownership, commodity, and employment for mines and mine-related activities under the Mine Safety and Health Administration (MSHA) jurisdiction for all 50 States. This data base alone provides continuity in the way information was collected and displayed for this Assessment.

The second key source of mine information is State mine agency records. These records are generally less detailed than the MSHA data base and often duplicate some information in that data base. The team discarded duplicate records in those cases where Federal and State regulatory authorities and record data overlapped. State mine agency records add to the list of mining operations in the Assessment area by including those mines under a State but not under the MSHA authority. Forest Service records provided the final key source of information on mine-related activities by including those mining operations occurring specifically on national forest lands within the Assessment area that, for whatever reason, did not show up on either MSHA or State records.

The Social-Economic Team developed a comprehensive mines data base for the Assessment area from a total of seven separate State and Federal data bases. The comprehensive data base is used throughout this report as the basis for discussions on the number of active mines in the year 1996, the locations of mines by counties, mineral commodities, types of mines, and other mining-related matters within the Assessment area.

Limitations of Market Analysis

A number of factors go into analyzing mineral commodity markets. Most mineral commodity operations go through three very costly and risky phases: (1) exploration, (2) development, and (3) production. Exploration for mineral resources involves techniques designed to detect the presence of mineral commodities in an environment that is often extremely difficult to reach, the subsurface of the earth. Once discovered, further activity and expense must occur to determine if the deposit is valuable and can be successfully recovered at a reasonable profit. An economically valuable deposit is considered ore. The value of the mineral commodity and its future anticipated demand are two factors used to evaluate the potential for exploration, development, or continued production of a given mined material (Seeger 1997). However, this is complicated by a variety of additional, less stable or less predictable factors:

- Changes in laws, regulations, and policies that restrict access to the mineral estate or place additional requirements on the mineral industry, making it more expensive to operate. Known mineral resources often have to be ignored or abandoned because of suddenly increased costs.
- The discovery of a new mineral source, a decrease in demand, and political instability in critical mineral-producing countries all have direct effects on the market value and feasibility of successfully producing a given mineral resource.
- A small fluctuation in price for a mineral commodity can have a major impact on the economic viability of the deposits being mined. For example, a change of 15 cents per pound in the price of lead, as has occurred since 1987, can quickly translate into millions of dollars in gains or losses for the lead industry in Missouri (Seeger 1997).
- The introduction to the marketplace of a mineral commodity that has been subsidized by another government often results in an artificially undervalued and underpriced product that is difficult for mining interests in this country (where a similar subsidy is typically lacking) to compete with.

These are just a few examples of factors that can readily affect market analysis for mineral commodities. A case in point is the mineral barite, successfully mined

for many years in the Missouri Ozarks and the Arkansas Ouachita Mountains within the Assessment area. Barite is an essential component of the fluids used to support the drilling of deep oil and gas wells. However, these productive barite mines were forced to close when China suddenly began exporting barite to the United States in the early 1980's. At about the same time, the demand for the product began to decrease. American producers could not compete with a Chinese barite industry that pays low wages and operates essentially free from environmental regulation as compared with operations within the United States. These economic advantages allowed foreign barite to be delivered anywhere in the world at very low prices, easily undercutting American barite producers. One of the American companies so affected had already invested \$40 million and about 6 years to develop a state-of-the-art mine and mill complex for a major barite deposit in the southeastern Ouachita Mountains. However, in 1984, just as this project had moved to the production stage, the company had to close the operation and sell off the buildings and equipment before producing any barite. The expectation of major employment and tax revenues associated with this project, much anticipated by several small local communities for which no similar-sized industries existed, never materialized (Seeger 1997, Howard 1997).

Ore reserves can change literally overnight as the many variables affecting mineral commodities change, thereby affecting mine life, investments, employment, tax and other revenues, and mineral production. Any of a number of factors can have an adverse effect on a minerals exploration or development project (Seeger 1997).

Economic Value

Mineral resources have been essential to the growth and development of communities, businesses, and social systems within the Assessment area. However, the benefit from the mineral resources has not been limited to Arkansas, Missouri, and Oklahoma. Just as early American Indians in the Highlands traded mineral resources they extracted with other tribal nations far beyond their own tribal boundaries, those extracting minerals today move them throughout the Assessment area and world wide for the benefit of millions.

Some of the 76 known mineral commodities within the Assessment area have achieved world recognition. Possibly the best known among them are the three historic, world-class lead and zinc producing districts of Missouri, and the quartz crystal deposits of Arkansas (table 7.1). Oklahoma was a past world leader in zinc, and Arkansas and Missouri were past world leading

Table 7.1—Highlights of mineral resources in the Assessment area by State

Highlight	AR	MO	OK
World's largest known concentration of lead ore ^a and past primary producer		x	
Three historic, world-class lead and zinc producing districts		x	
Past world's leading producer of barite ^b	x	x	
The principal provider of transparent quartz crystal in North America	x		
Historically yielded more bauxite ^c than all other U.S. production combined	x		
World-wide recognized novaculite ^d deposits	x		
Second largest bottled water producer in the world	x		
Largest production of silica stone abrasives in the United States	x		
Among the largest natural gas fields in the United States	x		x
World's largest grahamite ^e and one of world's largest impsomite ^e deposits			x
Past leading zinc producer in the world			x
World-class crinoid ^f fossil slabs		x	
World-renowned mineral collecting localities	x	x	
The original source sites for nine scientifically described mineral species ^g	x		
First U.S. diamond mine and 2 nd leading producer of diamonds in U.S. ^h	x		

^a Galena.

^b Heavy, dense mineral essential to oil and gas drilling operations and other applications.

^c Ore from which aluminum is made.

^d Used as sharpening stones for knives and other tools, including surgical instruments, and crushed for other applications.

^e Black solid bitumens that resemble coal but are more closely related to oil.

^f Fossils of a class of marine invertebrates.

^g Rectorite, kimzeyite, benstonite, kidwellite, eggletonite, strazcekitite, delindeite, lourensalsite, and mahlmoodyite.

^h Crater of Diamonds State Park located in Pike County, AR, immediately adjacent to the Highlands.

Source: Howard (1997), Seeger (1997), Suneson (1997).

producers of barite. On a national level, the Arkoma Basin of Oklahoma and Arkansas is highly regarded as an important United States exploration and production area for gas resources. The Crater of Diamonds State Park, adjacent to the Highlands in Pike County, AR, is a major attraction to gem enthusiasts and the general public from across the country. Table 7.1 highlights these and other mineral resources in the Assessment area.

Contributions to National Minerals Production

The 1996 Mineral Industry Surveys (MIS) for Arkansas, Missouri, and Oklahoma reported that among all 50 States, Missouri ranked 10th, Arkansas 29th, and Oklahoma 34th in the value of total nonfuel mineral production (USDI GS 1997a, b, c). The total mineral production value for the three States was over \$2 billion. Approximately \$1.2 billion was from within the Assessment area

where 60 percent of these States' mineral activities occur. Combined, these three States account for more than 5 percent of the total United States production value for nonfuel minerals. In 1996, these States also ranked among the top 10 States in the amount of production for a number of mineral commodities (table 7.2). For instance, Arkansas was first in quartz lascas, silica, stone, and quartz crystal. Missouri was first in the nation in the production of lead, fire clay (much of which is mined from within the Assessment area), and lime.

Information on the production and value of the various minerals in the Assessment area has been compiled from the three State geological agency reports written specifically for this Assessment (available at the Assessment Web site, <www.fs.fed.us/oonf/ooha.welcome.htm>). It should be noted that authors of the State reports took differing approaches to discussing and displaying commodity information about minerals.

Table 7.2—Minerals for which Assessment area States had significant national production or were in the top 10 in United States' production in 1996^a

Production rank ^a	AR	MO	OK
First	Quartz lascas, ^{b,c} silica stone, quartz crystal ^{c,e}	Lead, ^c fire clay, ^d lime ^d	None
Second	None	Iron oxide pigments	Tripoli
Third	Tripoli ^c	Iron ore, barite	Fire clay ^d
Fourth	Gemstones (mostly quartz crystal ^c), kaolin, fire clay	Zinc, ^c crushed stone ^d	Feldspar ^d
Fifth to tenth	Common clay ^d silver, ^e fullers earth, ^d copper ^e	Portland cement, ^d	Sand and gravel ^d
Significant ^f	Crushed stone, ^{c,d} sand and gravel, ^d gypsum, ^d dimension stone ^{c,d}	Sand and gravel, ^d masonry cement, ^d common clay ^d	Crushed stone, ^d portland masonry cements, ^d clay ^d

^a Based on USDI GS (1997a, b, c) estimates of quantities produced in the 50 States during 1996.

^b Quartz lascas are produced nowhere else in the United States.

^c Mineral commodities produced wholly or in part (within listed State) from national forest lands.

^d Mineral commodities produced (within listed State) both within and outside the Assessment area.

^e Implied from USDI GS (1996).

^f Additional significant production ranking below the top 10.

Source: USDI GS (1996; 1997a, b, c).

Consequently, the information displayed in the tables in this chapter is slightly different for each State. Additional information comes from Forest Service records. For example, the tables also display production and value information for mineral commodities that come from the national forests within the Assessment area.

The 1997 Missouri Geological Survey report (Seeger 1997) presents a detailed discussion of the contributions of the Missouri portion of the Assessment area to national minerals production. Table 7.3 displays some of these contributions. Production in the Assessment area ranges from 402 tons of silver and 7,000 tons of dimension (building) stone to nearly 2.9 and 5.8 million tons of lead and iron ore, respectively. Between 75 and 80 percent of U.S. lead production comes from Missouri's Mark Twain National Forest, a principal source of the world's lead supply (Seeger 1997).

Table 7.4 displays the nonmetallic minerals produced in the Missouri portion of the Assessment area from 1987 through 1995 (with the exception of masonry

cement for which figures were available from 1987 through 1989 only). (None of this production was from the Mark Twain National Forest.) The Assessment area of Missouri contributes 27 to 58 percent of the Highlands production of hardrock and other nonmetallic minerals such as crushed stone, cement, lime, sand, gravel, and clay.

The 1997 Oklahoma Geological Survey report (Suneson 1997) describes the contributions the Oklahoma portion of the Assessment area makes to the national marketplace, primarily in the form of energy minerals (gas and coal) and dimension stone materials. The report identifies the mineral resources produced recently and historically from within Assessment area counties (table 7.5). (These minerals are produced outside the Assessment area in Oklahoma as well.) With the exception of a small amount of building stone sales primarily for noncommercial use, none of the Oklahoma Assessment area minerals are being produced from national forest lands at this time. Because

Table 7.3—Production levels and sales values of minerals produced in the Missouri portion of the Assessment area (including Mark Twain National Forest lands) from 1987–1995 (or as noted)

Mineral commodity	Production		Sales value	
	Assessment area	Mark Twain NF	Assessment area	Mark Twain NF
	----- Tons -----		----- Dollars -----	
Lead ^a	2,876,000	2,169,763	2,180,000,000	955,084,538
Zinc ^b	428,000	477,308	501,111,000	240,149,437
Copper ^{b c}	37,441	319,478	84,497,000	176,472,801
Silver	402	—	61,693,000	—
Iron ore ^d	5,758,000	0	27,000,000 ^d	0
Barite (1987, 1988)	53,000	0	3,900,000	0
Dimension stone (1987, 1988)	7,000	0	1,001,000	0

NF = national forest; — = not available.

^a Leases on the Mark Twain NF produced from 38 to 74 percent of the total U.S. lead ore mine production for the last 10 years.

^b During some years, national forest production and sales for zinc and copper are higher than the Assessment area as a whole because the Bureau of Land Management includes the previous years' production under that year (Seeger 1997).

^c Total copper production and sales reported only from 1992–1995; production and sales from Mark Twain NF reported for 1987–1995.

^d Iron ore value figure available only for 1993.

Source: Seeger (1997), USDI BM (1996), USDI GS (1997a, b, c).

Table 7.4—Production levels of nonmetallic mineral materials from the Missouri portion of the Assessment area, 1987–1995^a

Mineral commodity	Production	Portion of all	Value
		production in Highlands	
	<i>Tons</i>	<i>Percent</i>	<i>Dollars</i>
Crushed stone	513,424,000	53	1,990,000,000
Portland cement	42,269,000	53	1,788,280,000
Masonry cement ^b	455,000	53	21,937,000
Lime	—	—	—
Sand and gravel	84,857,000	58	255,695,000
Sand	4,821,000	58	90,179,000
Clay	—	27	—

— = not available.

^a None of these minerals were extracted from national forest land.

^b Masonry cement figures available only for 1987–1989 and displayed as partial data.

Source: Seeger (1997).

the Oklahoma building stone industry ships its products across the United States and is presently operating at a number of locations near the Ouachita National Forest, the industry may look to the national forest for additional commercial sites.

The 1997 Arkansas Geological Commission report (Howard 1997) deals with the broadest range of mineral commodities produced from within the Assessment area. The Assessment area in Arkansas embraces three generally recognized geologic regions: the Arkansas Ozarks, Arkansas Valley, and Arkansas Ouachitas. Howard noted mineral production and value by these regions. Table 7.6 displays the minerals produced wholly from within the Assessment area and from the Ozark and Ouachita National Forests. Vital hardrock and industrial mineral resources and unique gemstones are contributed to the national and international marketplace from the Arkansas portion of the Highlands.

Table 7.5—Recent and historic mineral production in the Oklahoma portion of the Assessment Area

Mineral commodity	Recent production (years, counties)	Historic production (years, counties)
Oil	1.5 M barrels (1990–1993, Muskogee Co.)	—
Natural gas	2.3 mmcf (1990–1993, Muskogee Co.)	—
Natural gas, Arkoma Basin	1.6 mmcf (1990–1993, Sequoyah, Haskell, Le Flore, Latimer, Pittsburg, and Atoka Counties)	5 trillion cubic feet (1894–1990, Le Flore, Haskell, Latimer, and Pittsburg Counties)
Coal	1.4 M tons ^a (1996; primarily Le Flore Co.)	274 M tons (1880–1994, Mayes, Muskogee, Sequoyah, Haskell, Pittsburg, Latimer, Le Flore, and Atoka Counties)
Stone (aggregate and dimension)	19 M tons ^b (1993–1997, all Assessment area counties in OK)	—
Sand and gravel	1.9 M tons (1995 and 1997, all Assessment area counties in OK)	—
Tripoli	6,133 tons (1997, Ottawa County)	—
Clay and shale	0.8 M tons ^c (1993, 1995, and 1997; Adair, Cherokee, Le Flore, Muskogee, and Sequoyah Counties)	—
Lime	1.9 M tons (1993 and 1995, McCurtain and Sequoyah Counties)	—

M = million; mmcf = million cubic feet; — = not available.

^a 81 percent of total Oklahoma coal production.

^b 23 percent of total Oklahoma production; includes 52 tons produced from Ouachita National Forest in 1996.

^c 23 percent of total Oklahoma production.

Source: Suneson (1997).

Table 7.6—Synopsis of available information concerning production levels and values of minerals produced within the Arkansas portion of the Assessment area (partial data for various periods)

Mineral commodity	Recent production			Historic production			Production from national forests
	Year(s)	Quantity	Value	Years	Quantity	Value	
Lime	1972–1981	1.7M tons	\$37M	Arkansas Ozarks			
Limestone	1997	—	\$6–8/ton	1894–1966	2.4M tons	\$24M	0
Natural gas	1997	—	\$1.50–3.50/mcf ^a	1967–1979	20M tons	—	0
Sand and gravel	1984–1994	98M tons	\$345M	1953–1988	5.7M mcf	—	0.6M mcf, Ozark NF, 1996
Sandstone (includes Arkansas Valley)	—	15M tons/yr ^b	—	1958–1966	50M tons	—	0
Spring water, bottled (includes Arkansas Ouachitas)	1991	85M gal ^c	\$90 M	—	—	—	23,144 tons, Ozark NF, 1996
Coal, surface	<i>d</i>	<i>d</i>	<i>d</i>	Arkansas Valley			
Coal, underground	<i>d</i>	<i>d</i>	<i>d</i>	1840–1996	15.6M tons	—	0
Coal (combined)	1986–1996	0.8M tons	\$30/ton (1997)	1840–1996	90.6M tons	—	0
Natural gas	1986–1996	1.7B mcf	—	<i>e</i>	<i>e</i>	<i>e</i>	0
Barite	—	—	—	Arkansas Ouachitas			
Bauxite	—	—	—	1940–1982	9M tons	—	0.5M tons, Ouachita NF, 1960–1982
Diamond ^f	1972–1996	20,396 (4,065 carats)	\$1–10/pt (100 pts/carat)	1898–1981	76.8M tons	\$1.2M	—
Nepheline syenite	—	5M tons/yr	\$4–25/ton	—	—	—	—
Novaculite (silica stone) ^g	1995	925,000 lbs	\$3.9M	—	—	—	15,000 lbs, Ouachita NF, 1997
Quartz, crystal ^h	1996	0.9M lbs	\$1.4M	—	—	—	141,000 lbs, Ouachita NF, 1996
Quartz, electronic grade ^h	1996	1.3M lbs	\$1.1M	—	—	—	1.3M lbs, Ouachita NF, 1996
Sandstone ⁱ	<i>e</i>	<i>e</i>	<i>e</i>	<i>e</i>	<i>e</i>	<i>e</i>	182,502 tons, Ouachita NF, 1996
Soapstone	—	1,500 tons/yr (avg.)	—	—	—	—	—
Tripoli	—	15,000 tons/yr (avg.)	—	—	—	—	—
Turquoise	—	—	—	1974–1988	1,000 lbs	10 lbs sold for \$1,000	1,000 lbs (1979–1985), Ouachita NF

M = million; — = information not available in documents reviewed; mcf = thousand cubic feet; NF = national forest; lbs = pounds.

^a Natural gas wellhead price information from Gates (1997).

^b Total production from Arkansas Ozarks, Arkansas Valley, and Arkansas Ouachitas.

^c Total production from Arkansas Ozarks and Arkansas Ouachitas.

^d See “Coal (combined).”

^e Reported under “Arkansas Ozarks.”

^f Diamond information from Hall (1997).

^g Novaculite information from USDA FS records, Ouachita National Forest.

^h Quartz information from USDA FS records, Ouachita National Forest; price based on average grade value.

ⁱ Sandstone and aggregate on national forests from USDA FS (1996b).

Source: Howard (1997) unless noted otherwise

Lead, Quartz, Gas, and Coal Extractions

Lead

Lead exploration and extraction presently occurs in Missouri in a band approximately 40 miles (mi) wide and 100 mi long within the north-central portion of the Assessment area. The expectation is that future lead exploration and mining will remain within this band where the resource is concentrated (Seeger 1997). Significant exploration is extending southward into north Arkansas (Howard 1997). There are two major companies presently mining galena for lead and associated minerals from underground mines in the Missouri Ozarks. Part of the mining operations occurs on the Mark Twain National Forest. The operations are conducted under State and Federal environmental regulations, permits, and plans that require routine compliance inspections.

Quartz

There are 58 quartz mines currently permitted (data base year 1996) by State and Federal agencies in the Ouachita Mountains of the Assessment area. One of these mines is for high-grade quartz used in fiber-optic and other high-tech uses. It is the only mine of its type in North America. Many of these operations, including the high-grade quartz operation, occur on the Ouachita National Forest. Most quartz mines are relatively small, surface-excavation operations. The nature, pattern, and size of typical quartz deposits generally restrict the size of these mines, which normally impact 1 to 5 acres (ac). The two largest quartz mines are approximately 50 ac in size and located on private lands. Most quartz mines have a relatively short mine life of 5 to 10 years. Quartz mining operations proposed to take place on the Ouachita National Forest require extensive review and analysis, stipulation, bonding, and reclamation planning before approval is granted. The likely future trend is that quartz operations will continue to occur within the Assessment area because of the uniqueness of the deposits and the demand for the resource (USDA FS 1996 b).

Gas

Gas exploration operations are typically of short duration, lasting only a few weeks to several months. Exploration and production sites are generally less than an acre to several acres in size. State agencies are involved in the permitting and oversight process for exploration proposals and for producing wells on all lands within the State. Operations proposed to take place on national forests require extensive review and analysis, stipulation, bonding, and reclamation planning before approval is granted. All sites are fully reclaimed upon completion of the operation. The likely future trend is that gas operations will continue to occur within the Assessment area as new gas sources are sought and developed to meet societal demands.

Coal

Coal operations generally impact large tracts in relatively flat-lying areas. The operations take place under State and Federal controls and permitting authorities. Coal in the Assessment area is presently mined on private lands in Oklahoma. There have been coal mining operations in the past on national forests in Arkansas, but they are now closed and fully reclaimed. Currently, there are no coal mining operations on any of the three Assessment area national forests nor are there any proposals for new mines. Although the demand for coal is national in scope, coal mined in the Assessment area is utilized primarily to fuel a power plant in Oklahoma that supplies power for much of eastern Oklahoma (Hatley 1997). The likely future trend is for coal mining to continue as long as there is a demand for it.

Salaries and Taxes

The real value of a mineral resource is not only its usefulness to society, but also its direct and immediate economic benefits to local communities and economies in terms of exploring for, removing, and processing that resource. From this value comes employment and salaries to benefit families and taxes to provide for government services. The State geological reports prepared for the Assessment project include some salary and tax information. The Missouri report provides

insight and examples for the Missouri Assessment area minerals industry and its economic effect on local communities (Seeger 1997).

The minerals industry typically pays workers at wage levels above most other industries (also see Chapter 4). Examples from Missouri show the average wage is \$16.30 per hour for the metals mining industry and \$11.20 per hour for the industrial minerals sector (Seeger 1997). These are significantly higher than comparable recreation, sawmill, and timber labor wages, which range from \$7.20 to \$9.40 per hour. Salaries at a major mine on the Mark Twain National Forest in Missouri range from \$20,000 to \$80,000 per year. In 1996, Missouri metal mining companies within the Assessment area alone paid salaries totaling \$31.2 million (Seeger 1997). State employment data from Oklahoma indicate that 6 of the professions related to the geologic-resources industry (geologists, mining and petroleum specialists, and others) are in the top 25 of Oklahoma's highest paying occupations (Suneson 1997). In Arkansas, the quartz mining industry pays miners in the \$7.50 to \$11 per hour range, making these among the top wages paid in the rural areas where the mines are located (Coleman 1997).

Contributions to the tax base from mining-related activities are important to local, State, and Federal governments. For example, mining industry employees within the Missouri Assessment area annually pay more than \$14.8 million in State and Federal income taxes

(Seeger 1997). One major Missouri metals mining company pays approximately \$10 million annually in combined taxes. Seven mineral industry companies within the Missouri portion of the Assessment area pay personal property and real estate taxes exceeding \$4.3 million to six counties (Seeger 1997). During the time the mines operated, severance taxes from major bauxite (aluminum) mining within the Arkansas Assessment area paid for all the local school district's operating costs, including new construction and teachers' salaries. Even after the mines closed, they continued to benefit the local school district from savings during operational years (Howard 1997).

Employment

Table 7.7 displays the number of mines, gas wells, and mine and gas industry employees for the Assessment area in data base year 1996. The MSHA report includes the number of employees at the mines and mining-related operations (including some minerals manufacturing operations) that MSHA oversees as part of its mine safety permitting and inspection responsibilities. Some mines do not appear in MSHA records, but do appear in records administered by the States or by the Forest Service. The 690 mining-related operations within the Assessment area provide employment to about 9,000 persons. The gas well and pipeline industry employs about 1,600 more persons for over 6,500

Table 7.7—Mines, gas wells, and related industry employees in State portions of the Assessment area, 1996^d

State	MSHA records		State records		FS records		Mine total		Gas wells ^b	
	Mines	Employees ^c	Mines	Employees	Mines	Employees	Mines	Employees	Wells	Employees
Arkansas	169	2,958	42	86	61	154	272	3,198	2,968	480 ^d
Missouri	217	4,439	41	128	0	0	258	4,567	0	0
Oklahoma	78	928	82	272	0	0	160	1,200	3,563	1,116
Total	464	8,325	165	486	61	154	690	8,965	6,531	1,596

MSHA = Mine Safety and Health Administration; FS = Forest Service.

^a MSHA and FS records contain employee numbers; employee numbers in State records estimated based on size and type of similar typical operations where employee numbers are known.

^b Producing gas wells and associated employees within the Assessment area in 1996 (not in the mine records for MSHA, State, or FS); information from Gates (1997), Claxton (1997), and Suneson (1997).

^c MSHA records include employees of mines and some, but not all, minerals manufacturing operations.

^d Based on Oklahoma employee numbers for similar operations.

Source (in addition to those in footnote b): USDL MSHA (1997), AR DPCE MD (1997), MO DNR MD (1997), OK DM (1997).

producing gas wells in the Highlands. Thus, more than 10,500 persons are employed directly by mining-related operations within the Assessment area.

The secondary companies that support the mining industry and the tertiary businesses that move the mineral resources into society contribute significantly to the overall Assessment area employment that is related to minerals. These are businesses, companies, and jobs that would not exist if the mineral resources were not present or could not be extracted. One source, a 1997 report from the National Mining Association, estimates that the number of jobs directly or indirectly due to mining in Arkansas, Missouri, and Oklahoma is over 200,000 (including an estimated 50,000 in the Assessment area) (Leaming 1997). In Missouri, an association of companies that supply goods and services to the mining industry lists 88 member businesses and companies (Seeger 1997). Mount Ida, AR, a Highlands community of just over 1,000 persons and the County seat for Montgomery County, is in the heart of the quartz crystal production in the Ouachita Mountains. The Mount Ida Chamber of Commerce estimates that the quartz mining industry in Montgomery County alone directly affects 400 jobs in various support, supply, and marketing businesses (Baldwin 1997).

National Forest Minerals Revenue

In 1996, mineral exploration and extraction in the Mark Twain, Ozark, and Ouachita National Forests generated revenues of nearly \$6 million (table 7.8) from 969 mineral cases administered by the 3 forests. In the past 10 years, the minerals' revenue from the Highlands national forests has totaled approximately \$80 million. This includes an exceptional 2-year period of oil and gas lease bid revenues on the Ouachita National Forest that brought in \$31 million in 1990 and 1991. Also, in 1989, Congress passed legislation that moved quartz on the Ouachita National Forest from a nonrevenue to a revenue generating program administered by the Forest Service (Public Law 100-446 Section 323).

Supply

Supplies of mineral resources within the Highlands are discussed in detail in State geological reports (Howard 1997, Seeger 1997, Suneson 1997). The three reports also feature discussions of reserves and the discovery potential for many of the mineral commodities within the Assessment area. A mineral commodity spreadsheet matrix displays the past or present production and the

Table 7.8—Activities (cases) and revenue generated by minerals programs on the Highlands' national forests, 1996^a

Mineral commodity	Ouachita NF		Ozark NF		Mark Twain NF		Total	
	Cases	Revenue	Cases	Revenue	Cases	Revenue	Cases	Revenue
	<i>Dollars</i>		<i>Dollars</i>		<i>Dollars</i>		<i>Dollars</i>	
CVMM, quartz	50	43,493	0	0	0	0	50	43,493
CVMM, rock	80	28,251	59	14,583	1	225	140	43,059
Leases, hardrock	6	5,368	0	0	36	4,955,385	42	4,960,753
Leases, gas (not producing)	239	269,850	321	81,564	0	0	560	351,414
Leases, gas (producing)	0	0	107	551,531	0	0	107	551,531
Mining claims	35	0	0	0	0	0	35	0
Applications	6	0	6	0	11	0	23	0
Prospect permit, hardrock	0	0	0	0	12	5,748	12	5,748
Total	416	346,962	493	647,678	60	4,961,358	969	5,955,998

NF = national forest; CVMM = common variety mineral material.

^a "Cases" include contracts, leases, permits, mining claims, applications for prospecting permits, and prospecting permits.

Source: USDA FS (1996b).

mineral discovery potential for each known mineral and mineral commodity for each county within the Assessment area.

Reserves and Potential

Reserve estimates primarily depend on economic conditions and on exploration for minerals. Estimates of mineral reserves change (1) as the market value for a mineral commodity changes, thereby defining what is or is not considered ore, and (2) as exploration techniques

are refined and become more accurate and predictive. The amount and extent of exploration for minerals depends primarily on access—when prospectors can physically enter Federal, State, and private lands, they can use modern equipment and techniques to determine if minerals are present and, if so, at what grade. Such exploration generally does not last long and has a minimal effect on other resources.

Tables 7.9 and 7.10 list the reserve estimates and potential for new discoveries of mineral commodities within the Arkansas portion of the Assessment area.

Table 7.9—Reserve estimates and potential for discovery of mineral commodities in the Arkansas Ozarks and Arkansas Valley (excluding Oklahoma) portions of the Assessment area

Mineral commodity	Reserve estimates		Potential for discovery
	Assessment area	National forests	
Arkansas Ozarks			
Coal	Unknown reserves, 2 seams ^a	Unknown	Doubtful
Copper	Unevaluated	Unknown	Unknown
Diamond	Unknown	Unknown	Unknown
Industrial silica sand	100's of millions of tons	Unknown	Very high
Iron	20,000,000 tons ^b	Unknown	Low
Lead and zinc	100,000 tons	Unknown	Moderate
Limestone and dolostone	Widespread	Unknown	Very high
Manganese	198,000,000 tons	Possible	Low
Marble	Unknown	Unknown	Unknown
Natural gas	14 producing fields	66 producing wells	Low to high
Nickel	Unknown	Unknown	Low
Oil shale	Unknown	Unknown	Low
Phosphate rock	Considerable	Unknown	Low
Rare earth metals	Unknown	Unknown	Very low
Sand and gravel	Significant	Present	Significant
Sandstone	Extensive	Present	Very high
Shale	Extensive	Present	Very high
Silver ^c	100,000 tons	Unknown	Moderate
Tripoli	Several million tons	Unknown	Moderate to high
Arkansas Valley			
Clay and shale	Significant	Present	Moderate
Coal	1 billion tons, 13 fields ^d	Present	Low to moderate
Natural gas	1.1 trillion cubic feet	Present	Low to very high
Sand and gravel	Extensive	Present	High
Sandstone	Extensive	Present	High
Titanium	Unknown	Unknown	Low

^a An identifiable bed or layer of coal.

^b Iron at 30 percent grade, indicating moderate quality.

^c Silver with lead and zinc.

^d Areas with known coal deposits.

Source: Howard (1997).

Table 7.10—Reserve estimates and potential for discovery of mineral commodities in the Ouachita Mountains (Arkansas) portion of the Assessment area

Mineral commodity	Reserve estimates		Potential for discovery
	Assessment area	Ouachita NF (AR)	
Antimony	Unknown	Unknown	Low
Barite, 50–70% grade ^a	56 million tons	Significant; known	Low ^b deposits
Barite, lower grades	Tens of million tons	Unknown	Low to moderate ^b
Bauxite	113,646,000 tons	Unknown	Low ^b
Clay	Unknown	Unknown	Moderate
Cobalt with manganese	1–6 million tons	Present	Low to moderate
Copper	Minor	Present	Low
Diamond	Very low	Unknown	Low
Gallium	Data not available	Unknown	Data not available
Gold	150 years of exploration has revealed no deposits	Low to none	
Gypsum	Data not available	Unknown	High
Iron	Unknown	Unknown	Negligible to low
Lead and zinc	15,000 tons	Unknown	Low
Limestone	Modest	Occurs	Moderate to high
Lithium	Minor	Unknown	Low
Manganese	50,000 tons	Occurs	Moderate
Mercury	Unknown	Unknown	Moderate
Molybdenum	Unknown	Unknown	Low
Natural gas	Unknown	Unknown	Low to unknown
Nepheline syenite	13 square miles	Unknown	High
Nickel	Unknown	Unknown	Low
Niobium	Unknown	Unknown	Low
Novaculite	Extensive resources	Extensive resources	High
Oil	Unknown	Unknown	Low to unknown
Quartz	Extensive	Extensive	High
Rare earth metals	Unknown	Unknown	Low
Sand and gravel	Extensive	Extensive	High
Sandstone	Extensive	Extensive	High
Shale and slaty shale	Extensive	Extensive	High
Silver	Present	Unknown	Low
Soapstone	50,000 tons	Unknown	Low
Tantalum	Unknown	Unknown	Low
Thorium	Unknown	Unknown	Low
Titanium	Unknown	Unknown	Moderate to high
Tripoli	Several million tons	Several million tons	Moderate to high
Turquoise	Present	Present ^c	Low
Uranium	Unknown	Unknown	Low
Vanadium	Unknown ^d	Unknown	Low
Vermiculite	Unknown	Unknown	Low
Volcanic tuff	Present	Unknown	Moderate
Wavellite	Isolated locations	Isolated locations	Moderate
Wollastonite	Unknown	Unknown	Moderate

NF = national forest.

^a High-moderate to high quality.

^b Known deposits, but potential is low for new ore discoveries unless price increases.

^c Mined on the Ouachita National Forest from 1979 to 1985.

^d Mined from 1962 to 1990.

Source: Howard (1997).

The Ozark National Forest has 66 producing gas wells in areas that have a high potential for additional exploration and development. Similarly, table 7.11 for Missouri and table 7.12 for Oklahoma list the reserves and discovery potentials of mineral commodities within those States. These tables, compiled primarily from the States' geologic reports (Howard 1997, Seeger 1997, Suneson 1997), include information on the mineral resources for the three national forests within the Assessment area. The estimates of reserve and potential are current as of late 1997. The discovery of new economic deposits or the complete extraction of existing ones dramatically affects reserve estimates. For example, the lead industry in southern Missouri indicates there are approximately 13 to 16 years of known ore reserves remaining (Seeger 1997). Similar projection estimates would apply to almost any time period throughout the 270-year mining history of Missouri lead. Over that time, exploration has resulted in the discovery of new ore deposits, mining has resulted in the removal of known deposits, and economics have changed the real value of the commodity. All of these factors have affected the reserve estimates for lead over time. Still, by current estimates, the lead mining industry in Missouri will be gone in 13 to 16 years if exploration is not allowed to take place or if continued exploration does not reveal any new economic deposits. If sufficient exploration takes place, it will likely result in discoveries that will extend the reserve estimates.

The three national forests within the Assessment area include almost 4.4 million acres, the largest land base within the Assessment area managed by one entity. These lands contain important mineral deposits that are currently being mined and equally important mineral reserves and potential for further discoveries as noted in tables 7.9, 7.10, 7.11, and 7.12. While the potential for mineral discovery is specific to the physical evidence for that mineral, minerals development potential is dependent on laws, regulations, policies, and, in the case of private lands, permission for access and development. For example, physical evidence of a mineral deposit may be high, but laws and policies restricting access may render the development potential very low. In some cases—such as on some areas of public land where Federal laws do not allow mineral extraction—this potential may be nonexistent. The minerals development potential is thus one of the major factors affecting access for minerals exploration and development.

Costs

There are many factors involved in the costs of exploring for and developing mineral resources. The overall costs include (1) specialized equipment and structures, (2) uniquely qualified personnel, (3) surface access needs, and (4) considerations associated with environmental and reclamation requirements. The time required to explore for, study, and develop a newly discovered mineral resource can be very lengthy. For example, the exploration phase of a venture that anticipates operating a moderately sized surface mine for metallic or nonmetallic ores (i.e., one that produces 20,000 tons per day) will generally take at least 3 years. If a discovery is made, it may take another 5 years of studies and tests and 3 more years of development before production can begin. In other words, it may take a minimum of 11 years to go from initial exploration to production (USDI BM 1991). The Missouri Geological Survey report for the Assessment discusses exploration and development costs associated with non-Federal and Federal lands (Seeger 1997). Table 7.13 presents the time and costs for the largest mining-related activities within the Assessment area—obtaining permits and developing typical lead mines in Missouri. These operations occur on both private lands and the Mark Twain National Forest.

Federal laws and regulations on national forest lands are independent of State boundaries and contribute to costs regardless of where exploration and development activities take place. Natural resource specialists in the Federal Government are required to thoroughly analyze proposed operations on national forest lands to determine potential environmental effects of surface disturbing activities. Such a Federal environmental analysis can take several months for small, minimal surface impact proposals to a number of years for larger ones. Operators must factor in this process as part of the cost of operating on federally managed lands.

State laws governing mineral development differ in content and language among the three States, but they are similar in intent and in their definition of agency responsibilities. Such laws also have a similar influence on costs throughout the Assessment area. Large-scale mining ventures involving the outlay of millions of dollars will typically require proportionately large operating areas. Table 7.14 lists some typical sizes of operating areas for various mining-related activities within the Assessment area.

Table 7.11—Reserve estimates and potential for discovery of mineral commodities in the Missouri portion of the Assessment area

Mineral commodity	Reserve estimates		Potential for discovery
	Assessment area	Mark Twain NF	
Southeast Missouri			
Barite	Not large	Unknown	Limited
Clay	Small known deposits	Unknown	Very low
Igneous rock dimension	Limited exposure	Unknown	Moderate
Industrial sand	Extensive exposures	Unknown	High
Iron	Large (uneconomical)	Unknown	High
Lead and other metals ^a	13–16 years	Extensive	High
Limestones, high purity	Extensive deposits	Unknown	High
Metals, mafic ^b complex	Unknown	Present	Unknown
Sand and gravel	Abundant resources	Possible	High
Tungsten and manganese	Unknown	Present	Unknown
Uranium and thorium	Unknown	Present	Unknown
Southwest Missouri			
Asphaltic sandstone	Good for near surface	Possible	Moderate
Carbonate rock	Extensive resources	Present	High
Clay and shale	Low	Possible	Limited
Coal	Limited	Possible	Low
Dolomite, high purity	Good	Present	Good
Gas	Probable but unknown	Unknown	Limited to none
Industrial sand	Low	Possible	Unknown
Marble, dimension	Formations limited	Unknown	High
Oil, heavy	Some but limited	Unknown	Low
Oil shale	Minor	Possible	Nonexistent
Sand and gravel	Low	Present	Very low
Sandstone, dimension	Known resources	Present	High
Siltstone, dimension	Formations limited	Unknown	Unknown
Tri-state zinc and lead	5.3 million tons of ore	Present	Moderate
Central Missouri			
Aggregate, crushed	Large	Present	High
Aggregate, high quality	Limited	Unknown	Low
Barite, lead, zinc	Known, minor	Possible	Unknown
Coal	Large	Present	Favorable
Dolomite, high purity	Limited	Present	Speculative
Fire clay	Major	Present	High
Igneous and metamorphic	None	Unknown	None
Industrial sand	Known, scattered	Unknown	Speculative
Iron	Low	Unknown	None
Limestone, high purity	Good	Unknown	High
Magnetite, hematite	Unknown	Possible	Unknown
Marble, dimension	Large	Unknown	Low
Metals, layered mafic ^b	Unknown	Possible	Unknown
Sand and gravel	Good	Limited	Good

NF = National forest.

^a Includes zinc, silver, cobalt, nickel, cadmium, copper.

^b Made up mainly of magnesian rock-forming silicates.

Source: Seeger (1997).

Table 7.12—Reserve estimates and potential for discovery of mineral commodities in the Oklahoma portion of the Assessment area

Mineral commodity	Reserve estimates		Potential for discovery
	Assessment area	Ouachita NF	
Bentonite, volcanic ash	Limited	Unknown	Low
Chat, aggregate	61,500,000 tons	Unknown	Known sources
Clay and shale	Unknown	Unknown	Moderate
Coal	5,896,260,000 tons	Unknown	Moderate to high
Coalbed methane	5 trillion cubic ft	Unknown	Low due to economics
Granite, aggregate	Unknown	Unknown	Low
Granite, dimension	Unknown	Unknown	Low
Industrial sand	Unknown	Unknown	Low
Lime	Many known sources	Unknown	High
Limestone, aggregate	Almost unlimited	Unknown	High
Limestone, dimension	Unknown	Unknown	Low
Manganese	Unknown	Unknown	Very low
Migrabitumen	Unknown	Unknown	Low
Natural gas	20–51 trillion cubic ft	Unknown	Moderate to high
Oil	Unknown, 6 fields ^a	Unknown	Low to moderate
Sand and gravel	High	Unknown	Moderate
Sandstone, aggregate	Almost unlimited	Yes	High
Sandstone, dimension	Large reserves	Yes	High
Tripoli	Unknown	Unknown	Moderate
Vanadium	Unknown	Unknown	Very low
Zinc, lead, copper	Unknown	Unknown	Very low

NF = national forest.

^a Region or area with known oil deposits.

Source: Suneson (1997).

Table 7.13—Actions and associated time and cost to develop a large lead mine on private or national forest lands in the Missouri portion of the Assessment area (with comparisons to time and cost in previous decades)

Development action	Private lands	National forest lands
Years to obtain permit or construct mine		
Obtain mine/mill permits, circa 1970	2 to 3	Likely the same or slightly more than private
Obtain permits, new mine/mill, 1997	Minimum 3 to 4	Minimum 6 to 7
Construct shaft/surface plant, 1997	Minimum 3 to 4	Likely the same as private
Total new mine/mill development time	10 to 11 years	13 to 15
Exploration, development, and construction costs (1997 dollars)		
Cost to develop 2,500 tpd mine in 1960	3,200,000	Likely the same as private
Cost to develop 5,000 tpd mine in 1967	14,400,000	Likely the same as private
Cost to develop 5,000 tpd mine in 1973	21,600,000	Likely the same or slightly more than on private land
Cost to develop 4,000 tpd mine in 1985	31,000,000	Likely slightly more than private
Cost to duplicate a 1973 or 1985 mine in 1997	100,000,000 to 125,000,000	Added costs to develop
Exploration cost in 1997	5,000,000 to 10,000,000	Likely slightly more than private
Exploration cost for 300 ft drillhole in 1997	7,000 to 12,000	Likely slightly more than private
Exploration cost for deep drillhole in 1997	20,000 per 2,000 ft	Likely slightly more than private
Capital costs for new ore deposit in 1997	70,000,000 to 120,000,000	Cost will exceed private

Tpd = tons per day; ft = foot or feet.

Source: Seeger (1997).

Table 7.14—Typical size requirements for mining activities within the Assessment area

Mining activity	Size required	AR	MO	OK
Aggregate pit on national forest	0.25 to 6 ac	x		
Gas well padsite, deep	6 to 8 ac	x		x
Gas well padsite, shallow	1.5 to 2 ac	x		x
Padsite for metals exploration drillhole	100 ft x 100 ft		x	
Producing gas well site	0.23 ac	x		x
Quartz mine on national forest	0.25 to 5 ac	x		
Quartz mine on private land	0.25 to 40 ac	x		
Surface plant, metals mine-mill facility	Approx. 40 ac		x	
Tailings impoundment, metals mine	200 to 300 ac		x	
Underground metals mine	200 to 400 ac		x	

Ac = acres; ft = feet.

Source: Seeger (1997), USDA FS (1996b).

Reclamation costs often are high. A case in point is the reclamation of bauxite (aluminum ore) mines south of Little Rock, AR, where previous mining operations affected several local streams. The Aluminum Company of America (Alcoa) and Reynolds Aluminum Company are working with State agencies to reclaim the mined lands and mitigate effects to the streams (Durham 1997, Harper 1997, Keith 1997, Williams 1997). As of 1997, the Reynolds Aluminum Co. had committed over \$55 million for land reclamation projects that will mitigate effects to 1,200 ac in the Hurricane Creek drainage and Alcoa had obligated \$20 million for water treatment, earth moving, and revegetation of 850 ac of company-owned tracts in the Hurricane Creek drainage (Durham 1997, Harper 1997, Keith 1997, Williams 1997).

Demand

A number of mineral commodities produced within the Assessment area enjoy national and international significance. This is particularly true for lead from the Missouri Ozark Mountains and Mark Twain National Forest and for quartz crystal, novaculite used for whetstones and abrasives, and high-quality electronic-grade quartz for fiber optics and other hi-tech materials from the Arkansas Ouachita Mountains and Ouachita National Forest. Other mineral commodities from the Assessment area—such as building stone, coal, and gas from eastern Oklahoma; fire clay and monument grade granite from Missouri; and tripoli and gas from Arkansas—are all marketed nationally as well as within the Assessment area.

Mineral collectors and “rockhounds” from around the world come to the Assessment area specifically to explore for and collect unique mineral specimens. Local Chambers of Commerce and public information centers receive numerous inquiries and dispense many brochures and pamphlets catering to mineral resource hobby and educational interests. State geological agencies, the Forest Service, university geology departments, mineral organizations, and others provide and assist in mineral and geology theme tours within the Assessment area for schools, educational organizations like Elderhostel, and other professional and lay person groups. In 1995, the State of Oklahoma, recognizing the public interest in rockhounding, hosted a 3-day workshop for rockhounds, which is described in some detail by Johnson and Suneson (1996). A number of Highlands businesses cater to these interests as well, further adding to the social legacy of the minerals within the Assessment area. Within the heart of the Ouachita Mountains of Arkansas, the communities of Mt. Ida, Hot Springs, and Jessieville alone have at least 24 shops specializing in gemstones and minerals and at least 10 different commercial mineral-digging locations.

Price

Table 7.15 shows price trends for 19 of the nonenergy and energy minerals in the Highlands. With the exception of silver, which has declined in value, all mineral categories for which trend data are available have increased in price since 1987.

Table 7.15—Change in price and range of prices for 19 mineral commodities from 1987 to 1996

Mineral commodity	1987–1996 price change	1987–1996 price change	1996 price
----- Dollars per unit -----			
Barite ^a	Overall price increase	34.86 to 61.16/ton	50.00/lb
Cement ^a	Steady price increase	49.10 to 70.00/ton	70.00/ton
Coal ^b	Unknown	Not reported	30/ton
Cobalt ^a	Significant price increase	6.56 to 29.21/lb	26.00/lb
Copper ^a	Overall price increase	0.82 to 1.39/lb	1.08/lb
Diamond ^b	Unknown	Not reported	1 to 10/point
Gas ^b	Unknown	Not reported	1.50 to 3.50/mcf
Industrial sand ^a	Steady price increase	13.00 to 17.86/ton	17.56/ton
Iron ore ^a	Relatively stable	0.53 to 0.79/ton	0.67/ton
Lead ^a	Slight increase in price	0.31 to 0.48/lb	0.48/lb
Lime ^a	Reported for 1987–1992	49.96 to 51.70/ton	Not available
Nepheline syenite ^b	Unknown	Not reported	4 to 25/ton
Nickel ^a	Overall price increase	2.19 to 6.09/lb	3.40/lb
Quartz, crystal ^b	Unknown	Not reported	10 to 100/lb
Quartz, industrial ^b	Unknown	Not reported	1 to 3/lb
Sand and gravel ^a	Steady price increase	3.35 to 4.43/ton	4.43/ton
Silver ^a	Price dropped steadily	7.01 to 3.94/troy oz	5.30/troy oz
Stone, crushed broken ^a	Steady price increase	4.37 to 5.43/ton	5.43/ton
Zinc ^a	Slight increase in price	0.41 to 0.82/lb	0.51/lb

Mcf = thousand cubic feet; lb = pound; oz = ounce.

^a From Seeger (1997).

^b From Howard (1997).

Source: Seeger (1997), Howard (1997).

Public Consumption

The annual per-capita consumption of all nonfuel (nonenergy) minerals in the United States totals nearly 22,000 pounds (table 7.16). In addition, the annual per-capita consumption of energy minerals is approximately 18,000 pounds (USDI BM 1991). Mineral resources from the Assessment area end up in a wide variety of products and uses. From Missouri comes lead used in car batteries and the lining of hospital X-ray rooms. Arkansas provides quartz used in modern watches, computers, and the fiber optics that help doctors see into minute areas of a human body. Oklahoma coal generates power for 150,000 eastern Oklahoma homes. The Missouri Geological Survey report for this Assessment provides details on public consumption of Missouri minerals from within the Assessment area.

Imports and Recycling

The Mining and Minerals Policy Act of 1970 (Public Law 91-631) declares that it is in the national interest for the Federal Government to stabilize domestic mining and mine reclamation industries. Twenty years later, in a report written at the request of the Federal government, the National Research Council warned of the declining competitiveness of the U.S. minerals and metals producing industry along with other domestic industries (NRC 1990). While the mineral industry periodically adjusts to changes in public policies and other influences, the public demand for products and goods from mineral resources has remained strong and in most cases has increased.

Imports and recycling of mineral commodities affect commodity production. Imports of minerals are due to either (1) the lack of the mineral resource in an area or (2) an imported mineral product being able to compete better economically with products produced locally. In

Table 7.16—Average annual per capita consumption in the United States of nonfuel minerals and U.S. population supplied with minerals from the Highlands

Nonmetallic minerals		Metallic minerals	
<i>Pounds</i>		<i>Pounds</i>	
Annual per capita consumption of nonfuel minerals^a			
Clay	350	Aluminum	42
Cement	724	Copper	19
Phosphate rock	383	Iron and steel	1,200
Sand and gravel	7,600	Lead	11
Salt	345	Manganese	6
Stone	9,700	Zinc	11
Other	1,300	Other	18
U.S. residents supplied annually by nonfuel minerals from the Highlands^b			
Cement	27,035,912	Aluminum ^c	47,000
Clay ^c	11,565,565	Copper	986,316
Sand and gravel	5,332,846	Iron ore	608,333
Stone	24,919,085	Lead	58,000,000
		Zinc	8,363,636

^a From USDI BM (1991) and Seeger (1997).

^b From Seeger (1997) and others, as noted.

^c Clay and aluminum calculated from USDI BM (1991), Seeger (1997), and Howard (1997).

the former case, the imported mineral helps make up a supply need for the product and may enhance employment. In the latter case, the imported mineral will likely have an adverse impact on domestic mineral commodity industries. The imported mineral will probably have a negative effect on domestic exploration and development for new mineral resource projects. United States imports of ever-greater tonnages of mineral resources noticeably affect local, regional, and national economies.

Within the Highlands are several very good examples of recycling. In 1996, the Missouri lead industry recycled over 100,000 tons of lead, primarily from vehicle batteries (Seeger 1997), representing over 10 percent of the recycled lead in the United States. Nationally,

970,000 tons of lead are recycled annually, which is 56 percent of the apparent consumption of lead in the United States. Since 1989, 53 to 62 percent of the lead consumed nationally has been from recycled lead processed in the Missouri portion of the Assessment area (Seeger 1997). Seeger discusses additional examples of recycling in the Missouri Highlands. In Arkansas, the aluminum and the vanadium industries actively recycle the minerals that they are known for internationally. In all three cases (lead, aluminum, and vanadium) these metals recycle through plants once used almost exclusively for processing newly mined materials.

Unique Mineral Features of the Highlands

The Assessment area boasts a wide range of geologically interesting sites and natural attractions. Many of these are listed by counties in a matrix developed specifically for the Assessment. A spreadsheet titled “Geologic Interest Sites Within the Assessment Area” (available at the Assessment Web site, <www.fs.fed.us/oonf/ooha.welcome.htm>) contains information on some of the most interesting geologic features. Features include caves and unusual geologic formations, mineral-collecting localities, and other historic mining and interpretive sites. Several communities within the Assessment area have minerals-related theme celebrations. Others have museums either wholly or partly devoted to mineral exhibits and local mining histories contributing to the significance of mineral resources in the Assessment area.

Recognizing the educational and scientific values associated with the mineral resources they are recovering, mining companies often contribute quality specimens to museums, schools, universities, and professional geological agencies and organizations across the country. High-quality mineral specimens from the Assessment area are displayed in the Smithsonian National Museum in Washington, DC, the National Mining Museum in Leadville, CO, the Natural History Museum of New York City, and other museums. At events surrounding his 1992 inauguration, President William J. Clinton presented guests with special commemorative mementos made by novaculite and quartz crystal companies in the Ouachita Mountains of his home State of Arkansas.

Assessment area mining companies have consistently contributed minerals to the State geological agencies so that mineral kits can be prepared for school children. In Arkansas alone, each year, geologists and schoolteachers distribute over 40,000 of these kits composed of minerals donated by Arkansas mining companies. Missouri mining companies contribute minerals specimens in a similar manner there as well. Some Assessment area companies provide scholarships, help fund research projects of various types, and contribute toward various community events and human resource organizations (Seeger 1997). By opening their mines to professional geologists,

researchers, and students, these companies ensure that a wealth of information is documented that might otherwise not be gathered due to cost restraints. This critical information pertains to the nature and occurrence of the ore deposits and to our understanding of the geologic formations that house them within the Assessment area. This kind of knowledge is important to the understanding of ore deposits in general, improving chances of locating more deposits both within the Assessment area and elsewhere.

Implications and Opportunities

The Assessment area is a very important provider of mineral resources for local economies, the Nation and the world. The potential for discovery of additional mineral deposits on national forest land and elsewhere in the region ranges from low to high, depending on the resource. With increasing demand for some commodities, land managers will need to address the demand for additional access to explore for new mineral resources.

At 4.4 million ac, the Highlands’ national forests comprise the largest land base within the Assessment area managed by one entity—the Forest Service. With known important mineral resources and the potential for new discoveries associated with them, opportunity exists to coordinate minerals program management and policy among the three national forests.

The opportunity also exists to identify and establish mineral resource potential zones, or target areas, on the Highlands national forests and to identify environmentally sensitive conditions or areas to be mitigated in anticipation of future exploration proposals within those zones.

The Ozark-Ouachita Highlands Assessment brought together three State geological agencies to compile important mineral resource information independent of State boundaries. Deposits of many minerals overlap two or more Assessment area States. Opportunity exists for the three State agencies to continue working together with the Forest Service in future joint projects within the Assessment area, including periodically updating the information gathered for this Assessment. By working together, the region’s geologists can gain from shared expertise and better coordinated policy development and implementation.

Chapter 8: Range Resources, Special Forest Products, and Special Uses

Question 8.1: What are the nature and magnitude of the range resources, special forest products, and special uses programs on the national forests of the Ozark-Ouachita Highlands?

The national forests that are part of this Assessment have three programs that have relatively small economic and social impacts regionally but nevertheless are important to local communities and individuals living near the forests. The range resources, special forest products, and special uses programs are discussed together here because the available information about each one was not sufficient to warrant treatment in separate chapters, yet the Social-Economic Team recognized the need to include them in the Assessment. These programs do not often make headlines but are a significant part of the day-to-day workload of national forest staff and affect the daily lives of many area residents.

Key Findings

1. There are approximately 13,600,000 acres (ac) of non-Federal grazing land in the Highlands; the national forests provide an additional 743,000 ac of grazing land. More than 90 percent of the national forest range is grazed woodlands (principally on the Ouachita National Forest) that have low forage value.
2. In the decade 1987 through 1996, the number of individuals holding permits to use the national forest range in the Highlands declined 67 percent, and the number of animal unit months (AUM's) of range use dropped 63 percent.
3. There is a large and increasing demand for forest plants used for herbal dietary supplements and medicines. Arkansas accounts for 2 percent and Missouri accounts for 3 percent of total U.S. production of wild ginseng. The Ozark National Forest permits the limited harvesting of ginseng; otherwise, the three national forests have not been a significant source for these forest products.

4. Firewood is in demand on all Highlands' national forests. While the national forests have traditionally been a source of firewood, its availability on the Ouachita National Forest has declined by 62 percent since 1992.
5. The total revenue generated by the sale of all special forest products on the three national forests in 1996 was approximately \$32,000.
6. Many varied special uses are permitted on the Highlands' national forests to accommodate community needs, including economic development. In 1996, there were more than 2,000 special uses under permit, generating fee revenues of nearly \$330,000.

Data Sources

The Social-Economic Team obtained information about the national forest range resources from the *Forest Service Grazing Statistical Summaries* for 1987 and 1996 (USDA FS 1988, 1997c) and from the records of the individual national forests. For information on other resources, the team used National Resources Inventory (NRI) estimates of non-Federal grazing land in the Highlands (USDA NRCS 1997a). Finally, they obtained data for the analyses of special forest products and special uses from office records of each national forest and published studies.

Range Resources

Within the Highlands, there are about 13,595,600 acres (ac) of non-Federal grazing lands (USDA NRCS 1997a). The three national forests provide an additional 743,000 ac of range, accounting for about 5 percent of the Highlands total grazing land. The majority (704,000 ac) of the national forest range is grazed woodland that typically has little available forage but does include some occasional timber harvest areas suitable for grazing for a period of time before being replaced by shrubs and trees (table 8.1). Nearly 25,000 ac of national forest range land

Table 8.1—Area of grazed woodland, grazed natural open land, and improved pasture in national forests of the Highlands

National forest	Grazed woodland ^a	Grazed natural open land	Improved pasture	Total range
----- Acres -----				
Ouachita	697,531	0	1,111	698,642
Ozark	6,000	0	2,304	8,304
Mark Twain	0	24,500	11,500	36,000
Total	703,531	24,500	14,915	742,946

^a It is estimated that more than 90 percent of the woodland range in range allotments on the Ouachita and Ozark National Forests is heavily forested and produces very little forage. Within this area, even-aged timber harvest units can produce higher volumes of range forage for several years following a harvest (Bukenhofer 1998).

are grazed natural open land (i.e., land that is mostly free of trees due to the ecological conditions of the site) and about 15,000 ac are improved pasture.

More than 90 percent of the national forest grazing land is on the Ouachita National Forest; nearly all of this is woodland range with low forage value. About 60 percent of the Ouachita's range is in inactive allotments, i.e., not under permit and not used (table 8.2). In contrast, the 36,000 ac of "total range" land on the Mark Twain National Forest are entirely natural open land and improved pasture with about 75 percent in active range allotments. The Ozark National Forest has the least amount of grazed land. About 70 percent is grazed woodland range, and 30 percent is improved pasture. All the Ozark range allotments are active.

Table 8.2—Active and inactive national forest range allotments

National forest	Active range allotments	Inactive range allotments	Total range
----- Acres -----			
Ouachita	256,765	441,877	698,642
Ozark	8,304	0	8,304
Mark Twain	27,000	9,000	36,000
Total	292,069	450,877	742,946

In 1996, the range management program of all three Highlands forests represented 0.6 percent of national forest expenditures and accounted for 0.1 percent of receipts. Although the national forest range resources are of small regional significance, they are economically important to some local livestock owners who rely, in part, on the availability of national forest range land for grazing their cattle. As of 1996, there were 131 individuals holding range permits using the Highlands' national forests for 28,122 animal unit months (AUM's) of cattle grazing. (An animal unit month represents a cow-calf pair grazing for one month.)

There is a sharp decline in the use of national forests for cattle grazing. In the decade 1987 through 1996, the number of national forest range permittees in the Highlands declined 67 percent and the number of AUM's of range use dropped 63 percent. This decline in use was most dramatic on the Ouachita National Forest where the number of permittees declined 75 percent and livestock use dropped 81 percent (USDA FS 1988, 1997c). The greatest decline has been in the use of woodland range; however, the demand for improved pasture land on national forests remains relatively high.

Along with the decline in grazing, a deterioration in existing range "improvements" (e.g., fences and cattleguards) has occurred. Any significant increases in the range program would require a significant investment to restore or replace such "improvements."

The general decline in demand for national forest range is attributable to a variety of factors including: (1) the retirement of traditional permittees without replacement by younger generations, (2) the rise in grazing fees, (3) the decrease in small-scale ranchers who have been the traditional national forest range users (permittees), (4) the need of large-scale cattle operations for higher quality forage than national forests can provide, and (5) the decrease in forage value in woodland grazing land resulting from the reduction in even-aged timber harvesting (USDA FS 1990, Bukenhofer 1998, Owen 1998). For an additional discussion of range resources, see Chapter 2 of *Terrestrial Vegetation and Wildlife* (USDA FS 1999b).

Special Forest Products

Special forest products encompass the array of biotic resources—other than timber, minerals, and wild game—that people harvest from the forest for personal or commercial purposes. These special forest products include plants with medicinal or pharmaceutical value (e.g., ginseng and purple coneflower), wood and plant material used for decorative purposes (e.g., Christmas trees, grapevines, and pine knots and cones), firewood, and edible fruits and nuts (e.g., sassafras stems, blackberries, muscadine, and hickory nuts). Harvesting of special forest products is common throughout the country and world; in many areas, such harvests are a multigenerational tradition of folk culture (Vance 1997). To the extent that national forests provide a source for these products, they contribute to the lifestyles, traditions, crafts, and cottage industries of local communities.

The demand for some products has grown in recent years with the rise in popularity of herbal dietary supplements and homeopathic medical treatment. In the mid-1990's, sales outlets for herbal dietary supplements expanded from the specialty health and natural food stores to the broader chain pharmacies and other mass market outlets (Foster 1997, Mater 1997). National as well as international markets exist for some products found in the Highlands.

Approximately 80,000 pounds (lbs) of wild ginseng are harvested annually in the United States. The wholesale price for wild ginseng in 1995 was approximately \$500 a pound. In 1996, Arkansas accounted for

approximately 2 percent and Missouri accounted for 3 percent of the total U.S. production of wild ginseng. Both of these States are approved by the U.S. Fish and Wildlife Service to export ginseng. Oklahoma, where the status of ginseng is classified by The Nature Conservancy as “critically imperiled,” is not approved for ginseng export (Foster 1997, Robbins 1998). Exports account for approximately 95 to 97 percent of the ginseng grown in the United States most of which is sent to Hong Kong for distribution to international markets (primarily Asia) (Foster 1997). Exports of ginseng increased 180 percent between 1991 and 1996 (Robbins 1998).

Goldenseal and purple coneflower (echinacea) are two other plants of the Highlands with international demand. Approximately 100 tons of goldenseal are harvested annually in the United States with an estimated price of \$40 per pound, and the price for wild echinacea reached \$30 per pound in 1995 (Foster 1997). Although information was not available to estimate the demand for special forest products specifically in the Highlands, a 1993 study of several products in the State of Missouri indicates that the demand is significant, as shown below, and is expected to increase (Mater 1997):

Species	Demand (lbs)
Black walnut (<i>Juglans nigra</i>) hulls	200,000
Ginseng (<i>Panax quinquefolius</i>)	230,000
Goldenseal (<i>Hydrastis canadensis</i>)	275,000
May apple (<i>Podophyllum peltatum</i>)	220,000
Purple coneflower (<i>Echinacea purpurea</i>)	65,000
Slippery elm (<i>Ulmus rubra</i>)	200,000
Witch hazel (<i>Hamamelis</i> spp.)	110,000

Trends toward the commercial cultivation of some species, such as ginseng, goldenseal, and purple coneflower, may eventually relieve the current pressure on wild populations (Foster 1997).

National forests permit the removal of some special forest products (see table 8.3). Permit sales totaled about \$33,000 in 1996. Firewood sales from all three forests accounted for 56 percent of this revenue, and 42 percent came from ginseng sales on the Ozark National Forest. More than 900 lbs of ginseng root were harvested during that year. (The Ozark National Forest recently instituted measures to restrict the harvest of ginseng to ensure its continued viability.)

Table 8.3—Special forest products sold on Highlands’ national forests in 1996, number of permits, quantity, and revenue

National forest	Special forest product								Total
	Acorns	Christmas trees	Firewood	Ginseng	Grapevines	Hay	Pine knots	Sassafras	
Ouachita									
No. of permits	0	3	300	0	2	0	2	0	307
Quantity	0	3 trees	566 cords	0	200 ft	0	NA	0	0
Revenue (\$)	0	30	2,830	0	20	0	0	0	2,880
Ozark									
No. of permits	1	0	766	302	1	2	0	4	1,076
Quantity	77 lbs	0	1,532 cords	906 lbs	1,400 ft	351 bales	0	800 stems	
Revenue (\$)	10	0	9,066	13,575	35	543	0	40	23,269
Mark Twain									
No. of permits	0	0	596	0	0	0	0	0	596
Quantity	0	0	596 cords	0	0	0	0	0	0
Revenue (\$)	0	0	6,395	0	0	0	0	0	6,395
Total									
No. of permits	1	3	1,662	302	3	2	2	4	1,979
Quantity	77 lbs	3 trees	2,694 cords	906 lbs	1,600 ft	351 bales	NA	800 stems	0
Revenue (\$)	10	30	18,291	13,575	55	543	0	40	32,544

Ft = feet; NA = not applicable; lbs = pounds.

National forests are a traditional source of firewood, and removal of firewood is permitted on all three Highlands’ national forests. Although demand for firewood has remained consistently high, its availability on the Ouachita National Forest has declined. This decline is due to a reduction in the use of even-aged timber harvesting and an increased application of uneven-aged harvesting from which firewood is less available. Between 1992 and 1996, the amount of firewood sold on the Ouachita National Forest declined by 62 percent. In contrast, the availability of firewood on the Ozark National Forest has slightly increased.

Other special forest products sold under national forest permit include acorns, grapevines, pine knots (wood with high resin content), and sassafras stems. Many requests for the harvest of ferns, moss, lichens, plants, and other material from national forests are denied due to lack of funding and staff to assess the sustainability of the resource and to adequately monitor harvest operations. The numerous instances of illegal removal of products such as moss, purple coneflower, and grapevines point to the significant demand for these forest resources.

Special Uses of National Forests

As with other public lands, national forests often meet a variety of needs of communities, individuals, organizations, and agencies for uses such as dams or reservoirs for flood control, electric and other utility and railroad rights-of-way, military maneuvers, research sites, and other commercial and non-commercial activities. By providing a means for these special uses to occur when private land is not a feasible option, national forests play a key role in the infrastructure and well-being of many communities. In 1996, more than 2,000 special uses were under permit or easement on the three national forests (table 8.4). Approximately 60 percent of these authorized special uses were for road access across national forest land. Some of the special uses such as television broadcast towers or weather stations meet regional needs. Permit fees for special uses on the three national forests generated nearly \$330,000 in revenue in 1996.

Table 8.4—Special uses under permit or easement on national forests in 1996^a

Type of use	Ouachita NF		Ozark-St. Francis NF		Mark Twain NF		Total	
	Permits	Area	Permits	Area	Permits	Area	Permits	Area
		<i>Acres</i>		<i>Acres</i>		<i>Acres</i>		<i>Acres</i>
Airport beacon	1	9	0	0	0	0	1	9
Barn	0	0	6	4	0	0	6	4
Camp, organization	0	0	2	14	1	20	3	34
Cemetery	4	4	8	7	11	12	23	23
Church	2	5	3	2	5	6	10	13
Club	0	0	2	31	0	0	2	31
Camp and picnic area (community)	47	0	10	119	0	0	57	119
Cultivation	1	1	2	6	5	67	8	74
Dam, reservoir, impoundment	23	1,956	10	947	0	0	33	2,903
Electric cooperative	7	522	7	164	0	0	14	686
Electronic site-commercial	26	84	60	359	47	1,750	133	2,193
Electronic site-government	18	68	0	0	0	0	18	68
Fence	1	1	5	15	1	2	7	18
Geological exploration	3	49	0	0	0	0	3	49
Group event	0	0	4	1,800	1	30	5	1,830
Livestock area	4	462	15	295	11	84	30	841
Military training area	0	0	6	70	2	2,200	8	2,270
Miscellaneous improvement	14	9	25	42	18	15	57	66
Observatory	0	0	0	0	2	3	2	3
Occupancy permit	0	0	13	17	0	0	13	17
Orchard	1	36	0	0	0	0	1	36
Outfitter and guide service	9	0	16	2	8	18,024	33	18,026
Park, playground	0	0	3	536	2	61	5	597
Oil and gas pipeline	4	330	11	522	6	36	21	888
Oil and gas facility	0	0	1	1	1	65	2	66
Powerline	18	1,157	17	1,644	59	3,532	94	6,333
Railroad right-of-way	0	0	0	0	2	101	2	101
Recreation event	3	12	7	605	13	2,930	23	3,547
Recreation residence	0	0	59	26	0	0	59	26
Research study	0	0	13	60	5	150,000	18	150,060
Resource surveys and site survey	6	0	6	5	1	80	13	85
Road easement (depts. of transportation)	12	84	34	728	30	706	76	1,518
Road easement (private road)	54	21	231	602	423	5,907	708	6,530
Road easement (public road)	172	734	29	278	105	680	306	1,692
Road permit (temporary)	32	38	0	0	0	0	32	38
Road permit (WEYCO)	120	0	0	0	0	0	120	0
School education center	2	73	3	322	0	0	5	395
Service building	3	10	6	6	5	5	14	21
Stockpile site	4	52	0	0	1	3	5	55
Stream gauging station	0	0	5	40	0	0	5	40
Television broadcast	0	0	4	1	0	0	4	1
Trash transfer station	1	1	0	0	0	0	1	1
Vendor	0	0	1	5	1	0	2	5
Visitor center, museum	0	0	0	0	1	9	1	9
Water transfer pipe	18	17	25	124	14	27	57	168
Weather station	2	1	0	0	0	0	2	1
Well, spring, windmill	1	0	17	5	2	0	20	5
Total	613	5,736	666	9,404	783	186,355	2,062	201,495

NF = national forest; WEYCO = Weyerhaeuser Company.

^a Includes uses on national forest (NF) lands outside the Highlands (Cedar Creek Ranger District on the Mark Twain NF, Tiak Ranger District on the Ouachita NF, and the St. Francis NF).

Source: USDA FS (1997b).

Implications and Opportunities

The dramatic decline in cattle grazing on the Highlands' national forests over the last decade is noteworthy. The factors that have led to this decline are likely to continue; an increase in demand for national forest range is not expected.

The demand for some special forest products is growing, especially for those species used in herbal and homeopathic medicines such as ginseng, goldenseal, and purple coneflower. With few exceptions, national forests traditionally have given little emphasis to determining the status of the plant species used for these products and to evaluating their potential for sustainable harvest. With insufficient information on species status and limited funds for program administration, national forest staff are often unable to grant permits for removal of some

products. Problems with illegal removal of the more valuable species may grow if demand increases. With rising demand, there may be a need and opportunity to more fully evaluate the status of these special forest products and to reconsider their role in national forest programs.

The availability of national forest lands to accommodate a variety of commercial and noncommercial uses not possible on private lands is vital to local communities and regional economies. As the Highlands' population continues to grow, particularly in rural areas (see Chapter 2 of this report), and as the evolution of technology imposes new facility requirements, there will likely be new and greater demands for use of national forests and other public lands. Managers will need to address the possible resource impacts, including effects on scenic quality, when responding to the additional demands for land use.

Chapter 9: Attitudes, Values, and Public Opinions

Question 9.1: What are the attitudes, values, and opinions of people in the Highlands (including interest groups and forest inholders) regarding national forests and the Forest Service?

To help managers better understand public interests and perceptions concerning national forest management, the Social-Economic Team sought to answer the above question. However, the team found no comprehensive data for the Highlands per se and no data that focused specifically on the attitudes and values of national forest inholders (owners of land surrounded by or adjacent to national forests). Time requirements and cost made the prospect of developing and conducting a new survey infeasible. Information provided in this chapter therefore represents a distillation of studies available to the team, each of which had its own focus and objectives. It is possible that other important data on these topics exist.

The goals and objectives of the studies drawn upon for this chapter included: (1) ascertaining the values of the general public (Forest Service Values Poll), (2) attempting to build a national consensus about forest management (Seventh American Forest Congress), (3) compiling background information for State Comprehensive Outdoor Recreation Plans in the Assessment area, (4) characterizing a selected group of national forest “stakeholders” (Kuzmic and Caneday 1996), (5) analysis of public involvement practices and preferences on the Ouachita National Forest (Fendley and others in press), (6) polling a local public’s “forest values,” (7) ascertaining the attitudes of nonindustrial private forest (NIPF) landowners concerning forest management, and (8) gauging public response to the Ozark-Ouachita Highlands Assessment.

The methods researchers employed in these studies ranged from scientifically conducted telephone polling of the U.S. public to indepth interviews, focus groups, roundtable processes, and even summaries of oral and written statements and opinions expressed at public meetings. The various studies also differed in the ways they identified respondent populations and collected samples including, for instance, probability sampling of U.S., State, or regional populations; sampling from lists of interest groups; and purposeful selection of “key informants.”

Key Findings

1. There is a high level of public support for maintaining healthy forests and environmental quality, although the concept of a healthy forest is subject to a variety of interpretations.
2. Generally, the public accepts the idea that forests fulfill a variety of roles—from pristine wilderness to intensive tree farms—and that forest management objectives will differ among and within landowner categories.
3. Most respondents in public opinion surveys support the following: (1) forests should be managed for multiple uses; (2) forests should provide a range of goods, services, experiences, and values; and (3) public forests should not provide goods and services at the expense of long-term forest health and environmental quality.
4. There is widespread agreement that different uses of national forests should be balanced (e.g., among recreation, timber management, mining, wilderness, wildlife); however, there is no consensus about what that balance should be.
5. In various surveys, 40 to 50 percent of the respondents disapproved of timber cutting for wood products on public lands; if environmental protection measures were listed as conditions or the management objective included benefits to wildlife and/or scenery, as many as 70 percent of the respondents tended to be in favor of such timber harvests.
6. The public expects the USDA Forest Service to take a scientific approach to management of the national forests, but they also want the agency to encourage public participation in decisionmaking and monitoring.
7. Although some segments of the public have a strong interest in environmental issues and public land management, few people have a good grasp of land management principles and practices or even know which agencies are responsible for managing public land.
8. Results of an Arkansas survey indicated that nonindustrial private forest landowners have strong interests in a variety of environmental issues. Their

stated reasons for owning forest lands seem heavily weighted in favor of esthetic and environmental values.

9. Although it is difficult to estimate how many people in the Highlands believe private property owners face imminent threats of “takeovers” by United Nations-sponsored groups and/or government entities, those who hold such beliefs do so with great conviction. The public opinions voiced most often during Ozark-Ouachita Highlands Assessment Team working meetings in 1996 and 1997 were those having to do with perceived threats to private property and U.S. sovereignty.

The Role of Attitudes, Values, and Public Opinions

This chapter briefly examines both overall national trends in attitudes and opinions and a small collection of studies relating specifically to the Ozark-Ouachita Highlands area. The available sources use different terms, sometimes interchangeably, and therefore some definitions are needed at the outset.

“Values” are relatively firmly held and socially shared positions or expressions about what is good or right; they are abstract, normative, and considered to be somewhat stable. Lachman (1991) defines “attitude” as “a predisposition to respond to a focal object. [These] predispositions or sets are learned through experience, [and] the existence of an attitude is inferred from consistencies in an individual’s behavior.” Attitudes are not behavior but are considered to predispose people toward certain behaviors; typically, they change more readily than values. Each attitude has three components: (1) a belief, (2) a favorable or unfavorable evaluation, and (3) a behavioral disposition.

“Opinion” is defined as “a time-bound judgment or speculation that fluctuates unpredictably. In contrast to beliefs—tenaciously held convictions that represent what we ‘know’ to be true—opinions express what we feel to be true at a given moment. Opinions, then, generally are short-run impressions or ‘guesses’ about specific objects, ideas, issues, or events that are usually involved with aspects of public affairs” (Lachman 1991). “Public opinion” consists of the opinions gener-

ally shared by a significant number of people on matters considered to be of public significance, and hence predispose people toward certain behaviors on such matters. Values underlie attitudes, opinions, and behavior and, while there is always some coherence and integration among the values individuals hold, people also frequently hold values that appear to be inconsistent with each other. In a democratic society, public opinion is ultimately the major determinant of public policy. In the system of participatory decisionmaking widely adopted by Federal agencies, including the Forest Service, public opinion also becomes a major factor in the implementation of policy. Public opinion has two distinct components: (1) the “average view” of the public on a particular issue and (2) how the public actually articulates attitudes and values to policymakers, administrators, elected officials, and others.

Many citizens have neither the time nor the resources to adequately understand the issues, let alone time to participate in the decisionmaking process. Organizations and other “communities of interest” (see Chapter 3) therefore play key roles in injecting public opinions, values, and attitudes into the decisionmaking process. Organizations articulate members’ values and attitudes through their leadership and via issue campaigns. Television, radio, Internet, and print media also help define and propagate what becomes effective public opinion.

The role of public opinion is complicated by several other factors. First, although underlying values and even attitudes may have some stability, the attention of the public is dynamic and subject to rapid change. Ideas and issues propagated as “sound bites” come and go quickly, and something that is acceptable today may be condemned tomorrow. Finally, ascertaining and gauging public opinion, especially about something as complicated as natural resource management, is very difficult, and the wording of questions and the context within which they are asked strongly influence the responses. Despite these complications, many social scientists and public land managers now recognize that the attitudes and values held by the general public are important elements of the “social context”—i.e., the social, cultural, economic, and political setting—in which public land management occurs.

Patterns and Trends

Dunlap and his colleagues have documented the growth of what they call a new environmental paradigm (Dunlap and Van Liere 1978, Dunlap and Mertig 1991, Dunlap and others 1992), and national opinion polls support the idea that there has been widespread adoption of more environmentally friendly views (CEA and ODC 1990). In an overview of changing attitudes and opinions about environmental issues, McDonald and Brown (1995) say:

Over the years, shifts in natural resource values have taken place, spurred by social trends such as the environmental justice movement, holistic concepts of ecosystem management, and increased participation in outdoor recreation. These changes have had a profound impact on the way natural resources are being managed. . . . Mass communication, coupled with increasingly worrisome predictions of environmental degradation and a better understanding of ecological processes, is radically changing the way Americans think about the nation's (and the world's) natural resources. Contemporary American society, bombarded with conflicting media reports of the health of the natural environment, seems to sense that the environment is now something that must, at the very least, become part of their repertoire of concern.

At the same time, some segments of the U.S. public have reacted sharply to what they regard as the excesses of environmentalism. Property rights and "wise use" organizations have multiplied in the 1980's and 1990's and are now working in many arenas to counter the efforts of environmental organizations, oppose government regulations, and support traditional resource extraction activities. Arnold and Gottlieb (1994) and Coffman (1994) provide vivid insider accounts of some of the views of the wise use/property rights movements.

Public opinion about national forest (and other public land) management resists easy categorization, despite the common tendency to cast the range of opinions in stark black-and-white terms, i.e., advocacy for the environment versus advocacy for development, resource use, and/or property rights. This chapter provides insights into the complex and dynamic arena of the

public's views of forestry, public land management, and the environment, beginning with the results of two efforts to gauge U.S. public values and opinions about forest management issues.

Forest Service Values Poll

One national source of information that documents public attitudes and values concerning public land management is the Forest Service Values Poll (Hammond 1994). Kaset International conducted this poll by telephone in April 1994 with 500 randomly selected citizens. This sample included a balanced representation of all regions of the country; however, the sample was too small to generate findings for the South or Midwest, let alone the Ozark-Ouachita Highlands.

The purpose of this poll was to provide the Forest Service a "framework of values that describes how the general public in the United States feels about the management of public forests and grasslands" (Hammond 1994). Administrators of the survey sought to uncover the major trends and themes implied by participants' responses to broad statements about environmental issues, the role of the Federal Government in forest management, and the management of public lands. The poll included 26 questions (or statements). Responses to questions 1 through 24 are summarized in table 9.1; responses to questions 25 and 26 are summarized in figures 9.1 and 9.2.

The Forest Service Values Poll points to 11 important national themes. First and foremost is an overall theme of public support for maintaining "healthy" public forests and grasslands. This theme was the overriding one (note responses given for questions 8, 9, 11, 12, 14, 15, and 18 in table 9.1 and for question 26 in fig. 9.2). However, a definition of "healthy" (for which multiple interpretations exist) was not provided. The authors summarized the other 10 key themes (one of which appears to repeat the overall theme) as follows:

- The Federal Government should take a scientific approach to the management of public forests and grasslands;
- Creating recreation opportunities on public lands is important to the general public;
- The Federal Government should balance recreational use of public land with logging, mining, and grazing uses;

Table 9.1—Summary of responses (mean score and levels of agreement and disagreement) to questions posed in the Forest Service Values Poll

Question ^a	Mean score ^b	Strongly disagree (1)	2	3	Neutral (4)	5	6	Strongly agree (7)
		----- <i>Percent</i> -----						
1. Federal Government an effective caretaker of public forests and grasslands.	4.36	12	5	9	24	25	8	17
2. Threatened and endangered species in American public forests and grasslands should be protected even if it has a negative economic impact on citizens.	4.90	13	4	7	15	13	14	34
3. Important to take scientific approach to management of public forests and grasslands.	5.78	3	2	4	10	15	17	49
4. Natural resources in public forests and grasslands should be available to produce consumer goods.	3.62	26	10	11	17	14	8	14
5. Creating recreation opportunities on public forest lands is important to me.	5.00	12	4	6	16	12	12	38
6. Federal Government should regulate private land use to protect America's natural resources.	4.78	15	5	6	15	13	12	34
7. Important for Federal Government to inform and interact with people about all public forest matters.	6.10	3	1	2	6	10	18	60
8. Human intervention is necessary to maintain health of public lands.	5.59	5	2	5	13	12	16	47
9. Primary purpose of managing public forests is to maintain healthy environment.	5.87	4	2	3	9	12	18	52
10. Timber and other renewable resources harvested from public forests should be continuously replaced.	6.50	3	0	1	3	4	8	81
11. United States has international obligation to maintain health of America's forests.	6.06	5	1	2	7	7	14	64
12. Consumer needs of public should be satisfied even if natural resources on public forests are eventually depleted.	2.49	50	13	10	10	6	4	7
13. American public should take active role in managing and protecting public forests.	6.00	3	1	2	8	12	19	55
14. Health of public forests should not be compromised by short-term need for natural resources.	5.87	3	2	4	12	13	16	50
15. Federal Government has responsibility of conserving public forest resources for future generations.	6.27	3	1	1	5	9	14	67
16. Federal Government should balance wilderness and recreational use of public land with logging, mining, and grazing.	4.95	10	3	7	16	18	16	30
17. Federal Government should ask American public on regular basis for thoughts about public land use.	6.18	3	1	2	5	12	14	63
18. Federal Government organizations like Forest Service should increase regulation of commercial use of public forests.	5.12	11	5	6	13	14	13	38

(continued)

Table 9.1—Summary of responses (mean score and levels of agreement and disagreement) to questions posed in the Forest Service Values Poll (continued)

Question ^a	Mean score ^b	Strongly disagree			Neutral			Strongly agree
		(1)	2	3	(4)	5	6	(7)
----- Percent -----								
19. Need for conservation of natural resources on public forest lands will increase in 21 st Century.	5.89	3	1	2	14	11	17	52
20. I make special effort to remain current on how public forests are being managed by Federal Government.	4.60	7	8	9	21	22	14	19
21. I know how to participate in management, care, and use of public forests.	4.50	10	7	12	20	17	12	22
22. Those who live in closest proximity should play the primary role in way public forests are utilized and managed.	4.56	13	8	9	18	16	13	23
23. Federal Government should discover and disseminate information to solve natural resource problems.	5.62	5	1	5	10	16	20	43
24. Federal Government should assist State and local govt. agencies and private landowners in managing forest lands.	5.20	6	3	4	9	10	21	47

^a Some questions have been edited to conserve space, but original meanings have been preserved.

^b Mean scores on a 7-point scale. Bolded and italicized scores indicate the three responses that had the lowest levels of support; bolded but not italicized scores indicate the three responses that had highest levels of support.

Source: Hammond (1994).

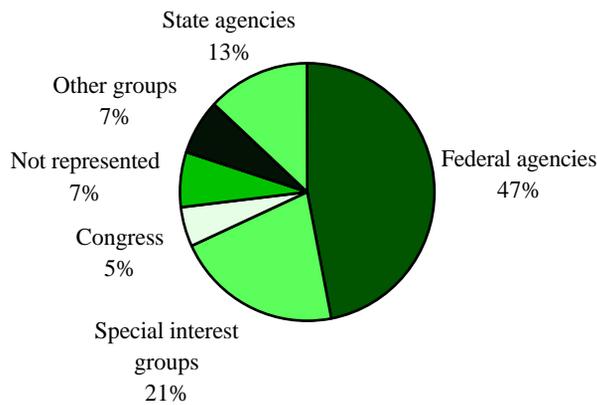


Figure 9.1—Responses to Forest Service Values Poll question 25, “My interest in public forest management is best represented by the following organizations” (Hammond 1994).

- The Federal Government has an obligation to maintain healthy public forests;
- The Federal Government should inform and interact with the American people so the public can take an active role in managing and protecting public forests;

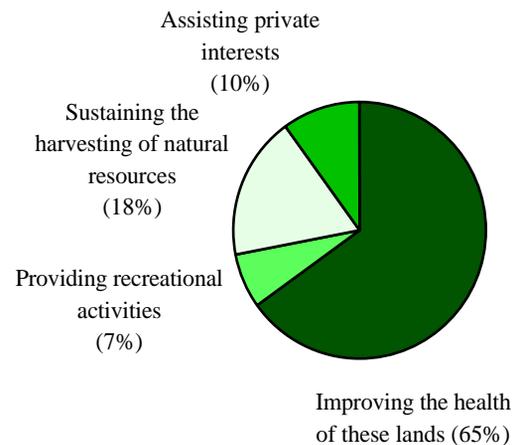


Figure 9.2— Responses to Forest Service Values Poll question 26, “The highest priority use of American dollars to manage public forests should be concentrated on the following . . .” (Hammond 1994).

- The long-term health of public forest land should not be compromised for short-term gains;
- Federal and State Government agencies represent the public’s interest in public land management;

- The consumer needs of the American public should not be satisfied at the expense of the health of public forests;
- It is the role of the Federal Government to discover and disseminate new information for solving the natural resource problems of the future; and
- The Federal Government should assist State and local government agencies and private landowners in managing forest lands.

The highest levels of support (see bolded, nonitalicized mean scores in table 9.1) were for public involvement in forest management (questions 7 and 17) and managing forests in a sustainable fashion (questions 10 and 15). The lowest levels of support (means in bolded italics in the table) concerned the use of forest products to produce consumer goods (questions 4 and 12) and the Federal Government as an effective caretaker of public forests and grasslands (question 1). The answers to question 25, however, indicated that 47 percent of those polled considered Federal agencies to best represent their interests in the management of public forests (fig. 9.1).

Among the points not discussed in the report narrative but evident from the survey results are the strong support for public involvement (questions 13 and 17); moderately strong support for a special role for people who live closest to Federal forests (question 22); a relatively high level of confidence in “scientific management” (question 3); and a perceived need for human intervention to maintain the health of public lands (question 8).

What emerges from this survey is a strong preference for “healthy forests,” strong support for public involvement in decisionmaking about forest management, and support for a balanced, “multi-use” approach for public forests and grasslands. Extraction of consumer products is a lower priority among those surveyed: about 36 percent of respondents thought that the natural resources of public forests and grasslands should be available to produce consumer goods, while 47 percent disagreed and 17 percent were neutral (question 4, table 9.1).

Seventh American Forest Congress and Local Roundtables

Another source of information concerning the American public’s attitudes toward forest management is the Seventh American Forest Congress, which was held in Washington, DC, in 1996 and is “believed to be the most diverse national gathering focused on forests in the country’s history” (SAFC 1997). The purpose of the Forest Congress was very different from that of the Forest Values Poll: it sought to find common ground among Americans who have a deep interest in the future of the Nation’s forests (essentially a self-selected audience).

Local roundtables were held in at least 35 States, including Arkansas and Missouri, prior to the Forest Congress. The participants in the Arkansas Roundtable adopted the following vision statement:

What we see as a vision for the forests of the future is a continuum of forests from pristine wilderness to intensive fiber farms. We acknowledge that different ownerships have different uses and responsibilities and all owners—both public and private—will generate some mix from the following values: ecological processes and functions including natural, aquatic, and terrestrial diversity; economic values, recreation and other amenities; and clean water and other environmental values. Forest practices should be carried out and maintained to improve water quality, and private landowners and industry should work together to ensure responsible logging. The cornerstone for achieving this goal of a diverse forest is balanced environmental and economic forest education (SAFC 1997).

The vision statement for America’s forests developed by participants at the Missouri Roundtable was: “The forests of the future will be abundant, healthy and perpetual, with a variety of plants and animals. They will benefit society and meet societal wants and needs” (SAFC 1997).

The Forest Congress itself was the culmination of many group discussions (including the pilot roundtables) in which participants representing a wide range of interests and interest groups sought to identify areas of agreement. More than 1,100 people engaged in the

discussions in Washington. Among other things, participants addressed two broad questions: “What is our common vision?” and “What principles do we agree on to guide us toward our vision?”

In response to the first question, the Forest Congress developed 13 elements of a common vision that a majority of the participants found acceptable (table 9.2).

These elements are very broad and are probably subject to varied interpretations. What emerges most clearly is a commitment to “sustainability.”

The participants also produced 21 principles for forest management, 15 of which at least half of the participants accepted (table 9.3). Ensuring that “open and continuous dialogue is maintained and encouraged among all parties

Table 9.2—Percentages of Seventh American Forest Congress participants who agreed or disagreed with or had mixed feelings about proposed elements of a vision statement^a

Vision elements: “In the future, our forests . . .”	Agree	Mixed feelings	Disagree
1. will be held in a variety of public, private, tribal, land grant, and trust ownerships by owners whose rights, objectives, and expectations are respected and who understand and accept their responsibilities as stewards.	90	7	3
2. will be enhanced by policies that encourage both public and private investment in long-term sustainable forest management.	89	6	5
3. will sustainably provide a range of goods, services, experiences, and values that contribute to community well-being, economic opportunity, social and personal satisfaction, spiritual and cultural fulfillment, and recreational enjoyment.	88	8	4
4. will be maintained and enhanced across the landscape, expanding through reforestation and restoration where ecologically, economically, and culturally appropriate, in order to meet the needs of an expanding human population.	85	10	5
5. will be shaped by natural forces and human actions that reflect the wisdom and values of an informed and engaged public, community and social concerns, sound scientific principles, local and indigenous knowledge, and the need to maintain options.	84	11	5
6. will be managed with consistent strategies and policies that foster forest integrity and maintain a broad range of ecological, economic, and social values and benefits.	79	14	7
7. will be sustainable, support biological diversity, maintain ecological and evolutionary processes, and be highly productive.	75	18	7
8. will contribute to strong and vital rural and urban communities that benefit from, protect, and enhance the forests in their vicinity.	74	16	10
9. will be managed with consideration for the global implications of land stewardship.	69	17	14
10. will maintain their essential role in protecting watersheds and aquatic systems.	68	14	18
11. will be acknowledged as vital by citizens who are knowledgeable and involved in stewardship and who appreciate the contribution of forests to the economic and environmental quality of life.	67	21	12
12. will be managed on the basis of a stewardship ethic with respect, reverence, and humility.	54	19	27
13. will provide a sustainable level of products and benefits that satisfy society’s needs because contributions from more efficient utilization, recycling, and other efforts reduce consumption.	31	34	35

^a Number of respondents per element ranged from 1,005 to 1,010. Source: SAFC (1997).

Table 9.3—Percentages of Seventh American Forest Congress participants who agreed or disagreed with or had mixed feelings toward 21 proposed principles of forest management^a

Principle	Agree	Mixed feelings	Disagree
1. Ensure open and continuous dialogue is maintained and encouraged among all parties interested in forests.	88	7	5
2. Voluntary cooperation and coordination among individuals, landowners, communities, organizations, and governments is encouraged to achieve shared ecosystems goals.	85	9	6
3. Cohesive and stable policies, programs, and incentives should be available to allow forest owners and managers to sustain and enhance forests.	84	11	6
4. Science-based information is accessible and understandable, distributed in a timely manner, and contributes to forest policy and management.	80	13	7
5. Comprehensive, integrated, and well-organized research is well funded. It is designed and conducted in collaboration with stakeholders to ensure for society the countless benefits of our forest ecosystems. Knowledge and technology products are effectively distributed, tested, and implemented.	76	12	11
6. All differences in goals and objectives of public, private, and tribal forest owners are recognized and respected. Forest owners, including the public, recognize and embrace both the rights and responsibilities of ownership. All forest owners acknowledge that public interests (e.g., air, water, fish, and wildlife) exist on private lands and private interests (e.g., timber sales and recreation) exist on public lands.	75	15	10
7. Urban and community forest ecosystems will be valued, enhanced, expanded, and perpetuated.	74	15	11
8. People's actions should ensure that the management of forests should sustain ecosystem structure, functions, and processes at the appropriate temporal and spatial levels.	70	20	10
9. Forestry policy and management decisions must reflect the interdependence of diverse urban, suburban, and rural communities.	69	17	14
10. Forests provide a broad range of social, environmental, cultural, and economic resources and benefits.	67	20	13
11. Forests are a global resource that sustain the health of the planet and its inhabitants. Our forest stewardship must recognize trends of global population; consequential supply and demand; and the potential for ecological, social, and economic impacts worldwide. We will actively seek to learn from the global community.	65	17	18
12. All Federal public lands should be maintained for present and future generations and managed in accordance with national laws. Changes in those laws should be pursued through an open legislative process that allows the airing of views by the public.	65	16	20
13. People's actions should ensure factual information and education concerning forests be readily available, engaging, and actively disseminated to all.	61	20	19
14. Land area covered by forests is maintained and potentially increased.	53	25	22
15. Forestry decisions should take into account the concerns of an increasingly diverse U.S. population, as well as the needs of the forests, while linking benefits and responsibilities within the communities.	50	26	24
16. Forests are sustained and their integrity is maintained with respect, reverence, and humility.	49	20	31
17. Native biological diversity is maintained and enhanced.	49	22	29
18. Forest related options that are available today shall be maintained for future generations.	45	26	29
19. Interdependence of people and forests is recognized and respected, including the important contribution forests make to social, economic, and community well-being, and the responsibility of communities to support balanced stewardship of all forest values.	44	25	31
20. Consistent with sound democratic principles and responsible forest management, Public Law 104-19, Section 2001 (the Emergency Salvage Rider to the Rescissions Bill) should be repealed.	23	11	66
21. Active and informed participation by people of all cultures and socioeconomic levels enriches and is imperative for balanced, equitable, and viable forest decisions and practices.	23	24	53

^a Number of respondents per principle ranged from 1,076 to 1,091.
Source: SAFC (1997).

interested in forests” won the most agreement (88 percent) and the least disagreement (5 percent).

Finally, participants considered 39 additional draft principles during a “missing principles” session. Table 9.4 presents the four principles that received the highest levels of agreement and the three that received the least support; see the summary report (SAFC 1997) for responses to all of the “additional principles.” Interestingly, the two proposed principles that received the least support (5 percent or less) were those suggesting there should be no more road construction or logging on public lands. According to the “Executive Summary” (SAFC 1997):

. . . the Forest Congress demonstrated that Americans agree on many elements of a future vision for their forests. They agree on several principles that will guide them toward this common vision. The shift toward stronger levels of agreement after redrafting the vision elements suggests that levels of agreement on principles will increase over time with recrafting at the national and local levels.

Studies That Address Timber Management on Public Lands

One of the key issues national forest (and some other public land) managers face is that the public appears sharply divided over whether timber cutting for wood products should be allowed on public lands. Several surveys conducted at national, regional, and sub-regional scales and the Seventh American Forest Congress (as already noted) have included one or more questions that directly or indirectly address this issue. This brief section draws upon studies conducted at various scales but is by no means an exhaustive treatment of the subject.

As noted above, participants in the Seventh American Forest Congress overwhelmingly opposed a suggested “principle” of forest management that would eliminate logging on public lands. Most public opinion surveys, however, indicate that people have sharply divergent views about whether timber harvesting should be allowed on public lands. Recall that 47 percent of the respondents in the Forest Service Values Poll (Hammond 1994) disagreed and 53 percent agreed or took a neutral

Table 9.4—Percentages of Seventh American Forest Congress participants who agreed or disagreed with or had mixed feelings toward seven additional draft principles of forest management proposed at the Seventh American Forest Congress^a

Proposed principle	Agree	Mixed feelings	Disagree
Natural resource issues should be resolved by peaceful means.	81	7	12
Create financial and nonfinancial incentives for long-term forest stewardship.	81	10	9
Conflicts over forest issues will be resolved through nonviolent processes.	71	9	20
Forest conservation will be promoted through efficient use, minimization of waste, recycling and reuse of forest products, and diversification of fiber sources. Clarification: “Sustainable forest management” may be substituted for “forest conservation.”	69	19	12
Ecological and ecocultural restoration should be integrated into ecosystem management due to its holistic integration of ethics, economics, ecology, etc.	11	22	66
Roading on public lands (no road construction or reconstruction on public lands).	5	5	90
Logging on public lands (no logging on public lands).	4	5	91

^a The 4 additional draft principles that received the highest level of agreement and the 3 that received the highest level of disagreement; respondents per principle ranged from 1,072 to 1,087. Source: SAFC (1997).

position in response to the statement “Natural resources in public forests and grasslands should be made available to produce consumer goods” (table 9.1). In a Missouri survey conducted in 1994, 1995, and 1996 (MO DC 1996b), 41 to 50 percent of the respondents opposed timber harvesting *per se* (the survey did not distinguish between harvesting on public or private lands).

Public response, of course, depends heavily upon the wording of such questions and the context in which surveyors present them. An interesting report on public opinion surveys in Kentucky addressed this issue directly. Gracey (1997) found broad support for timber management on public lands, given certain environmental assurances. Seventy percent or more of the respondents supported carefully planned harvesting when one of the following conditions was given: the land returns to forest, improves wildlife habitat, protects water quality, protects or enhances scenic beauty, provides income for forest improvements, or provides jobs for local workers.

Gracey (1997) concluded that 10 to 20 percent of the public was staunchly opposed to timber harvests on public lands regardless of environmental assurances, while many others were willing to support carefully planned timber harvests that protect the environment. Similarly, Kuzmic and Caneday (1996) showed that respondents were far more supportive of timber cutting to benefit wildlife or improve scenic vistas than they were of timber cutting for wood products alone. (This study is discussed in more detail below).

Brunson (1996) provided a summary of studies dealing with public attitudes toward forestry practices, including one conducted in the mid-South by Bliss and others (1994) that may be especially relevant for the Highlands (arguably part of both the mid-South and the lower Midwest). Bliss and others (1994) found that while nearly half of mid-South residents approved of clearcutting on private lands, only 14 percent approved of the practice on public lands. Brunson (1996) noted that opposition to clearcutting “should not be interpreted as opposition to the general practice of forestry to produce wood products. . . . Americans aren’t opposed to the practice of silviculture in a general sense, but they do object to silvicultural tools that they believe can threaten broader environmental values.”

Statewide Comprehensive Outdoor Recreation Plans

Important sources of information about the outdoor recreation resources and opportunities in each State are Statewide Comprehensive Outdoor Recreation Plans (SCORP’s). A State must prepare a SCORP to be eligible for the Land and Water Conservation Fund program, which provides Federal matching funds for acquisition and development of outdoor recreation lands and facilities. Arkansas’ most current SCORP dates to 1995, Oklahoma’s to 1992, and Missouri’s to 1996 (Turner 1995, OK TRD 1992, Synergy Group 1996).

Each State conducted opinion surveys as part of the preparation of their most recent SCORP. In Missouri, parks and recreation professionals and relevant agencies were surveyed (Synergy Group 1996). Arkansas completed a telephone survey of public opinion and asked local government officials and parks and recreation directors about their recreational facilities. Arkansas prepared a detailed inventory of facilities; held issue identification forums and grant workshops; and developed some case studies (Turner 1995). Two special studies were performed for the Oklahoma SCORP, a survey of “outdoor recreation organizations” and a survey of communities (OK TRD 1992).

The public opinion survey for the Arkansas SCORP, which included questions about environmental issues and concerns, is especially useful, even though most of the questions dealing with environmental issues had high percentages of “don’t know” responses, indicating a lack of knowledge, interest, and/or awareness of these issues. The author noted that “Respondents did not view the mining of public land, damming of rivers and streams, and the destruction of wetlands as environmental problems in Arkansas” (Turner 1995). A sample of his other conclusions follows:

- Air pollution—47 percent of respondents felt air pollution was a problem in Arkansas. A majority of those under 44 years of age felt air pollution was not a problem, while a majority of those 45 and older felt air pollution was a problem.
- Water pollution—69 percent felt that water pollution was a problem in the State.
- Littering—81 percent of the respondents felt that littering was a problem.

- Disposal of hazardous wastes—65 percent felt this was an environmental problem in Arkansas.
- Clearcutting—50 percent of the respondents felt that clearcutting was an environmental problem in Arkansas, but 17 percent “didn’t know.” Of those in the lowest income bracket, 41 percent felt clearcutting was a problem, compared with 67 percent of those earning \$40,000 to \$50,000 per year.
- Mining of public land—23 percent felt that mining on public land was an environmental problem in Arkansas.
- Building more dams on rivers and streams—only 18 percent felt dams are a problem in Arkansas.
- Agricultural waste—51 percent of respondents felt agricultural waste was an environmental problem in the State.
- Extraction of natural resources to benefit the economy—44 percent of respondents favored the extraction of resources, and 45 percent were opposed. Of those making more than \$50,000 per year, 70 percent opposed natural resource extraction.
- Destruction of wetlands was not seen as a major problem in Arkansas.

Satisfaction and Dissatisfaction with Life in Missouri

One source of information about attitudes and opinions in the Ozark-Ouachita Highlands that is especially valuable because of its quality, scope, and time depth is Missouri’s Annual “Conservation Monitor.” The most recent report in 1996 was based upon telephone interviews by the Gallup Organization of 862 individuals selected randomly and distributed evenly across nine regions of the State (MO DC 1996b).

Gallup asked a variety of questions on topics such as the major problems facing Missouri, environmentalism, sources of information about conservation and environmental issues, public perceptions of the Missouri Department of Conservation, landownership and use, and the interviewees’ recreational and environmental practices. The report presents data for the whole State and compares responses in 1996 to those from 1994 and 1995. Following are the results most likely to be relevant for users of the Assessment.

Respondents were asked about eight aspects of life in Missouri. As table 9.5 illustrates, the highest level of

Table 9.5—Percent satisfaction and percent dissatisfaction with selected aspects of life in Missouri, 1996 and 1994

Aspect of life in Missouri	Satisfied		Dissatisfied	
	1996	1994	1996	1994
Care of forests and wildlife	85	82	9	9
Care of environment	70	69	25	22
Economy	64 ^a	58	28	34
Quality of education	59	58	36	33
Family	58	61	31	27
Opportunities for next generation	54 ^a	48	37	44
Care of poor and needy	47	46	43	42
Safe from crime	46	43	49	50

^a Significant increases from 1994.
Source: MO DC (1996b).

satisfaction in both 1996 and 1994 was for the way forests and wildlife in Missouri are managed; “care of environment” took second place.

Most Serious Problem

Surveyors asked an open-ended question—“What is the most important problem facing Missouri today?” While the Missouri Department of Conservation (MO DC 1996b) reported issues identified by as few as 2 percent of the respondents, forest and wildlife management, environmentalism, and recreational concerns did not emerge as “most important problems.” The main issues respondents identified in 1996 were crime (19 percent), education/lack of money for schools (10 percent), lack of jobs (10 percent), and the economy (4 percent).

Environmentalism

When asked directly whether they considered themselves “environmentalists,” slightly more people did in 1996 (67 percent) than in 1995 (65 percent), but less than in 1994 (70 percent). When asked to respond to a variety of statements related to environmentalism, about 90 percent agreed that prairies should be reestablished; 77 percent agreed that forest land in Missouri is shrinking; 76 percent agreed that wildlife should be reestablished; 37 percent said that they understood “biodiversity”; and 50 percent agreed that “use of fire is not a good idea” (MO DC 1996b).

Timber Harvesting

Surveyors asked respondents if they “approved of cutting down trees to make lumber, furniture, or other wood products” (without specifying where the cutting might take place). In each of the 3 years of the study, 47 to 55 percent approved and 41 to 50 percent disapproved, with no clear trend over time.

Social Science Research on the Ouachita National Forest

As part of a nationwide shift in the management of national forest lands, the Ouachita National Forest established an ecosystem management program in 1991 that included three components: (1) demonstration sites and even whole landscapes where innovative forest management strategies were used, (2) a major ecosystem management research program, and (3) an Ecosystem Management Advisory Committee, the efforts of which Frentz and others (1997) recently documented.

The Advisory Committee, comprised of foresters, biologists, social scientists, and other professionals from Arkansas and Oklahoma, has emphasized that the “social context” of ecosystem management is just as important as the “biophysical” (or traditionally defined ecological) dimensions. At the same time, the Southern Research Station’s program of ecosystem management research on the Ouachita and Ozark-St. Francis National Forests sought to incorporate the human dimensions more effectively. Several social science research efforts emerged, summaries of two of which appear below.

Study of National Forest Stakeholders

Thomas Kuzmic and Lowell Caneday of Oklahoma State University performed a targeted study of stakeholders of two ranger districts within the Ouachita National Forest in 1994 and 1995 (Kuzmic and Caneday 1996). Their objectives were to identify an “innermost circle” of stakeholders (those who use the national forest directly) and characterize them with respect to their activities, attitudes, and opinions.

The researchers distributed questionnaires to 456 national forest stakeholders in Oklahoma. One-third of these individuals completed the questionnaires and returned them by mail. Survey participants represented

a broad range of national forest users, including those participating in hiking, hunting, mining, timber cutting, and other activities. Respondents gave the highest ratings of “very inappropriate” or “somewhat inappropriate” to the following activities or uses (combined percentage shown in parentheses):

- Closing the forest to all onsite human uses (77),
- Special use permits for mining (61),
- Special use permits for oil and gas leases (60),
- Timber cutting for wood products (50),
- Use of motorized all-terrain vehicles on forest roads (50),
- Special use permits for utility corridors (39),
- Timber cutting for firewood (35),
- Special use permits for livestock grazing (34),
- Shooting at rifle range (32),
- Hang-gliding (31),
- Hunting (30), and
- Timber cutting for scenic vistas (22).

Respondents to the mail survey indicated that a wide variety of activities and uses were “very appropriate” or “somewhat appropriate.” The 14 items rated “appropriate” by 75 percent or more of the respondents follow (with combined percentages in parentheses):

- Managing forest habitat for wildlife (86),
- Opportunities for solitude (84),
- Picnic areas (84),
- Protection of cultural and historic sites (82),
- Protection of endangered species of plants and animals (81),
- Trails for walking or hiking (81),
- Auto touring, driving for pleasure (80),
- Protection of wilderness areas (80),
- Nature study (79),
- Interpretive signs and displays (76),
- Developed campgrounds (75),
- Backpacking (75),
- Bird-watching (75), and
- Fishing (75).

Stakeholders’ perceptions of Ouachita National Forest management. Only 40 percent of the mail survey respondents knew who is responsible for managing the national forests; “National Park Service” was the most frequent wrong answer. About 63 percent said current management met their needs and expectations, and 67 percent thought that the agency in charge was doing an excellent job managing the Ouachita National

Forest (table 9.6). The highest rate of disagreement (62 percent) was in response to the statement, “The Ouachita National Forest (ONF) should be managed to emphasize commodities and products for people, such as wood for building homes and making paper.” (Only 18 percent agreed with this statement.)

As shown in table 9.6, many respondents were neutral or undecided about many of the survey items, including one statement that said that the variety of wild animals on the forest had increased over time (56 percent undecided) and another that stated that all decisions about national forest management come from

Table 9.6—Percentages of stakeholders who agreed or disagreed with statements concerning management of the Ouachita National Forest

Survey statement	Strongly disagree	Mildly disagree	Neutral or undecided	Mildly agree	Strongly agree
Overall, the OuNF has a natural and unspoiled appearance.	4	7	9	45	35
The OuNF is used heavily for resource extraction such as logging.	12	14	38	19	17
Current management of the OuNF meets my needs and expectations.	5	9	23	43	20
The OuNF is an economic asset to the local adjoining region.	2	4	22	34	38
The Forest Service is doing an excellent job at managing the OuNF.	5	7	22	40	27
The OuNF is like a “national park” and should be managed as such.	12	10	20	22	36
Evidence of forest management practices is obvious at the OuNF.	2	2	27	48	21
Recreational visitors should pay fees for activities on developed sites like campgrounds.	16	7	11	34	31
Forest Service has responsibility to inform public about management of OuNF.	1	0	14	32	53
The OuNF is an economic asset to the Nation.	3	2	20	29	46
The use of the OuNF by people for a wide variety of activities is obvious as I travel around the area.	1	7	19	41	32
As I travel around the OuNF, I often see Forest Service workers doing field work.	9	17	24	35	14
The Forest Service is the organization best suited to manage the OuNF.	1	0	26	35	38
The variety of plants at the OuNF has increased over time.	3	7	64	21	5
The variety of wild animals at the OuNF has increased over time.	7	10	56	19	9
The mix of pines and hardwoods (broadleaf trees) at the OuNF is about right.	3	11	31	32	22
As I travel around the OuNF, I often see Forest Service workers out talking to forest users and visitors.	12	20	32	24	12
I trust the Forest Service in being able to make sound decisions in the management of the OuNF.	5	4	28	39	24
Clearcut harvesting of timber regularly occurs at the OuNF.	14	8	55	13	10
I have a “stake” in the OuNF. It should be managed for people like me who come here for outdoor forest-related activities.	4	6	16	30	44
The Forest Service emphasizes the planting and management of pines instead of hardwood trees at the OuNF.	7	7	54	18	14
I regularly see wildlife at the OuNF.	7	14	20	44	15
The Forest Service workers at the OuNF have no decisionmaking authority for management. All decisions and authority come from Washington, DC.	21	15	50	9	5
The needs and concerns of local people living near the OuNF should have greater priority for management of the forest than those of people who live in distant cities or out-of-State.	17	13	21	24	25
The OuNF should be managed to emphasize commodities and products for people, such as wood for building homes and making paper.	49	13	20	9	9
The Forest Service has done a good job of getting the public’s opinion on issues related to the OuNF.	12	10	43	26	9
The public should be involved in decisionmaking.	4	7	15	35	40

OuNF = Ouachita National Forest.
Source: Kuzmic and Caneday (1996).

Washington, DC (50 percent undecided). When asked about the most important things forest managers should emphasize, 40 percent preferred less development and more “preservation.” Fifteen percent wanted more visitor services, while only 3 percent preferred that more timber be made available for harvesting. When asked about uses that should be discontinued, timber harvesting and motorized all-terrain vehicle use, at 11 percent and 4 percent, respectively, topped the list (Kuzmic and Caneday 1996).

Public involvement. Kuzmic and Caneday’s survey asked participants about public involvement in forest planning and management and about the role of local community people in the planning process. Seventy percent agreed with or were neutral in response to the statement that “the needs and concerns of local people living near the ONF should have greater priority for management of the forest than those of people who live in distant cities or out-of-state” (table 9.6). About 70 percent agreed that the public should be involved in

decisionmaking concerning national forests, but 15 percent were neutral or undecided on this point. About 35 percent felt that the Forest Service had “done a good job of getting the public’s opinion on issues related to the forest.” Even though many think public involvement is an important part of the decisionmaking process, 63 percent indicated that they trust the Forest Service to make sound management decisions for the national forest (table 9.6).

Perspectives about forest environments. Kuzmic and Caneday (1996) included an eight-part question designed to assess stakeholder awareness of ecological principles and basic ecosystem processes. Most respondents agreed that “the natural elements of a forest (i.e., trees, animals, soil, water, air) are linked together as a functioning system” (92 percent) and “forests gradually change over time due to natural forces and processes” (88 percent), indicating basic understanding of two important ecological principles (table 9.7). But they were divided about whether “logging or timber harvesting destroys forests” (51 percent agreed), the forests

Table 9.7—Percentages of Ouachita National Forest stakeholders who agreed or disagreed with statements concerning forest environments and the ways that they are used and managed

Survey statement	Strongly disagree	Mildly disagree	Neutral or undecided	Mildly agree	Strongly agree
Forests are renewable resources. After we harvest a part of the forest, trees will naturally grow back in time.	21	23	10	31	15
All of the natural elements of a forest (i.e., trees, animals, soil, water, air, etc.) are linked together as a functioning system.	1	1	7	12	80
Forests gradually change over time due to natural forces and processes.	0	2	10	28	60
Severe wildfires destroy forests. After such fires, we will never again have forests in the areas where fires occurred unless we plant trees there.	32	22	13	14	19
Logging or timber harvesting destroys forests. After a forest is logged or harvested, we will never again have a forest in the area where the logging occurred unless we plant trees there.	20	17	13	22	29
The forests that we see today at the OuNF will most likely look exactly the same 50 to 60 years from now, if forest managers and people would just leave them alone and let nature take its course.	13	15	21	19	32
[By] applying ecological and scientific principles, foresters can work mutually with nature as they manage forests to produce goods and services for people.	8	4	20	32	36
Forest managers at the OuNF are upsetting the balance of nature there.	25	20	40	11	4
I have no problem with harvesting trees for products for people, as long as more trees are promptly grown back.	13	13	17	30	28
Timber harvesting, planting, and forest management practices used by professional foresters resemble natural processes.	20	13	32	25	10

OuNF = Ouachita National Forest.
Source: Kuzmic and Caneday (1996).

they saw today would essentially look the same 50 to 60 years from now if forest managers and other people would “just leave them alone and let nature take its course” (51 percent agreed), and whether current forestry practices resemble natural processes (35 percent agreed, 33 percent disagreed, and 32 percent were neutral or undecided). About two-thirds (68 percent) of the respondents agreed that “[By] applying ecological and scientific principles, foresters can work mutually with nature as they manage forests to produce goods and services for people.”

Environmental ideology and opinions. Table 9.8 presents the survey responses to a series of statements about relationships between people and nature. Most respondents (90 percent) agreed that “people must live in harmony with nature in order to survive”; 89 percent agreed that “the balance of nature is very delicate and easily upset.” The strongest disagreement came in response to the proposition that “people need not worry about adapting to the natural environment because they can reshape it to suit their needs” (79 percent disagreed) and “people have the right to modify the natural environment to suit their needs” (68 percent disagreed).

Kuzmic and Caneday believe these data indicate that these national forest stakeholders tend toward a “biocentric” rather than an “anthropocentric” view. (An anthropocentric view considers human needs of greater

importance than those of any other life forms, regardless of circumstance, whereas a strict biocentric view regards all life forms as equally important.) When asked to respond to another set of statements about balancing the economy and the environment, stakeholder responses were consistent with a tendency toward environmentalism, as indicated below (Kuzmic and Caneday 1996):

The economy should be given greater priority even if it hurts the environment.	0
The environment should be given priority even if it hurts the economy.	8%
Both are important; if forced to make a choice, the economy should come first.	27%
Both are important; if forced to make a choice, the environment should come first.	65%

Focus Groups and the Social Context of Ecosystem Management

In another study, Fendley and her colleagues at the University of Arkansas used indepth interviews and focus groups to analyze patterns of public involvement in the Ouachita National Forest’s land management activities. The goals of this study were to contribute to improved understanding of the “social context” in which the forest exists and to enhance public involvement

Table 9.8—Percentages of Ouachita National Forest stakeholders who agreed or disagreed with statements concerning the relationship of people to natural environments

Survey statement	Strongly disagree	Mildly disagree	Neutral or undecided	Mildly agree	Strongly agree
The balance of nature is very delicate and easily upset.	4	7	11	44	45
People have the right to modify the natural environment to suit their needs.	41	27	14	15	3
The needs and welfare of people should always come first when we decide how to deal with nature and its resources.	31	26	11	24	9
People must live in harmony with nature in order to survive.	1	1	7	25	65
People are severely abusing the environment.	7	7	12	29	45
Plants and animals have as much right to exist as people.	7	9	11	25	48
People were meant to have rule or dominion over nature.	28	13	20	21	18
People need not worry about adapting to the natural environment because they can reshape it to suit their needs.	58	21	13	5	3

Source: Kuzmic and Caneday (1996).

generally. Specific objectives were to identify and describe public involvement methods that land managers use and methods most acceptable to the public. Related objectives were to gauge the social acceptability of existing forest management strategies and to assess the public's overall opinion of forest management.

The emphasis was upon obtaining the widest possible representation of views and opinions, not obtaining scientifically "representative" numbers. Although it has not been done, the researchers intended that the focus group sessions would be followed by a carefully designed survey using probability sampling techniques.

The methods used included (1) structured, in-depth interviews with district rangers; (2) structured focus groups of a wide range of citizens, public officials, and Forest Service employees; and (3) a brief questionnaire that focus group participants completed. Because these were group discussions, they did not produce many numerical results. Hence, the choice of what to emphasize in the report depends both upon how often particular points were made by various focus groups and the degree of emphasis they received. The focus group process also provides key quotations, which can frequently summarize a point more effectively than could a series of numbers.

District ranger interviews. Eleven of the 12 district rangers working on the Ouachita National Forest at the time of the study were interviewed to ascertain the forms of public involvement they were using. Seven rangers cited one-on-one, informal contacts as their best method. Some reasons given for selecting personal contacts were "[To] get a better flow of information back," and "People may be reluctant to talk in meetings with other people there." The second most favored method was mailings, followed by advisory board meetings, steering committees, and field trips. Rangers were also asked about methods that didn't work. As with the most preferred methods, some rangers listed more than one least successful method.

Open meetings or open houses rated as the number one method that did not work for five rangers. When asked why meetings do not work, rangers said, "People have other things they would rather do," "No interest," "People wouldn't attend," "Group meetings are a forum for arguments," and "Not much response." The second least favored method, but one the rangers use very commonly, was mailings. One ranger said that mailings that simply announce some action and request an

unspecified response were especially useless. Another mentioned that mailings do not reach people the way field trips or direct conversations do. Field trips did not work for two rangers. One said there is no interest in forest management tours in his area since, "People don't care how we get the timber out so long as we get it out." Two rangers listed "using large newspapers as the designated paper" and publishing newspaper articles and/or newspaper notices as their least successful methods. One ranger insisted that all methods work.

Finally, district rangers were asked to identify the kinds of projects that generate the greatest public response. Six rangers listed timber issues first, while the others listed "anything affecting hunting or fishing," "wildlife management," "closing roads," and "water quality." Projects that generate the most public interest were thought to include herbicide use, road construction and/or road closure, prescribed burning, and wildlife projects.

Major themes repeated by the district rangers throughout the interviews were (1) their need to inform or educate the public and (2) their desire to hear more from the "silent majority." These themes were tempered by two considerations—involvement from citizens would be time consuming, and not hearing from the "silent majority" may imply that this group is satisfied with current management. Another theme was the amount of time required to inform, educate, and perhaps placate interest groups, especially those at the "extremes" (e.g., some environmental groups and some timber interests). Rangers typically received little or no substantive public comment concerning proposed actions on their districts; not surprisingly, then, only rarely did public comments lead directly to changes in these proposed projects.

Focus groups with the public. Persons invited to the focus groups were identified from nine different audiences or assumed stakeholder groups: (1) natural resource agency personnel, (2) "ordinary" citizens, identified from voter registration lists, (3) "activists," identified as persons appearing more than once on ranger district mailing lists, (4) "hunters," obtained from hunter organization lists, (5) "attentive citizens," identified as persons appearing once on ranger district mailing lists, (6) public officials, (7) "recreationists," identified from the lists of recreational organizations, (8) "environmentalists," identified from lists of environmental organizations, and (9) timber industry, including both representatives of small loggers and of a major timber

organization. The researchers convened 28 focus groups that did not include Forest Service employees and 4 groups that did.

In addition to taking part in the discussions, 117 participants in the public focus groups completed brief questionnaires. Two questions especially relevant to this chapter were: “In general, how do you feel about how the Ouachita National Forest is currently being managed?” and “How do you feel about the opportunities provided for public input into forest management in the Ouachita National Forest?” In response to the first question, 38 percent of the focus group respondents said they were satisfied or very satisfied, while 30 percent said they were dissatisfied or very dissatisfied; the remaining 32 percent were neither satisfied nor dissatisfied. More dissatisfaction (40 percent) was expressed about opportunities for public involvement, but one third were satisfied and 26 percent were neutral or had no opinion.

A brief summary of the massive volume of discussion, commentary, and suggestions from the focus groups is provided below. Only comments, suggestions, and issues mentioned in more than one of the focus groups are included.

Uses appropriate for the forest. The focus groups began with the question, “How do you think this forest should be used?” Participants in most groups gave some version of “multiple use”—combining timber production, recreation, ecological concerns, esthetics, and so forth—as their answer. Some qualified their answer by saying, “Make timber just one aspect,” while others said, “Make commodities (defined as timber, water) the priority.” One focus group emphasized “hunting, logging, and firewood.” Recreation and protecting biodiversity were also mentioned as appropriate uses of the national forest.

Current national forest management. When asked about the appearance and composition of the forest and the way it is currently being managed, the most frequent responses involved opposition to clearcutting and the perceived loss of hardwoods. Some members of the focus groups expressed dissatisfaction with the forest’s appearance. Most want a mixed forest, not a “pine plantation.” This attitude should not be interpreted as hostility towards logging. Most groups said they do not like or support clearcuts, but they think “selective cuts” are fine. Only one group suggested a halt to logging on public lands.

The second most frequent statement was that management has greatly improved. Roads were a frequent concern, however. Participants held clearly opposing views on this issue, with some insisting no more roads should be closed and others arguing that roads should be closed. A few said that road building and/or the construction of “over-engineered roads” should stop. No consensus on road issues was apparent.

In a few of the focus groups, participants mentioned their lack of trust in the Forest Service, and some suggested that the agency had been forced to change, unwillingly, over the past decade. Others expressed opposition to the use of herbicides, and some complained about wasteful management practices that allowed trees to rot.

Past experiences with the Forest Service. The focus groups were told: “Think back to the last time you participated in any Ouachita National Forest public involvement program. Can you give a description of the experience, and how did you feel about it?” Responses were overwhelmingly positive. The great majority of the citizens interviewed who had taken advantage of Forest Service public participation opportunities had positive experiences.

It was evident, however, that many other citizens did not know how to get involved. Some, especially from the general citizen groups, did not know they had the right to speak to or express an opinion to their district ranger or staff, as evidenced by the following verbatim statement: “How would they even know to call? How would they even know, just like me, I didn’t even know I was allowed to even call to tell them what I thought.” Some simply don’t know whom to call. One individual was so moved by the invitation to the focus group that his voice cracked as he tried to hold back tears. He was overwhelmed by the opportunity to express his views on “his forest.” He had no idea that public participation opportunities existed.

When asked who should have a say in forest management, “Everyone” and “Only professionals or educated and informed people” were the most frequent answers; a few participants said “local citizens.” Several others answered in terms of who (in his or her opinion) had a “say” in decisions, not who should have a “say.” These citizens suggested that forest managers operate as “one man shows.”

How citizens want to be involved. Respondents were asked about how they would like to be involved

with the Ouachita National Forest. A major point of discussion was advisory committees and steering committees. To the direct question, "What do you think of the idea of having a forest-wide steering committee made up of all types of interest groups?" the response was usually "No!" One tongue-in-cheek reply was that the extreme groups ". . . could kill each other off. That'd be great." However, when the groups were asked to devise their own preferred method of public involvement, surprisingly, two methods tied as the most favored strategy for public participation: citizen advisory groups and public meetings. Most focus groups proposed some form of district level citizen advisory board that would not have decisionmaking authority but would make recommendations. These committees would be composed of local residents, and the objective would be to hear from the "regular" citizens.

Public officials suggested having a forest-level advisory committee, with members selected proportionate to the amount of public lands in each county. A variation on the advisory committee theme was a committee with the charge, not of representing the public, but of monitoring the work of the Forest Service to determine whether the work done is in accordance with the forest plan. Public meetings were frequently mentioned as a desirable method for informing the public of management activities and involving them in future project planning. Participants stressed that all people should have a chance to have a say and that special interest groups should not be allowed to dominate meetings.

At least five groups recommended improving the readability of Forest Service notices and documents. Many people felt that these materials were difficult to read. Some suggestions were to "write in English," eliminate jargon, and provide clear maps showing commonly used names for roads and places. Other suggestions included publishing meeting notices with plenty of lead time and not just in the legal notice section of the newspaper; publishing readable, interesting newsletters about national forest activities; developing information programs for television; and installing an "800" telephone line for citizens to call with questions or concerns.

As noted earlier, most people who participated in Forest Service public involvement efforts were satisfied with their experience. However, they had many ideas for improvement. One common concern is that the Forest Service pays too much attention to vocal interest groups, particularly environmental and timber industry

interests. The perception that the Forest Service mainly listens to, is only interested in, and is guided by the timber and environmental groups leads to the frustration of some citizens who define themselves as "average," "local," or "regular." The citizens kept repeating "it's our forest." They defended the idea that local people are good folks whose intimate understanding of the forest should be of value to and used by the Forest Service. These citizens want to be involved and want their involvement to mean something. Many of them said they would like to help the Forest Service.

Forest Service employees focus groups. Most of the Forest Service employees in the focus groups said that the Ouachita National Forest should be managed for multiple uses. When asked about forest management direction, members of two of the focus groups said it was improving and a third said that the public's trust in the Forest Service was improving. Participants in other groups felt that lack of trust was still a serious problem. Members of one group blamed the lack of trust on the extensive clearcutting of the past; in another, participants mentioned that the elimination of clearcuts had hurt rural people by reducing the availability of firewood.

The discussion included critiques of the organization. One criticism was that the required paper work hinders effective management; another was that it is wasteful to spend extensive efforts regenerating timber just to let it lie on the ground and rot later (e.g., after a major wind storm or beetle outbreak kills trees). In one focus group, members questioned allowing the desires of one or two interest groups to dominate decisionmaking.

When discussing public involvement, Forest Service employees said that a most important element is the one-on-one contacts they have in the local communities, including those with landowners with property next to proposed projects. Most of the suggestions for new public participation strategies centered on hearing from or informing mainstream citizens. Suggestions included surveys, expanded mailing lists, more readable mailings, paying citizens to attend meetings, video tapes on forest management for citizens, educational programs, and meetings for local citizens led by technicians who are well known in the community. Another suggestion was to revise the forest plan and eliminate the appeals process at the project level. Forest Service employees also discussed the importance of monitoring and the option of using independent scientists more to conduct monitoring.

Northwest Arkansas Forest Values Poll

In September 1996, the National Research Group of Fayetteville engaged Marshall Dale Evans of the Evans Law Firm of Fayetteville to conduct a survey to ascertain the level of support for uses of the Ozark National Forest associated with wildlife and recreation relative to support for “commercial” uses. This survey entailed a telephone poll of 400 registered voters in 10 northwest Arkansas counties (Washington, Benton, Carroll, Madison, Boone, Pope, Franklin, Johnson, Newton, and Crawford).

Poll respondents were randomly selected from a data base of approximately 220,000 registered voters in these counties. Percentages were adjusted to weight each county in proportion to its voter population. Respondents were screened according to an average voter profile (at least 18 years of age, likely to vote in the upcoming election, not employed by a media source). Those who met these standards and agreed to answer the questions were included in the survey (NCWA 1996).

The poll suggested that voters in northwest Arkansas were supportive of wildlife and recreation uses of national forests and opposed to commercial use of these lands. Sixty-seven percent said that the national forest should be used primarily for recreation and water supply; only 7 percent responded that it should be used primarily for timber production. Fifty-nine percent of the respondents said that they oppose or strongly oppose the present Ozark National Forest timber program, 13 percent said they supported or strongly supported the program, and 28 percent said they didn’t know. Eighty percent of the respondents replied that the preservation of native old forest is very important (NCWA 1996).

Nonindustrial Private Forest (NIPF) Landowner Survey

Also relevant to the Assessment are the results of an Arkansas survey that focused on the opinions of NIPF landowners concerning environmental issues, private property rights, and land management (Williams and others 1998). Twelve counties were selected, with the probabilities of selection proportional to the amount of land held by NIPF owners. Within each county, 200 respondents listed on county tax records as owning forest land were selected, using systematic random sampling. Of 2,400 surveys mailed, 866 usable responses were obtained.

The survey results indicate that NIPF owners have strong interests in a variety of environmental issues. Their stated reasons for owning forest lands are heavily weighted in the direction of esthetic and environmental values and a simple desire to live in an attractive natural environment (table 9.9). A surprisingly small percentage intend to sell timber from their lands: only 21 percent of the respondents in the Ozark portion of the State rated “timber to sell” as an important reason for owning forest land (compared to a statewide average of 32 percent).

In regard to private property rights, about 81 percent of the surveyed landowners in both the Ouachita Mountains and the Ozark Plateaus of Arkansas either agreed or strongly agreed that such rights were important but should not be exercised to the point of hurting the environment (table 9.10). About half of the respondents agreed that property rights should be limited, while roughly 25 percent felt that landowners should be able to “do as they please.”

Table 9.9—Reasons nonindustrial private forest landowners own forest lands in Arkansas (percent of respondents who selected each reason) by geographic area

Reason	All	Coastal			
		Plain ^a	Delta ^a	Ouachita	Ozark
----- Percent -----					
Live in rural environment	58.0	44.9	44.8	65.8	65.8
Enjoy own green space	53.6	41.8	44.0	58.1	60.9
Wildlife habitat	52.3	45.9	52.0	53.5	55.0
Building estate for heirs	42.6	57.7	47.2	43.5	33.2
Personal recreation	38.5	31.6	33.6	38.1	43.7
Livestock raising for sale	34.5	21.9	24.8	50.3	37.5
Timber to sell	31.9	59.2	29.6	26.5	21.1
Inherited the land	26.7	48.0	32.8	29.7	12.9
Crop or hay farming for sale	16.2	13.8	26.4	20.0	12.6
Second home site	13.2	6.1	8.8	14.2	17.7
Recreation for others	12.8	13.8	11.2	11.0	13.6
Eventually sell at profit	12.6	11.2	8.8	15.5	13.4
Other reasons	6.8	3.6	5.6	8.4	8.3
Tax shelter	5.4	4.1	3.2	7.1	6.2
Renting dwellings/mobile homes	4.2	4.1	7.2	4.5	3.1
Income from recreation (hunting)	3.9	10.7	1.6	1.3	2.3
Landscape shrubbery for sale	0.3	0.5	0.0	0.6	0.3
Nursery or Christmas trees	0.3	0.5	0.0	0.6	0.3

^a Parts of southern and eastern Arkansas, i.e., not within the Ozark-Ouachita Highlands.
Source: Williams and others (1998).

Table 9.10—Percentage of respondents to a survey of nonindustrial private forest landowners in Arkansas who agreed, disagreed, or expressed neutrality toward statements concerning private property rights, by geographic area

Survey statement (regarding private property rights)	All	Coastal			
		Plain ^a	Delta ^a	Ouachita	Ozark
----- Percent -----					
“Do as they please”					
Strongly agree	14.0	12.9	17.4	12.3	14.2
Agree	10.6	12.9	11.0	12.3	8.6
Neutral	9.8	10.0	11.9	13.0	7.7
Disagree	37.3	37.6	44.0	34.1	36.3
Strongly disagree	28.3	26.5	15.6	28.3	33.3
Total	100.0	100.0	100.0	100.0	100.0
“Important, but don’t hurt environment”					
Strongly agree	38.0	34.8	21.4	34.3	38.4
Agree	49.6	42.1	56.3	46.4	42.3
Neutral	10.5	11.2	11.6	7.9	8.7
Disagree	8.4	7.9	8.0	7.9	7.3
Strongly disagree	3.8	3.9	2.7	3.6	3.4
Total	110.4	100.0	100.0	100.0	100.0
“Should be limited”					
Strongly agree	11.5	10.3	6.1	12.6	13.4
Agree	38.1	35.8	39.4	35.4	40.1
Neutral	18.4	20.0	20.2	18.9	16.8
Disagree	17.1	19.4	17.2	18.9	15.2
Strongly disagree	14.9	14.5	17.2	14.2	14.6
Total	100.0	100.0	100.0	100.0	100.0

^a Not within the Ozark-Ouachita Highlands portion of the State.
Source: Williams and others (1998).

Public Opinions Expressed About the Assessment

The Ozark-Ouachita Highlands Assessment Team first provided broad public notice that the Ozark-Ouachita Highlands Assessment was underway in July 1996, soon after the USDA Forest Service initiated the project. In that month, the Forest Service issued a media release in Arkansas, Oklahoma, and Missouri and sent an announcement about the Assessment to the combined mailing lists of the Mark Twain, Ouachita, and Ozark-St. Francis National Forests. In October 1996, the Forest Service published a formal notice about the Assessment in the Federal Register. (For a more complete summary of the background of this Assessment, see the following Web site: <<http://www.fs.fed.us/oof/ooha/welcome.htm>>.)

Assessment leaders encouraged public involvement through a variety of means, including having working meetings open to the public, mailing updates that invited responses, issuing additional media releases, holding community meetings and open houses, making presentations to organizations, and other mechanisms. A summary of Assessment-related outreach efforts and public involvement through June of 1997 was provided in the June 27, 1996, "Assessment Update" (on file in the Supervisor's Office of the Ouachita National Forest, 100 Reserve St., Hot Springs, AR 71901).

A condensed version of public comments follows. The topics and concerns are categorized to indicate whether the Assessment Team was likely to be able to address them. (The team tried to address each of the Assessment-specific concerns as fully as possible, but describing how it did so would require a chapter unto itself). Some topics and concerns were clearly beyond the scope of this effort or beyond the authority of the Federal officials involved; some of these topics, however, may be appropriate to address during forest plan revisions.

Assessment-Specific Concerns

- Accuracy of and potential interpretation and use of data (e.g., concerning recreation "demands," the economic importance of recreation and tourism in the region, direct and indirect employment by the forest

products industry, expenditures of and revenues from national forest programs, and funding of programs some citizens do not want).

- Need for more information (e.g., effects of national forest management on inholders, transportation networks, population trends, water quality, hunting and fishing use, historic sites, and percentage of public land unavailable for timber production).
- Adequacy of public involvement (e.g., not enough evening meeting opportunities, too many meetings in larger cities, not enough time for public comment, unclear about what the Forest Service wanted, and Government actions occurring without public scrutiny).
- Involvement of county governments (e.g., coordination of planning, level of authority in decisions concerning Federal lands, and increased Federal control).
- Assessment area boundaries (e.g., placement of boundaries and collection of information).
- Private property rights (e.g., excessive regulation, denial of due process, and inappropriate or unjust condemnation procedures).
- Possibility of future special designations of land (e.g., "Wild and Scenic Rivers," "wilderness," "heritage corridors," "biosphere reserves," and "scenic byways").

Concerns Specific to National Forest Management

There were some topics and concerns specific to national forest management, which the Assessment was never intended to resolve. Some or all of the following may need to be addressed in plan revisions or at the local ranger district level:

- Amount of wilderness on the national forests,
- Amount of, costs of, and accounting methods for timber harvesting on Federal lands,
- Silvicultural practices and hardwood/conifer ratios,
- Number and miles of national forest roads closed or kept open, restrictions for public access,
- Access to private lands and land-line surveys, and
- Restrictions on use of off-road vehicles on national forests.

Other topics that were specific to national forest management and which can be addressed at the national level only are as follows:

- The purposes of national forests,
- How the budget process works; what gets funded, what doesn't,
- Whether or not national forests should have wilderness,
- Whether or not national forests should have timber harvesting,
- Appropriateness of laws and regulations governing national forest management,
- Whether national forests should continue to exist or not, and
- Sovereignty of Federal lands.

Public Opinions Expressed Most Frequently

During the Assessment, several individuals disagreed vigorously with the premise that it is important for managers and citizens to understand the regional context within which public lands exist before trying to make decisions about future management of these lands. They felt that Federal and State agencies should “stay home,” that is, study only those lands for which they are individually responsible. Furthermore, they felt that an assessment of the Ozark-Ouachita Highlands area implied Government intent to regulate and manage the region. Those who expressed this belief did so with great conviction.

Some of the same individuals were—and very likely will remain—convinced that programs of the United Nations and various environmental organizations (for example, initiatives such as the Man and the Biosphere Program, the World Heritage Convention, the International Biodiversity Convention, and the Wildlands Project) pose imminent threats to private property rights in the Highlands and to United States sovereignty (see Coffman 1997 for a more complete treatment of these and related concerns). Some argued that the Assessment must either be part of or aiding and abetting one or more of these perceived takeover efforts.

Although it is difficult to estimate how many people in the Highlands share these concerns, they were the issues voiced most often during Assessment Team working meetings in 1996 and 1997. Individuals raising concerns about private property rights and/or threats from the United Nations were doing so in many other arenas at the same time the Assessment was underway, and they successfully influenced some decisions

made by county and State governments and by Federal agencies in Missouri and Arkansas during that time (see below). It seems likely that such opinions will persist and be important factors in future public land management planning efforts of many agencies in the Highlands.

County Land Use Plans

As noted in Chapter 3, at least eight county governments in the Highlands during the course of the Ozark-Ouachita Highlands Assessment passed ordinances establishing draft “county land use plans” that assert an expanded role for county government in the management of Federal and State lands in those counties (Carroll, Fulton, Montgomery, Newton, Polk, Searcy, and Stone Counties, AR, and Dent County, MO).

Other counties in the Highlands have considered passing similar ordinances, all fashioned after a model developed in the Western United States. It is not clear what passage of such ordinances implies about public opinion in the respective counties, but conversations with several backers of these ordinances suggest that their intent was to ensure that they had a “place at the table” when national forest land management decisions are made, not that they (county elected officials or their designees) would control or actually make those decisions. Passage of these ordinances probably signals an increase in the level of local public interest in national forest planning, reflecting the growing opinion that local citizens need to participate if they want their voices to be heard over the “roar” of interest groups.

Implications and Opportunities

There appears to be broad support for multiple-use management of national forests, but there is little agreement on what the proper mix of uses should be. Managers should be aware that people are nearly evenly divided over whether timber harvesting is appropriate on public land and that as many as 70 percent of those at higher income levels (greater than \$50,000) may be opposed to natural resource extraction on public lands unless managers can assure stringent

environmental protection and achieve esthetic and ecological objectives as well as economic ones.

Studies suggest that when people are assured that timber harvesting will be carried out in a way that protects environmental values, they are more likely to be supportive of it. While surveys indicate there are many people who oppose logging on public land, they also indicate that many people have little understanding or information about forest management practices and the objectives and operations of the Forest Service and other public land managing agencies. People believe that Forest Service communications are too complicated and technical to be understood by the general public, and that highly organized interest groups dominate the planning process. People want information about the national forests that is accessible and readable. All of these findings point to a need to provide better information to interested citizens and to pay better attention to public responses to that information.

Results from national and local surveys indicate that trust in the Forest Service and in government does not seem to be as low as is sometimes alleged, and there is general support for the Forest Service to manage the national forests on a scientific basis. However, the public wants to be involved and be able to influence the land management decisions that are made; often, citizens do not have a clear understanding of the public involvement opportunities available to them. Moreover, there is a widely held perception that the ordinary citizen really doesn't have much say.

Forest Service employees frequently mentioned the "silent majority" when they discussed public opinions about forest management, sometimes invoking it as supportive of the planning and management decisions they make. Some employees feel that many people in local communities support their efforts but seldom speak out. People who are not Federal employees also invoke the silent majority in favor of their positions, including claims of major alienation and displeasure.

Of course, as long as any group is silent, there is no way to know what its attitudes and opinions are or whether any generalizations can be made about them. Several of the studies reported here probably come as close as is possible to identifying the attitudes and values of this silent majority, because they represent probability samples of the general public and have even gone to

great length to enlist input from a wide variety of publics. It does seem clear, though, that some people feel left out and overlooked, and that at times their resentment is great.

The Social-Economic Team found that, except for a few highly focused studies, little scientific information is available about the attitudes and values of the people living in the Highlands with respect to their relationships to national forests and the Forest Service. Information about the values and attitudes of private inholders, identified as an important subject by people attending working meetings of the team, is glaringly absent. Future social science research focused on these subjects would be helpful.

Fear of the Federal Government (and/or the United Nations and/or environmental groups) is apparently strong in some quarters. Even though the purpose of the Ozark-Ouachita Highlands Assessment was to gather and interpret information pertinent to public lands (not to develop a land use plan for the Highlands), some people saw it as a covert step toward increased Government control and accelerated erosion of private property rights. Several individuals felt strongly that the Assessment would lead to establishment of Biosphere Reserves in the Highlands. (None exist there, and the 105th Congress included language in an 1998 fiscal year appropriations bill that precludes Federal land managing agencies from establishing new Biosphere Reserves).

It seems likely that such fears and concerns will be factors in future public land management planning efforts. On the positive side, increased interest on the part of citizens living near public lands suggests opportunities for enhancing public participation in decisionmaking. One downside is that some citizens may be unwilling to move beyond rumors and fears to address the actual decisions pending, resulting in the latter getting short shrift and some citizens being discouraged from participating because there are so many side issues.

Federal land managers probably need to pay more attention to opportunities to coordinate public land management planning activities with local governments. A growing number of county governments are on record as desiring more say and better coordination. While Federal law does not support some of the legal theories that the county "land use plans" advance, it

very clearly supports cooperation and coordination among government entities having shared or overlapping responsibilities. If local interest in a more coordinated approach to national forest planning is indeed growing,

managers will be well served by working closely with local elected officials to determine how they can best achieve this goal.

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Glossary of Terms

acquired lands: lands currently managed by the Forest Service that were acquired through the Weeks Law (1911), Clarke-McNary Act (1924), or the McNary-Woodruff Act (1928). These acts allow the purchase or acquisition through exchange of land to improve regulation of the flow of navigable streams and/or for timber production.

alluvial: composed of material—such as soils and gravels—deposited by running water.

animal unit month (AUM): a measure of the amount of live-stock grazing over time. For cattle grazing, an animal unit month is equivalent to one cow-calf pair grazing for 1 month.

anthropocentric: considering human needs of greater value than those of any other life forms, regardless of circumstance.

Arkansas Natural and Scenic River: a State designation that protects certain rivers from permanent dams or structures and actions that would harm their scenic and recreational qualities. Designated rivers are part of the Arkansas System of Natural and Scenic Rivers. (From http://www.heritage.state.ar.us/her_ansr.html: “The system designation requires an act of the Arkansas General Assembly based upon the review and recommendations of local governments and citizens from the area through which the river flows. A river or river segment listed in the system is protected from any permanent dam or structure that would impound waters or channelization or realignment of the principal channel of the stream.”)

attitude: “a predisposition to respond to a focal object. [These] predispositions or sets are learned through experience, [and] the existence of an attitude is inferred from consistencies in an individual’s behavior” (Lachman 1991). Attitudes are considered to predispose people toward certain behaviors; typically, they change more readily than values. Each attitude has three components: (1) a belief, (2) a favorable or unfavorable evaluation, and (3) a behavioral disposition.

band: a small, territorially based social group consisting of two or more nuclear families.

barite: heavy, dense mineral essential to oil and gas drilling operations and other applications.

bauxite: ore from which aluminum is made.

biocentric: considering all life forms as important as humans.

cairn: a rounded or pyramidal heap of stones made as a monument or memorial.

Champion Communities: communities that applied for but did not receive recognition and funding as Empowerment Zones or Enterprise Communities; now eligible for other forms of support for planning and development.

chert: a stone comprised primarily of silica, commonly used as a source material for making chipped stone tools.

Civilian Conservation Corps (CCC): President Franklin D. Roosevelt created the corps in 1933 as a recovery program to combat the effects of the Great Depression. The corps was disbanded in 1942.

cohort: age group.

commodities: timber, water, minerals, and other resources that are bought and sold in markets.

communities of interest: see **interest community**.

communities of place: see **geographic community**.

commuting county: a county in which 40 percent or more of all workers aged 16 and older commuted to jobs outside their county of residence in 1990 (see also **policy-dependent county**).

component: an assemblage of artifacts, structures, or other remains (found on a particular site) that is associated with a certain cultural period or group. Heritage resource sites may contain multiple components: for example, an assemblage indicating the presence of Caddoan occupation and an assemblage indicating historic European occupation.

delivered log prices: the price paid by a mill to a logger for timber brought to the mill.

dependency ratio: a rough estimate of the number of dependents per worker. The ratio is computed by dividing the number of people who are most likely to be dependent (those under age 19 plus those over 64) by the number of people in the working-aged population (ages 19 through 64).

developed camping: camping in areas where facilities such as restrooms, picnic tables, campfire rings, information boards, and constructed camping pads are provided. Fees are sometimes charged in developed camping areas and encounters with many other campers can be expected.

devolution: the delegation of power, authority, and/or mandate from a central government to local governing units (as, for example, from the United States to the various States or from a State to its counties or municipalities).

dimension stone: building stone.

direct effect: economic response in an industry that results from a change in that industry's output.

dispersed or primitive camping: camping in areas where no facilities such as restrooms, picnic tables, or other developments are provided for the convenience of campers. This type of camping can occur in the general forest area—near roads or deep in the backcountry.

draw area: in this report, the area within which most of those who enjoy outdoor activities in the Highlands reside—typically within 300 mi (1 day's drive) of the border of the three national forests.

economic multiplier: see **response coefficient**.

ecotourism: a form of tourism that involves visiting places to learn about the cultural and natural history of an area in ways that minimize impacts on the land and ensure the maintenance of ecosystem integrity. The concept involves providing economic opportunities for local people through natural resource-based tourism.

employee compensation: wage and salary payments as well as benefits including health and life insurance, retirement payments, and any other noncash compensation; includes all income to workers paid by employers (p. 229, MN IMPLAN 1997b).

employment: total waged and salaried employees and self-employed individuals in a region; includes both full-time and part-time workers and is measured in total jobs (p. 211, MN IMPLAN 1997b).

energy minerals: primarily coal, gas, and oil.

environmental justice: the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, and/or socio-economic status. Presidential Executive Order No. 12898 (issued February 11, 1994) requires Federal agencies to respond to the issue of environmental justice by “identify[ing] and address[ing] disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations.”

epoch: a division of geologic time with a typical length between 5 and 15 million years.

even-aged management: timber management methods that result in the creation of forest stands in which all trees are essentially the same age.

exurb: a region outside a city and usually beyond its suburbs.

family: defined by the Census Bureau as two or more persons living in the same household who are related to the householder by birth, marriage, or adoption.

Federal lands county: a county in which Federal lands made up 30 percent or more of the area in 1987 (see also **policy-dependent county**).

fiscal year: a year set by a governing body for budgeting and billing purposes; the Federal Government's fiscal year begins on October 1 and ends on September 30.

forest dependency: as used in this report, a measure of dependence upon national forest revenues for a portion of school budgets.

Forest Inventory and Analysis (FIA): a USDA Forest Service research program that periodically conducts a forest inventory for each State. See the following Web site for more information: <<http://www.srsfia.usfs.msstate.edu/wofia.htm>>.

gauging station: a station set up along a river or stream to document the water level and flow in that stream.

General Educational Development (GED): The GED program is designed for persons preparing to take the GED examination to qualify for a state-issued high school equivalency diploma. The equivalency certificate is also known as a GED.

geographic community (community of place): a group of individuals who live in a particular geographic area (usually smaller than a county; may be as small as school districts or neighborhoods). See also **interest community**.

grazed woodland: see **woodland range**.

green offered volume: volume of timber offered for sale on a national forest that is not dead, dying, or otherwise considered salvage.

Gross Regional Product (GRP): a measure of total income in a given area. The GRP includes employee compensation, property income, and proprietary income plus indirect business taxes. The GRP is equal to total value added and is the local or regional equivalent of the national measure of economic growth, the Gross Domestic Product.

growing stock: the volume of sound wood in cubic feet in trees that are at least 5.0 in. in diameter at breast height (d.b.h.), from a 1-ft stump to a minimum 4.0 in. in top diameter (outside bark) of the central stem or to the point where the central stem breaks into limbs.

growth/removals ratio: a ratio obtained by dividing volume of timber growth by volume of timber removals during a particular time period, usually 1 year.

hardrock minerals: metallic and nonmetallic mineral deposits including such nonenergy-related (or nonfuel-related) mineral resources as quartz, novaculite, and gemstones. In this report, the term includes building and dimension stone, sand, and gravel.

heritage resource: archeological site, building, structure, or object greater than 50 years old that can help humans understand prehistory and history or that has some other significance in a local, regional, or national event.

historic: relating to or existing in times of written history; Within the Assessment area, the historic period is considered to begin with the expedition of Hernando de Soto in the 1540's.

Homestead Act: an act passed in 1862 by Congress that allowed citizens to settle on, improve, and establish a claim to public lands; claims were generally restricted to 160 acres (ac).

impoundment: human-engineered and dammed lake, pond, or reservoir.

Indian Territory: present day Oklahoma.

indirect effect: the economic effect that occurs when a producer purchases goods and services from another producer, who, in turn, also purchases goods and services.

induced effect: the economic effect that occurs through the payment of wages to employees of directly or indirectly affected industries.

inholder (national forest): owner of land surrounded by or adjacent to a national forest.

inholding: private land surrounded by or adjacent to a national forest or other public land area.

in-migration rate: the rate at which people move into a community or region over a given time period.

input-output model: a computer model designed to account for all linkages in an economy between industrial sectors and consumers. Some pertinent mechanics of the model include:

- Total industrial output (TIO) = total value added + total value of inputs,
- Total value added (also called Gross Regional Product) = total income + indirect business taxes, and
- Total income = employee compensation + proprietary income + other property type income.

The following hypothetical example of the forest products industry illustrates the relationship of the various economic measures:

Measure	Timber sector	Logging sector	Sawmill sector	Total
Value of inputs	2	10	27	39
Value added	8	17	35	60 (GRP)
Value of outputs	10	27	62	99 (TIO)

The model calculates direct, indirect, and induced effects of each industry or user-designed influence (e.g., increase in a national forest harvest). For the sawmill sector, for example, these effects could be:

Type of effect	Number of employees	How jobs occur
Direct	165	Mill employment
Indirect	27	Mill operations result in expenditures (e.g., on trucks, repair, deliveries, food services, accounting)
Induced	18	Employees spend income (e.g., on auto repair, housing, clothing, groceries, insurance)
Total	200	

interest community (community of interest): group of individuals belonging to an organization that has an identifiable set of interests. See **geographic community**.

inventory elasticity: a measure of the responsiveness of harvest to changes in standing timber inventory.

labor force: a group consisting of persons who are either working or looking for work.

labor market: a “place” in economic theory where labor demand and supply interact.

lanceolate: refers to long slender stone projectile points characteristic of Paleo-Indian culture.

lithic: stone; generally refers to waste debris resulting from manufacturing stone tools.

lithic debris: waste resulting from manufacturing stone tools from chert or other siliceous stone materials.

lithic scatter: site with lithic debris covering a small or large area. Depending on the types (e.g., kinds of stone tools, burned rock) and densities of materials found, inferences can be made regarding the age and length of occupation and function of the site (e.g., campsite, workshop, resource extraction site).

market zone: counties with mills that purchase timber from the respective national forests.

metropolitan area (MA): a core area containing a large population nucleus plus adjacent communities (usually additional counties) having a high degree of economic and social integration with that core, as defined by the U.S. Office of Management and Budget (OMB). Currently defined MA's are based on the application of 1990 standards (which appeared in the Federal Register on March 30, 1990) to 1990 census data and to subsequent Census Bureau population estimates and special census data. (According to the Census Web site <www.census.gov/population/www/estimates/aboutmetro.html>, accessed March 2, 1999, "The current standards provide that each newly qualifying MSA must include at least [1] one city with 50,000 or more inhabitants, or [2] a Census Bureau-defined urbanized area (of at least 50,000 inhabitants) and a total metropolitan population of at least 100,000 (75,000 in New England)." The same source reports, "Standard definitions of metropolitan areas were first issued in 1949 by the then Bureau of the Budget (predecessor of the OMB), under the designation 'standard metropolitan area' (SMA). The term was changed to 'standard metropolitan statistical area' (SMSA) in 1959, and to 'metropolitan statistical area' (MSA) in 1983. The collective term 'metropolitan area' (MA) became effective in 1990. MA's include metropolitan statistical areas (MSA's), consolidated metropolitan statistical areas (CMSA's), and primary metropolitan statistical areas (PMSA's). The standards for defining metropolitan areas were modified in 1958, 1971, 1975, 1980, and 1990, and currently are undergoing review."

metropolitan county: one that is included in an MA (see **metropolitan area**).

metropolitan statistical area (MSA): a Census Bureau-defined urbanized area of at least 50,000 inhabitants with a total metropolitan population of at least 100,000. Additional contiguous counties are included in the MSA if they meet certain requirements of commuting to the central counties and other selected requirements of metropolitan character (such as population density and percent urban).

midden: a deposit of camp refuse (e.g., food remains, lithic debris, broken ceramics); soils are usually black and sometimes greasy.

minerals-significant county: a county where the minerals industry represents a significant share of the economy (see **significant**).

multiple use management: the management of all the various sustainable resources of the National Forest System so they

are used "in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output" (adapted from 36 CFR 219.3).

natural decrease: decline in a population due to deaths exceeding births.

natural increase: increase in a population due to births exceeding deaths.

natural open land: land that is mostly free of trees due to the ecological conditions of the site.

nonfuel (nonenergy) minerals: mineral deposits that are not burned to produce energy (see **hardrock minerals**).

nonmetropolitan county: a county lying outside a defined metropolitan area (see **metropolitan area**).

novaculite: mineral used as sharpening stones for knives and other tools and crushed for other applications.

nutting stones: anvil stones used for processing plant foods and flint knapping.

Oklahoma Scenic River: a State designation that establishes restrictions on activities to preserve the scenic qualities of certain rivers.

opinion: "a time-bound judgment or speculation that fluctuates unpredictably. . . . Opinions, then, generally are short-run impressions or 'guesses' about specific objects, ideas, issues, or events that are usually involved with aspects of public affairs" (Lachman 1991).

ore: an economically valuable mineral deposit.

out-migration rate: rate at which people move out of a county or region over a given period of time.

Paleo-Indian: a prehistoric cultural group considered to be the "first Americans." Paleo-Indians are considered to have been "big game hunters," hunting now-extinct animal species such as the mammoth and giant bison. The Paleo-Indian period dates to approximately 11,500 to 9,900 B.P.

participation day: a day in which a person participated in a particular recreation activity for any length of time.

persistent poverty county: a county in which persons with poverty-level incomes in the preceding year were 20 percent or more of the population in 1960, 1970, 1980, and 1990 (see also **policy-dependent county**).

person trip (definitions used in different State studies): in Arkansas, a person trip is one person traveling 100 miles (mi) or more one way and/or spending at least 1 night away from the point of origin; in Oklahoma, a person trip is one person traveling at least 50 mi one way and/or spending at least 1 night away from point of origin; in Missouri, a person trip equals total participation days divided by 3.1.

persons at one time (PAOT): a measure of the potential capacity (number of people) a recreation area can accommodate at any given time.

petroglyph: pictures, symbols, or other artwork pecked, carved, or incised onto natural rock surfaces. Natural or abstract motifs may be represented.

phase: the basic unit in classifying archeological cultures. A phase represents a cultural unit characterized by enough unique traits to set it apart from others in time and place.

pictograph: picture, symbol, or other artwork painted on natural rock surfaces. Natural or abstract motifs may be represented.

poletimber: trees 5.0 to 8.9 in. d.b.h. for softwoods and 5.0 to 10.9 in. d.b.h. for hardwoods.

policy-sensitive county: a nonmetropolitan county that the Economic Research Service (Cook and Mizer 1994) classifies as particularly sensitive to policies and decisions made external to the county, e.g., by Congress, by State or Federal agencies, or by neighboring communities. See also: **commuting county**, **Federal lands county**, **persistent poverty county**, **retirement-destination county**, and **transfers-dependent county**.

polity: organized government as a whole.

prehistoric: relating to or existing in times predating written history. This term generally refers to those North American cultures in existence prior to A.D. 1540.

price elasticity: a measure of the sensitivity of supply and demand to changes in price. If price elasticity is low, a large change in price will lead to a small change in supply.

primitive camping: see dispersed camping.

projectile points: often referred to as “arrowheads,” these stone tools were often given handles and used as knives or placed onto dart or spear shafts and used as hunting implements or weapons.

proprietary income: income from self-employment.

public domain lands: originally, all lands ceded to the Federal Government by the 13 original colonies and all lands acquired through purchase or treaty. Public domain lands in the Highlands were acquired through the Louisiana Purchase in 1803. Subsequent congressional actions disposed of two-thirds of the public domain through sales to individuals, homesteaders, railroads, and others. The largest portion was granted to States when they were admitted to the Union in return for an agreement not to tax or contest Federal land holdings. Lands that remained in the public domain until the creation of forest reserves, national forests, national parks, or Bureau of Land Management districts remain public domain lands under the current management of the USDA Forest Service or various USDI agencies (Cubbage and others 1993).

public opinion: an opinion generally shared by a significant number of people on matters considered to be of public significance, and hence predisposes people toward certain behaviors on such matters. In a democratic society, a public opinion is the major determinant of public policy. The two distinct components of public opinion are (1) the “average view” of the public on a particular issue and (2) how the public actually articulates attitudes and values to policymakers, administrators, elected officials, and others.

pulpwood: trees in the poletimber size class that are harvested for use.

range allotment: a designated area of national forest land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan.

real price: price of products adjusted for the effects of general inflation. Adjustments were made using the Gross Domestic Product deflator from the *Economic Report of the President*.

recharge area: area around a spring or a group of springs through which water enters the underground aquifer. The recharge area may be close to or distant from the springs, depending on the location’s specific geology.

recreational rivers: rivers or segments of rivers included in the National Wild and Scenic Rivers System (NWSRS) (P.L. 542-82 stat. 906, as amended) that are readily accessible by road, may have some development along their shorelines, and may have undergone some impoundment or diversion in the past.

Recreation Opportunity Spectrum (ROS): a system of classifying land according to the types of recreation opportunities that it can provide. The six classes are based on the extent to which the natural environment has been

modified, the type of recreation facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The six classes are as follows:

- **Urban**—high levels of human activity and concentrated development. Human-built structures dominate the landscape. City parks, play fields, cemeteries, and small undeveloped areas provide the only open space.
- **Rural**—sights and sounds of human activity vary from moderate to high. While human-constructed features such as fields, pastures, and roads may dominate the landscape, there is still a strong sense of open space.
- **Roaded-natural**—predominantly natural-appearing settings, with moderate sights and sounds of human activities and structures. Evidence of human activity varies and can include improvements such as highways, railroads, developed campgrounds, small resorts, livestock grazing, and timber harvesting.
- **Semi-primitive motorized**—characterized by predominantly natural or natural-appearing landscapes, these areas are large enough to impart a strong feeling of remoteness. Roads are low standard and used primarily by four-wheel drive and off-highway vehicles. Interaction with other visitors is infrequent.
- **Semi-primitive nonmotorized**—user has ample opportunities to practice outdoor skills and self-reliance. Roads are either closed or used only in case of emergencies and are visually unobtrusive.
- **Primitive**—naturally evolving, unmodified environments. Their size and configuration ensure remoteness from the sights and sounds of human activity. The use of motor vehicles and equipment is forbidden except in extreme emergencies.

recreation visitor day (RVD): a measure of recreation use equivalent to 12 hours of participation in one recreational activity by one person.

registry river (Arkansas): a river studied by the AR NSRC and placed in a registry, which is a list of streams that the commission has determined to be worthy of addition to the State system of Natural and Scenic Rivers (see **Arkansas Natural and Scenic River**). The commission can draw from this list for nominations to the system for the Arkansas General Assembly. (This definition is adapted from <www.heritage.state.ar.us/her_ansr.html>.)

removal policies: policies of the Federal government to relocate American Indian tribes from their native territories to lands designated for that purpose.

removals: the net volume of growing stock trees removed from the inventory by harvesting or cultural operations such as

timber stand improvement (e.g., thinning), land clearing, or change in land use.

Renewable Resources Planning Act (RPA): passed by Congress in 1974 and updated in 1993, this law requires the Forest Service to conduct an assessment of the Nation's forests every 10 years (and to provide updates every 5 years).

response coefficient: effects on jobs, wages, or incomes per unit of production or output such as per million dollars of mineral extracted, million board feet harvested, or million recreation trips.

retirement-destination county: a county in which the population aged 60 years and over in 1990 increased by 15 percent or more from 1980 to 1990 through the in-migration of people (see also **policy-sensitive county**).

rockhound: generally, a person interested in the noncommercial search for and removal of rocks and minerals for personal purposes, typically using only small hand tools.

roundwood: volume of harvested timber (usually smaller than 9.0 in. d.b.h.) destined for use in pulp and paper production.

salvage volume: timber that is dead or dying.

sawtimber: trees with a 9 in. d.b.h. and larger for softwoods and 11 in. d.b.h. and larger for hardwoods.

scenic rivers: rivers or segments of rivers included in the NWSRS (P.L. 542-82 stat. 906, as amended) that are free of impoundments, with shorelines or watersheds that are still mostly primitive and undeveloped, but accessible in places by roads.

section: subdivision of a township measuring 1 square mi (640 ac) in area.

significant: counties were defined as "significant" if they had at least twice the Assessment area average percentage of total industrial output, employment, and/or employee compensation from the industry in question (e.g., forest products, mining, or travel).

social context: the social, cultural, economic, and political setting in which forest (or other resource) management takes place.

southwide: including or affecting all the Southern States of the United States.

special forest products: the array of biotic resources, other than timber, minerals, and wild game, that people harvest from the forest for personal or commercial purposes. Examples include firewood, ginseng, and grapevines.

special uses: uses of national forest land allowed under permit to private individuals, organizations, or other governmental agencies. Examples include road easements, communication transmission sites, and outfitter and guide operations.

stakeholders: those who have a “stake” in something, including those who use public lands directly for such purposes as food, livelihood, or recreation as well as those who simply are interested in how the public lands are managed or how they look, or who have some other interest in these lands.

Statewide Comprehensive Outdoor Recreation Plan (SCORP): report prepared by States that want to be eligible for the Land and Water Conservation Fund program, which provides Federal matching funds for acquisition and development of outdoor recreation lands and facilities.

stumpage price: the price paid by a logger to a landowner for standing timber.

Subregional Timber Supply (SRTS) model: a model developed by Robert C. Abt, North Carolina State University, Durham, NC. The model uses a timber supply framework consistent with the RPA models but tracks inventory and growth trends by individual FIA survey unit or subregion as well as by ownership category (forest industry and nonindustrial private forest).

suitable acres: timberland capable of and available to produce 20 cubic feet per acre (cf/ac) of industrial wood per year. Some lands allocated to other resource uses to meet forest plan objectives, such as recreation sites, experimental forests, areas with threatened or endangered species, and areas not economically efficient for timber harvesting are classified as “not appropriate” for timber production. Some land is classified as “not inventoried” and is currently excluded from suitable timberland.

system river: a river classification in Arkansas, designated by the Arkansas General Assembly, to protect it from any permanent dam or structure that would impound the waters or any channelization or realignment of the principal channel of the stream.

timber dependency: as used in this report, the percentage of all earnings in a county represented by timber-related earnings (SIC codes 08 and 24 of the U.S. Bureau of Economic Analysis).

timberland: forested land that is capable of producing crops of industrial wood at a rate of at least 20 cf/ac per year and has not been withdrawn from timber production. (Some forest lands are not classified by the FIA as timberland because they are unproductive and some—such as national parks

and wildernesses—because by law, they are off limits to harvesting.)

timber market zones: geographic areas used as a basis for analyzing the economic effects of timber sale programs on national forests. The zones comprise counties with national forest lands plus those counties that have mills that purchase national forest timber.

timber-significant county: a county where the forest products industry represents a significant share of the economy (see **significant**).

total income: the sum of employees’ compensation, proprietor’s income, and property type income.

total industrial output (TIO): the value of production by industry for a given time period. Output can be measured by the total value of purchases by intermediate and final consumers, or by intermediate outlays plus value added. Output can also be thought of as value of sales plus or minus inventory (p. 233, MN IMPLAN 1997b).

township: federally mandated division of land encompassing 36 square mi and consisting of 36 sections.

transfers-dependent county: a county in which the income from transfers payments (Federal, State, and local) contributed a weighted annual average of 25 percent or more to total personal income from 1987 through 1989; transfer payments consist of income from (1) retirement and disability programs, (2) medical programs, (3) income maintenance programs, (4) unemployment insurance, (5) veterans’ programs administered by the U.S. Department of Veteran’s Affairs, and (6) education and training programs (see also **policy-dependent county**).

travel-significant county: a county where the travel industry (for recreation, business, entertainment, and other purposes) represents a significant share of the economy (see **significant**).

tripoli: a very finely divided form of microcrystalline silica formed locally within the upper section of the Arkansas novaculite in the Ouachita Mountains (central Arkansas) and also from massive-bedded chert developed in limestones of the Boone Formation in northern Arkansas. Tripoli is used as an abrasive and as a filler in paint and other industrial products.

25-percent returns: the annual payments the Forest Service makes to States and counties based on gross revenues from timber, recreation, and other revenue-generating activities on national forests. These funds are used for schools and county roads according to State formulas.

uneven-aged management: timber management method that results in forest stands characterized by trees of many ages or sizes intermingled singly or in groups.

value added: the sum of all income deriving from an industry, including wage income and owner income, less business taxes.

values: relatively firmly held and socially shared positions or expressions about what is good or right; they are abstract and normative and are considered to be somewhat stable.

vandalism: in the context used in Chapter 1, the uncontrolled, undocumented, and unauthorized excavation and removal of artifacts from archeological sites (both prehistoric and historic); activities that destroy archeological information.

wild rivers: rivers or segments of rivers included in the NWSRS (P.L. 542-82 stat. 906, as amended) that are free of impoundments; are generally inaccessible except by trail; and the watersheds and shorelines of which are essentially primitive and unpolluted.

wilderness: a Congressionally-designated area that provides opportunities for solitude and primitive, unconfined recreational experiences. There are no constructed facilities such as campgrounds, picnic areas, or interpretive sites and motorized and mechanized vehicles are prohibited. See **Wilderness Act**.

Wilderness Act: The Federal Wilderness Act of 1964 established the National Wilderness Preservation System, declared it the policy of the United States to “secure...the benefits of an enduring resource of wilderness” and provided guidelines for managing wilderness areas. The Wilderness Act prohibits motorized and mechanized vehicles as well as recreation facilities such as campgrounds, picnic areas, and interpretive sites in wilderness areas.

withdrawn lands: those lands that are legally unavailable for harvest, e.g., wilderness areas.

woodland range: forest land (within range allotments) that produces minor amounts of forage. It includes occasional even-aged timber harvest areas that have higher forage value for several years before being replaced by shrubs and trees.

Glossary of Abbreviations and Acronyms

ac: acre(s)

A.D.: (anno Domini) refers to the number of years after the birth of Christ

AR AS: Arkansas Archeological Survey

AR DPCE MD: Arkansas Department of Pollution Control and Ecology, Mining Division

AR DPT: Arkansas Department of Parks and Tourism

AR GFC: Arkansas Game and Fish Commission

AR HPP: Arkansas Historic Preservation Program.

AR NSRC: Arkansas Natural and Scenic Rivers Commission

AR SHTD: Arkansas Highway and Transportation Department

AUM: animal unit month

B: billion

B.C.: years before the birth of Christ

bf: board foot or feet

bf/ac: board feet per acre

B.P.: years before the present date

CCC: Civilian Conservation Corps

CES: Cooperative Extension Service

cf: cubic foot or feet

cf/ac: cubic feet per acre

CFR: Code of Federal Regulations

CPI: Consumer Price Index

CSU: Colorado State University

CVMM: common variety mineral material

d.b.h.: a measurement of the diameter of a tree at breast height (4.5 ft from the ground)

EZ/EC: Empowerment Zone and Enterprise Community (program of the USDA and HUD)

FIA: Forest Inventory and Analysis

FS: Forest Service

ft: foot or feet

GED: General Educational Development

GLO: General Land Office

GRP: Gross Regional Product

HUD: U.S. Department of Housing and Urban Development

IMPLAN: IMPact analysis for PLANing computer model

in.: inch(es)

IWSRCC: Interagency Wild and Scenic Rivers Coordinating Council

lb: pound

lbs: pounds

M: million

mbf: thousand board feet

mcf: thousand cubic feet

mmbf: million board feet (of sawtimber)

mmcf: million cubic feet (roundwood timber)

MO DC: Missouri Department of Conservation

MO DNR MD: Missouri Department of Natural Resources, Mining Division

MO HTD: Missouri Highway and Transportation Department

MPO: Metropolitan Planning Organization

MSHA: Mine Safety and Health Administration (U.S. Department of Labor)

NABFCB: National Advisory Board of First Commercial Bank

NF: national forest

NIPF: nonindustrial private forest

non-NF county: county without national forest lands

NORSIS: National Outdoor Recreation Supply Information System

NPLOS: National Private Land Owner Survey

NRA: National Recreation Area

NRI: Nationwide Rivers Inventory

NSR: National Scenic Riverways

NSRE: National Survey on Recreation and the Environment

NWPS: National Wilderness Preservation System

NWSRS: National Wild and Scenic Rivers System

OK DM: Oklahoma Department of Mines
OK DT: Oklahoma Department of Transportation
OK DWC: Oklahoma Department of Wildlife Conservation
OK SRC: Oklahoma Scenic Rivers Commission
OK TRD: Oklahoma Tourism and Recreation Department
OMB: U.S. Office of Management and Budget
ORV: off-road vehicle
PAOT: persons at one time
P&DD: Planning and Development District
PILT: payment in lieu of taxes
PUMS-L: Public Use Microdata Sample-L
RCA: Rural Community Assistance (program of the USDA Forest Service)
RC&D: Resource Conservation and Development
ROS: Recreation Opportunity Spectrum
RPA: Renewable Resources Planning Act
RVD: recreation visitor day
SCORP: Statewide Comprehensive Outdoor Recreation Plan

SEELA: Social, Economic, Environmental, Leisure, and Attitudes (data set)
SIC: Standard Industrial Classification
SRTS: Subregional Timber Supply model
TIO: total industrial output
tpd: tons per day
U.S. ACE: U.S. Army Corps of Engineers
USDA: United States Department of Agriculture
USDA FS: USDA Forest Service
USDI: United States Department of the Interior
USDI BM: USDI Bureau of Mines
USDI FWS: USDI Fish and Wildlife Service
USDI GS: USDI Geological Survey
USDI NPS: USDI National Park Service
USDL: United States Department of Labor
U.S. OMB: U. S. Office of Management and Budget
WPA: Works Progress Administration

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This publication provides information about the social and economic conditions in and near the national forests in the Ozark-Ouachita Highlands: the Mark Twain in Missouri, the Ouachita in Arkansas and Oklahoma, and the Ozark-St. Francis National Forests in Arkansas. This report includes an archeological and historical background, describes demographic conditions and trends and communities, provides an economic profile, discusses recreation, timber, minerals, range, and other important resources in the Highlands, and examines attitudes, values, and public opinions about natural resources.

Keywords: Archeology, communities, mineral resources, population trends, public opinions, recreation, timber resources.



The Forest Service, U.S. Department of Agriculture, provides leadership in the management, protection, and use of the Nation's forests and rangelands. The Agency takes an ecological approach to the implementation of multiple-use management, providing sustained yields of renewable resources such as water, forage, wildlife, wood, and recreation. The Forest Service has embraced ecosystem management as its operating philosophy and is committed to the preservation of wilderness, biodiversity, and landscape beauty as well as the protection of the basic resources of soil, water, and air quality.

The Forest Service is responsible for the 191.8-million-acre National Forest System, with its 155 national forests and 20 grasslands in 44 States, Puerto Rico, and the Virgin Islands. In addition, the Agency works with State land management organizations to help private landowners apply good natural resource management practices on their lands. The International Program of the Forest Service enables the Agency to share its technical expertise and managerial skills with other nations. The Research and Development Program of the Forest Service conducts extensive research to enhance and protect productivity on all of America's forests and rangelands, with special attention to long-term natural resource issues of national and international scope.

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This report is one of five that documents the results of the Ozark-Ouachita Highlands Assessment. Three of the remaining reports examine *Air Quality*, *Aquatic Conditions*, and *Terrestrial Vegetation and Wildlife*, respectively, and the fourth provides an overall summary.

