

What are the supplies of and demands for forest-based recreation and other noncommodity uses of forests in the South?

Chapter 11: Forest-Based Outdoor Recreation

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Key Findings

- At the top of the list of recreation activities in which southerners participate are walking for pleasure, attending family gatherings, visiting nature centers, sightseeing, driving for pleasure, picnicking, viewing or photographing natural scenery, and visiting historic sites. Very far down the list are high-technology, high-skill activities such as rock climbing and whitewater kayaking that often occupy much of the attention of forest recreation managers.
- Participation in most outdoor recreation activities has been growing steadily over the last few years. Of forest-based activities, viewing and photographing fish, wildlife, birds, wildflowers, and native trees are among the fastest growing in the South. Other fast-growing activities include jet skiing, kayaking, day hiking, and backpacking.
- To southerners, outdoor recreation is a highly important part of their lifestyles. But because of climate and type of forest setting, the abundance of forests in the South, in comparison with other less forested regions of the country, does not result in higher per capita forest recreation participation.
- Thirty-one percent of residents of the South participate in gathering a wide variety of natural products, including nontimber forest products (NTFP). Most do so noncommercially. Sustaining availability of some NTFP resources will depend in large part on institutional capacities for education, monitoring, incentives, land management, and other conservation actions.
- Numerous recreation opportunities of many types are available across the South. They are found in a wide variety of settings, ranging from large tracts of undeveloped land to highly developed theme parks in largely urban settings, both in public and private ownerships.
- Of public ownerships, Federal tracts typically are large and mostly undeveloped. They fill a niche of providing back-country recreation. State parks and forests are usually smaller and more developed. They provide camping, picnicking, swimming, fishing, nature interpretation, and scenery.
- The outdoor recreation supply potentials of public land will depend on policy evolution. On southern national forests, greater protection of roadless lands is likely, while at the same time recreation is increasingly finding its way to the tops of the priority lists of national forest managers. These trends are not as yet linked, but they should be by explicit policies. National parks will serve a different supply role because they are managed first to protect park resources, and secondly for public enjoyment. On U.S. Fish and Wildlife Service refuges, recreation is viewed as an incidental or secondary use and is not allowed unless it is directly related to a refuge's primary purpose.
- While continuing to grow, adjust, and adapt, State government land systems, especially State parks, have reached a point of seeming maturity as a recreation resource, except for expansion of high-end resort developments which provide better sources of revenue.
- Recreation access to private land is increasingly limited to the owners themselves, their families or friends, and lessees. The number of southern private owners allowing the public to recreate on their land has been decreasing.
- Accommodating future public recreation demand increases will likely fall mostly to public providers, most of which will continue to face significant budget and capacity constraints. Some of this pressure would be reduced if private owners, the primary group of forest owners in the region, were willing to open more of their vast forested land holdings to public recreation. Current trends are not promising, however. Increasing demands for off-road vehicle use, hunting, fishing, and other of the more consumptive recreational activities are likely to bring about more conflicts between recreation participants and landowners.
- As forest recreation demands grow, recreation activities are likely to conflict more with each other, especially on trails, in back country, at developed sites, on flat water (large rivers and lakes), in streams and whitewater, and on roads and their nearby environs. Typically a greater degree of conflict is perceived by one group of recreation users (usually traditional and nonmotorized users) than is perceived by other groups (usually nontraditional and mechanized/motorized users).
- Depending on the characteristics of recreation use, the forest site, and site management, recreation can have a variety of impacts on soil, water, vegetation, and animal life. Almost

all types of recreation activity have impacts, but this is especially so for motorized uses.

■ Forested areas in the South with heavy recreation pressures include the coastal Carolinas; coastal Florida; coastal Alabama, Mississippi, and Louisiana; the “Piedmont Crescent”; south-central Mississippi; the Ozark and Ouachita Mountains; and northeastern West Virginia.

Introduction

This chapter overviews demands for and supplies of recreation and other nontimber uses of southern forests. We express demand in terms of the numbers of people who pursue various activities, including gathering NTFPs. In describing supply, we distinguish between public forests owned collectively by citizens and managed by government agencies at Federal, State, and local levels, and private forests owned by corporations or by individuals.

People are accustomed to paying little or nothing for recreation and other nontimber uses of the South's forests. At most, they may pay a small fee for an activity like camping. Typically, people pay nothing for the scenery or wildlife that makes camping, or any other activity, meaningful for them. But just because recreation activities for the most part are free does not mean they have no value. People often travel hundreds of miles to camp in just the right setting. And a birdwatcher may get inestimable joy from seeing a new species or from seeing a familiar species doing something unusual. Many, and possibly most, people would argue that recreation and other nontimber uses are the most important and highest valued uses of forests. The value of these uses is evident in the high demands for recreation opportunities in the region. As we report in this chapter, some of these demands are growing very rapidly.

In addition to addressing the general question of demand and supply, this chapter also addresses some specific questions raised during early public meetings where the Southern Forest Resources Assessment was described and discussed.

Methods

For the most part, estimates of demand and supply were obtained from published results of previous studies by the authors. These studies, or other sources used, are cited where that information is presented. In a few cases, special studies were necessary to answer some specific questions. The methods for these special studies are briefly described where their results are presented.

Results

Demand

Participation in outdoor recreation activities in the South and other regions of the country has been growing steadily over the last few years. Among the fastest growing activities are viewing and photographing nature, including fish, wildlife, flowers, and plant life (table 11.1). Number of people viewing and photographing fish almost doubled between 1995 and 2000. Gathering various forest products, such as berries, mushrooms, and herbs, also seems to be growing rapidly based on observed increases in visitation by forest managers. Various forms of boating such as kayaking and motorboating are also becoming increasingly popular.

Other activities growing almost as fast as boating activities include hiking, backpacking, bicycling, horseback riding, coldwater fishing, walking, and visiting nature centers. In addition to coldwater fishing, various other forms of fishing are growing in popularity, including warmwater fishing in lakes and lowland rivers. Further down the list, even camping and off-road driving are growing faster than the rate of population growth in the South. Hunting also is rising, but not nearly as rapidly as the activities already mentioned. Slower growing activities include motorboating, sightseeing, and waterskiing.

Across the Nation and the South, viewing, learning, and photographing activities have been adding enthusiasts the most rapidly. This fast growth in interest in viewing-learning activities and in demand for other activities brings both good and not so good tidings about the supply of recreation

opportunities, as we discuss later in this chapter.

Topping the list of recreation activities in which southerners participate are walking for pleasure, attending family gatherings, visiting nature centers, sightseeing, driving for pleasure, picnicking, viewing or photographing natural scenery, and visiting historic sites (table 11.2). All these are traditional activities that require little specialized skill, equipment, or financial outlay, and their persistent growth has shown no signs of subsiding. Next in popularity are a series of viewing and photographing activities, fishing, gathering NTFPs, hiking, visiting wilderness, boating, and biking. Of these top 20 activities, only 2, fishing and gathering, consume forest resources, and only 2 are motorized. None of the activities listed below the top 20 are participated in by more than 20 percent of the South's population. Activities become increasingly specialized and expensive as one moves toward the bottom of the list.

The relative popularity of activities is approximately the same in the South as in the United States as a whole. However, across almost all activities, participation percentages for the South are lower than nationally. The principal exceptions are the water-based activities. Nevertheless, the percentages in column 2 of table 11.2 represent very large numbers of people seeking outdoor recreation opportunities in the South.

Demands for NTFPs

In early public meetings where this Assessment was discussed, requests were made for information about NTFPs. Research on such products and the effects of harvesting them from forests is in its infancy. The information presented here is from two sources: (1) the National Survey on Recreation and the Environment (NSRE) (Cordell, in press) and (2) published literature about individual products. Very little quantitative information is presented about the products because very little information is available.

The gatherers—The question asked in the NSRE survey was, “During the past 12 months, did you gather mushrooms, berries, firewood, or other natural products?” In the South, 31 percent of respondents reported

Table 11.1—Percent of the population participating, number of participants in outdoor activities, and percent change from 1995 to 2000, Southern Region

Activity	1995 participation	Number of participants 1995	2000 participation	Number of participants 2000	Change in number of participants 1995-2000
	Percent	1,000s	Percent	1,000s	Percent
Viewing or photographing fish	13.8	8,809.8	25.4	17,441.4	98.0
Jet skiing	5.7	3,638.8	10.4	7,141.4	96.3
Kayaking	1.1	702.2	1.9	1,304.7	85.8
Viewing or photographing wildlife	28.6	18,258.0	43.2	29,664.1	62.5
Day hiking	18.1	11,554.9	26.9	18,471.4	59.9
Backpacking	5.8	3,702.7	8.2	5,630.7	52.1
Bicycling	24.4	15,576.7	34.0	23,346.8	49.9
Horseback riding	7.5	4,787.9	10.3	7,072.7	47.7
Coldwater fishing	7.4	4,724.1	10.1	6,935.4	46.8
Walking for pleasure	64.2	40,984.6	82.0	56,306.9	37.4
Visiting nature centers, etc.	42.8	27,323.1	53.4	36,668.2	34.2
Freshwater fishing	26.7	17,045.0	33.2	22,797.4	33.7
Developed camping	17.2	10,980.3	21.3	14,626.1	33.2
Driving off-road	14.5	9,256.7	17.7	12,154.1	31.3
Visiting prehistoric sites	16.1	10,278.1	19.6	13,458.7	30.9
Family gathering	59.5	37,984.2	72.1	49,508.9	30.3
Viewing or photographing birds	26.3	16,789.7	31.4	21,561.4	28.4
Big game hunting	7.8	4,979.4	9.3	6,386.0	28.2
Warmwater fishing	24.9	15,895.9	28.7	19,707.4	24.0
Rafting	7.9	5,043.3	9.1	6,248.7	23.9
Swimming in lakes, rivers, ocean	27.4	23,875.8	42.4	29,114.8	21.9
Picnicking	44.0	28,089.2	49.6	34,058.8	21.3
Canoeing	6.7	4,277.2	7.5	5,150.0	20.4
Migratory bird hunting	2.5	1,596.0	2.7	1,854.0	16.2
Small game hunting	7.8	4,979.4	8.4	5,768.0	15.8
Sailing	3.7	2,362.0	3.9	2,678.0	13.4
Saltwater fishing	13.4	8,554.4	14.1	9,682.0	13.2
Primitive camping	12.8	8,171.4	13.1	8,995.4	10.1
Visiting historic sites	43.2	27,578.4	43.7	30,007.5	8.8
Motorboating	24.9	15,895.9	24.9	17,098.1	7.6
Rowing	3.0	1,915.2	3.0	2,060.0	7.6
Sightseeing	54.4	34,728.4	52.9	36,324.8	4.6
Waterskiing	9.7	6,192.4	8.6	5,905.4	(4.6)

Source: 1995 and 2000 National Survey on Recreation and the Environment (NSRE), USDA Forest Service, Athens, GA.

participating in natural products gathering. Of these, 54 percent did their gathering in a forest setting thus making the products they gathered NTFPs. Over 96 percent did their gathering for personal use; only 2 percent did it for income. Nine percent of gatherers collected mushrooms, 47 percent picked berries, 73 percent collected firewood, 35 percent collected rocks and minerals, 43 percent gathered tree materials, and 43 percent collected herbs and flowers. Among the many miscellaneous things gathered were insects, feathers, walnuts, arrowheads, gold, moss, pine needles, Spanish moss, water, wild honey, and seashells. Twenty-nine percent of those

participating gathered on 3 or fewer days during the last 12 months; 34 percent gathered on 4 to 10 days; and about 11 percent gathered on 30 or more days.

Forty-two percent of those gathering natural products were male, 58 percent were female. Thirty percent were under age 35; 20 percent were 55 years or older. Eighty-six percent were white, 9 percent were black, 3 percent were Hispanic, 2 percent were American Indian, and the remaining, less than 1 percent, were Asian Americans. By income, the largest group (36 percent of gatherers) earned between \$25,000 and \$50,000 per year. The next largest

group earned between \$50,000 and \$75,000 (about 17 percent). Those earning less than \$15,000 per year made up just over 1 percent of all gatherers in the South, indicating that subsistence is not likely a motivating factor for most forest gathering. Forty-one percent of gatherers live in rural areas and 59 percent in urban areas. These percents differ greatly from the 80 to 20 percent split between urban and rural residence of people in the South. Almost 12 percent of gatherers had less than a high school education, and 59 percent had some college, including many who had earned their doctorate.

Table 11.2—Percentages of the population participating in recreational activities in the South and Nation in 2001

Activity	South	United States
Walk for pleasure	83.08	84.85
Family gathering	71.91	73.85
Visit nature centers	53.69	59.27
Sightseeing	53.04	53.98
Driving for pleasure	52.77	53.66
Picnicking	49.73	57.34
View/photograph natural scenery	46.56	55.09
Visit historic sites	43.83	48.71
Swimming in lakes and streams	42.35	44.38
View/photograph wildlife	36.83	41.05
View/photograph flowers, etc.	36.68	41.19
Visit the beach	36.45	39.96
Bicycling	35.03	41.63
Gather mushrooms, berries, etc.	31.19	27.97
Visit a wilderness	31.11	35.45
Warmwater fishing	28.45	20.17
View or photograph birds	27.47	30.07
Day hiking	27.43	36.48
Visit a waterside besides the beach	27.07	27.09
Motorboating	24.86	23.90
View or photograph fish	21.39	21.68
Outdoor team sports	21.33	22.51
Developed camping	20.70	26.83
Visit prehistoric sites	19.53	21.30
Drive off-road	17.81	17.01
Mountain biking	16.15	23.39
Saltwater fishing	13.82	7.90
Primitive camping	13.05	16.18
Hunting	12.77	10.54
Horseback riding on trails	10.59	9.99
Coldwater fishing	10.37	14.37
Jet skiing	10.03	8.85
Rafting	9.16	9.95
Horseback riding on trails	8.87	8.09
Waterskiing	8.72	7.92
Backpacking	8.61	12.15
Canoeing	7.51	10.23
Snorkeling	6.13	6.95
Downhill skiing	4.37	10.26
Sailing	3.99	5.43
Rowing	3.31	4.99
Anadromous fishing	3.16	4.83
Migratory bird hunting	2.73	2.21
Scuba diving	2.14	1.77
Snowboarding	2.02	5.83
Kayaking	1.82	3.51
Surfing	1.48	1.52
Snowmobiling	1.36	7.06
Cross-country skiing	1.22	5.03
Windsurfing	.75	.85

Source: National Survey on Recreation and the Environment, USDA Forest Service, Athens, GA.

By State, percentages of residents who participated in gathering varied quite a bit. Alphabetically, percentages of State residents 16 years or older participating were: Alabama (31), Arkansas (22), Florida (24), Georgia (29), Kentucky (39), Louisiana (30), Mississippi (29), North Carolina (34), Oklahoma (34), South Carolina (27), Tennessee (40), Texas (29), and Virginia (44). By State, percentages whose participation was mainly in forests were: Alabama (63), Arkansas (69), Florida (56), Georgia (66), Kentucky (51), Louisiana (41), Mississippi (52), North Carolina (70), Oklahoma (41), South Carolina (43), Tennessee (55), Texas (39), and Virginia (59).

The products—Even though little quantitative data are available, it is obvious that gathering NTFPs is an important use of the South's forests. Such products are gathered for both personal and commercial uses. Because so little data are available on most nontimber products, this section focuses on two of the better known products, herbs and mushrooms.

■ **Herbs:** A number of herbs and other plants are gathered for personal use or sale. Some examples of plants reported to have medicinal properties are *Aloe barbadensis*, chamomile (*Matricaria recutita*), *Echinacea pallida*, American ginseng (*Panax quinquefolium*), and *Ginkgo biloba*. It has been estimated that herbal supplement sales in retail outlets in the United States in 1997 totaled \$441 million (Blumenthal and others 1998). A national survey of alternative therapies published in Journal of the American Medical Association (JAMA) found that expenditures for alternative therapies increased by 45 percent between 1990 and 1997, to \$27 billion in 1997. The kind of alternative therapies increasing most were herbal treatments (Eisenberg and others 1998).

■ **Mushrooms:** In this chapter we present information on the most important mushrooms collected. Most of the information about wild mushrooms was obtained from personal communication with Professor Orson K. Miller, Jr., a noted authority on southern mushrooms (Miller 1979), who provided a list of southern mushrooms favored by collectors. Wild mushrooms are described in "Edible Mushrooms of North

America” (Fischer and Bessette 1992), “Mushrooms of the Great Smokies” (Hesler 1960), and “Texas Mushrooms” (Metzler and Metzler 1992).

The more prominent of edible wild mushrooms of the South include *Russula aeruginea*, which is a green-capped, distinctively colored mushroom with white gills that grows in hardwood forests. A close “cousin” is *Russula virescens*, another green-capped mushroom, similar to *R. aeruginea*, except that at maturity the cap shows cracks. *Lactarius volemus* is a reddish brown mushroom capped with whitish gills that is 2 to 5 inches wide. These mushrooms are considered choice edible wild mushrooms. Other favored mushrooms include the *Cratarellus cornucopiodes/fallax*, commonly known as the Black Trumpet or Horn of Plenty. They are 2 to 5 inches across, trumpet shaped, and range from grayish to dark brown. They are highly valued for cooking. *Hydnum repandum* is commonly known as Sweet Tooth. It has a pale to rich orange cap and stalk, with pointed spines beneath the cap. Other wild mushrooms are collected, but these are among the main ones.

In addition to growing wild, a number of mushrooms are cultivated. Though cultivated, however, they are important as forest products, because most must be cultivated under forest cover. Others are cultivated in cut-log production systems. Shiitake, for example, are cultivated on dead hardwood trees in warm, moist environments. Much of North Carolina has been identified as ideal for shiitake production. In addition to shiitake, consumption of other specialty forest-grown mushrooms (including morels, oyster, and boletus) has been increasing for over a decade.

■ **Other NTFPs:** In addition to herbs and mushrooms, a wide variety of plants and parts of plants are harvested from within and on the edges of natural and disturbed forests (Chamberlain 1998). Leaves, twigs, vines, ferns, cones, fruits, bark, foliage, sap, firewood, poles, and boughs are collected. Edibles from forests include syrups, nuts, ramps, wild berries, and persimmons (Grafton 2000). Nonedibles include charcoal, chips, shavings, sawdust, and pine straw. Generally, too little information on these and other commercial and personal products exists to fully assess

their supply and demand. But it is clear from the number of pamphlets, Web sites, and other emerging media that gathering, using, and selling NTFPs is rising across the South.

Several national organizations have been established to help maintain wild plant diversity, encourage understanding of threatened and endangered plant species, organize responsible wildcrafting, advance the interests of the herbal industry, and organize intergovernmental cooperation in managing land where nontimber products are gathered. Government agencies have highly significant roles in protecting vegetation and animals used as NTFPs. Each major public land agency (the Forest Service, National Park Service, and Fish and Wildlife Service) has or is currently developing a forest product-related policy. A joint Federal coalition for the management of wild plants has been developed to address issues related to overharvesting of wild medicinal plants on public and private land (<http://www.nps.gov/plants/medicinal/>). Recognizing that commercial demands may cause overharvesting in the wild, the Medicinal Plant Working Group, which includes representatives from industry, government, academia, tribes, and environmental organizations, aims to create a framework for discussion and action on behalf of conservation of medicinal plants.

Inventory of Outdoor Recreation Opportunities

Recreation opportunities of many types are available across the rural South and found across a variety of settings. Settings range from large tracts of undeveloped land to highly developed theme parks in urban settings. Our inventory was limited to rural settings to be consistent with the overall scope of this Southern Forest Resources Assessment. The source of data is the National Outdoor Recreation Supply Information System (Betz and others 1999). Because most of the data in this system are from secondary sources, it is not possible to separate forest from nonforest settings. The prevalence of forests on undeveloped land in the rural South, however, suggests that most of the opportunities reported here are, in fact, in forest settings.

Federal properties—There are an estimated 29.8 million acres of Federal land in the South, 4.6 percent of the Nation’s total Federal land. This total includes 12.9 million acres in national forests, 5.4 million acres in national parks, 3.8 million acres in wildlife refuges, 0.8 million acres in Bureau of Land Management properties, 5.6 million acres in Army Corps of Engineers projects, 1.0 million acres in Tennessee Valley Authority projects, and 0.2 million acres in Bureau of Reclamation projects.

Federal water resources—Water resources in forest settings are a very significant component of recreation opportunities. Under Federal jurisdiction, many of these water resources are available as recreation opportunities. The U.S. Army Corps of Engineers manages over 2.6 million acres of water area in the region, most of it in reservoirs along river systems. To access these water areas, there are almost 1,400 boat ramps and 423 swimming areas. The National Park Service manages 234,000 acres of national rivers, 435,000 acres of national seashores and lakeshores, and 183 sites for swimming and boating. The Tennessee Valley Authority manages 18 reservoirs along the Tennessee River and a few of its tributaries. These reservoirs are highly significant as boating and other recreation activity destinations, including resorts. The Bureau of Reclamation manages 94,000 acres of water in the South, to which there is limited boating access. The USDA Forest Service manages over 260 boating sites and almost 100 swimming sites. The U.S. Fish and Wildlife Service manages 84 refuges that have boating access. Fishing is permitted in 83 of these refuges. Together these Federal water resources are highly important for outdoor recreation, and increasingly they are under pressures for use by different recreational interests.

The National Wilderness Preservation System—This system was established by Federal law in 1964. Managed in the South by the Forest Service, National Park Service, and Fish and Wildlife Service, over 2.6 million acres of Federal wildland in this region have been designated for this system. Just under 2.4 percent of our country’s total land area is in designated protected wilderness. Six of the country’s 50 States have no designated

wilderness, but all of the Southern States do.

National recreation trails—

This system includes highly scenic or otherwise recreationally significant trails. The South has almost 2,500 miles of national trails. Of these, 1,479 miles are on Federal land, over 400 are on State land, 279 are on local government land, and over 300 miles are on other land such as that of corporations and foundations.

Public campgrounds—Federal, State, and local governments operate 1,064 public campgrounds in the South. This number represents an increase from the 993 that existed in 1987. In these campgrounds are almost 90,000 individual campsites.

State land—Southern States provide 1.7 million acres for recreation in their State park systems and 3.6 million in their State forest systems. In State park systems are 858,600 acres in designated parks, 106,500 acres in recreation areas, 622,900 acres in natural areas, 29,100 acres in historic areas, 4,700 acres in environmental education areas, and 53,500 acres in miscellaneous other areas. The State park systems have an estimated 36,000 campsites, 2,562 cabins or cottages, 2,681 lodge rooms, 54 golf courses, 128 swimming pools, and 23 stables.

State scenic rivers—Thirty-two of the 50 State governments have river protection systems similar to the National Wild and Scenic River System. The South has 99 protected river segments with a total of nearly 2,500 miles of protected river settings. Louisiana has the largest of the region's State river protection programs.

Local government recreation supply—Data are less available for describing the role of local governments (county and municipal) in providing outdoor recreation opportunities, and the sources do not distinguish between urban and rural locations. The South has 896 municipal recreation departments, 416 county, 9 special district, and 40 miscellaneous others. These departments range in size from 1 part-time professional to over 50 full-time professionals, depending on size of population and service area. Opportunities are provided for picnicking, boating, fishing, hunting, swimming, biking, hiking, and nature study. A highly significant local role,

in cooperation with Federal and State agencies, is the Rails-to-Trails program. With this program, abandoned rail corridors are converted to trail recreation uses. In the South in 1997, this program provided 101 trails with a total length of 669 miles. In addition, 241 new projects were underway that would add 3,560 miles of trails for nonmotorized uses.

Private forest land—In the South, almost 5 million private owners control nearly 190 million forested acres. The region has almost half of all the private forest land in the Nation. Fifty-five percent of the private land is owned by individuals. Only about 7 percent of this individually owned forest land (just over 13 million acres) is open for public recreation by people not connected in some way with the owner.

The Nature Conservancy—This private organization manages about 273,000 acres of natural land in the South. Of that total, about 102,000 acres are open for public recreation. The South has less Nature Conservancy land area than any other region of the United States.

Private campgrounds—About 1,850 privately owned and operated campgrounds are in the South. This total represents a decrease from 2,114 in 1987. These campgrounds have nearly 234,000 individual campsites—about 2 times the number of public campsites. Not only in the region, but also nationally, the number of private campgrounds and campsites decreased throughout the 1990s.

Private recreation businesses—The private sector provides recreation opportunities in a wide variety of ways. Except for campgrounds and day camps, the number of enterprises involved has grown over the last 15 years. For example, the number of guide and outfitter services has gone from just under 100 to over 350 in the South. Private enterprises make enormous contributions, especially as partners in providing facilities and services generally outside the mandates and authorities of government.

Potentials for Developing New Sources of Recreation Supply

The 2000 Renewable Resources Assessment of Outdoor Recreation and Wilderness (Cordell 1999)

and public agency Web sites were the principal sources of information used to address this topic.

It seems clear that a great deal of forest land is suitable for uses that would expand the supply of recreation opportunities. Forests provide the natural settings sought by people for most land-based activities. The probability that a given piece of land will be used to expand supply, however, depends heavily on who owns it. Individual private owners may spend considerable sums to purchase and make a tract of rural land suitable for their own recreation, but they are not likely to spend much for the benefit of others. On public land, the prospects for expanding recreation opportunities depend on the mandates and policies of the managing agencies.

National forests—National forests in the South are significant contributors of forest recreation, but only in areas where national forests exist. Management has given greater emphasis to providing recreation opportunities over the last decade. The Secretary of Agriculture under the Clinton Administration announced a proposed plan for protecting nearly 60 million acres of roadless areas in national forests across the country, including nearly a half million acres in the South. Early in January 2001, President Clinton made perpetual protection of these roadless acres official policy of the Forest Service. Depending on how this decision is administered through the Bush Administration, this policy would:

- Eliminate most road construction and reconstruction on 445,000 acres of inventoried roadless areas on southern national forests.
- Limit timber harvesting to that needed for meeting defined stewardship objectives in roadless areas.
- Allow road construction only when necessary for public safety and resource protection.

Recreation is increasingly finding its way to the top of the priority lists for management of national forests. The Agency's National Recreation Strategy, approved by the Clinton Administration and applying to the entire Nation, is designed to:

- Assure sound stewardship of forest resources by making sure recreation activities are compatible with targets for sustaining ecosystem health.

- Provide safe, natural, well-designed, and well-maintained recreation opportunities for visitors.

- Provide opportunities for the public to learn about the values of conservation, land stewardship, and responsible recreation.

The Forest Service recognizes that maintaining high-quality landscape settings in the South is essential to providing high-quality recreation opportunities. The priorities for managing settings in the South, as well as across the Nation, as described in the national strategy, include:

- Identifying attributes of natural, social, and built environments essential for ecological sustainability and recreation opportunities. Recreation activities will be managed within the range of natural variability in ecosystem composition, structure, and function.

- Investing in some facilities and removing others. There is a standing need on national forests to upgrade facilities to meet health, sanitation, and accessibility standards, as well to remove buildings and infrastructure no longer needed.

- Emphasizing high-quality motorized opportunities and experiences, but managing motorized uses to maintain acceptable and balanced environmental impacts on trails and open forest areas.

- Reducing criminal activity and enforcing compliance with laws and regulations to protect forest settings.

- Working with local governments and private landowners to assure public rights-of-way onto national forests. As a part of this strategy, universal accessibility will become increasingly important (U.S. Department of Agriculture Forest Service 2000).

National parks—The National Park Service encourages recreation activities that (1) are consistent with its applicable legislation, (2) promote visitor enjoyment of parks, (3) are consistent with the protection of natural areas, and (4) are compatible with other park uses. Recreation activities that are usually allowed include boating, camping, bicycling, fishing, hiking, horseback riding, outdoor sports, picnicking, scuba diving, cross-country skiing, caving, mountain and

rock climbing, and swimming. Aircraft use, off-road bicycling, hang-gliding, hunting, off-road vehicle use, and snowmobiling are covered by special regulations. The National Park Service manages recreation activities and southern park settings to protect park resources first, and then to provide for public enjoyment. Each park develops and implements visitor use management plans. Visitor use management plans contain specific, measurable management and resource protection objectives related to the activity or activities being addressed.

Unless mandated by statute, the National Park Service will not allow an activity if it would be inconsistent with the park's enabling legislation, nor if it would erode the values of or purposes for which the park was established. Unacceptable are activities that interfere with other visitor activities, consume park resources, impact natural processes, or endanger the welfare or safety of visitors.

Wildlife refuges—As in national parks, public recreation in fish and wildlife conservation areas must be compatible with refuge conservation purposes, and with any other primary objectives established by law or policy. Conservation areas include the National Wildlife Refuge System, national fish hatcheries, and other areas administered for fish and wildlife. Recreation is viewed as an incidental or secondary use of refuges. None of the refuges, hatcheries, game ranges, or other conservation areas allow forms of recreation not directly related to the primary purposes and functions of these areas.

The Division of Refuge Planning facilitates comprehensive planning on refuges. In this planning, the impacts of recreation visits are considered. Planning contributes to informed decisionmaking that recognizes the needs and interests of all parties, while keeping in sight the primary mission of the National Wildlife Refuge System.

Supply on State land—The South's State land has been an important source of outdoor opportunities for a long time, and it continues to be a highly important source. While never ceasing to grow, adjust, and adapt as times and demands change, State land systems, especially State parks, have seemed to reach a point of maturity (Landrum

1999). Little further expansion of park acreage is anticipated. What is expected is continued development of new facilities, especially the more upscale types, using more private than State capital, in order to draw visitors from greater distances and generate greater park revenues. Unlike Federal systems, States seem highly motivated to increase their in-State and out-of-State client base.

The greatest uncertainty facing State systems in the foreseeable future is unstable funding. Most seem likely to be required to generate an ever larger share of their operating budget through revenue-producing facilities, services, and programs. It is expected that State park systems especially will employ innovative measures to obtain sufficient funding to maintain or expand their operations. The challenge remains, however, for States to manage their land in ways that will maintain the quality of the outdoor recreation settings they offer, even as they plan to meet demands for fast-growing new activities.

Trail programs are highly significant in the makeup of most State programs. But managing State trail systems comes with a number of challenges. When asked in the National Survey of State Trail Administrators (Moore 1994), "What are the most significant roadblocks to getting and keeping trails on the ground in your State?" over one-fourth of the responding State officials identified funding as number one. Various threats to trails and connecting lands made up the next largest group of responses. Many trail administrators also reported that there was a major problem with lack of awareness of the value of trails and too little demonstrated support for trails by the public, by legislatures, and by State government in general.

When asked to identify the most pressing issues currently facing trails in their States, the most frequent responses related to specific threats to continued existence of trails and trail land. Many of these concerns involved landowner opposition to land development, obliteration of existing trails, and losses of potential trail locations to land use changes. Lack of funding and concerns about trail conflicts and other issues related to multiple use were the next most pressing issues identified. Ability

to provide trails close to where people live is also a serious issue for trail administrators. Across the South, State agencies can play a critical role in trail supply by conducting and maintaining an inventory of the number, length, and condition of trails so that trends and problems can be identified and addressed.

Supply on private land—Privately owned land dominates southern forests. Corporate private owners typically provide recreation access by leasing their land to clubs, counties, or others. Individual owners usually have little to none of their land open, either through lease or other means (Teasley and others 1999). The number of southern owners allowing the public to recreate on their land has been decreasing (Cordell and others 1999). It appears that less land will be open to public recreation in the future (table 11.3).

Without some intervention, then, it appears that the amount of private land available for public recreation will decline. There may be opportunities to change that trend, however. Many owners are highly interested in improving the natural conditions of their land. One motivation might be collaborative stewardship with interested potential users. Four of the nine fastest growing recreation activities involve viewing and learning. Partnerships seem possible between owners and those interested in having opportunities to see, study, and

photograph wildlife, wildflowers, birds, and other natural attributes of forests. In exchange for such use, owners might be helped to achieve their goal of improving the natural conditions of their land. Planting food species for wildlife, improving and protecting habitat, and monitoring users and mitigating their impacts may open a vast opportunity for owners and interested users alike.

Public land will likely offer better opportunities for new supply, but only to a limited extent. Lack of fiscal resources, movement toward low-impact uses, and a greater emphasis on ecosystem health on Federal land will bring more attention to the issue of visitor capacity than in the past. Increasing attention also may have to be directed at avoiding conflicts among uses.

Potential Conflicts Between Different Forms of Recreation

The sources of information on this subject were published articles and the experiences of the authors. These sources show that conflicts between different forms of recreation use have arisen with increasing frequency in recent years. The root cause for rising conflicts is simply the increase in demand for most outdoor recreation activities. Further complicating the effects of rising demand are changes in the way some activities are pursued. Technology-driven activities like off-road motorized vehicle driving, mountain biking, jet boating, hang gliding, and various forms of mechanical trail use are rising in popularity. Numbers of participants in activities like wildlife viewing, birdwatching, and nature photography also are growing very rapidly. The prospects for conflicts between nature watchers and people participating in technology-based activities are considerable. Land managers, therefore, are being forced to examine more closely the question of access and who gets what, when, and where. Early detection of user conflicts and effective conflict resolution depend on understanding where and how conflicts arise. Resolving a conflict in its initial stages before users ally themselves with larger, better organized interest groups helps to avoid costly political and legal actions.

At least two primary conceptual models help increase understanding of recreation conflict: the cognitive and the normative models. The cognitive model proposes that conflict occurs as a result of goal interference attributed to another's behavior (Gibbons and Ruddell 1995, Jacob and Schreyer 1980). Recreation goals are based on social (such as family affiliation), psychological (such as solitude), and physical (such as exercise) motives. When users with (1) high personal attachment to an activity, (2) high personal attachment to the resource, (3) specific and focused ways of experiencing the environment, and/or (4) low tolerance for other users encounter users with different beliefs and behaviors, there is ample potential for conflict (Jacob and Schreyer 1980).

The normative model assumes that conflict arises when users do not share the same norms or social values, independent of physical presence or actual contact between them (Vaske and others 1995, 2000). Norms are standards of acceptable and unacceptable behaviors for specific places. Examples are an acceptable number of rafters on a whitewater river or the appropriate level of human-induced noise at a campground. Unacceptable behavior may involve both users engaged in the same activity and users in different activities.

Of the two models of conflict, the cognitive approach has received more widespread acceptance. Studies support the role of at least one of the four factors of goal interference as influencing conflict (Gibbons and Ruddell 1995, Gramman and Ruddell 1989, Ivy and others 1992, Ramthun 1995). However, there is also support for the social values approach. Vaske and others (1995), for example, attribute conflict in hunting to differences in social values held by hunters and nonhunters.

Although most studies have been done in the parks and forests of the West, most of their findings can be generalized to the South. The bulk of these past studies suggests that recreation conflict is asymmetrical. That is, there is a tendency for one group (mostly traditional and nonmotorized users) to perceive more problems than the other group with whom they are in conflict. This other group, which typically holds

Table 11.3—Percent of owners indicating more, same, or less land open to recreation for nonfamily members by time period and region, 1995-96

Time period	South	Nation
	--- Percent ---	
Five years ago compared to now		
More	5.0	5.0
Same	86.1	88.2
Less	8.6	6.8
Five years hence compared to now		
More	4.2	3.0
Same	81.7	83.7
Less	14.1	13.3

Source: National Private Landowners Survey (NPLOS), Environmental Resource Assessment Group, Athens, GA.

an asymmetrical view of the level of conflict, is typically composed of nontraditional, mechanized, or motorized users. This finding of differential levels of perceived conflict holds for cross-country skiing versus snowmobiling in Minnesota (Knopp and Tyger 1973), for oar-powered versus motor-powered whitewater boating in the Grand Canyon (Shelby 1980), for anglers versus water-skiers on Midwest reservoirs (Gramman and Burdge 1981), for paddling canoeists versus motorboaters in the Boundary Waters canoe area (Adelman and others 1982), and for hikers versus mountain bikers in the Rattlesnake National Recreation Area (Watson and others 1991). Ramthun (1995) found that one-third of hikers on a trail near Salt Lake City, UT, sensed conflict with mountain bikers, while less than 6 percent of bikers perceived conflict. Gibbons and Ruddell (1995) found that helicopter skiers in the Wasatch National Forest in Utah reported no conflict, while nonmotorized back-country users reported high levels of conflict.

Two studies specific to the South help our understanding of recreation conflict. In a survey of winter visitors to Bird Island Basin in the Padre Island National Seashore in Texas, Ruddell and Gramman (1994) reported that noise-induced conflict (measured as sensitivity to loud radio playing) was a result of both goal interference and violation of norms. Visitors motivated by “being with people who were considerate of others” were more likely to perceive conflict than were visitors who were motivated by “being with friends and people like themselves.” In the second southern study, Ivy and others (1992) found support for asymmetrical conflict. Canoeists perceived more conflict than motorboaters in the backwater of the Everglades National Park in Florida.

Conflict resolution may involve both zoning and education. When the source of conflict is goal interference, it is more appropriate to consider zoning by time, space, or activity. Zoning can ensure that different types of users are physically separated. Zoning seems less effective when the conflict is attributable to differing social values, because such conflict does not necessarily require physical presence or actual contact between users. Off- and on-site education and

information campaigns can highlight rules and regulations, as well as acceptable behaviors, for engaging in various recreation activities. An education campaign for a ballot initiative for spring black bear hunting in Colorado demonstrated that education can reduce the potential for conflict (Manfredo and others 1995).

Settings where conflict is likely to occur include trails, back country, developed sites, rivers, lakes, streams, and roads. For each of these settings, we used the NSRE participation trends data to examine activities likely to be in conflict because of growth in numbers of participants (table 11.1). We looked at both numbers of people reporting participation in 2000 and at percent growth in numbers from 1995 to 2000 for each setting. Since some activities may occur in more than one setting, some are listed for more than one setting.

■ **Trails**—The trail activities with the greatest numbers of participants include walking, bicycling, and hiking. Increasing numbers of people participating in these activities on limited trail resources is likely to result in rising conflicts with horseback and off-road motor vehicle riders, who often use the same trails. Backpacking is a fast-rising trail activity, as is horseback riding. These two activities often can be in conflict. The rapid rise in number of day hikers, many of whom hike within the same large areas often used by backpackers, may result in greater perceived crowding by backpackers, who typically are seeking relative solitude.

■ **Back country**—Viewing and photographing wildlife, viewing and photographing birds, and day hiking are the most popular of activities that typically occur in back-country settings. For the most part, these are also among the fastest growing of outdoor activities. People who like to view and photograph nature often disapprove of hunting, so conflicts with hunters are likely. Hikers and viewers seeking solitude also are likely to perceive conflicts arising from motorized users.

■ **Developed sites**—A wide variety of activities occurs in or near developed sites, such as campgrounds and picnic areas. Family gatherings out of doors, walking, visiting nature

centers, and picnicking are among the most popular developed-site activities. At the same time, jet skiing is one of the fastest growing of outdoor activities, and it is often associated with developed sites. Noise and turbulence can cause conflicts with on-shore users of these developed sites. Conflicts involving developed sites, however, are likely to be fewer, and less contentious, than in many other settings because developed sites are designed to accommodate larger numbers and a wider variety of users at one time, and users expect to see other people.

■ **Streams and whitewater**—Water attracts a wide variety of visitors, including swimmers, viewers of fish, anglers, and users of muscle- and motor-powered watercraft. The possibilities of conflict are obvious. For the most part, all the uses just listed are incompatible with one another.

■ **Roads and their nearby environs**—Roads are the primary means of accessing forests for many forms of recreation. Future conflicts are most likely to be experienced through traffic problems, crowding of access areas, and incompatible uses.

From the standpoint of supply of recreation opportunities, one of the most difficult types of conflict is between users and owners of private tracts. These conflicts are a problem because they can lead to posting and a shrinking of supply. Most of the forested land in the South is privately owned, and most private forest tracts are owned by individuals and families. Results from the 1995 National Private Landowner Survey (Teasley and others 1999) tell of some of the possibilities for conflict.

About 59 percent of individual southern landowners have indicated that improving wildlife, water, aesthetics, and other natural components of their land are either a primary or secondary emphasis in their land management. Just over 7 percent emphasize making money from their land. Sometimes landowners encounter public use effects that can be incompatible with their land and conservation goals. The more prominent of these problems include dumping garbage, littering, illegal hunting and fishing, damage to fences and gates, damage to roads, disturbance

of wildlife, and careless shooting. About 41 percent of owners in the South post their land. The most common reasons for posting are to know who is on the property, to keep people out who do not have permission, to keep people out that the owner does not know, and to avoid property damage. Of owners who post, 81 percent anticipate posting the same acreage in the future, but an additional 16 percent anticipate posting more land.

Increasing demands for off-road vehicle use, hunting, fishing, and other of the more consumptive recreation activities are likely to bring about more conflicts between recreation participants and landowners in the future. In part as a response, many of the higher income residents of the South are purchasing their own land for personal recreation pursuits. Land purchased for the owner's personal recreation is less likely to be open to others for recreation. Conflicts are likely to continue to grow as a result of rising demands for access to private land, even though the owners have no obligation to provide public access.

Potential Adverse Impacts of Recreation Activities on Forested and Aquatic Ecosystems and Where They Are Located

Depending on the type and intensity of recreation use, the type and fragility of a forest site, and the type and level of site management, recreation in forested ecosystems impacts soil, water, vegetation, and animal life. To our knowledge, there is no comprehensive regionwide assessment of the impacts of recreation on forests. Such an undertaking would be enormously complicated and costly. There are only a few isolated studies of impacts, and these are primarily limited to trails, rivers, and campgrounds on public land. The most comprehensive treatment of recreation use found dealt with wildlife (Knight and Gutzwiller 1995). Nevertheless, recreation can significantly affect natural systems, such as forests, in the following ways:

■ **Soils**—Repeated foot, horse, motor vehicle, or other recreation traffic can compact many types of soil, especially those with high clay content

as is prominent in the Piedmont and mountain areas of the South. A heavy volume of traffic also can loosen topsoil and reduce vegetative cover, inviting erosion. Further, chemicals used in site management or by recreationists can change the chemical properties of soil.

■ **Water**—Surface water in streams and in impoundments, groundwater, and runoff from precipitation are all potentially impacted by recreation use and management. Chemicals, such as herbicides, used on or near shorelines or used directly in water to control aquatic vegetation will almost certainly alter the chemical and biological properties of water. Humans coming into contact with water can introduce high levels of bacteria. Recreation near or along shorelines also disturbs soils, diminishes the density and health of vegetation, and reduces populations of animals, especially amphibians and waterfowl. Heavy recreation traffic often causes high levels of sedimentation. Heavy traffic also can disrupt fish life patterns, including spawning. Overfishing interrupts balances among vertebrate and invertebrate species, both aquatic and terrestrial.

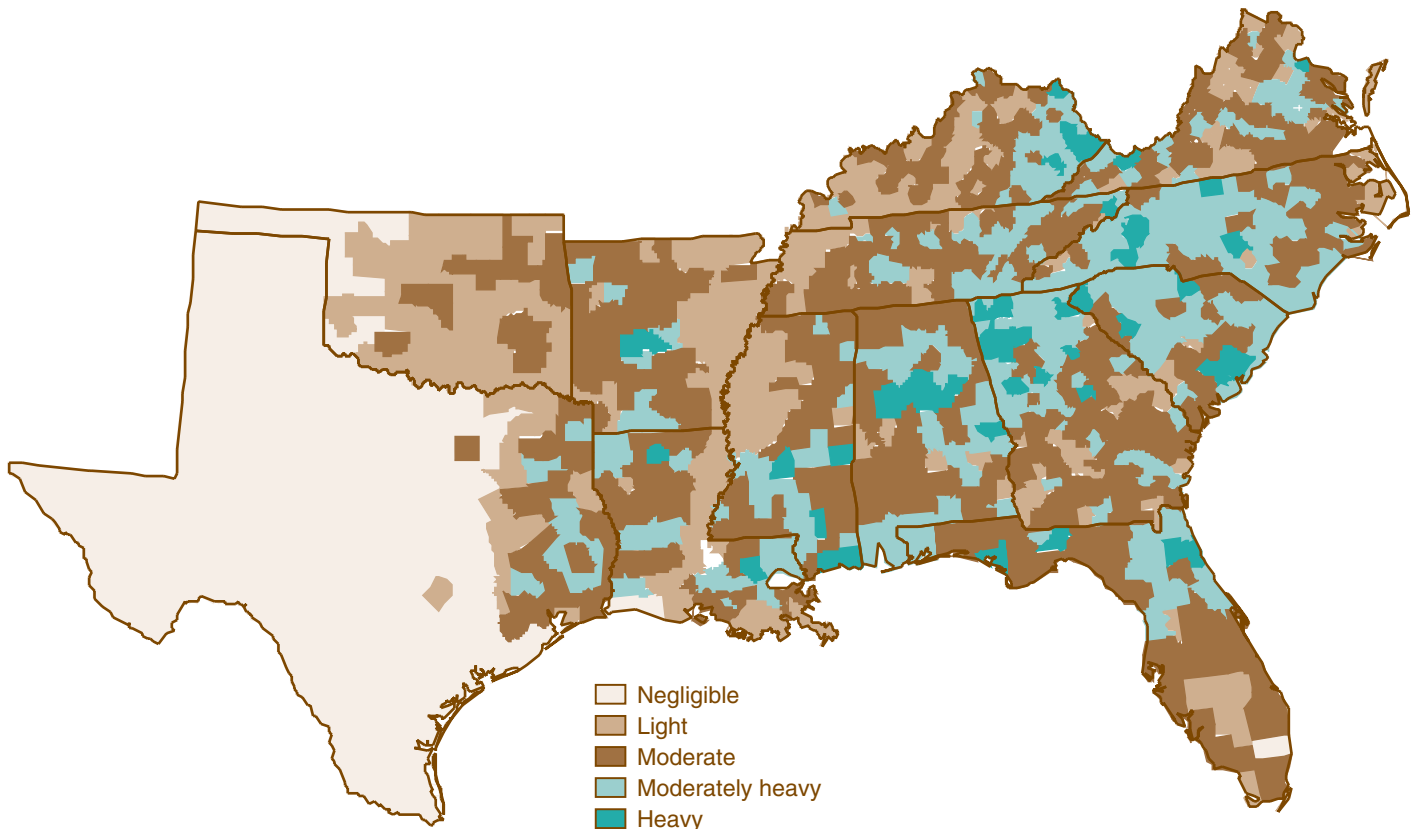


Figure 11.1—Hotspots of recreation demand pressure on forests, Southern States, 2000.

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■ **Vegetation**—Grasses, herbs, shrubs, trees, and aquatic vegetation all can be impacted by outdoor recreation. Recreation in developed sites mainly impacts the planted grasses, residual trees left for shade, and immediately surrounding woodlands. From a broad perspective, these impacts are relatively minor. There is also vegetative impact on and near trails caused by hiking, horseback riding, mountain biking, and motor vehicles. Crushing ground vegetation, breaking reachable herbal and woody vegetation, and exposure and damage to roots are the forms of damage usually encountered. Along roads, ground vegetation can be heavily impacted in unhardened areas by motor vehicles, and nearby sensitive plants can be impacted by exhaust emissions. Typically, vegetation along roads is not much impacted. Aquatic vegetation and vegetation along shorelines can be impacted by water disturbance and by wave action caused by boats. Persistent erosion and undercutting of shorelines is typical of Piedmont and mountain lakes. Native vegetation on a wide variety of settings can be cumulatively impacted by competition from exotic species planted or otherwise introduced as a part of recreation site management.

■ **Animal life**—Terrestrial mammals, birds, insects, bacteria, subterranean animals, fish, and all other forms of animal life can be dramatically impacted by recreation use. The

presence of recreation users influences animal behavior and animal habitat. Hunting of game animals alters their natural age and sex ratios. Horses and all-terrain vehicles have high potential for altering wildlife habitat. We will not attempt to list all the possible adverse effects of recreation on ecosystems. The main point is that recreation effects on the land are not benign. Ever-increasing use of forests and other natural systems will have increasing impacts (Knight and Gutzwiller 1995).

In figure 11.1, percentage of area in forest cover in southern counties is cross-indexed with outdoor recreation participation per 1,000 population based on data from the NSRE in 1995 (Cordell and others 1996, 1999). Recreation travel data indicate that the majority of outdoor recreation participation occurs within 50 miles of people’s residences, a distance approximately the same as the distance from the center of one county to the outer boundary of an adjacent county in the South (Cordell and others 1999). We have indexed reported participation from residence relative to percentage of resident and adjacent counties’ area in forest cover to identify counties with a high probability of heavy recreation pressure. In such counties, the level of forest cover and recreation participation are both high. The mapped

index highlights counties where heavy recreation pressures on forest resources are anticipated. Counties with these conditions are identified as hotspots. Where there is little to no forest cover (for example, in an urbanized county) or little to no recreation demand, negligible pressures are likely occurring. Our focus is on counties with relatively abundant forest resources where moderately heavy to heavy recreation pressures are occurring. These counties we identify as hotspots, and mostly they are found in:

- South coastal North Carolina and coastal South Carolina, especially in the Charleston area;
- North coastal Florida, the Jacksonville area;
- Gulf coastal north Florida; coastal Alabama, Mississippi, and Louisiana, especially the New Orleans Delta area;
- The “Piedmont Crescent” running from north-central North Carolina to the Birmingham area in Alabama;
- South-central Mississippi, especially the Jackson area;
- The Ozark and Ouachita Mountains and the Little Rock, AR, area; and

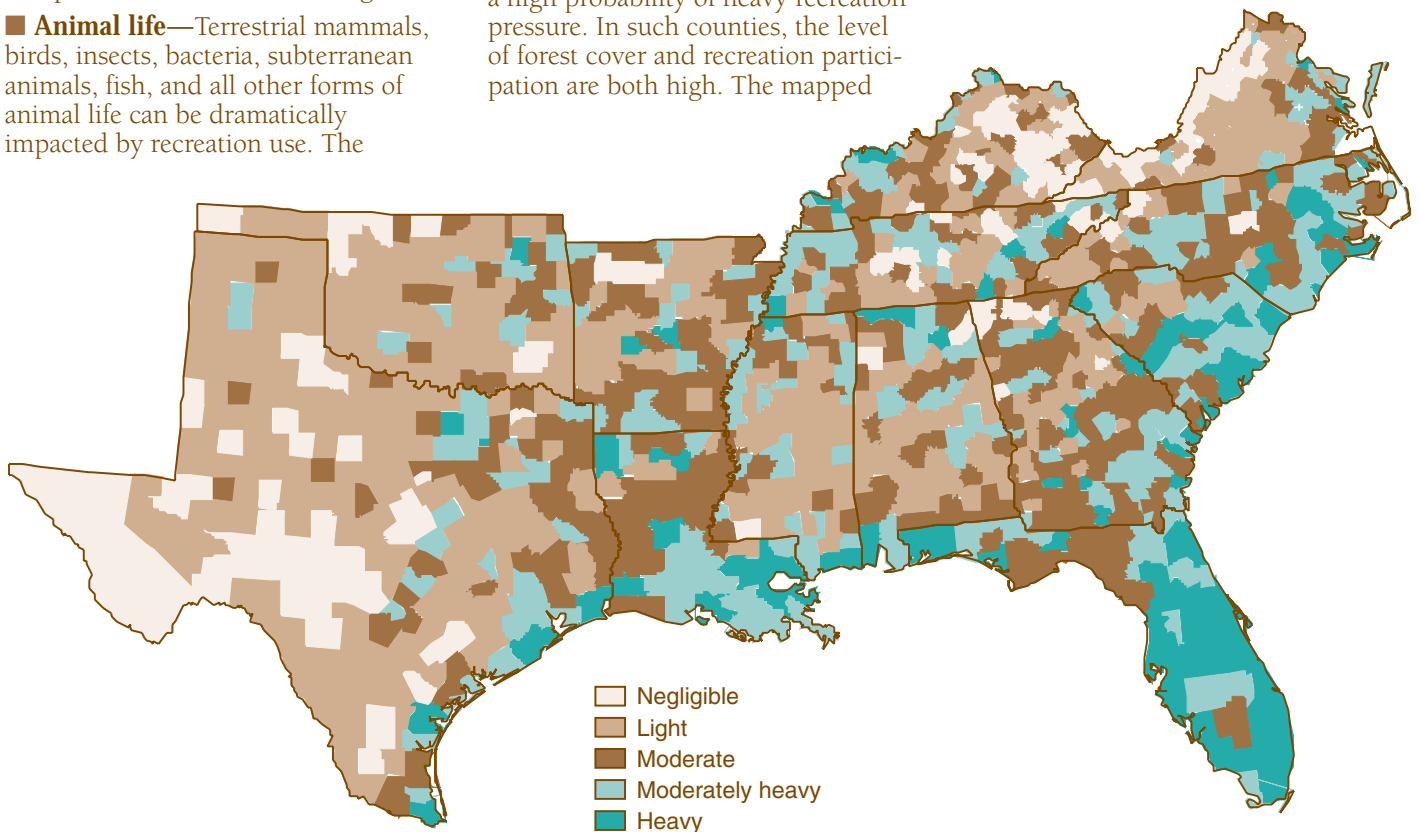


Figure 11.2—Hotspots of recreation demand pressure on water and wetlands, Southern States, 2000.

■ Northeastern West Virginia and western Virginia.

To address recreation pressures on aquatic systems, we use data from the National Resources Inventory (NRI) describing the acres of water bodies and wetlands. The NRI is conducted every 5 years by the Natural Resources Conservation Service. Figure 11.2 shows a number of areas with relatively abundant water and wetlands that also have heavy recreation pressures. The same approach of using data from resident and adjacent counties as explained above was used to identify counties with water and wetland resources under recreation pressure. Pressures on water bodies often are high because water is a very prominent draw for outdoor recreation. Counties that are hotspots and those with moderately heavy pressures include most of the coastline of the South from Virginia to Texas. Almost all of the Florida peninsula is coded as a water and wetland hotspot. Other areas include:

- Piedmont South Carolina;
- Northern Alabama;
- Northern Louisiana;
- Central Arkansas, especially the Little Rock area; and
- Isolated clusters of counties in east Texas, northeastern Oklahoma, western West Virginia, central Georgia, and western Tennessee.

Discussion and Conclusions

Forest recreation in the South has been growing steadily. Growth in demand for viewing and photographing nature has been particularly rapid. Also growing in popularity is the gathering of various NTFPs such as berries, mushrooms, and herbs. Nonmotorized boating also is becoming more popular. These are among the fastest rising activities in the region, adding the most participants year by year of all activities. Also growing are hiking, backpacking, bicycling, horseback riding, coldwater fishing, walking, and visiting nature centers. Camping and off-road driving also are growing, at rates much faster than the population of the South. Slower growing activities include motorboating, sightseeing, hunting, and waterskiing. Across the Nation,

as well as the South, viewing, learning, and photography activities have usually topped the list of activities adding large numbers of participants. There is no end in sight to the growth in demand and the pressures it will place on the forests of the South.

Given the dominance of private land in the region, it would seem that the preponderance of these growing demand pressures could be met by private ownerships. Among individual owners, however, approximately 59 percent indicate that an emphasis in managing their land is maintaining and improving the lands' natural components. For 37 percent of owners, improving the natural components is the primary thing they emphasize. Accordingly, only about 14 percent of owners in the South permit the outside public to use their land, even though the greatest growth in demand is for nature appreciation and photography. Unless conditions become more favorable for landowners, the percentage of them permitting public access is likely to continue to decrease, as it has been doing for several years. Increasing demands for off-road vehicle use, hunting, fishing, and other of the more consumptive recreational activities may bring about even more private land closure. Many individuals and families are purchasing land for their own personal recreational pursuits. These owners are even less likely to open their land to others for recreational pursuits. Thus, the weight of providing for increases in public recreation demand in the future is likely to fall mostly on public providers, who increasingly face significant budget and capacity constraints.

The percentage of private owners in the South who permit the outside public to use their land is likely to decrease even further, unless conditions for owners change appreciably. In that four of the nine activities adding the most participants are oriented toward viewing and learning, increasing numbers of partnerships between owners and potential users seem possible. These potential partners may represent for owners a better strategy for achieving their goal of improving the natural conditions on their land, while at the same time accommodating greater recreation use. Planting food species, improving and protecting habitat, monitoring

users and mitigating their impacts may open a vast, untapped opportunity.

Public land will likely offer better immediate opportunities for new supply, but only to a limited extent. Lack of fiscal resources, movement toward low-impact use policies, and a greater emphasis on ecosystem health on Federal land focuses more attention on visitor capacity than it has in the past. This increased attention is especially true for activities frequently in conflict with other uses and for those that most impact natural conditions. As with private land, increasing interest in viewing and learning activities could represent an important way for land management agencies to get tasks done that are necessary for improving and maintaining these natural conditions.

Increasing recreational use of forests is not without its drawbacks. In a number of forested areas in the South, recreation participation is likely to place greatly increased pressures on forest resources, public and private. If we are to sustainably manage our southern forests, these areas, which we have identified as hotspots, must be closely monitored. If left to develop as pressures demand, long-term health and productivity of many of our southern forest areas may be seriously impaired. Where pressures are predicted to occur (or are occurring), collective, multiscale planning and actions are needed. The forestry community is in a unique position to act as a leader in such planning and collaborative conservation efforts. Being situated across all levels of government and in the private sector, forestry professionals, including scientists, can act as catalysts to action.

Efforts to sustain forest productivity and health must include not only timber and recreation; increasingly, they must also include NTFPs of a wide variety. Both animals and plants are increasingly sought for increasingly diverse personal and commercial uses. Typically, NTFPs introduce nontraditional users, many of whom have little knowledge of the makeup of healthy forest ecosystems. Looking for leaves, twigs, vines, ferns, cones, fruits, bark, foliage, sap, firewood, poles, and boughs, these gatherers can have very significant impacts by interrupting balances among species and their habitats. Removal of edibles such as walnuts, hickory nuts, ramps, wild

blueberries, blackberries, elderberries, persimmons, and a wide variety of other materials reduces food supplies for wild species. While there is little hard data on the gathering of these and other forest products, it is clear that gathering is increasing and must become a more prominent component of forest planning.

In conclusion, recreation, aesthetic, forest product, and a wide variety of other demands are increasingly being placed on the South's forests. While the profession of forestry often focuses much of its time and talent on stand inventories, game habitat, water production, forest health, and commodity interests, these rising nontraditional, aesthetic demands are beginning to assume a dominance over traditional forest resource demands. Greater research and monitoring attention is immediately needed to better understand the nature of these demands and their potential unfettered consequences.

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The southern forest resource assessment provides a comprehensive analysis of the history, status, and likely future of forests in the Southern United States. Twenty-three chapters address questions regarding social/economic systems, terrestrial ecosystems, water and aquatic ecosystems, forest health, and timber management; 2 additional chapters provide a background on history and fire. Each chapter surveys pertinent literature and data, assesses conditions, identifies research needs, and examines the implications for southern forests and the benefits that they provide.

Keywords: Conservation, forest sustainability, integrated assessment.

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