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Paths More Traveled:

Predicting Future Recreation Pressures on America's National Forests and Grasslands

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A Forests on the Edge Report

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Key Words

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Paths More Traveled:

Predicting Future Recreation Pressures on America's National Forests and Grasslands

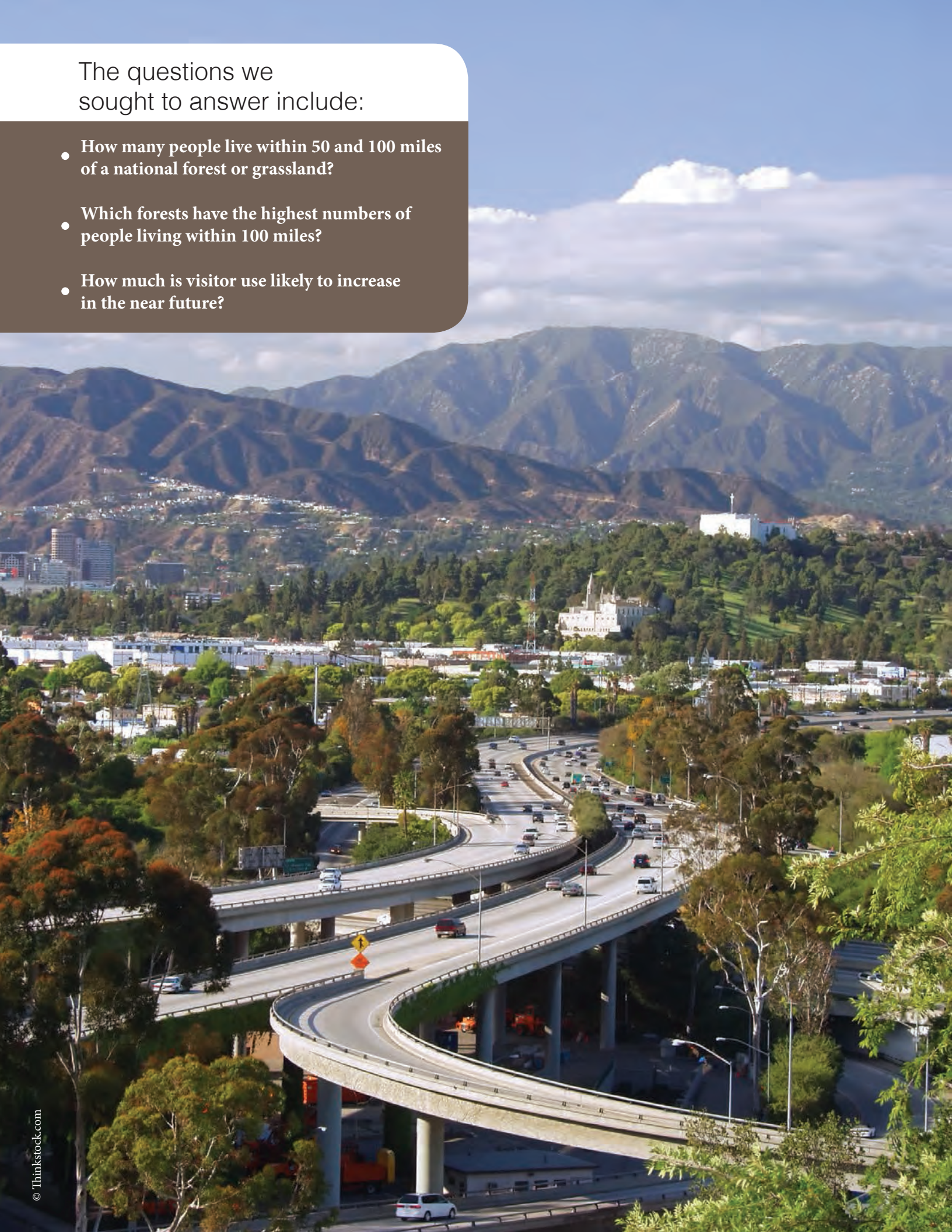
A Forests on the Edge Report

Abstract

Populations near many national forests and grasslands are rising and are outpacing growth elsewhere in the United States. We used National Visitor Use Monitoring (NVUM) data and U.S. census data to examine growth in population and locally based recreation visits within 50 and 100 miles of National Forest System (NFS) boundaries. From 1990 to 2010, the population living within 50 miles of NFS lands increased by 36 percent, from about 112 million to 153 million people; that population is expected to increase in the future. Recreation visits from local residents can be expected to increase by 12 million new visits per year, from 83 million in 2010 to about 95 million in 2020. Forests experiencing the most population growth and highest rates of local visitation can expect the greatest impacts on recreation resources and other public benefits. Strong partnerships and cooperation among Forest Service staffs, local communities, and other concerned parties can help avoid or mitigate potential impacts associated with increased recreation pressure and enhance the recreational experiences of users.

The questions we sought to answer include:

- **How many people live within 50 and 100 miles of a national forest or grassland?**
- **Which forests have the highest numbers of people living within 100 miles?**
- **How much is visitor use likely to increase in the near future?**



Introduction

America's 193 million acres of national forests and grasslands—managed by the U.S. Department of Agriculture (USDA), Forest Service—provide enormous recreational opportunities for the American public, as well as innumerable other benefits including clean water and air, timber and other forest products, habitats for endangered fish and wildlife species, and cultural and educational values.

Counties containing national forests and grasslands are among the fastest growing non-metropolitan counties in the country (Johnson 2012). National forests and grasslands hosted upwards of 161 million visits in 2012 (NVUM 2012); these numbers are likely to increase in the future.

"As nearby populations increase, so too will local visits to these treasured resources increase"

Understanding where and when to expect increased visitor use is key to ensuring the proper management of Forest Service recreational resources so that users continue to experience the wonder and excitement of natural areas and so that forests and grasslands can continue to provide other critical goods and services.

More than half the visits to national forests or grasslands nationwide are made by people who live within 50 miles, and two-thirds of National Forest System (NFS) visits are made by those who travel fewer than 100 miles (NVUM 2012). Given these facts, it is likely that, as nearby populations increase, so too will local visits to these treasured lands increase.

This report, a publication of the Forests on the Edge project of the Forest Service's State and Private Forestry Deputy Area, examines the growth in population within 50 and 100 miles of national forests and grasslands.[1] To understand how recreation pressure might increase in the future, the report also estimates future growth in recreation visits to NFS lands by local residents.

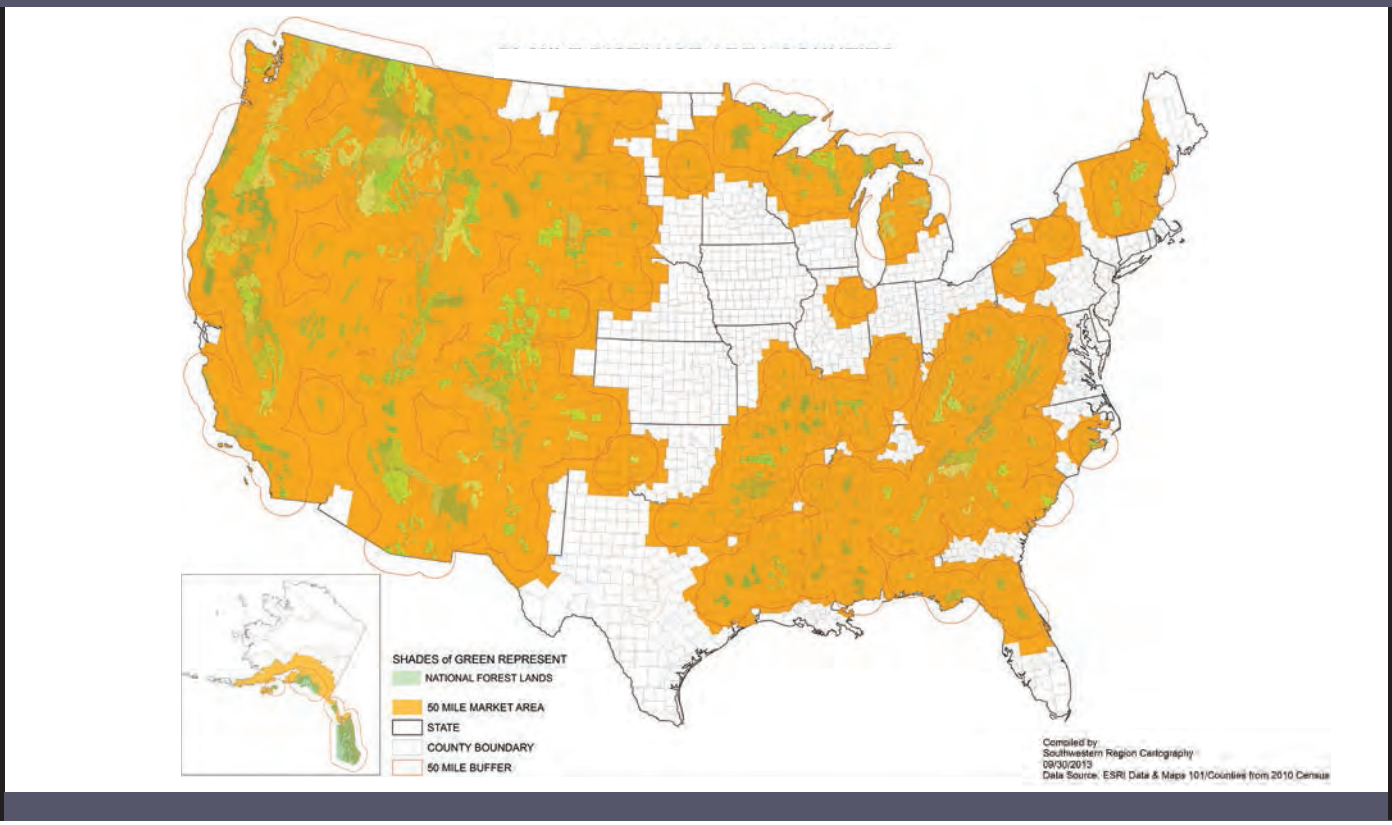
About Forests on the Edge

Forests on the Edge (FOTE) is a project developed and coordinated by the Forest Service, State and Private Forestry Deputy Area, in conjunction with Forest Service Research and Development and National Forest System Deputy Areas, universities, and other partners. FOTE reports identify areas across the country where public and/or private forests might change because of increased population, housing, or other factors, including climate change. This report focuses on the projected growth in recreational uses of U.S. national forests and grasslands.

[1]This report uses population data and results for only the contiguous United States. Results for National Forest System lands in Alaska, Hawaii, and Puerto Rico are not included.

As indicated in figure 1, a 50-mile zone drawn around national forests and grasslands includes almost the entire western portion of the United States and much of the Southeast, as well as the northern tier of the Lakes States and parts of the Northeast. People living within this zone have access to numerous benefits from national forests and grasslands, including substantial recreational opportunities. Indeed, people living within an hour's drive, or approximately 50 miles, of national forests often receive the greatest benefits from the ecosystem services and economic activity that come from those lands, including the jobs that depend on forest outputs such as timber and nontimber products.

Figure 1—*Location of national forests and grasslands in the United States with a 50-mile buffer zone.*



How Far and How Often Do People Travel to National Forests and Grasslands?

The Forest Service's National Visitor Use Monitoring (NVUM) program offers a great deal of information about the people who visit national forests and grasslands. For example, through NVUM surveys, we have learned that people who live in nearby areas are the Forest Service's primary recreation customers and are the main beneficiaries of the recreation opportunities that NFS lands provide. About 15 percent of all visits are made by people who are frequent visitors—that is, they report visiting that forest at least 50 times per year, or roughly once per week.

We also have a good idea of the proportion of visits to each NFS unit by people who report driving 50 miles or less (NVUM 2012). We know, for example, that 90 percent of NFS frequent visitors live within 50 miles of the forest they visit; the most avid recreation users often live in the zone closest to the forest.

However, the distribution of local visits is not uniform across the NFS. Some forests do receive most of their recreation visits from the local area. For example, about 87 percent of recreation visits to the Bitterroot National Forest (Montana) are made by people traveling 50 or fewer miles, 85 percent of visits to the National Forests in Mississippi are made by people living within 50 miles, and 81 percent of visits to the Lolo National Forest (Idaho) are locally based.

On the other hand, some forests receive most of their visits from much farther away, drawing from more regional or national markets. Several of these national forests and grasslands are located more than 50 miles from large population centers, while others have or are near to other resources that draw people from a wide array of distances. Examples include the Kaibab (Arizona) and the Inyo (California) National Forests, where only 12 percent of visits are made by people living within 50 miles, and the White Mountain National Forest (New Hampshire), with about 19 percent of visits locally based.

Ken Hammond, USDA

5 Million

With close to 5 million people living within 50 miles, the Mount Baker-Snoqualmie National Forest is a popular recreation destination.

Methods

Estimating Current and Future Recreation Patterns

To determine how many people live within 50 and 100 miles of America's national forests and grasslands, we followed several steps.[2]

1

First, we obtained polygons of forest and grassland administrative boundaries. [3]

2

We then added a buffer of the desired distance (50 or 100 straight-line miles) to the boundary polygons.

3

Next, we overlaid the NFS boundary plus buffer polygons with data showing the location of county and census tracks. [4]

4

For each census polygon, we calculated the proportion of its area that lies within the administrative boundary plus the buffer polygon.

5

We multiplied that proportion of the census tract area by the census area's population (which assumes that population within the census polygon is spatially distributed more or less evenly).

6

We summed population across all spatial units.

To estimate and compare the recreational use of each forest by surrounding populations, we multiplied the percentage of visits from people within 50 miles by the total estimated recreation visits for the forest, as reported in the NVUM (2012). This gave an estimate of the number of visits that come from that local area. Then, we divided by the population living within 50 miles to get an average number of visits per capita for that region.

To project population and recreation visitation for 2020, we assumed that population growth rates and recreation visit characteristics would remain nearly constant, and we extrapolated to arrive at estimates for future recreation use.

[2] The process to estimate proximate population was the same, regardless of whether the spatial unit for population was a county, census tract, or block.

[3] These data came from the Forest Service Automated Land Program (2005 Admin Forest ALP).

[4] County data were from the 1990 census, whereas census tract data were available for both 2000 and 2010 censuses. Census tract population estimates were not available for 1990 population.

Results

Here's What We Learned

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Results 1

The population is **increasing substantially** within 50 and 100 miles of national forests and grasslands

A large proportion of the population within the contiguous United States lives within 50 and 100 miles of national forests and grasslands, and this number increased substantially between 1990 and 2010 (table 1). During this period, the population living within 50 miles of NFS lands increased by more than 40 million people, from about 112 million to 153 million. That represents a 36-percent increase in the 20-year period; from 2000 to 2010 alone, there was a 14.6-percent increase in those living within 50 miles (fig. 2).

Expanding the circle to 100 miles, the population living within 100 miles (including those within 50 miles) increased by more than 50 million people between 1990 and 2010, from 180 million to more than 230 million people, a 25.5-percent increase in those living within 100 miles over the 20 years; about 12.5 percent of the increase occurred between 2000 and 2010. Both these growth spurts, within 50 miles and within 100 miles, have outpaced the Nation's overall population growth of 10 percent over the same period. The number of people living within 50 miles accounted for 45.3 percent of the total U.S. population in 1990, increasing to 49.8 percent by 2010; those living within 100 miles accounted for some 72.4 percent of the total U.S. population in 1990, increasing to 74.9 percent by 2010.

We estimate that, if the population continues to grow in this manner, by 2020 there will be about as many people living within 50 miles of NFS lands as there were within 100 miles in 1990.

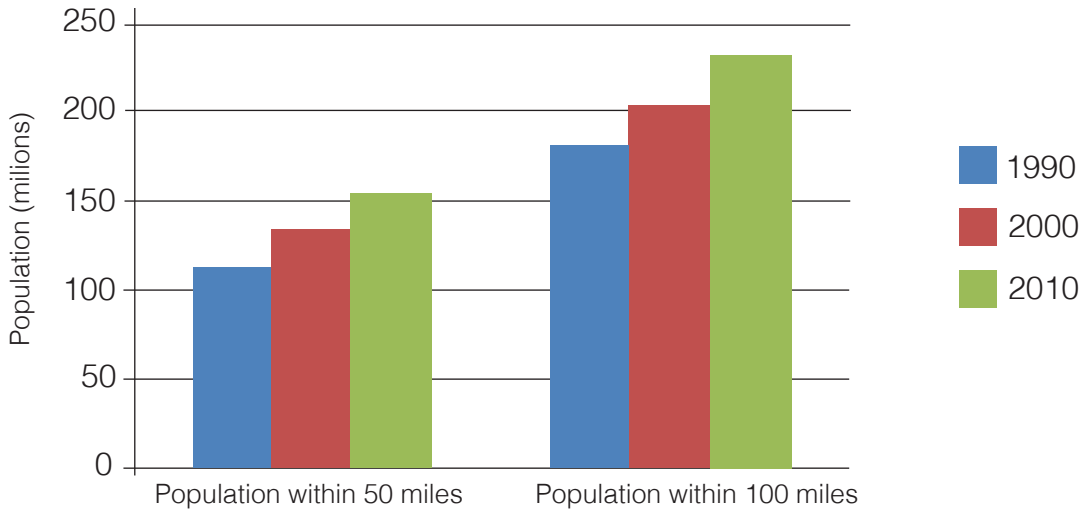
Table 1—*U.S. population,* in millions, living near national forests and grasslands, by year and distance zone.*

Year	Population within 50 miles	Percent of U.S. population	Population within 100 miles	Percent of U.S. population
1990	112.4	45.3	179.6	72.4
2000	133.7	47.4	204.8	73.0
2010	153.2	49.8	230.3	74.9

** Population data are from U.S. Bureau of Census. Note: 1990 spatial unit is by county; 2000 and 2010 are by census tract. Population figures are for continguous United States only.*

The Blue Ridge Mountains as seen from the Nantahala National Forest in North Carolina.

Figure 2—*Growth in population (millions) by distance zones from national forests and grasslands*

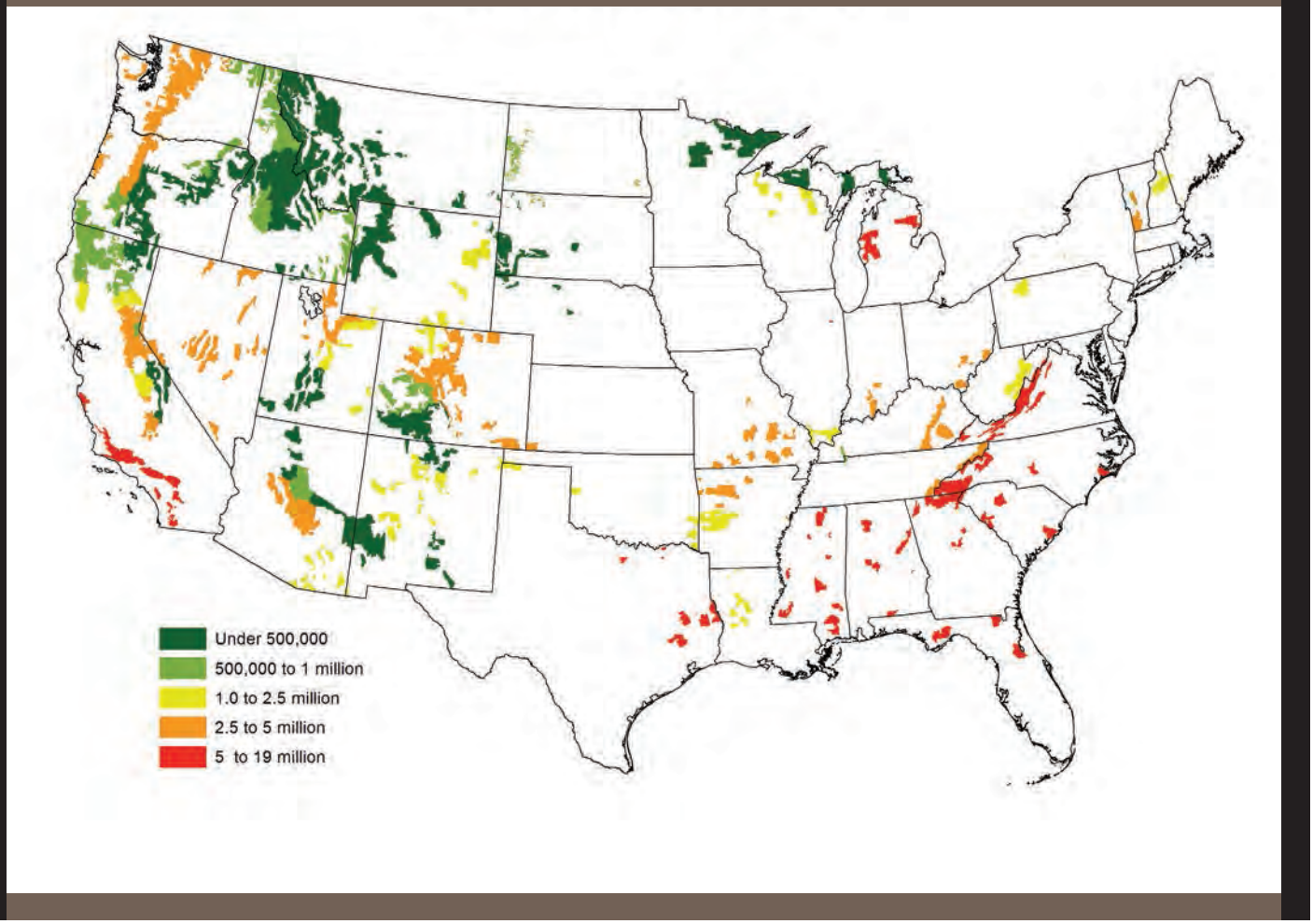


Results 2

The number of people living within 50 miles of individual national forests and grasslands **ranges** from fewer than 500,000 to 19 million

Most of the national forest units that have more than 5 million people living within 50 miles are located in southern California and in the South, from Virginia to Mississippi (fig. 3). Forests with the lowest levels of nearby population are near the Four Corners region (Colorado/Utah/New Mexico/Arizona), the northern Rockies, and in the Midwest along the Canadian border.

Figure 3—*Location of national forests and grasslands in the coterminous United States. National forests and grasslands are shown to highlight adjacent population ranges within a 50-mile radius. Population estimates are based on the 2010 U.S. Census.*



[5]The same spatial methods used for our national estimates were used here.

The Ozark-St. Francis National Forest has more than 3 million people living within 50 miles of its boundaries—more than any other national forest or grassland in the United States.

Results 3

Almost 60 national forests and grasslands that are identified as **"urban"** are surrounded by populations of 1 million or more people

We found nearly 5 dozen NFS units with more than 1 million people living within 50 miles in 2010 (table 2 and fig. 4). This represents an increase of four national forest units with more than a million people in the 50-mile zone since 2000. The following are units that crossed that threshold in the interim.

Idaho Panhandle National Forest, Idaho

973,000 to 1,095,000, 12.5 percent increase

Lake Tahoe Basin Management Unit, California/Nevada

953,000 to 1,108,000, 16.2 percent increase

Manti-LaSal National Forest, Utah/Colorado

944,000 to 1,228,000, 30.2 percent increase

Santa Fe National Forest, New Mexico

974,000 to 1,138,000, 16.9 percent increase

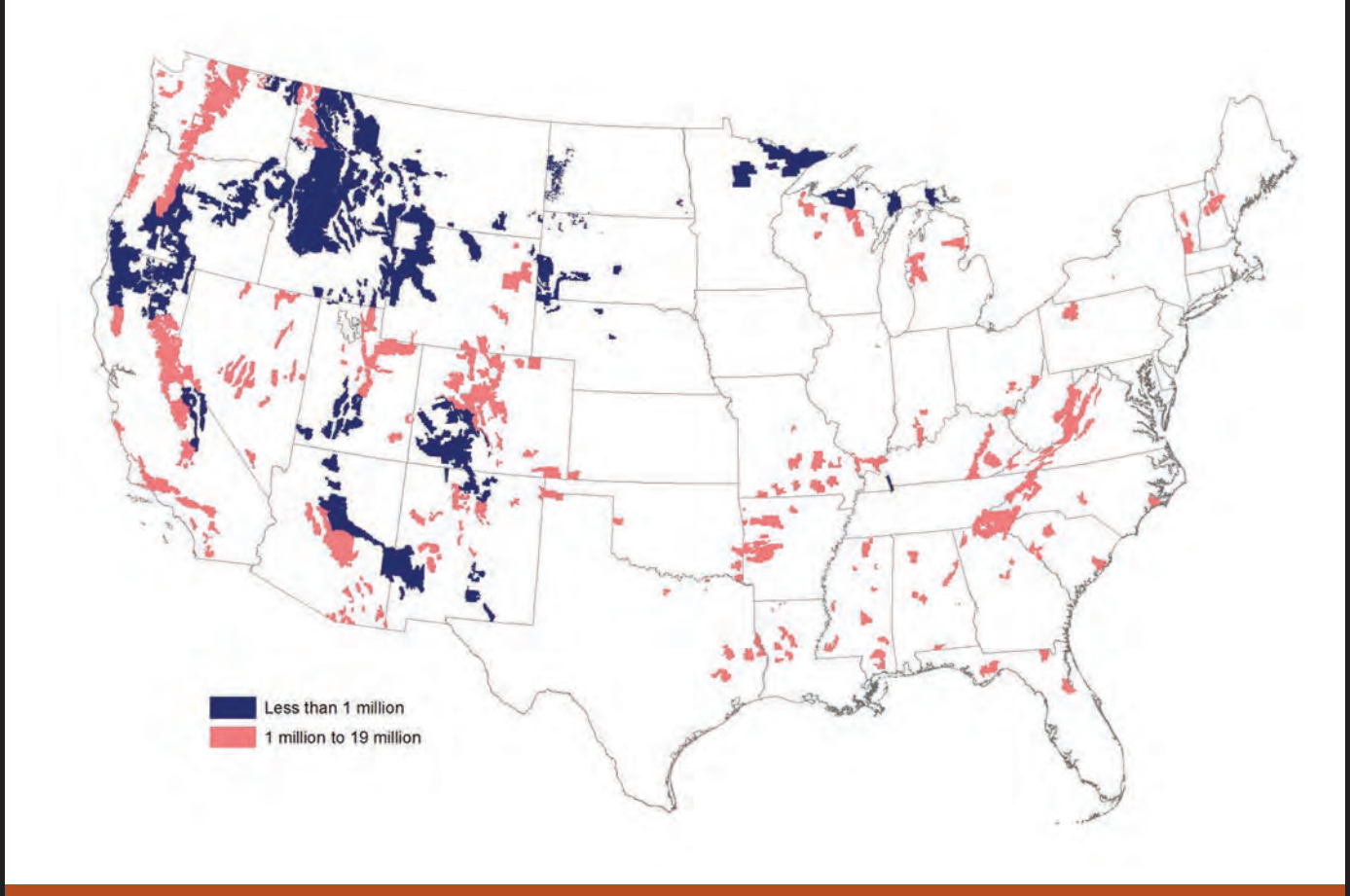
Our approach to defining "urban forest" differs from the formal Forest Service classification of urban forest as meaning a forest that has a population center of 1 million or more people within an hour's drive (USDA Forest Service 2003). Given the continued growth of housing and population, especially in and near the wildland-urban interface (Stein et al. 2007), we wanted to look at this long-standing issue with a new perspective. To get a more complete picture of the population pressures on NFS lands, we adjusted the definition of urban forest for the purposes of this report to include any NFS units that have 1 million people living within 50 miles. Our approach revealed substantially more "urban" units (53) than the official approach, which identified only 18 urban forests or grasslands a decade ago.

Table 2—*National forests or grasslands with more than 1 million people living within 50 miles.*

Forest Service unit	2010 population within 50 miles (thousands)	Forest Service unit	2010 population within 50 miles (thousands)
Cleveland National Forest	18,543	Humboldt-Toiyabe National Forest	3,228
San Bernardino National Forest	18,087	Eldorado National Forest	3,218
Angeles National Forest	17,913	Ozark-St. Francis National Forest	3,104
National Forests and Grasslands in Texas	11,137	White River National Forest	3,046
National Forests in North Carolina	11,022	Mt. Hood National Forest	2,963
Los Padres National Forest	10,086	Tahoe National Forest	2,962
Chattahoochee-Oconee National Forests	9,403	Columbia River Gorge National Scenic Area	2,657
Midewin National Tallgrass Prairie	8,219	Willamette National Forest	2,650
Francis Marion and Sumter National Forests	7,133	Prescott National Forest	2,638
National Forests in Alabama	6,891	Uinta-Wasatch-Cache National Forest	2,616
National Forests in Florida	6,311	Sequoia National Forest	2,588
George Washington and Jefferson National Forest	5,614	Ouachita National Forest	2,347
National Forests in Mississippi	5,387	Monongahela National Forest	2,135
Huron-Manistee National Forest	5,382	White Mountain National Forest	2,122
Mt. Baker-Snoqualmie National Forest	4,881	Sierra National Forest	2.010
Cherokee National Forest	4,642	Plumas National Forest	1,842
Gifford Pinchot National Forest	4,613	Kisatchie National Forest	1,693
Tonto National Forest	4,580	Shawnee National Forest	1,644
Green Mountain and Finger Lakes National Forests	4,530	Cibola National Forest	1,639
Olympic National Forest	4,490	Ashley National Forest	1,583
Pike and San Isabel National Forests	4,205	Chequamegon-Nicolet National Forest	1,396
Okanogan-Wenatchee National Forest	4,083	Coronado National Forest	1,387
Wayne National Forest	3,923	Medicine Bow-Routt National Forest	1,174
Mark Twain National Forest	3,853	Allegheny National Forest	1,275
Arapaho and Roosevelt National Forests	3,849	Manti-La Sal National Forest	1,228
Hoosier National Forest	3,488	Santa Fe National Forest	1,138
Siuslaw National Forest	3,336	Mendocino National Forest	1,135
Stanislaus National Forest	3,287	Lake Tahoe Basin Management Unit	1,108
Daniel Boone National Forest	3,242	Idaho Panhandle National Forest	1,095

Source: U.S. Department of Agriculture, Forest Service, Southwestern Region Geographic Information System analysis.

Figure 4—*Location of national forests and grasslands in the coterminous United States. National forests and grasslands are shown to highlight areas that have at least 1 million people within a 50-mile radius. Population estimates are based on the 2010 U.S. Census.*



Results 4

Population **growth rates** near some national forests and grasslands were more than 20 percent between 2000-2010

Seventy national forest and grassland units in the contiguous United States witnessed a population growth of 10 percent or more within 50 miles from 2000 to 2010 (fig. 5). More than a dozen forests have seen population growth increases of more than 20 percent within the same distance (table 3). Half the forests with the fastest growing population are located in the Intermountain West (fig. 6).

A slightly different picture emerges if we examine those forest units that had the greatest absolute growth in population within 50 miles from 2000 to 2010. Nine units had population growth of more than 1 million people in the surrounding 50-mile zone (table 4). Five are in the Southeast and three are in California. In general, these forests have one or more large cities within the 50-mile zone.

Figure 5—*Percent population growth within a 50-mile radius of a national forest or grassland from 2000 to 2010.*

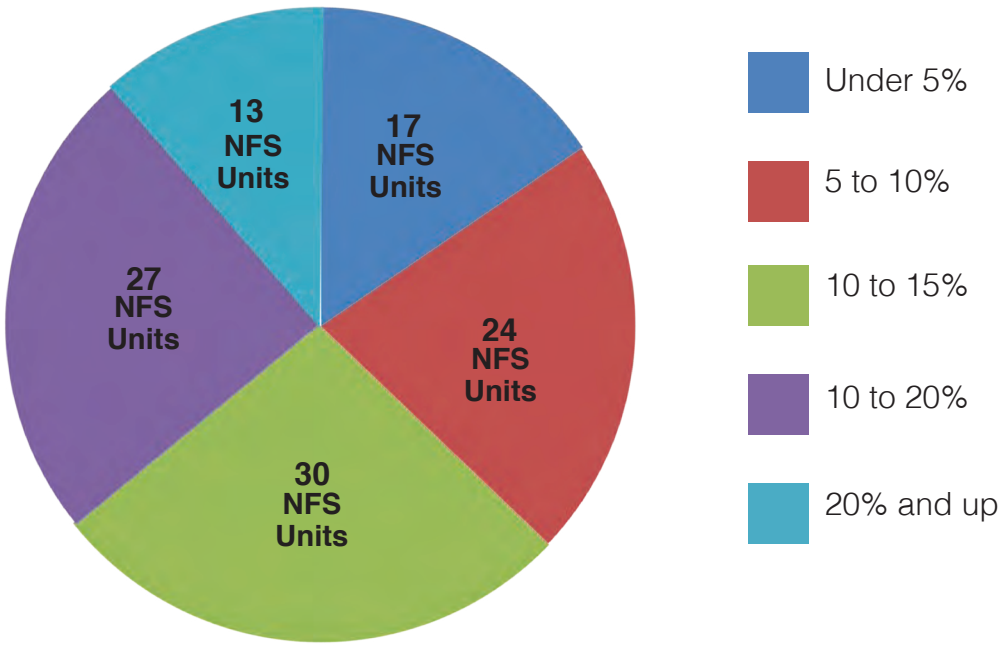


Table 3—*National forests or grasslands with population growth in 50-mile zone greater than 20 percent, 2000–2010.*

Region	National forest	Percent population growth
Southwestern	Coconino	39
Intermountain	Dixie	36
Intermountain	Fishlake	35
Intermountain	Manti-LaSal	30
Intermountain	Humbolt-Toiyabe	29
Southwestern	Tonto	28
Southwestern	Kaibab	26
Intermountain	Boise	25
Intermountain	Uinta-Wasatch-Cache	22
Southern	National Forests and Grasslands in Texas	22
Pacific Southwest	Sequoia	21
Southern	National Forests in Florida	21
Intermountain	Bridger-Teton	20
Pacific Northwest	Ochoco	20

Figure 6—*Percent population growth within 50 miles of national forest or grassland from 2000 to 2010.*

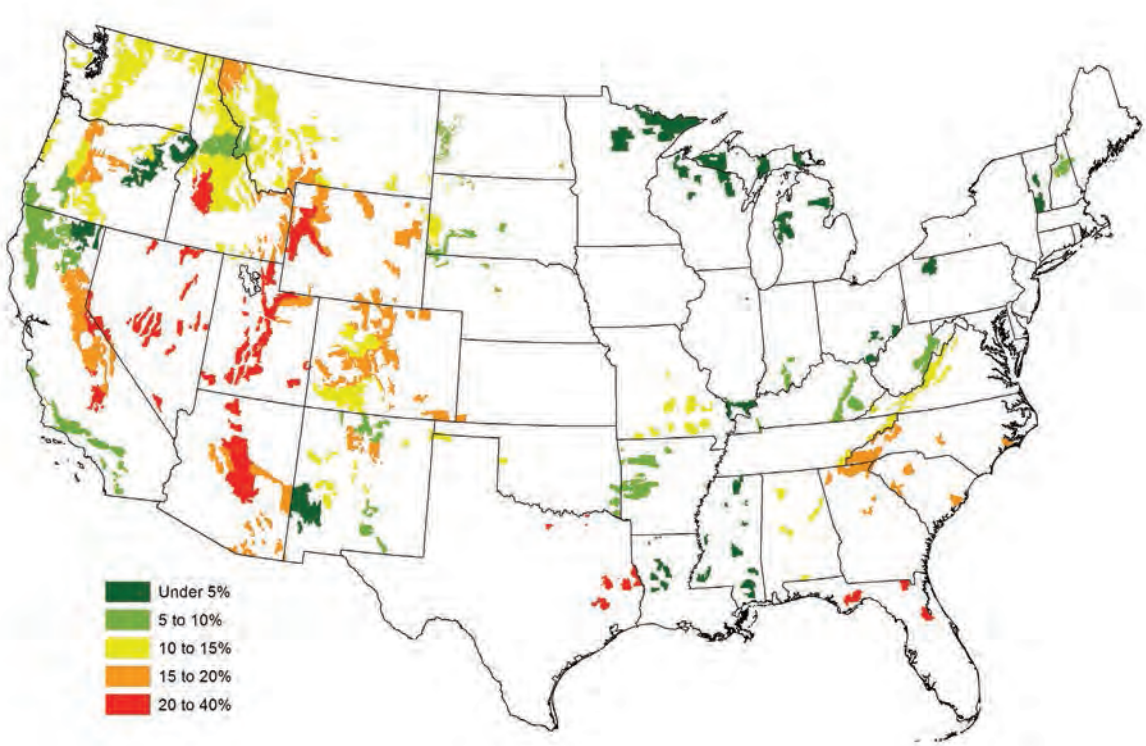


Table 4—*National forests and grasslands that had an increase of more than 1 million people within a 50-mile radius between 2000 and 2010.*

Region	National forest or grassland	Increased number of people (millions)
Southern	National Forests and Grasslands in Texas	2.0
Pacific Southwest	San Bernardino	1.6
Southern	National Forests in North Carolina	1.5
Pacific Southwest	Cleveland	1.5
Southern	Chattahoochie-Oconee	1.5
Pacific Southwest	Angeles	1.5
Southern	National Forests in Florida	1.1
Southern	Francis Marion-Sumter	1.0
Southwestern	Tonto	1.0

Results 5

Nationally, few **demographic changes** have occurred within the 50-mile and 100-mile zones

There were not many demographic differences between the people living within the 50-mile zone and the rest of the country (table 5). In 2010, for example, the population living within the 50-mile zone had a slightly higher percentage of people under age 35 than the population living beyond 50 miles, and slightly more Hispanics within 50 miles compared to the population outside that zone. It may be that there are greater demographic changes occurring in more localized areas, but these are not being picked up in our national analysis.

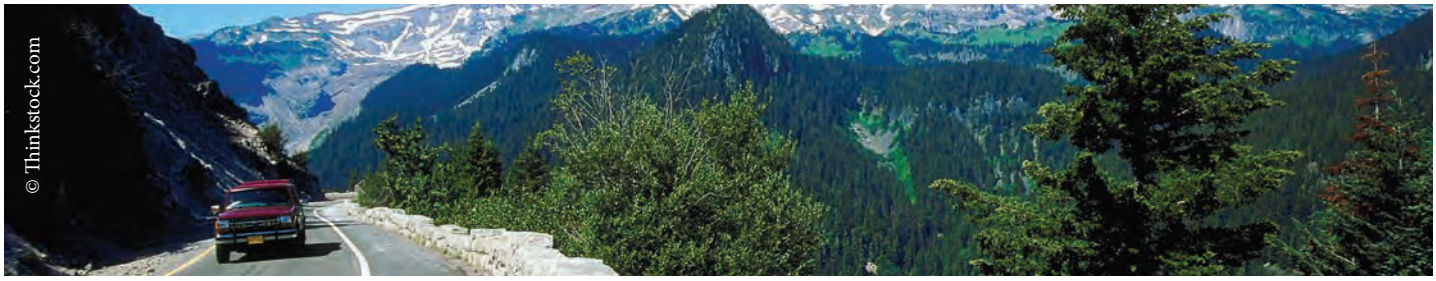


Table 5—*Demographics for U.S. population within and beyond a 50-mile radius of national forest and grasslands, 2010.*

Demographic	**Within 50 miles** (%)	**Beyond 50 miles** (%)
Male	49.4	48.9
Female	50.6	51.1
Under age 20	27.5	26.5
Age 20-34	20.6	20.0
Age 35-54	27.6	28.1
Age 55-64	11.7	12.0
Age 65 and older	12.5	13.5
Hispanic	18.0	14.8
Asian	4.5	5.0
Black	11.6	13.6
Native American	1.2	0.7
Hawaiian/Pacific Islander	0.2	0.2
Multi-racial	3.0	2.8

Source: U.S. Bureau of Census

Results 6

Average use by **local residents** varies greatly from one forest to another

Several national forests, including the Gallatin and Bridger-Teton (located in Montana and Wyoming, respectively), average more than three visits per year per local resident, while others, such as the Cleveland (California), Gifford-Pinchot (Washington), and Allegheny (Pennsylvania), receive an average of fewer than 3 visits per 100 local residents.

3 Visits

The Gallatin National Forest (pictured here) and the Bridger-Teton, average more than three visits per year per local resident.

Results 7

Substantial increases in **visitor use** are expected in the Intermountain West and parts of the South

If the rate in population growth within 50 miles of NFS lands that was observed from 2000 to 2010 continues from 2010 to 2020, what might the increase in local recreation visits be? As noted in the Methods section earlier, our assumption is that the visitation rate of local residents will remain nearly constant and that new residents will visit the forests and grasslands at about the same rate as the current residents. If so, forests experiencing the greatest population growth and highest rates of local visitation could expect the highest increase in recreation visits and, hence, the greatest impacts on their recreation resources and opportunities.

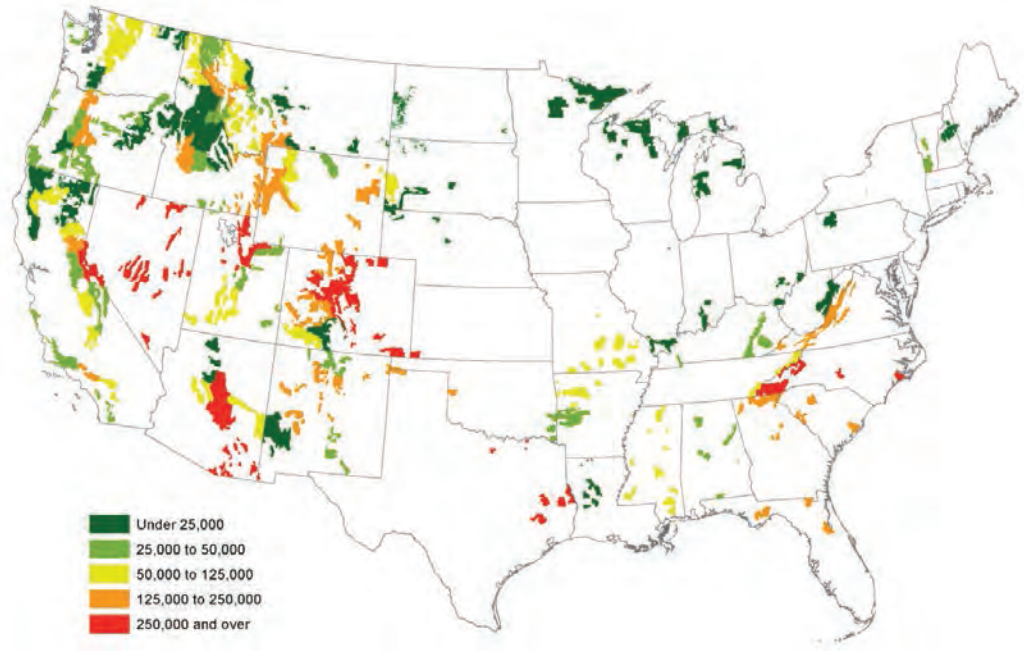
We expect that NFS lands will receive more than 12 million new visits by local residents each year, from about 83 million in 2010 to 95 million in 2020. That represents an increase of almost 8 percent above the current estimate for recreation visitation for NFS lands in the contiguous United States, at a national level. Table 6 shows individual forests that would have the greatest local visitation increase if population growth and visitation rates remain constant from 2010 to 2020. From 1990 to 2010, the population living within 50 miles of NFS lands increased by 36 percent, from about 112 million to 153 million people; that population is expected to increase in the future.

The Uinta-Wasatch-Cache National Forest (Utah) shows the greatest expected increase. More than a million additional visits could be expected from the local area annually. This results from a high rate of local visitation (about 2.1 visits per capita in the local area) and growth of nearly a half-million population from 2000 to 2010. Three other forests would be expected to have more than 500,000 new local visits: the Tonto (Arizona) (986,000), Francis Marion–Sumter (South Carolina) (904,000), and White River (Colorado) (530,000). Six other units could see between 250,000 and 500,000 additional annual visits from local residents. Figure 7 shows the spatial distribution of forests that could expect increases in local visitation.

Table 6—*National Forest System units that could expect to have 250,000 or more additional local recreation visits annually by 2020 based on population growth within 50 miles.*

Forest Service unit	Additional recreation visits (thousands) per year
Unita-Wasatch-Cache	1,207
Tonto	986
Francis Marion-Sumter	904
White River	530
Humbolt-Toiyabe	430
Arapaho-Roosevelt	428
Pike-San Isabel	398
Coconino	338
Coronado	321
George Washington-Jefferson	274
Lake Tahoe Basin Management Unit	264

Figure 7—*Location of national forests and grasslands in the coterminous United States. National forests and grasslands are shown to highlight the expected increase in annual local recreation visits from 2010 and 2020, based on constant population growth and local visitation rates.*



1,000,000

The Tonto National Forest in Arizona is expected to receive close to 1 million more visits annually by 2020.

Summary and Conclusions

Populations in areas near many national forests and grasslands are rising and are outpacing growth elsewhere in the United States. More than 150 million Americans live within 50 miles of NFS lands in the contiguous United States. More than 55 national forests and grasslands have more than 1 million people living within 50 miles of their borders. People in these areas account for the majority of recreation visits to NFS lands. If population growth continues as it has in the recent past, we can expect greater, but uneven, recreation pressures on NFS lands, as well as increased opportunities to expose the American public to the benefits of these national treasures.

Our conclusions are consistent with an earlier Forests on the Edge report examining housing growth on lands adjacent to national forests and grasslands (Stein et al. 2007). Based on a literature review, we reported numerous impacts associated with increased housing and population near these and other public lands. Of great concern is the impact on public access points. In some places, housing development has blocked access to trails leading to national forests and grasslands, resulting in increased use of remaining access points as well as the creation of new, unplanned access points (Johnson and Stewart 2007). Other impacts of increased population and housing growth have included impacts on wildlife habitat and water quality, increased risk of fire damage, and increased illegal use of NFS lands adjacent to private properties. Such impacts can indirectly affect the recreational user's experience. Greater recreation visitation could also result in increased crowding, resource damage, and conflicts among user groups.

On the positive side, as the number of Americans living near NFS lands increases, so do the opportunities for increasing the number of people who benefit from and appreciate the air and water quality, aesthetics, recreation opportunities, connection with nature, and fish and wildlife habitats that our national forests and grasslands provide. As the local customer base increases, so may the ability to connect children with nature and to provide additional opportunities for improving the physical health of the American public. Additionally, an increasing number of people living nearby could increase the number of people available for volunteering to help maintain NFS recreation trails and other resources.

Preparing for increased recreational use, whether by mitigating potential impacts or providing additional opportunities to connect with nature, will require strong partnerships and cooperation among Forest Service staffs, local communities, and other partners. Active participation and fruitful dialogue among all stakeholders can advance important efforts to help protect and maintain biodiversity, recreational opportunities, and other natural and cultural resources on NFS lands, as well as those of our neighbors, to the benefit of all concerned.

The growing need for such partnerships and cross-boundary communications is evidenced in the increasing number and scope of landscape-level partnerships, programs, and tools for supporting these efforts. More information on such tools can be found on the Forest Service Open Space Conservation Web site.

Susan Stein, Forest Service

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Susan Stein, Forest Service

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Forests on the Edge

Forests on the Edge is a project of the U.S. Department of Agriculture, Forest Service, State and Private Forestry, Cooperative Forestry Staff, in conjunction with staff from the Forest Service Research and Development and National Forest System Deputy Areas, universities, and other partners. The project aims to increase public understanding of the contributions of and pressures on America's forests and to create new tools for strategic planning. The first report in 2005 identified private forested watersheds in the conterminous United States most likely to experience increased housing density. Subsequent reports have provided more in-depth discussion and data on related topics, including development pressures on America's national forests and grasslands, impacts of increased housing density, and other pressures on private forest benefits, threats to at-risk species, sustaining America's urban trees and forests, understanding and preparing for wildfire in the wildland-urban interface, and threats to forests on U.S. Pacific and Caribbean islands. Reports may be viewed or downloaded from the Forests on the Edge Web site at http://www.fs.fed.us/openspace/fote/index.html.