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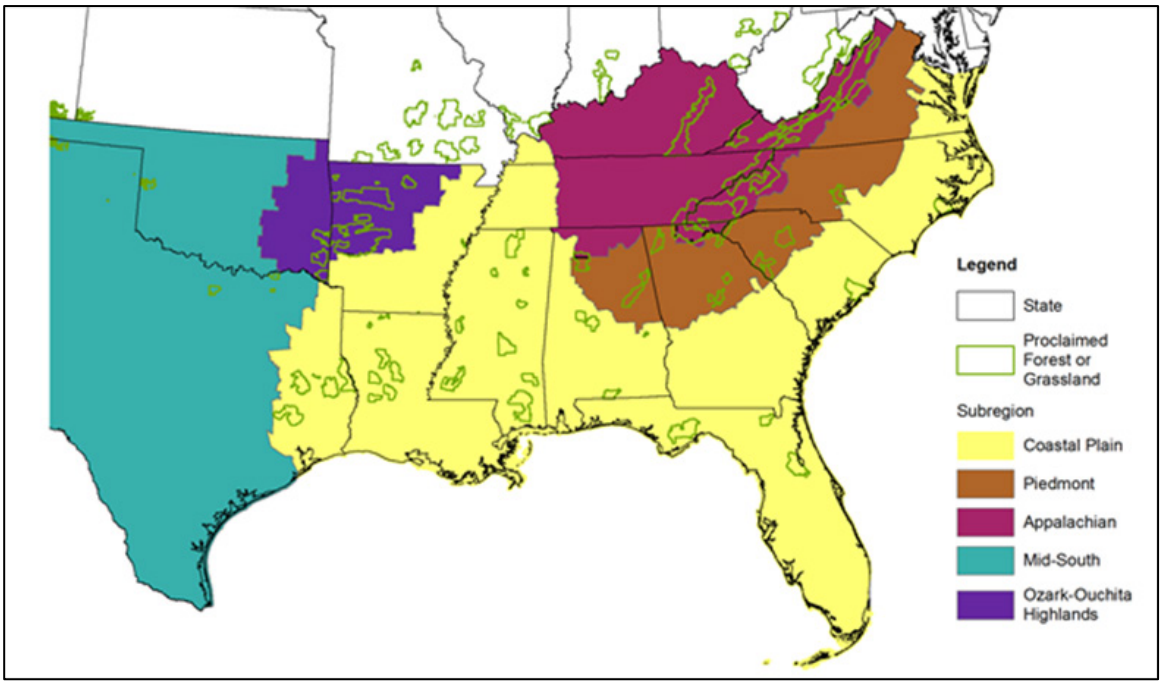
Five-Year Report for the Regional Broad-Scale Monitoring Strategy for the Forest Service Southern Region



Forest Service Southern Region June 2020

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About our Regional Monitoring Program

Purpose

The purpose of the 5-year evaluation report (report) for the 2016 Southern Region Broad-Scale Monitoring Strategy (strategy)[1] is to help responsible officials determine whether a change is needed in forest plan direction, such as plan components or other plan content that guide management of resources in the plan area. This report represents one part of the Forest Service's overall monitoring program, designed to provide efficiency for biennial monitoring evaluation conducted on each national forest unit (36 Code of Federal Regulations 219.12(d)). This report is not a decision document—it evaluates monitoring questions and indicators presented in the strategy. The strategy, though initiated in 2016, is built over time based on the ongoing implementation of the 2012 Planning Rule and related complementary efforts.

Monitoring and evaluation are continuous learning tools that form the backbone of informed decision making. Broader-scale monitoring is required to disclose results at least every 5 years, but regional office staff will produce an evaluation more often for monitoring questions for which more frequent evaluation and reporting is justified. This is the first written report of this evaluation since the strategy was developed. This report indicates whether a change to forest plans, management activities, monitoring program, or forest assessment may be needed based on the new information.

The strategy addressed one of eight topics required under Forest Service Handbook 1909.12 (Title 36 Code of Federal Regulations 219.12(a)(5)), plus the additional topic of social, economic, and cultural sustainability.

- (vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.

Monitoring Objectives

There are several objectives for this report, including:

- Deliver broader scale monitoring information from the strategy for consideration at the plan level.
- Assess the current condition (status) and trend, where applicable, of selected forest resources.
- Document implementation of the strategy, including changed conditions or status of key characteristics used to assess accomplishments and progress toward achievement of the selected plan components.
- Evaluate relevant assumptions, changed conditions, management effectiveness, and progress towards achieving the selected desired conditions, objectives, and goals described in forest plans.

1 U.S. Department of Agriculture, Forest Service. 2016. Southern Region Broad-Scale Monitoring Strategy, Version 1.0. 45 p. Retrieved from https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd493775.pdf.

- Address needed changes to current attribute details associated with each monitoring question based on new best available science. Present recommended change opportunities to the responsible officials.

How to Use this Report

This report is a tool and a resource for Forest Service personnel, specifically in the Southern Region, to assess the condition of forest resources in relation to forest plan direction and management actions. It is also a tool and a resource for the public to learn more about how Forest Service personnel are managing forest resources. The strategy identified "Alerts" and "Adaptive Management Strategies" associated with each monitoring question, which will be used to guide both evaluation of indicators and a regional response.

This report is designed to help the public, as well as Federal, State, local government, Tribal entities, and especially national forests within the Southern Region anticipate key steps in the overall monitoring programs. These steps include upcoming opportunities for public participation and how the public will be informed of those opportunities, and how public input will be used as the monitoring programs progress. The report is also intended to help people better understand reported results in relation to past and future monitoring reports on national forests within the Southern Region and the strategy that is issued at the regional level.

How Our Monitoring Program Works

Monitoring and evaluation requirements are established through the National Forest Management Act at 36 Code of Federal Regulations 219. Additional direction is provided by the Forest Service in Chapter 30 – Monitoring – of the Forest Service Handbook 1909.12, chapter 30, section 33.

In the context of the broader-scale, the three main monitoring goals are to establish monitoring questions that:

- Can best be answered at a geographic scale broader than one forest plan area;
- Can be coordinated with the relevant responsible officials, State and Private Forestry, Research and Development, partners, and the public; and
- Are within the financial and technical capabilities of the region and complements other ongoing monitoring efforts.

Providing timely, accurate monitoring information to responsible officials, national forests within the Southern Region, and the public is a key intent of the strategy. This report for the Southern Region is the vehicle for disseminating this information.

Summary of Findings and Results

Table 1 provides a summary of findings and results for climate change monitoring and table 2 provides a summary of findings and results for socioeconomic monitoring.

Table 1. Climate change summary of findings and results

Monitoring Question	Year Updated	Do monitoring results demonstrate intended progress or trend toward Southern Region targets?	Based on the evaluation of monitoring results, may changes be warranted?	If a change may be warranted, where may the change be needed?[2]
How has climate variability changed and how is it projected to change across the region?	2018 (First Evaluation) 2020	See Note: Precipitation See Note: Climate Extremes See Note: Land Cover Changes No: Increasing Temperatures No: Sea Level Rise	Yes	Plan Monitoring Program Forest Plans Management Activities Forest Assessment
How is climate variability and change influencing the ecological, social, cultural, and economic conditions and contributions provided by plan areas in the region?	2018 (First Evaluation) 2020	Yes: Prescribed Fire No: Nonnative Invasive Species No: Forest Health No: Animal and Plant Communities No: Water Resources No: Wildfire No: Recreation Use and Satisfaction No: Extreme Weather	Yes	Plan Monitoring Program Forest Plans Management Activities Forest Assessment
What effect do management units in the region have on a changing climate?	2018 (First Evaluation) 2020	Yes: Overall Carbon Sequestration No: Aging Forests Resulting in a Reduction in Carbon Sequestration	Yes	Plan Monitoring Program Forest Plans Management Activities Forest Assessment

Note: For these elements, the interval of data collection is beyond this reporting cycle, or more time and data are needed to understand status or progress of the plan component, or methods and results are inadequate to answer monitoring question.

Table 2. Socioeconomic summary of findings and results

Monitoring Question	Year Updated	Do monitoring results demonstrate intended progress or trend toward Southern Region targets?	Based on the evaluation of monitoring results, may changes be warranted?	If a change may be warranted, where may the change be needed?
What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?	2018 (First Evaluation) 2020	Yes: Forest management considers impact of population and population growth Yes: Forest management addressing sustainable recreation needs Yes: Forest management contributes to local economies	No	Plan Monitoring Program Forest Plans Management Activities

Potential Future Monitoring Opportunities

Census Reports

The Southern Region staff invests significantly in inventory, monitoring, and assessment activities, but the data collected are not always accessible, up to standard, or relevant to informing management decisions. To determine which monitoring data sets are extraneous, which are necessary, and which need bolstering to meet required standards, a census of these attributes was conducted across the Southern Region. Data were collected in 2017, including interviews with 18 regional program managers and with forest planners, monitoring coordinators, or both (that is, those responsible for monitoring evaluation reports) on all 15 administrative units, nine program-specific surveys administered on each of 14 administrative units, and four interviews with regional air quality specialists. Preliminary results were drafted into 10 program-specific reports, which have been reviewed and interpreted by regional program managers. The results of the inventory, monitoring, and assessment census identify the value of the Southern Region's monitoring efforts and can inform improvements in efficiency and efficacy of data being used to inform decision making. Two in a series of reports focused on vegetation and soil, watershed condition, air quality, and aquatic-animal-related monitoring was finalized in June and December of 2019, respectively. A continuing goal of this effort is to identify appropriate monitoring questions for currently available corporate data and share results with all staff across the region.

Climate Change and Other Stressors

Summary

In the short term, there is no need for change in forest plan direction, management activities, or monitoring arising from this evaluation. Periodic evaluation (approximately every 5 years) of the climate monitoring should continue to detect any changes not currently projected as models improve and datasets are made available for analysis.

The significant changes in temperature, precipitation (drought), and sea level rise need to be considered in future long-term planning efforts, including those that apply to ecological systems and recreation uses on the national forests.

Future forest plan assessments and revisions need to address short and long term climate change effects to forest ecosystems and the need to manage tree densities through practices such as thinning and prescribed fire to maximize carbon sequestration and reduce vulnerability of forest stands to water stress, insect and disease outbreaks, and fire.

It is difficult to project how forests and carbon trends will respond to novel future conditions. As climate change persists for several decades, critical thresholds may be exceeded, causing unanticipated responses to some variables like increasing temperature and carbon dioxide concentrations. The effects of changing conditions will almost certainly vary by species and forest type. Some factors may enhance forest growth and carbon uptake; others may hinder the ability of forests within the Southern Region to act as a carbon sink, potentially causing various influences to offset each other.

Personnel on national forests in the Southern Region need to address short- and long-term climate change effects and stressors to forest ecosystems and the human environment. They also need to address the effects of changes to carbon sequestration.

Monitoring Questions and Indicators

Question 1: How has climate variability changed and how is it projected to change across the region?

Question 2: How is climate variability and change influencing the ecological, social, cultural, and economic conditions and contributions provided by plan areas in the region?

Question 3: What effect do management units in the region have on a changing climate?

Relevant indicators to understand climate change and other stressors are climate extremes, precipitation, sea level rise, temperature, water balance, forest health, nonnative invasive species, phenology, prescribed fire, recreation use and satisfaction, and wildfire.

Key Results

Mean sea level heights have been rising at national forests located near the Atlantic Ocean and Gulf of Mexico. Based on monthly mean sea level data from various time periods they are projected to increase from 0.84 feet to 1.58 feet over the next 100 years. Significant increases in coastal high tide flooding are also forecasted; by 2065 they are estimated to increase by 34 to 351 days per year based on low and high greenhouse gas emissions modeling scenarios.

An increase in daily average maximum and minimum temperature, an increase in the days per year in which the temperature reaches above 90 degrees Fahrenheit, and a decrease in the days per year in which the temperature falls below 32 degrees Fahrenheit are projected. By mid-century (2036 to 2065), mean projected changes in temperature variables are statistically significant over the baseline (1961 to 1990).

The range of change in forecasted dry days per year includes the possibility of a decrease, an increase, or no change. However, the projection suggests an increase in dry days in three of the four representative ecoregions, with Southern Blue Ridge Mountains being the exception. There appears to be a trend toward a modest increase in total precipitation, with little change in the number of dry days per year.

In the southeastern U.S., extreme weather events like drought, hurricanes, and wildfires are projected to increase or worsen due to climate-related effects. The threat from invasive insects and diseases is projected to increase with warmer temperatures. Severe drought impacts could lower streamflow in forested watersheds. Increased water temperature due to warming climate can potentially lead to an increase in toxic algal blooms in lakes.

Changes in precipitation due to drought could negatively impact water based outdoor recreation like canoeing, kayaking, and motorized activities. Increase in temperature can impact visitors' comfort. Climate change can also have impacts on culturally significant natural resources.

Warmer temperatures due to climate change are converting saltwater marsh to mangroves and shifting where the marsh to mangrove ecotone exists. Sea level rise will increase soil salinity levels in coastal communities. Coastal forest retreat due to saltwater intrusion and the formation of "ghost forests" has been documented along the Southeast U.S. coastline. This has negatively affected some bird species. In addition, coastal wetlands have seen plant community shifts due to higher levels of salinity.

Certain amphibian and insect species such as the red legged salamander or the Diana Fritillary that are highly dependent on elevation are becoming more and more isolated due to habitat fragmentation and loss.

Forests in the Southern Region are maintaining a modest carbon sink (Dugan and others 2020[2]). Carbon stocks increased by about 29.7 percent on average across the Southern Region between 1990 and 2013, and negative impacts on carbon stocks caused by disturbances and environmental conditions have been modest, not exceeding forest growth.

Carbon storage in harvested wood products from national forests within the Southern Region increased since the early 1900s; however, recent declines in timber harvesting have slowed the rate of carbon accumulation in the product sector. Forest carbon losses associated with harvests have been small compared to the total amount of carbon stored in the Southern Region, resulting in a loss of about 2.4 percent of non-soil carbon from 1990 to 2011. Projections from the Resource Planning Act assessment indicate a potential decline in forest carbon stocks in the Southern Region (all land ownerships) beginning in the 2020s because the forests in the region are getting older—half are more than 80 years old.

Recent warmer temperatures and precipitation variability may have stressed forests, causing climate to have a negative impact on carbon accumulation in the 2000s. Conversely, increased atmospheric carbon dioxide and nitrogen deposition may have enhanced growth rates and helped counteract ecosystem carbon losses due to historical disturbances, aging, and climate.

Recommended Changes

Based on these results, we are considering the following possible changes:

- Develop a coordinated system of monitored and controlled entrance points that control the majority of water flow inland from the shoreline. Designate high-value water and land restoration areas in order to reduce salt-intrusion as well as to preserve marshes and swamps.
- Restore ecological integrity to impacted ecosystems (for example, managing for longleaf and shortleaf pine). This can have positive effects on disease and pest resistance, as well as wildfire and drought resilience.
- Conserve buffer areas along riparian habitats to provide habitat for amphibian species.
- To maintain habitat connectivity in high-elevation refugia areas, reduce road density and heavy equipment use where there is an opportunity.
- Create habitat corridors, assist in species movement, increase national forest management unit sizes, and identify high-value conservation lands adjacent to national forests.
- Manage for tree species with high adaptive capacity.
- Use early detection and rapid response to respond to invasive species.
- Reduce impact on aquatic ecosystems affected by drought by favoring tree species that are fire tolerant and have relatively low water use (for example, longleaf pine).
- Remove invasive species that use more water to reduce stress on the aquatic ecosystems.

2 Dugan, A.; McKinley, D.C.; Turpin, P. 2020. Forest carbon assessment for the Southern Region. U.S. Department of Agriculture, Forest Service. Unpublished report. 26 p. Available at the Southern Region, Regional Office, 1720 Peachtree Road, NW Ste. 816N Atlanta, GA 30309-2405.

- Monitor to determine when it is safe for recreational activities to take place in water recreation areas and effectively communicate the potential risks of higher temperature or high water levels to visitors.
- Work with local indigenous populations and cultural groups to provide resources to adapt to the climate-driven changes on their cultural sites.
- Manage tree densities through practices such as thinning and prescribed fire to maximize carbon sequestration and reduce the vulnerability of forest stands to water stress, insect and disease outbreaks, and fire.
- Communicate early warnings of extreme weather events to visitors.
- It will be important for forest managers to continue to monitor forest responses to these changes and potentially alter management activities to better enable forests to better adapt to future conditions (Dugan and others 2020).

Social, Economic, and Cultural Sustainability

Summary

Based on the review, population and poverty are two indicators worth noting at this time.

Many of the areas of influence surrounding the Southern Region's forests and grasslands have seen significant population growth (table 3). Managing the demands that population growth places on public lands will be a challenge that personnel in the Southern Region will need to continually address into the future.

With some exceptions, the unemployment rate for the national forests and grasslands' area of influence in the Southern Region is within the "natural" range of unemployment (table 4). Areas with higher unemployment may be more sensitive to changes in national forest management that impacts the local economy. However, the percentage of population below poverty level is slightly higher for the Southern Region than the national nonmetro average—18 percent compared to 15 percent. The communities adjacent to some national forests experienced even higher poverty levels (table 5).

Individuals with low incomes are more vulnerable to a number of hardships that may negatively affect their health, cognitive development, emotional well-being, and school achievement. Communities or households with low incomes will be more sensitive to management actions that impact costs to use or access forest resources, for example. Since these individuals will be more vulnerable to changes in the management of local resources, it is important for forest managers to understand how these national forest users may be affected by changes or restrictions to forest uses.

Finally, recreation-related employment is substantial relative to other resource areas in the Southern Region (table 6). Recreation visitor spending is the largest single source of economic activity associated with the Southern Region's national forests and grasslands. Managing sustainable outdoor recreation opportunities with decreasing budgets and increasing population is a challenge the region is already confronting through their sustainable recreation effort. This collaboration with communities, tourism providers, recreation enthusiasts, and other stakeholders is intended to maintain recreation experiences that are economically beneficial, as well as, socially and ecologically sustainable in the long term.

Monitoring Question and Indicators

Question 1: What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?

Relevant indicators to understand economic conditions are population size and growth, employment, income, and poverty. In addition, relevant indicators of the contribution of the management of the national forests to local economies are jobs and income, payment to states and counties, and forest expenditures and employment. For most of the indicators, the area of

influence for each national forest unit follows that used in the forest plan. These areas are a group of counties surrounding the national forest units. Reliable demographic and economic data are available at the county-level. The regional indicators are considered to be the grouping of all 279 counties within each of the 19 planning unit's areas of influence.

Key Results

Population size and growth: Many of the areas of influence surrounding the Southern Region's national forests and grasslands have seen significant population growth (table 3). Growing populations and development will place greater demand on forest resources and may affect the perceived aesthetics and uses associated with National Forest System lands. Forest managers can expect to be tasked with maintaining the quality of visitors' experiences while providing forest products and cultural and recreational experiences to a greater number of people. Growing populations, specifically homes, near public lands also contributes to the costs of fighting wildland fires. As populations grow, conflicts between local residents and forest visitors may increase.

Table 3. Total population and population change, by planning unit area of influence[1]

Planning Unit	Total Population 2000	Total Population 2016	Percentage Change 2000 to 2016
Francis Marion National Forest	966,212	1,298,705	34%
National Forests in Florida	1,232,584	1,631,303	32%
National Forests and Grasslands in Texas	1,083,846	1,429,561	32%
Ozark-St. Francis National Forests	678,374	867,283	28%
Chattahoochee-Oconee National Forests	879,200	1,081,647	23%
George Washington National Forest	587,309	673,028	15%
Nantahala-Pisgah National Forest	820,564	943,759	15%
Croatan National Forest	161,649	182,180	13%
Ouachita National Forest	545,030	597,548	10%
Uwharrie National Forest	305,600	335,760	10%
Cherokee National Forest	578,052	622,432	8%
Land Between the Lakes	138,430	146,896	6%
National Forests in Mississippi	1,079,419	1,136,356	5%
National Forests in Alabama	736,578	768,901	4%

Planning Unit	Total Population 2000	Total Population 2016	Percentage Change 2000 to 2016
Jefferson National Forest	779,875	810,922	4%
Sumter National Forest	405,695	414,921	2%
Kisatchie National Forest	395,644	400,706	1%
Daniel Boone National Forest	445,397	447,315	0%
El Yunque National Forest	336,795	326,091	-3%
Southern Region (excluding El Yunque)	11,711,122	13,676,759	17%
United States	282,162,411	323,127,513	15%
US (Nonmetro)	45,201,471	46,494,722	3%

1. The area of influence for each national forest unit follows that used in the forest plan. These areas are a group of counties surrounding the national forest units. The regional indicators are considered to be the grouping of all 279 counties within each of the 19 planning unit's areas of influence.

Data Sources: U.S. Department of Commerce. 2017. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C., reported by Headwaters Economics' Economic Profile System, headwaterseconomics.org/eps; U.S. Census Bureau, 2012–2016 American Community Survey 5-Year Estimates; U.S. Census Bureau, 2000 Decennial Census.

Employment: Though it may seem full-employment is often the goal, there is an inherent "natural" rate of unemployment. The natural rate of unemployment is believed to fall somewhere between 5 and 6 percent and allows workers to move between jobs and industries without signaling broad economic distress.

The Southern Region planning area rate of unemployment average falls between the national average and national nonmetro average (table 4). There is no indication of any particularly special circumstances within the region relative to the Nation. Generally, the unemployment rate for the national forests and grasslands' area of influence in the Southern Region is also within this acceptable range. Three planning areas—Kiskatchie National Forest, National Forests in Alabama, and Daniel Boone National Forest—have unemployment rates above 6 percent (table 4). These regions may be more sensitive to changes in national forest management that impacts the local economy.

Table 4. Unemployment rate in planning unit's area of influence, 2016

Planning Unit	Percentage Unemployed
El Yunque National Forest	23.1%
Daniel Boone National Forest	7.2%
Kisatchie National Forest	6.8%
National Forests in Alabama	6.5%
National Forests in Mississippi	6.0%
Land Between the Lakes	5.6%
Cherokee National Forest	5.4%
National Forests and Grasslands in Texas	5.4%
Chattahoochee-Oconee National Forests	5.3%
Sumter National Forest	5.3%
Croatan National Forest	5.2%
Francis Marion National Forest	5.0%
National Forests in Florida	4.9%
Uwharrie National Forest	4.9%
Jefferson National Forest	4.8%
Nantahala-Pisgah National Forests	4.6%
Ouachita National Forest	4.4%
George Washington National Forest	3.9%
Ozark-St. Francis National Forests	3.5%
Southern Region (Region 8)** (excludes El Yunque)	5.1%
United States	4.9%
US (Nonmetro)	5.4%

**Reported as a population weighted average of national forest-level unemployment rate. Some counties are double counted if they are included in more than one national forest area of influence.

Note: Unemployment rates by forest planning unit are included in an appendix D of the Broad-Scale Socioeconomic Monitoring Evaluation Report for the Southern Region.

Data Source: U.S. Department of Labor. 2018. Bureau of Labor Statistics, Local Area Unemployment Statistics, Washington, D.C., reported by Headwaters Economics' Economic Profile System, headwaterseconomics.org/eps; U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.

Income and poverty: The Southern Region's per capita income is similar to the nonmetro national average. However, the communities surrounding some national forests experience higher poverty levels (table 5). Poverty is an important indicator of both economic and social well-being. In general, low income individuals tend to rely more heavily on natural resources and depend more directly on National Forest System lands for sustenance and home heating. Communities or households with low incomes will be more sensitive to management actions that impact costs to use or access forest resources, for example. Since these individuals will be more vulnerable to changes in the management of local resources, it is important for national forest managers to understand how these forest users may be affected by changes or restrictions to forest uses.

Table 5. Per capita income and population poverty levels within planning unit's area of influence, 2016

Planning Unit	Per Capita Income	Percentage of Population below Poverty Level
El Yunque National Forest[1]	$ 9,968	47%
Daniel Boone National Forest	$ 30,908	29%
Kisatchie National Forest	$ 38,961	23%
National Forests in Mississippi	$ 34,252	23%
National Forests in Alabama	$ 34,211	21%
Sumter National Forest	$ 34,872	21%
Cherokee National Forest	$ 37,054	19%
Ouachita National Forest	$ 36,141	19%
Chattahoochee-Oconee National Forest	$ 36,464	18%
Land Between the Lakes	$ 36,928	18%
Nantahala-Pisgah National Forests	$ 37,623	18%
National Forests in Florida	$ 39,664	17%
Francis Marion National Forest	$ 41,187	17%
Uwharrie National Forest	$ 35,575	17%
Ozark-St. Francis National Forests	$ 47,198	17%
National Forests and Grasslands in Texas	$ 44,573	16%
Croatan National Forest	$ 44,153	15%
Jefferson National Forest	$ 39,750	15%
George Washington National Forest	$ 40,378	11%
Southern Region (Region 8)	$ 38,237	18%
U.S. (Nonmetro)	$ 39,024	13%

1. These estimates use different data sources and are not strictly comparable, however efforts were made to make them comparable.

Sources: U.S. Department of Commerce. 2017. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C., and U.S. Department of Commerce. 2017. Census Bureau, American Community Survey Office, Washington, D.C. reported by Headwaters Economics' Economic Profile System, headwaterseconomics.org/eps. Downloaded May 24, 2018; U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates, available at https://factfinder.census.gov. Downloaded June 7, 2018

Recreation-related employment: Recreation visitor spending is the largest single source of economic activity associated with the Southern Region's forests and grasslands (table 6). Local and non-local recreation visitors account for nearly 50 percent of all jobs contributed by Forest Service resources, uses, and management activities in the communities that surround national forests and grasslands in the Southern Region.

Table 6. Total number of jobs and total labor income contributed by program area, 2015

Program Area	Jobs	Total Labor Income (thousands of 2015 dollars)
Recreation	14,229	$454,544
Timber	4,208	$216,010
Minerals	174	$17,657
Grazing	80	$1,162
Payments to States/Counties	1,038	$50,441
Forest Service Expenditures	4,536	$271,820
Total Southern Region Forest	24,268	$1,011,632

Note: The reported figures are a summation of the analysis for each planning unit. The region is not modeled as a whole. Forest-planning unit level detail is included in the appendices of the Broad-Scale Socioeconomic Monitoring Evaluation Report for the Southern Region. Number may not sum due to rounding.

The job estimates serve as an annual average, but they do not differentiate between the provision of full-time, part-time, or seasonal work.

Due to changes in the methods used to define the areas of influence 2015 estimates are not strictly comparable to earlier year estimates.

Source: Economic Contributions at a Glance, 2015 via personal communications with Susan Winter, WO EMC, May 13, 2018; 2014 reports available at https://www.fs.fed.us/emc/economics/contributions/at-a-glance.shtml.

Recommended Changes

Employment by sector, and relative size of the sector, is an area that may be of interest in future iterations. A broader overview of employment by sectors could illustrate the size and importance of the timber sector, for example and therefore help understand the relative importance of forest product removal and changing relationship to public lands. However, some linkages are harder to make. The recreation program makes a significant contribution to the local economies, but sectors related to tourism and recreation are more dispersed throughout the economy and National Forest System lands are only one component providing these services. Regardless, a thoughtful assessment of sector employment trends is an area that is considered in forest-specific analysis.

Status of Select Ecological Conditions

Introduction

Since the strategy was initiated, and is incorporated in this 5-year report, we are moving toward a version 2.0 of the strategy by way of addressing, at the regional level, monitoring topic 219.12(a)(5)(ii), The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems. The following broad scale monitoring questions and indicator can be used in addressing the Southern Region's position of ecological plant health and vitality. Invasive plants are one indicator of ecological condition of terrestrial and aquatic systems that can be impacted by management actions as well as climate change. The management program for invasive species focus on early detection and rapid response, control, and prevention.

Monitoring Questions and Indicators

Question 1: What changes are occurring in the establishment and expansion of invasive plant species across the landscape?

Relevant indicators to understand conditions are the spatial extent of known invasive plant infestations on national forest system lands and distribution and density of invasive plant infestations across the landscape.

Question 2: What impact are management actions having on invasive plant species?

Relevant indicator to understand conditions are acres treated for invasive plant species, values and resources stewarded by invasive plant management, and partnerships.

Definitions

Infested area: An area of land or water, in acres, containing a single invasive species delineated by the actual perimeter of the infestation as defined by the outer edge of the canopy cover of plants or the visible population, home range or stream reach of other taxa, excluding adjacent areas not infested and outside the perimeter of the population.

Invasive species: An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). The species must cause, or be likely to cause, harm and be exotic to the ecosystem it has infested. Thus, native pests are not considered invasive.

Relevance and Rationale

Nonnative invasive species are an issue across the entire Southern Region and are identified within national forest land and resource management plans and State Forest Resource Assessments as primary threats to forest health and productivity.

Accuracy and Reliability

Utilization of Forest Service data within the Threatened, Endangered, and Sensitive Plants – Invasive Species (TESP-IS) database and Southern Research Station's Forest Inventory and Analysis Unit that is collected with a standardized protocol.