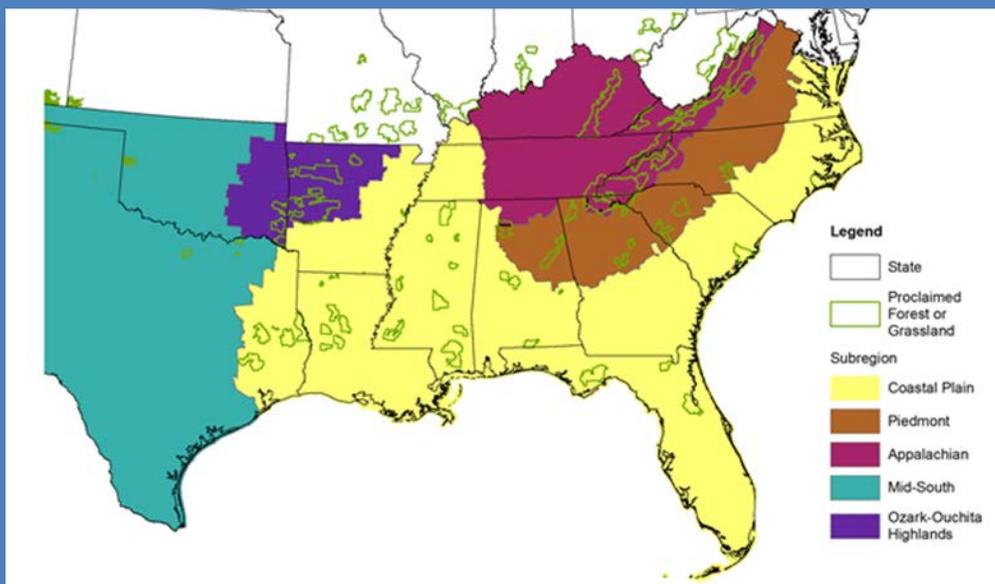




United States Department of Agriculture



SOUTHERN REGION BROAD-SCALE MONITORING STRATEGY

*VERSION
1.0*



Forest Service

Southern Region

February 2016

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1 Broader-scale Monitoring Strategy

1.1 Vision

The vision of the Southern Region’s (R8) Broad-scale Monitoring Strategy (hereafter “Strategy”) is to:

- Provide a flexible process that will implement the objectives of the 2012 Planning Rule while serving the needs of individual units;
- Promote overall efficiency by monitoring conditions at an appropriate scale across multiple units, gaining efficiencies of scale that will reduce monitoring needs on individual units;
- Support adaptive management by monitoring changes at the landscape level, and relating those changes to desired conditions on management unit land;
- Prioritize the essential portions of the eight monitoring items identified by the planning rule, using focused and efficient questions that aspire to the highest standards of scientific integrity;
- Produce high-quality data and data analysis, using methods that are within the available resources and capabilities of the agency;
- Utilize existing data, internal and external, as appropriate to the objectives of the 2012 Planning Rule.

1.2 Introduction

The 2012 Planning Rule requires that Regional Foresters develop broad-scale monitoring strategies (219.12 (b)), which include the following general characteristics:

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

Land Management Plans (LMPs) guide sustainable, integrated management of the resources within the plan area in the context of the broader landscape. LMP monitoring programs close the loop in the adaptive management cycle by connecting plan implementation with assessment (fig. 1), focusing on testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness (219.5). LMP monitoring should be coordinated and integrated with relevant broader-scale monitoring

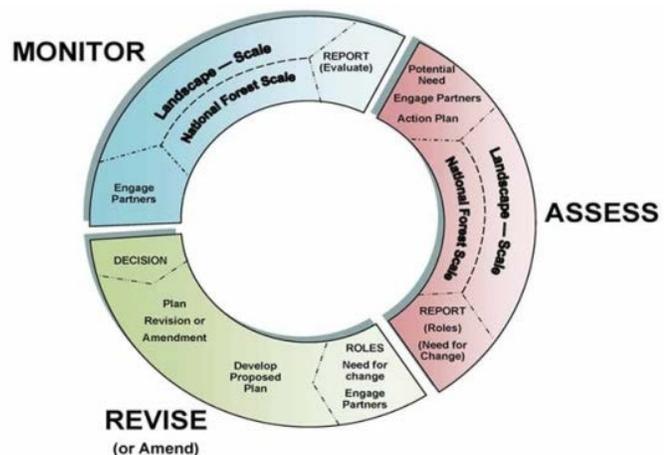


Figure 1—Adaptive management cycle.

strategies to ensure that monitoring is complementary and efficient, and that information is gathered at scales appropriate to the monitoring questions. Ultimately, each responsible official overseeing the implementation of a plan shall consider and evaluate existing and possible future conditions and trends of the plan area, and assess the sustainability of social, economic, and ecological systems within the plan area, in the context of the broader landscape (219.12).

Information Resources & Tools Supporting the Strategy

Forest Inventory

- [Forest Inventory and Analysis \(FIA\)](#)
- [Design Tool \(DTIM\) and Analytical Tools \(ATIM\)](#)

Programmatic Frameworks

- Forest Health Protection
- [Watershed Condition Framework](#)
- Recreation Program Trend Tracker

Corporate Data

- [Natural Resource Manager \(NRM\)](#)
 - *Forest Service Activity Tracking System (FACTS)*
 - *Infrastructure (Infra)*
 - *Natural Resource Information System (NRIS)*
 - *Timber Information Manager (TIM)*

Regional Monitoring

- R8 Bird Monitoring
- Fire Effects Monitoring

Planning Tools

- [Ecological Sustainability Evaluation \(ESE\) Tool](#)
- [Forest Plan Database Exchange of Current Knowledge \(FP_DECK\)](#)

Technology Transfer

- [Template for Assessing Climate Change Impacts and Management Options \(TACCIMO\)](#)

1.3 Implementation Approach

The Strategy is built over time based on the ongoing implementation of the 2012 Planning Rule and related complementary efforts. This section describes the implementation approach, which is driven by LMP revision and monitoring and evaluation processes. Information from regional and locally relevant sources is utilized to answer monitoring questions. Broad-scale questions connect to plan-level through common indicators, which should emphasize commonalities in science, questions, needs, methods, and scales. Similar to LMP monitoring and evaluation, the results of the Strategy are summarized biennially in a report posted to the Region’s public-facing website. Topics related to the implementation of the Strategy are described in detail in the sections that follow:

- Related key processes (1.3.1)
- Criteria for selecting monitoring questions and indicators (1.3.2)
- Definitions of key monitoring elements (1.3.3)
- Roles and responsibilities (1.3.4)
- Delivery of Strategy results to management units (1.3.5)
- Coordination needs (1.3.6)
- Making results public and receiving feedback (1.3.7)
- Partnerships (1.3.8)

1.3.1 Related processes that are key to developing and implementing the Strategy

The Strategy is supported by existing and ongoing planning activities on management units across the region:

- **LMP Revision Process** – The LMP revision process is the “engine” of the Strategy. LMP revision efforts will drive the development and refinement of the Strategy over time, as well as the integration of the Strategy into plan-level monitoring programs. The Ecological Sustainability Evaluation (ESE) Tool provides an existing framework used across plan revisions that is capable of connecting the Strategy to the LMP revision process (see Appendix E for additional detail).
- **Biennial monitoring and evaluation** – The biennial monitoring and evaluation process provides an ongoing opportunity to apply and evaluate the Strategy, including the review and refinement of monitoring questions, indicators, and connections to adaptive management.
- **Budget Timeline and Cycle** – The annual budget, work planning, and budget guidance process provides an opportunity to evaluate the Strategy from an operational point-of-view. In particular, program managers may realize efficiencies related to monitoring and evaluation by aligning work with the Strategy.

1.3.2 Criteria for selecting broad-scale monitoring questions, indicators, and sources of information

The general process for evaluating monitoring questions is described below and in figure 2. In general, these criteria are broad and are intended to provide significant latitude that supports the current and future needs of the management units.

- **Criteria for designing monitoring questions**

- Monitoring needs most efficiently addressed for multiple plan areas at the same time or are beyond the technical feasibility of a single management unit
- Contribute to a broader understanding of the landscape surrounding management units
- Provide information necessary to evaluate plan implementation
- Are within the financial and technical capabilities of the region
- **Criteria for selecting indicators and supporting sources of information**
 - Use the same attributes and measures as standardized data (e.g., corporate data)
 - Are based on best available science (see Appendix B)
 - Are useful for answering multiple questions (note: this should not be at the expense of the relevance of the indicator to the question)

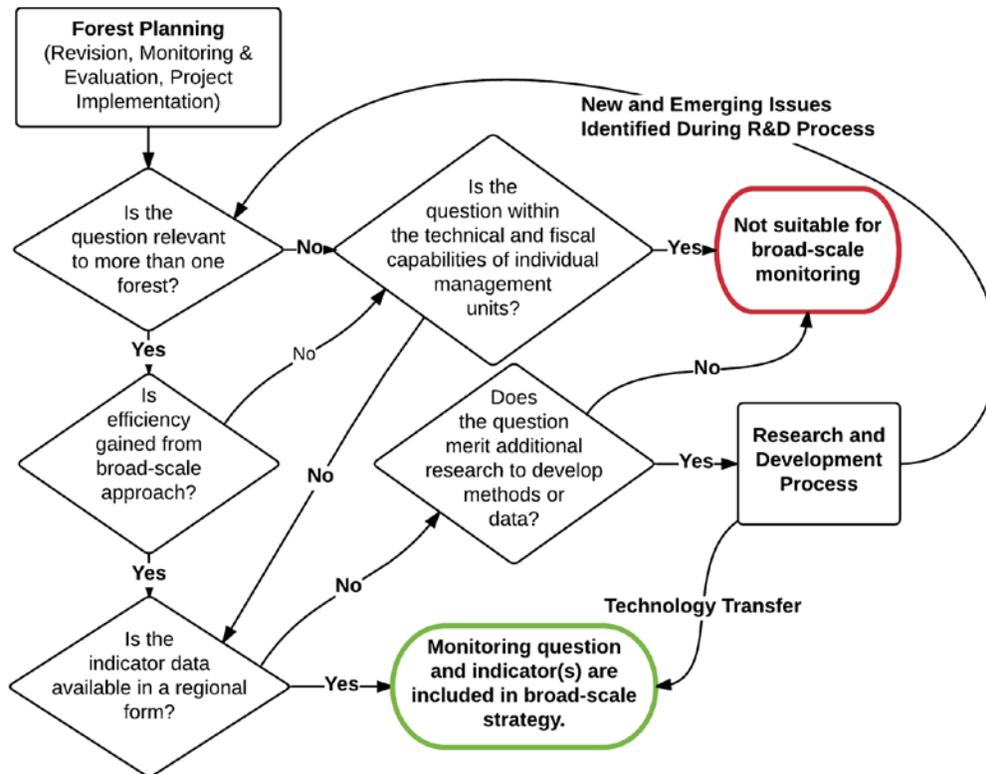


Figure 2-Monitoring question and indicator(s) selection process.

1.3.3 Monitoring Questions, Indicators, and Adaptive Management Elements

The Strategy incorporates the following elements:

- Monitoring Question—provides context for evaluation of indicators.
- Indicators—performance measures or other methods associated with monitoring questions that the agency will use to gauge or track accomplishments of management units in the region toward objectives and desired conditions. They provide a measureable quantitative or qualitative parameter and may be tiered (e.g., coarse filter, fine filter, or hierarchical). The attributes of each indicator are:

- Sources—the database (corporate or otherwise), partner, or other data provider supporting acquisition of indicator attributes and measures.
- Frequency of Reporting—describes the timing of monitoring and evaluation efforts. Most indicators are reported on annually, while others are reported at longer or shorter intervals based on the length of time needed to discern a measureable change.
- Scale of Reporting—describes the level of analysis with respect to land size or level of application.
- Monitoring System or Research Need—identifies areas where new protocols, procedures, systems of organization, or research may be needed.
- Alert—the condition that the monitoring measure or indicator passes (including measures of uncertainty) that may indicate a need for additional assessment, modifications to the monitoring, or need for change in plan direction.
- Adaptive Management Strategies—when an alert (monitoring finding of significance) is reached, the response strategy is described, along with practical implications to management.

1.3.4 Roles and responsibilities

A. Regional Office (RO)

1. The RO Planning Staff will coordinate implementation of the Strategy.
2. Planning Staff will work with Resource Information Management (RIM) and other appropriate staffs to design and produce results.
3. Planning Staff will facilitate the review and interpretation of these results by relevant subject matter experts from the RO interdisciplinary team (IDT).
4. The RO IDT will facilitate the transfer of Strategy results through program delivery and review functions, particularly those associated with forest plan revision.
5. The RO IDT will facilitate interactions with Research and Development when research needs exist.

B. Supervisor’s Office (SO)

1. Forest Supervisors will review Strategy results in the context of plan-level monitoring and evaluation reports.
2. Forest Supervisors will provide feedback to the RO on usefulness of Strategy results.
3. During LMP revision, Forest Supervisors will integrate relevant aspects of the Strategy into the revised LMP.

1.3.5 Providing broader-scale monitoring results to management units

A. General Support and Expertise

1. The RO IDT will facilitate the transfer of broad-scale results to Forest Supervisors in coordination with biennial monitoring at the unit-level so that Forest Supervisors can review unit-level finding in the context of the broader-landscape.
2. The RO Planning Staff assist management units with maintaining awareness of broad-scale monitoring resources through planning communities of practice (i.e., forest planners and NEPA coordinators)

B. Documentation of Results

1. Results of the strategy will be made available on the RO's website
2. Results will be presented in a report format similar to that of a forest-level monitoring and evaluation report
- C. Access to underlying datasets
 1. Whenever possible and practical, the data underlying the results summarized in the Strategy report will be made available

1.3.6 Coordination needs

- A. Research and Development
 1. The Southern Research Station (SRS) and other research partners may provide scientific reviews of reports developed under this Strategy. This will be particularly important for emerging issues or where research needs exist.
 2. The RO will collaborate with the SRS and other research partners to address research needs.
- B. State and Private Forestry (S&PF)
 1. Help build awareness of and deliver relevant results from the Strategy to external partners.
 2. Acquire and provide relevant data from traditional S&PF partners that serve the needs of the Strategy and provide for mutual benefits.
 3. S&PF may provide a review of the reports developed under this Strategy, especially where findings or issues are especially relevant to S&PF needs or where S&PF information is leveraged to meet management unit needs.
- C. External Partners
 1. Partners may provide information needed to address indicators and answer monitoring questions identified in the Strategy.
 2. Partners will be given the opportunity to provide feedback on the application of information obtained from them.
 3. Partners will be encouraged to actively engage in the ongoing implementation of the Strategy by identifying new monitoring needs and sources of information.

1.3.7 Making results public and receiving feedback

The RO will publish results of the Strategy under the "[Land and Resource Management](#)" section of the Region's public facing website. The RO will collect feedback on the Strategy through collaborative and comment activities related to formal forest planning processes (i.e., those related to LMP revisions and NEPA).

- A. Internal feedback
 1. Forests will provide informal feedback on the usefulness of broad-scale monitoring resources during the development of biennial monitoring and evaluation reports.
 2. Forests will provide formal feedback from partners and the public as it relates to Strategy results presented in forest monitoring and evaluation reports.
 3. LMP monitoring and evaluation reports will be reviewed by the RO to assess the applications of Strategy results.

B. External feedback

1. In addition to the feedback collected by management units from external sources, the RO will collect feedback from regional partners and interest groups through regional-scale collaborations and partnership activities (see Partnership Highlight sidebar).
2. The RO will consider revisions to monitoring questions, indicators, and sources of information, as well as results and evaluation, based on external feedback.
3. The RO will identify opportunities where partnerships of special significance may justify development of formal regional relationships to enable additional investments.

1.3.8 Partnerships

Partnerships (formal and informal) are an important element of the Strategy that can inform monitoring efforts and expand FS capabilities to effectively supporting the Strategy. Partnering with Forest Service Research and Development (R&D) and other federal agencies, states, and non-governmental entities will allow the Region to maximize efficiency while empowering contributions focused on unique capabilities of each partner. However, it should be noted, that that criteria for selecting monitoring questions, indicators, and sources of information (Sec. 1.3.2) still apply in the context of partnership activities. The general approach of when and how to engage partners in the Strategy is captured in figure 3.

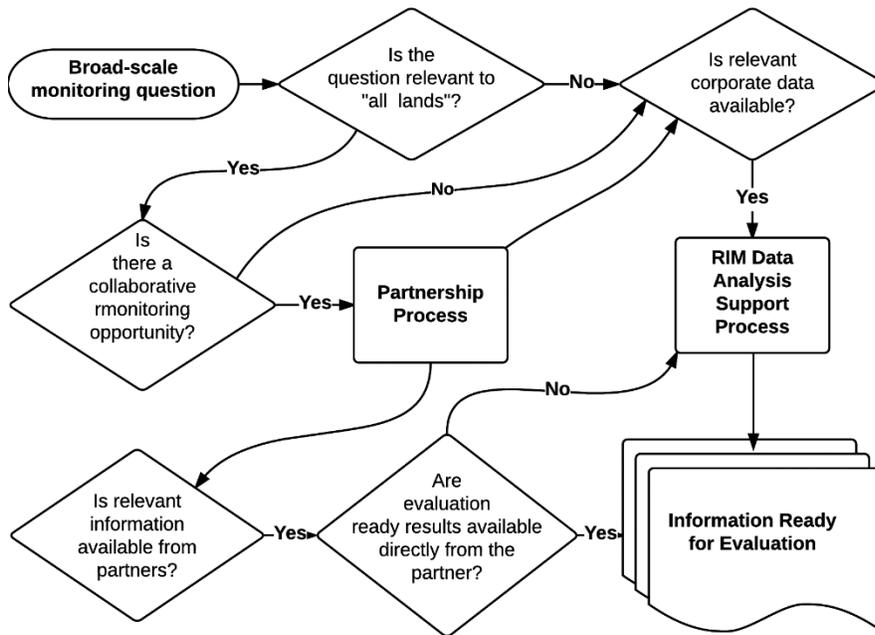


Figure 3—Process for leveraging partnerships to support information needs.



**Partnership Highlight:
America’s
Longleaf
Restoration
Initiative**

- Organized under a Federal Coordinating Committee
- Developed commonly used Condition Class Definitions
- Range-wide Accomplishment Reporting
- Local Implementation Teams and MOU Development
- Longleaf Pine Mapping Effort and Stand-level Database

1.4 Monitoring Questions and Indicators

Monitoring questions are presented in two sections: 1.4.1 contains questions and indicators that are adopted under the Strategy; 1.4.2 contains a crosswalk between questions adopted under the Strategy and by individual management units.

1.4.1 Broad-scale

Broad-scale monitoring questions and indicators are structured around the monitoring requirements of the 2012 Planning Rule (36 CFR 219.12(a)). This section presents monitoring questions, indicators, and adaptive management elements. See Appendix A for a detailed presentation of this information, including sources of information, reporting frequency, and regional relevance for each indicator.

1.4.1.1 Watershed conditions

Tentatively scheduled for completion in calendar year 2016.

1.4.1.2 Ecological conditions (terrestrial and aquatic ecosystems)

Tentatively scheduled for completion in calendar year 2016.

1.4.1.3 Focal species

Tentatively scheduled for completion in calendar year 2016.

1.4.1.4 Federally listed threatened and endangered species, proposed and candidate species, and species of conservation concern

Tentatively scheduled for completion in calendar year 2016.

1.4.1.5 Visitor use, visitor satisfaction, and progress toward meeting recreation objectives

Tentatively scheduled for completion in calendar year 2016.

1.4.1.6 Climate change and other stressors

Table 1.4.1.6—Monitoring questions with associated indicators, alerts, and adaptive management strategies related to climate change and other stressors.

Monitoring Question: How has climate variability changed and how is it projected to change across the region?	
Indicators: Climate extremes, Precipitation, Sea level rise, Temperature (air and water), Water balance	
Alert(s)	Adaptive Management Strategy
Significant changes in rates of known (e.g., temperature, precipitation intensity) trends or detection of significant trends for variables that were previously unknown or uncertain (e.g., average precipitation).	Support detection and implement coordinated responses to climate related disturbances; Support facilitated learning among management units that promotes improved consideration during planning and operational readiness.
Monitoring Question: How is climate variability and change influencing the ecological, social, cultural, and economic conditions and contributions provided by plan areas in the region?	
Indicators: Forest health, Forest status and trends, Non-native invasive species (NNIS), Phenology, Prescribed fire, Recreation use and satisfaction, Wildfire	
Alert(s)	Adaptive Management Strategy

Deterioration of and/or lack of progress toward climate sensitive desired conditions and objectives.	Assess trends as they relate to forest plan direction and determine if there is a need for change in plan monitoring and/or plan direction.
Monitoring Question: What effect do management units in the region have on a changing climate?	
Indicators: Carbon stocks and fluxes, Greenhouse gas emissions	
Alert(s)	Adaptive Management Strategy
The forest becomes a net-source of carbon.	Determine cause (e.g., successional trajectories, catastrophic disturbance) and evaluate consistency with forest plan direction.

1.4.1.7 Progress toward meeting the desired conditions and objectives

Tentatively scheduled for completion in calendar year 2016.

1.4.1.8 Management system sustainability

Tentatively scheduled for completion in calendar year 2016.

1.4.1.9 Social, cultural, economic sustainability

Table 1.4.1.9—Monitoring questions with associated indicators, alerts, and adaptive management strategies related to social, cultural, and economic sustainability.

Monitoring Question: What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?	
Indicators: Employment and Specialization, Jobs and Income, Personal Income, Population Change, Poverty, Racial and Ethnic Composition, Social Vulnerability	
Alert(s)	Adaptive Management Strategy
Declining trends in social, cultural and economic conditions that relate to contributions provided by the management units in the region.	Determine if changes in plan direction or plan implementation are needed to address changes.

1.4.2 Management Unit

Management unit monitoring that is supported by the Strategy (sec. 1.4.1) is presented in Table 1.4.2. This section will be expanded as LMP monitoring programs are revised within the context of the Strategy and 2012 Planning Rule.

Table 1.4.2—A Comparison of Broad-scale Monitoring Questions with Forest Plan Monitoring Questions (from Forest Plans being revised under the 2012 Planning Rule).

Broad-scale Monitoring Question	Plan	Plan Monitoring Question
What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?	Francis Marion (2015 - Draft)	MQ27a. Are unincorporated, crossroads communities gaining benefits from the Forest and adding to the Forest's cultural uniqueness?
What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?	Francis Marion (2015 - Draft)	MQ27b. Are incorporated communities gaining benefits from the Forest and adding to the Forest's cultural uniqueness?
How has climate variability changed and how is it projected to change across the region? How is climate variability and change influencing the ecological, social, cultural, and economic	Francis Marion (2015 - Draft)	MQ40. Is climate change, including changes in drought frequency and severity, influencing maintenance and restoration of ecosystems, including the ability to maintain desired fire return intervals?

conditions and contributions provided by plan areas in the region?

How has climate variability changed and how is it projected to change across the region?	Francis Marion (2015 - Draft)	MQ41. How is sea level rise influencing the ecosystems and related management in the margin of change and our ability to contribute to social, economic and cultural sustainability?
What effect do management units in the region have on a changing climate?	Francis Marion (2015 - Draft)	MQ42: Is the Francis Marion a sink or a source of carbon?

Appendix A – Detailed Broad-scale Monitoring Table

Table A-1 provides additional attribute detail associated with each monitoring question indicator presented in section 1.4.1. See section 1.3.3 for indicator attribute definitions.

Table A-1. Detailed inventory of the source, frequency, scale, and subregions for each monitoring question indicator.

Monitoring Question: How has climate variability changed and how is it projected to change across the region?			
Sea level rise and land cover changes			
Source	Frequency	Scale	Subregion(s)
NOAA - Tides and Currents: Sea Level Rise Trends, Sea Level Rise Affecting Marshes Model (SLAMM)	6-years	NF Plan Areas	Coastal Plain
Climate extremes			
Source	Frequency	Scale	Subregion(s)
NOAA - U.S. Climate Extremes Index	2-years	NF Plan Areas	Region-wide
Temperature			
Source	Frequency	Scale	Subregion(s)
NOAA -- State of the Climate Reports, Template for Assessing Climate Change Impacts and Management Options (TACCIMO), USDA - Southeast Regional Climate Hub	6-years	NF Plan Areas	Region-wide
Precipitation			
Source	Frequency	Scale	Subregion(s)
NOAA -- State of the Climate Reports, Template for Assessing Climate Change Impacts and Management Options (TACCIMO), USDA - Southeast Regional Climate Hub	6-years	NF Plan Areas	Region-wide
Water balance			
Source	Frequency	Scale	Subregion(s)
NOAA -- State of the Climate Reports, USDA - Southeast Regional Climate Hub	6-years	NF Plan Areas	Region-wide
Monitoring Question: How is climate variability and change influencing the ecological, social, cultural, and economic conditions and contributions provided by plan areas in the region?			
Non-native invasive species (NNIS)			
Source	Frequency	Scale	Subregion(s)
Forest Inventory and Analysis (FIA), University of Georgia - Center For Invasive	4-years	NF Plan Areas	Region-wide

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Species and Ecosystem Health - Early Detection & Distribution Mapping System			
Forest health			
Source	Frequency	Scale	Subregion(s)
Forest Health Technology Enterprise Team (FHTET) -- Forest Pest Conditions, Forest Health Technology Enterprise Team (FHTET) -- National Insect and Disease Risk Map, Forest Monitoring, University of Georgia - Center For Invasive Species and Ecosystem Health - Early Detection & Distribution Mapping System	2-years	NF Plan Areas	Region-wide
Prescribed fire			
Source	Frequency	Scale	Subregion(s)
Forest Activity Tracking System (FACTS)	2-years	NF Plan Areas	Region-wide
Recreation use and satisfaction			
Source	Frequency	Scale	Subregion(s)
National Visitor Use Monitoring	2-years	NF Plan Areas	Region-wide
Wildfire			
Source	Frequency	Scale	Subregion(s)
Monitoring Trends in Burn Servirty (MTBS)	2-years	NF Plan Areas	Region-wide
Jobs and Income			
Source	Frequency	Scale	Subregion(s)
IMPLAN, Management unit Economic Contributions	10-years	Unit Plan Areas of Influence	Region-wide
Phenology			
Source	Frequency	Scale	Subregion(s)
National Phenology Network, NOAA -- State of the Climate Reports, NOAA NowData Portal, Soil Climate Analysis Network (SCAN), USFS ForWarn, USFS Smart Forests, USGS Climate Science Centers	10-years	NF Plan Areas	Region-wide
Forest Status and Trends			
Source	Frequency	Scale	Subregion(s)
Forest Inventory and Analysis (FIA)	6-years	NF Plan Areas	Region-wide
Monitoring Question: What effect do management units in the region have on a changing climate?			
Carbon stocks and fluxes			
Source	Frequency	Scale	Subregion(s)
Forest Inventory and Analysis (FIA)	6-years	NF Plan Areas	Region-wide
greenhouse gas emissions			

Source	Frequency	Scale	Subregion(s)
EPA -- Facility Level Information on GreenHouse gases Tool (FLIGHT), GSA Carbon Footprint Tool, U.S. Energy Information Administration, USDA - ERS - Oil and Gas Production by County	2-years	NF Plan Areas	Region-wide
Monitoring Question: What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?			
Population Change			
Source	Frequency	Scale	Subregion(s)
Economic Profile System (EPS), U.S. Census Bureau	4-years	Unit Plan Areas of Influence	Region-wide
Racial and Ethnic Composition			
Source	Frequency	Scale	Subregion(s)
Economic Profile System (EPS), U.S. Census Bureau	10-years	Unit Plan Areas of Influence	Region-wide
Employment and Specialization			
Source	Frequency	Scale	Subregion(s)
IMPLAN, U.S. Bureau of Labor Statistics	10-years	Unit Plan Areas of Influence	Region-wide
Personal Income			
Source	Frequency	Scale	Subregion(s)
U.S. Bureau of Economic Analysis	10-years	Unit Plan Areas of Influence	Region-wide
Poverty			
Source	Frequency	Scale	Subregion(s)
U.S. Census Bureau	10-years	Unit Plan Areas of Influence	Region-wide
Forest Expenditures and Employment			
Source	Frequency	Scale	Subregion(s)
Forest Economic Analysis Spreadsheet Tool (FEAST), IMPLAN	2-years	Unit Plan Areas of Influence	Region-wide
Payments to States and Counties			
Source	Frequency	Scale	Subregion(s)
USFS - Payments and Receipts Reports	2-years	Unit Plan Areas of Influence	Region-wide
Population Growth and Density			
Source	Frequency	Scale	Subregion(s)
U.S. Census Bureau	10-years	Unit Plan Areas of Influence	Region-wide

Jobs and Income			
Source	Frequency	Scale	Subregion(s)
IMPLAN, Management unit Economic Contributions	10-years	Unit Plan Areas of Influence	Region-wide
Social Vulnerability			
Source	Frequency	Scale	Subregion(s)
CDC - Social Vulnerability Index (SVI), CDC/DHHS - Community Health Status Indicators (CHSI 2015), County Health Rankings & Roadmaps , DHHS - Social Determinants of Health	6-years	Unit Plan Areas of Influence	Region-wide

Appendix B – Best Available Science

This appendix contains documentation of best available science used to develop monitoring questions and indicators in the Strategy. The Strategy is intended to be adaptive to new issues and changing information over time. Accordingly, questions and indicators identified and the supporting best available science will evolve based on the ongoing development and implementation of the Strategy.

Table B-1. Best available science supporting the climate monitoring question and its indicators.

Question	How has climate variability changed and how is it projected to change across the region?
Indicators	Climate extremes, Precipitation and temperature, Sea level rise, Water balance
Requirement	(vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
Best Available Science Assessment	<p>Climate extremes</p> <p><u>Rationale:</u> Climate variability and extremes, including climate related disturbance, directly influence ecosystems and management.</p> <p><u>Accuracy:</u> Climate extremes are routinely measured and evaluated based on historic, current, and projected conditions (e.g., NOAA’s U.S. Climate Extreme’s Index) with adequate accuracy to evaluate regional and subregional conditions and trends. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Reliability:</u> Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Relevance:</u> Southern Region: While no significant region-wide changes in drought intensity and duration have been found, extreme high rainfall events appear to be increasing, which might imply an increased flooding frequency (Chen et al. 2012). South Central: Particularly during summer and fall, it is expected that droughts could become more common (Biasutti et al. 2011). Southern Appalachian: In addition to more intense precipitation, recent climate patterns trend toward more frequent periods of prolonged drought. Drought severity is increasing (Laseter et al. 2012).</p> <p>Precipitation and temperature</p> <p><u>Rationale:</u> Spatial and temporal patterns of precipitation and temperature are key long-term system drivers that influence landscape ecosystem dynamics. Temperature and precipitation patterns also influence management activities (e.g., prescribed burning).</p> <p><u>Accuracy:</u> Temperature and precipitation are the most widely used variables used variable for measuring and evaluating historic and future trends in climate. With respect to future projections, there is generally more confidence in temperature than precipitation. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Reliability:</u> Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Relevance:</u> Southern Region: Air temperature across the South is projected to increase significantly from historical and current levels (McNulty et al. 2013). Precipitation predictions have better agreement than those of previous climate model assessments, results are divergent for the remainder of the Southeast (Karl et al. 2009),</p>

except for indications that the amount of rainfall from individual hurricanes may increase (Gutowski et al., 2008).

South Atlantic: Spring and summer rainfall is projected to decline in South Florida during this century (Karl et al. 2009). Temperatures have increased at a rate of 0.26 °C per decade on the Santee Experimental Forest, South Carolina since 1946 (Dai et al. 2011).

Southern Appalachian: The mean annual air temperature at the Coweeta Laboratory [North Carolina] keeps rising; from 1998 to 2007, the annual mean was 14.0 °C, 1.2 °C above the long-term (73 years) mean (Walls 2009). Modeled future precipitation out to year 2050 were significantly different from the mean of observed conditions. Projections range from warmer and drier conditions with increased drought frequency to increasing frequency of extreme wet years (Marion et al. 2013).

South Central: Simulations all show more warming in summer than in winter. Surface air temperatures are projected to increase by 2.30°C on an annual basis, and 2.49°C and 1.92°C for summers and winters during the period 2040–2069 (Jiang et al. 2012). Overall variability has increased since 1980, especially during the winter months (Coopersmith et al. 2014).

Sea level rise

Rationale:

Coastal forests in the region, especially those systems that are hydrologically influenced by the ocean, are expected to experience sea-level rise related impacts.

Accuracy:

Sea-level rise is measured with accuracy sufficient to detect subtle, and long-term trends (e.g., NOAA - Tides and Currents: Sea Level Rise Trends). More challenging, however, is the geomorphological processes that control land-cover change driven by sea-level rise. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

Southern Region: Sea-level may rise from 0.4 to 2.0 m by the end of the 21st century. If sea level rose 1.5 m it is estimated that ~1.6 million acres of forests could be affected along the Atlantic Coast and ~2.1 million acres of forests could be impacted along the Gulf Coast. When physical processes are considered by the coastal vulnerability index, along the Atlantic Coast North Carolina and Virginia have the most coastline in the very high-risk class, and along the Gulf Coast, Louisiana and Texas have the most coastline in the very high-risk class (Lockaby et al. 2013).

South Atlantic Coastal Plain: Tidal forests are early indicators of sea level rise because they are sensitive to saltwater intrusion. Saltwater intrusion at low salinities reduces water use, growth, height and basal area of bald cypress and tupelo gum. Where marsh accretion rates are lower than the sea level rise rate, land cover change will result, including forest death and replacement by brackish marsh vegetation or open water (Craft et al. 2009).

Water balance

Rationale:

Water balance accounts the interactions of temperature and precipitation as well as the cumulative influences of these parameters over time. Products like the NOAA's Palmer Drought Severity Index (PDSI) provide important insight into water balance and soil moisture conditions that are meaningful to assessing ecosystem conditions.

Accuracy:

Water-balance is sufficiently accurate for routine evaluation of moisture stress in the context of historic, current, and future conditions. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

	Southern Region: Because higher temperatures lead to more evaporation of moisture from soils and water loss from plants, moisture stress is expected to increase (Karl et al. 2009).
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Table B-2. Best available science supporting the climate effects monitoring question and its indicators.

Question	How is climate variability and change influencing the ecological, social, cultural, and economic conditions and contributions provided by management units in the region?
Indicators	Non-native invasive plant species, Forest health, Jobs and Income & Recreation user satisfaction, Phenology, Wildfire and prescribed fire, Forest status and trends
Requirement	(vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
Best Available Science Assessment	<p>Non-native invasive species (NNIS)</p> <p><u>Rationale:</u> Non-native invasive plant species, some of which are already problematic, are expected to shift ranges in response to changing temperature and precipitation patterns.</p> <p><u>Accuracy:</u></p>

Non-native invasive species (NNIS) already pose management challenges and systems of detection that track their occurrence and spread (i.e., Forest Inventory and Analysis (FIA), University of Georgia - Center For Invasive Species and Ecosystem Health - Early Detection & Distribution Mapping System) provide sufficient accuracy for the purposes of the Strategy. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

Southern Region: Garlic mustard (*Alliaria petiolata*) is projected to shift northward by 2060, limiting suitable habit in the region to the Southern Appalachians (Olatinwo et al. 2013). Cogongrass (*Imperata cylindrical*) is favored by a warming climate with predictions that potential habitat for cogongrass will cover the majority of the South (Olatinwo et al. 2013). Kudzu (*Pueraria lobata*) habitats are predicted to contract, with a notable shift to the northeast likely by 2060 (Olatinwo et al. 2013). Chinese privet (*Ligustrum sinense* Lour.) is predicted to contract to upper portions of the South (Olatinwo et al. 2013). Chinese tallowtree (*Triadica sebifera*) may shift its range into the central portion by 2020 and into the central–northern portion by 2060, rendering the currently invaded areas as unsuitable (Olatinwo et al. 2013)

Forest health

Indicator Rationale:

Factors influencing forest health, including insects and disease, are often driven by climate and some are expected to change as temperature and precipitation patterns change.

Accuracy:

Forest health is tracked for the purpose of evaluating current conditions and trends in risk. Key sources of information that are designed to be accurate and relevant for this purpose include Forest Pest Conditions, National Insect and Disease Risk Map available from the Forest Service Forest Health Technology Enterprise Team (FHTET), and the Early Detection & Distribution Mapping System available from University of Georgia - Center For Invasive Species and Ecosystem Health. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and associated indicators are based on analysis of findings from peer reviewed scientific literature available in the Template for Assessing Climate Change Impacts and Managements Options (TACCIMO).

Relevance:

Southern Region: Southern pine beetles (*Dendroctonus frontalis*) are expected to maintain a considerable suitable habitat, with a slight northern shift (Olatinwo et al. 2013). Change in the frequency of extreme precipitation and temperature patters could alter population dynamics, ecological feedbacks, and leave pines more vulnerable to increased southern pine beetle activity (Olatinwo et al. 2013; Duehl et al. 2011; Friedenberget al. 2008). Gypsy moth (*Lymantra dispar*) range may extend northward as a result of climate change (Olatinwo et al. 2013). Emerald ash borer (*Agrilus planipennis*) is predicted to be significantly larger in 2020 compared to 2060 (Olatinwo et al. 2013). Annosus root disease (*Heterobasidion annosum*, *Fomes annosus*) suitable habitat is expected to cover most of the South (Olatinwo et al. 2013). Sirex woodwasp (*Sirex noctilio*) is predicted to see a northward expansion in suitable habitat (Olatinwo et al. 2013). Fusiform rust (*Cronartium quorum* f. sp. *fusiforme*) will likely extend throughout most of the region with a few unsuitable habitats below the south limit (Olatinwo et al. 2013).

Coastal Plain: Redbay ambrosia beetle (*Xyleborus glabratus*) may see a range expansion throughout the coastal plain. Laurel wilt (*Raffaelea lauricola*) may see range expansion during the winter and contraction from the western portion of the region by mid-century (Olatinwo et al. 2013).

Southern Appalachian: Hemlock woolly adelgid populations may grow as a result for less frequent occurrence of severe winter temperatures in the southern Appalachians (Nuckolls et al. 2008; Olatinwo et al. 2013).

Wildfire and prescribed fire

Rationale:

The conditions that contribute to wildfire and the ability to conduct prescribed fire are directly influenced by climate at short- and long-term time scales.

Accuracy:

Prescribed fire and wildfire indicators are among the most commonly tracked and reported on indicators and are available in centralized database (e.g., FACTS, Monitoring Trends in Burn Severity (MTBS)) that represent both observed and remotely sensed information with known methods and data quality. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

Southern Region: Fire potential is expected to increase in the South as the result of climate change with seasonal and subregional differences across the region. The length of fire seasons is likely to increase by a few months. Projected fire potential is unlikely to increase significantly until 2030–2040. (Liu et al. 2013). Actual burned areas for a specific landscape would not necessarily increase, due to interactions with landcover change and sources of ignition (Liu et al. 2013). Fuels may increase or decrease depending on temperature and precipitation patterns, among other factors, with current expectations supporting a future decrease in the western areas of the region and increase in the eastern areas (Liu et al. 2013; Zhang et al. 2010).

Recreation use and satisfaction

Rationale:

The social, cultural, and economic contributions that management units make to their plan areas are commonly measured in terms of jobs and income and recreation user satisfaction, both of which are influenced directly and indirectly by climate.

Accuracy:

Social, cultural, and economic sustainability are often analyzed in terms of jobs and income using economic impact and contribution analysis (e.g., IMPLAN, Management unit Economic Contributions, National Visitor User Monitoring), which is sufficiently accurate for comparing alternatives during plan development and for monitoring plan implementation. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

Southern Region: While overall demand for recreation is expected to increase due to population growth, climate change is expected to have negative consequences for day hiking, horseback riding, off-road driving, nonmotorized water activities, and fishing. Hunting forecasts remain largely unchanged (Bowker et al. 2013)

Phenology

Rationale:

Changes in phenology of plants and animals is a useful measure of how changing climate is influencing ecological systems and their management.

Accuracy:

There are a variety of sources of information on phenology based on both locally observed and remotely sensed responses of plant and wildlife to the timing of seasonal changes (e.g., National Phenology Network,

	<p>USFS ForWarn) that provide insight into the ecological implications of changing climate. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Reliability:</u> Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Relevance:</u> Southern Region: Migratory bird phenology is changing as a result of climate change for certain species (Todd et al. 2010). Egg laying and reproductive success of red-cockaded woodpeckers is also responsive to climate variability (Conner et al. 2005). Plant phenology (e.g., bud break, flowering, and senescence) has been shown to change as the result of temperature change (Gunderson et al. 2012; Park et al. 2014).</p> <p>Forest status and trends</p> <p><u>Rationale:</u> Landscape scale changes in forest composition and structure will provide key insight into both the influences of a changing climate and interactions with restoration efforts.</p> <p><u>Accuracy:</u> The primary source of information for this indicator is FIA, which has varying accuracy on management units in the region depending on levels of intensification and availability of re-measurement. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Reliability:</u> Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Relevance:</u> South Atlantic: Response to climate change species in the Coastal Plain are likely to be highest in the Florida Peninsular section (McNab et al. 2013). South Central: Overall effects of future climate change on vegetation will likely be relatively small (McNab et al. 2013). Southern Appalachian: Warming may cause vertical advance of the mixed deciduous forest, resulting in a reduction in size of the spruce-fir [Picea-Abies] ecosystem and a subsequent loss of species and ecosystem diversity (Soulé 2011). Oak [Quercus spp] and red maple [Acer rubrum] responses to changing climate will depend largely on the season of drought (McNab et al. 2013), red maple may be less tolerant to drought than associated oak species (McNab et al. 2013)</p>
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Table B-3. Best available science supporting the carbon monitoring question and its indicators.

Question	What effect do management units in the region have on a changing climate?
Indicators	Carbon stocks and trends, Greenhouse gas emissions
Requirement	(vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
Best Available Science Assessment	Carbon stocks and fluxes <u>Rationale:</u>

Tracking trends in carbon stocks and fluxes at appropriate temporal and geographic scales provides insight into how implementation of the forest plan is contributing to rates of carbon sequestration and the subsequent lifecycle of harvested forest products as one of many ecosystem services provided by the forest.

Accuracy:

Changes in carbon stocks and fluxes are derived from analysis of Forest Inventory and Analysis (FIA), which provides acceptable precision and accuracy for evaluating trends in carbon at scales relevant to the question. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

R8: Southern: Since forests account for more than half of the land area, the largest potentials for carbon sequestration in Southeastern United States may continuously serve as a strong carbon sink in the 21st century, though the carbon sink strength is projected to decrease (Song et al. 2013).

Southern Appalachian: Resulting from slower growth and species composition change, total carbon stocks and productivity may decline in the Cumberland Mountains and Plateau (Dale et al. 2009).

South Central: In the Gulf Coast, carbon sequestration is projected to increase through mid-century (Wang et al. 2011).

South Atlantic and South Central: The resulting changes in forest structure associated with longleaf pine restoration may result in reduced overall productivity and carbon stocks, but a more resilient landscape (Remucal et al. 2013).

Greenhouse gas emissions

Rationale:

Maintaining awareness of greenhouse gas emissions from all aspects of forest plan implementation, including management activities, operations, and development of multiple-uses, are important to evaluating the contributions of forest plan implementation to climate change at relevant and meaningful scales.

Accuracy:

Greenhouse gas emissions estimates are becoming increasingly standardized. Operational emissions will be available from the GSA Carbon Footprint Tool. The information needed to address emissions related to oil and gas development are available from U.S. Energy Information Administration, the USDA - ERS - Oil and Gas Production by County, and the EPA - Facility Level Information on GreenHouse gases Tool (FLIGHT). When these sources are evaluated together, a complete emissions picture can be presented that is sufficiently accurate to gauge current emissions and change over time. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Indicators related to greenhouse gas emissions were selected from reliable sources with published and available methodologies from GSA, USDA, and EPA. Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

As part of Executive Order 13514, which calls on Federal agencies and departments to increase sustainability and energy-efficiency, agencies are required to report and reduce greenhouse gas pollution to meet energy, water, and waste reduction targets. Greenhouse gas emissions serve as a useful metric to measure the effectiveness of agency energy and fuel efficiency efforts as well as renewable energy investments.

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Table B-4. Best available science supporting the social, cultural, and, economic sustainability monitoring question and its indicators.

Question	What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?
Indicators	(1) Jobs and Income, Employment and Specialization; Forest Expenditures and Employment; Payments to States and Counties, Personal Income, (2) Population Change, Population Growth and Density, Poverty, Racial and Ethnic Composition, Social Vulnerability
Requirement	(vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
Best Available Science Assessment	<p>Indicator(s): Population and Demographics, Racial and Ethnic Composition, Population Growth, Density, and Change, Poverty, Social Vulnerability</p> <p><u>Rationale:</u> The indicators selected represent those which are typically evaluated in an Environmental Impact Statement to gauge differences between alternatives with respect to the contributions of a management unit to a plan area’s social, cultural, and economic sustainability.</p> <p><u>Accuracy:</u> Results associated with these indicators are generally deemed to be sufficiently accurate and precise to differentiate among alternatives considered under NEPA, though caution should be applied when evaluating absolute values and differences. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Reliability:</u> Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.</p> <p><u>Relevance:</u> R8: Southern: Population is an important consideration in managing natural resources. In particular, population structure (size, composition, density, etc.) and population dynamics (how the structure changes over time) are essential to describing the consequences of forest management on the social environment (Seesholtz et al. 2004). Population growth can be an indicator of a region’s attractiveness to live and work. The natural, cultural, and social characteristics of an area contribute to greater population growth than areas with fewer natural amenities (Rudzitis and Johansen 1991, Johnson and Beale 1994, Johnson and Beale 1998, McGranahan 1999, Hunter et. al 2005, Frenzt et. al 2004), and that this growth occurs increasingly at the boundaries of public lands (Radeloff et. al 2001). Population density measures the number of people living per square mile within a given area and can serve as an indicator of the socioeconomic and living conditions of a region (Horne and Haynes 1999). Poverty is an important indicator of both economic and social well-being. Low income is an indication of increased vulnerability to variety of disparities including health, cognitive development, emotional well-being, school achievement and promote socially unacceptable behavior (Williams 1984, Haan et. al 1986, Battistich et. al 1995, Farrington 1995, Chung 2004, Booth and Caan, 2005, and Hopson and Lee 2011).</p>

Indicator(s): Jobs and Income, Personal Income, Forest Expenditures and Employment, & Payments to States and Counties

Rationale:

The indicators selected represent those which are typically evaluated in an Environmental Impact Statement to gauge differences between alternatives with respect to the contributions of a management unit to a plan area's social, cultural, and economic sustainability.

Accuracy:

Results associated with these indicators are generally deemed to be sufficiently accurate and precise to differentiate among alternatives considered under NEPA, though caution should be applied when evaluate the absolute values. Accuracy will be further evaluated as the Strategy is implemented, as accuracy varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Reliability:

Information considered in the development of this monitoring question and selection of associated indicators are based on analysis of findings from peer reviewed scientific literature (see Relevance section below). As is the case with the accuracy (above), reliability will be further evaluated as the Strategy is implemented, as reliability varies by information source (see Appendix A) and other factors that are more readily assessed when results are generated and evaluated.

Relevance:

R8: Southern: Personal income is an indicator of the economic well-being of a county and provides a measure of all sources of income within the plan area. High personal income may be a signal of greater job opportunities, highly skilled residents, greater economic resiliency, and well-developed infrastructure; while low personal income is often a reflection of the poor economic conditions and relatively few economic opportunities available within a region. Natural amenities, often provided by public lands, have been found to influence population and employment changes in amenity rich communities (Knapp and Graves 1989, Clark and Hunter 1992, Treyz et al. 1993, Mueser and Graves 1995, McGranahan 1999, Lewis et al. 2002).

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Appendix C – Forests by Subregion

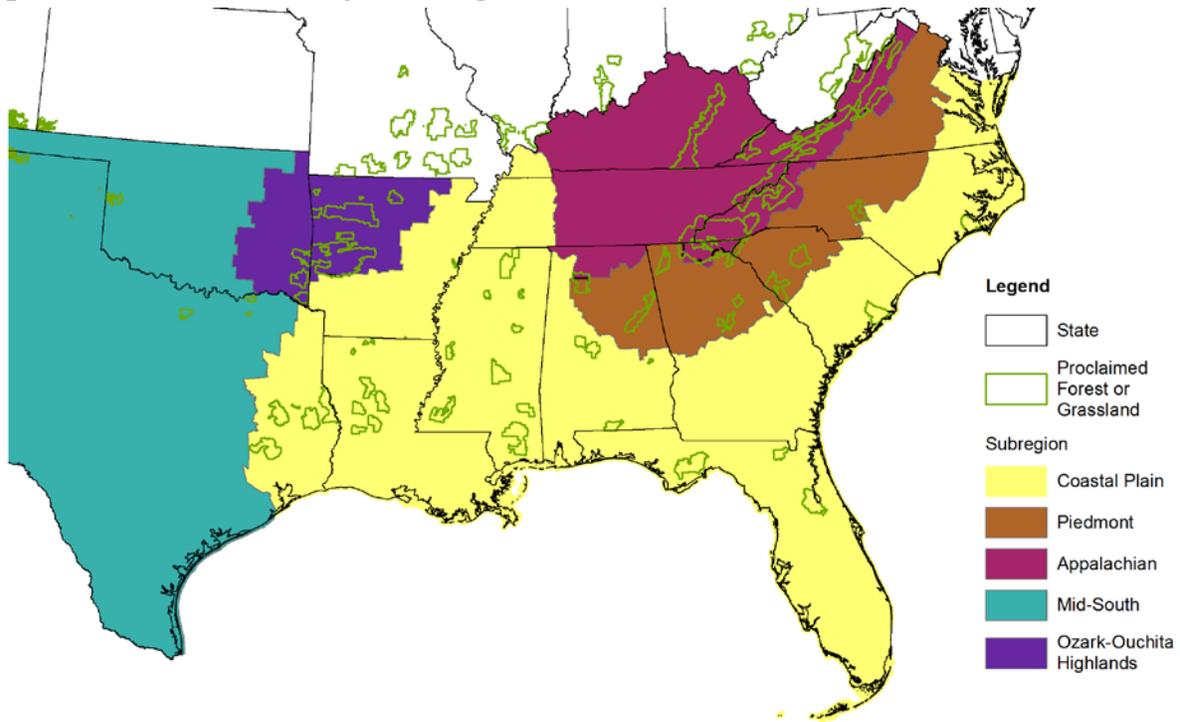


Figure C-1—Map of management unit boundaries in the context of the Strategy subregions. Note: Caribbean subregion not shown.

Table C-1—Crosswalk between forest plans, nationals forests, and subregions.

Forest Plan	Management unit(s)	Subregion
Alabama (2004)	Tuskegee Management unit, Conecuh Management unit, Talladega Management unit, William B. Bankhead Management unit	Coastal Plain, Piedmont
Chattahoochee-Oconee (2004)	Oconee Management unit, Chattahoochee Management unit	Piedmont, Appalachian
Cherokee (2004)	Cherokee Management unit	Appalachian
Croatan (2002)	Croatan Management unit	Coastal Plain
Daniel Boone (2004)	Daniel Boone Management unit	Appalachian
El Yunque (1997)	El Yunque Management unit	Caribbean
Florida (1999)	Apalachicola Management unit, Ocala Management unit, Osceola Management unit	Coastal Plain
Francis Marion (1996)	Francis Marion Management unit	Coastal Plain
Francis Marion (2015 - Draft)	Francis Marion Management unit	Coastal Plain
George Washington (2014)	George Washington Management unit	Appalachian
Jefferson (2004)	Jefferson Management unit	Appalachian
Kisatchie (1999)	Kisatchie Management unit	Coastal Plain
Land Between the Lakes (2004)	Land Between the Lake NRA	Appalachian
Mississippi (2014)	Holly Springs Management unit, Delta Management unit, De Soto Management unit, Homochitto Management unit, Tombigbee Management unit, Bienville Management unit	Coastal Plain
Nantahala-Pisgah (1994)	Pisgah Management unit, Nantahala Management unit	Appalachian
Ouachita (2005)	Ouachita Management unit	Ozark-Ouchita Highlands
Ozark-St. Francis (2005)	Ozark Management unit, St. Francis Management unit	Ozark-Ouchita Highlands
Sumter (2004)	Sumter Management unit	Piedmont

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Texas (1996)	Angelina Management unit, Sabine Management unit, Sam Houston Management unit, Davy Crockett Management unit	Coastal Plain
Uwharrie (2012)	Uwharrie Management unit	Piedmont

Appendix D – Contributing Staff and Reviewing Partners

Table D-1—Contributing and reviewing staff.

Name	Staff Area
Peter Gaulke, Director	Planning
Paul Arndt, Regional Planner	Planning
Emrys Treasure, Natural Resources Specialist (Detail)	Planning
Paul Morgan, Road & Transportation Engineer	Engineering
David Meriwether, Director	Resource Information Management
Renee Jacokes, Remote Sensing Coordinator	Resource Information Management
Eric Schmeckpeper, GIS Coordinator	Resource Information Management
Alan Hepworth, Regional Fire Planner	Fire & Aviation
Beth Buchanan, Regional Fire Ecologist	Fire & Aviation
Alison Koopman, Landscape Architect	Recreation
Melissa Twaroski, Archeologist	Recreation
Kelly Balcarczyk, Nature Based Tourism	Recreation
Michelle Mitchell, Volunteer and Partnerships	Recreation
Mary Long, Regional Conservation Planner	Biological and Physical Resources
Duke Rankin, Threatened and Endangered Species	Biological and Physical Resources
Joanne Baggs, Botanist	Biological and Physical Resources
Wallace Dillon, Soil Scientist	Biological and Physical Resources
Leigh McDougal, Fisheries	Biological and Physical Resources
Michelle Frank, Invasive Plants	Forest Health Protection (S&PF)
Stephen Klimetz, Petroleum Eng/Geologist	Minerals and Geology
Charles Sams, Air Resource	Biological and Physical Resources
Robert Makowski, Regional Silviculturist	Forest Management
Larry Mahler, Sales Preparation Forster	Forest Management

Table D-2—Contributing and Reviewing Partners

Name	Affiliation
Steve McNulty, Director	SRS
Henry Eichman, Economist	TEAMS
Cassandra Johnson Gaither, Research Social Scientist	SRS
Delilah Jaworski, Social Scientist	TEAMS
Kathleen McGinley, Research Social Scientist	IITF

Appendix E – Ecological Sustainability Evaluation Tool

The [Ecological Sustainability Evaluation \(ESE\) Tool](#) is a strategic conservation planning and decision support tool used by the US Forest Service Southern Region’s national forests for forest plan revision. The ESE tool is intended to provide the following benefits:

- Standardized, collaborative, regional framework for ecological and biological planning for the forest planning process and meet requirements and intent of the 2012 Planning Rule;
- Regional process that remains flexible, efficient and adaptable to forest specific priorities and needs;
- Transparent, credible and defensible process record in one location for unbiased ecological analyses to inform and support management decisions.

Using the coarse-filter fine-filter approach, at-risk terrestrial and aquatic species, ecological systems and watersheds are carried through preliminary assessment, assessment and planning frameworks, which provide a basis for monitoring. The ESE tool houses and provides algorithmic results using forest data, creating reports from which to make analyses to support and compare plan alternatives. Reports can be queried, exported and downloaded into planning documents. Forests are able to continue to use ESE tool data for additional analyses, post plan revision. The current web-based version of the ESE tool holds information from NFs in Mississippi, George Washington NF, El Yunque NF, Francis Marion NF, Nantahala-Pisgah NF, National Forests and Grasslands in Texas, and a combined dataset from the Southern Appalachian Management units. All Southern Region forests will use the ESE tool in their upcoming forest plan revision processes creating a complete database of R8 Management units.

The ESE Tool directly supports the purpose and need of the Strategy. In particular, the ESE Tool provides a valuable tracking system and inventory of indicators emerging at the forest-level through plan revision. To provide an initial snapshot of how the Strategy relates to information available in the ESE tool, Table E-1 presents a crosswalk between indicators identified in the ESE tool and relevant broad-scale indicators.

Table E-1. Crosswalk between indicators identified in the ESE tool and relevant broad-scale indicators for climate change.

LMP	Element Type	Element Name	Key Attribute Name	Indicator Name	Relevant Broad-scale Indicator(s)
El Yunque	Ecosystem	Mature Palo Colorado montane rain cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Palo Colorado montane rain cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Mature Palo Colorado montane wet cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Palo Colorado montane wet cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance

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El Yunque	Ecosystem	Mature Sierra Palm montane rain cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Sierra Palm montane rain cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Mature Sierra Palm montane wet cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Sierra Palm montane wet cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Mature Sierra Palm montane wet forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Sierra Palm montane wet forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Mature Tabebuia/Eugenia woodland montane wet cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Tabebuia/Eugenia woodland montane wet cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Mature Tabebuia/Eugenia woodland montane rain cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Tabebuia/Eugenia woodland montane rain cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Mature Tabonuco montane rain forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Tabonuco montane rain forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Mature Tabonuco montane wet forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Mature Tabonuco montane wet forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Novel montane wet cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Novel montane wet cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Novel montane wet forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Novel montane wet forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Novel submontane moist forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Novel submontane moist forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance

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El Yunque	Ecosystem	Riparian montane rain and wet cloud forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Riparian montane rain and wet cloud forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Riparian montane rain and wet forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Riparian montane rain and wet forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
El Yunque	Ecosystem	Riparian submontane moist forest	Climate Change	Changes in Spatial Extent	Forest Status and Trend
El Yunque	Ecosystem	Riparian submontane moist forest	Climate Change	Deviation from NRV	Climate Extremes, Phenology, Water Balance
Francis Marion	Ecosystem	Atlantic Coastal Plain Blackwater Stream and Small Blackwater River Floodplain Forest	Climate Change	Sea Level Rise, with saltwater overwash of terrestrial systems	Sea Level Rise
Francis Marion	Ecosystem	Central Atlantic Coastal Plain Maritime Forest	Climate Change	Sea Level Rise, with saltwater overwash of terrestrial systems	Sea Level Rise
Francis Marion	Ecosystem	Southern Atlantic Coastal Plain Broad Nonriverine Swamp and Wet Hardwood Forest/ Southern Coastal Plain Nonriverine Basin Swamp	Climate Change	Sea Level Rise, with saltwater overwash of terrestrial systems	Sea Level Rise
Francis Marion	Ecosystem	Southern Atlantic Coastal Plain Large River Floodplain Forest	Climate Change	Sea Level Rise, with saltwater overwash of terrestrial systems	Sea Level Rise
Francis Marion	Ecosystem	Southern Atlantic Coastal Plain Narrow Nonriverine Swamp and Wet Hardwood Forest/ Southern Coastal Plain Nonriverine Basin Swamp	Climate Change	Sea Level Rise, with saltwater overwash of terrestrial systems	Sea Level Rise
Francis Marion	Ecosystem	Southern Atlantic Coastal Plain Salt and Brackish Tidal Marsh	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Ecosystem	Southern Atlantic Coastal Plain Tidal Wooded Swamp	Climate Change	Sea Level Rise, with saltwater overwash of terrestrial systems	Sea Level Rise
Francis Marion	Watershed	Awendaw Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Bulls Bay	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Cane Pond Branch	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise

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Francis Marion	Watershed	Cape Romain	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Copahee Sound	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Dutart Creek-Santee River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	East Branch Cooper River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Echaw Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	French Quarter Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Gough Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Guerin Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Headwaters Wambaw Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Lower Wando River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Nicholson Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Outlet Wambaw Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Penn Branch-Santee River XXX	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Quinby Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Rediversion Canal-Santee River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Savanna Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	South Santee River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Turkey Creek-East Branch Cooper River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Upper Cooper River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Wadboo Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise

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Francis Marion	Watershed	Walker Swamp	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Wedboo Creek	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	West Branch Cooper River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise
Francis Marion	Watershed	Wittee Lake-Santee River	Climate Change	Sea Level Rise, with saltwater intrusion in aquatic systems	Sea Level Rise

Appendix F – Potential Broad-scale Monitoring

The most recent (as of November 2015) monitoring and evaluation report for each management unit in R8 was reviewed to identify common indicators. Table F-1 contains potential broad-scale monitoring question and indicators. Table F-2 contains an inventory of indicators used on management units that is ranked by frequency of indicator use. This information will be used by the Regional Broad-scale Monitoring Team in the further development of the Broad-scale Monitoring Strategy.

Table F-1. Potential broad-scale monitoring questions and indicators.

Required Monitoring Item	Proposed Broad-scale Monitoring Question	Potential Indicators
Watershed condition	What are watersheds conditions on forests in the region?	Acid Neutralizing Capacity (ANC), Best Management Practices (BMPs), Hydrologic connectivity, Large wood debris, Habitat diversity (riffle run, riffle glide) , Management strategy consistencies with riparian guidance, miles of stream habitat improvement, non-point source pollution, riparian area condition inventory, riparian area shade and cover, riparian soil and ground cover condition, stream classification and determination of channel function, streambank stability, vegetation management implemented in riparian areas by activity type, Water Quality, Watershed Action Plans, Watershed Assessments, Watershed Condition, Watershed Improvement, wetland habitats, wetland maintenance or mitigation
Ecological conditions (aquatic & terrestrial)	Are landscape-level and stand-level composition and structure of major forest communities within desirable ranges of variability?	Age class distribution, Canebrakes, Early-successional habitats, Forest density, landscapes important for forest interior birds, late-successional habitats, Loblolly pine, longleaf pine, mid-successional condition, Native Grasslands, oak-pine forests (acres), Old growth, open woodland, savanna, or grassland structure, permanent openings (pasture, ROW, etc.; acres), pitch pine (acres), Shortleaf pine, structural diversity, Table mountain pine, terrestrial ecosystem type, Timber Harvest - Commercial Thinning, Timber harvest - even-aged management, Timber Harvest - Regeneration, Timber Harvest - Thinning, Tree Planting, Tree Release, uneven-Aged Management (Group/Single Tree), Vegetation Management Treatments, wildlife openings
Ecological conditions (aquatic & terrestrial)	Are management units successfully restoring or maintaining quality forest ecosystems?	Longleaf pine, Shortleaf pine, Table mountain pine
Ecological conditions (aquatic & terrestrial)	What are the trends in species associated with diverse forest successional conditions on and surrounding forests in the region?	Acadian flycatcher, Bachman's Sparrow (<i>Aimophila aestivalis</i>), black bear, Bluegill, Brown-headed Nuthatch, Cerulean Warbler, chestnut-sided, field sparrow, golden winged warbler, hooded warbler, Largemouth Bass, Northern Hog Sucker, Northern Parula, ovenbird, pileated woodpecker, pine warbler, prairie warbler, Red-headed Woodpecker, Redear Sunfish, ruffed grouse, scarlet tanager, Smallmouth Bass, sunfish, Swainson's warbler, wood thrush, Yellow-breasted chat
Ecological conditions (aquatic & terrestrial)	What is the status and trend in aquatic habitat conditions?	Aquatic macro-invertebrate populations, Aquatic Organism Passage, Aquatic Vegetation Condition, lake fish communities, Recreational Fisheries Management, stream fish communities
Viability of species of concern	What are the status and trends of federally listed species and species with viability concerns on the forest?	American Alligator (<i>Alligator mississippiensis</i>), American Burying beetle (<i>Nicrophorus americanus</i>), Bald Eagle, Bat Population Trends, Bog turtle (<i>Clemmys muhlenbergii</i>), Cerulean Warbler, Cumberland bean pearly mussel, Eastern small-footed bat, fluted kidneyshell, Frosted Flatwoods Salamander, Georgia aster, gray bat, Indiana bat, northern long-eared bat, oyster mussel, Persistent trillium (<i>Trillium persistens</i>), Red-cockaded woodpecker (<i>Picoides borealis</i>), Small-whorled pogonia (<i>Isotria medeolides</i>), smooth purple coneflower (<i>Echinacea laevigata</i>), Species of Conservation Concern, swamp pink, tan riffleshell, Threatened and endangered species, Virginia spiraea, Virginian big-eared bat

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Visitor use, satisfaction, and recreation	Are heritage sites and resources protected on management units in the region?	heritage protection effectiveness, Heritage Resources Surveys, Sea level rise and land cover changes
Visitor use, satisfaction, and recreation	What are the conditions supporting recreation quality, customer satisfaction, primitive and semi-primitive recreation settings, natural resource integrity, and relevancy of recreation on management units in the region?	Backcountry campsite conditions (dispersed recreation sites), Deferred maintenance for recreation infrastructure, Developed Recreation Areas, facility maintenance, financial resources needed and available to provide recreation opportunities, High-priority recreation sites meeting national quality standards. , historic administrative and recreational facilities - preservation and maintenance plans, Illegal Equestrian Use, Illegal Off-Highway Vehicle (OHV) Use, National Wild and Scenic Rivers, Off-Highway Vehicle (OHV) Use, Outstandingly Remarkable Values, recreation accessibility, recreation opportunity spectrum (ROS), Recreation use and satisfaction, recreation use impacts, conflicts, and effects, Recreational Fisheries Management, Scenic Integrity Objectives, Scenic Integrity Objectives (SIOs), Special Interest Areas, trail maintenance, Trails, visitor comments, Wilderness Characteristics
Visitor use, satisfaction, and recreation	What are the trends for demand species and their use?	black bear, Bobwhite quail, brook trout, eastern wild turkey, hunting, Recreational Fisheries Management, white-tailed deer
Climate change and other stressors	What are the status and trends of forest health threats on and surrounding management units in the region?	autumn olive, Chinese Privet (<i>Ligustrum Sinense</i>), disease, drought, emerald ash borer, Forest health, Gypsy Moth, hemlock woolly adelgid, ice storms, Japanese honeysuckle, kudzu, lespedeza, native insect, Non-native invasive species (NNIS), Oak decline, southern pine beetle (SPB), tall fescue
Management system sustainability	Are conditions needed to sustain ecological function and productivity of the land being maintained?	Long Term Soil Productivity Study, soil and water protection standards, Soil Disturbance, Soil quality and productivity, Soil Restoration and Maintenance Activities
Management system sustainability	How do actual costs of management compare with estimated costs?	budget, estimated and actual costs of plan implementation
Management system sustainability	What are the air pollution conditions on and surrounding management units in the region?	Air Quality - Acid Deposition, Air Quality - Load exceedence, Air Quality - Ozone, Air Quality - Particulate matter, Air quality - visibility, Air Quality Related Values (AQRV), Smoke and Prescribed Burning
Management system sustainability	What are the conditions of roads and related infrastructure on forests in the region?	Hydrologic connectivity, Inventoried Roadless Areas, Motor Vehicle Use Maps (MVUMs), Transportation infrastructure
Management system sustainability	What are the conditions related prescribed fire and wildfire on and surrounding forests in the region?	Community Protection Zones, community wildfire protection plans (CWPPs), Fire Intensity Scale, Fire Regime Condition Class (FRCC), fire return interval, Firewise Communities, hazardous fuels treatment, mechanical fuels treatment (acres), Number of acres covered by community wildfire protection plan, Number of counties with wildfire protection plan, Prescribed fire, Prescribed Fire Effects, Trends in fire return intervals and seasonality, Wiland Urban Interface (WUI), Wildfire, Wildfire Ignition Density, wildland fire use (acres)
Social, economic, and cultural sustainability	How much actual outputs are management units in the region producing?	Applications for Permits to Drill (APDs) approved, Firewood, forest products production, Livestock Grazing/Range Activities, Mineral Resource Development, permits issued, special uses, Timber production and product yields, Timber Volume Offered and Sold

Table F-2. Indicators identified as potentially broad-scale.

Indicator	Forest Plans	Count	Potential Information Source
Prescribed fire	Chattahoochee-Oconee (2004), Cherokee (2004), Croatan (2002), Daniel Boone (2004), Florida (1999), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004), Texas (1996), Uwharrie (2007), Uwharrie (2012)	14	Forest Activity Tracking System (FACTS)

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Transportation infrastructure	Alabama (2004), Chattahoochee-Oconee (2004), Cherokee (2004), Croatan (2002), Francis Marion (2015 - Draft), George Washington (Working Draft 2007), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004), Texas (1996)	13	INFRA, TAP
Early-successional habitats	Chattahoochee-Oconee (2004), Cherokee (2004), Francis Marion (2015 - Draft), George Washington (2014), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004), Texas (1996)	11	Field Sampled Vegetation (FSVeg)
late-successional habitats	Chattahoochee-Oconee (2004), Cherokee (2004), Francis Marion (2015 - Draft), George Washington (2014), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004), Texas (1996)	11	Unknown
Non-native invasive species (NNIS)	Alabama (2004), Chattahoochee-Oconee (2004), Cherokee (2004), Francis Marion (2015 - Draft), George Washington (2014), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ouachita (2005), Sumter (2004), Uwharrie (2012)	11	Forest Inventory and Analysis (FIA), NRIS
Old growth	Chattahoochee-Oconee (2004), Cherokee (2004), Croatan (2002), Daniel Boone (2004), Florida (1999), Francis Marion (2015 - Draft), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ozark-St. Francis (2005), Sumter (2004)	11	Unknown
Recreation use and satisfaction	Chattahoochee-Oconee (2004), Cherokee (2004), Croatan (2002), Daniel Boone (2004), Francis Marion (2015 - Draft), George Washington (Working Draft 2007), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Sumter (2004)	10	National Visitor Use Monitoring
Best Management Practices (BMPs)	Cherokee (2004), Daniel Boone (2004), Francis Marion (2015 - Draft), Jefferson (2004), Kisatchie (1999), Land Between the Lakes (2004), Ozark-St. Francis (2005), Sumter (2004), Uwharrie (2012)	9	National Best Management Practices for Water Quality Management on Management unit System Lands Data
eastern wild turkey	Alabama (2004), Cherokee (2004), Croatan (2002), Daniel Boone (2004), Kisatchie (1999), Land Between the Lakes (2004), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	9	Alabama Department of Conservation
Management Indicator Species (MIS)	Alabama (2004), Cherokee (2004), Daniel Boone (2004), Florida (1999), George Washington (2014), Kisatchie (1999), Mississippi (2014), Sumter (2004), Uwharrie (2007), Uwharrie (2012)	9	Unknown
Water Quality	Chattahoochee-Oconee (2004), Cherokee (2004), Croatan (2002), Francis Marion (2015 - Draft), George Washington (2014), Jefferson (2004), Kisatchie (1999), Mississippi (2014), Sumter (2004)	9	DHEC
white-tailed deer	Alabama (2004), Chattahoochee-Oconee (2004), Cherokee (2004), Daniel Boone (2004), Kisatchie (1999), Land Between the Lakes (2004), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	9	Alabama Department of Conservation
Air Quality - Ozone	Chattahoochee-Oconee (2004), Cherokee (2004), Daniel Boone (2004), Francis Marion (2015 - Draft), Kisatchie (1999), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	8	CASTNET, Georgia Environmental Protection Division (GEPD), IMPROVE
Air Quality - Particulate matter	Chattahoochee-Oconee (2004), Cherokee (2004), Daniel Boone (2004), Francis Marion (2015 - Draft), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	8	Unknown

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Bobwhite quail	Alabama (2004), Cherokee (2004), Daniel Boone (2004), Kisatchie (1999), Land Between the Lakes (2004), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	8	Alabama Department of Conservation
heritage protection effectiveness	Chattahoochee-Oconee (2004), Cherokee (2004), Croatan (2002), Daniel Boone (2004), George Washington (Working Draft 2007), Kisatchie (1999), Sumter (2004), Uwharrie (2012)	8	Unknown
mid-successional condition	Cherokee (2004), George Washington (2014), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	8	Field Sampled Vegetation (FSVeg)
pileated woodpecker	Chattahoochee-Oconee (2004), Cherokee (2004), Kisatchie (1999), Land Between the Lakes (2004), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	8	Breeding Bird Survey, R8 Bird Database
Red-cockaded woodpecker (<i>Picoides borealis</i>)	Alabama (2004), Chattahoochee-Oconee (2004), Croatan (2002), Florida (1999), Francis Marion (2015 - Draft), Kisatchie (1999), Mississippi (2014), Ouachita (2005),	8	Surveys at the Forest Level
Timber Harvest - Thinning	Alabama (2004), Chattahoochee-Oconee (2004), Cherokee (2004), Florida (1999), Francis Marion (2015 - Draft), Mississippi (2014), Ouachita (2005), Texas (1996)	8	Forest Activity Tracking System (FACTS)
Timber production and product yields	Francis Marion (2015 - Draft), Mississippi (2014), Ozark-St. Francis (2005)	8	Annual Timber Sale Records, TIM
Wildfire	Croatan (2002), Daniel Boone (2004), Kisatchie (1999), Land Between the Lakes (2004), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004), Texas (1996)	8	Monitoring Trends in Burn Servirty (MTBS)
prairie warbler	Chattahoochee-Oconee (2004), Cherokee (2004), Kisatchie (1999), Land Between the Lakes (2004), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	7	R8 Bird Database
southern pine beetle (SPB)	Alabama (2004), Chattahoochee-Oconee (2004), Cherokee (2004), Daniel Boone (2004), Kisatchie (1999), Mississippi (2014), Ouachita (2005),	7	Forest Health Protection (USFS), Prediction trap surveys, Southern pine beetle information system (SPBIS)
Acadian flycatcher	Chattahoochee-Oconee (2004), Cherokee (2004), Kisatchie (1999), Land Between the Lakes (2004), Ozark-St. Francis (2005), Sumter (2004)	6	Breeding Bird Survey, R8 Bird Database
Deferred maintenance for recreation infrastructure	Chattahoochee-Oconee (2004), Daniel Boone (2004), Francis Marion (2015 - Draft), Land Between the Lakes (2004), Sumter (2004), Uwharrie (2007)	6	GIS, INFRA
Illegal Off-Highway Vehicle (OHV) Use	Alabama (2004), Chattahoochee-Oconee (2004), Daniel Boone (2004), George Washington (Working Draft 2007), Mississippi (2014), Texas (1996)	6	Unknown
longleaf pine	Croatan (2002), Florida (1999), Francis Marion (2015 - Draft), Kisatchie (1999), Mississippi (2014), Uwharrie (2012)	6	Field Sampled Vegetation (FSVeg)
National Wild and Scenic Rivers	Croatan (2002), Daniel Boone (2004), Kisatchie (1999), Mississippi (2014), Ozark-St. Francis (2005), Sumter (2004)	6	Unknown
scarlet tanager	Chattahoochee-Oconee (2004), Cherokee (2004), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004), Uwharrie (2012)	6	Breeding Bird Survey, R8 Bird Database
Shortleaf pine	Chattahoochee-Oconee (2004), Cherokee (2004), Kisatchie (1999), Ouachita (2005), Sumter (2004), Uwharrie (2012)	6	Field Sampled Vegetation (FSVeg), Forest Inventory and Analysis (FIA)
Trails	Croatan (2002), George Washington (Working Draft 2007), Jefferson (2004), Land Between the Lakes (2004), Mississippi (2014), Uwharrie (2007)	6	Unknown
Vegetation Management Treatments	Alabama (2004), Chattahoochee-Oconee (2004), Daniel Boone (2004), Kisatchie (1999), Land Between the Lakes (2004), Ozark-St. Francis (2005)	6	Forest Activity Tracking System (FACTS)

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Wilderness Characteristics	Daniel Boone (2004), Francis Marion (2015 - Draft), Kisatchie (1999), Mississippi (2014), Ozark-St. Francis (2005), Sumter (2004)	6	Unknown
Air Quality - Acid Deposition	Chattahoochee-Oconee (2004), Cherokee (2004), Daniel Boone (2004), Ouachita (2005), Sumter (2004)	5	CASTNET, NADP
aquatic macro-invertebrate populations	Cherokee (2004), George Washington (2014), Jefferson (2004), Sumter (2004), Uwharrie (2012)	5	Unknown
Bald Eagle	Jefferson (2004), Land Between the Lakes (2004), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	5	Kentucky Department of Fish and Wildlife Resources (KDFWR), Tennessee Wildlife Resources Agency (TWRA), USFWS, Volunteers
black bear	Chattahoochee-Oconee (2004), Cherokee (2004), Croatan (2002), Ozark-St. Francis (2005), Sumter (2004)	5	Unknown
Indiana bat	Cherokee (2004), Daniel Boone (2004), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005),	5	Unknown
Loblolly pine	Cherokee (2004), Kisatchie (1999), Land Between the Lakes (2004), Ozark-St. Francis (2005), Sumter (2004)	5	Field Sampled Vegetation (FSVeg)
Mineral Resource Development	Alabama (2004), Cherokee (2004), George Washington (Working Draft 2007), Kisatchie (1999), Ouachita (2005)	5	Unknown
recreation opportunity spectrum (ROS)	Croatan (2002), Francis Marion (2015 - Draft), George Washington (Working Draft 2007), Mississippi (2014), Sumter (2004)	5	Unknown
Recreational Fisheries Management	Chattahoochee-Oconee (2004), Croatan (2002), Daniel Boone (2004), Francis Marion (2015 - Draft), Sumter (2004)	5	Unknown
riparian area condition inventory	Cherokee (2004), Daniel Boone (2004), Kisatchie (1999), Ozark-St. Francis (2005), Sumter (2004)	5	Unknown
Bat Population Trends	Alabama (2004), Chattahoochee-Oconee (2004), Land Between the Lakes (2004), Ouachita (2005)	4	Georgia Department of Natural Resources, Southeastern Bat Diversity Network, USFWS
brook trout	Chattahoochee-Oconee (2004), Cherokee (2004), Jefferson (2004), Sumter (2004)	4	Georgia Council of Trout Unlimited, Georgia Department of Natural Resources
Cerulean Warbler	Alabama (2004), Chattahoochee-Oconee (2004), Cherokee (2004), Ozark-St. Francis (2005),	4	Breeding Bird Survey, R8 Bird Database
emerald ash borer	Cherokee (2004), Daniel Boone (2004), Land Between the Lakes (2004), Ouachita (2005)	4	Unknown
estimated and actual costs of plan implementation	Land Between the Lakes (2004), Mississippi (2014), Sumter (2004), Uwharrie (2012)	4	Unknown
Fire Regime Condition Class (FRCC)	George Washington (2014), Mississippi (2014), Ozark-St. Francis (2005), Sumter (2004)	4	Fire Regime Condition Class (FRCC)
fire return interval	Alabama (2004), Florida (1999), Francis Marion (2015 - Draft), Mississippi (2014)	4	Forest Activity Tracking System (FACTS)
Forest density	Chattahoochee-Oconee (2004), Cherokee (2004), Land Between the Lakes (2004), Sumter (2004)	4	Unknown
Heritage Resources Surveys	Alabama (2004), Chattahoochee-Oconee (2004), Croatan (2002), Kisatchie (1999)	4	Unknown
hooded warbler	Chattahoochee-Oconee (2004), Cherokee (2004), Kisatchie (1999), Sumter (2004)	4	Unknown
Large wood debris, Habitat diversity (riffle run, riffle glide)	Francis Marion (2015 - Draft), George Washington (2014), Jefferson (2004), Sumter (2004)	4	BVET Habitat survey
Largemouth Bass	Kisatchie (1999), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005)	4	Unknown

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Mast Capability	Chattahoochee-Oconee (2004), Daniel Boone (2004), Ouachita (2005), Sumter (2004), Texas (1996)	4	Unknown
oak-pine forests (acres)	Chattahoochee-Oconee (2004), Cherokee (2004), Ouachita (2005), Sumter (2004)	4	Unknown
permits issued	Chattahoochee-Oconee (2004), Cherokee (2004), Daniel Boone (2004), George Washington (2014),	4	TIM
project analysis and plan implementation	Cherokee (2004), Croatan (2002), Kisatchie (1999), Mississippi (2014), Sumter (2004)	4	Unknown
Scenic Integrity Objectives (SIOs)	Daniel Boone (2004), George Washington (Working Draft 2007), Kisatchie (1999), Sumter (2004)	4	Unknown
Smoke and Prescribed Burning	Daniel Boone (2004), Kisatchie (1999), Ozark-St. Francis (2005), Sumter (2004)	4	Unknown
terrestrial ecosystem type	Daniel Boone (2004), George Washington (2014), Mississippi (2014), Ouachita (2005)	4	Field Sampled Vegetation (FSVeg), Forest Inventory and Analysis (FIA)
Timber harvest - even-aged management	Ouachita (2005), Ozark-St. Francis (2005)	4	TIM
Air Quality - Load exceedence	Alabama (2004), Francis Marion (2015 - Draft), George Washington (2014)	3	Unknown
Aquatic Organism Passage	Alabama (2004), Francis Marion (2015 - Draft), Mississippi (2014)	3	Unknown
autumn olive	Cherokee (2004), Daniel Boone (2004), Land Between the Lakes (2004)	3	Unknown
Bachman's Sparrow (<i>Aimophila aestivalis</i>)	Francis Marion (2015 - Draft), Kisatchie (1999), Ozark-St. Francis (2005)	3	Unknown
Brown-headed Nuthatch	Ozark-St. Francis (2005), Sumter (2004), Uwharrie (2012)	3	Unknown
Canebreaks	Croatan (2002), Ozark-St. Francis (2005), Sumter (2004)	3	Unknown
Developed Recreation Areas	Croatan (2002), Jefferson (2004), Ozark-St. Francis (2005)	3	Unknown
disease	George Washington (Working Draft 2007), Land Between the Lakes (2004), Mississippi (2014)	3	Unknown
drought	Francis Marion (2015 - Draft), Land Between the Lakes (2004), Mississippi (2014)	3	Unknown
Firewood	Daniel Boone (2004), Kisatchie (1999), Ouachita (2005)	3	Unknown
Fish species presence and abundance.	Alabama (2004), Chattahoochee-Oconee (2004), Daniel Boone (2004), Francis Marion (2015 - Draft)	3	Surveys at the Forest Level
forest products production	Chattahoochee-Oconee (2004), Cherokee (2004), Sumter (2004)	3	Unknown
gray bat	Cherokee (2004), Daniel Boone (2004), Ozark-St. Francis (2005),	3	Unknown
hazardous fuels treatment	Cherokee (2004), Daniel Boone (2004), Sumter (2004)	3	Unknown
hemlock woolly adelgid	Alabama (2004), Cherokee (2004), Daniel Boone (2004),	3	Unknown
High-priority recreation sites meeting national quality standards.	Francis Marion (2015 - Draft), George Washington (Working Draft 2007), Kisatchie (1999),	3	GIS, INFRA
hunting	Francis Marion (2015 - Draft), Land Between the Lakes (2004), Mississippi (2014),	3	Unknown
ice storms	Francis Marion (2015 - Draft), Land Between the Lakes (2004), Mississippi (2014),	3	Unknown
lake fish communities	Cherokee (2004), Jefferson (2004), Kisatchie (1999),	3	Unknown
native insect	George Washington (Working Draft 2007), Land Between the Lakes (2004), Mississippi (2014),	3	Unknown
northern long-eared bat	Cherokee (2004), Daniel Boone (2004), Ouachita (2005),	3	Unknown
Oak decline	Daniel Boone (2004), Land Between the Lakes (2004), Ouachita (2005),	3	Unknown
Outstandingly Remarkable Values	Chattahoochee-Oconee (2004), Cherokee (2004), Sumter (2004)	3	Unknown

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ovenbird	Chattahoochee-Oconee (2004), Cherokee (2004), Ozark-St. Francis (2005),	3	Breeding Bird Survey, R8 Bird Database
pine warbler	Chattahoochee-Oconee (2004), Cherokee (2004), Sumter (2004)	3	Breeding Bird Survey, R8 Bird Database
recreation use impacts, conflicts, and effects	Chattahoochee-Oconee (2004), Cherokee (2004), Sumter (2004)	3	Unknown
riparian soil and ground cover condition	Chattahoochee-Oconee (2004), Cherokee (2004), Sumter (2004)	3	Unknown
Small-whorled pogonia (Isotria medeolides)	Chattahoochee-Oconee (2004), Cherokee (2004),	3	Unknown
Soil quality and productivity	Daniel Boone (2004), George Washington (2014), Mississippi (2014),	3	Unknown
Special Interest Areas	George Washington (2014), Mississippi (2014), Ozark-St. Francis (2005),	3	Unknown
special uses	Kisatchie (1999), Ouachita (2005), Ozark-St. Francis (2005),	3	Unknown
Species of Conservation Concern	Cherokee (2004), George Washington (2014), Mississippi (2014),	3	NRIS TESP
standards, guidelines, and management requirements	Croatan (2002), Daniel Boone (2004), Land Between the Lakes (2004), Mississippi (2014)	3	Unknown
streambank stability	Chattahoochee-Oconee (2004), Daniel Boone (2004), Sumter (2004)	3	Unknown
structural diversity	George Washington (2014), Land Between the Lakes (2004), Mississippi (2014),	3	Unknown
Swainson's warbler	Chattahoochee-Oconee (2004), Cherokee (2004), Sumter (2004)	3	Breeding Bird Survey, R8 Bird Database
Table mountain pine	Chattahoochee-Oconee (2004), Cherokee (2004), Sumter (2004)	3	Unknown
Timber Volume Offered and Sold	Kisatchie (1999), Ouachita (2005),	3	Unknown
tornado or straightline wind events	Alabama (2004), Francis Marion (2015 - Draft), Mississippi (2014)	3	Unknown
vegetation management implemented in riparian areas by activity type	Chattahoochee-Oconee (2004), Daniel Boone (2004), Kisatchie (1999),	3	Forest Activity Tracking System (FACTS), GIS
Watershed Improvement	Land Between the Lakes (2004), Mississippi (2014), Ozark-St. Francis (2005),	3	Watershed Condition Framework
wood thrush	Chattahoochee-Oconee (2004), Land Between the Lakes (2004), Mississippi (2014),	3	Breeding Bird Survey, R8 Bird Database
Acid Neutralizing Capacity (ANC)	Chattahoochee-Oconee (2004), Cherokee (2004)	2	Unknown
age class distribution	Cherokee (2004), Land Between the Lakes (2004)	2	Unknown
Air Quality Related Values (AQRV)	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Unknown
American Alligator (Alligator mississippiensis)	Ouachita (2005), Ozark-St. Francis (2005),	2	Unknown
American Burying beetle (Nicrophorus americanus)	Ouachita (2005), Ozark-St. Francis (2005),	2	Unknown
Applications for Permits to Drill (APDs) approved	George Washington (2014), Ozark-St. Francis (2005),	2	Unknown
Aquatic Vegetation Condition	Alabama (2004), Chattahoochee-Oconee (2004),	2	Unknown
Bluegill	Ouachita (2005), Sumter (2004)	2	Unknown

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Bog turtle (Clemmys muhlenbergii)	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Unknown
budget	Alabama (2004), Daniel Boone (2004),	2	Unknown
chestnut-sided	Chattahoochee-Oconee (2004), Cherokee (2004),	2	R8 Bird Database
Chinese Privet (Ligustrum Sinense)	Daniel Boone (2004), Land Between the Lakes (2004),	2	Unknown
Cumberland bean pearly mussel	Cherokee (2004), Daniel Boone (2004),	2	Unknown
Eastern small-footed bat	Ouachita (2005), Ozark-St. Francis (2005),	2	Unknown
facility maintenance	Chattahoochee-Oconee (2004), Ouachita (2005),	2	Natural Resource Manager (NRM)
field sparrow	Chattahoochee-Oconee (2004), Sumter (2004)	2	Unknown
fluted kidneyshell	Cherokee (2004), Daniel Boone (2004),	2	Unknown
Forest health	Francis Marion (2015 - Draft), George Washington (Working Draft 2007),	2	Forest Health Technology Enterprise Team (FHTET) -- Forest Pest Conditions, Forest Health Technology Enterprise Team (FHTET) -- National Insect and Disease Risk Map, Forest Monitoring, University of Georgia - Center For Invasive Species and Ecosystem Health - Early Detection & Distrib
Frosted Flatwoods Salamander	Florida (1999), Francis Marion (2015 - Draft),	2	Forest Monitoring
Georgia aster	Chattahoochee-Oconee (2004), Sumter (2004)	2	Unknown
golden winged warbler	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Breeding Bird Survey, R8 Bird Database
Gypsy Moth	Daniel Boone (2004), Land Between the Lakes (2004),	2	Unknown
hard mast production	Chattahoochee-Oconee (2004), Ouachita (2005), Sumter (2004)	2	Georgia Department of Natural Resources (GA DNR) – Wildlife Division
Hydrologic connectivity	Francis Marion (2015 - Draft), Mississippi (2014),	2	Forest Monitoring
Illegal Equestrian Use	Alabama (2004), Daniel Boone (2004),	2	Unknown
Japanese honeysuckle	Cherokee (2004), Daniel Boone (2004),	2	Unknown
Jobs and Income	Francis Marion (2015 - Draft), George Washington (2014),	2	IMPLAN, Management unit Economic Contributions
kudzu	Cherokee (2004), Daniel Boone (2004),	2	Unknown
land exchange and purchase (acres)	Cherokee (2004), Kisatchie (1999), Mississippi (2014)	2	Unknown
landscapes important for forest interior birds	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Unknown
lespedeza	Cherokee (2004), Land Between the Lakes (2004),	2	Unknown
Livestock Grazing/Range Activities	Kisatchie (1999), Ouachita (2005),	2	Unknown
Long Term Soil Productivity Study	Kisatchie (1999), Mississippi (2014),	2	Unknown
Management strategy consistencies with riparian guidance	Daniel Boone (2004), Sumter (2004)	2	Unknown
mechanical fuels treatment (acres)	Chattahoochee-Oconee (2004), Sumter (2004)	2	Forest Activity Tracking System (FACTS)
miles of stream habitat improvement	Mississippi (2014), Ozark-St. Francis (2005),	2	Unknown

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Motor Vehicle Use Maps (MVUMs)	Ouachita (2005), Ozark-St. Francis (2005),	2	Unknown
Native Grasslands	Daniel Boone (2004), Ozark-St. Francis (2005),	2	Unknown
non-point source pollution	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Unknown
Northern Hog Sucker	Ouachita (2005), Sumter (2004)	2	Unknown
Northern Parula	Kisatchie (1999), Ozark-St. Francis (2005),	2	Unknown
Off-Highway Vehicle (OHV) Use	Croatan (2002), Sumter (2004)	2	Unknown
open woodland, savanna, or grassland structure	Cherokee (2004), Francis Marion (2015 - Draft),	2	Field Sampled Vegetation (FSVeg)
oyster mussel	Cherokee (2004), Daniel Boone (2004),	2	Unknown
Payments to States and Counties	Kisatchie (1999), Sumter (2004)	2	USFS - Payments and Receipts Reports
permanent openings (pasture, ROW, etc.; acres)	Chattahoochee-Oconee (2004), Florida (1999),	2	Field Sampled Vegetation (FSVeg), GIS
Persistent trillium (Trillium persists)	Chattahoochee-Oconee (2004), Sumter (2004)	2	Unknown
pitch pine (acres)	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Unknown
recreation accessibility	Chattahoochee-Oconee (2004), George Washington (Working Draft 2007),	2	Unknown
Red-headed Woodpecker	Kisatchie (1999), Ozark-St. Francis (2005),	2	Unknown
Redear Sunfish	Ouachita (2005), Sumter (2004)	2	Unknown
riparian area shade and cover	Cherokee (2004), Sumter (2004)	2	Unknown
ruffed grouse	Cherokee (2004), Daniel Boone (2004),	2	Unknown
Scenic Integrity Objectives	Chattahoochee-Oconee (2004), Francis Marion (2015 - Draft),	2	GIS
Smallmouth Bass	Jefferson (2004), Ouachita (2005), Ozark-St. Francis (2005),	2	Unknown
smooth purple coneflower (Echinacea laevigata)	Chattahoochee-Oconee (2004), Sumter (2004)	2	Georgia Department of Natural Resources, Georgia Plant Conservation Alliance, USFWS
soil and water protection standards	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Unknown
Soil Disturbance	Francis Marion (2015 - Draft), Uwharrie (2012)	2	Forest Soil Disturbance Monitoring Protocol Database
Soil Restoration and Maintenance Activities	Ouachita (2005), Sumter (2004)	2	Unknown
stream classification and determination of channel function	Land Between the Lakes (2004), Uwharrie (2012)	2	NEPA
stream fish communities	Cherokee (2004), Sumter (2004)	2	Unknown
sunfish	Jefferson (2004), Kisatchie (1999),	2	Unknown
swamp pink	Chattahoochee-Oconee (2004), Jefferson (2004)	2	Unknown
tall fescue	Cherokee (2004), Land Between the Lakes (2004)	2	Unknown
tan riffleshell	Cherokee (2004), Daniel Boone (2004)	2	Unknown
Timber Harvest - Commercial Thinning	Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004)	4	Unknown
Timber Harvest - Regeneration	Alabama (2004), Cherokee (2004), Florida (1999), Mississippi (2014), Ouachita (2005), Ozark-St. Francis (2005), Sumter (2004), Texas (1996)	9	Forest Activity Tracking System (FACTS)
Timber – Allowable Sale Quantity (ASQ)	Kisatchie (1999), Mississippi (2014), Ouachita (2005)	3	Unknown

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trail maintenance	Chattahoochee-Oconee (2004), Mississippi (2014)	2	Natural Resource Manager (NRM)
Tree Planting	Alabama (2004), Mississippi (2014)	2	Forest Activity Tracking System (FACTS)
Tree Release	Alabama (2004), Mississippi (2014)	2	Unknown
uneven-Aged Management (Group/Single Tree)	Florida (1999), Ouachita (2005),	2	Unknown
Virginia spiraea	Cherokee (2004), Daniel Boone (2004),	2	Unknown
Virginian big-eared bat	Cherokee (2004), Daniel Boone (2004),	2	Unknown
visitor comments	George Washington (Working Draft 2007), Land Between the Lakes (2004),	2	Unknown
wetland habitats	Mississippi (2014), Sumter (2004)	2	Unknown
wetland maintenance or mitigation	Chattahoochee-Oconee (2004), Cherokee (2004),	2	Unknown
Wildland Urban Interface (WUI)	Mississippi (2014), Ozark-St. Francis (2005),	2	SouthWRAP
wildlife openings	Chattahoochee-Oconee (2004), Mississippi (2014),	2	Field Sampled Vegetation (FSVeg), GIS
Yellow-breasted chat	Land Between the Lakes (2004), Ozark-St. Francis (2005),	2	Unknown
annual summary of accomplishments and results	Daniel Boone (2004), Land Between the Lakes (2004)	2	Unknown
fig buttercup (Ranunculus ficaria)	Chattahoochee-Oconee (2004), Daniel Boone (2004)	2	Unknown
Grants and Agreements	Alabama (2004), Kisatchie (1999)	2	iWeb
grassy/herbaceous ground cover	Cherokee (2004), Kisatchie (1999)	2	Unknown
habitat condition	Florida (1999), George Washington (2014)	2	Unknown
integrated projects	Kisatchie (1999), Land Between the Lakes (2004)	2	NEPA
land suitable for timber production	Daniel Boone (2004), Mississippi (2014)	2	Unknown
mature forest (>70 years)	Mississippi (2014), Ozark-St. Francis (2005)	2	Unknown
plan amendments	Alabama (2004), Kisatchie (1999)	2	Unknown
Trends Related to Forest Plan Objectives and/or Desired Conditions	Daniel Boone (2004), Ouachita (2005)	2	Unknown
White fringeless orchid (Platanthera integrilabia)	Chattahoochee-Oconee (2004), Cherokee (2004)	2	Unknown