Chapter 1. Design of the Southern Forest Futures Project

***David N. Wear, John G. Greis*[1]**

Introduction

The South has a unique human and landscape history and forests that reflect many episodes of change. Spanning the 13 States from Virginia to Texas, the South still contains a widely diverse complement of physical, economic, and ecological conditions; where forests and other native habitats play an important role not only in supporting diversity of native plants and animals but also in providing economic, aesthetic, and cultural values for its residents. Perhaps more so than in any other region of the United States, southern forests continue to change in response to direct human uses and to changes in the physical and biological environment, raising important questions about their potential future. Because these and other forces will dictate the long term sustainability of forest resources, it is important to scientifically assess their consequences so that society can make informed policy and management decisions.

The Southern Forest Futures Project represents a response to this need for a careful, science-based assessment of the South's forests. It was chartered by the Southern Research Station and Southern Region of the U.S. Forest Service in cooperation with the Southern Group of State Foresters to forecast potential changes and to clarify, to the extent possible, how important trends and potential structural changes might affect a variety of forest values, conditions, and uses (Wear et al. 2009). The following definition of success shapes the objectives, design, and conduct of the Futures Project:

[1] David N. Wear is the Project Leader of the Forest Economics and Policy Research Work Unit, Southern Research Station, U.S. Department of Agriculture, Forest Service, Research Triangle Park, NC 27709. John Greis is a Resource Specialist, Southern Region, U.S. Department of Agriculture, Forest Service, Tallahassee, FL 32399.

A successful Southern Forest Futures Project will provide a credible, objective information foundation that helps shape sustainable forests in the South through the informed actions of private and public forest managers and through the design and development of effective land use and forest policies.

The Futures Project cooperators anticipate a broad audience, one that reflects the diverse population of forest owners and forest users, and recognizes that about 90 percent of southern forests are privately owned. Within this context, sustainability starts with understanding current trends, anticipating changes, and identifying potential future scarcities; and ends with designing and implementing management and policy in response.

The first step in developing questions and issues to be addressed was to engage in discussions with a cross section of forest owners and forest users in a set of workshops conducted in all 13 States. With the public's interests defined through the workshops, we set out to design an assessment process that would target the most important questions and make the most efficient use of available tools and science.

Success also depended on our ability to provide three different types of information. The first was to take a comprehensive "systems science" approach in forecasting change at a scale detailed enough to be meaningful for the analysis of economic and ecological issues and their implications, but also capable of addressing major uncertainties through a set of potential futures. Second was to collect information about issues that are developing rapidly, and are not suited for modeling because of their complexity or their dependence on policy development or other highly uncertain events. Third was to identify the management implications of forecasted changes, which required a tertiary analysis coupling changes and implications with management science to determine how forest management choices might affect—or be affected—by undesirable outcomes.

Satisfying these three sets of information needs defined distinct and necessary phases of the Futures Project (fig. 1-1):

1. A **forecasting** phase using a simulation modeling framework to play out the implications of several scenarios for land use, forest conditions, and forest uses in the South. We assembled a forecasting team to deploy a modeling system for forecasting these scenarios of the future.
2. A **meta-issue** phase analyzing and predicting the future of several key issues of concern to southern forested landscapes, their functions, and the values that are derived from them. We recruited experts to address specific questions about these meta-issues.
3. A **management implications** phase identifying important issues and management implications for five broad subregions (fig. 1-2) of the South (Coastal Plain, Piedmont, Appalachians-Cumberland, Mississippi Alluvial Valley, and Mid-South) and the ecological sections within each subregion (fig. 3). We recruited scientists and managers to co-lead the analysis of these management implications.

Methods

Soliciting Public Input on Issues

Before beginning the three phases of analysis described above, we asked for help in identifying the key issues to be analyzed. With a vast number of issues that could potentially be addressed by a project such as this, it was critical to decide where to (and not to) focus attention so as to streamline the project and maximize its usefulness. Because our intent was to address a broad complement of issues relevant to forest managers, landowners, agency specialists, policy makers, science leaders, and the interested public, we sought extensive input from them on the specific issues that should be addressed. Their input provided guidance on content and helped formulate specific plans for all phases of analysis. For the forecasting work, public input helped shape the scenarios to be analyzed with technical models. Public input was the basis for selecting and defining

the set of meta-issues. And public input helped frame the analysis of management implications, focusing attention on the potential ecosystem impacts of future changes and the values that participants considered at risk within each of the subregions.

It is important to consider what "the public" represents in the context of this project. In contrast to public involvement processes for resource planning or administrative decision making, where input focuses on deducing the values held by the public and their preferences regarding outcomes, we sought information about the range of issues, questions, and uncertainties surrounding the future of forests and their services in the South. The analysis teams used this information, coupled with their own expertise, to define the most important issues. We sought broad participation from all "stakeholders," but did not have the means to determine whether this was a representative cross section of all demographic subgroups within the region. No weighting or voting was applied to the comments received, so that the focus was on the complete set of issues, not on a set of aggregate preferences.

Our primary method of eliciting input was to organize public meetings in 14 locations (table 1) at sites selected to ensure at least two meetings in each of the five subregions and at least one in each State. This latter criterion was important because State agencies had a strong interest in these meetings and wanted to be sure that their interested citizens had an opportunity to participate. We also reinforced the process of the face-to-face meetings through three "webinars" using Internet and phone access, which allowed people to participate without traveling, no matter their location. Two of these were held in the evening for those who could only participate after work hours. The public was also invited to provide input through the project Web site.

After reading and evaluating all the comments received, the project co-leaders next identified the meta-issues embedded in the public comments and assigned specific comments to their respective issues. A meta-issue was defined as a broad area of concern that was raised region-wide

and that involved a complement of interrelated drivers and/or implications. Sorting algorithms grouped comments according to several topical categories with extensive cross-referencing. Finally, we summarized the major points raised within each category.

Taken together, the more than 2,200 comments from some 600 participants define a comprehensive view of natural resource dynamics in the South. They address the social dynamics that reshape forested ecosystems, and they focus attention on the key uncertainties that surround anticipated changes in the interactions between human and ecological systems. We categorized the broad and universally important issues identified by the public into nine meta-issues: socioeconomic factors, plant and animal diversity and sustainability, bioenergy, climate change, land ownership change, water resources, taxes, insects, diseases and invasive plants, and fire.

A thorough and comprehensive analysis of each of these areas would define a broad research program for a community of researchers for years to come, but our objective was to shape the first planning step of the Southern Forest Futures Project.

For the forecasting phase we enlisted a team of experts to summarize the forces of change and begin shaping a set of alternative futures for analysis using quantitative models (ch. 2). The public's input was the starting point for a structured workshop, in which the team developed a manageable number of scenarios that address the issues raised by the public.

For each meta-issue identified through the scoping process, we continued to use public input as we developed research questions and associated important elements to be evaluated. An expert scientist was assigned to manage the analysis of each meta-issue. We also linked specific concerns and questions to their applicable subregions. These would be considered by the team addressing management implications in each of the five subregions.

The meetings clearly showed that that the public anticipates (and is concerned about) important changes they believe will occur on the forested landscapes of the South over the next 50 years (Wear and others 2009). Multiple forces will drive these changes, and their effects will span ecological, economic, and social dimensions. The public sessions clearly validated the need to undertake the Futures Project, and the public's input provides the foundation upon which we designed the three analysis phases of the effort.

-----Begin Text Box----------

The Future of Southern Forests: An ongoing conversation

1969 > South's third forest—Supported by the wood products industry and large private forest landowners, the third forest report used literature reviews and an evaluation of trends to evaluate the future of timber supply in light of increased demands for wood products and perceived underinvestment in private forest lands (Wheeler 1970). Concerned that timber scarcity would limit growth of the wood products sector, the report recommends policies and strategies to encourage planting and increase management on private forests; protect forests from insects, diseases, and fires; and build stronger institutions for forestry training, technology transfer, and research. Its forecasts of population-driven urbanization and expansion of timber growing and production have been realized in the South.

1988 > South's fourth forest…alternatives for the future—Nearly 20 years after the third forest report, the Forest Service asked some of the same questions about the potential future of the timber-producing sector in the South (USDA Forest Service 1988), this time using a state-of-the-art timber market model and a technical analysis of various policy alternatives for reversing underinvestment by nonindustrial private forest owners. Their findings anticipate the growth in timber production realized through 2000 and point to a similar suite of programs and policies to

encourage reforestation, management, and forest protection. While the report dedicates a few pages to impacts of timber projections on wildlife and water, its emphasis is squarely on the future of timber management and production.

2002 > Southern forest resource assessment—The growth in forest management and timber production largely anticipated by the third and fourth forest reports, coupled with the emergence of satellite chip mills in the late 1990s, raised concerns about the sustainability of forests in the South (Wear and Greis 2002a and 2002b). An interagency effort let by the Forest Service and driven by a set of questions developed from extensive public meetings, the southern forest resource assessment drew knowledge from extensive literature and data bases to address concerns ranging from imperiled terrestrial and aquatic species to wetlands; from outdoor recreation to the influence of policies, regulations, and laws; from air pollution to the future course of timber markets and land use changes. The assessment identifies urbanization as a key threat to forest sustainability and raises additional concerns about the effects of increased management intensity on wildlife and water, and about an increasing scarcity of recreational opportunities in parts of the South.

Today > Southern forest futures project—Six years after the completion of the southern forest resource assessment, new issues and questions have arisen. Forest industry has largely divested its land holdings, science has provided new insights into potential future climates, and questions about water sustainability are on the horizon. To address these and other questions—again deriving from extensive public involvement—the Forest Service and Southern Group of State Foresters commissioned the Southern Forest Futures Project. Where the earlier assessment relied mostly on literature reviews and stand-alone analysis of future impacts for its forecast of a most-likely future, this new effort is focused on forecasting the future under a variety of scenarios and uses these scenarios to integrate findings. The Futures Project builds from the knowledge

foundation of its predecessor, updates some topical areas, and lays out a range of futures for consideration by policy makers and forest managers.

Note: include photos of the reports' covers in the box

---------End Text Box----------

Forecasting Forest Conditions and Uses

Forecasting forest conditions and uses required a determination of the variables that could change the world surrounding future forests, including the physical environment (such as climate change), the social environment (number of people, their relative wealth, and how they use land), and the economic environment (relative scarcity of timber and other forest amenities). Following evaluations of the input from public workshops to sort out the variables to be addressed, our next step was to conduct a scenario analysis so that combinations of variables could be projected and evaluated. In particular, we developed a set of alternative futures to organize and conduct the forecasting phase of the project. Derived from scenarios constructed for the 2010 Resources Planning Act assessment conducted by the Forest Service, these alternative futures represent a broad range of internally consistent world possibilities by linking climate, population, income, and technological advances.

Alternative futures were evaluated using the U.S. Forest Assessment System (USFAS), a modeling system designed to forecast alternative futures for U.S. forests. This system is a forward-looking adjunct to the Forest Inventory and Analysis System implemented by the Forest Service research and development staff. The FIA system provides nationwide monitoring through repeated inventories that provide for consistency over time and a high level of detail. The USFAS accounts for changes driven by multiple vectors including biological, physical, and human factors to generate forecasts of forest inventories. The modeling approach is designed to address scenarios changing

climate, market-driven timber harvesting, and land use changes along with changes driven by a successional transitions in forest conditions.

A general schematic of this modeling system (fig. 1-4) starts with internally consistent combinations of social, economic, and technology forecasts defined as Cornerstone Futures for this application of the USFAS. Linked to the Cornerstones are various through various General Circulation Models (climate change models), each selected to define a climate forecast that is consistent with the Cornerstone. Also linked are data from a forest inventory server, which defines starting conditions for all plots in the forest inventory.

The modeling framework at the center of this system shows how future forest conditions are driven by biological dynamics—such as growth and mortality—which are affected by climate factors, allocations among land uses, disposal of forest land, timber harvesting, and forest management. The interplay of all of these factors yields a set of outputs, each of which describes forest projections that are consistent with the flow of forest products and land uses. Changes in water, biodiversity, and other ecosystem services can also be derived from the forecasted changes in forest conditions and land uses. Many of these are described in subsequent chapters.

The forest products module of this framework can be approached in one of two ways. The first is an explicit market simulation of market-clearing wood products and timber production in three regions of the United States (North, South, and West) and all other countries in the world. This approach accounts for a wide variety of demand drivers including energy futures, U.S. housing starts, and changes in paper consumption by households (Ince and others 2011). The second approach, and one that is used for much of the analysis of this Futures Project, is to develop price futures for timber products in the region. Increasing prices are consistent with increased scarcity of timber; decreasing prices indicate a lessening of timber scarcity.

The land use module (fig. 1-4) described in chapter 3 simulates changes in all uses of land and is driven by population and income growth along with the prices of timber products. Projections of forest area from the land use module feed into forecasts of future forest conditions and other analyses described below.

The forest dynamics module of this framework projects the future of every FIA plot in the forest inventory in a multiple stage process. The process begins by determining the point at which the plot is harvested, if ever, and the intensity of the harvest based on timber prices (from the forest products module), and the condition of forests on the plot (Polyakov and others 2010). The age of each plot in the next period is determined, and if harvested, the plot is determined to be naturally regenerated or planted. Forecasted climate including temperature and precipitation is assigned and forest conditions on the plot are inferred based on the harvest/no harvest decision, age, and climate selection (ch. 5).

The USFAS generated simulation results include forecasts of land use (ch. 4), forest products (ch. 9), and detailed forest conditions (ch. 5) for the forecast period (2010 to 2060). In chapter 5, we generate forecasts on various forest conditions including the volume of forest biomass, the area of forests by type and age class, and the carbon contained in the above- and below-ground pools represented. Furthermore, we generate maps forecasting removals from forests determined by harvesting and land use changes.

Results of these forecasts are used in the analysis of meta-issues and are summarized for each subregion for evaluation of management implications.

Evaluating Meta-Issues

We defined a meta-issue as a broad area of concern that contains a complement of interrelated drivers and implications. The public input process identified the nine meta-issues shown in table 2.

For each meta-issue, we synthesized all of the public input into one central question and an accompanying set of specific issues in need of resolution. The lead analyst and team member assigned to each meta-issue designed a study approach. Study plans are located on the Futures Project Web site (http://www.srs.fs.usda.gov/futures/process/draftplan/). Reporting of each meta-issue analysis comprises one or more chapters in this publication (for example, the meta-issue report for invasive species is divided into two chapters to address invasive plants and invasive insects and diseases). The central meta-issue questions and associated specific issues follow.

Social/economic linkages—How will alternative futures be affected by changing demographics and values, and how will these futures alter certain social and economic benefits in the South?

- How are population, demographics, and values changing; what might these changes mean for forests futures?
- How and where will population growth, changing demographics ownership, and land use affect supply and demand for different types of forest-based recreation?
- How and where might forest-based employment and income be affected by anticipated futures?

Wildlife and forest communities—How might changes in forest environmental and social conditions affect terrestrial wildlife (birds, mammals, reptiles, and amphibians), their habitats, and forest vegetation communities in the South?

- How would anticipated fragmentation and population growth, urbanization, and related infrastructure affect wildlife habitats?
- How might anticipated futures affect wildlife diversity and where would changes likely be concentrated?

- What are the implications of anticipated futures for imperiled, rare, threatened and endangered wildlife and plant species?
- How will rare forest communities be affected by anticipated futures?

Water—What roles do forests and forested wetlands play in producing and protecting water resources in the South and how might future land-management and land-use changes affect these roles?

- What is the relationship between forests and water timing, flow, and quality?
- How will forest conversion and loss affect these relationships?
- What are the implications of intensive forest management for water?
- How do forested wetlands and riparian areas protecting water quality, and what are the potential implications of their conversion and loss?
- How will increased demand interact with forest conversion, drought, and climate change?
- What are the known effects of impoundment construction on forests and associated resources?

Taxes—How might taxation influence retention and management of forest land in the South?

- What are the effects of estate, income, severance, and property taxes for nonindustrial forest owners?
- How do differential income taxes affect "C" corporations?
- How can/will the tax structure affect conservation easements or other forms of forest stewardship?

Climate change—How might the environmental conditions associated with climate change affect forest ecosystem health and productivity?

- What are the critical climate change variables and how are southern forests are likely to be affected by them?
- Where in the South might forecasted changes in climate-induced environmental conditions be most/least significant?
- How will potential climate-change outcomes, such as severe weather events and drought, interact with forest pests?
- What are the economic consequences of extreme weather events for landowners, forest industry, and local governments?

Fire—How will fire behavior and fire risk change over time, and what are the likely effects on communities and people?

- What is the current and potential fire behavior/fire risk situation in the South and what factors contributing to potential changes?
- What is the likely future of prescribed burning in the South, including the factors that affect this practice and alternatives to its use as a management tool?
- How will restricted or excluded prescribed fire affect fire-adapted and fire-dependent forest communities and other dependent species, and where will these effects be concentrated?
- What are the economic consequences of reduced prescribed burning, including potential property and structural damage and loss, timber devaluation, liability, and emergency rehabilitation and reforestation costs?
- Do wildfire and prescribed burning differ in carbon cycling, air pollution, forest productivity, and forest health?

Forest ownership change—Describe recent and anticipated changes in forest ownership in the South and the implications of these changes for forest ecosystem conditions, management, and productivity

- How much and where has forest land ownership changed in recent years and where will changes likely to be concentrated in the future?
- What are the economic determinants for ownership change (all ownership categories) and how might they change in the future?
- How will forest-land use and forest uses likely change as a result of shifts in ownership?
- How are forest management practices influenced by ownership change and what are the ramifications of those influences?
- How will changing forest ownership affect the forest products industry?

Invasive species—How will invasive plants, insects, and diseases likely affect southern forests and related ecosystems in the future?

- What are the factors influencing historical spread and forecast future spread of significant invasive species?
- What are the expected consequences of the spread of important invasive species for forest composition, riparian health, and dependent communities?
- What is the likelihood of effective invasive species control in the future, given anticipated fragmentation, parcelization, and urbanization interactions?
- What forest species are likely to be completely lost as a result of the spread of invasive pests?

Bioenergy—What would be the likely effects of the emergence of a mature bioenergy market on southern forests, forest owners, and traditional forest product markets?

- What current and potential technologies are needed to realize large scale production of biofuels from woody biomass, including preferred feedstock (if known)?
- What might be the likely forest management regimes followed to maximize the production of woody biomass?

- How would these regimes affect indicators of forest ecosystem integrity such as habitat quality, biodiversity, and soil productivity?
- How will the emergence of a bioenergy market affect competition with traditional forest product markets and financial returns to landowners?
- What effects will subsidies or other incentives have on landowner behavior and wood product markets?

Discerning Management Implications of Futures Project Findings

The South's regional identity sometimes obscures the substantial diversity of its landscapes. From coastal pine flatwoods to Blue Ridge escarpments, from cedar swamps and hardwood hammocks to High Plains mesquite, the South's forests are varied across longitude and latitude and the region's diversity of tree species exceeds any other part of the conterminous United States. The findings of the Futures Project or any other regional assessment cannot be meaningfully generalized to the entire South. Rather they warrant evaluation at finer grains where forecasted change can be intersected with specific forest and social conditions.

To address the diversity of the South, we include interpretations of the findings for the subregions shown in figure 2 and, where appropriate, for the 19 sections nested within these subregions (figure 3). Throughout our analysis of forecasts and meta-issues, we summarize our findings for the entire region and for each of the subregions, and follow up with management implications of forecasts and issue analyses for each.

The analysis of management implications starts with a thorough examination of current conditions and a summary of findings from the forecasts and the meta-issue analyses. Then a team of experts, coupling forest managers with scientists, interprets forecasting and analysis results into implications for management. Management changes may be directly implied by the forecasts, for example where intensified management is indicated or where specialized management is indicated

by expected scarcity of an ecosystem service such as wildlife habitat or water. Other forecasted changes imply constraints on how forest management might be practiced in certain places, most notably where human populations are growing.

By design, the subregional analyses of management implications are staged for completion after the forecasting and met-issue analysis. Accordingly, the results of these efforts will be published under separate cover at a later date. We also anticipate that the findings of the Futures Project will spawn additional studies of the implications for management and policy across the South. To support such future study, our findings in all other areas will be readily accessible online at the Futures Project Web site.

Conclusions

The Southern Forest Futures Project was initiated to provide interested publics, including forest managers and policymakers, with insights into the array of possible futures and a better understanding of what those futures would mean for forests and their associated values. Anticipating the future is the first step toward sustainable forest management. The next is developing management and policy approaches that lead to desired outcomes in these complex systems. Our forecasting and meta-issue analyses intend to address the first step. Our analysis of management implications addresses the second. The future is uncertain, as is our understanding of forested ecosystems, the provision of ecosystem services, and possibilities for management design and effects. Sustainability is therein a moving target where objectives, means, and knowledge are all dynamic. The accumulated data and knowledge arrayed by the Futures Project provides a starting point for considering the future of southern forests. Informed management, research, monitoring, and attention to the mechanisms of change will necessarily define the region's path toward forest sustainability.

Literature Cited

Ince, P.J., A.D. Kramp, K.E. Skog, H.N. Spelter, and D.N. Wear. 2011. U.S. Forest Products Module for RPA Forest Assessment. USDA Forest Service, Research Paper, FPL-RP-xxx yy p.

Poylakov, M., D.N. Wear, and R. Huggett. 2010. Harvest choice and timber supply models for forest forecasting. Forest Science 56(4):344-355.

Rudis, Victor A. 1999. Ecological subregion codes by county, coterminous United States. Gen. Tech. Rep. SRS-36. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 95 p.

Smith, James E., Linda S. Heath, and Michael C. Nichols. 2007. U.S. forest carbon calculation tool: forest-land carbon stocks and net annual stock change. Gen Tech. Rep. NRS-13. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 28 p.

USDA Forest Service. 1988. The South's Fourth Forest: Alternatives for the Future. USDA Forest Service, Forest Resource Report no. 24. Washington, DC. 512 p.

Wear, D.N., R.J. Huggett, and R. Li. 2011. Forecasts of forest conditions in the U.S. South under future scenarios for the 2010 RPA Assessment. USDA Forest Service, General Technical Report, SRS-xxx. zz p.

Wear, D.N., and J.G. Greis (editors). 2002a. The Southern Forest Resource Assessment: Technical Report. USDA Forest Service, General Technical Report SRS-53, 635 pp.

Wear, D.N., and J.G. Greis. 2002b. The Southern Forest Resource Assessment: Summary Report. USDA Forest Service, General Technical Report SRS-54, 103 pp.

Wear, D.N., J.G. Greis, and N. Walters. 2009. The Southern Forest Futures Project: What the Public Told Us. USDA Forest Service, General Technical Report, SRS-115. 17 p.

Wheeler, P.R. 1970. The South's Third Forest. The Journal of Forestry March, 1970: 142-146.

Tables

Table 1-1–Locations, subregions represented, and schedule of public meetings held for the Southern Forest Futures Project in 2008

Meeting location	**Subregion represented**	**Date**
Baton Rouge, LA	Coastal Plain/ Mississippi Alluvial Valley	January 29
Stoneville, MS	Coastal Plain/ Mississippi Alluvial Valley	January 30
Gainesville, FL	Coastal Plain	February 7
Charleston, SC	Coastal Plain	February 8
Little Rock, AR	Mid-South/Mississippi Alluvial Valley	February 13
College Station, TX	Mid-South	February 11
Stillwater, OK	Mid-South	February 12
Lexington, KY	Appalachian Cumberland	February 19
Nashville, TN	Appalachian Cumberland	February 21
Raleigh/Durham, NC	Piedmont/Coastal Plain	February 25

Blacksburg, VA	Appalachian Cumberland	February 26
Asheville, NC	Appalachian Cumberland	February 27
Athens, GA	Piedmont/Coastal Plain	March 6
Auburn, AL	Piedmont/Coastal Plain	March 7
Webinar #1	All subregions	April 8 evening
Webinar #2	All subregions	April 16 afternoon
Webinar #3	All subregions	April 16 evening

Table 1-2–Definition of meta-issues for the Southern Forest Futures Project

• Social and economic factors—recreation, jobs, and income
• Timber markets
• Wildlife, biodiversity, and forest communities
• Water and forests
• Tax influences on forest management and conservation
• Climate change and forest conditions
• Fire in southern forests
• Forest ownership changes
• Invasive plant species and the integrity of forest ecosystems
• Forest insects and diseases
• Bioenergy and its potential influence on forests

Figures

Figure 1-1–The three phases of the Southern Forest Futures Project.

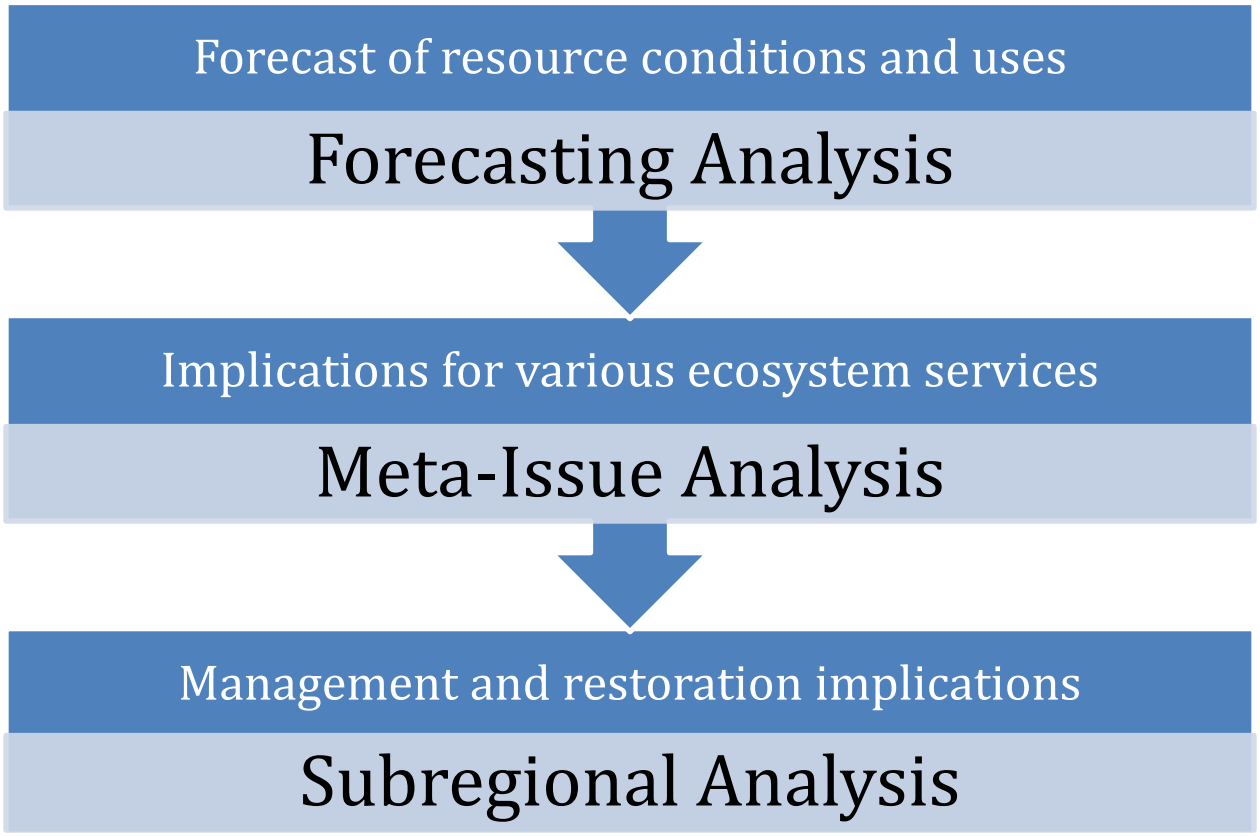

Figure 1-2—The five broad subregions of the South.

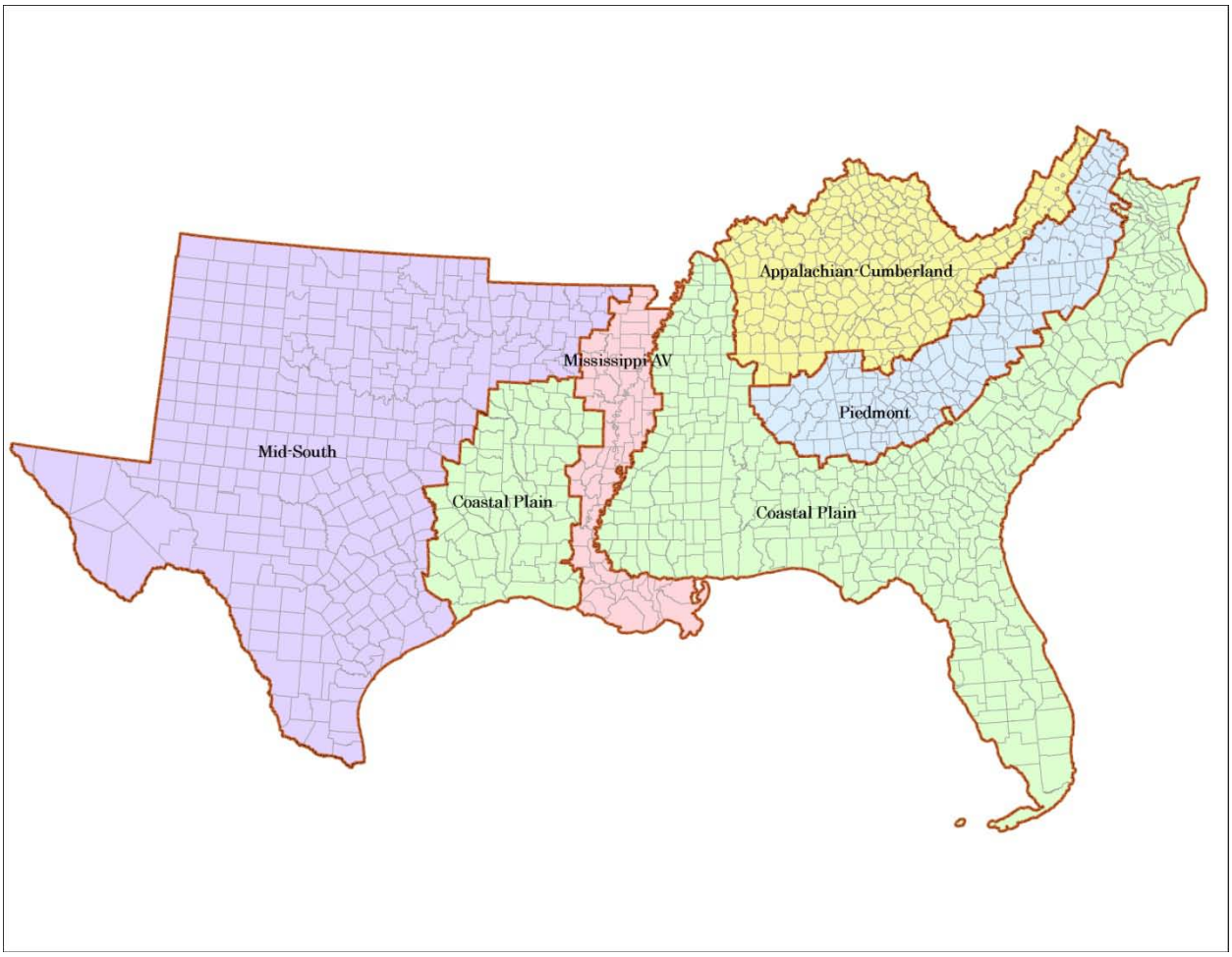

Figure 1-3—The 19 ecological sections of the South (source: Rudis 1999).

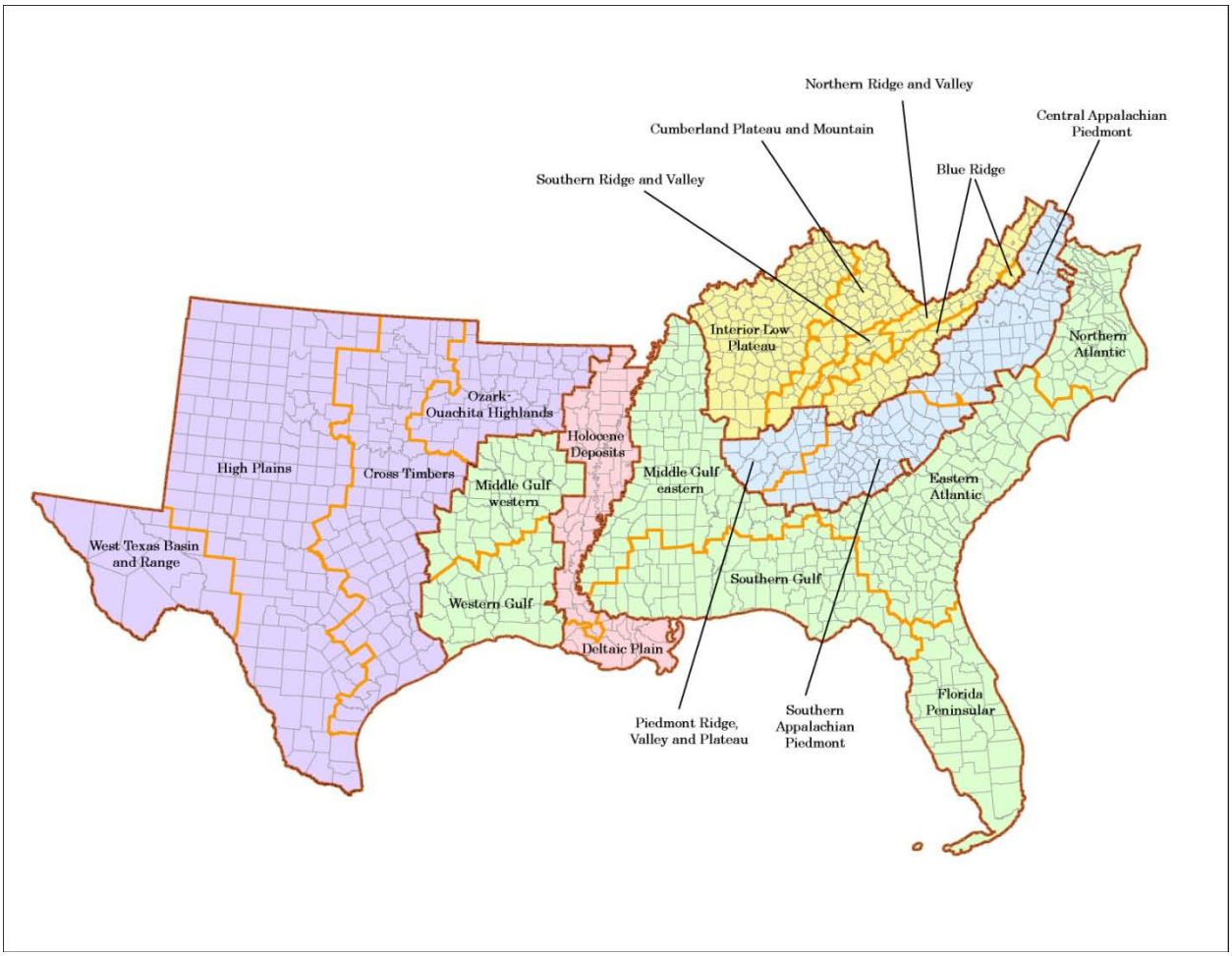

Figure 1-4–General schematic of the U.S. Forest Assessment System (USFAS).