



*South Carolina's
Statewide Forest
Resource Assessment
and Strategy*

**Conditions, Trends, Threats,
Benefits, and Issues**
June 2010



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A Message from the State Forester

South Carolina is blessed with a rich diversity of forest resources. Comprising approximately 13 million acres, these forests range from hardwood coves in the foothills of the Appalachian Mountains to maritime forests along the Atlantic Coast. Along with this diversity comes a myriad of benefits that these forests provide as well as a range of challenges that threaten their very existence.

One of the most tangible benefits is the economic impact of forestry, contributing over \$17.4 billion to the state's economy and providing nearly 45,000 jobs. South Carolina's forests also provide recreational opportunities for her citizens, diverse habitat for numerous wildlife species, and scenic beauty for all to enjoy. In addition, trees sequester carbon, provide for clean air and water, and soften the impact of streets and parking lots.

The state's forests also face many challenges. Some of these are biological, such as attacks by insects and diseases, while others are weather-related, such as drought and storms. Still other perils are due to man's activities, the most notable of which are wildfires and conversion of forestland to other uses.

The South Carolina Forestry Commission is charged with protecting and developing the forest resources of our state. Unfortunately, the agency is facing many challenges itself. Dramatically reduced state funding has resulted in reduced financial resources with which the Forestry Commission can provide the staffing and equipment needed to carry out its mission. The agency has had to greatly downsize its staffing and adjust in an effort to continue to be able to accomplish its mission provide the level of service that the citizens of South Carolina have come to expect and our forest resources deserve.

This Statewide Forest Resource Assessment was developed as a first step in identifying and quantifying the issues that face our state's forests and to assist in focusing reduced Commission capacity on the most important tasks. During this process, resource management experts and forestry-related organizations came together and prioritized these challenges so that strategies could be formulated. This type of collaborative, partner-based approach will be crucial as the SC Forestry Commission moves ahead in the 21st century and embraces the challenges that lie ahead. We invite you to go with us on this journey and work with us to ensure that our forests are able to continue providing the economic, environmental, and social benefits that are critical to our quality of life.

Best regards,

Gene Kodama
State Forester
South Carolina Forestry Commission

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Executive Summary

This Statewide Forest Resource Assessment provides an analysis of the benefits that the forests of South Carolina provide as well as an examination of the forces that threaten them. These benefits and threats can be summarized by the following issues, listed below in order of their priority ranking, as determined by stakeholders and steering committee members.

Water Quality and Quantity

Surface water that is free from pollutants and sediment and provides habitat requirements for wildlife is considered to be of high quality. Forestry operations generally have little detrimental effect on water quality. Nevertheless, the South Carolina Forestry Commission, cooperating with the South Carolina Department of Health and Environmental Control, aggressively promotes adherence to Best Management Practices. South Carolina has an abundant supply of freshwater, but is not immune to water quantity issues as evidenced by recent legal actions involving neighboring states.

Stormwater Management

Impervious surfaces such as roads, roofs, driveways, streets, and parking lots increase not only stormwater volume, but also the rate of flow. Maintenance and expansion of urban canopy cover is an effective tool that can be used to reduce the impact of stormwater runoff.

Prescribed Burning

Forest managers in South Carolina conduct prescribed burns on about 525,000 acres each year. Experts agree that nearly twice this amount needs to receive this treatment, but obstacles such as smoke management and liability concerns, fragmentation of forest land, and changing attitudes about prescribed burning make increasing the amount of acreage burned a major challenge.

Emerging Markets

Carbon credits, biomass, and other products of the forests of South Carolina are expected to become more important as issues such as climate change and the need for energy independence gain momentum on the federal level. Savvy landowners will position themselves to take advantage of these emerging markets, which may even enable some of them to retain ownership of their land. In addition, current markets for forest products need to be expanded to provide economic incentives for landowners to actively manage their forestland.

Wildfire Risk

Nearly 3,000 wildfires occur each year in South Carolina, two-thirds of which originate from escaped debris burns or are deliberately set. With the growth in the state's population, more and more of these fires damage not only timber and wildlife habitat, but also homes and other structures.

Forest Regulation

In many cases, forest regulation can be a disincentive for forest landowners to actively manage their forests and may be an incentive to convert their forestland to another use. Regulations may take the form of ordinances, taxes, and legislation such as the Endangered Species Act. Some forms of taxation, however, such as lower property tax rates for forested tracts, have a favorable effect on forest management.



Forest Health Threats

The threats to the health of the forests in South Carolina include native, non-native but naturalized, and non-native plants, diseases, and insects. The three most significant threats to South Carolina's forests currently are southern pine beetle, Sirex wood wasp, and cogongrass. They are important because of their potential economic, aesthetic, and ecological impacts.

Air Quality

South Carolina's forests play a major role in filtering the air of pollutants such as ozone and particulate matter. In addition, trees sequester carbon dioxide and emit oxygen through the process of photosynthesis.

Fragmentation and Parcelization

As South Carolina's population grows, forested tracts of land continue to become fragmented by the addition of roads, powerlines, and buildings. Many larger tracts are also being subdivided into parcels that make traditional forest management difficult to accomplish. This trend has implications for the long-term sustainability of the forest resources of South Carolina.

Population Growth

The population of South Carolina is predicted to grow from 4 million in 2000 to over 5 million by 2030. As the population grows, more forest land will be converted to housing and commercial development, stormwater runoff will increase, public demand on forest attributes will rise, and the number of wildfires that threaten structures will increase.

Climate Change

Increased incidence of droughts and storms, increased number and severity of wildfires, and more numerous and severe insect and disease outbreaks are possible if climate change predictions hold true. Sustainable management of forests can help reduce the negative effects of this change.

Public Perceptions about Forestry

Many South Carolina residents value the environmental role of forests, such as protecting water quality, as more important than their role as the provider of raw materials for the number one manufacturing industry in the state. With increased urbanization, many citizens also do not have a close connection with the land. As a consequence, restrictive regulations such as outdoor burning ordinances and tree protection ordinances are proposed with little or no consideration of the potential effects of this legislation on forestry operations.

Community Forests in South Carolina

Trees are major capital assets in communities. The quantity, placement and size of trees in populated places can positively impact and provide millions of dollars in savings regarding energy conservation, air filtration, stormwater runoff mitigation, and carbon dioxide sequestration.



Introduction

Background

In 2008, the USDA Forest Service implemented a "Redesigned" State and Private Forestry (S&PF) program. The S&PF Redesign effort was conceived in response to the combined impacts of increasing pressures on our nation's forests and decreasing S&PF resources and funds. Significant threats to forests, such as insect and disease infestations, catastrophic fires, and the loss of critical forested landscapes to development, coupled with the pressure placed on local economies by the increasingly global nature of the forest products industry, pointed to the need for more progressive strategies for conserving our nation's forest resource.

National Priorities

The 2008 Farm Bill established a new set of national priorities for federal assistance for private forest conservation. A new subsection (c) was added to the Cooperative Forestry Assistance Act:

(c) Priorities - in allocating funds appropriated or otherwise made available under this Act, the Secretary shall focus on the following national private forest conservation priorities, notwithstanding other priorities specified elsewhere in this Act:

- (1) Conserving and managing working forest landscapes for multiple values and uses.*
- (2) Protecting forests from threats, including catastrophic wildfires, hurricanes, tornados, wind storms, snow or ice storms, flooding, drought, invasive species, insect or disease outbreak, or development, and restoring appropriate forest types in response to such threats.*
- (3) Enhancing public benefits from private forests, including air and water quality, soil conservation, biological diversity, carbon storage, forest products, forestry-related jobs, production of renewable energy, wildlife, wildlife corridors and wildlife habitat, and recreation.*

Thus, the 2008 Farm Bill requires that forestry assistance aim to conserve working forests, protect and restore forests, and enhance public benefits from private forests.

Statewide Assessments and Strategies

The 2008 Farm Bill requires each state to analyze forest conditions and trends in the state and delineate priority rural and urban forest landscape areas. From this assessment, a statewide forest resource strategy will be developed to address critical issues facing the forests of that state. This strategy will also serve as the basis for formulating competitive proposals for S&PF funds.

The three S&PF national themes are:

- Conserve working forest landscapes,
- Protect forests from harm
- Enhance public benefits from trees and forests

In South Carolina, the South Carolina Forestry Commission is the lead state agency in the development of the assessment and resource strategy for the State's forests.

Final guidance for the state assessment comes from the Redesign Implementation Council and the 2008 Farm Bill (www.fs.fed.us/spf/redesign/stateassessstrategies.pdf). State assessments and resource strategies are integral to the State and Private Forestry (S&PF) redesign and required as an



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amendment to the Cooperative Forestry Assistance Act (CFAA), as enacted in the 2008 Farm Bill. This document provides national guidance to states to develop their state assessments and resource strategies.

The 2008 Farm Bill requires three components in the assessment and planning process:

- *A Statewide Assessment of Forest Resources*—provides an analysis of forest conditions and trends in the state and delineates priority rural and urban forest landscape areas which are the focus of this document.
- *A Statewide Forest Resource Strategy*—provides long-term strategies for investing state, federal, and other resources to manage priority landscapes identified in the assessment, identifying where federal investment can most effectively stimulate or leverage desired action and engage multiple partners.
- *An Annual Report on Use of Funds*—describes how S&PF funds were used to address the assessment and strategy, including the leveraging of funding and resources through partnerships for any given fiscal year.

To ensure that federal and state resources are focused on important landscape areas with the greatest opportunity to address shared management priorities and achieve meaningful outcomes, the SC Forestry Commission worked collaboratively with key partners and stakeholders to develop a statewide assessment of the forest resources. This statewide assessment provides a comprehensive analysis of the forest related conditions, trends, threats, and opportunities within the state. The assessment includes:

- An analysis of present and expected future forest conditions, trends, and threats on all ownerships in the state;
- The identification of forest-related threats, benefits, and services consistent with the S&PF redesign national themes; and
- A delineation of priority rural and urban forest landscape areas to be addressed by the state resource strategy through geospatial analysis.

The geospatial analysis includes data layers that address each of the following core issues or themes:

- Development Risk
- Fragmentation
- Wildfire Risk
- Forest Health Risk
- Fish and Wildlife Habitat
- Water Quality and Supply
- Economic Potential
- Green Infrastructure

Each core issue (theme) is tied to one or more of the S&PF redesign themes and associated national objectives. The state's assessment of forest resources includes a description of all spatial analysis methods and logic and one or more maps that identify priority forest landscape areas.

The Southern Group of State Foresters (SGSF) and USDA Forest Service (USFS) Southern Region represent 13 southern states and Puerto Rico. More than 5 million private owners control 89 percent of forests in this area. While each state ultimately decided how to approach its own state assessment, members of the SGSF elected to collectively create a template, or sample state assessment, to be used (if desired) by all southern states. The SGSF and USFS Southern Region identified the following common set of regional priority issues or opportunities for southern states to consider collectively while guiding their own assessment process:



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- Significant forest ecosystems and landscapes
- Urbanization, fragmentation, and loss of forestland
- Fire
- Forest health
- Water quality protection and watershed management
- Wildlife habitat and species conservation
- Forest resource market opportunities

This assessment addresses each of the regional priority issues listed above.

Assessment Development

The SC Forestry Commission formed a steering committee in February 2009 to guide the development of the state assessment and resource strategy. The first meeting of this group was held on March 5, 2009. The steering committee is composed of seven SC Forestry Commission program managers, the Forest Management Chief (state lead), and the Deputy State Forester. In addition, two managers from the SC Department of Natural Resources serve on the committee, one of whom is the Forest Legacy program manager for South Carolina. Additionally, a contractor was hired in May 2009 to assist the steering committee in the development of the assessment and strategy documents.

The steering committee contracted with the SC Budget and Control Board's Office of Human Resources. The contractor assisted with project planning, issue identification, data gathering, stakeholder and sub-group facilitation, and the writing and editing of the assessment. Additional assistance will be provided on the development of the Statewide Forest Resource Strategy. Also, a website was created to provide a central point of contact for the public and stakeholders. An additional website was created that became the primary vehicle for the committee members and stakeholders to receive progress updates.

The steering committee held several meetings to identify the issues to be considered during the assessment process. Twenty-eight (28) issues were identified initially. The committee identified the relationships among the issues and sorted them in several ways before deciding to group them under the three national themes: 1) Conserve working forest landscapes; 2) Protect forests from harm; and 3) Enhance public benefits from trees and forests.

The issues were then presented to approximately 60 stakeholders at a day-long meeting on June 30, 2009. Included in this group were key players, such as representatives of the State Forest Stewardship Coordinating Committee, State Technical Committee, federal and state land management agencies, conservation organizations, and other partners. Stakeholders were divided into three groups according to the national themes. Participants were asked to identify South Carolina's strengths, weaknesses, opportunities, and threats related to each of the issues associated with their theme. In addition, the stakeholders were asked to identify their priority areas from among the issues. Analysis of the data from the stakeholders' meeting allowed for further issue refinement and the creation of a public survey.

The online survey was available to stakeholders and the public from July 27, 2009 through August 10, 2009. A total of 378 responses were received. The survey asked each respondent to rank the issues in each of the three national theme areas. The survey also asked respondents to indicate their top five priorities from among all the issues. In addition, the survey collected demographic information to assist the committee in analysis of the data.



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The analysis of the survey data led to the creation of four working groups to develop sections of the final assessment document. The four working groups created were:

1. Forest Sustainability and Regulation
2. Wildfire Risk
3. Threats to Forest Health
4. Environment Benefits of Forests

Team leaders were then selected from the steering committee. Team members were drawn from SC Forestry Commission personnel as well as from several stakeholder groups. Team members independently gathered and shared data, and the teams met several times beginning in late September 2009 through February 2010 to develop and refine their sections of the assessment. In addition, the work groups identified critical geo-spatial data to be included in the final assessment to prioritize forest landscape areas in South Carolina. Facilitated sessions were held for each group to identify criteria for analysis or spatial nature of analysis for each issue to prioritize the data. The GIS data was designed to address where limited resources should be focused. The data identified was both spatial and non-spatial in nature and included sets of criteria that should be considered. The criteria considered included richness, threats or risks, and areas of opportunity.

Highlights from the Ninth Forest Inventory of South Carolina

Area

- Total forest area has remained relatively stable over time and amounted to 13 million acres in 2006. Forests occupy 67 percent of the land area of South Carolina.
- Timberland area now totals greater than 12.8 million acres which has increased 5 percent from 2001. Hardwood timber types occupy nearly 6.8 million acres (54 percent) of timberland which has increased 9 percent during the past 5 years.
- Softwood forest types occupy 5.9 million acres or 46 percent of the State's timberland area. The area of planted pine remains statistically unchanged at about 3.1 million acres.
- Loblolly-shortleaf pine is the predominant forest-type group and occupies 5.3 million acres.

Ownership

- Most (59 percent) of the State's 13 million acres of forest land is owned by private individuals. Forest industry owns 11 percent which has decreased from 16 percent in 2001. Corporate ownership has risen from 16 percent in 2001 to 18 percent as of 2006.
- Nearly 7.3 million acres of South Carolina's private forest land is in the hands of approximately 262,000 private individuals. One-fifth (21 percent) of these family forest landowners ranked the production of timber products as an important management objective.



Volume

- As of 2006, total all live volume on timberland in South Carolina amounted to 21.5 billion cubic feet which is the most volume ever reported for the State.
- All live volume is split almost evenly between softwoods (10.6 billion cubic feet) and hardwoods (10.9 billion cubic feet). The loblolly-shortleaf pine species group accounted for 8.8 billion cubic feet (83 percent) of the all live softwood volume.

Net Growth and Removals

- Total net annual growth of all live trees on timberland averaged greater than 1.2 billion cubic feet per year between 2002 and 2006.
- Net growth for all live softwood trees on timberland averaged 817.0 million cubic feet per year, and removals averaged 596.1 million cubic feet per year. Planted pine stands account for 493 million cubic feet (41 percent) of total net annual growth and 314 million cubic feet (39 percent) of total annual removals. Pine plantations, however, only occupy 3.1 million acres (24 percent) of the total forest area in South Carolina.
- Hardwoods are growing wood at a rate of 387.3 million cubic feet per year which is an increase of 27 percent over the record setting mark of 305.9 million cubic feet per year set during the previous survey. Hardwood removals dropped from an average of 250.7 million cubic feet per year between 1994 and 2001 to the current 217.7 million cubic feet per year.

Economic Impact

- Forestry is a crucial segment of the state's economy, contributing \$17.45 billion annually and providing support for almost 45,000 families.
- In South Carolina, forestry has emerged as the leading manufacturing industry in terms of employment and labor income. Nearly 45,000 people, earning \$2.43 billion in labor income, are directly employed in the forestry sector as defined by a 2006 economic Impact Analysis for Planning (IMPLAN) analysis. Because of the multiplier effect, the total number of jobs that forestry contributes to South Carolina is nearly 84,000.
- The export of South Carolina forest products approached \$1 billion in annual value in 2006. Aided by the declining value of U.S. currency in the world market, the value of South Carolina's forest products export grew 59 percent from \$604 million in 2001 to more than \$962 million in 2006.
- Approximately 75 sawmills, pulpwood mills, and other primary wood-processing plants were operating in South Carolina in 2005. These mills averaged nearly 755 million cubic feet of timber products per year (including domestic fuelwood and plant byproducts) between 2001 and 2005.
- Average annual output of roundwood products (including domestic fuelwood) declined from 673 million cubic feet in the previous survey period to an average of 669 million cubic feet between 2001 and 2005.
- Roundwood harvested for saw log and pulpwood production amounted to between 260 and 311 million cubic feet, respectively. These two products accounted for 85 percent of the total roundwood production for the State.



Overarching Issues



South Carolina's rapid population growth and the resulting change in public perceptions about forestry affect all aspects of managing the forest resources of South Carolina. In addition, climate change, if it occurs to the extent that some have predicted, will influence the state's forests and urban trees.

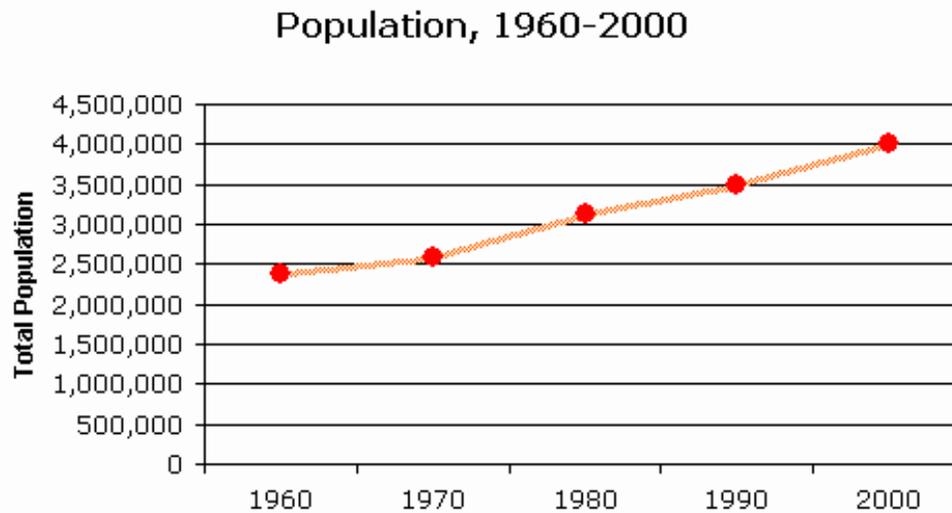


Population Growth

Description

South Carolina has one of the fastest growing populations in the nation (Strom 1998). As the graph below indicates, the population of South Carolina rose from less than 2.5 million in 1960 to more than 4 million in 2000 (Census Scope 2000).

Figure 1: Population Growth in South Carolina from 1960 – 2000.



This trend is expected to continue. Projections are for South Carolina's population to grow to over 5 million by 2030 (Census 2005).

In addition to an increase in the number of residents, the median age of the state's citizens is expected to rise in coming years. "In 2000, 12.1 percent of South Carolina's population was 65 years of age or older. By 2030, the 65 and over population is expected to make up 22.0 percent of the state's population" (Census 2005). These older citizens generally have more time available to give to causes and are more vocal and politically active than their young neighbors. They are often times supporters or authors of proposed ordinances that affect forest management.

Effects on Forest Resources

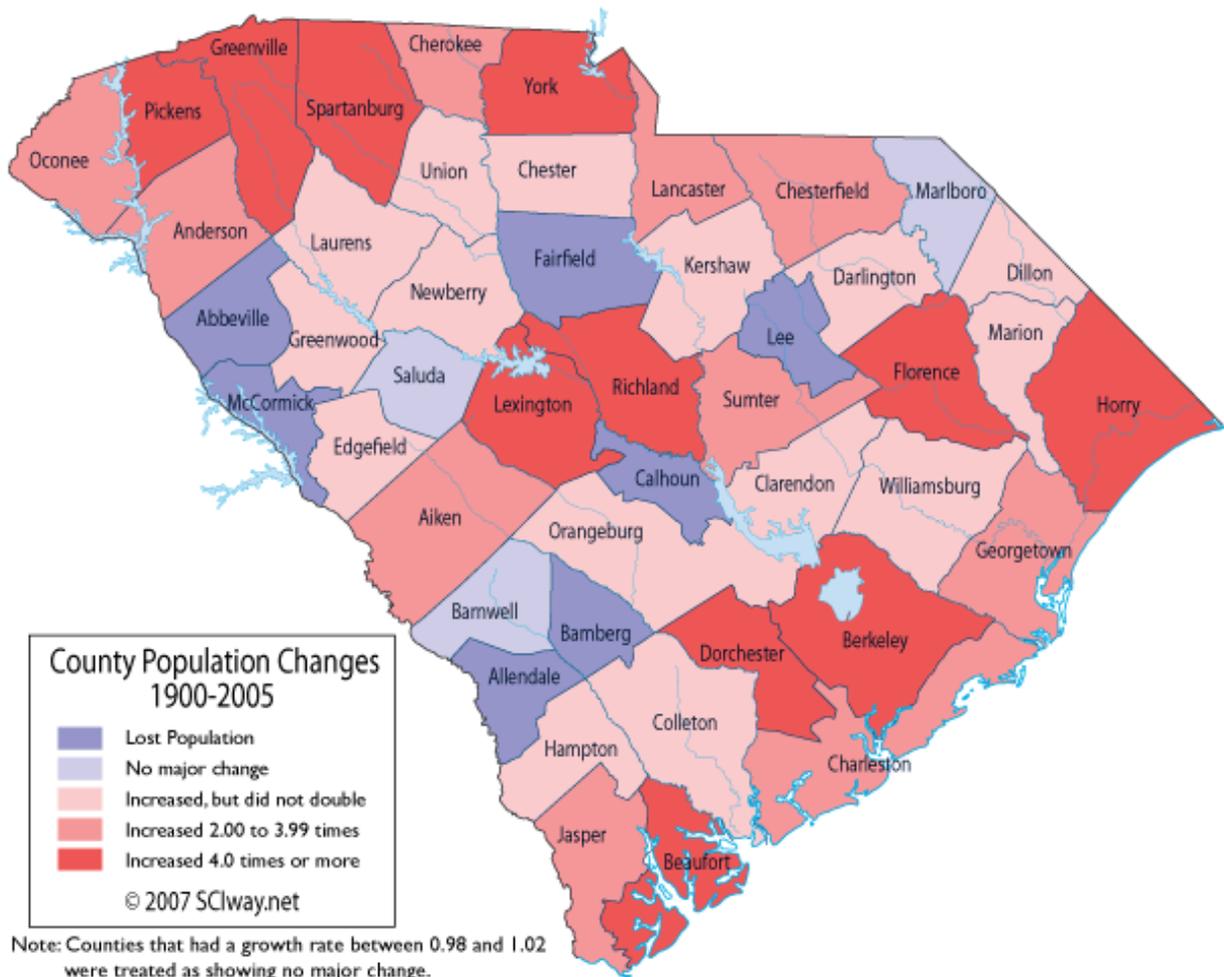
This population growth is impacting the forest resources of our state in several ways. People moving to South Carolina from other parts of the country account for most of the population growth not native South Carolinians having more children (Slade 2008). These new residents often have different views on forestry than people who have lived in the State all of their lives. For example, anecdotal information indicates that many of the newcomers are intolerant of smoke from prescribed burning. They also tend to be less familiar with timber harvesting operations, so they may advocate for regulations against logging. Many of these newcomers are more accustomed to older, natural hardwood forests versus the young pine plantations that are actively managed and commonplace in South Carolina.



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How this growth is occurring has a negative effect on forests. Much of this growth is in the form of urban sprawl, which results in conversion of forestland to residential use (Macie & Hermansen 2002). One definition of sprawl is when the rate of land consumption exceeds the rate of population growth for an area (Theobald 2001). This unplanned, uncontrolled growth consumes a disproportionate amount of land. In the Charleston area, for example, from 1973 to 1994, a one percent increase in population resulted in a six percent loss in forest and farm land (Allen and Lu 1998). “Among forces of change, urbanization [has] the most direct, immediate, and permanent effects on the extent, condition, and health of forests” (Wear and Greis 2002).

Figure 2: Population Growth – 1900-2005



Source: <http://www.sciway.net/data/county-population/2005-growth-rankings-map.html>

Much of the land that is being developed for commercial and residential use is highly productive. “South Carolina ranked 9th among 50 states in the rate of conversion of prime agricultural and forest lands to development between 1992 and 1997” (Ulbrich and London 2008). Once this conversion occurs, these properties are no longer available for the production of forest products and become unsuitable for most species of wildlife. In addition, carrying out forest management practices, such as prescribed burning and timber harvesting on forestland near these residential areas, becomes more difficult (Wear et al. 1999).



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Losses of wildlife habitat and timber production are only two of the consequences of population growth in South Carolina. This growth also results in a loss of many of the benefits of managed forests such as aesthetic and recreational value and water quality protection. The increased impervious surfaces associated with development results in higher amounts of stormwater runoff as well as increases in ambient air temperature (SCFC 2010).

Population growth also increases the risk of human-caused wildfires. "With more people, there is increased risk of fires caused by people...debris burning, equipment use, smoking, campfires and arson" (USFS 2010). In addition, controlling wildfires on forestland near residential or commercial development is more difficult than controlling wildfires that occur in rural areas. Firefighters place higher priorities on human lives and structures than they do on trees, consequently they must adjust their tactics when developed areas are nearby. For example, firefighter may be severely limited in using backfires because houses would be placed in danger by the use of that technique.

Current Activities

Several programs are mitigating the effects of population growth on South Carolina's forest resources. Through the South Carolina Forestry Commission's Urban & Community Forestry Program urban forestry specialists work with municipal and county planning organizations to develop tree ordinances, conduct tree inventories, and provide other technical assistance. This advice helps to reduce the negative effects of development and promotes healthy urban forests (SCFC 2010a). The Forest Legacy Program, coordinated by the South Carolina Department of Natural Resources, seeks to protect environmentally sensitive forestland through the use of conservation easements or fee simple title (USFS 2008). The Assessment of Need (AON) for South Carolina's Forest Legacy Program is attached as [Appendix 2](#). The AON has been updated and received public review as part of the public comment opportunities with the SC Forest Assessment. The only significant modification to the AON was the reduction in size of Forest Legacy Areas throughout the state to provide a more focused approach to forest conservation. For additional information on this process and the basis to the boundary adjustments, please refer to the AON.

The Forestry Commission's Forest Stewardship Program involves foresters working with landowners to develop management plans designed to optimize the productivity of their forestland to meet the landowner's objectives (SCFC 2010b). Also, the Forestry Commission manages approximately 93,000 acres on five state forests on a sustainable basis to provide forest products, recreation, and wildlife habitat.

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Public Perceptions about Forestry

Introduction

A challenge for the forest industry and public forestry agencies has been and always will be public perception. Thoughtful, sound management of forested lands involves activities which can appear destructive or downright dangerous to public safety, as in the case of prescribed fire. Overcoming the layman's attitudes toward such practices as, clearcut timber harvesting, thinning, monoculture species planting, and prescribed fire has been a continual challenge for those in the forestry community. Public attitudes are shaped by many sources, some of which may be the media, school curricula, special interest groups or the like, and are uninformed and inherently problematic.

Status

The Southern Forest Resource Assessment (SFRA) sought to address concerns raised by professionals and the lay public about the current state and the future of the forests in the American Southeast. This SFRA report contains a chapter on southern residents' values and attitudes about the forest resource which illustrates the perceptions across socioeconomic strata of the forest resource. This resource is an integral part of the culture, economy and environmental aesthetic (Wear et al. 2002).

The following key findings reflect the challenges seen in South Carolina for promoting forestry and its affiliated industries to a population whose connection to forest lands is merely one of proximity.

- Southern residents hold stronger (more intense) values about public than private forests. Among the four values of forests mentioned to respondents, the one considered most important was clean air, and the one rated as least important was wood production.
- Southern residents have moderately strong pro-environmental attitudes. They favor additional funding of environmental protection and stricter environmental laws and regulations.
- A review of the related literature reveals a strong and fundamental shift over the past two decades in public values about forests and their management. Values have shifted away from a commodity-oriented anthropocentric¹ approach to forest management toward inclusion of natural biological factors in a biocentric² approach.
- Southern women and younger people have stronger biocentric values about forests and stronger pro environmental attitudes than men and older people. There are only minor differences in environmental attitudes and values between other demographic groups such as urban and rural residents, long-term and short-term residents, land owners and non-landowners, people of different races, and people who live in different regions within the South.

It is this disconnect between the purpose of forestry and the general public's values attached to forested lands that may stand as one of the hurdles for the future of forestry and timber-related industry in South Carolina. If the demographic trend is toward urban centers, will an industry birthed in a natural resource stand the test of public opinion? The above findings suggest a strong association of the forests with something that must be protected, not managed in a regime that includes final harvests and regeneration.



Current Activities

From its inception, the South Carolina Forestry Commission has dedicated its efforts in part to education. Promoting state-of-the-art silvicultural techniques, offering various services, disseminating timely information on forestry legislation and tax code incentives, and keeping a finger on the pulse of the state's timber market for the benefit of landowners have all been the Forestry Commission's collective stock-in-trade for decades. However, public entities tend to benefit mainly those who are familiar with what they have to offer. Owners of forested land often are well aware of the information, services, and expertise the USDA Forest Service and the SC Forestry Commission offer. If landowners are not aware of the assistance available, they often know enough to at least turn to these agencies for help. The perception of the people working in the profession is that the general population lacks a sufficient understanding of the purpose and goals of forestry.

Tomorrow's policy decisions will be made by today's young people. Programs, such as the Forestry Commission's Wood Magic Forest Fair, aim to impart a commodity-based value of forestry to hundreds of South Carolina's fourth graders each year. It is a comprehensive environmental education program that is correlated to state curriculum standards in science and language arts. To help measure the effectiveness of this program, teachers are asked to administer a pre-test to the students before they attend Wood Magic and a post-test after the program. The results of these tests are compiled and examined to determine the educational success of Wood Magic. A summary of these results indicates a clear positive shift in attitudes and understanding of forestry practices (<http://www.trees.sc.gov/09wm.pdf>) (SCFC 2010).

While these results demonstrate a pro-industry shift in understanding by the end of the program, the results also suggest deficit prior to attending this field trip. The children's' attitudes prior to Wood Magic are being shaped and informed by their environment. It is reasonably safe to assume these influences include teachers, parents, popular media, and general experience. Shaping attitudes about South Carolina's forest resource must entail reaching back through all of these channels in order to foster a general appreciation for the state's number-one manufacturing sector in the decades ahead.

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Glossary

¹anthropocentric - assuming human beings to be the final aim and end of the universe

²biocentric - centered in life; having life as its principal fact
(source: <http://dictionary.reference.com/browse/anthropocentric>)



Climate Change

Definition

Weather data from the last 30 years indicates that the earth's atmosphere is warming, which is most likely due to increasing levels of carbon dioxide and other greenhouse gases that are being released into the atmosphere (The National Academies 2008). Much of this pollution is caused by the burning of coal for electricity generation and by the consumption of diesel fuel and gasoline for transportation. In fact, fossil fuel consumption results in 79 percent of greenhouse gas emissions in the United States (Hockstad et al. 2009). The resultant warming of the atmosphere results in changes in long-term weather patterns as well as a possible increase in the incidence of droughts, flooding, and severe weather (USFS 2008). Once known as global warming, this change in the atmosphere is now referred to as climate change.

Current Status

The effects of these changes in long-term weather patterns have not been quantified in South Carolina as of this writing. There is considerable debate among scientists as to the degree to which these effects will be felt in our state in the future.

Trends

One of the climatic changes that is being predicted is an increased incidence and severity of droughts. Even short-term droughts reduce the productivity of forests both for wood products and for wildlife habitat. Not only do the canopy trees grow more slowly under these conditions, but the shrub and herb layers of the forest also decrease in nutrient capacity for wildlife. Prolonged droughts can make trees more susceptible to insect and disease attacks and result in increased mortality.

In addition to the stress that droughts place on trees and other plants, climate change can increase the reproductive capacity of bark beetles (Dix 2009). Larger populations of insects may develop which will enable these pests to successfully attack trees whose vigor has been reduced by a lack of rainfall.

If the current warming trend continues, the natural ranges of both plant and animal species may change. The range of some tree species may move northward and to higher elevations. This change will affect ecosystems as these new species begin competing with the trees that formally dominated this landscape. In addition, invasive species could become more of a problem in some areas. The spread of these non-native species may be facilitated by longer growing seasons (USFS 2009).

Climate change predictions include the likelihood of more numerous and more severe wildfires (Hilbruner 2009). Longer growing seasons result in a larger amount of fuel on the forest floor. Droughts cause these fuels to dry to historically low levels which makes them more available for intense combustion.

Some studies suggest that warming of the atmosphere will result in a significant rise in sea levels in some parts of the world. If this occurs in South Carolina, this could have at least two effects on our forest resources. The most direct effect will be an intrusion of salt water into formally brackish or fresh water ecosystems. This change will have a major effect on the plants and animals that inhabit these areas. Those species that are less salt-tolerant will suffer reduced growth and higher levels of mortality. An indirect effect of the rise in sea level would be increased pressure on the forest resources from the human population along the coast. As coastal residents are forced to move inland, more and more forest land will be converted into housing and commercial development (Landner 2009).



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In addition to (or because of) the effect of climate change on trees, many species of wildlife will be affected as well. Fragmentation of wildlife and fish habitat is likely to occur if temperatures continue to increase and droughts become more frequent and/or severe. Bird populations may fluctuate dramatically in response to changes in food supplies. In fact, fish and wildlife species that are not able to adapt to climate changes will be forced to either move or face extinction (Solomon 2009a).

In contrast to all of these negative effects that are predicted, some scientists assert that several positive effects of climate change are possible. One of these effects is longer growing seasons that will result in more growth per year for some species of trees. Higher levels of CO₂ will “very likely increase photosynthesis for forests, but this increase will likely only enhance wood production in young forests on fertile soils” (Backlund et al. 2009). Nitrogen deposition will also probably cause increased forest growth where adequate water is available.

Role of Forests

Trees and forests play a key role in moderating the effects of climate change. U.S. forests currently offset about 10 percent of the carbon dioxide (700 million tons) that is produced by the burning of fossil fuels. Under diligent management, forests have the potential to offset an additional 1200 million tons and the use of forest-derived biofuel may offset 600 million tons more. Carbon can also be stored in forest products that do not decay rapidly as well as in standing trees (Solomon 2009). Managing forests sustainably helps keep the amount of carbon in these areas relatively constant (Buford 2009). In addition to helping with carbon sequestration, forests can “to a substantial degree, mitigate the dire effects of atmospheric pollution” (Malmsheimer et al. 2009). In short, sustainable forest management can enable our forests to “play a positive and significant role to help address global climate change” (Broekhoff et al. 2009).

Current Activities

Current activities that are mitigating the effects of climate change in South Carolina include the Forest Stewardship Program which is funded by the USDA Forest Service and is coordinated at the state level by the SC Forestry Commission. Through this program, foresters work with landowners to develop management plans designed to optimize the productivity of their forest land to meet the landowner’s objectives (SCFC 2009). In addition, several cost-share programs are available to assist private landowners with the cost of reforestation (SCFC 2009a).

The SC Forestry Commission also provides professional advice to other state agencies that own land. This technical assistance often results in a higher level of productivity for the forest land that these agencies manage. The Forestry Commission manages over 93,000 acres of state forest property with help from a forest planning model. This GIS-based computer model maximizes the economic return from these lands while providing for wildlife habitat, recreation, and aesthetics.

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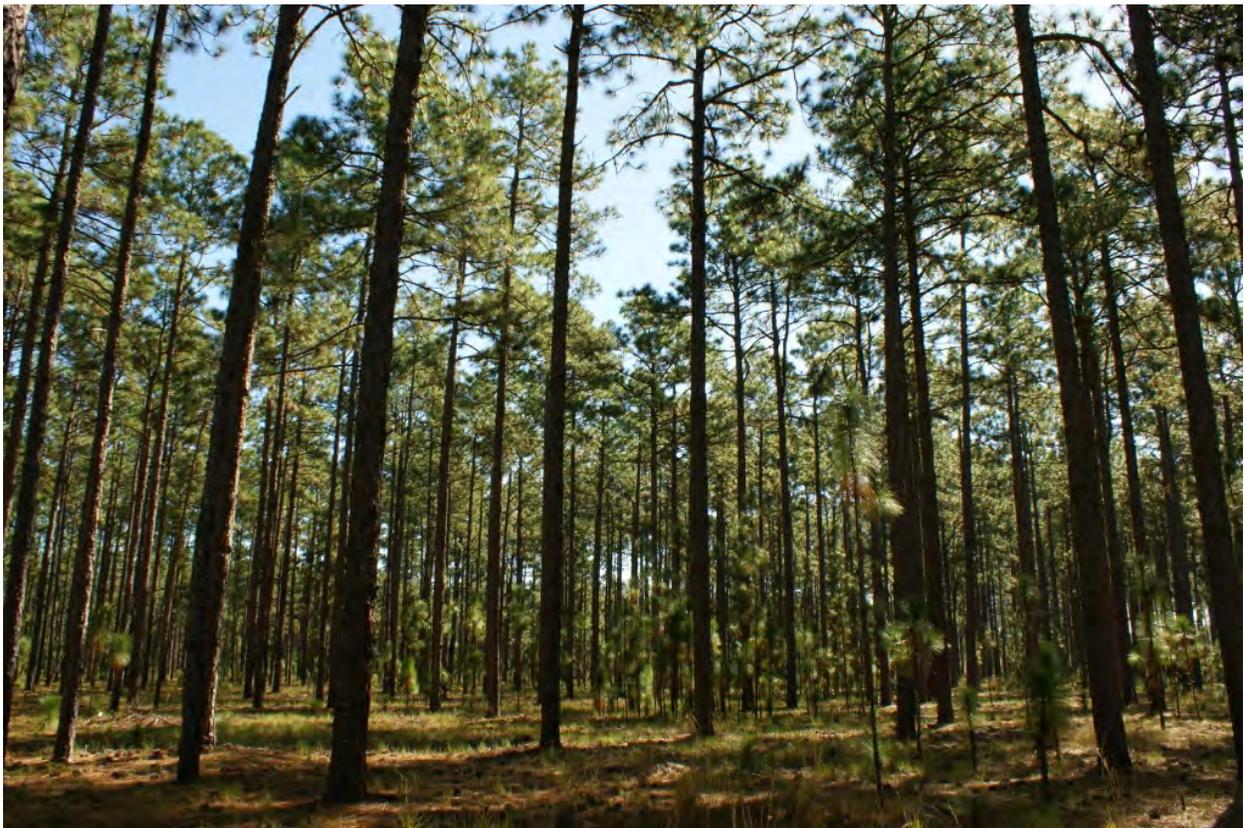
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Conserving South Carolina's Working Forests



This section addresses issues that affect the viability of forests that are managed for such uses as timber production, wildlife habitat, soil and water protection, aesthetics, and recreation.



Conserving South Carolina's Working Forests

The forests of South Carolina provide a number of economic and societal benefits such as manufacturing, employment, recreation, aesthetics, and environmental protection. Demands on our forest resources, as well as threats to the future status of our working forests, are as great as at any time in recent history. South Carolina is experiencing significant change in the management and use of our woodlands. Population growth, ownership changes, residential development, nonconsumptive demands, and the presence or absence of markets for our forest products will determine the future of South Carolina's forests. To ensure that our forests can meet the current and future economic, ecological, cultural, and recreational demands placed on them, managers must focus their efforts to address changing landowner objectives, parcelization and fragmentation, current and emerging markets, forest regulation, critical habitats, and cultural/recreational concerns.

Forest Area

Forests are the predominant land cover in South Carolina. Forests currently occupy 67 percent or 13 million acres of the land area in South Carolina. The vast majority of our forests are classified as timberland¹ with 54 percent or 6.8 million acres, being hardwood forest types and 46 percent or 5.9 million acres, being softwood forest types. Loblolly-shortleaf pine is the predominant forest type group occupying 5.3 million acres (Conner et al. 2009).

The remaining 6.3 million acres of land in South Carolina are in other uses such as agriculture or urban development. Long term trends, 1968 through 2006, show that forest land has been relatively stable while agricultural land has declined by 60 percent which is a decrease of about 2 million acres. Another long term trend is the increase in area in urban development which has increased from less than 1 million acres in 1968 to nearly 2.5 million acres in 2006. Analysis of the trends related to agriculture and urbanization are important because shifts in these land uses have direct impact on forest land in South Carolina (Conner et al. 2009).

Historically, the clearing of land for agriculture was the primary cause of deforestation in South Carolina. However, government incentive programs, such as the Conservation Reserve Program, have reversed this historical trend. While conversions to agriculture lands from forest lands do still occur, it is much more likely to see agricultural lands converted back into forest lands. This conversion from agriculture lands to forest lands is the primary reason that forest acreage in South Carolina has been relatively stable over time. Decreases in funding for federal and state conservation programs may decrease future conversions from agriculture lands to forest lands.

Urbanization is currently the primary cause of deforestation in South Carolina. Urban areas continue to expand into adjacent rural lands. In most cases, this rural land development reduces the area of economically and ecologically productive forest land. The loss of forest land to urbanization will continue to be a major forestry concern for the future. This development and urbanization of forest land will continue and possibly accelerate given the projected population growth in South Carolina (Wear and Greis 2002).

Forest Ownership

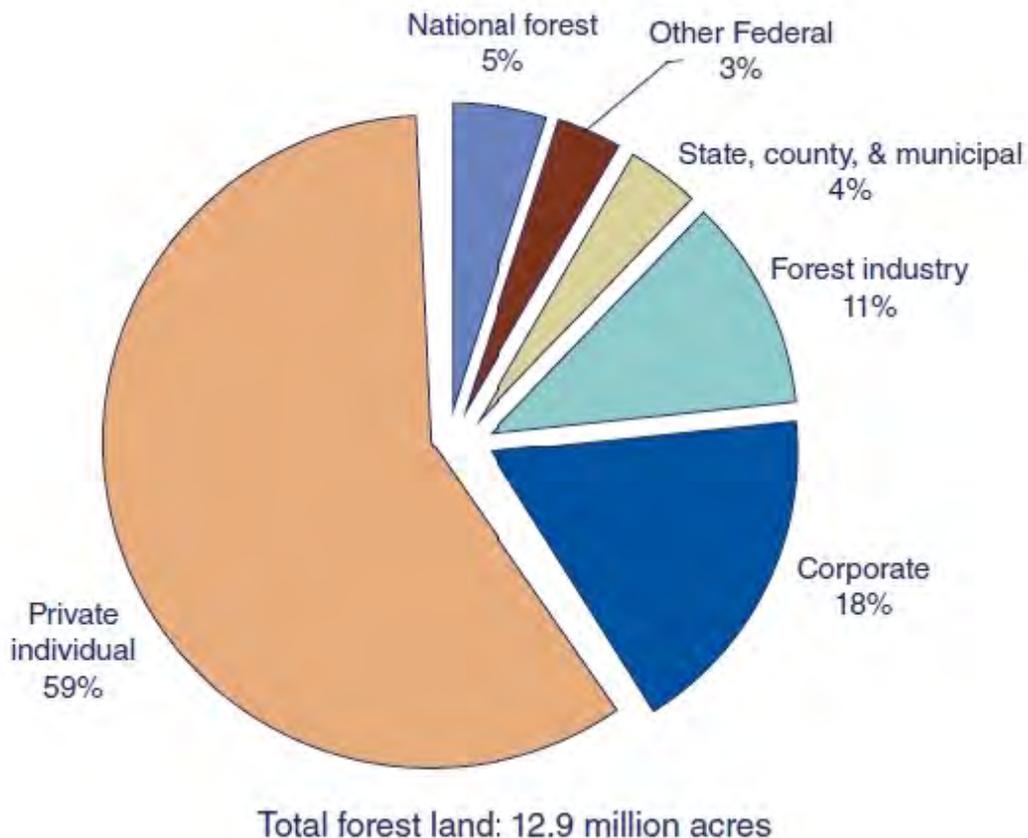
Most of South Carolina's forest land are currently owned by private individuals or families, making up about 59 percent of the total. The amount of forest land held by forest industry in South Carolina, and throughout the southern region, has declined substantially in recent years. In 2006, forest industry



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holdings comprised just 1.4 million acres, 11 percent of the total, in South Carolina. This area is down from the 2.6 million acres reported in 1986 when forest industry holdings were at their peak. Conversely, non-forest industry corporate ownership has increased and now comprises about 18 percent, more than 2.3 million acres, of the state's total forest lands. The majority of corporate ownership is held by timber investment management organizations (TIMOs), real estate investment trusts (REITs), and limited liability corporations (LLCs). The remainder of South Carolina's forest lands is divided among national forests (5%); state, county, and municipal government (4%); and other federal lands (3%) (Conner et al. 2009).

Figure 3: Ownership of Forest Land in South Carolina





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The majority of South Carolina's forest land is managed by 262,000 private forest landowners. As shown in Table 1 below, the size of these ownerships varies from 1 to 9 acres to greater than 10,000 acres.

Table 1: Size of Ownership of Forest Land in South Carolina

Size of Forest Landholdings (acres)	Area		Owners	
	Acres (thousand)	Percent of Total	Number (thousand)	Percent of Total
1-9	413	5.7%	158	60.3%
10-19	425	5.8%	33	12.6%
20-49	1,030	14.1%	36	13.7%
50-99	1,114	15.3%	18	6.9%
100-199	1,203	16.5%	10	3.8%
200-499	1,483	20.3%	5	1.9%
500-999	706	9.7%	1	0.4%
1,000-4,999	777	10.6%	1	0.4%
5,000-9,999	91	1.2%	<1	0.0%
10,000+	58	0.8%	<1	0.0%
Total	7,300	100.0%	262	100.0%

The largest class of landowners (158,000 or 60 percent of all landowners) own tracts smaller than 10 acres. These landowners, however, account for only six percent of the forest lands in South Carolina. The vast majority of forested acres, 94 percent, are in landholdings greater than 10 acres in size. This information is relevant because conventional wisdom indicates that it is not financially viable to manage forest products on tracts less than 10 acres in size. Therefore, based on tract size alone, the majority (94 percent) of family forest lands currently have the potential to be managed for a variety of uses including the production of timber (Conner et al. 2009).

Forest management offers many landowners an economically viable means of keeping land in forest use. Many landowners enjoy multiple benefits from their property, such as recreational opportunities, wildlife viewing, scenic beauty, and personal satisfaction of conserving natural resources. Periodic income from timber provides an alternative to converting forest land to other uses. Property taxes are also lower for lands in bonafide agricultural and forest use.

Millions of acres of forest land in South Carolina have changed ownership in recent years. Much of this change in ownership can be attributed to the divestiture of timberlands by forest industry. While the tracts were owned and managed by forest industry there was some assurance that the lands would remain in



forests and continue to provide multiple use benefits (Conner et al. 2009). However, with the transfer of these lands to non-forest industry corporations and private individuals, the future of these forest lands becomes less predictable and subject to more frequent ownership and management changes. Certainly, the number of new forest landowners in South Carolina is growing.

It is unknown what changes in land ownership mean for South Carolina's forest lands, but major concerns are fragmentation, parcelization, and the conversion of forests to non-forest uses. The distinction between parcelization and fragmentation of the forest is important because their causes and effects can be different. Parcelization generally refers to division of ownerships that result in smaller holdings. Parcelized ownerships generally fragment the forest landscape, constrain management options, adversely influence forest health and wildlife habitats, and directly and indirectly lead to forest loss. Fragmentation refers to isolation of forest tracts from one another and generally results from parcelization of ownership. Fragmentation can also be caused by introducing infrastructure, roads and power lines, for example, into the forest or forest management activities that have the same effect. The effects of fragmentation on habitat of certain wildlife species have been well-documented, but effects on timber availability, water quality, and forest manageability, while believed to be negative, are less certain. The projected population increase for South Carolina and the related urbanization will only exacerbate these issues.

Timber Supply

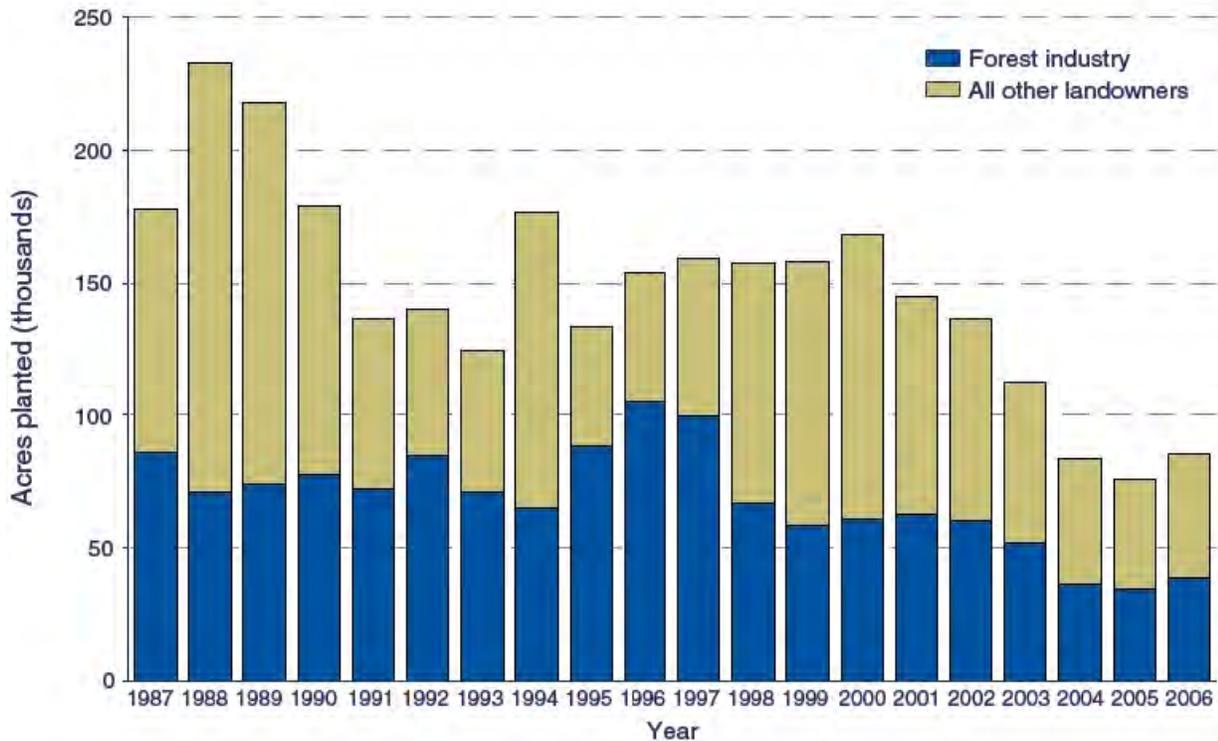
South Carolina has an abundant supply of timber. In 2006 the total live volume on timberland in South Carolina was 21.5 billion cubic feet which is the highest volume ever reported in the state. All live volume was split almost evenly between softwoods and hardwoods. The loblolly-shortleaf pine species group accounted for 83 percent of all live softwood volume (Conner et al. 2009).

South Carolina's supply of timber is still increasing. Net growth of all live softwood trees averaged 817.0 million cubic feet per year between 2002 and 2006. Softwood removals during that same period averaged only 596.1 million cubic feet per year. Hardwoods during the same period averaged 387.3 million cubic feet per year. This growth was substantially more than the average hardwood removal of 217.7 million cubic feet per year reported for the period (Conner et al. 2009).

While the growth/drain ratio for South Carolina bodes well for the near term, a survey of forest tree nurseries indicates a decline in the artificial regeneration of pine in the state (see Figure 4).



Figure 4: Acres of Tree Planting in South Carolina



The decline in tree planting over the past six years has been abrupt, decreasing from 168,000 acres in 2000 to approximately half that acreage in 2006. Continued reductions in tree planting throw into question the abundance of the state's future timber supply. Maintaining the pine resources at their current levels is difficult which is causing negative consequences for South Carolina's forest industries.

Another issue that may affect the availability of timber for use by the forest products industry is the capacity of harvesting contractors. Current studies have shown that logging capacity has fallen to a level that will not be able to sustain manufacturing demands if they return to pre-recession levels (Lewis 2009). With the tightening of credit, many loggers have not been able to stay in business. In addition, lower market demand for finished goods coupled with landowners pulling stumpage off the market due to falling prices has resulted in inadequate markets to deliver wood and insufficient stumpage to harvest (WSRI 2008).

Economic Impact

Forestry is a critical segment of the economy of South Carolina. The most recent study on the status of the forest products sector in South Carolina's economy showed it to be the largest industry in terms of the number of jobs and total labor income, providing a total economic impact of nearly 84,000 jobs with nearly \$4 billion in wages (Woodward 2009). In the current economic downturn, however, demand for traditional timber, solid wood and pulp, and paper-related products have been declining (Johnson and Adams 2009). The 2009 Timber Product Output Survey will document the severity of the decline in production of forest



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products as a result of the recession. Forest product companies, as well as forest landowners, are suffering from reduced demand and lower prices for the raw materials and manufactured products that they produce.

Nationwide, mill and machine closings and idlings have caused a decline in paper and pulp capacity since 2000 (AF&PA 2009). Furthermore, current and future pulp and paper manufacturing capacity and the associated wood fiber plantations are locating in South America and Asia (Suckling 2006). South Carolina's forest products industry has resisted this trend with steady manufacturing output and an abundant supply of wood fiber (Conner et al. 2009). In spite of the economic downturn and general nationwide forest industry shrinkage, South Carolina's forests and traditional forest products companies appear well-positioned to take advantage of increased wood volumes, investment, and product demand.

Concurrent with the economic recession and in part an effect of it, economically and politically driven development of new, and until now, minor business opportunities in timber and non-timber forest products is occurring. The demand for alternative fuels has stimulated an interest in examining and experimenting with the potential of woody debris, non-merchantable trees and other wood products usually considered waste, as a supplement to or replacement for oil and natural gas. Similarly, business leaders, government officials, and entrepreneurs are researching the potential of woody biomass plantations for the production of wood derived ethanol and other energy products (Gonzalez et al. 2009). A recent report documents the availability of 16.1 million tons per year of biomass in South Carolina for energy production (Conner et al. 2009a). A significant portion of this biomass is already being utilized.

Exports of forest products have increased by more than 59 percent since 2001 and now exceed \$1 billion annually. South Carolina port facilities serve as a great asset to the forest products industry in reaching a global market. Forest products have been the top export commodity for the four leading markets from the Port of Charleston (SCSPA 2004). Japan, Canada, and China were the top markets for South Carolina forest products in 2003 with Japan and China being South Carolina's fastest growing markets (SCEC 2004). The declining value of the US dollar relative to foreign currency offers an opportunity to expand export activity, especially for biomass products (SCFC 2007).

Ecosystem services and non-timber forest products have the potential to grow into significant markets in the future. Naturally-occurring carbon sequestration by trees now has commercial value through carbon trading, credits, and markets. Other natural forest processes, such as water quality and water flow, may develop commercial value or be further regulated to maintain quality and quantity. Meanwhile, family forest owners continue to market mushrooms, Christmas trees, various recreational activities, such as hunting leases, and other non-timber products and services, so that they will have cash flow at a sufficient level to allow them to keep land in a forested state or, in some cases, simply to keep ownership of the land.

While timber demand has fallen, our forest resource has continued to grow (Conner et al. 2009). South Carolina now has more land area in forest and more timber volume than ever recorded. Timber volumes, however, are not evenly distributed by age or size class because large acreages of young forests were created over a short time span through the Conservation Reserve Program (late 1980's and early 1990's) and reforestation efforts after Hurricane Hugo (early 1990's). This concentration of same-age wood, identified as a "wall-of-wood," is available to support a variety of new and expanded forest-based economic activities.

Development of existing and emerging markets for South Carolina's forest products requires ongoing research and development (R&D) activity in the areas of forest management productivity and wood products development. University-based research cooperatives are being tested as forest industry withdraws its financial support after eliminating land ownership from its business model, and state budgets are cut. Increased productivity gains from tree improvement are falling upon the shoulders of a few state



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forestry agencies and the remaining private sector tree improvement cooperative members. The status of product development R&D is also uncertain. The USDA Forest Service's R&D budget has been relatively steady since 2004 (USFS 2010). An internet search reveals that much of the readily identifiable forest-related research and development being conducted in the United States is directly related to wood-based energy and is funded by the Departments of Agriculture and Energy.

An October 2009 conference of forest sector leaders and analysts endorsed an initiative termed "20 by '15." The goal of this initiative is to grow forestry's economic impact in South Carolina from \$17 to \$20 billion by 2015. Conference attendees identified six action items: (1) retain and grow existing businesses and seize new opportunities; (2) fully utilize the state's record timber volume; (3) aggressively promote South Carolina forest products and business opportunities; (4) expand forest management and forest products R&D; (5) address infrastructure needs including wood export capabilities at the state's ports; and (6) rebuild the SC Forestry Commission's capacity for protecting and developing the forest resource.

The SC Forestry Commission will develop a business plan to implement the recommendations from this conference. This plan will be implemented by the agency with the assistance of multiple partners. Because the Forestry Commission's capacity for rural development projects has been lost through successive budget cuts, the agency will seek financial and manpower assistance to complete the plan. Currently, the SC Forestry Commission receives no federal funding for rural development.

Forest Regulation

Forestry in South Carolina is subject to federal regulation such as air quality, water quality, and endangered species laws; state regulation related to prescribed burning; and county regulation such as tree protection ordinances, road use permits, smoke ordinances, and harvest notification requirements. Many, if not all, of these well-intentioned laws and regulations restrict forest management activities, reduce land managers' options, and increase the cost of forest management (Hickman and Martus 1991) (Haney and Cleaves 1992). In many cases, forest regulation can be a disincentive for forest landowners to actively manage their forests and may be an incentive to convert their forest land to another use.

Most regulation are premised on the theory that society has an interest in the conservation of forests and other natural resources. Federal and state regulations often are instigated by politically active interest groups that have various objectives that are unrelated to forestry. The Clean Air Act and the Clean Water Act were directed not directed at the forestry industry, but at local governments and manufacturing polluters. At the county level, regulations are often proposed in response to citizen concerns about logging, clearcutting, muddy roads, noise, aesthetics, and more. State and local regulations also seek to protect public assets such as watersheds, wildlife, and roads and bridges (Seigel 1991) (Hickman and Martus 1991).

Local government planning commissions sometimes are not aware of the broad impact that their attempts to solve a local urban concern may have on the forest. For example, thirteen counties have enacted tree protection ordinances to preserve trees during development (see Figure 5).



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[203651&category=Legislation&session=118&conid=5559705&result_pos=0&keyval=1183651](#)). This law prohibits counties and municipalities from enacting ordinances that “restrict or regulate certain forestry activities,” thereby removing the burden of local regulations from those landowners who are carrying out legitimate forestry practices.

In addition to promoting this type of legislation, the SC Forestry Commission has joined forces with advocates of forestry in South Carolina to educate lawmakers about the economic importance of forestry and agriculture in the state. For example, the Palmetto Agribusiness Council sponsored an assessment in 2009 on the impact of agribusiness. This assessment showed that forestry and farming combined is a \$34 billion industry that supports 200,000 jobs (Miley et al. 2008). The Council has sent this report to state and local leaders to help them develop, as explained by Bob Scott, President of the SC Forestry Association, “policies and regulations that encourage growth of agribusiness, rather than restrict its growth and global competitiveness.” Efforts of this nature raise awareness among lawmakers and are important. Joey Ferguson of Resource Management Services observed that “when sectors of the economy get positive attention, they tend to be protected...from harmful regulation.”

Excessive income and property taxes can have the same negative effect on forest management as restrictive regulations. Fortunately, South Carolina’s tax environment is friendly to forestry. Federal and state capital gains treatment of timber sale revenue and the ability to expense reforestation costs, for example, provide incentives for landowners to continue managing their forest land. South Carolina’s property tax assessment is also pro forestry in that it is based on either current use of the land or its relative productivity. According to Bob Scott of the SC Forestry Association, the average statewide tax rate is relatively low at just \$3.25 per acre, so it encourages timber production.

Instead of a severance tax, South Carolina assesses a small tax on the forest products industry that is based on the amount of wood that is processed each year. This tax funds the \$1 million Forest Renewal Program (FRP), which pairs the \$800,000 that is collected from forest industry with \$200,000 that is allocated by the General Assembly (SCFC 2010). Through this Forestry Commission-administered program, forest landowners are eligible for partial reimbursement for reforestation practices that they implement. Because FRP helps ensure a sustainable supply of wood, the forest products industry supported creation of this program.

Unfortunately, not all of the effects of tax laws are positive. Forest landowners are much more likely than other Americans to incur the federal estate tax. “Nationwide, about 2.6 million acres of forest land must be harvested and 1.4 million acres must be sold each year to pay the federal estate tax” (Wear and Greis 2002). In addition, many of these tracts that are sold are soon converted to non-forest uses.

The trend in South Carolina is for this land conversion to increase as expansion of urban areas continues (see section on population growth). As the population of the state becomes more urban, the citizens will lose touch with the land and become less tolerant of forest management activities. Forestry advocates will need to remain diligent to ensure their voices are heard when federal, state, and local lawmakers propose restrictive regulatory and tax legislation.

Critical Habitats

Specific habitats, considered and protected for the benefit of wildlife, are critical. The Southeastern Association of Fish and Wildlife Agencies identified bottomland hardwood forest conservation and longleaf pine ecosystem restoration as regional priorities (SEAFWA 2006). Bottomland forests are important habitats for a variety of wildlife species, including neotropical migratory birds, bats, waterfowl, wild turkeys, game mammals, reptiles, and amphibians. This general habitat type includes linear or small-patch communities such as canebrakes, floodplain pools, riparian forests, and hardwood and pine-dominated hammocks. Maintenance of mature, intact and contiguous bottomland forests is important for



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conservation of South Carolina's wildlife diversity. In particular, old-growth canopy trees, snags, large woody debris, and diverse midstory and understory vegetation are important elements to maintain in these forests.

The South Carolina Comprehensive Wildlife Conservation Strategy identifies longleaf pine savannahs as a critical habitat type. Longleaf pine forests once covered a vast range from Texas to Virginia, but have been reduced to three percent of historical acreage due to conversion to other land uses and forest types. Longleaf pine forests are highly valued for their resistance to damage by insects, diseases, wildfire, and storms, and for their yield of high quality wood products, biological diversity, and beauty. This ecosystem is so significant that a group of conservationists assembled in 2005 and developed a 15-year plan designed to increase the acreage of longleaf pine across the South from 3.4 million to 8 million (America's Longleaf 2009).

Caves, sinkholes, and springs (both karst-related and fault-related) represent some of the most sensitive natural habitats in South Carolina and are susceptible to impacts from a wide variety of land-use practices, including forestry. Karst environments harbor many of the state's rarest and most imperiled species such as salamanders in the Four Hole Swamp area, and provide habitat to game animals in areas of intense agriculture. Fault-related springs in the Piedmont that flow, even during periods of drought, represent specific habitats to other rare species. These springs also provide water to game animals and birds as well as other fauna. Protection of karst environments, springs, and related wetlands is essential for maintenance of South Carolina's biological diversity and water quality (personal communication Dr. C.W. Clendenin, Jr., State Geologist, SCDNR, January 21, 2010).

Open canopy forests with diverse grass-forb-shrub groundcover characterize pine savannas. Prior to European settlement this habitat type dominated as much as three-fourths of the southeastern coastal plain landscape (Platt 1999). These forests were predominately two-layered with an overstory of widely spaced pines (Plummer 1975) and an herbaceous ground cover that was maintained by frequent fire (Frost 1998). Restoration of this habitat type, especially the longleaf pine savanna, is a high priority in a variety of conservation plans developed by federal, state and non-governmental conservation organizations. Examples include: America's Longleaf Initiative; North American Wild Turkey Management Plan (NAWTMP); Northern Bobwhite Conservation Initiative (NBCI); South Carolina Department of Natural Resource's (DNR) Comprehensive Wildlife Conservation Strategy (CWCS) (<http://www.dnr.sc.gov/cwcs/species.html>); Partners in Flight North American Landbird Conservation Plan; and Partners in Amphibian and Reptile Conservation's Habitat Management Guidelines for Amphibians and Reptiles of the Southeastern United States.

The widespread loss of pine savanna, resulting primarily from conversion to other land use types and reduction in fire, has contributed to the severe decline of numerous wildlife species that rely fully, or in part, on savanna habitats to meet their life requisites. Longleaf pine forests were ranked as the third most endangered ecosystem in the United States (Noss et al 1995). South Carolina's CWCS identifies several plant and animal species associated with pine savanna that are threatened or are species of concern.

The Northern Bobwhite (*Colinus virginianus*) serves as one example of a species in conservation need that is largely dependent on pine savanna restoration. South Carolina's bobwhite population has declined by over 70 percent since 1966. Research has shown that closed canopy pine stands provide poor quality habitat for bobwhites and may also serve as ecological sinks; thereby, negatively impacting bobwhite populations on adjacent grassland habitats. Establishing and maintaining high quality pine savanna is a priority focus of bobwhite quail habitat restoration efforts.



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When appropriately applied, frequent prescribed burning and forest thinning mimics the ecosystem processes that once occurred naturally across the landscape to create and maintain woodland savannas. Without thinning, tree canopies close and shade-out ground cover. Without frequent prescribed burning, grasses and forbs are replaced by woody species. Through active management, functional pine savanna systems, including the associated wildlife species, can be restored in existing loblolly, shortleaf, slash, and longleaf stands. Necessary management includes periodic thinning to maintain at least 60 percent of the ground in direct sunlight followed by prescribed burning on a two to three year rotation as well as chemical control of exotic grasses and/or planting of native ground cover.

Large landscape, multi-owner partnerships and conservation efforts provide a means to restore critical habitats and increase populations of declining wildlife. In 2004, the SC Forestry Commission signed a Memorandum of Understanding (MOU) with the SC Department of Natural Resources, the USDA Natural Resources Conservation Service, the USDA Forest Service, the Newberry Soil and Water Conservation District, the East Piedmont RC&D Council, the State and Newberry Chapters of Quail Unlimited, the National Wild Turkey Federation, and Clemson Cooperative Extension Service to implement a restoration of woodland savannas on national forest lands as well as private lands in Newberry County. The Indian Creek Wildlife Habitat Restoration Initiative has been very successful in obtaining cost share assistance for private landowners as well as technical assistance in establishing management practices. The combination of USDA Forest Service Stewardship Contracting and Agreement Authorities, the Wyden Amendment, and USDA Farm Bill programs were instrumental in this highly successful example of multi-partner collaboration.

In 2004, eighteen counties in the upper and lower coastal plain of South Carolina were identified as high priority areas for bobwhite restoration. Within these counties there are 293,661 acres of longleaf/slash pine and 1,825,374 acres of loblolly/shortleaf pine that potentially could be restored to functional pine savanna (USFS 2008). Additionally, there are over 1.8 million acres of harvested cropland, a portion of which might be restored to longleaf pine. If achieved, this could contribute as much as 50 percent toward South Carolina's NBCI recovery goals. The Northern Bobwhite Conservation Initiative (NBCI) is the first-ever landscape-scale habitat restoration and population recovery plan for northern bobwhites in the United States.

The plan focuses on population and habitat objectives needed to achieve the overall goal of recovering bobwhite densities to 1980 levels on remaining improvable portions of the landscape. The plan's building blocks are fifteen Bird Conservation Regions (BCRs), developed for and utilized by the North American Bird Conservation Initiative (NABCI). The plan consists of separate chapters for each BCR, in addition to population and habitat objectives for each region. Another important foundation of NBCI is the land-use data collected and analyzed every five years by the National Resources Inventory (NRI), a database of the USDA Natural Resources Conservation Service. The goal of the NBCI is to restore northern bobwhite populations range wide to an average density equivalent to that which existed on improvable acres in 1980. This will necessitate impacting habitat on about 7 percent of 81.1 million acres of farm, forest, and rangeland so as to increase the current quail population by 2.7 million coveys. The plan is currently under revision.

Further cooperation between the SC Forestry Commission, the National Wild Turkey Federation, the USDA Forest Service, the US Fish and Wildlife Service, the Department of Defense, and other federal agencies and non-governmental organizations (NGO's) can leverage resources to accomplish multiple resource management objectives. The use of the Stewardship Contracting and Agreement Authorities, the Wyden Amendment, and the "All Lands" approach from the Secretary of Agriculture provides the tools for successful collaboration among federal and state agencies, NGO's, and private landowners. Further examples of locations of opportunities to implement landscape scale restoration projects with multiple partners include:



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State Property

Sand Hills State Forest
Wee Tee State Forest
Manchester State Forest
Poe Creek State Forest
Keowee-Toxaway State Park
Jocasee Gorges (DNR)

Federal Property

Sand Hills National Wildlife Refuge
Francis Marion National Forest
Shaw Air Force Base
Sumter National Forest
Sumter National Forest
Sumter National Forest

Additional private lands programs, practices, and funding are needed for longleaf and other pine savanna restoration, especially for lands that do not have a recognized cropping history. Specifically, funding is needed to cost share longleaf planting, prescribed burning, herbicide application, planting of native ground cover, and heavy thinning of existing pine stands. Additionally, new and emerging programs, such as biofuels, need to be assessed for potential impacts to longleaf restoration efforts. When formulating or providing input on forest policy, landowner subsidies, and program delivery, consideration should be given to long-term ecological impacts and desired future landscape conditions as it relates to pine savanna ecosystem restoration and management.

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Glossary

¹timberland – forest land capable of producing 20 cubic feet of industrial wood per acre per year and not withdrawn from timber utilization

²non-attainment area – an area where the amount of ground-level ozone exceeds the EPA standard of 0.075 parts per million

Priority Areas

For Priority Area Maps see Appendix 2 (page 178)



Protecting South Carolina's Forests from Harm



This section addresses issues such as wildfire risk, forest pathogens, invasive species, and forest pests that threaten the health of South Carolina's forests.

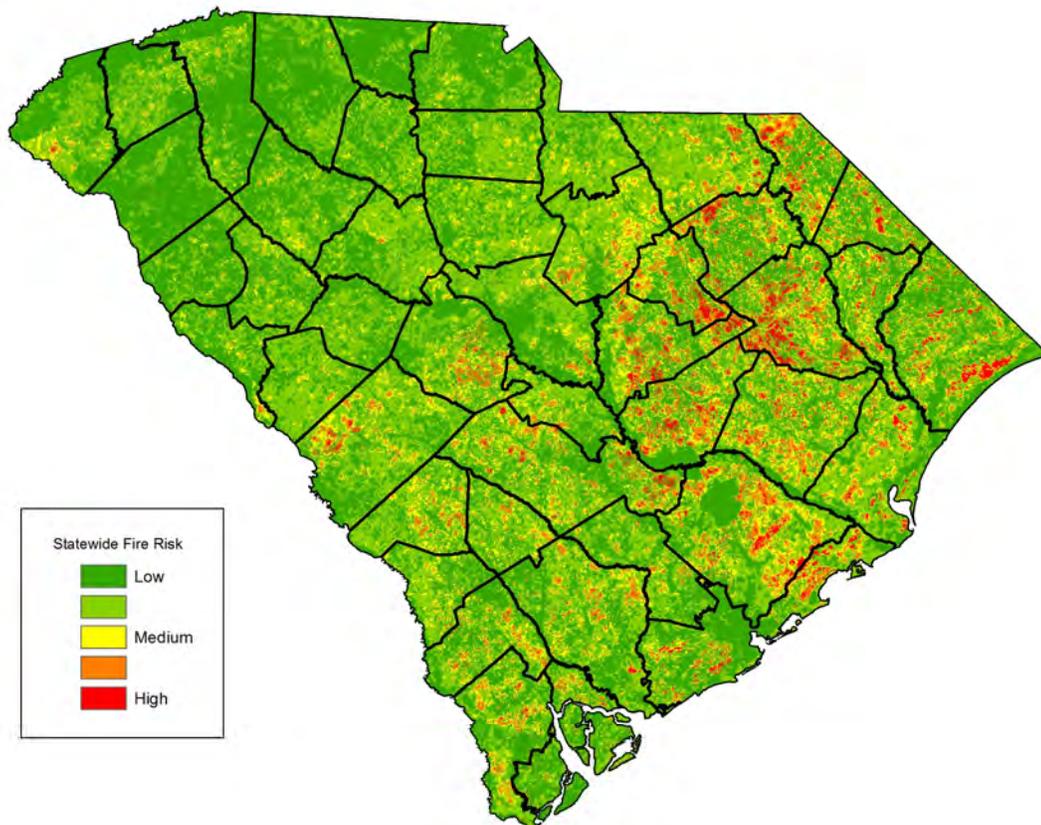


Wildfire Risk

The South Carolina Forestry Commission is responsible for protecting 14,291,320 acres of forest land in South Carolina from wildfire. This total area protected is based on the 2006 Forest Inventory Analysis data with 10 percent added to cover adjacent non-forest land. This figure includes 101,320 acres of federal land protected under special contract, such as the Carolina Sandhills National Wildlife Refuge and the Corps of Engineers land around Lake Thurmond, Lake Hartwell, and Lake Russell. Also included is forest land protected by Mutual Aid, which is approximately 824,801 acres of additional federal land, such as the Francis Marion and Sumter National Forests, National Park lands, and lands owned by US Fish and Wildlife Service (SCFC 2008).

South Carolina has a large percentage of land that contains fuels² that are highly flammable. These fuels ignite easily and burn with high intensity when the relative humidity is low and winds are high. These weather conditions occur many times during the year.

Figure 7: Wildfire Risk in South Carolina





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The five-year fire occurrence average from 2004 through 2009 is 2,791 wildfires that burn 19,826.8 acres annually. The average fire size is 7.6 acres. This average fire size is higher than that of previous years due to an exceptionally large fire that occurred in April, 2009 (the Highway 31 Fire near Myrtle Beach).

In Fiscal Year 2008-2009 wildfires destroyed 100 homes and damaged 109 additional homes. In addition, 45 other buildings were destroyed and 19 buildings were damaged. Eighty-six (86) vehicles were damaged by fire. Below is a summary of wildfire damage during the past five years (see Table 2).

Table 2: Property Damaged or Destroyed by Wildfire

Fiscal Year	Homes Destroyed	Buildings Destroyed	Homes Damaged	Buildings Damaged	Vehicles Damaged
2005	19	45	30	37	113
2006	40	67	17	28	72
2007	31	13	62	27	57
2008	35	103	48	41	103
2009	100	45	109	19	86
5 Yr Avg	45	55	53	30	86

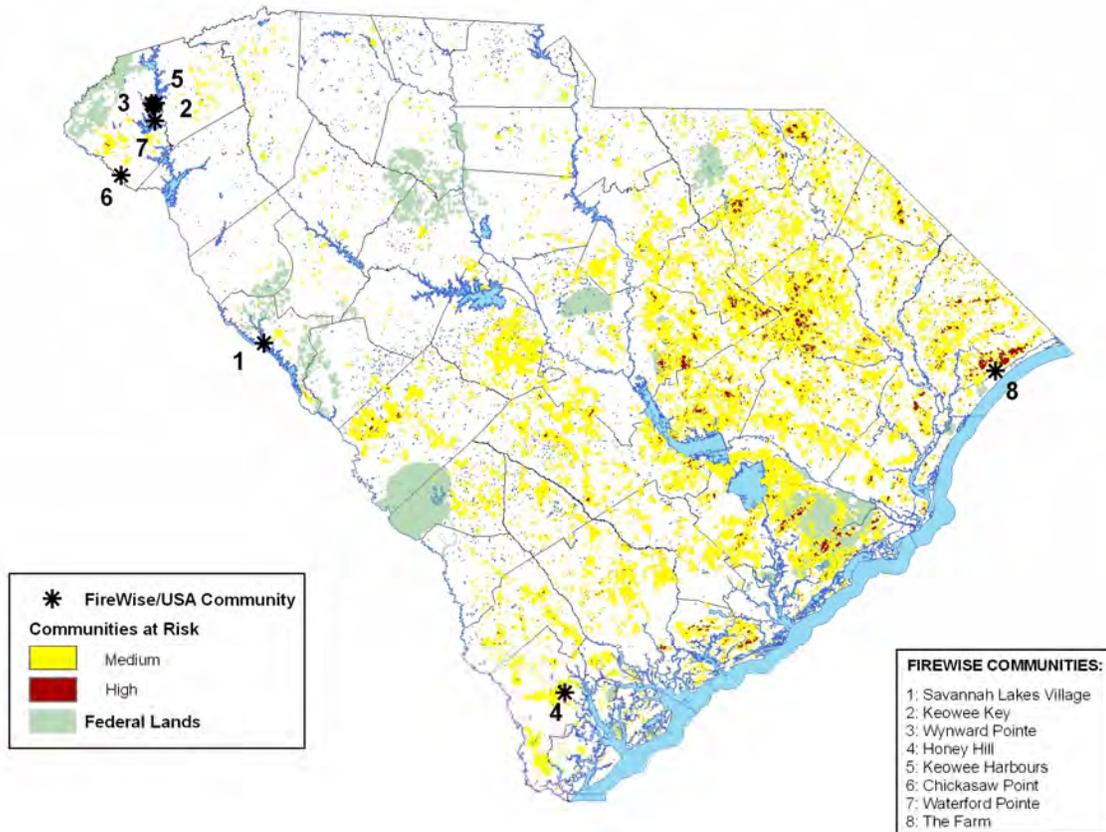
The number of homes and buildings damaged or destroyed by wildfire is increasing because of the rising number of wildland urban interface (WUI)¹ areas. The conversion of forest land to residential development has also increased wildfire risk in many areas of the state.

To combat this trend, the SC Forestry Commission actively promotes the FireWise Program (www.firewise.org) throughout the state (SCFC 2010). This national initiative encourages homeowners and developers to make neighborhoods more resistant to wildfire through practices such as the use of less flammable landscaping, trimming lower limbs on yard trees, and removal of flammable material from roofs and under decks. Eight communities across the state have been recognized as FireWise Communities/USA

The Forestry Commission also develops Community Wildfire Protection Plans (CWPPs) in partnership with local fire departments (see <http://www.state.sc.us/forest/nfpacc.htm>). Through this proactive approach, the agency works with homeowner associations, fire departments, and other organizations to write plans that, when implemented, will reduce the number of homes damaged or lost to wildfire. Initially, SCFC field personnel developed CWPPs for communities in high risk areas, based on the history of wildfire occurrence and local knowledge of risk factors (bay fuels, complex WUI, lack of infrastructure). When it was developed, plans were initiated in communities with high or moderate risk, as identified by the Southern Wildfire Risk Assessment.



Figure 8: FireWise Communities/USA and Communities at Risk from Wildfire



The two largest causes of wildfires in South Carolina are escaped debris burns (44 percent in 2009) and incendiary (23 percent in 2009). These causes are consistent over time as evidenced by the following data (see Table 3).



Table 3: Wildfires by Cause

Fiscal Year	Data	Campfire	Children	Debris Burning	Equipment Use	Incendiary	Lightning	Misc.	Railroad	Smoking	Fiscal Year Totals
2005	Fires	12	156	1,062	156	549	40	229	17	62	2,283
	Acres	50.1	502.8	5,206.2	904.3	4,784.4	322.4	1,258.9	54.3	394.7	13,478.0
2006	Fires	16	185	1,400	227	685	67	292	29	116	3,017
	Acres	25.7	391.5	7,616.6	664.2	5,098.3	876.1	1,019.6	83.8	549.9	16,325.7
2007	Fires	26	197	1,303	269	733	102	254	22	66	2,972
	Acres	645.1	443.4	5,888.9	1,006.3	5,766.2	1,925.5	1,009.9	62.1	255.7	17,003.1
2008	Fires	34	186	1,557	373	800	253	355	38	82	3,678
	Acres	83.1	443.7	8,600.8	2,152.8	5,320.7	2,515.8	2,231.0	239.4	334.2	21,921.5
2009	Fires	11	101	874	176	454	104	219	17	45	2,001
	Acres	386.9	290.7	23,469.4	722.1	3,616.2	1,267.2	802.2	63.3	121.6	30,739.6
5 Year Average	Fires	20	165	1,239	240	644	113	270	25	74	2,790
	Acres	238.2	414.4	10,156.4	1,089.9	4,917.2	1,381.4	1,264.3	100.6	331.2	19,893.6

As the data above shows, the vast majority of wildfires are human-caused. Consequently, the SC Forestry Commission actively promotes fire prevention through its Think Before You Burn Campaign (see <http://www.state.sc.us/forest/think>) and by vigorous enforcement of state fire laws. Wildfire prevention efforts have been implemented to help increase the public's awareness about outdoor burning, especially in regards to escaped debris burns. These prevention efforts highlight the proper way to conduct such burns in a safe manner. The Think Before You Burn Campaign has resulted in a slight decrease in the percentage of debris burns over the last five years. A significant element of the agency's wildfire prevention program is the prosecution of burning law violators. South Carolina Forestry Commission law enforcement officers investigate wildfires of suspicious origin and regularly make cases under the Notification and Precautions Law and other statutes. The five-year average for the number of fire investigations conducted is 1,458.



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The peak fire season in South Carolina is February through April, but wildfires occur in all months of the year (see Table 4).

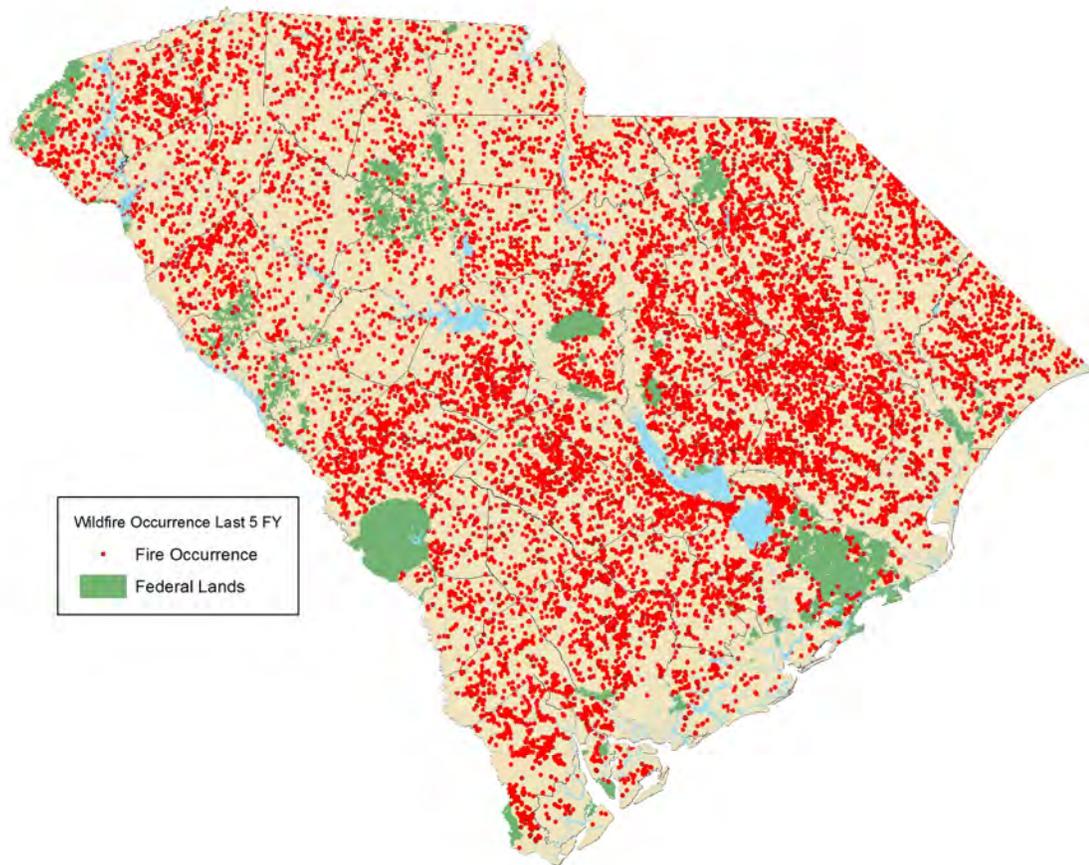
Table 4: South Carolina Wildfires by Month 2005 -2009

Fiscal Year		July	August	September	October	November	December	January	February	March	April	May	June	Total
2005	Fires	84	48	22	18	39	180	352	302	679	384	129	46	2,283
	Acres	269.3	106.5	26.5	18.3	63.4	692.6	1,596.0	1,851.0	5,215.0	2,701.0	665.0	272.6	13,477.2
2006	Fires	40	30	204	130	256	127	231	241	781	642	201	137	3,020
	Acres	234.6	61.2	655.6	228.6	673.6	361.0	784.1	1,138.9	5,575.2	4,836.3	974.8	770.3	16,294.2
2007	Fires	184	86	39	70	101	190	119	425	709	573	339	137	2,972
	Acres	969.2	536.3	86.1	183.5	386.5	789.8	362.9	2,228.9	4,536.4	3,669.4	1,409.9	1,518.2	16,677.1
2008	Fires	169	349	246	192	312	368	180	449	536	188	191	498	3,678
	Acres	764.5	1,970.7	1,062.3	534.6	1,156.3	2,217.9	622.3	4,193.3	4,000.9	921.7	976.6	3,500.5	21,921.6
2009	Fires	214	117	56	42	108	98	118.0	545	387	215	44	57	2,001
	Acres	942.2	899.8	90.9	96.7	270.0	309.3	351.4	3,645.0	2,595.0	21,323.7	75.7	139.9	30,739.6
5-Year Average	Fires	138	126	113	90	163	193	200	392	618	400	181	175	2,791
	Acres	636.0	714.9	384.3	212.3	510.0	874.1	743.3	2,611.4	4,384.5	6,690.4	820.4	1,240.3	19,821.9



As shown by the map below, wildfires occur most often in the Coastal Plains and Sandhills portion of the state, but do occur in every county of the state. Some areas historically have high fire occurrence because of a high concentration of flammable fuels. In addition, long-time residents in the Coastal Plain of South Carolina have a tradition of using fire for land and wildlife management purposes.

Figure 9: Five-Year Wildfire Occurrence (FY 2005 – 2009)



Topography presents challenges for wildfire suppression in many parts of the state. In the mountains and foothills, steep terrain makes access difficult and contributes to high rates of spread since fires generally move more quickly up slopes than on flat ground. Much of the Piedmont of South Carolina is plagued with deep gullies which can be troublesome for foot travel as well as for equipment. In addition, the soils below forested vegetation in low-lying areas in the Coastal Plain are often wet, causing firefighting equipment to get stuck; thereby, hindering



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suppression efforts. The agency addresses these challenges by providing specialized training for firefighting personnel and maintaining equipment adapted to these areas.

To fight these wildfires, the SC Forestry Commission maintains approximately 160 tractor plow units and 24 trucks outfitted with water handling equipment. From ten to fifteen years ago, over 200 units were deployed by the Commission and forest industry. The recommended replacement cycle for the tractor plow units is 15 years. A backlog of units beyond the 15-year replacement cycle is building rapidly, such that 26 units are over 15 years old and nine units are over 25 years old. Eighty-six units (60 percent) will be over 15 years old by 2011. Currently, there are no funds available to purchase replacement units. Equipment replacement funding has been zero in the last five years and inadequate in the last ten years even though the complexity of wildfires has continued to increase as more rural areas are developed. The SC Forestry Commission asks for state funds each year to replace the units. The agency has sought additional sources of funds with no success to date. As units age and become unreliable and unsafe, they will be removed from the fleet; thereby, reducing overall firefighting capacity even further.

Figure 10: 1989 Suppression Unit Still in Use by the Agency





Figure 11: 1997 Pickup with Pumper



Reduction in firefighting capacity has occurred as a result of budget reductions. Currently, the Forestry Commission has 69 fewer units than it had in the early 1980's. In addition, the forest industry has divested itself of the majority of its landholdings. In conjunction with these land sales, they eliminated 34 industry-owned tractor plow units and four air tankers which had formerly provided significant support for wildfire suppression. Having fewer resources decreases the number of units available for immediate dispatch. This reduced number of resources has the potential to increase response time and increase losses due to wildfire. The growth of rural fire departments has helped with the initial attack on small fires and with protection of structures from wildfires, but they have limited staff and are not adequately trained or equipped for fighting wildland fires.

The consolidation of forest industry, coupled with transfer of forest industry land to Timber Investment Management Organizations (TIMOs), has also decreased the number of acres treated with prescribed fire. These new owners have neither the personnel nor the technical expertise to continue the prescribed burning regime that the forest industry had established. To help fill this void, these landowners now rely on the SC Forestry Commission's prescribed burning services. However, the agency has less equipment and personnel available to perform these services than in the past.

Priority areas for fire prevention, suppression, and FireWise education efforts are in the areas of highest fire occurrence, areas of large fires, areas with high fire occurrence, and communities at risk. These areas are indicated in the Priority Area Maps in Appendix 2 (page 178).



Prescribed Fire

The use of prescribed fire in South Carolina has a long and valued tradition. Prescribed fire is most often applied in pine or pine-hardwood types, which exists statewide. Prescribed fire is a very cost effective, multi-beneficial tool. One of the benefits of prescribed burns is reduced wildfire risk through the removal of flammable fuel buildup. Wildfires that occur in areas that have been prescribed burned are less likely to cause damage than those that occur in unburned areas. By controlling brushy hardwoods, prescribed burning also reduces competition for resources such as moisture and nutrients and provides more suitable growing conditions for certain desirable tree species. Many types of wildlife benefit from prescribed burning. These fires make travel easier by removing thick underbrush and encourage the growth of legumes and nutritious food plants. Finally, prescribed burning helps forest managers maintain the open, park-like stands that many forest visitors find attractive. One of the more noteworthy aspects of prescribed fire is that a single burn can provide several of these benefits (SCFC 2009).

In 2009, fire managers conducted 15,339 prescribed burns which treated a total of 543,950 acres (SCFC 2008). As evidenced by the following data, this level of prescribed burning has been consistent over the past five years (see Table 5).

Table 5: Prescribed Burning by Year

Fiscal Year	Data	Total
2005	Number of Prescribed Burns	16,359
	Acres Burned	531,306.7
2006	Number of Prescribed Burns	15,404
	Acres Burned	513,986.5
2007	Number of Prescribed Burns	16,890
	Acres Burned	538,736.9
2008	Number of Prescribed Burns	15,464
	Acres Burned	518,640.1
2009	Number of Prescribed Burns	15,144
	Acres Burned	533,525.0
5 Year Average Number of Notifications		15,852
5 Year Average Acres Burned		527,239.0

The SC Forestry Commission estimates that 950,000 acres should be burned each year in South Carolina to achieve landowner management goals (SCFC 2010). This estimate is based on carrying out prescribed burns on a 4-year rotation in pine and pine-hardwood stands that are old enough to be burned.

Accomplishing this objective will be challenging. Obstacles include:

- ◆ Population growth and sprawl (see section on population growth)
- ◆ Fragmentation and parcelization of forest lands (see section on fragmentation and parcelization in the Forest Sustainability section)
- ◆ Changing public attitudes toward prescribed burning



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- ◆ More stringent air quality regulations
 - ◆ revised EPA regulations on ozone and particulate matter concentrations—see chapter on air quality in the Conserving South Carolina's Working Forests section
 - ◆ increased number of county burning ordinances such as those in the following counties: Lexington, Greenville, Lancaster, Anderson, York, and Georgetown
- ◆ Liability for damages as a result of fire and smoke (see <https://fp.auburn.edu/fire/additionalsmokerealtedaccidents.htm>)
- ◆ Reduced capacity to conduct prescribed burns (personnel and equipment)
- ◆ Lack of good smoke prediction models
- ◆ If more burning is not accomplished, negative impacts will include:
 - ◆ Increased fuel buildup resulting in more destructive wildfires
 - ◆ Decreased wildlife habitat for many species
 - ◆ Reduction of populations of fire-dependent plant and animal species
 - ◆ Forest conditions that are less aesthetically pleasing to some

The SC Forestry Commission conducts prescribed burning on its own land, offers a turnkey prescribed burning service to private landowners, and encourages other land managers to conduct burns. The Forestry Commission offers a Certified Prescribed Fire Manager Program and is an active participant in the South Carolina Prescribed Fire Council (see www.scpfc.org). The Forestry Commission participates in the One Message Many Voices Prescribed Fire Education Campaign. More information on this campaign is available at www.goodfires.org.

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Glossary

¹ Wildland Urban Interface (WUI) – where homes and other human development meet or intermingle with undeveloped land.

²Fuels – dead leaves, grasses, pine needles, and branches on the ground. Brush, shrubs, fallen logs, and sometimes even the trees themselves are also considered fuel.

(source: <http://www.trees.sc.gov/refwild.htm#fuels>)



Threats to Forest Health

Introduction

The health and productivity of South Carolina's forests have historically been threatened by insects, diseases, and plants. These threats can cause significant economic and ecological damage such as tree mortality, loss of tree growth, tree deformity or other reduction of quality, loss of native species, loss of species diversity, or a change in forest composition. Often, native insects cause damage on a cyclical basis, and losses can increase through either improper forest management practices (such as planting of species off site) or lack of forest management. Additionally, some pests react to weather events such as drought, lightning, ice storms, or hurricanes. They also can spread following man-caused disturbances like prescribed fire or wildfire, poor forest management, soil compaction, and timber harvesting. Non-native threats have the potential to cause much harm due to the trees' lack of natural defense mechanisms. In their native ranges, these threats have predators, parasites, pathogens, or plant defenses or adaptations which keep them in check.

The threats to the health of forests in South Carolina include native, non-native but naturalized, and non-native plants, diseases, and insects. The threats that are looming are termed Early Detection Rapid Response (EDRR). These threats are not yet present in South Carolina, but may exist in adjacent states or have the ability to spread or be moved long distances via anthropogenic movement. Examples of potential vectors are firewood, infested plant material, and solid wood packing material. These threats require detection or survey to determine their existence in South Carolina, and once discovered, will require a rapid response for eradication or containment.

Other categories of threats that exist in the state have been labeled Major Threats, Moderate Threats, or Low Threats. The primary focus is on the threats that were determined to be EDRR or Major Threats. Moderate and Low Threats are briefly mentioned, but these threats will likely cause little damage or cause damage only on a cyclical basis. They also may be native, naturalized, geographically restricted, or so geographically widespread that control or containment is not feasible or warranted at this time.

The threats discussed in this assessment are not the only potential threats to forests in South Carolina. Due to increased trade and shipment of goods from foreign countries, experts anticipate an increase in the number of threats to forests in the United States and in South Carolina.

The three most significant threats to South Carolina's forests currently are southern pine beetle, Sirex woodwasp, and cogongrass. They are important because of their potential economic, aesthetic, and ecological impact. In particular, the effects of the southern pine beetle and the Sirex woodwasp effects are primarily economic; however, both can cause ecological damage as well as having negative aesthetic effects. Cogongrass, an invasive species, is feared because of the potential for enormous consequences in all three categories.

Sirex Woodwasp (*Sirex noctilio* F.)

Sirex woodwasp, the most frequently detected exotic woodwasp at United States ports of entry and associated with solid wood packing material, was found in a New York forest in 2005. Since then this species has been found in Pennsylvania, Michigan, Vermont, and Ohio. *Sirex noctilio* is a member of the family Siricidae and it is the only species of the woodwasp family that can kill relatively healthy pine trees. Females carry a fungus, *A. areolatum*, which is deposited in trees when they are ovipositing. The fungus



and the mucus, injected by the wasp, rapidly weakens and kills host trees, and the developing larvae feed on the fungus. The native range of *S. noctilio* includes Europe, Asia, and North Africa, where it is a minor pest. *Sirex noctilio* is a serious pest of Monterey pine plantations in New Zealand, Australia, South Africa, Argentina, Uruguay, and Chile. In Brazil, loblolly pine is the primary host of *S. noctilio*. Both pines are North American species. Pest risk analysis indicates a high risk factor for this insect pest and the associated symbiotic fungus, *Amylostereum areolatum*. Indications are *S. noctilio* could pose a serious potential economic threat to the United States forestry industry. Climate does not appear to limit distribution of *S. noctilio* in the United States so projected colonization will depend on distribution of pines, which have the highest concentration in the South. The potential distribution of this insect in South Carolina is all pine and pine-hardwood stands which occur in every county of the state.

References:

Haugen D.A. and E. R Hoebeke. 2005. Sirex woodwasp—*Sirex noctilio* F. (Hymenoptera: Siricidae). USDA Forest Service, NA-PR-07-05.

Websites:

http://na.fs.fed.us/spfo/pubs/pest_al/sirex_woodwasp/sirex_woodwasp.htm

<http://na.fs.fed.us/fhp/sww/>

http://www.aphis.usda.gov/plant_health/plant_pest_info/sirex/index.shtml

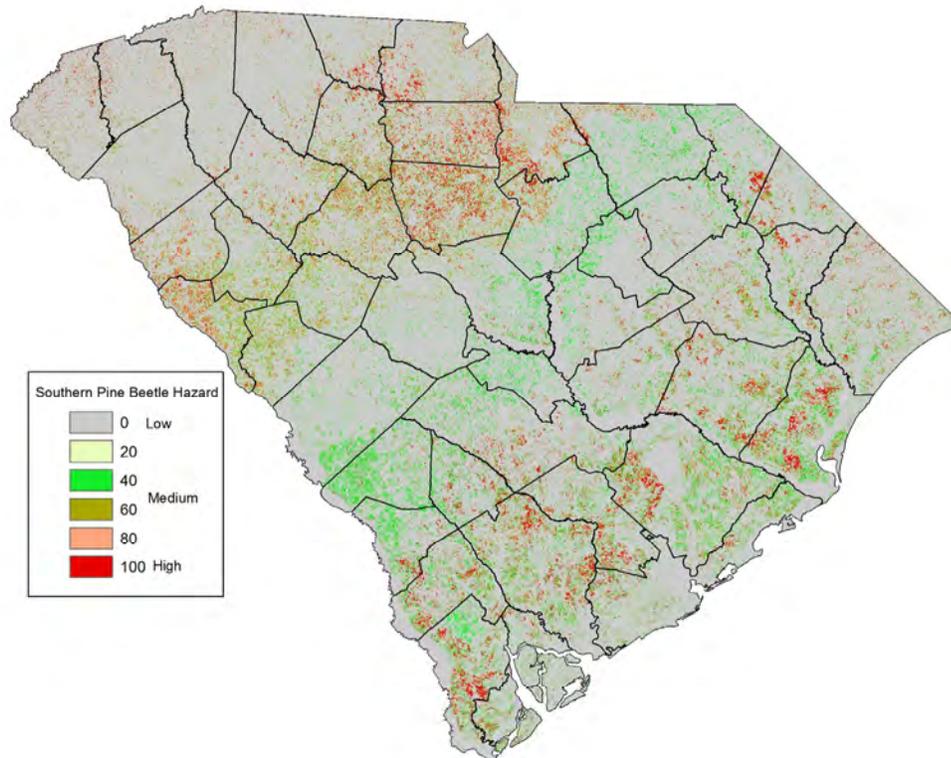
<http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=33&langdisplay=english>

Southern Pine Beetle

The native southern pine beetle (SPB) is one of the most destructive insects in the southern United States. Southern pine beetle outbreaks occur every 5 to 7 years in trees that are weakened due to drought and other environmental stresses. Preferred hosts are shortleaf, loblolly, Virginia, and pitch pines. Current range is throughout South Carolina, although activity levels have historically been low in Aiken, Barnwell, Allendale, Bamberg, Orangeburg, Calhoun, Sumter, Clarendon, Lee, Darlington, Florence, Marion, Dillon, Marlboro, and Chesterfield Counties. The southern pine beetle introduces a blue-stain fungus into trees. This fungus blocks the water movement of the tree, causing the tree to die. Outbreaks have been responsible for millions of dollars of tree loss in South Carolina. The last outbreak occurred from 1998 to 2002. Native predators, such as clerid beetles, and good forest management, including reducing stress on trees through thinning, low density planting, and prescribed burning, have proven successful in reducing the impact of SPB. There has been some level of activity since the last outbreak ended in several counties in the Piedmont and small outbreaks in restricted areas in the Coastal Plain. The South Carolina Forestry Commission administers a SPB prevention and restoration cost-share program. Approved practices include thinning young stands to help reduce southern pine beetle susceptibility, planting less susceptible species, such as longleaf pine, and non-susceptible species (hardwoods), and planting pines at low stocking (less than 500 trees per acre). Control of outbreaks includes salvaging affected stands or cutting and leaving affected trees and small buffers to prevent spread.



Figure 12: Southern Pine Beetle Hazard Map for South Carolina



References:

Price T.S., C. Doggett, J.L. Pye and T.P. Holmes, eds. 1992. *A history of southern pine beetle outbreaks in the southeastern United States*. Sponsored by the Southern Forest Insect Work Conference. The Georgia Forestry Commission, Macon, GA. 65 pp.

Thatcher R.C. and P.J. Barry. 1982. *Southern pine beetle*. USDA Forest Service, Washington, D.C. Forest and Disease Leaflet No. 49. 7 pp

Thatcher R.C. and M.D. Conner. 1985. *Identification and biology of southern pine bark beetles*. USDA Forest Service, Washington D.C. Handbook No. 634. 14 pp.

Thatcher R.C., J.L. Searcy, J.E. Coster and G.D. Hertel, eds. 1980. *The Southern Pine Beetle*. USDA, Expanded Southern Pine Beetle Research and Application Program, Forest Service, Science and Education Administration, Pineville, LA. Technical Bulletin 1631. 265 pp.

Websites:

http://www.na.fs.fed.us/spfo/pubs/fidls/so_pine_beetle/so_pine.htm

<http://www.barkbeetles.org/spb/spbbook/Index.html>



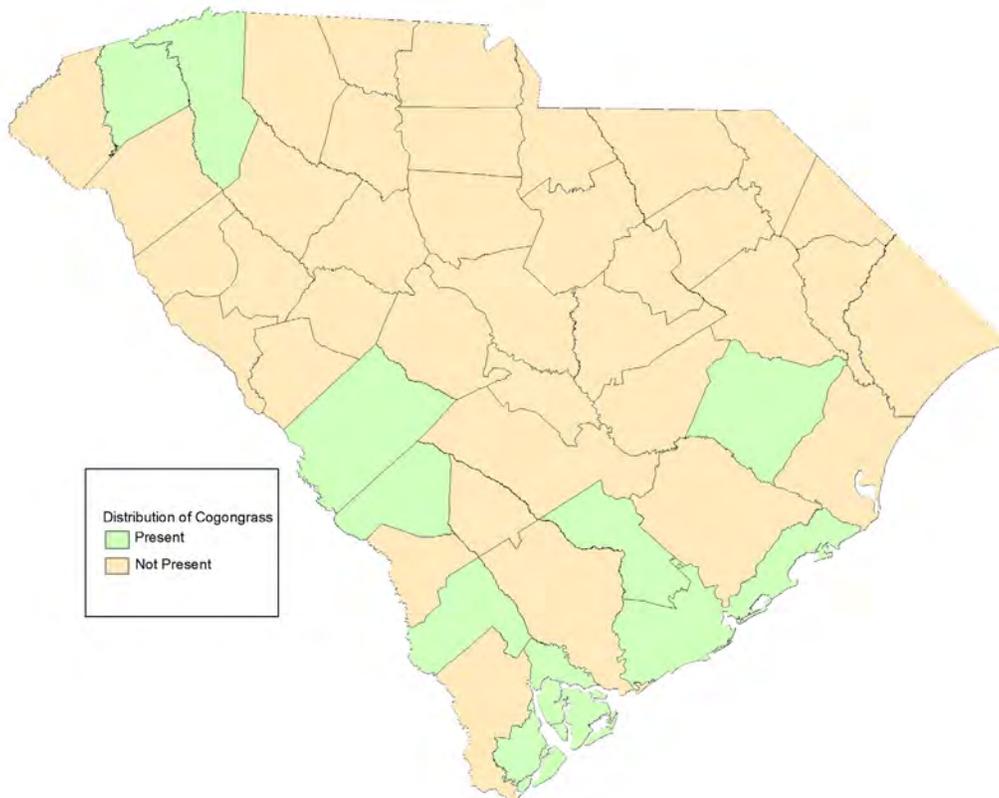
<http://www.barkbeetles.org/spb/index.HTML>

http://www.dfr.state.nc.us/forest_health/fh_spbpp.htm

Cogongrass

Cogongrass is a nonnative clumping grass species that is aggressive and grows in a circular pattern. The seeds are wind dispersed and each plant is reported to produce 30,000 seeds per seed head. This plant can also spread by rhizomes that can increase ten fold each year. Cogongrass first arrived in the United States in 1911 near Mobile, AL as packing material. In the 1920's this grass was planted in Alabama, Florida, and Mississippi as livestock forage. This plant forms dense stands over large areas that easily choke out native plants. By the 1970's tens of thousands of acres were infested across the South, including Florida which has almost one million acres of cogongrass. As of the 2009 Cogongrass Survey, this species has been found in Pickens, Greenville, Anderson, Aiken, Williamsburg, Hampton, Allendale, Beaufort, and Charleston counties. This species is highly flammable and can change the fire ecology of a site. Cultivars include Red Baron and Japanese Blood Grass. Both are banned from being sold in South Carolina. This plant is a federal noxious weed. Currently, a cogongrass task force is working to search for this species across the state to perform EDRR.

Figure 13: Distribution of Cogongrass by County in South Carolina





References:

<http://www.invasiveplantatlas.org/subject.html?sub=2433#maps>

Websites:

www.cogongrass.org

<http://www.ag.auburn.edu/agrn/cogongrass/cogongrass%20fact%20sheet.htm>

<http://www.invasive.org/eastern/biocontrol/28CogonGrass.html>

The rest of the Forest Health section is organized in the following manner:

1. INSECTS
 - a.EDRR
 - b.Major Threats
 - c.Moderate Threats
 - d.Low Threats
2. PLANTS
 - a. EDRR
 - b. Major Threats
 - c. Moderate Threats
 - d. Low Threats
3. DISEASES
 - a. EDRR
 - b. Major Threats
 - c. Moderate Threats
 - d. D.Low Threats

INSECTS

Early Detection Rapid Response

Asian Longhorned Beetle (*Anoplophora glabripennis*)

Asian longhorned beetle (ALB) is a large wood-boring beetle 1 to 1.5 inches long which attacks many hardwood tree species including maple, elm, willow, birch, poplar, ash, horsechestnut, and hackberry. Larvae feed on vascular tissue, thus weakening and killing trees. First found in Brooklyn, New York in 1996, ALB spread to Long Island, Queens, and Manhattan. It was also found near Chicago, in New Jersey, and recently in Worcester, Massachusetts. If ALB becomes established, this beetle could become one of the most destructive and costly invasive species ever to enter the United States. Threatened are urban and suburban shade trees, recreational and forest resources, maple syrup production, nurseries and tourism. The USDA and the states with ALB infestation are working together to eradicate this pest.

References:

Asian Longhorned Beetle - A New Introduction, USDA Forest Service; Animal and Plant Health Inspection Service, NA-PR-01-99, 2008

Websites:

<http://na.fs.fed.us/fhp/alb/>



http://www.aphis.usda.gov/plant_health/plant_pest_info/asian_lhb/index.shtml

http://na.fs.fed.us/pubs/palerts/alb/alb_pa.pdf

<http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=53&langdisplay=english>

European Gypsy Moth/Asian Gypsy Moth (*Lymantria dispar*)

Gypsy moth was accidentally introduced and was discovered to be highly destructive pest of trees. Larvae in large numbers feed on over 500 species of trees and shrubs and constitute one of the most destructive defoliators of hardwood and softwood trees. The European Gypsy Moth, introduced into Massachusetts in 1869, is established in Wisconsin, Michigan, and the entire Northeast, as far south as Virginia. Asian Gypsy Moth is not known to occur in the United States. Temperate, hardwood growing areas are at risk from Gypsy Moth. The gypsy moth has been highly successful in range expansion despite all attempts to prevent its movement. This species now occurs in all or parts of 19 states. More than 78 million acres have been defoliated by gypsy moth since 1970. Gypsy moth defoliation causes tree mortality, reduces property values, adversely affects commerce, and creates health problems for sensitive individuals who may come in contact with the caterpillars. Asian Gypsy Moth is considered to be a major threat to United States forests. This species has a broader host range than European Gypsy Moth which includes some evergreens. The female Asian Gypsy Moth is an active flyer with a range of up to 25 miles. A significant Asian Gypsy Moth pathway is via ships and cargo from the Far East.

References:

Liebhold, A.M. et al. 1995. *Suitability of North American tree species to gypsy moth: a summary of field and laboratory tests*. Gen. Tech. Rep. NE-211. U.S. Department of Agriculture, USDA Forest Service, Northeastern Forest Experiment Station.

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Websites:

<http://www.fs.fed.us/ne/morgantown/4557/gmoth/>

<http://www.na.fs.fed.us/SPFO/pubs/fidls/gypsymoth/gypsy.htm>

http://www.aphis.usda.gov/plant_health/plant_pest_info/gypsy_moth/index.shtml

<http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=113&langdisplay=english>

Emerald Ash Borer (*Agrilus planipennis*)

Emerald ash borer (EAB) is an introduced insect pest of *Fraxinus spp.* Identified in 2002, this insect was causing ash tree mortality near Detroit. Since then EAB has moved rapidly killing ash by the tens of millions. Emerald ash borer is prevalent in 13 states (IL, IN, KY, MD, MI, MN, MO, NY, OH, PA, VA, WI, and WV). The EAB is a huge threat and is a very aggressive killer of healthy and stressed ash trees. An initial eradication plan has changed to a management approach due to the pest pressure. Emerald ash borer changes the forest ecology and affects wildlife, causing billions of dollars in loss. This pest has no known natural enemies in the U.S., and consequently no effective control options. If not contained or mitigated, EAB will continue to infest and kill all species of *Fraxinus spp.*

Reference:

McCullough D.G. and N.F. Schneeberger, *Emerald Ash Borer*, United States Department of Agriculture Forest Service, NA-PR-02-04, 2008



Websites:

<http://www.emeraldashborer.info/>

<http://na.fs.fed.us/fhp/eab/>

http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/index.shtml

<http://spnnc.fs.fed.us/exfor/data/pestreports.cfm?pestidval=155&langdisplay=english>

Light Brown Apple Moth (*Epiphyas postvittana*)

Light brown apple moth (LBAM), a tortricid, was first found on the United States mainland in 2007 in Alameda County, California. An intensive survey revealed LBAM was located in 15 additional California counties. Light brown apple moth is of considerable concern because of its potential to damage a wide range of crops and other plants. Some hosts include cypress, redwood, oak, pine, grapes, citrus, and stone fruit. The host list includes over 2,000 plant and tree species and over 250 fruits and vegetables. An assessment in 2007 indicated light brown apple moth could become established through the majority of the United States with the southeastern states being among the highest at risk. An analysis of light brown apple moth threat concluded the following:

- 1) Significant potential crop production and market losses, ranging from \$0.5 to \$1.0 billion across 33 states that have a climate and hosts predicted to be suitable for the light brown apple moth's establishment and survival;
- 2) Potential impacts associated with threatened and endangered species that are hosts as well as negative impacts linked to potential increases in pesticide use;
- 3) Phytosanitary trade barriers and restrictions for US commodities that are hosts of light brown apple moth among U.S. trading partners (as high as \$9 billion annually); and
- 4) Increased costs due to restrictions on the interstate and intrastate movement of nursery plants.

Reference/Websites:

http://www.aphis.usda.gov/plant_health/plant_pest_info/lba_moth/index.shtml

http://www.cdfa.ca.gov/phpps/PDEP/target_pest_disease_profiles/LBAM_PestProfile.html

<http://pest.ceris.purdue.edu/searchpest.php?selectName=ITBUBPA>

Sirex Woodwasp (*Sirex noctilio* F.) - See description at beginning of this section

Major Threats

Southern Pine Beetle – See description near the beginning of this section

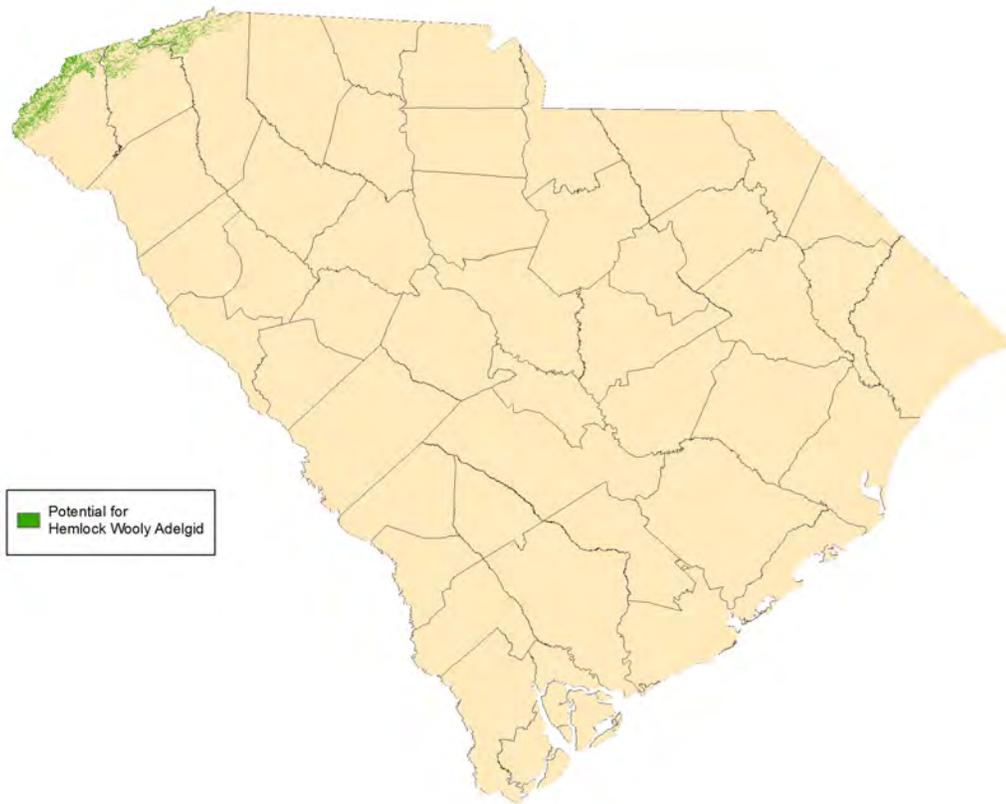
Hemlock Woolly Adelgid

Native to Japan, hemlock woolly adelgid (HWA) is an exotic destructive pest of Eastern and Carolina hemlock trees. This species was first detected in South Carolina in 2001. Since that time, HWA has been detected in all South Carolina counties with hemlock trees (Oconee, Pickens, Greenville, and Spartanburg Counties). The insect feeds from fall through spring at the base of needles, causing them to desiccate and which inhibits new growth. Tree death can occur within a few years of being infested, although trees have survived 10 or more years with HWA infestation. Hemlock trees are an ecologically important component to both forest and riparian habitats. These trees provide cover and forage for mammals and birds. Hemlocks also provide shade for streams which promotes aquatic organisms, such as trout,



insects, and salamanders. In addition, they provide shade for recreation activities such as hiking, biking, and camping. The loss of hemlocks due to this invasive insect has been devastating to the forested riparian ecosystems. Control of HWA has been via systemic insecticides in urban areas, forest trees of high aesthetic, ecological, or historical significance, and recreation areas at state parks. Releases of biological control beetles (*Sasjiscynmus tsugae* and *Laricobius nigrinus*) have also been made in South Carolina (beetles reared and released by Clemson University HWA predatory rearing lab).

Figure 14: Hemlock Wooly Adelgid Potential in South Carolina



References:

Godman, R. M. and Kenneth Lancaster. 1990. *Tsuga canadensis* (L.) Carr. *Eastern hemlock*. In: Burns, Russell M.; Honkala, Barbara H., technical coordinators. *Silvics of North America*.

Volume 1. Conifers. Agric. Handb. 654. Washington, DC: U.S. Department of Agriculture, Forest Service: 604-612.

Hemlock Woolley Adelgid Pest Alert, United States Department of Agriculture Forest Service, NA-PR-09-05, 2005

McClure M.S., S.M. Salom and K.S. Shields, *Hemlock Woolley Adelgid*, Forest Health Technology Enterprise Team, United States Department of Agriculture Forest Service, FHTET-2001-03, 2001



Websites:

<http://na.fs.fed.us/fhp/hwa/>

<http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=171&langdisplay=english>

http://na.fs.fed.us/spfo/pubs/pest_al/hemlock/hwa05.htm

<http://www.ces.ncsu.edu/depts/ent/notes/O&T/trees/note119/note119.html>

Redbay Ambrosia Beetle (see laurel wilt disease)

Moderate Threat

Black Turpentine Beetle

Nantucket Pine Tip Moth

Pales/Reproduction Weevil

Pine Sawflies

Low Threat

Black Twig Borer

Cactus Moth

Eastern Tent Caterpillar

Fall Webworm

Forest Tent Caterpillar

Locust Leafminer

Plants

Early Detection Rapid Response

None currently

Major Threat

Cogongrass – See description near the beginning of this section.

Chinaberry (*Melia azedarach* L.)

Chinaberry is a deciduous tree that has a mature height of 50 feet and a diameter of two feet. The tree has dark, musky leaves and blooms in spring with clusters of lavender flowers that yield numerous poisonous yellow berries. The bark is dark brown with fissures on older trees. This plant is common around old homesites and roadsides. Chinaberry was introduced in the 1800's from Asia and planted as an ornamental around homes. This tree can now be found in Alabama, Arkansas, Florida, Georgia, Hawaii, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas, Utah, Virginia, Puerto Rico, and the Virgin Islands. Chinaberry is spread abundantly by birds and also forms colonies from root sprouts. It forms dense thickets that crowd out native vegetation and is most invasive in riparian and disturbed areas. Leaf litter also changes soil pH which can completely alter the make-up of the native plant communities. The South Carolina Exotic Pest Plant Council considers this plant a significant threat in South Carolina.

**Range map:**

<http://www.invasiveplantatlas.org/subject.html?sub=3049>

Website:

<http://www.invasive.org>

<http://www.se-eppc.org/southcarolina/SCList.pdf>

Chinese Tallow (*Triadaca sebifera*)

Chinese tallow was introduced to South Carolina in the late 1700's and has spread south to Florida and west to California. This tree was primarily cultivated as a seed oil crop and used for fuel, candle making, and soap. It is well adapted to a variety of habitats and soil types and appears to thrive with site disturbance. Currently, tallow is found in Chesterfield, Calhoun, Horry, Georgetown, Charleston, Dorchester, Colleton, Jasper, Beaufort, Berkeley, Hampton, and Allendale Counties. Tallow spreads quickly and displaces native vegetation. This tree is unattractive to all types of wildlife because the plant sap and berries are extremely toxic. It also excretes toxins that change the soil chemistry around the tree and discourages any native species plant growth. This tree is especially troublesome in waterways and bottomland hardwoods. Chinese tallow is considered a severe threat by the South Carolina Exotic Plant Pest Council.

Range map:

<http://www.invasiveplantatlas.org/subject.html?sub=3079>

Website:

<http://www.invasiveplantatlas.org/subject.html?sub=3079>

Japanese Honeysuckle (*Lonicera japonica*)

Japanese honeysuckle is the most commonly occurring invasive plant. This plant is an evergreen woody vine that typically grows up to 80 feet long. The white or yellow flowers are tubular and fragrant. This plant is spread by rooting at vine nodes and dispersed by animals spreading seeds. Introduced from Japan in the early 1800's, it is widely used and planted as deer browse. Japanese honeysuckle occurs across the southern United States, from California to New England and the Great Lakes region. Escaped populations also occur in Hawaii. Japanese honeysuckle has few natural enemies and forms dense infestations and arbors in forest canopies which can kill plants by not allowing them access to sunlight. This plant can also creep along the ground smothering large areas of native ground cover. Japanese honeysuckle is considered a severe threat by the South Carolina Exotic Pest Plant Council.

Range map:

<http://www.invasiveplantatlas.org/subject.html?sub=3083>

Reference/Website:

<http://www.invasivespeciesinfo.gov/plants/honeysuckle.shtml>

Kudzu (*Pueraria montana*)

Kudzu is a twining, trailing leguminous vine that can grow 35 to 100 feet long. The vine has three leaflets and tuberous roots reaching up to 16 feet. Lavender pea-like flowers occur in June through September. Kudzu most often spreads by runners and rhizomes, but can be spread by seed. Kudzu was introduced in



South Carolina's Statewide Forest Resource Assessment and Strategy

1876 in Philadelphia, Pennsylvania from Japan. This vine was promoted for use as forage in the 1920s and during the Great Depression of the 1930s, the Soil Conservation Service promoted kudzu for erosion control. Common throughout the Southeast, kudzu destroys trees by preventing them from getting sunlight, uprooting them from the weight of the vine, and girdling trunks. This plant also occurs frequently along stream banks and rights-of-way, often taking over dozens of acres. Kudzu is also unaffected by most common herbicides. The South Carolina Exotic Plant Pest Council considers this plant a severe threat in South Carolina.

Potential Data Sources:

Richardson Robert J., *Aquatic and Non-cropland Weed Management*, Crop Science Department, Box 7620, North Carolina State University, Raleigh, NC 27695-7620

James H. Miller. 2008. *Kudzu Eradication and Management*. USDA Forest Service. Southern Research Station. Auburn University, Auburn, AL.

Range map:

<http://www.invasiveplantatlas.org/subject.html?sub=2425>

Websites/References:

<http://www.invasivespeciesinfo.gov/plants/kudzu.shtml>

<http://www.invasive.org/eastern/biocontrol/25Kudzu.html>

Japanese Stiltgrass, Nepalese Browntop (*Microstegium vinimeum*)

Microstegium is an annual grass with a sprawling habit. This grass germinates in spring and grows slowly through the summer months, ultimately reaching heights of 2 to 3½ feet. The leaves are pale green, lance-shaped, asymmetrical, one to three inches long and have a distinctive shiny midrib. Flowers are produced in late summer (August to early October) and dry fruits are produced soon afterwards. This grass can produce up to 1,000 seeds per plant per year. *Microstegium* threatens native plants and natural habitats in open, shady, and moist or dry locations. When this species spreads, it forms large patches, displacing and outcompeting native species. This plant is found in all counties west of Calhoun County and in Berkeley County. This species may impact other plants by changing soil chemistry and shading other plants. Soil disturbance increases the rate of spread. The South Carolina Exotic Plant Pest Council considers this species a severe threat.

Range map:

<http://www.invasiveplantatlas.org/subject.html?sub=3051>

References/Websites:

<http://www.nps.gov/plants/alien/fact/mivi1.htm>

<http://www.invasive.org/species/subject.cfm?sub=3051>

Privet (*Ligustrum japonicum*, *L. sinense*, *L. lucidum*)

There are currently three *Ligustrum* species that are widespread, presenting the greatest threat in South Carolina. These plants are typically woody stemmed, semi-evergreen shrubs that can grow up to 20 feet in height. The trunks are usually multi-stemmed. Flowering is extremely abundant with white flowers appearing on the ends of the branches. Each cluster of flowers produces numerous dark purple fruits that readily germinate in a variety of soil conditions and are easily spread by birds and other types of wildlife.



Chinese privet (*L. sinense*) has small leaves around one inch in length. Japanese privet (*L. japonicum*) and glossy privet (*L. lucidum*) leaves can be three inches in length with glossy privet having slightly larger (up to six inches) shiny leaves. Privet was introduced through the landscaping industry for use as hedging due to its hardiness and ease of care. This shrub is highly aggressive, often displacing native vegetation in a matter of a few years. Privet can be especially damaging and prolific along streams and bottomlands.

Range maps:

<http://www.invasive.org/weedus/subject.html?sub=3034#maps>

<http://www.invasive.org/weedus/subject.html?sub=3035#maps>

References/Websites:

http://www.invasive.org/eastern/srs/CP_EP.html

<http://www.invasive.org/species/subject.cfm?sub=3035>

<http://www.duke.edu/~cwcook/trees/lija.html>

Chinese Wisteria (*Wisteria sinensis*)

Chinese wisteria is a deciduous woody vine that can grow up to 40 feet in height with single stems growing up to 10 inches in width. This vine was first planted in 1816 as an ornamental plant and has become naturalized since this time and is widely sold by the nursery industry because of the large inflorescences. Primary means of reproduction is by vegetative spread, but it can spread by seed. Wisteria is found extensively throughout central and eastern South Carolina. This plant is especially troublesome because it is long-lived (50 years), an aggressive grower, displaces native vegetation, and kills trees by girdling. Wisteria changes the composition of the forest floor by destroying trees and allowing sunlight to reach the ground, essentially inhibiting succession from occurring. The South Carolina Exotic Plant Pest Council lists this species as a severe threat. Disturbance increases the rate of infestation.

Range map:

<http://www.invasiveplantatlas.org/subject.html?sub=3083>

References/Websites:

<http://www.nps.gov/plants/alien/fact/wist1.htm>

<http://plants.usda.gov/java/profile?symbol=WISI>

<http://www.invasive.org/species/subject.cfm?sub=3083>

Moderate Threat

Eleagnus

Japanese Climbing Fern

Multiflora Rose

Paulownia

Sericea Lespedeza

Tree of Heaven

Tropical Soda Apple



Low Threat

Bradford Pear
English Ivy
Garlic Mustard
Japanese Knotweed
Mimosa
Miscanthus
Periwinkle
Phragmites

DISEASES

Early Detection Rapid Response

Sudden Oak Death, Ramorum Leaf Blight, Ramorum Twig Blight or Dieback

The fungal-like organism, *Phytophthora ramorum*, causes the forest disease termed Sudden Oak Death. The disease currently results in widespread dieback of several tree species in California and Oregon forests. Sudden oak death is considered a threat to the nation's oak woodlands, urban forests, and the ornamental nursery industry as the cause of ramorum blight of common ornamentals. Trade in nursery stock resulted in movement of this pathogen from source populations on the West Coast to locations across the United States, thus risking introduction to other native forests. Infested areas currently include 14 California counties and a portion of one county in Oregon. In addition, diseases caused by *P. ramorum* have been detected in 11 states (CA, OR, WA, AL, GA, MD, MI, NJ, NC, PA, SC) at 30 sites (24 nurseries and 6 in the landscape). Pest risk assessment is based on the following risk elements: climate-host interaction; host range; dispersal potential; economic impact; environmental impact; and pest opportunity determined the risk presented by *P. ramorum* to be high in South Carolina. *Phytophthora ramorum* infects leaves and twigs of common ornamental plants, for example, rhododendron, camellia, pieris, and kalmia, which can serve as vectors for pathogen dispersal. Currently natural hosts are expanding and 35 families, 70 genera, and over 109 species are now documented.

References:

O'Brien J. G., Manfred E. Mielke, Steve Oak, and Bruce Moltzan. *Sudden Oak Death*. USDA Forest Service, NA-PR-02-02, 2002.

APHIS List of Regulated Hosts and Plants Associated with *Phytophthora ramorum*, (Revision dated 5 May 2008 (corrected 30 May)), this list is updated often. The most current version is posted at: http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/

Major Threat

Annosus Root Rot

Annosus root rot, caused by the native fungus *Heterobasidium annosum*, can be very destructive to pines located in areas of risk. The fungus primarily infects loblolly, slash, shortleaf, white, and longleaf pines, but also can infect eastern red cedar. The fungus enters a stand when airborne spores land on and grow in a freshly cut stump or wounded roots. The fungus causes the roots to rot and can spread into nearby



healthy trees through root grafts. The result in healthy trees is loss of growth, susceptibility to blow over, increasing susceptibility to pine beetle attack, or mortality. Pines growing in sandy or sandy loam soils are susceptible to root rot, especially if thinning occurs during the winter months when the spore-producing conks are most active. Additionally, trees that are planted on old field sites are more susceptible than trees planted in a historically forested situation. Each year losses due to annosus root rot are observed throughout the high risk soil types. Losses statewide can be as high as over 10,000 acres affected annually.

Hazard Map:

<http://www.fs.fed.us/r8/foresthealth/atlas/index.shtml>

References:

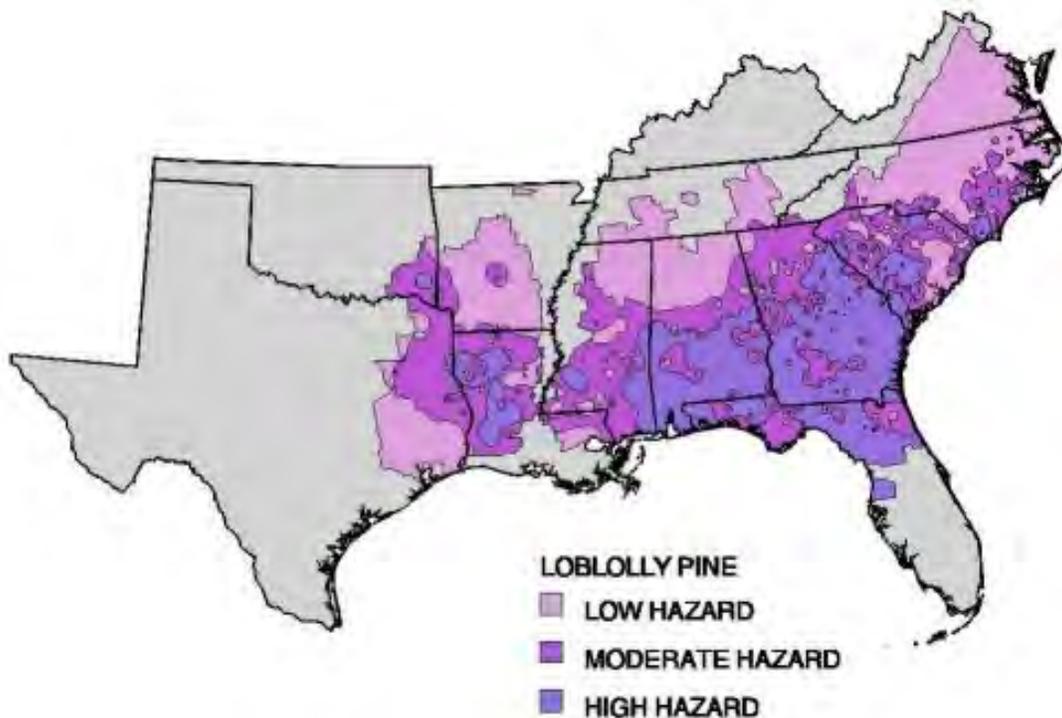
Robbins, K. 1984. *Annosus root rot in eastern conifers*. Forest Insect & Disease Leaflet 76. USDA Forest Service.

Insects and Diseases of Trees in the South. 1989. R8-PR16. USDA Forest Service - Forest Health Protection.

Fusiform Rust

Fusiform rust is caused by the native fungus *Conartium quercuum f. sp. fusiforme*. This fungus primarily affects loblolly, slash, and to a lesser extent, longleaf pines. The fungus primarily enters a tree through wounds, branch scars, or needle scars, and causes cankers. If the fungus grows from an infected branch into the main stem, the resulting canker is a point of weakness/breakage and can lead to mortality. This disease can cause serious losses in nurseries, reduce tree growth, increase susceptibility to pest problems, and result in stem breakage. The potential distribution of this insect in South Carolina is all pine and pine-hardwood stands which occur in every county of the state.

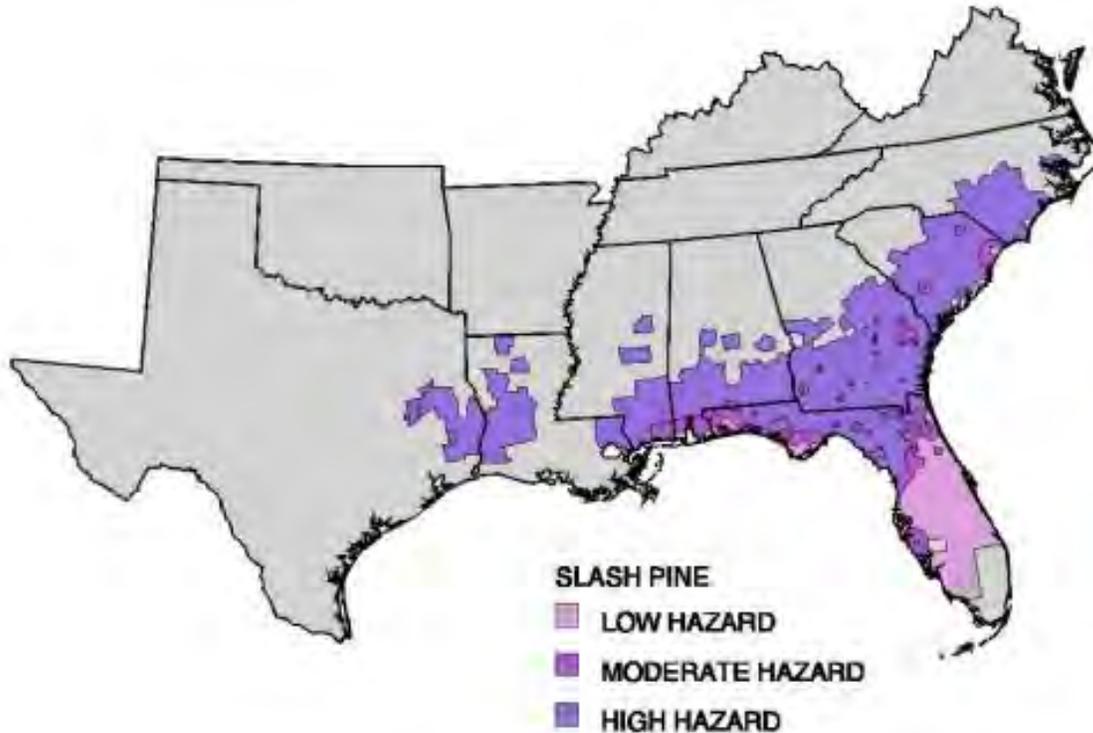
Figure 15: Fusiform Rust Hazard for Loblolly Pine



Source: <http://www.fs.fed.us/r8/foresthealth/hosf/fusrust.htm>



Figure 16: Fusiform Rust Hazard for Slash Pine



Source: <http://www.fs.fed.us/r8/foresthealth/hosf/fusrust.htm>

References:

Insects and Diseases of Trees in the South. 1989. R8-PR16. USDA Forest Service - Forest Health Protection.

Laurel Wilt Disease (vectored by redbay ambrosia beetle)

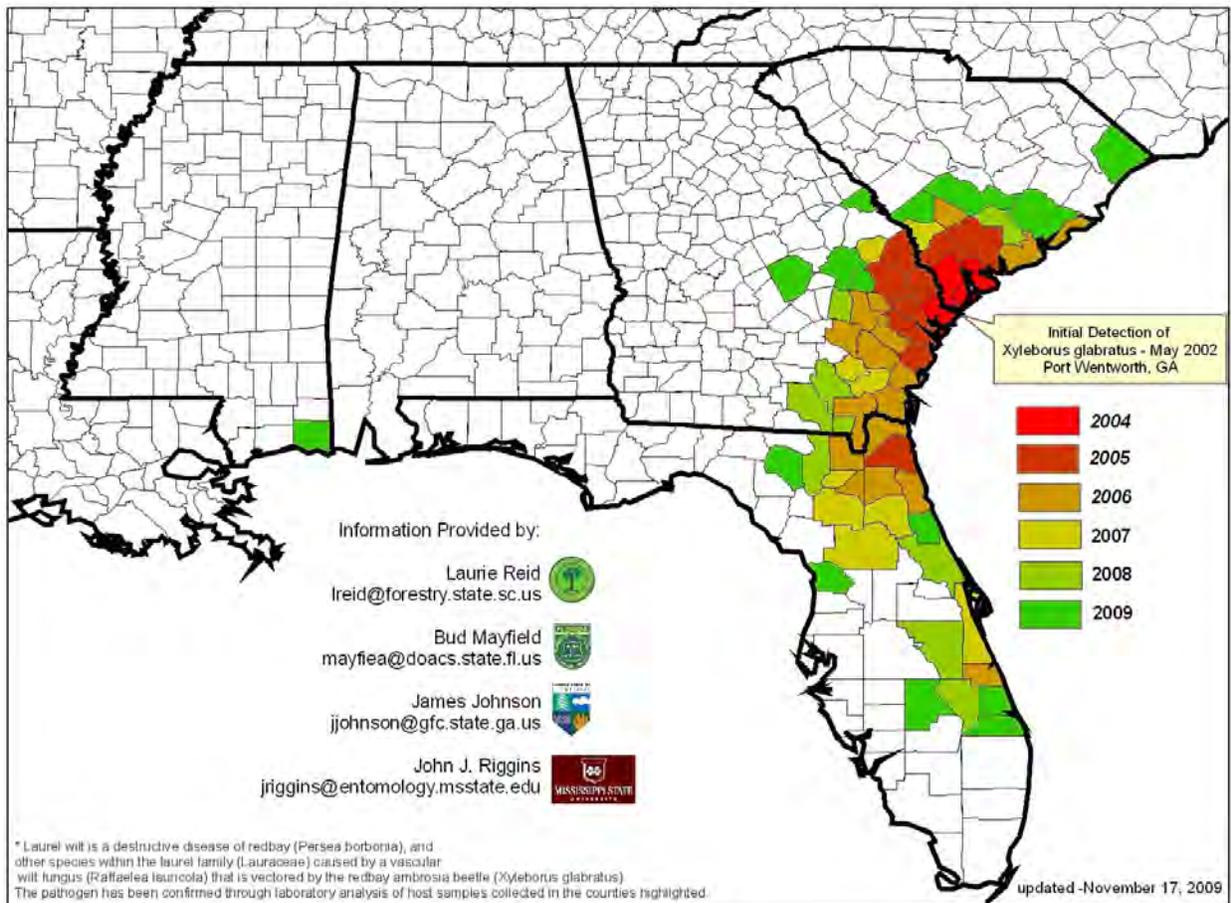
The redbay ambrosia beetle (*Xyleborus glabratus*) is a non-native ambrosia beetle which was first detected in the United States near Savannah, Georgia in 2002. This beetle is responsible for vectoring the laurel wilt fungus (*Raffaelea lauricola*) into the sapwood of redbay (*Persea borbonia*) and other trees in the laurel family (Lauraceae). The beetle is native to Southeast Asia (Japan, Taiwan, Myanmar, and the Bonin Islands). Laurel wilt has caused high levels of redbay mortality in South Carolina, Georgia, and Florida. The current range of laurel wilt disease in South Carolina is in the following counties: Beaufort, Jasper, Hampton, Allendale, Bamberg, Barnwell, Orangeburg, Colleton, Dorchester, Charleston, Berkeley, and Horry Counties. Laurel wilt has the potential to threaten redbay (*Persea borbonia*), swampbay (*P. palustris*), sassafras (*Sassafras albidium*), spicebush (*Lindera benzoin*), pondberry (*Lindera melissifolia*), pondspice (*Litsea aestivalis*), avocado (*Persea Americana*), and possibly other species in the Lauraceae family. *Lindera melissifolia* is currently a federally endangered plant, and *Litsea aestivalis* is currently a multi-state threatened plant. The female *X. glabratus* beetle carries fungal spores on her mouthparts. After the female beetle bores into a tree, she makes tunnels in the sapwood in which she will lay eggs. During this boring process, the fungal spores are released from the mandibles, and the fungus grows in the tunnels. The fungus blocks the movement of water, causing the tree to wilt and eventually die from lack of water. This fungus is extremely fast-acting and trees typically die within a month after being infected.



Redbay trees are of high ecological value. Songbirds, bobwhite quail, and turkeys often feed on the fruit, while deer and bears frequently feed on foliage and fruit of redbay and sassafras. Palamedes swallowtail butterflies rely on redbay trees for completion of their life cycle (larvae feed on the redbay leaves). Additionally, spicebush swallowtail butterflies complete their lifecycle on sassafras and spicebush (both in the Lauraceae family). This exotic pest can spread to new areas through the movement of infested wood, such as firewood or dead wood being transported for disposal.

Officials estimate that natural spread is about 20 miles per year, but movement of infested firewood, wood chips, and logs may be a major factor in spreading the disease into new locations not contiguous with the main area of infestation.

Figure 17: Distribution of Counties with Laurel Wilt Disease by Year of Initial Detection



References:

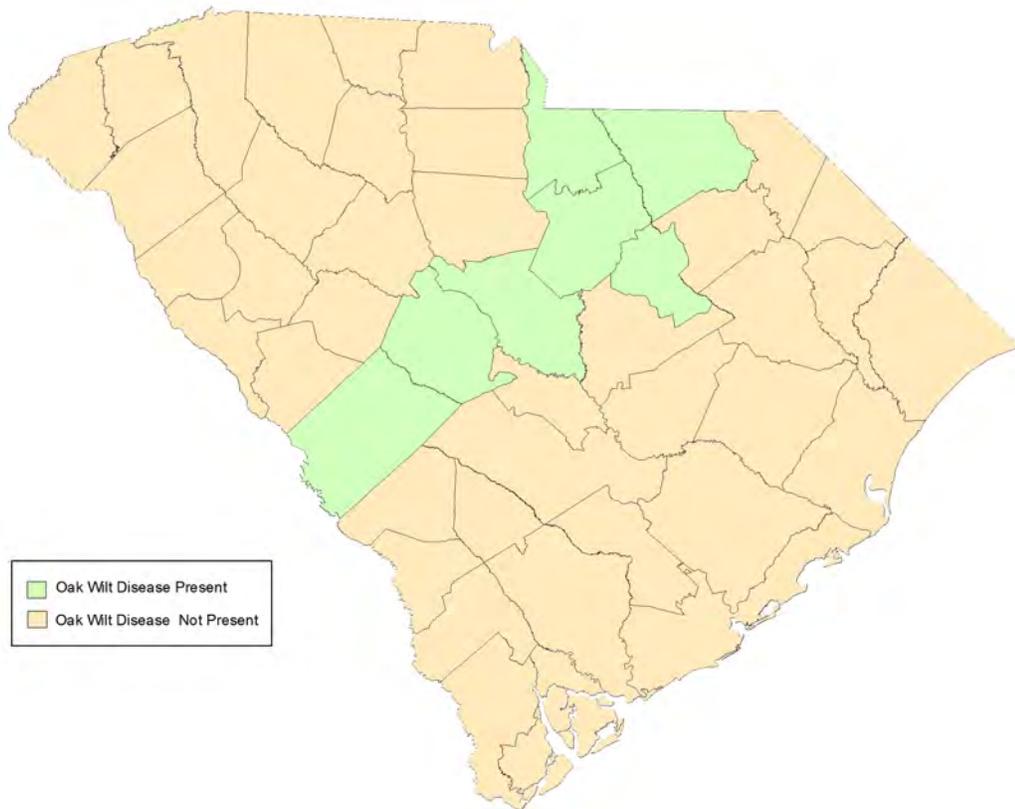
Various sources at <http://www.fs.fed.us/r8/foresthealth/laurelwilt/index.shtml>



Oak Wilt

Oak wilt, a vascular wilt disease of white and red oaks, is caused by the fungus *Ceratocystis fagacearum*. Oak wilt was first identified in Wisconsin in 1942 and although this disease has been found in 21 states (Starkey, USFS), it is responsible for severe mortality of live oaks only in central Texas. The Oak wilt fungus causes affected trees to wilt and usually to die. Oak species in the red oak group (northern red, scarlet, and black oak) are affected more frequently and die more readily than oaks in the white oak group (white, post, and chestnut oaks). Once a tree is infected, the fungus spreads via roots grafts to adjacent trees, thus resulting in infection centers. Additionally, sap feeding beetles can spread the spores to nearby healthy trees and over long distances. Control strategies in the forested landscape consists of killing infected trees; control strategies in the urban landscape consists of removing infected trees and trenching between diseased and healthy trees which will eliminate root grafts and prevent tree-to-tree spread. In South Carolina, Oak Wilt has been identified in 7 counties (Aiken, Chesterfield, Kershaw, Lancaster, Lee, Lexington, and Richland) from one live oak (Aiken County), scrub oaks, and water oaks.

Figure 18: Counties in South Carolina where Oak Wilt Disease has been Identified



Range map: L.Reid 2009, based on Dale A. Starkey 2006.

References:

Insects and Diseases of Trees in the South. USDA Forest Service - Forest Health Protection, R8-PR16, 1989 Starkey, Dale A., USDA Forest Service 2009, Personal communication.



Moderate Threat

Oak Decline Complex
Littleleaf Disease
Hypoxylon Canker
Sycamore Anthracnose

Low Threat

Brown Spot Needle Blight
Pitch Canker
Dogwood Anthracnose
White Pine Decline
Pine Needle Cast

Priority Areas

For Priority Area Maps, see Appendix 2 (page 178).



Enhancing the Benefits of South Carolina's Trees and Forests



This section describes the role of community forests in South Carolina as well as the benefits that forests and trees provide in protecting the quality of air and water in the state.



Water Quality and Quantity

Stakeholders indicated that water quality and water quantity were high priority issues. Surface water that is free from pollutants and sediment and provides habitat requirements for wildlife is considered to be of high quality. Water is a critical resource affecting all aspects of quality of life, from health and recreation to economic development.

Managing forests and trees has the potential to impact water quality and water availability throughout the state. South Carolina is 67 percent forested land, and a significant portion of the state's water resources are linked to healthy forests.

Compared to other land uses, the negative impacts of forest management activities on water quality are minor, with silviculture the lowest leading source of impairment in Southern states. Timber harvesting is viewed by some as a source of water pollution, but normally leaves understory and organic material in place, and results in little disturbed or exposed soil (USFS 2002). In general, forests produce the highest water quality and most stable streams of any land use (Myers et al. 1985).

Sediment is typically the greatest nonpoint source pollutant. The average annual sediment yield from land in the southeast is 1.3 tons per acre.

Table 6: Sources of Sediment by Land Use Type

Land Use	Sediment Yield (tons/acre/year)
Undisturbed Forest	trace - .32
Careful Clearcut	.06 - .17
Careless Clearcut	1.35
Mechanical Site Prep	5.60 - 6.36
Cultivated Field	.42 - 7.50
Careless Agriculture	7.80 - 43.06
Active Construction	48.40 – 218.91

(Source: Yoho 1980)

Several classifications may indicate desirable water quality. These include state and federally designated scenic rivers, Outstanding Resource Waters, and waters supporting threatened and endangered aquatic wildlife. Trout waters and source drinking water further indicate quality water resources that may need special management considerations. Headwater streams are especially important for water quality, and isolated wetlands present unique habitats for biodiversity.

The greatest risk of impact from forestry operations is typically sediment from roads and stream crossings. Failure to follow Best Management Practices (BMPs) in riparian areas can result in increased turbidity or sediment, water temperature, nutrient levels, and lowered dissolved oxygen. Most water-quality impacts are temporary or short-lived, are minimized or mitigated when BMPs are applied, and the site recovers within two to three years as vegetation grows (USFS 2002). Maintaining forested land use and application of BMPs is important in riparian areas to maintain the current high standard of water quality. BMPs are designed to address most conditions, but adjustments are sometimes needed for waters with high richness or uses.

Although negative water quality impacts from forestry are minor, some forestry activities can have a significant impact if not carried out properly. Considerable research has shown use of Best Management Practices to be successful in controlling and preventing nonpoint source pollution during forestry activities



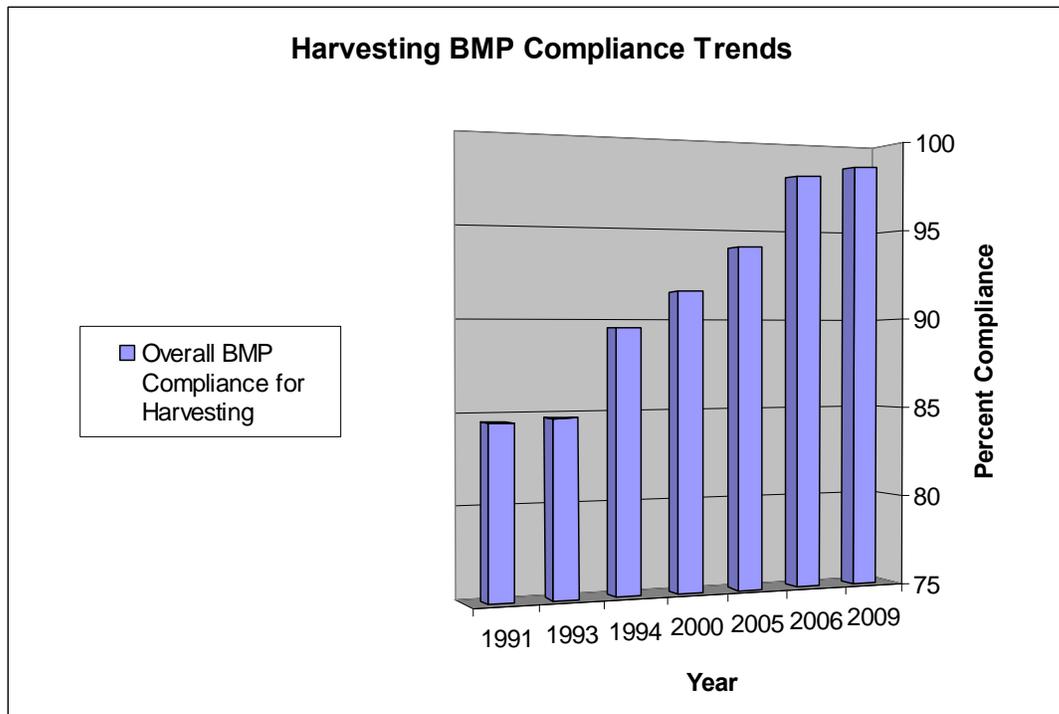
(USFS 2002).

The SC Forestry Commission is the state agency designated to provide oversight and guidance for forest management practices and to establish BMPs for forestry. The agency provides educational opportunities and technical assistance through a BMP Courtesy Exam program designed to improve compliance and implementation. The forest industry in South Carolina has a strong commitment to support logger compliance with BMPs.

The BMP Courtesy Exam program offers free services to identify potential environmental impacts from forestry operations. Specially-trained BMP Foresters visit sites before, during, and after operations to offer recommendations and ensure applicable BMPs are being followed. Courtesy exams are initiated on request, but sites may also be located by complaint, incident, or through aerial detection. Failure to implement BMPs may result in regulatory violations that are reported to the appropriate enforcement agency for possible action. In addition, forest industry will often take action when suppliers fail to comply with BMPs. Many mills will not accept wood from loggers who have been cited for failure to comply with BMPs.

Overall compliance with South Carolina's Best Management Practices for Forestry is 98.6 percent for timber harvesting operations. This indicates that the South Carolina BMP Program is highly successful, and that landowners, loggers, and forestry professionals demonstrate a strong commitment to protecting water quality (Sabin 2009). The regional average among 13 southeastern states for overall BMP compliance during harvesting is 89 percent (SGSF 2008). Harvesting compliance in South Carolina has shown continual improvement since the first monitoring study was started in 1989 (see Figure 19).

Figure 19: Compliance with BMPs Related to Forest Harvesting Operations



From *Compliance and Implementation Monitoring of Forestry Best Management Practices for Harvesting in South Carolina, 2007-2008*.



The SC Forestry Commission provides further assistance to help landowners protect water quality by providing forest management plans, cost-share assistance, and reforestation advice. Commission foresters routinely offer information on all aspects of resource management, including BMPs. South Carolina's BMPs for Forestry are applicable for all silvicultural activities, with specific guidelines for timber harvesting, road construction, stream crossings, riparian buffers, wetlands, site preparation, reforestation, prescribed burning and firelines, pesticide and fertilizer application, wildlife improvements, and minor drainage.

The SC Department of Health and Environmental Control (DHEC) have identified areas with significant threats to water quality. These designations are based on the state 303(d) listing of impaired waters and watersheds with current or in-process Total Maximum Daily Loads (TMDLs)¹. Impairment may result from a wide range of sources and pollutants. Although none of these impaired areas in South Carolina are directly linked specifically to forestry activity, opportunities may exist to mitigate or buffer impacts from other uses by using forested buffers. In these areas forest management can capture, absorb, detain, or retain pollutants and contribute to cleaner, healthier water.

Watershed features can also affect water quality. Certain features can lead to greater risk of negative impacts and suggest the need for additional attention. Past land uses are sometimes a consideration, especially where they have left the surface eroded, gullied, and/or barren. Other features to address include slope, erodible soils, riparian areas, and wetlands. Occurrence of these features may indicate a higher potential for negative impacts from forestry activities. Evaluation of the water quality indicators previously mentioned provides additional knowledge on watersheds that warrant prioritization to conserve high quality water resources, mitigate impaired water quality, and support areas where threats are greatest.

Managing water resources is the responsibility of many state and federal agencies, and is the focus for many other organizations, businesses, and citizens. For example, the SC Forestry Commission has a Memorandum of Agreement with (and regularly cooperates with) the US Army Corps of Engineers on silvicultural water quality issues under jurisdiction of the SC Pollution Control Act and Clean Water Act. In addition, the Forestry Commission's BMP Courtesy Exam Program is supported by a US EPA Section 319 grant administered by DHEC.

An issue of such wide-ranging importance to both society and the environment requires an interdisciplinary and multi-jurisdictional approach involving many partners and stakeholders. For example, the SC Forestry Commission provides technical expertise, experience, and resources on the role of forestry in water quality. The agency can also seek new partnerships and strengthen communications with existing partners to focus on water issues within the state. In addition, the Commission can promote the use of tree cover and forest management to protect water quality and streambank stability from adjoining land uses.

A closely-related, high-profile subject has been water quantity and availability. In recent years, related issues have included water rights, reservoir management, in-stream flow needs, and drought. Industrial, agricultural, and human consumption of water are often at odds, competing for limited available resources. Indigenous aquatic life and other beneficial water uses are also considerations.

South Carolina has an abundant supply of freshwater, but is not immune to water quantity issues. Inter-basin transfers and years of drought have led to disputes with neighboring states over water use. Most of South Carolina's major rivers are shared with North Carolina and Georgia. Dams, diversions, canals and other hydrologic modifications alter the natural path of water, creating varied positive and negative effects to ecosystems and society. Groundwater supply is also an issue, especially in the coastal plain. Surface and groundwaters are connected, but with varying degrees of intensity relative to recharge and discharge.



Although forests play an important role in providing clean water, issues of water quantity are largely beyond the traditional scope of the SC Forestry Commission. However, forests provide most of the available potable water and serve as the most efficient water filters. With responsibility for overall forest resource management in South Carolina, the SC Forestry Commission has a role to play in helping protect water quality. Timber harvesting can result in increased water yield for several years until new growth is established. Depending on the circumstances, conversion of forests or cover types may increase or decrease stream flow. Where ownership and goals within a watershed match, forest management can be used to affect water yield. With adequate funding, the SC Forestry Commission would be in a good position to highlight the types and persistence of water yield changes that can occur in connection to forests and their management and lead in managing the impact of forests on water quality and quantity.

Opportunities for the SC Forestry Commission also include additional work with partner agencies and emphasis on the importance of forestry for sustained water resources, conservation, and stewardship.

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Swank, W.T., L.W. Swift, Jr., and J.E. Douglas. 1988. *Streamflow changes associated with forest cutting, species conversions and natural disturbances*. Ecological Studies of Forest Hydrology and Ecology at Coweeta. W.T. Swank and D.A. Corssley, Jr. (Eds). Springer-Verlag.

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Glossary

¹TMDL – Total Maximum Daily Load - written quantitative analysis of water quality for a pollutant at one or more sites in a watershed. (Source: DHEC – available online at <http://www.scdhec.gov/environment/water/regs/r61-110.pdf>)



Air Quality

Air Quality is defined as a measurement of the pollutants in the air; a description of healthiness and safety of the atmosphere (Dictionary 2010). South Carolina's forests play a major role in filtering the air of pollutants (in other words, ozone and particulate matter), but can act as a source of particulate matter when wildfires rage through them. Forestry practices such as prescribed burning can reduce these fuel loads, thereby reducing the negative effects of wildfires. The forests also respond positively to carefully planned and executed prescribed burning with improved growth as competition for sunlight, water, and minerals is reduced.

Trees sequester atmospheric CO₂ through the process of photosynthesis. This sequestration exceeds the CO₂ emissions generated by events such as forest harvests, land conversions, and fires. Methane from forest fires amount to about 5 percent of the total. Forest fires also produce about 1 percent of the total nitrous oxide emissions. Forest fires in this context include prescribed burns and wildfires (USFS 2007).

New housing developments often lead to increased levels of air pollutants. For example, as the population grows and industry moves in to meet the population's needs, increased levels of air pollutants such as sulfur dioxide, nitrous oxide and mercury are emitted into the atmosphere. In South Carolina, attainment levels for sulfur dioxide and nitrous oxide are met due in large part to strict air quality regulations. Landscaping with trees around industrial sources of pollution can help filter such pollutants, thus reducing the negative impacts on air quality (Tommy Flynn, pers. comm., SC Department of Health and Environmental Control (DHEC), January 6, 2010).

Other sources of air pollutants include vehicles. However, with new emissions equipment and standards, the quantity of these pollutants has actually been decreasing. And, with active urban forestry programs where tree planting and arbor care are implemented, additional reductions in the pollutants released by vehicular emissions can be achieved.

Urban tree plantings can also play a significant role in energy conservation especially in metropolitan areas where population densities are greatest. Trees tend to decrease the temperatures around these heat sources, resulting in less ozone being produced.

DHEC monitors air health impairments, non-attainment areas¹, and inversions. York County is the only area within the state that currently has non-attainment issues (Tommy Flynn, pers. comm., DHEC, January 6, 2010).

Current Activities

South Carolina has an average of 2,791 wildfires per year that burn a total of approximately 20,000 acres. The Southern Wildfire Risk Assessment is being used along with SC Forestry Commission historical records to classify and identify those communities at-risk to support wildfire planning and protection efforts. At the state level, the assessment is being used to increase awareness of the fire problem in South Carolina and to help the public understand fire management issues (Andreu et al. 2008).

Prescribed burning is one forest management tool used by forest managers to help reduce the hazardous fuel buildups that often accumulate in the forest lands around South Carolina. By conducting prescribed burns, fuel buildups are reduced lessening the chance of a disastrous wildfire. Prescribed burns also burn less intensely, produce less particulate matter and, therefore; have less of an impact on the atmosphere than wildfires (Hessburg and Agee 2003).



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The South Carolina Smoke Management Guidelines provide for minimizing the impact of smoke from vegetative debris burning operations for forestry, agriculture, and wildlife purposes. To do this, the Guidelines define smoke sensitive areas, amounts of vegetative debris that may be burned, and atmospheric conditions suitable for burning this debris. The SC Forestry Commission is responsible for administering the Smoke Management Guidelines. In doing so the Commission consults with and coordinates activities with the National Weather Service and the South Carolina Department of Health and Environmental Control (DHEC-Air Quality Division) to ensure compliance with air quality standards as outlined in the Memorandum of Understanding (SCFC 2006).

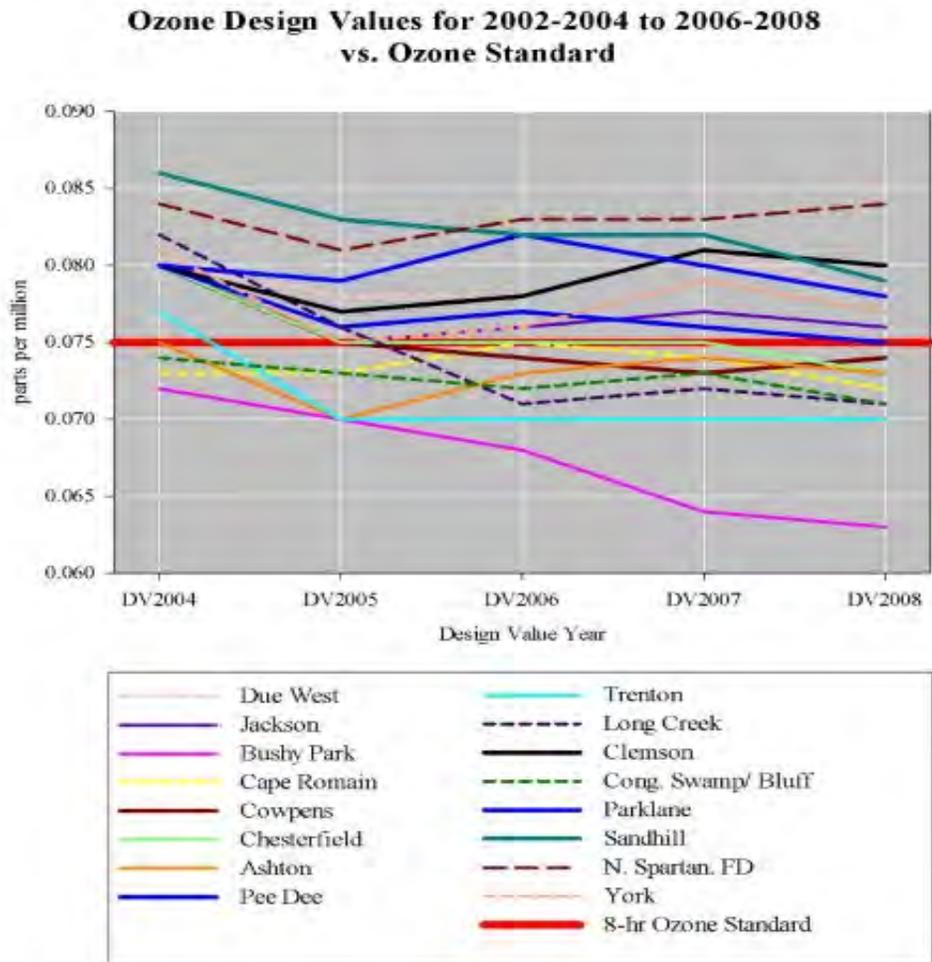
Prescribed burns and wildfires are a source of ozone and smoke (particulates). These pollutants have the greatest impact on air quality. Human activities are the primary cause (98 percent) of wildfires in South Carolina with about 40-45 percent due to escaped debris burns. This cause alone accounts for approximately 1,300 wildfires burning 8,400 acres per annually. A reduction in the number and size of human-caused wildfires can help reduce the negative effects on air quality (SCFC 2010a).

In South Carolina, forest managers prescribe burn an average of 527,000 acres annually (FY05 – FY09) for wildlife, forestry, and agriculture purposes. These prescribed burns are managed so that they produce limited amounts of smoke as compared to wildfires. The state's Smoke Management Guidelines limit the amount of burning which can take place depending on how well the smoke will be dispersed that day (SCFC 2006).

It is unusual for ozone problems to occur during the prescribed burning season (late winter through spring), but can be a problem with summer wildfires when ozone levels are higher. Ozone is created during the combustion of nitrous oxide. High summer temperatures combined with burning of forest fuels can result in elevated amounts of ozone. In the last five years ozone levels have decreased due in large part to tighter emissions controls on power plants and automobiles. The outlook is for continued improvement helped by new and more stringent standards that will be implemented by the EPA sometime in 2010.



Figure 20: Concentration of Ozone

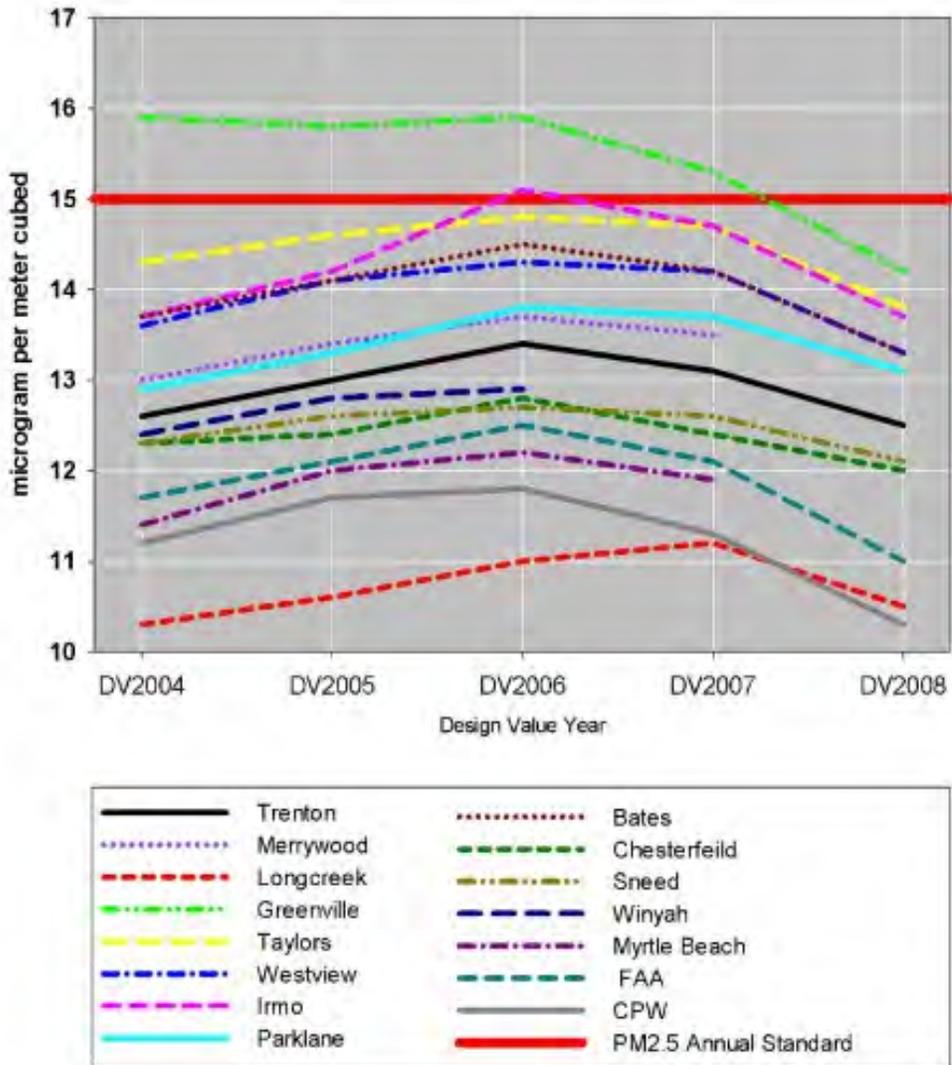


Particulate Matter, (PM 2.5) is measured in micrograms and since 2003 has been decreasing. This decrease in atmospheric particulate matter, especially over the last couple of years, may also be due in part to the downturn in the economy. (Tommy Flynn, pers. comm., DHEC, January 6, 2010). However, data is limited as there are only a dozen air quality stations statewide.



Figure 21: Concentration of Particulate Matter

PM2.5 Annual Design Values for 2002-2004 to 2006-2008 vs. the PM2.5 Annual Standard



Contributing to the amount of ozone produced are approximately 320,000 yard debris burns, as well as burns associated with the clearing of land for development and the maintenance and installation of highway rights-of-way. These burns are not regulated by the Smoke Management Guidelines, but are restricted by DHEC Regulation 61-62.2 – Prohibition of Outdoor Burning (SCFC 2006).



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When prescribed burning is conducted in the wildland–urban interface (WUI), the smoke that is produced can sometimes inconvenience people, and it can also cause serious health and safety problems. The public is unlikely to continue to tolerate the use of prescribed fire, regardless of the benefits, if burn managers cannot keep smoke out of smoke–sensitive areas (Wade et al. 2007, p.i).

Negative public reaction to smoke generated by prescribed and debris burns can lead to the passage of ordinances such as county–wide burn bans. Such burn bans may not consider the positive effects of prescribed burning. Therefore, they should be carefully scrutinized to ensure that forestry, wildlife and agriculture burns are exempt from such ordinances. The SC Forestry Commission's continued collaboration with DHEC will keep the forestry, wildlife and agriculture burns in mind as regulations affecting air quality are pursued.

The SC Forestry Commission's urban and community forestry grants provide opportunities for communities to address the care of urban forests and plan for green space to help offset the negative impacts of urban developments on air quality. For example, these grants provide funds for maintenance of the urban trees which absorb significant amounts of air pollutants and reduce surface temperatures. Refer to the chapter on community forests in South Carolina for additional information.

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Glossary

¹non-attainment areas - areas where the amount of ground-level ozone exceeds the EPA standard of 0.075 parts per million



Community Forests in South Carolina

The community forest is the aggregate of all vegetation and green spaces within populated places. Community forests are an integral part of cities, subdivisions, streets, residential yards, parks, and open spaces. This *urban* forest provides benefits and values vital to enriching the quality of life where South Carolinians live, work and play. Properly cared for and well-managed community forests can provide economic and social value that far exceeds their management costs.

Community forestry is the combination of planning, establishing, and managing trees and associated plants (individually, in groups, or under forest conditions) within cities, towns, suburbs and military bases. Community forest management addresses the interface between people, the built environment and trees through a dynamic interaction of various professions including forestry, horticulture, arboriculture, landscape architecture and urban planning.

As our cities continue to grow in population and land coverage, community forest management is critical for healthy and sustainable living. Essential components of a well-managed and fully integrated program include fulltime staff and equipment, tree management and zoning policies, a tree inventory and management plan, a sustained budget and local political support.

Approximately 100 communities, representing 2.5 million South Carolinians, have some level of tree management. The Community Forestry program tracks, classifies and assists these communities into three distinct management levels as defined by the USDA Forest Service requirements for receiving federal funds for the state program implementation. These levels are: managed, developing and non-participating. A managed community is one that has established all of the following: a fulltime professional staff position, a management plan, tree policy, and an advocacy group. A developing community is one that has established one to three of the above listed components. A non-participating community is one that has not yet established any of the above listed components. Listed below are the definitions for and examples of the program management components.

Professional Staffing: An individual who has one or more of the following credentials, and who the community directly employs or retains through written agreement to advise and/or assist in the development or management of their urban and community forestry program: 1) a degree in urban forestry or a closely related field (e.g., forestry, horticulture, arboriculture, etc.), and/or; 2) International Society of Arboriculture Certified Arborist (ISA) or equivalent professional certification.

Management Plan: A detailed document or set of documents developed from professionally-based inventories/resource assessments that outline the future management of the community's trees and forests. Examples of management plans include: Urban Forest Master Plan, Public Tree Planting and Maintenance Plan, Comprehensive Land Use Plan that incorporates specific management recommendations for the community's trees and forest resources, and a Hazard Tree Reduction and Replanting Plan based on an inventory of community trees.

Ordinance/Policy: Statutes or regulations that direct citizens and local governments in the planting, protection and maintenance of urban and community trees and forests. Examples include: Public Tree Care and Maintenance Ordinance, Tree Preservation and Landscaping Ordinance, Watershed Protection Ordinance, and Tree Conservation and Tree Warden Ordinance.

Advocacy/Advisory Organization: An organization that is formalized or chartered to advise (organizations established by the local government) or advocate or act (non-governmental organizations active in the community) for the planting, protection and maintenance of urban and community trees and forests. Approximately 25% of incorporated municipalities (>1,000 in population) live in a managed community.



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This represents 760,832 South Carolinians. Approximately 54% of incorporated municipalities (> 1,000 in population) live in a developing community. This represents 1,673,440 South Carolinians.

The goal of the SCFC's Community Forestry Program is to create, enhance and support long-term local, regional and statewide community forestry programs. To accomplish this, the community forestry staff provides state-wide technical and educational assistance regarding the components listed above as well as tree inventories, grant project implementation, tree and utility line issues, and air and water quality issues. Additional services offered include Tree City USA and Tree Campus USA implementation, proper tree selection, installation, care and maintenance, distribution of educational information, coordinate and conduct training workshops, and Arbor Day/Earth Day activities. Primary assistance is provided to personnel working for towns, cities and counties. Secondary assistance is provided to professional associations, civic and volunteer organizations, state agencies, educational institutions, businesses and others.

Up until January 2010, the Community Forestry Program has also provided financial assistance to a wide array of entities in the form of 1-to-1 cost-share grants. Over the past 18 years, the program awarded approximately \$4.5 million dollars to over 620 municipalities, counties, non-profit organizations, state agencies and educational institutions across the state. There are four basic categories which are available for funding: Community Forestry Program Development, Community Forestry Program Improvement, Information & Education and Public Tree Planting.

These grants have not only helped establish most of the municipal forestry programs that exist today and cited above but have also provided funding for thousands of trees to be planted in public spaces and have helped provide the skill set needed for those charged with public tree management. Hundreds of local government and university tree managers have been able to attend urban forestry and arboriculture related educational events and at least a dozen folks have become ISA Certified Arborists or Municipal Specialists through this program. This educational and accreditation assistance is not available through any other state agency.

During 2009, SCFC community forestry staff provided technical, educational and/or financial assistance to approximately 60 local government entities with a collective population of 2,434,272 citizens.

This type and availability of assistance described above is very specialized and is only provided by the Forestry Commission. No other public agency fills this much needed niche. While the potential and need for the Community Forestry Program to impact many more communities and SC citizens exists, the optimal resources to do so do not.

One of the tools used to engage and initiate community forestry management within municipalities is Tree City USA program (<http://www.arborday.org/programs/treeCityUSA/>). Tree City USA is a community improvement program sponsored by The National Arbor Day Foundation in cooperation with the US Conference of Mayors, the National League of Cities, the National Association of State Foresters, the USDA Forest Service and the SC Forestry Commission. In order to qualify, a community must meet four standards:

- ◆ Establish a tree commission or designate a municipal department responsible for public trees
- ◆ Develop, pass and implement a municipal public tree care ordinance
- ◆ Conduct a local Arbor Day observance and celebration
- ◆ Spend two dollars per capita on community forest management

These standards provide a framework for action and initial direction for a community forestry program. Like the first rungs on a ladder, the standards help get a community started toward annual, systematic management of its tree resources. South Carolina's Tree Cities have been steadily increasing over the



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past 12 years and in 2009 we recertified 42 entities. These include 38 municipalities, 3 military bases and 1 county.

In providing assistance to local units of government, the Community Forestry staff has developed relationships in many communities across the state. These include personnel in the following departments: planning and zoning, public works, parks and recreation, and city leadership. In addition, Community Forestry staff contacts with other agencies (SCDOT, SCDNR and NRCS), professional organizations (SC Chapter of the American Planners Association, SC Nursery and Landscape Association, SC Landscape and Turfgrass Association and the Municipal Association of SC), and non-profits (Trees SC, tree boards, and beautification boards) promotes relationship-building with these organizations.

All of these factors help to connect the public with trees, forests and the agency in general. It is through these connections that staff help bridge the gap when local government struggles with wildland-urban interface issues during expansion of population and jurisdictional boundaries.

Human Benefits of Trees and Forests

Trees and forests have a real impact on the economic, social, and physical well-being of people. Folks gravitate toward green and well-landscaped areas where trees are the predominant feature. Trees planted in public places (streets, parks, schools, cemeteries, and college campuses, for example) as well as in accessible forested areas provide a wide array of tangible and non-tangible benefits to the public. Trees are on the job 24 hours every day working for all of us to improve our environment and quality of life.

Economic Benefits

Trees are major capital assets in cities and towns. Just as streets, sidewalks, sewers, public buildings and recreational facilities are a part of a community's infrastructure, so are publicly owned trees. Trees, and collectively, community forests are important assets that require care and maintenance the same as other public property. (USFS 2003)

The community forest is seen by many municipal governments and business owners as improving the company's image by sending a "message of care" to potential customers. Trees attract businesses and tourists to an area, thereby enhancing the community's economic stability (GFC 2010). Some economic benefits of community forests include:

- More income for businesses. Customers will pay as much as 10 percent more for some goods and services provided by businesses that are located on tree-lined streets.
- Surveys show a 30 percent higher sales rate for shopping areas with large numbers of shade trees versus sales of the same products in shopping areas without trees.
- Customers tend to linger longer in areas with trees than those that are barren.
- "Trees absorb and store an annual average of 13 pounds of carbon each year. Community trees across the United States store 6.5 million tons of carbon per year, resulting in a savings of \$22 billion in control costs" (GFC 2010).
- Employees who have a view of trees are more productive, with 23 percent less incidence of illness than those who cannot see trees. Those with a view also report a higher level of enthusiasm for their job and are generally more patient than those without a view (Wolf 1998).

The presence of trees also has a positive effect on occupancy rates and residential home sales.



- Neighborhood green spaces or greenways typically increase the value of properties located nearby.
- Healthy trees can add up to 15 percent to residential property value.
- Wooded apartment complexes provide preferred aesthetics that can increase occupancy rates (SCFC 2010).

Energy Conservation

- Trees can help cool the "heat island" effect in our inner cities and downtown areas. These islands result from storage of thermal energy in concrete, steel and asphalt. Heat islands are 3 to 10 degrees warmer than the surrounding countryside. The collective effect of a large area of transpiring trees (evaporating water) reduces the air temperature in these areas.
- Strategically placed shade trees - a minimum of three large trees around a home - can reduce air conditioning costs up to 30 percent. Shade trees offer their best benefits when deciduous trees are planted to shade all hard surfaces such as driveways, patios and sidewalks to minimize landscape heat load. (USFS 2003)

Air Quality

- Trees and other plants release oxygen (O_2) for us to breathe and in turn, absorb carbon dioxide (CO_2) and other dangerous gases.
- Trees help to settle out, trap and hold particulate pollutants (dust, ash, pollen and smoke) that can damage human lungs.
- An acre of trees produce enough oxygen for 18 people every day.
- During one year, an acre of trees absorb enough CO_2 to equal the amount produced when a car is driven 26,000 miles.
- Trees remove gaseous pollutants by absorbing them through the pores in the leaf surface. (USFS 2003)

Water Conservation

Tree roots increase soil permeability, resulting in:

- Reduced surface runoff of water from storms.
- Reduced soil erosion and sedimentation of streams.
- Increased ground water recharge.
- Lesser amounts of chemicals transported to streams. (USFS 2003)

Health Benefits

- Physical Activity/Obesity: Studies have found a correlation between community forests and the average amount of physical activity exerted by neighborhood residents. People are more inclined to get outdoors and exercise when their surroundings are greener. Greater physical activity can lead to fewer cases of obesity, which in turn may help reduce other health problems such as heart disease and diabetes. Savings to individuals and the nation can be substantial: health care costs in America associated with obesity top \$100 billion a year.



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- **Asthma:** Trees filter airborne pollutants and can reduce the conditions that cause asthma and other respiratory problems. Asthma incidents increase in urban communities where trees are eliminated in favor of new roads, homes, or commercial developments. The American Lung Association estimates that ozone-associated health care costs Americans about \$50 billion annually (ALA 1997).
- **Hospital Stays:** Post-operative stays are shortened when patients have a view of trees and open spaces.
- **Attention/Focus:** Children who spend more time outside pay better attention inside. Attention-deficit/hyperactivity disorder (ADHD) children, in particular, are better able to concentrate, complete tasks, and follow directions after playing in natural settings.
- **Reduced Air Temperatures:** By reducing air temperatures and building energy use, and directly removing ozone and NO_x from the air, trees reduce ozone concentrations. However, trees can also influence volatile organic compound (VOC) emissions that can lead to ozone formation.
- **Reduced Ultraviolet Radiation:** trees provide shade and therefore protection from the sun. Tree canopy coverage on school grounds and where people gather to shop and recreate can help decrease the chance of skin cancer formation.

Social Benefits

Studies have identified a direct correlation between the amount of trees and grass in community common spaces and the use of those common spaces by residents, which leads to more opportunities for informal social interaction and greater relationships between neighbors.

- Trees make communities livable for people and soften the outline of masonry, metal and glass.
- Trees can be associated with specific places, such as memories of past events or times, or a favorite tree climbed as a youth.
- Less violence occurs in urban public housing where there are trees. Researchers suggest that trees afford a place for neighbors to meet and get to know each other (Kuo and Sullivan 2001). Their research showed that friendships developed into a network of support.

Because these benefits are so broad and all-encompassing, no specific data or research has been collected or conducted here in South Carolina. However, various data on the above quantifiers can be gleaned from numerous sources.

South Carolina is fortunate to have an abundance of forested land despite population growth over the past 20 years. This growth has been accompanied by urban/suburban sprawl primarily in regional pockets of growth in the Greenville-Spartanburg corridor, the Midlands, and areas along the coast. While continued population growth and land development fragments forest land it also offers opportunities to promote state-wide tree planting initiatives and interaction as well as the importance and value of trees and forests to non-traditional audiences such as those in energy production, health care, economic development and citizen groups.

Perhaps the biggest threat that links all of these factors is the potential loss of political support, cost-share grants and staffing to provide technical, educational and financial assistance to the entities that have a major role in benefiting most from the environmental services that trees and forests provide.



Stormwater Management

Over 75 percent of the U.S. population lives in cities (Nowak et al. 2000). As a result, more and more people are disconnected from natural resources such as forests that support them and the watersheds in which they live. As a result, urban residents may take for granted the important benefits provided by forests and trees in their own back yards.

Urban watershed forestry represents an important management approach given the many benefits provided by urban forests and the impact of development on forest structure and function and watershed health. Managing urban forests in ways that explicitly address watershed health can mitigate some of the negative impacts of forest fragmentation, soil compaction, and increased impervious cover in urban watersheds.

A partial listing of the watershed benefits of urban forests and the unique properties of the urban planting environment are as follows:

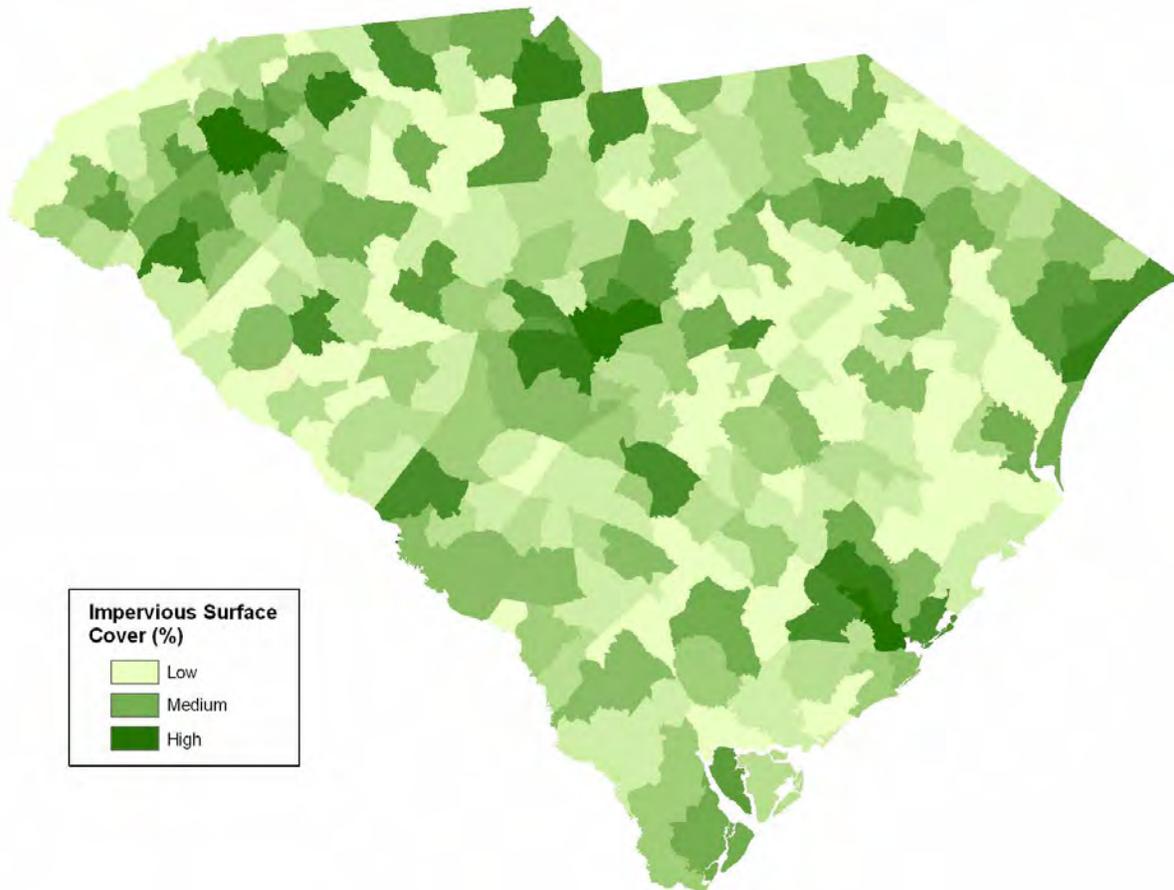
- Reducing construction and maintenance costs (by decreasing costs related to clearing, grading, paving, mowing and storm water management);
- Reducing stormwater runoff and flooding;
- Reducing urban heat island effect¹;
- Enhancing function of stormwater treatment;
- Improving soil and water quality;
- Reducing stream channel erosion;
- Providing habitat for native plants, terrestrial and aquatic wildlife; and
- Preserving of native ecotypes.

Population growth, residential and industrial development, and the resulting demands on our landscape and waterways have led to water quality and quantity concerns throughout South Carolina. Currently, more than 1,150 of our lakes, rivers and creeks have been listed as impaired by the state's Department of Health and Environmental Control (DHEC).

Impervious surfaces such as roads, roofs, driveways, streets, and parking lots increase not only stormwater volume, but also the rate of flow. The volume of runoff in an urban area is five times greater than that of an equally large forested area. The consequences of stormwater runoff in populated places are flooding, soil erosion, and non-point source contaminants, which negatively impact both the built and natural environment. Impacts to the built environment include property damage and loss and poor quality drinking water. Impacts to the natural environment include waterway sedimentation and poor water quality for aquatic life.



Figure 22: Impervious Surfaces in South Carolina Summarized by 12 Digit Watersheds



In accordance with recently passed federal legislation, South Carolina adopted a permitting process designed to manage stormwater. The stormwater rules require all construction sites of one acre or more, many industrial sites, and all regulated Municipal Separate Storm Sewer Systems (MS4s) to obtain a permit. Currently, there are over 70 municipalities throughout the state that are required to comply with the MS4 regulations. In addition, EPA stormwater rules require many of South Carolina's cities and towns to implement public outreach and education programs as part of their local efforts to reduce pollutants in stormwater runoff.

The main influence of urban watershed problems, and hence, stormwater management is land conversion of greenspace to grayspace. Examples of this land use change are the conversion of forests (greenspace) to streets (grayspace) and fields to parking lots. As with many environmental issues, stormwater management is not confined to jurisdictional boundaries.

Natural resources professionals know the many benefits and values of trees and forests. These experts must be more proactive in reaching those outside of the field who can benefit from this knowledge.



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Although the Forestry Commission does not have any control over the pace of population growth or development, the agency can influence how communities of people and structures are arranged and built. This can be accomplished through affecting local planning and zoning policy, educational awareness, and technical assistance.

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Glossary

¹urban heat island effect - an area, such as a city or industrial site, having consistently higher temperatures than surrounding areas because of a greater retention of heat, as by buildings, concrete, and asphalt. (source: <http://www.answers.com/topic/urban-heat-island>)

Priority Areas

For Priority Area Maps, see Appendix 2.

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INTRODUCTION

This section outlines strategies that have been selected to address the thirteen priority issues that were identified by the assessment. In addition, SC Forestry Commission program areas are also described and strategies are referenced. The strategies addressing the priority issues are outlined in the same order as in the assessment: Overarching Issues appear first, followed by strategies aligned under the three national themes of Conserving Working Forests, Protecting Forests from Harm, and Enhancing Public Benefits from Trees and Forests. Most of this information is presented in a matrix format, with number codes used to indicate the national objective that each strategy supports. Below is a cross reference for these national objectives. Additional details as well as cross references for other codes listed in the matrix are available in the appendices.

Objective	Number
Identify and conserve high priority forest ecosystems and landscapes.	1.1
Actively and sustainably manage forests.	1.2
Restore fire-adapted lands and reduce risk of wildfire impacts	2.1
Identify, manage, and reduce threats to forest and ecosystems health.	2.2
Protect and enhance water quality and quantity.	3.1
Improve air quality and conserve energy.	3.2
Assist communities in planning for and reducing wildfire risks	3.3
Maintain and enhance the economic benefits and values of trees and forests.	3.4



Overarching Issues

Population Growth

The population of South Carolina is predicted to grow from four million in 2000 to over five million by 2030. As the population grows, more forest land will be converted to housing and commercial development, stormwater runoff will increase, public demand on forest attributes will rise, and the number of wildfires that threaten structures will increase.

Climate Change

Increased incidence of droughts and storms, increased number and severity of wildfires, and more numerous and severe insect and disease outbreaks are possible if climate change predictions hold true. Sustainable management of forests can help reduce the negative effects of this change.

Public Perceptions about Forestry

Many South Carolina residents value the environmental role of forests, such as protecting water quality, as more important than their role as the provider of raw materials for the number one manufacturing industry in the state. With increased urbanization, many citizens also do not have a close connection with the land. As a consequence, restrictive regulations such as outdoor burning ordinances and tree protection ordinances are proposed with little or no consideration of the potential effects of this legislation on forestry operations.

Goal: *Mitigate the potentially negative effects of population growth and climate change and encourage the public to adopt a more favorable attitude about forestry.*

Note: many of the objectives and strategies listed here are repeated elsewhere in this document because of the all-inclusive nature of these issues.

<p>Objective 1.1: Develop, promote, and deliver forestry education programs to all audiences.</p>
<p>Performance Measures: Desired outcome is an increase in the number of educational programs conducted and the number of participants in these programs. Metrics include number of programs developed or updated, number of requests for educational programs, number of participants trained, and overall positive evaluations.</p>
<p>Resources Needed: Funding for the development of educational materials, cooperator support, and staff to deliver programs.</p>



Strategy 1.1.1: Continue to develop Harbison State Forest and Piedmont Forestry Center for forestry education centers, and expand programs to other suitable Forestry Commission properties.

National Objectives Supported (see Appendix 4)	SCFC Program Areas	Stakeholders (see Appendix 5)	Priority Areas	Key Findings Supported (see Appendix 6)
1.2	Information & Education	SC Forestry Association	Conserve Working Forests	OA 1, 2, 3, 6, 7, 8
3.4, 3.5, 3.6	State Forests	SC Department of Education	Community Forestry	CWF 6, 9, 10
		Clemson Extension Service	Wildfire Risk	
		Conservation Organizations	Threats to Forest Health	
		SC DNR	Water Quality and Quantity	
		Society of American Foresters		
		Clemson University		
		Natural Resource Associations		
		USDA Forest Service		



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Strategy 1.1.2: Promote conservation education programs such as Wood Magic, Protect Learning Tree, and Teaching KATE (Kids About The Environment). Increase SC Forestry Commission personnel participation in education programs.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Information & Education	SC Forestry Association	Conserve Working Forests	OA 1, 2, 3, 6, 7, 8
3.4, 3.5, 3.6	State Forests	Clemson Extension Service	Community Forestry	CWF 6, 9, 10
	Fire Management	Conservation Organizations	Wildfire Risk	
	Forest Stewardship	SC DNR	Threats to Forest Health	
		Society of American Foresters	Water Quality and Quantity	
		Clemson University		
		SC Department of Education		
		Natural Resource Associations		
		USDA Forest Service		



Strategy 1.1.3: Continue annual teacher's tour and development of forestry education material.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Information & Education	SC Forestry Association	Conserve Working Forests	OA 1, 2, 3, 6, 7, 8
3.4, 3.5, 3.6	State Forests	Clemson Extension Service	Community Forestry	CWF 6, 9, 10
		Conservation Organizations	Wildfire Risk	
		SC DNR	Threats to Forest Health	
		Society of American Foresters	Water Quality and Quantity	
		Clemson University		
		SC Department of Education		
		Natural Resource Associations		
		USDA Forest Service		



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Objective 1.2: Improve contacts and communication with state and local levels of government concerning forestry-related issues

Performance Measures: Desired outcome is an improved outreach plan that targets specific audiences and ensures that relevant information is shared. Metrics would include number of meetings attended, number of lawmakers contacted, number of issues in which the agency participated, inquiries responded to, and number of employees trained in communication skills.

Resources Needed: Funding to support adequate staffing levels.

Strategy 1.2.1: Encourage active participation in forestry issues at all organizational levels. Identify specific audiences to be reached by each program and/or operating segment of the SC Forestry Commission.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	All program areas (Executive Leadership to lead)	General Assembly	Conserve Working Forests	OA 1, 2, 3, 4, 5, 6, 7, 8
3.4, 3.5, 3.6		SC Forestry Association	Community Forestry	CWF 2,4,6,9,10
		Clemson Extension Service	Wildfire Risk	
		Conservation Organizations	Threats to Forest Health	
		SC DNR	Water Quality and Quantity	
		Society of American Foresters		
		Clemson University		
		SC Department of Education		
		Natural Resource Associations		
		USDA Forest Service		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 1.2.2: Invite legislative staff to participate in high profile forestry events, and plan periodic field trips for legislative staff and the Governor's office staff, focusing on all services provided to citizens of the state. Involve key legislators as available.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Information & Education	General Assembly	Conserve Working Forests	OA 1, 2, 3, 4, 5, 6, 7, 8
3.4, 3.5, 3.6	Executive Leadership	Governor's Office	Community Forestry	CWF 2,4,6,9,10
	State Forests	SC Forestry Association	Wildfire Risk	
	Forest Management		Threats to Forest Health	
	Fire Management		Water Quality and Quantity	

Strategy 1.2.3: Address regulatory and liability issues associated with forest management practices such as prescribed burning, use of pesticides, and timber harvesting.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Information & Education	General Assembly	Conserve Working Forests	OA 1, 2, 3, 4, 5, 6, 7, 8
3.1, 3.4, 3.5, 3.6	Executive Leadership	Governor's Office	Community Forestry	CWF 2,4,6,9,10
	Fire Management	SC Forestry Association	Wildfire Risk	
	Forest Health		Threats to Forest Health	
	Forest Management		Water Quality and Quantity	



Strategy 1.2.4: Train personnel to be effective communicators.				
National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Information & Education	USDA Forest Service	Conserve Working Forests	OA 1, 2, 3, 4, 5, 6, 7, 8
3.4, 3.5, 3.6	Executive Leadership	SC Forestry Association	Community Forestry	CWF 2,4,6,9,10
			Wildfire Risk	
			Threats to Forest Health	
			Water Quality and Quantity	

Objective 1.3: Utilize all media to reach targeted audiences with relevant forestry information.

Performance Measures: Desired outcomes are identification of targeted audiences and development of appropriate materials.

Resources Needed: Funding for adequate staffing to allow the development and delivery of information and purchase of materials.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 1.3.1: Research potential audiences for which to develop targeted information and/or education campaigns.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Information & Education	General Assembly	Conserve Working Forests	OA 1, 2, 3, 4, 5, 6, 7, 8
3.4, 3.5, 3.6	Executive Leadership	SC Forestry Association	Community Forestry	CWF 2,4,6,9,10
	Forest Management	Clemson Extension Service	Wildfire Risk	
		Conservation Organizations	Threats to Forest Health	
		SC DNR	Water Quality and Quantity	
		Society of American Foresters		
		Natural Resource Organizations		
		USDA Forest Service		

Strategy 1.3.2: Develop audio-visual, print, and exhibit material, promoting forestry and forest management, for use by agency personnel in their communities.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Information & Education	SC Forestry Association	Conserve Working Forests	OA 1, 2, 3, 4, 5, 6, 7, 8
3.4, 3.5, 3.6	Executive Leadership	Clemson Extension Service	Community Forestry	CWF 2,4,6,9,10
	Forest Management	Conservation Organizations	Wildfire Risk	
		SC DNR	Threats to Forest Health	
		Society of American Foresters	Water Quality and Quantity	
		Natural Resource Organizations		
		USDA Forest Service		



South Carolina's Statewide Forest Resource Assessment and Strategy

Objective 1.4: Increase interaction, cooperation, and communication with other state agencies, local governments, forestry organizations, universities, professional societies, and environmental and conservation groups.

Performance Measures: Desired outcome is increased collaboration with other organizations. Metrics include number of informal and formal partnerships developed, increased participation by SC Forestry Commission personnel in partner organizations, and number of assists to other state agencies.

Resources Needed: Information about projects that collaborative partners are engaged in, time for SC Forestry Commission personnel to participate in meetings, and funding for personnel to assist other agencies.

Strategy 1.4.1: Partner with the South Carolina Forestry Association (SCFA), American Forest and Paper Association (AF&PA), Association of Consulting Foresters (ACF), Clemson University, the National Association and Southern Group of State Foresters (NASF, SGSF) and other sister organizations to identify common messages and deliver to targeted audiences.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Information & Education	SC Forestry Association	Conserve Working Forests	potentially ALL
2.1, 2.2	Forest Health	AF & PA	Wildfire Risk	
3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7	Forest Management	ACF	Threats to Forest Health	
	Resource Development	Clemson University	Water Quality & Quantity	
	Executive Leadership	NASF	Community Forestry	
	Community Forestry	SGSF		
	Forest Stewardship	Natural Resource Assoc.		
	Forest Legacy	Conservation Organizations		
	Fire Management			



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 1.4.2: Improve contacts and communication with local governments.				
National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Information & Education	SC Forestry Association	Conserve Working Forests	potentially ALL
2.1, 2.2	Forest Health	Clemson Extension Service	Wildfire Risk	
3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7	Forest Management	Conservation Organizations	Threats to Forest Health	
	Resource Development	SC U&CF Council	Water Quality & Quantity	
	Executive Leadership	Forest Landowners	Community Forestry	
	Community Forestry	Natural Resource Associations		
	Forest Stewardship	USDA Forest Service		
	Forest Legacy	SC DNR		
	Fire Management	SC Fire Chief's Assoc.		

Strategy 1.4.3: Increase SCFC personnel participation in landowner associations and other forestry and conservation-related organizations.				
National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Information & Education	SC Forestry Association	Conserve Working Forests	potentially ALL
2.1, 2.2	Forest Health	Clemson Extension Service	Wildfire Risk	
3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7	Forest Management	Conservation Organizations	Threats to Forest Health	
	Resource Development	SC Urban & Community Forestry Council	Water Quality & Quantity	
	Executive Leadership	Forest Landowners	Community Forestry	
	Community Forestry	Natural Resource Associations		
	Forest Stewardship	SC DNR		
	Forest Legacy			
	Fire Management			



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 1.4.4: Provide leadership for state agencies to cooperatively provide forest conservation information to landowners in forest management, recreation, wildlife management and wildland/urban interface concerns.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Information & Education	SC Forestry Association	Conserve Working Forests	potentially ALL
2.1, 2.2	Forest Health	Clemson Extension Service	Wildfire Risk	
3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7	Forest Management	Conservation Organizations	Threats to Forest Health	
	Resource Development	SC Urban & Community Forestry Council	Water Quality & Quantity	
	Executive Leadership	Forest Landowners	Community Forestry	
	Community Forestry	Natural Resource Associations		
	Forest Stewardship	SC DNR		
	Forest Legacy	State Land Management Agencies		
	Fire Management			

Objective 1.5: Manage and restore trees and forests to mitigate and adapt to global climate change.

Performance Measures: Desired outcome is to update SC Forestry Commission Strategic Plan to reflect the best available scientific data for response to the effects of climate change.

Resources Needed: Accurate and reliable data that quantifies the effects of climate change.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 1.5.1: Increase tree planting to mitigate the effects of climate change.				
National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Management	USDA Forest Service	Conserve Working Forests	EB 6, 7
2.1, 2.2	Nursery	NRCS	Community Forestry	
3.2, 3.3, 3.5, 3.7	Tree Improvement	FSA		
	Community Forestry	State Land Mgt. Agencies		
	Forest Health	Clemson Extension Service		
	Information and Education	Natural Resource Associations		
		SC U&CF Council		

Strategy 1.5.2: Promote forest management and arboriculture practices such as thinning, prescribed burning, and favoring of resistant species to address the increased risk of insect attacks that is predicted due to climate change.				
National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Health	USDA Forest Service	Conserve Working Forests	CWF 6, 7, 8, 10
2.1, 2.2	Forest Management	NRCS	Community Forestry	PF 9, 10, 11
3.4, 3.5, 3.7	Community Forestry	FSA		
	Information and Education	State Land Mgt. Agencies		
		Clemson Extension Service		
		Natural Resource Associations		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 1.5.3: Increase wildfire mitigation efforts, especially in wildland-urban interface areas, to address the increased number and intensity of wildfires that is predicted due to climate change.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC State Fire Chief's Assoc.	Wildfire Risk	OA 5, 9, 10
2.1	Community Forestry	SC Urban & Community Council	Community Forestry	PF 1,2,3,4,5,6,7,8
3.3, 3.5, 3.6, 3.7	Information & Education			

Strategy 1.5.4: Seek additional resources to increase the SC Forestry Commission's capacity to respond to the increased number and intensity of wildfires that is predicted due to climate change.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC State Fire Chief's Assoc.	Wildfire Risk	PF 1,2,3,4,5, 6, 7, 8
2.1	Executive Leadership	SC EMD		OA 10
3.3, 3.4, 3.5, 3.7	Information Technology	SC DHEC		
	Information and Education	General Assembly		
		Forest Industry		
		TIMOs and REITs		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 1.5.5: Increase monitoring of forestland to address the increased threat of invasive species that is predicted due to climate change.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Health	USDA Forest Service	Threats to Forest Health	OA 10, 12
2.2	Forest Management	USDA APHIS	Conserve Working Forests	EB 8,9,10,11,12,13
3.4, 3.5, 3.7	State Forests	State Land Mgt. Agencies	Community Forestry	CWF 3,6,7,8,11
	Community Forestry	Federal Land Mgt. Agencies		PF 11, 13, 15
	FIA	TMOs and REITs		
	Information and Education	Clemson DPI		

Strategy 1.5.6: Increase the amount of urban canopy cover to mitigate the increased heat island effect and CO₂ production that is predicted due to climate change.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Community Forestry	USDA Forest Service	Community Forestry	PF 11, 13, 15
2.2	Information and Education	SC U&CF Council		
3.4, 3.5, 3.7				



Conserving South Carolina's Working Forests

Emerging Markets

Carbon credits, biomass, and other products of the forests of South Carolina are expected to become more important as issues such as climate change and the need for energy independence gain momentum on the federal level. Savvy landowners will position themselves to take advantage of these emerging markets, which may even enable some of them to retain ownership of their land. In addition, current markets for forest products need to be expanded to provide economic incentives for landowners to actively manage their forestland.

Forest Regulation

In many cases, forest regulation can be a disincentive for forest landowners to actively manage their forests and may be an incentive to convert their forestland to another use. Regulation can take the form of ordinances, taxes, and legislation such as the Endangered Species Act. Some forms of taxation, however, such as lower property tax rates for forested tracts, have a favorable effect on forest management.

Fragmentation and Parcelization

As South Carolina's population grows, forested tracts of land continue to become fragmented by the addition of roads, power lines, and buildings. Many larger tracts are also being subdivided into parcels that make traditional forest management difficult to accomplish. This trend has implications for the long-term sustainability of the forest resources of South Carolina.

Goal: *Conserve and manage working forest landscapes in South Carolina to achieve multiple objectives.*

Objective 2.1: Serve as a catalyst for promotion, development and expansion of the forest resource and forestry-related industry in the state.

Outcomes and Performance Measures: Desired outcome is a positive five-year trend in each of the following metrics: total economic impact of forestry on the state (billions of dollars); new capital investments announced (millions of dollars); and forestry jobs created (actual number). For R&D efforts, the metric is research projects with SC Forestry Commission involvement (number).

Resources Needed: Funding for marketing, analysis, program development, outreach, and additional staffing, which can be incorporated into programs like the SC Forestry Commission's "20 by 15" project for jobs and economic development.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.1.1: Provide leadership in the identification, marketing, and development of appropriate primary and secondary forest industries.

National Objectives Supported (see Appendix 4)	SCFC Program Areas	Stakeholders (see Appendix 5)	Priority Areas	Key Findings Supported (see Appendix 6)
1.2	Resource Development Division	SC Department of Commerce	Conserve Working Forests	CWF 6, 7, 8
3.4		SC Forestry Association		
		Forest Industry		

Strategy 2.1.2: Cooperate with national, state, regional and local economic development organizations to promote forestry-based businesses in South Carolina.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Resource Development Division	SC Department of Commerce	Conserve Working Forests	CWF 6, 7, 8
3.4		SC Forestry Association		
		Councils of Government		

Strategy 2.1.3: Expand delivery of forestry-related rural development programs in cooperation with other agencies/entities.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Resource Development Division	SC Department of Commerce	Conserve Working Forests	CWF 6, 7, 8
3.4		SC Forestry Association		
		USDA Forest Service		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.1.4: Identify and recommend mechanisms that would encourage enhanced management of forest lands for products and forest-related amenities.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Management	SC Forestry Association	Conserve Working Forests	CWF 3,4,5,6,7,8,11
3.1, 3.2, 3.4, 3.5, 3.6, 3.7	Forest Stewardship	Clemson Extension		EB 1,2,3,4,5
	Forest Legacy (DNR)	SC DNR		
		Conservation Organizations		
		USDA Forest Service		
		Tree Farm		

Strategy 2.1.5: Develop mechanisms to recognize and compensate landowners who provide ecosystem services that benefit the public.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Management	SC Forestry Association	Conserve Working Forests	CWF 3,4,5,6,7,8,11
3.1, 3.2, 3.4, 3.5, 3.6, 3.7	Forest Stewardship	Clemson Extension		EB 1,2,3,4,5
	Forest Legacy (DNR)	SC DNR		
		Conservation Organizations		
		USDA Forest Service		
		Tree Farm		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.1.6: Encourage full utilization of current and projected timber supplies.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Resource Development	SC Department of Commerce	Conserve Working Forests	CWF 3, 5, 6, 7, 8
3.4, 3.7	Forest Management	SC Forestry Association		OA 12

Strategy 2.1.7: Support research and development efforts in silviculture and new product development.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Forest Management	Clemson University	Conserve Working Forests	CWF 3, 5, 6, 7, 8
3.4, 3.7	Resource Development	USDA Forest Service		OA 12
	State Forests			

Strategy 2.1.8: Encourage expansion of domestic and international markets for South Carolina forest products.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Resource Development	SC Department of Commerce	Conserve Working Forests	CWF 3, 5, 6, 7, 8
3.4, 3.7		SC Forestry Association		OA 12



Strategy 2.1.9: Develop relationships with educational institutions and research organizations to encourage the use of state forest lands as potential research sites and forestry practices demonstration sites.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	State Forests	Clemson University	Conserve Working Forests	CWF 8, 11
3.4, 3.5	Tree Improvement	Clemson Extension	Threats to Forest Health	OA 6, 8
	Forest Health			
	Fire Management			
	Forest Management			

Objective 2.2: Provide policy makers, the forestry community and the interested public accurate and timely information on the state's forest inventory and health of the forest.

Outcomes and Performance Measures: Desired outcome is meeting the required federal standards (completing 20% per year and meeting accuracy standards). Metric is accurate (80% accuracy) and timely (20% or more per year) data gathered in FIA and TPO.

Resources Needed: Funding for three FIA crews for South Carolina and for support, equipment, and vehicles.

Strategy 2.2.1: Maintain funds and personnel to re-measure the state's Forest Inventory and Analysis (FIA) plots on a five-year cycle.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	FIA	USDA Forest Service	Conserve Working Forests	CWF 1, 2, 3, 4, 5, 11
2.1	Forest Health	SC Department of Commerce		
3.4, 3.5, 3.7		Forest Industry		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.2.2: Survey adequate forest plots to ascertain a picture of forest health.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	FIA	USDA Forest Service	Conserve Working Forests	CWF 1, 2, 3, 4, 5, 11
2.1	Forest Health	SC Dept. of Commerce		OA 4
3.4, 3.5, 3.7		Forest Industry		PF 11, 12, 13, 14

Strategy 2.2.3: Continue to collect and provide information about land use, fragmentation, and ownership issues.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	FIA	SC Forestry Association	Conserve Working Forests	CWF 1, 2, 3, 4,
3.3, 3.4, 3.5		Forest Industry		
		USDA Forest Service		

Objective 2.3: Identify and conserve high priority forest ecosystems and landscapes.

Outcome and Performance Measures: Desired outcome is an increase in the number of acres of forestland protected from development and functioning as working forests.

Resources Needed: Funding for protection or acquisition of property, for staffing, and for the Forest Stewardship program.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.3.1: Collaborate with other natural resource organizations to identify and conserve high quality forest ecosystems and landscapes.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1	State Forests	SC DNR	Conserve Working Forests	OA 6,7,8
2.2	Forest Management	USDA Forest Service		CWF 1, 4, 11
3.4, 3.5	Forest Legacy (DNR)	Natural Resource Associations		
	Forest Stewardship	SC Forestry Association		
		Tree Farm		

Strategy 2.3.2: Actively seek out grants, federal funds and other income sources to expand the state forest system, with the primary goal of acquiring tracts contiguous to existing properties.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	State Forests	General Assembly	Conserve Working Forests	CWF 4,11
3.4, 3.5	Forest Legacy (DNR)	USDA Forest Service		OA 6, 8
		Conservation Organizations		
		Natural Resource Associations		
		Conservation Bank		
		SC DNR		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.3.3: Utilize Stewardship Contracting and Agreement Authorities in collaboration with the USDA Forest Service to benefit landscape scale ecosystem restoration projects on both public and private lands near federal lands.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Management	USDA Forest Service	Conserve Working Forests	CWF 3, 4, 5, 6, 11
3.1, 3.4, 3.5, 3.7	State Forests	Federal Land Mgt. Agencies		OA 12
	Forest Stewardship	State Land Mgt. Agencies		
		Conservation Organizations		

Objective 2.4: Promote informed management of public and private forestland in South Carolina.

Outcome and Performance Measures: Desired outcome is greater informed management as indicated by the number of forest management plans written (number), implementation of Forest Stewardship Plans (%), implementation of Forest Stewardship Plans in priority areas (acres), number of landowners assisted (number), acres assisted on other state lands (acres), number of consultant-written plans (Forest Stewardship) (number), number of Memorandum of Understandings with other agencies (number), number of referrals to consulting foresters (number), number of current plans (Forest Stewardship and FRP) (number), and number of landowners that indicated on seedling survey that they worked with a SC Forestry Commission forester (%).

Resources Needed: Funding for program development, outreach, and staffing. Technology transfer.

Strategy 2.4.1: Utilize the Stewardship program to deliver comprehensive management plans to all landowners with multiple natural resource management objectives.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1	Forest Management	Tree Farm	Conserve Working Forests	CWF 3, 4, 11
2.2	Forest Stewardship	USDA Forest Service		
3.4, 3.5		SC DNR		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.4.2: Provide special services, for a fee, that are not sufficiently provided by the private sector, such as prescribed burning, firebreak plowing, and water bar construction.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Fire Management	Forest Landowners	Conserve Working Forests	CWF 3, 4, 10
2.2	Forest Management	SC Forestry Association		PF 5, 10
		Association of Consulting Foresters		
		TIMOs and REITs		

Strategy 2.4.3: Actively seek partnerships that increase the number of sources for reforestation assistance and the funding available for forestry practices.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Management	USDA Forest Service	Conserve Working Forests	CWF 3, 4, 5, 6
3.6	Forest Renewal Program	NRCS		
	Forest Stewardship	Forest Industry		
		SC Forestry Association		
		FSA		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.4.4: Provide technical assistance to landowners to promote informed management of private forestland in South Carolina.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Forest Management	Forest Landowners	Conserve Working Forests	CWF 1, 3, 4, 5, 6, 11
2.1, 2.2	Forest Stewardship	Forest Industry		EB 10, 11, 12
3.3, 3.4, 3.5, 3.7		SC Forestry Association		
		SC DNR		
		Natural Resource Associations		

Strategy 2.4.5: Provide forest management assistance to public entities that hold forested lands.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Forest Management	SC DNR	Conserve Working Forests	CWF 1, 3, 4, 5, 6, 11
2.1, 2.2	Forest Stewardship	SC Department of Corrections		
3.3, 3.4, 3.5, 3.7	State Lands	SC Park Service		
		State Land Mgt. Agencies		

Strategy 2.4.6: Stay current with new management techniques and methods of forest management to ensure delivery of the best possible advice.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Forest Management	SC DNR	Conserve Working Forests	CWF 1, 3, 4, 5, 6, 11
2.1, 2.2	Forest Stewardship	SC Department of Corrections		
3.3, 3.4, 3.5, 3.7		SC Park Service		
		State Land Mgt. Agencies		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.4.7: Develop and maintain effective partnerships with organizations, agencies, and private consultants to collaboratively provide forest management information and services.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Forest Management	SC DNR	Conserve Working Forests	CWF 1, 3, 4, 5, 6, 11
2.1, 2.2	Forest Stewardship	SC Dept. of Corrections		
3.3, 3.4, 3.5, 3.7		SC Park Service		
		State Land Mgt. Agencies		
		Association of Consulting Foresters		

Objective 2.5: Provide landowners with optimum quality forest tree seedlings to meet needs not filled by the private sector.

Outcomes and Performance Measures: Desired outcomes are customers satisfied with the product (percent satisfaction of customers that self-report), revenues meet or exceed costs (over 5-year period), and Performance Rating System (PRS) comparable with that available from other sources.

Resources Needed: Funding and staffing to enable the SC Forestry Commission to re-join the NC State Tree Improvement Cooperative as full members.

Strategy 2.5.1: Partner with nursery and tree improvement organizations to maintain access to technical expertise, high value plant material, and funding sources.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Tree Improvement	Forest Landowners	Conserve Working Forests	CWF 1, 3, 4, 5
3.4, 3.7	Nursery	TIMOs and REITs		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.5.2: Provide the best available forest tree seedlings through self-sustaining nursery operations.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Tree Improvement	Forest Landowners	Conserve Working Forests	CWF 1, 3, 4, 5
3.4, 3.7	Nursery	TIMOs and REITs		

Objective 2.6: Enhance the image of the Forestry Commission as an initial source for forest management information and assistance in South Carolina.

Outcome and Performance Measures: Desired outcome is increased public awareness of the SC Forestry Commission as measured by the number of people surveyed (percent of respondents).

Resources Needed: Funding for staff positions in Information & Education program area, space on a server for internet applications, and for materials and advertising.

Strategy 2.6.1: Develop creative approaches to reaching landowners and explore diverse methods for marketing the agency's programs and promoting services to new audiences.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.3, 3.6	Information & Education	Clemson Extension Service	Conserve Working Forests	OA 1, 2, 6, 7, 8
	Community Forestry	SC Forestry Association		CWF 3
	State Forests	Conservation Organizations		
	Forest Stewardship	Natural Resource Associations		
	Forest Management	USDA Forest Service		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 2.6.2: Improve, maintain, and continually update the Forestry Commission website to communicate effectively to the public.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.3, 3.6	all program areas (Information & Education is lead)	Clemson Extension Service	Conserve Working Forests	OA 1, 2, 6, 7, 8
		SC Forestry Association		CWF 3
		Conservation Organizations		
		Natural Resource Associations		
		USDA Forest Service		



Protecting South Carolina's Forests from Harm

Prescribed Burning

Forest managers in South Carolina conduct prescribed burns on about 525,000 acres each year. Experts agree that nearly twice this amount needs to receive this treatment, but obstacles such as smoke management and liability concerns, fragmentation of forest land, and changing attitudes about prescribed burning make increasing the amount of acreage burned a major challenge.

Wildfire Risk

Nearly 3,000 wildfires occur each year in South Carolina, two-thirds of which originate from escaped debris burns or are deliberately set. With the growth in the state's population, more and more of these fires damage not only timber and wildlife habitat, but also homes and other structures.

Forest Health Threats

The threats to the health of the forests in South Carolina include native, non-native but naturalized, and non-native plants, diseases, and insects. The three most significant threats to South Carolina's forests currently are southern pine beetle, Sirex wood wasp, and cogongrass. They are important because of their potential economic, aesthetic, and ecological impacts.

Goal: *Protect South Carolina's forests from threats such as wildfires, insect and disease attacks, and invasive species.*

Objective 3.1: Ensure prompt and effective response to wildfires and other natural disasters.

Performance Measures: Desired outcome is a positive five-year trend in each of the following metrics: 1) Decreased fire size as measured by the mean number of acres burned; 2) Reduced response time to fires as measured from the time a call is received to the time a suppression unit is on-site; and 3) Reduced relative fire size as compared to the mean fire size in the Southeast.

Resources Needed: Equipment and personnel needed to maintain a 170-unit operating force; upgraded radios for dispatch.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.1.1: Serve as a primary point of contact for 9-1-1 centers, fire departments, and the public. Forestry Commission dispatch operations will be current with technology, equipment, and staffing to support the agency's statewide fire dispatch, smoke management, and emergency communication roles.

National Objectives Supported (see Appendix 4)	SCFC Program Areas	Stakeholders (see Appendix 5)	Priority Areas	Key Findings Supported (see Appendix 6)
2.1	Fire Management	Fire Service	Wildfire Risk	PF 1,2,3,4,5, 6, 7, 8
	Training & Safety	SC EMD		
	Information Technology	SC DHEC		
		County 911 Centers		

Strategy 3.1.2: Increase emphasis on training Forestry Commission personnel and cooperators in the Incident Command System (ICS) and general wildfire suppression tactics. Seek out non-fire and additional opportunities to use ICS and complete task books.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1	Fire Management	USDA Forest Service	Wildfire Risk	PF 1,2,3,4,5,7,9
	Training & Safety	Forest Industry		
	Information Technology	State Land Management Agencies		
		TMOs and REITs		
		US Fish and Wildlife Service		

Strategy 3.1.3: Cooperate with Emergency Management Division, fire departments, and other emergency response organizations. Explore opportunities to train and utilize private and/or non traditional cooperators.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1	Fire Management	Fire Service	Wildfire Risk	PF 1,2,3,4,5,7,9
3.3	Training & Safety	SC Emergency Management Division		
	Information Technology	SC DHEC		
		S.C. Fire Marshall's Office		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.1.4: Evaluate staffing, equipment and technology to ensure adequate response to all wildfires and other disasters within the scope of the SC Forestry Commission's mission.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1	Fire Management	USDA Forest Service	Wildfire Risk	PF 1,2,3,4,5,7,9
3.3	Training & Safety	SC Emergency Management Division		
	Information & Education			
	Information Technology			

Objective 3.2: Evaluate and develop wildfire protection strategies, priorities and capabilities as urban development into forested areas creates additional hazards.

Performance Measures: Desired outcome is a positive five-year trend in each of the following metrics: 1) reduction in the number of structures lost to wildfire; 2) increase in the number of FireWise communities; 3) increase in the number of CWPPs; 4) increase in the number of local fire departments that have received wildfire training; and 5) evidence of cooperative agreements with non-traditional partners.

Resources Needed: Funding for personnel to conduct assessments, design plans and deliver training; and equipment that would allow for low impact fire suppression.

Strategy 3.2.1: Redefine and strengthen the cooperative relationship with local fire departments as urban developments expand into forested areas.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1, 3.3	Fire Management	Fire Service	Wildfire Risk	OA 5
	Community Forestry	SC U&CF Council	Community Forestry	PF 1,2,3,4,5,6,7,8
		Local Governments		
		SC Fire Marshall's Office		
		Local Fire Departments		
		Homeowners Associations		
		Private Landowners		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.2.2: Implement low-impact suppression techniques where applicable.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1	Fire Management	USDA Forest Service	Wildfire Risk	OA 5
3.3	Community Forestry	SC U&CF Council	Community Forestry	PF 1,2,3,4,5,6,7,8
		US Fish and Wildlife Service		
		SC DNR		
		Natural Resource Organizations		
		Local Fire Departments		

Strategy 3.2.3: Incorporate a FireWise approach to wildland urban interface areas by identifying communities at risk through hazard assessment, developing wildfire protection plans for communities, developing education/awareness efforts for communities, and developing fuel management strategies.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1	Fire Management	SC State Fire Chief's Assoc.	Wildfire Risk	OA 5
3.3	Community Forestry	USDA Forest Service	Community Forestry	PF 1,2,3,4,5,6,7,8
	Information & Education	SC Urban & Community Council		
		US Fish and Wildlife Service		
		SC DNR		
		Local Governments		
		Developers		
		American Planning Association		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.2.4: Continue to promote fire prevention and emphasize wildfire prevention through the deployment of fire prevention teams during Fire Prevention Week and periods of high wildfire occurrence.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1	Fire Management	USDA Forest Service	Wildfire Risk	OA 5
3.3	Community Forestry	Fire Service	Community Forestry	PF 1,2,3,4,5,6,7,8
	Information and Education	SC U&CF Council		
		Local Fire Departments		
		US Fish and Wildlife Service		

Strategy 3.2.5: Seek out non-traditional partners who may provide assistance with changing fire protection issues.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.1	Fire Management	USDA Forest Service	Wildfire Risk	OA 5
3.3	Community Forestry	Fire Service	Community Forestry	PF 1,2,3,4,5,6,7,8
		SC DHEC		
		SC U&CF Council		
		SC DNR		
		Natural Resource Associations		



Strategy 3.2.6: Promote prescribed burning to restore fire-adapted lands to reduce the risk of wildfire impacts.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	USDA Forest Service	Wildfire Risk	CWF 11
2.1	Forest Management	SC DNR	Conserve Working Forests	PF 1, 2, 3, 4, 5, 9, 10
3.3, 3.5, 3.6, 3.7	Forest Stewardship	Forest Industry		OA 5, 10
		State Land Mgt. Agencies		EB 8
		Natural Resource Associations		
		TMOs and REITs		
		Prescribed Fire Council		
		Conservation Organizations		
		DHEC		

Objective 3.3: Lead in law enforcement services in wildfire and forest product theft and fraud arenas.

Performance Measures: Desired outcome is a positive five-year trend in each of the following metrics: 1) an increase in the number of successful prosecutions as measured by the percent of successful/total prosecutions; and 2) the number of certified officers.

Resources Needed: Funding to maintain an adequate-sized law enforcement staff and improved technology for investigations.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.3.1: Provide forest product theft awareness and prevention training to SCFC personnel, landowners, and cooperators.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Law Enforcement	Forest Landowners	Conserve Working Forests	CWF 3, 6
2.1	Forest Management	SC Forestry Association		OA 2
3.4, 3.5, 3.7	Information & Education	Clemson Extension Service		
	Training & Safety	Forest Industry		
		TMOs and REITs		

Strategy 3.3.2: Develop and enforce a standardized procedures manual for field investigation and prosecution of cases involving violations of burning, timber theft, or other laws.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Law Enforcement	SC Criminal Justice Academy	Conserve Working Forests	PF 1,2,3,4,5
2.1	Fire Management	SLED	Wildfire Risk	CWF 3,6,7,8
3.4	Information & Education	SC Forestry Association		
		SC Timber Producers Association		
		Local Law Enforcement Organizations		
		US Forest Service		

Strategy 3.3.3: Continue to implement a Class 1 Certification Program for SC Forestry Commission officers and investigators.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Law Enforcement	SC Criminal Justice Academy	Conserve Working Forests	PF 1,2,3,4,5
2.1	Fire Management	SLED	Wildfire Risk	CWF 3,6,7,8
3.4				



Strategy 3.3.4: Review law enforcement officer staffing levels and adjust accordingly.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Law Enforcement	SC Criminal Justice Academy	Conserve Working Forests	PF 1,2,3,4,5
2.1	Fire Management	SLED	Wildfire Risk	CWF 3,6,7,8
3.4				

Objective 3.4: Detect, identify, and respond promptly to forest pests (insects, diseases, non-native plants, and invasive species).

Outcomes and Performance Measures: Desired outcome is a positive five-year trend in each of the following metrics: 1) early detection and rapid response to forest pest problems as measured by evidence that all pests identified as major or moderate threats or Early Detection Rapid Response (EDRR) in the assessment are identified as appropriate; 2) number of workshops conducted, number of educational materials distributed, and positive responses to participant surveys (how useful they have found information); and 3) response time from the time at which Forest Health Section is notified or detects a forest pest until a recommendation is made.

Resources Needed: Cooperators, projects with other agencies in South Carolina, funding for personnel and equipment, technology to assist with data collection and analysis.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.4.1: Provide education and training to agency foresters, technicians, and cooperators (consulting foresters, industry foresters, federal agencies in combination with USFS, other state agencies, (PRT, DNR, DOT, for example), and other organizations) on survey techniques, identification and control of forest pests, and integrated pest management.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Health	USDA Forest Service	Threats to Forest Health	OA 10, 12
2.2	Forest Management	SC DNR	Conserve Working Forests	EB 8,9,10,11,12,13
3.4, 3.5, 3.7	State Forests	State Land Mgt. Agencies	Community Forestry	CWF 3,6,7,8,11
	Community Forestry	Clemson Extension Service		
	Training & Safety	Association of Consulting Foresters		
		Forest Industry		
		SC Forestry Association		
		Federal Land Mgt. Agencies		
		TMOs and REITs		
		USDA APHIS		
		Clemson DPI		

Strategy 3.4.2: Conduct continuous monitoring of forest pests (insects, diseases, non-native plants, and invasive species).

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Health	USDA Forest Service	Threats to Forest Health	OA 10, 12
2.2	Forest Management	USDA APHIS	Conserve Working Forests	EB 8,9,10,11,12,13
3.4, 3.5, 3.7	State Forests	State Land Mgt. Agencies	Community Forestry	CWF 3,6,7,8,11
	Community Forestry	Federal Land Mgt. Agencies		
		TMOs and REITs		
		Clemson DPI		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.4.3: Provide detailed field or lab evaluation of specific forest pest problems for use by land managers. Partner with federal, state, local, and private organizations on issues of mutual interest.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Health	Clemson University	Threats to Forest Health	OA 10, 12
2.2	Forest Management	Forest Landowners	Conserve Working Forests	EB 8,9,10,11,12,13
3.4, 3.5, 3.7	State Forests	Forest Industry	Community Forestry	CWF 3,6,7,8,11
	Community Forestry	State Land Mgt. Agencies		
		TMOs and REITs		
		USDA APHIS		
		Clemson DPI		

Strategy 3.4.4: Enhance staffing, technology and equipment to combat forest pest problems on a timely basis and as required by state law.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Health	Clemson University	Threats to Forest Health	OA 10, 12
2.2	Forest Management	Forest Landowners	Conserve Working Forests	EB 8,9,10,11,12,13
3.4, 3.5, 3.7	State Forests	Forest Industry	Community Forestry	CWF 3,6,7,8,11
	Community Forestry	State Land Mgt. Agencies		
		TMOs and REITs		
		USDA APHIS		
		Clemson DPI		



South Carolina's Statewide Forest Resource Assessment and Strategy

Objective 3.5: Promote the responsible use of prescribed fire.

Performance Measures: Desired outcome is a positive five-year trend in each of the following metrics: 1) an increase in the number of acres burned using prescribed burning; 2) an increase in the number of certified prescribed fire managers; 3) an improved climate for prescribed burning as evidenced by fewer legal restrictions.

Resources Needed: Improved smoke management models; the availability of affordable liability insurance; and personnel and equipment to conduct prescribed burns.

Strategy 3.5.1: Continue to implement and educate the public regarding smoke management guidelines.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC DHEC	Wildfire Risk	OA 6,7
2.1, 2.2	Information Technology	USDA Forest Service	Conserve Working Forests	EB 8
3.2, 3.3, 3.4, 3.5, 3.7		Department of Defense	Threats to Forest Health	CWF 9,10
		US Fish and Wildlife Service	Community Forestry	PF 1,2,3,4,5,10,11

Strategy 3.5.2: Continue to monitor and research smoke management guidelines to maintain air quality standards.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC DHEC	Wildfire Risk	OA 6,7
2.1, 2.2	Information Technology	USDA Forest Service	Conserve Working Forests	EB 8
3.2, 3.3, 3.4, 3.5, 3.7		Clemson University		CWF 9,10
		US Fish and Wildlife Service		PF 1,2,3,4,5,10,11
		Department of Defense		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.5.3: Maintain an active leadership role on the SC Prescribed Fire Council.				
National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC Prescribed Fire Council	Wildfire Risk	OA 6,7
2.1, 2.2		Forest Landowners	Conserve Working Forests	EB 8
3.2, 3.3, 3.4, 3.5, 3.7		SC DNR	Threats to Forest Health	CWF 9,10
		TIMOs and REITs		PF 1,2,3,4,5,10,11
		State Land Mgt. Agencies		
		Federal Land Mgt. Agencies		
		Clemson University		

Strategy 3.5.4: Examine regulations and liability issues concerning prescribed burning and seek solutions that will provide for public safety while promoting prescribed burning.				
National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC Prescribed Fire Council	Wildfire Risk	OA 6,7
2.1, 2.2	Community Forestry	Forest Landowners	Conserve Working Forests	EB 8
3.2, 3.3, 3.4, 3.5, 3.7		SC DNR	Threats to Forest Health	CWF 9,10
		TIMOs and REITs	Community Forestry	PF 1,2,3,4,5,10,11
		State Land Mgt. Agencies		
		Federal Land Mgt. Agencies		
		General Assembly		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 3.5.5: Develop a method for prioritization of prescribed burning in order to effectively utilize resources to accomplish prescribed burning goals.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC Prescribed Fire Council	Wildfire Risk	
2.1	Forest Management	Forest Landowners	Conserve Working Forests	
3.3, 3.5	Community Forestry	SC DNR	Community Forestry	
	Forest Stewardship	TIMOs and REITs		
		State Land Mgt. Agencies		
		Federal Land Mgt. Agencies		

Strategy 3.5.6: Restore fire adapted lands and/or reduce risk of wildfire impacts by encouraging the increased use of prescribed burning.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC Prescribed Fire Council	Wildfire Risk	OA 6,7
2.1, 2.2	Forest Management	Forest Landowners	Conserve Working Forests	EB 8
3.2, 3.3, 3.4, 3.5, 3.7	Community Forestry	SC DNR	Threats to Forest Health	CWF 9,10
	Forest Stewardship	TIMOs and REITs	Community Forestry	PF 1,2,3,4,5,10,11
		State Land Mgt. Agencies		
		Federal Land Mgt. Agencies		



Enhancing the Benefits of South Carolina's Trees and Forests

Water Quality and Quantity

Surface water that is free from pollutants and sediment and provides habitat requirements for wildlife is considered to be of high quality. Forestry operations generally have little detrimental effect on water quality. Nevertheless, the South Carolina Forestry Commission, cooperating with the South Carolina Department of Health and Environmental Control, aggressively promotes adherence to Best Management Practices. South Carolina has an abundant supply of freshwater, but is not immune to water quantity issues as evidenced by recent legal action involving neighboring states.

Stormwater Management

Impervious surfaces such as roads, roofs, driveways, streets, and parking lots increase not only stormwater volume, but also the rate of flow. Maintenance and expansion of urban canopy cover is an effective tool that can be used to reduce the impacts of stormwater runoff.

Air Quality

South Carolina's forests play a major role in filtering the air of pollutants such as ozone and particulate matter. In addition, trees sequester carbon dioxide and emit oxygen through the process of photosynthesis.

Community Forests in South Carolina

Trees are major capital assets in communities. The quantity, placement and size of trees in populated places can positively impact and provide millions of dollars in savings regarding energy conservation, air filtration, stormwater runoff mitigation, and carbon dioxide sequestration.

Goal: *Enhance the environmental and public benefits of South Carolina's trees and forests such as water quality and quantity, stormwater management, air quality, and community forest benefits.*

Objective 4.1: Enhance water quality protection by increasing awareness and compliance with South Carolina Best Management Practices for Forestry (BMPs).

Performance Measures: Desired outcome is increased awareness and compliance with BMPs as shown by training participation, courtesy exam requests, requests for assistance, and continued high level of compliance as evidenced by monitoring.

Resources Needed: Adequate staffing to carry out program implementation, funding for aerial detection, and funding for field equipment.



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 4.1.1: Improve delivery of pre-harvest planning and BMP recommendations through the Courtesy Exam Program to protect water quality and site productivity during forestry operations.

National Objectives Supported (see Appendix 4)	SCFC Program Areas	Stakeholders (see Appendix 5)	Priority Areas	Key Findings Supported (see Appendix 6)
1.2	Water Quality	Conservation Organizations	Water Quality & Quantity	EB 1, 2, 3, 4
3.1, 3.4		Professional Organizations		

Strategy 4.1.2: Provide classroom and field BMP training for forestry contractors, private landowners, industry, SCFC employees, and other agencies through the Timber Operations Professional (TOP) training program, in cooperation with industry and through SCFC workshops.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Water Quality	Forest Industry	Water Quality & Quantity	EB 1, 2, 3, 4
3.1, 3.4	Training & Safety	SC Forestry Association		
		Contractors		
		Forest Landowners		
		TIMOs and REITs		

Strategy 4.1.3: Encourage contractors to include BMP compliance statements in their contracts.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Water Quality	Contractors	Water Quality & Quantity	EB 1, 2, 3, 4
3.1, 3.4				



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 4.1.4: Work with SC Forestry Association, Association of Consulting Foresters, Clemson University, SC Department of Health and Environmental Control, SC Timber Producers Association, county landowners associations, and other organizations to encourage landowners, loggers, foresters, and contractors to request courtesy BMP examinations.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Water Quality	SC Forestry Association	Water Quality & Quantity	EB 1, 2, 3, 4
3.1, 3.4		Professional Organizations		
		Clemson University		
		SC DHEC		
		Forest Landowners		
		SC Timber Producers Association		

Strategy 4.1.5: Continue BMP monitoring to document success and provide opportunities for education of landowners, loggers, and forestry professionals.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Water Quality	SC Forestry Association	Water Quality & Quantity	EB 1, 2, 3, 4
3.1, 3.4		Contractors		
		Professional Organizations		
		Forest Landowners		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 4.1.6: Respond to BMP complaints and provide technical expertise to appropriate enforcement agencies.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Water Quality	SC DHEC	Water Quality & Quantity	EB 1, 2, 3, 4
3.1, 3.4		Army Corps of Engineers		

Strategy 4.1.7: Periodically review Best Management Practices (BMP) guidelines and update as needed to better protect water quality.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.2	Water Quality	Professional Organizations	Water Quality & Quantity	EB 1, 2, 3, 4
3.1, 3.4		SC DHEC		
		Army Corps of Engineers		

Strategy 4.1.8: Update cooperative agreements with state and federal regulatory agencies, forest industry, and private organizations to protect environmental functions.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
2.2	Water Quality	SC DHEC	Water Quality & Quantity	EB 1, 2, 3, 4, 6, 7
3.1, 3.2		Army Corps of Engineers		
		Forest Industry		
		TIMOs and REITs		
		Conservation Organizations		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 4.1.9: Provide pre-harvest planning and technical assistance to forest landowners and forestry professionals on implementation of BMPs.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.1	Water Quality	SC DHEC	Water Quality & Quantity	EB 1, 2, 3, 4
	Forest Management	SC Forestry Association		OA 6, 7
	Forest Stewardship	Clemson Extension Service		

Objective 4.2: Provide technical, educational, and financial assistance in community forestry to local governments and organized groups living and working within established, developing, and populated areas.

Performance Measures: Desired outcome is a sustained capacity for communities of place and communities of people to actively manage and care for trees and associated vegetation as measured by professional staff, tree/natural resource inventory information and management plans, skilled and knowledgeable workers, recurring funding, tree management and conservation policies, and advocacy groups.

Resources Needed: Adequate and qualified staffing to provide state-wide assistance, funding for cost-share grant programs, and logistical and administrative support to implement program components.

Strategy 4.2.1: Meet with local government personnel, advocacy groups, professional organizations and natural resource associations to provide technical assistance in the development and management of sustainable community tree/forest programs.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.4, 3.6, 3.7	Community Forestry	Local Governments	Community Forestry	OA 4, 6
	Forest Health	SC U&CF Council		CWF 2, 9,10
		Councils of Government		EB 1, 9, 10, 11, 12, 13, 14, 15
		Professional Organizations		
		Natural Resource Associations		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 4.2.2: Develop and/or acquire tools to facilitate technical, educational and financial assists and services.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.4, 3.6, 3.7	Community Forestry	Local Governments	Community Forestry	OA 4, 6
	Information & Education	SC U&CF Council		CWF 2, 9,10
		Councils of Government		EB 1, 9, 10, 11, 12, 13, 14
		Professional Organizations		
		Natural Resource Associations		

Strategy 4.2.3: Administer the community forestry cost-share grant program as available and provide information on other available sources of grants and funding to assist in the development and management of sustainable community tree/forest programs.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.4, 3.6, 3.7	Community Forestry	Local Governments	Community Forestry	OA 4, 6
	Information & Education	SC U&CF Council		CWF 2, 9,10
		Councils of Government		EB 9, 10, 11, 12, 13, 14, 15
		Professional Organizations		
		Natural Resource Associations		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 4.2.4: Conduct on-site programs, provide literature and website information, and work through partners to sponsor / present information regarding arboriculture, community forestry issues, and the value of ecosystem services and environmental benefits of trees to targeted audiences.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.4, 3.6, 3.7	Community Forestry	Local Governments	Community Forestry	OA 2, 4, 6, 8, 12
	Information & Education	SC U&CF Council		CWF 1, 2, 6, 9,10
		Councils of Government		EB 1, 9, 10, 11, 12, 13, 14, 15
		Professional Organizations		
		Natural Resource Associations		

Strategy 4.2.5: Work with local, regional, and state partners on issues where trees and forests can help address common objectives such as energy conservation, green infrastructure implementation, storm planning and mitigation, economic development, air quality, and stormwater management.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.4, 3.6, 3.7	Community Forestry	Local Governments	Community Forestry	OA 1, 2, 3, 4, 6, 7, 8, 12
	State Forests	SC U&CF Council		CWF 1, 2, 4, 6, 9,10
	Forest Management	Councils of Government		EB 1, 9, 10, 11, 12, 13, 14, 15
	Forest Stewardship	Professional Organizations		PF 2, 3
		Natural Resource Associations		



South Carolina's Statewide Forest Resource Assessment and Strategy

Strategy 4.2.6: Offer expertise to other SC Forestry Commission program areas and support opportunities for professional development and technical skill enhancement of agency foresters regarding arboriculture and/or community forestry issues and involve them in local forestry issues within their assigned areas.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.4, 3.6, 3.7	Community Forestry	Local Governments	Community Forestry	OA 2, 4, 6, 8, 12
	State Forests	SC U&CF Council		CWF 1, 2, 6, 9,10
	Forest Management	Councils of Government		EB 1, 9, 10, 11, 12, 13, 14, 15
	Forest Stewardship	Professional Organizations		
		Natural Resource Associations		

Objective 4.3: Enhance air quality by actively managing smoke from prescribed burns and wildfires and by maintaining a healthy forest cover that increases air filtration, temperature reduction, and energy efficiency.

Performance Measures: Desired outcome is a reduction in the number of smoke-related complaints, increased participation in the SC Forestry Commission's burning notification program, increased amount of acres prescribed burned, and participation in reforestation and urban tree programs.

Resources Needed: Funding for community forestry program grants, adequate staffing in applicable SCFC program areas, MOU's and viable working relationships with DHEC and other organizations, and logistical and administrative support.

Strategy 4.3.1: Continue to monitor and research smoke management guidelines to maintain air quality standards. (duplicate of 3.5.2)

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC DHEC	Wildfire Risk	OA 6,7
2.1, 2.2	Information Technology	USDA Forest Service	Conserve Working Forests	EB 8
3.2, 3.3, 3.4, 3.5, 3.7		Clemson University		CWF 9,10
		US Fish and Wildlife Service		PF 1,2,3,4,5,10,11
		Department of Defense		



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Strategy 4.3.2: Include air quality measures from other agencies into SC Forestry Commission burn advisories.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
3.2, 3.6, 3.7	Fire Management	SC DHEC	Wildfire Risk	EB 8
	Information Technology	USDA Forest Service	Conserve Working Forests	CWF 9,10
				PF 1,2,3,4,5,10

Strategy 4.3.3: Promote prescribed burning and fuel load reduction to reduce potential air quality impacts from wildfires.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Fire Management	SC DHEC	Wildfire Risk	OA 6,7
2.1, 2.2	Forest Management	USDA Forest Service	Conserve Working Forests	EB 8
3.2, 3.3, 3.4, 3.5, 3.7	Information & Education	SC Prescribed Fire Council		CWF 9,10
	Forest Stewardship	SC Forestry Association		PF 1,2,3,4,5,10

Strategy 4.3.4: Promote healthy forest cover to increase air filtration, temperature reduction, and energy efficiency.

National Objectives Supported	SCFC Program Areas	Stakeholders	Priority Areas	Key Findings Supported
1.1, 1.2	Forest Management	SC Forestry Association	Conserve Working Forests	OA 7, 10, 12
2.2	Community Forestry	Clemson Extension Service	Community Forestry	CWF 2, 3, 4, 8
3.2, 3.4, 3.5, 3.6, 3.7	Information & Education	USDA Forest Service		PF 3
	Forest Stewardship	SC U&CF Council		EB 6, 7, 9, 10, 11, 12, 13, 14



SC Forestry Commission Programs

Rural Forestry Assistance and Forest Stewardship

Rural Forestry Assistance and the Forest Stewardship Program were established by the Cooperative Forestry Assistance Act of 1978. Rural Forestry Assistance establishes a cooperative program between USDA and States to provide technical information, advice, and related assistance to private landowners and other entities within the forest management community to encourage conservation and management of non-Federal forests. The Forest Stewardship Program focuses specifically on nonindustrial private forest lands by assisting owners of these lands to more actively manage their forests for multiple uses and values based on a Forest Stewardship Plan and using available expertise and assistance. Grant funds are made available to South Carolina Forestry Commission under the legislative authority of the Cooperative Forestry Assistance Act of 1978 (as amended) and various appropriation acts.

Priority Area: Conserve Working Forests

Objectives and Strategies

- Objective 1.1 -- Strategy 1.1.2
- Objective 1.2 -- Strategies 1.2.1, 1.2.2, 1.2.3
- Objective 1.3 -- Strategies 1.3.1, 1.3.2
- Objective 1.4 -- Strategies 1.4.1, 1.4.2, 1.4.3, 1.4.4
- Objective 1.5 -- Strategies 1.5.1, 1.5.2, 1.5.5
- Objective 2.1 -- Strategies 2.1.4, 2.1.5, 2.1.6, 2.1.7, 2.1.9
- Objective 2.3 -- Strategies 2.3.1, 2.3.3
- Objective 2.4 -- Strategies 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5, 2.4.6, 2.4.7
- Objective 2.6 -- Strategies 2.6.1, 2.6.2
- Objective 3.2 -- Strategy 3.2.6
- Objective 3.3 -- Strategy 3.3.1
- Objective 3.4 -- Strategies 3.4.1, 3.4.2, 3.4.3, 3.4.4
- Objective 3.5 -- Strategies 3.5.5, 3.5.6
- Objective 4.1 -- Strategy 4.1.9
- Objective 4.2 -- Strategies 4.2.5, 4.2.6
- Objective 4.3 -- Strategies 4.3.3, 4.3.4

Performance Measures

Desired outcome is greater informed management as indicated by the number of forest management plans written (number), implementation of Forest Stewardship Plans (%), implementation of Forest Stewardship Plans in priority areas (acres), number of landowners assisted (number), acres assisted on other state lands (acres), number of consultant-written plans (Forest Stewardship) (number), number of Memorandum of Understandings with other agencies (number), number of referrals to consulting foresters (number), number of current plans (Forest Stewardship and FRP) (number), and number of landowners that indicated on seedling survey that they worked with a SC Forestry Commission forester (%).

Resources Needed

Funding for program development, outreach, and staffing. Technology transfer.



Nursery and Tree Improvement

The South Carolina Forestry Commission operates two Nursery & Tree Improvement (N&TI) facilities: Taylor Nursery in Edgefield County and Niederhof Forestry Center in Jasper County. The goal of the N&TI Program is to provide landowners with the highest-quality seed and seedlings available for timber production, wildlife habitat improvement, Christmas tree production, and restoration of valuable forested ecosystems. Taylor Nursery has the capacity of growing 20-25 million Bareroot seedlings and 2.5 million containerized seedlings. Niederhof Forestry Center has over 130 acres of second generation loblolly pine orchards and 25 acres of third generation loblolly pine orchards. Longleaf orchard expansion will increase the availability of elite longleaf seedlings for forest landowners. The N&TI program conducts a customer satisfaction survey annually as a means of tracking performance improvement.

Priority Area: Conserve Working Forests

Objectives and Strategies

- Objective 1.2 -- Strategy 1.2.1
- Objective 1.5 -- Strategy 1.5.1
- Objective 2.1 -- Strategy 2.1.9
- Objective 2.5 -- Strategies 2.5.1, 2.5.2
- Objective 2.6 -- Strategy 2.6.2

Performance Measures

Desired outcomes are customers satisfied with the product (% satisfaction of customers that self-report), revenues meet or exceed costs (over 5-year period), and Performance Rating System (PRS) comparable with that available from other sources.

Resources Needed

Funding and staffing to enable the SC Forestry Commission to re-join the NC State Tree Improvement Cooperative as full members.

Resource Development

The goal of the Resource Development Program is to increase the contribution that forest resources, forest products, and forest product-related businesses make to South Carolina's economy. The agency accomplishes this goal by producing accurate and timely forest resource inventory data and working with existing and prospective companies in identifying opportunities for expansion.

Priority Area: Conserve Working Forests

Objectives and Strategies

- Objective 1.2 -- Strategy 1.2.1
- Objective 1.4 -- Strategies 1.4.1, 1.4.2, 1.4.3, 1.4.4
- Objective 2.1 -- Strategies 2.1.1, 2.1.2, 2.1.3, 2.1.6, 2.1.7, 2.1.8
- Objective 2.6 -- Strategy 2.6.2



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Performance Measures

Success is measured in the long-term sustainability of the forest resource, the amount of new capital investment in forestry-related business, and the number of jobs created through business expansion. Efforts are leveraged for more impact through partnerships that have been developed with state and local economic development organizations.

Resources Needed

Funding for marketing, program development, and outreach. Also, funding for additional staffing.

Forest Inventory and Analysis

The Forest Inventory and Analysis (FIA) program is a joint cooperative program with the USDA Forest Service in which the South Carolina Forestry Commission collects forest inventory data on a network of plot locations. The data collected is then furnished to the Forest Service for analysis on a statewide, as well as, on a national basis.

The Forest Inventory and Analysis section collects forest measurements on a network of 3,491 plots located throughout South Carolina. During this year, plots are measured in 20 percent increments of the total number of plots for mensurational, growth projections, damage assessments, and land use classification. The South Carolina Forestry Commission employs six full-time employees to collect data. One full-time coordinator oversees all measurement operations.

In addition, the Forest Inventory and Analysis program collects forest health data on a network of 204 FIA plot locations throughout the South Carolina. During the summer, 20 percent of the total plots are measured for mensurational, health, soil chemistry, lichens, and related parameters. In addition, separate bioindicator plot samples will be established or previously established locations will be used to detect the presence of ozone pollution.

Priority Area: Conserve Working Forests

Objectives and Strategies

- Objective 1.2 -- Strategy 1.2.1
- Objective 1.5 -- Strategy 1.5.5
- Objective 2.2 -- Strategies 2.2.1, 2.2.2, 2.2.3
- Objective 2.6 -- Strategy 2.6.2

Performance Measures

Desired outcome is meeting the required federal standards (completing 20% per year and meeting accuracy standards). Metric is accurate (80% accuracy) and timely (20% or more per year) data gathered in FIA and TPO (Timber Products Output) survey.

Resources Needed

Funding for three FIA crews for South Carolina and for support, equipment, and vehicles.



State Fire Assistance

The State Fire Assistance (SFA) Program is a component of the Cooperative Fire Protection Program and is authorized by Congress through the Cooperative Forestry Assistance Act of 1978, (PL 95-313 as amended). Funds are distributed to State Foresters based on recognition of the minimum need for all states to maintain and enhance coordination and communication with federal agencies. Funds provide financial assistance, technical training, and equipment to ensure Federal, State, and local fire agencies can deliver a coordinated response to wildfire.

The goal of the State Fire Assistance Program in South Carolina is to protect the state's communities, especially within the Wildland-Urban Interface, and timberland from significant loss of economic, ecological, or aesthetic value due to wildfire. This is in the spirit of the agency's mission of protecting and conserving the forestlands while preventing and suppressing wildfires. The emphasis is on improving fire planning, initial attack capabilities (primarily equipment and communications), knowledge and use of the Incident Command System, and wildfire technical training for local fire agencies.

Priority Area: Wildfire Risk

Objectives and Strategies

- Objective 1.1 -- Strategy 1.1.2
- Objective 1.2 -- Strategies 1.2.1, 1.2.2, 1.2.3
- Objective 1.4 -- Strategies 1.4.1, 1.4.2, 1.4.3, 1.4.4
- Objective 1.5 -- Strategies 1.5.3, 1.5.4
- Objective 2.1 -- Strategy 2.1.9
- Objective 2.4 -- Strategy 2.4.2
- Objective 2.6 -- Strategy 2.6.2
- Objective 3.1 -- Strategies 3.1.1, 3.1.2, 3.1.3, 3.1.4
- Objective 3.2 -- Strategies 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5, 3.2.6
- Objective 3.3 -- Strategies 3.3.2, 3.3.3, 3.3.4
- Objective 3.5 -- Strategies 3.5.1, 3.5.2, 3.5.3, 3.5.4, 3.5.5, 3.5.6
- Objective 4.3 -- Strategies 4.3.1, 4.3.2, 4.3.3

Performance Measures

Desired outcome is a positive five-year trend in each of the following metrics: 1) reduction in the number of structures lost to wildfire; 2) reduction in average fire size 3) increase in the number of hours of training conducted; 4) increase in the number of local fire departments that have received wildfire training; 5) evidence of cooperative agreements with non-traditional partners; and 6) decrease in the number of work time loss incidents per hundred fires.

Resources Needed

Funding for personnel to suppress wildfires as well wildfire suppression equipment.



National Fire Plan, State Fire Assistance

The National Fire Plan, State Fire Assistance (NFP-SFA) Program is a component of the Cooperative Fire Protection Program and is authorized by Congress through the Department of Interior and Related Agencies Appropriation. Funds are distributed to State Foresters based on recognition of the minimum need for all states to maintain and enhance coordination and communication with federal agencies. Fifty percent of these funds are to provide financial assistance for preparedness efforts; technical training and equipment to ensure Federal, State and local fire agencies can deliver a coordinated response to wildfire. The remaining fifty percent of these funds are to provide financial assistance to administer and implement wildfire hazard mitigation activities. Mitigation activities fall within the categories of:

- Fire prevention and education
- Community fire protection planning
- Wildfire hazard reduction treatments

The goal of the National Fire Plan, State Fire Assistance Program in South Carolina is to protect the state's communities and timberland from significant loss of economic, ecological, or aesthetic value due to wildfire and to reduce the threat to communities from the impacts of wildland fire. The emphasis is on improving fire prevention, community wildfire planning, and reducing wildfire risk through hazard reduction treatments.

Priority Area: Wildfire Risk

Objectives and Strategies

-- same as for State Fire Assistance above --

Performance Measures

Desired outcome is a positive five-year trend in each of the following metrics: 1) reduction in the number of structures lost to wildfire; 2) increase in the number of FireWise communities; 3) increase in the number of CWPPs; 4) increase in the number of local fire departments that have received wildfire training; and 5) evidence of cooperative agreements with non-traditional partners.

Resources Needed

Funding for personnel to conduct assessments, design plans, and deliver training.

Forest Health

Through the Forest Health Program, the SC Forestry Commission monitors, reports, and coordinates suppression of endemic pests affecting forest trees in South Carolina. The agency also works closely with Christmas tree growers, forest tree nurseries, seed orchards, and municipalities to manage forest health problems. It also operates a laboratory that provides free diagnosis of insects and diseases. The SC Forestry Commission maintains close working relations with the USDA Forest Service and other federal and state agencies such as Clemson University's Department of Plant Industries.

Priority Area: Threats to Forest Health



Objectives and Strategies

- Objective 1.2 -- Strategies 1.2.1, 1.2.3
- Objective 1.4 -- Strategies 1.4.1, 1.4.2, 1.4.3, 1.4.4
- Objective 1.5 -- Strategies 1.5.1, 1.5.2, 1.5.5
- Objective 2.1 -- Strategy 2.1.9
- Objective 2.2 -- Strategies 2.2.1, 2.2.2
- Objective 2.6 -- Strategy 2.6.2
- Objective 3.4 -- Strategies 3.4.1, 3.4.2, 3.4.3, 3.4.4
- Objective 4.2 -- Strategy 4.2.1

Performance Measures

Desired outcome is a positive five-year trend in each of the following metrics: 1) early detection and rapid response to forest pest problems as indicated by the prevention of new invasive species becoming established 2) number of workshops conducted, number of educational materials distributed, and positive responses to participant surveys (how useful they have found information); and 3) response time from the time at which Forest Health Section is notified or detects a forest pest until a recommendation is made.

Resources Needed

Cooperators, projects with other agencies in South Carolina, funding for personnel and equipment, technology to assist with data collection and analysis.

Water Quality (Best Management Practices)

The SC Forestry Commission coordinates a statewide Best Management Practices (BMP) Program for forestry-related activities. This program utilizes a proactive approach to help prevent non-point source pollution through offering voluntary courtesy BMP exams to forest landowners, foresters, and forestry operators. Specially trained Forestry BMP Specialists locate ongoing forestry operations through regular flights of high-priority watersheds, through voluntary notification, and through complaint calls. Courtesy BMP exams are offered to landowners, foresters, and forestry operators, providing them with site-specific recommendations regarding BMP implementation that can be included in timber sale contracts. After the forestry operation is completed, a final on-site inspection is conducted to determine if the appropriate BMPs were implemented on the site. On sites where damage has already occurred, recommendations for mitigating the damage are made. A monthly summary report of completed courtesy BMP exams is provided to DHEC and forest industry, indicating which forestry operators failed to implement the appropriate BMPs, resulting in a likely water quality impact. Forestry BMP Specialists conduct BMP training throughout the state, including the Timber Operating Professional (TOP Program) course.

Priority Area: Threats to Water Quality

Objectives and Strategies

- Objective 2.6 -- Strategy 2.6.2
- Objective 4.1 -- Strategies 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5, 4.1.6, 4.1.7, 4.1.8, 4.1.9



Performance Measures

Desired outcome is increased awareness and compliance with BMPs as shown by training participation, courtesy exam requests, requests for assistance, and continued high level of compliance as evidenced by monitoring.

Resources Needed

Adequate staffing to carry out program implementation, funding for aerial detection, and funding for field equipment.

Urban and Community Forestry Assistance

The Urban and Community Forestry Assistance (U&CF) program provides technical and financial assistance to local governments and others to plan urban forestry programs and to plant, protect, and improve urban forests and associated natural resources. The goal of the U&CF Assistance Program is to create, enhance and support long-term local, regional and statewide community forestry programs. The active management of trees, forests and greenspaces contributes to clean air and water and energy conservation, reduces the impact of urbanization, mitigates the heat island effect, and reduces risk of tree failure during catastrophic events, among other things.

The SC Forestry Commission will work with public and private partners to address and implement the issues and action items within the state's five-year strategic plan (revised in July 2006). Some of those strategies listed in the U&CF section of the plan include:

- Encourage those responsible for tree management within community settings to become certified under ISA's accreditation program.
- Encourage and assist county and municipal governments in the development of tree inventories, management plans and/or vegetation ordinances.
- Encourage opportunities for training and continuing education in arboriculture and community forestry.
- Promote the Tree City USA program and encourage interested communities to apply for Tree City status.

Priority Area: Community Forestry

Objectives and Strategies

- Objective 1.4 -- Strategies 1.4.1, 1.4.2, 1.4.3, 1.4.4
- Objective 1.5 -- Strategies 1.5.1, 1.5.2, 1.5.3, 1.5.5, 1.5.6
- Objective 2.6 -- Strategy 2.6.2
- Objective 3.2 -- Strategies 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5
- Objective 3.4 -- Strategies 3.4.1, 3.4.2, 3.4.3
- Objective 3.5 -- Strategies 3.5.4, 3.5.5, 3.5.6
- Objective 4.2 -- Strategies 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6
- Objective 4.3 -- Strategy 4.3.4



Performance Measures

Desired outcome is a sustained capacity for communities of place and communities of people to actively manage and care for trees and associated vegetation as measured by professional staff, tree/natural resource inventory information and management plans, skilled and knowledgeable workers, recurring funding, tree management and conservation policies, and advocacy groups.

Resources Needed

Adequate and qualified staff to provide state-wide assistance, funding for cost-share grant programs, and logistical and administrative support to implement program components.

State Lands

The State Lands Forest Management Program was created to provide professional forest management assistance to South Carolina state agencies that own timberlands. Through this program, SC Forestry Commission foresters write or approve management plans for state-owned land, approve and coordinate forest products sales, and provide services such as timber marking and prescribed burning. Fees charged for this work are comparable to those the agency charges for services on private lands.

Priority Area: Conserve Working Forests

Objectives and Strategies

- Objective 1.1 -- Strategies 1.1.1, 1.1.2, 1.1.3
- Objective 1.2 -- Strategy 1.2.1
- Objective 1.5 -- Strategy 1.5.5
- Objective 2.1 -- Strategies 2.1.7, 2.1.9
- Objective 2.3 -- Strategies 2.3.1, 2.3.2, 2.3.3
- Objective 2.4 -- Strategies 2.4.2, 2.4.5
- Objective 2.6 -- Strategies 2.6.1, 2.6.2
- Objective 3.4 -- Strategies 3.4.1, 3.4.2, 3.4.3, 3.4.4
- Objective 4.2 -- Strategies 4.2.5, 4.2.6

Performance Measures

Desired outcome is an increase in the number of acres of forestland protected from development and retained as working forests as well as revenue generated per acre.

Resources Needed

Funding for acquisition of property, equipment, and for supporting technology and adequate resource management capacity.

Information and Education

The Information and Education (I&E) program of the SC Forestry Commission manages the dissemination of information for the agency and develops and conducts educational programs. To this end, I&E employees manage the agency's website, write news releases, respond to requests from the news media, conduct an annual Teacher's Tour, coordinate Project Learning Tree for South Carolina, and provide educational opportunities for schools at state forests. In



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addition, I&E and other agency employees work with other agencies to conduct joint educational programs such as the Envirothon, Woodlands Clinic, and FFA Forestry Career Development Event.

Priority Area: Combined Priority Area for the State

Objectives and Strategies

- Objective 1.1 -- Strategies 1.1.1, 1.1.2, 1.1.3
- Objective 1.2 -- Strategies 1.2.1, 1.2.2, 1.2.3, 1.2.4
- Objective 1.3 -- Strategies 1.3.1, 1.3.2
- Objective 1.4 -- Strategies 1.4.1, 1.4.2, 1.4.3, 1.4.4
- Objective 1.5 -- Strategies 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5, 1.5.6
- Objective 2.6 -- Strategies 2.6.1, 2.6.2
- Objective 3.1 -- Strategy 3.1.4
- Objective 3.2 -- Strategies 3.2.3, 3.2.4
- Objective 3.3 -- Strategies 3.3.1, 3.3.2
- Objective 4.2 -- Strategies 4.2.2, 4.2.3, 4.2.4
- Objective 4.3 -- Strategies 4.3.3, 4.3.4

Performance Measures

Desired outcomes are the identification of target audiences, development of appropriate materials, an increase in the number of educational programs conducted, and the number of participants in these programs. Metrics include description of target audiences, number of programs developed or updated, number of requests for educational programs, number of participants trained, and overall positive evaluations.

Resources Needed

Funding for the development of educational materials, cooperators support, and adequate staffing to allow the development and delivery of information and programs.

Forest Legacy

The lead agency for the Forest Legacy Program in South Carolina is the SC Department of Natural Resources (DNR). The goal of this program is to conserve working forests and protect them from being converted to nonforest uses. The SCDNR has utilized this program to conserve critical wildlife habitat across the state while ensuring that traditional values and uses of forested areas continue to be available. When Forest Legacy came to South Carolina in 1999, DNR worked in consultation with the State Forest Stewardship Coordinating Committee (SFSCC) and the South Carolina Forestry Commission (SCFC) to develop an Assessment of Need (AON). Representatives from the SCDNR, SCFC, and SFSCC were asked to serve on the Forest Legacy Subcommittee. The state grant option was selected in the AON. Under the State Grant Option, all Forest Legacy acquisitions shall be transacted by the state with the title vested in the state. Landowner participation is entirely voluntary. The subcommittee identified five Forest Legacy Areas in need of conservation and long-term forest management.



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Priority Area: Conserve Working Forests

Objectives and Strategies

Objective 1.4 -- Strategies 1.4.1, 1.4.2, 1.4.3, 1.4.4

Objective 2.3 -- Strategies 2.3.1, 2.3.2

Performance Measures

Desired outcome is for Forest Legacy to play a key role in supporting landscape conservation efforts and generate an increase in the number of acres of forestland protected from development and retained as working forests.

Resources Needed

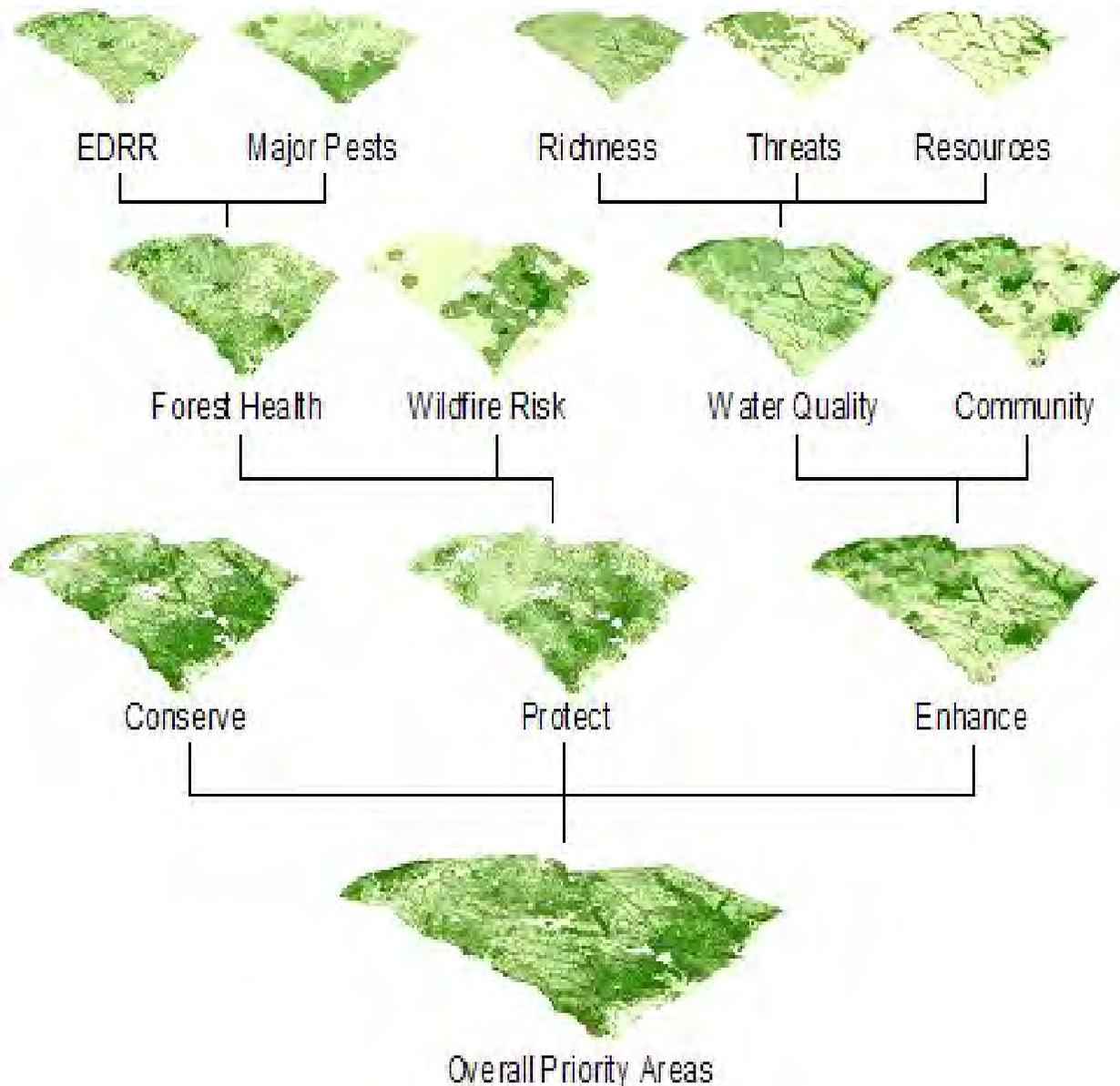
Funding for acquisition of property and for administration of the Forest Legacy program.

Appendix 1

Development of Priority Areas for South Carolina's Statewide Forest Resource Assessment

A required element of State Forest Resource Assessments is the delineation of priority landscape areas, both rural and urban, to be addressed by the State Resource Strategy. In South Carolina, priority areas have been developed to address issues identified within South Carolina's Statewide Forest Resource Assessment with the goal of focusing limited resources on areas where the greatest benefit can be achieved. To allow maximum flexibility during the development of strategies, priority areas have been developed at multiple levels based on the input of working group members (see Figure 1).

Figure 1. Hierarchy of spatial analyses for South Carolina's Statewide Forest Resource Assessment.



Priority areas were developed using a series of spatial analyses using Geospatial Information Systems (GIS) software. Spatial analysis can be performed in many ways. To create priority areas for South Carolina's Statewide Forest Resource Assessment, weighted overlay analyses were used. The general methodology utilized was as follows:

1. GIS staff identified all available data that could potentially relate to issues identified in South Carolina's Statewide Forest Resource Assessment. GIS staff was encouraged to use readily available data for all analyses due to the relatively short timeframe afforded states to complete their assessment. One major source of readily available data to southern states was the input data from the Southern Forest Land Assessment (SFLA).
2. The Delphi method was used with each working group to identify the criteria to be used when determining areas of priority, the relative importance of these criteria for determining priority, and the level of analysis best suited for the issues being addressed by the working group. The following assumptions and questions were used by each working group to reach their consensus decisions:
 - A. Assumptions:
 - i. There are limited resources: e.g., money and manpower
 - ii. All lands in the state must be served
 - iii. There is a need to focus resources on lands where maximum benefit, for the issue, can be achieved
 - B. Questions:
 - i. What criteria would you use to give priority to a landscape or individual piece of land? Criteria will most likely fit into: Indicators of Resource Richness or Threats to the Resource. Many of these criteria may be physical characteristics of the land.
 - ii. Are criteria place-based or are they situational? Place-based criteria can be used to create maps of the issues. Situational criteria can be used to establish priority areas based on if/then scenarios.
 - iii. Are issues different enough to require separate priority areas?
3. Criteria were matched to the best available GIS data and prepared for input into the overlay analysis. If criteria could not be adequately represented by an existing dataset, a new dataset was created if possible. Criteria that could not be represented due to lack of data or inadequate time to create new data were noted as missing data.
4. The input data layers for each analysis were weighted based on their relative importance and defined by the working groups. Weights were assigned such that they summed to 100.
5. Spatial overlay analyses were conducted at the working group level to produce the desired outputs for each working group. Working group outputs were combined as necessary, using un-weighted overlay analysis, to create priority areas for National Themes and an overall South Carolina state priority.
6. Outputs were classified into three classes – high, medium, low – using Jenks Natural Breaks. Priority areas were presented as the raw output of 30-meter pixels and as polygons representing landscapes created by generalizing the pixel data.

Forest Sustainability and Regulation Working Group

The Forest Sustainability Working Group addressed the issues of Forest Parcelization and Fragmentation, Forest Regulation, Emerging Markets, and Critical Habitats. It was the consensus of the working group that these issues could be addressed by a single set of priority areas. The criteria used to determine priority areas, the data layers used to spatially represent the criteria, and the relative weighting of the data layers is shown in Table 1.

Table 1: Criteria, data layers, and relative weights used to create priority areas for the Forest Sustainability and Regulation Working Group.

Criteria	GIS Layer	Source	Layer Weight
Private Forestland	Forestland	SFLA	21
Site Productivity	Site Productivity	SFLA	21
Excess Timber Supply	SC Growth Drain Ratio	SCFC	8
Demand on Timber Supply Economically and Ecologically Viable Forests	SC Timber Product Output Removals	SCFC	8
Urbanization	Forest Patches	SFLA	8
Declining Tree Planting	Development Level	SFLA	5
Longleaf Pine Potential	Declining Tree Planting	SCFC	5
Presence of T&E Species	Longleaf Range	USGS	5
Riparian Areas	Threatened and Endangered Species	SFLA	5
Distance from Ports Economically Depressed Areas	Riparian Areas	SFLA	5
Proximity to Public Lands	Distance from Ports	SCFC	3
Parcelization	2010 Job Tax Credit Rankings	SCFC	3
	Proximity to Public Lands	SFLA	3
	N/A	N/A	N/A

Results of the spatial analysis for the Forest Sustainability and Regulation Working Group yielded a single set of priority areas for their assigned issues and for the Conserve Working Forests National Theme. Priority areas are presented in the 30 meter pixel format (see Map 1a). To display the priority areas as landscapes, the pixel data was generalized using Block Statistics to create polygons of high priority greater than 15,000 acres in size (see Map 1b).

Wildfire Risk Working Group

The Wildfire Risk Working Group addressed the issues of wildfire risk and prescribed burning. It was the consensus of the working group that these issues could be addressed by a single set of priority areas. The criteria used to determine priority areas, the data layers used to spatially represent the criteria, and the relative weighting of the data layers is shown in Table 2.

Table 2: Criteria, data layers, and relative weights used to create priority areas for the Wildfire Risk Working Group.

Criteria	GIS Layer	Source	Layer Weight
Communities	Communities at Risk	SWRA	67
Fire Occurrence	Fire Occurrence FY05-09	SCFC	23
Fire Size	Mean Fire Size FY05-09	SCFC	10

Results of the spatial analysis for the Wildfire Risk Working Group yielded a single set of priority areas displayed in the 30 meter pixel format (see Map 2a). To display the priority areas as landscapes the pixel data was generalized using Block Statistics to create polygons of high priority greater than 5,000 acres in size (see Map 2b).

Threats to Forest Health Working Group

The Threats to Forest Health Working Group addressed potential threats to forest health and productivity from insects, diseases, and invasive plants. The working group focused on two primary categories of threats: those requiring Early Detection and Rapid Response (EDRR) and those deemed Major Threats/Pests. The consensus of the working group was that these two categories of threats were sufficiently different to require separate priority areas. Therefore, three spatial analyses were conducted for this working group. The first analysis focused on priority areas for EDRR (see Table 3). The second analysis focused on priority areas for Major Threats (see Table 4). The final analysis combined the results of the EDRR and Major Threats analyses, giving equal weight to each, to create an overall set of priority areas for Threats to Forest Health.

Table 3: Criteria, data layers, and relative weights used to create priority areas for EDRR.

Criteria	GIS Layer	Source	Layer Weight
Sirex Wood Wasp	Sirex Susceptibility Potential	FHTET	40
Gypsy Moth	Oak Layer Extraction	USGS GAP	39
Asian Longhorn Beetle	Asian Longhorn Beetle Susceptibility Potential	FHTET	13
Emerald Ash Borer	Emerald Ash Borer Risk Potential (Suitability)	FHTET	8
Sudden Oak Death	Not Available	N/A	N/A
Light Brown Apple Moth	Not Available	N/A	N/A

Table 4: Criteria, data layers, and relative weights used to create priority areas for Major Threats to Forest Health.

Criteria	GIS Layer	Source	Layer Weight
Southern Pine Beetle	Southern Pine Beetle Hazard Map	FHTET	34
Cogon Grass	Cogon Grass Hazard Areas	SCFC	34
Annosus Root Rot	Annosus Root Rot Map – National Insect and Disease Risk Map	FHTET	11
Laurel Wilt	Laurel Wilt Location by County	SCFC	7
Fusiform Rust	Pine Layer Extraction	USGS GAP	5
Hemlock Woolly Adelgid	Eastern Hemlock Layer Extraction	USGS GAP	5
Oak Wilt	Oak Wilt Location by County	USFS	4
Red Bay Ambrosia Beetle	Not Available	N/A	N/A

Results of the spatial analyses for Threats to Forest Healthy yielded three sets of priority areas. Priority areas for EDRR and Major Threats are presented in 30 meter pixels (see Map 3a and Map 4a). The overall priority areas for Threats for Forest Health are presented in the 30 meter pixel format (see Map 5a). To display the Threats to Forest Health priority areas as landscapes the pixel data was generalized using Block Statistics to create polygons of high priority greater than 5,000 acres in size (see Map 5b). To create priority areas for, the national theme, Protect Forests from Harm the Threats to Forest Health and Wildfire Risk priority areas were combined using an un-weighted overlay analysis. Results from this analysis are presented in 30 meter pixel format (see Map 6a). To display the Protect Forests from Harm priority areas as landscapes the pixel data was generalized using Block Statistics to create polygons of high priority greater than 5,000 acres in size (see Map 6b).

Enhance Benefits of Forests and Trees Working Group

The Environmental Benefits Working Group addressed the issues of the Environmental Benefits of Forests and Trees through analysis of two subsets; Watershed Quality and Quantity, and Community Forestry. It was the consensus of the working group that these issues should be addressed separately, with the resulting analyses combined to reflect the overall Environmental Benefits. The criteria used in both analyses to determine priority areas, the data layers used to spatially represent the criteria, and the relative weighting of the data layers is shown in Tables 5 and 6.

Table 5. Criteria, data layers, and relative weights used to create priority areas for Watershed Quality and Quantity.

Criteria	GIS Layer	Source	Layer Weight
Ecoregions	Ecoregions	EPA	23
Wetland Areas	Wetlands	SFLA	13
Riparian Areas	Riparian Areas	SFLA	10
Steep Slopes	Slope	SFLA	10
Impaired Watersheds	Watersheds	SCDHEC	10
Scenic River Watersheds	Scenic Watersheds	SCFC	8
Impaired Waterways, Other	TMDL Streams	SCDHEC	7
Impaired Waterways	303D List	SCDHEC	7
Public Drinking Water Source	Drinking Water	SCDHEC	5
Major Rivers	Rivers	USCGIS	3
Presence of T&E Species	Threatened and Endangered Species	USGS	3
Scenic Rivers	Scenic Rivers	SCFC	3

Results of the spatial analysis for the Watershed Quality and Quantity assessment yielded a single set of priority areas for their assigned issues which could be utilized in the later Environmental Benefits analysis. Priority areas are presented in 100 meter pixel format (see Map 7a). To display the priority areas as they pertained to their relative HUC12 watersheds, pixel data was generalized using Zonal Statistics to create polygons reflecting average scoring within each watershed (see Map 7b).

Table 6. Criteria, data layers, and relative weights used to create priority areas for Community Forestry.

Criteria	GIS Layer	Source	Layer Weight
Urban Development	Development Level	SFLA	30
% of Impervious Surfaces	Impervious Surfaces	USFS	20
% of Urban Forest Canopy	Urban Forest Canopy	USFS	20
Population Density	Population Density	USFS	15
Forestland	Forestland	SFLA	15

Results of the spatial analysis for the Community Forestry assessment yielded a single set of priority areas for their assigned issues and which, combined with the Watershed Quality and Quantity Assessment, could be used in the Enhance Benefits from Trees and Forests analysis. Priority areas are presented in 100 meter pixel format (see Map 8a).

Using the results of these two analyses, data were combined with equal weighting to generate the total Enhance Benefits from Trees and Forests assessment layer. Priority areas are presented in 100 meter pixel format (see Map 9a). To display the priority areas as they pertain to their relative HUC12 watersheds, pixel data was generalized using Zonal Statistics to create polygons reflecting average scoring within each watershed (see Map 9b).

Description of Data Layers Used in Spatial Overlay Analyses

A total of 37 data layers were utilized in the spatial overlay analyses conducted for South Carolina's Statewide Forest Resource Assessment. Data layers utilized were provided by the SC Forestry Commission, Southern Group of State Forester's Southern Forest Land Assessment (SFLA), Southern Group of State Foresters' Southern Wildfire Risk Assessment (SWRA), USDA Forest Service National Information Center (NIC), USDA Forest Service Forest Health Technology Enterprise Team (FHTET), US Geologic Survey (USGS), SC Department of Health and Environmental Control (SCDHEC), University of South Carolina, and the Environmental Protection Agency (EPA). Links to all data sources are provided in Tables 1-6.

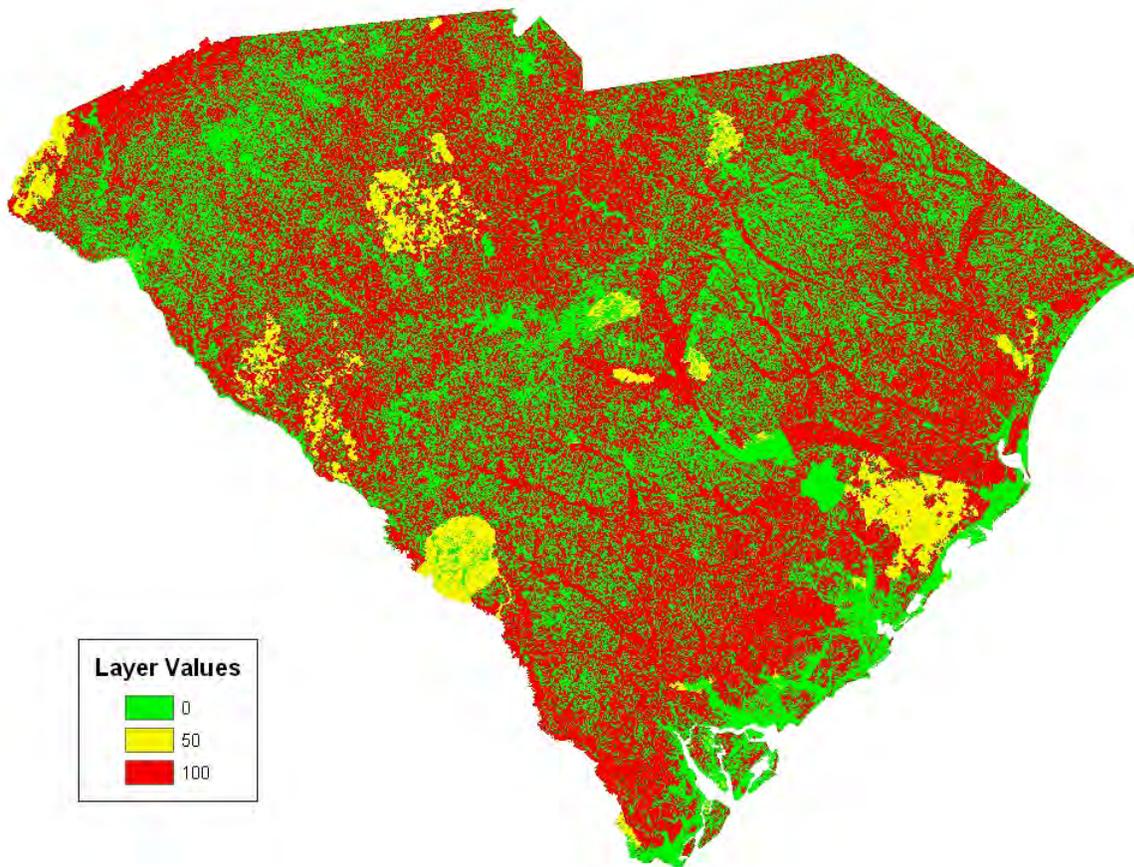
Nine of the data layers utilized came from the SFLA. Detailed descriptions of the SFLA and all data layers utilized in it can be found in the SFLA Report available online at <http://tfsweb.tamu.edu/main/popup.aspx?id=5818>. Two of the SFLA layers were modified for use in South Carolina's Statewide Forest Resource Assessment. Descriptions of any modifications are listed in this section.

The SC Forestry Commission created 15 data layers for use in the analyses. Detailed descriptions of these layers are provided in this section.

Forestland

The forestland layer was originally created for use in the SFLA. A full description of this data layer can be found in the SFLA report (SFLA, 2008). The forestland layer was included in the priority analysis for South Carolina's Statewide Forest Resource Assessment to place emphasis on lands with existing forest cover. Two variations of the forestland layer were utilized in the priority analyses. The layer was used in its original binary form in the Enhance Benefits from Forests priority analysis. The Conserve Working Forests working group desired to place less emphasis on publically-owned forestlands. Therefore, a variant of the dataset was created that decreases the value of forest cover within federal ownerships in South Carolina (see Figure 2).

Figure 2: Forestland input data layer used in Conserve Working Forests analysis.

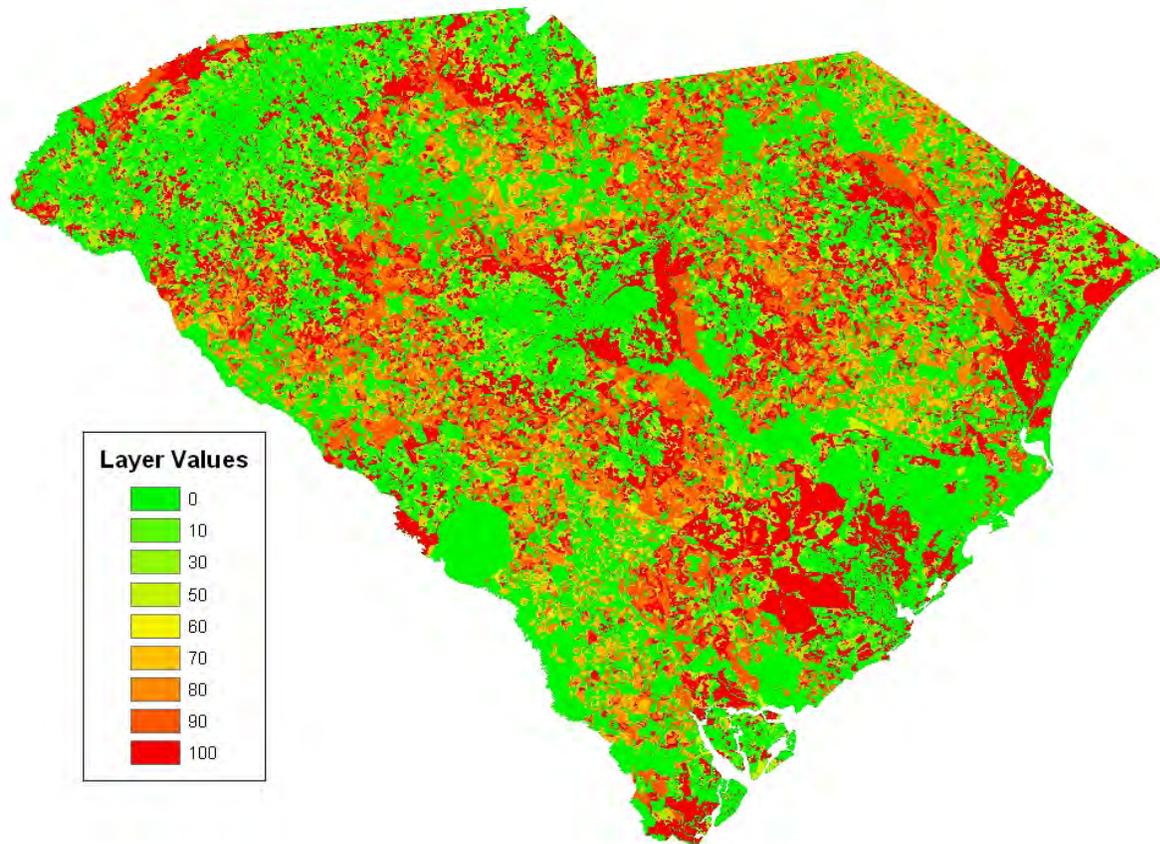


Source: Jacobs, J., R. Srinivasan, and B. Barber. 2008. Southern Forest Land Assessment: A Cooperative Project of the Southern Group of State Foresters. Available online at <http://tfsweb.tamu.edu/main/popup.aspx?id=5818>.

Development Level

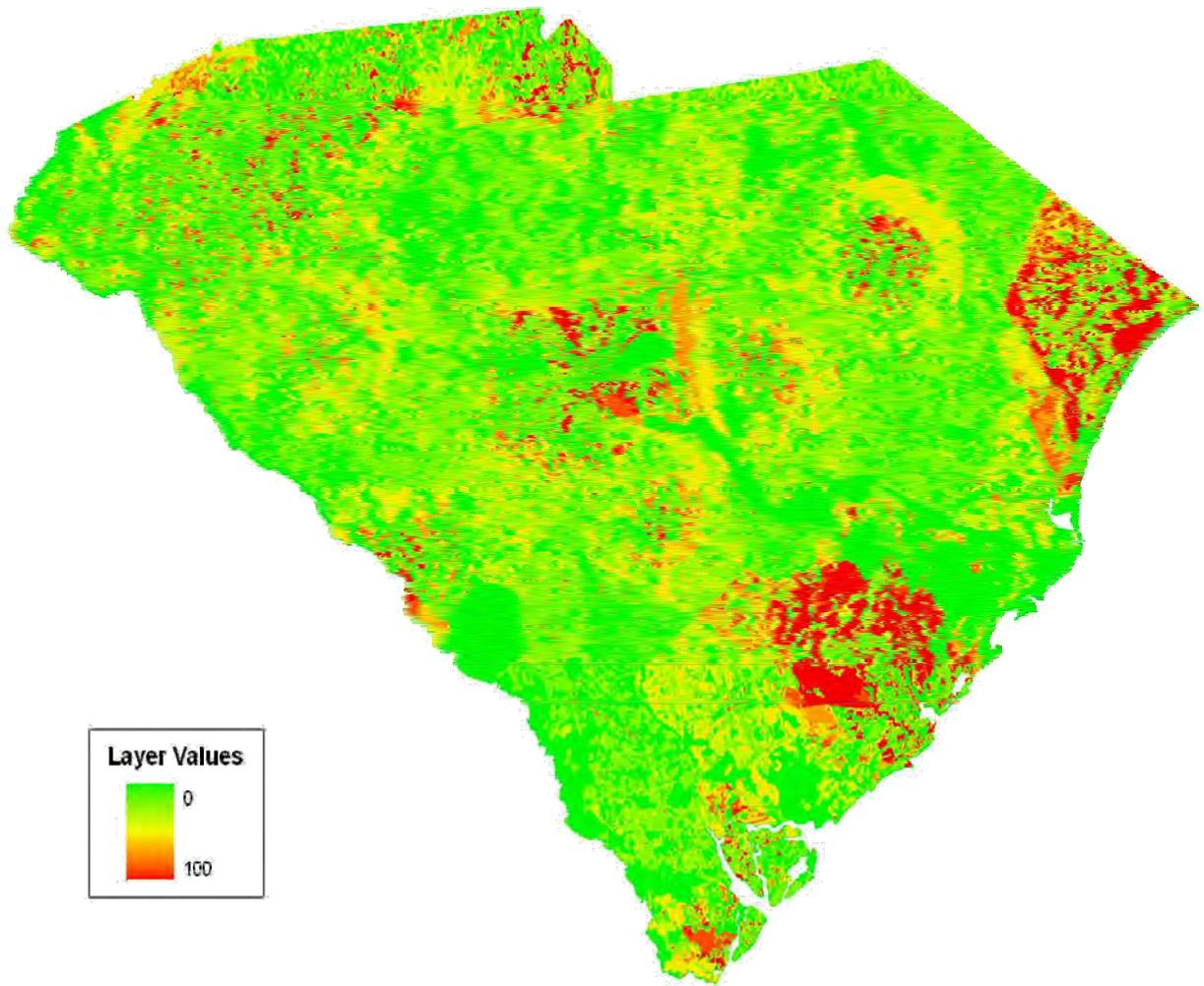
The development level layer was originally created for use in the SFLA and was derived from housing density projections for 2030 developed by David Theobald. A full description of this data layer can be found in the SFLA report (Jacobs, 2008). The development level layer is included in the priority analysis to place emphasis on areas projected to experience housing development. Two variations of the development level layer were utilized in the priority analyses. The layer was used in its original form in the Conserve Working Forests priority analysis (see Figure 3). This is based on the assumption that active management of private forestlands within these areas and strong markets for forest products may increase the probability that these forests will remain forests. This assumption is not valid for the community forestry analysis. Therefore, a variant of the development level layer was created for use in the community forestry analysis. The purpose of this variant was to place emphasis on areas projected to experience development from lower to higher categories of urbanization, while decreasing emphasis on areas that have already achieved a level of urbanization beyond a threshold where existing urban forests may be successfully retained (see Figure 4).

Figure 3: Development Level input data layer for Conserve Working Forests analysis.



Source: Jacobs, J., R. Srinivasan, and B. Barber. 2008. Southern Forest Land Assessment: A Cooperative Project of the Southern Group of State Foresters. Available online at <http://tfsweb.tamu.edu/main/popup.aspx?id=5818>.

Figure 4: Development Level input data layer for Community Forestry analysis.



Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

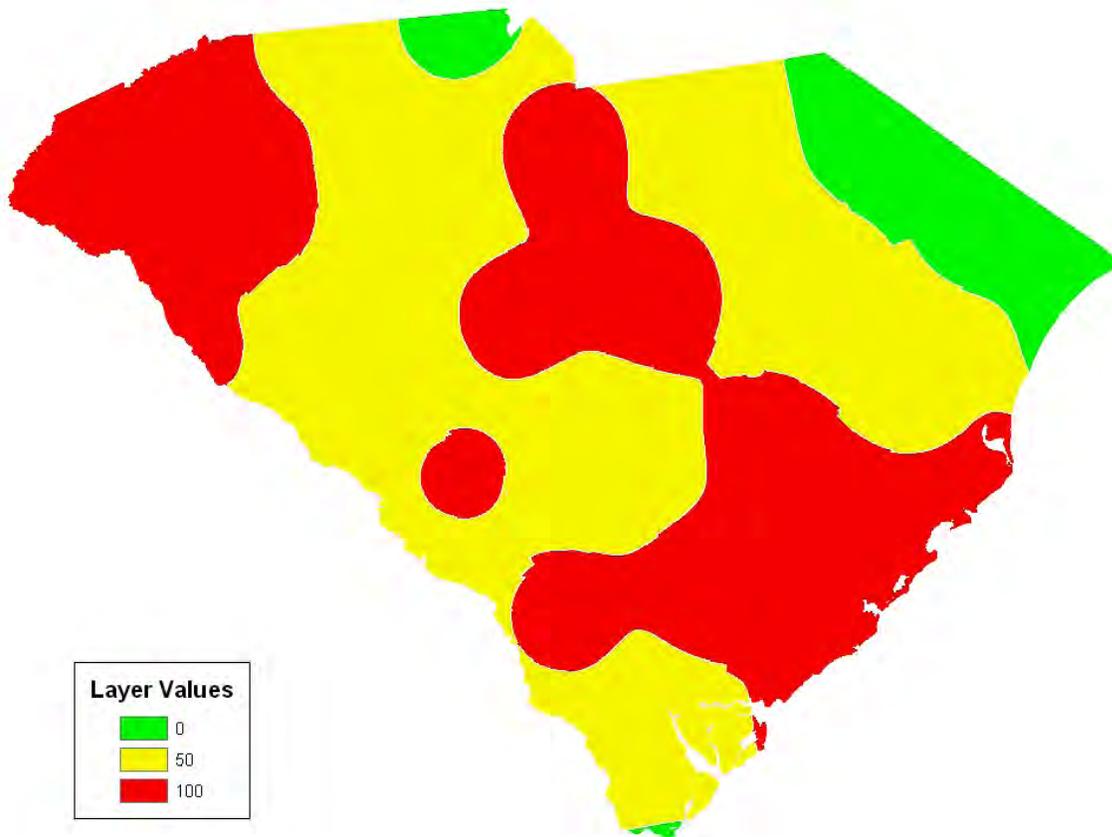
SC Growth- Drain Ratio

The SC Growth-Drain Ratio layer was originally created for use in South Carolina's Statewide Forest Resource Assessment. The purpose of the layer is to place emphasis on areas where excess timber supply exists in South Carolina. The layer was derived from data obtained from the USDA Forest Service Forest Inventory and Analysis (FIA) National Program. Using the Forest Inventory Online Database (FIDO), growth and removal reports were created for a series of points that covered the extent of the state. Using the values from these reports, the growth-drain ratio was calculated for each point and a raster surface was created using Inverse Distance Weighting. The layer value scheme for the layer can be seen in Table 7.

Table 7. Layer value scheme for the SC Growth-Drain Ratio layer.

Layer Value	Growth Drain Ratio
0	.8 - 1.2
50	1.2 - 1.6
100	> 1.6

Figure 5: SC Growth-Drain Ratio input data layer.

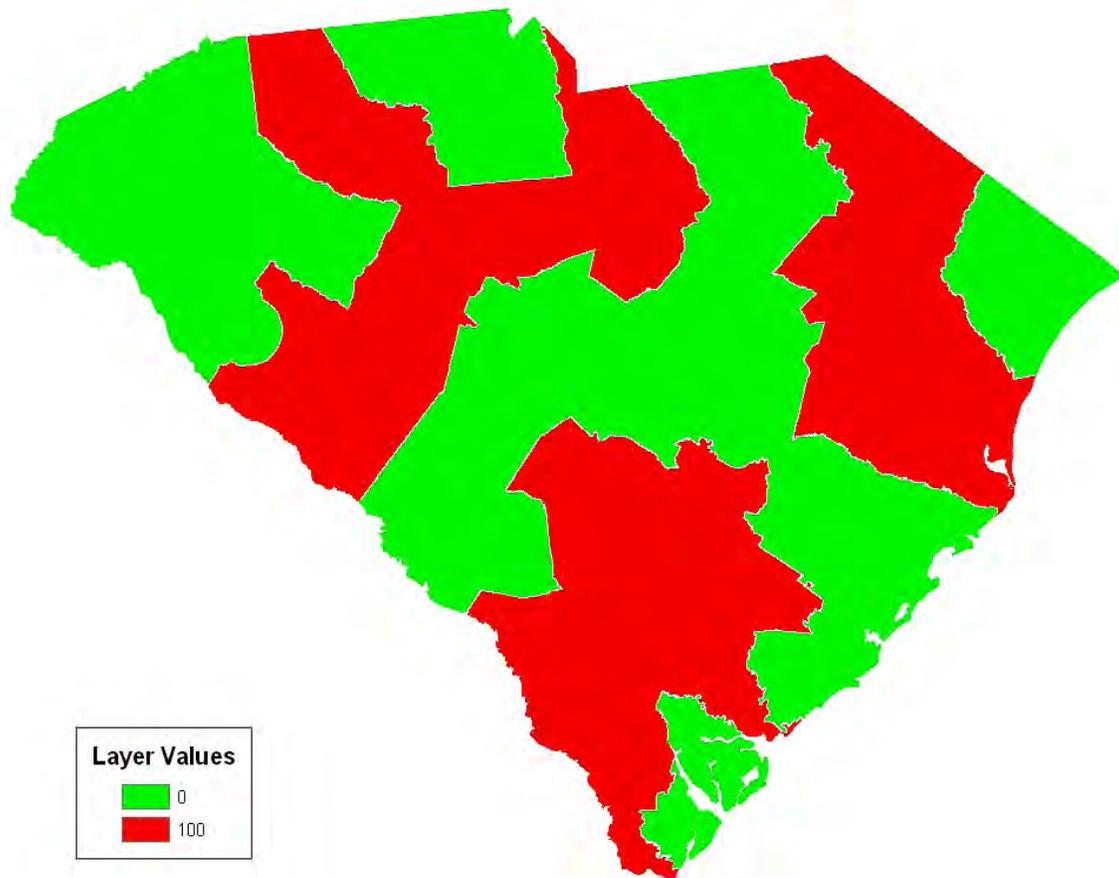


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

SC Timber Product Output Removals

To place emphasis on areas of South Carolina where there is high demand for forest products, the SC Forestry Commission GIS Department created a county level data layer representing South Carolina's Timber Product Output removals. The layer was derived from South Carolina Timber Product Output (TPO) data from the 2003, 2005, and 2007 TPO surveys (Johnson, 2006; Johnson, 2007; Johnson, 2009). TPO removals per acre of timberland were calculated for each county and each survey period. A weighted average for removals per acre was calculated for each county given the assumption that removals in more recent surveys better reflect current demand on the forest resources within the counties. Counties with removals per acre above the fiftieth percentile were given full layer value. All other counties received a layer value of zero.

Figure 6: SC Timber Product Output Removals input layer.



Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

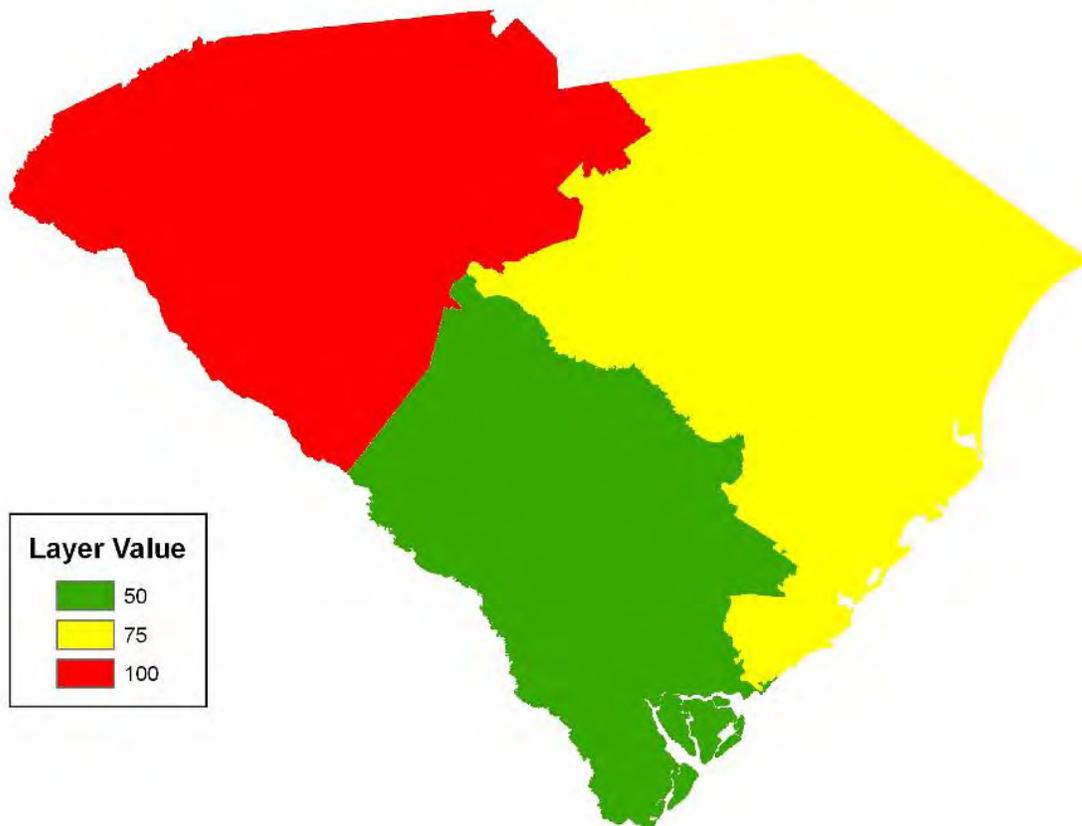
Declining Tree Planting

The Declining Tree Planting layer was originally created for use in South Carolina's Statewide Forest Resource Assessment. The purpose of the layer is to place emphasis on areas where artificial regeneration of pine species is occurring in the state. The layer was derived from data obtained from the USDA Forest Service FIA National Program. Using EVALIDator version 4, reports were generated for each of the three FIA units in South Carolina detailing the number of acres of softwood in the 0-5 year old age class by stand origin. The proportion of timberland within the age class was then calculated for each FIA unit and applied to a spatial layer representing the FIA units. The layer value scheme for the layer can be seen in Table 8.

Table 8. Layer value scheme for the Declining Tree Planting layer.

Layer Value	% Timberland Artificially Regenerated
50	68
75	56
100	42

Figure 7. Declining Tree Planting input layer.

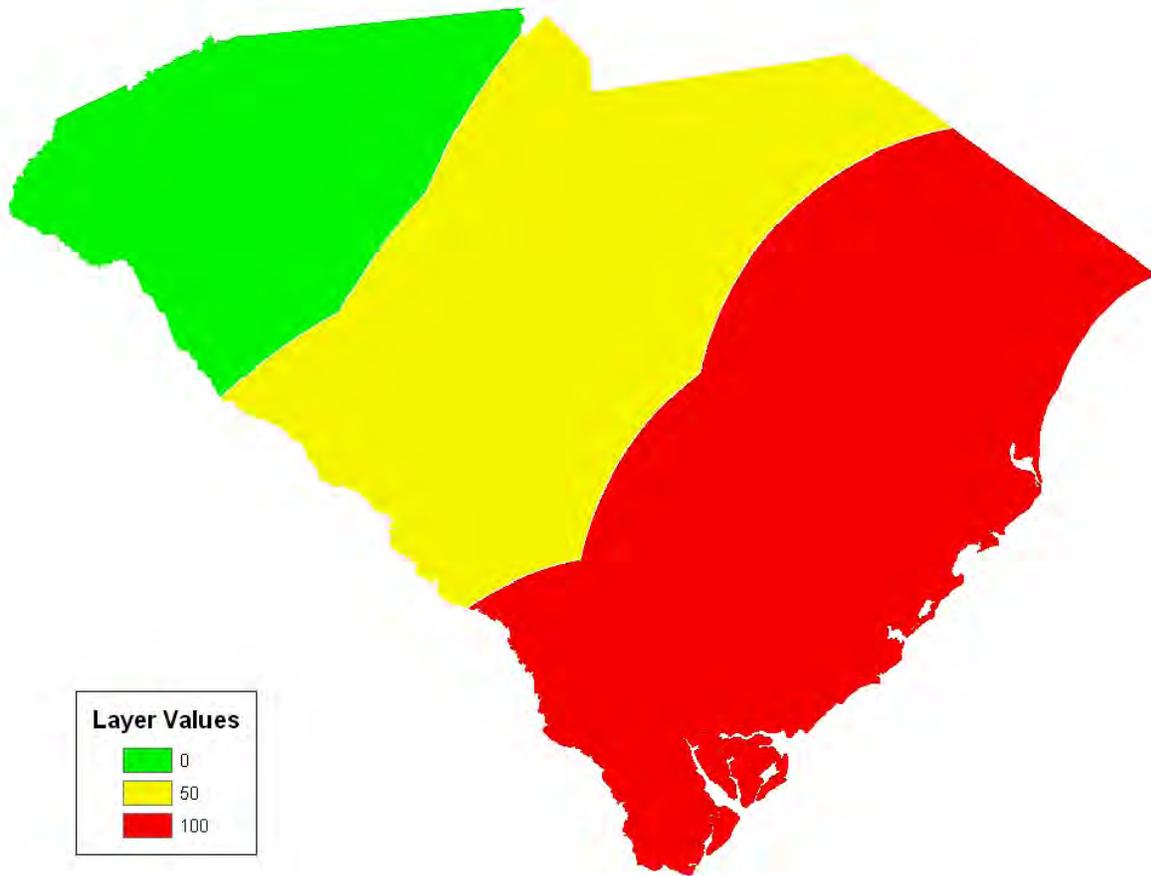


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Distance from Ports

The Distance from Ports layer was originally created for use in South Carolina's Statewide Forest Resource Assessment. The purpose of the data layer is to place emphasis on lands near ports. This is based on the assumption that lands nearer to the ports have a higher potential for being utilized to produce raw materials that could be used for export markets. The data layer was derived from the US Army Corps of Engineers Navigation Data Center ports layer (<http://www.ndc.iwr.usace.army.mil/gis/gis1.htm>). To create the raster dataset, the Euclidean distance function was used to create a surface. The surface was then reclassified into three classes using Jenks Natural Breaks.

Figure 8: Distance from Ports input data layer.



Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

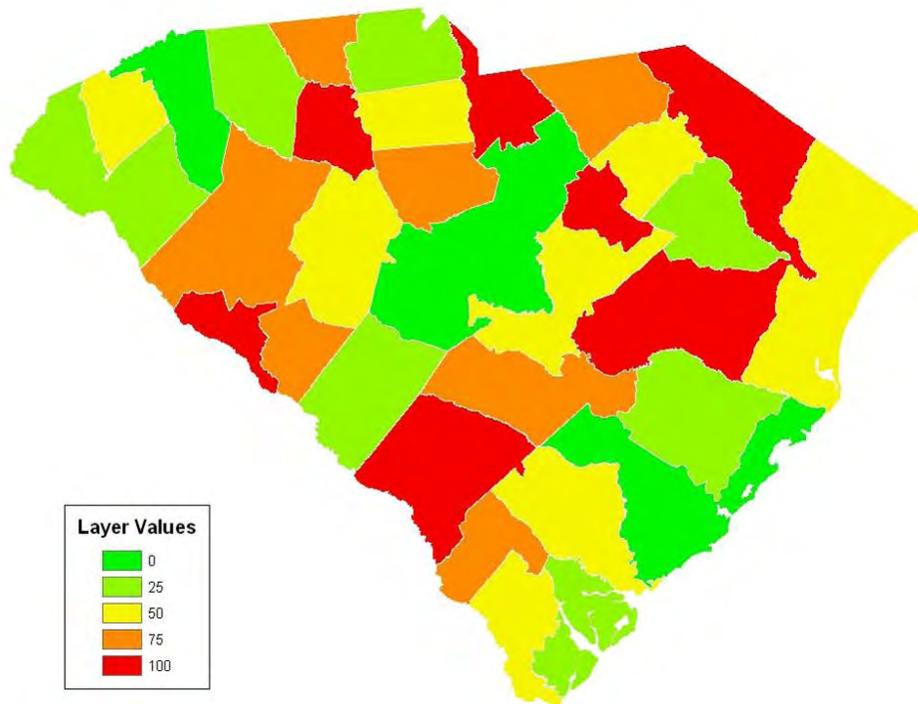
2010 Job Tax Credit Rankings

The 2010 Job Tax Credit Rankings layer was originally created for use in South Carolina's Statewide Forest Resource Assessment. The purpose of the data layer is to place emphasis on economically depressed areas within the state. It is believed that the development of stronger forest markets in these areas could benefit the local and state economy. The data layer was derived from South Carolina's 2010 Job Tax Credit Rankings as reported by the SC Department of Revenue (SCDOR). Annually, SCDOR ranks South Carolina's counties for job tax credit purposes with equal weight given to unemployment rate and per capita income and then adjusted in accordance with special rules in South Carolina Code subsections 12-6-3360(B) and 12-6-3360(L), as applicable. The report is available online at <http://www.sctax.org>. The layer value scheme for the job tax credit layer can be seen in Table 9.

Table 9. Layer value scheme for the 2010 Job Tax Credit Ranking layer.

Layer Value	County Ranking
0	Developed
25	Moderately Developed
50	Under Developed
75	Least Developed
100	Distressed

Figure 9: The 2010 Job Tax Credit Rankings input data layer.

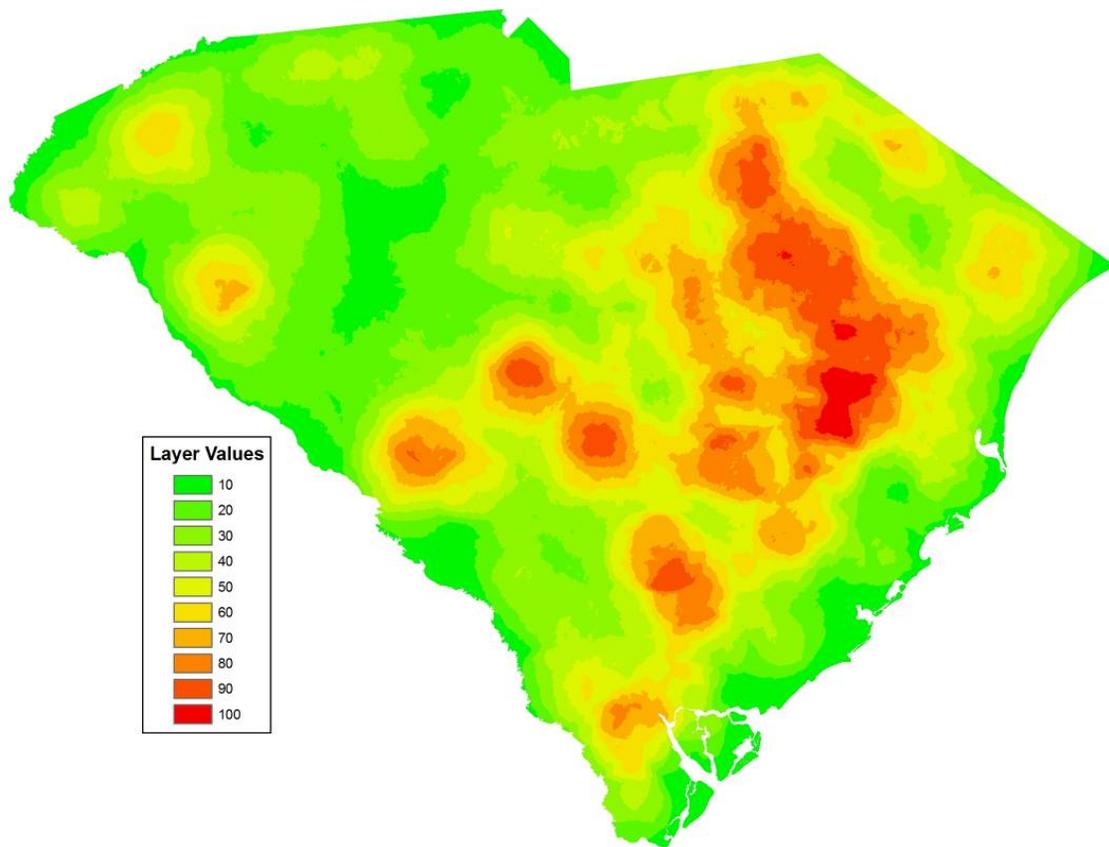


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Fire Occurrence FY 2005 – 2009

The Fire Occurrence layer was created for use in South Carolina's Statewide Forest Resource Assessment. The purpose of the layer is to place emphasis on areas where there is a history of fire occurrence. The data layer was derived from data gathered and stored in the SC Forestry Commission's dispatch operations database.

Figure 10: South Carolina Fire Occurrence input data layer.



Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

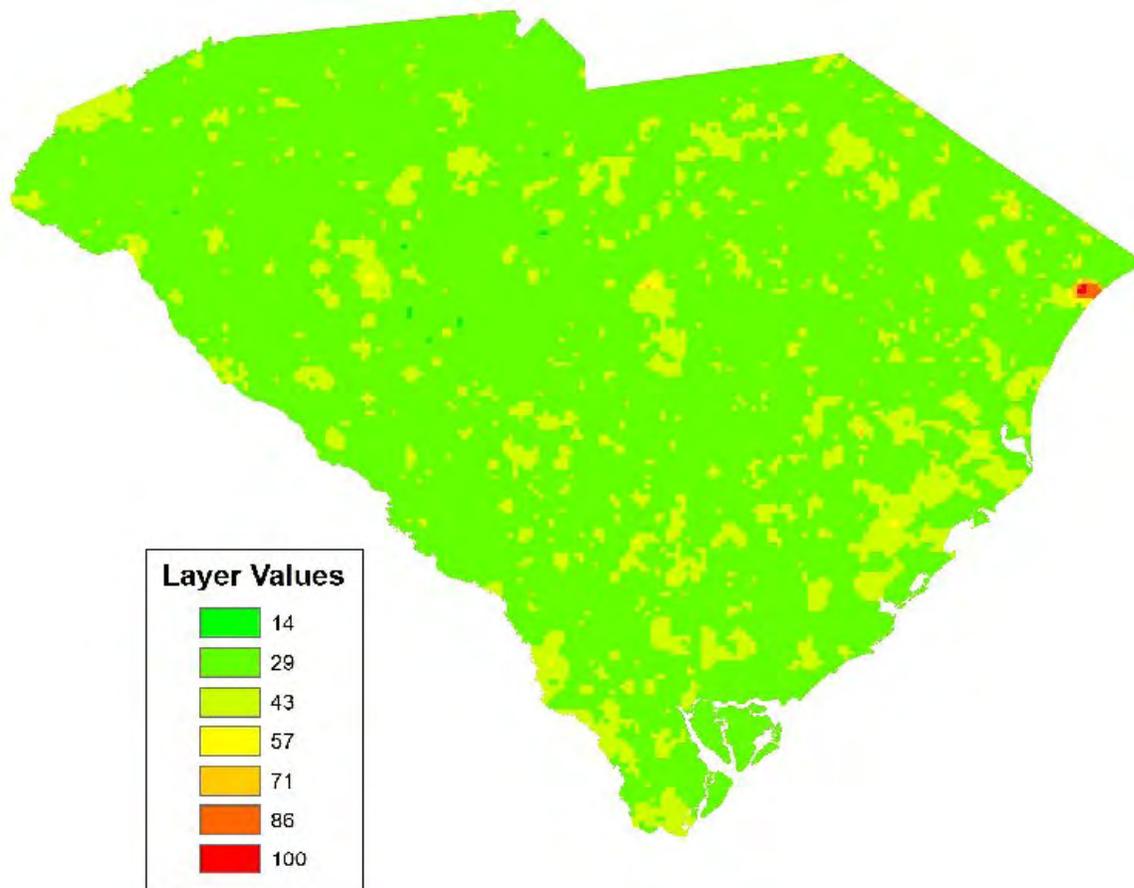
Mean Fire Size FY 2005 - 2009

The Fire Size layer was created for use in South Carolina's Statewide Forest Resource Assessment. The purpose of the layer is to place emphasis on areas where larger class fires occur. The data layer was derived from data gathered and stored in the SC Forestry Commission's dispatch operations database. The layer value scheme for the Mean Fire Size layer can be seen in Table 10.

Table 10. Layer value scheme for the Mean Fire Size data layer.

Layer Value	Fire Size Class
14	A
29	B
43	C
57	D
71	E
86	F
100	G

Figure 11: South Carolina Mean Fire Size input data layer.

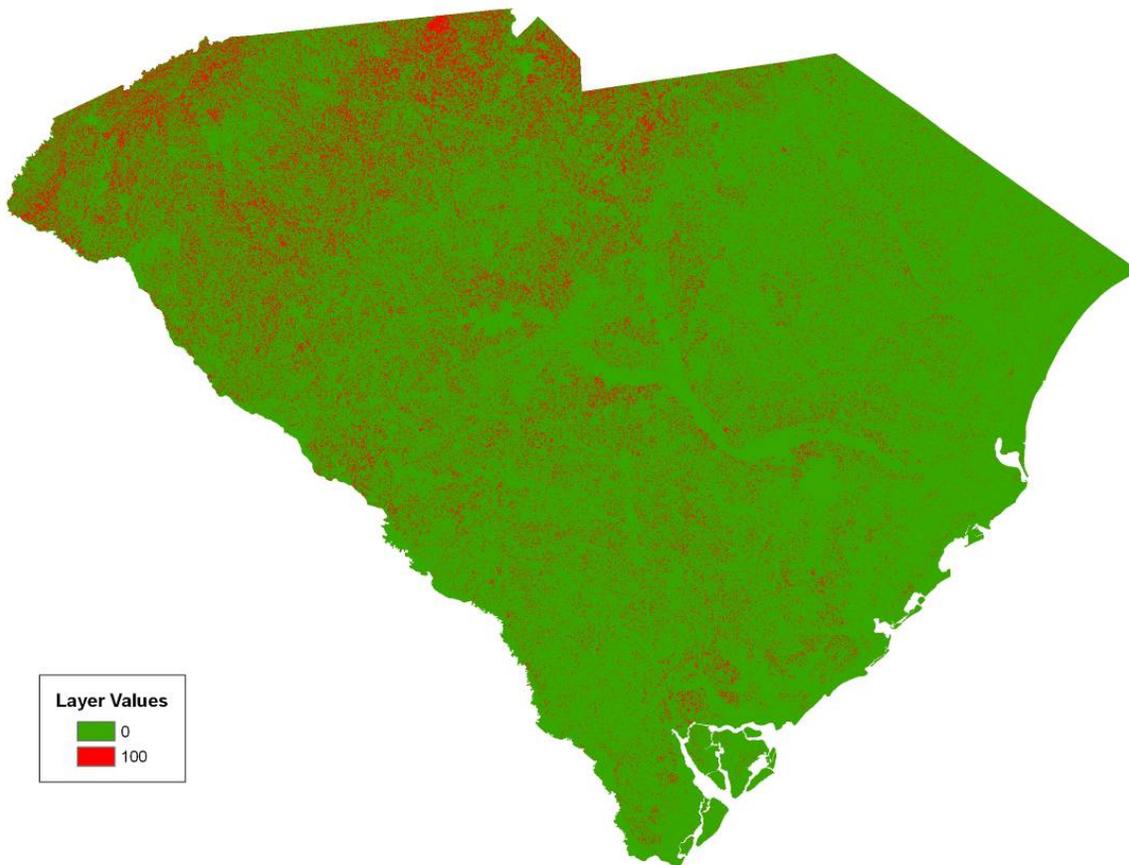


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Oak Layer Extraction

The oak layer extraction was created by the SC Forestry Commission for use in South Carolina's Statewide Forest Resource Assessment using 30-meter GAP data with GAP classes from the USGS. From the GAP data, codes associated with predominately oak areas were taken and exported as an original GRID. The codes used were 203.241, 202.596, 202.886, 202.339a, and 203.494.

Figure 12: The Oak Layer Extraction input data layer.

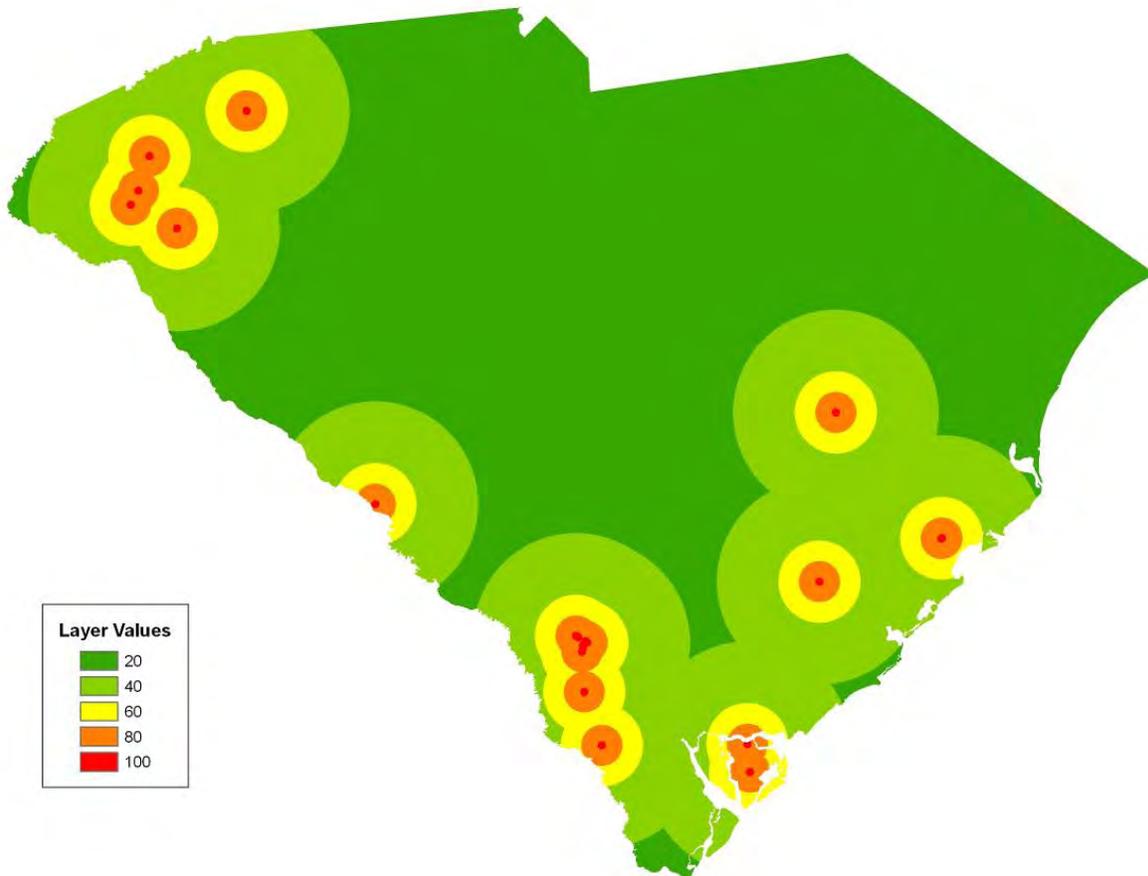


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Cogongrass Hazard Areas

The cogongrass hazard areas data layer was created by the SC Forestry Commission specifically for use in South Carolina's Statewide Forest Resource Assessment. Point data was provided by Steve Compton (Clemson University), and a Euclidean distance analysis was processed to give generalized areas of cogongrass occurrence and potential spread.

Figure 13: The Cogongrass Hazard Areas input data layer.

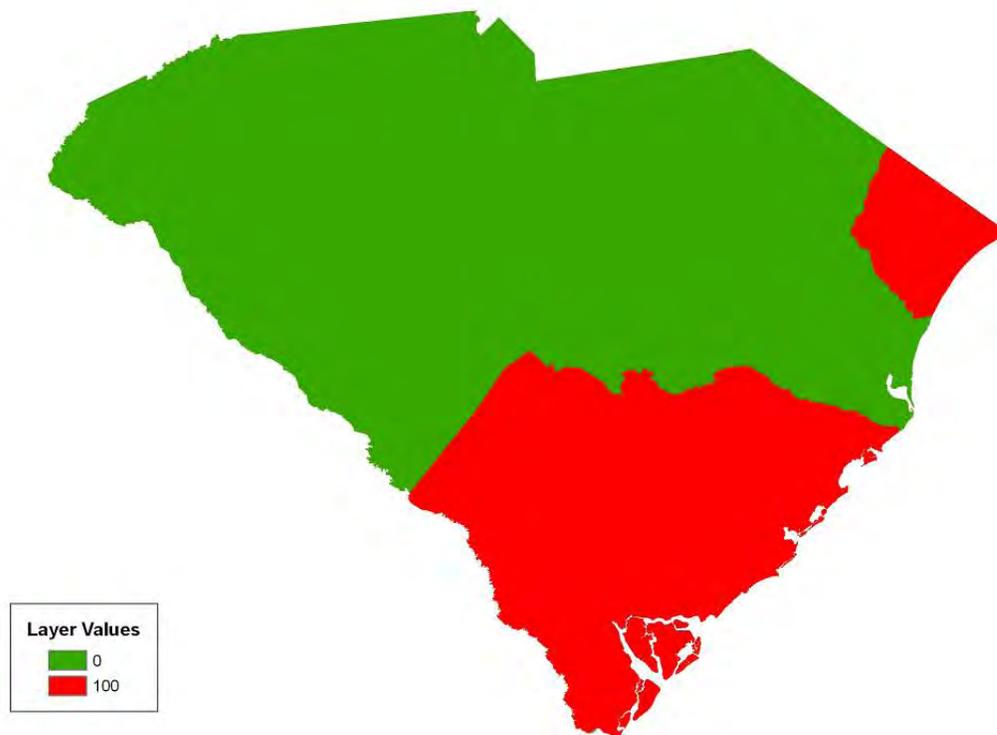


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Laurel Wilt Location by County

The laurel wilt data layer was created by the SC Forestry Commission for use in South Carolina's Forest Resource Assessment. The county-level location information was compiled by Laurie Reid (SCFC), Andy Boone (SCFC), James Johnson (GAFC), Bud Mayfield (USFS) Jeff Eickwort (Florida), and John Riggins (Mississippi State University). This data layer was used to represent laurel wilt as a major threat to forest health.

Figure 14: Laurel Wilt input data layer.

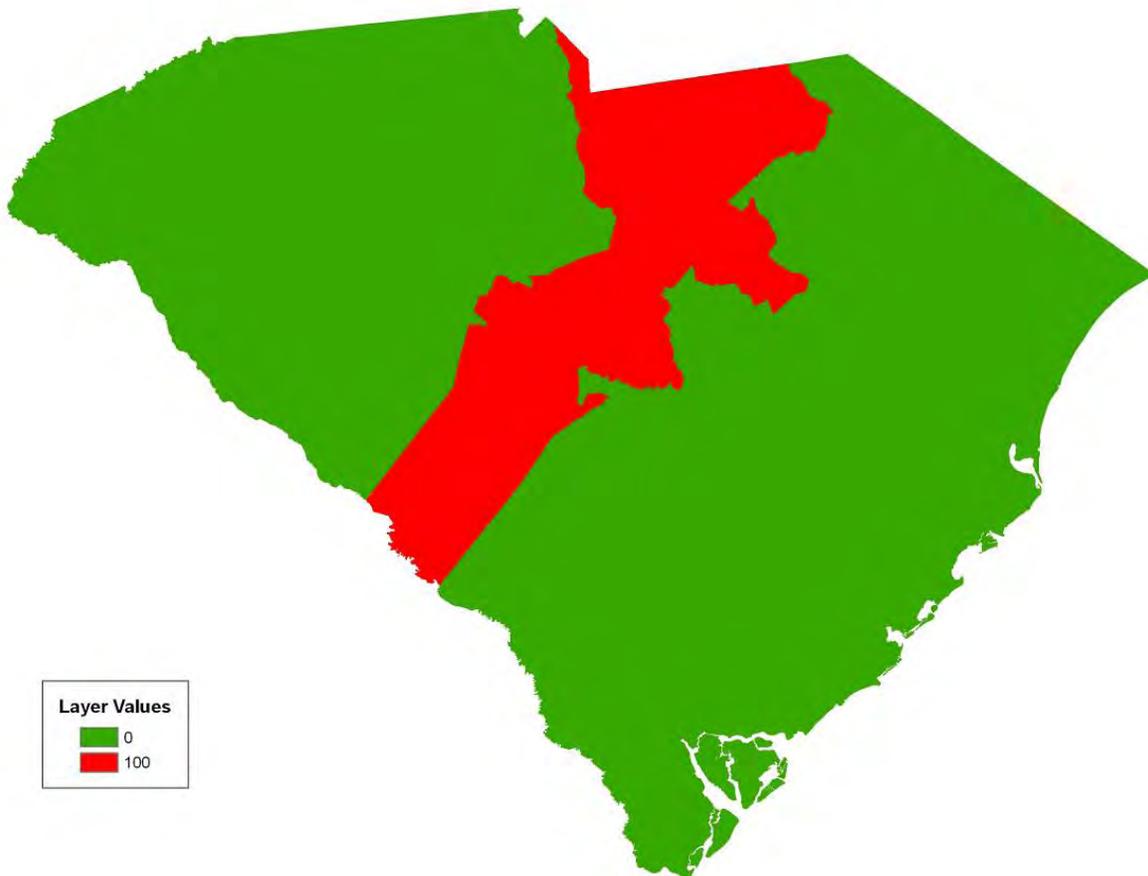


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Oak Wilt Location by County

The oak wilt location information was compiled on a national level by Dale Starkey (2009) based on reports from states with oak wilt disease. This county-level data is specific to South Carolina only. This data layer was used in South Carolina's Statewide Forest Resource Assessment to represent oak wilt as a major threat to forest health.

Figure 15: Oak Wilt input data layer.

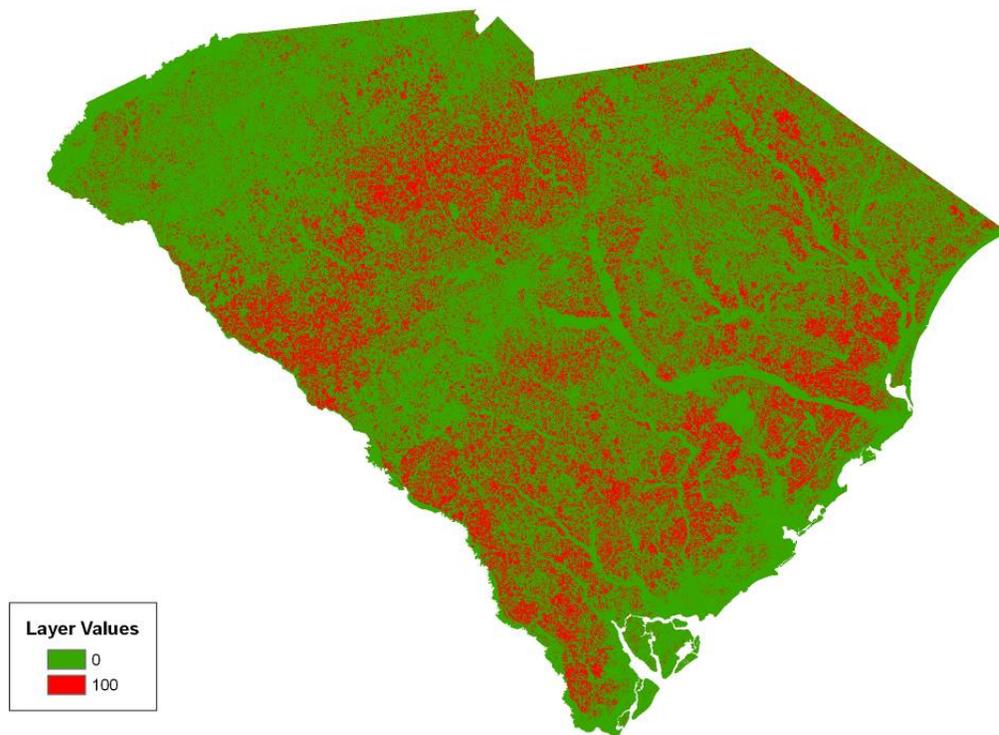


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Pine Layer Extraction

The pine layer extraction was created by the SC Forestry Commission for use in South Carolina's Forest Resource Assessment using 30-meter GAP data with GAP classes from the USGS. From the GAP data, codes associated with predominately pine areas were taken and exported as an original GRID. The codes used were 203.254c, 202.596, 202.339b, 203.336, SEGAP420, 203.281, and 203.265. This data layer was utilized in the priority analysis to represent potential for fusiform rust.

Figure 16: Pine Extraction input data layer.

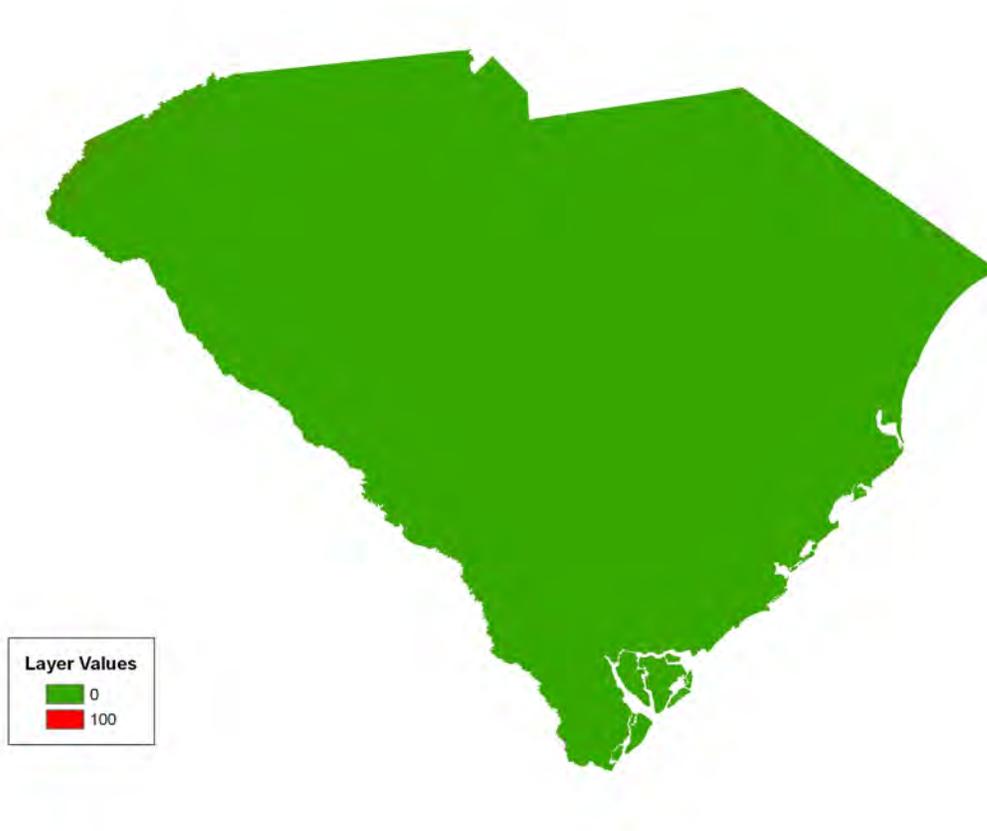


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Hemlock Layer Extraction

The hemlock layer extraction was created by the SC Forestry Commission for use in South Carolina's Forest Resource Assessment using 30-meter GAP data with GAP classes from the USGS. From the GAP data, codes associated with predominately hemlock areas were taken and exported as an original GRID. The code used was 202.593. This layer was utilized in the priority analysis to represent potential for hemlock wooly adelgid.

Figure 17: Hemlock Extraction input data layer.

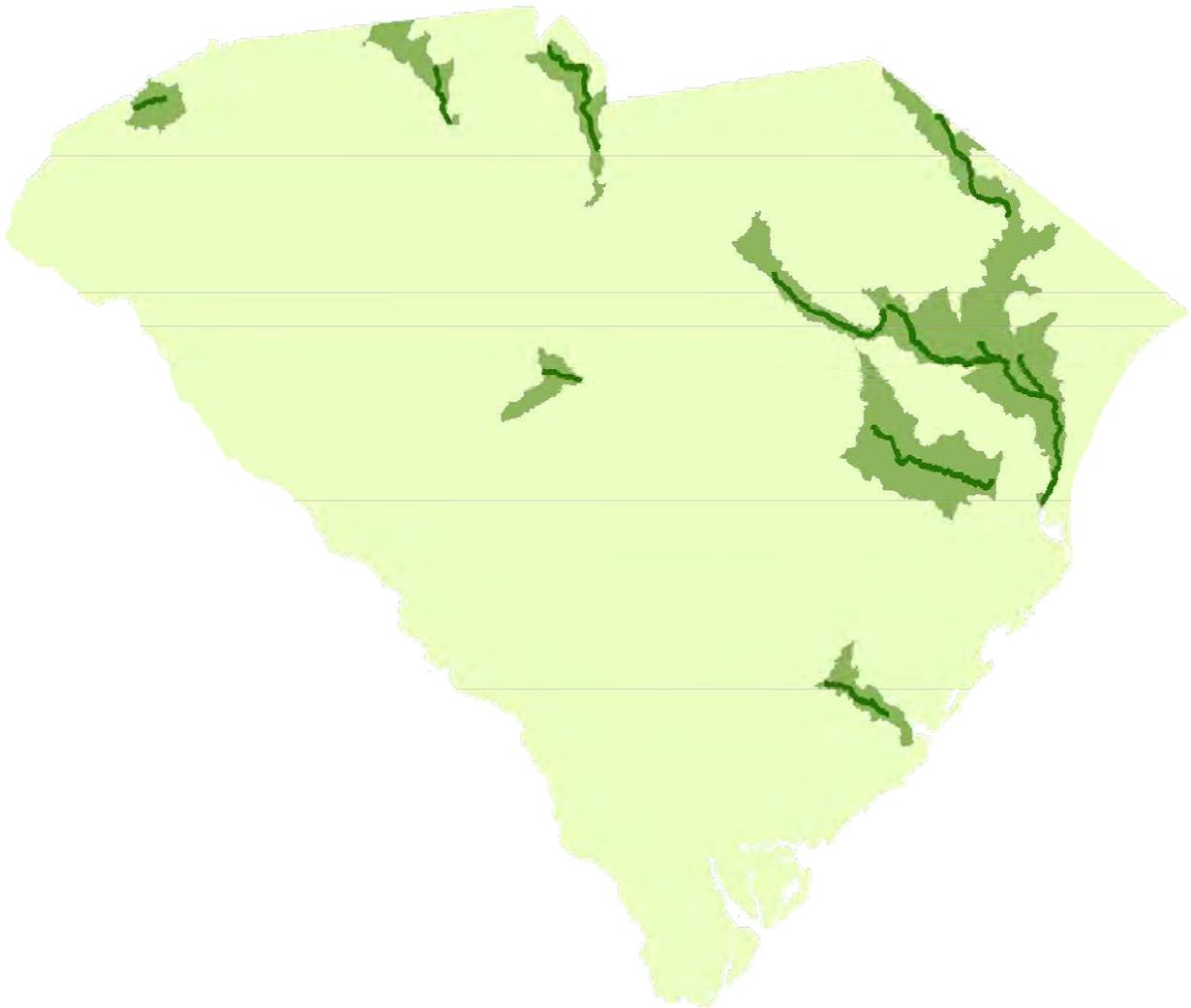


Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

Scenic Rivers and Watersheds

The scenic river and scenic river watershed layers were used in the Quality Water Resource sub-analysis, and as a component in the Watershed Quality and Quantity assessment. Data for the scenic river polylines were digitized on-screen from graphics available from the South Carolina Department of Resources, and then intersected with HUC 12 watersheds. Public release of this data through the SCDNR GIS Clearinghouse is anticipated by 2011.

Figure 18: Composite of Scenic Rivers and Scenic Watersheds data layers.



Source: South Carolina Forestry Commission GIS Department. Contact Hblount@forestry.state.sc.us for additional information.

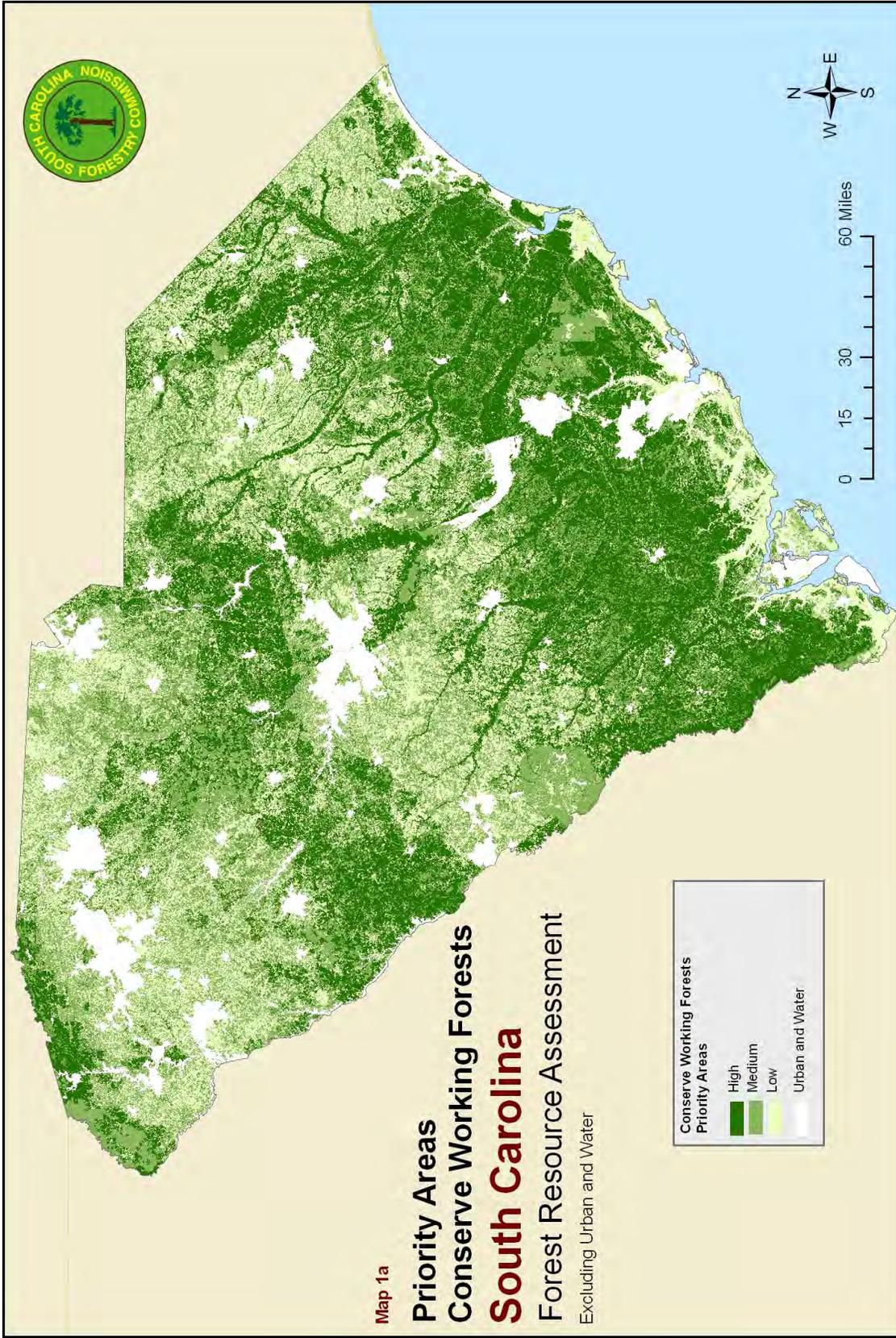
Literature Cited and References

- Jacobs, J.; R. Srinivasan; and B. Barber. 2008. *Southern Forest Land Assessment: A Cooperative Project of the Southern Group of State Foresters*. Available online at <http://tfsweb.tamu.edu/main/popup.aspx?id=5818>.
- Johnson, T.G.; M. Knight. 2006. *South Carolina's timber industry—an assessment of timber product output and use, 2003*. Resour. Bull. SRS-106. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station.
- Johnson, T. G.; N. Smith. 2007. *South Carolina's timber industry—an assessment of timber product output and use, 2005*. Resour. Bull. SRS-121. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station.
- Johnson, T. G.; J.W. Bentley.; M. Howell. 2009. *The South's timber industry – an assessment of timber product output and use, 2007*. Resour. Bull. SRS-164. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station.
- Starkey, D. A. 2009. USDA Forest Service. Personal communication.

APPENDIX 2

Priority Area Maps

The maps on the following pages are a compilation of GIS layers that relate to the issues discussed in the assessment. The priority area maps show all three rankings (Low, Medium, and High) based on these layers while the priority landscape maps highlight those areas that were ranked in the High category.



Map 1a

**Priority Areas
Conserve Working Forests
South Carolina
Forest Resource Assessment**
Excluding Urban and Water

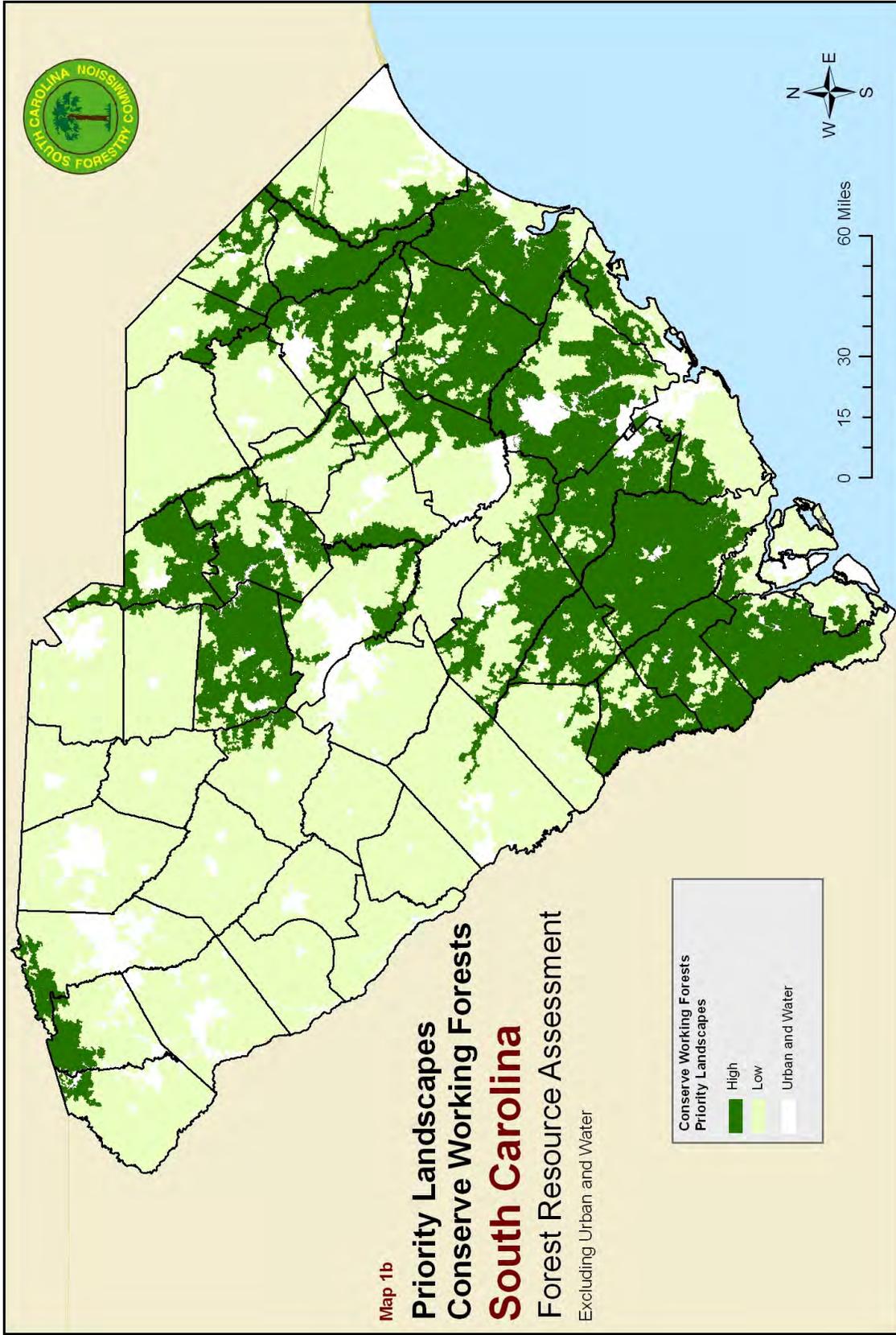


South Carolina Forestry Commission
5500 Broad River Road
Columbia, SC 29212
DISCLAIMER: This is a product of the South Carolina Forestry Commission GIS Department.
Reasonable efforts have been made to ensure the accuracy of this map.
The SCFC expressly disclaims responsibility for damages or liability that may arise from the use of this map.

OVERLAY INPUT DATA LAYERS
Development Level
Timber Supply
Distance to Port
Proximity to Public Lands

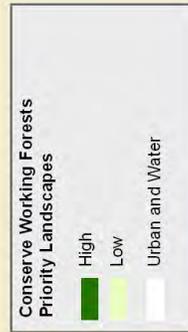
MAP NOTES
Date: June 2010
Map by: SCFC GIS
Projection: NAD1983 State Plane South Carolina FIPS 3900

CONTACT INFORMATION
Russell Hubright
Forest Management Chief
South Carolina Forestry Commission
803-896-8823
rhubright@forestry.state.sc.us



Map 1b

**Priority Landscapes
Conserve Working Forests
South Carolina
Forest Resource Assessment**
Excluding Urban and Water



South Carolina Forestry Commission
5500 Broad River Road
Columbia, SC 29212

DISCLAIMER: This is a product of the South Carolina Forestry Commission GIS Department. Reasonable efforts have been made to ensure the accuracy of this map. The SCFC expressly disclaims responsibility for damages or liability that may arise from the use of this map.

OVERLAY INPUT DATA LAYERS

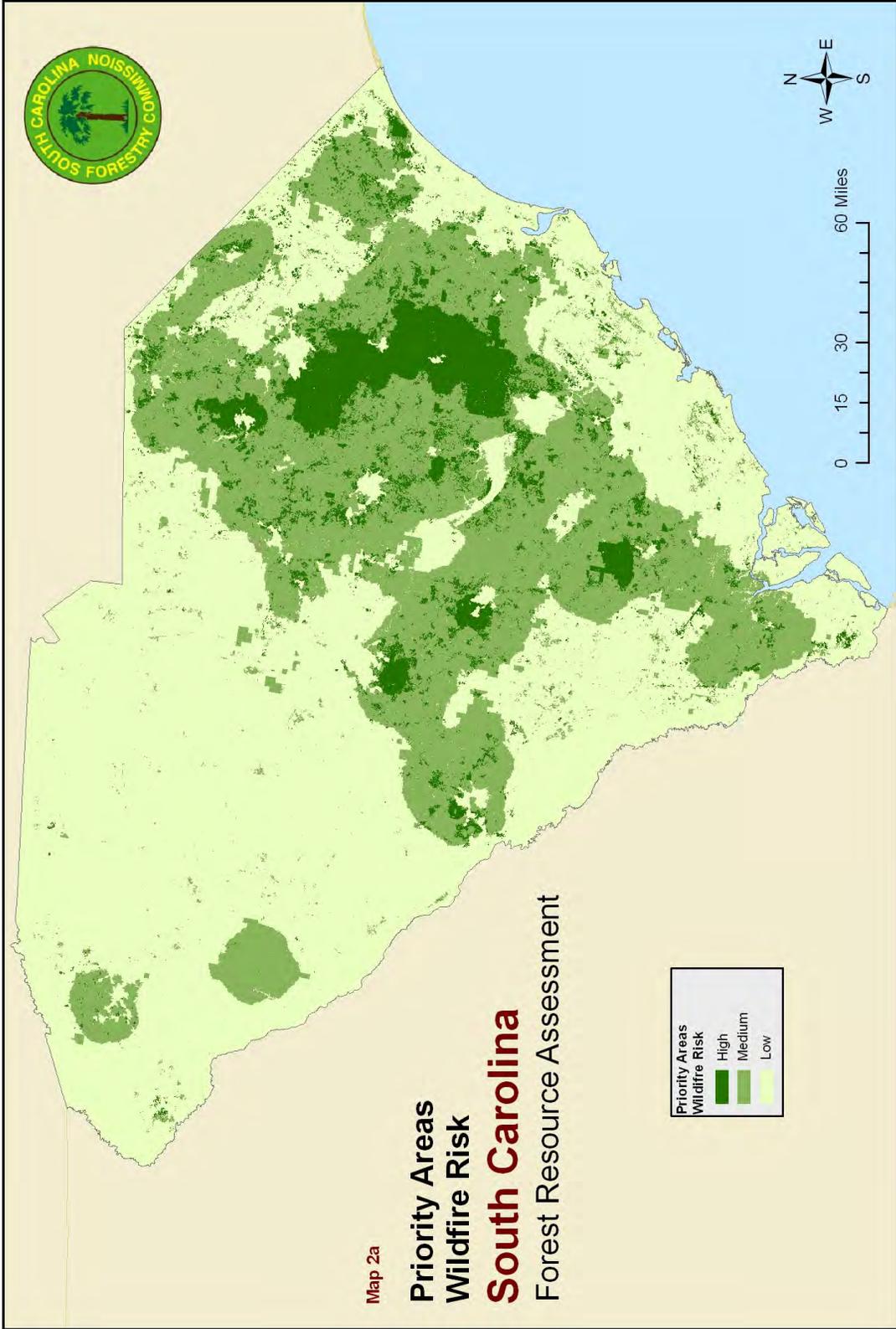
- Development Level
- Timber Supply
- Distance to Port
- Proximity to Public Lands
- Site Productivity
- Economically Distressed Areas
- Decreased Forestation
- Longleaf Range
- T&E Species

MAP NOTES

Date: June 2010
Map by: SCFC GIS
Projection: NAD1983 State Plane South Carolina FIPS 3900

CONTACT INFORMATION

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Forest Management Chief
South Carolina Forestry Commission
803-896-8823
rhubright@forestry.state.sc.us



Map 2a

**Priority Areas
Wildfire Risk
South Carolina
Forest Resource Assessment**

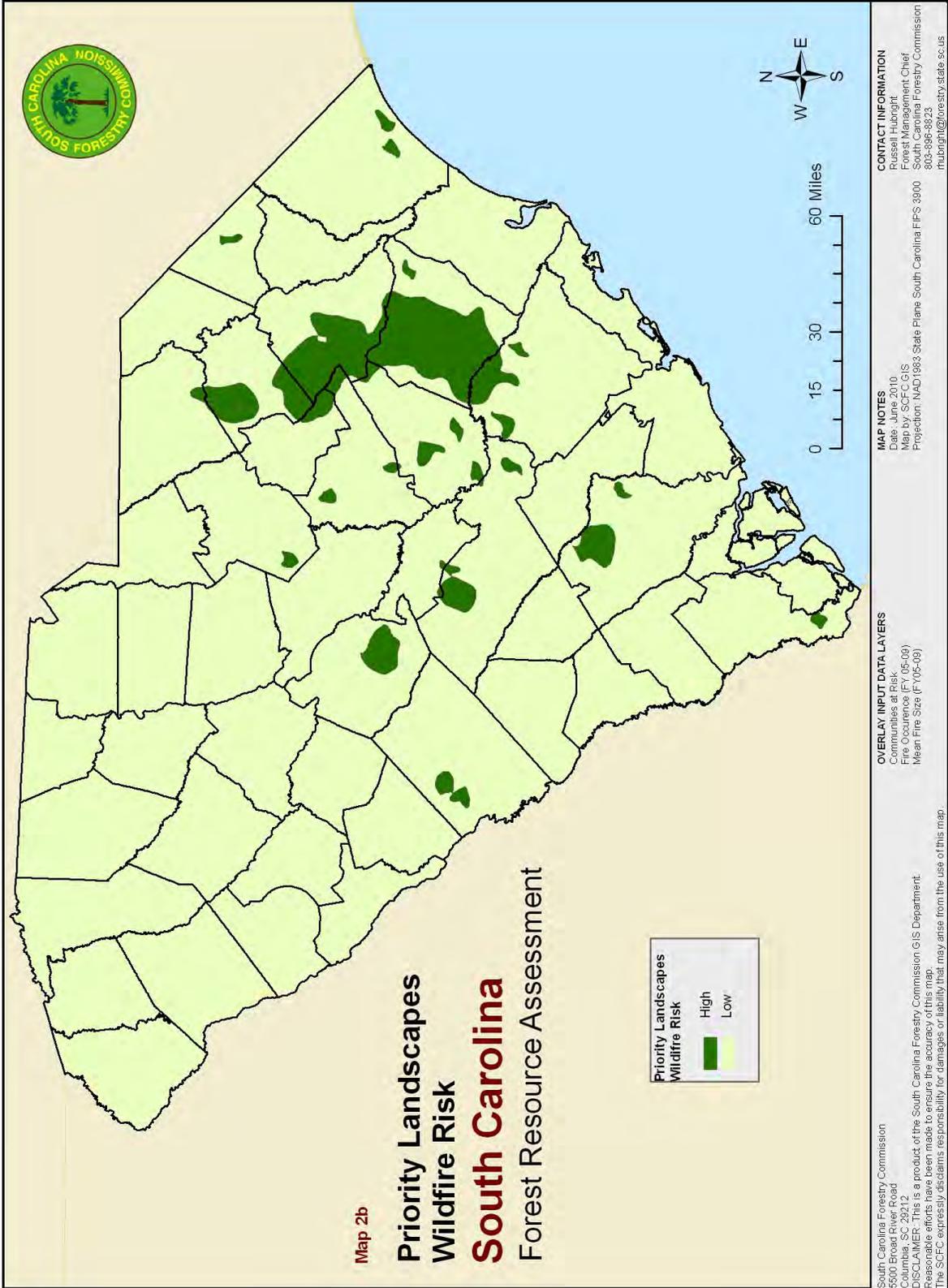


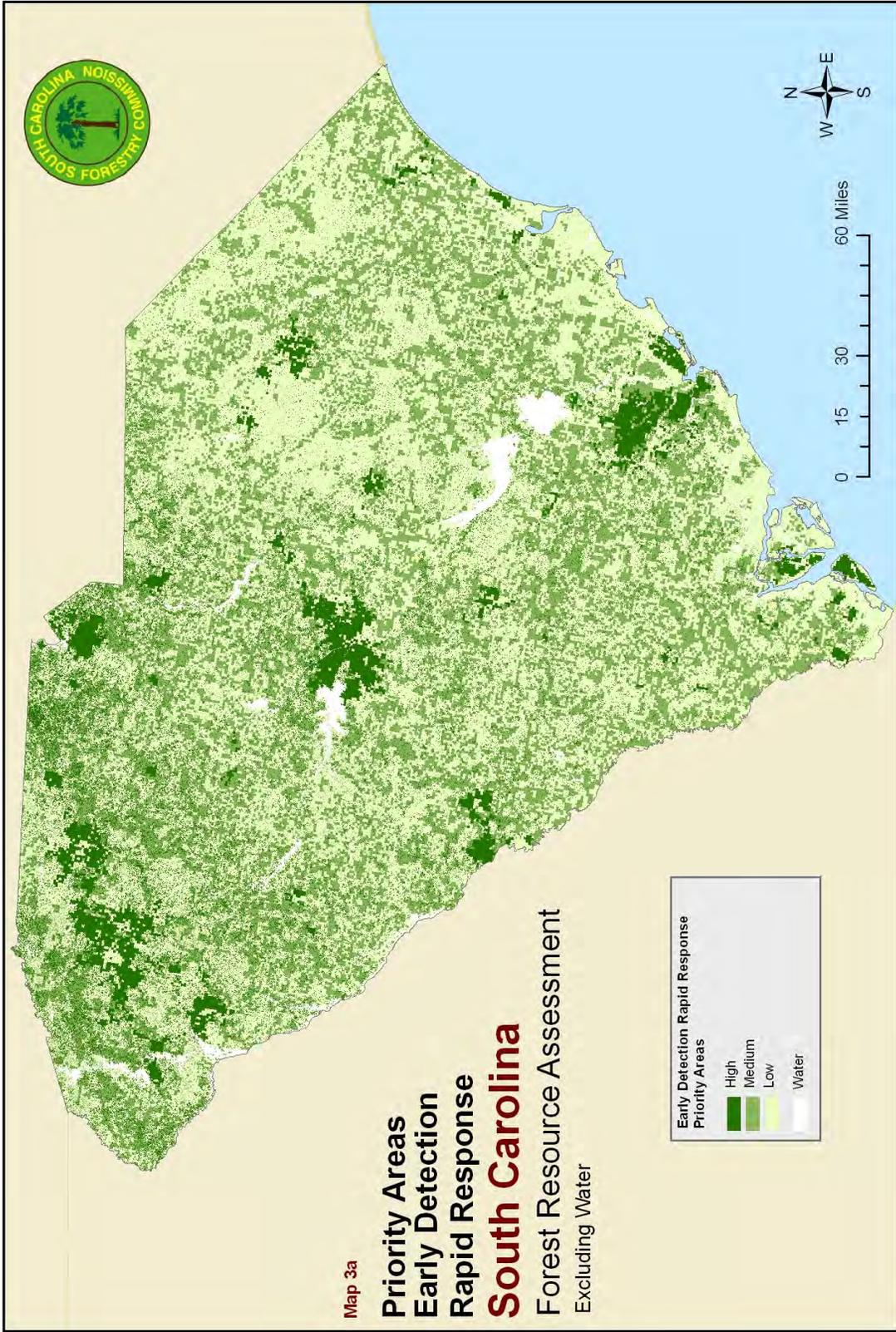
South Carolina Forestry Commission
 5500 Broad River Road
 Columbia, SC 29212
 DISCLAIMER: This is a product of the South Carolina Forestry Commission GIS Department.
 Reasonable efforts have been made to ensure the accuracy of this map.
 The SCFC expressly disclaims responsibility for damages or liability that may arise from the use of this map.

OVERLAY INPUT DATA LAYERS
 Communities at Risk
 Fire Occurrence (FY 05-09)
 Mean Fire Size (FY05-09)

MAP NOTES
 Date: June 2010
 Map by: SCFC GIS
 Projection: NAD1983 State Plane South Carolina FIPS 3900
 802-896-8823
 rhubright@forestry.state.sc.us

CONTACT INFORMATION
 Russell Hubright
 Forest Management Chief
 South Carolina Forestry Commission
 802-896-8823
 rhubright@forestry.state.sc.us





Map 3a

**Priority Areas
Early Detection
Rapid Response
South Carolina
Forest Resource Assessment
Excluding Water**

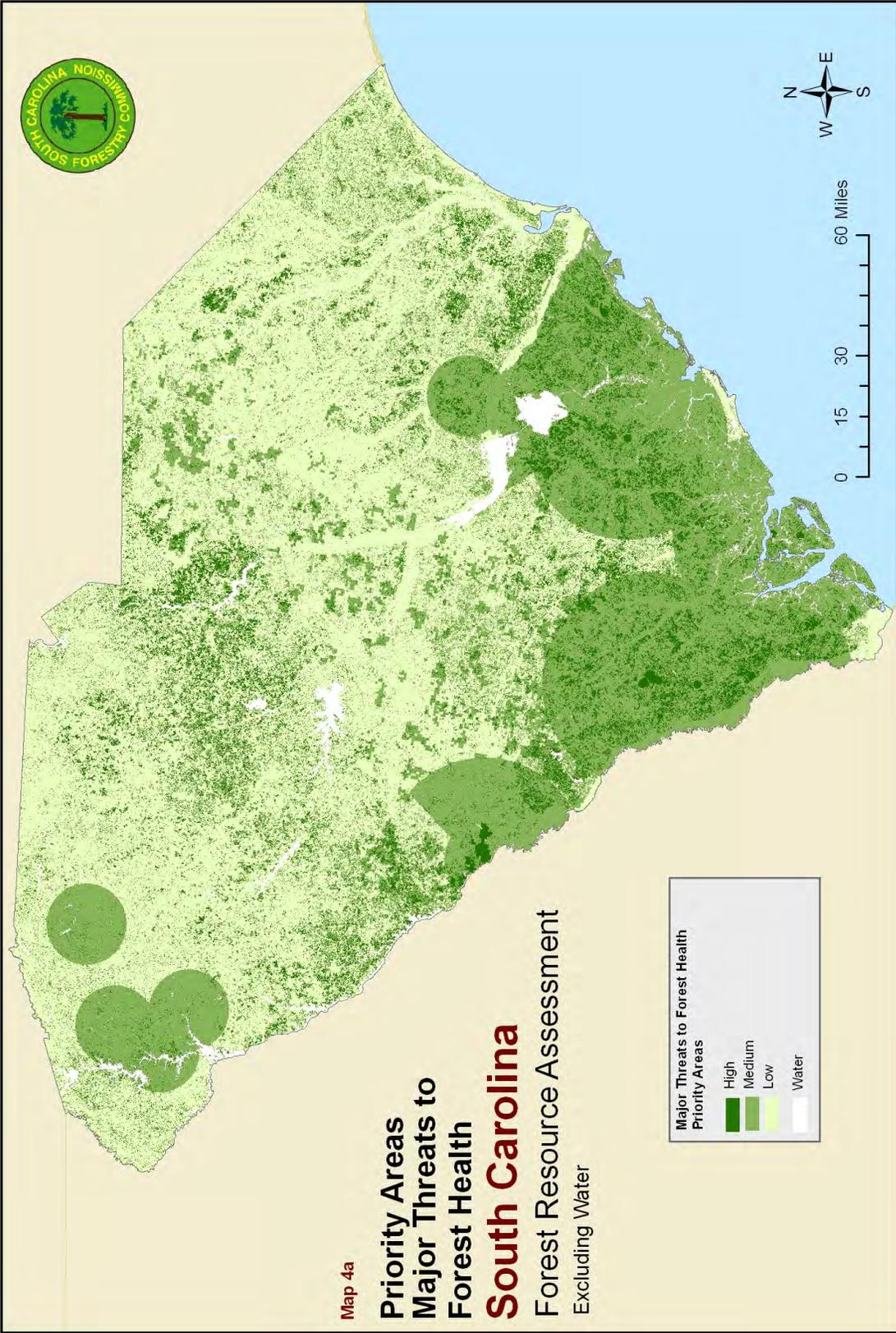


South Carolina Forestry Commission
 500 Broad Street
 Columbia, SC 29101
 DISCLAIMER: This is a product of the South Carolina Forestry Commission (SCFC) Department.
 Reasonable efforts have been made to ensure the accuracy of this map.
 The SCFC expressly disclaims responsibility for damages or liability that may arise from the use of this map.

OVERLAY/INPUT DATA LAYERS
 Sirex Wood Wasp Susceptibility
 Asian Longhorn Beetle Susceptibility
 Gypsy Moth Potential Habitat

MAP NOTES
 Date: June 2010
 Appy: SCFC GIS
 Projection: NAD 1983 State Plane South Carolina FIPS 3900
 rhubright@forestry.state.sc.us

CONTACT INFORMATION
 Russell Hubright
 Management Chief
 South Carolina Forestry Commission
 803-896-8823
 rhubright@forestry.state.sc.us



Map 4a

**Priority Areas to
Major Threats to
Forest Health
South Carolina**
Forest Resource Assessment
Excluding Water

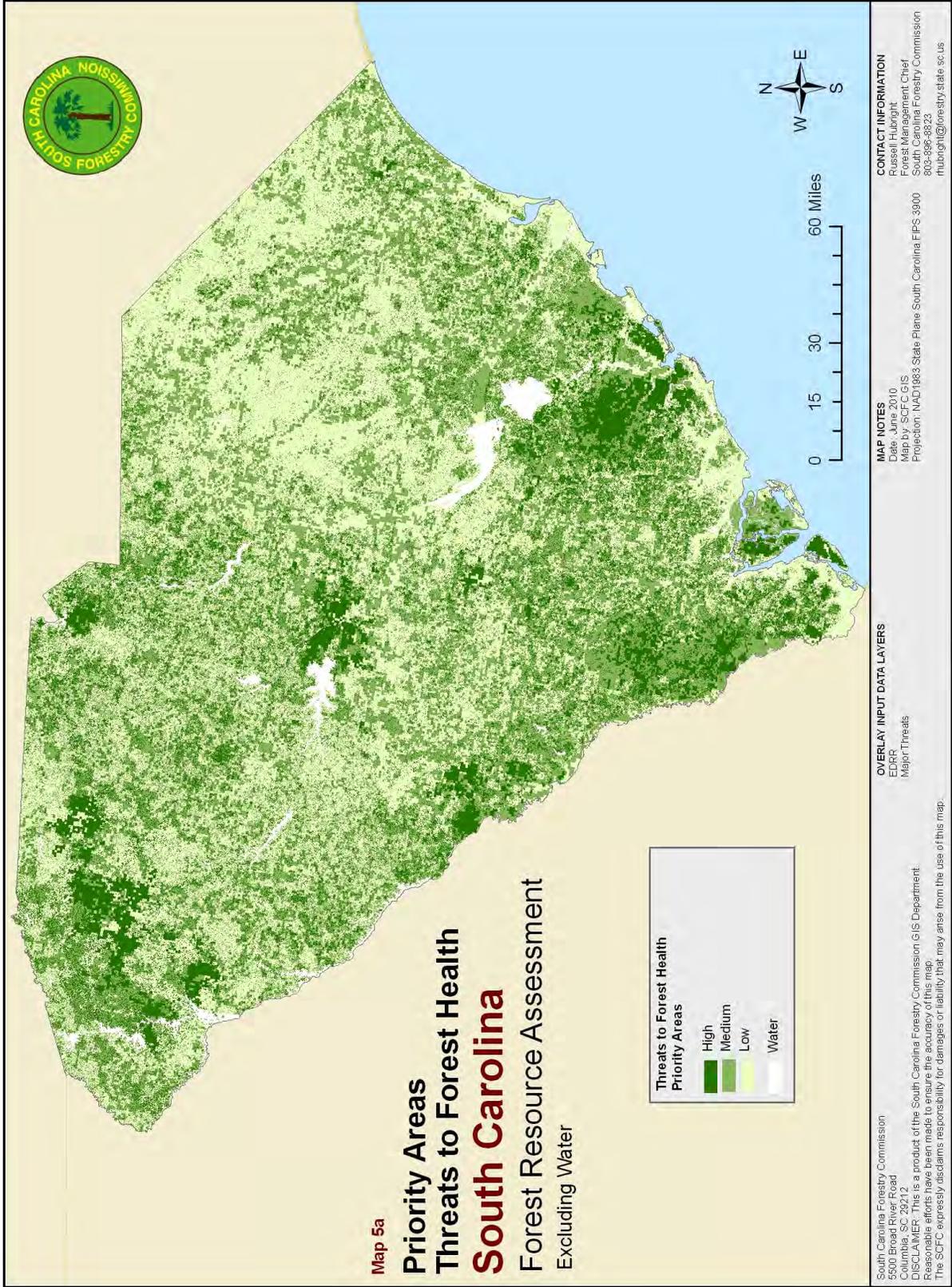


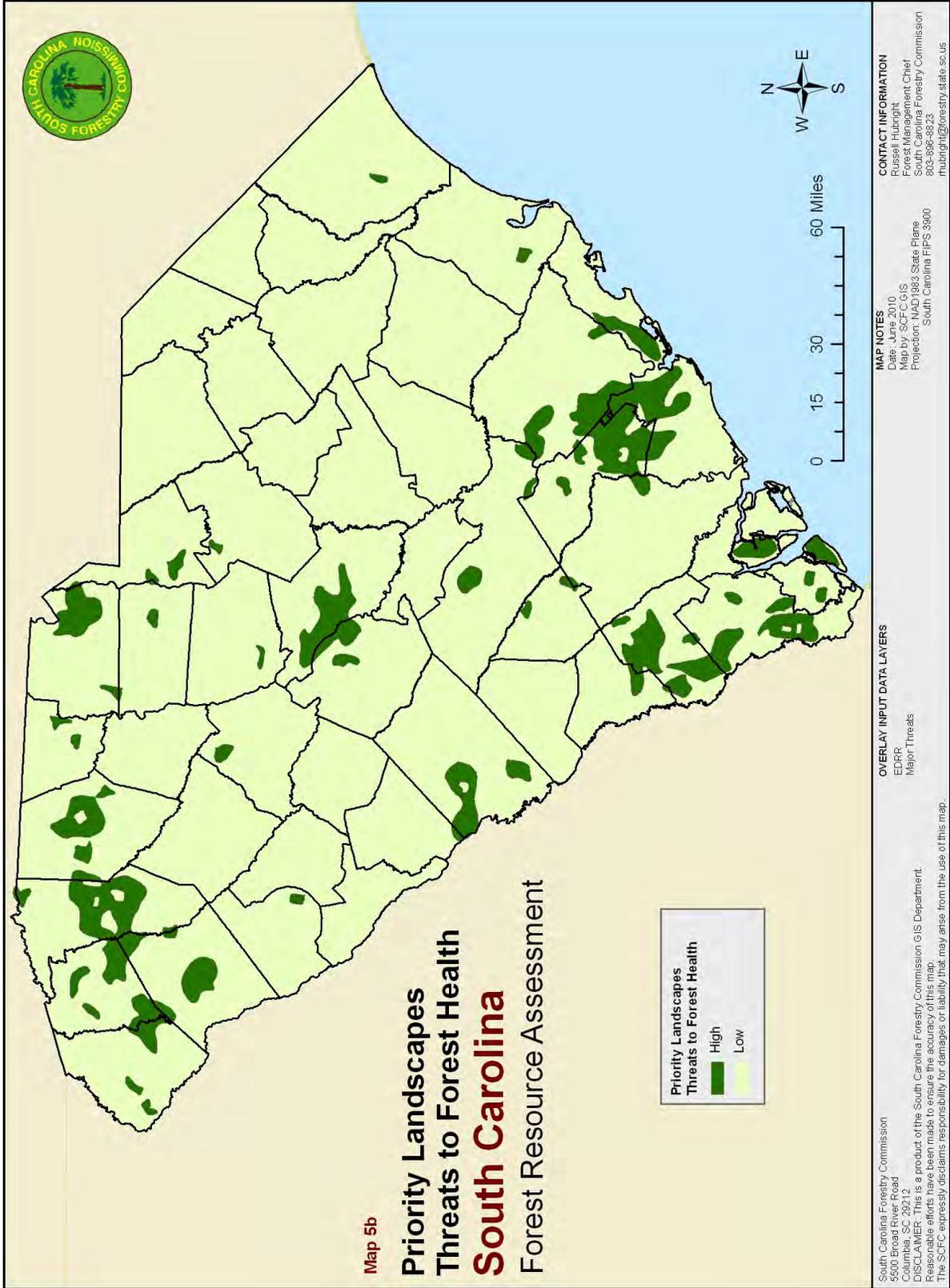
South Carolina Forestry Commission
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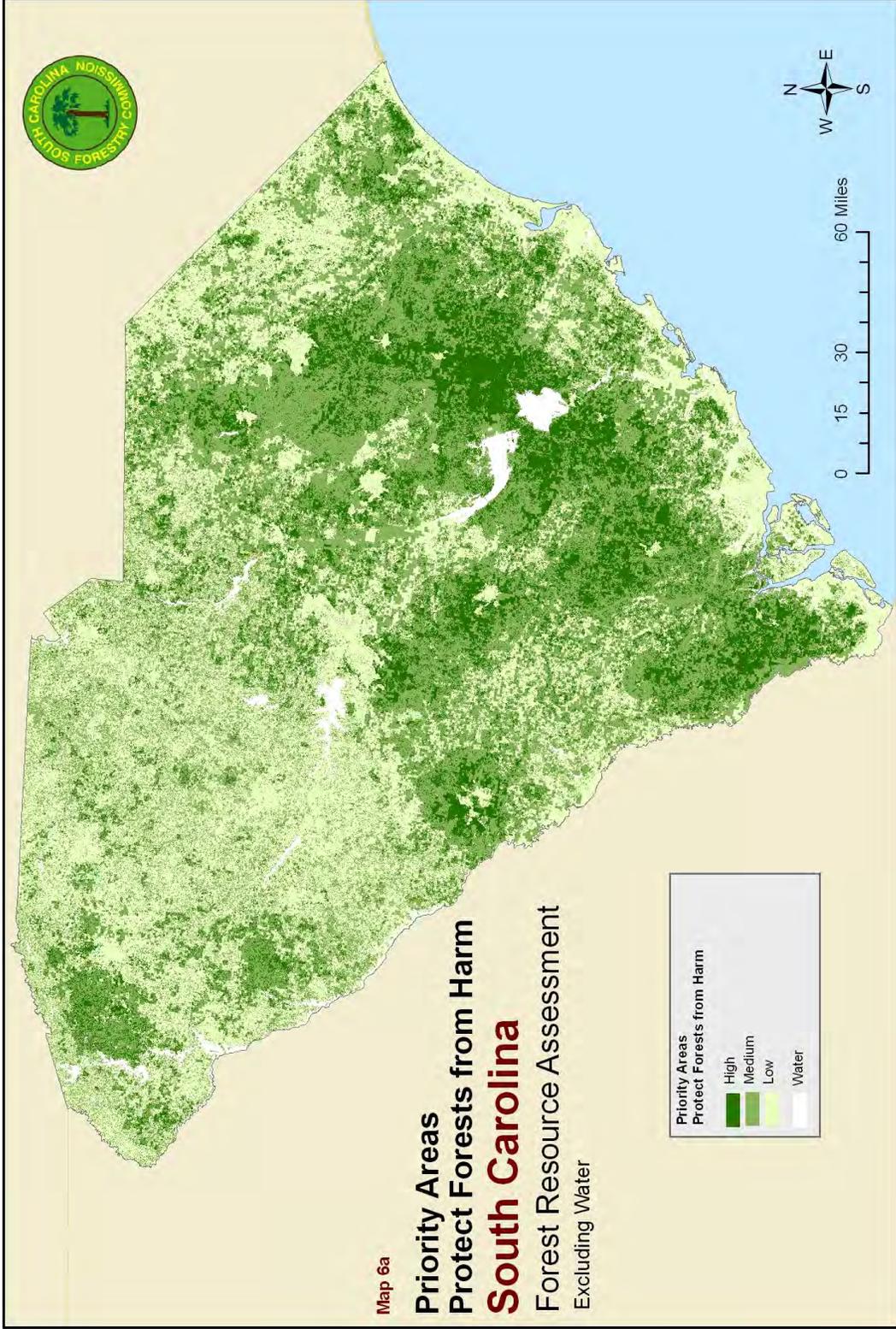
OVERLAY INPUT DATA LAYERS
Southern Pine Beetle Risk
Cogongrass Potential
Annoyous Root Rot Risk
Laurel Wilt Distribution
Hemlock Woolly Adelgid Potential
Fusiform Rust Potential
Oak Wilt Distribution

MAP NOTES
Date: June 2010
Map by: SCFC GIS
Projection: NAD 1983 State Plane South Carolina FIPS 3900

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rhubright@forestry.state.sc.us







Map 6a

**Priority Areas
Protect Forests from Harm
South Carolina
Forest Resource Assessment
Excluding Water**

**Priority Areas
Protect Forests from Harm**

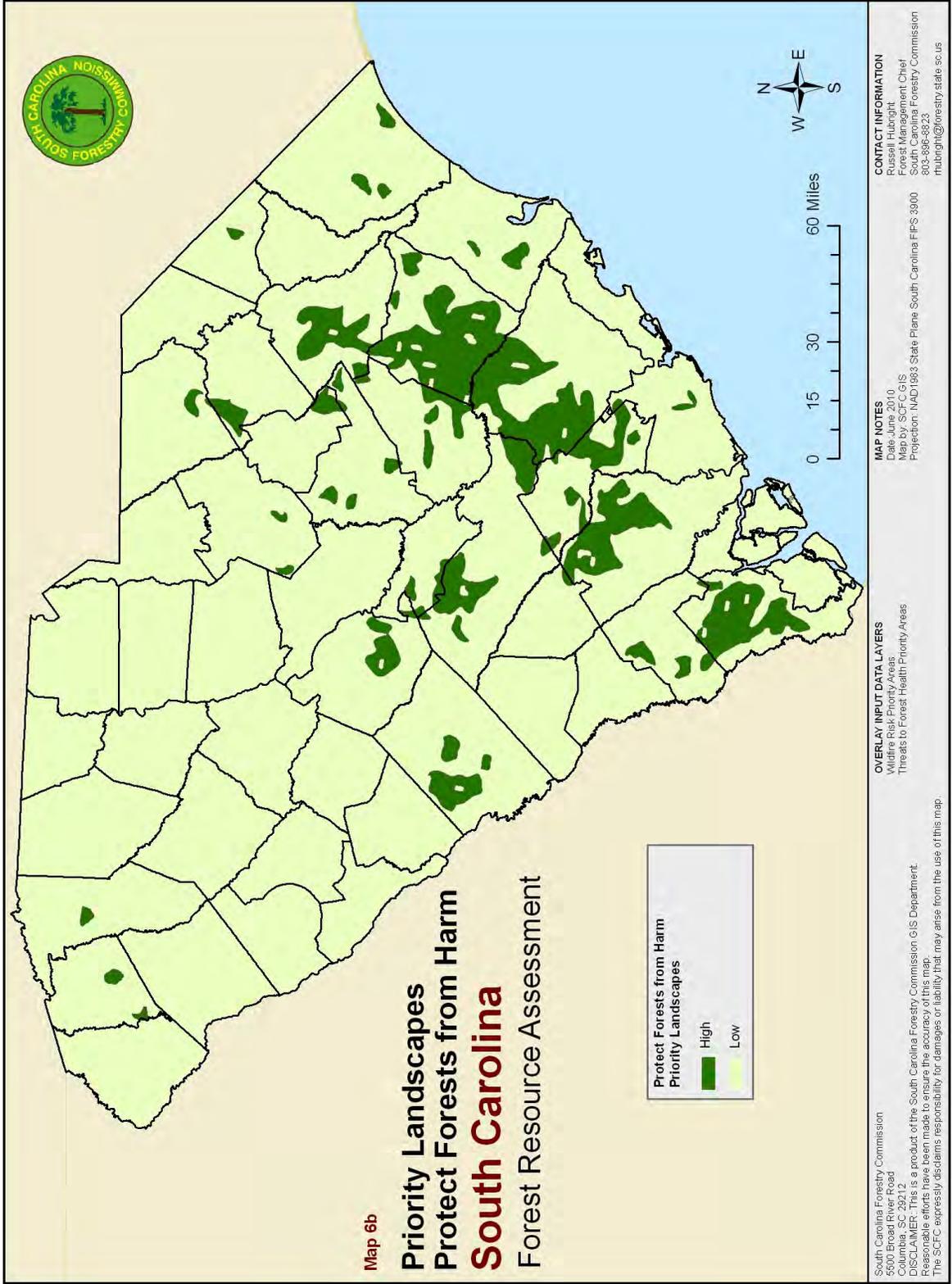
- High
- Medium
- Low
- Water

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OVERLAY INPUT DATA LAYERS
 Watersheds
 Threats to Forest Health Priority Areas

MAP NOTES
 Date: 10/10
 Map by: SCFC GIS
 Projection: NAD 1983 State Plane South Carolina FIPS 3900

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Map 6b

**Priority Landscapes
Protect Forests from Harm
South Carolina
Forest Resource Assessment**

**Protect Forests from Harm
Priority Landscapes**

- High
- Low

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OVERLAY INPUT DATA LAYERS
Wildfire Risk Priority Areas
Threats to Forest Health Priority Areas

MAP NOTES
Date: June 2010
Map by: SCFC GIS
Projection: NAD1983 State Plane South Carolina FFS 3000

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Map 7a

Priority Areas Water Quality and Quantity South Carolina Forest Resource Assessment

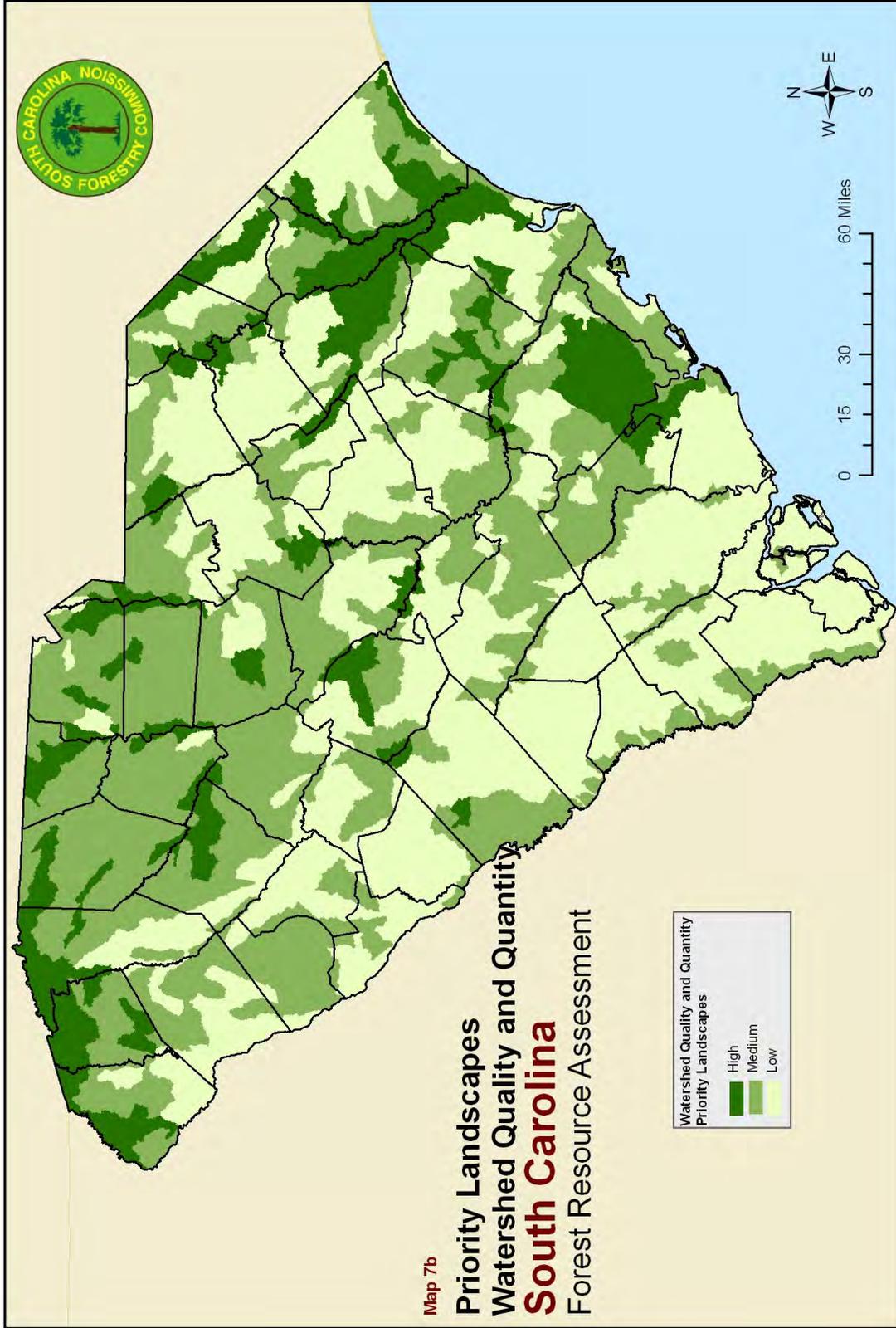


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OVERLAY INPUT DATA LAYERS
Richness Assessment
Water Quality Threat Assessment
Water Resources Assessment

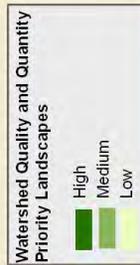
MAP NOTES
Date: June 2010
Map by: SCFC GIS
Projection: NAD1983 State Plane South Carolina FPS 3900

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Map 7b

Priority Landscapes
Watershed Quality and Quantity
South Carolina
 Forest Resource Assessment

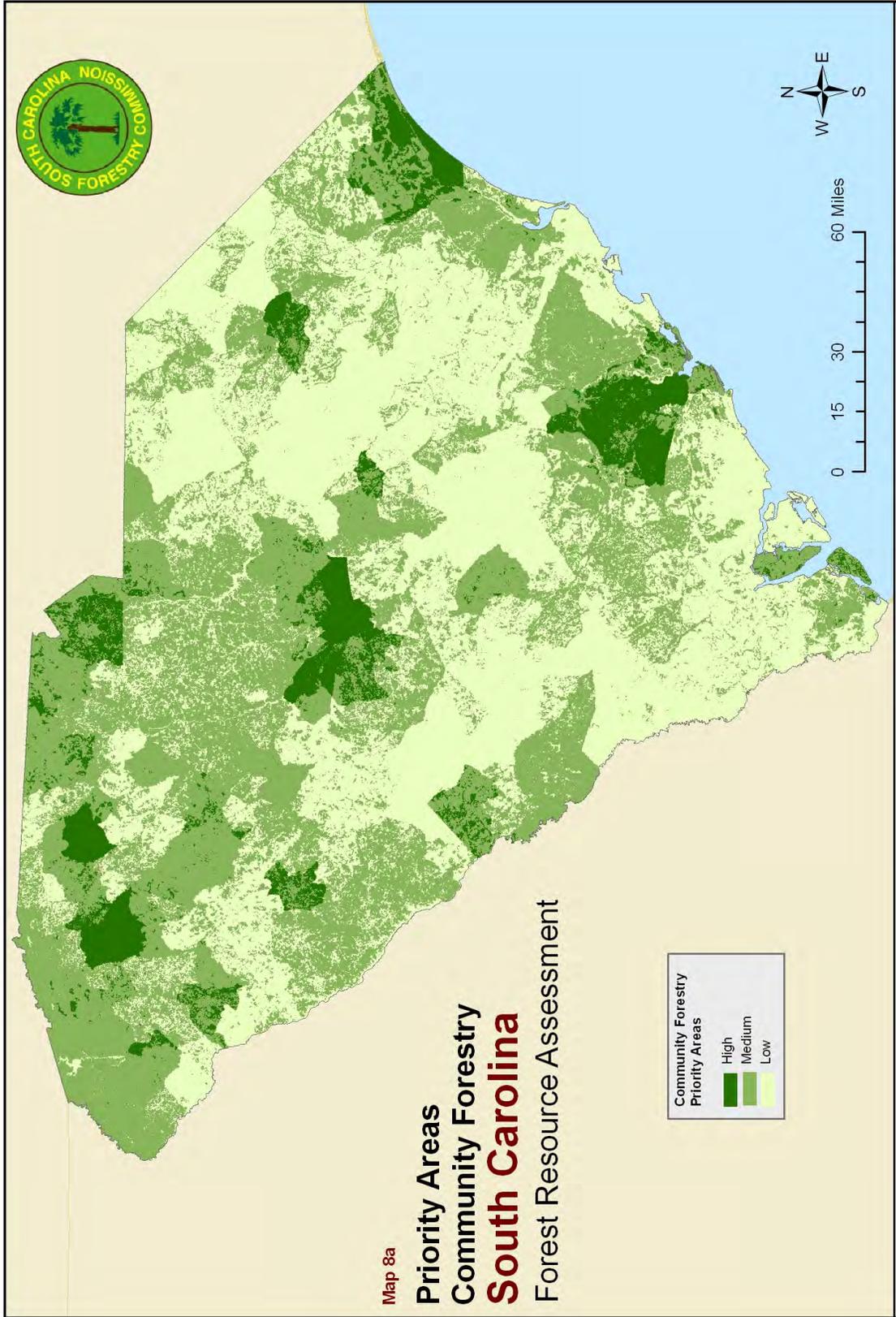


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OVERLAY INPUT DATA LAYERS
 Richness Assessment
 Water Quality Threat Assessment
 Water Resources Assessment

MAP NOTES
 Date: June 2010
 Map by: SFC GIS
 Projection: NAD1983 State Plane South Carolina FFS 3900

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Map 8a

Priority Areas Community Forestry South Carolina Forest Resource Assessment

Community Forestry
Priority Areas

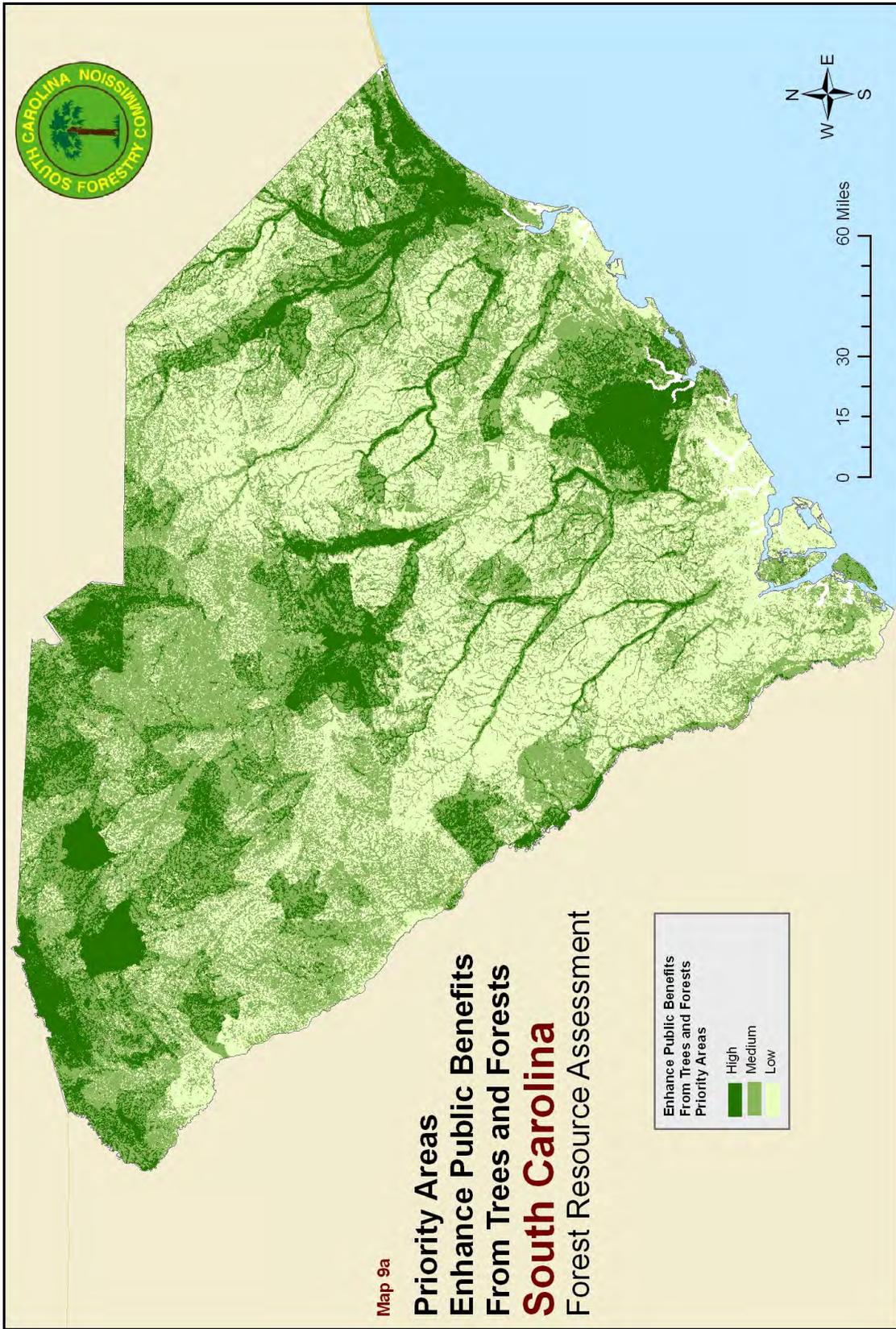
- High
- Medium
- Low

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OVERLAY INPUT DATA LAYERS
Development Level
Forestland
Impervious Surface (%)
Population Density
Urban Forest Canopy (%)

MAP NOTES
Date: June 2010
Map by: SCFC GIS
Projection: NAD1983 State Plane South Carolina FIPS 3900

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Map 9a

**Priority Areas
Enhance Public Benefits
From Trees and Forests
South Carolina
Forest Resource Assessment**

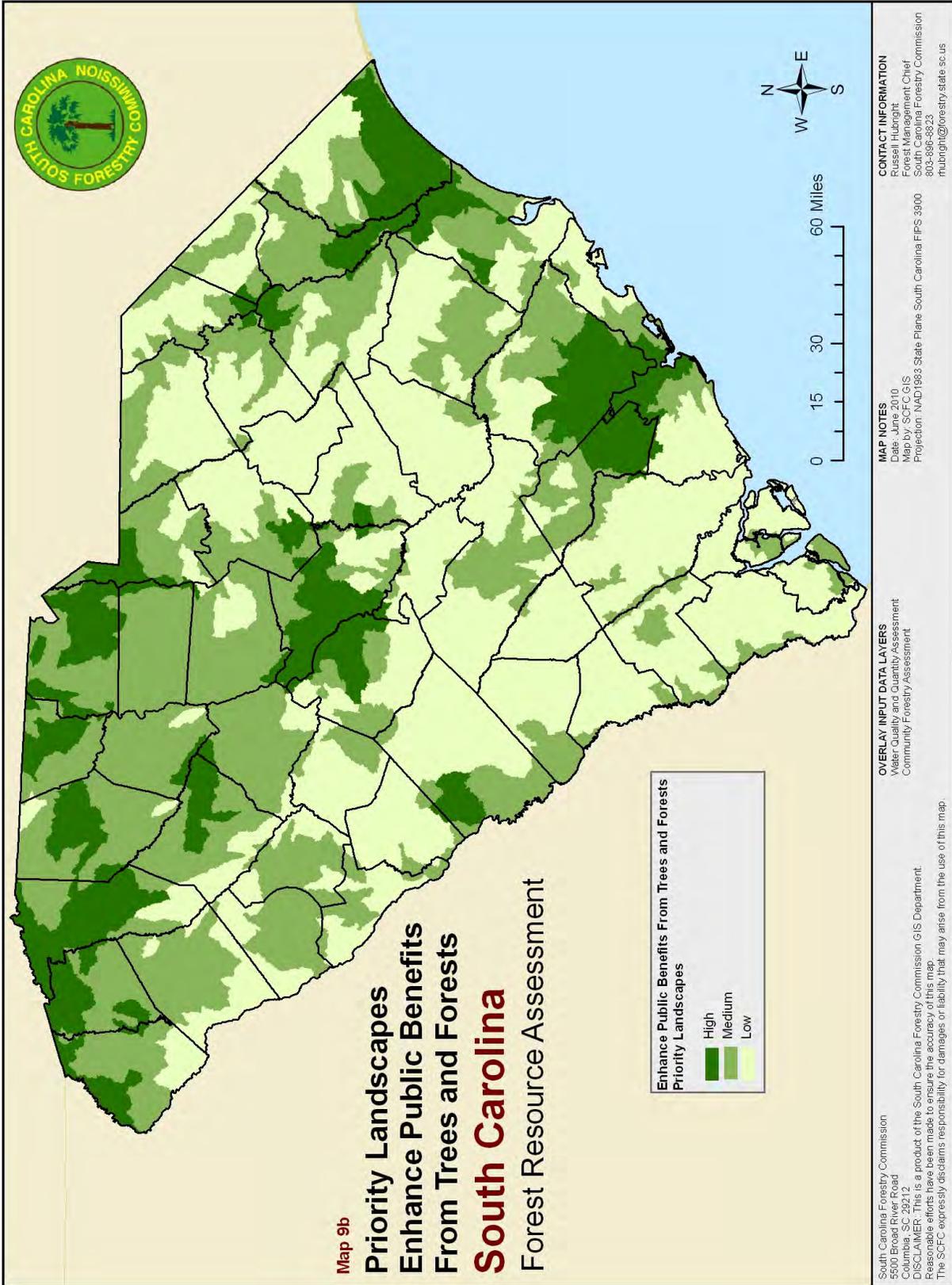


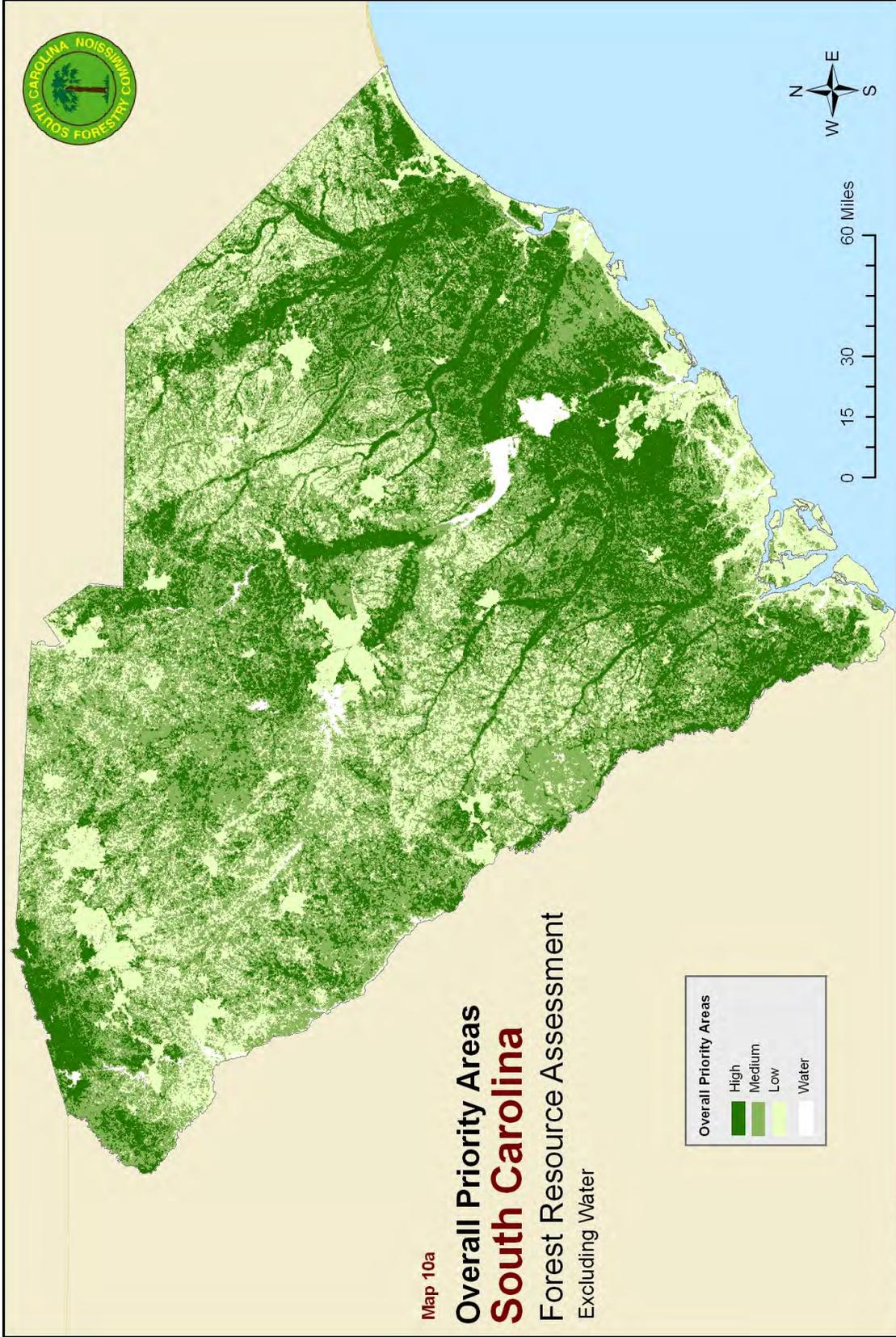
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OVERLAY INPUT DATA LAYERS
 Water Quality and Quantity Assessment
 Community Forestry Assessment

MAP NOTES
 Date: June 2010
 Map by: SCFC GIS
 Projection: NAD 1983 State Plane South Carolina FIPS 3900

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Map 10a

Overall Priority Areas South Carolina Forest Resource Assessment Excluding Water



South Carolina Forestry Commission
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OVERLAY INPUT DATA LAYERS

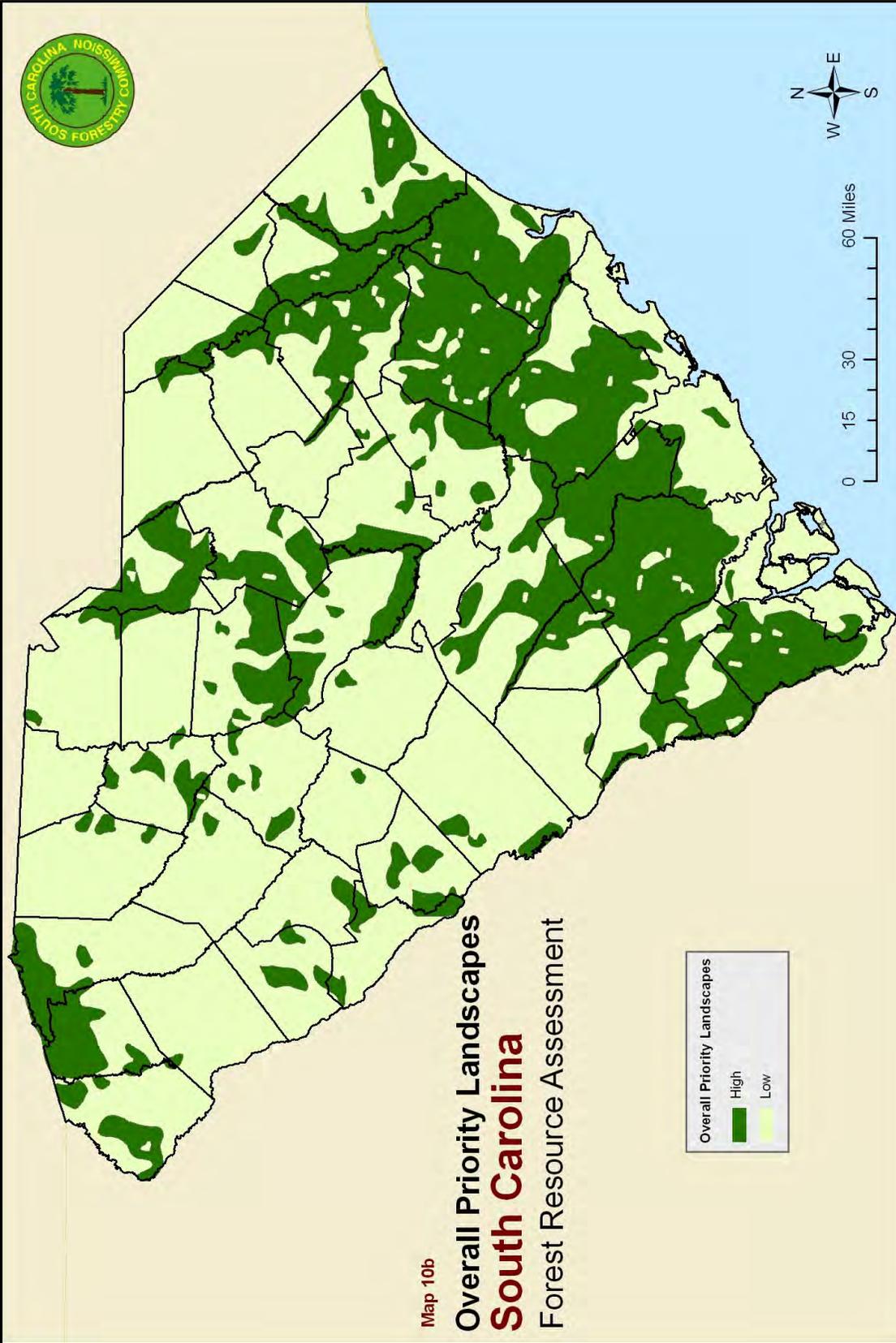
Conserve Working Forests Overlay/Analysis
Protect Forests from Harm Overlay/Analysis
Enhance Benefits from Forests Overlay/Analysis

MAP NOTES

Date: June 2010
Map by: SCFC GIS
Projection: NAD 83 State Plane
South Carolina FIPS 3900

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Map 10b

Overall Priority Landscapes
South Carolina
 Forest Resource Assessment



South Carolina Forestry Commission
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OVERLAY INPUT DATA LAYERS
 Concurrence Mapping Forests Overlay Analysis
 Private Forests in High Overlay Analysis
 Enhance Benefits from Forests Overlay Analysis

MAP NOTES
 Date: June 2010
 Map by: SCFC GIS
 Projection: NAD83 State Plane
 South Carolina FIPS 3900

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Appendix 3

Multi-State Issues

Issue	States Included (current and/or potential)
Identify and conserve high priority forest ecosystems and landscapes	VA, NC, SC, GA, FL, AL, MS, LA, TX
Example of current activity: restoration of longleaf pine ecosystem	
Regional forest health issues	SC, GA, FL, AL, MS, LA, TX, TN
Example of current activity: cogongrass eradication	
Conserve working forests	VA, NC, SC, GA, FL, AL, MS, LA, TX, TN, OK, AR, KY
Example of current activity: ensure that local ordinances do not restrict forest management activities	
Regional wildfire issues	VA, NC, SC, GA, FL, AL, MS, LA, TX, TN, OK, AR, KY
Example of current activity: One Message, Many Voices campaign	
Water quality and quantity	GA (Atlanta's water use), SC, NC (Charlotte water use)
Example of current activity: conflict over water use	
Wildland-urban interface issues	VA, NC, SC, GA, FL, AL, MS, LA, TX, TN, OK, AR, KY
Example of current activity: Changing Roles training	
Economic vitality of forestry	NC, SC, GA
Example of current activity: online mapping of forest products facilities	

APPENDIX 4

National Objectives			
Theme	Outcome	Objective	Number
Conserving Working Forest Landscapes	High priority forest ecosystems and landscapes are identified and conserved.	Identify and conserve high priority forest ecosystems and landscapes.	1.1
	Forests are actively and sustainably managed.	Actively and sustainably manage forests.	1.2
Protect Forests From Harm	Fire-adapted lands are restored and risk of wildfire impacts is reduced.	Restore fire-adapted lands and reduce risk of wildfire impacts.	2.1
	Threats to forest and ecosystem health are identified, managed, and reduced.	Identify, manage and reduce threats to forest and ecosystems health.	2.2
Enhance Public Benefits Associated with Trees and Forests	Water quality and quantity is protected and enhanced.	Protect and enhance water quality and quantity.	3.1
	Air quality is improved and energy is conserved.	Improve air quality and conserve energy.	3.2
	Communities plan for and reduce their risks from wildfire.	Assist communities in planning for and reducing wildfire risks.	3.3
	The economic benefits and values of trees and forests are maintained and enhanced.	Maintain and enhance the economic benefits and values of trees and forests.	3.4
	Wildlife and fish habitat is protected, conserved, and enhanced.	Protect, conserve, and enhance wildlife and fish habitat.	3.5
	People are connected to trees and forests and are engaged in environmental stewardship activities.	Connect people to trees and forests, and engage them in environmental stewardship activities.	3.6
	Trees and forests are managed and restored to help mitigate and adapt to global climate change.	Manage and restore trees and forests to mitigate and adapt to global climate change.	3.7

APPENDIX 5 Stakeholders

Many of the organizations below participated in stakeholders meetings and responded to surveys to help ensure that this document is accurate and represents a broad array of interests.

Aiken Land Conservancy	SC Department of Health & Environmental Control
American Forest Foundation	SC Department of Natural Resources
American Tree Farm System - SC	SC American Planning Association
Army Corps of Engineers	SC Association of Conservation Districts
Association of Consulting Foresters	SC Association of Counties
Beaufort County Open Land Trust	SC Association of Realtors
Berkeley-Charleston-Dorchester Council of Government	SC Camo Coalition
Black Creek Land Trust	SC Chamber of Commerce
Bureau of Land Management	SC Conservation Bank
Catawba Indian Nation	SC Department of Agriculture
Catawba Regional Planning Council	SC Farm Bureau
Central Midlands Council of Government	SC Forestry Association
Clemson Extension Service	SC Home Builders Association
Clemson University	SC Land Trust Network
Coastal Conservation League	SC Landscape & Turfgrass Association
Community Open Land Trust	SC Native Plant Society
Congaree Land Trust	SC Nursery & Landscape Association
Conservation Voters of SC	SC Prescribed Fire Council
Ducks Unlimited	SC Sportsmen's Association
Edisto Island Land Trust	SC State Park Service
Environmental Defense Fund	SC Timber Producers Assoc.
Foresters Council	SC Tourism Council
Hilton Head Island Land Trust	SC Tree Farm Committee
Katawba Valley Land Trust	SC Urban & Community Forestry Council
Longleaf Alliance	SC Wildlife Federation
Lowcountry Open Land Trust	SCANA
Lower Savannah Council of Government	SFI Committee
Municipal Association of South Carolina	Sierra Club
Nation Ford Land Trust	Stewardship Coordinating Committee
National Arbor Day Foundation	Strom Thurmond Institute - Jim Self Center
National Audubon Society	Sustaining Family Forests
National Park Service	The Conservation Fund
National Rifle Association	The Land Trust Alliance
National Wild Turkey Federation	The Nature Conservancy
National Wildlife Federation	Trout Unlimited
Naturaland Trust	Trust for Public Land
Palmetto Agribusiness Council	Upper Savannah Council of Government
Palmetto Conservation Foundation	Upstate Forever
Palmetto Conservation Foundation	Urban Land Institute
Partnership for the Blue Ridge	US Fish & Wildlife Service
Pee Dee Land Trust	USDA Farm Services Agency
Pee Dee Regional Council of Government	USDA Forest Service
Quail Unlimited	USDA NRCS
S.C. Appalachian Council of Government	Waccamaw Regional Planning & Development Council
Santee Indian Organization	Wildlife Action, Inc.
Santee Lynches Council of Government	

Stakeholders Sorted by Group Name

ORGANIZATION GRO	UP
Clemson Department of Plant Industry	Clemson DPI
Clemson Extension Service	Clemson Extension Service
Clemson University	Clemson University
Audubon South Carolina	Conservation Organization
Conservation Voters of SC	Conservation Organization
Ducks Unlimited	Conservation Organization
Longleaf Alliance	Conservation Organization
National Audubon Society	Conservation Organization
National Wild Turkey Federation	Conservation Organization
Quail Unlimited	Conservation Organization
SC Camo Coalition	Conservation Organization
SC Wildlife Federation	Conservation Organization
Sierra Club	Conservation Organization
Sustainable Midlands	Conservation Organization
Sustaining Family Forests	Conservation Organization
Trout Unlimited	Conservation Organization
Wildlife Action, Inc.	Conservation Organization
The Nature Conservancy	Conservation Organization
Berkeley-Charleston-Dorchester Council of Government	Council of Government
Catawba Regional Planning Council	Council of Government
Central Midlands Council of Government	Council of Government
Lower Savannah Council of Government	Council of Government
Municipal Association of South Carolina	Council of Government
Pee Dee Regional Council of Government	Council of Government
S.C. Appalachian Council of Government	Council of Government
Santee Lynches Council of Government	Council of Government
SC Association of Counties	Council of Government
Upper Savannah Council of Government	Council of Government
Waccamaw Regional Planning & Development Council	Council of Government
Army Corps of Engineers	Federal Land Management Agency
Bureau of Land Management	Federal Land Management Agency
Department of Defense	Federal Land Management Agency
National Park Service	Federal Land Management Agency
US Fish & Wildlife Service	Federal Land Management Agency
USDA Farm Services Agency	Federal Land Management Agency
USDA NRCS	Federal Land Management Agency
Fire Departments	Fire Service

ORGANIZATION GRO	UP
Association of Consulting Foresters	Forestry Association
Kershaw County Forest Landowners Association	Forestry Association
Lexington County Forestry Association	Forestry Association
Newberry County Forest Landowners Association	Forestry Association
Orangeburg-Calhoun Landowners Association	Forestry Association
SFI Committee	Forestry Association
Catawba Indian Nation	Indian Tribe
Santee Indian Organization	Indian Tribe
Aiken Land Conservancy	Land Trust
Beaufort County Open Land Trust	Land Trust
Black Creek Land Trust	Land Trust
Coastal Conservation League	Land Trust
Community Open Land Trust	Land Trust
Congaree Land Trust	Land Trust
Edisto Island Land Trust	Land Trust
Katawba Valley Land Trust	Land Trust
Lord Berkeley Conservation Trust	Land Trust
Lowcountry Open Land Trust	Land Trust
Nation Ford Land Trust	Land Trust
Naturaland Trust	Land Trust
Pee Dee Land Trust	Land Trust
SC Conservation Bank	Land Trust
The Conservation Fund	Land Trust
Trust for Public Land	Land Trust
Upstate Forever	Land Trust
Palmetto Agribusiness Council	Natural Resource Association
SC Association of Conservation Districts	Natural Resource Association
SC Exotic Pest Council	Natural Resource Association
SC Farm Bureau	Natural Resource Association
SC Forestry Association	Natural Resource Association
SC Native Plant Society	Natural Resource Association
SC Prescribed Fire Council	Natural Resource Association
SC Timber Producers Association	Natural Resource Association
Stewardship Coordinating Committee	Natural Resource Association
US Endowment for Forestry & Communities, Inc.	Natural Resource Association
SC Association of Realtors	Professional Organization
SC Chapter of the American Planning Association	Professional Organization
SC Chapter of the American Society of Landscape Architects	Professional Organization
SC Home Builders Association	Professional Organization
SC Landscape & Turfgrass Association	Professional Organization
SC Nursery & Landscape Association	Professional Organization
SC Public Works Association	Professional Organization
SC Urban & Community Forestry Council	Professional Organization

ORGANIZATION GRO	UP
SC Department of Agriculture	SC Department of Agriculture
SC Department of Commerce	SC Department of Commerce
SC Department of Health & Environmental Control	SC DHEC
SC Department of Natural Resources	SC DNR
SC Emergency Management Division	SC EMD
Southern Group of State Foresters	SGSF
SLED	SLED
SC Department of Corrections	State Land Management Agency
SC Department of Transportation	State Land Management Agency
SC State Park Service	State Land Management Agency
SC Tree Farm Committee	Tree Farm
USDA Forest Service	USFS
SCANA	Utility
SCE&G	Utility

APPENDIX 6

Key Findings

Overarching Issues

- OA 1. The population in South Carolina is growing rapidly in specific geographic areas.
- OA 2. Much of this growth is from people moving into the state from other areas; these new residents are less familiar with forest management practices.
- OA 3. Much of this growth is in the form of urban sprawl.
- OA 4. This growth is resulting in loss of forest resource benefits in the wildland-urban interface.
- OA 5. Wildfire risk is increasing as population grows in the wildland-urban interface.
- OA 6. Public perceptions about forestry are shaped by many sources.
- OA 7. South Carolina residents have fairly strong pro-conservation attitudes.
- OA 8. Many residents view forests as a resource to be protected instead of one that should be managed (especially if management involves harvesting).
- OA 9. Weather data from the last 30 years indicates that the Earth's atmosphere is warming.
- OA 10. Increased incidence of droughts would reduce the productivity of forests, cause higher mortality due to insect and disease attacks, and contribute to more numerous and more severe wildfires.
- OA 11. Wildlife habitat could be affected adversely by climate change.
- OA 12. Trees and forests play a key role in moderating the effects of climate change.

Conserving SC's Working Forests

- CWF 1. The amount of forest land in South Carolina has remained relatively stable at 12.9 million acres.
- CWF 2. Urbanization is the primary cause of deforestation in South Carolina.
- CWF 3. Private individuals own 59% of the forest land in the state; ownership by forest industry has declined dramatically during the past 10 years; and non-forest industry corporations have acquired significant acreage of forest land.
- CWF 4. Fragmentation, parcelization, and conversion of forests to non-forest uses are major concerns for conserving the state's working forests.
- CWF 5. Timber supply is relatively abundant, but tree planting has declined recently.

- CWF 6. Forestry is a crucial segment of the state's economy, directly providing nearly 45,000 jobs and \$2.3 billion in wages.
- CWF 7. Demand for alternative fuels is creating a market for woody biomass.
- CWF 8. Ecosystem services and non-timber forest products have the potential to grow into significant markets.
- CWF 9. Some regulations such as tree protection ordinances and outdoor burning ordinances have the potential to negatively affect forest management activities.
- CWF 10. Forestry advocates need to remain vigilant to make sure proposed regulations do not restrict forestry practices.
- CWF 11. Several types of critical habitats such as longleaf pine ecosystems and bottomland hardwood forests need to be promoted because of their important role in providing wildlife habitat.

Protecting South Carolina's Forests from Harm

- PF1. The South Carolina Forestry Commission is responsible for protecting nearly 14.3 million acres of forestland in South Carolina from wildfire.
- PF 2. The number of homes and buildings damaged or destroyed by wildfire is increasing because of the rising number of wildland urban interface (WUI) areas.
- PF 3. The conversion of forestland to residential development has also increased wildfire risk in many areas of the state.
- PF 4. The two largest causes of wildfires in South Carolina are escaped debris burns (44% in 2009) and incendiary (23% in 2009).
- PF. 5 Wildfires occur most often in the Coastal Plains and Sandhills portion of the state. Some areas have historically high fire occurrence because of a high concentration of flammable fuels.
- PF 6. Eighty-six of the South Carolina Forestry Commission's 170 tractor-plow units will be older than the suggested 15-year replacement cycle by 2011. This represents 60% of this capacity.
- PF 7. Agency budget reductions have caused the elimination of 69 firefighting units since the early 1980's, significantly reducing firefighting capacity.
- PF 8. Forest industry divestment of landholdings has led to a concurrent elimination of 34 industry-owned fire suppression units and four air tankers, further reducing the statewide firefighting capacity.
- PF 9. The consolidation of forest industry coupled with the transfer of forest land to Timber Investment Management Organizations (TIMOs) has decreased the number of acres treated with prescribed fire.
- PF 10. An estimated 950,000 acres should be treated with prescribed fire each year to achieve management goals, but less than 60% of that total is burned annually.
- PF 11. The three most significant threats to South Carolina's forests currently are southern pine beetle, Sirex wood wasp, and cogongrass.

- PF 12. Other major insect threats include the Hemlock Woolly Adelgid and the Redbay Ambrosia Beetle.
- PF 13. Additional invasive species that constitute a major threat include Chinaberry, Chinese Tallow, Japanese Honeysuckle, Kudzu, *Microstegium vinimeum*, Privet, and Chinese Wisteria.
- PF 14. Other diseases that pose a major threat include Annosus Root Rot, Fusiform Rust, Laurel Wilt Disease, and Oak Wilt.
- PF 15. Numerous potential threats that exist elsewhere in the United States require the capacity for early detection and rapid response on behalf of the SC Forestry Commission and its partners.

Enhancing the Benefits of South Carolina's Trees and Forests

- EB 1. Stakeholders indicated that water quality and water quantity were high priority issues.
- EB 2. Compared to other land uses, the negative impacts of forest management activities on water quality are relatively minor, with silviculture the lowest leading source in Southern states.
- EB 3. The greatest risk of impact from forestry operations is typically sediment from roads and stream crossings.
- EB 4. Overall compliance with South Carolina's Best Management Practices for Forestry is 98.6% for timber harvesting operations.
- EB 5. South Carolina has an abundant supply of freshwater, but is not immune to water quantity issues. Inter-basin transfers and years of drought have led to disputes with the neighboring states of Georgia and North Carolina.
- EB 6. The amount of CO₂ sequestered by trees exceeds the CO₂ emissions generated by events such as forest harvests, land conversions, and fires.
- EB 7. In the last five years, ozone levels have decreased primarily because of tighter emission controls on power plants and automobiles.
- EB 8. Negative public reaction to smoke generated by prescribed and debris burns has led to the passage of ordinances such as county-wide burn bans, creating a threat to the practice of forestry.
- EB 9. 2.5 million citizens in South Carolina live in communities that have some form of community forestry program.
- EB 10. The SC Forestry Commission is the only agency responsible for providing staff to implement technical, educational and financial assistance to all incorporated municipalities which represents 55% of the state population.
- EB 11. USDA Forest Service funding has enabled the SC Forestry Commission to implement the community forestry program since 1991 and as such, fluctuations in federal funding levels strongly impact the level of assistance provided.
- EB 12. Cost-share funding awarded to more than 600 local governments and other entities have enabled the establishment of public tree management programs that include tree inventories and management plans, advocacy group formation, skill and knowledge development for tree managers, public tree policy adoption, tree planting initiatives, and professional staffing and/or accreditations.
- EB 13. Tree City USA is a valuable tool that enables communities to initiate a systematic public tree management program that results in healthier, safer and livable places.

- EB 14. Trees are major capital assets in communities. The quantity, placement and size of trees in populated places can positively impact and provide millions of dollars in savings regarding energy conservation, air filtration, stormwater runoff mitigation, and carbon dioxide sequestration.
- EB 15. Studies have shown a correlation between the amount of trees and/or greenspaces and the positive effects on occupancy rates and residential homes sales, the amount of physical activity of neighborhood residents, informal social interaction between neighbors and Attention-Deficit-Hyperactivity Disorder in children.

APPENDIX 7

Forest Legacy Assessment of Need

Statement of Purpose

South Carolina entered the Forest Legacy Program in 1999. Since then, the South Carolina Department of Natural Resources (SCDNR) has received almost \$32 million that worked to conserve over 71,000 acres in South Carolina (Appendix A). The Forest Legacy Program is critical to the conservation of habitats in South Carolina and to the SCDNR's ability to leverage other funds for habitat conservation. The purposes of this update are to revise the target areas for the Forest Legacy Program in South Carolina, provide updated threat information, and provide updated operating procedures.

South Carolina is approximately 20 million acres in size with 19.2 and 1.3 million acres in land area and water area, respectively. In 2008 it was estimated that 12.9 million acres of land in South Carolina were forested. With an ever increasing statewide population, South Carolina is seeing a tremendous rise in residential and commercial development, and many of South Carolina's forest lands are being converted to non-forest uses.

In March 1999 the governor of South Carolina appointed the South Carolina Department of Natural Resources (SCDNR) as the state lead agency to develop and administer a Forest Legacy Program in South Carolina. The purpose of the Forest Legacy Program (FLP) is to identify and protect environmentally important forest land from conversion to non-forest uses, through the use of conservation easements and fee purchases. Under the guidelines for the Forest Legacy Program, the SCDNR prepared an Assessment of Need (AON) to establish a state Forest Legacy Program. The SCDNR worked in consultation with the State Forest Stewardship Coordinating Committee (SFSCC) and the South Carolina Forestry Commission (SCFC) to develop the AON. Representatives from the SCDNR, SCFC, and SFSCC were asked to serve on the Forest Legacy Subcommittee. The state grant option was selected in the AON. Under the State Grant Option, all FLP acquisitions shall be transacted by the state with the title vested in the state. Landowner participation is entirely voluntary.

The Forest Legacy Subcommittee identified five Forest Legacy Areas in need of conservation and long-term forest management. At the request of the Forest Service, the Forest Legacy Areas have been reduced in size to provide stronger focus to target areas in South Carolina. Under the Forest Legacy Program, South Carolina will continue to exercise both the option to purchase conservation easements and the option for fee purchase. As these resources are protected, many traditional values and uses of the forests will continue to be available. The AON represents a commitment to the conservation of all natural resources in South Carolina.

As appropriate, periodic review and revision of this assessment will be made to meet the future needs of this program in South Carolina.

John E. Frampton, Director
South Carolina Department of Natural Resources

Henry E. Kodama, State Forester
South Carolina Forestry Commission

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South Carolina Forest Stewardship Coordinating Committee

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Mr.	Paul	Bradley	Forest Supervisor	Francis Marion and Sumter National Forests
Mrs.	Ann	English	SC State Conservationist	USDA NRCS
Mr.	Laurie	Lawson	State Executive Director	USDA Farm Services Agency
Mr.	Crad	Jaynes	Executive Director	SC Timber Producers Association
Mr.	Virgil	Wall, Jr.	Chair	SC SFI Implementation Committee
Dr.	Steve	Meadows	Chief Operating Officer	Clemson Cooperative Extension Service
Mr.	John	Frampton	Director	SC Department of Natural Resources
Mr.	Mike	Wetzel	Chair	Association of Consulting Foresters
Mr.	Greg	Henderson	President	SC Association of Conservation Districts
Mr.	Mark	Robertson	Executive Director	SC Nature Conservancy
Mrs.	Natalie	Britt	Executive Director	Palmetto Conservation Foundation
Mr.	Ben	Gregg	Executive Director	South Carolina Wildlife Federation
Mrs.	Susan	Corbett	Director	SC Chapter of Sierra Club
Mr.	Norman	Brunswick	Executive Director	Audubon South Carolina
Mr.	Michael	Cone	Director	SC Association of Counties
Mr.	Wayne	Shuler	Chief Planner	Central Midlands Council of Governments
Mrs.	Denise	Bonnette	Chair	SC Tree Farm Committee
Mr.	Robert	Scott	President	SC Forestry Association
Mr.	Chad	Prosser	Director	SC Dept. of Parks, Recreation, and Trails
Mr.	Gary	Spires	Director of Governmental Relations	SC Farm Bureau

FOREST LEGACY SUBCOMMITTEE

The Forest Legacy Subcommittee shall consist of:

Two representatives from the South Carolina Department of Natural Resources
Two representatives from the South Carolina Forestry Commission
Two representatives from conservation groups
One representative from the Natural Resource Conservation Service
One representative from the Association of Consulting Foresters
One representative from the US Forest Service
One representative from the Tree Farm Committee

The current designees for such are:

Emily Cope	South Carolina Department of Natural Resources
Tim Ivey	South Carolina Department of Natural Resources
Scott Phillips	South Carolina Forestry Commission
Joel Felder	South Carolina Forestry Commission
Peggy Jo Nadler (Steve Wells, alternate)	Francis Marion & Sumter National Forests
Ben Gregg	South Carolina Wildlife Federation
Sara Hartman	The Nature Conservancy
Dick Yetter	Natural Resource Conservation Service
Unidentified	South Carolina Tree Farm Committee
Unidentified	SC Association of Consulting Foresters

INTRODUCTION

From the mountains to the sea, South Carolina has a wide diversity of habitats, environmentally important areas, and scenic resources. Unfortunately, increases in urban sprawl and industrialization have led to a tremendous rise in residential and commercial development. Growing population densities and increasing land development trends across the state place economic pressure on South Carolina landowners to convert their forest land to other uses. Although efforts have been made to protect lands in South Carolina, the rate of development is far exceeding the rate of protection. The Forest Legacy Program will greatly assist South Carolina in offsetting this inequity.

South Carolina has been spending a great deal of time and money to protect vital habitats. The South Carolina Forestry Commission manages approximately 84,000 acres of state forests. In addition, the South Carolina Department of Natural Resources (SCDNR) currently has 49 Wildlife Management Areas (many of these also are national forests, heritage preserves or state forests) and 70 Heritage Preserves. The total acreage owned by SCDNR is approximately 270,000 acres. As part of the Wildlife Management Area program, SCDNR leases approximately 824,000 acres of land each year for wildlife conservation and management. This may seem like an outstanding accomplishment, but when one considers the expanding population in South Carolina, it is nowhere near enough. In fact, the amount of land leased into the Wildlife Management Area program has been significantly decreasing. This number is expected continue decreasing as the state population continues to increase and as timber corporations continue to dispose of property. The state population increased by about 9.9% from 2000-2007 to just over 4.4 million people. This was well above the national average of 7.2% for the same six year period. The South has been designated as the fastest growing region in the United States. Projections for 2015 and 2025 suggest a population of approximately 4.6 and 5.0 million respectively (U.S. Census Bureau, 2005). Of the 20.5 million acres in South Carolina only 12.9 million are forested; however if left unprotected, this will decrease as well with the projected population increase.

Whether it be a house at the beach or a cabin in the mountains, South Carolina has become a popular retirement and vacation destination. If something is not done to conserve the state's valuable resources, South Carolina will lose the qualities that make it such a unique place. Simply put, we can never do too much to protect our natural resources for future generations. As it has been quoted so many times, "We do not inherit the earth from our ancestors; we borrow it from our children."

Due to concerns about land-use changes and conversion to non-forest uses, the United States Congress established the Forest Legacy Program (FLP) as part of the Food, Agriculture, Conservation, and Trade Act of 1990 (P. L. 101-624: 104 stat. 3359) to promote long-term integrity of forest lands. The program's purpose is to identify and protect environmentally important forest lands threatened with conversion to non-forest uses through the purchase of conservation easements and fee-simple acquisitions. Through the Federal Agricultural Improvement and Reform Act of 1996 (P. L. 104-127: stat. 888), the Secretary of Agriculture is authorized at the request of the state to make a grant to the state to carry out the FLP in the state, including the acquisition by the state of lands and interests in lands. South Carolina will continue to exercise this option.

The Assessment of Need for South Carolina evaluates the potential need and use of this program in South Carolina; determines eligibility criteria for areas to be considered for the program within the state; identifies and describes the forest areas meeting these eligibility criteria; recommends all or parts of these areas for inclusion in the Forest Legacy Program to the Forest Service and the Secretary of Agriculture; and identifies the specific conservation goals and objectives for the Forest Legacy Program in South Carolina.

In order to protect our forests from such fragmentation, South Carolina has been divided into five Forest Legacy Areas (Map 1). These include the Foothills, Central Piedmont, Western Piedmont, Northern Coastal, and Southern Coastal Forest Legacy Areas. The original Forest Legacy Areas were based on the pre-existing Focus Area Initiatives, geology, political boundaries, and soil resource areas. The amended boundaries of these areas have been modified to remove large blocks of habitats that are protected through other programs and remove areas of the state where development pressures have either already consumed the forestland or increased the price of land to a point where it is not financially feasible to focus conservation efforts. The eligibility criteria remain basically the same as the original criteria. Minor modifications have been made for clarity.

The Forest Legacy Program will be used as a statewide approach to protect forests that are threatened with conversion to non-forest uses. Targets for protection will be focused and prioritized based on the ranking criteria. **Tracts that support ongoing conservation efforts, are adjacent to another protected tract, are along a river corridor or buffer a river system, and provide multi-faceted resource benefits will be given priority for acquisition. Special consideration will be given to properties that are designated as important by the Southern Forest Land Assessment, Focus Area Initiative or other conservation partnership, and that work to link existing conservation areas.**

Goals are outlined for each Forest Legacy Area based on the natural resources in that area.

Goals and Objectives for Foothills Forest Legacy Area:

- Encourage habitat enhancement through land purchase and sound forest management.
- Protect important historic and archeological sites.
- Maintain and enhance all significant forest types and their associated plant and animal communities.
- Increase public recreation opportunities.
- Protect scenic landscapes in the area, particularly along a designated scenic road or river.
- Protect areas designated as part of the Upper Savannah Focus Area Initiative or the Partnership for The Blue Ridge.
- Protect river systems, wetlands, and their associated upland habitats.
- Provide a connective corridor between existing conservation projects.

Goals and Objectives for the Central Piedmont Forest Legacy Area:

- Maintain and enhance the forests of the Piedmont Plateau and their associated plant and animal communities.
- Enhance the opportunities for public recreation.
- Protect the scenic landscapes within the area.
- Protect areas of historic and archaeological significance.
- Protect diminishing riparian corridors from further development; including the protection of river systems, wetlands, and their associated upland habitats.
- Protect areas designated as part of the Catawba Focus Area Initiative.
- Provide a connective corridor between existing conservation projects.

Goals and Objectives for the Western Piedmont Forest Legacy Area:

- Maintain and enhance significant examples of all forest types in the Western Piedmont. Forest Legacy Area and their associated high quality plant and animal communities.
- Protect riparian corridors and flood plains along the Savannah and Saluda rivers.
- Protect important historic and archeological sites.
- Maintain contiguous forest land by linking managed public and private lands.
- Encourage habitat enhancement through land purchase and sound forest management.
- Increase public hunting and other outdoor recreation opportunities.
- Protect the scenic landscapes within the area.
- Protect areas designated as part of the Upper Savannah and South Lowcountry Focus Area Initiatives.

- Provide a connective corridor between existing conservation projects.

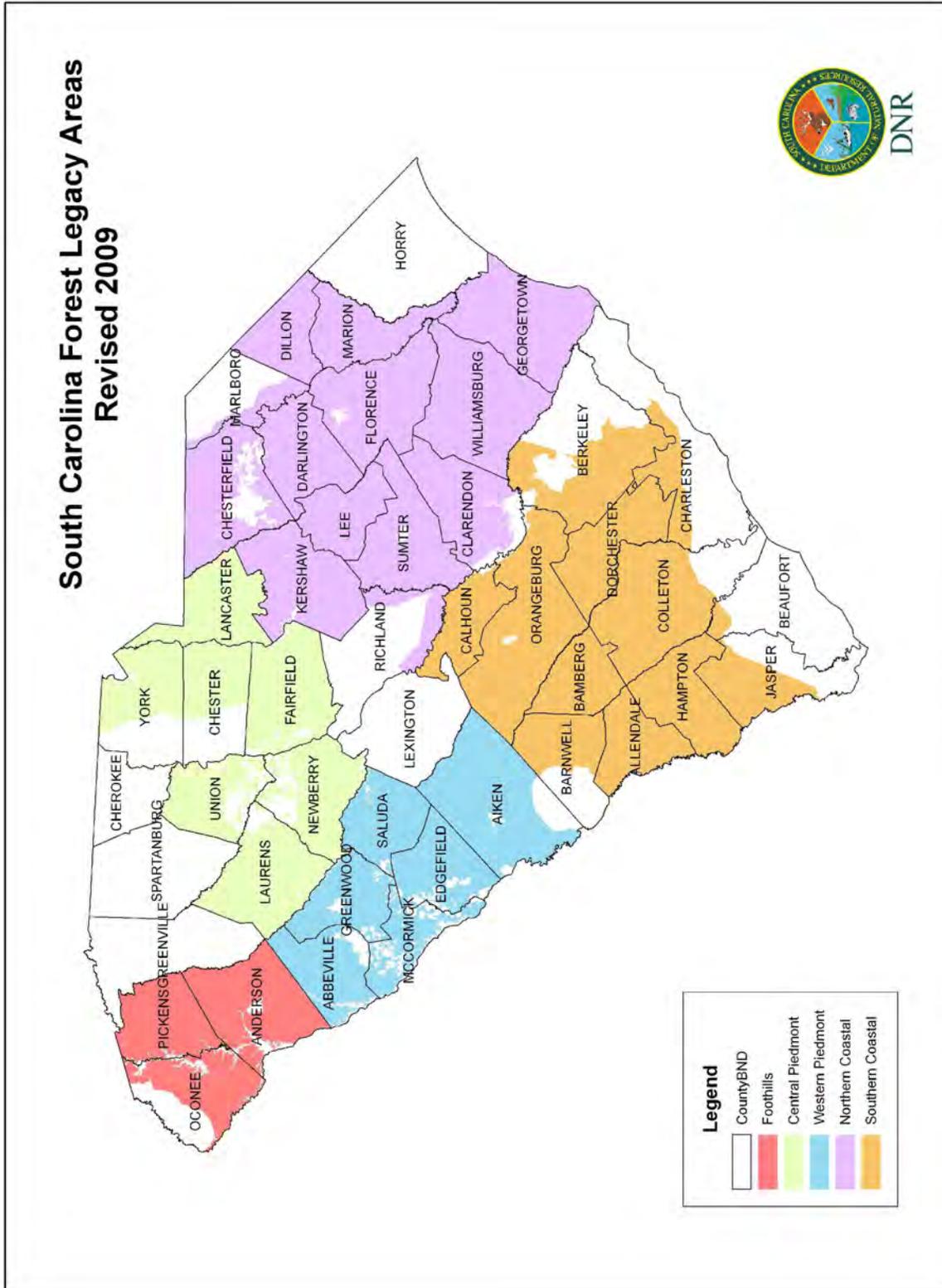
Goals and Objective for Northern Coastal Forest Legacy Area:

- Strategically protect lands to provide significant greenways along the river systems.
- Protect, maintain and enhance significant forested areas.
- Increase public recreation opportunities.
- Protect important cultural and archaeological sites.
- Protect the scenic landscapes within the area.
- Protect diminishing riparian corridors from further development; including the protection of river systems, wetlands, and their associated upland habitats.
- Protect areas designated as part of the Winyah Bay, Little Pee Dee-Lumber River, Great Pee Dee-Lynches River, Santee River, Upper Congaree-Santee-Wateree (COWASEE), Upper Waccamaw, and Santee Cooper Lakes Focus Area Initiatives.
- Provide a connective corridor between existing conservation projects.

Goals and Objectives for Southern Coastal Forest Legacy Area:

- Maintain and enhance the high quality of forest resources along with the associated plant, and animal communities.
- Maintain and enhance the bottomland hardwood areas located along major river systems.
- Protect historical and cultural resources.
- Protect areas inhabited by threatened and endangered species.
- Maintain contiguous forest land by connecting to managed public and private lands.
- Preserve the rural landscape and associated by-products that provide jobs.
- Provide opportunities for the public to have a place to enjoy various types of outdoor recreation.
- Provide opportunities for environmental education and research.
- Protect the scenic landscapes.
- Protect diminishing riparian corridors from further development; including the protection of river systems, wetlands, and their associated upland habitats.
- Protect areas designated as part of the Santee River, CAWS Basin, ACE Basin, South Lowcountry, and Santee Cooper Lakes Focus Area Initiatives.
- Provide a connective corridor between existing conservation projects.

Map 1.



I. South Carolina Forest Resources

A. Land Base and Forest Ownership

South Carolina is approximately 20.5 million acres in size with 19.2 and 1.3 million acres in land area and water area, respectively. As of 2008, it was estimated that forested lands totaled 12.9 million acres. This is slightly higher than previous estimates as the most recent FIA survey reported a slight increase in forestland extent, especially in the Pee Dee region of the state. Changes in inventory procedures and the increased use of technology likely account for some of the increase in acreage estimates. This change in forestland acreage prompted the South Carolina Forestry Commission to do a special five-county study in the Pee Dee to validate the FIA data. While this special study does not explain the reason for the increase in forestland area, the results do support the FIA area estimates derived from the current sampling procedures. (SCFC, 2008).

Forest industry has traditionally owned large blocks of forest land in South Carolina; however these corporations have recently begun divesting of some or all of their land holdings. International Paper made such a decision in 2005 and other large companies such as MeadWestvaco and in the process of identifying tracts for divestiture and development. In 2006, forest industries owned 1.4 million acres, which is down 29% and continuously decreasing. Due to limited financial resources, conservation groups are only acquiring a very small percentage of these lands. Some of the tracts are immediately being developed while others are being held by timber investment groups for undetermined periods of time.

Approximately 88% of SC's forests are privately owned. Nonindustrial private forest landowners control 74% of South Carolina's forests, and other significant forest land owners include the commercial forest landowners. Approximately 67% of private forest lands are family owned and the average "family forest" is 65 acres. Of these owners, 74% actually live on the land.

National Forests and other public ownerships represent the remaining 12% (SCFC, 2008). From these statistics, it is evident that the future of forest resources largely depends on the stewardship of the private citizens.

B. Population

Between July 2006 and July 2007, South Carolina ranked 10th in the nation and 5th in the region for highest percent population change (SC Office of Research and Statistics 2007 State Population Estimates). To consider a longer period of time, from 1990 to 2005, the state's population increased 21.8% whereas the overall population of the United States increased 15.9% (Ulbrich and London, 2008). The July 2007 population estimated was just over 4.4 million people which yielded a 1.8% increase within one year whereas the national average was 1.0% and a 9.9% increase since 2000 whereas the national average was 7.2%. To compound the severity of this growth, South Carolina ranks 40th in size but 24th in overall population. (U.S. Census Bureau, 2007). AARP lists SC as second fastest growing in the South in terms of in-migrant retirees and in the top seven retirement locations in the nation. The South Carolina Department of Commerce projects that South Carolina's population will jump by over one million new residents within the next fifteen years with many believing this to be a conservative estimate based upon the expected jump in retiree rates when the baby boomers begin leaving the workforce. In fact, approximately 36% of South Carolina's population growth is a result of immigration. To compound this issue, studies by the Strom Thurmond Institute have shown that land is converted at a rate six times faster than the rate of population growth. With a growing statewide economy, rural forested areas continue to be converted to non-forested, urbanized landscape. Existing large tracts of forested lands are disappearing as the increasing population pushes development farther from cities, thus resulting in additional habitat fragmentation.

C. Forest Type and Distribution

South Carolina is fortunate to have a wide diversity of forest types. Physiographic regions range from the mountains to the ocean and include the Blue Ridge, Piedmont, Upper-, Middle-, and Lower Coastal Plains. A report prepared by John B. Nelson entitled "The Natural Communities of South Carolina - Initial Classification and Description" details sixty-seven different natural communities within the state. This report describes each community and provides their geographic locations, lists any potential elements of concern (threatened or endangered flora or fauna,

noteworthy geologic structures, etc.), ecological dynamics, vegetative associations, brief comments, and references. Several of the major forest communities presented in the publication include: oak-hickory, pine-flatwoods, pine savannah, pocosin, cypress, and bottomland hardwood. Several unique communities harbor threatened or endangered flora and fauna, or have significant geological features.

Forest acreage declines in the mountain and coastal forest types are a direct result from construction of residential and vacation homes, golf courses, and the development of resorts. Because of a high demand for scenic vistas, both mountain and coastal properties are being converted to non-forested areas faster than other areas. Lands within the Piedmont and Upper Coastal Plain also are being converted to commercial and industrial uses as well as residential areas. Many quality forested areas have been purchased as investment properties by land speculators for future conversion.

D. Forest Product Composition

Timberlands within South Carolina are generally classified into three broad categories: hardwoods, softwoods, and oak-pine. In 1970, softwoods, oak-pine, and hardwoods tallied 5.5, 1.8, and 5.1 million acres, respectively. In 1993, hardwood acreages had declined to fewer than 5.0 million acres while oak-pine stands accounted for over 1.9 million acres, and softwoods dominated with about 5.6 million acres. The increase in softwood acreages since 1986 can be linked to the aggressive planting of plantation pines (33% increase) utilizing programs such as the Federal Conservation Reserve Program of the 1980's. A major portion of those planted acres are a direct result of attempts to restock areas heavily damaged in 1989 by Hurricane Hugo. Forest estimates for 2003 suggest that the majority of forest land in South Carolina is loblolly-shortleaf pine (40%) followed by oak hickory (20%), oak-gum-cypress (19%), oak-pine (15%), longleaf-slash pine (5%), and other (1%) (USFS, 2003). Many experts are concerned, however, that this acreage will dramatically decrease as focus turns to ethanol production and potential incentives to produce agricultural products such as corn.

E. Forest Wildlife

A wide diversity of habitats allows for numerous wildlife species to be found within the state. Whether it is one of the 150 species of birds that nest here or one of the many mammals that roam the countryside, South Carolina is fortunate to house many types of wildlife. In addition to huntable populations of Eastern wild turkeys, white-tailed deer, wood ducks, small game, and furbearers, the state has many non-game species as well as 23 animal species that are currently listed as federally endangered or threatened. Many wildlife species throughout the state depend on having different types and age classes of timber in which to live and feed. As certain types of habitats are decreased or lost, so are the wildlife species associated with them.

Isolated black bear populations exist in the Northern and Southern Coastal Forest Legacy Areas; however, the largest population occurs in the Foothills Forest Legacy Area (FFLA). From an estimated population of 1,000 black bears in this area, a total of fifty-eight bears were legally harvested in 2007. Because black bears are known to have a large home range and may travel several miles daily, it is imperative that large contiguous blocks of undeveloped forest habitat be maintained. Hardwood mast production is extremely important to black bears. In years of poor mast production, the movement patterns of these animals may significantly increase as they expand their range in search of alternate food sources. Forest habitats in early successional stages are particularly important during years of poor mast crops. Increased development, forest fragmentation, and increasing human populations have resulted in additional human-bear conflicts, and biologists expect these problems to increase further as available habitat continues to decrease.

White-tailed deer are abundant across most of the state with lower population densities within the Foothills Forest Legacy Area (FFLA) and the northern portion of the Northern Coastal Forest Legacy Area (NCFLA). Current populations are largely the result of past restoration efforts. White-tailed deer were trapped in the Southern Coastal Forest Legacy Area (SCFLA) and relocated in the Piedmont Legacy Areas, the FFLA, and the NCFLA from the 1950's to the 1980's. Combined with restrictive bag limits and diligent law enforcement, South Carolina has one of the longest hunting seasons and largest harvests per unit area in the United States. White-tailed deer can be found

utilizing many different habitats, including forest regeneration areas, early age timber stands, and older aged hardwood stands. The estimated deer population in 1960 was between 60,000 and 80,000 animals. Today, South Carolina has an estimated deer population of 725,000 animals. The statewide deer harvest in 1972 was approximately 20,000 animals; however, the number harvested in 2007 was approximately 215,000 animals. Similar to the situation described with black bear, increased human encroachment and habitat fragmentation unfortunately will result in deer-human conflicts.

Another success story in South Carolina is the restoration of the Eastern wild turkey. Populations of the birds dwindled by the turn of the last century with only small numbers of birds being present in the Coastal Forest Legacy Areas. During the 1950's turkeys were trapped from the Francis Marion National Forest and released in the Piedmont and Foothills Forest Legacy Areas. These birds did well and served as stock for restoration efforts in Coastal Forest Legacy Areas that began in the mid-1970's. With an estimated 19,289 birds harvested in 2007, huntable populations were found in every Forest Legacy Area of the state. The estimated population to date is approximately 90,000 birds. In fact, every county in South Carolina now has a spring turkey hunting season. The restocking efforts and resulting population growth has been so successful that South Carolina has assisted several other states in reestablishing huntable populations by providing them with over 1,700 birds for restocking. Forested habitats are utilized extensively by the wild turkey with clearcuts, thinned areas, and young pine stands providing brood rearing habitat, nesting cover, and escape cover. Older stands of hardwood and mixed pine-hardwood and their mast production are important to the wild turkey. River drainages and their associated hardwood components are extremely important as travel corridors, allowing for movement of turkeys from one habitat type to another. Northern bobwhite, American woodcock, ruffed grouse, swamp rabbit, marsh rabbit, cottontail rabbit, and gray squirrel are also important wildlife species in South Carolina. Most of these species are associated with several seral stages of forest habitat. Implemented properly within a good forest management plan, clearcuts, thinned stands, young stands, and mature forests each can provide life requisites of small game species. Regionally, bobwhite quail populations are low across the Southeast, due to change in land use that have decreased or eliminated suitable habitat. Ruffed grouse distribution is limited geographically to the Blue Ridge Escarpment in the northwest corner of the state. Northern bobwhite, American woodcock, ruffed grouse, and swamp rabbit are listed as priority species under South Carolina's Comprehensive Wildlife Conservation Plan.

South Carolina has 23 animal species and 19 plant species that are federally threatened or endangered (Appendix D). Threatened and endangered species such as the flatwoods salamander, bog turtle, bald eagle, and red-cockaded woodpecker can be found in South Carolina. These species are closely associated with specific ecological communities and have attained their listing mostly because of the conversion of their habitats to other uses.

The red-cockaded woodpecker (RCW) is one of the most recognized endangered species associated with forested areas. Colonies of these birds are found almost exclusively in the old growth pine forests of the southeastern United States. In South Carolina, the RCW is located primarily within the Coastal Forest Legacy Areas. The RCW requires mature pine forests over 60 years old, which are fairly open and have little hardwood understory, and is the only woodpecker that excavates a cavity in a living tree. It is estimated that there are approximately 1,000 groups (a group is defined as a breeding male and female, sometimes including one or more helper birds that assist the breeding pair) in South Carolina. Forty percent of these groups are located on privately owned lands. Although RCW groups on private lands in South Carolina have been stabilized to some extent through the use of Safe Harbor agreements, which encourage landowners to maintain and enhance RCW habitat, many groups are still threatened by habitat alteration and forest fragmentation. Throughout South Carolina, RCW groups are threatened by urban sprawl, which greatly limits or negates the ability of forest managers to conduct proper management practices, such as prescribed burning. The trend towards cutting timber at a shorter rotation has also greatly diminished the suitable habitat necessary for the red-cockaded woodpecker.

The bald eagle is the largest bird of prey found in South Carolina. With the Endangered Species Act, the eagle has rebounded from all time lows that occurred in the 1960's and 1970's. In 1977, only 13 breeding pairs existed in the state; however, 222 active breeding pairs were documented in 2007. Only nine young were fledged in 1977 as compared to 315 being fledged in 2007. The majority of the active nests are found within the Northern and Southern Coastal Forest Legacy Areas. Eagle nests are usually found near water, such as along major river drainages throughout the coastal areas. Most eagle nests are constructed in large pine trees. These larger sized pine trees can be hard to find in habitats that are conducive to eagle nesting. The bald eagle was taken off the Endangered Species list in 2007 and is now protected by the Bald and Golden Eagle Act of 1940

The fox squirrel is another important wildlife species in South Carolina. A survey conducted in 2006 revealed 418 individual fox squirrel sightings in twenty-one different counties across the state. Habitat types in which the sightings occurred were: pine/hardwood >50 years old (19 %), mixed pine hardwood 30-50 years old (18%) pine sawtimber (17 %), agricultural or other open field (15%), pulpwood sized pine plantation (11%), pine/hardwood <30 years old (10 %), young pine plantation <15 year old (5%) and other sites (5 %). As the data indicates, fox squirrels primarily use older growth type timber stands. Part of the decline in fox squirrel numbers throughout the Southeast can be attributed to urban sprawl, agribusiness, and the current trends in the forest industry that favor young, short rotation age pine stands.

The Forest Legacy Program provides an excellent opportunity for South Carolina to acquire and properly manage needed habitats for the continued survival of all wildlife, both hunted and protected. South Carolina has leveraged the Forest Legacy Program with state and other federal funding sources to target large-scale conservation projects that meet a diverse range of wildlife conservation objectives. Acquisition and management by the state is one of the only ways that many critical habitats will be protected from development and enjoyed by future generations.

F. Recreation

South Carolinians are very fortunate to have tremendous outdoor recreational opportunities. Currently, there are 4 state forests, 7 national wildlife refuges, 2 national forests, 70 heritage preserves, 46 state parks, 49 wildlife management areas (many of these also are national forests, heritage preserves or state forests), and 1 national park that offer some form of public outdoor recreation. In addition to these public outdoor recreational opportunities, many people also enjoy outdoor activities on private forests. Hunting is one of the most common forms of outdoor recreation on private lands.

South Carolina's forests and wild lands offer some of the best hunting in the Southeast both in terms of game populations and opportunities. Recent studies have shown that 203,000 sportsmen are taking advantage of those opportunities by spending \$308,731,000 annually. Wildlife watching also is a significant form of outdoor recreation with 1,133,000 participants spending \$482,659,000 annually. A recent survey by the US Fish and Wildlife Service further revealed that the total wildlife associated recreation contribution to the state's economy by residents and nonresidents was \$2.5 billion. In the same respect, fishing also significantly influences the state's economy. On an annual basis, fishing normally accounts for around 789,000 participants spending approximately \$1,323,990,000 (U.S. Fish and Wildlife Service, 2007).

South Carolina's forests also offer excellent back country camping and trail use opportunities. There are thousands of miles of hiking, biking, canoe, and equestrian trails that traverse mountains, rivers, swamps, Carolina bays, state parks, national wildlife refuges, national and state forests, coastal preserves, and other unique and interesting landscapes. One of South Carolina's most visited hiking trails is the Foothills Trail in Greenville, Pickens, and Oconee Counties. This trail offers more than 100 miles of backcountry beauty from Jones Gap State Park to Oconee State Park. The growing popularity of forest based recreation is evidenced by the growing list of guides, books, and maps covering a cross-section of outdoor activities. Approximately 30 million people visit South Carolina annually including over 700,000 Canadians and about 150,000 overseas visitors. These visitors spent an estimated \$9.1 billion while traveling in the state in 2006 which results in a 6.9% increase over 2005. Tourism directly generates 6.3% of the state's employment base or 119,800 jobs. If you include indirect and related impacts generated by tourism spending, tourism is the catalyst for 198,900 jobs. Twelve of SC's forty-six counties received over \$100 million in domestic travel expenditures in 2006, and thirteen counties indicated 1,000 or more jobs directly supported by domestic travelers during 2006. South Carolina ranks 23rd among the 50 states for travel expenditures by domestic visitors which is significant when one considers the lower cost-of-living in South Carolina (Travel Industry Association, 2007).

G. Aesthetic and Scenic Resources

Traditionally, our ancestors viewed forests as a source of wood products and food. As society has changed and

become more affluent, the values placed on forests expanded to include wildlife, clean water, and beautiful vistas. A recent survey, that included respondents from South Carolina, examined attitudes toward certain aspects of forest management. The results indicated that landowners chose scenic enjoyment as the second most important benefit, following wildlife appreciation, derived from their forest land (Yarrow et. al. 1996)

Outstanding examples of the natural beauty of the Southern Appalachians are ubiquitous in the mountains of Pickens, Oconee, and Greenville Counties. In this area, natural beauty lies in the vistas at Jumping-Off Rock and Pretty Place over looking large unbroken expanses of oak-hickory forests, gorges with swift moving streams and rivers, spectacular waterfalls such as Lower White Water Falls, Laurel Fork Falls, and Raven Cliff Falls and incredible granite outcrops at Table Rock Mountain, Caesar's Head and Glassy Mountain. In the fall, tourists flock to South Carolina's mountains to view fall colors. Similarly, spring brings beauty in the form of blooming wild flowers. Many of these sites can easily be accessed from the South Carolina Scenic Byway (SC Hwy 107) and the Cherokee Foothills Scenic Highway (SC Hwy 11).

The 115 mile Foothills Scenic Highway runs from near the Georgia border east to Gaffney in Cherokee County. Some of the more scenic locations along the route include spectacular views of Table Rock Mountain and Caesar's Head Mountain. Scenic locations such as Lake Jocassee and several state parks are only a short side trip from the Foothills Highway. This is a great I -85 alternative for tourists traveling through South Carolina. Because of its aesthetically pleasing views, this area is also seeing a tremendous rise in commercial and residential development.

One of the more prominent natural attractions to this area is the Chattooga National Wild and Scenic River located in the Andrew Pickens District of the Sumter National Forest. This river offers some of the most challenging white water paddling in the Eastern United States. Additionally, the Chattooga's beauty attracts thousands of eco-tourists and trout anglers.

Gently rolling terrain with pine and mixed pine-hardwood forests are characteristics of South Carolina's Piedmont Plateau. Within this area there are several significant scenic areas including the Long Cane, Tyger, and Enoree Ranger Districts of the Sumter National Forest. These Districts contain some outstanding examples of mature mixed pine-hardwood communities that many consider the most aesthetically pleasing Piedmont landscape. The Broad, Middle Saluda, and Lower Saluda Rivers all flow through this part of South Carolina. While these are not the only Piedmont rivers that offer scenic beauty, they all have been deemed worthy of Scenic River status bestowed by the South Carolina Legislature.

The natural beauty of South Carolina's Coastal Plain is most often associated with tidal marshes, maritime forests, undeveloped beaches, and relatively undisturbed black and red river swamps and associated forests. One of the finest examples of a near-virgin southern hardwood forest is the Congaree Swamp National Park situated in the Congaree River floodplain. This 22,000 acre tract is truly a national treasure and one of the most beautiful natural areas in South Carolina and is currently South Carolina's only National Park. The park preserves the largest expanse of old-growth, flood plain forest in America and has been designated as a South Atlantic Coast Biosphere Reserve. A walk through this area is to go back in time and visit a pre-colonial pristine, southern bottomland hardwood forest.

Many of the slow moving rivers flowing through the Upper Coastal Plain dissect some healthy forests. All Coastal Plain rivers have segments that are aesthetically pleasing. However, some of the best examples of unspoiled river corridors are found on Lynches River and Little Pee Dee River. Portions of these rivers are so outstanding that they have been designated by the state as Scenic Rivers.

South Carolina's ACE Basin contains exemplary examples of Lower Coastal Plain beauty. Strong, black, and clean, the Ashepoo, Combahee, and South Edisto Rivers flow from their inland origins into South Carolina's resource-rich St. Helena estuary. Together these rivers combine to drain a large portion of South Carolina's Lowcountry and support a diversity of life unmatched in North America. Included in this area is over 300,000 acres of coastal plain communities, typically associated with barrier islands, marsh islands, and estuarine rivers. The beauty of the area is the physical landscape, flora and fauna associated with salt marshes, brackish marshes, tidal flats, maritime forests, bird keys and banks, and mixed pine-hardwoods.

South Carolina is fortunate to have approximately 200 miles of coastline. Since the turn of the century, most beaches have been developed as resorts; however, there are still unspoiled beaches associated with undeveloped barrier

islands. These beaches and associated habitats are very different from beaches that most people visit. The ecological value of these undeveloped beaches is the undamaged dune structure and the considerably richer and more diverse flora and fauna. Most people that have had the privilege of visiting South Island, North Island, or another of South Carolina's few undeveloped beaches would probably agree that the real aesthetic value lies in the simple things such as finding a piece of driftwood or a sunrise without a hotel in sight.

South Carolina has some of the most diverse and aesthetically pleasing landscapes in the United States. South Carolinians and visitors greatly value and appreciate the state's natural beauty and quality of life. Ongoing vigilance and hard work by natural resource managers and strong support from the public will ensure that South Carolina will continue to rank high on the list of states with outstanding scenic resources.

H. Economics

Timber is South Carolina's most valuable crop with landowner receipts totaling over \$514 million per year. Numerous individuals and communities throughout the entire state rely on the forest to provide jobs as well as a quality of life. The forest industry ranked 1st in employment among all manufacturing industries in South Carolina and employed approximately 44,708 people with a payroll of \$2.4 billion. South Carolina exports about \$1 billion in forest products annually, and forest industry has an economic impact of over \$17.45 billion annually to the state's economy. This makes it rank second in value added goods among the state's manufacturing sectors. These forests also provide more than just wood and fiber to the economy. By products such as the collection and sale of pine straw can mean jobs for individuals located in these rural settings. Timber is the state's top agricultural commodity and produces approximately \$870 million annually (SCFC, 2008).

In addition, approximately 39% of South Carolinians participate in wildlife-related recreation. Whether it is hunting, hiking, or bird watching on these forests, equipment and supplies used in these activities bring in dollars to the local economy that might not otherwise be available. In 2006, hunting expenditures brought in \$308 million dollars and wildlife watching activities brought in another \$482 million to the local economy throughout the state (U.S. Fish and Wildlife Service, 2007). These activities would not be able to take place if there were a lack of forested areas throughout South Carolina.

Maintaining sustainable forestry is vital to the economy, and it is the livelihood and way of life for many citizens throughout the state. Even though public owned forests account for only 10% of the total forested areas within the state, these areas are important for public recreation, wildlife habitat, revenue, and numerous other activities, especially as the population of South Carolina becomes more urban.

South Carolina's renewable timber resource has served as a basis for a strong rural economy and generated considerable wealth for South Carolina through direct and indirect expenditures. Forests should continue to be the foundation of one of the most important manufacturing sectors in the state, subsequently providing forest products for the regional, national, and global marketplace.

I. Urban Influences

South Carolina is one of the fastest growing states in the United States and the Southeast. A 2007 population update indicates that South Carolina ranks 10th in growth nationally and 5th regionally (U.S. Census Bureau, 2007). Much of this development and growth results in a loss of productive forest lands. From 1992 to 1997, South Carolina ranked 9th among 50 states in the rate of conversion of agricultural and forest lands (Ulbrich and London, 2008).

Productive forests not only are economically important but also have critical environmental values. A study by Clemson University's Department of Planning and Landscape Architecture examined the changes during a 10-year period (1988-1998) within a 600,000 acre watershed in upstate South Carolina. The study found that impervious surfaces such as pavement increased by 11,000 acres during the study period. This additional hardscape resulted in a 9% increase of surface runoff. Surface runoff is a major contributor to non-point source pollution and results in substantial infrastructure mitigation costs.

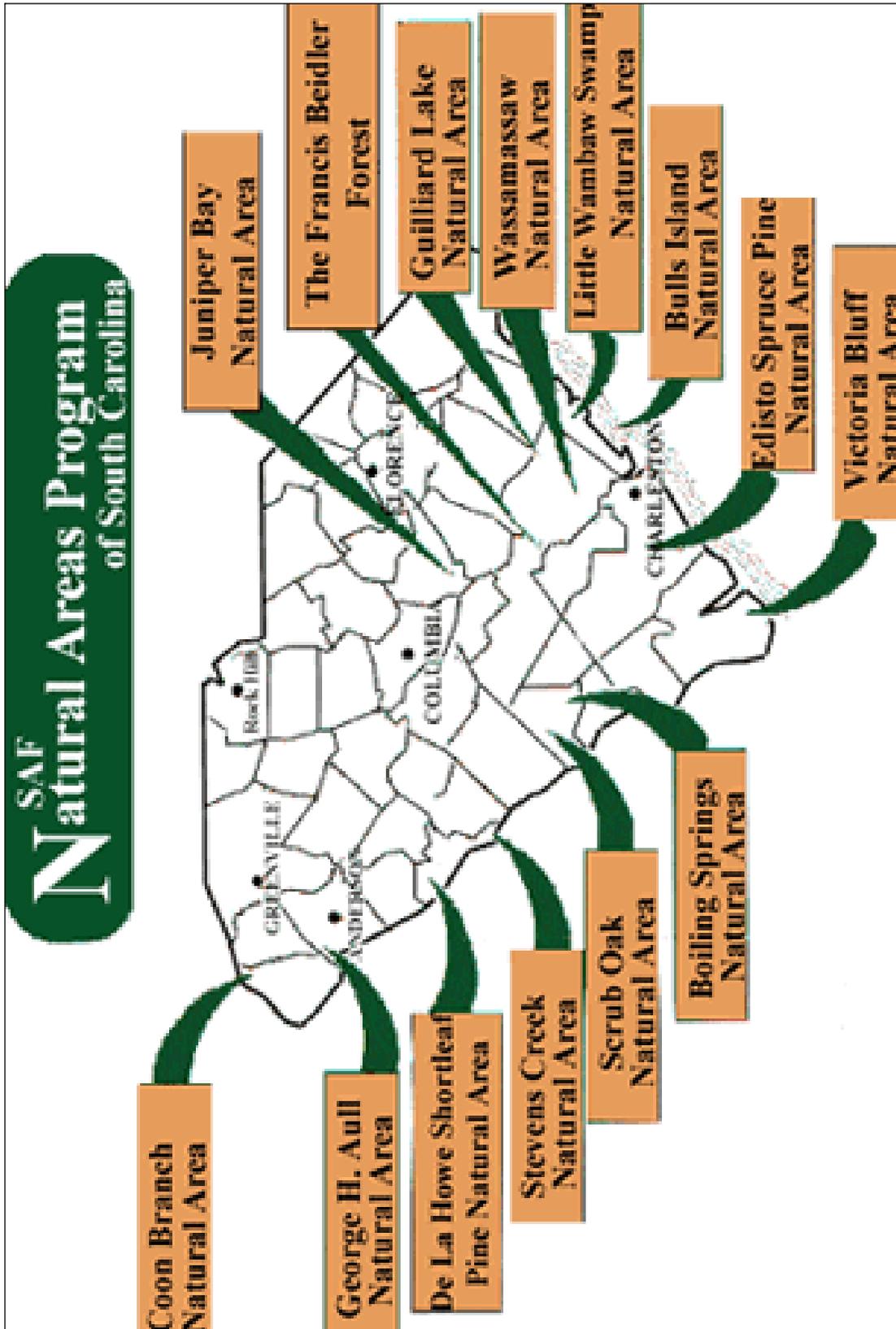
Research has shown that significant forest lands in close proximity to large cities can have a positive impact on air quality and energy usage. In fact, studies have shown that commercial, industrial, farm, and forest property consistently generate far more revenue than costs (Ulbrich and London, 2008). A California study found that urban forests in the Sacramento area annually removed 300,000 tons of carbon dioxide (McPhearson, 1998). This reduction in atmospheric pollution represents an implied value of \$3.3 million. In addition, many newcomers to each region in SC desire to have parks and recreation areas where they can walk, hunt, and enjoy the outdoors.

Much of the growth in South Carolina is classified as a sprawl pattern (the remote, unplanned, and uncoordinated residential development on large lots of land). This has an even more dramatic impact when one considers that the number of housing units in SC increased 35.4% from 1990 to 2005. This is well above the national average of 21.8% for the same time period. Considering that the SC population for that period increased 21.8%, much of the increase in housing is attributed to smaller households and second homes (Ulbrich and London, 2008). At the current growth rate, problems associated with urbanization will increase. This heightens the need for forest lands in close proximity to metropolitan areas especially as many of the faster-growing areas are already experiencing problems with ambient air quality due to traffic flow on roads. While the Forest Legacy Program in South Carolina will attempt to focus on tracts near expanding urban areas, it is important to note that all areas in the state are within 50 miles of an urban area, and if they are not already converted, they are threatened by conversion in the near future.

J. Unique Natural Areas

The importance of natural areas was recognized by scientists in the early twentieth century. Soon after this realization, interest in the preservation of forested natural areas began when U.S. Forest Service suggested natural area status for a number of areas within National Forest Service Lands. The first “Natural Area” was formally designated in 1927. Today the Society of American Foresters (SAF), through a Committee on Natural Areas, continues to provide leadership in establishing and maintaining natural areas. The goal of this program is to provide representative samples of undisturbed major forest types. In South Carolina the SAF has identified and designated 15 areas across South Carolina as Natural Areas (Map 2: Note that Congaree Swamp Natural Area is not depicted on map).

Map 2



In addition to the SAF, the South Carolina Department of Natural Resources has a well developed land acquisition plan through the Heritage Trust Program. This program was created in 1976 to preserve natural and cultural remains that were quickly disappearing. The goal of natural feature preservation is to inventory and protect the elements considered the most outstanding representatives of our state's unique and natural areas. To date, the Heritage Trust Program has acquired over 70 properties that have unique elements. Many of these properties are purchased to protect rare, threatened or endangered plants and animals or to protect critical habitats. Through this program, examples of South Carolina's most unique natural areas have been protected. Some of the most notable Heritage Preserves include Laurel Fork, Lewis Ocean Bay, Lynchburg Savanna, Longleaf Pine, Bunched Arrowhead and Rock Hill Blackjack. The 1,000-acre Laurel Fork Heritage Preserve in Pickens County is part of a larger acreage that holds the largest number of natural elements in the state. In addition to rare elements, this site contains trout streams, river gorges, and scenic waterfalls. The Lewis Ocean Bay Heritage Preserve in Horry County contains a group of 20 undisturbed Carolina bays that are the epicenter of South Carolina's Coastal Plain black bear population. Additionally, this 9,647-acre site includes a pond pine pocosin plant community, habitats for the endangered red-cockaded woodpecker, the threatened Venus' flytrap, and a rare Savannah milkweed. The 291-acre Lynchburg Savanna in Lee County is classified as a wet, longleaf pine savannah habitat. Containing at least 10 carnivorous plant species, this habitat type is considered the most biologically diverse and imperiled ecosystem in North America. Also in Lee County is the 843-acre Longleaf Pine Heritage Preserve. This longleaf pine forest supports habitat for the federally endangered red-cockaded woodpecker and Canby's dropwort. The 176-acre Bunched Arrowhead Heritage Preserve in Greenville County is particularly unique in that it harbors one of the largest populations of bunched arrowhead (*Sagittaria fasciculata*). And finally, the 289-acre Rock Hill Blackjacks in York County may be the last remnant of a once flourishing prairie system in South Carolina. This site also happens to be the only location where the federally endangered Schweinitz's sunflower enjoys permanent protection.

In addition to Heritage Preserves, the SCDNR also manages 49 Wildlife Management Areas. In total, SCDNR owns approximately 270,000 acres and leases an additional 824,000 acres through the Wildlife Management Area program. A tremendous amount of unique, natural habitat can be found in these Wildlife Management Areas. South Carolina is very fortunate to have a mechanism to preserve unique and natural areas; however, there are still many additional natural areas and rare elements in need of protection.

K. Fisheries, Rivers and Streams

Forests are an important component of the aquatic systems in South Carolina. Failure to protect these areas has implications far greater than the immediate site. The Land and Water Resources Division of the South Carolina Department of Natural Resources estimates that there are over 11,100 miles of rivers and streams within the state. Of this total, 3,538 river miles are important to inland fisheries. These aquatic ecosystems provide feeding, spawning, and nursery grounds for a variety of resident and migratory fish. There are approximately 150 species of fish in the fresh waters of the state. These inland fisheries are made up of game fish, rare and endangered species, nongame fish, and fish of high commercial value. Species such as trout are found only in cold water systems, while other species such as the bluespotted sunfish live in the blackwaters of Coastal Plain streams (Beasley et. al., 1988).

Rivers and streams in South Carolina often are characterized by the location of their watersheds. Blackwater streams primarily drain lands from the Coastal Plain. Typically, these systems drain poorly buffered soils and are acidic due to the decomposition of leaf litter. Tannins resulting from decomposition give these streams a stained appearance. Blackwater streams typically have extended stretches through alluvial swamps where the main channel is obscured after braiding out into multiple smaller channels. Streams and rivers originating above the fall line are sometimes referred to as Piedmont streams, red rivers, or brown rivers. These rivers typically discharge larger watersheds than coastal streams and attain a higher stream order. Piedmont rivers often carry high sediment loads resulting in a red or brownish color.

Riparian zones are an important component of all streams and rivers in South Carolina. Riparian ecosystems are areas of vegetation adjacent to or within streams and rivers extending onto the floodplain. A dominant type of riparian ecosystem in South Carolina aside from alluvial swamps is the bottomland hardwood forest. Flora associated with this ecosystem are adapted to seasonal inundation for at least part of the year. There are many benefits of riparian ecosystems to adjacent rivers and streams. Alterations in the riparian zone can have negative

effects on the aquatic community.

Primary production in streams comes largely from allochthonous sources rather than photosynthetic production of phytoplankton within the water column. Riparian vegetation provides leaf litter and detritus to streams that serve as a food source for aquatic invertebrates and ultimately provides food for fish communities. Also, large woody debris in streams serves as a substrate for aquatic invertebrates and provides cover for fishes. Additionally, the large woody debris can provide spawning habitat for certain fish species. Davis (1972) and Bass and Hitt (1974) observed redbreast sunfish (an important game fish in South Carolina coastal streams) preferred to nest adjacent to snags and woody debris in North Carolina and Florida, respectively.

In addition to reproductive habitat, riparian ecosystems also provide shading to the underlying stream systems. Clearing trees along a stream bank will result in increased water temperatures during summer months (Cobb and Kaufman, 1993) which affects spawning habitat for indigenous fishes. Also, the removal of the canopy along a stream can cause a shift in primary production from aquatic invertebrate communities to autochthonous production of single celled phytoplankton and consequently can be detrimental to fish species that rely on riparian habitats for food and reproduction.

Riparian ecosystems control erosion and sedimentation in streams and rivers. Vegetation along stream banks can stabilize the channel with root mass and the deposition of large woody debris. Riparian vegetation stabilizes floodplain soils and slows overbank flooding, allowing deposition of alluvium onto the floodplain rather than in the stream channel. Excess sedimentation in streams can affect fish spawning by covering nest sites and feeding behavior by changing visibility within the water column.

South Carolina's rivers and streams are some of the state's most important natural resources. One of the best ways to protect them, however, is through proper forest management. Not only are our rivers ecologically critical, but they have tremendous economic significance. The management of our river resource is so complex that it is beyond the capabilities of any single organization or program. Continued sound management of this resource will require cooperative partnerships and shared responsibility between public and private interests (Beasley et. al. 1988).

II. Related Resources

A. Geology, Topography, and Other Geologic Features

There are three distinct physiographic and tectonic provinces in South Carolina: the Blue Ridge Mountains, Piedmont, and Coastal Plain (Map 3). These three provinces are unified by a combination of rock type, structural history, and other geologic criteria. These geologic criteria are the non-biological building blocks for entire ecosystems.

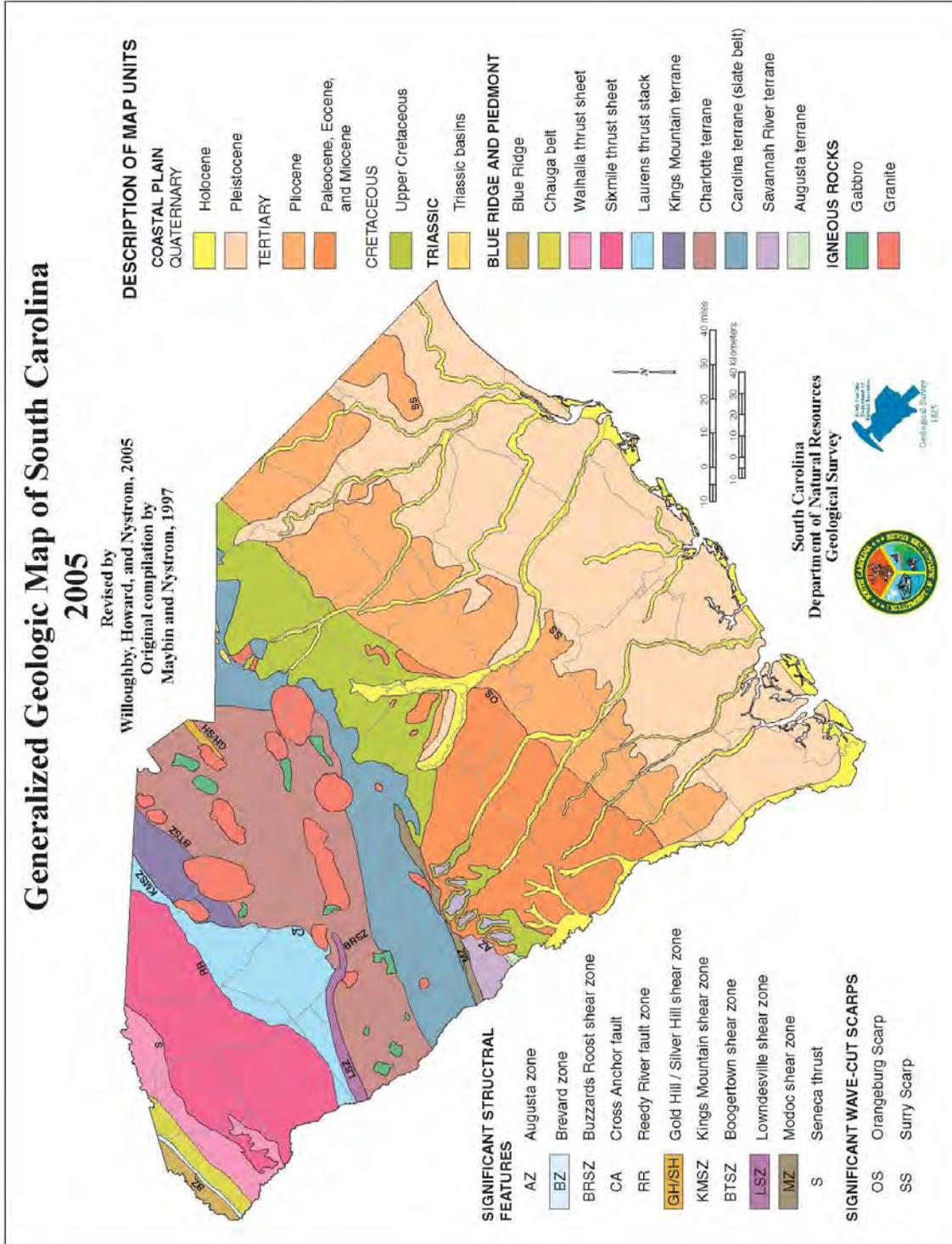
The portion of the Blue Ridge Mountains in South Carolina is 90 miles long, 25-30 miles wide, and located in the northwest corner of the state. This area is a series of deep valleys and river gorges flanked by steep northeast trending mountain ridges. The Blue Ridge Mountains contain the oldest (1.2 billion years old) rocks in South Carolina. The Brevard fault zone is a northeast thrust/fault structure (Chattooga Ridge) that separates the Blue Ridge province from the Piedmont province and can be traced along the eastern edge of the Appalachian Mountains.

The Piedmont (French word meaning "foot of the mountain" consists of rolling hills and valleys. The region contains the roots of an ancient, eroded mountain chain and is generally hilly with thin, stony clay soils. Much of this area was once farmed; however the area has primarily been converted to timber production. The southern edge of the Piedmont is the fall line, where the rivers drop into the coastal plain.

The Coastal Plain is southeast of the Piedmont and extends to the Atlantic Ocean with few changes in elevation. The oldest sediments in the Coastal Plain date back 86 million years. Carolina bays are depressions found in the Coastal Plain of South Carolina. Geologists theorize they may have been formed by prevailing southwesterly winds. Consequently, these winds carved ovate-like beds with their long axis oriented northwest-southeast. Undisturbed Carolina bays have distinctive biological communities. The vast majority of Carolina bays in South Carolina have

been ditched and drained for agriculture, development, and other uses. For those that remain, there is a growing appreciation of the role Carolina bays play in the Coastal Plain's ecology and hydrologic framework.

Map 3.



B. Soils

Soil is the basic foundation of any terrestrial ecosystem and sustains forests in many ways. Trees need soil because it stores, provides, and recycles nutrients; stores water; provides oxygen for roots; and provides physical support. There are 265 different soil types that are currently recognized in South Carolina. Most of these are considered forest soils because they developed under forest vegetation. The variation in the soils of South Carolina can best be described by geographic regions outlined by USDA-NRCS as Major Land Resource Areas:

- Blue Ridge - steep to gently sloping soils, often shallow to bedrock.
- Southern Piedmont - steep to gently sloping, may be deep or shallow to bedrock.
- Carolina Sand Hills - broad, flat ridges and steep slopes.
- Southern Coastal Plain - broad, flat plains with occasional ridges, slight differences in elevation results in major soil differences.
- Atlantic Coast Flatwoods - similar to Southern Coastal Plain, except lower in elevation and water table closer to the surface.

Massive soil erosion has occurred in the Piedmont and Blue Ridge areas. This erosion has been largely due to poor farming and timber harvesting practices resulting in water and wind erosion. Currently, the greatest soil losses are a result of industrial and housing development. Properly managing a forest is one of the best methods of preventing erosion of soil.

C. Agriculture

The amount of land in agriculture has remained relatively constant between 1997 and 2002. In 2002, there were approximately 24,541 farms in South Carolina totaling approximately 4.8 million acres compared to 1997, when there were approximately 25,807 farms totaling approximately 4.9 million acres. This leveling is taken as a positive sign since the period from 1982 until 1997 saw an 18% decrease in agricultural acreage. (South Carolina Office of Research and Statistics, 2007)

South Carolina has a diverse mixture of agricultural fields and forest lands, which create habitat for most wildlife species. The Forest Legacy Program is designed to conserve working forests in that landscape, and many farmers depend on the economic option to harvest timber to supplement their income. Agriculture and forest land uses complement each other in South Carolina, but rural lands are being replaced with non-forest and non-agricultural uses. The Forest Legacy Program allows up to 25% of the conserved property to remain in non-forest production. Flexibility such as this creates numerous opportunities to combine sound forest management and agricultural production.

D. Mineral Resources

South Carolina is rich in non-fuel raw minerals with a total of over \$659 million produced in 2005. The most common minerals produced in South Carolina are: cement, clays, gemstones, peat, sand, gravel, and crushed stone (Maps 4 and 5). In 2005 South Carolina was the top producer of vermiculite, ranked third in masonry cement, eighth in common clays, second in kaolin, and fourth in crude mica (USGS, 2005).

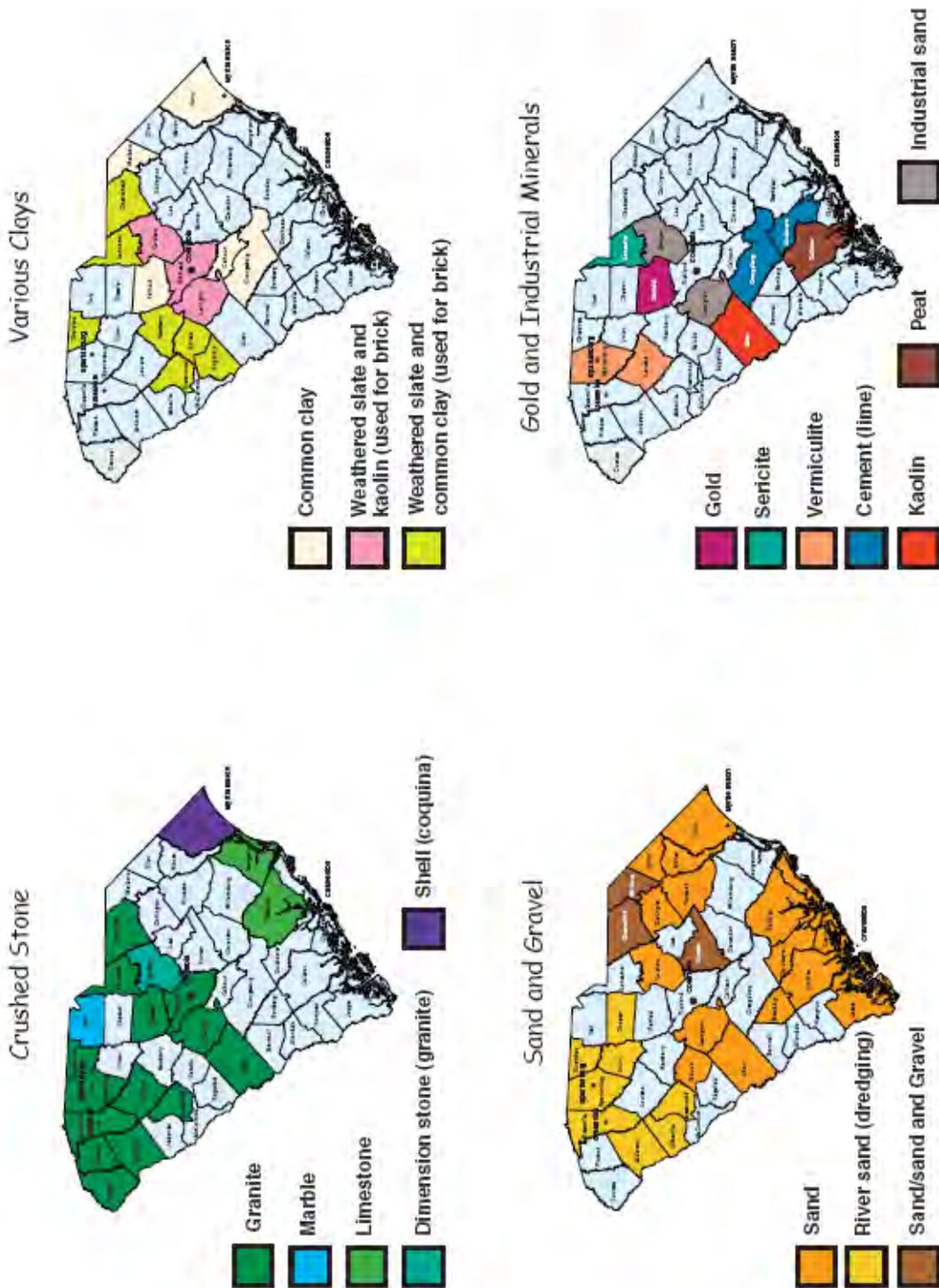
E. Cultural Heritage Resources

South Carolina has been inhabited for over 12,000 years. About 5,000 years ago humans were making clay vessels, and about 3,500 years ago they used the bow and arrow, and lived in semi-permanent to permanent villages. About 1,000 years ago, humans in South Carolina lived in large palisade villages surrounding a mound and produced domesticated crops such as corn, beans, squash, and pumpkins. Many historic period occupations are unique to South Carolinasuch as the French Charles Fort of 1562 and the Spanish town of Santa Elena during the period of 1566-1587.

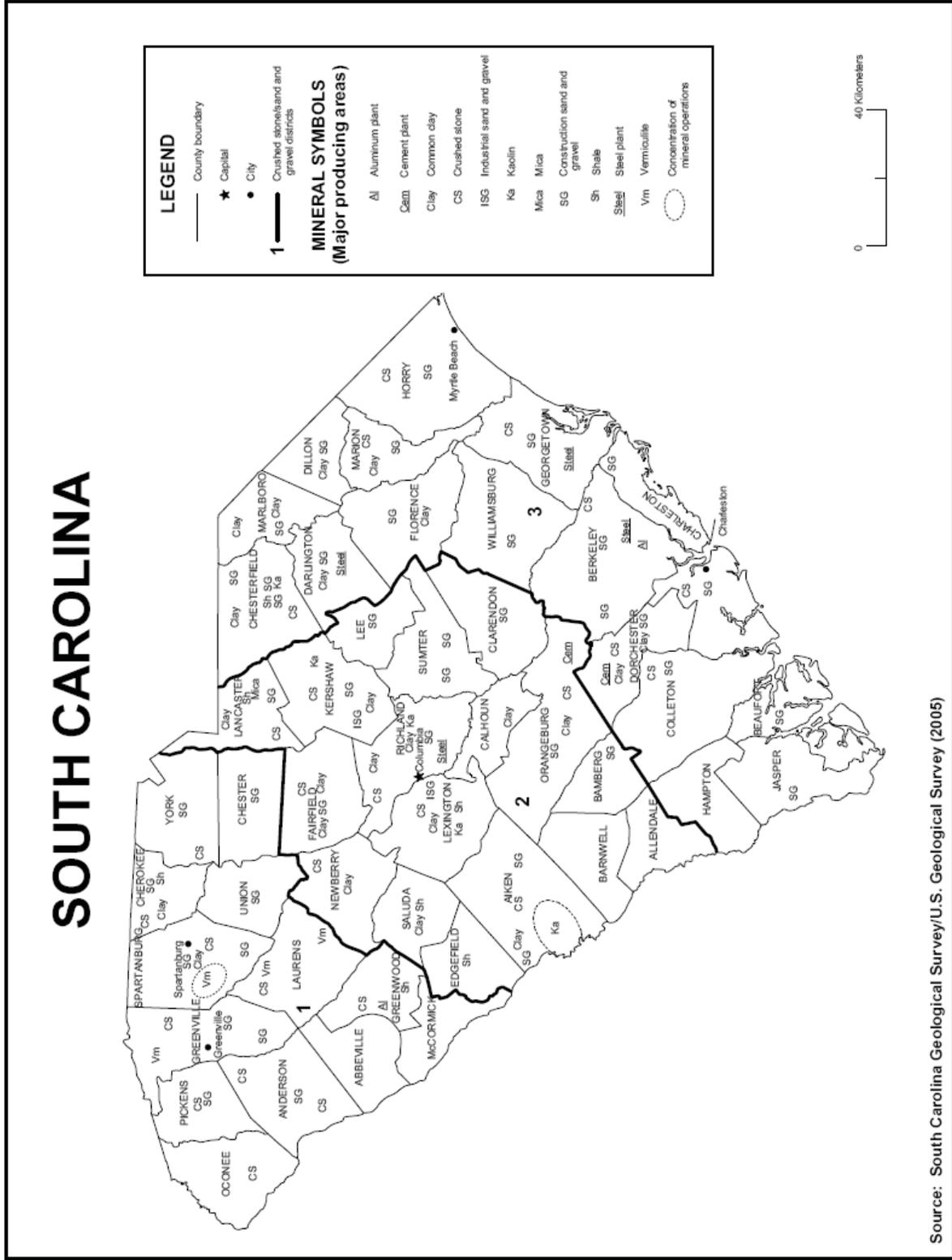
Archaeological sites have been recorded in South Carolina spanning from 12,000 year old camp sites to 1950's era farmsteads and military installations. To date, only a small fraction of sites have been investigated by professional archaeologists. Unlike natural resources, cultural resources are non-renewable. Because many cultural resources in South Carolina are linked to forested land, protecting forest land from non-forest use will better protect South Carolina's cultural resources.

U.S. Geological Survey, 1999 Mineral Production Data

Map 4.



Map 5.



III. Critical Issues

A. Fragmentation

As human populations increase, the necessity for space to accommodate our needs and desires also increases. Many individuals want to move from the city and into the more tranquil setting of a subdivision where there is still some resemblance of a forest. These subdivisions are usually tracts of wooded areas that were once forests but have now been transformed into somewhat large lots (1/2 to 1 acre) where a house can be surrounded by a few trees. As the demand for this type of setting is increasing, more forest land is bought by developers, sub-divided, and sold for a premium price.

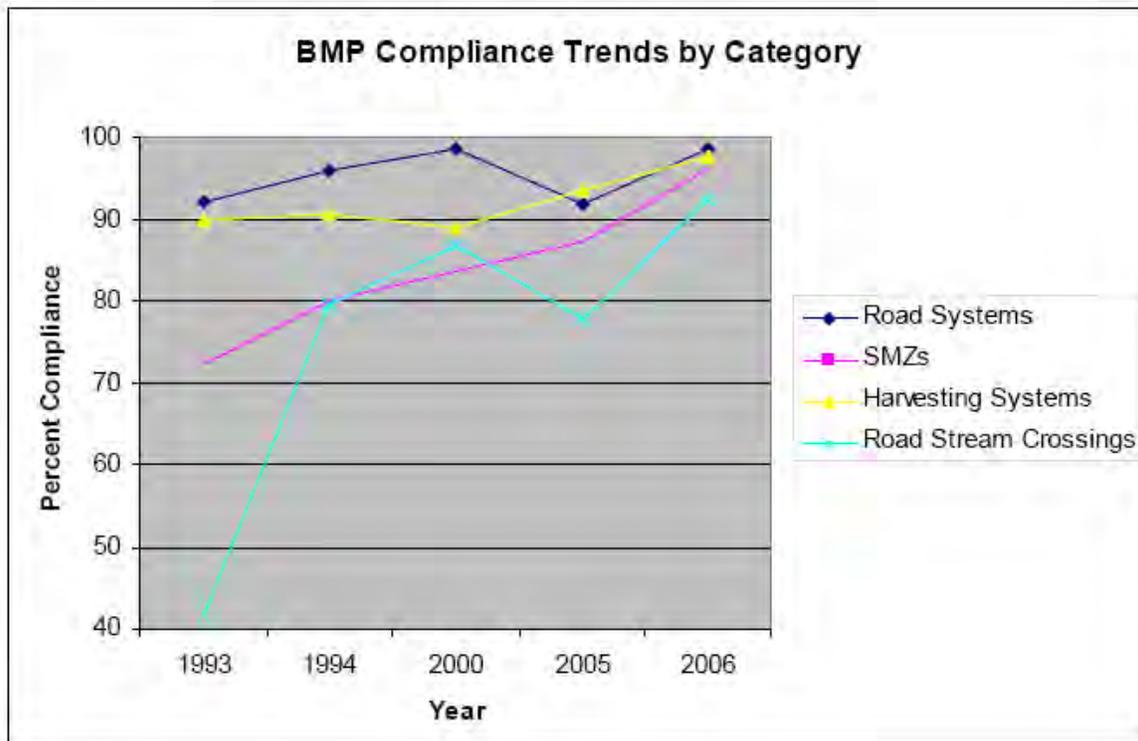
Fragmentation of forest land is occurring as landowners are offered large sums of money for their forested property. A property owner may sell all of the forested property or just a prime portion to developers. As the size of the forest decreases so does the biodiversity that is unique to that specific area. Meanwhile, an adjacent property owner who enjoys the forest and its associated benefits refuses to convert his property into some type of development. The end result is a patchwork type pattern that goes from forest to non-forest to forest and back again. This results in large contiguous forest lands being broken into smaller tracts. This in turn leads to habitat loss, threatens water quality, and decreases biodiversity. Once development has occurred, the ability to manage the adjacent forest becomes limited.

B. Sustainable Forests and Timber Harvesting

Sustainable forestry includes many components that are all needed to ensure there will be forests available for the next generation. Some of the numerous components include: (1) the practice of proper planting, growing, and harvesting of trees while not jeopardizing the associated soil, air, water, wildlife, and aesthetics; (2) education of the private non-industrial landowners who own 74% of the state's forests; (3) ensuring forests are protected from pests, diseases, exotic plants, and human development; and (4) to continue to improve on all of the afore mentioned aspects of the forest industry. It is critical to continue sustainable forestry activities throughout the state to ensure an adequate supply of forest products for the human population that continues to grow at an alarming rate.

Best Management Practices (BMP's) are voluntary forestry practices implemented to minimize and prevent non-point source pollution. BMP's have existed since the late 1970's but began receiving more emphasis in the early 1990's. Overall harvesting compliance with BMP's in 2006 was 98%. Of the major BMP categories, compliance was highest for road BMP's (98.5%), followed closely by harvesting BMP's (97.5%) and stream side management zones (96.2%). Compliance was lowest for road stream crossings (92.3%), however, it is worthy to note that this is a significant increase from 77.8% in the previous survey (Sabin 2006).

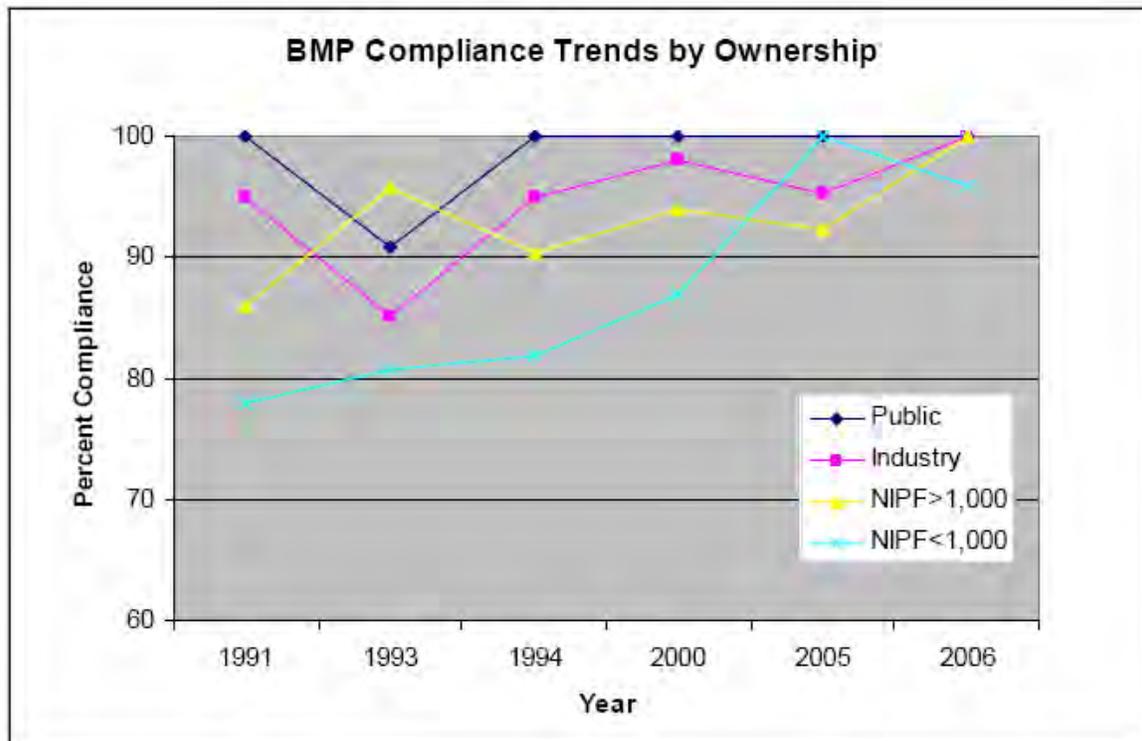
Figure 1.



Timber harvesting when BMP's are not utilized can cause overall habitat degradation and decrease environmental parameters associated with the harvested area. These include but are not limited to: soil erosion, sedimentation, water quality problems, rutting, poor placement of logging decks, loss of wildlife habitat, and clogging of streams with woody debris. In order to control and minimize these problems, a set of guidelines was developed for loggers as well and landowners to follow.

The 2006 survey also indicated that landowner compliance with BMP's varied as follows: public property = 100%, industrial property = 100%, non-industrial owned private property greater than 1000 acres = 100%, and non-industrial owned private property less than 1000 acres = 94%. When surveyed, only 44.6% of landowners with less than 1000 acres were familiar with BMP's and only 83.5% of all landowners required BMP compliance as part of that contract (Sabin, 2006).

Figure 2.



There are several programs that offer incentives for landowners to keep areas forested. They include but are not limited to the Environmental Quality Incentives Program, Conservation Reserve Program, and the Forest Renewal Program. However, these programs need additional funding to meet their reforestation and environmental goals. The South Carolina Forestry Commission, Clemson Cooperative Extension Service, consulting foresters, and industrial foresters offer expertise in proper forest management. Numerous pamphlets have been produced for the landowner that explain the BMP's and why they are important. However, many landowners still do not know the forestry services and incentives that are available to them. Thus, a significant portion of them do not realize how important and necessary BMP's are to the environment. Partners intend to continue expanding educational and outreach opportunities to reach these landowners.

C. Water Quality and Quantity

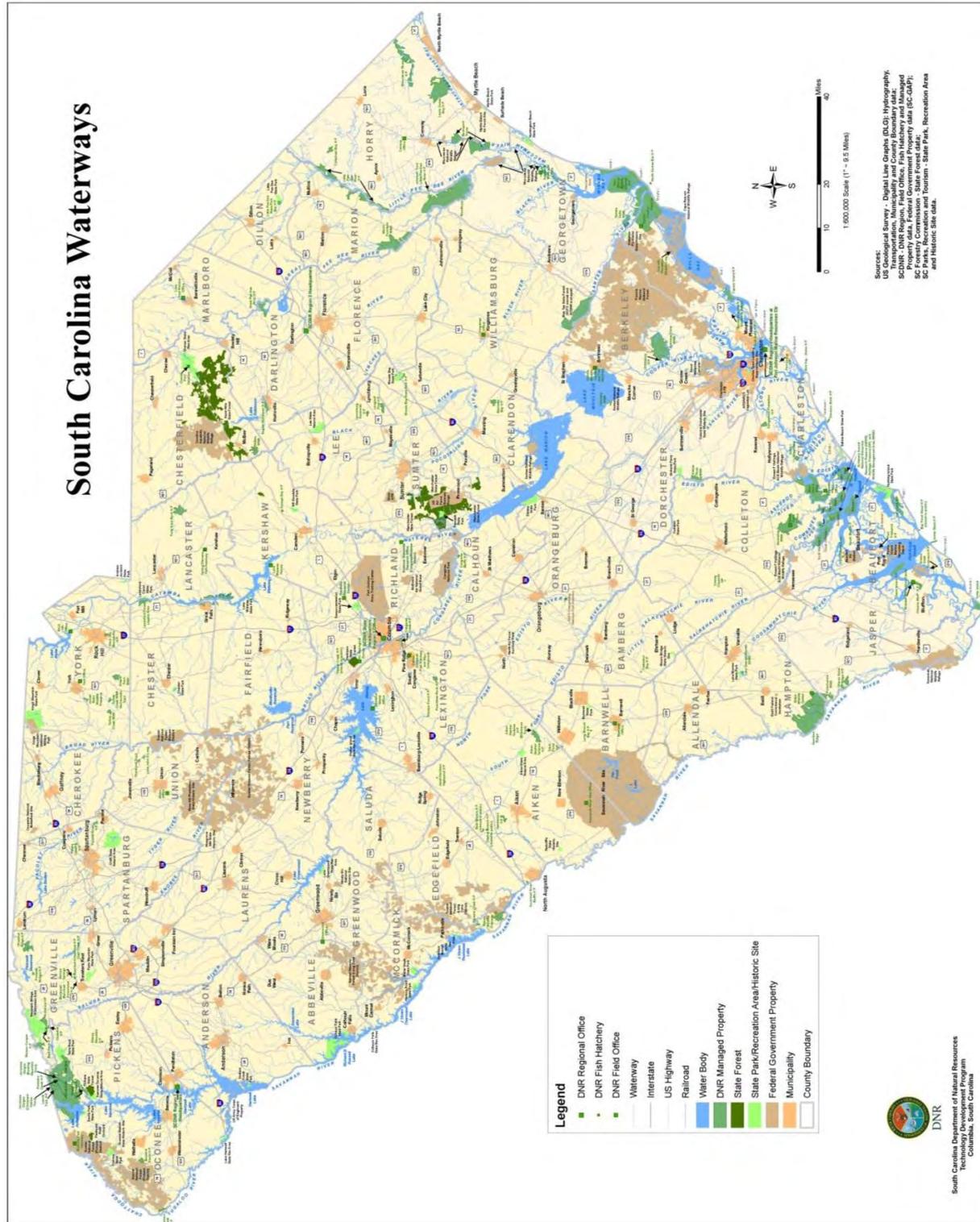
South Carolina's average streamflow is about 33 billion gallons per day. This water, coupled with surface reservoirs and underground aquifers must be managed to ensure adequate water for the future. Both surface and ground water availability correlate with the general physiology and geology of the state. Streams in the Foothills, Central Piedmont, and Western Piedmont Forest Legacy Areas tend to have well sustained base flows with only moderate variability; however, streams in the Northern and Southern Coastal Forest Legacy Areas generally have poorly sustained base flows and are highly variable.

Ninety-six percent of the State's water needs are supplied by surface waters. South Carolina river corridors provide 1,311 river miles for water supply which represents 12% of the total miles of rivers in the state (Map 6). In 1980, gross water withdrawals in South Carolina were estimated to be 5,780 million gallons per day (mgd), representing a 96% increase during the past decade (South Carolina Water Resources Commission, 1983). About 7.6% of this water is consumed and not returned to available supplies.

Statewide gross water use is projected to increase 48% to 8,550 million gallons per day by the year 2020 (South Carolina Water Resources Commission, 1983). In 1980, 206 mgd of ground water and 5,570 mgd of surface were used throughout the state. In contrast, the projected use for the year 2020 is 484 mgd of ground water and 8,060 mgd of surface water (South Carolina Water Resources Commission, 1983). To further compound this issue, South Carolina is involved with intense negotiations with Georgia and North Carolina regarding surface water withdrawal and discharge into the rivers to ensure the wise use and sharing of this vital resource.

During most sampling periods, an estimated 84% of the state's major river miles meet Federal water quality goals, and 86% meet State water quality standards. Water quality problems include fecal coliform bacteria contamination, low dissolved oxygen concentrations, high suspended solid levels, and elevated nutrient levels. Large quantities of sediment enter the state's streams each year. This sedimentation impairs municipal, industrial, and recreational water use; destroys aquatic habitat; and adversely impacts desired aquatic organisms. Over 18 million tons of soils are eroded each year in South Carolina and contribute to the sedimentation problem (South Carolina Water Resources Commission, 1983). Forest lands that comprise over 90% of the nonfederal acres in South Carolina contribute only about 4% of total soil erosion (Assessment of Non-point Source Pollution for the State of South Carolina, 1989). Non-point source pollution contributors include agricultural runoff (67%), urban runoff (43%), construction (14%), abandoned gravel, sand, and clay mines (6%), silviculture (4%), and other categories (6.2%). The total percentage exceeds 100% because several of the identified waterbodies had more than one non-point source category contributing to the problem (SC Department of Health and Environmental Control, 1989). Most of the erosion in the state occurs in the Central and Western Piedmont Forest Legacy areas. Best management practices, which are primarily voluntary, have been developed to mitigate erosion. Modification of watershed lands for various uses can significantly contribute to non-point source pollution. Forests that are located throughout these watersheds play an important role in decreasing sedimentation and improving water quality throughout the state.

Map 6.



D. Conserving the Forest Land Base

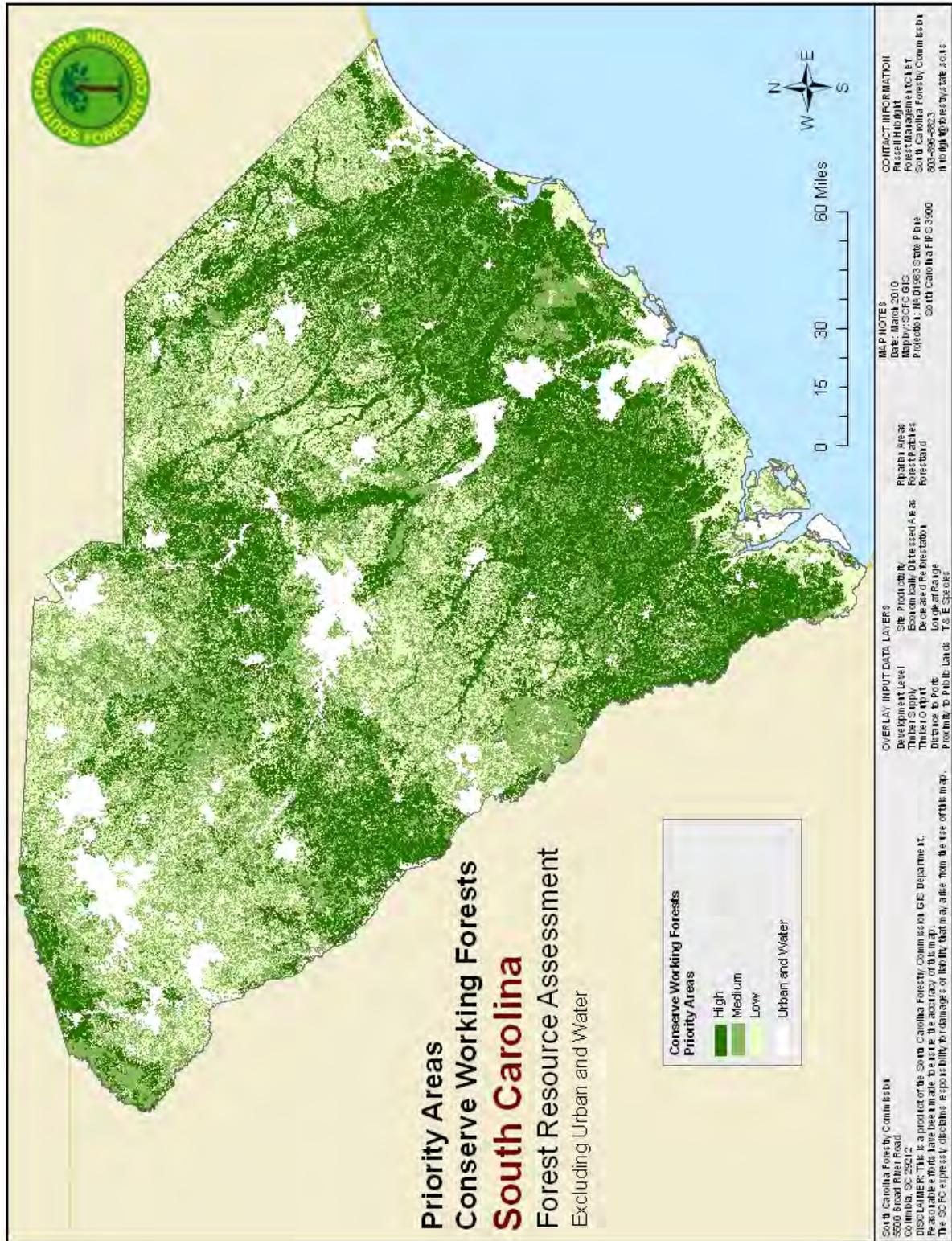
South Carolina recently received draft data from the Southern Forest Land Assessment (Map7) which will provide a tremendous resource for conserving forest land in the state. The Southern Forest Land Assessment (SFLA) is a cooperative project of the Southern Group of State Foresters to spatially identify important forest lands in the 13 southern states and Puerto Rico. The project was funded by a Forest Stewardship Program grant from the USDA Forest Service and will use thirteen GIS data layers to map locations of important private forest lands. Other project outputs will include regional and state maps defining areas with significant forest resource threats and forest resource richness.

With the ever increasing population in South Carolina, urban areas are continuing to sprawl uncontrollably into the rural areas. Many counties in the state have very little or no zoning and have not even begun to plan for development. The state is already beginning to see a net loss of rural settings, rural land use, and their associated by-products. Conservation partners have begun to work with counties and local communities to address planning and conservation; however, this is a very long process and requires considerable time and money. Partners simply lack the resources to produce quality plans and stay ahead of the development curve.

In addition, the number of housing units in South Carolina increased by 35.4% between 1990 and 2005. This well exceeded the national average of 21.8% during the same time period (Ulbrich and London, 2008). Much of this increase is a result of vacation and second homes. The urban areas are expanding and continuing to acquire more land to accommodate the building demands. Along with these houses come infra-structure, development, stores, malls, and other facilities. The price of forested land has now become expensive due to the demand for retailers to build and supply the necessary goods needed by the public.

One of the biggest threats from development is the indirect or secondary impacts to neighboring areas. Once development occurs near a forest, the management capabilities become threatened. For example, managers may no longer be able to prescribe burn the forest to enhance the growth of certain forest plants. With increasing development, sensitive animal species may be driven from their secluded habitats, noise pollution, as well as air pollution, and non-point source increase plus wildlife related activities such as hunting may be excluded due to the close proximity of an urban population, and the list continues. The end result is one forest may have been lost to the development itself, but another adjacent forest was impacted due to the inability to manage it properly. Conservation partners are working diligently to create conserved corridors of land to ensure the continuation of traditional forest management activities. The Forest Legacy Program plays an instrumental role in helping to curtail the loss of prime forest land and in the future ability to manage such forest land. Inclusion of land in the Forest Legacy Program will ensure working forests for generations to come and help the state in creating corridors of conserved forest lands.

Map 7.



E. Prescribed Burning and Smoke Management

Prescribed burning has long been used as a preferred timber and wildlife management technique. In addition to reducing the risk of wildfire, prescribed burning helps to control hardwood competition within pine stands and stimulates early successional vegetation that is used by wildlife for food and cover. Unfortunately, fragmentation of forests and increasing development have caused an increase in smoke management concerns and threatened this cost-effective technique. If the ability to conduct prescribed burns is lost, numerous ecosystems and wildlife species will be at risk. One of the most significant ways to ensure the continuation of prescribed burning is to protect large blocks of forest land from development and fragmentation. The Forest Legacy Program can play a critical role toward ensuring the future of prescribed burning.

EXISTING PROGRAMS TO PROTECT LANDS IN SOUTH CAROLINA

A wide variety of programs are available to assist landowners in South Carolina in the proper management of their properties. They include but are not limited to the following:

Forest Stewardship Program: The Forest Stewardship Program (FSP) is a federally funded program administered by the South Carolina Forestry Commission. Landowners are furnished with a written management plan prepared by a team of natural resource professionals and tailored to fit the landowner's objectives for the property. Objectives include wildlife, timber, recreation, soil and water conservation, and aesthetics. All landowners who own at least 10 acres with at least 5 acres of woodland are eligible for FSP. There is no upper limit on acreage.

Forestry Renewal Program: The Forest Renewal Program (FRP) is a state program, administered by the Forestry Commission and funded by a tax on roundwood processed by forest industry and state appropriated funds. The FRP assists landowners with establishing timber production on their property.

Southern Pine Beetle Prevention and Restoration Program: The Southern Pine Beetle cost-share program makes cost-share funds available to landowners for approved forest management practices that minimize future outbreaks and restore productive stands previously impacted by SPB infestations. Prevention practices include pre-commercial thinning to reduce the number of stems and basal area per acre in over-stocked pine stands. Restoration practices include returning damaged areas back to healthy forests by creating stands less susceptible to future SPB infestations. This is accomplished by planting loblolly at lower densities or planting species more resistant to SPB such as longleaf or hardwoods.

Conservation Reserve Program: The Conservation Reserve Program (CRP) offers landowners incentives to conserve soil, water, and wildlife habitat. Landowners can apply to enroll highly erodible land and other environmentally sensitive areas in the CRP. By enrolling land, a landowner can receive annual rental payments and cost-share benefits to implement conservation practices. Permanent vegetation which may include trees, grasses, or wildlife foods must be maintained for the contract period.

Wetlands Reserve Program: The Wetlands Reserve Program (WRP) is designed to help eligible landowners restore wetlands. Under this program, landowners enter into permanent easements, 30-year easements, or 10-year wetlands restoration agreements in exchange for a portion of restoration costs. The landowner maintains full control over access and use of WRP easement lands. Acceptable uses of WRP land may include activities such as hunting, fishing, and other compatible uses. The primary objective is to restore altered wetlands as closely as possible to the natural hydrology, native vegetation, and natural topography, protecting the functions and values of wetlands in the agricultural landscape.

Wildlife Habitat Incentives Program: The Wildlife Habitat Incentives Program (WHIP) was established by the 1996 Farm Bill for the purpose of making technical and financial assistance available to landowners to develop, enhance, and restore upland wildlife, wetland wildlife, threatened and endangered species, fish, and other types of wildlife habitat. In South Carolina, WHIP is specifically targeted towards developing, restoring, and enhancing habitat for the following "priority species":

- Bobwhite quail and associated grassland/shrub songbirds
- Wintering waterfowl and shorebirds
- Threatened, endangered, and species of state concern.

Environmental Quality Incentives Program: The Environmental Quality Incentives Program (EQIP) is designed to identify conservation concerns and set conservation priorities to address soil erosion, water quality, wildlife habitat, and other resource issues through a community-based process. EQIP is available in all 46 counties to address statewide resource concerns. Sixty-five percent of EQIP funds are targeted towards approved Conservation Priority Areas. State Conservation Priority Areas have been identified by local work groups, ranked by the State Technical Committee, and submitted to Washington for approval. Practices such as field borders, filter strips, and grassed waterways designed to protect water quality may also be maintained as early successional habitats to benefit bobwhite quail and other species. Riparian (streamside) buffer zones used to protect streams from runoff can also be highly productive areas for wildlife, providing food, cover, and travel corridors.

Farm and Ranchland Protection Program: The Farm and Ranch Lands Protection Program (FRPP) provides matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses. By working through existing programs, NRCS partners with state, tribal or local governments and non-governmental non-profit organizations to acquire conservation easements or development rights on prime, unique or other productive farmland. The program also provides assistance for farms containing significant historical or archaeological resources. NRCS provides up to 50 percent of the fair market easement value. To qualify, farmland must: be part of a pending offer from a state, tribe, or local farmland protection program; be privately owned; have a conservation plan for highly erodible land; be large enough to sustain agricultural production; be accessible to markets for what the land produces; have adequate infrastructure and agricultural support services; and have surrounding parcels of land that can support long-term agricultural production. Depending on funding availability, proposals must be submitted by the eligible entities to the appropriate NRCS State Office during the application window.

Grassland Reserve Program: The Grassland Reserve Program (GRP) is a voluntary program offering landowners the opportunity to protect, restore and enhance grasslands on their property. Section 2401 of the Farm Security and Rural Investment Act of 2002 (Pub. L. 107-171) amended the Food Security Act of 1985 to authorize this program. The Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA) and the U. S. Forest Service are coordinating implementation of GRP, which helps landowners restore and protect grassland, rangeland, pastureland, shrubland and certain other lands and provides assistance for rehabilitating grasslands. The program will conserve vulnerable grasslands from conversion to cropland or other uses and conserve valuable grasslands by helping maintain viable grazing operations.

Focus Area Initiative:

The Forest Legacy Program's (FLP) objectives are very similar to the Focus Area Initiative in South Carolina. Focus Areas are local grass-roots projects working within the framework of the Atlantic Coast Joint Venture of the North American Waterfowl Management Plan (NAWMP). The NAWMP recognizes the loss of wetland habitats and recommends that wetland habitat and associated uplands be protected through conservation easements and land acquisition.

In South Carolina, there are twelve Focus Areas (Map 8) that typically comprise major waterways and river systems. The majority of the Focus Area's success has come within the coastal areas which contain numerous wetland acreages. Larger plantations, that contain substantial wetland acreages, have been the major donor of conservation easements. This effort has seen much success along the coast; however, easement donation is very limited in the inland areas of the state. These Focus Area Initiatives were the original guiding factor in the design of the Forest Legacy Areas.

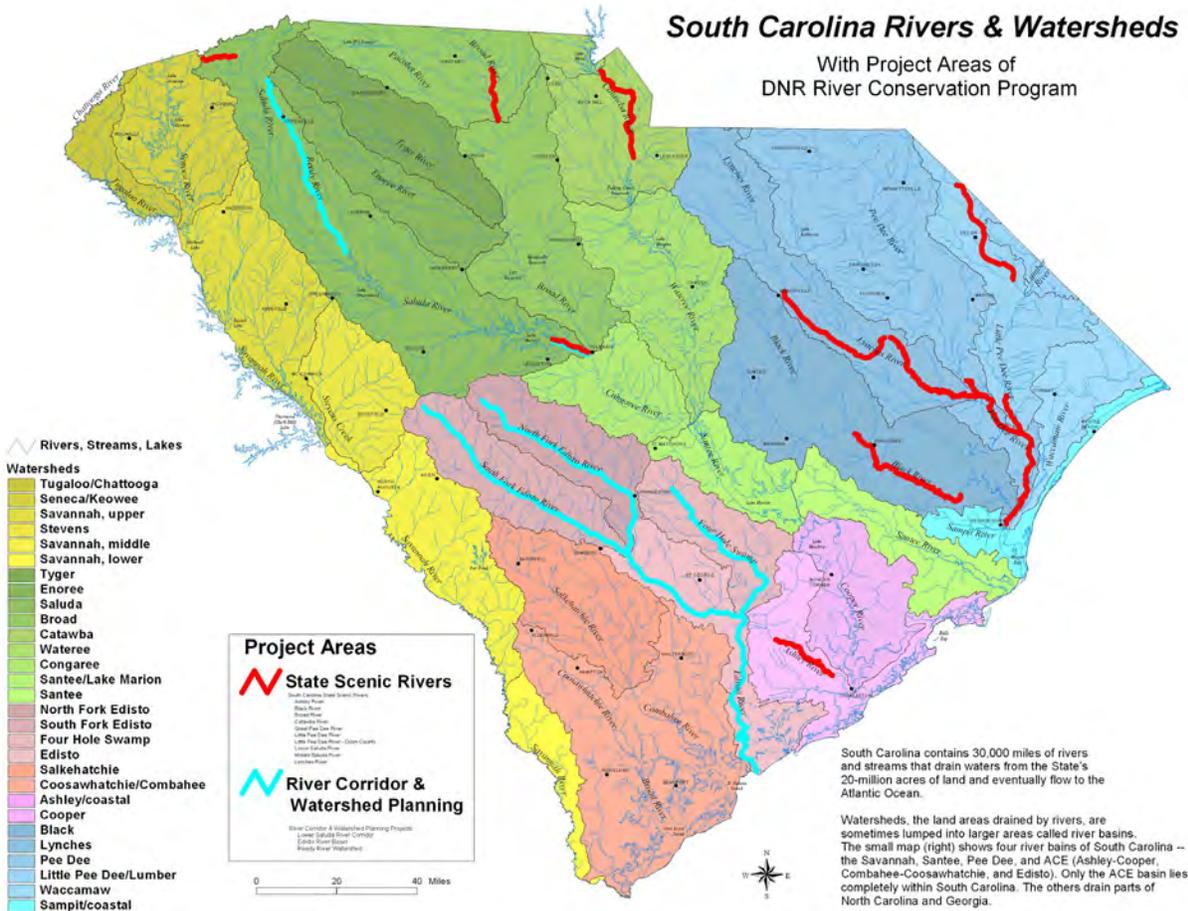
The Focus Area Initiative in South Carolina has done well in promoting conservation easements since 1987, but forest land and wildlife habitat are being lost to development at a faster rate than the land is being protected. As part of the Focus Area Initiative, conservation easements are donated to private organizations or funded through a grant from the SC Conservation Bank. Conservation Bank funds are extremely competitive, so grants must be highly leveraged and not all applications will be funded. In an effort to prevent competition with the nonprofit

organizations and prevent duplication of effort, grants received from the FLP will primarily be used for land acquisition. The FLP and the Focus Area Initiative complement each other very well and allow SCDNR to target major acquisitions that could leverage donated conservation easements for the Focus Areas.

Scenic Rivers Program:

The goal of the Scenic Rivers program is the conservation of SC’s river heritage through proper management of the natural and cultural character of the state’s river corridors. As is stated in the South Carolina Scenic Rivers Act of 1989, this program has the purpose of protecting “unique or outstanding scenic, recreational, geologic, botanical, fish, wildlife, historic, or cultural values” of selected rivers or river segments in the state. This program utilizes a community-based planning approach that works with riparian landowners and other community interests to write and implement a river corridor management plan. As with other previously described programs, landowner participation is entirely voluntary. To date, portions of ten rivers have been designated as South Carolina Scenic Rivers (Map 10).

Map 10. South Carolina Rivers and Watersheds



LAND TRUSTS IN SOUTH CAROLINA

South Carolina has one of the most successful land trust programs in the United States. Land trusts are non-profit organizations that are dedicated to the preservation and protection of land through acquisition of land and interests in land. Land trusts have also played a major role in assisting with the donations of conservation easements to meet the South Carolina Focus Area goals. Currently, there are 26 Land Trusts in South Carolina with the primary goal of protecting undeveloped land.

- Aiken County Open Land Trust
- Beaufort County Open Land Trust
- Black Creek Land Trust
- Community Open Land Trust
- Congaree Land Trust
- Edisto Island Open Land Trust
- Katawba Valley Land Trust
- Kiawah Island Natural Habitat Conservancy
- Lord Berkeley Conservation Trust
- Lowcountry Open Land Trust
- Mount Pleasant Open Space Foundation
- Nation Ford Land Trust
- Naturaland Trust
- Pacolet Area Conservancy
- Palmetto Conservation Foundation
- Pee Dee Land Trust
- Friends of the Reedy River Land Trust
- South Carolina Battleground Preservation Trust
- Spartanburg Conservation Endowment
- The Conservation Fund
- The Nature Conservancy
- Wetlands America Trust (Ducks Unlimited)
- Upper Savannah Land Trust
- Upstate Forever
- Waccamaw Land Trust
- Trust for Public Land

Public Participation Process

The updated draft of the Forest Legacy AON was made available for public review and comment as part of the State Assessment process in conjunction with the SC Forestry Commission.

GOALS FOR THE FOREST LEGACY PROGRAM IN SOUTH CAROLINA

- Identify and protect environmentally important forest lands threatened with conversion to non-forest uses;
- Protect river systems, wetlands, and their associated upland habitats;
- Increase the opportunity for public recreation;
- Reduce forest fragmentation caused by development;

- Provide environmental benefits through the restoration and protection of riparian zones, native forest plants and animals, and remnant forest types;
- Provide for watershed and water supply protection;
- Provide employment opportunities and economic stability through maintenance of traditional forest uses;
- Maintain important scenic resources of the state;
- Protect rare, threatened, or endangered species of plants and animals;
- Promote Forest Stewardship;
- Promote Best Management Practices for forestry;
- Provide for educational and research opportunities;
- Provide buffer areas and connectivity to already protected areas;
- Enhance forest diversity.

ELIGIBILITY CRITERIA FOR FOREST LEGACY AREAS

- To be eligible as a South Carolina Forest Legacy Area forested land must meet all of the following criteria:
- Be threatened by present or future conversion to non-forest uses;
- Be threatened with conversion by encroaching development or be subject to division into small non-contiguous forest tracts, separated by non-forest land;
- Contain one or more of the following important public values:
 - –scenic resources;
 - –public recreation opportunities;
 - –rivers, streams, or lakes recognized as important to the State;
 - –wetlands, riparian areas, or floodplains;
 - –important public water supplies;
 - –habitat for forest-dependent birds (resident and migratory species), mammals, reptiles, amphibians, invertebrates, and fish;
 - –habitat for rare, threatened, and endangered plant or animal species;
 - –important cultural resources;
 - –large blocks of contiguous forest land.
- Provide opportunities for continuation of traditional forest uses (forest management, watershed protection, and recreational activities such as bird watching, hiking, hunting, and fishing);
- Reflect important regional values.

THE FOREST LEGACY ACQUISITION PROCESS IN SOUTH CAROLINA TRACT IDENTIFICATION AND PRIORITIZATION

Landowners interested in participating in the Forest Legacy Program may contact the South Carolina Department of Natural Resources (SCDNR) or the South Carolina Forestry Commission (SCFC). All applications and tract information will be collected and maintained by the Forest Legacy Coordinator with the SCDNR. The SCDNR will maintain close communication with representatives from the SCFC regarding the FLP. Since the primary focus of the FLP in SC is to conduct fee-simple title to tracts, most of the potential acquisitions will likely be with corporate landowners and not individual citizens. The FLP coordinator will have the discretion of determining what paperwork and documentation is necessary for review by the Forest Legacy Subcommittee. If an individual landowner wishes to have a small tract considered for a conservation easement, forms are available in Appendix C. Potential tracts for FLP funding will be discussed by the Forest Legacy Subcommittee. The Forest Legacy Subcommittee will evaluate the proposed properties with the eligibility and the evaluation criteria in Appendix C.

The Forest Legacy Program will be used to acquire forested lands that are threatened with conversion to non-forest uses. Special consideration and priority will also be given to tracts designated as significant or high priority by the:

- Southern Forest Land Assessment
- Focus Area Initiative and/or
- State Comprehensive Wildlife Conservation Strategy
- Other collaborative landscape conservation partnerships in South Carolina.

Priority will be also given to tracts that adjoin already conserved properties, promote significant leverage from other funding sources, are located along or buffer river systems, and provide multi-faceted resource benefits.

The Forest Legacy Subcommittee has the option to purchase a conservation easement or to pursue a fee simple purchase. **Lands will only be acquired on a willing buyer-willing seller basis.** Fee simple purchases are the preferred means of acquisition. Conservation easements will only be purchased under specific circumstances including but not limited to the following:

- The possibility of a fee simple purchase is not available.
- The property offers considerable public recreation benefits.
- The property offers considerable benefits to the conservation of neighboring properties.

All members of the Forest Stewardship Coordinating Committee will not be involved in the decision process. Instead, a diverse group of representatives from the Forest Stewardship Coordinating Committee have been assigned to serve on the Forest Legacy Subcommittee. These representatives will provide the input for the Forest Stewardship Coordinating Committee.

The Forest Legacy Subcommittee will rank the available properties and make recommendations to the SCDNR. Since Forest Legacy funding is limited and rarely provides enough funding to complete an acquisition, SCDNR will consider recommendations from the committee and make the final decision for identifying submissions for the Forest Legacy Program.

Due to a long history and previous working relationships, no disagreements or problems should arise with this strategy. Once specific properties are identified, the tract will be established as an acquisition project, and an appraisal and a level one environmental assessment will be contracted. It will then be submitted through the Forest Service review and ranking process and to the State Budget and Control Board for final approval. All land transactions will follow state procurement procedures and FLP guidelines.

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Appendix A

Completed Forest Legacy Projects

Project/Tract Name	Date Funded	Date Completed	Acres	CE/Fee	FLP Contribution
Belfast Phase I	12/26/2007	10/10/2008	2,228	Fee	\$1,485,000
Belfast Phase II	10/1/2009		2,436	Fee	\$3,250,000
Catawba River	02/16/05	06/29/07	1,540	Fee	\$ 2,958,000
Landsford Canal	02/11/02	05/06/02	1,049	Fee	\$ 2,960,000
Tuomey	05/07/03	09/24/04	3,270	Fee	\$ 4,503,000
Santee	10/01/01	11/18/03	12,349	Fee	\$ 2,850,000
Beech Hill	05/15/01	01/28/02	1,369	Fee	\$ 1,592,167
Edisto WMA	05/14/01	01/28/02	5,752	CE	\$ 4,050,000
Geddis	05/15/01	09/15/04	25	Fee	\$ 64,000
Mead Easement	05/26/04	12/15/04	6,326	CE	\$ 6,795,300
Woodbury	02/15/07	07/13/07	25,668	Fee	\$ 3,306,754
Hamilton Ridge	02/15/07	04/26/07	13,281	Fee	\$ 1,693,246
Shooting Tree	02/14/00	12/07/00	571	Fee	\$ 975,000
South Carolina Total			75,864		\$ 36,482,467

Appendix B

Forest Legacy Area Descriptions

FOOTHILLS

Description:

The Foothills Forest Legacy Area (FFLA) is comprised of portions of Anderson, Oconee, and Pickens Counties and is located in the northwestern corner of the state. The area is primarily mountain, foothill, and piedmont type terrain. Elevations vary from 475 feet at the high water mark on Lake Russell to 3,554 feet at the top of Sassafras Mountain, the highest point in South Carolina. Major lakes in the area include Lake Jocassee, Lake Cunningham, Lake Robinson, Lake Hartwell, Lake Keowee, Lake Russell and Tugaloo Lake. Major river systems include the Chauga, Chattooga, Keowee, Enoree, and Saluda. This forest legacy area contains the Upper Savannah Focus Area and adjoins the Andrew Pickens Ranger District of the Sumter National Forest.

Special Values of the Forest Land in the Area:

Forest types range from extensive pine plantations in many of the piedmont sections of the area to mountain ecosystems in Oconee, and Pickens Counties. While most of the piedmont forest are in private ownership much of the mountainous land is owned by local municipalities and state and federal agencies. The northern forest is primarily managed for hardwoods, and the southern forest is primarily managed pine. The mountain ecosystems are one of the most unique natural resource areas east of the Mississippi. The mountains ecosystems' substantial stands of hardwood and pine-hardwood forest, contribute to its significant ecological, scenic and recreational attributes. This area has over 120 miles of quality trout streams supporting naturally reproducing populations of brown, rainbow, and the unique strain of Southern Appalachian brook trout. The area also provides essential habitat for the region's black bear and grouse populations. Because of its size and position on the Blue Ridge Escarpment, the mountain area provides important habitat for neo-tropical migratory songbirds considered by ornithologists to be species of concern.

In addition to being important breeding habitat, Clemson University researchers have documented that extensive mountain habitat is critically important to all bird migrants in the area. During 1997, more bird migrants came through the Jocassee area than any other place in South Carolina (Clemson University radar work).

The FFLA has many state listed rare, threatened or endangered plant and animal species. The area has a rich cultural heritage. Native American sites and folklore are abundant, as well as sites used by early settlers.

Current Conversion Pressures:

The decline in number of acres of Wildlife Management Areas has escalated rapidly over the past few years. Over 20,000 acres of WMA have been removed in the past decade. These were primarily lands that will be developed into residential communities. Lands around Lakes Keowee and Hartwell are developing rapidly into upscale housing and gated communities. Thousands of acres of mountain land have been sold to developers for golf course communities. Urban expansion, second homes and rural subdivisions have greatly decreased the amount of land available for forest management.

Greenville County continues to maintain the highest population of any county in South Carolina and in 2007 was rated as the fifth fastest growing county in the state (Population Division, US Census Bureau). Given the developed nature of this county, forested areas within the neighboring counties of this Forest Legacy Area are vital to the Upstate, especially as citizens who work in Greenville are seeking more rural landscapes in which to live and are willing to commute long distances. This trend is mirrored throughout the FFLA. These statistics clearly indicate that people are moving from metropolitan to rural areas.

There is a trend on public lands to minimize forestry activities at the expense of species which require forest management. Recently, several environmental groups asked the USFS to refrain from any timber management on their lands. Currently, approximately thirty percent of the Andrew Pickens District is already in areas zoned for no timber management. With the decreasing management of private lands because of urban encroachment and other before mentioned activities it is becoming increasingly important that public forested lands be managed. Because of lack of managed lands, hunting opportunities and hunter enthusiasm has already begun to decrease.

Potential Future Conversion Factors:

All parts of the FFLA are experiencing significant growth. Future housing developments are being planned throughout the FFLA. The purchase and protection of the Jocassee Gorges Property has increased the interest of persons to move into this area. The Southern Connector Highway in southern Greenville County will further enhance development of industry and will further erode good wildlife habitat.

Goals and Objectives for FFLA:

- Encourage habitat enhancement through land purchase and sound forest management
- Protect important historic and archeological sites
- Maintain and enhance all significant forest types and their associated plant and animal communities
- Increase public recreation opportunities
- Protect scenic landscapes in the area; particularly along a designated scenic road or river.
- Protect areas designated as part of the Upper Savannah Focus Area Initiative or Partnership for the Blue Ridge.
- Protect river systems, wetlands, and their associated upland habitats.
- Provide a connective corridor between existing conservation projects.

CENTRAL PIEDMONT

Description:

The Central Piedmont Forest Legacy Area (CPFLA) encompasses counties within the Piedmont Plateau Region of South Carolina. The CPFLA includes portions of Chester, Fairfield, Lancaster, Laurens, Newberry, Union, and York Counties. This area contains the Catawba Focus Area. The topography consists of moderate to steeply sloped drainages characteristic of the Piedmont Plateau, and soils are generally acidic with a sandy-loam topsoil and a red clay subsoil.

Special Values of the Forest Land in this Area:

Forest types range from extensive bottom-land hardwoods along the Broad River, Tyger River, Enoree River and the Catawba River basins, with loblolly and shortleaf pines in the Piedmont, to limited upland hardwood forests in portions of the area.

Production of forest products is a major industry in the area. Commercial wood using industries produce lumber, plywood, oriented strand board, chips for paper and pulp, posts, and fuel. Forest related activities, such as hunting and outdoor recreation are also very significant opportunities which contribute greatly to the well being and livelihood of the local communities and their economies.

These forests provide many unique habitats that are used by a variety of wildlife, some of which are endangered or threatened. In addition to many endangered or threatened plant species found in these forests, this area is home to many endangered or threatened animal species such as the Bald Eagle, wood stork and Schweinitz's sunflower. The area also has a rich cultural heritage, both historic and prehistoric. Native American sites abound (particularly around the river basins), as well as sites used by early settlers. Several of these areas have already been protected under the state Heritage Preserve program (Rock Hill Blackjacks HP, Pacolet River HP and Peters Creek HP) or as part of state parks (e.g. Landsford Canal SP, Rose Hill State Historic Site, Chester SP, Croft State Natural Area and Musgrove Mill SP) and national historic sites (Kings Mtn. National Battlefield and Cowpens National Battlefield).

Managed Lands within the CPFLA:

Managed lands include those that are publicly and privately owned for the purpose of conserving and preserving natural resource values. These values include fish and wildlife habitat conservation, preservation of archaeological and historical sites and sustainable recreation areas. The SCDNR manages several properties within the CPFLA including but not limited to: Draper, Landsford Canal, Heritage Tract, McDowell Creek, and Forty-Acre Rock. These Wildlife Management Areas (WMA's) and Heritage Preserves (HP's) generally include upland habitat and most have significant frontage along creeks and/or major rivers. These areas provide key opportunities for hunting, fishing, hiking, bird watching, and other non-consumptive uses. The Draper WMA is a flagship WMA within the CPFLA that promotes habitat development and maintenance for early plant successional stage communities that enhance the propagation of bobwhite quail and other wildlife species that benefit from these habitat types.

The South Carolina Parks, Recreation and Tourism Department also managed property in and around the CPFLA. These areas include Andrew Jackson, Chester, Croft, Kings Mountain, Landsford Canal and Rose Hill State Parks. In most cases these parks are managed for daily visitation to inform visitors of significant historical events or places and have limited camping facilities.

Finally, the Enoree Ranger District of the Sumter National Forest adjoins this Forest Legacy Area. The Enoree is one of three ranger districts that comprise the Sumter National Forest. Its 161,216 acres are located in Chester, Fairfield, Laurens, Newberry, and Union Counties.

Current Conversion Pressures:

Many of the counties within the CPFLA are experiencing dramatic conversions from timberlands to residential and commercial development. In fact, from 2006-2006 York County was the fastest growing county in South Carolina and ranked second in overall population (Population Division, US Census Bureau). Most of this growth can be attributed to the expansion of Charlotte, North Carolina and Rock Hill, South Carolina.

Potential Future Pressures:

This region has four interstates (I-26, I-77, I-385 and I-85) which make commuting by workers and transportation of business products very desirable. It is apparent that the continual growth and expansion of urban areas and the loss of rural forested areas, particularly along interstate corridors, will continue. The next decade will most likely see a much greater conversion of forested lands to urban sprawl than the last decade due to the attractiveness of the region to industrial development and its commutable proximity to major metropolitan areas.

Goals and Objectives for the CPFLA:

- Maintain and enhance the forests of the Piedmont Plateau and their associated plant and animal communities.
- Enhance the opportunities for public recreation.

- Protect the scenic landscapes within the area.
- Protect areas of historic and archaeological significance.
- Protect diminishing riparian corridors from further development; including the protection of river systems, wetlands, and their associated upland habitats.
- Protect areas designated as part of the Catawba Focus Area Initiative.
- Provide a connective corridor between existing conservation projects.

WESTERN PIEDMONT

Description:

The Western Piedmont Forest Legacy Area (WPFLA) includes portions of Abbeville, Aiken, Edgefield, Greenwood, McCormick, and Saluda Counties. Terrain in the area is typical of the Piedmont and Sandhills, with gently to severely rolling elevations varying from about 80 to 850 feet above mean sea level. Two major river systems, the Savannah and the Saluda, drain the area. This area contains the portions of the Upper Savannah and South Lowcountry Focus Area Initiatives.

Special Values of the Forest Land in this Area:

Forest types range from extensive bottom-land hardwoods along the Savannah River, longleaf pine-wiregrass and scrub oak communities in the Sandhills, loblolly and shortleaf pines in the Sandhills and Piedmont, to limited upland hardwood forests in the upper portion of the area.

Production of forest products is a major industry in the area. Commercial wood using industries produce lumber, plywood, oriented strand board, chips for paper and pulp, posts, and fuel. Forest related activities, such as hunting and outdoor recreation are also important industries which contribute significant amounts of money to local economies.

These forests provide many unique habitats that are used by a variety of wildlife, some of which are endangered or threatened. In addition to many endangered or threatened plant species found in these forests, this area is home to many endangered or threatened animal species such as Webster's salamander and the gopher tortoise. The area also has a rich cultural heritage, both historic and prehistoric. Native American sites abound, as well as sites used by early settlers. Several of these areas have already been protected under the state Heritage Preserve program or as part of state parks and national historic sites.

Managed Lands within the WPFLA:

Managed lands include those lands that are owned primarily for the purpose of natural resources conservation, and may be publicly or privately owned. This area adjoins the Long Cane Ranger District of the Sumter National Forest (119,077 acres) and the Savannah River Site (198,000 acres) which is owned by the Department of Defense. SCDNR owns several properties including Aiken Gopher Tortoise Heritage Preserve and the Mason Wildlife Management Area.

Current Conversion Pressures:

All counties in the WPFLA are experiencing significant industrial growth especially Greenwood and Aiken Counties. Due to its proximity to Laurens County and Augusta, GA which both are major centers for manufacturing in textiles, pharmaceuticals, metals, and other products, this corridor is facing tremendous development pressure from commuters and second home sites. The Savannah River and Lake Greenwood provide

highly sought after amenities for such developments. In addition, forest land in Aiken County is rapidly being cut and converted into small horse farms and thereby creating a dramatic rise in land value.

Potential Future Conversion Factors:

All parts of the WPFLA are experiencing significant growth, with a noticeable trend of locating residences in rural, rather than suburban areas. A number of new industries have located within the area, bringing additional people to the area. Developers have actively been seeking to acquire and develop lands around Lake Russell and Lake Thurmond (including lands owned by the Corps of Engineers). Interstate 20 traverses the area thereby creating easy access to nearby metropolitan areas. In addition, plans are underway to widen or four-lane a number of other highways, which will encourage subsequent development and loss of forests.

Goals and Objectives for the WPFLA:

- Maintain and enhance significant examples of all forest types in the Western Piedmont Forest Legacy Area and their associated high quality plant and animal communities.
- Protect riparian corridors and flood plains along the Savannah and Saluda rivers.
- Protect important historic and archeological sites.
- Maintain contiguous forest land by linking managed public and private lands.
- Encourage habitat enhancement through land purchase and sound forest management to increase public hunting and other outdoor recreation opportunities.
- Protect the scenic landscapes within the area.
- Protect areas designated as part of the Upper Savannah and South Lowcountry Focus Area Initiatives.
- Provide a connective corridor between existing conservation projects.

NORTHERN COASTAL

Description:

The Northern Coastal Forest Legacy Area (NCFLA) of South Carolina includes portions of Chesterfield, Darlington, Dillon, Florence, Lee, Marion, Marlboro, Horry, Sumter, Richland, Clarendon, Georgetown and Williamsburg Counties. This area contains the Great Pee Dee/Lynches, Little Pee Dee/Lumber, Upper Waccamaw, Santee River, Santee Cooper Lakes, Upper Congaree/Wateree/Santee, and Winyah Bay Focus Area Initiatives.

Special Values of the Forest Land in this Area:

Within the NCFLA, many coastal plain forest ecosystems can be found. In the upper coastal plain region well developed xeric sandhills can be found in Kershaw and Chesterfield Counties. These forests are dominated by longleaf pine and turkey oak. Moving eastward deep sandy soils are less prevalent and tree species diversity increases. Most stands on upland sites are dominated by loblolly and/or longleaf pine with the understory consisting of a variety of hardwood shrub species.

There are however, some very unique ecosystems just east of the Sandhills. In Lee County there are forests that are classified as Longleaf Pine Savannas. These savannas are critical for the existence of several rare and threatened plants and animals in Lee County.

The Great Pee Dee River is the ecological cornerstone of the Northern Coastal Plain. This large red river enters South Carolina from North Carolina and travels south to Winyah Bay in Georgetown County. The Great Pee Dee is the only large red river in South Carolina that has not been dammed, so a considerable amount of diversity in forest lands still exists. The higher bluff portions are mostly mature oak-hickory forests with the lower elevations being comprised mainly of gum-cypress swamps. Currently, the Great Pee Dee river swamp represents the most significant forested land mass in the region. In addition to the Great Pee Dee, there are several black water streams in the region that have forested wetlands and uplands. These river systems are essential flood plain habitats that are important to many aquatic species and must be protected.

The coastal portion of this region contains many Carolina bays that have not been cleared for agriculture. Carolina Bays are elliptical shallow depressions found primarily in the Northern Lower Coastal Plain. They have many unique physical and botanical characteristics and usually differ markedly from local flora both in terms of plant structure and species composition. Carolina Bays provide tremendous diversity and are home to many threatened and endangered species.

Managed Lands Within the NCFLA:

Non-industrial private landowners still own the majority of the land in South Carolina's Northern Coastal FLA. Desirable agricultural characteristics have resulted in a very high percentage of the land base being converted to farmland. However, there is considerable forest land owned by non-industrial landowners. The most significant managed forest lands in the NCFLA are those owned by forest industry. Additionally, there are several forests owned by state agencies including the South Carolina Forestry Commission, South Carolina Parks Recreation and Tourism, South Carolina Public Service Authority, and the South Carolina Department of Natural Resources. Also there are two National Wildlife Refuges, and numerous tracts protected by non-profit organizations through either fee-simple ownership or conservation easements.

Current Conversion Pressures:

Currently some of the fastest population growth rates in the state are occurring in this region. From 2006-2007, Horry County was the third fastest growing county in the state. Much of Horry County has been developed, and the remaining undeveloped land is too expensive for conservation to be a feasible option. Within the last 10 years the coastal portion of Horry County has developed a reputation as a year-long resort area. Most notably the golf industry has soared. With this tremendous increase in year-round tourism has come a need for increased infrastructure. Conservation priorities have therefore been established for neighboring areas and counties to limit the spread of uncontrolled development.

Potential Future Conversion Factors:

Historically, most development has occurred close to the coast. However, within the last 5 years, significant development has occurred inland. There is every reason to believe that growth will continue to spread westward, especially as the construction of Interstate-73 begins. In addition to the growing threat from the tourism industry, legislators from some rural counties have introduced bills to relax tax rates for large industries. If these efforts are successful and new industries locate in this area, the value of land will increase. As demand for land increases, so will the economic incentives for private landowners and industrial forest landowners to sell tracts for development. This FLA recently saw major changes in ownership as International Paper decided to divest of all its land holdings. Fortunately, many of the large tracts were purchased by other timber investment organizations; however, these companies are still in the process of identifying which tracts they wish to retain and which ones are going to be sold. The future of these traditional industrial forests is still very uncertain.

Goals and Objectives for NCFLA:

- Strategically protect lands to provide significant greenways along the river systems.
- Protect, maintain and enhance significant forested areas.

- Increase public recreation opportunities.
- Protect important cultural and archaeological sites.
- Protect the scenic landscapes within the area.
- Protect diminishing riparian corridors from further development; including the protection of river systems, wetlands, and their associated upland habitats.
- Protect areas designated as part of the Great Pee Dee/Lynches, Little Pee Dee/Lumber, Upper Waccamaw, Santee River, Santee Cooper Lakes, Upper Congaree/Wateree/Santee, and Winyah Bay Focus Area Initiatives.
- Provide a connective corridor between existing conservation projects.

SOUTHERN COASTAL

Description:

The Southern Coastal Forest Legacy Area (SCFLA) encompasses much of the southeastern third of the state. The SCFLA contains portions of Allendale, Bamberg, Barnwell, Beaufort, Berkeley, Calhoun, Charleston, Colleton, Dorchester, Hampton, Jasper, and Orangeburg Counties. There are many low/wet areas with rivers flowing into the Savannah River, Edisto River or the Atlantic Ocean. This area contains four focus areas (Santee River, CAWS Basin, ACE Basin, and South Lowcountry and the Santee Cooper Lakes Focus Area Initiatives.

Special Values of Forest Land in this Area:

Historically, longleaf pine dominated the uplands, and bottomland hardwoods including oaks, bald cypress, and water tupelo dominated the low/wet areas. The abundant low-lying areas along with productive uplands make this area and the forest within it diversified and valuable.

The forest industry is a thriving part of the economy for these counties and creates a large majority of the workforce needs for the area. Forest industry and the overall local economies rely heavily on the forest in this area and the assurance of these forests for years to come. In addition to money generated from the management and harvesting of the forests, is the contribution to the local economies for hunting leases and other recreational opportunities such as camping, walking, bike-riding, fishing, and boating. This portion of the state maintains the longest hunting season on any state in the nation and counties receive direct financial benefits from travel and expenditures associated with these activities.

The SCFLA contains many threatened and endangered species including but not limited to the: gopher tortoise, wood stork, red-cockaded woodpecker, Canby's dropwort, and pondberry.

Managed lands within SCFLA:

Managed lands include those lands that are publicly or privately owned for the purpose of natural resource conservation. The SCFLA contains and adjoins many state and federally owned properties such as wildlife management areas, heritage preserves, state parks, research reserves, military bases, and wildlife refuges. In

addition, a tremendous amount of land that is protected within SCFLA by voluntary conservation easements. The Francis Marion National Forest (252,201), administered by the USDA, Forest Service, also adjoins this FLA.

Current Conversion Pressures:

Five counties in this area are growing at an equal or faster rate than the state average of 7.3%, between 1990 and 1995 (Dorchester 21%, Beaufort 19.9%, Berkeley 18.4%, Jasper 8.5%, and Colleton 7.3%). Major cities within these counties are also expanding at a fast rate. The expansion of these counties and cities indicates the conversion of rural land into urban area and along with other uses that are non-conductive to natural forests.

Potential Future Conversion Factors:

Cities are annexing property on all sides to allow for the expanded growth in population and the accompanying development. Large industries are locating along major river systems, especially those near ports. Charleston, South Carolina already contains the largest containerized port in the Southeast Atlantic and Gulf Coasts. A proposed interstate (I-73), that will bisect numerous rural areas, may run from West Virginia to Charleston, South Carolina. Along with this will come industries, commercial development, and residential development. The major island resorts are also expanding to accommodate the growing numbers of tourists that are relocating and visiting the coastal areas.

Goals and Objectives for SCFLA:

- Maintain and enhance the high quality of forest resources along with the associated plant, and animal communities.
- Maintain and enhance the bottomland hardwood areas located along major river systems.
- Protect historical and cultural resources.
- Protect areas inhabited by threatened and endangered species.
- Maintain contiguous forest land by connecting to managed public and private lands.
- Preserve the rural landscape and associated by-products that provide jobs.
- Provide opportunities for the public to have a place to enjoy various types of outdoor recreation.
- Provide opportunities for environmental education and research.
- Protect the scenic landscapes.
- Protect diminishing riparian corridors from further development; including the protection of river systems, wetlands, and their associated upland habitats.
- Protect areas designated as part of the Santee River, CAWS Basin, ACE Basin, South Lowcountry, and Santee Cooper Lakes Focus Area Initiatives.
- Provide a connective corridor between existing conservation projects.

Appendix C

Application and Evaluation Forms

South Carolina Forest Legacy Landowner Application Package

Contents:

Landowner Inspection Consent Agreement
Forest Legacy Program Application Form
Application Submission Checklist
Map of Designated Forest Legacy Areas
Forest Legacy Parcel Evaluation Criteria Scale and Description

FOR OFFICE USE ONLY

APPLICATION NUMBER: _____

DATE: _____

**STATE OF SOUTH CAROLINA
FOREST LEGACY PROGRAM
LANDOWNER INSPECTION CONSENT AGREEMENT**

I, _____ as the landowner or the landowner's authorized agent (proof of authorization must accompany this document) agree to allow inspection, appraisal and survey of my property being offered for consideration under the Forest Legacy Program. I agree to allow members of the U.S. Forest Service, South Carolina Forestry Commission, South Carolina Forest Stewardship Coordinating Committee, the South Carolina Department of Natural Resources or their designated staff to inspect the property as may be required at any time. I shall be notified in advance of all inspection visits.

Signature of Landowner or Agent

Date

SC Department of Natural Resources

Date

Title

(Complete For Conservation Easement Purchase Only)

LANDOWNER GOALS AND OBJECTIVES

Describe your long term goals and objectives for this parcel:

TRADITIONAL FOREST VALUES

What is/are the traditional use(s) of this forest land? (Examples: timber production, hunting, other outdoor recreation, scenic beauty, etc.)

LANDOWNER COMMENTS

In your opinion, is there a “threat of conversion to non-forest use” of the parcel proposed for enrollment in the Forest Legacy Program? Be specific:

Do you currently have a forest management plan? _____
If so, please provide a copy.

(Complete for Conservation Easement Purchase Only)

Please complete the following section carefully and completely. The information you provide will assist us in deciding upon the eligibility and desirability of the parcel as well as its appraised value and ranking. **Note that checking “retain” does not limit your ability to negotiate price and options in the future; it merely assists us when evaluating your parcel.**

Indicate which of following interests you desire to retain: (Those marked “retain” should be the rights you want to keep. All other rights may become the property of the State of South Carolina upon successful completion of negotiations between the State of South Carolina and yourself.)

Retain	Not Retain	
___	___	Timber and wood production rights
___	___	Water rights
___	___	Mineral/gas/oil rights (unrestricted access)*
___	___	Mineral/gas/oil rights (restricted access)**
___	___	Pine straw raking
___	___	No public access***
		Retain control of the following recreational activities:***
___	___	Hunting
___	___	Fishing
___	___	Camping
___	___	Hiking or other passive recreation
___	___	Bicycling
___	___	Horseback riding
___	___	Motorized vehicles access
		Non-forest uses withining easement area****
___	___	Grazing (amount of area ___ acres)
___	___	Farming (amount of area ___ aces)
___	___	Road Construction (other than for forest management/protection)
___	___	Buildings and other improvements (amount of area ___ acres)
___	___	Other:_____

*Retention of unrestricted mineral/gas/oil rights will exclude that portion of the tract from consideration in the Forest Legacy Program.

**Retention of restricted mineral/gas/oil rights which will allow less than 25% surface occupancy may be consistent with the Forest Legacy Program.

***In order for the tract to be considered for the Forest Legacy Program, the opportunity for public recreation is required.

****Total area of all non-forest uses cannot exceed 25% of the total tract area.

CONFIDENTIAL

The following information shall remain strictly confidential until such time as: 1) the application is approved and all financial transactions are concluded, or 2) all title holders give written permission to release the information.

FINANCIAL INFORMATION

The following recommendations are for preliminary use only. Any final offer will be based on, and cannot exceed, the fair market value, determined by an appraisal meeting federal appraisal standards.

State the value of the interests to be enrolled in the Forest Legacy Program, and the method used to determine that value (appraisal, landowner estimate, etc.)

What is/are the estimated sale price(s) of the interests being offered?

State the value of the landowner(s) contribution, if any, either in donated value of in-kind services or financial.

LIENS AND ENCUMBRANCES

List any and all liens and encumbrances on the property proposed for enrollment in the Forest Legacy Program.

Example: utility easements, public rights of way, water flow or use restrictions, septic systems or water easements, deed restrictions, tax liens, etc.

The information provided is true to the best of my/our knowledge and belief. ALL TITLE HOLDERS MUST SIGN.

PRINT NAME(S)

SIGNATURE

DATE

FOR OFFICE USE ONLY

Application Number: _____

Date: _____

FOREST LEGACY PROGRAM - Checklist

With the Forest Legacy Program application package, please submit the following for each contiguous parcel:

- ___ Completed application
- ___ Name(s) and address(es) of other owner(s) of record for this tract
- ___ Signed consent agreement
- ___ Copy of road map indicating location of the property
- ___ Copy of plat or survey map of the parcel
- ___ Legal description (if available)
- ___ Forest management plan (if available)

NOTE: All materials will become the property of the State of South Carolina and are non-returnable.

DISCLOSURE OF THIS INFORMATION IS VOLUNTARY; HOWEVER, FAILURE TO COMPLY MAY RESULT IN THIS FORM NOT BEING PROCESSED.

South Carolina Forest Legacy Area Evaluation Criteria

Each parcel nominated for acquisition under the Forest Legacy Program will be evaluated, in part, by using the following criteria. The total numerical score will NOT be the ultimate deciding factor but will serve as a tool used to prioritize parcels. Below is a list the criteria and maximum points available for each tract. Points will be awarded based on the characteristics of the area and the goals of that particular Forest Legacy Area.

Forest Legacy Parcel Evaluation Criteria

Category	Weighting Maximum Score
1. Forest Sustainability	80 points
2. Fish and Wildlife Habitat Values	80 points
3. Public Recreation Potential	80 points
4. Level of Conversion Threat	80 points
5. Acquirability	80 points
6. Manageability	80 points
7. Riparian and Hydrologic Values	50 points
8. Threatened and Endangered Species Values	50 points
9. Archaeological, Cultural, Geologic and Historic Resources	30 points
10. Special Considerations	80 points

Maximum Possible Points = 690

Note: Minimum score allowed for consideration in the Forest Legacy Program is 300 points.

Forest Legacy Program

Description of Evaluation Criteria

1. Forest Sustainability: The potential of a parcel to produce forest products including productivity, accessibility, vegetative community, standing timber, management history and location.

- Parcel has the soil productivity and natural vegetative community to produce high quality timber, pulpwood and other forest products.
- Parcel has growing timber stock in place.
- Parcel is located such that products can be transported a reasonable distance to a user.
- Parcel has the ability to access the timber for removal.
- Parcel has the ability to be managed for forest products due to its history and current condition.
- Parcel has diverse timber age and type and creates or provides the opportunity to create species diversity on the tract.

2. Fish and Wildlife Habitat Values: The habitat potential of a parcel for all types of wildlife and fish species including those hunted and fished.

- Parcel contains excellent habitat or habitat potential for game species.
- Parcel contains excellent habitat or habitat potential for game fish including cold-water trout, black bass, sunfish and others.
- Parcel contains significant populations of resident species.
- Parcel contains good or excellent habitat or habitat potential for forest inhabiting or grassland bird species.
- Parcel contains good or excellent habitat or habitat potential for significant populations of forest inhabiting mammals, reptiles, amphibians and invertebrates.
- Parcel contains areas for resting and feeding of migratory species.
- Parcel exhibits connective habitats, corridors, habitat linkages and areas that reduce biological isolation.
- Parcel borders other protected/managed lands

3. Public Recreation Potential: The potential of a parcel to provide the public with outdoor recreation potential including hunting, fishing, hiking, birding, horseback riding, wildlife observation, and other types of recreation. Parcels to be owned and managed by SCDNR must be compatible with SCDNR's Recreational Use Policy.

- Parcel is accessible for management activities.
- Parcel is externally accessible to the public by automobile or boat and internally accessible by reasonable means.
- Parcel has potential water-based recreational value.
- Parcel has unique habitat, geological formation, wildlife population or other special recreational attraction.
- Parcel has potential for inclusion in the Wildlife Management Area Program.
- Parcel is compatible with SCDNR's Recreational Use Policy (if to be owned and managed by SCDNR).

4. Level of Conversion Threat: The parcel is threatened by conversion from managed forest into other land uses by residential development, commercial development, infrastructure development, or subdivision into smaller parcels.

- Parcel is in danger of conversion to non-forest use within 10 years.
- Parcel is currently for sale on the open market.
- Parcel may remain wooded, but will become further subdivided within 10 years.
- Parcel is located where infrastructure extensions and improvements are imminent.
- Parcel may remain wooded, but is in danger of non-sustainable management.

5. Acquirability: The potential ability of a managing entity to acquire the parcel easily.

- Parcel is available from a willing seller at a reasonable price.
- Parcel has clear title and no other legal or social complications.
- Parcel is available with the 25% match funding donated by the current owner or 25% nonfederal match is readily available.
- Parcel has significant opportunity to leverage multiple funding sources for acquisition.

6. Manageability: The potential ability of a managing entity to manage the area in a cost effective and efficient manner.

- Parcel is accessible for management activities.
- Parcel can be managed economically due to location, topography, vegetative community and other concerns.
- Parcel is located such that management activities such as burning, timber harvest and other activities will not be restricted.
- Parcel can accommodate proposed priority uses and management activities without degrading its natural value.
- Parcel can be protected from future degradation by activities occurring on neighboring properties.
- Parcel is close to other SCDNR properties or other conservation areas.

7. Riparian and Hydrologic Values: The parcel contains wetlands that have ecological values including unique habitats, flood control, sediment filtration, and contaminant filtration.

- Parcel is situated on a river, stream or marine shore.
- Parcel has extensive river, stream or marine shoreline.
- Parcel includes the 100-year floodplain.
- Parcel includes a designated scenic river, stream or wetland.
 - Parcel contains minimum 50-foot buffer of trees along shorelines as a sediment buffer.
- Parcel contains ecologically significant wetlands such as isolated bays, bogs, depression meadows and ponds.
- Parcel is adjacent to or near other protected wetlands.
- Parcel includes the surface watershed or the recharge area of a ground water aquifer for a public water supply.

8. Threatened and Endangered Species: The parcel contains populations or suitable habitats of rare, threatened or endangered species of fish, wildlife or plants.

- Parcel contains known occurrences of rare, threatened or endangered species of animals or plants or will serve as a buffer for such property.
- Parcel is within close proximity to a site with known occurrences of species of concern.
- Parcel contains habitats that are suitable for reoccupation of such species.
- Parcel contains habitats that often harbor such species.
- Parcel is contiguous to Heritage Trust or other protected properties with similar habitat.

9. Archeological, Cultural, Geologic and Historic Resources: The parcel contains known or likely sites of significant historic or cultural value.

- Parcel contains forest related cultural resources such as a historic forest, mill site, tar kiln or other forest industry site.
- Parcel contains other historic or archaeological resources such as Native American sites, historic structures or historic sites.
- Parcel contains significant rock formations, waterfalls, earth strata, or limestone bluffs.

10. Special Considerations: The parcel has special attributes that are not accounted for in 1-9 above. Examples of special considerations include but are not limited to:

- Parcel is located within an area of special interest including but not limited to a Focus Area or Scenic River corridor
- Parcel borders a scenic highway and/or contains a panoramic view or other scenic resources.
- Parcel is available at a low cost per acre.
- Parcel is located in an area with limited public recreation or limited resource protection in place.
 - Parcel will leverage significant conservation action or provide conservation opportunities on adjacent tracts.
- Parcel has a desirable size and shape.
- Parcel has established roads, wildlife openings, etc.
- Parcel is located near other areas of conservation efforts.
- Parcel provides excellent opportunities for education or research related to SCDNR mission.
- Parcel will leverage significant conservation action or provide opportunities on adjacent tracts.

SOUTH CAROLINA FOREST LEGACY PARCEL EVALUATION PACKAGE

Contents:

***Cover sheet:** To be completed with information supplied on the application form. The landscape description is meant to include the physical characteristics of the surrounding area including topography, soils, and surface and ground water hydrology; brief inventories of major vegetative groups, fish and wildlife resources, scenic resources and any other forest resources; as well as surrounding land uses. The parcel description is meant to include an in-depth description of the above mentioned items, but as they pertain to the parcel. Use additional sheets as needed. This sheet will be completed by investigating personnel directed to do so by the State lead agency.

***Parcel Evaluation Sheet:** This sheet will be completed by personnel directed to do so by the lead agency, in consultation with investigating personnel and the Forest Legacy Committee.

***Scoring:** The final numerical score will not be used as the sole factor in determining which parcel/ interest should be acquired but merely as a guide to relative values of the resource under evaluation.

COVER SHEET

**SOUTH CAROLINA FOREST LEGACY PROGRAM
PARCEL EVALUATION PACKAGE**

Forest Legacy Area _____

File Number: _____ Date of Evaluation _____

Landowner's Name _____

Parcel Location _____

Legal Description _____

On Site Investigators _____, _____

Landscape Description:

Parcel Description:

South Carolina Forest Legacy Parcel Evaluation Criteria

Parcel Name: _____ Owner: _____

County: _____ Acres: _____

Location: _____

Forest Legacy Area _____

Evaluator Name(s) _____

Category	Weighting					Score
	None	Poor	Fair	Good	Excellent	
1. Forest Sustainability	0*	20*	40	60	80	_____
2. Fish and Wildlife Habitat Values	0*	20	40	60	80	_____
3. Public Recreation Potential	0*	20	40	60	80	_____
4. Level of Conversion Threat	0*	20*	40	60	80	_____
5. Acquirability	0*	20	40	60	80	_____
6. Manageability	0*	20	40	60	80	_____
7. Riparian and Hydrologic Values	0	10	20	35	50	_____
8. Threatened and Endangered Species Values	0	10	20	35	50	_____
9. Archeological, Cultural, Geologic, and Historic Resources	0	5	10	20	30	_____
10. Special Considerations	0	20	40	60	80	_____

Final Score: _____

Maximum Possible Points = 690

Note: Minimum score allowed for consideration in the Forest Legacy Program is 300 points.

*A tract with such a rating will not be considered eligible for acquisition as part of the Forest Legacy Program.

Comments:

Appendix D

Threatened and Endangered Species in South Carolina

Animals -- 23	
	<i>Species/Listing Name</i>
E	Bat, Indiana (<i>Myotis sodalis</i>)
E	Beetle, American burying (<i>Nicrophorus americanus</i>)
E	Curlew, Eskimo (<i>Numenius borealis</i>)
E	Heelsplitter, Carolina (<i>Lasmigona decorata</i>)
E	Panther, Florida (<i>Puma (=Felis) concolor coryi</i>)
E	Pelican, brown except U.S. Atlantic coast, FL, AL (<i>Pelecanus occidentalis</i>)
T	Plover, piping except Great Lakes watershed (<i>Charadrius melodus</i>)
E	Puma (=cougar), eastern (<i>Puma (=Felis) concolor cougar</i>)
T	Salamander, flatwoods (<i>Ambystoma cingulatum</i>)
T	Sea turtle, green except where endangered (<i>Chelonia mydas</i>)
E	Sea turtle, hawksbill (<i>Eretmochelys imbricata</i>)
E	Sea turtle, Kemp's ridley (<i>Lepidochelys kempii</i>)
E	Sea turtle, leatherback (<i>Dermochelys coriacea</i>)
T	Sea turtle, loggerhead (<i>Caretta caretta</i>)
T	Snake, eastern indigo (<i>Drymarchon corais couperi</i>)
E	Stork, wood AL, FL, GA, SC (<i>Mycteria americana</i>)
E	Sturgeon, shortnose (<i>Acipenser brevirostrum</i>)
E	Warbler (=wood), Bachman's (<i>Vermivora bachmani</i>)
E	Whale, finback (<i>Balaenoptera physalus</i>)
E	Whale, humpback (<i>Megaptera novaeangliae</i>)
E	Whale, right (<i>Balaena glacialis (incl. australis)</i>)
E	Wolf, gray Lower 48 States, except where delisted; where XN; and Mexico. (<i>Canis lupus</i>)
E	Woodpecker, red-cockaded (<i>Picoides borealis</i>)

Federally Threatened and Endangered Species of South Carolina

Plants -- 19	
<u>Status</u>	<u>Species/Listing Name</u>
T	Amaranth, seabeach (<i>Amaranthus pumilus</i>)
T	Amphianthus, little (<i>Amphianthus pusillus</i>)
E	Arrowhead, bunched (<i>Sagittaria fasciculata</i>)
E	Chaffseed, American (<i>Schwalbea americana</i>)
E	Coneflower, smooth (<i>Echinacea laevigata</i>)
E	Dropwort, Canby's (<i>Oxypolis canbyi</i>)
T	Gooseberry, Miccosukee (<i>Ribes echinellum</i>)
E	Harperella (<i>Ptilimnium nodosum</i>)
T	Heartleaf, dwarf-flowered (<i>Hexastylis naniflora</i>)
E	Loosestrife, rough-leaved (<i>Lysimachia asperulaefolia</i>)
T	Pink, swamp (<i>Helonias bullata</i>)
E	Pitcher-plant, mountain sweet (<i>Sarracenia rubra</i> ssp. <i>jonesii</i>)
T	Pogonia, small whorled (<i>Isotria medeoloides</i>)
E	Pondberry (<i>Lindera melissifolia</i>)
E	Quillwort, black spored (<i>Isoetes melanospora</i>)
E	Sumac, Michaux's (<i>Rhus michauxii</i>)
E	Sunflower, Schweinitz's (<i>Helianthus schweinitzii</i>)
E	Trillium, persistent (<i>Trillium persistens</i>)
E	Trillium, relict (<i>Trillium reliquum</i>)