

## CHAPTER 8: FORESTRY LANDS ASSESSMENT

*The following chapter is a draft that is pending peer review.*

### Introduction

The N.C. Division of Forest Resources is mandated and directed by Chapters 77, 113 and 143 of the N.C. General Statutes and by Title 15, Chapter 9 of the N.C. Administrative Code to protect, manage and develop the forest resources of the state. NC DFR is directly involved with providing forest management assistance to private landowners, reforestation services, forest fire prevention and suppression, and insect and disease control programs. This mission is reflected in the forest resource assessment conducted by the division.

The forest landscape provides many ecosystem services from wildlife habitat to water quality protection. As a result, many of the assessments in the N.C. Conservation Planning Tool consider forests to some extent. Likewise, this assessment values these associated ecosystem services in addition to economic values of the state's forest resources. It is also appropriate to consider other forest resource issues that are not included elsewhere in the plan, such as forest health and wildfire threat. The resulting product is represented in two parallel sections: High Value Forest Resources and Threatened Forest Resources.

This assessment is designed to be used as a multipurpose tool to:

1. Assist with prioritization of conservation projects;
2. Benefit local planning efforts by providing a regional perspective on forest resources; and
3. Educate residents about the importance of their forests as working lands.

### Methodology

This assessment is logically grouped into two sections:

- **High Value Forest Resources:** Those which are important for sustaining the forest products sector of our economy and providing ecosystem services that are compatible with forest management, such as protecting drinking water supplies.
- **Threatened Forest Resources:** Those resources that, if left unmanaged, are at risk of no longer providing their full benefit due to potential degradation from wildfire, pests, disease or forest fragmentation.

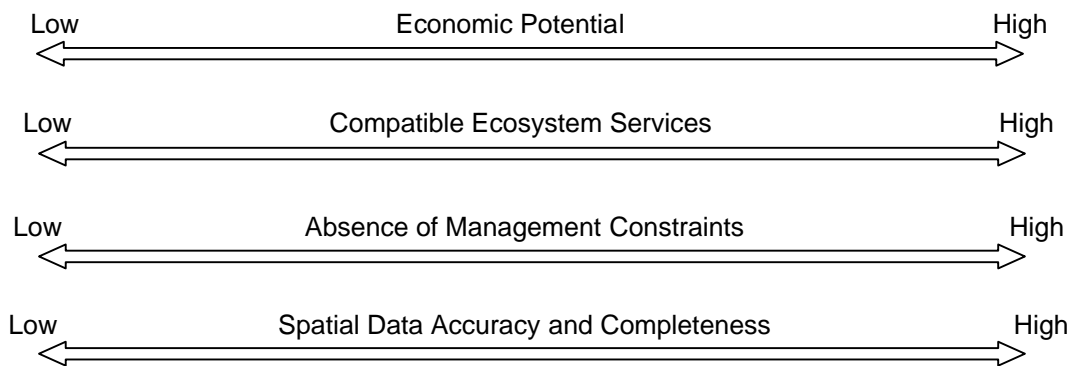
For each section, a set of principles were developed and agreed upon by NC DFR management to ensure that the assessment reflected the division's goals and values. These 'guiding principles' were used to select data layers that were included in the analysis. This ensures that the resulting map is as accurate and cohesive as possible.

## Data Sources and Ranking

### High Value Forest Resources

In considering the factors that affect the value of a working forest, potential data layers were placed into one of three categories: economic potential, ecosystem services and management constraints. These categories, plus an additional consideration for the accuracy and completeness of the data, were used as the guiding principles for this section:

#### Guiding Principles for High Value Forest Resources



#### **Economic Potential**

North Carolina's forest land is one of the greatest influences on the state, providing great economic value and adding immeasurably to the quality of life for its citizens. In 2007, the forest products industry became the number one manufacturing industry in North Carolina, employing more than 100,000 people and contributing \$3.6 billion in wages. Because forests are so important to the economy of North Carolina, measures that capture economic potential of the land were considered in the assessment. Data layers are detailed below:

**1. Soil Productivity Class - Goal:** *To place emphasis on areas that have the highest capacity for economic return.*

Physical and chemical properties of soil - such as percent organic matter, texture and pH - determine the productivity, and to some extent, the economic potential of a particular soil type for a given tree species. Each of the soil types in North Carolina have been classified by their ability to produce timber income and published in the *2006 Use Value Manual for Agricultural, Horticultural and Forest Land*. The manual gives five soil productivity classes based on site index, plus a sixth for soils of no value. This data will be combined with the existing STATSGO (State Soil Geographic Database) and SURGO (Soil Survey Geographic Database) spatial soils data to generate a new layer with the values listed below.

<b>Soil Productivity Class</b>	<b>Score</b>
I	5
II	4
III	3
IV	2
V	1
VI	0

**2. Haul Distance - Goal:** *To place emphasis on the areas closest to primary producers of forest products.*

Proximity to market, often referred to as ‘haul distance,’ is a significant factor in the value of standing timber. Not only does haul distance affect the cost of delivery from a mill’s perspective, but having multiple markets available allows more options for management of a tract, such as ‘commercial thinning.’ The values below represent an estimate of the average haul distances based on professional judgment of forest industry professionals in North Carolina. The values for the distances are based on the average haul for 75 percent, 95 percent and greater than 95 percent of the wood supply. Each area will be scored for its distance each of the following markets:

<b>Mill Type</b>	<b>Score = 2</b>	<b>Score = 1</b>	<b>Score = 0</b>
Chip / Saw	< 65 miles	65 – 110 miles	> 110 miles
Pulp	< 65 miles	65 – 110 miles	> 110 miles
Plywood Veneer	< 80 miles	80 – 120 miles	> 120 miles
Composite	< 80 miles	80 – 120 miles	> 120 miles
Pole	< 80 miles	80 – 120 miles	> 120 miles

**3. Forest Patch Size - Goal:** *To place emphasis on areas that will allow more management options and economic potential.*

Large forest areas allow more economic return and greater flexibility from a management standpoint. In addition, wildlife species that prefer interior forest or that require large areas of forest as their home range also benefit from contiguous forest patches. Scores are assigned based on the total area of contiguous land in any patch.

**Ecosystem Services**

In addition to the economic return, a working forest also provides many other benefits as it grows from an early successional habitat to a closed canopy forest. Among these ecosystem services are: protection of water quality, improvement of air quality, provision of wildlife habitat and corridors, and carbon sequestration. This assessment takes these needed services into account by including layers that reflect their value.

**4. Water Supply Watersheds - Goal: To place emphasis on areas where working forests can protect water quality and provide real benefit to municipalities.**

The N.C. Division of Water Quality Water Supply, Watershed Protection Program has identified all watersheds that drain to surface water intakes as 'Water Supply Watersheds'. These watersheds are subject to municipal ordinances that guide land use and development in order to protect the source of their drinking water. Conservation of these areas, which comprise approximately 20 percent of the total land area of North Carolina, is vitally important. All other things being equal, a working forest in these areas has a greater benefit to society than elsewhere. Water Supply Watersheds will be scored as 1 and other areas as 0 for this layer.

<b>1 point</b>	<b>0 points</b>
Water Supply Watersheds	other areas

**5. Areas Adjacent to Conservation Lands – Goal: To place emphasis on areas where a working forest can add to existing open space.**

North Carolina is blessed with many holdings that are managed for open space, both private and public. Although many of these holdings, such as parks and Significant Natural Heritage Areas, may not be working lands, they can benefit from having adjacent lands conserved as a working forest to increase the overall size of the open space. Likewise, a working forest will benefit from adjacent lands or 'neighbors' that support the forest management activities. This layer will be created from a buffer placed on the 'Lands Managed for Conservation and Open Space' and 'Significant Natural Heritage Areas' data sets available from NC One Map. Areas within this 0.5 mile buffer will be valued a 1 and areas outside this area will be valued as 0.

<b>1 point</b>	<b>0 points</b>
Within .5 mile buffer	other areas

**Management Constraints**

Some areas of the landscape are less accessible for forest management or carry extra restrictions. Other areas may be preserved for uses that are not compatible with the operational practices of a working forest. Areas that contain fewer of these management constraints are subsequently valued higher in the assessment.

**6. Riparian Buffers - Goal: To place emphasis on areas not immediately adjacent to streams.**

While responsible forest management is one of the best land uses for protecting water quality, there are sensitive areas where management options are limited, such as riparian buffers. This layer will come from a buffer of the digital

hydrography dataset based on the 1:24,000 scale USGS digital line graphs. Values are listed below:

Distance from Stream	Score
0 – 50 feet	-1
> 50 feet	0

**7. Significant Natural Heritage Areas - Goal:** *To place emphasis on lands that do not contain Significant Natural Heritage Areas, which may not be compatible with all of the normal practices associated with forest management.*

The N.C. Department of Environment and Natural Resources, Division of Parks and Recreation, and the Natural Heritage Program, in cooperation with the N.C. Center for Geographic Information & Analysis, developed the Significant Natural Heritage Areas digital data to determine the areas containing ecologically significant natural communities or rare species. These areas should be managed to support those communities and therefore may not be compatible with traditional forest management. These areas will be scored according to their rank with the following premise: the rarer a particular community is, the more restrictive it will be as a working forest. Therefore, it is better conserved under a different management scheme.

SNHA Rank	Score
A	-4
B	-3
C	-2
D	-1

**8. Slope – Goal:** *To place emphasis on areas that are easier to manage and maintain high water quality.*

Extreme slope can present a challenge to forest management in nearly all phases of a rotation from road construction to tree planting. While the steepest areas have and continue to provide all of the benefits of a working forest, they also require more diligence on the part the operator. Since more measures are necessary to ensure a successful job, this not only increases cost, but causes there to be more is at stake when problems do occur. Slope will be based on the NC DOT DEM dataset and scored as follows:

Slope	Score
1% - 10%	5
11% - 20%	4
21% - 30%	3
31% - 40%	2
> 40%	1

**9. Wetlands** – *Goal: To place emphasis on areas that are more suitable and accessible for forest management.*

Advances in low ground pressure equipment and ‘mat logging techniques’ have made it possible to access timber in wet areas with minimal disturbance.

However, even with those tools available, some areas are still only accessible a few months of the year or even only during certain years. The score of -1 for wetlands and 0 for other areas reflects the preference for areas that are more suitable for forest management.

### **Masks**

A mask serves the purpose of identifying areas that should or should not be considered in the final area. For instance, if you chose to ‘mask out’ open water, then your final map would not contain any data for those areas, which would make sense here because there are no forests to be managed in the middle of a lake. Two masks will be used for the ‘High Value Forest Resources’ layer:

**10. Forest Lands Mask** – *Goal: To ensure that only areas of forest lands are considered on this map.*

This mask will remove from consideration all areas that are not or could not be forested. These areas include open water, bare rock, unconsolidated sediment and high density urban areas. This source for this information is the 1996 Land Sat imagery dataset, which broadly classifies land cover type.

**11. Preserved Land Mask** - *Goal: To remove lands that are preserved and have no potential to be managed as a working forest from consideration for this map.*

This is land that is already set aside as open space but has restrictions that do not allow traditional forest management. This data comes from the ‘Lands Managed for Conservation and Open Space’ dataset from NC One Map. Lands in this data set, such as National or State Parks, will be identified and assigned a null value in the final map.

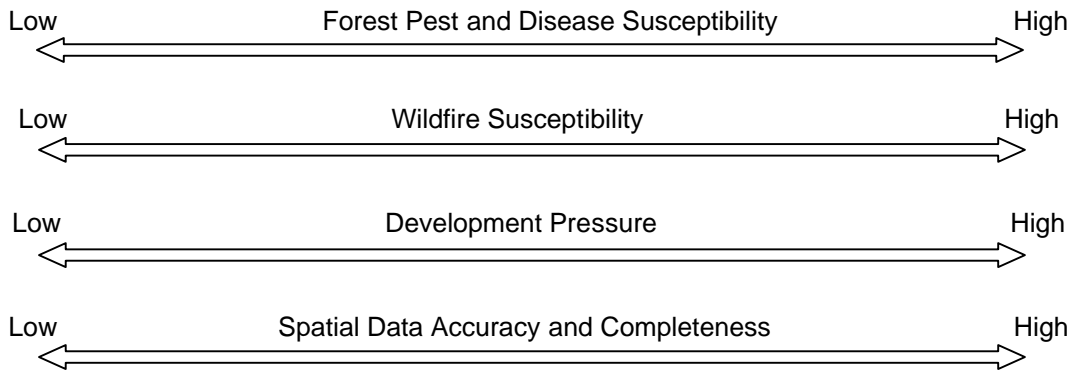
## **Threatened Forest Resources**

The Southern Group of State Foresters funded a GIS-based assessment of the forest resources in the Southern United States; a project known as the ‘Southern Forest Lands Assessment.’ The SFLA is a Southern Region assessment designed to determine forest land importance values that will guide expenditures of federal Forest Service funds in the region.

This assessment contains a ‘Forest Resource Threat’ layer comprised of three relevant datasets. This layer reflects the concerns of the Division and is suitable for inclusion into the N.C. Strategic Conservation Plan as our ‘Threatened Forest Resource’ layer. A description of that dataset is below.

In considering the factors that affect the health and condition of a forest, three types of data were considered: Forest Pest and Disease Susceptibility, Wildfire Risk and Development Pressure. These categories, plus an additional consideration for the accuracy and completeness of the data, are the guiding principles for this section.

### Guiding Principles for Threatened Forest Resources



**1. Forest Pest and Disease Susceptibility – Goal:** *To place emphasis on forest resources that are at risk of mortality due to forest pest or disease and where planning and management can reduce this risk.*

A National Insect and Disease Risk Map (NIDRM) was completed in 2006 as a strategic assessment of the risk of tree mortality due to major insects and diseases. The NIDRM is compiled from nearly 190 separate models in a GIS-based framework that assigns risk to individual 1 kilometer pixels based on forest type, host species basal area and numerous other factors associated with different host species and damage agents. The risk assigned is a projection of expected volume lost in trees 1" and larger in diameter over the next 15 years. This data will be scored as follows:

Percent mortality expected over 15 years	Score
0% - 5%	0
6% - 15%	33
16% - 25%	66
26% - 100%	100

**2. Wildfire Susceptibility – Goal:** *To place emphasis on areas with high risk of wildfire where planning and management can reduce this risk.*

The Southern Group of State Foresters funded a region-wide risk assessment to identify areas at risk for wildland fire within each state. This product considers terrain, surface fuels and canopy fuels, historical weather, historical fire occurrence and fire behavior metrics to calculate probabilities of any unit of land

burning. The output from this model, the 'Wildfire Level of Concern' will be used to score this layer as follows:

Level of Concern	Score
0	0
.0001 - .0004	11
.00041 - .0054	22
.00241 - .0458	33
.04581 - .06429	44
.064291 – 1.3593	55
1.35931 – 3.4268	67
3.42681 – 4.9999	78
4.99991 – 14.999	89
14.9991 – 100	100

**3. Development Pressure** – *Goal: To place emphasis on rural areas that are expected to increase significantly in housing density in the next 25 years.* As populations expand into rural areas, the ability of these areas to be managed and function as an intact resource diminishes. This layer is based on GIS data that contains an analysis of expected housing density increase between the years 2000 and 2030, done by David Theobald, Colorado State University. The scores range 0 to 100 based on the expected increase in housing density, with 0 being no threat and 100 being highly threatened.

### Data Layer Summary

<b>High Value Forest Resources</b> <i>composite of these data layers</i>	<b>Threatened Forest Resources</b> <i>composite of these data layers from the Southern Forest Lands Assessment</i>
<b><i>Economic Potential</i></b>	Forest Pest and Disease Susceptibility
Soil Productivity Class	Wildfire Susceptibility
Haul Distance	Development Pressure
Forest Patch Size	
<b><i>Ecosystem Services</i></b>	
Water Supply Watersheds	
Areas Adjacent to Conservation Lands	
<b><i>Management Constraints</i></b>	
Riparian Buffers	
Significant Natural Heritage Areas	
Slope	
Wetlands	
<b><i>Mask Layers</i></b>	
Forest Lands Mask	
Preserved Land Mask	