

Executive Summary

The Southern Appalachian ecosystem is widely recognized as one of the most diverse in a temperate region. The headwaters of nine major rivers lie within the boundaries of the Southern Appalachians, making it a source of drinking water for much of the Southeast.

The assessment area (fig. 1) includes parts of the Appalachian Mountains and Shenandoah Valley extending southward from the Potomac River to northern Georgia and the northeastern corner of Alabama. It includes seven states, 135 counties, and covers approximately 37 million acres. The Southern Appalachians are one of the world's finest remaining ecological regions. Early in the 20th century, the Appalachian landscape and natural resources were being exploited; croplands, pastures, and hillsides were eroding; and timberlands were being cut with little thought for sustaining the resources. National forests and national parks were created to preserve and restore the natural resources in the region. The seven national forests in conjunction with three national parks, the Blue Ridge Parkway, and the Appalachian Trail form the largest contiguous block of public lands east of the Mississippi River.

This comprehensive, interagency assessment began in the summer of 1994 and was completed in March 1996. It was designed to collect and analyze ecological, social, and economic data. The information provided will facilitate an ecosystem-based approach to management of the natural resources on public lands within the assessment area.

Public participation has been, and will continue to be, an important part of the assessment. One of the first actions of the assessment was to conduct a series of town hall meetings at which the public gave suggestions on the major themes and questions to be addressed. These questions, embellished by additional concerns expressed by land managers and policy makers, form the structure for the assessment.

The Terrestrial Team for the SAA examined the status and trends in forest health and in terrestrial plant and animal resources on 37.4 million acres in seven southeastern states.

The information was gathered to help land managers and landowners make planning decisions.

The assessment was designed to answer eight questions, four concerned wildlife and botanical resources and four concerned forest health. Findings are summarized as responses to those eight questions.

Question 1:

Based on available information and reference material, what plant and animal species occur in the SAA area, and what are their habitat associations?

More than 20,000 species of plants and animals may occur in the Southern Appalachians. No effort was made to list all of them. Instead, a list of species was compiled that are of particular interest for various reasons. The total includes 51 federally listed, threatened and endangered (T&E) species, 366 species whose viability is of concern (VC), 38 species of high interest to natural resource managers and the public, 10 game species, and 7 other species with demanding habitat requirements. The short list includes 225 plants, 155 invertebrates, 47 birds, 23 amphibians and reptiles, and 22 mammals.

Sixteen land cover classes were defined for analysis of SAA ecosystem status and trends. These included nine forest cover types, agricultural pasture, agricultural cropland, grass/forb early successional, developed, barren, wetland, and water. There were four forest successional classes defined for each forest cover type.

Thirty-one rare community types were identified as occurring in the SAA area.

Habitat associations were determined for 442 of the 472 species on the short list. Based on habitat associations and habitat suitability models, the special list of species was placed in 19 groups. The assessment focused on these groups.

Question 2:

What are the status, trends, and spatial distributions of terrestrial habitats and wildlife and plant populations for:

Federal T&E species?

Viability Concern (VC) species?

Rare communities?

Wildlife species that are hunted, viewed, or photographed?

Species for which there is high management and public interest?

Species with special or demanding habitat needs?

Species considered to be true ecological indicators?

Of the 26 million acres of forest in the Southern Appalachians, 67 percent is in deciduous forests, 17 percent is in evergreen forests, and about 16 percent is in mixed deciduous and evergreen forests. The acreages occupied by the major forest type groups in the region are:

Forest Type Group	Million Acres
Oak	17.6
Southern yellow pine	3.8
Mixed pine-hardwood	3.2
Mixed mesophytic hardwood	3.1
White pine-hemlock-hardwood	0.8
Northern hardwoods	0.6
White pine-hemlock	0.7
Bottomland hardwood	0.4
Montane spruce-fir	0.09

The percentage distribution of forest acres among types of owners is:

Type of Owner	Percent
Private	77
National forest	17
National park	3
State	2
Other federal	1

Forest acreage has decreased by 2 percent since the mid-1970s. The loss is occurring primarily on private land, and is expected to

continue at the same pace though the year 2010. Since 1980, large urban areas have grown by 35 percent and small urban areas by 53 percent. Acreage of cultivated cropland has diminished by 25 percent.

The percentage distribution of forestland by forest succession class is: early successional, 8 percent; sapling/pole, 22 percent; middle successional, 52 percent; and late successional, 18 percent.

In an initial inventory, approximately 1.1 million acres of possible old growth have been identified on national forest lands.

Rare Communities

Thirty-one rare communities were identified in the study area. Each of the communities occupies less than 1 percent of the land in the Southern Appalachians. Almost three-fourths of the rare terrestrial plant and animal species are found in at least 1 of the 31 rare communities. Some rare communities are concentrated on federal land where T&E and VC species can be nurtured under existing programs. Many are on private land where special cooperative efforts may be needed to conserve the species.

T&E and VC Species

A list of 51 federal T&E species and 366 VC species was compiled from information provided by the U.S. Fish and Wildlife Service, state natural heritage programs, and peer review of the original species list.

The highest number of occurrences for federally listed species (300) and VC species (1,929) is in the Blue Ridge Mountain section with most of these occurring in the Southern Blue Ridge Mountain subsection.

Private lands had 493 of 788 (63 percent) occurrences of federal T&E species, followed by NFS lands with 154 of the 788 (20 percent), national parks with 90 occurrences (11 percent), and other federal lands with four occurrences.

Private lands contain 1,802 out of 3,243 (56 percent) occurrences of species with viability concern, followed by NFS lands with 952 (29 percent) occurrences, national park lands with 315 (10 percent), state lands with 113 (3 percent), and other federal lands with 53 occurrences.

Game Species

Populations of white-tailed deer and wild turkeys have increased greatly in the Southern Appalachians since 1970. Populations of black bears have also increased, but the species is absent from many areas. Ruffed grouse densities are generally low to medium. National forests and national parks contain the highest densities. Populations have declined since 1970, possibly due to a decrease in acreage in the sapling/pole successional class. Bobwhite quail populations also have decreased since 1970. This species depends heavily on agricultural, grass and shrub habitats. A continued decline in the species is expected as the acreage of suitable habitat continues to decrease.

Landscape Habitat Suitability Analysis

Spruce-Fir/Northern Hardwood Habitats

Potential habitat for 23 spruce-fir/northern hardwood associated species (of which 4 species are federally listed, 18 species are VC, and 1 species is high-interest) is estimated at 184,000 acres. Forty-seven percent of these acres is located in national parks and 32 percent is located in national forests.

The outlook for this community and the 23 species associated with these high-elevation habitats is uncertain due to the negative effects caused by air pollution and exotic pests. A downward trend for these habitats is expected over the next 15 years.

High-Elevation Balds

There are an estimated 27,000 acres of high-elevation grassy balds and grass/shrub early successional habitat in the SAA area. Eighteen species were identified as being associated with these habitats. Approximately 86 percent of this habitat is located in the Blue Ridge Mountains section, 73 percent on private lands, and 25 percent on NFS lands. Approximately one-half of these early successional habitats is greater than 20 acres in size.

The outlook overall is for these habitats to remain near, or slightly above, the current levels over the next 15 years. However, the effects from air pollution on these communities could adversely affect quality of the remaining habitat. Populations of the rare species associated with this habitat will continue at low levels.

General High-Elevation Forest Habitats

Of the 350,000 acres of high-elevation, mid- and late-successional forest, 150,000 acres (42 percent) are in tracts larger than 5,000 acres and have the potential to support all seven general high-elevation forest species. Approximately 90 percent of total acres is interior forest habitat. The national parks contain 74 percent of the total habitats in 5,000 acre and larger tracts, followed by NFS lands with 17 percent.

The outlook for these forest communities and the seven species associated with these general high-elevation habitats is uncertain due to the negative effects caused by air pollution and exotic pests. A downward trend for these habitats is probable over the next 15 years.

Early Successional Habitats

There are an estimated 1.5 million acres of early successional habitat in the SAA area. Ten species were identified as associated with this habitat. Much of this habitat is located in the Southern Cumberland Plateau, Southern Ridge and Valley, and Southern Appalachian Piedmont sections. Approximately 97 percent of this habitat is located on private lands, with 2 percent located on NFS lands. About half of these early successional habitats are greater than 20 acres in size.

Riparian Habitats

A total of 2.3 million acres of riparian habitat was identified, with 1.5 million of these acres in forest riparian habitat. Forty-nine plant and animal species are associated with these seeps, springs, and streamside habitats. Approximately 80 percent of the forested riparian habitat is located on private lands.

Mid- to Late-Successional Deciduous Forest Habitats

There are an estimated 17 million acres of mid- and late-successional closed-canopy deciduous forest habitats in the SAA area. There are 66 species associated with these habitats (does not include species identified in other species groups). Over 50 percent of these habitats occurs in the Blue Ridge Mountain section. Around 71 percent of this habitat is on private lands. National forest lands contain 23 percent of these habitats

Habitats for Area Sensitive Species Associated with Mid- to Late-Successional Deciduous Forests

A total of 15.8 million acres of suitable habitat was identified for mid- to late-deciduous forest species with some area sensitivity requirement. About half of this area is in tracts greater than 5,000 acres in size. It is thought that these larger tracts have the potential to support all 16 area sensitive bird species associated with this species group. The majority of these habitats is located in the Blue Ridge Mountains, the Northern Ridge and Valley, Allegheny Mountains, and the Northern Cumberland Mountains. Approximately 51 percent of the larger tracts occurs on private lands, followed by national forest lands with 39 percent.

About 66 percent of the total acres is suitable forest interior habitat for the 10 interior bird species included in this group.

Based on past trends in land use, overall habitat acres in larger tract sizes and associated forest interior habitats will continue to decrease over the next 15 years due to loss of forestland to other land uses such as agricultural pasture and development. These decreases may continue to be most evident in the section/section groups currently with less than 70 percent of the area forested. These decreases should be seen primarily on private lands.

Black Bear Habitat

Approximately 21 million acres of potential bear habitat were identified in the SAA. Of these acres, 51 percent had total road density less than 1.6 miles per square mile. Approximately 75 percent of the total potential acres is located on private lands, followed by

19 percent of the acres on NFS lands. Around 91 percent of national forest land, 84 percent of state lands, 78 percent of national park land, and 51 percent of private lands contain suitable bear habitat. Approximately 70 percent of the Northern Cumberland Plateau, Southern Cumberland Plateau, and the Blue Ridge Mountains contains potential habitat. The forecast is for potential habitat to remain stable on public ownership, with expected decreases in the amount of potential habitat on private lands due to continued loss of forested habitats and increased development.

Question 3:

What habitat types, habitat parameters, and management activities are important for maintaining viable populations of the species on the "short list" of plants and animals?

And

Question 4:

Based on our current knowledge of ecological land unit capabilities in the Southern Appalachians, what are the conditions needed to:

Recover T&E species?

Conserve populations of VC species?

Maintain existing species and community diversity?

Provide suitable populations on national forests?

The rare communities that were identified are keys to conserving many of the region's plant and animal species. The report provides management considerations for:

- Cave communities
- Mountain bog communities
- Fen or pond communities
- High-elevation balds
- High pH or mafic balds
- Rock outcrop and cliff habitats
- Montane spruce-fir forests
- Seeps, springs, and streamside habitats
- Mountain longleaf forests

The report also provides management considerations for mid- to late-successional forest habitats, early successional habitats, and black bear habitat.

Question 5:

What changes or trends in forest vegetation are occurring in response to human-caused disturbances or natural processes?

Disturbances can be broadly grouped into those resulting from human influence and those not caused by humans. Human-caused changes, such as introduction of exotic plants and diseases, extirpation/extinction of species, or utilization of natural resources, raise particular concern because their long-term consequences often are unknown. Natural processes of disturbance that currently affect ecosystems may be similar to past processes, whereas human processes of disturbance are much different and much greater in magnitude than at any previous time.

Logging and other land uses of the past have particularly affected age-class distribution on national forests. Currently, this distribution of age consists of a large percentage of stands aged in the 60- to 90-year-old age classes. This condition may exacerbate the severity of insect and disease outbreaks in some forest types. Current rates of disturbance from timber harvesting and other forest management activities may be low when compared to estimates of pre-European settlement early successional vegetation trends and the descriptions of historic land use patterns of the late 19th and early 20th centuries.

Future vegetation is likely to be greatly affected by the direct and indirect impacts of exotic pest organisms. Some factors affecting vegetation are: (1) the amount of distribution of older-age forest stands, (2) fire suppression, (3) air pollutants, and (4) the introduction of new pests or other unforeseen causes. A principal source of human-caused disturbances in forests are silvicultural activities that are designed to manage vegetation and regenerate commercially valuable tree species.

Question 6:

What are the potential effects of the presence or absence of fire on forest health?

Fire is perhaps the most common form of major natural disturbance in most of the ecosystems of the Southern Appalachians. Fire is particularly important in systems dominated by southern yellow pines, and its ecological effects in those systems are well understood. Effects on xeric deciduous forests are also important but are less understood. Fire certainly appears to be a major factor in the development of upland oak forests. Light burning appears to increase the amount of oak regeneration beneath maturing stands of mixed hardwoods. Periodic fire probably also checks plant succession in oak forests, because later successional species, such as red maple, have low resistance to fire damage.

In the absence of fire, two rare forest communities in the Southern Appalachians—mountain longleaf pine woodlands and table mountain pine-pitch pine woodlands—are being replaced by hardwoods and loblolly pine. Judicious use of fire is needed to halt the decline of these communities.

Fire also is important for regeneration and maintenance in many other forest types and plant communities in the Southern Appalachians. Additional information is needed on the precise effects of prescribed burning in the mountains and on the risks associated with its use.

Question 7:

How is the health of the forest ecosystems being affected by native and exotic pests?

Many tree species in the Southern Appalachians are being severely affected by native and exotic pests.

Flowering dogwood is affected by dogwood anthracnose. The hemlock woolly adelgid will impact the future of Carolina and eastern hemlocks. The balsam woolly adelgid has damaged Fraser fir. Butternut canker could eliminate butternut from the area's forests.

American chestnut and Allegheny chinquapin have almost been eliminated as tree species by chestnut blight. American elms in the area's forests are killed by Dutch elm disease, but losses in the forest are noticed less than loss of shadetrees in cities. Table mountain pine is disappearing from the Southern Appalachians primarily because fire exclusion is preventing reproduction.

Gypsy moth is one of a combination of factors contributing to oak decline. The effects of the decline complex appear to be accelerating in North Carolina and Virginia. Oak leaves are a favored food of the European gypsy moth, which is steadily advancing southward through the Appalachians. The Asiatic gypsy moth could be an even greater threat because females of that species can fly and because it has a much wider host range than the European gypsy moth. In 1995, an infestation of Asiatic gypsy moths in North Carolina was aggressively treated at great cost. Whether they were eradicated remains to be seen.

Question 8:

How are current and past management practices affecting the health and integrity of forest vegetation in the Southern Appalachians?

Reforestation, watershed improvement, erosion control, and fire protection were the primary management activities on the area's national forests in the first half of the century. Selective logging occurred until the 1960s. In efforts to reproduce desired tree species, the USDA Forest Service (FS) began to clearcut in the 1960s. The policy of extinguishing wildfires continues.

In response to public objections, the FS has severely curtailed clearcutting, and it is doing some prescribed burning. The agency's focus is now on management of ecosystems. Timber harvests on national forests peaked in 1985 and have declined rapidly since then. Current harvesting levels are comparable to those in the 1970s.

On average, national forest land in the region is at higher elevations and is less productive than private land. National forest stands are logged less frequently, so they have higher average timber inventory per acre, less removals, less growth, and slightly higher mortality rates than private land. While they encompass only 17 percent of the timberland in the Southern Appalachians, the national forests there have much larger proportions of the highest quality sawtimber. (SAMAB 1996C)

Oak decline appears to be a major threat. Its effects might be reduced with treatments to improve the vigor of individual trees. Evolving markets for low-quality trees and rising prices for high-quality oak sawtimber could provide profitable opportunities to improve the health of oak stands.

Integrated pest management is a program that could be used to reduce the impacts of pests such as the gypsy moth and the southern pine beetle.

Genetic conservation is one option for preserving species threatened by exotic pests. Species at risk include American chestnut, Allegheny chinquapin, butternut, Fraser fir, flowering dogwood, and eastern and Carolina hemlock. Hybridizing with closely related species and backcrossing could preserve genetic resources.