

# The Appalachian Region

Characterized by its mountainous geography rich in biodiversity and unique culture, the chain of mountains can be divided along geographic and ecological lines into three sections - Northern, Central and Southern. The Central and Southern Appalachians and associated landforms serve as the focal point of the Appalachian Landscape Conservation Cooperative stretching from New York to Alabama.

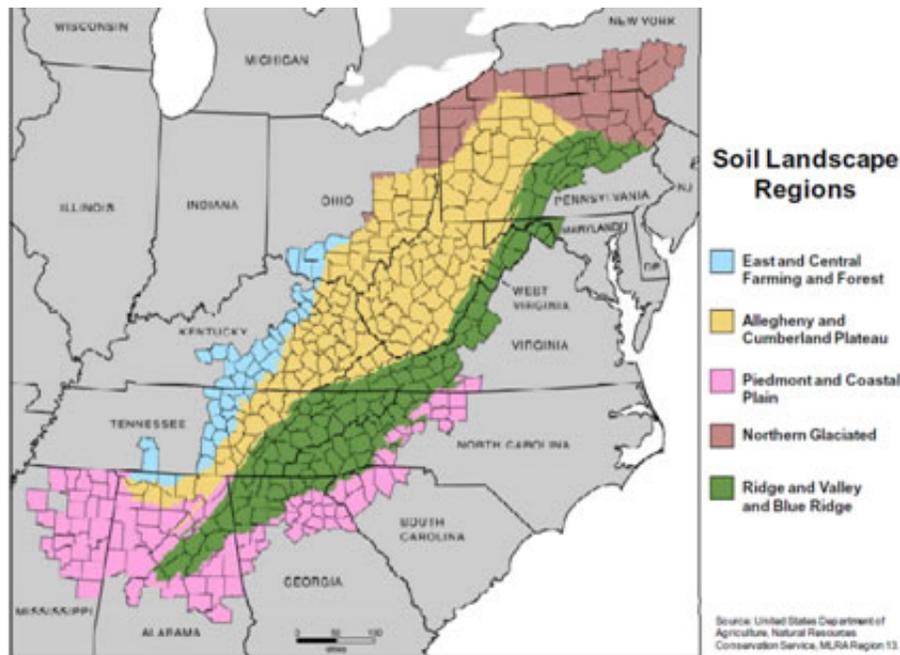


Map: Appalachian LCC Relative to Continental US Map

The region's diverse topography with long broad ridges, steep slopes, deep gorges and wide intermountain valleys, and geologic stability over long periods of evolutionary history has resulted in a broad range of microhabitats and the presence of numerous relict species and communities. A host of plants, invertebrates, salamanders, crayfish, freshwater mussels and fish are restricted to single watersheds or peaks due to millions of years of isolation and favorable conditions. Over 6,300 plant species are known from the region.



Map: Geological Regions



Map: Soil Regions

*The Appalachian Mountains* are among the richest of temperate areas, providing habitat for over 250 birds, 78 mammals, 58 reptiles and 76 amphibians (Pickering et al. 2002). One-third of the known salamander species are found in North America; the highest concentration of these is found in the Appalachian Mountains region. The Southern Appalachians are a global hotspot for aquatic species. Mussel, fish and

crayfish richness is unparalleled, in part because streams and rivers drain toward the south, allowing aquatic species to persist during successive glaciations. As a measure of aquatic species richness, 290 fish species are known from Tennessee, more than all of Europe (Stein et al. 2000).

The mountains in the region play a critical role safeguarding and buffering the headwaters of key watersheds that serve the heavily populated regions of the North Atlantic, South Atlantic, and Great Lakes.

*The Central Hardwoods* The Central Hardwood Forest (CHF) refers to the area where deciduous hardwood species overwhelmingly, but not exclusively, dominate the stands and cover types that occur as repeating units across the landscape. Transition zones where Central Hardwood species mix with species from adjacent regions identify boundaries of the region. These regions are the Northern Hardwood-Conifer Forest along the northern border the Southeastern-Pine Forest along the eastern and southern borders, and the Tall Grass Prairie region to the west. There is a distinctness and cohesiveness to the CHF as its boundaries frequently cut across geographic features. The 18 oak and 10 hickory species that dominate stands from Missouri to West Virginia, and Wisconsin to Alabama unify the region. The more important species such as white, black, and chestnut oak may form essentially climax communities on dry sites or successional communities on moist sites. These species may be regarded as obligate xerophytes and facultative pioneers. Such a successional/stability pattern/process is either absent or difficult to identify in other forested regions. Geographically, the region is also diverse. Physiographic provinces include the unglaciated Blue Ridge Mountains, Appalachian Plateaus, Interior Low Plateaus, and Ozark Plateaus, and the glaciated Central Lowlands. The Mississippi floodplain and Gulf Coastal Plain extend into the region. Bedrock, surface deposits, topography, and the soil mosaic vary from province to province and with subregions within provinces.



Map: Original Boundary Designation: (Blue) Central Hardwoods Bird Joint Venture (Eastern Portion) & (Tan) Appalachian Mountain Bird Joint Venture

## Land Cover

Land use patterns vary widely within the Appalachian LCC, depending on climate, topography, soils and human population distribution. General land area cover estimates based on the National Land Cover Dataset indicate that approximately 62% of the Appalachian LCC is forested while agricultural lands represent 26% (pasture/hay/grassland 18% and cropland 8%) of land use.

[Map: National Land Cover Data](#)

## Conservation and Federal Lands

Federal ownership is approximately 12% in the Appalachian Region, with National Parks and Forests being the primary land holders of the Federal community, at 1,800 and 24,750 square miles respectively. The Department of Defense owns approximately 1,500 square miles, Tennessee Valley Authority 1,190 square miles, and Fish and Wildlife Service approximately 327 square miles.

## Historic and Cultural Resources

Human communities across the region are heavily reliant on nature-based industries. Timber, agriculture, mining, and manufacturing were the traditional mainstays of the Appalachian economy into the mid-20th century. More recently other industries such as new energy development have replaced agriculture and mining as more important economic forces. But the region support many historic traditions such as sport hunting, fishing and outdoor recreation, as part of the area's cultural heritage.

## *A Biological “Hotspot” – Habitat and Priority Species*

The Appalachian LCC contains the most **significant biodiversity “hotspot”** east of the Rocky Mountains and is the largest contiguous hot spot area in the nation. The Central and Southern Appalachians are unrivaled in the U.S. for aquatic species diversity and comparable only to China for forest diversity.

Approximately 198 species in this proposed LCC are federally listed as threatened or endangered; of these 108 or 54% are aquatic species (primarily mussels and fish).

Numerous invertebrates, salamanders, crayfish, freshwater mussels and fish are restricted to single watersheds or peaks due to millions of years of isolation and favorable conditions. The Southern

Appalachians are a global hotspot for aquatic species diversity in part because streams and rivers drain toward the south, allowing aquatic species to persist during successive glaciations.

The mountain region and drainage system along the Cumberland Plateau represents the richest of temperate areas in North America in terms of its biodiversity which evolved due to the Appalachian region's diverse topography with long broad ridges, steep slopes, deep gorges and wide intermountain valleys and geologic stability over long evolutionary time-scale periods. This unique combination of physical characteristics and history has resulted in a broad range of microhabitats and the presence of numerous species and communities that at one time existed in abundance but now only survive in particular places in the region.

Major threats to the biological diversity, as well as the environmental services and benefits to society they provide, include the complete loss, fragmentation, or disturbance to terrestrial and aquatic systems due to expanding energy development, urban and suburban expansion with its attendant pollution and roadways, and changes to the hydrologic cycle due to extreme levels of water consumption, withdrawal, and increased variability in the climate system.

[Map: Biodiversity Hotspots across the Continental US and Hawaii](#)

## Aquatic

**Nearly half of the crayfish, freshwater fish, and amphibians in the Southern Appalachians are at risk of extinction (Smith et al. 2002).** Approximately 108 aquatic species in the Appalachian LCC are federally listed as threatened or endangered, due primarily to habitat degradation and population segmentation. The Upper Tennessee River Basin is one of the most diverse aquatic habitats in the world and contains dozens of rare freshwater mussel species. **Many freshwater mussels are endangered** due to water pollution and disturbance or destruction of their natural habitats. Waterway alterations have led to major mussel population declines and extirpations from large areas of many species' historical ranges (USFWS 1985). This is also true of other aquatic species. Dams and their impounded waters present physical barriers to the natural dispersal of mussels, including emigration (dispersal) of host fishes, and isolation of surviving mussel populations in limited portions of their range. Small isolated aquatic populations are subject to natural random events (i.e., droughts, floods) and to changes in human activities and land use practices (i.e., urbanization, industrialization, mining, certain agricultural activities and practices, etc.). Without avenues of emigration to less-affected watersheds, mussel populations gradually disappear where land use activities result in deterioration of aquatic habitats. Many aquatic species require fast flowing, silt free streams and rivers in order to survive. Yet the increase levels of siltation due to road construction, poor agricultural land management practices, and deforestation are putting many species at increased risk in addition to exposing them to heavy metals, agricultural chemical runoff, and acid mine drainage (Williams and Neves 1993).



Photo: Fresh water Mussels. Credit: USFWS

## Terrestrial

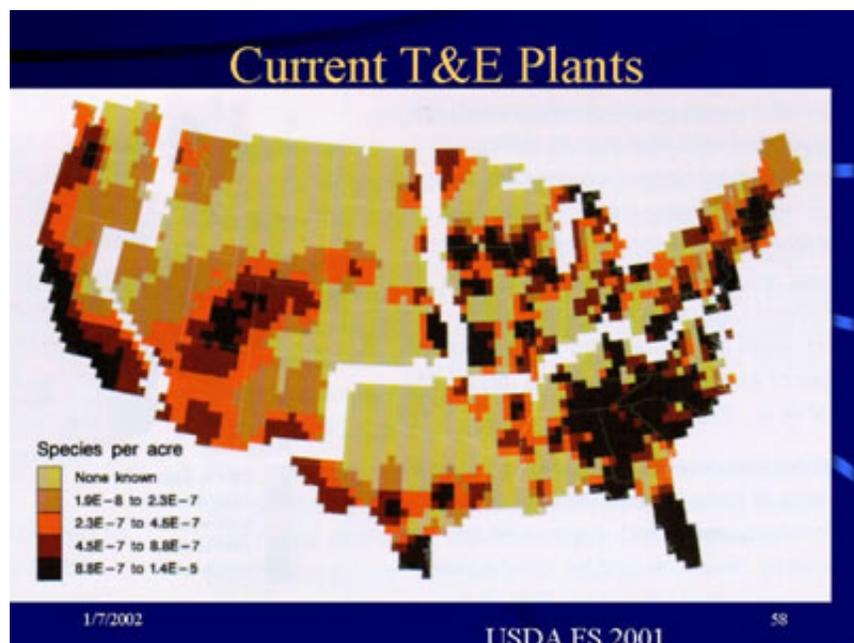
Appalachian mountain forests serve as a critical migration corridor. The Appalachian Mountains are also a critical migration corridor for over 64 high priority migratory bird species. Given it's span of over 1,500 miles of Canada and the Eastern U.S. many different forest types exist [Northern Hardwoods - PA, NY, WV; Oak Forest - PA, OH, WV, KY, NC, GA; Oak-Hickory-Pine - WV, VA, GA, AL; Mixed Mesophytic - WV, KY, TN].

The Appalachian-Blue Ridge forests consist of two major forest community types, corresponding to elevation gradients. At lower elevations, between 250 and 1350 meters, **mixed oak forests** dominate. **Old-growth cove forests** at mid-elevations once supported massive tulip poplars, chestnuts, red spruce, and oaks. Above 1,350 m, **spruce-fir forests** develop and dominate the landscape. High elevation ridges are dominated by balsam fir, Fraser fir and red spruce. **Fraser fir is endemic** to the southern Appalachians and can form almost pure stands on the highest peaks. This community type is a Pleistocene relic that is now confined to a limited number of high mountains in southwestern Virginia, eastern Tennessee, and western North Carolina. **Spruce-fir is** the least abundant forest community type in the southern Appalachians and is separated into disjunct patches due to its elevational limits. There is concern about the persistence of some endemic species such as the northern flying squirrel and the spruce-fir moss spider. The Spruce-fir moss spider is a federally listed endangered species. The diversity of mountain forests habitat types across the Appalachian mountains serve as critical migration corridors and offer breeding habitat for **migratory birds**, including neotropical migrant species such as the cerulean warbler, hooded warbler, and wood thrush.



Photo: Cerulean Warbler. Credit:

Understory plants in the Southern Appalachians are incredibly diverse but many are highly susceptible to alteration of the forest canopy. More than 2,000 species of vascular plants occur in the Southern Appalachians, making it **one of the most botanically diverse regions in the temperate zone**, and therefore an area considered to have high potential for future medicinal plant research and development. Hundreds of these species are federally listed and are at risk of extinction due to land use practices and development. **Many species have restricted ranges and occur in specialized habitats**, or require intact canopy and moist understory conditions, which are destroyed by logging and other large-scale human disturbances.



Slide: T&E Plants. Credit: USDA/FS 2001

## Karst

Ancient limestone have eroded into extensive karst formations in some areas, creating a network of sinkholes, underground streams, caves and unusual communities on limestone. During the Pleistocene glaciations, the Appalachians acted as a mesic and thermal refuge for a number of species and communities. In a similar manner, after the retreat of the glaciers, cold-adapted communities, such as cranberry bogs, remained in refugia in cooler portions of the Appalachians, well south of their usual range. The prevalent limestone and karst formations in this ecoregion are associated with a cave fauna of salamanders, fish, and invertebrates. The diversity and distribution of these species are not well known, but they likely rival cave faunas around the world in richness and endemism. Cave habitats in the Appalachian LCC support several federally listed species including the Madison cave isopod, Townsend's big-eared bat and Indiana bat.



Photo: Indiana Bat. Credit: USFWS



Photo: Townsend's big-eared bat. Credit: USFWS



Photo: Madison Cave. Credit: Richmond Times Dispatch 2008-10-15