ECOREGIONS OF SOUTH CAROLINA

Regional Descriptions

by

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45. Piedmont

Considered the nonmountainous portion of the old Appalachians Highland by physiographers, the northeast-southwest trending Piedmont ecoregion comprises a transitional area between the mostly mountainous ecological regions of the Appalachians to the northwest and the relatively flat coastal plain to the southeast. It is an erosional terrain of moderately dissected irregular plains with some hills, with a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks. Most rocks of the Piedmont are covered by a thick mantle of saprolite, except along some major stream valley bluffs and on a few scattered granitic domes and flatrocks. Rare plants and animals are found on rock outcrops, such as at Forty Acre Rock in Lancaster County, South Carolina. The domes and flatrocks exhibit processes of soil formation and plant succession from lichens and mosses to herbs, shrubs, and trees. Stream drainage tends to be perpendicular to the structural trend of the rocks across which they flow. This lack of structural control is likely due to the drainage being superimposed from a Coastal Plain cover (Staheli 1976; Hack 1982).

The soils are generally finer-textured than those found in coastal plain regions with less sand and more clay (Markewich et al. 1990). Several major land cover transformations have occurred in the Piedmont over the past 200 years, from forest to farm, back to forest, and now in many areas, spreading urban- and suburbanization. The historic oak-hickory-pine forest was dominated by white oak (Quercus alba), southern red oak (Quercus falcata), post oak (Quercus stellata), and hickory (Carya spp.), with some shortleaf pine (Pinus echinata) and loblolly pine (Pinus taeda). Once largely cultivated with crops such as cotton, corn, tobacco and wheat, most of the Piedmont soils were moderately to severely eroded (Trimble 1974). Most of this region is now in planted pine or has reverted to successional pine and hardwood woodlands, with some pasture in the landcover mosaic. We have divided the Piedmont of South Carolina into five level IV ecoregions: Southern Inner Piedmont (45a), Southern Outer Piedmont (45b), Carolina Slate Belt (45c), Triassic Basins (45g) and Kings Mountain (45i).

45a. Southern Inner Piedmont

The Southern Inner Piedmont is generally higher in elevation with more relief than 45b. As a transitional region from the Blue Ridge (66) to the Piedmont, it contains some mountain outliers, and it receives more rainfall than 45b and 45c. The general roughness of the landscape decreases to the southeast away from the mountains. The rolling to hilly well-dissected upland contains mostly gneiss and schist bedrock that is covered with clayey and micaceous saprolite. It is warmer than the Northern Inner Piedmont (45e) to the north in North Carolina and Virginia, and it contains thermic soils rather than 45e's mesic soils. The region is now mostly forested, with major forest types of oak-pine and oak-hickory, and less loblolly-shortleaf pine forest than 45b. Open areas are mostly in pasture, although there are some small areas of cropland. The boundary with 66d is relatively distinct, based primarily on topography and soils, while the boundary with 45b to the south is more transitional and fuzzy.

45b. Southern Outer Piedmont

The Southern Outer Piedmont ecoregion has lower elevations, less relief, and less precipitation than 45a. The landform class is mostly irregular plains rather than the plains with hills of 45a. Gneiss, schist, and granite are typical rock types, covered with deep saprolite and mostly red, clayey subsoils. Kanhapludults are common soils, such as the Cecil, Appling, and Madison series. Some areas within this region have more alkaline soils, such as the Iredell series, formed over

diabase, diorite, or gabbro, and may be associated with areas once known as blackjack oak prairies. Pine (mostly loblolly and shortleaf) dominates on old field sites and pine plantations, while mixed oak forest is found in less heavily altered areas. The upper portion of the region tends to have more pasture, cropland, and the urban and manufacturing influence of the Greenville-Spartanburg-I-85 corridor, while the lower portion of the region has a landscape now dominated by loblolly pine plantations.

The northern or northwestern boundary with 45a is transitional or fuzzy. The southern boundary of the ecoregion occurs where it meets the slate belt rocks and soils of 45c, or at the fall line where unconsolidated coastal plain sediments are deposited over 45b's metamorphic and igneous rocks.

45c. Carolina Slate Belt

This region extends from southern Virginia, across the Carolinas, into a small part of eastern Georgia. The mineral-rich metavolcanic and metasedimentary rocks with slatey cleavage tend to be finer-grained and less metamorphosed than other parts of the Piedmont (except for the Triassic basins) and are somewhat less resistant to erosion. They therefore form areas of slightly lower elevations with wider valleys. These conditions are also beneficial to reservoir sites, such as on the Saluda River above Columbia, SC, and on the Savannah River above Augusta, GA (Hunt 1967). The volcanic-sedimentary rock formations include volcanic slates, basic and acid tuffs, breccias and flows that are interbedded. The volcanic rocks are intruded in many areas by granites. The Carolina Slate Belt has been an important region of mineral production and is thought to have potential for containing undiscovered deposits of gold and silver, as well as of copper, lead, zinc, molybdenum, and tin. The volcanic slates are deeply weathered in places forming clay and shale and soils generally have high silt contents. Georgeville and Herndon soils (fine, kaolinitic, thermic Typic Hapludults) are common. Similar Slate Belt regions have been defined for natural land use areas (Barnes and Marschner 1933), soil system regions (Daniels et al. 1984, 1999), and USFS subsections (Keys et al. 1995). It was defined as a forest habitat subregion in South Carolina by Myers et al., (1986).

45g. Triassic Basins

The Triassic Basins of the Carolinas have only a small occurrence in South Carolina but contain unusual Piedmont geology of unmetamorphosed shales, sandstones, mudstones, siltstones, and conglomerates. Local relief and elevations are often less than in surrounding regions, and, with rocks that are easier to erode, stream valleys that cross the region tend to widen. Soils tend to be clayey with low permeability, and streams have low base flows. The clay has a high shrink-swell potential that can hinder construction; it is also utilized by many brick makers in the North Carolina portion of the region. A mosaic of mixed and deciduous forest, pasture, and cropland is the main land cover in the South Carolina portion.

45i. Kings Mountain

The Kings Mountain ecoregion is a hilly, somewhat rugged area with some northeast to southwest trending ridges and distinctive metasedimentary and metavolcanic rocks. Aluminum-rich quartz-sericite schist is common. The metamorphic grade is generally lower than adjacent geologic belts and the rocks contain an unusual variety of mineral deposits. Mining strongly influenced the early development of the region, including an iron industry in the late 1700's to late 1800's, and later production of marble, lime, gold, lead, silver, pyrite, lithium, mica, feldspar, silica, and clay.

Soils are often a very fine sandy to silty texture, similar to 45c. The region is covered with oak-hickory-pine forest, and Virginia pine is common.

63. Middle Atlantic Coastal Plain

Ecoregion 63 is found primarily in the Carolinas and other states to the north, and has a broad transitional boundary with ecoregion 75 to the south. It consists of low elevation, flat plains, with many swamps, marshes, and estuaries. Forest cover in the region, once dominated by longleaf pine in the Carolinas, is now mostly loblolly and some shortleaf pine, with patches of oak, gum, and cypress near major streams, as compared to the mainly longleaf-slash pine forests of the warmer Southern Coastal Plain (75). Its low terraces, marshes, dunes, barrier islands, and beaches are underlain by unconsolidated sediments. Poorly drained soils are common, and the region has a mix of coarse and finer textured soils compared to the mostly coarse soils in the majority of ecoregion 75. Ecoregion 63 is typically lower, flatter, more poorly drained, and more marshy than ecoregion 65. Pine plantations for pulpwood and lumber are typical, with some areas of cropland.

63g. Carolinian Barrier Islands and Coastal Marshes

The Carolinian Barrier Islands and Coastal Marshes covers only a small portion of the South Carolina coast, extending southwest from the border with North Carolina to just past the Cherry Grove Beach area near North Myrtle Beach. It covers the small piece of the remaining marsh and island landscape of the north coast, but not the more developed and paved strand portion of the Myrtle Beach area. The entire ecoregion extends north to Albermarle Sound in North Carolina. Similar to 63d along the coast in northern North Carolina and southern Virginia, the region contains marshes, dunes, beaches, and barrier islands, but it tends to be slightly warmer and wetter. The barrier islands differ in their genesis and morphology from that found in the Sea Islands / Coastal Marsh region (75j) to the south. The maritime forests include live oak, laurel oak, loblolly pine, red cedar, yaupon holly, wax myrtle, dwarf palmetto, with cabbage palm (Sabal palmetto) in the southern portion of the region. The region encloses Pamlico Sound in NC, a shallow estuary supporting an important nursery for 90 percent of all the commercial seafood species caught in North Carolina, as well as vast recreational fisheries.

63h. Carolina Flatwoods

The nearly level coastal plain of the Carolina Flatwoods has less relief, wider upland surfaces, and larger areas of poorly drained soils than the adjacent, higher elevation ecoregion 65l. Covered by shallow coastal waters during the Pleistocene, the resultant terraces and shoreline-related landforms are covered typically by fine-loamy and coarse-loamy soils, with periodically high water tables. Other areas have clayey, sandy, or organic soils, contributing to the region's plant diversity. Carolina bays and pocosins are abundant in some areas. The region is a significant center of endemic biota, with more biological diversity and rare species compared to adjacent 63e to the north in North Carolina and Virginia. Pine flatwoods, pine savannas, freshwater marshes, pond pine woodlands, pocosins, and some sandhill communities were once common. Loblolly pine plantations are now widespread with an active forest industry. Artificial drainage for forestry and agriculture is common.

63n. Mid-Atlantic Floodplains and Low Terraces

The Mid-Atlantic Floodplains and Low Terraces are mostly a continuation of the riverine ecoregion 65p, although a few floodplains mapped in this region originate within ecoregion 63. Large, sluggish rivers, deep-water swamps, and some oxbow lakes characterize 63n. The alluvial deposits of the floodplains and terraces tend to have abrupt textural changes. Brownwater floodplains originate in or cross the Piedmont (45) and the sediments contain more weatherable minerals than the blackwater floodplains that have their watersheds entirely within the coastal plain. Cypress-gum swamps are common, along with bottomland hardwoods of wetland oaks, green ash, red maple, and hickories.

65. Southeastern Plains

These irregular plains with broad interstream areas have a mosaic of cropland, pasture, woodland, and forest. Natural vegetation was mostly longleaf pine, with smaller areas of oak-hickory-pine. On some moist sites, especially in the far south near Florida, Southern mixed forest occurred with beech, sweetgum, southern magnolia, laurel and live oaks, and various pines. The longleaf pine forests had a diversity of age classes, structure, and species in response to environmental gradients and natural disturbances. Over the past three centuries, naval stores or pine tar production, logging, open range cattle and feral hog grazing, agriculture, and fire suppression removed almost all of the longleaf pine forests. The Cretaceous or Tertiary-age sands, silts, and clays of the region contrast geologically with the older metamorphic and igneous rocks of the Piedmont (45) and Blue Ridge (66). Elevations and relief are greater than in the Southern Coastal Plain (75), but generally less than in much of the Piedmont or in the more mountainous Blue Ridge. streams in this area are relatively low-gradient and sandy-bottomed.

Ecoregion 65 has similarities to defined regions in the other major land classification systems. The Southern Coastal Plain MLRA includes this ecoregion within it (USDA, SCS 1981), and it is within the Coastal Plains and Flatwoods, Lower Section of the USFS (Bailey et al., 1994; Keys et al., 1995). The ecoregion has been divided into three level IV ecoregions within South Carolina: Sand Hills (65c), Atlantic Southern Loam Plains (65l), and Southeastern Floodplains and Low Terraces (65p).

65c. Sand Hills

The Sand Hills are a rolling to hilly region composed primarily of Cretaceous-age marine sands and clays, capped in places with Tertiary sands, deposited over the crystalline and metamorphic rocks of the Piedmont (45). It tends to be more rolling and hilly than adjacent 65l, with a different mix of soils. Many of the droughty, low-nutrient soils formed in thick beds of sand, although some soils contain more loamy and clayey horizons. Some upland areas are underlain by plinthite, and sideslopes tend to have fragipans that perch water and cause lateral flow and seepage. Stream flow is consistent; streams seldom flood or dry up because of the large infiltration capacity of the sandy soil and the great ground-water storage capability of the sand aquifer. On drier sites, turkey oak and blackjack oak grow with longleaf pine and a wiregrass ground cover. Shortleaf-loblolly pine forests and other oak-pine forests are now more widespread due to fire suppression and logging. The Sand Hills are a center of rare plant diversity in the Carolinas. The region in most areas has soils that are poorly suited to crops due to the droughtiness and rapid leaching of plant nutrients. Many areas are in woodland, and some areas are used for pasture. Portions of the region are also known for its peach orchards, golf courses, and horse farms.

Parts of the southern boundary for this region are not easily defined. For the eastern portion of southern boundary, east of the Congaree River, there is relatively good agreement of boundary placement among frameworks such as the MLRA (USDA, SCS 1981), USFS (Keys et al, 1995), Forest Habitat Regions (Myers et al., 1986), and STATSGO soils. For the western portion of the region, the southern boundary is more difficult to determine. The area around the Aiken Plateau has more loamy and sandy loam soils, but does include some droughty, sandhill soil types. The MLRA, STATSGO, and general soils maps would suggest extending the boundary into Barnwell County, as we have done, although the USFS and Myers et al., frameworks place their boundary farther north, closer to Aiken.

65l. Atlantic Southern Loam Plains

The Atlantic Southern Loam Plains ecoregion is lower, flatter, more gently rolling, with finer-textured soils than 65c. It is a major agricultural zone, with deep, well-drained soils, and more cropland than 65c or 63h. The sedimentary formations are younger than those of the Sand Hills (65c) and older and more dissected than the flatter terraces of the Carolina Flatwoods (63h). The flora is varied due to the variety of edaphic conditions, but is generally more mesic than found in 65c, and more xeric than in 63h. The region has a high concentration of Carolina bays. These are shallow, elliptical depressions, often swampy or wet in the middle with dry sandy rims. Carolina bays not drained for agriculture often contain rare or endangered plant and animal species.

Within South Carolina, the northern portion of the region in the Florence and Pee Dee River area tends to be flatter with more areas of wet soils. Also in the north, there were disagreements among researchers in North and South Carolina about where the level III boundary should be placed between ecoregion 65 and 63. Our early draft maps kept the boundary to the north of the Lumber River in the state border area. The 65l / 63h boundary in Bladen and Columbus counties of North Carolina is not easily discerned, and it is a fuzzy transitional mosaic of characteristics from each region. Scarps, where they are even detectable, do not appear to always be the best division between the 63 and 65 ecoregions. In North Carolina, the consensus was to move the boundary south of the Lumber River to cover some of the rolling, loamy soil, cropland areas, and in this area the boundary is close to the Surry Scarp. From Tabor City, NC, the boundary angles back toward Nichols, SC, near the Lumber River.

65p. Southeastern Floodplains and Low Terraces

Southeastern Floodplains and Low Terraces comprise a riverine ecoregion that provides important wildlife corridors and habitat. Composed of alluvium and terrace deposits of sand, clay, and gravel, the region includes large sluggish rivers and backwaters with ponds, swamps, and oxbow lakes. It includes oak-dominated bottomland hardwood forests, and some river swamp forests of bald cypress and water tupelo. Similar to 63n, the flood-prone region includes brownwater floodplains and blackwater floodplains. The brownwater floodplains originate in or cross the Piedmont (45) and the sediments contain more weatherable and mixed minerals than the blackwater floodplains that have their watersheds entirely within the coastal plain. The low terraces are mostly forested, although some cropland or pasture occurs in some areas that are better drained.

66. Blue Ridge

The Blue Ridge level III ecoregion extends from southern Pennsylvania to northern Georgia, varying from narrow ridges to hilly plateaus to more massive mountainous areas with high peaks.

The Blue Ridge is part of one of the richest temperate broadleaf forests in the world, with a high diversity of flora and fauna. From a national scale, the potential natural vegetation within South Carolina consists of Appalachian oak forests (Kuchler 1964), but a variety of oak, hemlock, cove hardwoods, and pine communities comprise this general class. Fauna include black bear, whitetail deer, wild boar, turkey, grouse, songbirds, many species of amphibians and reptiles, thousands of species of invertebrates, and a variety of small mammals. The ecoregion within South Carolina is characterized by floristically diverse forested slopes; high gradient, cool, clear streams with rocks and boulders; and rugged terrain on primarily metamorphic bedrock (gneiss, schist, and quartzites). Soils are mostly mesic, udic Dystrudepts and Hapludults. Elevations generally range from 900-3000 feet, with Sassafras Mountain, the highest point in South Carolina, reaching near 3560 feet. Annual precipitation ranges from 65 inches to more than 80 inches on the higher peaks.

Many Blue Ridge forests were once dominated by the American chestnut (Castanea dentata), an ecologically and economically important tree that provided food and shelter to many animal species. A fungal disease, the Chestnut blight, introduced to the U.S. around 1904, killed most all of the chestnut trees by the 1930's. Root sprouts and small, young saplings can be found today, but they do not survive. In place of the chestnut, other trees, such as tuliptree, chestnut oak, white oak, black locust, red maple, and pine species have become the important canopy dominants.

The ecoregion in South Carolina falls within one level IV ecoregion: Southern Crystalline Ridges and Mountains (66d).

66d. Southern Crystalline Ridges and Mountains

The Southern Crystalline Ridges and Mountains occur primarily on Precambrian-age igneous and high-grade metamorphic rocks, in contrast to the sedimentary and metasedimentary rocks of 66e and 66g in North Carolina and Tennessee. The crystalline rock types are mostly gneiss and schist, covered by well-drained, acidic, loamy soils. The region has greater relief and higher elevations than adjacent 45a. Topographic break and soil types help define the boundary between 66d and 45a. Elevations of this rough, dissected region are generally 850-3500 feet. The region extends north into Virginia, but this southern part of the region, south of Asheville, NC, is wetter than the north. The region is somewhat heterogeneous, even within the small South Carolina portion. The Chauga Ridges area is distinct to some researchers (Hutto et al., 1999), while in the Eastatoe River area, there is an apparent high diversity of plant and animal species and possibly some similarities to ecoregion 66k. (R. Mancke, USC, personal communication). The ecoregion is mostly forested, with chestnut oak (and formerly American chestnut) dominating on most slopes and ridges. Upland oak forests on more xeric sites have scarlet oak, post oak, and shortleaf pine. Pine-oak and pine forests occur along some dry ridges and slopes (Barry 1980). The mixed mesophytic or cove hardwoods include hemlock, tulip poplar, basswood, beech, buckeye, northern red oak, and red maple. There are a few small areas of pasture, apple orchards, or minor cropland, but low-density recreational activities in forested settings have become the typical land-use. Recreation activities such as rafting, kayaking, hiking, cycling, fishing, hunting, and camping are increasingly popular activities on the the public lands of the Blue Ridge.

75. Southern Coastal Plain

The Southern Coastal Plain extends from South Carolina and Georgia through much of central Florida, and along the Gulf coast lowlands of the Florida Panhandle, Alabama, and Mississippi. From a national perspective, it appears to be mostly flat plains, but it is a heterogeneous region also

containing barrier islands, coastal lagoons, marshes, and swampy lowlands along the Gulf and Atlantic coasts. In Florida, an area of discontinuous highlands contains numerous lakes. This ecoregion is generally lower in elevation with less relief and wetter soils than ecoregion 65. It is warmer and has a different mix of vegetation than ecoregion 63. Once covered by a variety of forest communities that included trees of longleaf pine, slash pine, pond pine, beech, sweetgum, southern magnolia, white oak, and laurel oak, land cover in the ecoregion as a whole is now mostly slash and loblolly pine with oak-gum-cypress forest in some low lying areas, citrus groves in Florida, pasture for beef cattle, and urban.

The South Carolina portion of the Southern Coastal Plain contains two level IV ecoregions: Floodplains and Terraces (75i), and Sea Islands/Coastal Marsh (75j).

75i. Floodplains and Low Terraces

The Floodplains and Low Terraces are a continuation of the riverine 65p ecoregion across the Southern Coastal Plain. Similar to 63n, the broad floodplains and terraces of major rivers, such as the Savannah in South Carolina, comprise the region. Composed of stream alluvium and terrace deposits of sand, silt, clay, and gravel, along with some organic muck and swamp deposits, the region includes large sluggish rivers and backwaters with ponds, swamps, and oxbow lakes. River swamp forests of bald cypress and water tupelo and oak-dominated bottomland hardwood forests provide important wildlife habitat.

75j. Sea Islands / Coastal Marsh

The Sea Islands/Coastal Marsh region contains the lowest elevations in South Carolina and is a highly dynamic environment affected by ocean wave, wind, and river action. Quaternary unconsolidated sand, silt, and clay has been laid down as beach, dune, barrier beach, saline marsh, terrace, and nearshore marine deposits. Mostly sandy soils are found on the barrier islands, while organic and clayey soils often occur in the freshwater, brackish, and salt marshes. Maritime forests of live oak, red cedar, slash pine, and cabbage palmetto grow on parts of the sea islands, and various species of cordgrass, saltgrass, and rushes are dominant in the marshes. The island's dunes are dominated by sea oats, which play a primary role in stabilizing the dune. Other dune plants include bayberry, dogfennel, bitter panic grass, broomsedge, wax myrtle, and spanish bayonet.

The island, marsh, and estuary systems form an interrelated ecological web, with processes and functions valuable to humans, but also sensitive to human alterations and pollution. The coastal marshes, tidal creeks, and estuaries are important nursery areas for fish, crabs, shrimp, and other marine species. Charleston Harbor is one of the largest container ship ports on the East Coast, and it also contains one of the largest commercial shrimp fisheries in the state, raising concerns about the health of the estuary, coastal marshes and associated flora and fauna. The Sea Islands region has a long history of human alterations. Native Americans cultivated corn, melons, squash, and beans on some of these islands. During the colonial and antebellum periods in the 1700's and 1800's, a plantation agriculture economy dominated the region, producing rice, indigo, and Sea Island cotton. While parts of the this region are now managed as wildlife refuges or estuarine research reserves, the expanding resort economy continues to broadly change land uses, water quality, and the once more isolated Gullah and Sea Island cultures.