

Teaching Georgia's Regions with Soils

Mike Kahle- Cobb County Watershed Stewardship Program

Some of you asked for the titles the books we discussed on the short walk into the woods... here they are. If you have any recommendations, please feel free to let me know- I'm always looking for great resources.

The Forest Unseen, A Year's Watch in Nature by David George Haskell

Place-Based Education, Connecting Classrooms & Communities by David Sobel

Sharing Nature with Children by Joseph Cornell

Websites with general info about soils:

<http://www.ga.nrcs.usda.gov/technical/soils/soilsinfo.html>

<http://www.rain.org/global-garden/soil-types-and-testing.htm>

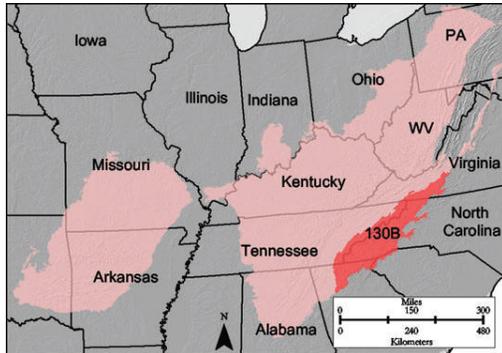
http://dlg.galileo.usg.edu/CollectionsA-Z/soilsurveys_search.html

The soils of GA make and take kit:



Clockwise from upper left: Piedmont- red clay (Cobb County), Barrier Island – dark brown w/sand (Jekyll), Mountain reddish-brown loamy (Blairsville), Coastal Plain – yellow, sandy (unknown source)

BLUE RIDGE



This MLRA is mainly in the Southern Section of the Blue Ridge Province of the Appalachian Highlands. The southern tip of the MLRA and two protruding areas to the east are in the Piedmont Uplands Section of the Piedmont Province of the Appalachian Highlands. This MLRA consists of several distinct topographic areas, including the Blue Ridge Escarpment on the eastern edge of the area, the New River Plateau on the northern end, interior low and intermediate mountains throughout the MLRA, intermountain basins between the major mountains, and the high mountains making up the bulk of the MLRA. Elevation ranges from about 900 feet (275 meters) at the south and southwest boundaries of the area to more than 6,600 feet (2,010 meters) at the crest of the Great Smoky and Black Mountain ranges.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Upper Tennessee (0601), 46 percent; Kanawha (0505), 13 percent; Middle Tennessee-Hiwassee (0602), 12 percent; Edisto-Santee (0305), 9 percent; Alabama (0315), 8 percent; Ogeechee-Savannah (0306), 6 percent; Pee Dee (0304), 4 percent; Chowan-Roanoke (0301), 1 percent; and Apalachicola (0313), 1 percent. From north to south, the major rivers in this area are the New River in Virginia; the Yadkin, Catawba, French Broad, Little Tennessee, and Hiwassee Rivers in North Carolina; the Saluda, Seneca, Chattooga, and Tugaloo Rivers in South Carolina; and the Toccoa and Coosawattee Rivers in Georgia. The Tugaloo River is a headwater stream of the Savannah River, and the French Broad, Little Tennessee, Hiwassee, and Ocoee Rivers also flow into Tennessee in this area. The Hiwassee River in Tennessee and the Conasauga River in Georgia have been designated National Wild and Scenic Rivers in this area. The Chattooga River in South Carolina is a National Scenic River.

The soils of the Blue Ridge Mountain region are a product of their geologic history and weathering processes. The mountains seen today were once giants, rivaling the Himalayas in size, and were formed when Africa and North America collided more than a billion years ago. The rocks formed over time; prominent today are hard igneous and metamorphic rocks such as granite, gneiss and marble. On the western slopes of the region are some [softer](#) sedimentary rocks. The mountainous terrain and predominance of hard rocks makes most of the soils in the region thin and vulnerable to erosion from wind and rain

The bedrock geology in this area consists mostly of Precambrian metamorphic rock formations with a few small bodies and windows of igneous and sedimentary rocks. The degree of metamorphism varies but generally decreases westward. The higher grade metamorphic rocks include formations of gneiss, schist, and amphibolite. Low-grade metamorphic formations in the southwestern part of the MLRA include distinct and interbedded bodies of metasandstone, slate, phyllite, metasiltstone, and metaconglomerate. Surficial deposits include colluvial material on fans and aprons along the ridges and alluvial material along the major streams.

The dominant soil orders in this MLRA are Inceptisols and Ultisols. The soil moisture regime is udic. The soil temperature regime typically is mesic, but it is frigid at elevations above 4,200 feet (1,280 meters). Soil depth ranges from shallow to very deep. The general textural class is loamy or clayey.

Because the basement rock of the region is composed of hard igneous and metamorphic rock that is resistant to weathering, in addition to the steep slopes and frequent rainfall, soils do not have the opportunity to build up over time in the Blue Ridge Mountain region. There are, however, pockets of soil that are fertile and have long supported lush agricultural practices. These areas are the result of weathering processes on ancient rocks formed from lava flows and pools due to volcanic activity in the past.

In areas at elevations of less than 3,500 feet (1,065 meters), the soils on uplands generally are red, fine-loamy or fine Typic Hapludults (Evard, Junaluska, and Hayesville series). Humic Hapludults (Trimont and Snowbird series) are on north and east aspects. Soils that formed in colluvium in coves are Typic Dystrudepts (Tate, Greenlee, and Northcove series), Typic Hapludults (Lonon and Keener series), or Humic Hapludults (Saunook and Thunder series).

At elevations between 3,500 and 4,200 feet (1,065 and 1,280 meters), the soils on uplands generally are brown, fine-loamy or coarse-loamy Dystrudepts. Humic Dystrudepts (Plott, Porters,

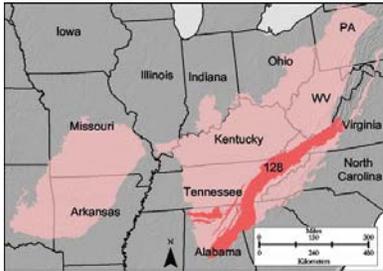
and Cheoah series) are common on north and east aspects, and Typic Dystrudepts (Edneyville, Chestnut, Ditney, and Stecoah series) are common on south and west aspects. Soils that formed in colluvium in coves are Humic Dystrudepts (Cullasaja, Spivey, Tuckasegee, and Santeetlah series) or Humic Hapludults (Saunook and Thunder series).

In areas at elevations above 4,200 feet (1,280 meters), the soils on uplands generally are brown, fine-loamy or coarse-loamy Humic Dystrudepts with a frigid soil temperature regime (Burton, Oconaluftee, and Breakneck series). Soils that formed in colluvium also are Humic Dystrudepts (Balsam and Chiltoskie series). Soils that formed in alluvium vary with stream gradient, energy, and entrenchment into the valley floor. In the upper reaches of watersheds where flood plains are narrow, the soils are Oxyaquic and Fluvaquentic Dystrudepts (Dellwood, Reddies, and Cullowhee series). In the lower and broader river valleys, Udipsamments (Biltmore series) and coarse-loamy Dystrudepts (Rosman series) are in areas closest to rivers and streams on flood plains. Humaquepts (Ela, Nikwasi, and Toxaway series) are in low-lying, frequently flooded or ponded areas. Ultisols are most common on the more stable stream terraces. Fine-loamy Aquic and Typic Hapludults (Dillard and Statler series) are on low terraces, and fine Typic Hapludults (Braddock and Unison series) are on high terraces.

This area supports a wide diversity of plant and animal life because of highly varied topography and climatic conditions. The kind of vegetation changes with elevation and slope aspect. At the lower elevations, below 3,000 feet (915 meters), the most common trees are white oak, black oak, scarlet oak, chestnut oak, hickory, eastern white pine, Virginia pine, and pitch pine. Yellow-poplar and northern red oak are common in the northern part of the MLRA. At the middle elevations, the most common trees are yellow-poplar, black cherry, black birch, sugar maple, northern red oak, American basswood, eastern hemlock, and yellow buckeye. At the higher elevations, above 5,000 feet (1,525 meters), red spruce and Fraser fir are the dominant tree species. In some areas at a high elevation, grassy and heath "balds" are evident. These are large meadows or treeless areas. Grassy balds are dominated by grass species and are home to rare shade-intolerant plant varieties. Heath balds support shrubs, such as rhododendron, mountain laurel, blueberry, flame azalea, hawthorn, huckleberry, and sand myrtle.

The diverse plant communities provide habitat for many species of wildlife. Black bear, white-tailed deer, and wild turkey are plentiful. The higher elevations provide suitable habitat for the birds and animals that are common in northern latitudes, such as northern saw-whet owl, Canada warbler, common raven, northern flying squirrel, and red squirrel.

VALLEY AND RIDGE:



Most of this area is in the Tennessee Section of the Valley and Ridge Province of the Appalachian Highlands. The thin stringers in the western part of the area are mostly in the Cumberland Plateau Section of the Appalachian Plateaus Province of the Appalachian Highlands. A separate area of the MLRA in northern Alabama is in the Highland Rim Section of the Interior Low Plateaus Province of the Interior Plains. The western side of the area is dominantly hilly to very steep and is rougher and much steeper than the eastern side, much of which is rolling and hilly. Elevation ranges from 660 feet (200 meters) near the southern end of the area to more than 2,400 feet (730 meters) in the part of the area in the western tip of Virginia. Some isolated linear mountain ridges rise to nearly 4,920 feet (1,500 meters) above sea level. This area is highly diversified. It has many parallel ridges, narrow intervening valleys, and large areas of low, irregular hills. Many ridges and valleys have a difference in elevation of 660 feet (200 meters).

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Upper Tennessee (0601), 37 percent; Alabama (0315), 24 percent; Middle Tennessee-Elk (0603), 12 percent; Middle Tennessee-Hiwassee (0602), 11 percent; Kanawha (0505), 9 percent; Lower Chesapeake (0208), 3 percent; Chowan-Roanoke (0301), 2 percent; and Mobile-Tombigbee (0316), 2 percent. The Tennessee River and its main tributaries, the Clinch, Holston, Obed, Hiwassee, and Sequatchie Rivers, are in this area. Two other tributaries in the area, the French Broad and Little Rivers, have been designated National Wild and Scenic Rivers. The Tennessee River is one of the largest rivers in the United States. It is a navigable waterway because of the numerous locks and dams on the river.

The bedrock in this area consists of alternating beds of limestone, dolomite, shale, and sandstone of early Paleozoic age. Ridgetops are capped with more resistant carbonate and sandstone layers, and

valleys have been eroded into the less resistant shale beds. These folded and faulted layers are at the southernmost extent of the Appalachian Mountains. The narrow river valleys are filled with unconsolidated deposits of clay, silt, sand, and gravel.

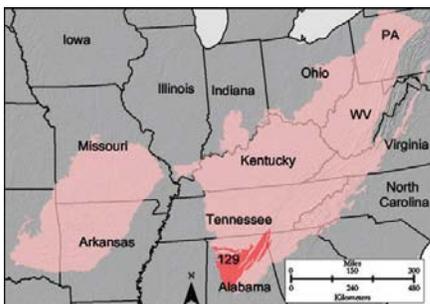
The soils in this area are mainly Udults and, to a lesser extent, Udepts. They have a udic soil moisture regime and a thermic or mesic soil temperature regime; are dominantly well drained, strongly acid, and highly leached; and have a clay-enriched subsoil. They range from shallow on sandstone and shale ridges to very deep in valleys and on large limestone formations.

Paleudults (Decatur, Dewey, Frederick, Fullerton, and Pailo series, commonly cherty) are in the many extensive areas underlain by limestone that traverse the MLRA from southwest to northeast. Hapludults (Townley and Armuchee series) are dominant in valleys underlain by acid shale. Steep, shallow or moderately deep, shaly and stony Dystrudepts (Weikert, Wallen, Montevallo, and Calvin series) are on the sides of steep ridges. Shallow, shaly Eutrudepts (Bays and Dandridge series) are in areas of the shale formation extending along the eastern side of the MLRA. Eutrudepts (Hamblen, Sullivan, and Pettyjon series) are on narrow bottom land.

This area supports hardwoods or mixed hardwoods and pine. The deeper soils support good oak-hickory stands. The shallower soils, mostly on south and west aspects, support pine or oak-pine types. The understory vegetation also is affected by aspect. Little bluestem is the dominant grass species.

Some of the major wildlife species in this area are red fox, gray fox, raccoon, skunk, opossum, muskrat, mink, cottontail, gray squirrel, fox squirrel, bobwhite quail, and mourning dove. The species of fish in the area include carp, bullhead, largemouth bass, and bluegill.

CUMBERLAND PLATEAU



Most of this area is in the Cumberland Plateau Section of the Appalachian Plateaus Province of the Appalachian Highlands. This MLRA is deeply dissected and consists mainly of a series of rather narrow valleys, steep escarpments, and broad plateaus that are underlain by consolidated bedrock. Elevation ranges from 330 to 2,300 feet (100 to 700 meters). Valley floors are commonly about 100 to 400 feet (30 to 120 meters) below the adjacent plateau summits, but local relief may be as much as 1,200 feet (365 meters).

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Mobile-Tombigbee (0316), 50 percent; Middle Tennessee-Elk (0603), 25 percent; Alabama (0315), 21 percent; and Middle Tennessee-Hiwassee (0602), 4 percent. The Sipsey Fork, Locust Fork, and Mulberry Fork Rivers, headwaters of the Black Warrior River, are in this area. The Tennessee River forms part of the northern boundary of the area.

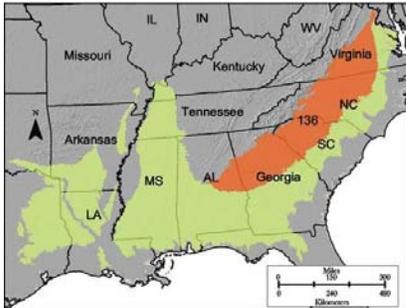
The bedrock in this area consists of alternating beds of limestone, dolomite, shale, and sandstone of early Paleozoic age (mostly Mississippian and Pennsylvanian age). The summits of ridges and plateaus are capped with the more resistant carbonate and sandstone layers, and valleys have been eroded into the less resistant shale beds. These mostly level-bedded sedimentary rocks are at the southernmost extent of the Appalachian Mountains. The narrow river valleys are filled with unconsolidated deposits of clay, silt, sand, and gravel.

The dominant soil orders in this MLRA are Ultisols and Inceptisols. The soils in the area dominantly have a thermic soil temperature regime, a udic soil moisture regime, and mixed or siliceous mineralogy. They are shallow to very deep, generally well drained, and loamy. Hapludults (Albertville, Hartsells, Gorgas, Linker, Nauvoo, Sipsey, Sunlight, and Townley series), Fragiudults (Wynnville series), Dystrudepts (Bankhead, Hector, and Montevallo series), and Eutrudepts (Limrock series) formed in residuum on hills, ridges, and plateaus and in residuum and colluvium on mountainsides.

This area supports mixed oak, hickory-pine, and oak-hickory forests. Shortleaf pine, loblolly pine, Virginia pine, sweetgum, yellow-poplar, hickory, American beech, red oak, and white oak are the major overstory species. Dogwood and redbud are the major midstory species. Japanese honeysuckle, greenbrier, low panicums, bluestems, and native lespedezas are the major understory species.

Some of the major wildlife species in this area are white-tailed deer, fox, bobcat, raccoon, skunk, opossum, mink, rabbit, gray squirrel, quail, and mourning dove.

PIEDMONT



Almost all of this area is in the Piedmont Upland Section of the Piedmont Province of the Appalachian Highlands. A very small part of the MLRA, in central North Carolina, is in the Atlantic Plain Division. A very small part in the Roanoke, Virginia, area is on the eastern edge of the Blue Ridge Province of the Appalachian Highlands. This MLRA is a rolling to hilly upland with a well defined drainage pattern. Streams have dissected the original plateau, leaving narrow to fairly broad upland ridgetops and short slopes adjacent to the major streams. The valley floors are generally narrow and make up about 10 percent or less of the land area. The associated stream terraces are minor. Elevation ranges from 330 to 1,310 feet (100 to 400 meters).

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Edisto-Santee (0305), 18 percent; Chowan-Roanoke (0301), 14 percent; Apalachicola (0313), 10 percent; Pee Dee (0304), 10 percent; Ogeechee-Savannah (0306), 10 percent; Alabama (0315), 9 percent; Altamaha-St. Marys (0307), 9 percent; Lower Chesapeake (0208), 9 percent; Neuse-Pamlico (0302), 5 percent; Cape Fear (0303), 5 percent; and Potomac (0207), 1 percent. Some of the major rivers in this MLRA are, from north to south, the Roanoke, Cape Fear, Savannah, Altamaha, Chattahoochee, and Alabama Rivers. These rivers typically form within the Piedmont Province and flow east and south across the Coastal Plain Province and empty into the Atlantic Ocean or Gulf of Mexico. Reaches of the Rappahannock, Rivanna, and Roanoke (Staunton) Rivers have been designated National Wild and Scenic Rivers in Virginia.

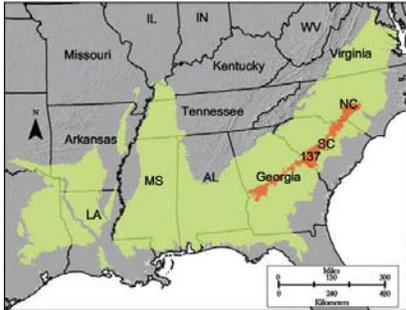
Precambrian and Paleozoic metamorphic and igneous rocks underlie almost all of this MLRA. The dominant metamorphic rock types include biotite gneiss, schist, slate, quartzite, phyllite, and amphibolite. The dominant igneous rock types are granite and metamorphosed granite. Some gabbro and other mafic igneous rocks also occur, and diabase dikes are not uncommon. The Carolina Slate terrane occurs just east of an imaginary centerline in this MLRA. It consists of metamorphic rocks with some metavolcanics and metasediments. Scattered graben basins, which are bounded by faults where the ground between the faults has dropped down, occur from South Carolina to south of Charlottesville and Richmond, Virginia. These basins have Triassic and Jurassic siltstone, shale, sandstone, and mudstone. River valleys have recent alluvium and few terraces.

The dominant soil orders in this MLRA are Ultisols, Inceptisols, and Alfisols. The soils in the area dominantly have a thermic soil temperature regime, a udic soil moisture regime, and kaolinitic or mixed mineralogy. They are shallow to very deep, generally well drained, and loamy or clayey. Hapludalfs (Enon and Wilkes series), Hapludults (Badin, Nason, and Tatum series), and Kanhapludults (Appling, Cecil, Georgeville, Herndon, Madison, Pacolet, and Wedowee series) formed in residuum on hills and ridges. Dystrudepts (Chewacla series) formed in alluvium on flood plains. Udults in the Rhodic subgroup (Davidson, Hiwassee, and Lloyd series) formed in old alluvium on stream terraces or in residuum derived from mafic rocks.

The uplands in this area generally support a mixture of hardwoods and pine. Loblolly pine, slash pine, white oak, red oak, gum, yellow-poplar, and sycamore are the principal species. Pine is dominant on eroded sites. Hardwoods or mixed stands of pine and hardwoods are on slightly eroded soils and the flood plains along streams. The understory includes dogwood, honeysuckle, pinehill bluestem, and briars.

Some of the major wildlife species in this area are white-tailed deer, cottontail, squirrel, bobwhite quail, and mourning dove.

THE FALL LINE and GEORGIA/CAROLINA SAND HILLS



This area is in a transitional zone between the true Piedmont and the Coastal Plain. Most of the area is in the Sea Island Section of the Coastal Plain Province of the Atlantic Plain. Part of the area in Alabama and the western half of the area in Georgia are in the East Gulf Coastal Plain Section of the same province and division. Parts of the inland edge and half of the northern end of the area are in the Piedmont Upland Section of the Piedmont Province of the Appalachian Highlands. This MLRA is a dissected, rolling to hilly upland. Many of the more dissected areas have stabilized dunes, resulting in very irregular slopes. Elevation ranges from 165 to 660 feet (50 to 200 meters), increasing gradually from south to north. Local relief is mainly 10 to 20 feet (3 to 6 meters), but a few hills are 80 to 165 feet (25 to 50 meters) above the adjacent areas.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Edisto-Santee (0305), 24 percent; Pee Dee (0304), 23 percent; Apalachicola (0313), 16 percent; Ogeechee-Savannah (0306), 15 percent; Altamaha-St. Marys (0307), 11 percent; and Cape Fear (0303), 11 percent. From North Carolina to Alabama, the major rivers crossing this area are the Lumber, Pee Dee, Little Lyncnes, Wateree, Congaree, North and South Forks of the Edisto, Savannah, Brier, Ogeechee, Oconee, Ocmulgee, Flint, and Chattahoochee Rivers.

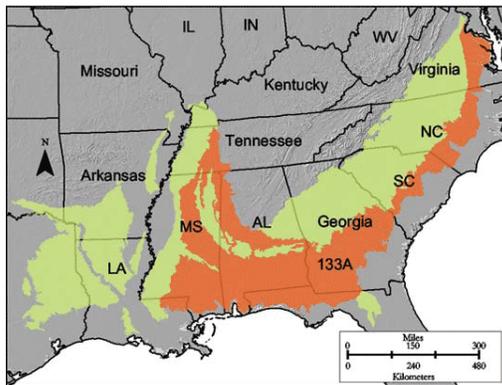
The Sand Hills area is just below the "fall line," which marks the boundary between the older crystalline rocks in the Piedmont and the younger, unconsolidated sediments of the Coastal Plain. Deep Cretaceous sands deposited in this ancient shoreline area were reworked during periods of submergence of the Coastal Plain in Pleistocene time. Several areas have deposits of kaolin and high-silica sands that are mined. Stabilized sand dunes are common in the area. Deposits of siltstone, shale, and marl generally lie beneath the coastal plain side of this area, and the crystalline rocks of the Piedmont lie beneath the sands on the inland side. The dominant soil orders in this MLRA are Ultisols and Entisols. The soils dominantly have a thermic soil temperature regime, a udic soil moisture regime, and kaolinitic or siliceous mineralogy. They generally are very deep, well

drained to excessively drained, and loamy or sandy. Hapludults (Blaney series) and Kanhapludults (Ailey, Pelion, and Vacluse series) formed in marine sediments on flats, hills, and ridges. Kandiudults formed in marine sediments (Fuquay series) and mixed marine and alluvial sediments (Troup series) on uplands. Paleudults formed in marine sediments (Candor series) and mixed marine and eolian deposits (Blanton series) on uplands and stream terraces. Quartzipsammments (Lakeland series) formed in mixed marine and eolian deposits on uplands.

This area supports pine-oak vegetation. Longleaf pine is the dominant species. Turkey oak, blackjack oak, bluejack oak, and sand live oak also occur. Little bluestem, panicums, pineland threawn, and associated grasses and forbs make up the ground cover.

Some of the major wildlife species in this area are white-tailed deer, red fox, gray fox, beaver, raccoon, opossum, cottontail, gray squirrel, turkey vulture, black vulture, crow, screech owl, barred owl, mallard, wood duck, bobwhite quail, Carolina wren, and mourning dove. The large stands of longleaf pine provide critical nesting areas for the red-cockaded woodpecker, an endangered species. Some of the major wildlife species in this area are white-tailed deer, turkey, rabbit, squirrel, bobwhite quail, and mourning dove. The species of fish in the area include bass, bluegill, and channel catfish.

COASTAL PLAIN



This area extends from Virginia to Louisiana and Mississippi, but it is almost entirely within three sections of the Coastal Plain Province of the Atlantic Plain. The northern part is in the Embayed Section, the middle part is in the Sea Island Section, and the southern part is in the East Gulf Coastal Plain Section. This MLRA is strongly dissected into nearly level and gently undulating valleys and gently sloping to steep uplands. Stream valleys generally are narrow in their upper reaches but become broad and have widely meandering stream channels as they approach the coast. Elevation ranges from 80 to 655 feet (25 to 200 meters), increasing gradually from the lower Coastal Plain

northward. Local relief is mainly 10 to 20 feet (3 to 6 meters), but it is 80 to 165 feet (25 to 50 meters) in some of the more deeply dissected areas.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Mobile-Tombigbee (0316), 12 percent; Choctawhatchee-Escambia (0314), 12 percent; Apalachicola (0313), 10 percent; Pascagoula (0317), 9 percent; Altamaha-St. Marys (0307), 7 percent; Alabama (0315), 6 percent; Pearl (0318), 6 percent; Suwannee (0311), 4 percent; Ogeechee-Savannah (0306), 4 percent; Pee Dee (0304), 4 percent; Lower Mississippi-Yazoo (0803), 4 percent; Lower Chesapeake (0208), 3 percent; Cape Fear (0303), 3 percent; Ochlockonee (0312), 2 percent; Neuse-Pamlico (0302), 2 percent; Lower Mississippi-Hatchie (0801), 2 percent; Lower Tennessee (0604), 2 percent; Chowan-Roanoke (0301), 2 percent; Edisto-Santee (0305), 2 percent; Middle Tennessee-Elk (0603), 1 percent; Lower Mississippi-Lake Maurepas (0807), 1 percent; Lower Mississippi-Big Black (0806), 1 percent; and Potomac (0207), 1 percent. This MLRA stretches from the Chesapeake Bay in the north to just short of the Mississippi River in Louisiana and Mississippi. A great number of major rivers originating in the Appalachian Mountains west of this area cross the MLRA and empty into the Atlantic Ocean or the Gulf of Mexico.

This MLRA is bordered on the west and north by the "fall line." This line of water falls marks the western and northern extent of the unconsolidated Coastal Plain sediments. It is an erosional scarp formed when this area was the Atlantic Ocean shore in Mesozoic time. The MLRA is underlain by eroded igneous and metamorphic bedrock. Rivers and streams draining the Appalachians deposited a thick wedge of silt, sand, and gravel east and south of the fall line as delta deposits in the Atlantic Ocean. These Jurassic and Cretaceous river sediments were eventually exposed as the Coastal Plain uplifted and the sea level changed. When the sea level rose again, the Coastal Plain was submerged and covered by a thin layer of Cretaceous sands in the eastern half of the area. In the western part of the area, the water was deeper and limestone, dolomite, and calcareous sands were deposited. As the Coastal Plain continued to uplift and the sea level dropped again, Quaternary material consisting of unconsolidated clay, silt, sand, and gravel was deposited over the Tertiary sand and carbonates. Subsequent changes in the sea level created terraces in these younger deposits along many of the streams and rivers draining this area. Much of the MLRA has a "benched" appearance because of the cycles of erosion and deposition that occurred as the area was exposed and submerged numerous times in its geologic history.

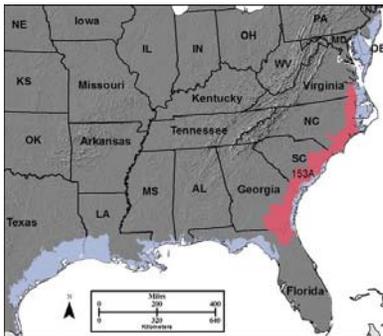
The dominant soil orders in this MLRA are Ultisols, Entisols, and Inceptisols. The soils in the area dominantly have a thermic soil temperature regime, a udic or aquic soil moisture regime, and siliceous or kaolinitic mineralogy. They generally are very deep, somewhat excessively drained to

poorly drained, and loamy. Hapludults formed in marine sediments (Luverne and Sweatman series) and mixed marine sediments and alluvium (Smithdale series) on hills and ridges. Kandiodults formed in marine sediments (Dothan, Fuquay, Norfolk, and Orangeburg series) and mixed marine and fluvial sediments (Troup series) on hills and ridges. Fragiudults (Ora and Savannah series) and Paleudults (Ruston series) formed in mixed marine and fluvial sediments on uplands and stream terraces. Fluvaquents (Bibb series) and Endoaquepts (Mantachie series) formed in alluvium on flood plains. Quartzipsamments (Lakeland series) formed in sandy eolian or marine material on uplands. Paleaquults (Rains series) formed in marine and fluvial sediments on terraces.

This area supports mixed oak-pine vegetation. Loblolly pine, longleaf pine, slash pine, shortleaf pine, sweetgum, yellow-poplar, red oak, and white oak are the major overstory species. Dogwood, gallberry, and farkleberry are the major understory species. Common sweetleaf, American holly, greenbrier, southern bayberry, little bluestem, Elliott bluestem, threeawn, grassleaf goldaster, native lespedezas, and low panicums are other understory species.

Some of the major wildlife species in this area are white-tailed deer, turkey, rabbit, squirrel, bobwhite quail, and mourning dove. The species of fish in the area include bass, bluegill, and channel catfish.

ATLANTIC COAST/FLATLANDS



This area is in the Coastal Plain Province of the Atlantic Plain. Almost three-fourths of the area is in the Sea Island Section of the province, the northern end is in the Embayed Section, the extreme southern end is in the Floridian Section, and part of the southwest corner is in the East Gulf Coastal Plain Section. This area is a relatively flat coastal plain crossed by many broad, shallow valleys that have widely meandering of stream channels. Some short, steep slopes border the stream valleys. Elevation ranges from 25 to 165 feet (8 to 50 meters). Local relief is mainly less than 35 feet (10 meters).

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Altamaha-St. Marys (0307), 18 percent; Pee Dee (0304), 17 percent; Edisto-Santee (0305), 16 percent; Suwannee (0311), 12 percent; Neuse-Pamlico (0302), 9 percent; Chowan-Roanoke (0301), 9 percent; Cape Fear (0303), 9 percent; Ogeechee-Savannah (0306), 6 percent; St. Johns (0308), 3 percent; and Lower Chesapeake (0208), 1 percent. Some of the major rivers that cross this area on their way to the Atlantic Ocean are, from north to south, the Blackwater, Nottoway, Chowan, Roanoke, Tar, Pamlico, Neuse, Cape Fear, Little Pee Dee, Pee Dee, Lynchies, Black, Santee, Cooper, Edisto, Combahee, Coosawhatchie, Savannah, Ogeechee, Altamaha, Big Satilla, Satilla, and Suwanee Rivers.

Mostly unconsolidated Coastal Plain sediments occur at the surface throughout this area. These sediments are primarily Tertiary to Quaternary in age. They are a mixture of river-laid sediments in old riverbeds and on terraces, flood plains, and deltas. These young sediments are made up of combinations of clay, silt, sand, and gravel. From central North Carolina to Florida, Cretaceous marine, near-shore shale, sandstone, and limestone deposits occur beneath the surface. Swamps were common in this area prior to agricultural development. The present-day river valleys are extensive and are flat near the coast. The water table typically is close to the surface in these river valleys. Soils having restricted drainage are common throughout the area.

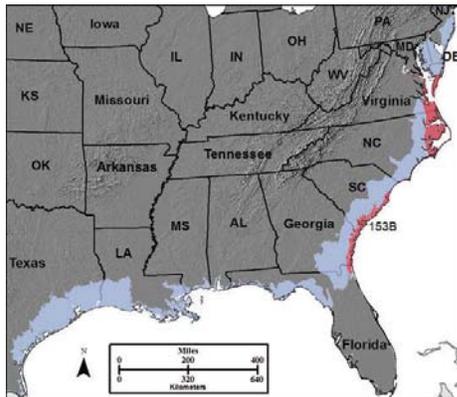
The dominant soil orders in this MLRA are Spodosols and Ultisols. The soils in the area dominantly have a thermic soil temperature regime, an aquic or udic soil moisture regime, and siliceous or kaolinitic mineralogy. They generally are very deep, well drained to very poorly drained, and loamy or clayey. Paleaquults formed in marine sediments on flats and in depressions on the coastal plain (Coxville, Lynchburg, Pantego, and Pelham series) and on marine terraces (Rains series). Paleudults (Goldsboro series) and Kandiuults (Norfolk series) formed in marine sediments on uplands. Albaquults (Leaf series) formed in mixed alluvium and marine sediments on flats and terraces. Alaquods (Leon and Mascotte series) formed in marine sediments on flats and terraces and in depressions. Haplosaprists (Croatan series) formed in organic deposits over mixed marine and fluvial deposits on the coastal plain.

This area supports pine-oak forest vegetation. Loblolly pine, sweetgum, red maple, blackgum, and oaks are dominant in the uplands. Water tupelo, swamp blackgum, bald cypress, sweetgum, and red maple are dominant on the bottom land.

Longleaf uniola, cutover muhly, toothachegrass, panicums, little bluestem, and associated grasses and forbs characterize the understory vegetation.

Some of the major wildlife species in this area are white-tailed deer, feral hog, gray fox, red fox, bobcat, raccoon, skunk, opossum, otter, rabbit, armadillo, squirrel, turkey, and bobwhite quail. The species of fish in the area include largemouth bass, channel catfish, bullhead catfish, bluegill, redear sunfish, spotted sunfish, warmouth, black crappie, chain pickerel, gar, bowfin, and sucker.

TIDEWATER AREA



Most of this area is in the Sea Island Section of the Coastal Plain Province of the Atlantic Plain. The northern quarter is in the Embayed Section of the same province and division. The area is on a nearly level coastal plain crossed by many broad, shallow valleys that have meandering stream channels. Most of these valleys terminate in estuaries along the coast. Sea level is rising, creating tidal marshes at the edges of the estuaries. Elevation ranges from sea level to less than 25 feet (0 to 8 meters). Local relief is mainly about 3 feet (1 meter) or less.

The Suffolk Scarp is the upper (western) limit of this area. The scarp marks a point where the ocean shore extended prior to the Wisconsin period of glaciation. The eastern edge of the area is characterized by a system of barrier and sea islands. The barrier islands extend from the Eastern Shore of the Chesapeake Bay in Virginia to north of Charleston, South Carolina. The portion in North

Carolina is referred to as the Outer Banks. Large bodies of brackish water, such as the Pamlico and Albemarle Sounds, are on the inland side of the barrier islands. The sea islands extend from north of Charleston, South Carolina, to Jacksonville, Florida.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Chowan-Roanoke (0301), 21 percent; Edisto-Santee (0305), 18 percent; Neuse-Pamlico (0302), 17 percent; Ogeechee-Savannah (0306), 13 percent; Altamaha-St. Marys (0307), 12 percent; Lower Chesapeake (0208), 12 percent; Pee Dee (0304), 5 percent; Cape Fear (0303), 1 percent; and St. Johns (0308), 1 percent. Some of the major rivers that cross this area on their way to the Atlantic Ocean are, from north to south, the Rappahannock, York, Rivanna, and Nottoway Rivers; Albemarle Sound (the Chowan and Roanoke Rivers); Pamlico Sound (the Pamlico and Neuse Rivers); and the Cape Fear, Pee Dee, Black, Santee, Cooper, Edisto, Combahee, Coosawhatchie, Savannah, Ogeechee, Altamaha, Satilla, and St. Marys Rivers. The headwaters of the St. Johns River are in this MLRA. The Great Dismal Swamp is in the parts of the MLRA in Virginia and North Carolina.

Mostly unconsolidated Coastal Plain sediments occur at the surface throughout this area. These sediments are primarily Tertiary to Quaternary in age. They are a mixture of river-laid sediments in old riverbeds and on terraces, flood plains, and deltas. These young sediments are made up of combinations of clay, silt, sand, and gravel. The islands and coastline in this area are covered with sand derived from these sediments. From central North Carolina to Florida, Cretaceous marine, near-shore shale, sandstone, and limestone deposits occur beneath the surface. Sea level has been rising since the last period of continental glaciation, drowning the mouths of estuaries. Swamps were common in this area prior to agricultural development. The present-day river valleys are extensive and are flat near the coast. The water table typically is close to the surface in these river valleys. Soils having restricted drainage are common throughout the area.

The dominant soil orders in this MLRA are Alfisols and Entisols. Histosols are of lesser extent. The soils in the area are characterized by restricted drainage, a thermic soil temperature regime, and an aquic soil moisture regime. The soils in the northern part of the area dominantly have mixed mineralogy, and those in the southern part dominantly have mixed clay and siliceous sand mineralogy. Very deep, loamy to clayey Endoaquults (Tomotley, Yeopim, Yemassee, and Wahee series), Umbraquults (Cape Fear and Portsmouth series), Endoaqualfs (Argent and Yonges series), and Albaqualfs (Meggett series) are extensive. Hapludults (Bertie and Tetotum series) are in the higher areas where drainage is better but is somewhat restricted. Other important soils are Alaquods (Leon and Lynn Haven series) and Psammments (Wando, Newhan, Corolla, and Fripp series). Histosols (Pungo and Belhaven series) are in large areas in North Carolina and Virginia, in

the Great Dismal Swamp and in broad upland wetlands known as poquosins. Aquents (Bohicket and Capers series) are extensive throughout the brackish tidal marshes protected by the barrier islands and sea islands.

Loblolly pine and some oaks are dominant in the uplands in this area, and blackgum, sweetgum, oaks, water tupelo, and bald cypress are dominant on the bottom land. Longleaf pine and slash pine are dominant in the southern part of the area. Longleaf uniola, switchcane, panicums, little bluestem, inkberry, large gallberry, greenbrier, waxmyrtle, cabbage palm, and associated grasses and forbs characterize the understory.

Some of the major wildlife species in this area are black bear, white-tailed deer, fox, raccoon, opossum, otter, muskrat, rabbit, mink, squirrel, quail, and mourning dove. The red wolf, an endangered species, is being reintroduced in several parts of the area.

SOILS OF GEORGIA

Why is it red?

Not all Georgia soils are red, but many of them are. The State is well known for its abundance of "Georgia Red Clay". People often ask why the soils are red.

The red color that is so evident in Georgia soils is due primarily to iron oxides.

Soils form from the interaction of climate, organisms, parent materials, relief, and time. Red soils in Georgia result from the affect of a warm, humid climate weathering acid crystalline rocks on rolling hills over a long period of time.

Soils in much of Georgia, particularly the Southern Piedmont region of North Georgia, developed in materials weathered primarily from granite and gneiss. These rocks are black, white, and gray, and are relatively low in bases, or natural fertility. Georgia has a climate of warm (hot) temperatures and high rainfall, so there has been intense weathering of the rocks over the years. High rainfall has leached out most of the bases that were present.

Materials that remain are composed mostly of iron, aluminum, and silica, and it is the iron that gives the soils the red color. The red color is not just from iron, but more specifically from unhydrated iron oxides. The red soils are generally on convex landforms that are well drained.

Organic matter can mask soil colors in some areas. However, organic matter content is low in most of Georgia's soils because of the warm climate, so the red color is not affected by it.

From Soil Taxonomy (1975):

"The red color of soils is generally related to unhydrated iron oxides, although manganese dioxide and partially hydrated iron oxides may also contribute red colors. Since unhydrated iron oxide is relatively unstable under moist conditions, red color generally indicates good drainage and good aeration. Strongly red soils are expected on convex surfaces underlain by pervious rocks. ...

In regions where the normal soils have red color, the well developed red color is one indication that the soils are relatively old or at least that the soil material has been subjected to relatively intense weathering for a considerable time."

Tifton Soils... Coastal Plain

The Proposed State Soil of Georgia

The Tifton soil series is the proposed state soil of Georgia. The Tifton soil series was one of the first soils to be established in Georgia. The Tifton series was established in Grady County, Georgia, in a 1908 soil survey conducted by Hugh Hammond Bennett.

A typical Tifton soil profile consists of an 11 inch topsoil of dark grayish brown loamy sand. The subsoil extends to about 65 inches, strong brown fine sandy loam to 22 inches; yellowish brown sandy clay loam to 40 inches; yellowish brown mottled, sandy clay loam to 60 inches, and strong brown, mottled sandy clay to 65 inches. Two distinctive features of the Tifton soil profile are the presence of more than 5 percent ironstone nodules in the upper part of the soil and more than 5 percent plinthite in the lower part of the soil.

Tifton soils are on nearly level to gently sloping uplands of the Southern Coastal Plain. They formed in loamy sediments of marine origin. Tifton soils are among the most agriculturally important soils in the state. Twenty-seven percent of Georgia's prime farmland is on Tifton soils, more than twice as much as any other soil series. Cotton, peanuts, soybeans, and corn are the principal crops grown on these soils.

Soil Family Classification: Fine-loamy, siliceous, thermic Plinthic Kandiudults.

Tifton soils are in the Ultisols soil order. Ultisols are highly weathered soils developed under woodland vegetation. They are generally low in natural fertility. "Fine-loamy" means the upper part of the subsoil has an average clay content between 18 and 35 percent, and an average sand content of more than 15 percent. "Siliceous" means the sand and silt size particles are mostly silica minerals, such as quartz. "Thermic" refers to an average annual soil temperature between 15 degrees and 22 degrees C (59 degrees-72 degrees F). "Plinthic" refers to the presence of reddish, firm, iron enriched bodies in the soil. "Kandi" indicates that the clay fraction of the subsoil has a relatively low activity.

Tifton soils occur throughout the Southern Coastal Plain in Georgia. They are the most extensive

(Tifton Soils continued)

soils in the State, with over 2 million acres correlated. They have been correlated in more Georgia counties (56) than any other soil.

[See a graphic showing the counties in Georgia where the Tifton soil is located.](#)

