CHAPTER 2: SOUTH CAROLINA'S CONTEMPORARY LANDSCAPE

> "To keep every cog and wheel is the first precaution of intelligent tinkering."
>
> – Aldo Leopold

The State of South Carolina, one of the 13 original colonies, lies within the Southeastern part of the United States, and as such, is in a hotspot of ecological diversity because of its sub-tropical climate, aquatic diversity, habitat types, and variety of soils and topography. Because of this climate (USDA plant hardiness zones 7a-9a), the State was an historic producer of cotton, indigo, rice, and other staple agricultural products, with timber production now the number one agricultural product. Growing industries in South Carolina include automotive, aerospace, and tourism. The following sections detail current landscape features, historical features, and modern demographics, economics, human population patterns and expansions.

General Ecoregion Descriptions

Five general ecoregions exist in South Carolina and are visualized in Figure 2-1. Each ecoregion is classified by its soils, geology, and floristic and faunal components. Ecoregions delineated for the SWAP are largely based on the EPA's Ecoregions of South Carolina (Griffith et al. 2002); however, to more generally reflect variations in habitat/ecosystems across the State, several modifications were implemented:

- Blue Ridge and Piedmont Ecoregions are directly delineated from the EPA dataset's Level III Blue Ridge and Piedmont regions;
- The 'Sandhills' Ecoregion is predominantly the Level IV Sand Hills region, extending coverage along the border of the Piedmont region;
- The 'Coastal Plain' Ecoregion is comprised of the Level III 'Middle Atlantic Coastal Plain' plus the 'Southeastern Plains' (excluding the sandhills);
- The 'Coastal Zone' Ecoregion is derived from the Level III 'Southern Coastal Plain region, which was then extended northward along the shoreline of Horry County to include shoreline/dune habitats in this part of the coast.

Blue Ridge (Mountain) Ecoregion – A narrow belt forming the Southeastern terminus of the Blue Ridge Physiographic Province, which extends from southern Pennsylvania to northern Georgia, ranging from about 200-1,083 m (656-3,554 ft.) in elevation, characterized by steep slopes on Paleozoic crystalline rocks, narrow river valleys, and high-gradient streams; predominantly vegetated by extensive hardwood and hardwood-conifer forests. The ecoregion concept in this SWAP follows Griffith et al. (2002).

Piedmont Ecoregion – A portion of the Piedmont Physiographic Province characterized by rolling hills with highly weathered soils, often severely eroded, overlying mostly Paleozoic crystalline rock substrates, with low-gradient streams on narrow floodplains; vegetation consists mostly of pine and pine-hardwood forests interspersed with agricultural land. The ecoregion concept in this SWAP follows Griffith et al. (2002).

Sandhills Ecoregion – A nearly continuous belt of broad, rolling hills along the Fall Line, generally having sandy soils derived from coarse Cretaceous and Tertiary marine sediments; predominantly vegetated by pine forests interspersed with agricultural land, with hardwood forests on narrow floodplains along medium-gradient streams. For the SWAP, we treat the Sandhills as a distinct ecoregion, including the contiguous Savannah River floodplain. This differs from Griffith et al. (2002) who treated it as a subregion of the "Southeastern Plains," the Inner Coastal Plain. We also include a small, isolated area of the Southeastern Plains at the intersection of Aiken, Edgefield, and Saluda counties to maintain continuity.

Coastal Plain Ecoregion – A series of broad belts derived from a variety of marine sediments, all oriented somewhat parallel to the coastline, the innermost consisting of rolling hills and the outermost consisting of flat terraces. The vegetation consists of pine-dominated forests interspersed with agricultural land on better-drained sites, hardwood forests occupying broad floodplains along low-gradient streams, and extensive pine forests on less well-drained terraces. For this SWAP, we combine the "Southeastern Plains" and "Middle Atlantic Coastal Plain" into a single ecoregion, as well as the contiguous Savannah River floodplain, differing from Griffith et al. (2002). We also include the High Hills of Santee region of Sumter County in this ecoregion, rather than as a disjunct area of the Sandhills ecoregion. Note that other literary sources further divide the Coastal Plain into Inner and Outer Coastal Plains and delineate the Slate Belt above the Sandhills at the Fall Line where the Piedmont "falls away" into the flatter Coastal Plain.

Coastal Zone Ecoregion – The seaward extension of the Coastal Plain Ecoregion, extending from the inland boundary of saltwater influence, seaward to the artificial three-mile offshore limit. Habitat types range from forested variants of Coastal Plain types at inland sites, seaward to sand flats and pine-hardwood forests on unstable emergent coastal sediments, and finally to emergent marshes and submerged bottoms in association with open water. The SWAP differs slightly from Griffith et al. (2002) by extending the ecoregion north along the coast to the North Carolina border, including the entire coast of Horry County.

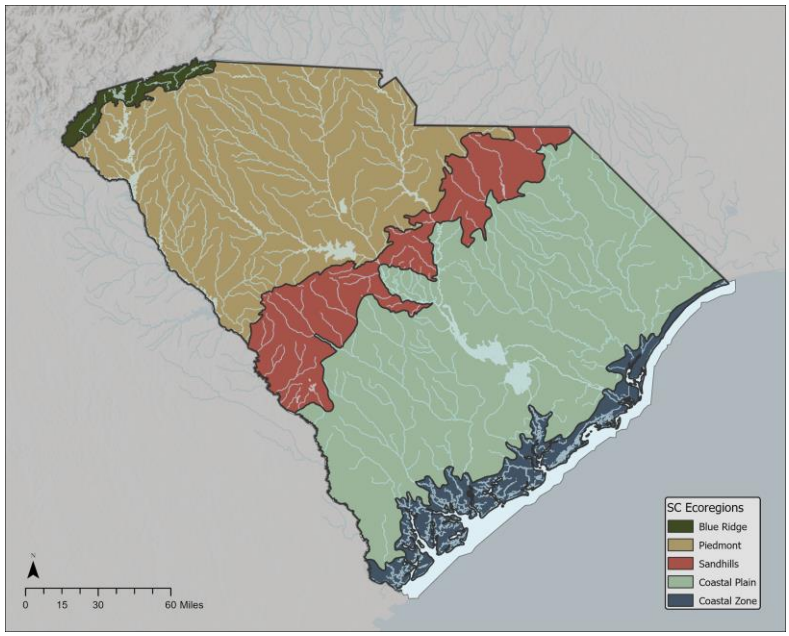


FIGURE 2-1: The five ecoregions of South Carolina, adapted from Griffith et al. (2002) with modifications to account for floristic and faunal assemblages.

Aquatic Resources

One fourth of the land base of the State of South Carolina is classified as wetlands. South Carolina possesses over 17,703 km (11,000 mi.) of permanently flowing rivers and over 48,280 km (30,000 mi.) of permanent and non-permanent streams. The land area that drains to a common river is called a drainage basin, with water flowing from the smallest ephemeral streams into larger streams and eventually rivers. South Carolina is drained by four major river basins--the Savannah, Santee, Pee Dee, and Ashepoo/Combahee/Edisto (ACE) (Figure 2-2). The Santee basin is often subdivided further into the Broad, Congaree/Lower Santee, Catawba/Wateree, and Saluda basins, with the state represented by 7 basins. These, in turn, are made up of 39 sub-basins with their own hydrologic unit codes (HUCs). According to the US Forest Service's Forests to Faucets 2.0 Data Explorer (USFS 2024), South Carolina has 2,100 watersheds, 847 surface water intakes, and 6.6 million of the population using surface water. Except for the ACE Basin, each of the basins originate in the Blue Ridge Ecoregion and pass through the Piedmont, Sandhills, Coastal Plain, and Coastal Zone. Part of the ACE Basin, the Edisto River is the third longest undeveloped free-flowing river in the Southeastern United States. Twenty of South Carolina's rivers connect directly with the State's coastal estuaries, and all rivers and receiving estuaries are dependent on upstream lands and tributaries. There are 11 major lakes in South Carolina, all of which are man-made. The South Carolina Department of Natural Resources' (SCDNR) State Lakes Program stocks and manages 17 small lakes and ponds across the State, a majority of which are in the Piedmont. South Carolina's major water bodies, rivers, and bays are illustrated in Figure 2-3. South Carolina's coastline is the 11th longest in the nation at 301 km or187 mi. If all convolutions (bays, inlets, etc.) are included, South Carolina ranks 12th with 4,628 km or 2,876 mi. of shoreline. The marine ecosystem occurs along all of South Carolina's Atlantic Ocean coastline and extends offshore to the State 4.8 km (3 mi.) jurisdictional boundary, incorporating a surface area of nearly 140,000 ha (345,946 ac.).

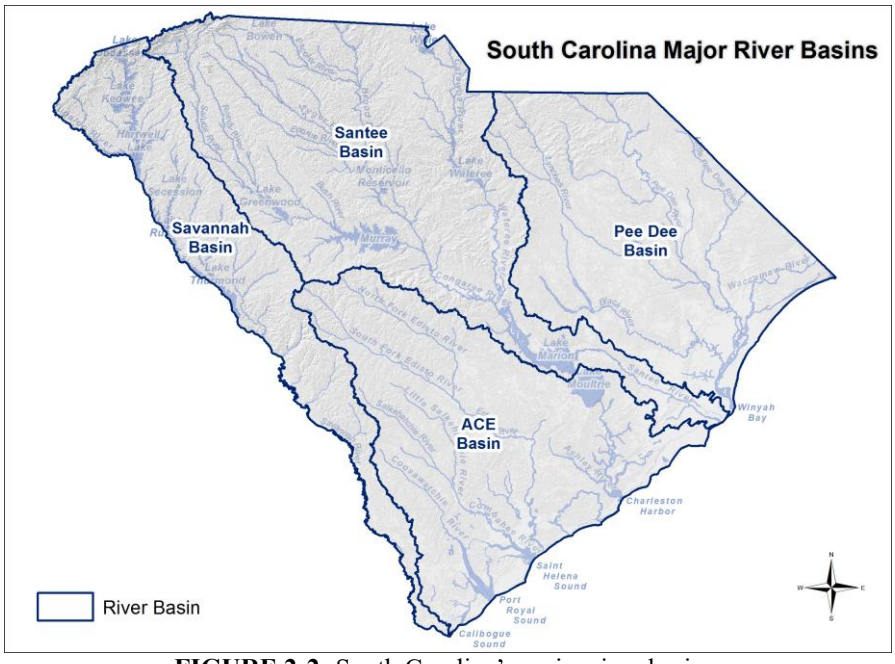


FIGURE 2-2: South Carolina's major river basins.

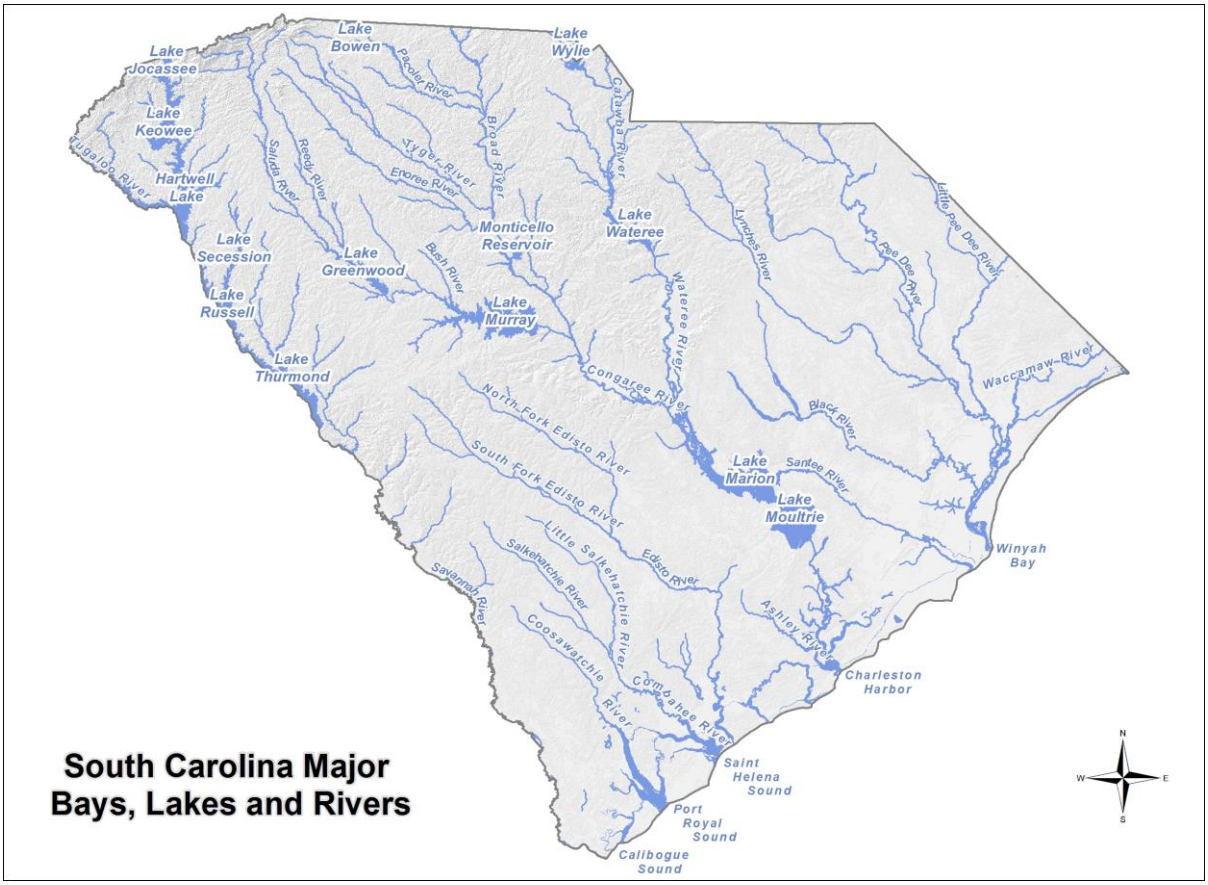


FIGURE 2-3: South Carolina's major bays, lakes, and rivers.

A view of Lake Marion from the Orangeburg County, SC side. Photo by Anna Smith, SCDNR.

Soils

Of the approximately 20,000 soil taxonomic series that are identified and classified in the United States, South Carolina has 278. South Carolina soils typically have an organic matter content of less than 5% (closer to 1% or less across the Piedmont region). Some wetland soils, however, may have greater than 50%. Figure 2-4 depicts the generalized arrangement of ecoregional soils, and Official Soil Series Descriptions (OSD) can be found on the Natural Resources Conservation Service's (NRCS) website.

The majority of soils in the Coastal Plain are sandy or loamy sand in texture. They generally have minimal organic matter, a low cation exchange capacity and water holding capacity, and are infertile. Water rapidly percolates through the soils and can potentially carry contaminates to the shallow water tables and hydrologically connected surface waters. Closer to the coast, depressions and low-lying areas have more poorly drained soils with finer textured subsoil.

Soil texture becomes finer the further west and northward into the State. The "Sandhills," were so named after prehistoric dune remnants. The Sandhills area is a transitional zone located between the Coastal Plains and the Piedmont regions. Soils in this area have textures that range from a fine sand to loam. As with the Coastal Plain soils, Sandhills soils have minimal organic matter. Many soils have a finer textured subsoil (clay hardpan) that can limit deep rooting, and result in horizontal movement of rapidly percolating waters above the hard pan to receiving water bodies.

Soils of the Piedmont and Blue Ridge Ecoregions are commonly termed "Piedmont soils." The soils are predominately loamy clay to clay in texture. The majority are deep soils except for soils on steep slopes and tops of mountains. In these two environments, the soils are shallow with the parent material close to the surface. These heavier textured soils have minimal organic matter but high cation exchange capacity and water holding capacity. Water infiltrates slowly, so rapid rainfall can result in surface water runoff and minimal infiltration.

Soil horizons. Photo by SCDNR.

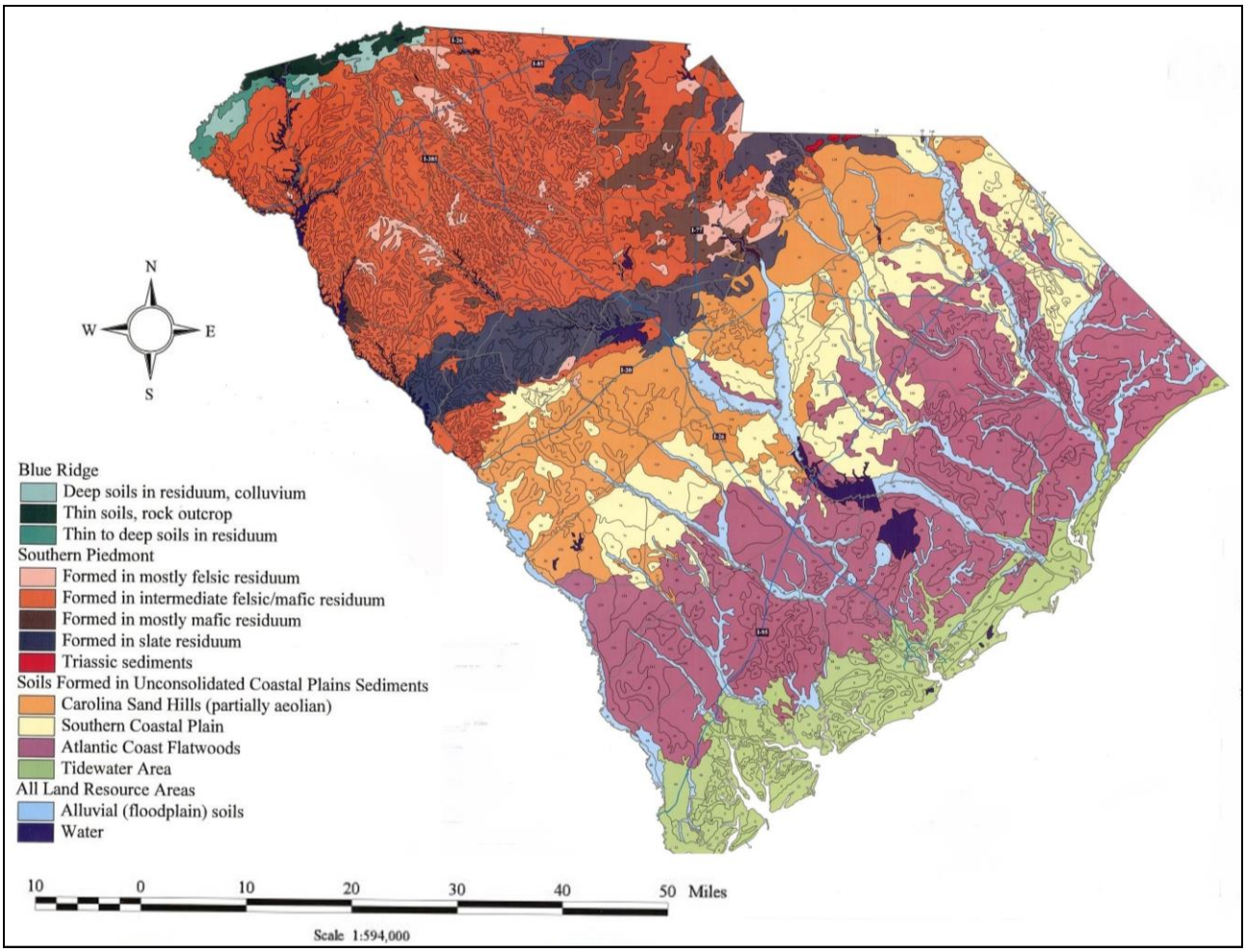


FIGURE 2-4: General Soil Map of South Carolina. Produced by SCDNR for the SCMAPS Program in cooperation with USDA-NRCS (1997).

Geology

South Carolina's geology can be broadly separated into two provinces: The Piedmont/ Blue Ridge, and the Atlantic Coastal Plain. The Piedmont/ Blue Ridge lies west of Columbia and consists of South Carolina's oldest rocks. Gneisses that are 1.1 billion-year-old (BYO) lie west of the Blue Ridge escarpment and represent part of Rodinia, the supercontinent that formed prior to Pangea. East of the escarpment, there are 300-500 million-year-old (MYO) igneous and metamorphic rocks that formed part of a now extinct ocean basin and a series of volcanic island arcs. Well-known granite balds such as Table Rock and Caesars Head intruded into the overlying metamorphic rocks as they were thrust onto the North American continent when Pangea developed. Piedmont rocks are prospective sources of

Fossilized Megoladon teeth are often found in coastal rivers and estuaries of South Carolina. Photo by Anna Smith, SCDNR

dimension stone, lithium, gold, base metals, and rare earth elements. The Carolina Slate Belt is a 550 MYO volcanic arc that hosts some of the United States earliest worked gold deposits.

The "Wando Whale," an ancient species found in Charleston County 32-30 MYA when the county was under the Atlantic Ocean. Photo taken at the Mace Brown Museum of Natural History at the College of Charleston by Anna Smith, SCDNR.

The Atlantic Coastal Plain is east of Columbia and consists of Triassic (180 MYO) and younger sedimentary rocks deposited following the breakup of Pangea and the opening of the Atlantic Ocean. In the Upper Coastal Plain, the Carolina Sandhills are capped by wind-swept eolian dunes formed over the last 3 million years. Beneath the dunes are sands and clays that record the rise and fall of sea level over the last 65 million years. Exposed in the incised valleys of the Coastal Plain are fragments of extinct deltas, river systems, beaches, and shallow seas. Within these rocks we find fossil evidence of the creatures that inhabited those environments – shark teeth, whale bones, mollusks, and plant life. In parts of the Coastal Plain, caves formed in shallow marine limestones provide habitat for bats and other land-dwelling creatures. In South Carolina, Snows Island in Florence County contains the epicenter of the 11-mi. radius of the Johnsonville Crater created 200-90 MYA during the Mesozoic Era (Talwani et al. 2003). It is the only verified impact crater in South Carolina. The Pee Dee River curves around the inner rim and streams flow into the center in a radial pattern.

Eroded sandstone pillars at Peachtree Rock Heritage Preserve in Lexington County, SC recall a time when this part of the State was under the ocean. Photo by Anna Smith, SCDNR.

Approaching the Lower Coastal Plain, subtle hills, valleys, and ridges mark other remnant shorelines, salt marshes, Carolina Bays, and barrier islands that were at one time ocean-front real estate in South Carolina. Along the modern-day coastline, the dynamic ebb and flow of the wind

and the waves can be seen, simultaneously building and destroying the beaches and dunescapes, reminding South Carolinians that understanding present-day processes are the key to unlocking Earth's past and future.

The High Hills of the Santee, the remnant of an ancient ocean shoreline, can be seen in the distance from the overlook at Wateree Heritage Preserve. These hills run for 25 miles through Sumter and Lee Counties in South Carolina. Photo by Anna Smith, SCDNR.

South Carolina is one of the most seismically active States on the eastern seaboard (Figures 2-5 & 2-6), recording on average about 20 earthquakes per year. The average magnitude is roughly around M2.0. All earthquake activity in South Carolina is classified as Intraplate. It is not caused by the interaction of two or more tectonic plates at their edges like on the West Coast, Turkey, or Japan. Intraplate earthquakes occur within major plates in supposedly stable areas. The earthquakes occur on faults that formed during previous events (i.e. inherited structures). It is proposed that the assembly and separation of Pangea during the Mesozoic is the origin of South Carolina's inherited structures.

South Carolina has had some notable seismic events, especially the 1886 Charleston earthquake which occurred on the evening of August 31st that registered between M6.0 and M7.3. It killed 60 people and caused widespread damage to the city of Charleston. The Charleston area has historically been the most active area for seismic activity. It was and still is the largest known earthquake to have occurred in eastern North America. This remains an enigmatic event as the source area is buried by a few thousand feet of Coastal Plain deposits. There were surficial disturbances associated with it, such as sand blows, liquefaction areas, twisted railroad tracks, and damaged buildings, but a surficial expression of the source fault has never been identified. Modern seismicity indicates clustering of epicenters around Summerville defining three fault segments: The North and South Woodstock Faults, and a short connecting fault, the Sawmill

Branch fault. The more extensive Woodstock Fault is considered a candidate source structure for the 1886 earthquake.

Since late 2021, however, a swarm of over 100 earthquakes has been occurring northeast of Columbia in the Elgin-Lugoff area, along what is known as the Eastern Piedmont Fault System (EPFS). The EPFS was recognized in the late 1970's from aeromagnetic data. This system extends from Georgia to South Carolina and into North Carolina approximately parallel to the Piedmont-Coastal Plain contact, the Fall Line. The EPFS is a network of anastomosing linear faults (NE and ENE trending) that create a highly complex pattern of interconnected faults. Seismicity in the EPFS is frequent, but magnitudes are much less than the 1886 Charleston event. A major state-sponsored earthquake study from the early 2000's suggests that the greatest magnitude to be expected would be approximately M5. Most earthquakes are in the M2-3 range (Figure 2-5).

Reservoir Induced Seismicity are small earthquakes associated with changing water levels in large bodies of water (i.e. Monticello Reservoir, Lake Jocassee). Changing water levels create differences in pore pressure of fluids at depth. An increase in pore pressure can induce an earthquake to occur. These are small magnitude events, typically not exceeding M2.

Small earthquakes do occur outside the three areas previously described. They are typically low magnitude events that cause no damage or concern.

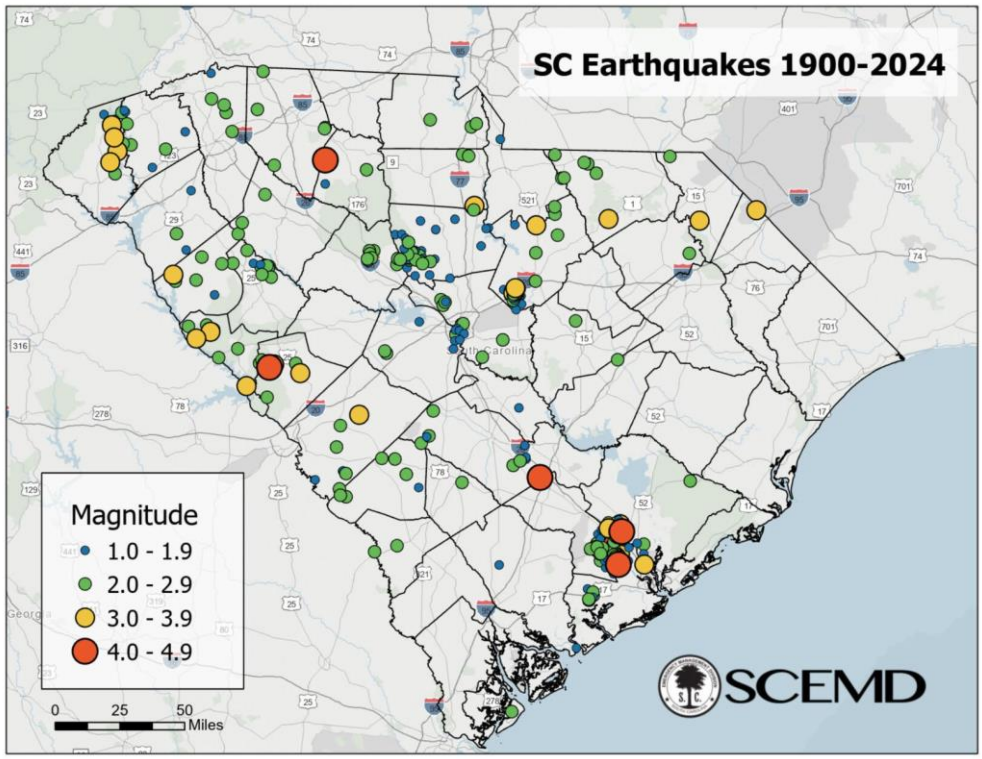


FIGURE 2-5: Magnitude tracker for earthquakes in South Carolina over the last 124 years.

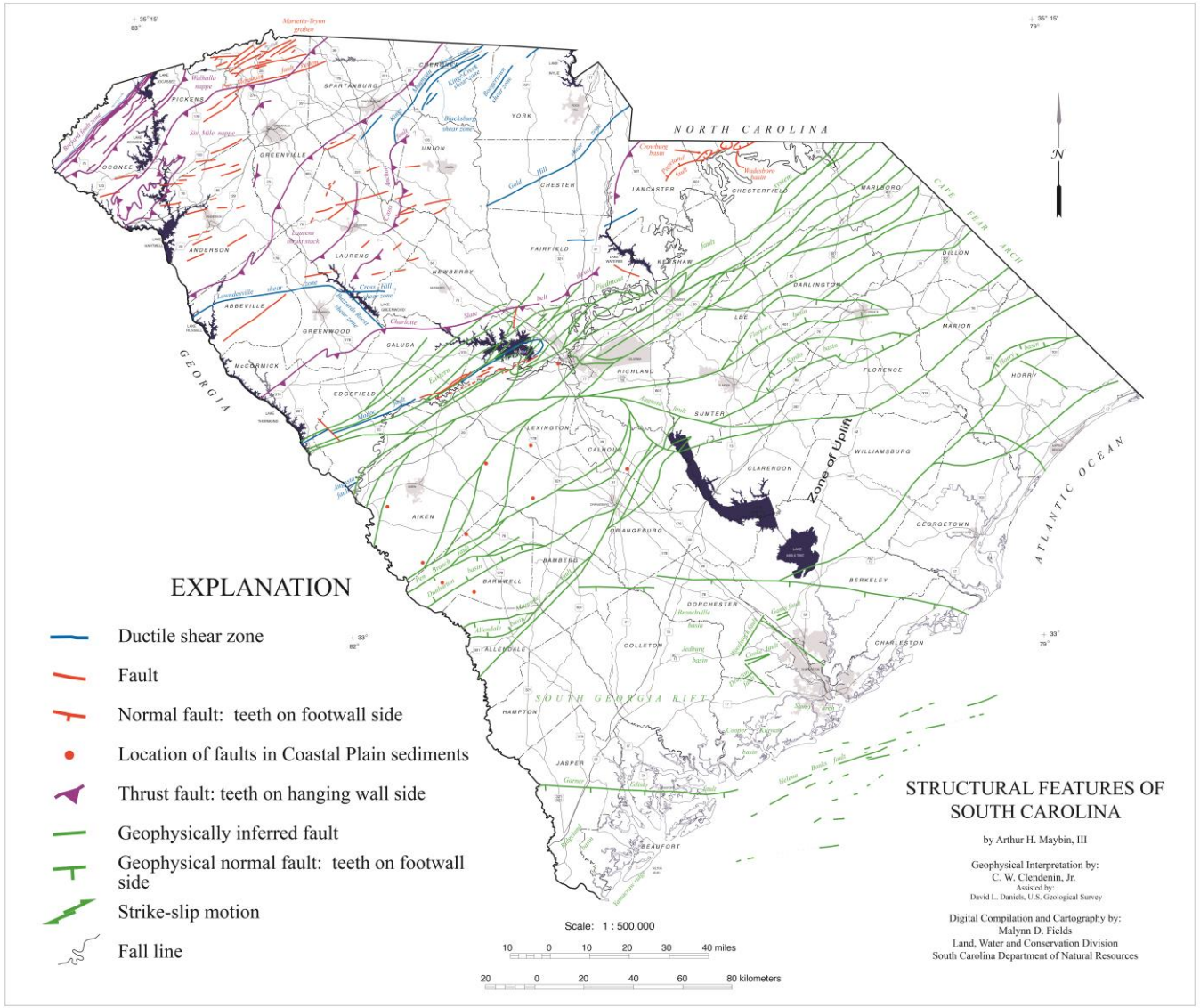


FIGURE 2-6: Faults and other structural features in South Carolina.

Current Climate

Despite its modest size, South Carolina harbors a remarkably diverse climate. Most of the State falls within the humid subtropical (Cfa) Köppen Climate Classification, leading to hot, humid summers and mild winters. However, the mountainous regions in the South Carolina Upstate exhibit fewer tropical characteristics, adding a unique twist to the State's climate. Several distinctive factors, including its continental position and elevation, contribute to the intriguing temperature and precipitation patterns observed within its borders.

Due to South Carolina's position within the mid-latitudes, the prevailing westerly winds help steer weather systems across the region, affecting the state's climate and weather. Seasonally, the winds are primarily out of the southwest during the summer and the northwest during the winter. Its position on the continent's eastern coast makes the State susceptible to cold air masses moving in from the northwest. The Appalachian Mountains tend to block most cold air outbreaks, contributing to the State's mild winters. However, cold air damming events occur mainly from October to May when cool air masses flow from the northeast and are funneled along the Appalachians' windward side. The downsloping winds, which warm the air by compression, can contribute to the warmer temperatures and rain shadow observed in the Midlands.

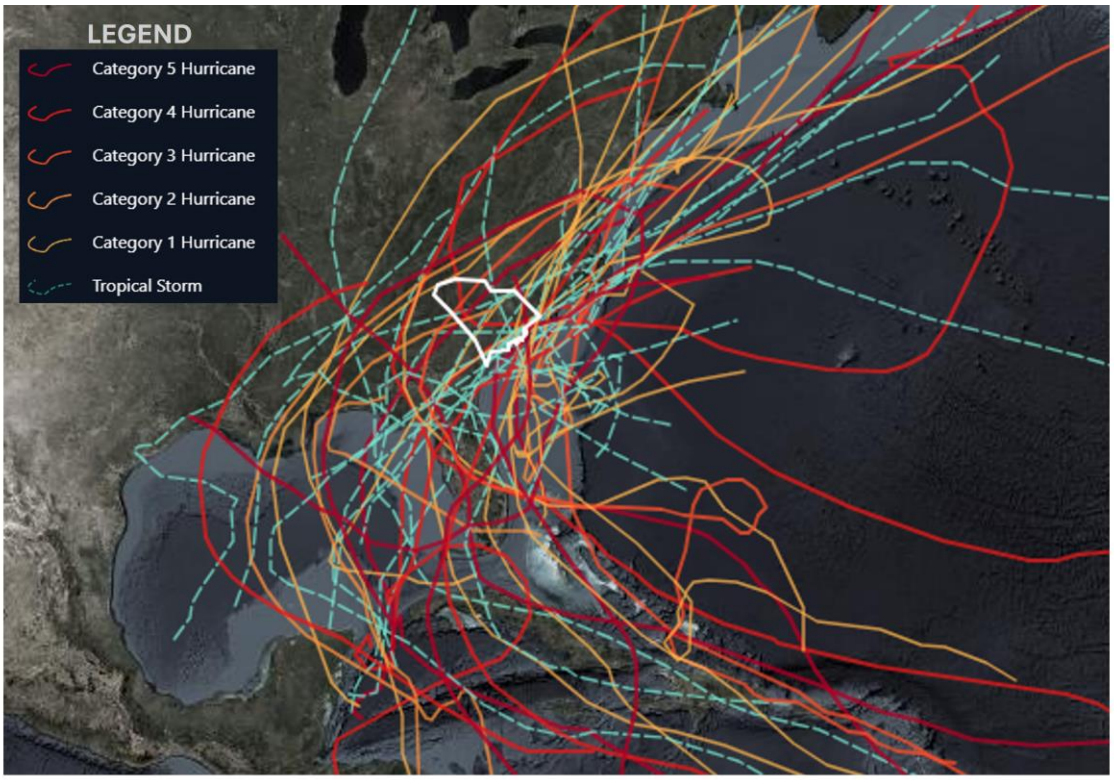
The presence of the Atlantic Ocean, with the Gulf Stream flowing northward off the coast, is important since land and water heat and cool at different rates. The position of the Bermuda High dominates South Carolina's weather during the warm season, which provides a persistent flow of warm, moist air into the region. While the elevation changes from sea level along the 187-mile South Carolina coast to 3,560 feet at the State's highest point, Sassafras Mountain in Pickens County, more than 90% of the State is at an elevation of fewer than 1,000 feet. These elevation changes impact the temperature and precipitation trends observed across the Lowcountry, Midlands, Pee Dee, and Upstate regions.

The State's annual average temperature varies from the mid-50s in the Upstate to the low-60s along the coast. Since the late 1800s, the statewide annual average temperatures have gone through multiple periods of above and below-normal temperatures. Despite the year-to-year variability, the overall pattern of average temperatures across South Carolina has increased since the mid-1970s. A substantial rise in minimum temperatures has driven this increase. The warmest year on record for the State was 2017, with an average temperature of 65.1°F, and seven of the top ten warmest years have occurred since 2010.

Drought conditions are a threat to many species that depend on aquatic habitats for all or a portion of their life cycle. Photo by Anna Smith, SCDNR

The State's geography plays a pivotal role in shaping its precipitation

patterns. The statewide annual rainfall average from 1895-2021 is 47.80 inches, with significant variations across South Carolina. Annual rainfall ranges from less than 40 inches in the Sandhills to over 80 inches in the higher elevations of the Appalachian Mountains in the western portion of the State. The absence of a distinct dry season and the highly variable nature of rainfall throughout the year are direct results of the State's unique geography. The passage of cold fronts and low-pressure systems contributes to precipitation in non-summer periods, while convective shower activity during the warm season drives summer precipitation. Some locations of the Coastal Plain experience higher rainfall totals due to sea-breeze thunderstorms. Tropical cyclones, especially from August through October, significantly contribute to rainfall during the hurricane season. South Carolina is ranked fifth nationally in hurricane impacts. The driest year was 1954, with a statewide average rainfall of 31.72 inches, and many locations in the Midlands and Pee Dee regions recorded less than 30 inches. Ten years later (1964), the state reported the wettest year on record, with an annual average of 69.32 inches. Historic flood events, droughts, heat waves (Griffin and SCDNR 2018 a, b, c) provide data that climatologists use to track trends in South Carolina's weather and overall climate changes. More information on South Carolina's climate can be found online in an Overview of South Carolina's Climate and Hazards (SCDNR 2021, *in revision*).



Hurricanes and tropical storms impacting South Carolina from 2004-2023.
Data from https://www.dnr.sc.gov/climate/sco/hurricanes/#map

Habitat Connectivity and Resiliency

The Nature Conservancy's terrestrial resilience analysis evaluates the capacity of inland habitats to continue supporting biodiversity and ecosystem function in the face of climate change, while

their coastal resilience analysis evaluates the capacity of coastal habitats to migrate to adjacent lowlands in order to sustain biodiversity and natural services under increasing inundation from sea-level rise. When these two assessments are taken together, roughly 30% of the State of South Carolina scores above average on climate resilience, 28% average, 24% below average, 12% developed, and the remaining 6% not assessed (which includes open water, Tribal lands, etc.). Therefore, over half of the State (58%) is considered resilient. Additionally, the Southeast Conservation Blueprint (SECAS 2024) identifies 55% of the state of South Carolina as a priority for a connected network of lands and waters; 12% is rated as highest priority, 17% highest, 22% medium, and 4% priority connections.

Carbon Sequestration Potential

Greenhouse gases are a concern in the State and across the Nation. In 2020, South Carolina's total gross emissions were estimated to be 73.746 MMTCO2e and total net emissions at 50.179 MMTCO2e (calculated by subtracting sinks from total gross emissions). Major contributors to this were electric power generation and transportation (exhaust). Land conservation and restoration is therefore a strategy to employ to reduce greenhouse gas impacts. [PAQC 2024]

Southeastern forests are especially efficient carbon sinks (Kreye 2023) with more species-rich forests storing up to 70% more carbon than monocultures (Warner et al. 2023). Trees of various species take up carbon differently as some grow fast but die sooner (e.g. pines) while others grow slower but live longer (e.g. hardwoods) (Kreye 2023). Sequestration rates are calculated based on stand densities (Kreye 2023). According to the Trust for Public Land's Conservation Carbon Map (2024), the current average rate of carbon sequestered in living biomass on all acreage in South Carolina is over one billion metric tons/acre/year. Because most of the State is in private ownership, it is significant to note that these private tracts alone provide 0.8 metric tons/acre/year whereas the national average is 0.55 metric tons/acre/year. The average social value (economic impacts and health due to climate change) of keeping South Carolina's 12.8 million forested acres forested is significant at over $199.8 billion with a yearly sequestration potential of over $1.6 billion. South Carolina's market value of total carbon is over $133 billion with a yearly sequestration potential of over $1 billion. Climate change, however, adds uncertainty to the future productivity of forests (Johnsen et al. 2014) which will impact their carbon sequestration potential.

A Timber Rattlesnake (coastal Canebrake variety) takes refuge in a stump hole during a prescribed fire. Photo by Zachary Orr.

South Carolina's forests are not the only sources of carbon sequestration. Carbon is sequestered and stored in coastal wetlands and salt marshes at ten times the rate of mature tropical forests, making them critical moderators of climate change impacts (SASMI 2023). Approximately 23% or 4.5 million acres of South Carolina's land area is made up of wetlands; 10% or 350,000 acres of these are coastal marshes with the

remaining 90% freshwater (Purcell et al. 2019). Unfortunately, since the mid-1700s, South Carolina has lost 27% or 1,755,000 acres of its wetlands, mostly due to development (Purcell et al. 2019). Carbon can also be stored in native grasslands. Studies have shown that in an unstable climate where droughts cause increases in wildfires, native grasslands can often sequester more carbon than forests (Dass et al. 2018, MN BWSR 2019). This is because most of their carbon is stored underground in their extensive root systems where it remains post-fire. Pre-European settlement, South Carolina had open prairie and savanna ecosystems mostly prominent in the Piedmont (Noss 2013), but like wetlands, they too have been lost to development over time.

Natural Fire Return Intervals

Fire suppression in the Southeastern United States began to be institutionalized between 1910 and 1930 (Frost 1993; Ware et al. 1993); it came to be viewed as an agent of destruction and was actively and effectively suppressed. However, pre-European contact, South Carolina was part of a pyric (fire-adapted) landscape that burned frequently. According to the Physical Fire Frequency Model (PC2FM) and visualized in Figure 2-7, the natural fire return intervals for the State range from four to six years across much of the Coastal Plain and Piedmont (Guyette et al. 2012). Only the highest peaks in the mountains had longer return intervals, approaching 17 years and even longer in some small areas of the Blue Ridge Ecoregion (Guyette et al. 2012).

Prescribed burn on private lands in Clarendon County, SC.
Photo by Johnny Stowe, SCDNR

Fire management using prescribed burns across the State is based on these natural fire return intervals, current habitats, and desired future conditions. Prescribed fire is used by managers to enhance habitat for wildlife, lessen wildfire risk through the reduction of fuel loads, suppress woody vegetation, encourage the growth of fresh forage, and recycle nutrients. Burns are also beneficial to wetland areas. Peer-reviewed research demonstrates that proper fire rotation within wetlands increases desirable moist-soil plants by up to 70% while improving water quality (i.e. Laubhan 1995; de Szalay and Resh 1997; and Gabrey et al. 1999). This can result in three times more migratory waterfowl being supported in managed versus in unmanaged areas (Ducks Unlimited 2023).

State of South Carolina

Governor's Proclamation

WHEREAS, prescribed burning is the skilled application of fire under planned weather and fuel conditions to achieve specific forest and land management objectives; and

WHEREAS, ecosystems throughout the Palmetto State evolved in an environment in which understory fires occurred naturally every few years; and

WHEREAS, prescribed burning is not only the most effective, economical protection against wildfires because it reduces accumulated fuels, but it is also a key tool in managing and maintaining the ecological integrity of South Carolina's woodlands, grasslands, agricultural areas, and wildlife habitats; and

WHEREAS, many plants and animals require fire for their survival; and

WHEREAS, the approximately 500,000 acres of South Carolina land that are prescribed-burned annually represent only half of the estimated one million acres that could benefit from its strategic application.

NOW, THEREFORE, I, Henry Dargan McMaster, Governor of the great State of South Carolina, do hereby proclaim March 2025 as

PRESCRIBED FIRE AWARENESS MONTH

throughout the state and encourage all South Carolinians to learn more about prescribed burning and the essential role fire plays in the stewardship of our natural resources and protection of our citizens.

HENRY DARGAN MCMASTER
GOVERNOR
STATE OF SOUTH CAROLINA

For South Carolina, reduction in fire frequency in intervals greater than five years leads to elimination of the herbaceous layer in pine woodlands (Frost 1990) and eliminates much of the habitat value of early successional stages. Burns can be conducted in either the dormant season (winter) or the growing season (spring and summer), benefiting different assemblages of plants depending on the season in which they occur (American Forest Foundation 2007). The benefits of prescribed burns, especially those conducted during spring and summer months, are now more widely appreciated; however, burning is increasingly hampered by liability concerns. Expanding urban areas and proliferating highways are such that the smoke from a prescribed fire often creates extremely dangerous conditions. See Chapter 10 for further discussion of possible climate change impact on prescribe burning regimes in the Southeast.

Nature needs fire; sometimes the most powerful conservation tools come from working with natural processes, not against them. Recently, South Carolina Governor Henry McMaster proclaimed March 2025 as Prescribed Fire Awareness Month, underscoring its evolutionary significance to wildlife diversity, its reduction of wildfire risk, and the need for more of it statewide. Chapter 10 discusses potential changes in burning windows in coming decades due to changes in climate.

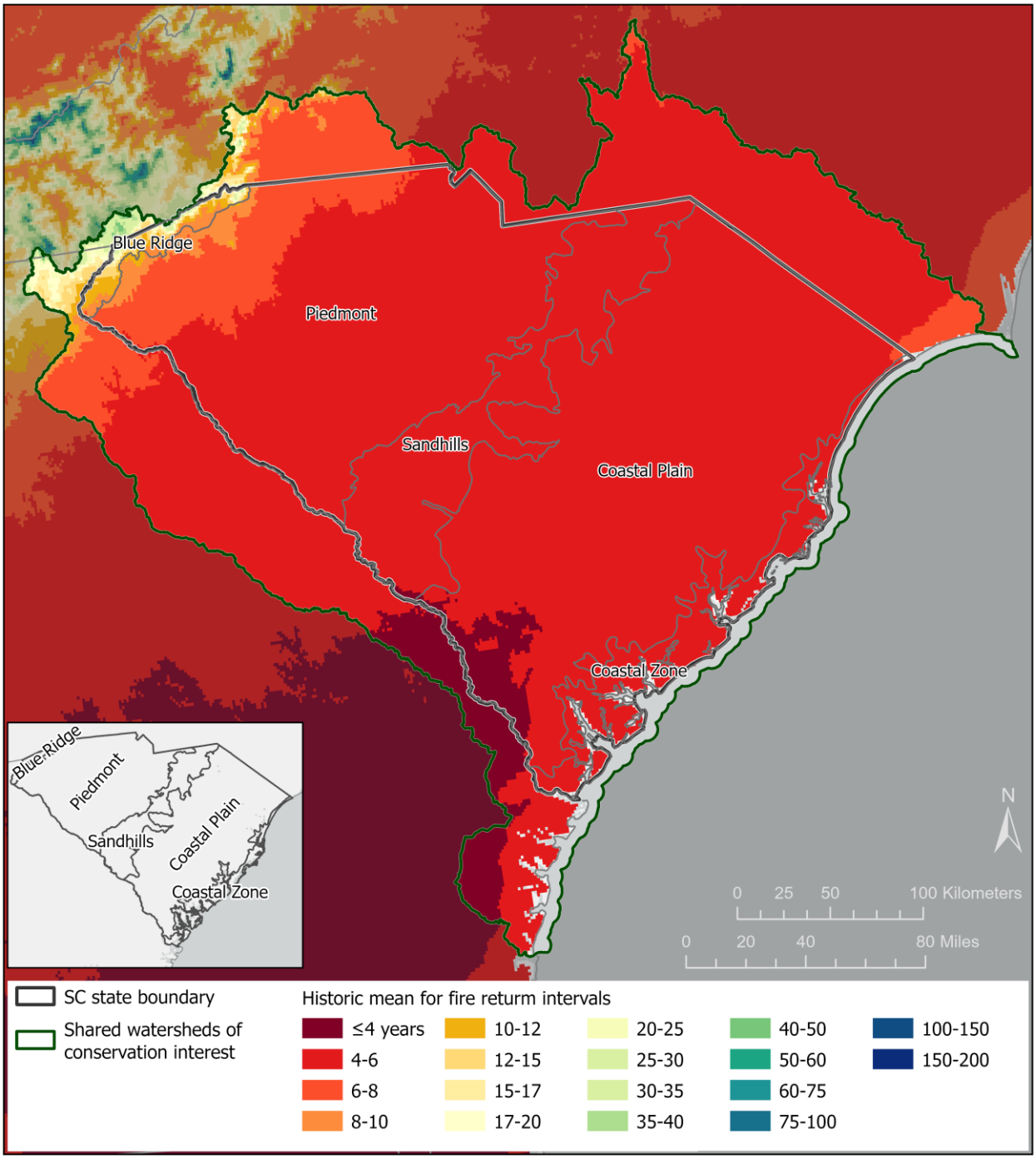


FIGURE 2-7: Fire return intervals for South Carolina.

Land Ownership Patterns

Private ownership dominates in South Carolina with 90% being held by individuals, families, and corporations. State and local municipalities constitute 3.2% of the land base while 6.8% is held by federal entities. Figure 2-8 visualizes this division of ownership graphically and correlates to Table 2-2. Lakes and other waters are included in these percentages.

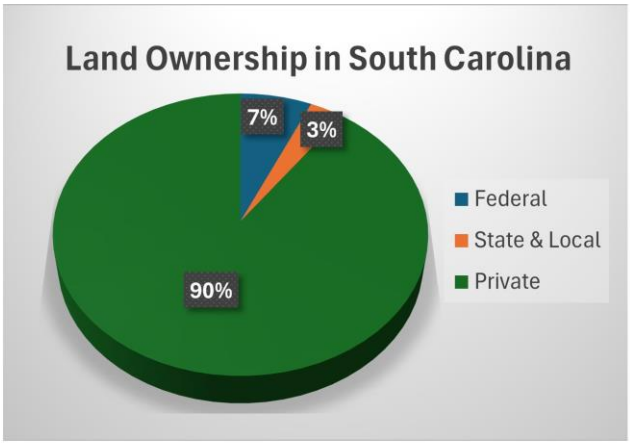


FIGURE 2-8: Land ownership percentages in South Carolina.

South Carolina's Protected Lands Portfolio

South Carolina supports a wide diversity of habitats, culturally and historically significant landscapes, and ecosystems that provide benefits to the State as well as the broader Southeast Region. The South Carolina Department of Natural Resources (SCDNR) follows the conservation biology principles of resiliency, redundancy, and representation (collectively known as the "3Rs") when assessing lands for fee simple acquisition and encouraging private landowners to place prime examples of common, rare, and declining habitat types under conservation easement. Locations of highly resilient lands, or those that can be restored to higher resiliency, are assessed for protection. Representative examples of each habitat type are protected across the State while making sure enough examples of each habitat are conserved. This same concept extends to both common species and SGCN residing within these habitats.

> "Wilderness is a resource which can shrink but not grow... creation of new wilderness in the full sense of the word is impossible."
>
> **- Aldo Leopold**

Based on conserved lands data, more than three million acres (17%) of the State are considered protected (Figure 2-9), more than the national average of 13%. The SCDNR and its partners have done a tremendous job of conserving valuable habitat in each ecoregion of the State. This includes important landscapes like National Wildlife Refuges, National Forests, State Wildlife Management Areas, Heritage Preserves, State Parks, and private conservation easements. The following tables illustrate that fact; Table 2-1 summarizes the percentage of each ecoregion protected in South Carolina while Table 2-2 shows the statewide acreages in conservation status by ownership, all as of July 8th, 2024. The 'Other' category statistics in Table 2-2 includes Clemson University, Santee Cooper, US Department of Energy, US Deptartment of Defense, and the US Army Corps of Engineers. Conservation Lands data was used to complete these tables and coincides with the SC Conservation Bank's reporting. GIS acres are used rather than deed acres.

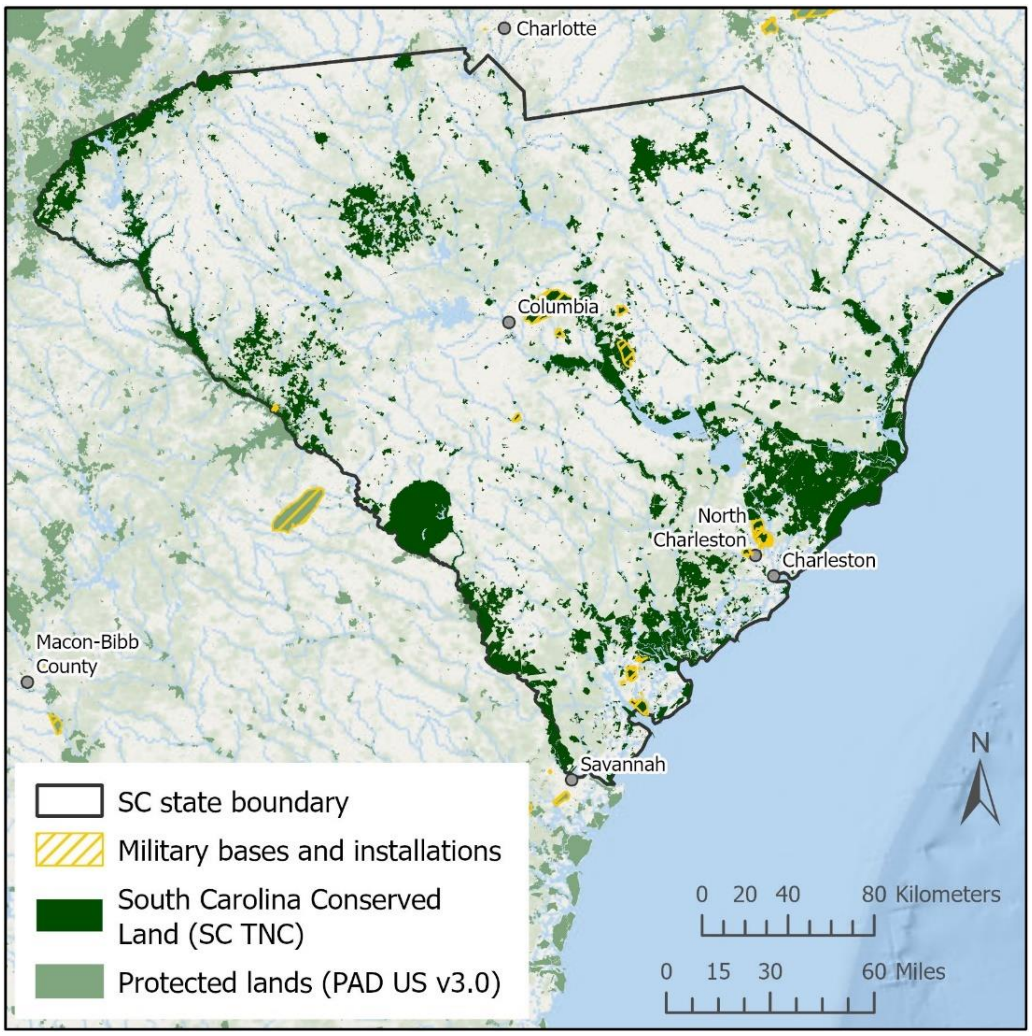


FIGURE 2-9: Conserved lands in South Carolina (SC TNC) and protected lands throughout the region (PAD US 3.0). Within South Carolina, conserved lands data is managed by The Nature Conservancy South Carolina (SC TNC) and supported by data contributions from participating members of the SC Land Trust Network and other conservation partners. The data is updated every six months. Last update: June 2024.

TABLE 2-1: Acreages protected by ecoregion.

	Ecoregion Area (Acres)	Ecoregion Area (Hectares)	Conservation Areas (Acres)	Conservation Area (Hectares)	Percentage in Conservation Status
Blue Ridge	308,830	124,980	198,738	80,427	64.4%
Piedmont	6,897,367	2,791,277	670,844	271,482	9.7%
Sandhills	2,394,196	968,901	404,400	163,656	16.9%
Coastal Plain	8,871,575	3,590,213	1,284,135	519,673	14.5%
Coastal Zone	1,311,253	530,647	450,714	182,398	34.4%
Total	**19,783,221**	**8,006,018**	**3,008,831**	**1,217,636**	**15.2%**

TABLE 2-2: Statewide acreages protected by entity.		
Type	**Acres**	**Hectares**
Federal	894,801	362,115
State	577,404	233,668
Local	49,133	19,884
Private	1,032,059	417,661
Other	455,434	184,308
Total	**3,008,831**	**1,217,636**

Demographics, Urban Growth, and Economic Drivers

In addition to contributing to the conservation landscape of the Southeast, South Carolina's lands and waters also benefit the State's economy. In 2022, the US Bureau of Economic Analysis estimated that the outdoor recreation economy generated $7.6 billion in value for the State's Gross Domestic Product and another $3.3 billion in wages and salaries. Beyond providing recreational value, natural landscapes also support working lands such as agriculture and timber. As of 2023, South Carolina supported more than 4.6 million acres of farmland across 22,600 farms, and crop production alone was valued at more than $986 million (USDA-NASS 2023). However, the timber industry is the number one crop and number one export in South Carolina with an annual impact of $23.2 billion, supporting more than 100,000 jobs and $5.5 billion in salaries (SCFC 2024).

Master Naturalist field day April 2024 at Caw Caw Interpretive Center. Photo by Anna Smith, SCDNR.

South Carolina entered a period of rapid economic expansion starting in the 1970s and human population growth that continues to this day. In 2008, the population of South Carolina was projected to reach 5 million by 2030 (Miley, Gallo and Associates LLC 2008); this milestone was realized a full decade earlier than expected with 5.2 million residents recorded in the 2020 US Census (US Census Bureau 2020). South Carolina now has an estimated population of 5.5 million with the biggest population increases currently occurring are in the Upstate, coastal counties, and around the capital (Lexington and Richland Counties) (US Census Bureau 2024). The 2020 COVID-19 pandemic fueled an increase in the number of people that turned to natural resource outlets for recreation, according to data from the federal Bureau of Economic Analysis, making the outdoor sector 2.6% of the State's gross domestic product and a 4.4%

increase in outdoor recreation employment (Archote 2024). This trend has not slowed, and with this growing appreciation for South Carolina's greenspace and amenities so close in proximity to each other, South Carolina is now the number one fastest growing state in the nation with a 1.71% population increase (Pew Charitable Trusts 2024). Projected future urbanization is shown in Figure 2-10.

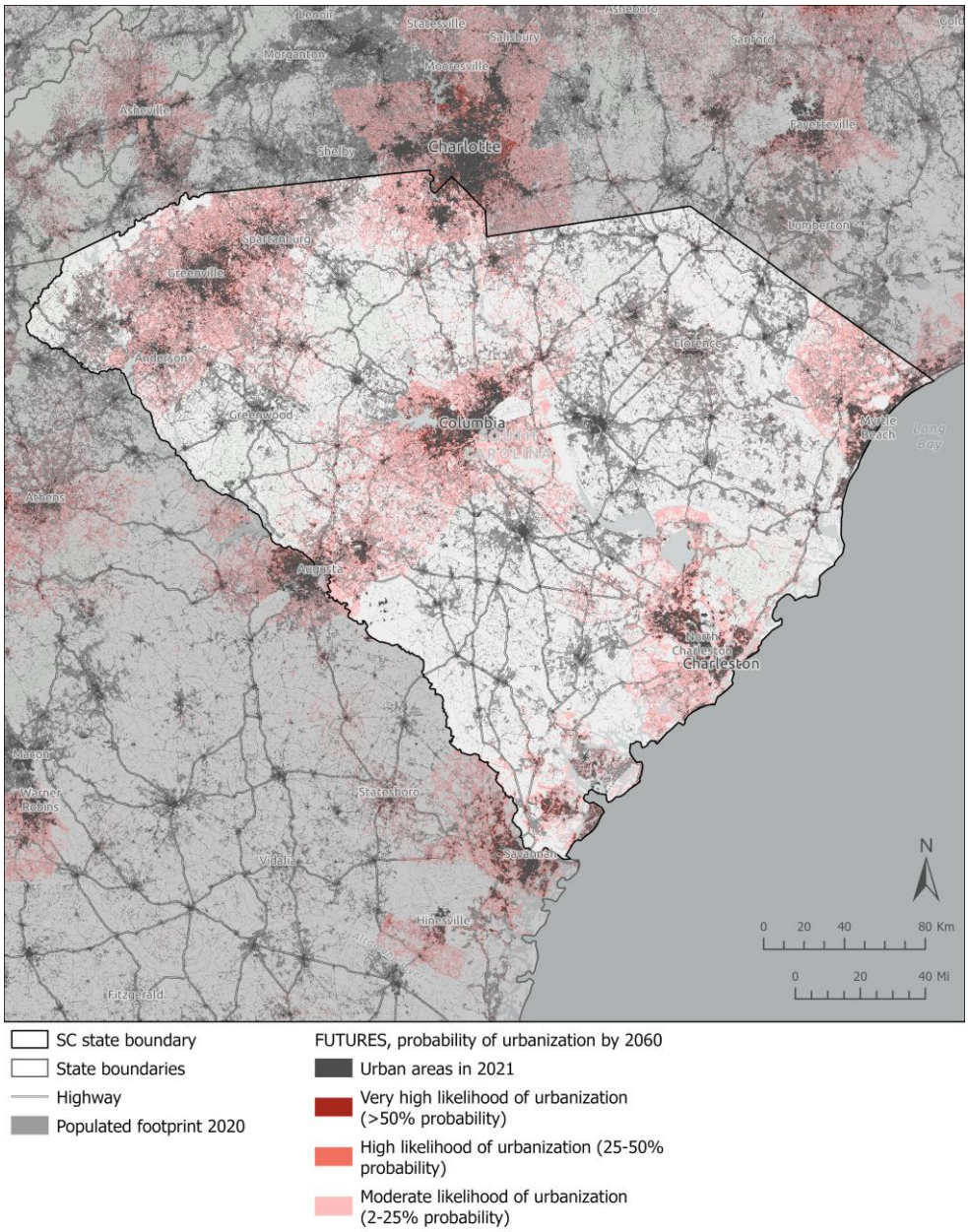


FIGURE 2-10: This map represents the current developed landscape of South Carolina and potential future urban development by 2060. The populated footprint areas represent an estimate of the footprint of human settlement in 2020 and captures places that have been altered for human use like developed areas and agricultural areas. The populated footprint was derived from the 2020 slice of the WorldPop Population Density 2000-2020 100m and 1km layers using imagery datasets and population data. The FUTURES urban growth model predicts the likelihood that an area will urbanize by 2060. Developed areas from the 2021 National Landcover Database serve as the baseline for current urban areas. The model simulates landscape change based on trends in population growth, local development suitability factors, and an urban patch-growing algorithm.

> "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect"
>
> **- Aldo Leopold**

The increase in population is changing the rural character and landscape of South Carolina as timber and small agricultural farms are converted to residential and industrial development. Growth is possible, in part, due to 90% of the State's 20.5 million acres (32,020 square miles) being in private ownership. Parcelization of once large, generational landholdings is one of the biggest threats to wildlife habitat in South Carolina (SCFC 2020). Economic development has attracted a variety of major companies to the State's counties in the last 20 years including BMW (Spartanburg), Boeing (Charleston), Volvo (Berkeley), Michelin (Greenville), and Volkswagen (Richland).

Because of South Carolina's geologic past and present, the State has mineral deposits that are also economically important including clay, sand, vermiculite, limestone, shale, gold, and granite. The South Carolina Department of Health and Environmental Control (SCDHEC) currently permits around 500 mining operations which can be viewed on their Active Mines Viewer (SCDHEC 2024). Sand is the most commonly extracted deposit with the majority of mines located in the Coastal Plain.

A granite mine in Rock Hill, SC. Photo by Keith Bradley, SCDNR.

Another growing industry in the State is industrial-scale solar farming that contributes over $1.5 billion to the States economy (Hefner & Burnett 2020). There are 111 active solar farms operating statewide, impacting 8,758 acres (SCEO 2023, USPVDB 2024), and many more are planned based on recent sales to solar companies. Although a renewable energy source, the downside to solar farms is the required razing of all trees on site and the installation of panels, effectively limiting biodiversity on site. To help mediate this problem, the South Carolina Legislature passed the South Carolina Solar Habitat Act in 2018 (South Carolina Code of Laws, Chapter 4, Section 50-4-10), directing the SCDNR to provide a Solar Habitat Guide to solar developers on how to voluntarily create pollinator habitat on their solar farms and utilize a Solar Siting Tool (mapping application) to steer prospective solar farm developers away from sensitive habitats.

Military Presence

South Carolina contains military installations (Figure 2-11) servicing the United States Marines, Air Force, Army, National Guard, and the Navy. Integrated Natural Resource Management Plans (INRMPs) govern natural resource management on Department of Defence lands and are

required by the Sikes Act. South Carolina's bases harbor many SGCN as well as state and federally listed species so that military cooperation on management is crucial for the continued survival and recovery of these species. The SCDNR reviews INRMPs on a regular schedule and offers suggestions for new ways to monitor and manage for species present. South Carolina also has the 2,256,592-acre Lowcountry Sentinel Landscape (LSL). It encompasses three military installations: the Marine Corps Air Station Beaufort, the Marine Corps Recruit Depot (Parris Island), and the Naval Support Facility Beaufort. The LSL is also discussed in Chapter 10. Its goals are the following and mirror South Carolina's SWAP goals:

- Reduce vulnerabilities to climate change by promoting nature-based solutions to restore and/or enhance the inherent resilience of the landscape and protect critical infrastructure.
- Protect and enhance ecologically significant areas to support imperiled species.
- Protect source water quality and supplies.
- Support and protect working farms and forests to ensure equitable access to conservation programs to prevent development that is incompatible with military operations.
- Establish and promote the Lowcountry Sentinel Landscape to ensure long-term military readiness.

FIGURE 2-11: Military Installations within South Carolina. Map created by the SC Office of Resilience.

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