

CHAPTER

2

- ▶ The physical geography of Georgia
- ▶ Georgia's natural resources



The Land of Georgia

Georgia is a large state. Including land and water area, it takes in approximately 58,900 square miles. That's larger than many countries of the world. At the points of greatest distance between borders, Georgia is 300 miles from north to south and 250 miles east to west. It is the largest state east of the Mississippi River.

When Britain created Georgia in 1732, its boundaries were much different. Then, the colony consisted of all the land between the Savannah and Altamaha rivers, westward all the way to the Pacific Ocean! Later, the Mississippi River became Georgia's western boundary. There were other changes, but by 1802, Georgia looked much as it does today.

The Physical Geography of Georgia

Georgia Landforms

Look out your window. Is the land around you flat or hilly? In the distance, do you see tall hills, or maybe even mountains? Depending on where you live, the surface features of Georgia can be quite different. Near the coast, you will see flatlands. In north Georgia, you will see ridges, valleys, and mountains. Nature has produced a wide range of land formations (or **landforms**, for short) in Georgia.

Why does Georgia have this variety of landforms? The ocean once covered the southern half of Georgia and wore away most land formations. To the north, the land was shaped by forces beneath the earth's surface and by water erosion. Today, **erosion**—the



Snapshot

Providence Canyon in southwest Georgia is known as Georgia's Little Grand Canyon. Considered one of Georgia's natural wonders, Providence Canyon State Park attracts thousands of visitors each year.

wearing away of soil and rock by natural forces, primarily water—is the main natural force affecting Georgia land formations.

Mountains, Hills, and Plains

If you want to visit the highest point in Georgia, you will have to go to north Georgia. There, in the Blue Ridge Mountains, is Brasstown Bald, the tallest mountain in the state. On top of the mountain is this sign:

BRASSTOWN BALD,
The Highest Point in Georgia—4,784 ft.

However, if you could measure Brasstown Bald, you would find it is only 2,864 feet high from base to top. This difference can be explained because geographers have two ways of telling how high, or tall, a land formation is.

The most common measurement is **elevation**, which is height above sea level. The sign on top of Brasstown Bald giving the height of 4,784 feet refers to its elevation above the Atlantic Ocean, which is almost 300 miles away. Even though the mountain is far from the ocean, elevation is important for several reasons. First, temperature generally is related to elevation, dropping an average 3.3°F for each 1,000 feet above sea level. Higher elevations mean milder summers, colder winters, and shorter growing seasons. This directly affects the plant life and the type of crops that can be grown.

Elevation can also influence the amount and form of **precipitation**—water falling to the earth, such as rain and snow. The first tall mountains in the path of moist, warm air currents off an ocean will likely have high rainfall patterns in spring and summer. They will have frequent snowfalls in winter.

Elevation also affects how rivers are formed and how they flow. Because of greater rainfall in higher elevations, some of Georgia's major rivers begin here. Most of the rainfall in the mountains either runs off directly into streams or is absorbed into the ground and then feeds countless springs. These springs are the source of mountain streams, which are pulled by gravity to lower elevations where they join with others to form rivers.

Related to elevation is **relief**, a term for the difference in elevation within a landform (such as the height of a mountain from its base to its peak) or between neighboring landforms. In the case of Brasstown Bald, from base to top, its relief is 2,864 feet. Stone Mountain, rising over 825 feet from the earth's surface, is another example of high relief.

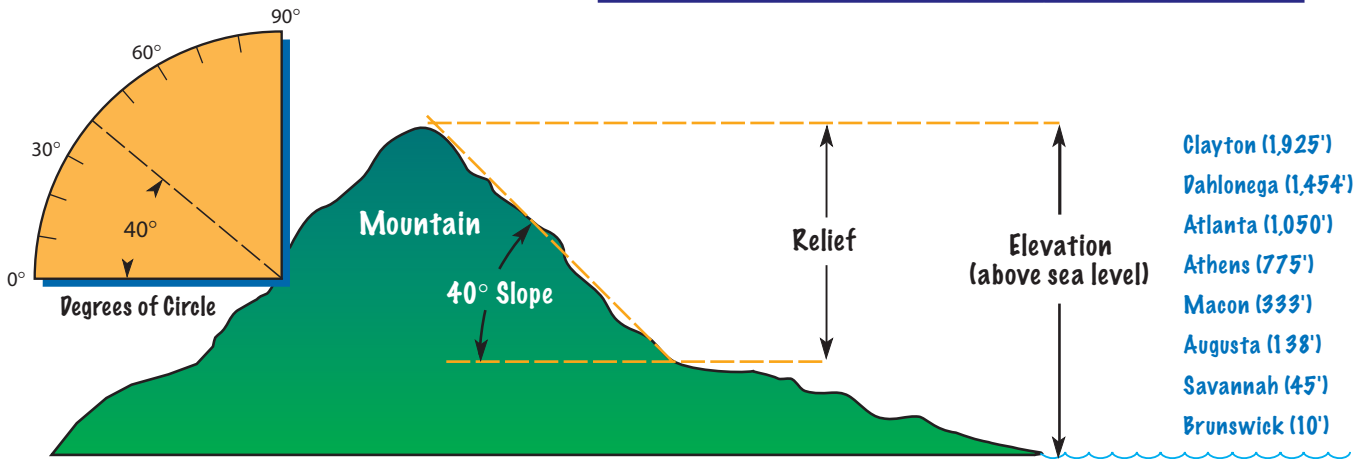


North Georgia offers scenic areas and opportunities for a variety of such outdoor activities as hiking, camping, and mountain climbing.

(Below) Visitors at the top of Brasstown Bald get a spectacular view of the Blue Ridge Mountains.



Measuring Relief and Elevation



Slope refers to the steepness of a landform and is measured in degrees of a circle. Land with absolutely no incline (0°) is “flat”—or horizontal. A 90° slope would be vertical—or straight up and down—like the side of a building.

Portions of Georgia near the ocean have practically no slope. Most of the southern half of the state has low relief and flat to gentle slopes. In the northern half of the state you will see a variety of reliefs and slopes—from near flatlands to steep slopes. For the most part, this is an area of rolling hills. Extreme north Georgia, however, has a variety of landforms, including mountains and valleys. ◀

Physiographic Regions

Within the United States, geographers have identified more than 30 natural regions. These regions, called **physiographic provinces**, are based on similarities in land formations, elevation, rocks and minerals, soil, and other characteristics. Georgia is crossed by five provinces: (1) Coastal Plain, (2) Piedmont, (3) Blue Ridge, (4) Ridge and Valley, and (5) Appalachian Plateaus (or Plateau).

These provinces formed at different times and for different reasons. The outer layers of the earth consist of plates that move. When one plate collides with another, the earth’s crust near the collision can fold and wrinkle—creating hills and mountains. Geologists believe that this is how the Appalachian Mountain chain that stretches along the eastern coast of North America was formed. Originally, these mountains were as tall as or taller than any mountains on earth today, but over time wind, rain, and ice eroded their jagged peaks. Later, rising sea levels brought the ocean far inland. Slowly, the water retreated, leaving Georgia with distinct physiographic provinces.

▶ Locating the Main Ideas

1. Define: landform, erosion, elevation, precipitation, relief, slope
2. The relief of Brasstown Bald is greater than the rise in elevation from sea level to its base. True or False?
3. Geographers use two ways to tell the height of a land formation. Explain the difference between the two.
4. How are the formation and flow of rivers affected by elevation?

Physiographic Regions of Georgia

The Coastal Plain

Georgia's largest physical region is the **Coastal Plain**, which covers about 60 percent of the state. In a prehistoric time, this area was entirely covered by ocean. As the ocean shoreline advanced inland, waves slowly wore away hills and other land formations in their path. As time passed, billions of seashells and other remains of ocean life sank to the sea floor. Tightly packed, they eventually became beds of a soft rock called limestone. Over time, rivers and streams deposited into the ocean large amounts of soil, clay, and rock that had eroded from the hills and mountains to the north. As a result, thousands of feet of **sediment**—or settled deposits—covered the ocean floor.

Eventually, the ocean retreated, leaving a vast area of limestone, clay, sand, and other sedimentary deposits. This region is known as the Coastal Plain. It extends along the Atlantic and Gulf coasts from Massachusetts to Mexico, inland up to 200 miles.

Along the eastern states, the Coastal Plain's interior boundary is marked by the **Fall Line**. This line is actually a **zone** or region several miles across. It marks the prehistoric ocean's shoreline. Land north of the line is higher in elevation than that to the south, causing rivers to pick up speed as they travel—or fall—through this zone. South of the Fall Line, the ground is soft and sandy. Rivers widen, deepen, and move more slowly, making navigation by large boats possible. Later, you will learn how the Fall Line's importance to river navigation and water power influenced Georgia history.

The Coastal Plain is relatively flat, with low relief and flat to gentle slopes. With no steep hills or rock near the surface, rivers entering the Coastal Plain from the north flow slowly, develop wider banks, and take a winding path. By the time they reach the coasts, many of these rivers—such as the Altamaha and Savannah—have become much wider.

Along Georgia's coast, the land is low-lying. For about 75 miles inland, the soil typically consists of sand and clay, and is not very fertile. In general, the land is poorly drained, and swampy areas are common. Early settlers discovered that little would grow here except pine trees and brush, and they gave the name "Pine Barrens" to the region. Even today, this part of the

Plateau

Ridge and Valley

Blue Ridge

Piedmont

Coastal Plain



Snapshot

Sometimes called goober peas, peanuts are one of Georgia's most famous crops. They are grown primarily in the southwestern Coastal Plain. Georgia produces more peanuts than any other state.



The four physiographic provinces northwest of the Coastal Plain form a vast area of the eastern United States known as the Appalachian Highlands.

(Below) Georgia's Piedmont is an area of rolling hills, red clay, and pine trees. Sometimes rainfall can cause significant erosion of hillsides.



state remains poorly suited for agriculture. The land is used mainly for pasture and growing pine trees for timber, pulp, turpentine, and other products.

Further inland, the Coastal Plain slowly rises in elevation, but seldom more than 500 feet above sea level. The well-drained soil consists of sand, clay, and other materials. This region is famous for its peanuts, peaches, and pecans.

The Piedmont

Georgia's second-largest physiographic province is the **Piedmont**, a French word for "foot of the mountains." This hilly region makes up about 30 percent of the state and lies between the mountain regions of north Georgia and the Coastal Plain. Along its southern boundary, the Piedmont sits about 500 feet above sea level, but elevations range up to 1,700 feet at the southern edge of the Blue Ridge Mountains. The region consists mainly of rolling hills with many valleys. In some areas, however, the hills are quite tall and almost appear to be mountains.

In the Piedmont, large areas of solid rock are found just beneath the earth's surface. This is called **bedrock** and consists of such stone as granite, gneiss (pronounced "nice"), and marble. Unlike the sedimentary rock of the Coastal Plain, Piedmont bedrock generally is very hard. Because of this, it is common to see large areas of exposed bedrock called outcrops where the soil has been washed away. Other evidence of bedrock can be seen in river beds, along highways, and on many hillsides.

Numerous streams and rivers cross the Piedmont, generally flowing from north to south. Because of the bedrock, streams tend to have shallow beds, with narrow banks. Exposed rocks create frequent rapids, making navigation impossible for large boats.

A common feature of Piedmont soil is its distinctive red color. The red is the result of iron minerals found in granite and other rock. Due to erosion and weathering, exposed rock in outcrops breaks down into iron and other minerals. Water then causes the iron to produce a rusty red soil often termed "Georgia red clay."

Except for areas with frequent outcrops and bedrock near the surface, Piedmont land generally is well suited for agriculture. Cotton, soybeans, and wheat are common crops. Beef cattle and dairy cattle are raised in large numbers, although the most important part of the agricultural economy is chicken

broilers. Additionally, the land supports extensive forests, with pine trees an important part of the timber industry.

Blue Ridge

In terms of scenic beauty, Georgia's most striking physiographic province is the **Blue Ridge**. Here are found the Blue Ridge Mountains, the highest in the Appalachian Highlands. This range stretches from northeast Georgia to southern Pennsylvania, and contains the highest point east of the Mississippi River (North Carolina's 6,684-foot Mt. Mitchell). Georgia's highest mountain—Brasstown Bald, 4,784 feet above sea level—is located in the Blue Ridge province.

Nearby, Springer Mountain (3,782 feet) marks the beginning of the Appalachian Trail, a hiker's path traveling 2,158 miles through the Appalachian Highlands to Maine.

The height of the Blue Ridge Mountains cools the warm, moist air currents off the Gulf of Mexico, producing great amounts of rainfall in most years. As a result, numerous rivers—such as the Chattahoochee and Savannah—begin here.

The Blue Ridge accounts for less than 1 percent of Georgia's prime farmland. Because of mountains and valleys, farms tend to be small. Steep slopes and high rainfall also contribute to the highest erosion rate in Georgia.

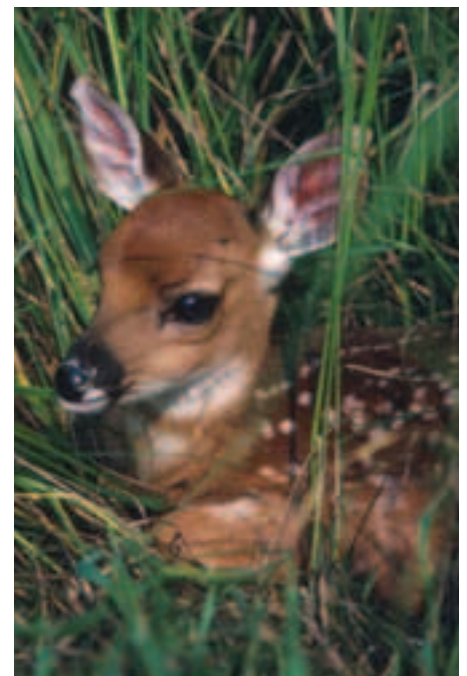
High elevation also affects agriculture in the Blue Ridge. The growing season—the period between the last frost of spring and the first frost of fall—varies from 210 days along the southern boundary to 180 days in the area of highest elevation. Apples, corn, and other vegetables are suitable to the climate. Hardwood timber, such as oak and hickory, does well in the mountains.

Ridge and Valley

Located west of the Blue Ridge is the **Ridge and Valley** province, a region which stretches 1,200 miles from northern New York to central Alabama. The Ridge and Valley has long, parallel ridges overlooking wide, rolling valleys. From the valley floor, the ridges appear to be mountains, but really the highest has a relief of only 700 feet from top to base. Elevations within the region range from 700 to 1,600 feet above sea level.



Unlike the taller and more rugged mountains of the West, the Blue Ridge Mountains are covered with hardwoods, pine, and other plants. The mountains are also home to a variety of wildlife, including deer, black bears, and other animals.





The Ridge and Valley province is a region of long, roughly parallel ridges separated by wide valleys.

(Right) In extreme northwest Georgia is the Plateau province, which consists of Lookout Mountain and Sand Mountain. Lover's Leap overlook on the eastern rim of Lookout Mountain is a popular tourist attraction.

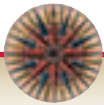
The Ridge and Valley province is nestled among the Blue Ridge, Piedmont, and Plateau provinces. Unlike the provinces to the south and east, which consist of hard bedrock, the Ridge and Valley consists of softer sedimentary rock. The ridges are composed of sandstone, while the valley floors were formed from limestone, shale, and other sedimentary deposits.

Today, the sandstone ridges are forest-covered. Valley floors are used for farming and pasture. With an average growing season of 210 to 220 days, a variety of crops can be grown here, including corn, soybeans, wheat, and cotton. The soil is moderately suited for agriculture and accounts for 4 percent of Georgia's prime farmland. Much of the land is used for pasture and harvesting hardwood and pine timber.

Plateau

Georgia's smallest physiographic province is the **Appalachian Plateaus**, more commonly called the **Plateau**. A plateau is an area of flat or gently sloping land with a high relief over neighboring valleys and low-lying areas. Stretching from New York to Alabama are a series of plateaus along the western edge of the Appalachian Highlands. The southernmost of these—the Cumberland Plateau—includes about 300 square miles of the northwest corner of Georgia. Here you will find two flat-top features—Sand Mountain and the famous Lookout Mountain—separated by a deep and narrow valley. Off Lookout Mountain to the east is the thumblike Pigeon Mountain.

The Plateau province consists of sedimentary rock, principally sandstone, shale, and limestone. Land here is primarily used for hardwood forest and pasture, although a small amount of corn and soybeans is grown. This area marks the only known source of coal in Georgia. ◀



▶ **Locating the Main Ideas**

1. Define: physiographic province, Coastal Plain, sediment, Fall Line, zone, Piedmont, bedrock, Blue Ridge, Ridge and Valley, Appalachian Plateaus, Plateau
2. How many physiographic regions are there in the United States? in Georgia?
3. How was the Fall Line created?
4. Why do many Georgia rivers begin in the Blue Ridge province?

Georgia's Coast

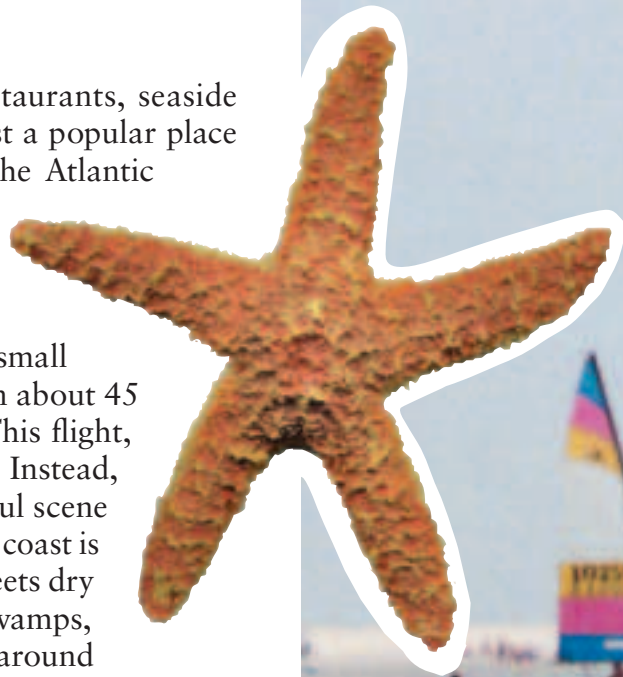
Sandy beaches, coastal wildlife, seafood restaurants, seaside rooms, and historic sites make Georgia's coast a popular place to visit. Here, you'll find vacation sites on the Atlantic Ocean, such as Tybee Beach, St. Simons Island, and Jekyll Island. This is also the area first settled by British colonists in the 1730s.

Georgia's coast is not particularly long. In a small plane, you can fly from one end to the other in about 45 minutes—a distance of less than 100 miles. This flight, however, would not follow one long seashore. Instead, you would see a strange, irregular, yet beautiful scene below. Unlike California and Florida, Georgia's coast is not a continuous beach where sea abruptly meets dry land. Rather, it is a region consisting of (1) swamps, (2) rivers and streams, (3) **estuaries** (the area around a river's mouth where fresh and salt water mix), (4) numerous small islands in these estuaries, and (5) a chain of large coastal islands facing the ocean. Only on the seaward side of these outer islands will you find stretches of real beach.

There's another thing you should know about Georgia's coast. Because of **tides**—the daily rise and fall of the ocean—the point where sea touches land is constantly rising or falling. At low tide, sea level is down and Georgia rivers are free to flow out to sea. At high tide, however, the ocean's height is up by six or seven feet. Seawater now rushes in, forcing rivers and streams to reverse their flow and carry a mixture of salt and fresh water inland for a distance of 10 miles or more. In the process, coastal rivers—also called tidal rivers—spill over their banks and flood low-lying areas, thus creating saltwater marshes. These marshes are one of the most important features of the coast.

Coastal Wetlands

A **wetland** is any area of low-lying land covered by water all or part of the time and in which special types of plant and animal life are found. Georgia has large areas of wetlands—ranking fourth in the nation in total number of acres. Many freshwater wetlands are found south of the Fall Line—particularly along rivers and streams and near the coast. The largest freshwater wetland in the state is the famous Okefenokee Swamp, located south of Waycross along the Florida border.



Coastal Georgia is known for its beaches, marshes, and historical sites. Further inland is the Okefenokee Swamp, a National Wildlife Refuge and Wilderness Area, and one of the largest freshwater wetlands in America.



Along Georgia's coast are 400,000 acres of saltwater wetlands, commonly called **marshes**. Twice each day, Atlantic tides flood coastal rivers, streams, and estuaries. For several hours at a time, nearby land—actually mud—is covered with salt water. As a result, little vegetation can survive, except for saltmarsh grass, cordgrass, and a few other plants. Amazingly, a complex and rich **ecosystem** is supported by the marshes. The salt marshes teem with life.

Acre for acre, they are far more productive than the most fertile farmland. The reason marshlands are so productive is that minerals and other nutrients are deposited there by freshwater rivers and streams, as well as by tides. These fertilize marsh plant life and cause a **food chain** (a term for “eat and be eaten”) to begin. A variety of life is attracted, including insects, birds, wildlife, and—most important of all—fish, shrimp, and crabs. Here they find food, as well as a nursery to safely raise their young. Because of Georgia's marshes, an important seafood industry has developed along the coast.

Coastal marshes serve other valuable functions. They serve as buffers for storms. They filter out many pollutants from the Savannah, Ogeechee, Altamaha, and other rivers before they discharge into the Atlantic. And, as any traveler driving along Interstate 95 or U.S. 17 can see, these marshes are a delight to view. Here you will see marsh grass swaying in the wind, egrets and other large wading birds, fiddler crabs, and other wildlife. More than a century ago, the beauty of Glynn County's tidal wetlands so impressed poet Sidney Lanier that he wrote “The Marshes of Glynn,” his most famous work.

Barrier Islands

Several miles off Georgia's mainland lies a chain of sea islands. Geographers call these **barrier islands** because they form a barrier, or wall, blocking ocean waves and wind from directly hitting the mainland.

Georgia's offshore islands are frequently called the “Golden Isles,” a name given by early explorers expecting to find gold there. None was, but the name stuck. In the late 1800s, the title “Golden Isles” took on new meaning as millionaires from the North began buying these islands and building expensive winter homes there. Today, most of Georgia's sea islands are protected by state or federal authorities. Many have been reserved as national wildlife refuges and wildernesses, and one—Cumberland—is now a national seashore. These designations help protect the islands and their animal and plant life from human injury and destruction.



Snapshot

Georgia's saltwater marshes are an important ecosystem found along Georgia's entire coast stretching inland as far as the ocean tide reaches. Georgia's seafood industry depends on the marshes as a nursery.

Large areas of Georgia's barrier islands barely rise above the sea and thus exist as marshlands because of the daily tides. Also, most are crisscrossed with rivers and streams. Viewed from the air, one large island actually appears to be several small connected islands.

Georgia's beaches are found on the seaward side of the outer islands. The most visited beaches are on the islands of Tybee, St. Simons (of which Sea Island is a part), and Jekyll. Bridges and elevated highways (causeways) connect these three islands with the mainland, allowing visits by car. Access to other barrier islands is by boat or helicopter only.

While driving to or from Tybee, St. Simons, or Jekyll islands, you may see boats on the waterway as you cross the bridges to the islands. This marks the famous **Atlantic Intracoastal Waterway**, a 1,000-mile inland water highway stretching from New York to Miami. Located between the barrier islands and the mainland, this channel allows fishing boats, pleasure craft, and shippers to travel up and down the coast protected from direct ocean winds, waves, and currents.

Continental Shelf

Have you ever wondered how deep the ocean is off Georgia or why you can walk far out from shore before the water gets up to your head? On the East Coast, the ocean floor drops very gradually. For the first 70 or 80 miles off Georgia's coast, the drop is about two feet for each mile away from shore. After that, however, the bed drops more sharply. If the ocean were drained, the floor from the shore to this drop-off would resemble a large, flat ledge—or shelf—attached to North America. Actually, this is the submerged part of the North American continent and thus is called the **continental shelf**.



This map shows the chain of sea islands that make up Georgia's barrier islands. It also shows the path of the intracoastal waterway. James Oglethorpe and the early Georgia colonists used the waterway when sailing from Savannah to Charleston to the north, or Fort Frederica to the south.



This map shows the Gulf Stream and the continental shelf off the southeastern United States. About 450 miles east of Georgia's southern boundary is one of the deepest points in the Atlantic Ocean.

The continental shelf influences the path of the **Gulf Stream**. This is a current of warm ocean water flowing from the Gulf of Mexico up through the straits of Florida. It continues northward along the east coast of North America and then in a northeasterly direction across the Atlantic Ocean. The Gulf Stream stays in the deeper waters beyond the continental shelf. ◀

Georgia's Natural Resources

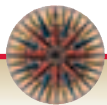
Water Resources

Since the late 1970s, Georgia has been one of the fastest-growing states in the nation. However, most of this growth has taken place north of the Fall Line, where over 70 percent of all Georgians live. The fastest-growing region is the Piedmont. Three out of every five Georgians live there, but it has no major underground sources of water.

To help meet the growing demand for water in north Georgia, state, federal, and local officials have devised a plan. It calls for building regional **reservoirs**—large artificial lakes—as well as some smaller lakes. But there are many problems to face, such as where to build new reservoirs, how to protect valuable wetlands, and who is going to pay.

South of the Fall Line, water resources are affected by the makeup of the earth beneath the surface. Here, sedimentary beds of sand and porous rock such as limestone can store vast supplies of underground water, called **groundwater**. Pores—tiny spaces—in the sand and rock allow liquid to pass through it. Water-saturated layers of the earth are called **aquifers**. How does water get into an aquifer? If the aquifer is near the earth's surface, its water comes mainly from rainfall.

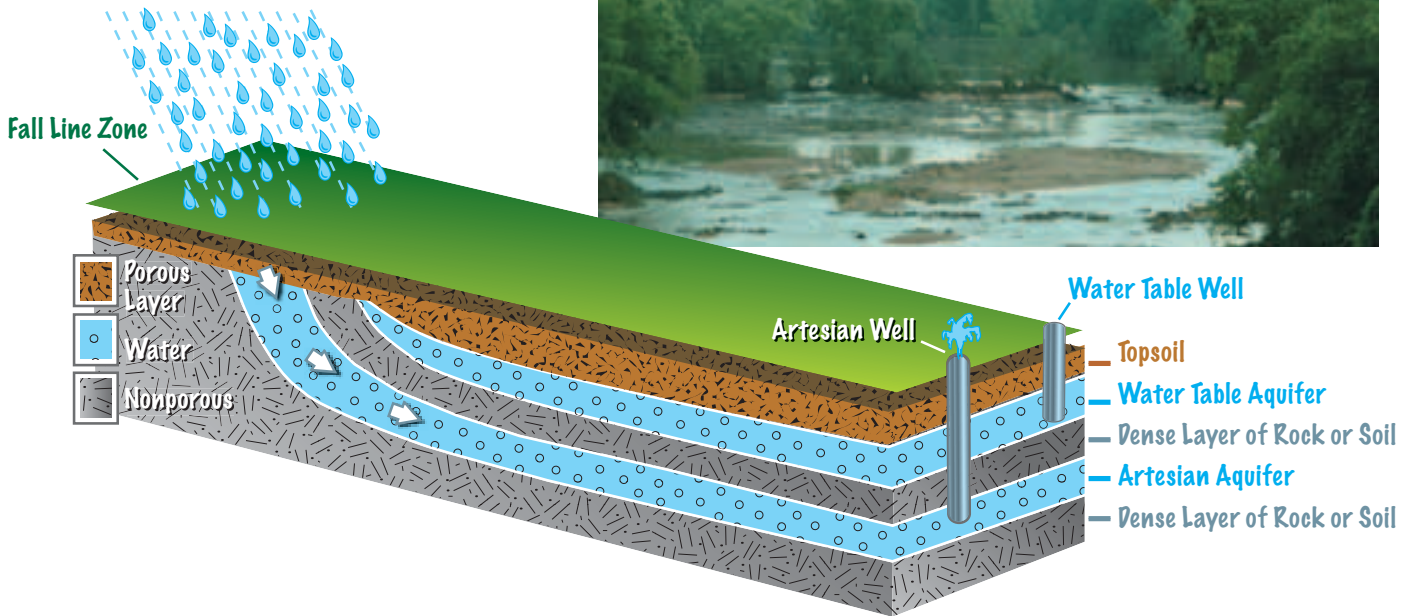
There are two types of aquifers. One is found near the earth's surface. It extends from the **water table**—the upper limit of water-saturated soil—down to the first dense, nonporous layer of earth. To obtain well water from this aquifer, an electric pump must be used to bring the water to the surface. A second and deeper type of aquifer is found in some parts of Georgia. This is the **artesian aquifer**. It is a porous layer of earth located between two denser layers. With nowhere to escape, water trapped in an artesian aquifer is under pressure. If a well is drilled into the aquifer, water will rise, perhaps even reaching the surface without the need for a pump.



▶ Locating the Main Ideas

1. Define: estuary, tide, wetland, marsh, ecosystem, food chain, barrier island, Atlantic Intra-coastal Waterway, continental shelf, Gulf Stream
2. List the five features that make up Georgia's coastal zone.
3. How are Georgia's marshes important to humans and animal life?
4. What are two reasons why Georgia's barrier islands are called the "Golden Isles"?

Sources of Groundwater



South of the Fall Line, water for cities, irrigation, and other uses comes primarily from groundwater in artesian aquifers. North of the Fall Line, however, the earth is different. Instead of a porous soil, the surface has more clay and rock, which is less able to absorb rainfall. Because the surface is hilly, water runs off it, and less sinks into the ground than if the land were flat. Here, the geology of the subsurface is much different from the Coastal Plain. Except for northwest Georgia, there are few aquifers north of the Fall Line, and groundwater is limited. Bedrock beneath the surface further prevents large amounts of water from collecting underground. Thus, most north Georgia cities and industries must depend on **surface water**—that is, water flowing in rivers and streams, or stored in ponds and lakes.

Areas of the state with large amounts of groundwater do not depend on rivers and lakes for their water supply. Parts of the state lacking groundwater, however, must depend on surface water. A problem with river water is that rainfall declines in the summer and fall. If river levels get too low, cities have to restrict water use. They may put a ban on watering lawns or washing cars. No one can control rainfall, so we have to store water in reservoirs and use it wisely.

The Fall Line is a natural barrier that prevents boats from traveling north of it. In north Georgia, narrow rivers and streams flow quickly, making them ideal for whitewater rafting.



Georgia Rivers and Lakes

Georgia Rivers and Streams

Georgia is fortunate to have 20,000 miles of rivers and streams. Rivers determined Georgia's original boundaries and affected the location of its settlements.

With few exceptions, Georgia rivers generally flow from north to south. Why? Because of the drop in surface elevation from north to south. Georgia as a whole slopes toward the southeast. Rivers and streams are pulled toward the sea, much like water flowing down a giant water slide.

Characteristics of Georgia Rivers

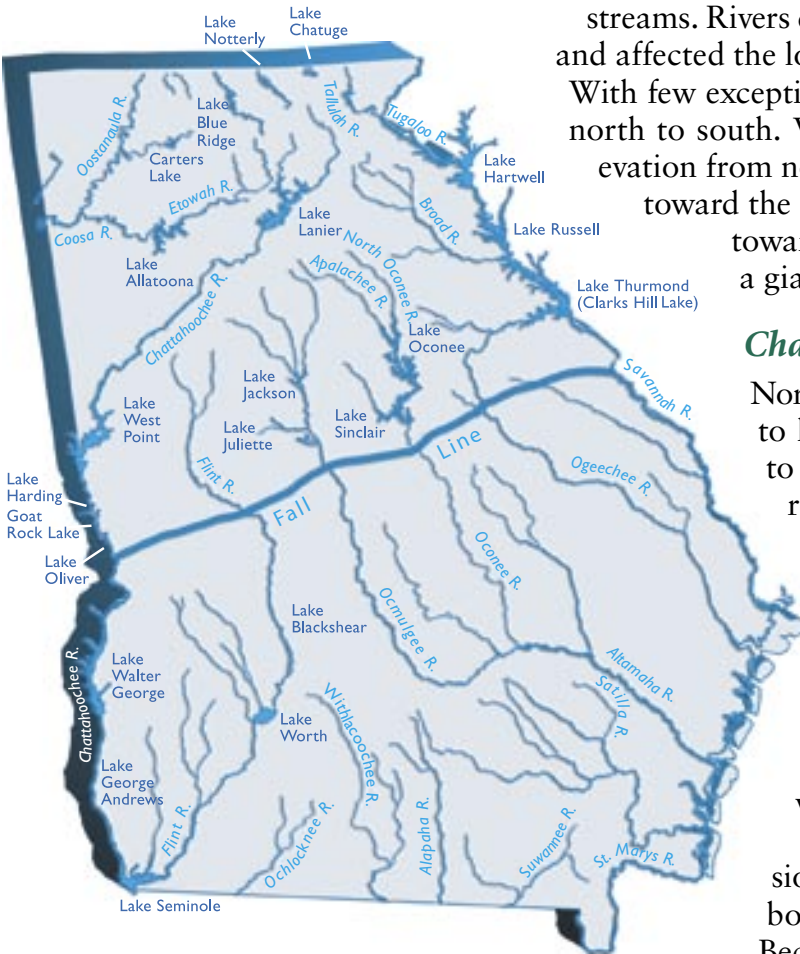
North of the Fall Line, rivers and streams tend to have different characteristics from those to the south. Because of frequent rock beds, rivers here are more shallow and narrow.

Exposed rocks, uneven riverbeds, and the drop in elevation cause numerous rapids and waterfalls. The tumbling waters appear white. Attempting to “run” these rapids by raft or canoe is a popular sport, and Georgia is noted for its exciting—and dangerous—white-water rivers.

Along some streams, you will find occasional **shoals**—shallow areas where the river bottom consists of sand or layers of rock. Because they marked convenient places to

cross the rivers, shoals frequently attracted settlements. One such community that survives today is North High Shoals, on the Apalachee River.

As rivers from the north approach the Fall Line zone, the slope of the surface drops fairly quickly. The water picks up speed, providing a force to power mills and machinery. This water power was an important factor in settlement along Fall Line river sites.



(Below) This dam on the Etowah River northwest of Atlanta forms Lake Allatoona. All lakes of significant size in Georgia are manmade. Most have been built by the U.S. Army Corps of Engineers.



Georgia Lakes

Every summer, millions of visitors head to Georgia's lakes to boat, ski, swim, fish, picnic, or simply relax. Four out of every five Georgians live within 40 miles of a major freshwater lake. But this hasn't always been true. Early in this century, the only lakes in Georgia were ponds and, in south Georgia, water-filled hollow places in the ground known as sinkholes. Every one of our 28 major reservoirs has been built since 1910.

Without them, modern Georgia could not have developed as it did.

The lake-building era in Georgia began with the arrival of the age of electricity. Georgians built dams in order to convert flowing river water into electricity. In the process, many reservoirs were created. Dams and reservoirs serve other purposes as well. They prevent floods, supply water to nearby cities, and provide downstream navigation. They are important to fish and wildlife conservation and to recreation.



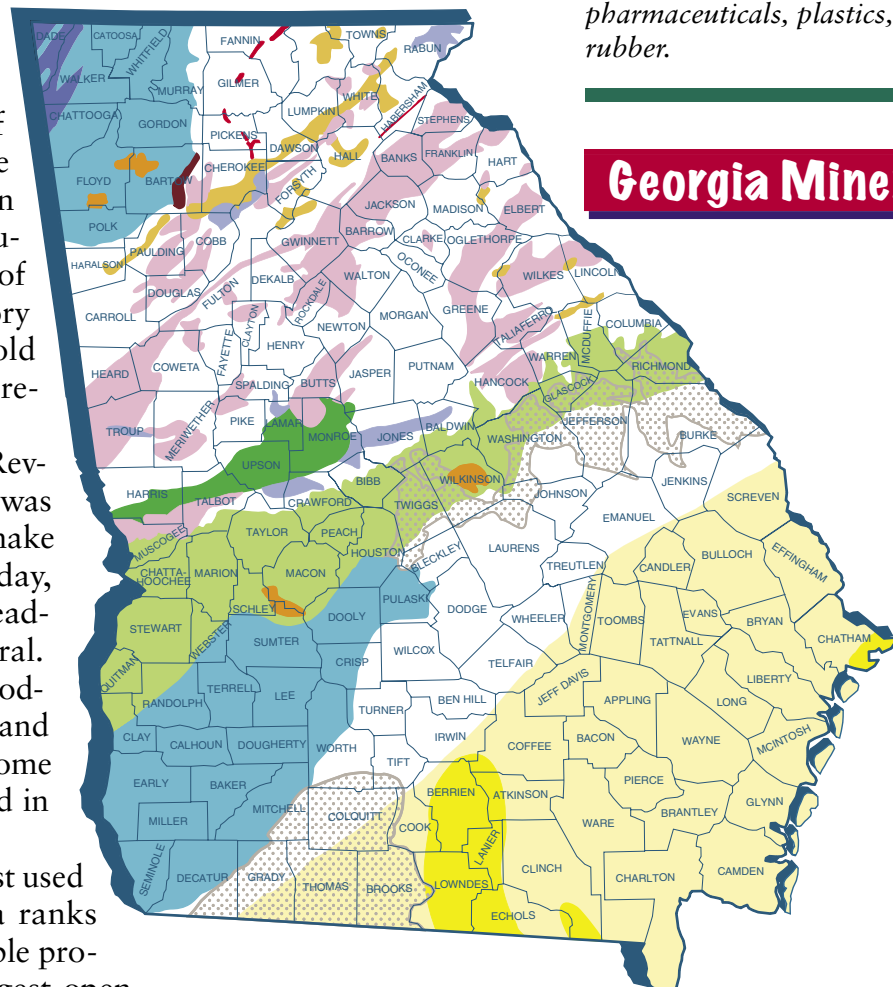
Kaolin is a chalky white clay found near the Fall Line. Kaolin is best known for use in making glossy paper and china, but it also is used in making adhesives, ceramics, glass, ink, pesticides, pharmaceuticals, plastics, and rubber.

Rocks and Minerals

Rocks and minerals are a part of Georgia history. Before the coming of the Europeans, the natives chipped quartz and other stones into arrowheads and spearheads. They shaped stone into tools and used clays to make pottery. Of course, the search for gold and silver was one of the chief reasons that Hernando de Soto explored Georgia in 1540. Almost three centuries later, the discovery of gold in Cherokee territory led to the nation's first gold rush and hastened the removal of the Indians.

Before the American Revolution, Georgia's kaolin was shipped to England to make Wedgwood pottery. Today, Georgia is the world's leading producer of this mineral. Kaolin is used in many products, including the strong and glossy paper you see in some magazines and books and in paints.

Georgia marble was first used in 1838. Today, Georgia ranks first in the nation in marble production. The world's largest open pit quarry is at Tate in Pickens County. Marble in crushed form is used for agricultural lime and as a filler for such products as toothpaste and gum.



Georgia Minerals

- Barite
- Bauxite
- Granite, Gneiss
- Feldspar, Mica
- Iron and Coal
- Marble
- Fuller's Earth
- Kaolin
- Limestone, Sandstone
- Phosphate
- Phosphate Concentration



The Norcross Quarry in Gwinnett County is one of the largest granite quarries in the United States. This quarry supplies stone for roads, buildings, and homes in the area.

Marble is also popular for cemetery headstones and monuments. One of the most famous statues in the world, the Lincoln Memorial in Washington, D.C., is made from Georgia marble.

Georgia also ranks first in the nation in granite production. Although granite is popular for headstones, monuments, and buildings, it is mainly used in crushed form. One mile of four-lane highway may consist of over 40,000 tons of crushed granite. Elbert County is known as the granite capital of the world.

Other important rocks and minerals mined in Georgia include limestone, fuller's earth, mica, bauxite, barite, phosphate, feldspar, and over a dozen more.

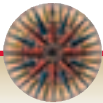
Although rich in a variety of rocks and minerals, Georgia is lacking in energy-related resources. The only supplies of coal are in the extreme northwest corner of the state. To date, more than 200 wells have been drilled in exploring for oil or natural gas, but none were successful. ◀

Georgia's Weather and Climate

What's the weather like in Georgia today? Your answer will probably tell whether it's hot or cold, cloudy or sunny, rainy or dry, and windy or calm. Georgia is such a large state that the weather can be quite different, depending on where you happen to be.

Weather refers to conditions in the atmosphere—the air, clouds, and gasses around the earth—on any given day. **Climate**, on the other hand, refers to the average weather conditions over time—at least 25 to 30 years. Weather affects whether we go to the beach today or tomorrow. Climate determines what kind of crops a farmer will plant.

Climate was important to the creation of Georgia in 1732. Because Georgia lay at the same latitude as China, India, Persia, and Palestine, England's leaders believed the colony could become its new source of crops grown in those lands. They expected the colonies to produce wine, silk, rice, tea, olives, oranges, cotton, and indigo. As it turned out, some of the desired crops fared well in Georgia. Others—such as grapes for wine—were not suited to



▶ Locating the Main Ideas

1. Define: reservoir, ground-water, aquifer, water table, artesian aquifer, surface water, shoals
2. Where do most Georgians south of the Fall Line get their drinking water? North of the Fall Line, where does most drinking water come from?
3. List five reasons for building a reservoir.
4. How are granite and marble important to Georgia?

the humidity and diseases of the coastal climate.

Georgia's climate is mainly determined by geographic location. It is near the Atlantic Ocean, the Gulf of Mexico, and the eastern edge of the continent. These factors, combined with Georgia's closeness to the Equator, result in a climate of hot summers, mild winters, and, in most years, abundant rainfall throughout most of the state.

Climate and Georgia's Development

Georgia's moderate temperatures have helped the state to grow and develop. The cool summers in the north Georgia mountains have attracted many new residents to this area. Dotted the slopes and ridges of the Blue Ridge Mountains are vacation and retirement homes. High elevations have even made a snow ski resort possible at Sky Valley, in the extreme northeastern corner of the state.

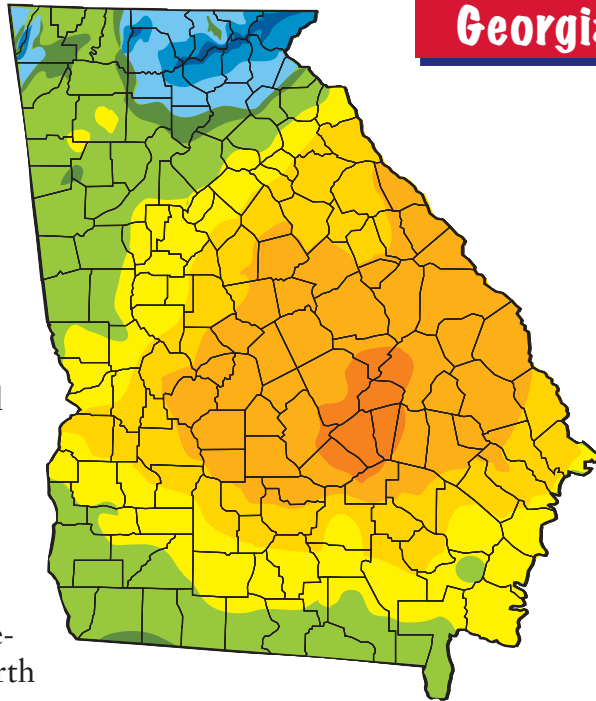
For the rest of the state, mild winters have contributed to a continuing population migration into Georgia. Mild winters have also helped attract the military. To date, a total of 11 army, air force, navy, and marine bases and installations have been built in Georgia. The last new base was Kings Bay submarine facility in Camden County, created in 1978. A warm climate means that outdoor training, flights, and other military operations can go on year-round.

Precipitation

Have you ever wondered how water gets into clouds, or what happens to rain after it hits the ground? The answer to these and many other questions involves the **water cycle**. This refers to the journey of water from ocean to rainfall, its use and reuse on land, and then its return to the sea.

In most years, Georgia receives abundant rainfall, snow, and other forms of precipitation—an average of 50 inches annually. Depending on where you live, you may get more or less rainfall than the state average. The annual rate varies from about 80 inches in Rabun County in extreme northeast Georgia to half that amount in the Augusta area.

Georgia's nearness to the ocean helps account for a usually abundant precipitation. The Gulf of Mexico is responsible for this blessing. That is because most winds and weather patterns



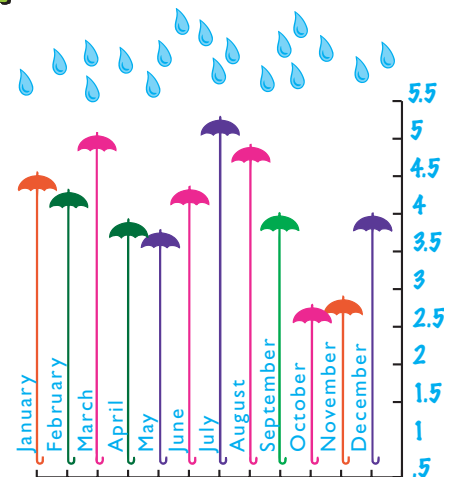
Georgia Climate

Annual Average Precipitation 1961-1990

Legend (in inches)

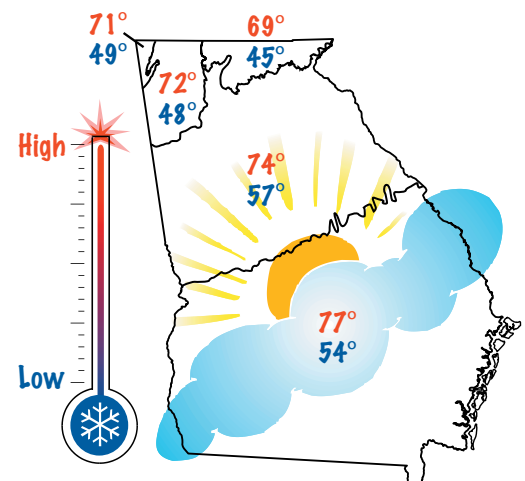
- Under 46
- 46 to 48
- 48 to 50
- 50 to 52
- 52 to 56
- 56 to 58
- 58 to 62
- 62 to 70
- Over 70

Average Monthly Precipitation



Monthly average precipitation 4.2 inches

Average Annual Temperature





(Left) Downtown Augusta, 1908. Such flooding was a common occurrence in river cities before the building of dams and levees.

(Above) In 1936, the deadliest tornado in state history hit Gainesville, killing 203 people and flattening many downtown businesses.



affecting Georgia come from the west and southwest. As warm Gulf water evaporates, moisture rises and is blown to the northeast. Pushed over the Blue Ridge Mountains, the air cools, resulting in frequent rains. Precipitation also occurs as warm Gulf air meets colder air currents flowing down from Canada.

Hurricanes

Because of the shape of the southeastern coast, Georgia is less exposed to the full impact of hurricanes than either Florida or the Carolinas. The wide expanse of the continental shelf off Georgia's coast also helps influence most hurricane storms to move northward. But a direct hit along Georgia's barrier islands is possible. Today, satellite tracking of hurricanes allows forecasters to predict where and when a storm may hit land, thus allowing time to evacuate residents. Hurricanes develop on warm ocean water and are most likely to occur in September and least likely in April.

Tornadoes

Tornadoes are violent whirlwinds that can develop when a cold front moves rapidly into an area of warm, moist air, resulting in severe thunderstorms. Winds may reach over 200 miles an

hour, and destruction can be severe in their path. These damaging wind funnels strike Georgia an average of 19 times a year. Tornadoes are most likely to strike in April and least likely in October. ►

Air and Ocean Currents

When early explorers sailed to the New World on their voyages of discovery, they were risking their lives. Maps and navigation instruments were primitive, and once on the high seas, ship captains were at the mercy of the weather. In time, however, they learned to use wind and ocean currents to speed their long journeys across the Atlantic. A **current** is a continuous movement or flow of a large body of air or water along a particular path.

What causes air and water to travel great distances as currents? The main cause is the uneven heating of the earth by the sun. The sun strikes the earth most directly at the Equator and least directly at the poles. This means that air, water, and land temperatures are hottest along the Equator and coolest in the polar regions.

Air Currents

Have you ever wondered why cool breezes flow in off the ocean or why chilling winds are so common during winter months? Winds, or air currents, occur because air tends to flow from cooler places, such as the ocean, to warmer places, such as land.

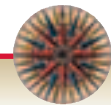
As air is warmed, it expands and rises. The opposite occurs as air cools—it contracts and sinks. Because warm air is lighter, it exerts less pressure on the earth's surface. In contrast, cooler air is heavier, producing greater pressure. Around the earth, air is always flowing from areas of high pressure to those of low pressure in order to balance our atmosphere. This constant shifting creates air currents on land and sea.

Early ship captains did not know what caused sea winds, but they soon realized how important they were to sailing across the Atlantic. As merchants and traders replaced explorers, the winds came to be known as the **trade winds**.

The trade winds helped in sailing from Europe to America. But what about getting back? Between latitude 35°N and 60°N, cold high pressure from the polar region influences a pattern of winds that blow from the west to the northeast. These air currents, called **prevailing westerlies**, helped carry sailing ships from America back to Europe.



In Georgia, the greatest hurricane damage usually results from flooding rather than wind damage. In 1994, Tropical Storm Alberto dumped record amounts of rain on southwest Georgia. In Baker County, flood waters from the Flint River almost reached the second floor of the courthouse.



► Locating the Main Ideas

1. Define: weather, climate, water cycle
2. Why did England's leaders think the Georgia colony could produce wine, silk, rice, tea, olives, oranges, cotton, and indigo?
3. How has Georgia's climate contributed to its growth?
4. How does the Gulf of Mexico help account for Georgia's abundant precipitation?

Wind and Ocean Currents of the North Atlantic



One other air current which you should know about is the **jet stream**—since it sometimes brings very cold weather into Georgia. This is a “river” of air found between 30,000 and 40,000 feet above sea level, flowing at speeds of 100 to 300 miles per hour. This current follows an irregular pattern around the earth, sometimes bringing polar air in from the northwest and influencing weather in the United States. This current was named because pilots of high-flying jet aircraft found that they could cut flying time and fuel use by riding with this current.

Ocean Currents

Similar to air currents are the movements of water masses in the ocean. Near the surface, these tend to follow the general path of air currents. They result from wind action and the uneven heating of the world’s oceans by the sun.

One of the most famous ocean currents in the world is the Gulf Stream. It originates in the Caribbean Sea and Gulf of Mexico and travels up through the straits of Florida and along the East Coast. Then it flows across the north Atlantic, breaking up south of Greenland. This warm water current helps keep the southeastern climate mild during winter. The Gulf Stream aided early travel and trade between Europe and the Western Hemisphere. The first to use it were the Spanish explorers returning to Spain aboard great ships loaded with gold, silver, and other treasure from Central and South America. Later, the current cut travel time on the voyage from the American colonies eastward to England. ◀



▶ Locating the Main Ideas

1. Define: current, trade winds, prevailing westerlies, jet stream
2. What are the causes of air and water currents?
3. How did ocean currents affect European exploration and trade with the New World?

Chapter Activities



Reviewing the Main Ideas

1. How does Georgia's physical geography affect agriculture?
2. Why is erosion more severe in north Georgia than in other areas of the state?
3. Explain why the physical geography of north Georgia has more in common with the western Carolinas than with south Georgia.
4. Why is it possible to find fossilized shark's teeth in places as far away from the ocean as Macon?
5. Why are long droughts more likely to cause water shortages north of the Fall Line than south?
6. List some important functions that Georgia's saltwater marshes serve.
7. How does the continental shelf help protect Georgia's coast from hurricanes?
8. Explain why Georgia's coastal islands are called barrier islands.
9. Geographic features can shape history. How did gold do that for Georgia?
10. Identify a geographical factor that helps influence Georgia's climate.

Give It Some Extra Thought

1. **Inferring.** Georgia's population continues to grow at a fast pace. Discuss two features of our state's geography that might account for this.
2. **Generalizing.** If you started in Miami, Florida, and moved north along the eastern seaboard, what landforms would you expect to find? In your trip north, what difference in climate would the changing latitude make?

3. **Explaining.** Explain what this phrase from a bumper sticker means: "No wetlands, no seafood."

Sharpen Your Skills

1. **Mapping Information.** On an outline map of the state, draw in the five physiographic regions of Georgia. Label each region and the Fall Line. Identify the location of your hometown. Label the Atlantic Ocean on your map.
2. **Mileage Report.** Using a state highway map, decide which river you are closest to and choose another town located near the river. List the route numbers of the highways you would have to use to go from your town to the one you chose. Use the map scale and estimate the distance you would travel.
3. **Map Interpretation.** Using the maps of "Wind and Ocean Currents of the North Atlantic" (page 36), describe the trip of an explorer from Spain to the Western Hemisphere and back home again. Include three things in your description: the names of the currents the explorer would have used, the direction in which the currents flow, and the continents the Spaniard might be able to explore.

Going Further

1. **Using Many Sources of Information.** Find more information about Georgia's rocks and minerals by using *The Atlas of Georgia*, encyclopedias, almanacs, and science books. Choose one rock or mineral and write a report about it. Tell where it is found in the state, what it is used for, and how much is produced. How does its production in Georgia compare with its production in other states or countries?

