Section 5
North Carolina's Weather and Climate

As you read, look for:
- the difference between weather and climate
- average temperatures and precipitation in the state
- types of severe weather
- vocabulary terms **weather, climate, westerlies, humidity, precipitation, tornado, hurricane**

North Carolinians live in different regions, but they all breathe the same air. Or, as scientists describe it, they have a common *atmosphere*. Scientists refer to short-term atmospheric conditions as **weather** and to long-term conditions as **climate**. In general, everywhere in North Carolina has a temperate climate, which means there are no extremes in temperature and precipitation. There is, however, a lot of variation in the weather.

Below: Thundershowers are a frequent occurrence each summer day in the Mountains region. Moist air coming from the west rises when it hits the Blue Ridge and often condenses into rain as it cools. The rapid change in temperature can produce long zigzags of lightning.

Class Discussion

North Carolina has a temperate climate, as described in the text. Ask students to discuss the pros and cons of living in this type of climate.

Objectives

There are no specific objectives for this section.

Section 5 North Carolina's Weather and Climate

INTRODUCE

Outline

A. It's Not the Heat; It's the Humidity
B. Different Storms in Different Places
C. The Path of Hurricanes

Materials

Textbook, pages 37-41
Teacher CD-ROM
Blackline Masters
Transparencies
www.mystatehistory.com
Online textbook
Ch 1 Internet Activity, "An Internet Tour of the Climate and Geography of North Carolina"
Smart Reading

Getting Started

Discuss why climate is probably the single most talked about topic in the world. Have students listen for a few days to adult conversations and see how many times someone mentions the weather. ("Hot enough for you?" "Sure is a cold one today!" "My joints say it's going to rain," etc.) Discuss an "ideal" climate, recording student responses. Take each element and note pros and cons mentioned by students. Using the text, determine all of the elements that make up our climate.

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Technology Activity

Have students go to www.weatherbug.com. Students should write out a five-day forecast for your area including such data as lows and highs, precipitation, winds, etc. Beneath each day for the next five days, log in the actual conditions and compare.

Map 4 Skill
36-40 degrees Fahrenheit

Map 5 Skill
Above 80 degrees Fahrenheit

Writing Activity

Imagine that you are a scientist stationed on Grandfather Mountain on the coldest night in North Carolina history, as described in the text. Write a journal entry describing your experience during that night.

Critical Thinking

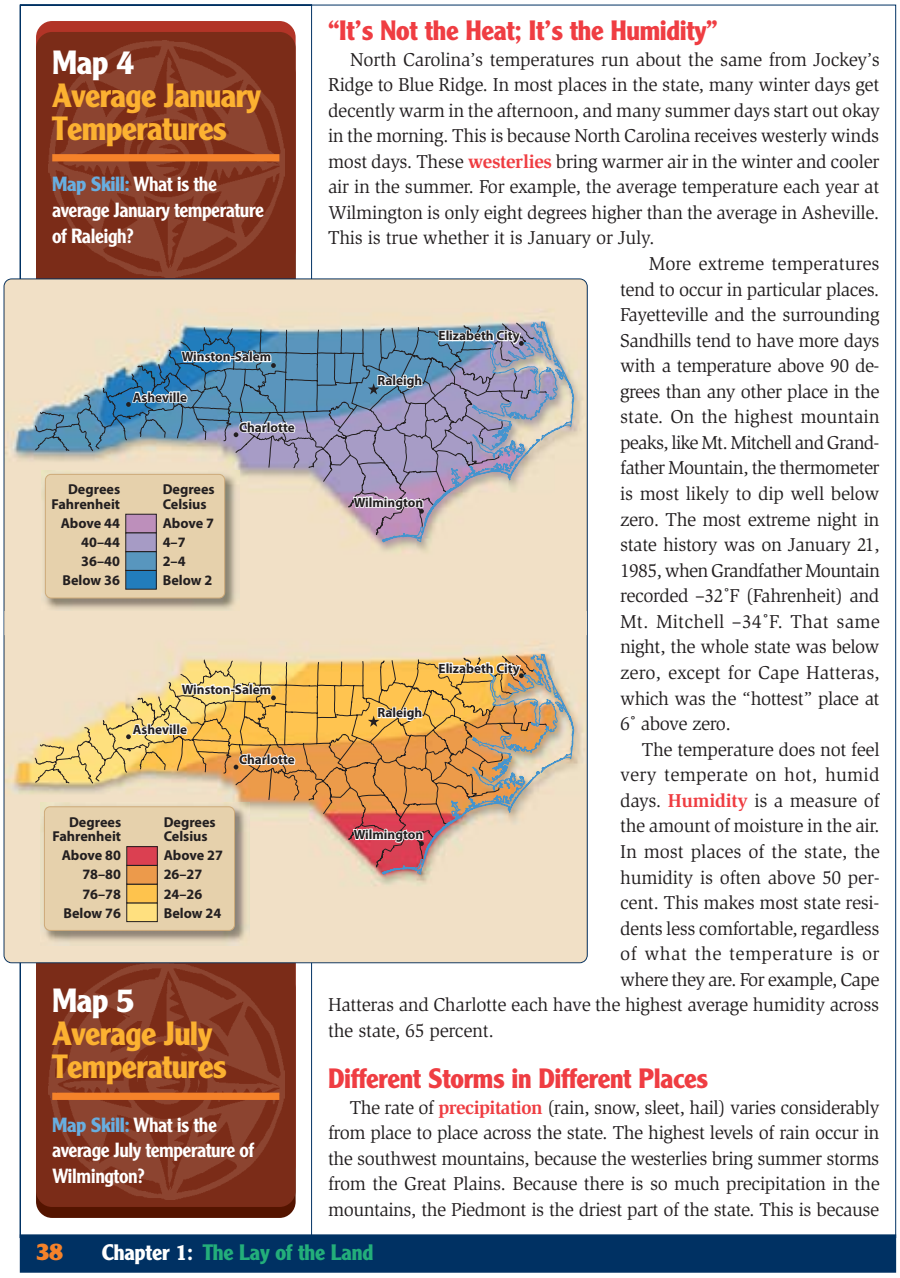
Does a person feel differently when the humidity is at 90 percent as opposed to 50 percent? How might the humidity level impact your daily life (e.g., different clothing, different activity level, etc.)?

Geography Activity

Using a blank U.S. map, coloring pencils, and the following information, have students indicate conditions in the 2002 drought: (1) Driest on record (12-month period) North Carolina, Virginia, Colorado, Utah, Arizona, and Nevada; (2) Second driest on record (12-month period) South Carolina, Georgia, Maryland, Delaware, and Wyoming; (3) Wettest records: Texas, Florida, and Minnesota.

Multidisciplinary Activity

Art: Have students draw a picture illustrating North Carolina's four seasons.



"It's Not the Heat; It's the Humidity"

North Carolina's temperatures run about the same from Jockey's Ridge to Blue Ridge. In most places in the state, many winter days get decently warm in the afternoon, and many summer days start out okay in the morning. This is because North Carolina receives westerly winds most days. These **westerlies** bring warmer air in the winter and cooler air in the summer. For example, the average temperature each year at Wilmington is only eight degrees higher than the average in Asheville. This is true whether it is January or July.

More extreme temperatures tend to occur in particular places. Fayetteville and the surrounding Sandhills tend to have more days with a temperature above 90 degrees than any other place in the state. On the highest mountain peaks, like Mt. Mitchell and Grandfather Mountain, the thermometer is most likely to dip well below zero. The most extreme night in state history was on January 21, 1985, when Grandfather Mountain recorded –32˚F (Fahrenheit) and Mt. Mitchell –34˚F. That same night, the whole state was below zero, except for Cape Hatteras, which was the "hottest" place at 6˚ above zero.

The temperature does not feel very temperate on hot, humid days. **Humidity** is a measure of the amount of moisture in the air. In most places of the state, the humidity is often above 50 percent. This makes most state residents less comfortable, regardless of what the temperature is or where they are. For example, Cape Hatteras and Charlotte each have the highest average humidity across the state, 65 percent.

Different Storms in Different Places

The rate of **precipitation** (rain, snow, sleet, hail) varies considerably from place to place across the state. The highest levels of rain occur in the southwest mountains, because the westerlies bring summer storms from the Great Plains. Because there is so much precipitation in the mountains, the Piedmont is the driest part of the state. This is because

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most of the rain in the Piedmont comes from clouds that first have to cross the mountains, where they drop most of their moisture.

Anywhere in North Carolina can get snow, but the mountains get the bulk of it. The northwestern mountains get the highest levels of snowfall, because they are the first lines of high peaks that polar air reaches. Although there are very high peaks in the Smoky Mountains, they get less snow on average. There is also less snow east of the Blue Ridge, because the heavy snow clouds have already dumped their moisture, just like the rain clouds. Sometimes, everywhere in western North Carolina that is at least 1,000 feet above sea level gets some snow, but it rains at lower levels. On days like that, Hickory or Rutherfordton will see flakes, but Asheboro and Albemarle will see drops.

Some of the worst weather in the state occurs when the temperature is just around freezing, and the rain turns to ice. These ice storms happen most often in the Piedmont. Sometimes the ice will be as thick as an inch around tree limbs and power lines, breaking both of them. Even more dangerous are smaller storms that lay thin layers of ice on roads and streets. Motorists at night often cannot tell where this "black ice" is, and frequent wrecks occur.

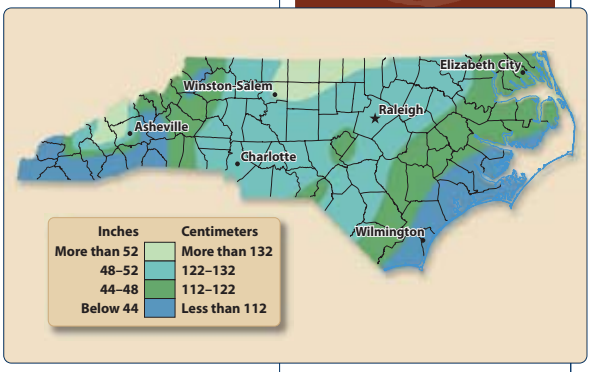
When moist air coming up from the Gulf of Mexico collides with drier, colder air from the polar regions, blizzards result. In 1993, "the storm of the century" in the state dumped fifteen inches of snow on the Coastal Plain, while the mountain areas got a lot less.

The whole state experiences thunderstorms during the summer. Some of these intense bursts of heavy rain showers pour down on just one or two places in a region. Other times, a whole front of storms—where the downpour is usually in a line that runs north to south—sweep across the state. These fronts most often come from the west and bring hail (rain that freezes high up in the atmosphere).

Sometimes **tornadoes** come with the storm fronts. (Tornadoes are funnel-shaped storms whose rotating winds can reach as much as 250 miles an hour or more.) Compared to the Great Plains states, North Carolina does not have frequent tornadoes. When tornadoes do occur, they tend to hit the Sandhills and certain counties in the southern half of the Coastal Plain. Duplin and Onslow counties have had more tornadoes touch down than any other place in the state in the last fifty years. The worst tornado in state history hit March 25, 1985. It touched down in at least fifteen eastern counties. Forty people died, and 400 more were injured.

Map 6
Average Annual Precipitation

Map Skill: About how much precipitation does Asheville receive each year?



Did You Know?

Summer is the wettest season, and July is the wettest month.

Map 6 Skill

48-52 inches

Cooperative Learning

Have students look through magazines, newspapers, etc., to find pictures or articles about the types of weather described in this section. Have students make a class collage of their work to display in the classroom.

Critical Thinking

Introduce the concept of home safety kits or emergency kits for use in the event of severe weather. List a number of items on the chalkboard and have students eliminate those not useful. Have them provide a reason for the items they choose to include in their safety kit and those they exclude. Then have them add items they feel should be included in a family safety kit.

Suggested items for you to list on the board include Sterno, box of cereal, diapers, large flashlight, canned fruit, electric can opener, aluminum rope, AA batteries, oatmeal, water, pots, aluminum bowl, portable television, lamp, plastic sheets, broom, plastic bowls, aluminum foil, compass, cooking oil, nails, rain gauge, lightning rod, butane lighter, fresh vegetables, light bulbs, matches, towels, chocolate bars, and thermometer. Suggested items to be added include D batteries, hammer.

Note: For a complete listing of recommended supplies, see www.redcross.org/images/pdfs/preparedness/A5055.pdf.

Tar Heel Trivia

- **During a thunderstorm, about 5 million drops of water fall on an acre of land.**
- **Lightning strikes about 6,000 times a minute on our planet.**

Addressing Multiple Learning Styles

Have students interview their parents, grandparents, or other adults about any experiences they have had with severe weather, such as a tornado, a hurricane, or ice storm. Let the students share the information they gathered.

Map 7 Skill

Florida or the Yucatan Peninsula of Mexico

Economics Activity

Hurricanes often leave a wide swath of devastation in their paths, with the most important impact of such events being the fatalities and injuries caused by these violent storms. But there are other costs as well. What is the economic impact of such storms?

Have students work in teams to identify the economic impact of hurricanes on our state. Teams should cover at least the following areas: (1) Farming costs and losses; (2) livestock costs and losses; (3) timber/forest costs and losses; (4) business/industrial costs and losses; (5) residential costs and losses; (6) utilities/public services disruptions in services; and (7) health/emergency care costs.

As teams research their areas, they should identify such common economic loss factors as revenue lost from production time in businesses and industry, revenue lost from damaged crops, loss of timber production from damaged trees, the impact of loss of buildings and homes, medical expenses for handling injuries and emergency services as well as for mental and physical stress associated with hurricanes. In addition to immediate economic impact, teams should think about long-term impact caused by such factors as employee absenteeism due to rebuilding needs and emotional stress.

Figure 1 Enhanced Fujita Scale for Tornadoes

Category	Wind Speeds (mph)	Potential Damage
EF0	65–85	Light damage
EF1	86–110	Moderate damage
EF2	111–135	Considerable damage
EF3	136–165	Severe damage
EF4	166–200	Devastating damage
EF5	Over 200	Incredible damage

Map 7 Hurricane Paths

Map Skill: What area seems to be the most active for hurricanes?

North Carolinians are far more likely to die from being struck by lightning than from tornadoes. Our state ranks third in the nation in the number of citizens killed by lightning, just behind Texas and Florida.

The Path of Hurricanes

Hurricanes are tropical storms that bring high winds and heavy rains. North Carolina's hurricanes most often develop over the Atlantic Ocean, where they pick up enough moisture to create a huge vortex (rotation) of water high in the atmosphere. The rain rotates very rapidly around a center known as "the eye." If the "wall" at the edge of the eye is strong enough to hold together, the force of the wind and rain can do very heavy damage when the storm hits land.

Hurricanes generally damage North Carolina in three ways. First, the wind and rain create a "storm surge" that brings a huge tide onto the beach, wiping out the sand, plants, and manmade structures in its path. A hurricane that hit the Outer Banks in 1845 actually cut two inlets, Hatteras and Oregon, in the sand. Second, the swirling winds can do great damage. This occurred in 1954 when Hurricane Hazel's winds pounded the state's Coastal Plain for thirty-six hours. In some places, the winds exceeded 150 miles an hour, enough to tear up houses in less than a minute. Third, hurricanes usually slow up and weaken over land, since they can no longer suck up water from the ocean. They end up dumping their water onto the state, causing widespread flooding. This was the case in 1999, when Hurricane Floyd caused un-

Character Education

Emphasize that part of taking responsibility is understanding that our actions affect those around us. Discuss ways in which your students can show their sense of responsibility in caring for younger brothers or sisters in the event of severe weather.

Research Activity

Have students choose one of the hurricanes mentioned in the text and conduct further research on it. They should prepare a 1-2 page report on the hurricane, including such information as the number of people killed or injured, the number of houses or buildings destroyed, and the economic impact on the region and the state.

Figure 2 Saffir-Simpson Hurricane Scale

Scale Number or Class	1	2	3	4	5
Wind Speeds (mph)	74–95	96–110	111–130	131–155	Over 155
Storm Surge (in Feet)	4.0-4.9	5.0-7.9	8.0-11.9	12.0-18.0	Over 18.0
Expected Damage	Minimal	Moderate	Extensive	Extreme	Catastrophic

precedented flooding on the rivers of the Coastal Plain. Princeton, a small suburb of Tarboro on the Tar River, was destroyed by the flood.

Hurricanes can also enter the state from other states, most often coming from the south. Hurricane Hugo did major damage in 1989 after almost wiping out the South Carolina coast. Electric power was off in the Charlotte area for weeks. Even the mountains can be affected by these tropical storms. Two groups of clouds converged near Grandfather Mountain to cause the "1916 Flood," which swept away houses and bridges all along the Catawba River. Witnesses saw a six-foot-high wave go downriver near where the Interstate 40 bridge crosses the river today.

The frequency of hurricanes comes and goes in cycles. There were twice as many major hurricanes in the 1950s as in the 1960s. No significant storms came along in the 1970s, but the frequency of the storms coming to North Carolina increased dramatically in the 1980s and 1990s.

Although North Carolinians cannot predict which part of their state will be hit when a hurricane develops, they can plan for the likelihood of a storm. Most develop during the hurricane "season" that starts in June, peaks in September, and lasts until the end of November. North Carolinians then worry about other types of storms as the weather cools.

Above: Hurricane Floyd flooded much of the Coastal Plains. Thousands of residents lost their cars, animals, and houses.

Did You Know?

The U.S. National Weather Service started naming hurricanes in 1953, using women's names. In 1979, it began including men's names.

It's Your Turn

1. What is the difference between weather and climate?
2. What are the four types of precipitation?
3. Which is a "tropical" storm—a tornado or a hurricane?

Multidisciplinary Activity

Math: Using the Saffir Simpson Hurricane Scale, Figure 2, have students answer the following questions:

1. During a category 4 hurricane in Wilmington, North Carolina, the winds reached a speed of 140 mph. If the wind speed was cut in half, would the condition still be considered a hurricane? If so, what category would it fall under? Would it still be a hurricane if the wind speed was cut in half again?
2. If the current wind speed is 100 mph, and catastrophic damage is expected during the upcoming hurricane, at least how many more miles is the wind going to have to move per hour before it has reached that stage?
3. If the hurricane is supposed to reach category 4 but wind speeds have only reached 70 percent of those speeds, what are the current wind speeds?

Answers: 1. no; 2. 55; 3. ranging between 91.7 or 92 mph to 108.5 or 109 mph.

Lesson Closure

Ask students why climate and weather make a difference to the economy of the state, including the impact of climate on tourism, agriculture, and recreation.

ASSESS

It's Your Turn

1. Weather is short-term atmospheric conditions; climate is the long-term conditions.
2. Rain, snow, sleet, hail
3. Hurricane

Teacher Notes

Teacher CD-ROM

You can use the ExamView software on the CD-ROM to create a section quiz or a chapter test.