

Virginia's Weather History

Virginia Winters

Virginia's biggest winter storms are the great "Nor'easters". At times, Nor'easters have become so strong that they have been labeled the "White Hurricane". In order for these storms to form, several things need to occur. High pressure builds over New England. Arctic air flows south from the high center into Virginia. The colder and drier the air is, the denser and heavier it becomes. This cold, dry air is unable to move west over the Appalachian Mountains. Instead, it remains trapped to the east side, funneling down the valleys and along the coastal plain toward North Carolina. To the east of the arctic air is the warm water of the Gulf Stream. The contrast of cold air sinking into the Carolinas and the warm air sitting over the Gulf Stream creates a breeding ground for storms. Combine this with the right meteorological conditions such as the position of the jet stream, and storm development may become "explosive" (sudden, rapid intensification; dramatic drop in the central pressure of the storm).

For a good Nor'easter to develop, the jet stream entering the West Coast of the United States splits. The northern branch crosses the northern Rockies and Canada while the southern branch dips to cross the Gulf Coast states, where it picks up a disturbance that it carries northeast across Virginia to rejoin the northern branch over Newfoundland. The northern branch of the jet supports the southward sinking cold air. When the disturbance interacts with the temperature boundary formed by the warm Gulf Stream waters and the arctic air mass inland, a low-pressure system forms that intensifies into a Nor'easter. The strong wind from the northeast gives the storm its name, Nor'easter. Wind blowing counter-clockwise around the storm center carries warm, moist air from the Gulf Stream up and over the cold inland air. The warm air rises and cools, and snow begins. The storm's speed and exact track to the north become critical in properly forecasting and warning for heavy snow across Virginia. It is quite common for the rain-snow line to fall right over Petersburg, Richmond or Fredericksburg. Heavy snow often falls in a narrow 50-mile wide path about 150 miles northwest of the low-pressure center. Closer to the low's center, the warmer ocean air changes the precipitation to sleet, freezing rain and eventually rain. If the forecasted storm track is off by just a little bit, it may mean the difference between forecasting heavy rain, freezing rain or sleet, and a foot of snow.

Intense winds around the storm's center build waves that rack the coastline and sometimes drive water inland, causing extensive coastal flooding and severe beach erosion. Unlike a hurricane, which usually comes and goes within one tidal cycle, the Nor'easter can linger through several tides, each one piling more water on shore and into the bays. March 5-9, 1962, is known as the "Ash Wednesday Storm." The storm lingered off the Virginia Capes for days. It caused over \$200 million (1962 dollars) in property damage and major coastal erosion from North Carolina to Long Island, N.Y.

During the winter of 1993-1994, a series of ice storms struck Virginia. The region was overdue for an ice storm, but it was unprecedented to have several occur in one season. Ice storms are not an uncommon event in the valleys and foothills of the Appalachian Mountains; utility company records show the frequency with which fallen wires need to be repaired. The set up is not completely unlike that for a Nor'easter. High pressure over New England funnels cold, dry arctic air south over the state. The air tries to push west but can not rise over the Appalachian Mountains and becomes trapped on the east side. A storm moves northeast from the southern plains or Gulf Coast region. Instead of passing south and east of Virginia, it often moves up the western slopes of the mountains. As this warm, moist air rises over the mountains and the trapped cold air on the east side, precipitation begins.

The type of precipitation depends on the depth of the cold air. At first the thickness of the cold air mass is often enough to produce snow, but as the warm air passes over the cold air and erodes it, the cold air mass gets more and more shallow. Soon the cold air mass is too thin to produce snow. Rain droplets freeze into small ice pellets, or sleet, as it falls through the cold air. When sleet hits the ground, it bounces and does not stick to objects. Therefore, it is generally considered no more than a minor nuisance. However, during the 1993-1994 winter storms, several inches of sleet were enough to cause considerable problems on roadways in Northern Virginia.

Eventually, the cold air mass is so shallow that the rain does not freeze. If the temperature of the earth's surface is below freezing, then rain will freeze as it hits the ground, producing freezing rain, a very dangerous on roadways or walkways. As the ice accumulates on trees and wires, the weight eventually causes them to break, knocking out power and phone service. Sometimes, so much ice can accumulate that structural damage and collapse can occur to buildings and communication towers. During the Feb. 10-11, 1994 ice storm, some areas of southern Virginia received an astounding three inches of ice, causing tremendous tree damage and power outages for up to a week. More recently on Dec. 23, 1998, the Petersburg and Williamsburg area had a similar experience.

Other types of weather systems generally do not cause major problems for Virginia. Storms such as the "Alberta Clipper," a fast moving storm from the Alberta, Canada region, or a cold front sweeping through from the west generally do not bring more than one to four inches of snow in a narrow 50 to 60 mile-wide band. Sometimes, the high pressure and cold arctic air that follow in the wake of a clipper become the initial set up for a Nor'easter. In very rare cases, elements combine to produce very localized heavy snow without any fronts or storm centers nearby. These events are nearly impossible to forecast with any accuracy, such as the event in Northern Virginia on March 9, 1999. An unexpected nine to 12 inches of snow fell in a very narrow band (about 25 miles wide) through a very heavily populated and well-traveled corridor (Winchester to Middleburg to Fairfax to Alexandria).

Virginia's Historic Winter Extremes

Information on storms and weather go back a long time in Virginia, thanks to record keeping by early weather observers such as George Washington, James Madison and Thomas Jefferson, and journals and articles written by early settlers. While early documentation of winter storms is not as extensive as that of hurricanes, listed below are some of the historic winter storms and cold waves to have impacted the Commonwealth of Virginia. David Ludlum, a weather historian and author, compiled information for the 18th and 19th centuries prior to National Weather Service records that begin in 1871 in his books "Early American Winters" and "American Weather Book."

18th Century Winters

Washington and Jefferson Snow Storm, Jan. 28, 1772: Recorded in both George Washington's and Thomas Jefferson's diaries, the storm left 30 to 36 inches of snow from Charlottesville to Winchester to Washington, D.C., and remains the unofficial record. The deep snow pack prevented travel for up to two weeks, and postal service was stopped for five weeks.

May 4, 1774: Snow was reported in the Williamsburg Gazette to have fallen in Dumfries, Va. George Washington's at Mount Vernon, logged in his diary a cold day with spits of snow and a hard wind from the northwest. Thomas Jefferson near Charlottesville observed the Blue Ridge Mountains covered with snow. The late-season snow and frost killed most of the fruit crop in the northern part of the state.

Dec. 25, 1776: Thomas Jefferson noted that the first winter snow fell on Dec. 20, but did not last on the ground one day. Temperatures dropped to 30°F or colder on Christmas Day. That night, 22 inches of snow fell. From the 20th of December until March 6, 10 snows covered the ground and some of them were deep. The first rain came on the 9th of March. In Frederick County, two feet of snow was recorded.

The Hard Winter of 1779-1780: This winter was so cold that ice was said to have been piled 20 feet high along the Virginia Coast and stayed there until spring. The upper portion of the Chesapeake Bay was frozen, allowing people to walk from Annapolis to Kent Island, Md. The Virginia portion of the Bay was frozen near the mouth, as well as all waterways in Virginia, which were firm enough to support the crossing of a regiment of the Virginia Infantry fighting the War of Independence as it marched from Falmouth to Fredericksburg, crossing the Rappahannock River, which had been frozen since the previous November.

The Long Winter of 1783-1784: Not as cold as 1780, this winter lasted longer into the spring, and was thought to rank near the top for extremes in cold and snow. The Chesapeake Bay once again froze almost all the way to the mouth. James Madison in Orange County, Va. wrote in a letter to Thomas Jefferson, "We had a severer season and particularly a greater quantity of snow than is remembered to have distinguished any preceding winter." The thaw caused an ice jam on the James River at Richmond that gave way, causing a flash flood of ice and water that swept away a bridge and sank boats that were tied up below the falls. Ice on the Potomac did not break until March 15th.

Jan. 1792: The Elizabeth River at Norfolk froze for the first time since 1784.

Feb. 14, 1798: The Norfolk Herald on Feb. 17 and the New York Spectator on March 3 reported snow in Norfolk "in many places up to six feet deep," the greatest snowfall ever experienced. Some accounts claim that 40 inches of snow fell in one night in Norfolk and along the coast, but no snow fell 25 miles inland. Over northeast North Carolina, 16 inches of snow was reported. Wind blowing from the north to northwest off the Chesapeake Bay may have enhanced the snowfall in the Norfolk area, much like the winds blowing across Lake Erie produce "lake effect snow" in New York.

19th Century Winters

May 1803: Washington, D.C. had several days of unprecedented cold, with ice forming at night and snow falling on at least one day. More significant snow fell to the north across New Jersey and into New England.

Jan. 6-7, 1821: A Nor'easter traveled from Charleston, S.C. to New England, leaving a band of deep snow stretching from Virginia to New Jersey. Winchester had eight inches of snow and Washington D.C., had 12 to 18 inches. Temperatures fell to below zero in some areas after the storm.

The Great Snowstorm, Jan. 14-16, 1831: Deep snow measuring 13 inches in Washington, D.C. and the Shenandoah Valley prompted an Alexandria observer to state that nothing since 1809 even approached the fury of this storm. Petersburg suffered a 50-hour blizzard and eight inches of snow. The Winchester Republican reported, "Never was such a storm known here, nor does any person whom we have seen, remember to have witnessed one more severe elsewhere." The storm stretched from Georgia to Maine and west into Ohio.

Jan. 4-5, 1835: Alexandria recorded the temperature at -15°F. The Potomac River was frozen and the Chesapeake Bay froze down to the Virginia Capes for the first time in almost 50 years.

Dec. 22-23, 1839: Snow began around 3 a.m. in Washington, D.C. as a northeast gale intensified. The storm reached its greatest intensity around 9 p.m. that evening when the barometer dropped to its lowest point, 29.25 inches. Then the wind backed toward the northwest and snow continued until morning, with 10 inches accumulation in the city.

March 16-18, 1841: A heavy snowstorm dropped up to 30 inches of snow in the Tidewater area, measured in areas unaffected by wind.

The Great Gust, Feb. 27 to March 2, 1846: A severe coastal storm hit the Northeast and caused \$500,000 in damage. Norfolk recorded tides up to five feet above normal; fifty families drowned in North Carolina.

William S. Forrest in "Historical and Descriptive Sketches of Norfolk and Vicinity" in 1853 recorded:

"Friday, Feb. 27, 1846. A snowstorm of almost unprecedented severity commenced on this day, the wind blowing a gale from the northeast.

"Saturday, 28th. The snow was several inches deep, and rain began to fall during the day, which continued until noon on Monday, March 2nd, when the rain gave place to hail, which fell rapidly, the wind continued with unabated violence 'til midnight when it increased to a terrific hurricane, which tore off roofs of buildings, uprooted trees and demolished fences. The tide rose to an extraordinary height. Never since 1825 had it risen so high. Wide Water Street and the streets, lanes, and wharves below were completely inundated and very large quantities of merchandise...were destroyed."

The American Beacon, March 4, 1846:

"The wind continued from the NNE, accompanied by snow and hail until nearly 12 o'clock Monday night...Damage...confined to unroofing of residences...blowing down of (some buildings) damage...to shipping (was) immense."

The Norfolk Landmark, Aug. 19, 1879:

"The great storm of 1846, known in all this section as "The Great Gust" commenced at 8 o'clock on the night of Sunday, March 1st of that year, and the rain and sleet were terrible. It continued all day Monday and terminated Monday night with heavy fall of snow. The tide rose 12 inches higher than it had for 45 years, inundating the wharves and coming beyond the north side of Water Street half way up to the market house.... The storm was equally severe at Portsmouth, Old Point and Hampton, and great loss of property resulted."

The Great Blizzard and Freeze, Jan. 18-19, 1857: More than a foot of snow fell with temperatures below 20°F across the state. Strong winds caused structural damage on land, wrecked ships at sea and great drifts that blocked transportation through the state. One report states that Norfolk was buried under 20 foot drifts of snow. Washington, D.C. got 14 to 24 inches, with drifts four feet deep; Portsmouth reported 16 inches; Halifax, about 16 inches with drifts to five feet; Brunswick County reported 18 inches; Prince George County 15 inches; Christiansburg measured 14 inches; and Winchester 8 inches. Richmond was cut off from Washington, D.C. for seven days. The Richmond Enquirer's editor remarked,

"Sunday last we had one of the severest snowstorms which has occurred in this area for many years. Snow commenced falling about 7 pm Saturday night and by Sunday morning the wind had increased to a perfect gale - all day Sunday and Sunday night the snow fell rapidly accompanied by high winds which banked up the snow in some places as high as seven or eight feet. On average we would think the snow about two feet deep."

Temperatures fell below zero after the storm: Christiansburg reported -8°F; a Petersburg newspaper reported the temperature in the city dropped from -15°F to -22°F; temperatures fell

to between -10° to -17° in Halifax; at Portsmouth, it was -5°F. The cold was so extreme that all Virginia rivers were frozen over. The Chesapeake Bay was solid ice a 1 ½ miles out from its coast. At Cape Henry, one could walk out 100 yards from the lighthouse on the frozen ocean.

Jan. 21, 1863: A severe coastal storm dropped heavy rains on the Fredericksburg area. It rained for 30 hours, dropping more than two inches, making mud so deep that mules and horses died attempting to move equipment. The rivers became too high and swift to cross, disrupting the Union Army offensive operation in the ill-famed "Mud March".

The Great Storm of 1872, March 1-2: Winds increased from the northeast to gale force (over 40 mph) on the coast and snow accumulated several inches. The wind drove water into the Tidewater area and rivers. Water rose rapidly, flooding wharves and the lower part of Norfolk.

Nov. 17, 1873: Severe storm and gale brought high tides to tidewater area flooding wharves and the lower portion of Norfolk.

Dec. 3-6, 1886: A southern storm dumped heavy snow in far southwest Virginia. The storm dumped 11 inches in Montgomery, Ala., 22.5 inches in Knoxville, Tenn., 26 inches in Asheville, N.C. and 16 inches in Wytheville, Va., causing some roofs to collapse.

April 6, 1889 Nor'easter: Hampton Roads recorded 75 mph sustained wind from the north and Cape Henry at 105 mph. Tides at Norfolk reached 8.37 feet above Mean Low Water, which is over 4 feet above flood stage level.

The Norfolk Landmark, April 7, 1889:

"...The storm was equal of the famous one of August 18, 1879. Water Street from end to end was a river of raging water; both ends of Main Street were covered with water, West Main Street as high as Jackson. Jackson Street was flooded clean up to Main. The water was a foot at the station-house door, and all the low Washington, was far under water."

On April 9, 1889, The Norfolk Landmark reported that damage was heavier than the August 1879 hurricane because it lasted for a much longer duration- the water was 18 inches higher. Rain, snow and sleet fell, totaling 3.2 inches. Drummonds Bridge was swept away (later replaced by the Ghent bridge). Trees were uprooted and roofs were torn off.

Dec. 26-28, 1892: Norfolk set three local records for snow: The greatest single snowfall at 18.6 inches; the most in 24 hours at 17.7 inches; and the maximum depth of snow on the ground at 18.6 inches. Normal snowfall at Norfolk is only 7.8 inches per year.

Great Arctic Outbreak of '99 and the Great Eastern Blizzard of '99, February 1899: Extreme cold settled into the state with Quantico recording a record low of -20°F and Washington, D.C. recording -15°F on the 11th. The temperature fell to -21°F in Fredericksburg, -9° in Warrenton, -12° in Greene County, -17° in Winchester, -23°F at Woodstock, -22° at Harrisonburg and -29° at Monterey in Highland County. The blizzard struck on Valentine's Day, dropping 16 inches of snow in Richmond and giving Washington, D.C. a snow depth of 34 inches. The city recorded its greatest monthly total with 35.2 inches and its greatest seasonal snowfall total with 54.4 inches. For the month, Harrisonburg recorded 47 inches, Winchester 39 inches and Fredericksburg 35 inches. Warrenton recorded the state monthly snowfall record with 54 inches. The 1898-1899 winter was so cold over a large part of the United States that ice flowed from the Mississippi River into the Gulf of Mexico.

20th Century Winters: 1900-1949

Dec. 22-23, 1908: Washington D.C. recorded 11.5 inches of snow.

Jan. 13-14, 1912: An arctic cold wave struck the region with subzero temperatures. Washington D.C. fell to -13°F, Quantico fell to -16°F, Fredericksburg to -11°F, Culpeper to -20°F, Loudoun County to -25°F, Woodstock to -22°F, Harrisonburg to -25°F, Staunton to -12°F and Lexington to -16°. In Rockingham and Loudoun Counties these were the coldest temperatures ever recorded.

March 29, 1921: In Northern Virginia and Washington, an early spring abruptly ended when a cold front passed through. It was 82°F at noon in Washington, D.C. on the 28th, and by the morning of the 29th, the temperature had dropped to 26°F - a fall of 56° in less than 24 hours. The sudden drop in temperature in caused damage to crops for the year.

Knickerbocker Storm, Jan. 28, 1922: Exactly 150 years after the Washington and Jefferson Storm came the deepest snow of this century to hit parts of Virginia. The storm struck from South Carolina to Massachusetts with a heavy snow band stretching across Richmond (19 inches) and Washington, D.C. (25 inches), immobilizing the region. The weight of the snow was too much for the Knickerbocker Theater in Washington, D.C. and it collapsed, crushing 98 people to death and injuring 130.

March 1-3, 1927: Nor'easter high winds gusted to 62 mph at Cape Henry and 52 mph at Norfolk. Heavy snow fell across North Carolina into Virginia and travel was delayed for two to three days. In Virginia Beach, high tide and heavy surf on March 2 inflicted considerable damage. The beaches in some places were washed back 50 feet and denuded of the overlying sand, exposing the clay beneath.

Feb. 7, 1936: Over 14 inches of snow fell in the Northern Virginia with greater amounts in the Skyline Drive area. The heavy snow set the stage for the great spring flood in March when warm temperatures brought a sudden thaw to the snow pack. Following the snow, Richmond's temperature fell to a record low for the month reaching -10°F.

Nov. 24-25, 1938: It was the largest snow of record for November. Early heavy snowstorms dumped seven inches in Washington, D.C. and Northern Virginia and as much as one to 2.5 feet of snow in western Maryland and the Virginia mountains. Hundred of automobiles were snowbound on the highway during the Thanksgiving holiday travel period. Three Virginians died in the storm.

Jan. 23-24, 1940: Farmville and New Canton recorded 24 inches in 24 hours setting a new record in the state. The storm also set a number of records for Richmond. Official records in Richmond began in 1897. The storm dropped almost two feet of snow (21.6 inches) in 24 hours and helped set a record for the month of 28.5 inches. Lighter amounts fell to the north. Alexandria received close to 10 inches of snow. Richmond was shut down with drifts as deep as four feet. Businesses were closed for a couple of days and some schools for a week. There were 12 deaths attributed to the storm in Virginia with damages estimated at \$500,000. With fresh snow on the ground, temperatures fell. On the six days following the storm, low temperatures dropped below zero with the coldest day setting a new all time record of -12°F. This was also the coldest month of February on record for Richmond.

March 29-30, 1942: The "Palm Sunday Snowstorm" was a seasonal latecomer. Washington, D.C. and portions of Northern Virginia received a foot of snow.

January 22-28, 1943: Three years after Richmond's big snowfall, Richmond was hit with its worst ice storm of record up to that time. The ice accumulated to a glaze an inch thick. The weight of the ice was too much for utility poles and wires bringing them down and cutting off electricity and telephone service. Thousands of trees were damaged or destroyed by the weight of the ice.

20th Century Winters: 1950-2000

April 11, 1956: A severe Nor'easter gave gale winds (40 mph +) and unusually high tides to the Tidewater Virginia area. At Norfolk, the strongest gust was 70 mph. The strong northeast winds blew for almost 30 hours and pushed up the tide, which reached 4.6 feet above normal in Hampton Roads. Thousands of homes were flooded by the wind-driven high water and damages were large. Two ships were driven aground. Waterfront fires were fanned by the high winds. The flooded streets made access to firefighters very difficult, which added to the losses.

February 15-16 and March 20-21, 1958: Over 14 inches of snow fell in Northern Virginia in the Washington area in a mid-February storm. Transportation was paralyzed. Two deaths in Virginia were attributed to the storm. Another Nor'easter struck on March 21, dropping another 10 to 15 inches in the central mountains and across northern Virginia.

February 12 through March 10, 1960: Four storms in four weeks. The first storm hit February 12-15 dropping 6 inches to a foot all the way from Louisiana to Canada. There six fatalities attributed to the storm in Virginia. The second storm struck February 18-20 and dropped up to two feet in the western Virginia mountains. The third storm hit March 2-5 and dropped 4 to 20 inches in Virginia. Twelve deaths were attributed to the storm in Virginia. The fourth storm struck on March 8-10. It dropped 10 inches in Georgia and up to 24 inches in Kentucky. Four to 15 inches fell across Virginia with drifts much higher. North Carolina recorded drifts from 3 to 30 feet! Many buildings collapsed from the accumulative weight of the snow and structural damage totaled into the millions.

The Winter of 1960-1961: The stormy pattern of the last couple winters continued with three more significant storms. The first one was December 10-12, 1960. Heavy snow and high winds hit from Virginia into New York. In Virginia, snow fall ranged from 4 to 13 inches in the north and west. There were seven fatalities in Virginia attributed to the storm. The next snowstorm struck on January 19-20 from North Carolina to New York. Virginia saw up to 12 inches. It caused a great traffic jam in northern and central Virginia and D.C.. Two deaths were blamed on the storm in Virginia, due to overexertion and accidents. The third storm struck February 3-5 and hit like a blizzard with severe cold and gale force winds. Eight inches fell in Washington, 2 to 13 inches across Virginia with as much as 36 inches in New York. There four fatalities in Virginia.

March 5-9, 1962, The "Ash Wednesday Storm": The storm hit Virginia during "Spring Tide" (sun and moon phase to produce a higher than normal tide). The storm moved north off the coast past Virginia Beach and then reversed its course moving again to the south and bringing with it higher tides and higher waves which battered the coast for several days. The storm's center was 500 miles off the Virginia Capes when water reached nine feet at Norfolk and 7 feet on the coast. Huge waves toppled houses into the ocean and broke through Virginia Beach's concrete boardwalk and sea wall. Houses on the Bay side also saw extensive tidal flooding and wave damage. The beaches and shorefront had severe erosion. Locals felt the damage from this storm was worst in Virginia Beach than that of the 1933 Hurricane. The islands of Chincoteague and Assateague were completely underwater. When the water receded, hundreds of thousands of dead chickens were left and the Virginia Department of Health indicating it was an extreme health hazard asked all women, children and elderly to evacuate. A million dollars in damage was done to NASA's Wallops Island Launch facility and an estimated \$4 million in wind and flood damages occurred to the City of Hampton. Winds up to 70 mph built 40-foot waves at sea.

Heavy snows fell inland. Big Meadows, in Shenandoah National Park on the Blue Ridge Mountains just southeast of Luray, recorded Virginia's greatest 24-hour snowfall with 33 inches and the greatest single storm snowfall with 42 inches. Two feet of snow fell from Charlottesville (21 inches) to Luray (24 inches) to Winchester (22 inches) setting new records.

Hot Springs (in the mountains northwest of Roanoke) recorded 17 inches of snow, Culpeper 15 inches, and Richmond 12 inches from the storm. Roads were blocked and electrical service was out for several days in some areas.

January 30-31, 1966: A blizzard struck Virginia and the Northeast U.S. This was the second snowstorm to hit Virginia in a week. The first storm dumped 15 inches in Richmond and 9 inches in Norfolk. With fresh snow on the ground, arctic air settled in and temperatures dropped into the teens. The second storm dumped one to two feet of snow over a large part of the state: Lynchburg - 11 inches; Farmville - 23 inches; Partlow - 20 inches; Fredericksburg - 15.5 inches; Manassas - 13 inches; and Arlington - 14 inches (added to a previous snow, the depth on the ground came to 20 inches). Lynchburg set a monthly record with almost 32 inches (31.8). Intense blowing and drifting snow continued and kept roads closed for several more days after the storm. Temperatures dropped into the single digits with some falling below zero. Wind chill temperatures were dangerously low. The Richmond area went on to set a record for the calendar year with 41.6 inches. Roanoke had a record month with 41.2 inches.

January 1977: The Bicentennial Winter was the coldest seen on the East Coast since before the founding of the republic. In Northern Virginia, the snow began on January 4, just as the Carter Administration was moving into town. New storms dropped a few more inches every few days to put a fresh coating on the streets that were just clearing from the previous storm and give a clean look to the piles of dirty snow that were accumulating along roadways and in parking lots. The Tidal Potomac (salt water) froze solid enough that people could skate across it near the Memorial Bridge. The average temperature for the month of January in Washington was 25.4°F, which was the coldest since 1856 when the temperature averaged 21.4°F. The normal January average temperature for Washington is 34.6°F (about 9° warmer). Roanoke averaged only 23.6°F, Richmond 25.3°F, and Norfolk 29.2°F (all 12° below normal). The prolonged cold wave caused oil and natural gas shortages. President Carter asked people to turn thermostats down to conserve energy. Washington did not see heavy snow like the Great Lake region did that winter. The cold winds blowing across the warm lakes brought 68 inches of snow to Buffalo, NY. Washington recorded 10 inches of snow in January, Richmond 11 inches, and Roanoke only 9 inches. Little to none fell the rest of the winter ending it well below normal. The cold wave penetrated into the South and on January 19, snowflakes were seen in Miami, Florida!

January 19-20, 1978: A strong Nor'easter developed off the Southeast Coast. It was the third snow in a week for Virginia. Charlottesville got a foot of snow, with up to 30 inches in the west central mountains of Virginia. East of the mountains saw 4 to 8 inches until you reached Richmond. Richmond received a devastating ice storm causing major power disruptions and tree damage. Many small buildings and roofs collapsed from the weight of the snow in the west. One man was injured when a roof fell. One person died while shoveling snow.

January 20-21, 1979: Up to an inch of solid ice was reported over sections of Southwest Virginia. Numerous trees and power lines came down causing extended power outages. Some localities were still without power a week after the storm. Pittsylvania County reported \$1 million in damage to trees. Utility damages were in the millions. Damage also occurred to homes and vehicles from trees falling on them.

February 18-19, 1979: "The Presidents Day Storm" was considered the worst storm in 57 years to strike Northern Virginia. Snow depths from the storm ranged from 6 to 8 inches southwest and southeast, 8 to 14 inches in the piedmont from south-central Virginia through central Virginia (Richmond reported 11 inches), and up to 20 inches over Northern Virginia. At times, snow was falling 2 to 3 inches per hour and temperatures were in the single digits to teens. Huge tractors and other farm machinery had been driven to the Mall in Washington, D.C. to protest for higher agricultural pricing. When the storm hit, the farmers used their equipment to help locals dig out of nearly two feet. Four deaths were attributed to heart

attacks from stress due to overexertion during and after the storm, and 18 injuries occurred from falls on ice. Temperatures across the state were very cold (single digits in the north) when the snow began making the storm similar to the February 1899 storm. Even Norfolk got 7 inches before changing to rain and recorded nearly 13 inches of snow for the month.

Winter of 1980: On January 4 and 5, a heavy wet snow fell over eastern Virginia with as much as 18 inches reported at Williamsburg. A second storm hit on February 6 that dumped 6 inches in Williamsburg and as much as 20 inches at Virginia Beach. Over a foot of snow fell in Norfolk. This was topped on March 1. Once again, arctic air had settled over Virginia and temperatures were in the teens. More than a foot (13.7 inches) of snow fell in Norfolk. The heavy snow combined with strong winds created blizzard conditions. Norfolk's total for the season came to a record 41.9 inches making this the snowiest winter ever for eastern Virginia.

February 10-11, 1983: The "Blizzard of '83" beat the Presidents Day Storm. It covered an unusually large area of Virginia with more than a foot of snow. The storm set a new 24-hour snowfall record in Lynchburg with 14.6 inches, Roanoke with 18.6 inches and Richmond with 16.8 inches. Richmond received 18 inches total and parts of Northern Virginia measured as much as 30 inches on the ground. Winds gusted over 25 mph all day on February 11 in the Richmond area causing three-foot high drifts. This was the third heaviest snowfall on record for Richmond for the last 100 years. The cost of clearing the snow from state roads came to \$9 million.

March 28-29, 1984: A rapidly deepening storm moved out of the central Mississippi Valley on the 28th. It produced heavy rains over Southern Virginia on top of already wet soils and numerous streams and rivers flowed out of their banks. The intense low tracked across the lower Chesapeake Bay early on the 29th. Winds gusted to over 50 mph. Strong easterlies combined with the low pressure to cause considerable tidal flooding in the Tidewater area and especially in Accomack County. The tidal flooding was the worst experienced since the great March 1962 storm. Several hundred homes and businesses in the towns of Saxis, Onancock and surrounding communities were inundated with water as much as 5 feet deep, causing the evacuation of many residents. Seventy five percent of Tangier Island was flooded with up to a foot of water, while a large section of the airfield was unusable. The flooding, high winds and heavy surf destroyed many crab houses. Over 1500 acres of farmland planted with small grains was damaged by salt water. Rain changed to snow northwest of Richmond and west of Washington, D.C.. 15 inches fell in Berryville (probably convective type of snowstorm or "thundersnow"). The storm produced severe thunderstorms in the south part of the state that toppled trees and damaged buildings. In North Carolina, the storm produced the state's worst tornado outbreak of record.

January 20-22, 1985: An arctic cold front swept across the state ushering in extreme cold and high winds. Wind chill temperatures plunged well below zero. Winds knocked out power compounding the effects of the cold. Pipes froze and burst. Fresh snow of 4 inches with the front helped temperatures across the entire state fall below zero. New records were set at several locations in the south including Roanoke with -11°F and Norfolk with -3°F. Cable television lines were damaged by shrinkage caused by the extreme cold. On January 22, Mountain Lake recorded the coldest temperature ever in the state with -30°F.

February 1989: This was a month of big swings in the weather for Southeast Virginia. Twice, Norfolk saw record high temperatures in the mid 70°s followed by a significant snowfall. The two storms dumped a record 24.4 inches of snow in Norfolk. Over 14 inches occurred during one 24-hour period. It was the most snow to occur in one month in southeast Virginia in the last 100 years.

March 13-14, 1993: The "Superstorm of March '93" was also known as "The Storm of the Century" for the eastern United States, due to its large area of impact, all the way from Florida and Alabama through New England. The storm was blamed for some 200 deaths and cost a

couple billion dollars to repair damages and remove snow. In Florida, it produced a storm surge of 9 to 12 feet that killed 11 people (more deaths than storm surges Hurricanes Hugo and Andrew combined) and it spawned 11 tornadoes. In a large swath from Alabama to New England, it dropped over a foot of snow. As the storm's center crossed Virginia, weather stations recorded their lowest pressure ever.

However, this storm was not the storm of the century for Virginia. Virginia had seen greater snowfall and more damage by past storms such as the "Ash Wednesday" storm in March 1962. It was the biggest storm in a decade and it packed quite a wallop to the western portions of the Commonwealth. Unlike most big winter storms that move up the coast, this storm took a more inland track across Richmond and the Chesapeake Bay. It brought rain and some high winds to Southeast Virginia and heavy snow and blizzard conditions over portions of the north and west. A foot to a foot and a half of snow fell along the foothills to the Blue Ridge with two feet to the west. Extreme Southwest Virginia saw 30 to 42 inches of snow from the storm (the most snow in over 25 years). Some roofs collapsed under the weight of the snow. Winds produced blizzard conditions over portions of the west with snow drifts up to 12 feet! Interstates were shut down. Shelters were opened for nearly 4000 stranded travelers and those that left without heat and electricity. Virginia called out its National Guard to help with emergency transports and critical snow removal. Eleven people died in Virginia during and immediately following the storm from over-exertion and heart attacks shoveling snow or from exposure and hypothermia. Snow removal and clean-up costs were estimated at 16 million dollars.

January-February, 1994: These two months saw an unusual assault of ice storms on the Commonwealth. It began in mid January with an arctic blast that sent temperatures below zero over northern and western Virginia for a couple mornings. Winchester recorded -18°F on the 16th, Harrisonburg reached -13°F, Woodstock was -17°F and western Loudoun County reached -15°F. Between then and mid February, about a dozen storms hit dropping snow, sleet, and freezing rain over all but the southeast. The most devastating storm struck February 10-11. A swath of Virginia was coated with one to three inches of solid ice from freezing rain and sleet! The hardest hit was an area from Danville and Lynchburg northeast through Fredericksburg. Some counties lost 10 to 20 percent of their trees from the heavy ice. Roads were blocked and impassable. Electric and phone lines were down with as much as 90 percent of the county's people without power. Even with the help of electric companies from other states, many people were without power for a week. A presidential disaster declaration was given and damages were estimated at \$61 million. There were numerous injuries from automobile accidents and people falling on ice. Unfortunately, the National Weather Service does not keep records on ice amounts. However, this was likely the iciest winter Virginia had seen, at least this century.

January 6-13, 1996: The "Blizzard of '96" or the "Great Furlough Storm" began late on Saturday, January 6. Just one day earlier, an impasse between a republican congress and a democratic president over the 1996 Federal Budget had finally come to an end. Many federal employees had been on furlough with government offices shut down for almost a month. Employees would finally return to work on Monday, January 8.

However, Mother Nature did not cooperate. By Monday morning, much of Virginia and the Washington area were buried under 2 feet of snow. As much as 30 to 36 inches of snow fell over the western mountains and the Shenandoah Valley. Roanoke set a new 24-hour snow record with 22.2 inches and Lynchburg set a new record with 20 inches. High winds on the 8th swept the snow into 10-foot drifts in the mountains. Around Richmond and throughout central Virginia 1 to 2 feet of snow fell with 11 to 14 inches in the immediate metro area. Even the Tidewater area saw 5 to 8 inches of snow.

The entire I-95 corridor from near the North Carolina border into New England was paralyzed. Many rural and some residential areas did not see a snow plow for 5 days. The Federal

Government remained shut down for another 4 days. Many local governments and businesses were also closed. Schools announced their closure for the entire week and some were closed longer. A second storm struck on Friday, January 12 dumping another 2 to 6 inches. A maximum of 10 inches of snow fell over Highland and western Loudoun Counties. By the week's end, most of Virginia, west of Richmond, had seen 2 to 4 feet of snow! Most areas to the east had received at least a foot.

January 19-22, 1996: Just one week after 2 to 4 feet of snow fell over western Virginia, temperatures warmed into the 60°s ahead of a front which brought thunderstorms and heavy rain. The sudden warm-up caused a rapid snowmelt. The melted snow was the equivalent of 2 to 4 inches of rain. Some areas saw another 2 to 5 inches of rainfall on top of the melted snow. The saturated ground meant that all the rain and snow became run off into the streams and rivers, which could not handle it. Major flooding resulted. This sort of event had not happened since March 1936.

February 2-3 and February 16, 1996: A continuing series of Alberta clippers followed by strong Nor'easters struck the Commonwealth. The storm on February 2-3 dropped one to two feet of snow from to Charlottesville, Fredericksburg and across the Northern Neck. To the north of the heavy snow band fell 6 to 10 inches of snow and to the south of the band was a significant ice storm. Some counties along the North Carolina border saw about half of its population lose power. The ice caused about a half million dollars in damage and caused widespread disruptions in the Hampton Roads area. Following the fresh snow and ice came a cold wave from the 3rd through the 6th, with many areas dropping below zero. On the 5th, several places set new records. Lynchburg set a new all-time record low temperature reaching -10° F and Burkes Garden recorded -22° F, which is one of the coldest temperatures ever recorded in Virginia. On the 16th, another Nor'easter moved up the coast dumping 6 to 12 inches of snow in a swath across Virginia from Nottoway to Fredericksburg with Charlottesville on the west side of the heavy band and Richmond on the east side.

Winter of 1995-1996: Much of Virginia, north and west of Richmond, had either a record seasonal snow total or it was in the top three for this century. Lynchburg set a new record with 57 inches of snow and Dulles with 62 inches. Blacksburg had 76 inches. Bluemont recorded 87 inches. Fredericksburg and the Northern Neck saw nearly 60 inches of snow. Roanoke recorded its third snowiest season with 53.4 inches. Burkes Garden recorded 97 inches of snow (over 5 feet). Bland and Glasgow had 62 inches and Buckingham saw 67 inches for the season. Some schools lost as many as 15 days. It was difficult to make up the time and compensate for the disrupted school year. Some schools added hours to their days, others added Saturdays or teacher conference days and some schools stayed in session through most of June.

January 27-28 and February 3-6, 1998: "Back-to-Back Nor'easters" pounded the Tidewater area and produced coastal flooding. Tides remained higher than normal from astronomical high tides and the January 27-28 Nor'easter. Then came the February Nor'easter. Its slow movement and gale force winds pushed the tide to 7.0 feet above Mean Lower Low Water (MLLW) at Norfolk, which resulted in moderate to severe flooding. The entire town of Chincoteague on the Eastern Shore was under water. Willoughby Spit was the hardest hit area in Norfolk and homes in Sandbridge and Chick's Beach were severely damaged in Virginia Beach. Inland, heavy rains fell. Most areas that saw 2 to 4 inches with the January 27-28 storm again saw it with the February storm. Some locations received as much as 7.5 inches of rain. The rain resulted in flooding on small streams and creeks closing numerous roads. The floodwaters eventually flowed into the main stem of the rivers, which reached bank full or minor flood levels. A woman died in Culpeper after driving her car into floodwaters.

In the western part of the state, some high elevation counties saw one to two feet of snow in the January 27-28 storm. Thundersnow fell in Dickerson and Buchanan Counties were some people described the huge size of the snowflakes as being more like snowballs falling. Some

trees and power lines came down. Power was out to 99% of Dickerson County residents. When the next storm on February 3rd began snowing, over 1000 customers were still without power. A charter bus on Interstate-81 overturned injuring 20 people. One man in Tazewell County died as a result of rescue services not being able to reach him fast enough with the heavy snow and downed trees and power lines. With the February storm came more snow and then ice. In the Allegheny Highlands, a foot or more of snow fell and winds drifted it in some areas up to 6 feet closing roads. Areas east of the highlands saw 4 to 8 inches before the snow changed to freezing rain. A man died of a heart attack shoveling snow in Harrisonburg. Some areas got significant ice on top of the snow, causing trees to come down and, in one case, a roof to collapse. Heavy ice accumulated in the mountains with as much as 5 inches in some spots. (Click here to go to web site with pictures.) This did incredible damage to trees. Shenandoah National Park was closed for a week while trees were removed from Skyline Drive. Thousands of trees fell and work continued into April. Damage in the park alone was \$607,000. Near the North Carolina border on the Blue Ridge Parkway west of Martinsville and again near Lynchburg, severe thunderstorms blew down trees, power lines, destroyed two mobile homes and blew a roof off a business.

December 23, 1998, "The Christmas Ice Storm": A major ice storm struck central and southeast Virginia beginning on Wednesday, December 23 and lasting into Friday, December 25, Christmas Day. Icy conditions caused injuries from slips and falls and numerous vehicle accidents. Ice accumulations of up to an inch brought down trees and power lines. Outages were so widespread (400,000 customers on Christmas Eve) that some people were without power for up to ten days.

March 9, 1999: An area of low pressure moved southeast from the Ohio Valley toward North Carolina dropping heavy snow across the Appalachians. Light snow began around daybreak and intensified into the mid day. A localized band of heavy snow developed that stretched from the Eastern Panhandle of West Virginia, across Winchester, Middleburg and Fairfax. While the band was no more than 50 miles wide, the heaviest snow occurred in a 25 miles wide area that just happened to hit a major population area. Schools were closed and some stayed home with the children, but many others found themselves at work and on the roads in rapidly deteriorating conditions. In the heaviest band, snow was falling at a rate of 2 inches an hour making it difficult for road crews to keep up. Cars were stuck in snow and abandoned and soon littered the roadways making plowing even more difficult and travel for others even more hazardous. Reagan National Airport and Washington-Dulles International were nearly closed for most of the day. Loudoun County alone reported 53 vehicle accidents and 18 injuries. For those schools that do not close, 24 school buses got stuck on rural routes. At least 200 abandoned, damaged, or stuck vehicles had to be towed off interstates 95 and 66. Fairfax County reported 500 disabled vehicles and 30 injuries in just 6 hours.

January 24-25, 2000: A storm that was expected to move away from the coast, instead rapidly intensified off Georgia and headed almost due north. The Nor'easter spread heavy snow into Virginia during the night of the 24th and through the 25th. Storm warnings were posted for the late news on the 24th, but those who went to bed early without catching the news were startled to see the heavy white stuff falling in the morning. Several inches of snow was on the ground at daybreak, with winds gusting at 25 to 45 mph creating blizzard conditions in some areas. The region was at a stand still. Airports and transit systems were shut down. Schools were closed. Federal, state and county government offices were closed or quickly closed once the full impact of the storm was realized. Some federal employees in Northern Virginia who begin their commutes well before the government shutdown at 7 am were left battling the storm to attempt to return home. The heaviest band of snow fell from south central Virginia through Petersburg and the Northern Neck with a foot to a foot and a half of snow. Drifts of four to five feet were common. Snow mixed with sleet and freezing rain in some of the eastern counties. For those who did venture out on the 25th, numerous traffic accidents occurred. Virginia Beach alone recorded 84 during the storm. Strong winds pushed the tide in causing flooding of some roads. The most significant flooding was reported in the

Grandview area of Hampton. Some beach erosion occurred along the shore and the U.S. Coast Guard rescued four crewmembers of a vessel caught in the rough seas off Cape Charles. Cold weather followed with the fresh snow pack and temperatures fell into the single digits in the western valleys and piedmont. One woman died of hypothermia.

21st Century Winters

February 14-18, 2003: The most significant storm of the 2003-04 winter season impacting just about the entire state occurred from late February 14th through the morning hours on February 18th. Three rounds of precipitation resulted in 20 to 36 inches of snow across far northern Virginia, decreasing to between 7 and 12 inches of snow and sleet in the central part of the state, to mainly several inches of sleet and/or 1/4 to 1/2 inch of ice accretion in the south. A 24-hour snowfall of 16.7 inches at Ronald Reagan National Airport was the 5th highest on record. Charlottesville recorded almost 9 inches of sleet from the storm.

February 28, 2004: A snowstorm affected much of central and western Virginia...with 6 to 12 inches of snow reported in the Blue Ridge Mountains of southwest Virginia. The heaviest amounts, in the 10 to 12 inch range, fell in Roanoke city/county, and in Franklin county.

December 26, 2004: A coastal storm system produced a narrow band of heavy snow across northeast North Carolina and southeast Virginia, including the Virginia Eastern Shore. Some of the more significant snowfall totals were at Tabb and Quinby Virginia, where 14 inches fell, while between 12 and 13 of snow was reported at Eastville Virginia and Newport News Virginia. The snowfall fell in a band so narrow that nary a flake fell in the Richmond and Tri-Cities areas.

February 11-12, 2006: A major winter storm dumped significant snow across much of northern and central Virginia. Up to 15 inches of snow fell in the northern Virginia suburbs of Washington, D.C. Snowfall totals of 5 to 8 inches were common as far south as Charlottesville, Fredericksburg and areas north of Richmond. Nearly 300,000 customers in northern Virginia were without power as a result of the storm due to downed trees and power lines.

Virginia Winter Weather Summary

- **Roanoke Winter Statistics**
Average Snowfall = 22.9 inches
Greatest Snow = 22.2 inches in Jan. 1996
Snowiest Month = 41.2 inches in Jan. 1966
Coldest Temperature = -11°F in Jan. 1985
- **Richmond Winter Statistics**
Average Snowfall = 14.0 inches
Greatest Snow = 21.6 inches in Jan. 1940
Snowiest Month = 28.5 inches in Jan. 1940
Coldest Temperature = -12°F in Jan. 1940
- **Norfolk Winter Statistics**
Average Snowfall = 7.5 inches
Greatest Snow = 14.2 inches in Feb. 1989
Snowiest Month = 24.4 inches in Feb. 1989
Coldest Temperature = -3°F in Jan. 1985
- **Arlington/Alexandria/Washington Winter Statistics**
Average Snowfall = 16.6 inches
Greatest Snow = 28 inches in Jan. 1922
Snowiest Month = 35.2 inches in Feb. 1899
Coldest Temperature = -15°F in Feb. 1899

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