

= Effects of Hurricane Isabel in Virginia =

The effects of Hurricane Isabel in Virginia proved to be the costliest disaster in the history of Virginia . Hurricane Isabel formed from a tropical wave on September 6 , 2003 in the tropical Atlantic Ocean . It moved northwestward , and within an environment of light wind shear and warm waters it steadily strengthened to reach peak winds of 265 km / h (165 mph) on September 11 . After fluctuating in intensity for four days , Isabel gradually weakened and made landfall on the Outer Banks of North Carolina with winds of 165 km / h (105 mph) on September 18 . It quickly weakened over land as it passed through central Virginia , and Isabel became extratropical over western Pennsylvania on September 19 .

Strong winds from the hurricane affected 99 counties and cities in the state , which downed thousands of trees and left about 1 @. @ 8 million without power . The storm surge impacted much of the southeastern portion of the state , peaking at around 9 feet (2 @. @ 7 m) in Richmond along the James River ; the surge caused significant damage to homes along riverways . The nationwide maximum rainfall total from the hurricane was 20 @. @ 2 inches (513 mm) in Sherando , Virginia . In the state 's mountainous region , heavy rainfall caused severe and damaging flash flooding . The hurricane caused about \$ 1 @. @ 85 billion (2003 USD , \$ 2 @. @ 17 billion 2008 USD) in damage and 36 deaths in the state ? 10 directly from the storm 's effects and 26 indirectly related .

= Preparations =

By four days before Isabel made landfall , most weather models predicted Isabel to make landfall between North Carolina and New Jersey . Initially , forecasters predicted it to move along the coastline of the Chesapeake Bay , though as the hurricane neared land the predicted track was much closer to where it ultimately was . The National Hurricane Center issued a hurricane watch from the North Carolina / Virginia border to Chincoteague near its border with Maryland about 50 hours before Isabel struck land , including the southern portion of the Chesapeake Bay . 18 hours before the hurricane made landfall , the National Hurricane Center upgraded the watch to a hurricane warning for the entire coastline . Additionally , inland hurricane and tropical storm warnings were issued for south @- @ central Virginia . The Wakefield National Weather Service office issued three tornado warnings for four counties , though none became tornadoes . The office also issued two county @- @ wide flood warnings and 43 flood warnings and flood statements for various river basins .

The Virginia Emergency Management Agency was activated on September 15 , about three days prior to Isabel making landfall and entering the state . Officials in Hampton issued the first mandatory evacuation in the state on September 17 , about 35 hours prior to landfall . Eleven hours later , a mandatory evacuation was issued for some residents in Chesapeake , Norfolk , and Virginia Beach , with a recommended evacuation for some residents in the city of Suffolk and Isle of Wight , Northumberland , Richmond , and York counties . Later on September 17 Governor Mark Warner provided authorization for all recommended evacuations to become mandatory . By the time Isabel entered Virginia late on September 18 , evacuations were also issued for Accomack County , Chincoteague , Gloucester County , Lancaster County , Mathews County , Newport News , Poquoson , Portsmouth , and Westmoreland County . The zones ordered to evacuate included residents along waterfronts , in areas prone to flooding , potentially affected by storm surge from a Category 2 hurricane , low @- @ lying areas , health care facilities , or islands . The tools officials used to determine the evacuation zones included shelter locations , the SLOSH storm surge model , evacuation maps , and clearance times .

Despite the orders , a relatively small number of people evacuated for the hurricane . According to a telephone survey conducted by the United States Department of Commerce , the highest participation rate was for residents in the Northern Neck in areas potentially affected by the storm surge from a Category 2 hurricane , of which 41 % in the survey stated they left their houses for a safer location . In Surry , only 9 % of those in a Category 2 hurricane storm surge zone left . 30 % who participated in the survey along the Eastern Shore left . The primary reasons for the choice

whether to evacuate or not were due to the track of Isabel , its strength , or influence from the media . Most participants in the survey stated they did not hear any sort of evacuation notice from public officials in their location , however . Of those who evacuated , about 64 % left for the house of a friend or a relative , with about 24 % evacuating to a hotel or a motel . Most of those in Hampton and Norfolk left for elsewhere in the state , while the majority of those in the Northern Neck evacuated to destinations in their own neighborhood or community . The evacuation destinations on the Eastern Shore of Virginia were varied , with 23 % leaving for Maryland and 46 % staying in their own neighborhood or community . The length of the evacuation process varied between a few hours to two days , with the worst evacuation problems being closed or flooded roads . The Virginia Army National Guard and State Police troopers assisted in the evacuations . In all , more than 160 @,@ 000 residents in southeastern Virginia were told to evacuate , including 11 @,@ 000 in vulnerable locations along the Chesapeake Bay and all residents in mobile home parks in Chesapeake and Newport News . A total of about 16 @,@ 325 people evacuated to 67 shelters . Some of the reported problems were shortages of supplies , unanticipated medical issues , overcrowding , and lack of security .

United States Navy officials in Norfolk ordered more than 40 destroyers , frigates , and amphibious ships out to sea to avoid any potential damage from the hurricane . Officials at the Langley Air Force Base in Hampton ordered about 6 @,@ 000 workers to evacuate elsewhere , due to its vulnerability to flooding . About 350 National Guard workers assisted boat owners in the southeastern portion of the state . In Mathews County , two boat owners experienced fatal heart attacks as they worked to protect their boats . Officials distributed sandbags throughout the state for residents in flood @-@ prone areas , including about 10 @,@ 000 in the city of Alexandria . Prior to the arrival of the hurricane , the Chesapeake Bay Bridge Tunnel was closed , as were all campgrounds along the Blue Ridge Parkway and the primary parkway in Roanoke . In Chincoteague , the famous Chincoteague Ponies were moved by volunteer firefighters to grounds of about 20 feet (6 @.@ 1 m) higher . Officials closed schools , government offices , and businesses across the eastern portion of the state , leaving usually heavily congested roads as empty streets . Additionally , officials canceled trains along the Washington Metro , the Virginia Railway Express , and Amtrak lines , and several flights in and out of the Richmond International Airport .

= = Impact = =

Throughout the state , Hurricane Isabel resulted in a damage total of \$ 1 @.@ 85 billion (2003 USD , \$ 2 @.@ 17 billion 2008 USD) . The hurricane destroyed more than 1 @,@ 186 homes and 77 businesses , severely damaged 9 @,@ 110 homes and 333 businesses , and left 107 @,@ 908 homes and over 1 @,@ 000 businesses with minor damage . Across the state , the hurricane generated an estimated 660 @,@ 000 dump trucks of debris . At least ten people were directly killed by the storm , and hundreds more were injured . A total of 1 @.@ 8 million electrical customers were left without power , with electrical damage totaling \$ 128 million (2003 USD , \$ 150 million 2008 USD) . Dominion Virginia Power reported 2 @,@ 311 broken utility poles , 3 @,@ 899 snapped crossarms , and 7 @,@ 363 spans of downed power lines , with 72 % of its primary distribution circuits damaged . The passage of the hurricane resulted in an agricultural damage total of about \$ 117 million (2003 USD , \$ 137 million 2008 USD) .

= = = Hampton Roads Metropolitan Area and Delmarva Peninsula = = =

Along the Eastern Shore of Virginia , Isabel produced sustained winds reaching 50 mph (80 km / h) with gusts to 62 mph (100 km / h) at Wallops Island . Higher unofficial gusts were recorded , including a peak reading of 71 mph (114 km / h) in Chincoteague . Rainfall was fairly light , with 2 inches (51 mm) recorded in Heathsville . On Fisherman Island , the hurricane produced a 4 @.@ 26 @-@ foot (1 @.@ 3 @-@ m) storm surge , flooding much of the island . The combination of the surge and waves resulted in minor beach erosion and overwash . Northampton County reported \$ 10 million in crop damage (2003 USD , \$ 12 million 2008 USD) . One person died in Accomack

County when a tree fell on his mobile home .

In the Hampton Roads region , Isabel produced a high storm surge , including reports of 7 @. @ 5 feet (2 @. @ 3 m) at the Chesapeake Bay Bridge @- @ Tunnel and a peak of 8 @. @ 3 feet (2 @. @ 5 m) at Gloucester Point . Unofficially higher amounts included an estimate of 10 @. @ 75 feet (3 @. @ 28 m) at Smithfield . In some locations , the surge surpassed the previous record set by the 1933 Chesapeake @- @ Potomac Hurricane . Despite being classified as a hurricane while crossing the state , sustained winds only peaked at 70 mph (110 km / h) at Gloucester Point , 4 mph (6 @. @ 4 km / h) less than minimum hurricane intensity . Hurricane @- @ force wind gusts were recorded at multiple locations , with a 91 mph (146 km / h) reading at Gloucester Point and unofficial reports peaking at 107 mph (172 km / h) on Gwynns Island . Additionally , Chesapeake Light , located 12 miles (19 km) east of Virginia Beach , reported a peak wind gust of 107 mph (172 km / h) . The hurricane produced heavy rainfall in the Hampton Roads area , reaching 10 @. @ 6 inches (270 mm) at James City . The outer rainbands of Isabel spawned a 150 @- @ foot (46 m) wide F0 tornado in Nottoway County near Crewe , the only confirmed tornado during the passage of the hurricane . However , many people in the city of Norfolk reported that there was a tornado in that city as well . The tornado lasted a short amount of time and caused no known damage . Strong waves , which reached 20 feet (6 @. @ 1 m) in height offshore , caused severe beach erosion in Hampton , Newport News , and other locations along the western shore of the Chesapeake Bay .

In Virginia Beach , the 15th Street fishing pier was significantly damaged due to intense wave action . Likewise the historic Harrison 's Pier in the Ocean View area of Norfolk was completely destroyed . Many private piers and some public ones along the coastline were destroyed or damaged from the waves and storm surge , including a destroyed pier each in Buckroe Beach and Lynnhaven . Moderate winds caused light damage to roofs and siding of oceanfront homes and hotels . In Virginia Beach , beach erosion and coastal flooding was minimal , credited due to a \$ 125 million beach expansion project . Several bridges in the Hampton Roads area were closed due to the hurricane . The strong storm surge surpassed the floodgate to the Midtown Tunnel while workers attempted to close the gate . About 44 million US gallons (170 @, @ 000 m3) of water from the Elizabeth River flooded the tunnel entirely in just 40 minutes , with the workers barely able to escape . The flooding left the tunnel damaged and closed for nearly a month .

Heavy rainfall led to moderate to severe inland flooding , with high waters reported along U.S. Route 460 in Prince George County , U.S. Route 17 , and several other roads . The rainfall led to river flooding , including minor to moderate flooding along the Rivanna and James Rivers , moderate flooding along the Appomattox River , and moderate to major flooding along the Meherrin , Nottoway , and Blackwater Rivers . In Isle of Wight County , a driver attempted to cross high water on the James River Bridge and was killed when the water washed the car off of the road .

The unusually large wind field uprooted many thousands of trees , downed many power lines , damaged hundreds of houses , and snapped thousands of telephone poles and cross arms . Hundreds of roads , including major highways , were blocked by fallen trees . An emergency evacuation shelter in Newport News reported minor wind damage . Two people in the region died due to falling trees ? one in New Kent County and one in the city of Hopewell . Power outages left most traffic lights not working across Hampton Roads , resulting in multiple minor car accidents . Additionally , most gas stations were closed , due to power outages leaving the pumps unusable . Old Dominion University remained closed for two weeks due to storm damage and power issues , the longest it has ever been closed during a school term . Likewise , Norfolk State University , Regent University , Tidewater Community College and Eastern Virginia Medical School all experienced significant closing times due to both storm damage and a lack of electricity .

= = = Northern = = =

Funnel clouds were reported along the Northern Neck . The hurricane produced a strong storm surge across northern Virginia , reaching 9 @. @ 5 feet (2 @. @ 9 m) in Alexandria . Rainfall was light across the region , with amounts varying between 1 ? 3 inches (25 ? 75 mm) .

The storm surge washed out 160 homes and 60 condominiums in Fairfax County , with an

additional 2 @, @ 000 units reporting minor to severe damage from the flooding . In Stafford County , the surge destroyed five marinas and broke many boats free from their docks , while in Alexandria it flooded numerous businesses and severely impacting marinas . One section of CSX Transportation railway tracks in Prince William County collapsed into the Potomac River from the surge .

Gusty winds downed several trees across Alexandria , causing about \$ 2 million in damage (2003 USD , \$ 2 @. @ 3 million 2008 USD) . In Arlington County , flooding and downed trees destroyed two houses and damaged 192 homes , 46 severely . The storm surge flooded a parking lot at the Reagan National Airport . Damage in the county totaled \$ 2 @. @ 5 million (2003 USD , \$ 2 @. @ 9 million 2008 USD) . Falling trees caused major damage to 15 homes in the city of Fairfax , and damage throughout Fairfax County totaled \$ 18 million (2003 USD , \$ 21 million 2008 USD) . Four homes and 20 businesses in King George County were severely damaged , with an additional 150 ? 200 reporting lesser damage from winds and falling trees . Gusty winds forced the closure of the Governor Harry W. Nice Memorial Bridge . In Prince William County , seven homes were destroyed , with 24 homes and three businesses experiencing major damage . Several roads were closed due to downed trees . The Marine Corps Base Quantico reported severe damage amounting to \$ 9 @. @ 5 million (2003 USD , \$ 11 million 2008 USD) . Damage included a destroyed marina from flooding , with falling trees damaging buildings and vehicles . Additionally , fallen trees severely damaged 31 homes and caused minor damage to 68 more in Stafford County . The roof of a shelter in Mathews County was partially blown off . A power outage in Northumberland County caused the NOAA Weather Radio Station in Heathsville to go off the air during the height of the storm , leaving the transmitter out of service for several days .

= = = Central and southwest = = =

A tornado was reported near Emporia , though this was not later confirmed . The storm surge tracked into the central portion of the state , with a site on the James River in Richmond reporting an estimated surge of about 9 feet (2 @. @ 7 m) , about 103 river miles (166 km) from its confluence with the lower Chesapeake Bay . Additionally , widespread areas of heavy rainfall of over 5 inches (130 mm) led to flooding of rivers . Richmond set a new daily rainfall record from the precipitation from Isabel . Strong winds were reported throughout the region , and wind gusts reached 73 mph (117 km / h) at Richmond International Airport .

The storm surge significantly damaged or destroyed many homes along the James River , particularly in the towns of Claremont and Burwells Bay , Virginia . The surges in several tidal rivers caught some residents by surprise , both in height and severity . A man in Henrico County drowned after crashing into a flooded creek .

The winds downed trees throughout the area , some of which hit homes and vehicles . In Amelia County , strong winds removed a mobile home from its foundation and destroyed it . Falling trees killed two in the area ? one in Chesterfield County and one in the city of Richmond . The downed trees snapped many power lines , leaving about 365 @, @ 000 Dominion Virginia Power customers in the Richmond area without power . A portion of the roof of The Diamond , home of the Richmond Braves , was damaged by the winds .

Wet conditions caused many accidents along roadways in central Virginia . A motorist on Interstate 95 in Richmond died when he hydroplaned and crashed his car . In Albemarle County , a popular forest boardwalk that was part of the Monticello property was destroyed by a falling oak tree . Also in Albemarle , two people were killed when their car drove off a road and crashed into a tree during heavy rainfall . A man in Chesterfield County died when struck by a tree . Three people died when a car in southern Fluvanna County crashed into a tree . The deaths were considered indirectly related to the storm . In south @- @ central Virginia , strong winds produced widespread wind damage , with numerous trees and power lines reported down . In Campbell County , two homes were destroyed and ten others suffered minor damage . One residence in Amherst County suffered minor damage , and in Appomattox County one home reported major damage . In Buckingham County , one home was destroyed , three reported major damage , and one business suffered minor damage , while in

Charlotte County , two homes were destroyed , 30 homes suffered major damage , and five businesses suffered minor damage . The storm destroyed one home and damaged 20 , severely damaged three businesses , and caused some crop damage in Pittsylvania County . Monetary damage in the region totaled about \$ 3 million (2003 USD ; \$ 4 million 2008 USD) .

= = = Shenandoah Valley = = =

Intense rainbands from Isabel produced heavy rainfall across the Shenandoah Valley , peaking at 20 @. @ 2 inches (513 mm) in Upper Sherando in Augusta County . Sustained winds in the area ranged from 25 ? 50 mph (40 ? 80 km / h) , while wind gusts reached about 60 mph (97 km / h) . Strong winds downed numerous trees and power lines , causing some power outages .

The rainfall led to extensive flash flooding and river flooding , including along several tributaries of the South River . The rainfall also caused extensive surface runoff in higher terrains , which led to flow over emergency spillways . Four spillways to dams flooded , causing damage , though none of them failed . At the Mills Creek Dam , the water reached about 2 @. @ 5 feet (0 @. @ 76 m) above the emergency spill way , causing \$ 125 @, @ 000 in damage to the dam (2003 USD) . Water flowed down the Black Creek at 60 mph (97 km / h) , washing out the bridge and several hundred feet of asphalt along several locations of State Route 608 . The South River at Waynesboro rapidly flooded and crested at nearly 13 @. @ 9 feet (4 @. @ 2 m) , destroying four bridges and flooding downtown businesses in 2 feet (0 @. @ 61 m) ? 3 feet (0 @. @ 91 m) of water . There , emergency management personnel evacuated about 300 people due to the ensuing flooding , which caused about \$ 250 @, @ 000 in property damage (2003 USD ; \$ 293 @, @ 000 2008 USD) . In all , about 350 were evacuated in Augusta County , 21 of whom by boat . Damages to public roads and equipment in the area were estimated at \$ 1 million (2003 USD ; \$ 1 @. @ 2 million 2008 USD) . 13 homes were destroyed , with three businesses and 64 other residencies reporting major damage ? some reported over 1 foot (0 @. @ 30 m) of mud in their homes . Damage in the Shenandoah Valley totaled about \$ 29 million (2003 USD ; \$ 34 million 2008 USD) . A man canoeing in high flood waters drowned in Harrisonburg , while two others drowned in a horse and buggy after crossing a low water bridge in Rockingham County . The flooding also killed 25 ? 30 head of livestock .

= = Aftermath = =

On the day of Isabel moving through the state , President George W. Bush declared 18 counties and 14 independent cities as disaster areas , making residents and business @- @ owners there eligible for federal funding . Additionally , funds were allocated for state and local governments in the 31 designated jurisdictions to pay 75 % of the eligible cost for debris removal and emergency services related to the hurricane , including requested emergency work undertaken by the federal government . Many other jurisdictions were added , based on subsequent damage reports , and by September 22 , 99 jurisdictions were eligible for disaster assistance . The Federal Emergency Management Agency (FEMA) provided hurricane @- @ related bulletins , including safety tips and the method for removing hazardous materials . By 12 days after the passage of the hurricane , FEMA distributed more than 6 @. @ 3 million lbs . (2 @. @ 9 million kg) of ice and 1 @. @ 4 million US gallons (5 @, @ 300 m3) of water to areas affected by Isabel . Disaster Recovery Centers , which contain information on the aftermath process , were opened in eight locations and received more than 1 @, @ 850 inquiries . More than 350 FEMA inspectors visited homes to verify damages caused by Isabel , and by the end of September 2003 about 12 @, @ 000 inspections were completed . In response to the power outages , FEMA installed 28 generators at disaster @- @ affected critical public facilities to support life @- @ sustaining community needs . By about four months after the hurricane , 93 @, @ 139 individuals in the designated areas applied for disaster assistance , while 20 @, @ 417 people visited Disaster Recovery Centers throughout the state . The Small Business Administration approved more than 3 @, @ 000 low @- @ interest disaster loans from homes and businesses , with the value of the loans totaling \$ 74 million (2003 USD ; \$ 87

million 2008 USD) . The government provided \$ 105 million (2003 USD ; \$ 123 million 2008 USD) for debris removal , emergency protective services , and permanent work , and approved about \$ 25 @. @ 9 million (2003 USD ; \$ 30 @. @ 3 million 2008 USD) for life @- @ sustaining needs such as water , ice , and generators at critical public facilities . Monetary assistance for temporary rental assistance and minimal home repairs totaled \$ 32 million (2003 USD ; \$ 37 million 2008 USD) , as well .

Volunteer agencies arrived in the state to assist in the aftermath of the hurricane , and by about ten days after Isabel volunteers served more than 550 @, @ 000 meals to affected residents ; over 933 @, @ 000 meals were served during the four @- @ month cleanup operation Over 10 volunteer organizations , under the coordination of Virginia 's Voluntary Organizations Active in Disaster , worked to help individuals with debris removal across the state .

Dominion Virginia Power quickly began to restore the widespread power outages with a workforce of about 11 @, @ 000 , working between 14 and 16 hours per day . By two days after the storm , about 900 @, @ 000 remained without power . By five days after the storm , about 584 @, @ 000 throughout the state were still without power , and by ten days after Isabel the total dropped to about 160 @, @ 000 , most of whom were in the Hampton Roads area . Improper use of generators caused three indirect storm deaths due to carbon monoxide poisoning resulting from improper ventilation of homes .

As a result of polluted runoff from storm surge and heavy rains , the Virginia Department of Health forbade gathering shellfish in the Virginia portion of the Chesapeake Bay , as well as all rivers flowing into the bay .