



National Weather Service

Storm Data and Unusual Weather Phenomena



September 2003

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm
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ATLANTIC NORTH

ANZ536 Dahlgren	Tidal Potomac Indian Hd To Cobb Is Md 02 1543EST Quarter sized hail fell.				0	0			Marine Hail (1.00)
ANZ536 Route 301 Bridge	Tidal Potomac Indian Hd To Cobb Is Md 02 1545EST A waterspout was reported near the Route 301 Bridge.				0	0			Waterspout

DISTRICT OF COLUMBIA

DCZ001	District Of Columbia 18 1500EST 19 0900EST				0	0	125M		Tropical Storm
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Hurricane Isabel shut down Washington, DC on Thursday September 18 and Friday September 19. The city had days of preparation and many people including non-emergency government personnel were told to stay home. Tropical storm force winds spread north into the area by 4 pm. Because air temperatures were cool (in the 60s) and the peak of the storm occurred near midnight, the real hurricane force winds were a few hundred feet up. Wind sensors on building tops recorded 70 to 85 mph hour winds. At the surface, winds were about half of that, but occasional strong gusts would mix down from above and damage trees and power lines. Winds began to subside falling below tropical storm by 4 am after the storm's passage west of the city, but remained gusty through the morning. Over 700 trees were blown down in the city with 23 falling on homes. The U.S. National Arboretum lost many mature trees. During the peak of the storm up to 129,000 customers lost power.

As the storm's winds peaked near midnight with wind gusts of 55 to 65 mph from a more southerly direction, Isabel's storm surge began. Flooding began around midnight as water pushed up both the Potomac and the Anacostia Rivers. The surge crested around 5 am and receded below flood stage around 10 am with the southerly winds dying off. All flooding was tidal related since only two inches of rain fell across the district during the storm. The NWS gauge at Wisconsin Avenue measured 11.3 feet (MLW) at 5:15 am. This was 0.2 feet higher than the reading during the 1933 hurricane (however, sea level has risen since 1933 by at least this much). The NOS gauge at the pier in SW DC recorded a peak surge of 10.25 feet (MLLW) or 8.7 feet MSL at around 5 am. This was also higher than the 1933 storm. This makes Isabel the record tidal flood at these locations, but downstream freshwater flooding has caused higher river levels at each of these points. While sandbagging and other preparations mitigated against a lot of potential damage, damages were still high. At Naval District Washington along the Anacostia, marinas were damaged and cars left in low area garages were flooded. Some buildings were flooded. Coast Guard Headquarters had water come into several levels of the building causing serious damage. Other marinas water front properties and parks were damaged and had a lot of debris and cleanup to do. The U.S National Arboretum lost many of its 12,000 azaleas located along the bank of the Anacostia. Five people were rescued from cars in flood waters during the storm. Park Police had to close the roads around the tidal basin, the mall, and near Rock Creek.

Total damages for the District are estimated to combine damages to private and public property which in this case includes a lot of federal property and National Park land.

DCZ001-001	District Of Columbia 23 0300EST 24 1845EST				0	0			Flood
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During the morning of the 23rd heavy rain fell on top of already saturated ground from Hurricane Isabel which struck a few days



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DISTRICT OF COLUMBIA

before. This led to flooding of roads, waterways, and other low lying areas across the District. The following roads were flooded during the morning rush hour: Canal Road, George Washington Memorial Parkway, Rock Creek Parkway, Beach Drive, Constitution Avenue, Kenilworth Avenue, Nannie Helen Burroughs Avenue, Minnesota Avenue, Third Street Tunnel, and Ohio Avenue. Rainfall totals included 2.76 inches at the National Arboretum in Northeast, 2.36 inches in Southwest, and unconfirmed amounts up to 3.4 inches in Northwest. The tidal Potomac River rose just above flood stage at Wisconsin Avenue at time of high tide between the afternoon of the 23rd and the afternoon of the 24th. Independence Avenue was closed when the Potomac flooded.

MARYLAND, Central

Charles County

Nanjemoy	02	1605EST			0	0			Lightning
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A lightning strike ripped up a yard.

St. Mary's County

Hollywood	02	1637EST			0	0	2K		Thunderstorm Wind (EG50)
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Many trees were downed.

A thunderstorm with high winds moved from Virginia into St. Mary's County during the evening of the 2nd. The storm downed trees in Hollywood. A waterspout was also reported near the Route 301 bridge as the storm crossed the Potomac River. In addition, a lightning strike in Charles County ripped up a yard in Nanjemoy.

Washington County

East Portion	03	2000EST			0	0	20K		Flash Flood
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Widespread road and basement flooding was reported.

Frederick County

Thurmont	03	2130EST 2330EST			0	0			Flash Flood
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Road flooding was reported.

MDZ003

Washington									
	04	0130EST 1100EST			0	0			Flood

Flooding continued in low lying areas

An area of showers and thunderstorms with very heavy downpours moved through North Central Maryland during the evening of the 2nd. Up to 6 inches of rainfall caused significant flooding in Eastern Washington County. The hardest hit area was Williamsport where 5.75 inches was recorded. Three homes were significantly damaged by flood waters in town, including one which had to be condemned. Another hard hit area was St. James Village south of Hagerstown. At the peak of the flooding water was thigh high on the roads. Up to 5 feet of water collected in basements. One resident's sliding glass door was shattered by the rapidly flowing water. A total of 3.94 inches of rain was recorded in Hagerstown. A total of 3.63 inches was recorded in Smithsburg. Three county roads were closed by flooding: Falling Waters Road, Memorial Boulevard, and Millers Church Road. Antietam Creek also overflowed its banks. Due to the severity of the flooding, the water was slow to recede. Water levels remained high through midday on the 4rd. In Frederick County, road flooding was reported near Thurmont on the evening of the 3rd.

Carroll County

Countywide	04	0330EST 1000EST			0	0			Flash Flood
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Several roads were flooded.

Baltimore County

Countywide	04	0400EST			0	0			Flash Flood
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MARYLAND, Central

1100EST

A woman had to be rescued when her car became stalled in rising water.

An area of showers and thunderstorms dropped 2 to 3 inches of rain over a portion of Carroll and Baltimore counties during the morning of the 4th. In Carroll County, several roads were flooded including Route 97 between New Windsor and Interstate 70. In Baltimore County an elderly woman and her dog had to be rescued from a vehicle after it became stalled in rapidly rising water on Ruxton Road in Towson.

Harford County Countywide

15	0930EST 1600EST			0	0				Flash Flood
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Numerous roads and low lying areas were flooded.

Harford County Countywide

15	1600EST 2030EST			0	0				Flash Flood
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Route 7 in Abington (Harford County) was covered by 3 feet of water from James Run, a tributary of the Bush River. (Photo courtesy of the Aegis Newspaper of Bel Air, Maryland).

Roads and creeks stayed flooded several hours after the rain ended

A rare "bay effect" band of showers formed in a south to north line over the Chesapeake Bay on the morning of the 15th. The band moved northward and dropped heavy rainfall over Harford County for over 5 hours. Up to 4 inches of rainfall caused significant flooding on roads, creeks, and in low lying areas. Rainfall totals included 3.5 inches in Hickory and 3.13 inches in Street. County officials reported 12 roads were closed by high water during the deluge. One of the hardest hit areas was Abington. Route 7 between Route 136 and Route 543 was covered by 3 feet of fast moving water from James Run, a tributary of the Bush River. Several motorists became stranded when they drove their vehicles across the James Run bridge. Fire and rescue personnel had to rescue two people from the flood waters. One woman was pulled from her vehicle and another woman was found screaming for help while clinging to a tree alongside the creek. The woman pulled from the woods was treated at a local hospital for hypothermia. Nine other water rescues were reported countywide. Other roads that were flooded included Edgewood Road near Aberdeen Proving Ground, Old Post Road in Aberdeen, and Goat Hill Road in Harford Furnace. Roads were also flooded in Perryman, Churchville, and Havre de Grace. In addition, officials received several reports of flooded basements across the county.



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MARYLAND, Central

MDZ006>007-011-013>014-016>018

Northern Baltimore - Harford - Southern Baltimore - Prince Georges - Anne Arundel - Charles - St. Mary'S - Calvert

18	1300EST								
19	1700EST				1	200	530.5M	190K	Tropical Storm

On September 18, 2003, Hurricane Isabel made landfall on the North Carolina Coast. Its huge wind field was already piling water up into the southern Chesapeake Bay. By the time Isabel moved into central Virginia, it had weakened and was downgraded to a tropical storm. Isabel's eye tracked well west of the bay, but the storm's 40 to 50 mph sustained winds pushed a bulge of water northward up the bay and its tributaries producing a record storm surge. The Maryland western shore counties of the Chesapeake Bay and along the tidal tributaries of the Potomac, Patuxent, Patapsco and other smaller rivers experience a storm surge reached 5 to 9 feet above normal tides. In many locations, Isabel's surge was higher than the previous record storm known as the Chesapeake-Potomac Hurricane of 1933. For coastal properties below 10 feet MSL exposed to wave action, much damage was wrought. Over 2000 people were evacuated from their homes. Maryland saw 472 homes and buildings destroyed, 3260 with major damage and over 3600 more affected. Extensive damage occurred to Maryland's shoreline which rarely sees storms of this intensity. The Chesapeake Bay Foundation estimates that 43,000 tons of silt and millions of pounds of nitrogen and phosphorus and millions of gallons of raw sewage washed into the bay during Isabel.

Water surrounded many of the buildings on the U.S. Naval Academy in Annapolis. The flooding caused \$116 million in damage. FEMA was estimating up to \$500 million in total damages to Anne Arundel County from the storm. In Dundalk (Baltimore County), a 27-year-old man was found drown floating in the flood waters. In Baltimore County alone, \$3 million in damage is estimated to have occurred from erosion of the shoreline. Residential areas of Millers Island, Edgemere, North Point, Bowley Quarters and Turners Station were hard hit with more than 400 people being rescued from their homes and over 300 buildings destroyed. Marinas were also destroyed or severely damaged. Water flooded Baltimore's Inner Harbor and Fells Point area causing millions of dollars damage to waterfront property. The Baltimore Museum of Industry alone received \$1.5 million in damage. The two hardest areas hit in Harford County were up the Bush River and the waterfront at Havre de Grace. About 55 people were evacuated from Abingdon, Edgewood and Perryman along the Bush River and about a dozen people were evacuated in Havre de Grace. The 12.5 million dollars in damage to Harford County does not include damages sustained to Aberdeen Proving Grounds. Those figures were unavailable at this time.

In Calvert County, 4 to 5 foot waves crashed into the towns of North Beach and Solomons. In North Beach, a house was moved off its foundation. The pier at Solomons Island was lost with the storm surge causing extensive damage to the shoreline. In St Mary's County residents saw 6 foot waves crashing onto shore and some homes were literally flattened. Estimated damage to wharves and piers is 2500 destroyed and 1000 with moderate damage costing \$10.25 million. Damage to Point Lookout State Park is \$3 million. Damage to "shore revetments" was \$53.4 million. Damage to residential property is estimated at \$16.95 million and businesses \$1.5 million. Most of the damage was from storm surge, but some was from wind. On St. George Island, 20 homes were destroyed and water covered much of the island at high tide for a week. The bridge to the island washed out as early as 3:45 pm on Thursday. Charles County had \$2 million in damage to roads. Cobb Island was hit hard with two homes destroyed and others damaged. Other areas hit included Chigger City, Port Tobacco, Woodland Point, Swan Point, and Morgantown. Fifty-two dwellings were flooded with damages estimated at \$1.1 million with another \$600,000 to commercial property. Prince Georges County had high water on the Patuxent, Potomac and Anacostia River fronts. Much of the shoreline has a good rise protecting it from flooding, but three roads were closed from flooding and some property may also have been impacted.

Hurricane Isabel's wind field extended for hundreds of miles from the storm's center. Winds were highest along the Chesapeake Bay and Tidal Potomac where the warm waters and smooth surface helped mix down the strong winds from above and blow onto the coastline. Inland, the air at the surface was relatively cool. Temperatures had been in the 60s during the day and the strongest winds came at night. The high winds came with bands of showers that would mix down to the surface causing streaks of damage that sometimes appeared as though a tornado had moved through instead of a strong narrow ribbon of wind. Wind damage to structures was limited with the greatest damage reported in St. Mary's County where on one property winds blew the roof off a structure. and knocked down 70 trees. Unofficial wind gust readings of up to 110 mph have been reported, but not confirmed. Patuxent Naval Air Base recorded wind gusts to 69 mph at midnight and Quantico Marine Base recorded a wind gust of 78 mph near the same time. Andrews Air Force Base also recorded a wind gust of 69 mph around 1 am EDT. Wind damage to trees in the area was extensive and widespread to the region. Soil moisture was high from previous rains making it easier for trees to uproot. Also, the trees were still in full canopy which acted like a sail to catch the wind. Trees fell on electrical and utility wires taking out power and phone. Trees fell on roads, cars, and homes.

In Anne Arundel County, 196,000 out of a possible 211,000 customers lost power. In Baltimore, 220,000 out of a possible 273 customers lost power. Baltimore County was estimating 3189 tons of debris to be hauled from the storm. 118 trees fell on school grounds. In Baltimore City, 70,000 customers were without power. Calvert County had 22,400 customers without power. Charles County had 32,000 customers lose power. Harford County saw 51,600 of its 88,000 customers lose power. Prince Georges County had nearly 200,000 customers lose power and 5000 tons of debris to haul. There were at least 15 buildings with major damage and 53 more buildings that were affected. St Mary's County had 27,092 customers lose power. While most people had their power back in a week, some locations took up to two weeks. Many injuries and 3 fatalities occurred from carbon monoxide poisoning from people improperly running generators in their houses. Other injuries were related to chain saws and the clean-up of debris. Calvert



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MARYLAND, Central

County Hospital said they were seeing an extra 130 patients per day.

M27IW

MDZ002>005-009>010	Allegany - Washington - Frederick - Carroll - Montgomery - Howard								
	18	1500EST			0	3	1.8M	270K	High Wind (EG50)
	19	2100EST							

MDZ002-004-009	Allegany - Frederick - Montgomery								
	19	0800EST			0	0	130K		Flood
	21	2000EST							

On September 18, 2003, Hurricane Isabel made landfall on the North Carolina Coast. Its wind field extended for hundreds of miles from the storm's center. As bad as it was across Maryland and Virginia, it could have been much worse. The air at the surface was relatively cool. Temperatures had been in the 60s during the day and the strongest winds came at night. Most areas saw wind gusts of 50 to 60 mph. However, wind sensors on building tops in and around DC recorded winds averaging 70 to 80 mph for an extended period of time at just a couple hundred feet off the surface. Surface winds were about half of that. The high winds gusts to 70 mph came with bands of showers that would mix down to the surface causing streaks of damage that sometimes appeared as though a tornado had moved through instead of a strong narrow ribbon of wind. Wind damage to structures was very limited. Wind damage to trees in the area was extensive and widespread. Soil moisture was high from previous rains making it easier for trees to uproot. Also, the trees were still in full canopy which acted like a sail to catch the wind. Trees fell on electrical and utility wires taking out power and phone. Trees fell on roads, cars, and homes.

Allegany County was on the fringe of the storm. Higher terrain saw the most wind. Only 2,259 customers lost power during the storm and one house was damaged when a tree fell on it. Carroll County had seven homes that had damage with one house losing part of its roof. In Frederick County, a State trooper was injured when a tree fell on his car in the storm and another was injured when a tree fell on him. Two homes had some damage and there were 40 road closures from trees falling on them. 28,892 customers lost power in the County. In Howard County, over 50% of the county lost power with 65,105 customers out. Five homes had major damage and another 8 had minor damages. In Montgomery County, the power was out to over 600 traffic signals. Come Saturday morning, 330 lights were still out with dense fog across the region combining to contribute to some serious accidents. Almost 240,000 customers lost power in the storm in Montgomery. The County reported 94 buildings destroyed, 23 with major damage and 32 with minor damage. In Washington County, 21,743 people lost power and 30 roads were closed due to downed trees. Hagerstown Airport reported wind gusts over 40 mph from 10 pm through 2 am with a peak gust of 52 mph at 1 am. After the storm, many injuries occurred from carbon monoxide poisoning from people improperly running generators in their houses. Other injuries were related to chain saws and the clean-up of debris.

Two to four inches of rain fell across central and western Maryland. This was not enough to cause flash flooding but when added to previous rains, it was enough to bring the Potomac River out of its banks. Route 135 was closed due to river flooding in Luke. Pekin Bridge which was under construction experienced a washout. Officially, the river crested in Luke 1.7 feet below flood stage. Cumberland and Hancock crested just 4 feet below flood stage and Williamsport, 2 feet below flood stage. But flooding did occur along some stretches of the river. Minor flooding occurred at Paw Paw where the river crested at 27.91 feet (Flood Stage is 25 feet) and moderate flooding occurred from Shepherdstown, WV down past Point of Rocks, MD. At Point of Rocks, the river crested at 23.12 feet at 1:30 am on September 21. Flood stage is 16 feet. Frederick County reported three homes with moderate to major damage from flooding and two homes with minor to moderate damage. The flood waters also closed down a section of the C&O canal. The Monocacy River remained well below flood stage in Frederick. Seneca Creek saw minor flooding a Dawsonville from 9 am until 4 pm on the 19th reaching a crest less than a foot above bankful. As Seneca Creek was going down, the Potomac River was rising in Montgomery County as the flood crest moved down from Point of Rocks disrupting Ferry operations at Whites Ferry. Little Falls rose above flood stage at 7 pm on the September 21, crested at 11.33 feet (1.33 feet above flood stage) and fell back below flood stage at 9 pm that night.



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MARYLAND, Central

Frederick County

Countywide	23	0100EST 0630EST			0	0			Flash Flood
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Numerous roads closed by flooding.

Montgomery County

Countywide	23	0200EST 0445EST			0	0			Flash Flood
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Roads and low lying areas were flooded.

Baltimore City (C)

Countywide	23	0300EST 0600EST			0	0			Heavy Rain
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Harford County

Countywide	23	0300EST 0600EST			0	0			Heavy Rain
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Washington County

East Portion	23	0300EST 0600EST			0	0			Heavy Rain
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MDZ004-004>005-009-009 Frederick - Carroll - Montgomery

23		0400EST			0	0			Flood
24		1230EST							

Roads continued to be flooded.

Prince George'S County

Countywide	23	0400EST 0700EST			0	0			Heavy Rain
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Carroll County

Countywide	23	0415EST 0715EST			0	0			Flash Flood
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Numerous roads were flooded.

Anne Arundel County

Countywide	23	0500EST 1000EST			0	0			Flash Flood
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Several roads were flooded.

Howard County

Countywide	23	0600EST 0800EST			0	0			Flash Flood
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Small streams and roads were flooded.

Harford County

Forest Hill	23	1545EST			0	0	2.5K		Thunderstorm Wind (EG50)
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Numerous trees and a deck were damaged.

During the morning of the 23rd heavy rain fell on top of already saturated ground from Hurricane Isabel which struck a few days before. This led to widespread flooding of roads, waterways, and other low lying areas. In Washington County, rainfall totals included 2.65 inches in Knoxville and 2.19 inches in Sharpsburg. In Frederick County, nearly 60 roads were closed by flooding and 37 people had to be rescued from their water-stranded cars. Carroll Creek overflowed into homes along Thomas Avenue and into Baker Park in Frederick. The Monocacy River which rose over 4 feet above flood stage in Frederick flooded Buckeystown Community Park. Bennett's Creek flooded cars on Route 355 up to their windshields and two men were rescued from the roofs of their vehicles. One man was rescued from his car after being caught in floodwaters on Gas House Pike. Another person was rescued from the roof of his car on South Ren Road. Water rescues were also reported on Big Woods Road, Crum Road, Coppermine Road, Biggs Ford Road, and Cap Stine Road. Lake Linganore Dam Spillway overflowed onto Boyers Mill Road. Countless other roads along creeks and streams were also flooded. Mudslides were reported on routes 464, 75, 85, 28, and 355. A 120-foot long and 40-foot deep sinkhole formed along Route 70 near the intersection of Reich's Ford Road, shutting down the interstate for hours. A second 15-foot deep sinkhole opened up near the Frederick fairgrounds. Rainfall totals included an incredible 5.12 inches in Frederick and 2.30 inches in Thurmont.

In Carroll County, 2.86 inches of rain was reported in Westminster. Numerous streets and basements were flooded across the county. Sams Creek overflowed its banks onto Sams Creek Road. In Baltimore County, 2.52 inches of rain fell in the city of Baltimore. The entrance ramps to Interstate 83 and the Jones Falls Expressway were closed temporarily due to high water. In Harford County, 2.69 inches of rain fell in Street and 2.62 inches fell in Fallston. Broad Creek at Old Pylesville Road reached



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					Killed	Injured	Property	Crops	

MARYLAND, Central

bankful. A thunderstorm that moved through Forest Hills produced wind gusts that damaged a deck and downed numerous trees on Walters Mill Road. In Howard County, rainfall totals included 2.50 inches in Hipsley Mill, 2.30 inches in Cooksville, and 2.21 inches in North Laurel. Hammond Branch in North Laurel overflowed onto Stephens Road. In Montgomery County, rainfall totals included 4.46 inches near Poolesville, 3.08 inches in Damascus, 3.01 inches in Forest Glen, 2.87 inches in Germantown, 2.40 inches in Gaithersburg, and 2.28 inches in Chevy Chase. Several road closures and water rescues were reported in and around Poolesville and Dickerson. Roads were also flooded in Bethesda and Chevy Chase. Seneca Creek rose nearly 3 feet above flood stage in Dawsonville.

In Anne Arundel County, 2.38 inches of rain was recorded at Baltimore-Washington International Airport and 2.10 inches was reported in Annapolis. Dozens of roads in the northern and western portion of the county were closed by flooding including Dorsey Road, Baldwin Avenue, Furnace Branch Road, Hammonds Ferry Road, Lee Drive, and Race Road. Numerous roads were flooded in spots including Route 2, Baltimore/Washington Parkway, Patuxent River Road, Whiskey Bottom Road, and Defense Highway. Two motorists had to be rescued from their cars after being stuck in floodwaters. In Prince George's County, rainfall totals included 2.78 inches in Laurel, 2.54 inches in Greenbelt, 2.26 inches in Oxon Hill, and 2.13 inches in Bowie. Route 1 was closed by flooding at the intersection of Ammendale Road. Flooding also closed Route 50 at Kenilworth Avenue. The Beltway was flooded in spots near Route 202.

Allegany County

La Vale

27	1530EST		0	0		Hail(1.00)
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Quarter sized hail fell.

Allegany County

Countywide

27	1700EST 1930EST		0	0		Flash Flood
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Roads and streams were flooded.

Scattered thunderstorms with heavy downpours and hail moved through Allegany County during the afternoon of the 27th. Pea to quarter sized hail was reported in La Vale. Route 220 was closed by flooding from near Cumberland to Bedford. Streams were out of their banks in La Vale and 30 basements were flooded across the county. Rainfall totals included 2.50 inches in Mt. Savage, 2.10 inches in Frostburg, and an unofficial reading of up to 4 inches in La Vale.

VIRGINIA, North

Fauquier County

1 SE Bethel

01	1755EST		0	0	0.75K	Thunderstorm Wind (EG50)
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Trees were downed.

A thunderstorm with high winds moved through Fauquier County during the evening of the 1st. Trees were downed onto Airlie Road just northeast of Warrenton.

Stafford County

Stafford

02	1445EST		0	0	0.50K	Thunderstorm Wind (EG50)
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Trees were downed.

Madison County

Madison

02	1450EST		0	0		Hail(0.75)
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Penny sized hail fell.

Madison County

Madison

02	1450EST		0	0	0.50K	Thunderstorm Wind (EG50)
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Trees were downed.

Stafford County

2 NW Falmouth

02	1450EST		0	0		Funnel Cloud
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A trained spotter reported a funnel cloud near I-95. The time was estimated.



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VIRGINIA, North

Stafford County

Stafford	02	1450EST			0	0			Hail(1.00)
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Quarter sized hail fell.

King George County

King George	02	1535EST			0	0			Hail(0.75)
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Penny sized hail fell.

King George County

Dahlgren	02	1543EST			0	0			Hail(1.00)
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Quarter sized hail fell.

Scattered thunderstorms moved through Madison, Stafford, and King George counties during the afternoon of the 2nd. These storms contained high winds, large hail, and were strong enough to produced a funnel cloud north of Fredericksburg. In Stafford County, trees were downed and quarter sized hail was reported in Stafford. A trained spotter near Interstate 95 2 miles northwest of Falmouth reported seeing a funnel cloud form, then break up a short time later. In King George County, penny sized hail fell in King George and quarter sized hail was reported in Dahlgren. A waterspout was also reported near the Route 301 bridge on the Potomac River. In Madison County, trees were downed and penny sized hail fell in and around Madison.

Shenandoah County

Strasburg	03	1900EST 2030EST			0	0			Flash Flood
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A debris slide was reported near Route 11.

Warren County

Front Royal	03	1945EST 2100EST			0	0			Flash Flood
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Roads were flooded.

Showers and thunderstorms with very heavy downpours moved through the Northern Shenandoah Valley during the evening of the 3rd. In Shenandoah County, a debris slide was reported near Route 11 near Strasburg. Several area basements were also flooded. Rainfall totals included 4.10 inches at Mt. Olive, 3.30 inches at Waterlick, 3.21 inches at the Strasburg Reservoir, and 2.54 inches at Fetzer Gap. In Warren County, a road near Front Royal was covered by flood waters. Rainfall totals included 4.58 inches at Nineveh and 2.10 inches in Front Royal.

VAZ052>055-057

Prince William - Fairfax - Arlington - Stafford - King George

18	1300EST								
19	1000EST			0	29	55.1M	130K		Tropical Storm

On September 18, 2003, Hurricane Isabel made landfall on the North Carolina Coast. Its huge wind field was already piling water up into the southern Chesapeake Bay. By the time Isabel moved into central Virginia, it had weakened and was downgraded to a tropical storm. Isabel's eye tracked well west of the bay, but the storm's 40 to 60 mph sustained winds pushed a bulge of water northward up the bay and its tributaries producing a record storm surge. The Virginia western shore counties of the Chesapeake Bay and the tidal tributaries of the Potomac, Rappahannock and other smaller rivers, experienced a storm surge which reached 5 to 9 feet above normal tides. In many locations, Isabel's surge was higher than the previous record storm known as the Chesapeake-Potomac Hurricane of 1933. For coastal properties below 10 feet MSL exposed to wave action, much damage was wrought. Impact on the commonwealth of Virginia as a whole is staggering with \$1.6 billion in damages with over 1,186 homes and 77 businesses destroyed, 9,110 homes and 333 businesses with major damage and 107,908 homes and over 1,000 businesses affected or impacted with minor damage. An estimated 660,000 dump trucks of debris was generated. At least 10 people were directly killed by the storm with hundreds injured. Almost 2 million electrical customers found themselves without power. Crop losses were calculated to be \$59.3 million with another \$57.6 million in damages to fences, farm buildings and equipment. Cost to Virginia's Dominion power were \$128 million, Red Cross outlays \$6 million, military bases \$283 million, private property \$732 million, National Park Service \$123 million, public property \$270 million.

In Alexandria, the water level in Old Town reached 9.5 feet MSL. Numerous businesses were flooded and the marinas were hard hit.



National Weather Service

Storm Data and Unusual Weather Phenomena



September 2003

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm
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VIRGINIA, North

Winds also knocked trees down around the city. Damages totaled \$2 million. Storm surge water flooded the employee parking lot of Reagan National Airport. Arlington had 2 homes destroyed and 46 with major damage. Another 146 residences had minor damage. Costs of flooding and damage from falling trees were estimated at \$2.5 million. In Fairfax County, 160 homes and 60 condominiums were washed out in the Belleview area south of Alexandria. Over 2000 units had minor to moderate damage from storm surge flooding. In addition, many trees fell causing additional property damage across the county. In the City of Fairfax, 15 homes had major damage from trees. Fairfax County damages came to \$18 million.

In King George County, four homes and 20 businesses had major damage. An estimated 150 to 200 homes were damaged by wind and falling trees. Dahlgren was the most impacted part of the county which includes the Naval Warfare base. The Route 301 Harry Nice Bridge was closed due to high winds and much of the county was without power. In Prince William County, seven homes were destroyed and 24 homes and 3 businesses had major damage. Scattered trees and wires were down causing roads to be closed. The storm surge washed away 20 feet of embankment along the Potomac which caused one of the CSX tracks to collapse along the Cherry Hill Peninsula. Damages at Quantico Marine Base were significant. Quantico's weather station recorded a 2 minute sustained wind of 54 mph with a peak gust of 78 mph between 11 pm and Midnight on the 18th. Damages to the base included buildings, houses and vehicles hit by fallen trees and flooding destroyed their marina. Total damages were reported to be 9.5 million. In Stafford County, many boats at the docks broke free. Five marinas were destroyed. Thirty-one homes had major damage from fallen trees and another 68 had minor damage with an additional 56 properties affected.

VAZ021-025>031-036>042-050>051-056 Highland - Augusta - Rockingham - Shenandoah - Frederick - Page - Warren - Clarke - Nelson - Albemarle - Greene - Madison - Rappahannock - Fauquier - Loudoun - Orange - Culpeper - Spotsylvania

	18	1400EST		0	70	16.9M	12.0M	High Wind (EG50)
	19	0700EST						

Albemarle County

Countywide	18	1700EST		0	0	100K		Flash Flood
	19	0400EST						

Nelson County

Countywide	18	1700EST		0	0	70K		Flash Flood
	19	0400EST						

Augusta County

Countywide	18	1800EST		0	0	1.5M		Flash Flood
	19	0400EST						

Highland County

Countywide	18	1800EST		0	0	50K		Flash Flood
	19	0400EST						

VAZ025>027-029>031-041-051 Augusta - Rockingham - Shenandoah - Page - Warren - Clarke - Fauquier - Culpeper

	18	1800EST		0	0	4.9M	10K	Flood
	21	0100EST						

Greene County

Countywide	18	2000EST		0	0	20K		Flash Flood
	19	0500EST						

Rockingham County

Countywide	18	2000EST		0	0	1M		Flash Flood
	19	0500EST						

Culpeper County

Countywide	18	2030EST		0	0	10K		Flash Flood
	19	0500EST						

Orange County

Countywide	18	2030EST		0	0	100K		Flash Flood
	19	0200EST						

Fauquier County

Countywide	18	2100EST		0	0	10K		Flash Flood
	19	0500EST						

Madison County

Countywide	18	2100EST		0	0	30K	50K	Flash Flood
	19	0500EST						



National Weather Service

Storm Data and Unusual Weather Phenomena



September 2003

Location	Date	Time Local/Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm
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VIRGINIA, North

Rappahannock County

Countywide	18 19	2100EST 0400EST			0	0	5K		Flash Flood
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Shenandoah County

Countywide	18 19	2100EST 0500EST			0	0	300K		Flash Flood
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Spotsylvania County

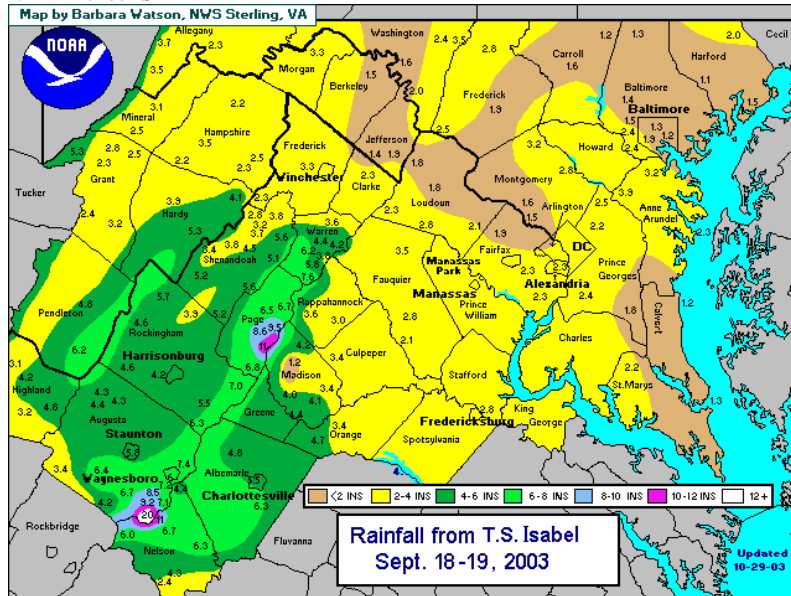
Countywide	18 19	2100EST 0400EST			0	0	50K		Flash Flood
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Page County

Countywide	18 19	2200EST 0500EST			0	0	2M		Flash Flood
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Warren County

Countywide	18 19	2200EST 0400EST			0	0	50K		Flash Flood
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Frederick County

Countywide	18 19	2245EST 0400EST			0	0	10K		Flash Flood
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By 9 pm on September 18, a rain band associated with Isabel had set up over the Shenandoah Valley and showers were training southward into the Blue Ridge Mountains on the east side of Augusta County. The rain gauge located at Upper Sherando had recorded over 6 inches of rain and more was to come. County officials quickly began evacuations of homes downstream. In all 350 people in the South River area would be evacuated and 21 of those ended up being by boat. Water flowed down the Black Creek at 60 mph washing out the bridge and several hundred feet of asphalt along Route 608. Four spillways to dams flooded causing damage but none of them failed. There was \$125,000 damage to the Mill Creek Dam alone. Damages to public roads and equipment were estimated at \$1 million. One home was destroyed and three businesses and four condos had major damage.

Loudoun County

Countywide	23	0045EST 0630EST			0	0	500K		Flash Flood
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Six inches of rain in 4 hours caused major flooding.



National Weather Service

Storm Data and Unusual Weather Phenomena



September 2003

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
<u>VIRGINIA, North</u>									
Fauquier County									
Countywide	23	0055EST 0630EST			0	0			Flash Flood
			Several roads and low lying areas were flooded.						
Clarke County									
South Portion	23	0100EST 0330EST			0	0			Flash Flood
			Flooding was reported in Shenandoah Farms.						
Page County									
Countywide	23	0130EST 0630EST			0	0			Flash Flood
			Eight county roads were closed by flooding.						
Warren County									
Countywide	23	0130EST 0630EST			0	0			Flash Flood
			Several roads were closed by high water.						
Alexandria (C)									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Arlington County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Augusta County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Culpeper County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Fairfax (C)									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Falls Church (C)									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Nelson County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Orange County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Rappahannock County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Rockingham County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Spotsylvania County									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Staunton (C)									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain
Waynesboro (C)									
Countywide	23	0300EST 1000EST			0	0			Heavy Rain



National Weather Service

Storm Data and Unusual Weather Phenomena



September 2003

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	

VIRGINIA, North

Fairfax County

Countywide

	23	0415EST 0645EST			0	0			Flash Flood
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Roads were flooded.

VAZ030-042-051

Warren - Loudoun - Culpeper

	23	0445EST			0	0			Flood
	24	1315EST							

During the morning of the 23rd heavy rain fell on top of already saturated ground from Hurricane Isabel which struck a few days before. This led to widespread flooding of roads, waterways, and other low lying areas. In Loudoun County, up to 6 inches of rain fell in 4 hours. Widespread flooding was reported, especially in the Leesburg, Purcellville, Bluemont, Aldie, and Middleburg areas. Across the county, over 50 roads were affected by flooding. Lime Kiln Road, Evergreen Mills Road, and Route 15 were underwater for over 24 hours after Goose Creek surged nearly 11 feet above bankful stage. Crooked Lane Bridge off Lime Kiln Road sustained major damage to a pillar. Pavement damage and debris deposits were left behind after the flooding subsided. Twelve other roads along the creek were also closed by high water and a few sustained significant damage. Goose Creek Golf Course was also flooded and 30 golf carts were damaged. The creek rose over its 12 foot bankful stage at 5:45 AM on the 23rd, crested at 22.7 feet at 4:30 PM on the 23rd, and fell below bankful stage at 5:45 AM on the 24th. Little River flooded the Oatlands Mill area and five people had to be rescued from their homes by boat. One farmhouse along Oatlands Mills Road had water up to its second story. The community of Aldie was also cut off by Little River flooding when Route 50, Snicker Hill Road, and the historic Hibbs Bridge went underwater. The local firehouse sustained significant flood damage and St. Louis Road was completely washed away.

In Leesburg, Tuscarora Creek and Town Branch overflowed into yards, basements, and parking lots. Two vans in a parking lot along Town Branch were washed downstream and residents along Shenandoah Street had to be evacuated. The Sheriff's Office administrative building was heavily damaged after the heavy rain collecting on the roof caused the ceiling to collapse. Just south of town on Route 650 (Gleedsville Road), a motorist had to be rescued after being caught in rushing Sycolin Creek flood waters. Just north of Leesburg, Route 15 was flooded by Limestone Branch. In Broad Run Farms, Broad Run overflowed after it was unable to drain into the swollen Potomac River. Young's Cliff Road was closed by high water. Beaverdam Creek near Beaverdam Reservoir also overflowed. It rushed into a nearby home and surged up the historic Hibbs Bridge. Across the county 60 basements were flooded. Rainfall totals included 5.98 inches in Leesburg, 4.4 inches in Lincoln, 4.3 inches in Hamilton, 3.59 inches in Bluemont, 3.2 inches in Ashburn, 2.95 inches in Middleburg, and 2.50 inches at Dulles International Airport.

In Clarke County, flooding was reported in Shenandoah Farms along the Warren County border. In Warren County, the following roads were closed by high water: Happy Creek Road, Route 55 East, Free Land Road, Morgan Hollow Road, and Newton Road. The South Fork of the Shenandoah River rose above its flood stage of 12 feet at Front Royal at 6:15 PM on the 23rd. It crested at 13.8 feet around 11:45 PM on the 23rd and fell below flood stage at 6:45 AM on the 24th. Rainfall totals included 3.57 inches at Hogback Mountain, 3.34 inches at Chester Gap, 3.22 inches at Manassas Gap, 2.39 inches at Browntown, and 2.0 inches in Front Royal. In Fairfax County, routes 50, 193, 7, and 29 were underwater in spots. Forty five other roads were closed by flooding across the county. Rainfall totals included 3.11 inches in Annandale, 3.06 inches in Herndon, 3.0 inches in Centreville, 2.57 inches in Vienna, and 2.48 inches in Great Falls. In Alexandria, around 2 inches of rain fell. In Arlington County, 2.45 inches of rain fell at Washington Reagan National Airport. In Falls Church, around 2.5 inches of rain fell.

In Fauquier County, high water was reported in Delaplane, Marshall, and Upperville. Route 50 in Upperville and Route 17 in Delaplane were under water for several hours. A total of 2.19 inches of rain was recorded in Warrenton and 2.13 inches was reported in Opal. In Rappahannock County, 4.35 inches fell in Massey's Corner and 3.15 inches of rain fell in Sperryville. The Rappahannock River at Remington rose over its flood stage of 15 feet at 5:45 PM on the 23rd. It crested at 17.9 feet at 6 AM on the 24th and fell below flood stage at 2:15 PM on the 24th. In Culpeper County, a spotter measured 2.30 inches of rain in Culpeper. In Orange County, 2.7 inches of rain was recorded in Gordonsville and 2.11 inches was recorded in Orange. In Spotsylvania County, 2.51 inches of rain fell in Fredericksburg. In Page County, rainfall totals included 4.80 inches at Big Meadows, 4.18 inches in Skyland, 3.80 inches at Rocky Branch, and 2.90 inches in Luray. Flooding damaged 8 county roads across the county, including Naked Creek Road which remained impassible for several days. In Rockingham County, 3 inches of rain fell just north of Lynwood and 2.54 inches was recorded at Swift Run. In Augusta County, the South River reached bankful in Waynesboro. Rainfall totals included 3.15 inches in Upper Sherando, 3.12 inches in Middlebrook, 2.60 inches at Spottswood, and 2.10 inches in Staunton. In Nelson County, 2.52 inches fell at Montebello Fish and 3.04 inches fell at Devils Knob.



National Weather Service

Storm Data and Unusual Weather Phenomena



September 2003

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm
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WEST VIRGINIA, East

Morgan County

Countywide	03	1900EST 2200EST			0	0			Heavy Rain
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Berkeley County

North Portion	03 04	2000EST 0900EST			0	0	50K		Flash Flood
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Several roads were flooded. An apartment building had to be evacuated after being inundated by water

An area of showers and thunderstorms moved through the Eastern Panhandle during the evening of the 3rd. Two to four inches of rain fell across northern Berkeley County. Eleven roads were closed by flooding, including Hedgesville Road and Williamsport Pike. Dry Run overflowed into the basement of the Fairlawn Gardens apartment complex in Martinsburg, rendering the utilities unusable. Twenty-three people had to be evacuated from the building and put up in a local shelter until the damage could be repaired. Hope Run also overflowed onto Route 11 and water was 4 feet deep at the Route 5 intersection. Route 9 (Hedgesville Road) was also flooded. Due to very saturated ground the high water did not recede until mid-morning on the 4th. A total of 2.26 inches of rain was recorded at Sleepy Creek. In Morgan County, rainfall totals included 2.53 inches at Luttrell and 2.10 inches at Cacapon Park.

WVZ049

Mineral

04	0530EST 0845EST			0	0			Flood
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The Potomac River rose just above flood stage at Kitzmiller.

Heavy rainfall over a three day period caused the headwaters of the Potomac River to run high. At 6:30 AM EDT on the 4th, the river rose above its 9 foot flood stage Kitzmiller, Maryland. The river crested at 8:30 AM at 9.22 feet then dropped below flood stage at 9:45 AM. Minor flooding occurred in low lying areas along the river.

WVZ048>055

Grant - Mineral - Hampshire - Morgan - Berkeley - Jefferson - Pendleton - Hardy

18	1500EST			0	0	645K		Flood
21	1700EST							

WVZ048>055

Grant - Mineral - Hampshire - Morgan - Berkeley - Jefferson - Pendleton - Hardy

18	1600EST			0	3	780K	290K	High Wind (EG50)
19	0700EST							

Pendleton County

Countywide	18	2200EST 0300EST			0	2	200K		Flash Flood
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Hardy County

Countywide	18	2300EST 0330EST			0	2	300K		Flash Flood
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Hampshire County

Countywide	18	2330EST 0400EST			0	0	50K		Flash Flood
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Grant County

Countywide	19	0000EST 0400EST			0	0	50K		Flash Flood
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On September 18, 2003, Hurricane Isabel made landfall on the North Carolina Coast. It moved northwest across Virginia and by 5 am on September 19, the center was over the heart of the eastern panhandle of West Virginia. Fortunately the storm had greatly weakened by this point. The heaviest rains appear to have been on the left side of the center track of the storm with the greater wind damage was to the right side. While sustained winds were no longer strong enough to do damage, the storm was still producing wind gusts in the 50 to 60 mph range. Previous rains had softened the soil and trees still had a full sail of leaves. Numerous trees uprooted onto power lines, roads, cars and houses. In Berkeley County a few houses and cars had trees fall on them and several roads were blocked. Thousands of people were temporarily without power and phone. Grant, Hardy, Mineral and Pendleton County had downed trees and power lines. Hampshire County had 6 homes with major damage from trees falling on them and many other trees blocked



National Weather Service

Storm Data and Unusual Weather Phenomena



September 2003

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed Injured	Estimated Damage Property Crops	Character of Storm
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WEST VIRGINIA, East

roads and took out power lines. Morgan County saw power and phone outages in several communities with some lasting several days. Communities impacted were Great Cacapon, Largent, Fisher's Bridge and on the outskirts of Paw Paw. In Jefferson County 9600 customers were without power Friday evening and many roads were blocked by trees and downed wires. About 30 to 40 trees fell in Harpers Ferry, one of which caused major damage to a house. A couple trees also fell on houses in Shepherdstown doing substantial damage. The Weather Station at Martinsburg Airport recorded a sustained wind of 30 mph and a peak wind gust of 46 mph between 11 pm and midnight. Winds on the ridges and in local gusts with rain showers were much stronger.

Heavy rain fell with the storm and because it was on the heels of previous rains it lead to more runoff and quicker rises on the rivers. In Pendleton and Hardy County, four to six inches of heavy rain caused some mudslides and flash flooding. Sugar Grove and parts of Moyers in Pendleton County saw damages to some properties. In Grant County, a levee broke at Micheal Field. In Mineral County, one school was flooded and 14 basements flooded. Flooding occurred on most of the rivers. On the South Branch of the Potomac at Franklin in Pendleton County, there was major flooding with the river cresting at 12.12 feet (flood state is 7 feet) at 4 am on September 19. There was moderate flooding at Petersburg with the river cresting at 13.96 feet (flood state is 10 feet) at 8:30 am on September 19. At Moorefield, the South Fork of the South Branch of the Potomac peaked at 10.94 feet at 1:30 pm on September 19 causing minor flooding. Flood stage is 10 feet. At Springfield, the river crested at 24.70 feet at 4:14 am on September 20 causing moderate flooding. Flood stage is 15 feet. On the North Branch of the Potomac there was moderate flooding at Kitzmiller with the river cresting at 12.51 at 5:30 am on September 19. Flood stage is 9 feet. The Potomac at Paw Paw saw minor flooding reaching a crest of 27.91 feet at 10 am on September 20. Flood state is 25 feet. At Shepherdstown, there was moderate flooding with the river cresting at 19.83 feet at 4:30 on September 20. Flood stage is 15 feet. The Opequon Creek at Martinsburg had minor flooding. Millville on the Shenandoah River had moderate flooding had moderate flooding reaching a crest of 17.31 feet at 8 pm on September 20. Flood stage is 13.5 feet. Harpers Ferry at the confluence of the two rivers saw minor flooding. In Morgan County, water topped the bridge over the Cacapon River. Two low water bridge spans were washed away and River Road near Route 9 west was flooded. In Grant and Mineral County, minor damage was reported to roads and bridges. In Jefferson County, a car drove into flood waters. The driver and child in the car were rescued. Pendleton County had 12 roads under water.