

SECTION 5 – HAZARD ANALYSIS

The *Hazard Analysis* provides information on historical hazard occurrences in the region for the hazards listed below. This includes an assessment of the location and spatial extent of the event as well as best available data regarding the impact on the region.

In developing this section, data from the original Plan was updated using research from a variety of sources. They include The National Climatic Data Center (NCDC), Virginia Department of Forestry (VDOP), and others. Data from Amelia County was added to the Plan as part of the 2012 update process. The information gathered was presented to the Project Management Team and interested stakeholders at a series of Hazard Mitigation workshops to gather input. Members of the Project Management Team and participating localities reviewed the data presented in this section for accuracy.

It should be noted that the NCDC undertook an overhaul of their storm events data in 2014. As a result, the data in some of the tables will be noticeably different from what was in the 2012 Plan update as the new data is more defined in its scale. The changes between the 2012 update and this plan will be most noticeable in Tables 5.3 (Winter Storm/Freezes) and 5.8 (Drought/Extreme Heat). The changes in the data could affect how this region ranks hazard risk for Plan updates going forward.

This section also includes a brief discussion of man-made hazards (which were not covered in the original Plan, but added in the 2012 Update). The narrative on man-made hazards will not include a detailed hazard analysis based on data collection, but will identify man-made hazards that could impact the region.

- **Flood**
- **Hurricanes, Tropical Storms and Nor'easters**
- **Severe Thunderstorms and Tornadoes**
- **Wildfire**
- **Drought/Extreme Heat**
- **Winter Storms and Freezes**
- **Erosion**
- **Earthquakes**
- **Sinkholes**
- **Landslides**
- **Dam/Levee Failure**
- **Man-made hazards**
 - **Hazardous material/chemical spills**
 - **Bio hazards**
 - **Accidents at fertilizer/other chemical facilities**
 - **Accidents at power plants/substations**
 - **Pipeline explosions**

44 CFR Requirement

44 CFR Part 201.6(c)(2)(i):
The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

To a large extent, historical records are used to identify the level of risk within the region — with the methodological assumption that the data sources cited are reliable and accurate. Information in this section includes, but is not limited to:

HAZARD ANALYSIS

- Number of events (per locality)
- Injuries or deaths (per locality)
- Damages (in dollars, per locality)
- A history of the more significant events for each hazard

Flood

Flooding in the region is caused by several different sources. The region is drained by two major river basins, the James and the Roanoke. Major rivers and tributaries in the region include the Appomattox River, Roanoke/Staunton River, Nottoway River, Meherrin River (North, Middle, and South), James River, Bush River, Little Nottoway River, Little Willis River, Willis River, North River, Sandy River, and the Slate River. In addition to these major rivers, there are numerous branches and creeks in the region that can cause flash flooding in times of heavy rain. Maps showing the flood hazard areas for each county can be found in the Appendices.

Flood Insurance Rate Maps (FIRMs) show the flood hazard areas within counties and jurisdictions. On most of the FIRMs within Planning District 14, there are generally two flood zones that are shown: the 100-year floodplain, and the 500-year floodplain. The area of the 100-year floodplain represents the area that stands a 1% chance of being flooded in any given year. The 500-year floodplain represents the area that stands a 0.2% chance of being flooded in any given year. Detailed information on the flood hazard within a jurisdiction can be found in the local Flood Insurance Study (FIS). Maps showing flood hazard for each county are based on FIRM data.

Table 5.1 lists data on several flood events that have occurred in the region since 1993 as reported by the National Climatic Data Center (NCDC). Details for each event have not been included in the Plan because of the large number of events. Details for events recorded in the National Climatic Data Center’s database can be obtained by visiting <http://www.ncdc.noaa.gov/oa/ncdc.html>. Based on historical evidence alone, it is clear that there is a high level of occurrence with regard to flood events in the region. The floods referenced below resulted in a total of two (2) deaths, and approximately \$2,263,500 in reported property damages.

**Table 5.1
Flood Events Since 1993**

Location	Number of Flood Events	Deaths	Property Damage*
Amelia County	3	0	\$8,000
Buckingham County	49	1	\$615,500
Charlotte County	52	0	\$1,572,000
Lunenburg County	7	0	\$50,000
Nottoway County	5	1	\$18,000
Prince Edward County	3	0	\$0
REGIONAL TOTALS	119	2	\$2,263,500.00

Source: National Climatic Data Center

* Approximate numbers based on NCDC records (does NOT include floods in Farmville and Prince Edward County from September 2011, July 2013, or May 2014).

Significant Events (Details from events slightly modified from National Climatic Data Center’s storm database):

HAZARD ANALYSIS

March 1936 – Successive storms between March 9 and 22 caused extensive flooding from Virginia to Maine. Damages were in the millions, and 150-200 deaths were blamed on this event. Significant amounts of snow fell during the winter. March started with mild temperatures, which were accompanied by heavy rains. Those rains melted the snows, which caused extensive flooding. The first rain, in the second week of March, dumped three inches of rain on top of the melting snow – causing rivers to rise. A second storm, on March 17-18, dumped six more inches of rain across the State. The Appomattox River crested at 17.72 feet in **Farmville** (just above flood stage – 16 feet) on March 18, and 25.27 feet in Mattoax (in **Amelia County**) on March 20.

April 1937 – Heavy rains caused flooding over much of the State. Major damage ensued, including washed out bridges and flooded homes. The Appomattox River crested at 20.28 feet in **Farmville** on April 26, and 29.97 feet at Mattoax on April 28. One person died in **Amelia County** when their car dropped into the river where a bridge approach was washed out.

Hurricane Camille, 1969 – Rain from Camille produced the worst flash flooding in Virginia's history. The James River experienced severe flooding as far east as Richmond, due to the amount of rainfall received in its tributaries and headwaters. More than 100 deaths in Virginia were blamed on Camille, all communication to the outside world was cut off, and damages were estimated at more than \$500 million. The James River crested at 30.00 feet in Scottsville – near Route 20 at the **Buckingham County** line (flood stage is 20 feet) and 39.10 feet at Bremono Bluff – near U.S. 15 at the **Buckingham County** line (flood stage is 19 feet) on August 20. The next day, August 21, the river crested at 33.75 feet at Cartersville in northern **Cumberland County** (flood stage is 20 feet).

Hurricane Agnes, 1972 – Some of the worst flooding to ever occur in the region resulted from this storm. The remnants of Agnes dropped heavy rains across the region. The Appomattox River in **Farmville** reached 29.7 feet, a record (flood stage is 16 feet).

Election Day Floods, November 1985 – Excessive flooding was blamed for 22 deaths and caused nearly \$800 million in damage across the State. Heavy rains began on November 4, causing flash flooding. The Roanoke River crested at 23 feet in Roanoke on November 5 (Election Day). Flood waters carried significant amounts of debris, taking out bridges and filling channels with rocks. An estimated \$8 million worth of tobacco was lost in warehouses along the James River. Fifty jurisdictions in Virginia were declared disaster areas, and 19 polling stations had to be moved because of flooding. The Appomattox River crested at 20.03 feet in **Farmville** on November 5. On November 6, the James River crested at 31.77 feet in Scottsville, 40.70 feet at Bremono Bluff, and 32.60 feet at Cartersville.

Hurricane Fran, 1996 – Rains from Hurricane Fran caused the Appomattox in **Farmville** to crest at 24.5 feet, the second highest level on record. It was estimated that the June 1972 flood was nearly equal to a 100-year event while the August 1940 and September 1996 floods were in the range of a 50-year flood.

September 2011 – Locally heavy rains in the region caused flash flooding in **Farmville** and **Prince Edward County** on September 23. A slow-moving system dumped several inches of rain on the area during the morning hours (according to *The Farmville Herald*, six inches of rain fell during a short period). Out in the County, the dam at Farmville Lake

HAZARD ANALYSIS

– located south of Town – was breached. There were also reports of several basements in residential and business properties being flooded, and some gravel roads were washed out.

In Farmville, a number of streets – including parts of Third and Fourth Streets – were flooded and impassible for part of the morning after Gross’s Branch overflowed its banks. Cars parked at Longwood Landing were partially under water for a time, and there was at least one known instance of sewage backing up in a commercial building near the Appomattox River. According to river data from the National Weather Service, the Appomattox River crested at just under 14 feet during the overnight hours of September 23/24 (Action Stage is 12 feet; Flood Stage is 16 feet).

July 2013 – Heavy rains during the month caused flash flooding in the **Town of Farmville** and surrounding areas. According to WFLO, the area’s official observation station for the National Weather Cooperative, 4.17 inches of rain fell during the 24-hour period ended at 7:00 a.m. on July 12 – a new record. By July 12, rainfall for the month at WFLO measured 8.08 – breaking the old record for the month of July, set in 1975, before the month was half over. According to a report in *The Farmville Herald*, at least one street – River Road – was closed by the Town due to flooding and Riverside Park was overtaken by the Appomattox River – prompting the Town to cancel its planned First Friday music event scheduled for July 12. The Appomattox River in Farmville crested at 17 feet, just above flood stage, on July 12.

May 2014 – Heavy rains resulted in flooding across the region. Riverside Park in Farmville was completely underwater as the Appomattox River overflowed its banks. The river in **Farmville** crested at 19.81 feet, more than three feet above flood stage, on May 16. A few days later, downriver, the Appomattox River at Mattoax (**Amelia County**), crested at 25.09 feet – more than four feet above flood stage – on May 20. The James River saw some issues as well, with the river at Bremono Bluff (near U.S. 15 in Fluvanna County, across the river from **Buckingham County**) cresting at 23.6 feet – more than three feet above flood stage – on May 16.

December 2015 – Heavy rains in the area caused local flooding during Christmas week, as a low-pressure system moving through the Central United States spawned heavy rains in much of the country – in addition to snows in the Rockies, Upper Midwest, and New England, and tornadoes in the Deep South. Regionally, as a result of the rains, area rivers and streams rose above flood stage. The Appomattox River crested at 17.74 feet in Farmville (nearly two feet above flood stage) on December 24 and 25.17 in Mattoax (more than six feet above flood stage) feet on December 27. In **Amelia County**, the bridge on Route 636 (North Lodore Road) over Flat Creek was overtaken by floodwater from the rains. A van tried to cross the bridge but got stranded (see photo above). It took firefighters from two local companies more than an hour to rescue the two passengers and the Christmas presents on board.



HAZARD ANALYSIS

January 2017 – Heavy rains in the area caused local flooding, as parts of the region saw rain for several days at the end of the month (parts of Virginia experienced above-average rainfall and above-average temperatures for the month). In **Amelia County**, Route 607 (West Creek Road) was closed for a day due to the bridge being under water. The bridge over Deep Creek on Route 615 (Namozine Road) was also under water and had to be closed. More than 2 inches fell in Amelia County between January 20 and 24, according to a report in the *Amelia Bulletin-Monitor*.

Local Flooding Concerns:

Amelia County – The following roads have been identified as subject to flooding:

- Route 621 at the Appomattox River
- Route 615 at Deep Creek
- Route 607 at West Creek
- Route 622 at Namozine Creek
- Route 620 at the Appomattox River
- Route 636 at Flat Creek
- Route 643 at Little Bent Creek
- Route 637 at Jones Lake

Buckingham County – The following roads have been identified as flooding periodically:

- Route 636 (from U.S. 15 to Cumberland County Line)
- Route 605 (from Appomattox County Line to the end of the road)
- Route 664 (from Route 604 to Route 737)
- Route 662 (from Route 607 to Route 663)
- Route 741 (from Route 604 to Route 56)
- Route 720 (from Route 20 to the end of the road)
- Route 657 (from Route 659 to Route 658)
- Route 717 (from Route 613 to Route 610)

Charlotte County – The following roads were identified as having flooded over the last 10 to 15 years:

- Route 619 (from Route 746 to Route 645)
- Route 650 (from Route 47 to Route 649)
- Route 650 (from Route 40 to Route 604)
- Route 616 (from Route 727 to Route 672)
- Route 695 (from Route 727 to Route 617)
- Route 648 (from Route 619 to Route 746)
- Route 619 (from Route 637 to Route 645)
- Route 638 (from Route 691 to Appomattox County line)
- Route 691 (from Route 638 to Route 47)
- Route 701 (from Route 691 to Route 736)
- Route 668 (from Route 667 to Route 40)
- Route 638 (from Route 628 to Route 691)
- Route 649 (from Route 619 to Route 678)

HAZARD ANALYSIS

- Route 619 (from Route 693 to Route 620)
- Route 701 (from Route 615 to Route 691)
- Route 618 (from Route 40 to Route 749)
- Route 701 (from Route 736 to Route 691)
- Route 649 (from Route 678 to Route 731)

Lunenburg County – The following roads have been identified as subject to frequent flooding:

- Route 621 between Route 602 and U.S. 1 (in Mecklenburg County)
- Route 621 between Route 620 and Route 637 (in Brunswick County)
- Route 602 between Route 668 and Route 621
- Route 602 between Route 638 and Route 668
- Route 647 between Route 609 and Route 648
- Route 627 between Route 615 and Route 600
- Route 644 between Route 635 and Route 643
- Route 643 between Route 635 and Route 644
- Route 643 between Route 635 and Route 640
- Route 664 between Route 49 and Route 626
- Route 656 between Route 626 and Route 625
- Route 690 between Route 680 and Route 692
- Route 694 between Route 49 and Route 631
- Route 626 between Route 723 and Route 49
- Route 680 between Route 681 and Route 689

The following roads have been identified as subject to occasional flooding:

- Route 635 between Route 641 and Route 659 (in Mecklenburg County)
- Route 636 between Route 640 and Route 654 (in Mecklenburg County)
- Route 697 between Route 40 and Dead End
- Route 607 between Route 609 and Route 1101
- Route 637 between Route 646 and Route 614
- Route 637 between Route 614 and Route 613
- Route 659 between Route 675 and Route 770
- Route 626 between Route 682 and Route 689
- Route 678 between Route 680 and Route 626
- Route 678 between Route 704 and Route 662

Town of Kenbridge – The local wastewater treatment plant floods any time there is a measurable rainfall.

Nottoway County – The following roads have been identified as subject to frequent flooding:

- Route 608 between 153 and 609 at Bland Creek
- Route 611 between 615 and 613 at Deep Creek
- Route 611 between 607 and 625 at Woody Creek
- Route 626 between 49 and 723 at Nottoway River

HAZARD ANALYSIS

- Route 633 between 49 and 607 at Lazaretto Creek (During excessive hard rains)
- Route 607 between 460 and 633 at Lazaretto Creek (During excessive hard rains)
- Route 633 between 723 and Dead End at Carys Creek
- Route 629 between 628 and 647 at Flat Creek (During excessive hard rains)

These roads have been identified as topographically inclined for special event flooding or that have actually flooded:

- Route 307 at Flat Creek and at Little Creek
- Routes 618, 611, and 614 at Deep Creek
- Routes 642 and 633 at their intersection with Lazaretto Creek
- Route 603 at the confluence of Whitestone Creek and the Little Nottoway River
- Route 640 at the Hobbs Mill on Namozine Creek.
- Route 610 at Sweathouse Creek

Town of Crewe – Wastewater treatment plant subject to routine flooding.

Prince Edward County – Frequent flooding along the Bush River, Little Saylers Creek, and the Appomattox River (often causes road flooding during flash floods). The following roads have been identified as subject to frequent flooding:

- Route 665 (Worsham Road) between U.S. 15 and Route 630 at Briery Creek
- Route 636 (Poorhouse Road) between U.S. 460 and Route 740 along the Bush River
- Route 619 (Lockett Road) between Route 726 and Route 618 at Sailor's Creek
- Route 686 (Allen Farm Road) between Route 666 and Route 665 at Buffalo Creek
- Intersection of Route 625 (Featherfin Road) and Route 609 (Peaks Road) at Vaughan's Creek
- Intersection of Route 651 (Chinquapin Road) and Route 608 (First Rock Road) at Plum Creek
- Intersection of Route 634 (New Bethel Road) and Route 721 at the Bush River
- Route 664 (Singleton Road) between Route 659 and Route 658 at Spring Creek
- Route 620 (Scuffletown Road) between Route 619 and Route 600 Sailor's Creek.

Town of Farmville – Experiences the most flooding problems in the region. Town officials identified the following roads/areas as being subject to flooding:

- North Main Street (Appomattox River-Green Front area)
- Second Street, between South Street and Virginia Street (near Gross' Branch and DMV Office)

HAZARD ANALYSIS

- North Bridge Street (adjacent to river)
- North Virginia Street (adjacent to river)
- Plank Road (Price Supply area)
- River Road
- South Street
- Fourth Street (adjacent to branch behind First Baptist Church)
- East Third Street (Macado's area, near Gross' Branch)
- West Third Street (adjacent to Fire Dept. and Centra Southside Community Hospital)



Flood prone portions of the North Virginia Street and North Bridge Street area of Farmville. (Photo by Commonwealth Regional Council)

Historical Crests, local rivers (source – NOAA/National Weather Service):

For this Plan Update, we will only include the top 15 crests given the amount of data. We are also including only gauges at stations where the river runs along one of the localities participating in the Plan Update. The James River gauges at Scottsville and Bremono Bluff are located across the river from Buckingham County.

Appomattox River at Farmville (flood stage – 16 feet)

	Level	Date
1)	29.70 feet	June 21, 1972 (Hurricane Agnes)
2)	24.02 feet	September 7, 1996 (Hurricane Fran)
3)	23.60 feet	August 15, 1940
4)	21.79 feet	February 25, 1979
5)	21.19 feet	January 26, 1978
6)	21.10 feet	August 12, 1928
7)	21.00 feet	September 20, 1944
8)	20.99 feet	October 24, 1971
9)	20.90 feet	September 19, 1945
10)	20.90 feet	October 26, 1974
11)	20.90 feet	September 26, 1975
12)	20.79 feet	November 29, 1993
13)	20.78 feet	March 5, 1993
14)	20.47 feet	April 27, 1978
15)	20.28 feet	April 26, 1937

Appomattox River at Mattoax (flood stage – 21 feet)

	Level	Date
1)	35.30 feet	August 18, 1940
2)	34.08 feet	June 25, 1972 (Hurricane Agnes)
3)	31.10 feet	October 7, 1972
4)	30.84 feet	February 26, 1979
5)	29.97 feet	April 28, 1937
6)	27.73 feet	January 28, 1978
7)	27.49 feet	September 10, 1996 (Hurricane Fran)
8)	27.33 feet	September 23, 2003

HAZARD ANALYSIS

9)	26.64 feet	November 7, 1985 (Election Day Flood)
10)	26.54 feet	December 1, 1993
11)	26.53 feet	August 21, 1955
12)	26.38 feet	March 8, 1993
13)	25.96 feet	April 19, 1987
14)	25.94 feet	August 15, 1928
15)	25.85 feet	March 22, 1998

James River at Scottsville (flood stage – 20 feet) *

	Level	Date
1)	34.02 feet	June 22, 1972 (Hurricane Agnes)
2)	31.77 feet	November 6, 1985 (Election Day Flood)
3)	30.00 feet	August 20, 1969 (Hurricane Camille)
4)	28.24 feet	September 7, 1996 (Hurricane Fran)
5)	26.17 feet	April 17, 1987
6)	26.02 feet	January 20, 1996
7)	26.00 feet	September 19, 1944
8)	25.84 feet	August 16, 1940
9)	25.46 feet	March 19, 1936
10)	25.31 feet	April 23, 1992
11)	24.63 feet	March 19, 1975
12)	24.56 feet	September 8, 1987
13)	23.24 feet	October 6, 1972
14)	23.06 feet	September 6, 1935
15)	23.00 feet	October 16, 1942

James River at Bremo Bluff (flood stage – 20 feet) *

	Level	Date
1)	44.80 feet	June 22, 1972 (Hurricane Agnes)
2)	40.70 feet	November 6, 1985 (Election Day Flood)
3)	39.10 feet	August 20, 1969 (Hurricane Camille)
4)	36.60 feet	September 7, 1996 (Hurricane Fran)
5)	34.50 feet	September 19, 1944
6)	33.50 feet	August 17, 1940
7)	33.50 feet	January 20, 1996
8)	33.30 feet	April 17, 1987
9)	32.70 feet	September 9, 1987
10)	31.60 feet	April 23, 1992
11)	31.40 feet	March 20, 1975
12)	30.70 feet	December 4, 1949
13)	30.00 feet	February 26, 1979
14)	29.80 feet	October 6, 1972
15)	29.30 feet	January 28, 1978

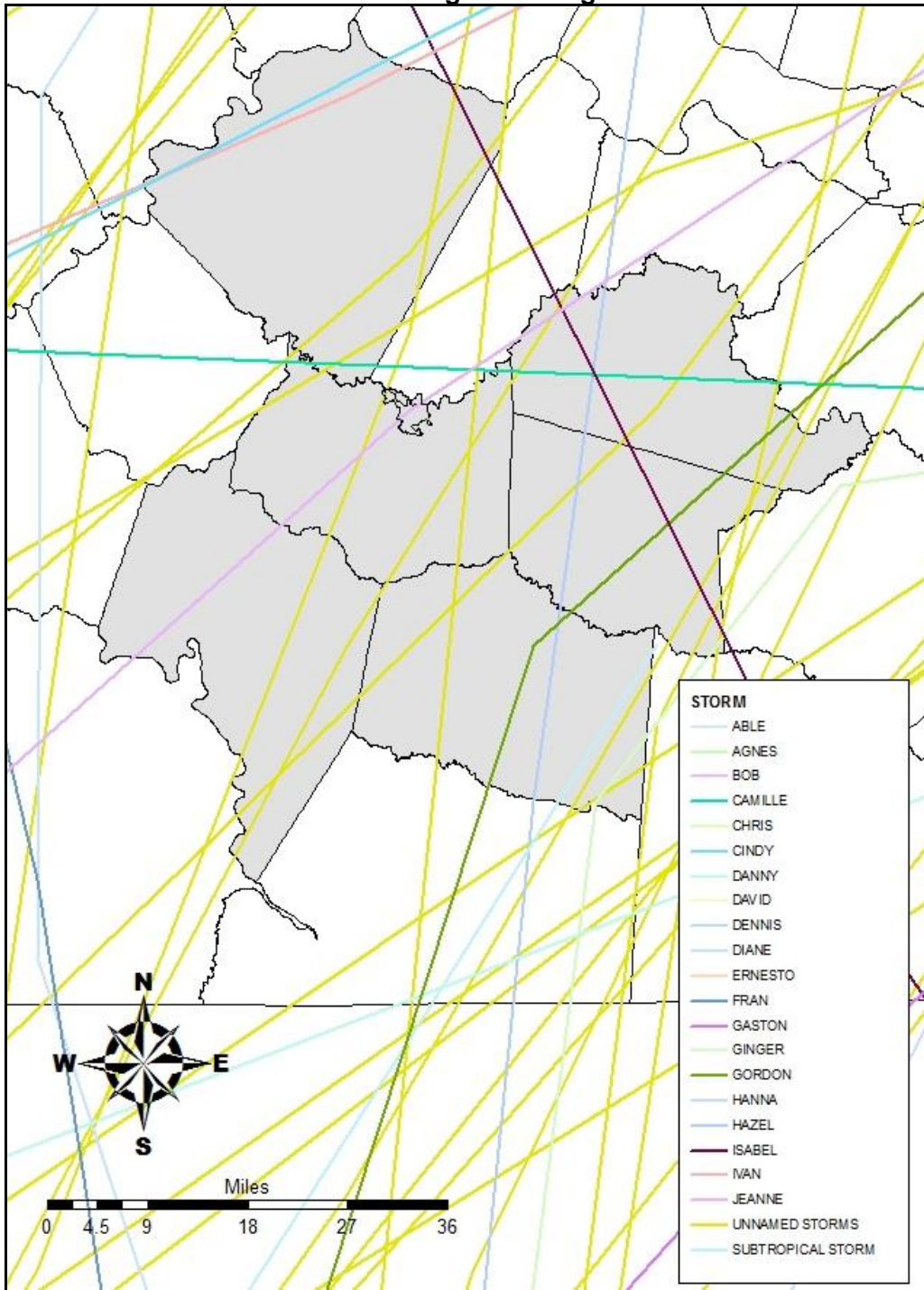
Hurricanes, Tropical Storms and Nor'easters

Since 1851, one Category 3 hurricane (Hazel), one Category 2 (Unnamed 1878) and 11 Category 1 hurricanes have passed within 75 miles of Planning District 14 (**Map 5.1** – on the next page). More than 70 tropical systems have passed within 75 miles of the region or are otherwise noteworthy in the region's hurricane history. Thirty-six were tropical storms with the remainder classified as tropical depressions and extra tropical systems (Refer to the *Hazard Identification* section for explanation of the Saffir-Simpson scale,

HAZARD ANALYSIS

associated damage classifications and other background information with regard to tropical cyclones). Some of the more significant events have been listed in **Table 5.2**.

**Map 5.1
Historic Hurricane Tracks through Planning District 14 – 1851-2015**



Map created by CRC – October 2010 (Source: NCD/NOAA)

Data from National Hurricane Center shows no significant tropical systems have affected the region since 2008.

HAZARD ANALYSIS

**Table 5.2
Significant Hurricane/Tropical Storm History in Planning District 14 (1851–2015)**

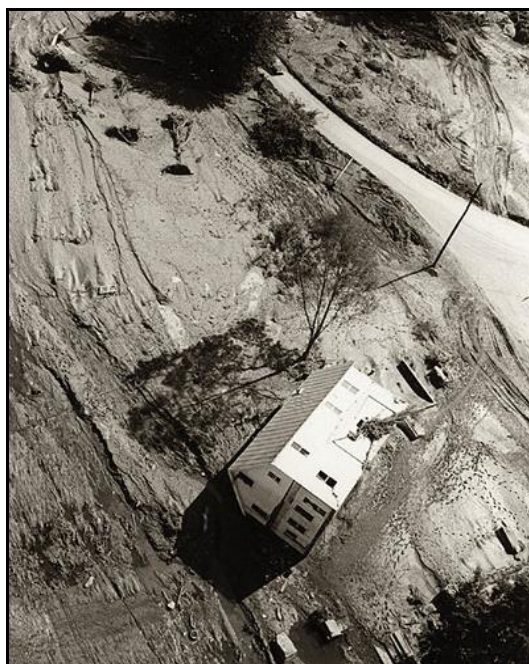
Name of Storm	Date of Occurrence
Not Named	1878
Hazel	1954
Camille	1969
Agnes	1972
Bertha	1996
Fran	1996
Dennis	1999
Isabel	2003
Gaston	2004
Frances	2004
Ivan	2004
Ernesto	2006
Hanna	2008

Sources: National Hurricane Center, National Climatic Data Center, National Weather Service and NOAA Coastal Services Center

Significant Events:

Unnamed hurricanes, 1878 – Two storms impacted Virginia this year. The first came from the Caribbean and hit southern Florida in September, then drifted around the state and went out over the Atlantic. The storm made a second landfall over South Carolina, and moved through North Carolina and Virginia. At least nine deaths were attributed to the storm, though more is possible. The second storm came from the Caribbean and moved over southeast [Florida](#) and the [Bahamas](#), then made a second landfall over North Carolina with winds of 100 mph. The storm moved up the east coast, causing more than \$2 million in estimated damages and at least 72 casualties.

Hurricane Hazel, October 1954 – Maintained hurricane force winds up the East Coast and produced a number of record wind gusts. The Town of Blackstone had 63 mph sustained winds with 92-mph gusts. Hundreds of thousands of trees were destroyed. Half of the phone and electric lines in the state were knocked out equaling \$2 million in damages. Five to six inches of rain fell in the region causing flooding of small streams. The storm was blamed for 13 deaths in Virginia, and damages were estimated (conservatively) at \$15 million.



Rains from Hurricane Camille caused catastrophic flooding and landslides. This aerial view shows a house in Nelson County (just west of Buckingham County) that was removed from its foundation and washed away.

Photo by Bill Whitehead (courtesy *The Virginian-Pilot* – www.Pilotonline.com)

HAZARD ANALYSIS

Hurricane Camille, August 1969 – Made landfall on the Louisiana Coast and maintained hurricane strength for 150 miles up the Mississippi Valley. The storm turned east and headed for Virginia, where it tapped into the warm and humid air over the southern Gulf Stream that drew it northwest toward the Virginia Mountains – triggering heavy rains in Central Virginia. An area 100 miles long and 25 miles wide received more than 10 inches of rain. Rain from Camille produced the worst flash flooding in Virginia's history. The James River experienced severe flooding as far east as Richmond, due to the amount of rainfall received in its tributaries and headwaters. More than 100 deaths in Virginia were blamed on Camille, all communication to the outside world was cut off, and damages were estimated at more than \$500 million.

Hurricane Agnes, June 1972 – Made landfall along the Florida panhandle as a category 1 hurricane, then weakened as it moved up the coast (east of the Appalachians) and reorganized as a tropical storm as it passed into Virginia, Agnes caused some of the most devastating flooding in Virginia's recorded history, with severe flooding along the James and Appomattox River Basins. Pressures fell to 29.10" at Norfolk. Langley Air Force Base experienced wind gusts to 54 mph. Approximately 49,000 phones were put out of service by downed lines, 103 highways were destroyed or damaged across the state, and 13 deaths were blamed on the storm. Damages were estimated at \$222 million. **Farmville** received its worst flooding in history as a result of this storm. The Appomattox River crested at 29.70 feet (flood stage is 16 feet).

Hurricane Bertha, July 1996 – Made landfall between Wrightsville and Topsail Beaches, North Carolina, then moved up the east coast toward Canada and Greenland. Damage was minimal in Virginia, though there was significant damage in North Carolina and flooding was reported along the storm's path. Eight deaths were blamed on the storm.

Hurricane Fran, September 1996 – Made landfall at Cape Fear on the North Carolina coast and moved north, entering Virginia near Danville. In just one hour, some areas saw 3.5 inches of rain. All rivers in the central part of the State experienced major flooding, and 100 people were rescued from floodwaters caused by Fran's excessive rains. Damages totaled \$350 million, and six deaths were blamed on the storm. Rain



Rain from Hurricane Agnes made parts of Farmville impassable by vehicle. In this photo, East Third Street is completely underwater between Main and Virginia Streets.

Photo courtesy of *The Farmville Herald*

HAZARD ANALYSIS

bands produced tropical storm force winds with gusts as high as 79 mph (Big Meadows) with measured gusts to 60 mph at lower elevation areas. Scattered tree damage occurred throughout much of the state with many trees uprooting from the combination of strong winds and saturated ground. During the height of the storm, 78 primary roads and 853 secondary roads were closed due to flooding and downed trees. Estimated damages to state roads were \$37 million. Access to and from isolated communities continued to be a problem for a couple weeks due to washed out bridges and roads. A record number of people (560,000) in Virginia experienced power outages. Agricultural damages appeared to be severe and extensive to what would have been a bumper crop from the cooler, wetter than normal summer. Agricultural damages were estimated in excess of \$50 million.

Hurricane Dennis, August/September 1999 – Moved along the southeast U.S. Coast, dumping heavy rains and causing beach erosion in North Carolina, then made landfall and moved through North Carolina and Virginia before continuing through the Mid-Atlantic region. Many parts of Virginia received significant rainfall from the storm (giving the region some much-needed rain on the heels of a summer-long drought), and the southeastern part of the State experienced tropical storm force winds.

Hurricane Isabel, September 2003 – Made landfall in North Carolina, and passed through Central Virginia during the afternoon and evening. The storm caused the loss of electricity and knocked down several large trees across the region, but most of the area was spared any major flooding and/or damage. Damage to agriculture was reported too, but reported losses were minimal. Governor Warner declared a state of emergency, and President Bush issued a federal disaster declaration (**Amelia, Buckingham, Lunenburg, Nottoway, and Prince Edward Counties** were covered under this declaration).

Tropical Storm Gaston, August 2004 – The storm skirted the region, causing some localized flooding. Specifically, the **Town of Kenbridge** reported flooding of the sewer plant and Police Department. The tin roof at Mt. Nebo Church in **Nottoway County** was partially blown off and a tree limb damaged a trailer. Several tops of trees were reported damaged in **Nottoway County**. The **Town of Drakes Branch** received 3.5 inches of rain, but reported no local flooding. Several roads in the region were closed and, in some cases, washed out. **Lunenburg County** was the hardest hit in the region. The bridge over the South Meherrin River was submerged by floodwaters and a swift water rescue was performed to rescue two stranded motorists.

Hurricane Frances, September 2004 – Made landfall in Florida as a category 2 hurricane, but weakened to a tropical depression by the time it reached Virginia. Minimal damage was reported in the region. Two mobile homes were damaged in **Buckingham County** and the sewer plant in the **Town of Kenbridge** flooded. A tornado hit Buckingham Branch Railroad seven miles north of **Dillwyn**, near Route 622, at about 5:00 pm. Railroad crews had to clear trees from approximately two miles of track. Otherwise, locally heavy rains fell throughout the region and caused some localized flooding.

Hurricane Ivan, September 2004 – This storm caused a possible tornado in **Prince Edward County**, between **Farmville** and Prospect. A few trees and large limbs were downed. There were areas of heavy downpours that caused flash flooding across the region; otherwise the region was spared any major damage.

HAZARD ANALYSIS

Tropical Storm Ernesto, August/September 2006 – Made its first U.S. landfall in southern Florida, then went out over the Atlantic Ocean and made a second U.S. landfall near Long Beach, North Carolina. The storm affected eastern parts of Virginia, causing an estimated \$90 million in losses throughout the State. Parts of eastern Virginia received 8-12 inches of rainfall. **Lunenburg County** was one of 25 localities in the State (22 counties and three cities) eligible for public assistance from the federal disaster declaration related to Ernesto.

Hurricane/Tropical Storm Hanna, September 2008 – Strengthened into a hurricane over the Atlantic, then weakened into a tropical storm before making landfall near the North Carolina/South Carolina border. The storm moved across eastern North Carolina, then turned northeast across the southeastern part of Virginia and eventually moved across the Chesapeake Bay and Delaware and back out over the Atlantic before making a second landfall over Long Island, New York. The storm was blamed for approximately 500 deaths in Haiti. Only minor damage was reported in the U.S., but the storm produced heavy rain and tropical storm force winds across northern and central Virginia. Rainfall amounts totaled around 4 to 8 inches across many locations with locally higher amounts over 9 inches. Numerous roads were closed throughout Northern and Central Virginia due to flash flooding, and the storm downed trees and power lines across northern and central Virginia.

Nor'easters:

Nor'easters also impact the region. Unlike hurricanes and tropical storms that typically come and go within one tidal cycle, nor'easters can linger for days. One of the largest nor'easters to impact the region occurred on January 23 and 24, 1940 as a storm dumped 24 inches of snow on **Farmville** in 24 hours. Businesses were closed for a couple of days and some schools were closed for a week. There were 12 deaths attributed to the storm in Virginia and damages statewide were estimated at half a million dollars. 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.

Significant Events (Nor'easters):

January 30-31, 1966 – A blizzard struck Virginia and the northeast United States. 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 snow still on the ground, arctic air settled in and temperatures dropped into the teens. The second storm dumped 1 to 2 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 (this is on top of the previous snow). Lynchburg set a monthly record with almost 32 inches (31.8), and Roanoke set a monthly record with 41.2 inches. Strong winds and drifting snow kept roads closed for several days after the storm. Temperatures dropped into the single digits with some falling below zero, with dangerous wind chills. The Richmond area set a record for the calendar year with 41.6 inches.

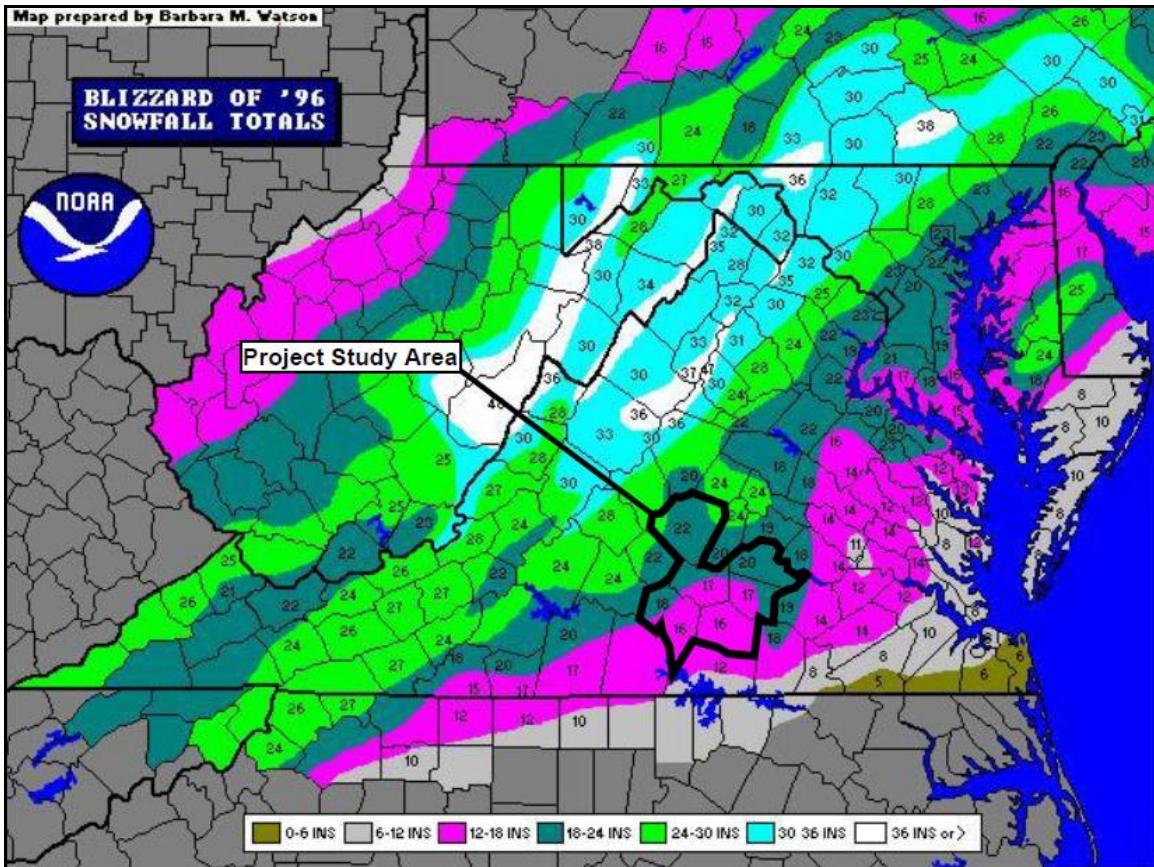
Winter of 1995-1996 – Much of the State north and west of Richmond had either a record seasonal snow total or totals in the top three for the century. **Buckingham County** saw 67 inches for the season. Some schools lost as many as 15 days, and

HAZARD ANALYSIS

school systems compensated by adding hours to their days, adding Saturdays or teacher conference days, or staying in session through most of June.

Blizzard of '96 (January 6-13, 1996) – Part of the winter mentioned above, this storm resulted in snow for every county in the State, and dumped 16 to 24 inches of snow in the region. See map below for snowfall totals across the region.

**Map 5.2
Blizzard of '96 Snowfall Totals**



Source: National Oceanic and Atmospheric Administration

November 2009 Nor'easter – Even though this storm did not have a great effect on the region, a state of emergency was declared by Governor Kaine and a number of Virginia localities received federal disaster designations – making the entire State eligible for HMGP funding.

December 18 to December 20, 2009 – A nor'easter dumped heavy snow from North Carolina northward along the Eastern Seaboard to New England and the Canadian Maritime Provinces. Heavy snow began in Virginia around midday on December 18, and snow rapidly accumulated to the point where winter storm warnings were issued for much of the State. Travel was rendered extremely difficult for several days, and numerous vehicle accidents were attributed to this storm. According to NCEM data, final snow totals ranged from less than 6 inches in the southeast part of the State to more than 25 inches in the western and southwestern parts of Virginia. Nearly 50 Virginia

HAZARD ANALYSIS

localities were directly affected by the ensuing Presidential Disaster Declaration (issued on February 16, 2010).

Winter Storms/Freezes

According to the National Climatic Data Center, the counties in Planning District 14 have experienced 306 winter storm events since 1993. These events together are accountable for a total of approximately \$123,000 in reported property damages.

Table 5.3
Winter Storm Activity in the Region

Location	Number of Events	Property Damage by County	Injuries	Span of Recorded Events (Years)	Annualized Losses
Amelia County	62	\$115,000	0	22	\$5,227
Buckingham County	36	\$0	0	22	\$0
Charlotte County	25	\$5,000	0	22	\$227
Lunenburg County	54	\$0	0	22	\$0
Nottoway County	55	\$0	0	22	\$0
Prince Edward County	74	\$3,000	0	22	\$136
TOTAL	306	\$123,000.00		-----	\$5,590.00

Source: National Climatic Data Center

Significant events:

March 13-14, 1993 – The “**Superstorm of March '93**” affected the eastern United States from Florida and Alabama through New England. The storm was blamed for approximately 200 deaths and cost several billion dollars in damages and snow removal. As the storm made its way into Virginia, some weather stations recorded their lowest recorded pressures ever. Unlike most large winter storms that move up the Virginia coast, this storm took a more inland track across Richmond and the Chesapeake Bay. It brought snow, ice, rain and some high winds to the region. The icy conditions caused slick roads and downed power lines, and some portions of the region were without power for 14-15 days. In the State, 11 people died 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.

December 23 to December 25, 1998 – The “**Christmas Ice Storm**” is estimated to have caused approximately \$20 million in damage across several states including Virginia. At least three deaths in Virginia were blamed on the storm, all elderly people who died of hypothermia after they lost power in their homes. Central and Southeast Virginia were hit particularly hard, including many localities in Planning District 14. A prolonged period of freezing rain and sleet resulted in accumulations ranging from ½-inch to one inch in many locations, and ice on trees and power lines resulted in widespread power outages (it is estimated that as many as 400,000 customers in Virginia were without power at one point), some lasting as long as 10 days. Roads and bridges/overpasses were slick, and some secondary roads were rendered impassable due to fallen limbs or – in some cases – entire trees that blocked roadways.

HAZARD ANALYSIS

March 2009 – most significant statewide winter weather event in over 8 years. Most areas received over 4 inches of snow. Amounts range from a dusting in VA Beach to 10-11 inches in Richmond through the Northern Neck area. This caused travel disruptions and widespread power outages. Schools throughout the region were closed, and the Emergency Operations Center was activated in **Charlotte County**.

December 2009 – A winter storm moved from the Gulf Coast through North Carolina and Virginia, dumping heavy snow across the State. Heavy snow began in Virginia around midday on December 18, and snow rapidly accumulated to the point where winter storm warnings were issued for much of the State. Travel was rendered extremely difficult for several days, and numerous vehicle accidents were attributed to this storm. According to NCDC data, final snow totals ranged from less than 6 inches in the southeast part of the State to more than 25 inches in the western and southwestern parts of Virginia. Nearly 50 Virginia localities were directly affected by the ensuing Presidential Disaster Declaration (issued on February 16, 2010).

January 25 and January 30, 2010 – Two storms impacted parts of the region just a few days apart. The first, on January 25, dumped six to 12 inches of snow across Central Virginia. Snowfall amounts varied, with six to 10 inches in **Prince Edward County** and 10 inches in **Cumberland and Amelia Counties**. No damages were reported from this storm, but the snow remained on the ground for several days in many areas due to below-average temperatures. Then, on January 30, a significant ice storm caused an estimated \$200,000 in damages across Central and Eastern Virginia. What started out as a mix of snow, sleet, and freezing rain turned into all freezing rain. Ice accumulations ranged from ¼ inch to ¾ inch in **Nottoway and Amelia Counties**. Downed trees and power lines resulted in widespread power outages (an estimated 285,000 customers in Central Virginia were without power at one point).

February 5-11, 2010 – On the heels of the December 2009 nor'easter and the January 2010 ice storm, another storm dumped record snowfalls across the Mid-Atlantic region and dumped significant snow in parts of Virginia. Deaths in Mexico, New Mexico, Maryland, and Virginia were attributed to this storm. Some parts of Virginia (in particular, Northern Virginia) received between 20 and 40 inches of snow, bringing travel to a halt. To give just one example, rail service south and west of Washington, D.C. was suspended and rail service from Washington to Boston was suspended for a time. In this region, snow totals ranged from two inches in **Lunenburg County** to 10 inches in **Amelia County**. A Presidential Disaster Declaration for this event was issued on April 28, 2010. Locally, **Buckingham County** was included in this declaration.

January 22-24, 2016 – A major snowstorm brought heavy snow to many states along the east coast of the United States. Known as Winter Storm Jonas, it affected an area stretching from Arkansas to New Hampshire. It started as a disturbance in the Pacific Northwest earlier in the week, moved southeast across the Plains, then spawned a weak area of low-pressure over Texas. Then a new area of low pressure formed over the Carolinas and Georgia, and the storm started to move north and rapidly gained strength. Parts of Northern Virginia and along the Blue Ridge Mountains were under a blizzard warning on January 21, just before the storm hit the Commonwealth, and Governor McAuliffe declared a state of emergency for Virginia. The storm was rated a Category 4 or “Crippling” winter storm on NOAA’s Northeast Snowfall Impact Scale (NESIS). Areas further north along the coast, including Washington, DC and New York City, reported two to three feet of snow. In this region, totals were not as high but schools and businesses

HAZARD ANALYSIS

were closed or opened late for a number of days. According to published reports in the local media, snowfall totals ranged from six to 10 inches in **Charlotte County** to 10 inches in **Lunenburg County** and **Farmville** to 11 to 15 inches in **Amelia County**.

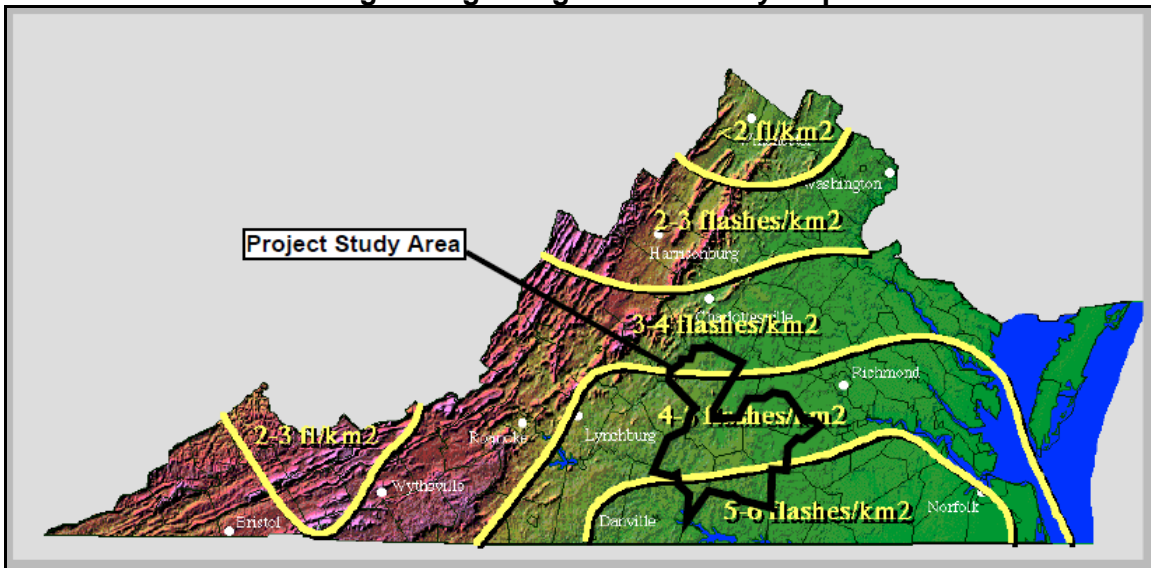
January 6-7, 2017 – A weekend snow storm created dangerous travel conditions and led to scattered power outages, with snowfall amounts between five and 10 inches reported across the region and overnight low temperatures near zero over the weekend. The combination of snow and cold temperatures created slick road conditions, with numerous automobile accidents reported but no known serious injuries, and led to the closure of area schools for a few days afterward. In **Lunenburg County**, icy road conditions made responding to a house fire in **Victoria** difficult over the weekend. The **Victoria** and **Kenbridge** Fire Departments were able to put out the blaze with no injuries, but the house was a total loss. The fire is believed to have started in the area of the house where the wood stove and chimney were located.

Severe Thunderstorms and Tornadoes

Thunderstorms

Thunderstorms are common throughout the State of Virginia, and have been known to occur during all calendar months. In addition to the high winds associated with these events, thunderstorms can also bring dangerous lightning that can cause fires, property damage and may cause death or serious injury to humans. A thunderstorm with wind gusts in excess of 58 mph (50 knots) and/or hail with a diameter of 0.75 inches or more is classified as a “severe thunderstorm.” Hail is another element of this form of inclement weather, and can cause varying degrees of property and crop damage. **Map 5.3** shows lightning strike density in the State of Virginia. **Table 5.4** provides summary information of thunderstorms and lighting events reported to the National Climatic Data Center (NCDC).

Map 5.3
Virginia Lightning Strike Density Map



Source: Virginia State Climatology Office

Note: This map is based upon lightning strike data for the year 1989. Strikes were identified by the detector network established by the Electric Power Research Institute.

HAZARD ANALYSIS

Table 5.4
Severe Thunderstorm Activity in the Region*

Location	Number of Events	Property Damage	Deaths/ Injuries	Span of Recorded Events (Years)	Annualized Losses
Amelia County	92	\$289,000	0/1	40	\$7,225
Buckingham County	173	\$1,254,000	1/0	49	\$25,592
Charlotte County	144	\$589,500	0/0	40	\$14,738
Lunenburg County	70	\$1,029,000	0/0	41	\$25,098
Nottoway County	102	\$224,500	0/0	60	\$3,742
Prince Edward County	96	\$423,500	0/0	58	\$7,302
TOTAL	677	\$3,809,500	1/1	-----	\$83,697

Source: National Climatic Data Center (*Approximate numbers based on NCDC records)

NOTE: These numbers do not include the April 2011 storm, which caused significant damage across Virginia and spawned a number of tornadoes.

Table 5.5
Hail Events in the Region

County	Number of Hail Events	Property Damage	Crop Damage	Span of Recorded Events (Years)
Amelia County	22	\$2,000	\$0	37
Buckingham County	54	\$59,000	\$0	49
Charlotte County	43	\$46,000	\$15,000	51
Lunenburg County	25	\$500	\$50,000	54
Nottoway County	29	\$5,000	\$500	40
Prince Edward County	24	\$0	\$0	38
TOTAL	197	\$112,500	\$65,500	-----

Source: National Climatic Data Center (* Approximate numbers based on NCDC records)

Significant events:

May 5, 1996 – A storm that the National Weather Service classified as a “microburst” hit **Lunenburg County** late at night. A microburst is a phenomenon that has been compared to a tornado, in that it produces damaging, straight-line winds. The **Town of Kenbridge** suffered some tree damage from this event, and there were widespread power outages throughout the County, but the **Town of Victoria** took the brunt of this storm – which hit after 10:00 that evening. Due to the time of the storm, the streets in Victoria were largely empty. Thus, there were no reports of serious injuries. However, numerous buildings within the Town’s business district – which was the hardest hit area – were damaged to varying degrees.

May 22, 2000 – Widespread hail “up to nearly softball size” affected large portions of **Lunenburg County**. Specific reports from spotters and the media indicated hail measuring 2.25 to 2.5 inches in diameter fell in Victoria at 2:50 p.m., hail “up to nearly softball size” just before 3 p.m., and “hail the size of tennis balls and eggs” around 3 p.m. Numerous trees were reported downed by high winds in a swath 2 to 3 miles in width in the Double Bridges area. Many vehicle and business windows were broken by the large hail, resulting in expensive repairs. Six county-owned vehicles were damaged by the storm, including one that was hit by a tree.

HAZARD ANALYSIS

October 13, 2011 – A severe thunderstorm came through the region during the morning, causing damage and knocking out power in **Farmville** and the surrounding areas. According to WFLO Radio, nearly 2,000 homes and businesses lost power in and around **Farmville** shortly after 8:30 a.m. when a large tree fell across Plank Road (Route 600) and damaged a power line. Power was restored to about half of those who lost it later in the morning, but WFLO and more than 600 other homes and businesses were without power much of the day. In **Prince Edward County**, flash flooding was reported on Route 651 (Chinquapin Road) when Harris Creek overflowed its banks due to the heavy rain. VDOT estimated that the water on the road and adjacent ground reached three inches deep at one point. Homes in **Prospect**, in the western part of the County, were without power for several hours.

December 2011 – A storm that the National Weather Service classified as a “microburst” hit Charlotte County at night. The storm, which also came with heavy rain, caused significant damage to homes in the **Phenix** and **Madisonville** areas. Damage included storage sheds and a barn that were completely destroyed, damage to the roof of a house, and uprooted trees and downed power lines. According to a report in *The Charlotte Gazette*, a tornado was initially believed to be responsible for the damage but the weather service later determined that it was a microburst.

June 29, 2012 – A storm event known as a “derecho,” which had little rain but unusually high winds, barreled through the area resulting in property damage and power losses throughout the region. A derecho is a complex of thunderstorms or a mesoscale convective system that produces large swaths of severe, straight-line wind damage at Earth’s surface. This particular storm started in the Midwest and traveled 600 - 700 miles, affecting multiple states. It is believed the derecho was exacerbated by higher-than-average temperatures across the eastern United States. Governor McDonnell declared a state of emergency throughout the State of Virginia as a result of damage from the event.

March 16, 2013 – A windstorm hit **Amelia County** causing widespread damage. According to a report in the *Amelia Bulletin-Monitor*, the National Weather Service said the storm was unique to the County. The weather service reported that the storm, which was accompanied by rain, packed winds of 60 miles per hour. The Amelia County Sheriff’s office received calls from the **Amelia Court House**, **Little Patrick**, **Mannboro**, **Scott’s Fork**, and **Paineville** areas of the County. The Village area was hit particularly hard, as the roof was torn off one local business and county buildings on the Village suffered minor damage. In addition, the roof was torn off the gymnasium at Amelia Academy. The storm knocked out power to parts of the County – including along Route 628, where a tree fell on a pickup truck (the driver escaped without injury, according to the paper) and the tree cut a power line – the downed line started a small field fire.

June 19, 2017 – A line of strong storms moved through the area, bringing with it heavy rain and wind along with lightning. **Prince Edward County** reported a wire/transformer fire on U.S. 460 and some downed trees as a result of the storm. In **Amelia County**, there were reports of downed trees in a number of areas. They include Route 705 (Mount Olive Lane), which resulted in traffic needing to be detoured until VDOT crews could remove the debris; Route 696 (Locust Dale Lane), which blocked the roadway until it was removed by the property owner; and U.S. 360 eastbound near Route 624 (Whitaker Road). That tree was struck by two passenger vehicles and a tractor trailer (the tractor trailer was able to miss the two passenger vehicles, but not the tree). All

HAZARD ANALYSIS

three vehicles suffered damage, with one of the passenger vehicles estimated to be a total loss.

Tornadoes

When compared with other states, Virginia ranks 28th in the Nation in number of tornado events, 25th in tornado deaths. These rankings are based upon data collected for all states and territories for tornado events between 1950 and 2005 (Source – NCDC, NWS Storm Prediction Center). According to NCDC records, the covered localities have experienced a total of 30 tornado events from 1950 through 2015. These events are reported to have caused no deaths, but did cause a total of two (2) injuries and approximately \$12,462,000 in property damage. Two significant events of note:

April-May 2000 – A string of tornadoes hit parts of the state, including counties in this region. Governor Gilmore declared a state of emergency, which was later amended to include **Prince Edward County**.

April 2011 – Tornadoes hit the State, and the region, during two separate events:

- On **April 16, 2011**, a line of severe thunderstorms came through Virginia during the afternoon, spawning at least 10 tornadoes statewide. This system started in the Southern Plains of the U.S. two days earlier, spawning tornadoes from Oklahoma eastward. In Virginia, the storms were blamed for at least five deaths and Governor McDonnell declared a statewide emergency.

At least one tornado struck **Lunenburg County**, near Victoria, causing significant damage to one house (which had to be condemned) and varying degrees of damage to several other homes and a couple of other buildings. Total damages were estimated at approximately \$100,000.

- Less than two weeks later, on **April 27**, a line of severe storms came through the State during the day. This system started in the same region of the country as the April 16 storm, and spawned tornadoes in several states from Texas to New York. According to published reports, the storms were blamed for more than 300 deaths across six states – making this the deadliest outbreak of tornadoes in the United States since 1932. The large majority of fatalities were in Alabama. According to National Weather Service estimates, the system touched off a total of 312 tornadoes during a 24-hour period from 8:00 a.m. on April 27 to 8:00 a.m. on April 28, a new record (the previous record was 148, recorded during the April 3-4, 1974 tornado event).

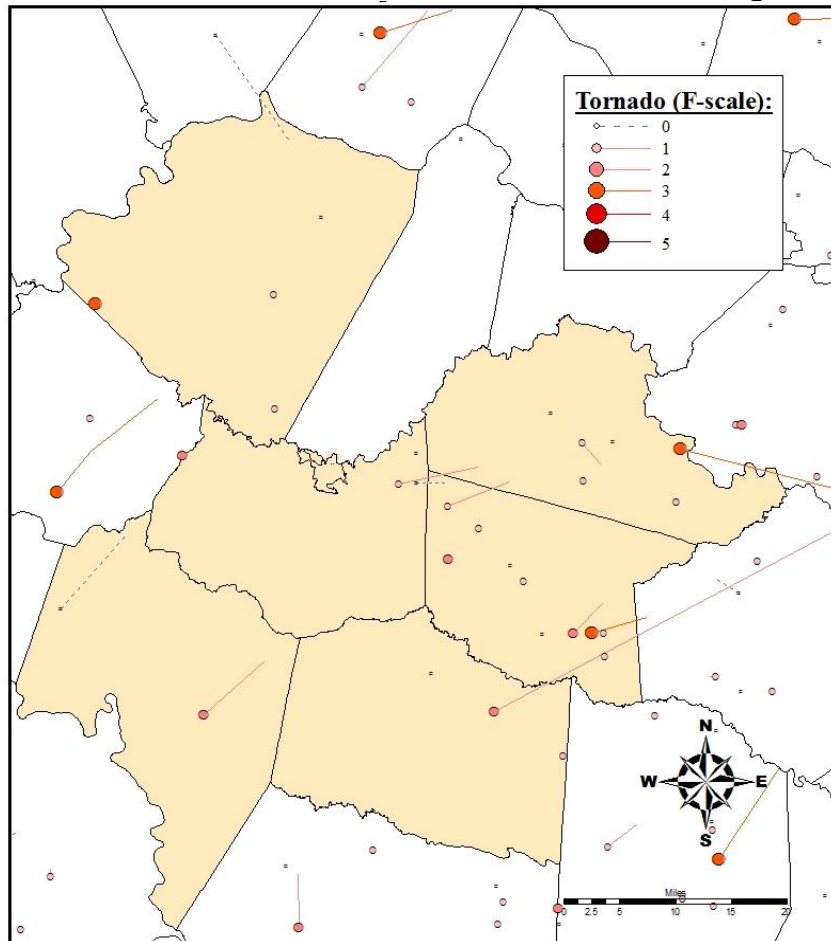
At least 15 tornadoes were confirmed in Virginia from this event, killing five people. Governor McDonnell declared a statewide emergency. One confirmed tornado struck **Prince Edward County**, near **Farmville**. The funnel cloud was seen from parts of Farmville, including Longwood University (see photo on next page).

HAZARD ANALYSIS



Longwood University student Amelia Perry took this photo of the tornado that came through Farmville on April 27, 2011 (courtesy *The Farmville Herald*)

Map 5.4
Historic Tornado Touchdowns and Tracks in and around the Region – 1950-2016



Map created by VDEM/CGIT (updated by CRC – May 2016)

HAZARD ANALYSIS

**Table 5.6
Tornado Events in the Region (1950–2015)**

Location	Date	Time	F-Scale	Property Damage
Amelia	10/13/1983	2:50 p.m.	F1	\$250,000
Amelia	11/16/1989	7:15 a.m.	F0	\$250,000
Amelia	05/04/1990	7:45 p.m.	F3	\$2,500,000
Amelia	05/09/2003	2:35 p.m.	F1	\$25,000
Amelia	09/23/2003	4:30 a.m.	F1	\$25,000
Truxillo (Amelia Co.)	09/08/2004	4:40 p.m.	F0	\$2,000
Mannboro (Amelia Co.)	09/17/2004	3:08 p.m.	F1	\$10,000
Jetersville (Amelia Co.)	09/28/2006	4:50 p.m.	F1	\$25,000
Jetersville (Amelia Co.)	6/10/2013	5:13 p.m.	F0	0
Nottoway	11/02/1966	1:50 p.m.	F2	\$250,000
Nottoway	05/12/1974	3:00 p.m.	F2	\$25,000
Nottoway	07/10/1975	2:30 p.m.	F1	\$25,000
Nottoway	05/22/1983	4:30 p.m.	F3	\$250,000
Nottoway	10/13/1983	2:47 p.m.	F1	\$250,000
Nottoway	08/06/1986	4:00 p.m.	F1	\$25,000
Burkeville	05/02/2002	2:50 p.m.	F0	\$20,000
Burkeville	09/28/2006	4:40 p.m.	F1	\$5,000
Blackstone	08/30/2004	12:10 p.m.	F0	\$5,000
Blackstone	07/07/2005	7:53 p.m.	F1	\$5,000
Blackstone AAF	07/13/2005	5:59 p.m.	F1	\$5,000
Crewe	09/23/2003	3:45 a.m.	F0	\$5,000
Lunenburg	05/27/1957	9:15 a.m.	F1	\$25,000
Kenbridge	8/6/1993	11:43 a.m.	F2	\$5,000,000
Victoria	09/23/2003	3:30 a.m.	F0	\$20,000
Charlotte	07/10/1959	10:25 a.m.	F0	\$25,000
Charlotte	10/13/1983	3:45 p.m.	F2	\$250,000
Charlotte	05/08/1984	3:15 p.m.	F2	\$2,500,000
Charlotte	10/14/1986	6:05 a.m.	F3	\$250,000
Charlotte	11/23/1992	3:00 a.m.	F1	\$25,000
Prince Edward	10/13/1983	2:45 a.m.	F1	\$250,000
Buckingham	08/23/1959	3:00 p.m.	F1	\$25,000
Buckingham	09/10/1960	4:00 p.m.	F2	\$25,000
Buckingham	06/16/1966	6:45 p.m.	F3	\$2,500
Buckingham	10/02/1979	5:30 p.m.	F1	\$2,500
Gold Hill (Buckingham Co.)	09/08/2004	3:30 p.m.	F0	0
Victoria	04/16/2011	2:30 p.m.	F1	\$100,000
Prince Ed./Farmville	04/27/2011	5:58 p.m.	F1	\$45,000
Lunenburg (S of Kenbridge)	5/5/2017	6:13 a.m.	F0	Unknown at this time
TOTAL				\$12,462,000

Source: National Climatic Data Center (* Approximate numbers based on NCDC records)

NOTE: This list does not include the February 2016 tornado that touched down in eastern Appomattox County, near Buckingham and Prince Edward Counties.

HAZARD ANALYSIS

Wildfire

According to the Virginia Department of Forestry (VDOF), there were 2,478 recorded wildfires in the region from 1994 through June 2015. Total damages from these events were estimated at more than \$4.8 million. Causes included debris burning, smoking, equipment use, children and lightning. There are no known records of any deaths or injuries attributed to a wildfire event in the region.

Table 5.7
Occurrences of Wildfire in the Region – 1994 through June 2015*

Location	Number of Wildfire Events	Total Amount of Damage
Amelia County	311	\$130,200
Buckingham County	488	\$1,010,305
Charlotte County	395	\$441,777
Lunenburg County	449	\$2,137,755
Nottoway County	524	\$858,225
Prince Edward County	311	\$238,745
REGIONAL TOTALS:	2,478	\$4,817,007.00

Source: Virginia Department of Forestry (VDOF)

* According to VDOF, 1994 was the year their new database program was initiated. Therefore, data for this year may not include the entire year.

Significant Events (according to the VDOF, media reports, and VDEM incident reports):

Fall 2001, Spring/Summer 2002 – Drought conditions were blamed for busier than normal fire seasons. In 2001, more than 2,200 fires were reported across the State burning more than 19,000 acres. This prompted the VDOF to request help from the U.S. Forest Service and Florida Department of Forestry. In addition, FEMA provided wildfire funding assistance. Drought conditions continued into 2002, causing an early start to the Spring Fire Season. After a brief respite from March and April rains, drought conditions returned in the summer. For all of 2002, the VDOF managed more than 1,600 wildfires consuming more than 13,000 acres. Locally, in October 2001, a fire burned 949 acres in **Lunenburg** and **Nottoway Counties**.

February 2008 – Multiple wildfires were reported in 62 counties across the State. The fires were fueled by high winds, making them difficult to contain. As many as 300 fires were reported statewide at one point, some as large as 1,000 acres or more. The VDOF, State Police, and National Guard (among other groups) provided assistance to firefighters in many localities. Among localities in Planning District 14, fires were reported in **Buckingham, Charlotte, Lunenburg, Nottoway** and **Prince Edward Counties**. Local emergencies were declared in **Charlotte** and **Lunenburg**.

April 2008 – A wildfire in northern **Buckingham County** burned about 600 acres near Routes 622 and 676. No houses were damaged, but a significant amount of timber was lost. All five of the County's fire departments and VDOF personnel battled the blaze, which was brought under control after about nine hours. One VDOF employee was sent to the University of Virginia Medical Center with upper-body burns, and two other firefighters were treated locally for smoke inhalation.

HAZARD ANALYSIS

February 2011 – Multiple wildfires were reported in more than 50 counties across the State, as abnormally dry conditions combined with high winds to spark (and spread) many blazes. Fires were reported in each county within Planning District 14, according to local reports and the Virginia Emergency Operations Center.

At **Fort Pickett**, an estimated 2,000 acres burned between February 14 and February 21. That fire was contained, and no structures were damaged. **Amelia County** reported seven fires between February 17 and 21, all grass and woodland fires. According to county officials, several structures were threatened but none burned. **Lunenburg County** reported a few fires, with one – started when a brush fire set by a local resident got out of control due to high winds – destroying a shed and damaging two other buildings. Other fires burned open land, including a 10-acre brush fire that resulted from a downed power line, but there were no other reports of building damage. Three fire departments responded to that blaze. **Charlotte County** reported a number of fires between February 14 and February 21. There was no known damage to buildings from these events, as these were field and brush fires.

Other parts of the State did not fare as well. During this period, fires in Louisa, Shenandoah, and Goochland Counties destroyed a small number of houses. Additionally, Interstate 64 in New Kent County near Interstate 295 (east of Richmond) was closed for several hours on February 19 by a brush fire that was fueled by high winds. Traffic was diverted onto U.S. 60 while firefighters battled the blaze.

Drought/Extreme Heat

From 1993 to 2015, there were 38 periods of drought recorded for the localities in the Region, according to the National Climatic Data Center. This does not include the recent drought in 2010. Damage to crops was extensive and caused major hardship to farmers in the region.

Table 5.8
Occurrences of Drought/Extreme Heat in the Region

Location	Number of Events	Property Damage	Span of Recorded Events (Years)	Annualized Losses
Amelia County	4	\$4,980,000	22	\$226,363
Buckingham County	12	\$330,000	22	\$15,000
Charlotte County	13	\$10,440,000	22	\$474,545
Lunenburg County	1	\$0	22	\$0
Nottoway County	4	\$4,220,000	22	\$191,818
Prince Edward County	4	\$6,280,000	22	\$285,455
TOTAL	38	\$26,250,000	-----	\$1,193,181

Source: National Climatic Data Center

Significant events:

Summer 2001-Summer 2002 – A drought, caused by abnormally low rainfall, gripped much of the state. Below normal rainfall made dry conditions that started back during the late 1990s even worse, resulting in rivers and streams – as well as reservoirs – dropping to dangerously low levels. Virginia recorded the driest 12-month period on record from August 2001 to August 2002. Conditions statewide prompted Governor Warner to

HAZARD ANALYSIS

declare a state of emergency. Locally, private well failures and disruptions to local water supplies were reported across the region. In **Farmville**, water levels on the Appomattox River dropped so low in the fall of 2002 that there was uncertainty as to whether the Town would be able to supply water for Longwood University.

Summer/Fall 2007 – Governor Kaine declared a statewide emergency and imposed a statewide burning ban due to dry conditions caused by lower than average rainfall across the state. **Amelia, Nottoway, and Prince Edward Counties** were included in federal disaster designations related to this event.

Summer 2010 – Lower than average rainfall across the State and above-normal temperatures led to abnormally dry conditions that affected water supplies and diminished agricultural production in a number of localities. All seven counties in **Planning District 14** were included in a subsequent federal disaster declaration, which made farmers in the region eligible for low-interest loans and other related assistance that might be approved by Congress.

Erosion

There is no database of historic erosion events, and no known scale to measure the extent of erosion. However, areas of steep slopes and numerous rivers, streams, and creeks that run through the region, as well as the large tracks of farmland in the region present conditions that are favorable for erosion to take place.

Earthquakes

According to data from the Virginia Department of Mines, Minerals, and Energy, approximately 500 earthquakes have been reported in or near the State of Virginia since 1774 (the earliest year an earthquake was documented in the State). Less than 20 percent were strong enough to be felt. Two areas in the state known for seismic activity are Giles County (in the Western part of the state) and in central Virginia (roughly located around Richmond and Charlottesville). A small part of this region is located in the central Virginia area (see **Map 5.6**). However, the effects from the earthquakes that occur in both of these seismic areas could be felt throughout the region.

Some minor quakes have been experienced in the region over the last 10 years. A minor tremor was experienced in the region on December 9, 2003. The earthquake measured 4.5 on the Richter Scale and was centered close to Maidens, east of the region. It was felt strongly in the region. Minor damage was reported in the **Town of Victoria**, as some homeowners reported cracked windows and sheetrock from the quake. An earthquake was recorded less than five miles southwest of the **Town of Dillwyn** on December 16, 2009. It registered 2.2 on the Richter Scale, and no damage was reported.

In July 2010, an earthquake registering 3.6 magnitude shook the Washington, DC, area causing windows to rattle but no reported damage. The quake, the strongest felt in the DC area on record at that time, was centered northwest of DC in Rockville, MD. In this region, there were a few reports of people seeing things on their shelves rattle but no reports of damage or injuries.

More recently, an earthquake measuring 5.8 on the Richter Scale struck Louisa County (just north of Planning District 14) on the afternoon of August 23, 2011. The quake was centered near Mineral, in the eastern part of the County, and was less than four miles

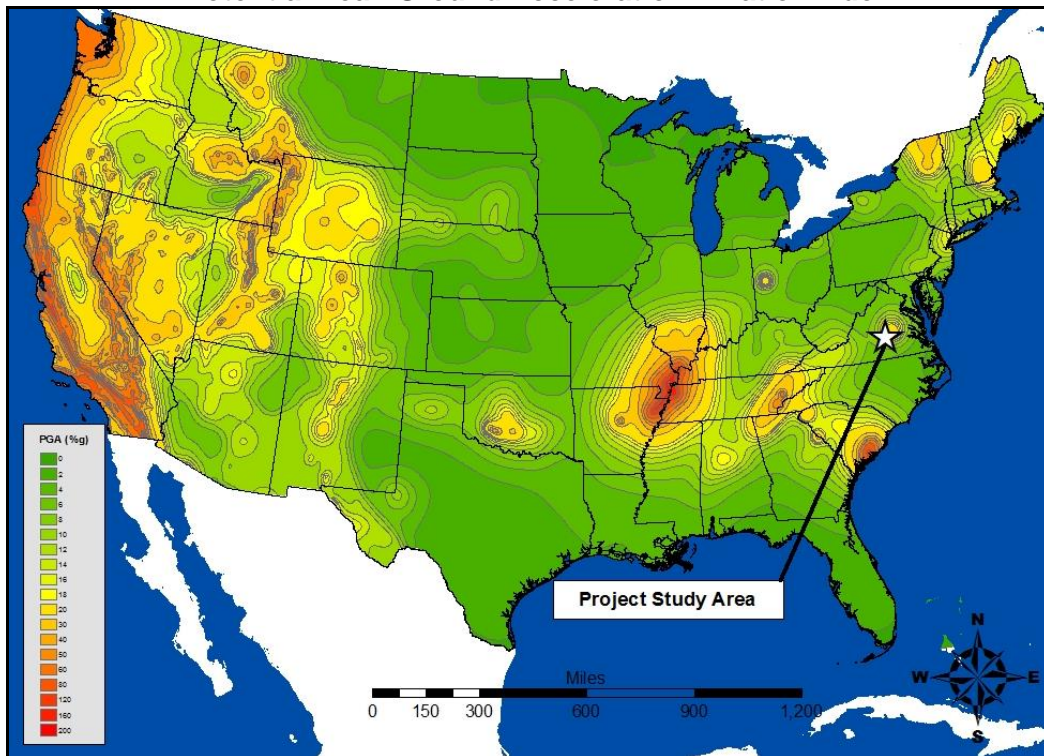
HAZARD ANALYSIS

deep. It was felt all up and down the east coast of the United States, and even in to southern Canada. Louisa County suffered considerable damage to houses and businesses, and the High School had to be closed (and classes held in other locations) because of damage there. According to the blog on the VDEM web site, damage was reported in more than 1,400 homes in Louisa County. Some damage that was initially reported as minor became worse as a result of more than 40 subsequent aftershocks. Damage was reported in Washington, DC and points north. In this region, only minor damage was reported.

A minor quake struck the area in May 2014, and another one in November 2015. The May 2014 quake was centered in the northern part of Amelia County. It registered 3.2 on the Richter Scale, and little or no damage was reported. The November 2015 quake was centered in **Buckingham County**, just north of **Dillwyn**. It was 4.7 miles deep (according to published reports), and registered 2.6 on the Richter Scale. Little or no damage was reported from this quake.

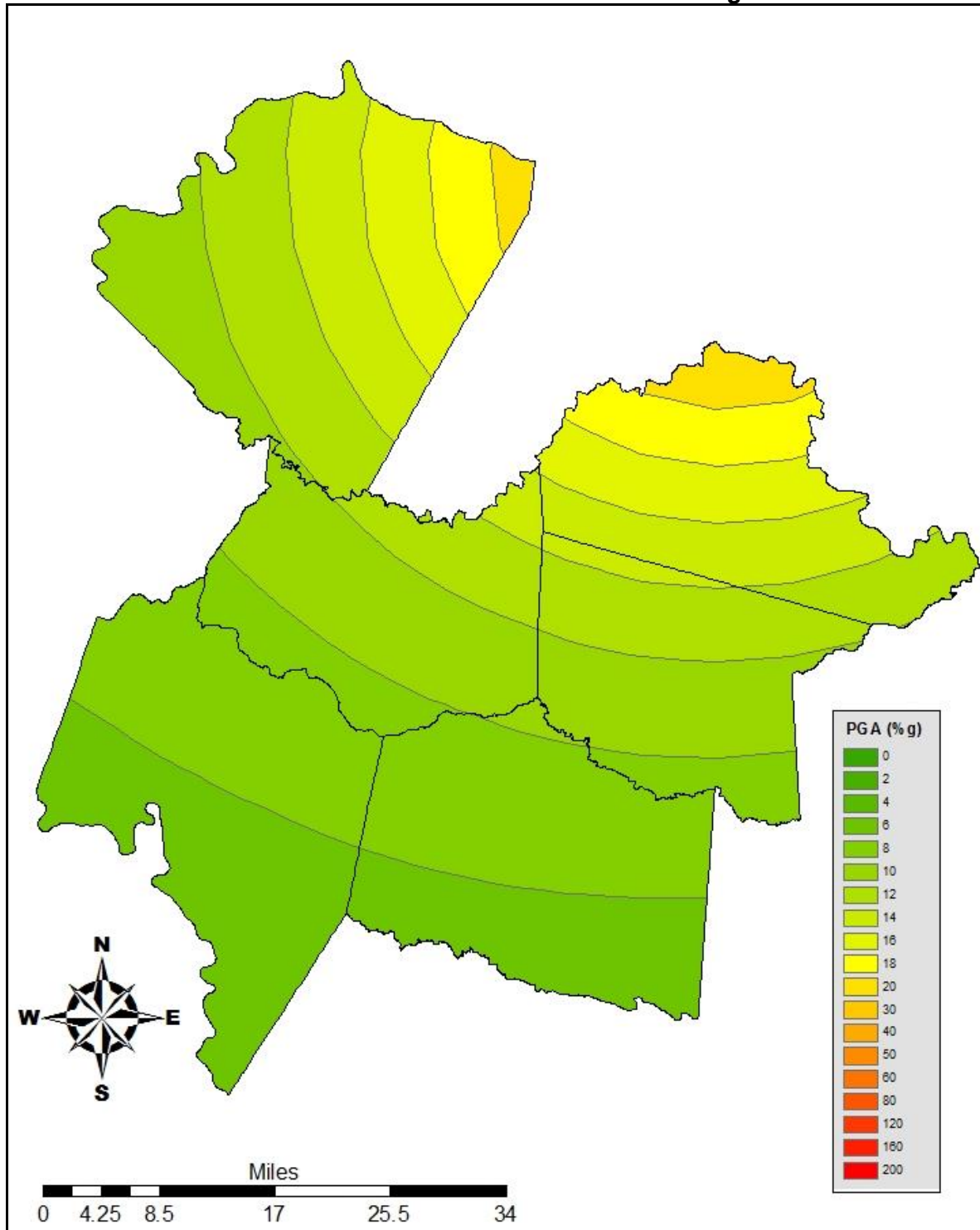
Approximately two-thirds of Virginia is subject to earthquakes, with the western and central regions most vulnerable to an earthquake resulting in some damage. **Table 5.9** lists notable earthquake events that have occurred in the region since 1875 (compiled from National Geophysical Data Center records). **Map 5.5** and **Map 5.5a** show potential Peak Ground Acceleration for the country and the region. **Map 5.6** shows significant earthquakes in and around the region from 1568-2015.

Map 5.5
Potential Peak-Ground Acceleration – Nationwide



Map created by CRC - October 2015
Sources: USGS, ESRI, Great Lakes Information Network

Map 5.5a
Potential Peak-Ground Acceleration – Region



Map created by CRC - October 2015
Sources: USGS, ESRI, Great Lakes Information Network

Peak Ground Acceleration – the largest increase in velocity recorded by a particular station during an earthquake (source: USGS).

HAZARD ANALYSIS

Table 5.9, below, lists significant events that have affected the region since 1921.

Table 5.9
Significant Seismic Events Impacting Planning District 14

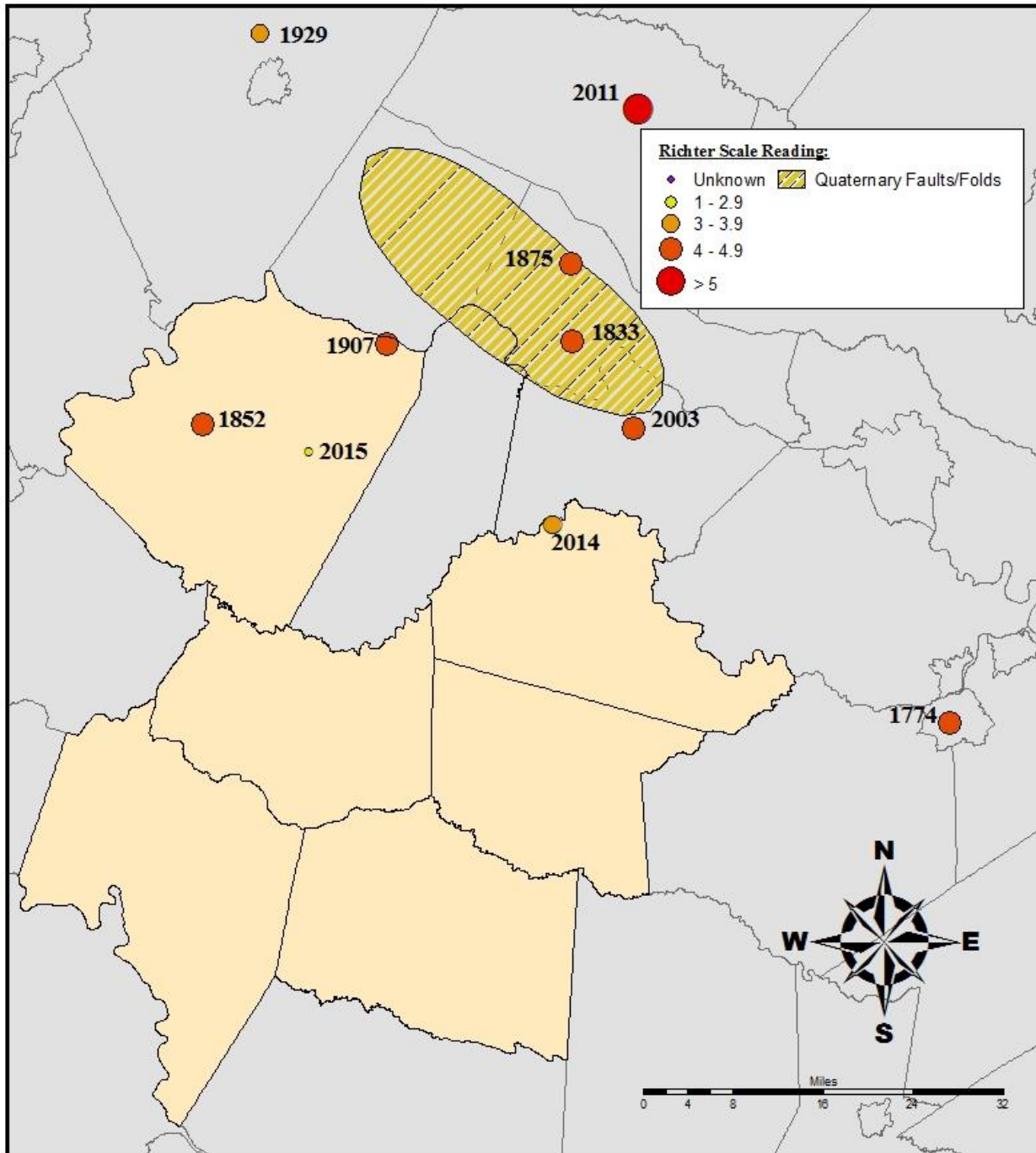
Date of Occurrence	Location Recording Occurrence	Distance from Epicenter (Miles)	Modified Mercalli Intensity
08/07/1921	Dillwyn	29	Not reported
01/05/1932	Dillwyn	Not reported	Not reported
10/07/1942	Farmville	Not reported	Not reported
10/1945	Dillwyn	Not reported	Not reported—Three earthquakes reported in the month.
01/05/1948	Farmville, Dillwyn, Crewe	Not reported	Not reported—Three earthquakes reported within minutes of each other
11/26/1950	Dillwyn	Not reported	Not reported
01/17/1955	Farmville	Not reported	Not reported
05/31/1966	Farmville	47	IV – V
11/20/1969	Farmville	230	III – IV
02/11/1981	Farmville	46	III – IV
08/17/1984	Farmville	66	III – V
08/23/2011	Regionwide (centered in Louisa Co.)	56 (from Farmville)	VII

Source: National Geophysical Data Center

This table does NOT include the May 2014 or November 2015 Earthquakes, as they caused little or no damage.

HAZARD ANALYSIS

**Map 5.6
Significant Earthquakes in and around Region – 1568-2015**



DATA SOURCES:

USGS Significant Earthquakes
 USGS Quaternary Faults
 VGIN Jurisdictional Boundaries
 ESRI State Boundaries

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data is to give general indication of areas that may be susceptible to hazards. It is not intended to be used for individual site-specific hazard assessments.

HAZARD IDENTIFICATION:

This map layer contains the locations of significant, historic earthquakes that caused deaths, property damage, and geological effects, or were otherwise experienced by populations in the United States (1568 - 2004). USGS Quaternary Faults and Folds are believed to be sources of earthquakes, greater than magnitude 6, in the past 1,600,000 years.

Map created by VDEM/CGIT (updated by CRC – February 2016)

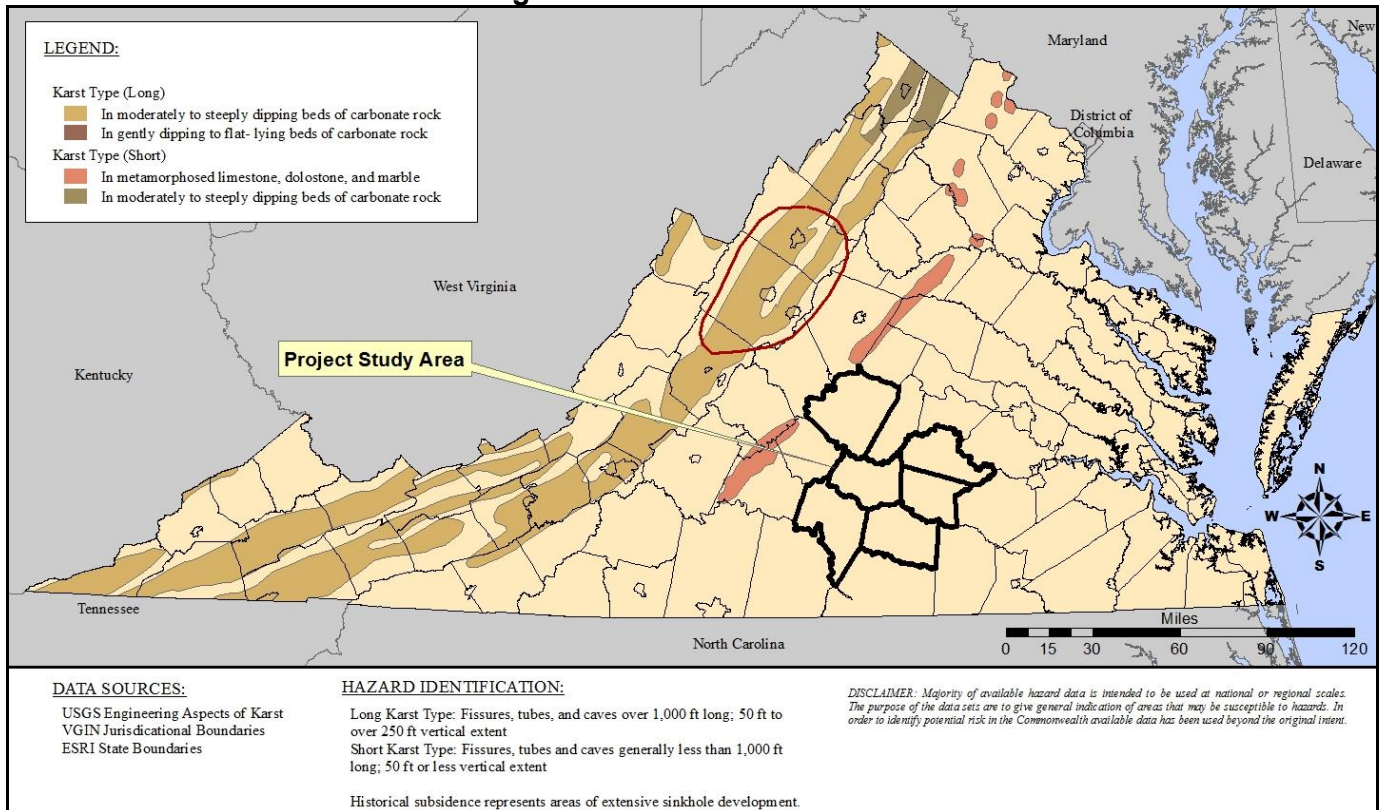
HAZARD ANALYSIS

Sinkholes

Sinkholes (also known as Karst) do not pose an extremely significant risk within the region. The soil types are not conducive to creating sinkholes, although there have been a few reported instances of sinkholes in the area. **Farmville** Town officials noted that they sometimes experience sinkholes for which most of the time they can determine the cause (loss of groundwater, pipe failure, etc.). However, there have been occurrences of sinkholes where the cause was undetermined. Although soil or road collapses caused by erosion are not technically defined as sinkholes by geologists, as they are not related to the dissolution of carbonate rock, and there are no known karst forming geologic formations in the region, the potential for sinkholes or related soil collapse exists.

No maps of past occurrences are available for the sinkhole hazard due to the fact that there have been very few incidents reported within the planning area. Additionally, other than information from the State Hazard Mitigation Plan, no known sources of sinkhole probability data exist for the region at the time of this writing. **Map 5.7**, shows known landslide (karst) regions and historical subsidence throughout the state.

Map 5.7
Karst Regions and Historical Subsidence



Map created by VDEM/CGIT

Landslides

Portions of Planning District 14 are susceptible to landslides. However, according to national base maps provided by the U.S. Geological Survey and maps in the State Hazard Mitigation Plan, most of the region is located in a low landslide hazard area. Portions of **Buckingham County** are located in a higher landslide hazard area and

HAZARD ANALYSIS

represent the only portions of the region that fall under the high landslide hazard area classification. There are no known historical occurrences of landslides in the region.

Dam/Levee Failure

According to the National Inventory of Dams and the U.S. Army Corps of Engineers, there are 176 state-regulated dams in Planning District 14. For the six counties covered under this Plan Update, there are 161 dams. Of those, 31 are high-hazard dams and 24 are significant-hazard dams. The rest are low-hazard dams.

In late September 2011, there was a dam failure in **Prince Edward County**. Due to heavy rains in the region, the dam at Farmville Lake failed. As seen in the picture below, a section of the road that goes over the spillway was taken out. This was a partial failure, not a total breach.



Heavy rains from a slow-moving system that came through the area on September 23, 2011 caused a breach in the Farmville Lake dam. The failure of the spillway took out a section of the road that passes over it.

(photo by T. Jordan Miles, III
courtesy of Facebook)

Elsewhere in the region, there was a close call in 2003 with a private pond near one of the wells for the public water system in **Amelia County** (specifically, the Courthouse Village area). This dam required emergency maintenance in the aftermath of Hurricane Isabel to keep it from failing. Had it failed, it would have contaminated one of the wells for the public water supply. Since there are multiple wells feeding the system, the loss of one well would not have been a significant problem. However, had it happened without the knowledge of local officials, the contaminated well could have pushed contaminated water into the entire system.

A list of high, significant and low hazards dams for each county in Planning District 14 can be found in Section VI. High hazard dams are those dams that will probably cause the loss of at least one life in the event of a breach and economic, environmental and lifeline losses. Significant hazard dams are those dams that will also cause economic, environmental and lifeline losses, but no deaths are expected in the event of a breach.

HAZARD ANALYSIS

Man-made Hazards

Hazardous materials (hazmat) spills

Hazmat substances, because of their chemical nature, can pose a danger to life, health or property if released. Hazmat spills can happen during production, storage, transportation, use or disposal of these substances. Virginia's hazardous materials officers typically receive 2,000 notifications of hazmat incidents a year, according to the Virginia Department of Emergency Management.

Significant event – July 2002: A transport tanker holding tar (liquid asphalt) spilled near the **Lunenburg/Nottoway County** Line, resulting in more than 5,000 gallons of tar flowing into the Nottoway River beneath the dam at Nottoway Falls. The tanker, delivered to a job site in advance of a road project in the area, was parked in a gravel lot near the river. During the afternoon of July 2, 2002, a motorist driving through the area noticed something flowing into the river. This individual discovered the leaking tanker, and immediately notified officials in the **Town of Victoria** – which uses the river as a source of drinking water. Even though Victoria's water system was not affected (the water intake for the Town is above the dam), the Town switched to an alternate water source for a few days as a precaution. The spill was contained before it reached the Fort Pickett Reservoir, which supplies water to the **Town of Blackstone**. Local wildlife, however, did not fare as well. Some snakes, turtles, fish, and other animals that depend on the river died from exposure to the tar. The spill is believed to be an intentional act, as the cap to the tanker's piping was found in a nearby wooded area, but no arrests have been made as of January 1, 2017.

Significant event – January 2011: A propane tanker, owned by Synergy Gas, overturned on Friendship Church Road near Fort Mitchell Road in the eastern part of Charlotte County. According to published media reports, the tanker was travelling toward U.S. 360 (just east of Drakes Branch) when it hit an icy patch in the road and slid into a ditch before overturning. The driver escaped without injury. A small amount of propane leaked from the tanker, but the leak was contained by firefighters who responded to the scene and the propane was transferred to another tanker.

Accidents at fertilizer/chemical facilities

Fertilizer and chemical plants and storage facilities are prone to accidents that can have a significant impact on the facility as well as the surrounding community. Accidents at these facilities can be caused by inadequate process hazards analysis, use of inappropriate or poorly-designed equipment, inadequate indications of process condition, and other factors. For significant accidents tracked by the U.S. Environmental Protection Agency and Occupational Safety and Health Administration, issues of note include installation of emissions or pollution control equipment (occurred prior to a number of accidents, which highlight the need for stronger systems for management of change) and similar accidents, near-misses, or low-level failures occurring just before a major accident (indicating the need for more attention to lessons-learned implementation and more thorough company investigation of near-misses and low-level failures). There are no known reports of such incidents in the region.

HAZARD ANALYSIS

Biological (Bio-) hazards

Bio-hazards can pose a threat to people, animals, and the environment when biological agents are accidentally or intentionally released into the air or water. Samples of bio-hazards include medical waste, samples of a microorganism, virus or toxin (from a biological source). There are no known reports of such incidents in the region.

Accidents at power plants

Nuclear reactors cannot explode like a nuclear bomb, since they use different materials and structures, and nuclear power plants are designed to prevent the release of radioactive materials and include multiple protective barriers placed around reactors. However, accidents do sometimes occur at nuclear power plants that result in the release of radioactive materials into the atmosphere or nearby water sources. There are no nuclear power plants located in Planning District 14. However, there are two such facilities in the State of Virginia that are close enough to the region that an incident could affect the area. They are the North Anna Power Station, located in Louisa County; and the Surry Power Station, located in Surry County. While the Surry County Station is located in the southeastern part of the State (near Williamsburg), the North Anna Power Station is located less than 50 miles from **Amelia County** and **Buckingham County**.

While there are no known incidents involving either facility, there have been instances where a reactor at the facility had to be shut down. In May 2010, Unit 2 at the North Anna plant was shut down after a cooling water pump failed. This followed a problem with the reactor a couple of months before, when what was supposed to be a routine refueling outage took longer than expected (it took seven weeks to get the reactor back to full speed; normally, refueling outages last about four weeks). Back in October 2009, Unit 1 at the plant had to be shut down after leaks were detected in a water pipe at the reactor. More recently, in June 2010, Unit 1 at the Surry power plant had to be shut down after a power supply inverter failed, triggering a series of subsequent valve failures which resulted in an automatic reactor trip. It should be noted that neither of these incidents posed any danger to plant workers or the public.

Other types of power plants (coal fired, gas fired) and electric substations can sometimes experience accidents or malfunctions that can cause injury or death to plant workers and disrupt the flow of electricity for homes and businesses in the area. There are numerous power plants and substations across Planning District 14. There are no known reports of incidents in the region involving “conventional” power plants.

Pipeline explosions/accidents at above-ground storage facilities

A number of pipelines, carrying gas and petroleum products, run through Planning District 14. Colonial Pipeline Company, Plantation Pipeline Company, and Williams Transco Pipeline own pipelines that run through the region. In addition, a joint venture between Dominion and three other companies has proposed the Atlantic Coast Pipeline – which would run through the region. Survey work of affected properties is ongoing, and required federal approvals are pending.

While pipelines are considered the safest way to move gas, petroleum, and other hazardous materials, they can sometimes malfunction and even explode. If corrosion controls fail to properly function, and/or corrosion is not repaired in a timely manner, then

HAZARD ANALYSIS

the pipeline could explode. An explosion can cause serious injury, even death, and significant damage to property. Storage tanks for gas, oil, and other chemicals can sometimes experience “catastrophic failure” and explode. This can occur when flammable vapors are ignited, causing a break in either the shell-to-bottom or side seam of the tank. Sometimes, workers performing maintenance or other operations can introduce an ignition source.

There are no records of pipeline explosions within Planning District 14; however, there was a recent incident in a nearby locality. On September 14, 2008, a section of gas pipeline owned by Williams Gas Company and located in eastern Appomattox County – less than 20 miles from the **Buckingham County** Line and Appomattox-Buckingham State Forest – ruptured (it was one of three pipelines running side-by-side in the area). The force of the rupture sent rocks and dirt flying through the air, and knocked a 30-foot section of pipe – 30 inches in diameter – out of the ground and across Virginia Primary Route 26. The force of the gas pouring out of the ruptured pipeline also knocked loose a nearby power line, causing it to fall to the ground. The ensuing spark ignited the gas, causing an explosion that destroyed two homes and damaged several others, injured five people, blew a crater in the ground near the accident site, and resulted in a number of area residents being displaced for several days.

Storage tanks for gas, oil, and other chemicals can sometimes experience “catastrophic failure” and explode. This can occur when flammable vapors are ignited, causing a break in either the shell-to-bottom or side seam of the tank. Sometimes, workers performing maintenance or other operations can introduce an ignition source. This type of accident can cause injury or death to workers, and release harmful chemicals into the atmosphere. Such accidents can happen anywhere, but are more of a concern in cases where the tanks were built before 1950 or tanks are poorly maintained, rarely inspected, or repaired without attention to the tank’s design. The only storage tank facilities in the region are located at the Mitchell Junction Tank Farm and Pumping Station in northern Cumberland County near the **Buckingham County** line (owned by Colonial Pipeline).

HAZARD ANALYSIS

Data Sources

American Society of Civil Engineers (ASCE), “Facts About Windstorms.”

Web site: www.windhazards.org/facts.cfm

Bureau of Reclamation, U.S. Department of the Interior

Web site: www.usbr.gov

Federal Emergency Management Agency (FEMA), Department of Homeland Security

Web site: www.fema.gov

National Climatic Data Center (NCDC), U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Web site: <http://lwf.ncdc.noaa.gov/oa/ncdc.html>

Web site: <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=51%2CVIRGINIA>

National Geophysical Data Center

Web site: <http://www.ngdc.noaa.gov/>

National Hurricane Center, National Oceanic & Atmospheric Administration (NOAA)

Web site: <http://www.nhc.noaa.gov/>

National Severe Storms Laboratory (NSSL), U.S. Department of Commerce, NOAA

Web site: www.nssl.noaa.gov

National Weather Service (NWS), U.S. Department of Commerce, NOAA

Web site: www.nws.noaa.gov

Storm Prediction Center (SPC), U.S. Department of Commerce, NOAA, NWS

Web site: www.spc.noaa.gov

The Tornado Project, St. Johnsbury, Vermont

Web site: www.tornadoproject.com

United States Geological Survey (USGS), U.S. Department of the Interior

Web site: www.usgs.gov

Virginia Department of Emergency Management (VDEM)

Web site: <http://www.vaemergency.com/index.cfm>

VDEM Blog

Web site: <http://www.vaemergency.gov/disaster-recovery/mineral-earthquake-recovery/>

Virginia Emergency Operations Center

Web site: <http://www.vaemergency.com/about/structure/ops/veoc.cfm>

Virginia Department of Agriculture and Consumer Services

Web site: <http://www.vdacs.virginia.gov/index.shtml>

Virginia Department of Mines, Minerals and Energy: Division of Geology and Mineral Resources

Web site: <https://www.dmme.virginia.gov/dgmr/divisiongeologymineralresources.shtml>

U.S. Department of Transportation Pipeline and Hazardous Material Safety Administration

Web site: <http://www.phmsa.dot.gov/portal/site/PHMSA>

HAZARD ANALYSIS

U.S. Environmental Protection Agency

Web site: <http://www.epa.gov/>

U.S. Department of Agriculture

Web site: <http://www.usda.gov/wps/portal/usda/usdahome>

U.S. Department of Agriculture, Farm Service Agency

Web site: <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=landing&topic=landing>

Plant Maintenance Resource Center

Web site: <http://www.plant-maintenance.com/>

U.S. Nuclear Regulatory Commission

Web site: <http://www.nrc.gov/>

ESRI

Web site: <http://www.esri.com/>

Great Lakes Information Network

Web site: <http://www.great-lakes.net/>

Amelia Bulletin-Monitor

Web site: <http://www.ameliamonitor.com/>

Appomattox News

Web site: <http://www.appomattoxnews.com/>

Lynchburg News & Advance

Web site: <http://www2.newsadvance.com/>

WSLS Channel 10, Roanoke

Web site: <http://www2.wsls.com/>

The Southside Messenger

Web site: <http://www.southsidemessenger.com/>

The Charlotte Gazette

Web site: <http://www.thecharlottegazette.org/>

The Kenbridge-Victoria Dispatch

Web site: <http://kvdipatch.com/>

(Blackstone) Courier Record

Web site: <http://courier-record.com/>

The Farmville Herald

Web site: <http://www.farmvilleherald.com/>

The Weather Channel

Web site: <http://www.weather.com/>

WFLO Radio (Web site: <http://wflo.net/>)

The Crewe-Burkeville Journal

ESRI (Web site: <http://www.esri.com/>)