



APPENDIX E RISK ASSESSMENT SUPPLEMENTARY DATA

This appendix contains supporting information for the Risk Assessment (Section 5) as available. It contains excerpts of the previous events and losses as presented in the 2016 Hazard Mitigation Plan (HMP), organized by hazard of concern. This information has been compiled into one appendix for ease of reference; however, it has not been updated and is reproduced as documented in the 2016 plan.

In order to create a more streamlined plan, the 2021 HMP was reorganized and condensed into a practical and more readable document for the public with the goal of providing a plan easier to implement for the county and all municipalities to support future risk reduction. The information in this appendix supplements the information provided in Section 5.4 of this plan.

E.1 Critical Facilities and Lifelines

The identification of community lifelines across Erie County provides an enhancement to the 2021 HMP. The Federal Emergency Management Agency (FEMA) defines a lifeline as: *“providing indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security.”* Identifying community lifelines will help government officials and stakeholders to prioritize, sequence, and focus response efforts towards maintaining or restoring the most critical services and infrastructure within their respective jurisdiction(s). Identifying potential impacts to lifelines can help to inform the planning process and determining priorities in the event an emergency occurs. Figure E-1 is FEMA’s fact sheet that describes lifelines further.



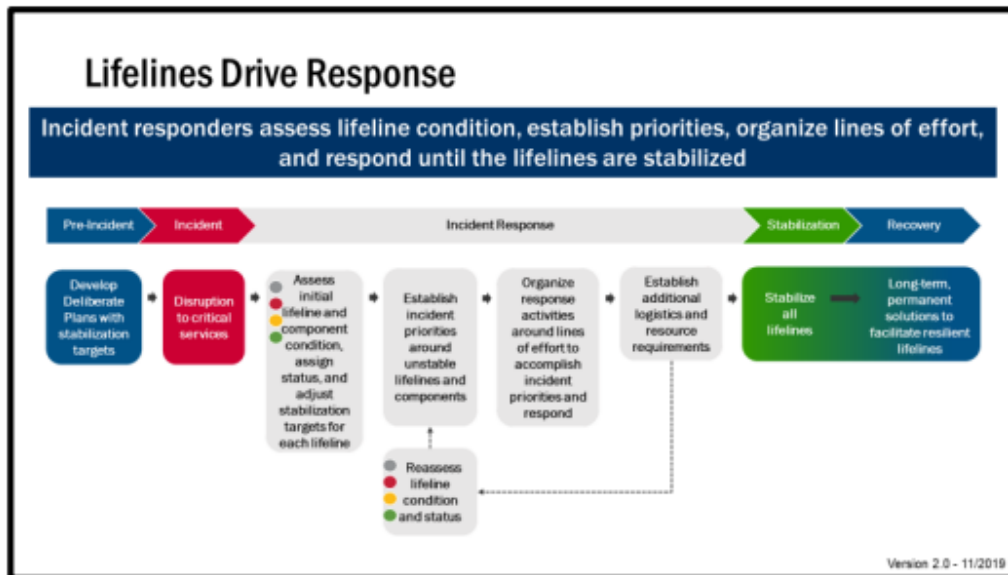
Figure E-1. FEMA Community Lifelines

Why lifelines?

- FEMA developed the community lifelines construct to increase effectiveness in disaster operations and better position the Agency to respond to catastrophic incidents
- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society
- When disrupted, decisive intervention (e.g., rapid service re-establishment or employment of contingency response solutions) is required
- During initial response, priority efforts focus on stabilizing community lifelines.
- Lifelines provide an outcome-based, survivor-centric frame of reference that assists responders with:
 - Root Cause Analysis
 - Interdependencies
 - Prioritization
 - Ease of Communication

How were lifelines developed?

- FEMA released initial guidance (*Lifelines Toolkit*) introducing the lifelines construct in February 2019, followed by significant stakeholder outreach and feedback including:
 - State and Local Emergency Managers
 - Interagency Partners
 - Private and Non-Profit Stakeholders
- Construct was validated during responses to Hurricanes Michael, Florence, and Dorian, Super Typhoon Yutu, Alaska Earthquake, and during Shaken Fury full-scale exercise.
- Lessons learned from exercises, operations, and stakeholder feedback resulted in refinement and improvement to the construct.
- *National Response Framework (NRF) 4th Edition* formalized lifelines in national response policy
- Enhanced Lifelines guidance (*Lifelines Toolkit 2.0*) released to support NRF Publication.



See the Lifelines Toolkit at:

<https://www.fema.gov/media-library/assets/documents/177222>

If you have any questions or feedback, please email them to: Lifelines@fema.dhs.gov



E.2 History of Hazard Events in the County – 2016 HMP

E.2.1 Coastal Erosion

December 12, 2000. The high winds caused water levels at the eastern end of Lake Erie to rise over five feet in a few hours. The high water levels coupled with waves of 10 to 14 feet caused shoreline erosion and localized flooding. Evacuations took place at Hoover Beach.

November 6, 2005. High water levels and waves of ten to fifteen feet resulted in some erosion of the lake shore and limited property damage.

January 30, 2008. The high water levels and waves to twelve to sixteen feet resulted in erosion of the lake shore and significant flooding at the extreme eastern end of the lake.

E.2.2 Extreme Temperature

Extreme Cold - February 1, 1993. This extreme cold event was reported to have caused \$50,000 in property damage. No other information is available.

Extreme Heat - July 13, 2005. A 25-year-old construction worker collapsed and died from heat stroke as he was walking home from his construction job.

Unseasonable Warmth - October 8, 1993. Period of unseasonably warm temperatures. No further information is available.

E.2.3 Extreme Wind

NOAA’s NCDC database [now NCEI] records 287 high wind and thunderstorm wind events affecting Erie County between July 1956 and March 2011 (data includes wind events greater than 50 knots/57.5 mph, with the exception of tornado events which are addressed separately). These incidents resulted in a reported total of three deaths and 34 injuries across the region which they affected, as well as more than \$34 million in property damages and \$200,000 in crop damages.

Date	Area Affected	Description	Recorded Damages
9/29/2005	Greater Buffalo Area	The thunderstorms accompanying the front produced damaging winds that downed trees and power lines. At the peak of the storms, over 30,000 customers were without power. Falling trees damaged homes and/or automobiles in Rochester, Silver Creek and Buffalo.	\$30,000
11/3/2005	Hamburg	While most of wind gusts ranged from 45 to 50 mph, the winds did knock down several large trees in Hamburg during the late morning hours.	\$4,000
8/2/2006	Tonawanda	Trees and limbs were downed in Constableville and Tonawanda.	\$8,000
9/11/2007	Orchard Park, Buffalo, Tonawanda	The thunderstorm winds downed trees and power lines. In Orchard Park, a 15- to 20-foot section of the Buffalo Bills Field house was torn off by the thunderstorm winds.	\$50,000
1/30/2008	Various	Sustained winds increased to 30 to 45 mph with gusts measured to 80 mph at the peak of the storm. Trees and power lines were downed by the strong winds. Utility companies reported close to 100,000 customers without power in locations scattered throughout region. Several homes and automobiles were damaged by falling trees and limbs. On Grand Island, the roof a manufacturing company sustained significant damage. The Buffalo Airport was closed between 8:30 a.m. and noon with over half of its scheduled flights canceled for the day. In downtown Buffalo, a building from the 1850s that had been damaged in an earlier January windstorm, sustained further damage and was deemed unsafe and to be demolished.	\$250,000



Date	Area Affected	Description	Recorded Damages
12/28/2008	Various	A peak gust of 75 m.p.h. was recorded at 8:21 a.m. EST at the Buffalo Airport. Close to 100,000 customers lost power during the storm and nearly 90,000 were without phone service. Downed trees damaged several structures and automobiles. The strong winds tore off roofs and shingles on many buildings. At the Buffalo Airport, wind gusts blew several jetways into the terminal building and the airport lost power during much of the storm. At Orchard Park, the wind tore 2 feet by 50 feet section of the roof the Buffalo Bills field house. The wind picked up gravel and windows and windshields of numerous cars in the stadium parking lot were broken. Inside the stadium, the strong winds tilted both goal posts. Also, near the stadium, a concession trailer was blown over with only minor injuries to the occupants reported.	\$250,000
2/12/2009	Various	Wind gusts were measured to 69 mph with widespread estimated gusts between 55 and 60 mph. The strong winds downed trees and power lines. Electric utilities reported nearly 100,000 customers without power at the peak of the storm.	\$50,000
8/9/2009	Various	Trees and wires were downed by thunderstorm winds in East Aurora, Forest Glen, Eden, Springville, Williamsville, Ebenezer	\$67,000
8/20/2009	Buffalo	The thunderstorms that developed produced damaging winds that downed trees and power lines.	\$15,000
12/9/2009	Various	On the New York State Thruway, several tractor trailers were blown over as winds gusted to near 70 mph. As the system passed to the north, winds shifted to southwest and increased. Gusts were measured to 60 mph at the Buffalo International Airport. The winds downed trees and power lines and utilities reported tens of thousands without power.	\$750,000
10/26/2010	Falconwood, Cheektowaga	Thunderstorms accompanying the front produced damaging wind gusts to 60 mph. In Cheektowaga, a traffic signal at Union Road and George Urban Boulevard was blown down.	\$29,000

The SHELDUS database lists more than 335 storm events featuring high winds affecting Erie County since January 1960 (including 81 events recorded between 2005 and the present) to which approximately \$36.5 million in property damages was attributed.

E.2.4 Flood

Date	Affected Municipalities	Description	Recorded Damages
2/7/94	Various	Three to four inches of rain fell in less than an hour over the towns of Boston and Eden. The flood waters swamped yards and basements and washed out roads, culverts and crops.	\$500,000 property damage; \$50,000 crop damage
Jan. 1996	Various	Warm temperatures and rapid snowmelt of 8 to 12 inches of snow combined with heavy rainfall produced significant flooding and ice jams. Nearly two hundred homes were damaged by flood waters. In West Seneca, over three feet of water and ice covered some sections of Clinton and Transit Roads. Evacuations occurred and several roads were closed due to the flood waters in West Seneca and Elma.	\$1.7 million property damage; \$500,000 crop damage
Sept. 1996	Tonawanda	Storm sewers and drains could not handle the runoff forcing the closure of over 30 streets and resulting in serious basement flooding in thousands of homes. Thousands of homes lost both their natural gas and their power.	\$400,000 property damage
7/8/98	Various	The extensive flooding closed numerous roads throughout the multicounty area. Several were completely washed out. Specific road closures included: Rte.78 in Depew, Rte.98 in Arcade, Four Rod and Old Three Rod Roads in Alden, Rte.63 in Dansville, and Rte.20 in Darien.	\$1.9 million property damage; \$100,000 crop damage
Jan. 1999	Various	Ice jam flooding occurred on area Buffalo area creeks. Some evacuations were necessary and roads were closed in the vicinity of south Cheektowaga. Some of the hardest hit areas included Lancaster and	\$740,000 property damage



Date	Affected Municipalities	Description	Recorded Damages
		Williamsville in Erie County. Evacuations occurred in Angola, Chili and Lancaster.	
9/23/00	Blasdell	A State of Emergency was declared in Blasdell. Roads were washed out and basements flooded throughout the southtowns. The heavy rains caused three area creeks to overflow their banks.	\$400,000 property damage
12/20/00	Lake Erie coastline (notably Buffalo)	SEICHE. High winds at the eastern end of Lake Erie caused the water to rise above five feet in a few hours. High water levels, along with ten to 14 foot waves, caused shoreline erosion and local flooding. Evacuations were ordered at Hoover Beach. The lake remained above flood stage for a few hours. There were no reports of injuries or fatalities.	\$50,000
03/09/02	Lake Erie coastline (notably Angola)	SEICHE. Winds above 50 knots on Lake Erie caused the lake level to rise at the eastern end of the lake. The lake exceeded the eight foot flood stage and peaked at 9 feet 63 inches at 2340 hours. No injuries or fatalities occurred. Evacuations were not ordered.	\$35,000
May-June 2004	Not specified	Federal Disaster Declaration for Severe Storms and flooding between May 13th and June 17th resulted in a PA-only declaration for 14 New York Counties. Erie County was included in this declaration. (Neither the NOAA NCDC database nor the SHELUDS database includes this event period in its event history for Erie County.)	FEMA reports \$18.7 million in PA payouts across the 14 affected counties
11/06/05	Not specified	SEICHE. High water levels and waves of ten to fifteen feet resulted in some erosion of the lake shore and limited property damage. Several roads along the lake shore were water covered or closed because of spray.	\$25,000
12/01/06	Not specified	SEICHE. Along the Lake Erie Shore, the water levels at the eastern end of the lake fell several feet ahead of the storm, then quickly surged as the winds shifted with the passage of the cold front. The lake level rose over ten-and-a-half feet in a matter of hours, peaking at 9.93 feet at the lake level gage at Buffalo.	\$10,000
01/30/08	Buffalo	SEICHE. The high water levels and waves to twelve to sixteen feet resulted in erosion of the lake shore and significant flooding at the extreme eastern end of the lake. The FEMA FIS reports that this unnamed storm had sustained winds of 30 to 40 mph and gusts to 60 mph. Coastal flooding occurred in several areas in the City of Buffalo, with high water marks ranging from about 578 to 580 feet.	\$50,000
Dec. 27-28, 2008	West Seneca, Marilla, Elma, Lancaster, Buffalo	SEICHE. The combination of the wind shift, rapid strengthening of the wind speed and the long fetch up the length of Lake Erie produced a seiche on the lake. Water levels rose over six and a half feet in about three hours' time. In addition, flooding was reported in West Seneca and near Cazenovia Park in South Buffalo. Cayuga Creek at Lancaster crested above its flood stage at 9.23 feet at 6 p.m. on the 27th. Flooding was reported in Marilla, Alden and Lancaster. Flooding occurred in Elma and Gardenville.	\$275,000 property damage (with \$25,000 attributed specifically to seiche)
08/09/09	Village of Gowanda	Devastating storms struck the southern area of Erie County, particularly in the Village of Gowanda, where caused extensive building and infrastructure damage occurred. This event received a Federal disaster declaration, and was the highest flow on record for the Cattaraugus Creek gage #04213500 at Gowanda. The Village estimates that nearly \$5 million in damages were incurred to Village-owned facilities and infrastructure, including damages to the Village Hall (\$534,677), DPW Building (\$146,675), Village roads (\$1,142,882), Village Water Department (\$1,388,475), debris removal (\$651,767), creek bank erosion repairs (\$611,123), and wastewater treatment plant repairs (\$121,232). The FEMA FIS also reports that the New York and Lake Erie Railroad was temporarily suspended due to a washout of track.	More than \$15 million
12/09/09	Not specified	SEICHE. The combination of the wind shift, rapid strengthening of the wind speed and the long fetch up the length of Lake Erie produced a seiche on the lake. Water levels rose over six feet in just a few hours.	\$15,000



E.2.5 Ice Jams

January 18-19, 1996. According to a NWS Flood Statement on 1/18/96, an ice jam formed on Buffalo Creek between Borden and Transit Streets in West Seneca, NY. Borden Street, Transit Street, and Clinton Road were closed due to flooding caused by the mile long ice jam. At about 7PM on 1/18/96 the jam broke and started moving rapidly downstream. Flood waters began to recede after the jam broke. Rapid snowmelt of eight to 12 inches of snow and heavy rainfall of about an inch combined with warm temperatures to produce a major ice jam on the Buffalo Creek in West Seneca. Over three feet of water and ice covered some sections of Clinton and Transit Roads. Evacuations occurred and several roads were closed due to the flood waters in West Seneca and Elma. Nearly two hundred homes were damaged by flood waters. \$1.7 million in property damages and \$500,000 in crop damages were reported for this event (NOAA NCDC). On 2/9/96 the jam was located between Union and Harlem Rds. It extended from the Black Railroad bridge near Brookview Apartments on Indian Church Rd to just west of Borden Rd. Backyard flooding resulted. A portion of the jam broke at the Black Railroad bridge on 2/10/96. The next day the jam was located just downstream of Union Rd. The water level continued to rise on the river at Union Rd through 2/21/96. Warm temperatures and rain were thought to possibly loosen the jam on 2/23. Jim Lever, CECRL-IE, was at the site of the jam on 2/22/96. He reported that the jam had heavily flooded a strawberry field near Clinton St and Transit Rd. On 2/23/96 it was believed that warm temps and rain might loosen the jam. By 2/28/96 the jam had loosened and cleared and water levels were back to normal. A total of \$4500 in damages occurred in West Seneca due to the jams on Buffalo Creek and Cazenovia Creek.

January 23-24, 1999. Ice jam flooding was reported on Buffalo area creeks. Evacuations were necessary and roads were closed in south Cheektowaga. Some of the hardest hit areas included Lancaster and Williamsville. Evacuations also occurred in Angola, Chili and Lancaster. Property damages of \$740,000 were reported for this event (NOAA NCDC).

February 4, 2003. An ice jam formed on Cayuga Creek at Four Rod Road in Alden. Ice blocked the bridge and water overflowed. A flood warning was issued for Erie County.

March 2-3, 2004. The NWS reported a major ice jam on the Cazenovia Creek in the Buffalo, NY area near I-90. At least 2 road closures had been reported. At 555 PM, the NWS reported the ice jam on the Cazenovia Creek in South Buffalo broke and progressed downstream into Cazenovia Park resulting in a rapid rise in the creek level downstream into South Buffalo. The Stevenson Street Bridge was closed. The NWS reported that the last jam affecting the Buffalo area eroded by Friday morning, March 5th. The National Weather Service reported an ice jam on the Buffalo Creek near Elma, NY on March 3. The Buffalo Creek overflowed in the town of Elma, flooding the home of an Erie County elected official. During the overnight and into the early morning, several fire companies were in the town of Elma to hold back waters from the overflowing Buffalo Creek. It affected one home. Throughout the overnight, volunteer firefighters and officials from Erie County and the town of Elma checked the banks of the Buffalo Creek and nearby homes for possible flooding. About 7 miles to the south, the siren wailed at Sunset Bay warning residents to get their cars out, as the icy waters of Cattaraugus Creek spilled over its banks.

December 30, 2004. The National Weather Service reported an ice jam on Cazenovia Creek in Buffalo New York between the Stevenson Street Bridge and the Cazenovia Bridge. At 945 AM Friday December 31, the jam was causing water to back up into Cazenovia Park. At that time, no private homes were affected. About a half inch of rain had fallen since midnight, causing runoff from snowmelt that resulted in ice breakup, movement, and jamming. At 1 PM EST on December 31, 2004, the NWS reported that the jam remained in place but water was receding from Cazenovia Park. At 431 PM, the NWS cancelled the flood warning after flood waters receded from Cazenovia Park. USGS real-time stage information for Gage no. 04215500 (Cazenovia Creek at Ebenezer) showed that a jam had been in place at the gage between December 27 and very early in the morning of December



31. Stage records show a sudden drop in stage at 3:15 AM on December 31 typical of ice jam failure. (NOAA NCDC records for this event indicate only \$3,000 in property damages).

March 15, 2007. Ice on Cattaraugus Creek at Gowanda NY, broke up and has caused river levels to rise eight feet over a two day period, but appeared to have begun to recede midmorning 15 March. Warm temperatures during the past week, the resulting snowmelt, and a period of rain, led to the breakup of numerous rivers across New England, many causing flooding.

E.2.6 Landslide

Cause	Municipality	Location	Description	Damage Estimate
Man-induced	Springville	Route 39	Till or lake clay	Not identified
Not identified	Springville	Route 39	Sheeting 30 feet long, houses on steps, slide	Not identified
Natural	East Aurora	Not identified	Slide into Buffalo Creek. 15 acre lake created. Regional DOT reports creek erosion slides all along Buffalo Creek from [illegible] to county line.	Not identified
Natural	Springville	Near Springville, east of intersection of Route 39 with Route 240	Slumps occur on exposures of clayey till – [illegible]	Not identified
Natural	Springville	Just south of Springville	Slumps occur on exposures of clayey till – [illegible]	Not identified
Natural	Not identified	East of Morton Corners area, on both sides of creek that crosses Route 39	Slumps occur on exposures of clayey till – [illegible]	Not identified
Natural	Sardinia	Just south of Sardinia	Slumps occur on exposures of clayey till	Not identified
Natural	Sardinia	Southwest of Sardinia	Slumps occur on exposures of clayey till	Not identified
Natural	Not identified	Shero Road - west of Patchin	Stream erosion	Not identified
Man-induced (seepage - saturation of embankment)	Cheektowaga	Scajaquada Creek Flood Control Project	Failures have occurred along the cut slopes of a local flood control project. Four separate phases of slides were repaired. The total reach of sliding was about 1/4 mile (both banks). Oversaturated soils after water level drops.	~ \$250,000
Natural	Lancaster	Cayuga Creek Flood Control Project	Erosion of outer bend of Cayuga Creek has resulted in sliding and threat to road above	Not identified

E.2.7 Tornado

Table E-1. Tornado Events in Erie County, 1957–2015

Date	Location	Magnitude	Impacts	Recorded Property Damage
4/25/57	Erie County	F1	None Reported	\$25,000
7/7/1961	Erie County	F2	None Reported	\$250,000
6/9/1966	Erie County	F0	None Reported	\$3,000
8/19/1970	Erie County	F3	None Reported	\$250,000
8/23/1971	Erie County	F2	None Reported	\$25,000
5/2/1972	Erie County	F2	None Reported	\$250,000
6/30/1976	Erie County	F1	None Reported	-



Date	Location	Magnitude	Impacts	Recorded Property Damage
9/18/1977	Erie County	-	None Reported	\$250,000
7/30/1987	Erie County	F2	None Reported	\$2,500,000
4/9/1991	Erie County	F1	None Reported	\$25,000
5/1/1991	Erie County	F0	None Reported	\$250,000
7/12/1992	Erie County	F1	None Reported	\$0
8/31/1993	Clarence	F1	A thunderstorm spawned a small tornado during the early morning hours. Downburst winds with an embedded tornado downed numerous trees; some were 1 to 1.5 feet in diameter and at least 100 feet high. Some structural damage to homes resulted due to falling trees and limbs.	\$500,000
9/23/1993	Grand Island	F0	The tornado first touched down on Grand Island where it ripped the antenna off a house and overturned outdoor lawn furniture. The tornado moved southeast downing some trees in Tonawanda.	\$50,000
6/24/1994	Angola	F0	The tornado mainly uprooted trees: one fell on a house.	\$50,000
8/28/1994	Amherst	F0	No description	\$50,000
9/25/1997	Evans Center	F0	Power lines and five large maple trees were downed.	\$15,000
4/28/2002	East Concord	F0	In the Town of East Concord, a weak tornado (winds between 70 and 75 mph) briefly touched down. A portion of the back and roof of an outbuilding were blown away, a pier was tossed across a pond, and trees were damaged.	\$35,000
6/30/2006	Cheektowaga	F1	A thunderstorm spawned a tornado which moved across the Town of Cheektowaga from the northwest to the southeast, initially touching down at 2:55 pm on Walden Avenue near Harlem Road. On Walden Avenue, a construction trailer was moved several hundred feet. The worker in the trailer suffered minor injuries. It then moved across the New York State Thruway, lifting a tractor trailer and depositing it on its side across the Jersey barrier; the driver suffered a broken leg. It then continued on a southeast trek damaging a 20 by 30 foot section of a wall on a warehouse and then downed trees as it crossed through central Cheektowaga. The tornado touched down several times along its path. Its final touchdown was at the Parkside Village Mobile Home Park around 3:05 pm where three mobile homes sustained significant damage and eight others sustained minor damage. The tornado was ranked an F1 with a path length of three miles and a width of 75 yards.	\$250,000

E.2.8 Winter Storm

These events are reported as being responsible for property damage totaling approximately \$95.1 million, although this includes damage reported in counties besides Erie County that were affected by the same events. Details and descriptions for some of the events are as follows:

- **Blizzard of 1977.** This storm crippled Western New York with bitter cold temperatures and high winds bringing existing snow into the county off Lake Erie, yet deposited very little new snow.
- **January 3, 1993.** A combination of a cold surface and warm moist air aloft created freezing rain and freezing drizzle which resulted in over a thousand traffic accidents throughout the area.
- **December 9-10, 1995.** Known familiarly as the “Weekend Storm” (and meteorologically as “Gary ”), this lake-effect snow storm was declared a snow emergency at the state level. A total of 37.9 inches



of snow fell over a 24 hour period. Impacts were less severe because of the storm's occurrence over the weekend when many people were home.

- **November 11, 1996.** Lake effect snow squall persisted across the southern portion of the county for nearly three days dropping localized amounts of 10 to 22 inches.
- **December 19, 1996.** Parts of the New York State Thruway were closed for more than 12 hours. Thirty to forty cars were stranded near Angola. A state of emergency was declared in Dunkirk and various municipalities imposed driving bans. Many school districts cancelled classes.
- **January 10, 1997.** Some Buffalo suburbs received 24 to 30 inches of snow. During Saturday morning, over a foot of snow fell in just four hours over Amherst and Tonawanda.
- **March 14, 1997.** Several inches of the icy slush coated trees and power lines, the weight of which downed the trees and lines. Various school districts throughout the area cancelled classes because of the treacherous conditions. Countless automobile accidents were reported.
- **December 5, 1997.** Heavy snow closed the New York State Thruway from Ripley to the Pennsylvania state line.
- **March 2, 1998.** It was the largest snowfall of the entire winter season in the Buffalo metro area. The snow made roadways extremely slick and innumerable accidents resulted. The heavy ice and snow on power lines and trees resulted in scattered power outages throughout the area.
- **January 1999. January 1-15.** Known familiarly as the “Big Dump” (and meteorologically as “Europa”), this series of lake-effect and synoptic snowstorms resulted in 60.5 inches of snow falling over a 15 day period, with a 24-hour maximum of 12.0 inches. A Federal snow emergency was declared. The cumulative effects of these storms caused extensive structural damage throughout the region. January 15-25. In Orchard Park, a man was injured when a garage collapsed on top of him during this period of excessive snow. Roof collapses and entire structure failures were numerous across the area. Numerous barns across the region collapsed under the excessive weight of the snow, in several dairy cows were injured and killed. Several garages collapsed damaging the automobiles and machinery inside them.
- **November 20, 2000.** Known familiarly as “Gridlock Monday” for its occurrence during a Monday morning rush-hour, (and meteorologically as “Chestnut”), this lake-effect storm resulted in a Federal disaster declaration. The storm crippled much of the Buffalo metro area with 24.9 inches of snow falling in a 24-hour period. Tens of thousands of people were stranded in autos as city and suburban streets became clogged with traffic and came to a standstill. Three thousand school children were stranded in buses which were unable to complete their routes.
- **December 24, 2001-January 1, 2001.** This well-forecasted, lake-effect storm known as the “Christmas Storm” or “Bald Eagle” storm resulted in a Federal disaster and emergency declaration. Over a nine-day period, 81.6 inches (6.8 feet) of snow fell. The 24-hour maximum accumulation was 35.4 inches. This storm crippled Buffalo and surrounding areas; however, its occurrence over the holidays when schools and many businesses were already closed, thus minimizing the catastrophic nature of such a large snowfall.
- **April 3, 2005.** Locally heavier amounts of up to two feet were reported along the ridges southeast of Lake Erie. Numerous accidents were blamed on the spring snowstorm. Tens of thousands were without power as the heavy snow downed trees, limbs and power lines.
- **October 12-13, 2006.** This historic lake-effect snow storm was characterized by the NWS Buffalo Forecast Office as a “dramatic, crippling, out of season event” . Roughly one million residents of the Niagara Frontier lost power, some for as long as a week. With most trees still in full leaf at the time, damages to vegetation were the worst in recent memory. The 22.6 inches recorded at the Buffalo airport not only blew away any October record (6" in 1909, only 4 falls of 2" or more in 100 years in October), but was the 7th greatest snowfall ever at any time in Buffalo. Depths varied quite a bit, from a minimum



of 2 to 10 inches in parts of Grand Island, to 24 inches in Depew and Alden. Even within the City of Buffalo there was marked variation in total accumulations, ranging from 20 inches in the north, to 15 inches downtown, and 10 inches to the south.

- **March 4-7, 2008.** On March 4, general snow of four to six inches blanketed the entire region and was followed by several inches of sleet and up to a half inch of glaze from freezing rain. This system was followed on March 7 by a storm in which 21.6 inches of snow was measured at the Buffalo Airport - the greatest general (non-lake effect) snowfall in Buffalo in 24 years. Numerous automobile accidents were blamed on the slippery conditions and poor visibilities in falling and blowing snow.
- **December 1-2, 2010.** This lake-effect snow storm began on the afternoon of December 1 and continued through December 2, burying parts of Buffalo and surrounding towns. Suburban Depew recorded 42 inches while Buffalo neighborhoods south of downtown got 39 inches, according to the National Weather Service. Hundreds of motorists were stranded overnight when jackknifed tractor trailers on the NYS Thruway just east of Buffalo blocked traffic.
- **February 25, 2011.** A 30-mile stretch of the New York State Thruway between Hamburg and Dunkirk was closed due to multiple accidents. There were several reports of building collapses throughout the region from the weight of the snow which had built up throughout the snowy winter.
- **November 17-26, 2014.** Erie County was hardest hit by lake-effect snow during much of the week before Thanksgiving. The Buffalo southtowns were hardest hit with some areas receiving over 7 feet of snow. A 132 mile stretch of the New York State Thruway was shut down. Snowfall rates were recorded as high as six inches per hour. The extraordinary snow loads took their toll on homes and businesses.

In addition to the events listed by NCDC, the SHELDUS database lists a further 177 winter storm events affecting Erie County since January 1960 (of which all but 35 were recorded before 1993) to which slightly \$45.7 million in property damages was attributed.