

AN EXCERPT FROM

A History of Severe Weather

To the Lee of Lake Erie and Lake Ontario

In Western, Central, and North-Central New York

1798-2022

By Kellen Bassette

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DECEMBER 1878 - JANUARY 1879

A series of major storms impacted the region in December 1878 culminating in a historic blizzard-like period in early January 1879. Prior to the first of the region-wide events, a snowstorm affected southwest New York and northern Pennsylvania on December 5-6, 1878. Papers reported that two feet of snow fell in Chautauqua.^{1,2}

THE FLOOD

On the night of December 8-9, 1878, a large storm system brought heavy rains and flooding to eastern New York, New England, and Canada.³ At 0100 on December 9, an area of low pressure was centered south of Lake Michigan and moving northeast towards New York's Lake Region.⁴

0.10" of precipitation fell by midnight on December 8 in Buffalo. Precipitation began later to the west. All other official stations in the region did not report precipitation until the calendar day of December 9. Locally, the storm proved to be most potent east of Lake Ontario and appears to have been centered near Oswego.⁴

At 0300 on December 9, the storm began as snow in Oswego before changing to rain. The barometer bottomed out at 28.71"/972 mb at 2100 on December 10. The rain continued until 0330 on Wednesday, December 11, when the wind shifted to the west, and rain turned to snow as a cold front crossed the region on the backside of the storm. The snow ended at 0930 on December 11. A total of 4.62" of precipitation fell in a 54.5-hour storm period. Minor snowfalls later in the day added to the precipitation total.^{4,5}

On the morning of December 11, Buffalo and Rochester reported sustained west winds of 30 MPH while Oswego measured sustained winds of 26 MPH at 0700.^{4,5}

The driving rain saturated the ground allowing gusty winds to down trees, chimneys, and fences. The combination of wind and wet snow, which coated the telegraph wires with an accumulation of snow and ice an inch thick, tore down the wires and snapped miles of poles in the Oswego area.^{5,6}

High seas washed away the piers at Oswego Harbor and tore boats from their fastenings, smashing them into each other. Lake Ontario hurled boats into small buildings near the shore, demolishing the structures. The angry lake battered the wharves, damaging many of them. The north side of the life saving station gave way and the building was nearly lost.^{5,7}

Driven into the City of Oswego, Lake Ontario flooded the park near the shore. Waves four feet high rolled almost into the grandstands. Flood waters covered parts of the city several feet deep. Many homes sustained damage and the Oswego River rose to an unusual height.^{5,7}

The downpours and snowfall added to the swollen creeks and swamps that had filled up during an unusually wet November. Railroad tracks washed out in Minetto, Oswego County, and Rose, Wayne County. Washouts ripped the tracks in half in Fulton. Flooding hit the hamlet of Oswego Center and the Village of Hannibal hard. Roads and mills washed away and cellars flooded. Bridges succumbed to rising waters across the county. Hannibal alone lost more than 15.^{4,5}

Grindstone Creek, in the Town of Richland, ran at the the highest levels ever witnessed. Elsewhere in Oswego County, the Little Salmon River and the Salmon River both flooded badly, the latter the worst in 15 years. Several mills and dams were swept away on all three waterways.^{8,9,10}

In a positive consequence of the storm, the high water on the Black River brought a bonanza to some fur sellers. The river flooded the dens of muskrats along the banks and forced them onto logs and brush. Two men near Lowville bagged 101 rats in a single hunt while another hunt at Wood's Pond in Belleville, southern Jefferson County, resulted in the harvest of 140 rats.^{11,12}

Precipitation for the observation days of December 9-11, 1879, includes:^{4,13}

Oswego	4.67"
North Volney	3.75"
Madison Barracks	3.60"
Rochester	3.06"
Pierrepont Manor	2.88"
Watertown	2.44"
Buffalo*	2.20"
Vernon Center	2.10"
Fort Porter	2.08"
Fort Niagara	2.02"

*An additional 0.10" of precipitation fell at Buffalo on the evening of December 8 making the storm total there 2.30".⁴

Following the synoptic storm, local snows, likely lake effect, centered on central Oswego County on December 12-13. Diarist Francis Squires reported a foot and a half of snow in North Volney¹⁴ as did a letter from Mexico.¹⁵ Palermo measured 17" of snow, and Oswego reported 0.55" of precipitation.⁴

On December 17, and overnight, another lake effect event centered near Oswego. 18" of snow fell around the city according to newspapers. The snow was localized, not extending south of Fulton, west of Sterling, or east of Mexico.¹⁶ The Signal Office tallied 2.15" of liquid at Oswego on December 17-18, 1878, suggesting snowfall may have been higher than 18" in some sections.⁴ 10" fell in North Volney.¹⁴

THE SEVEN DAY STORM

On the night of December 19-20, light snow began falling in southern Jefferson County. The next day, snow squalls were reported in Watertown, an all-day snowfall at Pierrepont Manor, and snowstorm conditions in Highmarket, Lewis County. These snows were likely lake effect and did not impact either Oswego or Palermo.^{4,17,18,19}

Hard on the heels of the lake snow came a synoptic storm. It lasted about 24 hours at locations near the storm center and impacted the region between the evening of December 20 and the morning of December 22.⁴

In Buffalo, snow fell from 1700-2120 on December 20, commencing again the next morning at 0715 and continuing through 0100 on December 22. The Signal Office, located downtown, reported 0.42" of precipitation while Fort Porter, some 1.7 miles to the northeast, measured 1.06" for a similar period.⁴

On the south shore of Lake Ontario, the observer at Fort Niagara in Youngstown, Niagara County, reported the snowfall on December 21 to contain 0.27" of liquid. ⁴

Rochester measured 0.77" of precipitation from 0800 on December 21 through 0815 on December 22. Elsewhere in Monroe County, newspapers reported over a foot of snow in Fairport.^{4,20}

Oswego recorded 1.23" of precipitation between 1000 on December 21 and 1040 the next day. In Cape Vincent, northern Jefferson County, the cooperative observer measured 12" of snow ending at 1000 on December 22. At Madison Barracks, the snow ended at 0800 on December 22 and contained 0.45" of liquid. Pierrepont Manor measured 1.00" of precipitation during the event. A snowfall record maintained in Watertown indicated that 16" of snow fell there while newspaper correspondents in the Adirondack foothills of Lewis County noted a foot of snowfall in Belfort and two and a half feet in North Greig.^{4,21,22,23}

This system spread snow from Virginia to Canada and as much as three feet of snow fell in portions of Ontario and Quebec.^{24,25,26}

THE BIG SNOW

On December 22-23, 1878, a potent lake effect snow band set up northeast of lakes Erie and Ontario. Snow began in Buffalo at 1610 on December 22 and continued until 2140 on December 23. Southwest winds reached a sustained velocity of 30 MPH on December 23 creating near-blizzard conditions as temperatures fell through the teens into the single digits.⁴

Precipitation totaled 2.73" at the Signal Office in the 29 1/2 hour period. Just 1.7 miles to the northwest, Fort Porter recorded only 0.54" of precipitation⁴ indicating a steep gradient on the north side of the band, a common feature in major lake effect events in the Buffalo area.⁴

The band of heavy snow off Lake Erie was only about 10 miles wide and appears to have been centered directly over downtown Buffalo.²⁶

A similar situation developed east of Lake Ontario. The northeast winds that accompanied the synoptic snow in Watertown on Saturday, December 21, shifted to the west on Sunday. The snow ended by midday offering a brief respite. Winds backed to the southwest on the night of December 22-23 and heavy lake effect snow began in Watertown about 0300 on December 23.^{4,27}

The snow band did not extend much north of the city. On the morning of December 23, very little snow fell in Cape Vincent and Clayton. The main snow band was located south of Stone Mills in the Town of Orleans, some 10 miles north-northwest of Watertown. The Lake Ontario band seems to have been much wider than the Lake Erie band with the area of heavy snow extending into northern Oswego County. Heavy snow fell inland to Carthage and the Tug Hill.^{4,27}

In Oswego County, *The Pulaski Democrat* did not estimate the snowfall there, but claimed it to be "beyond all account." Drifting was severe and the depth of snow in Pulaski ranged from 3 to 15 feet after the lake effect ended about 1100 on December 23.¹⁰ Nearly three feet of snow fell in Mexico.¹⁵

The *Palladium* reported the snow to be six feet deep on the level between Albion and Richland Junction that day. While the heavy lake effect snow spared western Oswego County, the deep accumulation from the earlier storms drifted badly and blockaded roads and railroads. In Oswego, large gangs of shovelers worked to open St. Paul's cemetery so that a funeral could be held.²⁸

Meanwhile, trains loaded with dead hogs and sheep that perished in the storm, and cattle that were "exhausted and down", traveled south from Buffalo.²⁹ Swine detained in stock cars without food resorted to cannibalism.^{30,31} In the East Buffalo stockyards, an agent from the Society for the Prevention of Cruelty to Animals was on-site to ensure proper treatment of the animals. Despite best efforts, several cattle, 120 hogs, and 37 sheep died during the storm in those yards. The editor of the *Evening Republic* made it a point to praise the efforts of Mr. C.C. Kelleher of the Lake Shore Railroad, Mr. James Todd of the Grand Trunk and Canada Southern, and Mr. William Lewis, stock agent, for their efforts to ensure humane treatment of the animals.³²

The severe conditions resulted in a fatal railroad accident near Buffalo on December 23. Two freight trains had become snowbound on the tracks the night prior. A passenger train, being closely followed by another train amid the blinding snowstorm, found itself forced to stop as it neared the pair of stranded freight trains.³³

When it became apparent that the second train would be unable to stop in time, a brakeman yelled for the passengers to jump. The 40 to 50 passengers panicked and ran to the front platform. Only three men were able to make it through the door but they were caught between the cars in the wreck. Two of the men, Azel Gay and Michael Maloney, were killed and their bodies badly mangled. The third, George Vick, received serious injuries.³³

A stove tipped over and caught fire to the wrecked car. Further loss of life was narrowly averted when a railroad employee by the name of William N. Lewis ran through the debris to the Wagner car and

"wrenched off the water tank." He extinguished the fire before it could get out of control.³³

Another man had a close call the next afternoon while working on a shovel gang. While clearing snow so that stock cars could be pushed to the chutes for unloading, the laborer inadvertently stepped in front of the stock cars and was knocked over across the rails. By some unknown fortune, the brake was set and instead of being run over by the wheels, he was pushed in front of the car for about 250 feet at about 12 to 15 MPH. He nearly suffocated under the snow, but escaped with only slight bruises.³³

Newspapers indicated blizzard conditions in Westfield, Chautauqua County, on the night of December 23-24 as snow fell along Lake Erie to west of Cleveland, Ohio.²⁹

In Buffalo, snowfall ceased overnight but commenced again at 0840 on December 24. Winds increased in velocity creating true blizzard conditions. Sustained west winds reached 56 MPH at 1400 causing whiteouts in the city. Winds in Buffalo averaged 35 MPH over the entire day of December 24, 1878.^{4,33}

Telegraph dispatches indicated the snowfall from the afternoon of December 22 through 2230 on December 24 totaled 37". The source of the measurement is unclear but the figure seems reasonable as the Signal Office officially measured 3.28" of precipitation during the corresponding period. The 37" measurement is also corroborated by estimates from the *Buffalo Daily Courier* that put the snowfall at three feet on the level. A few miles either side of the city, snow was measured in inches instead of feet. On December 24, the snow reportedly lay four to five feet deep in places between Buffalo and Batavia.^{4,26,33,34}

In Watertown, the snowfall from 0300 on December 23 through December 24 totaled 42" by actual measurement. Cape Vincent measured 6" of snow for the same period. While no instrumental wind data is available for Watertown, the local weather observer noted west and southwest gales with extensive drifting.^{4,21,24}

Railroad men reported the depth of snow on the ground in Watertown on December 24 as four feet. A frustrated Addison Day, superintendent of the RW&O Railroad, sent the following dispatch when pressed by Boston stakeholders concerning the condition of his railroad:

As soon as the storm ceases I shall dig down and find the tops of the telegraph poles to locate the road, and shall then dig down to see if the track is left.³⁵

An engineer received minor injuries when a train derailed north of Baldwinsville in Onondaga County. Across the region, trains were off their tracks or buried in snowdrifts.³⁵

THE STORM CONTINUES

With trains unable to penetrate the drifts, an estimated two to three thousand people spent Christmas Eve stranded at the Exchange St. Depot in Buffalo.³³

Lake effect snows continued off both lakes Erie and Ontario on Christmas Day. The *Lewis County Democrat* reported on December 25 that four feet of snow had fallen in Lowville since December 21 with about three feet of snow on the level and drifts 10 feet high in the village.²²

Another period of snow impacted Buffalo from 0200 to almost noon on December 25 while sustained southwest winds reached speeds of 38 MPH. Nearby Port Colborne, Ontario, reported snow three feet deep for 10 miles inland on December 25.^{4,30}

A fire broke out in the Black Rock neighborhood of north Buffalo on Christmas morning. Two flour mills and two other buildings were consumed as strong winds fanned the flames. People credited the heavy mantle of snow on the ground and roofs with saving the entire neighborhood from destruction.³⁰

Two firefighters landed in a canal after they were thrown from separate trucks crossing a bridge. They

suffered greatly from the cold.³⁰

White-out conditions were common across much of Jefferson County and the *Re-Union* estimated the loss to Watertown merchants at \$50,000 (1878 USD) due to the lack of Christmas shoppers who dared not brave the impassable roads.¹²

Heavy snow made it as far north as Chaumont. A train lay buried between that village and Brownville. Treacherous conditions prevailed from Watertown to Carthage with "considerable snow" reported in Great Bend. The situation improved beyond Carthage and rail lines passed that village were open.¹²

A train leaving Rome, Oneida County, made it as far as Sandy Creek in northern Oswego County. It followed three engines and a plow that cleared the tracks ahead of it. The work was abandoned between Sandy Creek and Mannsville. The engines drifted over with snow and were buried 15 feet deep.¹²

In Carthage, local pastors and YMCA members, concerned about the lack of food and wood for the poor in their village, set out to visit local families. Several families were found to be destitute and a meeting was held at the YMCA rooms on Christmas Day. Citizens made arrangements to procure and distribute supplies to the needy. The efforts were hampered by blockaded country roads and the fact that even horses couldn't be ridden on village streets as snow depths ranged from four to ten feet. Business in Carthage remained at a standstill for a full week.¹²

On Christmas Day, the keeper of the lighthouse at Stony Point in Henderson, Jefferson County, gathered a couple of bushels of pike, bass, and perch. They were in the shallows and driven ashore by the powerful gale the night before. The rapidly accumulating snow blocked the fish from the water. They were, "alive and kicking," when discovered by the lighthouse keeper.³⁶

The federal weather observer in Sackets Harbor attested to the power of the storm on Lake Ontario's northeast shore calling it "the most severe storm ever recorded in this vicinity." His record noted high winds continuing until the night of December 26-27 and snow and ice piled 20 feet high all along the south side of the bay.⁴

Troubles compounded in Fulton on December 25. An ice jam at a tributary creek a mile below Fulton caused the flats on the north side of the village to flood while the Oswego River, already unusually high, rose three feet in about 24 hours.³⁷

About 100 families, mostly poor, saw their homes flooded as the water rose to the top of the first floors in some houses. On the west side of the river, in what was then the Village of Oswego Falls, the flumes of factories and mills became jammed with ice causing trouble for many businesses. The gasworks also flooded leaving streets and many residences in the dark. Meanwhile, the drifting snow rendered the area nearly impassable.^{37,38}

Along the Onondaga/Oswego County line, snow depths totaled about two feet deep at Lysander and Brewerton on December 25. Much of the total on the ground likely fell in the synoptic storm and additional contributions from lake effect were probably modest at best in northern Onondaga County.³⁹

On December 26, two trains traveling at low speeds collided during a whiteout on the Lake Shore Line. The impact threw one man through a window but he was not severely injured.³⁴ Meanwhile, three trains stalled between Buffalo and Aurora on the Buffalo & Philadelphia line. Local farmers cared for the stranded passengers.³⁰

Railroad men that worked for 48 hours straight with no sleep were given no reprieve. When word of a derailed train came in they were sent down the line to Battle Island, between Oswego and Fulton. The accident there claimed the life of 28-year-old Orville H. Paige. Five other men were injured in the incident, two of them severely. Near Mexico, the cuts filled up with eight to ten feet of snow.^{37,38}

A Lewis County man, traveling from Natural Bridge to Lake Bonaparte with a team of cattle, got lost in the woods and spent two days and three nights in the elements. He was found nearly frozen to death. The man survived by lying down close to the necks of the cattle for warmth.⁴⁰

The storm wound down on December 26, ending seven consecutive days of storm conditions in the snow belts. A Watertown observer measured a total of 67" of snow during the six-day period of December 21-26, 1878.²¹ Snow banks fifteen feet deep were commonplace in the city.⁴¹

The *Watertown Daily Times* reported the snow to be five feet deep on the Sackets Harbor Railroad on December 26. The railroad line in question was the Carthage Watertown & Sackets Harbor Railroad. I suspect the estimated snow depth of five feet should be understood to have been between Watertown and Carthage and not in Sackets Harbor itself where weather records maintained at Madison Barracks indicate considerably less snow fell than in Watertown.^{4,41}

Most stations in the region reported light snows on December 27 but they were insignificant and did little if anything to hinder snow removal efforts.^{4,42}

AFTERMATH

Due to the storm, schools in Pulaski and several other surrounding hamlets and villages remained closed for a full week. On Lake Street, the great depth of snow required the sidewalk to be tunneled. Drifts in the area ranged as high as twelve to fifteen feet in places.⁴²

A survey of estimated snow depths, reported by Lewis County newspaper correspondents following the storm, indicates three feet of snow in Denmark and Martinsburg, over three feet in the southern part of the Town of Greig, and three to six feet in the Town of Diana.^{43,44}

Lewis County's troubles were compounded by multiple outbreaks of what was generally attributed to diphtheria, and occasionally scarlet fever, at several locations across the county. Many children and teenagers lost their lives and doctors braved perilous conditions to travel to remote farmhouses to call on the sick and dying. One family, in the West Martinsburg area, lost seven children to disease. A doctor traveled eight miles on snowshoes at the height of the storm to attempt to save them.^{19,44,45} A diphtheria outbreak occurred simultaneously in the Delphi Falls area of Onondaga County and claimed several lives there.³⁹

The Village of Gouverneur, in southern St. Lawrence County, witnessed nearly six days of storm conditions then considered almost without precedent. It had been one of the worst storms in memory in Gouverneur and snow depths totaled two and a half feet on the level. Ten miles to the north and ten miles to the east, beyond the reach of the heaviest lake effect bands, snow depths dropped to around 15".¹²

On the evening of December 26, the railroad track between Central Square and Pulaski had been cleared. On Friday, December 27, the first train since the prior Tuesday made it from Pulaski to nearby Richland.⁴²

In Chautauqua County, the *Silver Creek Local* reported the snowfall in that village to have been near 30" during the storm.⁴⁶ West of the New York border, a family that lived at the foot of a steep hill just south of North East, Pennsylvania, saw their entire house buried by the drifting snow. Only a portion of the stovepipe extended above the drift to verify its existence.⁴⁷

All railroads in the Buffalo area were clear by this time. A train on the Utica & Black River line managed to make it into Watertown that day. It ended the isolation "and let light and hope into that blockaded city and the people who had been denned up there for several days."^{12,42}

Conditions on the RW&O Railroad were poorer. A snowplow pushed by four engines made it 11 miles north of Watertown on December 28, where it became stuck in the drifts and forced to dig out and return. It wouldn't be until December 31 that trains could make it both out of and into the city. A portion of railroad between Mannsville and Adams, in southern Jefferson County, remained blocked.^{12,42}

By December 31, the situation improved materially. The streets of Pulaski had been made passable and a bright day shone as the village bustled with activity. Across the north country, snow-bound travelers

made attempts to reach their long-delayed destinations.⁴²

Light snow fell daily through the end of the year in portions of the Lake Ontario snowbelt as attested to by weather records maintained in Palermo and Watertown. The stations ended the year with 11 and 12 consecutive days of snowfall respectively but the additional snowfalls were insignificant compared to the conditions of December 21-26.^{4,48,49}

After the end of 1878, the *Watertown Re-Union* published a review of newsworthy events for the year. Their account for the last eight days of December is as follows:¹²

24. Watertown snowed in.
25. A stormy Christmas day.
26. The Railroads are blocked up and our people are mad.
27. People crawl out of the upper story windows in order to get over the top of the snow drifts.
28. No trains from Rome from day to day.
30. Trains expected. All exchanges a week old.
31. Hurrah! The snow bound train gets out and in. Sixteen tons of mail and a happy New Year.

Precipitation totals for the observation days of December 20-26, 1878, include:^{4,49}

Buffalo	4.23"
Watertown*	2.81"
Fort Porter	2.66"
Pierrepont Manor	2.63"
Madison Barracks	1.78"
Oswego	1.45"

*The running precipitation total reported on Dec. 24 by Mr. Eames, then 2.27", a 0.46" increase over the previous day's sum, is said to have been the storm total as of 1200 Dec. 24, 1878. This is contradicted by Mr. Eames' report on the day prior that indicates the running total of 1.81" began on Dec. 15, 1878.^{17,24,27}

There were some very minor snowfalls prior to Dec. 21 that were included in Eames' storm total and were detailed in the Dec. 20, 1878, issue of the *Watertown Daily Times*. No precipitation figure was given for the flurries that occurred before Dec. 21, 1878, so we cannot separate them from the storm total suffice to say the amounts were insignificant. A half-inch of new snow was reported on Dec. 20 on top of "the previous thin mantle."^{17,24,27}

EL NIÑO INFLUENCE DURING 1878

The strongest El Niño on record occurred during 1877-78 and greatly impacted global weather patterns. The combination of the super El Niño in 1877-78, an extreme positive phase of the Indian Ocean dipole in 1877, and record warmth in the North Atlantic in 1878, exacerbated drought conditions that began in 1875 in portions of Brazil, Africa, and Asia.⁵⁰

The climax of the so-called "Great Drought" occurred with the anomalous El Niño that lasted through 1878. Portions of south, central, and east Asia suffered the most when the Asian Monsoon failed.⁴⁹

Over 50 million people, about 3% of the world's population at the time, died in the Global Famine of 1876-78.⁵⁰

Locally, the El Niño impacts were evident in an unusually warm and wet year in 1878. It was the wettest year on record at Buffalo with 60.24" of precipitation. This bests the second wettest year, 1977, by almost 7" of precipitation.^{4,51}

In Oswego, 1878 remains the second wettest year in a precipitation record that dates to 1844. The

55.83" of precipitation in 1878 fell just 0.14" short of the mark established in 2008. It was also the second wettest year on record in Rochester where 48.81" of precipitation fell. Only 1873 received more precipitation.^{4,51}

Precipitation totals for December 1878 include:^{4,51,52,53}

Oswego*	10.49"
Buffalo	8.55"
North Volney	8.35"
Palermo	7.95"
Pulaski	7.89"
Pierrepont Manor	7.19"
Fort Porter	6.65"
Madison Barracks	6.18"
Rochester†	6.17"
Watertown	6.05"

* All-time precipitation record for any month.⁴

† All-time December precipitation record.⁵¹

DATA ANALYSIS

We are fortunate to have an unofficial daily snowfall record from Watertown for the period of Dec. 21-26, 1878. The record was preserved in the *Watertown Daily Times* and maintained by "a friend in the city." The name of the observer, methodology, and observation times for the record is unknown. We can make rough comparisons with the precipitation measurements and snow depth estimates reported by Mr. Eames, the regular weather observer for the *Times*. Comparisons between the available data in Watertown and snowfall/depth estimates by the media suggest that the snowfall record is reliable and of good quality.²¹

Daily snowfall measured at Watertown from December 21-26, 1878, is as follows:²¹

21-22.	16" through morning,
23.	22" (7" overnight, 15" during the day,)
24.	20"
25.	6"
26.	3"
Total	67"

About 1200 on December 24, with heavy snow still falling, Mr. Eames estimated the snow on the level to be nearly three feet deep. That evening, newspapers reported that railroad workers estimated the snow depth in Watertown to be four feet.^{24,35}

At the close of the storm on December 26, Mr. Eames estimated the badly drifted snow cover to average between three and four feet in depth. This was more conservative than estimates of snow depths between four and six feet deep made by other contributors in the same issue of the *Times*. Drifting clearly made discerning an average snow depth difficult. Allowing for settling, the measured snowfall appears to be as reasonable as we could expect given the conditions.⁴¹

The total precipitation for the event, as measured by Mr. Eames, equaled 2.81". This total may include some insignificant snowfall prior to December 21 as daily sums are not available and Eames' articles in the *Times* would often total several days of data in one report. The figure is a reasonable, if not precise,

representation of the storm total per Mr. Eames' rain gauge.⁴¹

Using the precipitation total from Mr. Eames' record, and the snowfall figures printed in the *Times*, we see the storm had a water/snow ratio of about 1:24 at Watertown assuming that both records are fairly accurate and comparable amounts of precipitation fell at both stations. Ratios would have likely been lower in the synoptic snowfall and higher in the lake effect portion of the event.^{21,41}

On December 28, the *Times* updated Eames' record with an additional 0.07" of precipitation that had fallen in the form of snow since December 26. Eames noted that the 2.88" of precipitation represented over five feet in snowfall which was now "compactly settled" with over three feet of snow on the level.⁵³

On December 31, Mr. Eames reported that a total of 3.05" of precipitation had fallen since December 15 and was equivalent to about six feet of total snowfall. These estimated snowfall totals by Eames are in good agreement with the snowfall record from the unnamed observer at Watertown but it must be noted that Eames' estimates may have been influenced by the record of the other observer which was printed in his daily newspaper column.⁴⁷

OSWEGO COUNTY DATA

The evidence suggests there were two centers of heavy snowfall east of Lake Ontario during the lake effect portion of the event from Dec. 23-26, 1878. We find a band of heavy snow centered from Watertown to Carthage, likely running along the north slope of the Tug Hill Plateau, and a second band of heavy snow in northern Oswego County which seems to have been centered over the Pulaski/Sandy Creek area inland to the west slope of Tug Hill.^{27,28}

The large area of snowfall east of Lake Ontario on December 23 may be indicative of lake enhanced snowfall before a transition to pure lake effect. It is also possible two main snow bands may have developed simultaneously to the lee of Lake Ontario on December 23, in contrast to the one narrow plume of heavy snow to the lee of Lake Erie.^{27,28}

Anecdotal accounts suggest the snowfall in northern Oswego County may have been as intense as at Watertown. Longtime weather observer, George Gurley, leaves us some limited information on snowfall in Pulaski. He notes that from June through December 1878 a total of 54.5" of snow fell. The majority of this certainly occurred during the last half of December as little snow fell in the area in November 1878 and prior to December 12. The greater part of the total would have fallen between Dec. 21-26, 1878. Nothing is known of Mr. Gurley's methodology and he notes that he arrived at his snowfall total through a combination of measurement and estimation. I suspect this total should be viewed as conservative.⁵²

We know that the City of Oswego remained well south of the main lake effect bands. The station there reported a mere 0.22" of precipitation for the entire period lasting from the afternoon of December 22 through December 26.⁴

Despite the lack of heavy lake effect snow, the storm was still noteworthy in western and southern Oswego County due to moderate winds blowing and drifting the large body of snow on the ground. Maximum sustained winds ranged from 24 to 27 MPH at Oswego each day from Dec. 22-26, 1878.⁴ While winds in Oswego were not overly impressive, the drifting was sufficient and persistent enough to create blockades. Local papers agreed that the storm had been severe in the area.^{28,35,37,55}

Oswego papers did not estimate the fall or depth of the snow but the *Watertown Re-Union* printed a telegram from Oswego detailing conditions there on the afternoon of December 25:

It is blowing hard and some snow is falling. The snow is fine and drifts in like so much sand. The only way to get out is to dig out. There are not far from four feet of snow on the level, and it is very cold.⁵⁶

It is difficult to independently verify the accuracy of the snow depth estimate at Oswego. A total of 4.29" of precipitation was measured at the Signal Office from Dec. 12-25, 1878, all in the form of snow, so it is quite likely that over four feet of snow fell at Oswego during this time frame but we have no way to account for the settling of the snow.⁴

The Signal Office measured 24" of snow on the ground at the end of the month which is not an unreasonable amount of settling from the estimated depth on December 25 considering additional snow from Dec. 26-31 amounted to only 0.18" of liquid.⁴

While snowfall/depth figures are uncertain,⁴ it is easy to see how a prolonged period of windy conditions with a heavy accumulation of snow on the ground could make for a rough stretch of winter weather.

The only cooperative station to regularly record snowfall in Oswego County was Palermo, also located south of the area of heavy snow. The snowfall record at Palermo is problematic, however. It appears that consistent methodology wasn't employed and it is obvious that reported snowfall was more indicative of increases in snow depth than daily snowfall. The observer commonly included multiple days of precipitation/snow in a single measurement and it is evident that totals were usually estimated assuming a perfect 1:10 water/snow ratio. It is uncertain if totals were derived by measuring the liquid-equivalent and assuming the snowfall or measuring periodic increases in snow depth and assuming the precipitation. The station's record in December 1868 seems to suggest the latter.⁴

The other central Oswego County station, North Volney, did not regularly report snowfall, and precipitation records are of limited use due to the proclivity of the observer to include several days of precipitation in a single measurement. From December 16-31 the observer at North Volney noted that snow fell on 13 days but made only two precipitation measurements, each totaling a perfect inch of liquid.⁴

Long-time weather observer, Francis Squires, also located in North Volney, reported 40" of snow between December 12-22. Squires also typically included several days in a single measurement and often did not measure accumulating snowfalls.¹⁴

BUFFALO DATA

To the lee of Lake Erie, we have only two official stations to draw data from, both in Buffalo. The one snowfall measurement of 37", from an unknown observer at an unknown location in the city, was sourced from telegraph dispatches that were printed in several regional papers.²⁶

The measurement covers a period of over 54 hours beginning with the commencement of lake effect snow in Buffalo on the afternoon of December 22 and, as stated above, compares favorably with local media reports and the official precipitation total from the Signal Office for the corresponding period.^{4,26,33}

The 4.23" of precipitation measured at the Buffalo Signal Office is considerably more than what was reported by the *Times* observer in Watertown. I would caution against using precipitation data to make direct comparisons between snowfall in Buffalo and Watertown, however, as we have no information on the exposure of Mr. Eames' rain gauge. Since we lack wind data from Watertown, we can only speculate as to how much that factor contributed to the compacting of the snow there as compared to Buffalo. Based on reported snow depths, the storm appears to have been of similar magnitude in both cities.^{4,33,41}

SNOW COVER

The official weather forms in 1878 included a line on which to note snow depth at the month's end. This is very useful to us as it is the only measured snowfall data from the official stations that otherwise did not maintain snowfall records at the time. It is of particular importance to this period as it was to be a major factor in the next big storm that affected the region in the winter of 1878/79.⁴

Snow depths on December 31, 1878, include:^{4,49}

Watertown	36"+
Buffalo	36"
Palermo	30"
North Volney	28"
Oswego	24"
Rochester	4"

The form used by the observer at Madison Barracks did not have a line for snow depth at the month's end but the observer did record the depth on the ground on December 29, 1878. Notably, only 10" of snow cover was measured there that day. By all accounts, the immediate northeast Lake Ontario shoreline was heavily impacted by high winds so it is unclear how representative the snow cover at the Sackets Harbor station would have been of the general area.⁴

THE NOR' EASTER

January 2, 1879, the entire Utica and Black River Railroad was open for business, excepting the Sackets Harbor Branch. Things were more hit and miss on the Rome, Watertown & Ogdensburg Railroad. The line had been cleared from Rome to Richland but remained snow-bound between Richland to a few miles south of Watertown. The whole day and night prior, a snowplow and four engines removed snow from the line north of Watertown but made it only a mile and a half passed Sanford's Corners in Calcium. Work had not yet begun between Watertown and Cape Vincent. The snow had drifted badly on the Cape Vincent Line and the wind packed it densely.¹²

Snow removal efforts got set back significantly that day. A nor' easter impacted portions of the US East Coast and the Canadian Maritimes while a trough in the jet stream brought frigid air to the Midwest. New York's Lake Region found itself in an area of high winds as two low pressure centers merged.^{4,57,58}

At 0100 on January 2, low pressure centered over Lake Huron as a weaker low moved north along the Atlantic Coast off of Norfolk, Virginia. By 0735 the area of low pressure over Lake Huron had moved east and was now north of Lake Ontario. The low-pressure centers over the Great Lakes and the Atlantic appear to have merged into a single closed low centered off Massachusetts at 1635. The pressure gradient resulted in high winds over New York State as the barometer in Boston dropped to 29.04"/983 mb by 2100.⁴

Snow began falling at 0120 on January 2 in Buffalo. The temperature dipped from an early high of 26° into the single digits as the day progressed. Fort Porter reported a reading of -5° at 2100 while the Signal Office noted a low of 4° was noted for the day.⁴

The cyclone intensified on January 3 and gale winds occurred from Virginia to Maine. The storm moved slowly northeastward, centering near Eastport, Maine, at 0735. The pressure at the core now stood near 28.60"/969 mb. Meanwhile, a strong high-pressure system over the central plains fed cold air and northwest winds into the Midwest. The barometer in Eastport bottomed out at 28.49"/965 mb at 1400 on the January 3. The storm center had barely moved by 1635.⁴

At 0735 on January 4, the storm center resided near Halifax, Nova Scotia, with the barometer at 28.59"/968 mb. The cyclone continued to impact the Northeast with high winds as it moved out of the Maritimes on the afternoon of January 4.⁴

The trough plunged deep into the South. Sleet fell at Pensacola and Jacksonville, Florida, and also in New Orleans. Snow whitened the ground as far south as Dupont, Georgia. and Mobile, Alabama. Heavy snow accumulated in parts of Louisiana and Texas.^{59,60}

LOCAL IMPACTS

Snow fell at intervals across the Lake Region from January 2-5, 1879. The snow was generally light to moderate but three days of high winds, coupled with the new snowfall and deep accumulations from the December storms, resulted in a historic period of near-blizzard conditions.

Maximum sustained wind speeds from January 2-4, 1879, include:⁴

STATION	JANUARY 2	JANUARY 3	JANUARY 4
BUFFALO	34 MPH SW	38 MPH SW	32 MPH SW
OSWEGO	32 MPH W	32 MPH W	27 MPH W
ROCHESTER	32 MPH W	32 MPH W	24 MPH W

On the afternoon of January 2, a snowplow and locomotive clearing the Midland road between Oswego and Fulton were found to have blood on the plow after reaching Fulton. Railroad workers ascertained that there had been an accident and backtracked the train for a mile where they found the 75-year-old Mr. Eddy whose leg had been cut off by the plow. The man could neither see nor hear the approaching train while walking the tracks in the blinding storm. He later died from his injuries.^{61,62}

The *Daily Palladium* carried the following account of the conditions in Oswego on January 3, 1879:

The hope inspired when the storm lulled yesterday afternoon [Jan. 2, 1879] was delusive, and before nightfall its fury was redoubled. We despair of properly picturing the gale of snow and wind which raged throughout the night and still continues with almost tireless fury. It is enough to say that few persons can name the day and date of its equal. We have been often snow bound, but since we knew the town, it seems to us never so completely before.

There are literal mountains of snow everywhere. Streets are blockaded and sidewalks abandoned. There are but few streets in town where a horse can be driven at all, and there is almost a complete suspension of business.

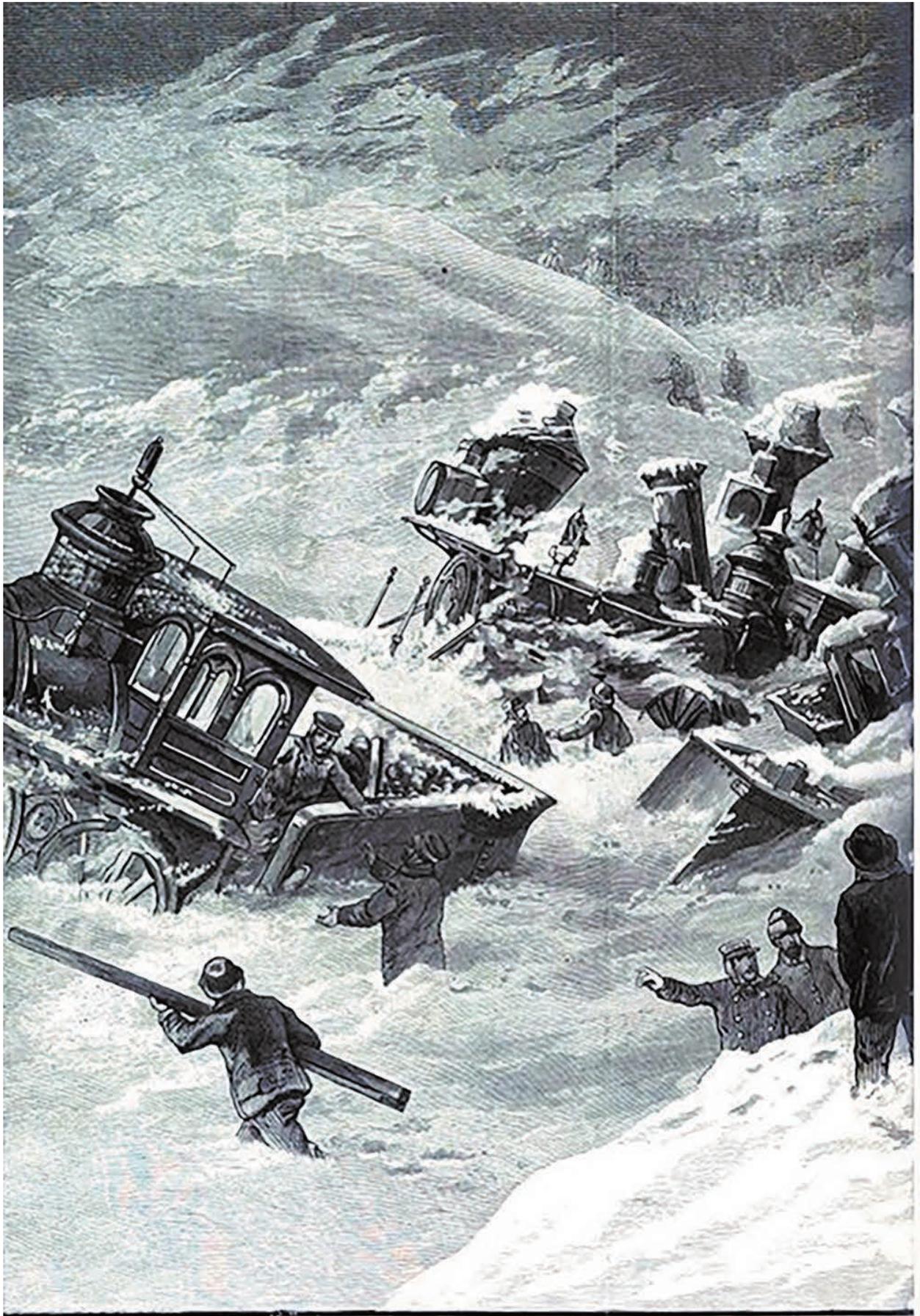
Since yesterday afternoon there has been no attempt to keep up railroad communication, and over the various lines leading from the city the snow lies, a dreary and unbroken waste, with every trace of railways obliterated except the telegraph poles, which mark like tombstones the roads that used to be. On every railroad lies one or more stalled trains, and unless the storm soon lets up, the condition of these storm bound travelers will be far from happy.⁶³

January 3 featured the highest winds and coldest mean temperatures during the event. Buffalo reported a high of 12° and a low of 3°. Readings were only a degree warmer in Sackets Harbor.⁴ Unofficial reports from Mayfield, Chautauqua County, put the temperature there as low as -16°.⁶⁴

THE WRECK AT THE SAND CUT

At 1700, Friday, January 3, the *St. Louis Express*, a train of three sleeping coaches, two passenger cars and three mail, express, and baggage cars, followed by a caboose and pulled by eight engines with a "monster plow," left Rochester. It made it a half mile past the "Sand Cut", two and a half miles west of Fairport, before striking a snowdrift at the rate of 14 to 15 mph. All eight engines were thrown from the tracks and "scattered in all directions." Drifting snow covered the train almost immediately.^{65,66,67,68}

The following sketches depicting the wreck at the Sand Cut appeared in *Frank Leslie's Illustrated Newspaper*, Jan. 24, 1879, pp 386-387.



NEW YORK.—THE GREAT SNOW-STORM OF JANUARY 2d TO 6th.—SCENE AT THE SAND CUT NEAR FAIRPORT
FROM SKETCHES BY TRO



THE WRACKING OF THE ENGINES OF THE ATLANTIC EXPRESS AND THE RELIEF TRAIN, JANUARY 1900.
— THE PAGE 178.

The three men in lead engine No. 478, Clark Brundage, engineer, Harry Condover, fireman, and D.W. Clough, trackmaster, were all thrown from the train. Brundage suffered internal injuries and his legs below the knees were "torn to strings." His face was badly cut and bruised. He succumbed to his injuries three hours later. Mr. Condover sustained severe injuries to his ribs and leg, the latter requiring amputation. He also later died from his injuries. Mr. Clough received multiple injuries including his left leg being broken in three places. James McCarthy, the driver of another engine, No. 127, which "lay on her side 1500 feet down the track," suffered a broken arm. His fireman, Robert Moyer, escaped the wreck with only some fractures.^{65,66,67,68}

Another conductor, a Mr. Burns, walked to Fairport to seek help. Several men returned to the scene of the accident with sleighs to transport the injured to medical aid.^{65,66,67,68}

The next morning, eight locomotives were sent to the site but failed to reach the wreck before they were also stalled in the snow at the Rock Cut. Three of them derailed. Another five engines were then sent to join the battle. After working all day in an attempt to free the original eight locomotives, the rescue party pushed on with one engine and a team of 45 shovelers.^{65,66,67,68}

That night, the cars at the accident were freed from the snow and drawn out. On Sunday morning they began the return trip to Rochester with the snow-bound passengers. The going was difficult, the drifts they shoveled through the day before had filled back in. Another twelve locomotives left Rochester along with 300 men to help free the engines still stranded at the Rock Cut. At 1700 on Sunday, January 5, the ill-fated procession finally made it the seven miles back to Rochester. The passengers remained comfortable throughout their detention, the wood boxes having been filled sufficiently to provide heat for the duration.^{65,66,67,68}

According to the *Daily Morning News*, Superintendent Burrows attempted to prevent the disastrous journey before the train ever left Rochester for Fairport. He was overruled by his superiors.⁶⁹

THE WRECK AT CANASTOTA

That afternoon, another accident near Canastota, Madison County, injured 5 railroad men and derailed several cars. The express and mail cars were thrown down an embankment and caught fire.⁷⁰

The hand of Express Messenger George H. Butts was pinned under the car as it caught fire. Butts reportedly cried out, "Save me or kill me! Don't let me burn alive!" The railroad men and passengers worked heroically in the raging storm to free him. As flames engulfed the car and the situation seemed hopeless, Conductor Snyder drew his knife with the intent of amputating Mr. Butts' hand. At the last moment, the rescuers forced an iron bar under the car and freed the injured man whose hand had been nearly severed off from the accident.⁷¹

THE STORM CONTINUES

By January 4, the situation had not improved. In Oswego County, supplies of firewood ran low at Sandy Creek and Pulaski. Drifts ranged from 15 to 20 feet deep at several points in the county.^{72,73}

Besides the obvious problems of freeing stranded trains, railroad companies had to deal with the logistics of keeping large shovel gangs working across the countryside and the issue of passengers being snowbound, often without sufficient food or fuel for the stay. Able-bodied men, who left the passenger cars to walk to town with the news, brought back food provided by station agents in some instances. On the morning of January 4, it became necessary for railroad employees to provide breakfast to a shovel gang of 97 who had been working near Attica with nothing to eat since the day prior.⁶⁹

When coal fires could not be kept burning in the stalled trains due to insufficient draft, wood had to be

procured to keep the fires going. This was accomplished with great difficulty. In the open fields, fences and cowsheds were scavenged for fuel.⁶⁹

Telegraph dispatches on January 4 give us a picture of some of the snow depths and conditions around northern New York. The storm was still in progress when these totals were estimated. In northern Jefferson County, Cape Vincent had about two and a half feet of snow on the level, high west winds, and heavy snowfall. Clayton reported snow falling with three feet on the level. To the northeast, in St. Lawrence County, the wind in Ogdensburg blew from the northwest under cloudy skies. The snow depth had not exceeded 15" there.⁷³ In the traditional snowbelt of Oswego County, Richland reported six feet of snow on the level at this point and it was "storming with terrible force."^{53,72}

In northern Onondaga County, a couple of miles south of Brewerton, 35 passengers rode out the storm in a train as the snow drifted in around them faster than it could be shoveled out. There was nothing to do but wait. Local farmers tended to them and provided the travelers with food.⁷²

An anonymous passenger, snowbound in Brewerton with little better to do with their time, penned a poem about the ordeal.⁷⁵

Tw'as out upon the Northern Road,
The train got stuck in snow,
The evil one was 'round and showed,
How hard the wind could blow.

It blew the snow upon the track,
Some ten feet deep or less,
Then satan bro't more on his back,
And dumped it on the rest.

The section men, all cold and soaked,
Could not attack the snow,
But in their bunks serenely smoked,
And listened to the blow.

The farmer and his wife, near by,
To show they were well bred,
Well bread and buttered us, and pie,
And doughnuts round us shed.

The tall conductor did his best,
To smooth the way so rough,
But still his best, like all the rest,
Lord knows was bad enough.

The passengers, each one and all,
Prayed for the storm to bate,
Yet cheerful watched the fleecy fall,
And chuckled o'er their fate.

The ladies, bless each tender heart,
Did all they could to cheer,
And woman fully did her part,
To make the way less drear.

With pleasant smiles and cheerful song,
Which shows the woman's heart,
They helped the weary time along,
With woman's tender art.⁷⁵

The situation was by no means unique. Hundreds of travelers across the region were snowbound in stalled trains. Papers filled their columns with stories of men making dangerous journeys into town, walking several miles from stranded trains, and families penned up in the farmhouses of strangers.^{64,72,73,74}

On January 5, the storm finally abated. The wind speed decreased considerably from the speeds of the three days prior and the persistent snows came to an end.⁴

CONDITIONS IN PULASKI

The preexisting conditions from the big December snowfall exacerbated the storm's impact on northern Oswego County. *The Pulaski Democrat* leaves us the following account of conditions in that village:

A second edition of the great snow blockade narrated in the Democrat of two weeks since, began on Thursday last [Jan. 2, 1879] and continued with scarcely an intermission until Saturday night. [Jan. 4-5, 1879]

The railroad companies which had been running trains through snow sided canals of from one to fifteen feet in depth, were instantly blocked and suspended operations entirely, almost from the first. Business men who "positively couldn't wait," were forced to stop wherever they were and stride up and down like caged animals sighing for freedom. Bridegrooms with blushing girls waiting their coming, postponed the wedding indefinitely or started off on foot only to bring up at some farm house, and there remain more snugly entrapped than ever. Sorrowing friends with a dying mother, father, or near and dear relative wishing to see them, were compelled to see the snow drift up higher and harder, with a constantly lessening prospect of release.

Even the dead were unburied for days. Yes, it was a hard storm, and none of our inhabitants have ever seen its like in duration or the heavy fall of snow accompanying it. Many of our dealers seeing it was impossible for customers to venture abroad, closed their stores and remained at home the greater part of the time.

The howling wind and driving snow combined made many fantastic heaps and contorted figures in nooks and corners—wherever an eddy could be formed. Fantastic and amusing they were to look upon, but when a giant mountain was stationed directly over and against one's door or window, or completely covered the wood pile or well-pump ten feet under the "beautiful" the points presented were more practical than poetical.

While there were but few if any who really suffered for food, very many Pulaski families were destitute of wood and some even went without fires for a time.

The storm was of great extent, and thus what was true of our own village and town was paralleled by the condition of neighboring villages and hamlets.⁷³

CONDITIONS IN WESTFIELD

There were no official weather stations in the traditional Lake Erie snowbelt during the winter of 1878/79 and information pertaining to precipitation/snowfall amounts in southwest New York is scarce. Newspaper reports indicate there to have been about three feet of snow on the ground between Sherman and Brocton in late December 1878.⁷⁶

The Lake Erie shoreline drifted badly from Buffalo to Erie, Pennsylvania, and the storm was severe along the lakeshore of Chautauqua County.⁷⁷

The following account of the event is preserved in the *Westfield Republican*. The conditions observed at Westfield were likely representative of surrounding areas near the Lake Erie shoreline:

The last storm had scarcely got past, and its effects were yet felt in the blockading of freight on the railroads, when a second of even greater severity was upon us. On Thursday morning, [Jan. 2, 1879] following the exceptionally fine New Year's day, the wind from the west began blowing a gale, and the mercury went down to zero. The storm continued without abatement during Thursday and Thursday night. Friday the only change was in lower temperature, the mercury indicating from 8 to 14 below zero, the latter being on the side hill, the wind still howling from the west.

All business was suspended, and every one in the track of the tornado gave himself to keeping warm. The railroads were completely blockaded. A few trains got through on Thursday, but on Friday everything on the Lake Shore, N. Y. Central, and the Cross roads was abandoned. Many stock trains were caught in the storm, and the freezing cattle were turned loose in the snow beside the track, or an attempt was made to feed them on board the cars, which was almost an impossibility. The cattle on a stock train blockaded at Brocton were turned loose Saturday morning, after standing nearly two whole days in the piercing wind.

Saturday morning the air was filled with snow, and there was no abatement in the force of the wind, but the mercury indicated 16 degrees better than on the previous morning, being 8 above zero.

A snow plow driven by two engines left Erie, but at North East the plow and one of the engines left the track. The Cross Cut road was blocked. Towards night it began to grow warmer, and the indications were that the fiercest of the storm was passed.

Sunday morning [Jan. 5, 1879] there was a fresh fall of snow, with the west wind still blowing, but not with the force of the previous days. The snow plows were out at an early hour opening the walks, and had the avenues of locomotion been opened, it would have passed for a comfortable winter day, with the mercury ranging from 14 to 18 above zero.⁶³

Precipitation totals for the observation days of January 2-5, 1879, include:⁴

Rochester	2.65"
Buffalo	1.30"
Palermo	0.90"
Fort Porter	0.76"
Oswego	0.61"
Pierrepoint Manor	0.52"
Madison Barracks	0.25"
Fort Niagara	0.04"

AFTERMATH

Between the synoptic snowstorm of December 20-22, 1878, and the January 2-5, 1879, event, a decent snowpack built up in central and northern New York even outside the traditional snowbelt. The snow was said to be "almost waist deep"⁵⁹ in Syracuse with drifts ranging from three to ten feet in height.⁷¹ During the snow, there was a period with an electrical storm that interfered with the telegraphs in Syracuse.⁷⁸ Great depths of snow covered the countryside of Madison County.⁷⁹

Well north of the influence of Lake Ontario, the editor of the *Courier and Freeman* claimed the snow in Potsdam to be as deep as ever known, two and a half to three feet on the level. Further south, up the Raquette River, snow depths increased to between three and three and a half feet.⁸⁰

To the lee of Lake Erie conditions were worse. At Akron, Erie County, the snow lay so deep that no fences were visible for miles around the village.⁸¹

Snow on the railroad tracks ranged from zero to 10 feet deep all the way from Silver Creek, Chautauqua County, to Angola, Erie County, a testament to the strong winds and drifting.⁷⁷

Livestock suffered considerably and some perished on trains across western New York. Cattle were left at a train yard in Rochester for four or five days without anything to drink when transporting them became impossible.⁶⁶ 287 head of cattle, save one that was trampled while down and froze, were unloaded and turned loose into Lee's woods near Silver Creek on the night of January 2-3. On the night of January 5-6, they were loaded on the cars again. A Mr. A. Horton supplied them with four and a half tons of hay.⁷⁷

Southeast of Lake Ontario, drifting had been particularly severe between Hannibal and Oswego. Two men walked the rail line between the towns on January 5, following the tracks wherever possible. They reported the snow on the tracks themselves as 2 to 15 feet deep and estimated only two miles of the twelve-mile stretch could be cleared by an engine. The rest would have to be shoveled by hand. They reported the cuts as "chock full and solid as old rock."⁶⁰

A locomotive stranded on the line near Hannibal had run out of wood and water. Railroad men kept it alive by tearing down the fence along the tracks to feed the furnace and shoveling snow into the water tank. Another nearby engine also required melted snow for water.⁶⁰

Severe weather impacted much of the East Coast and Upper Midwest and several people across the nation froze to death. Icy rivers in New York City caused ferries to shut down.^{76,82}

CLEANUP

On January 6, school resumed at Rochester but with light attendance as many students, teachers, and some principals were snowbound out of town. At school No. 8, no class was held as the windows had been broken during the storm and the building half filled with snow.⁶⁸

Rochester's former City Assessor, Mr. Ebenezer T. Oatley, dropped dead of a heart attack while shoveling his walk that morning.⁶⁵

Snow removal efforts on the railroads were in full swing. The Lakeshore Road was opened from Cleveland to Buffalo as were the Dansville and Rochester branches of the Erie Railroad.⁶⁸

The Central Road, however, remained closed from Buffalo to Rochester. Some 2000 to 3000 men, in addition to the railroad employees, were engaged in snow removal on the Central. Superintendent Burrows himself purportedly worked nearly five days without sleep, manning an engine and snowplow overnight.^{67,68} Drifts between Syracuse and Rochester reached 20 feet in height in some places.⁸³

On the NY&P, 350 men worked to clear the badly blocked tracks near Aurora. Meanwhile, nearly 4000 cars remained snowbound between Syracuse and Buffalo.^{68,84}

The day brought more accidents and tragedy. On the morning of January 6, a snow plow and four

locomotives were thrown down an embankment some three or four miles west of Batavia on the Central Road when the train hit a solid snowdrift. Several people were injured, three of them seriously.⁶⁸

The steam of the broken boiler badly scalded engineer Samuel Cooper. Fireman Thomas Lawless suffered internal injuries and his leg was crushed between the machinery, splintering the bones. Lawless could only be extracted by having his leg amputated at the knee by surgeons that were summoned to the wreck. He succumbed to his injuries later that day.⁶⁸

Shortly before noon, a pair of locomotives were thrown from the tracks when they struck a drift about two and a half miles west of Avon, Livingston County, on the Attica Division. One of the locomotives wrecked badly.⁶⁸

Charles Downs, of Scriba, Oswego County, found it impossible to drive his cattle to water over the drifts and tunneled through them to water his stock.⁸⁵

The Village of Sand Bank (now Altmar) ran out of kerosene during the storm and had no lights for several days.³⁶

News from the Village of Phoenix reported the banks of the Oswego River were swollen. A dispatch from Phoenix stated: "The dam is not to be seen—there is not a ripple to indicate its location. This is unprecedented. The mills are at a stand still."⁶⁰

In Richland Junction, the little hamlet could not handle the number of stranded travelers. The three small hotels and six houses of the hamlet filled up and 40 or 50 other travelers had to make do in the coaches. Railroad hands worked in relay teams, running firewood in baskets to five engines in a desperate attempt to keep them "alive." Meanwhile, other workers spent the day shoveling snow into the water tanks.⁶⁰

Hotel managers that cheerfully provided food and shelter the first day of the storm, now faced with the reality that their unprepared guests could be with them for several days, had become unwilling to feed travelers who had run out of money. Several people found themselves at the mercy of strangers, being unable to pay for room and board.⁶⁰

On the morning of Monday, January 6, two men were sent from Fulton to Oswego with mail pouches to collect newspapers and gather any information they could. Fulton had been completely cut off from outside news since Thursday, January 2. The men traveled the 10 miles with great difficulty and arrived in Oswego at 1000 and hung out in the city until the *Palladium* finished printing the daily news.⁶⁰

Snow removal work that had started the day before continued on January 6 and 7. Over 100 men working north from Syracuse, and another 250 shoveling south from Oswego, worked to reconnect the two cities. Trackmaster Murphy reported the entire line from Oswego to Syracuse would have to be hand shoveled.^{60,85,86,87}

On January 6, *The Syracuse Daily Courier* raised concerns, shared by many other regional editors, about the political ramifications of the storm. With several members of the State Legislature from northern and western districts being unable to reach Albany in time for the scheduled vote, there were worries that Thomas G. Alvord's bid for Speaker of the Assembly would be endangered. The paper supported the Onondaga County Republican and suggested his allies in Albany give long-winded speeches to buy time until his supporters from the snowbound districts could arrive.⁵⁹

No filibuster was necessary as the vote was delayed to give legislators from the Lake Region a chance to make it to Albany. Alvord defeated George B. Sloan and was elected to serve his third term as Speaker on January 8, 1879.^{79,88}

The same day, the blockade between Syracuse and Oswego on the DL&W was lifted.⁷⁸

The area that suffered the most drifting on the Erie Line, according to the *Buffalo Morning Express*, that between Avon and Attica, was successfully cleared on January 9.⁸⁹

Drifting had been particularly extensive just west of Le Roy, Genesee County. One drift there, squarely

on the tracks, averaged 18 feet in height, and extended down the tracks for a distance of 660 feet.⁸⁹

A synoptic storm centered over Pennsylvania and eastern New York produced minor snowfall in central and north-central New York on January 9. Fresh drifting on the railroads hampered cleanup efforts more than the light snows.^{4,36}

On January 13, for the first time since before Christmas, the entire length of the beleaguered Rome, Watertown & Ogdensburg Railroad was open for travel.⁹⁰

DATA ANALYSIS

With the notable exception of Rochester, precipitation from Jan. 2-5, 1879, was not particularly impressive by local standards. The 2.65" of precipitation reported in Rochester for the storm period is an outlier in the available data. It is more than double the next highest official precipitation total in the region reported in Buffalo.⁴

Lacking snowfall or snow depth information from Rochester, it is impossible to determine if the measured precipitation was representative of the actual conditions or if the rain gauge overreported due to drifting snow. I do find support for the higher precipitation total in Rochester from Brockport, also in Monroe County, about 19 miles to the west. The *Republic* reported:

During the previous storm the snow in this section fell to the depth of about one foot. During the last storm probably not to exceed eighteen inches more was added to the previous stock, making the total depth about two feet and a half. This was not an extraordinary depth of snow, had it laid on a level but the furious winds piled it up on the sidewalks, and wherever it could find a resting place.⁷⁴

The *Republic's* estimate of 18" of snow during the storm period, which of course would not account for any settling of the snow, suggests that Monroe County may have been near the center of the heaviest precipitation or that there may have been significant lake enhancement along the south shore of Lake Ontario.⁷⁴

The low temperatures and likely lake enhanced nature of the snow to the lee of the lakes would suggest that the snow was probably low density. This is supported by reports from Syracuse that characterized the snow as light and fluffy.⁹¹ The assumption that the snow was low density is not supported by the official record at Palermo, however. Palermo was the only cooperative station in the snowbelt regions to have both snowfall and precipitation data and from the figures recorded there I derive a water/snow ratio of about 1:10. Problems with the methodology employed at Palermo are noted in the data analysis section from the earlier December storm.⁴

The only cooperative stations in the Eastern Lake Ontario Region to measure snowfall were Palermo, which reported 9 $\frac{1}{4}$ " of new snow in the storm,⁴ and Cape Vincent which measured 7". Looking beyond the lee of the lakes, Nile, in Allegany County, reported 3" of snow and Penn Yan, in Yates County, totaled 6" of snow with a very suspect 0.06" of precipitation. The heaviest precipitation total reported east of Lake Ontario was probably from North Volney where the cooperative observer noted 1.30" of precipitation through January 6. This total includes some minor snowfall that occurred on January 6.⁴ North Volney's private observer, Francis Squires, made no snowfall measurements.¹⁴

It's easy to see that the severity of the January storm was not due to the fall of snow itself but to the drifting, blockades, and prolonged isolation which was only briefly interrupted for a period of two weeks.⁴

The January 9, 1879, edition of *The Pulaski Democrat* printed an assessment of the conditions on January 4 during the ongoing storm. Details were sussed from dispatches around the county:

At all points in Oswego County snow is reported six feet on the level and from fifteen to twenty in drifts.⁷³

While average snow depths of six feet may have been representative of conditions in Pulaski and northern Oswego County in general, average depths were almost certainly lower in other sections of the county. Assuming the 24" of snow cover measured at the Oswego Signal Office on January 31 to be representative of the city overall, and the precipitation total reasonably accurate, it seems unlikely that average snow depths could have much exceeded three feet in the village. Taking the Palermo data at face value, average snow depth there must have been less than 40" following the storm.⁴

Telegraph dispatches originating from Oswego did indeed put average snow depths as high as five to six feet but I strongly suspect that these numbers were exaggerated from drifting and not representative of snow "on the level."⁷⁴ Other dispatches from Oswego noted the snow four feet deep in the surrounding countryside, rather than in town, on January 3, 1879, which is probably closer to reality. The local papers themselves made no estimates of the snowfall or depth.⁴⁰

Mexico, Oswego County, also reported four feet of snow on the level,^{15,92} as did Belleville, southern Jefferson County.⁹³ Those totals are probably reasonably representative of depths in the Lake Ontario snowbelt outside the area of heavier snow in northern Oswego County and the western Tug Hill. The lowest temperatures, and likely most extreme wind chills, in the region occurred in southwest New York which found itself closest to the core of the cold air.^{4,64}

Several editors and railroad men considered the conditions to be the most severe since the winter of 1855/56,^{64,92,94} some thought it worse.^{72,85}

1. *Buffalo Morning Express*, Dec. 9, 1878, p 1,
2. *The Evening Republic*, (Buffalo, NY,) Dec. 11, 1878, p 2,
Quoting the *Jamestown Democrat*, of Dec. 9, 1878,
3. *Buffalo Morning Express*, Dec. 12, 1878, p 1,
4. EV2, Forts, Cooperative Observations, Daily Weather Maps,

See daily War Department weather maps for Dec. 9-11, 1878, Jan. 2-4, 1879, and Jan. 9, 1879.

All wind speeds corrected in accordance with Weather Bureau Instruction No. 14, Dec. 18, 1931.

5. *The Oswego Daily Palladium*, Dec. 11, 1878, p 4,
6. *Oswego Morning Herald*, Dec. 12, 1878, p 1,
7. *The Oswego Daily Palladium*, Dec. 12, 1878, p 4,
8. *The Mexico Independent*, Dec. 18, 1878, p 4,
9. *The Pulaski Democrat*, Dec. 18, 1878, pp 2,3,
10. *The Pulaski Democrat*, Dec. 26, 1878, p 3,
11. *The Lowville Times*, Dec. 19, 1878, p 3,
12. *The Watertown Re-Union*, Jan. 2, 1879, pp 3,5,8,
13. *Watertown Daily Times*, Dec. 11, 1878, p 3,

Watertown precipitation data is from the weather record of Moses Eames, observer for the *Times*.

14. Francis Squires Diaries, Half-Shire Historical Society, Richland, NY, and New Haven Historical Society, New Haven, NY,
15. Sykes, R. B., Jr. (1972). Oswego's Tardy, Tough Winter of 1971-72. *Weatherwise*, 25:6, 276-283.
Quoting a letter from Mexico, NY, in *The Country Gentleman*, (Albany, NY,) Feb. 6, 1879,
16. *The Oswego Daily Palladium*, Dec. 18, 1878, p 4,
17. *Watertown Daily Times*, Dec. 20, 1878, p 3,
18. *Watertown Daily Times*, Dec. 21, 1878, p 3,

19. *Lewis County Democrat*, (Lowville, NY,) Jan. 8, 1879, p 3,
The Watertown Re-Union (Jan. 9, 1879, p 5,) attributed deaths in Lewis County to "black tongue," a claim the *Democrat* refuted. Papers reported scarlet and yellow fever outbreaks across the state.
20. *Fairport Herald*, Dec. 27, 1878, p 3,
21. *Watertown Daily Times*, Dec. 27, 1878, p 3,
22. *Lewis County Democrat*, Dec. 25, 1878, p 3,
23. *The Lowville Times*, Dec. 26, 1878, pp 2,3,
24. *Watertown Daily Times*, Dec. 24, 1878, pp 2,3,
25. *The Buffalo Daily Courier*, Dec. 23, 1878, p 3,
26. *The Syracuse Daily Courier*, Dec. 25, 1878, p 1,
27. *Watertown Daily Times*, Dec. 23, 1878, p 3,
28. *The Oswego Daily Palladium*, Dec. 23, 1878, pp 1,4,
29. *Westfield Republican*, Dec. 25, 1878, p 2,
30. *The Evening Republic*, Dec. 26, 1878, pp 1-4,
31. *The Evening Republic*, Dec. 28, 1878, p 3,
32. *The Evening Republic*, Jan. 9, 1879, p 2,
33. *The Buffalo Daily Courier*, Dec. 25, 1878, p 2,
34. *The Evening Republic*, Dec. 24, 1878, pp 1,3,
35. *Oswego Morning Herald*, Dec. 25, 1878, pp 1,4,
36. *The Oswego Daily Palladium*, Jan. 10, 1879, pp 2,4
37. *The Oswego Daily Palladium*, Dec. 26, 1878, p 4,
38. *The Oswego Daily Palladium*, Dec. 27, 1878, p 4,
39. *Syracuse Daily Courier*, Dec. 27, 1878, p 1,
40. *Watertown Daily Times*, Jan. 3, 1879, p 3,
41. *Watertown Daily Times*, Dec. 26, 1878, p 3,
42. *The Pulaski Democrat*, Jan. 2, 1879, p 2,3,
 Also quoting the *Ogdensburg Journal* of Dec. 28, 1878,
43. *Lowville Times*, Jan. 2, 1879, p 3,
44. *Lewis County Democrat*, Jan. 1, 1879, p 3,
45. *Silver Creek Local*, Dec. 27, 1878, p 3,
46. *Silver Creek Local*, Jan. 3, 1879, p 3,
47. *Lewis County Democrat*, Jan. 15, 1879, p 3,
48. *Watertown Daily Times*, Dec. 30, 1878, p 3,
49. *Watertown Daily Times*, Dec. 31, 1878, p 3,
50. Singh, D., Seager, R., Cook, B. I., Cane, M., Ting, M., Cook, E., Davis, M. (2018). Climate and the Global Famine of 1876–78. *Journal of Climate*, 31(23), 9445-9467.
51. National Weather Service, Buffalo
https://www.weather.gov/buf/BUF_top10
https://www.weather.gov/buf/ROC_top10, retrieved Nov. 12, 2020,
52. *The Pulaski Democrat*, Jan. 8, 1880, p 3,
 From the weather record of George Gurley,
53. *Watertown Daily Times*, Jan. 4, 1879, p 3,
54. *Watertown Daily Times*, Dec. 28, 1878, p 3,
55. *Oswego Morning Herald*, Dec. 24, 1878, p 4,
56. *The Watertown Re-Union*, Dec. 26, 1878, p 5.
57. *The Oswego Daily Palladium*, Jan. 2, 1879, p 1

58. *The Evening Republic*, Jan. 3, 1879, pp, 1-4,
59. *The Syracuse Daily Courier*, Jan. 6, 1879, pp 1-3,
60. *The Oswego Daily Palladium*, Jan. 6, 1879, pp 1,4,
61. *Oswego Morning Herald*, Jan. 3, 1879, p 4,
62. *Oswego Morning Herald*, Jan. 4, 1879, p 4,
63. *The Oswego Daily Palladium*, Jan. 3, 1879, pp, 1,4,
64. *Westfield Republican*, Jan. 8, 1879, pp 2,3,
65. *Rochester Evening Express*, Jan. 6, 1879, pp 2,3,

Early newspaper reports of the Fairport accident state 6 engines were off the track, later reports indicate 8 engines derailed.

66. *The Herald*, (Fairport, NY,) Jan. 10, 1879, p 3,
The *Herald* account puts the speed of the train at 25 MPH.
67. *Democrat and Chronicle*, (Rochester, NY,) Jan. 6, 1879, p 4,
68. *Democrat and Chronicle*, Jan. 7, 1879, p 4,

The *Democrat and Chronicle* correct erroneous details from their earlier account. Reports originating from Syracuse named the train the *Atlantic Express* instead of the *St. Louis Express* and reported the train to have been struck by another train rather than derailing after running into a snowdrift. (See *Syracuse Daily Courier*, Jan. 6, 1879, p 4, and *The Oswego Daily Palladium*, Jan. 6, 1879, p 1.)

69. *Daily Morning News*, (Batavia, N.Y.) Jan. 5, 1879, pp 1,4,
70. *Syracuse Morning Standard*, Jan. 4, 1879, p 4,
71. *Syracuse Morning Standard*, Jan. 6, 1879, pp 1,4,

Also quoting the *Utica Herald*,

72. *The Oswego Daily Palladium*, Jan. 4, 1879, p 4,
73. *The Pulaski Democrat*, Jan. 9, 1879, p 3,
74. *Brockport Republic*, Jan. 9, 1879, pp 2,3,
75. *Lowville Times*, Jan. 9, 1879, pp 2,3,
76. *Buffalo Morning Express*, Jan. 4, 1879, pp 1-3,
77. *Silver Creek Local*, Jan. 10, 1879, p 3,
78. *The Oswego Daily Palladium*, Jan. 9, 1879, p 1,
Referencing the *Syracuse Herald*,
79. *Cazenovia Republican*, Jan. 9, 1879, pp 2,3,
80. *Potsdam Courier and Freeman*, Jan. 9, 1879, p 3,
81. *Buffalo Morning Express*, Jan. 8, 1879, p 1,
82. *Rochester Democrat and Chronicle*, Jan. 4, 1879, pp 1,4,
83. *The Syracuse Daily Courier*, Jan. 7, 1879, p 4,
84. *Syracuse Morning Standard*, Jan. 7, 1879, p 4,
85. *Oswego Morning Herald*, Jan. 6, 1879, p 4,
86. *The Oswego Daily Palladium*, Jan. 7, 1879, p 4,
87. *Oswego Morning Herald*, Jan. 7, 1879, p 4,
88. *The Herkimer Democrat*, Jan. 8, 1879, p 2,
89. *Buffalo Morning Express*, Jan. 10, 1879, pp 1,2,
90. *Lewis County Democrat*, Jan. 15, 1879, p 3,
91. *Syracuse Daily Courier*, Jan. 3, 1879, p 4,
92. *The Mexico Independent*, Jan. 8, 1879, p 3,
93. *The Watertown Re-Union*, Jan. 9, 1879, p 5,
94. *Buffalo Morning Express*, Jan. 7, 1879, p 1,