National Weather Service, Binghamton, NY

The Nor'easter

Fall/Winter, 2002

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From the WCM

Winter is around the corner in upstate New York and northeast Pennsylvania! This is our first winter season edition of the Nor'easter and we hope you find it interesting and informative. This will also be the first winter season that graphical snowfall forecasts will be available from our web site. "A picture is worth a thousand words". We feel that forecast information and all the complexities that can arise from our complicated weather patterns are better communicated to you through graphics. If you haven't yet seen our graphical forecasts, I encourage you to check them out from our main web page at: **http://www.nws.noaa.gov/er/bgm**

NWS Binghamton is one of three offices in the Eastern Region of the weather service to participate in an experimental grid point forecast program. Our forecasters now prepare their forecasts graphically using a Grid Forecast Editor program. This allows forecasters to generate high resolution graphical forecasts of various parameters. The parameters, such as temperature, are forecast hour-by-hour for every grid point in our area of responsibility. The grid points at this time are 5 km apart. This means that forecasts will vary slightly from one location to another within a county, or even a metropolitan area. On our main web site, you can sample what these high resolution forecasts look like. If you click on any point in central NY or northeast PA on the map that is on our main web site, you get a specific forecast for the nearest grid point. This high resolution forecast gives you forecasts for each point in our area to a 5 km resolution

This past summer season also saw our NOAA weather radio network expand by adding 4 new transmitters to upstate NY. At present, we operate 13 NOAA weather radio transmitters in central NY and northeast PA with most of our population now covered by at least one transmitter.

In order to improve our services to you in the winter season, we have revised our winter storm criteria to better suit your needs. You can find this new criteria inside as well. We also have articles on Finger Lakes Snow bands, a phenomena specific to our region, the great Blizzard of 1961, winter-time flood threats, spotter news, wind chill, winter safety, why winters have been so mild lately and the current winter outlook and winter climatology.

From all of us at the NWS in Binghamton, we wish you a safe and happy winter season!!!

Dave Nicosia
Warning Coordination Meteorologist

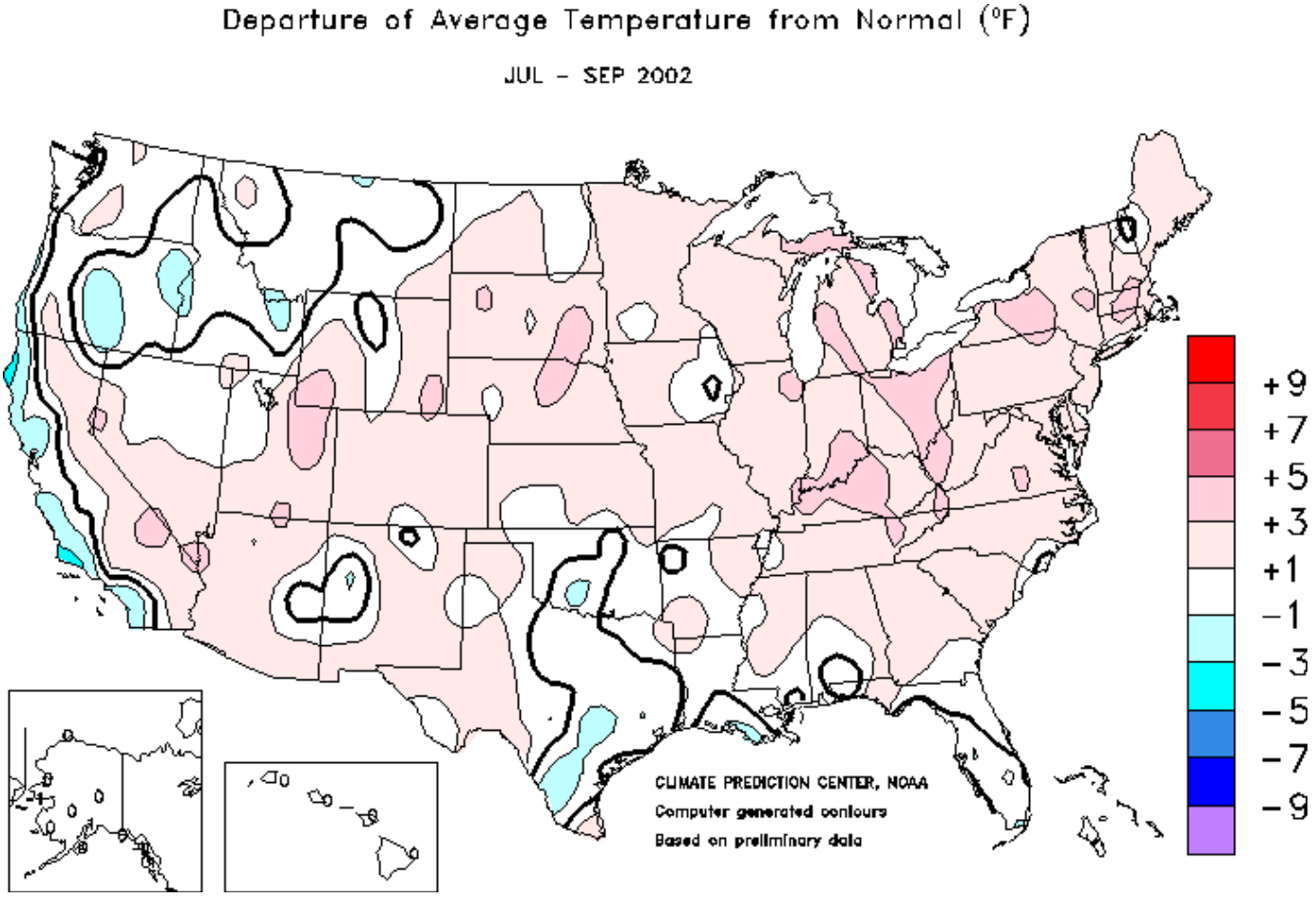
Summer Climate Review

This summer continued the trend of late for having warmer than normal temperatures. For the June through September period, temperatures were warm enough to break into the top five for the last 50 years. For our offices' three major airports, Syracuse was 2nd warmest, while Binghamton and Wilkes-Barre/Scranton both finished 4th warmest. Generally for this period temperatures were two to three degrees above normal for the entire period.

Ninety degree days were also noteworthy. Ninety degree days are days were the high temperature is at least 90 degrees Fahrenheit. Syracuse had 26 - 90 degree days, finishing second to 1955, which had 28. Wilkes-Barre/Scranton had 23 days which was second to the hot summer of 1988 with 27 days. Binghamton was tied for fourth with 8 days. The record year here was also 1988 with 13 days. (The Binghamton airport has fewer 90 degree days than Syracuse and Wilkes-Barre since the airport sits on top of a hill about 800 feet above the city of Binghamton in the valley.)

Rainfall was erratic during the last six months. April was near normal, followed by above normal rainfall in May and June. The spring rainfall made up for the precipitation deficit from the winter. Making the heat worse in July and August was the lack of rain. Most areas received only 3 to 5 inches of rain for these two months. This ended up being 2 to 4 inches below normal. The heat continued into September but the rain finally came the last half of the month. September precipitation ended at or above normal with some areas 3 inches above normal. The rain in September mostly fell in three batches. The first two were on the 15th and 22nd. The last was the 27th with the tropical moisture of Isidore.

Ted Champney, Meteorologist



New Criteria for Winter Weather Warnings and Advisories

As of October 1st, 2002, The National Weather Service in Binghamton implemented new criteria for issuing winter weather warnings and advisories. The new criteria was decided upon after surveys from a group of our customers, which included county emergency management officials. We would like to thank all who participated in this survey, your input was valuable!! Here are the criteria that the NWS in Binghamton will be using this winter.

Winter Storm and Lake Effect Snow Watch/ Warning	Average of 7 or more inches of snow in 12 hours or less (9 inches/24 hours)
Winter Weather and Lake Effect Snow Advisory	Average of 4 or more inches of snow in 12 hours or less
Winter Storm Watch or Warning for Freezing Rain	Accumulation of 1/2 inch of ice or more
Winter Weather Advisory for freezing rain	Any accumulation of ice less than 1/2 inch
Wind Chill Watch or Warning	Wind chill values –25F or less
Wind Chill Advisory	Wind chill values between –15F and –24F
Blizzard Watch/Warning	Sustained or frequent wind gusts of 35 mph or above AND considerable blowing/drifting of snow reducing visibilities below 1/4 mile

Some Terms We Use

Heavy Snow: more than 7 inches/12 hours or 9 inches/24 hours .

Blizzard: the most severe winter storm. Wind or wind gusts exceeding 35 mph for 3 hours or more combined with blowing and/or falling snow. Visibilities near zero. Widespread whiteout conditions. Blizzards are a serious life-threatening weather hazard!

Snow Squall: intense periods of snow with near blizzard or blizzard conditions at times.

Snow Shower: intermittent accumulating snow

Snow Flurries: very light snow with little or no accumulation.

Freezing rain: rain that freezes on contact with all exposed surfaces. Objects become encased in ice, can damage trees and power lines.

Sleet: Frozen raindrops that bounce on impact with the ground. Does NOT glaze over or encase objects with ice.

Joanne LaBounty
Meteorologist

The Outlook for Winter 2002-2003: Another Mild One Expected

The official winter outlook from the National Oceanic and Atmospheric Administration's (NOAA's) Climate Prediction Center was released a few weeks ago and is calling for another mild winter in upstate New York and northeast Pennsylvania. In fact, the northern third of the United States and Alaska is expected to have another mild winter.

There are two reasons that the upcoming winter is expected to be mild. First, there is an El Nino brewing in the tropical Pacific Ocean which is expected to last well into next year. When there is an El Nino, warmer than usual ocean waters exist in the central and eastern tropical Pacific Ocean. This leads to a stronger than normal subtropical jet stream which flows into the United States from the Pacific Ocean. As its name implies, the subtropical jet stream floods the lower 48 states with mild Pacific air displacing the frigid polar jet stream to our north. Therefore, during an El Nino, the majority of our air masses come from the milder Pacific ocean instead of the icy cold Canadian landscape. The current El Nino is not expected to be as strong as the previous one which occurred in 1997-1998. The 1997-1998 El Nino was very strong and brought record warmth across our area that winter. Therefore, there likely will be a few more blasts of cold Canadian air this winter when compared to the winter of 1997-1998.

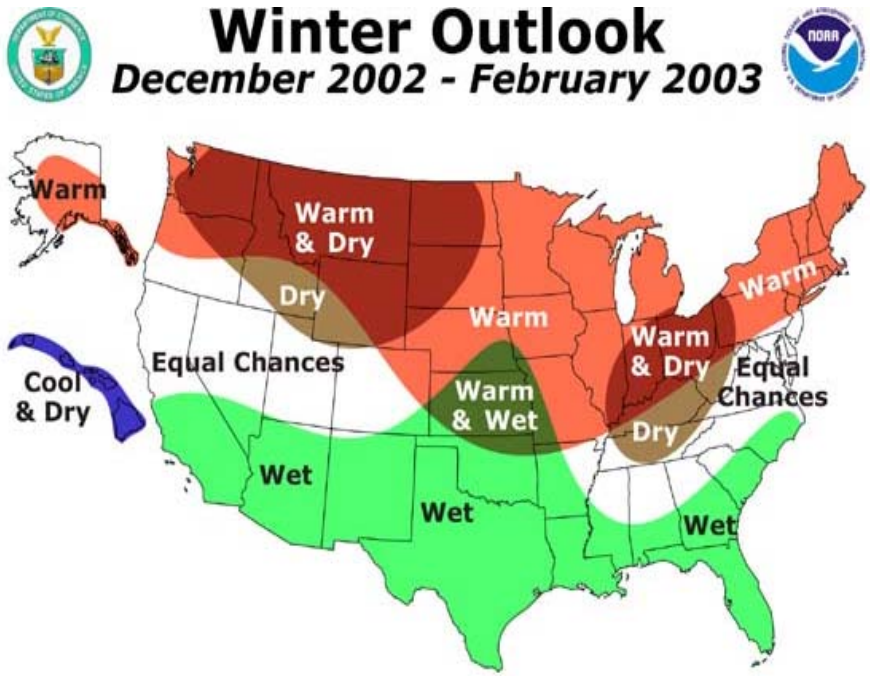
The second reason for the prediction of a mild winter is that the past several winters have been mild. Usually, mild winters occur for several years in a row. Even though a mild winter is expected, this winter will likely not be as mild as last winter, which, in many areas was the warmest winter on record.

What is a "normal" winter in central New York and northeast Pennsylvania? During the "dead" of winter, average high temperatures range from the upper 20s over the higher terrain to the mid 30s in our valleys with nighttime minimum temperatures generally in the teens. A few colder valleys in upstate New York have average minimum temperature in the single digits.

Snowfall varies widely across central New York and northeast Pennsylvania. Average snowfall ranges from over 200 inches in the Tug Hill Plateau, to between 80 and 120 inches in the western Mohawk Valley which includes Syracuse, Utica and Rome. Across the Finger Lakes, western Catskills and Southern Tier of New York, seasonal snowfall averages anywhere from 45 to 90 inches. In northeast Pennsylvania, total seasonal snowfall averages 60 to 80 inches over the Poconos and other higher terrain areas, to between 40 and 60 inches across the rest of this region.

Is there a chance that some severe winter weather with cold and snow will affect our area this winter? The answer to this question is a resounding YES! Even during mild winters, central New York and northeast Pennsylvania can still experience a severe snowstorm or a severe cold air outbreak. For example, the winter of 1992-1993 was generally a mild winter with below normal snowfall...then...the great Blizzard of 1993 hit March 12-14th dumping 2 to 3 feet of snow over the area and dropping temperatures below zero in many areas!

Even though a mild winter is expected, everyone in central New York and northeast Pennsylvania should prepare for the worst. We all know that sudden swings in our weather are common. One week can be mild and snow-less, then, seemingly out of nowhere, a snowstorm drops more than a foot on our region followed by bitter cold winds. This was the case almost three years ago. The first week of January 2000 saw temperatures climb well into the 50s and 60s



Winter Outlook (continued from p. 4)

across the region. There was no snow, and winter seemed to be the farthest thing on anyone's mind. Then, during the second week of January that year, temperatures dropped below zero in many areas and the snow began to pile up. By the end of that month, snow depths reached up to 2 feet in spots with temperatures struggling to get out of the teens. Many nights saw temperatures below zero. What a contrast! The first half of the month had temperatures average 10 to 15 degrees above normal, while the second half of the month saw average temperatures about 15 degrees below normal...a 25 to 30 degree shift! So this winter don't let Mother Nature catch you by surprise.

The official NOAA winter outlook can be found at the following web page:
http://www.noaanews.noaa.gov/stories/s997.htm

Dave Nicosia
Warning Coordination Meteorologist

Winter Weather Safety

There's one thing that's a sure bet when it comes to winter in central New York and northeast Pennsylvania. You can bet that it will be changeable. The latest long range forecasts predict a warm and dry winter, but that doesn't mean there won't be stormy periods and all the dangers that come with them.

Before winter begins, do a quick inventory to be sure you have all you need in case a major storm strikes. Make sure you have a working flashlight and a supply of batteries. If you don't have a battery operated NOAA Weather Radio, get one. It will be your link to outside information and forecasts should you lose power. You may wish to purchase, or have installed, an emergency heating source, such as a fireplace, wood stove, or space heater. Be sure you know how to safely operate them. Also, be sure your smoke detector is operating properly.

About 70 percent of winter storm fatalities occur in automobiles. Many of these deaths are avoidable. Check to be sure your car is ready to face winter's cold and snow. Consider purchasing snow tires. They offer far more grip in the snow than even all-season tires. Check your antifreeze and get a tune up if your car is due. Keep your gas tank full to help avoid fuel line freeze ups.

Gather items for a winter storm survival kit and keep them in your vehicle. Items in the kit would include a blanket, flashlight, first aid kit, sand or kitty litter, shovel, tool kit, and booster cables.

Once winter is here, be sure your are up to date on the latest forecasts. Listen to NOAA Weather Radio once a day so you know what to expect. If a storm is forecast, plan your upcoming days to avoid travel during the storm.

Once you know a storm is coming, check your essential daily items to be sure you have enough for several days. Essential daily items would include prescription medicine, baby supplies and first aid supplies. Check to see that you have enough heating fuel to last for several days.

Once the storm hits, avoid travel as much as possible. Obey all travel restrictions. Listen to NOAA Weather Radio often for updates on the storm's progress. If you go outside, dress in several loose fitting layers of warm clothing. Wear a hat. Mittens keep your hands warmer than gloves. Avoid shoveling snow if you are over forty or have a history of heart disease or high blood pressure.

The change of seasons is one of the things that makes living in this part of the country so enjoyable. Winter presents many opportunities for outdoor fun and can be a season of great beauty. Following these few safety tips and using common sense can help you and your family enjoy all that winter brings.

Dave Morford
Meteorologist

Winter Climatology of Central New York and Northeast Pennsylvania

The winter season varies widely across Binghamton's County Warning Area. Normal winter (Dec-Feb) temperatures range from 19.1°F in Boonville, NY, located on the southern Tug Hill Plateau in northern Oneida County, to 28.8°F in Matamoras, located in eastern Pike County, PA. Snowfall amounts (Oct-May) vary quite a bit as well with the highest average seasonal snowfall ranging from 219.6" in Boonville, NY to 32.5" in Matamoras, PA. Below are average temperatures, snowfall, elevation, and contributing weather factors for selected locations:

Location	Elevation (feet)	Temp (°F)	Snowfall (inches)	Weather Factors**
Binghamton, NY	1600	24.7	81.0	LES, ELEV, CS
Syracuse, NY	420	25.9	119.0	LM, LES
Utica, NY	712	23.8	96.3	LES
Ithaca, NY	960	24.8	67.9	LES
Elmira, NY	844	26.4	42.5	
Scranton (Avoca), PA	930	28.5	44.9	
Montrose, PA	1420	23.7	88.8	LES, ELEV, CS
Towanda, PA	750	27.6	39.8	
Pleasant Mount, PA	1800	22.3	73.8	ELEV, CS

** CS – More susceptible to coastal storms (higher snowfall)
ELEV – High elevation location (lower avg. temperature, higher snowfall)
LES – Lake-effect snow (higher snowfall)
LM – Lake-modified temperature (higher avg. temperature)

Some of the above numbers don't seem to make sense on the surface. For instance, why is it colder in Pleasant Mount, PA than Syracuse, NY when Pleasant Mount is about 100 miles south-southeast of Syracuse? Or why does Montrose, PA, which is about the same latitude as Towanda, PA, receive over twice as much snowfall on average? The weather factors listed in the above table attempt to explain what causes the variability between sites, and are described in more detail below.

Winter Climatology (continued from p. 6)

CS – More susceptible to coastal storms (higher snowfall)

During the winter season, storms will occasionally develop off the Eastern Seaboard, typically near Cape Hatteras, North Carolina. These storms (also called Nor'easter's) generally move in a north or northeast direction, and if they move close enough to the coast, will spread precipitation (often in the form of snow) into the mid-Atlantic and Northeast regions of the U.S.. The locations noted in the table above are closest to the ocean, and are more likely to be affected by Nor'easters, which contributes to higher average snowfall.

ELEV – High elevation location (lower average temperature, higher snowfall)

The majority of the time in the atmosphere, temperature decreases with height, which leads to warmer temperatures in valley locations and colder temperatures on the hilltops. This is especially true during the daytime hours and at mid levels of the atmosphere (5000-25,000 feet). At night, inversions (temperatures increasing with height) often form close to the ground, which means temperatures are colder in valley locations than on hilltops. Taken over a whole season or year, higher elevation locations are colder than valley locations (which the table on page 6 illustrates). Coldest locations across our area are "elevated valleys", where it stays cool in the daytime AND gets cold at night. Pleasant Mount, PA is one such location in our area.

Elevation also has an impact on snowfall, especially early and late in the season. There are times when valley locations are in the mid 30's and raining, while it is snowing on the hilltops. This contributes to higher annual snowfall at higher elevations.

LES – Lake-effect snow (higher snowfall)

Locations downwind of the Great Lakes, as well as the Finger Lakes experience lake-effect snow, which is formed by cold air moving over the *relatively* warm lake water. Several factors determine how much lake-effect snow a location receives: air-lake temperature differential, the orientation of the snowband, topography, and distance from the lake. The Tug Hill Plateau, in northern Oneida County, receives 200-250 inches of snow per season, and benefits from each factor listed above. This region is close to Lake Ontario at an elevation of 1000-1500 feet, and is affected by west-east oriented snowbands that are parallel to the long-axis of the lake (snowbands that are oriented this way tend to be strongest). Syracuse and Utica are other locations that receive a lot of snow from Lake Ontario snowbands. Ithaca, Binghamton, and Montrose are locations that are affected by snowbands off the Finger Lakes and to a lesser degree (due to distance from the lake), Lake Ontario snowbands.

LM – Lake-modified temperature (higher avg. temperature)

Lake Ontario does not freeze in winter, and air that blows over it is warmed from below (assuming the air is initially colder than the lake). Since winds often blow from the northwest in winter, the area along Interstate 90 (Thruway) from Waterloo to Syracuse experiences slightly warmer temperatures. Actually, all of central NY and northeast PA benefit from the warming influence of Lake Ontario. Without the lake, there would be more nights of below zero temperatures each winter. However, the area from Waterloo to Syracuse is affected to a greater degree because it is closest to the lake and is at a low elevation (the air doesn't undergo cooling from going up in elevation).

To see maps of normal temperature, precipitation, and snowfall for central NY and northeast PA, please follow this link: www.erh.noaa.gov/er/bgm/climate.html#MAPS

Jon Van Ausdall
Meteorologist

Why Have Recent Winters Been So Mild?

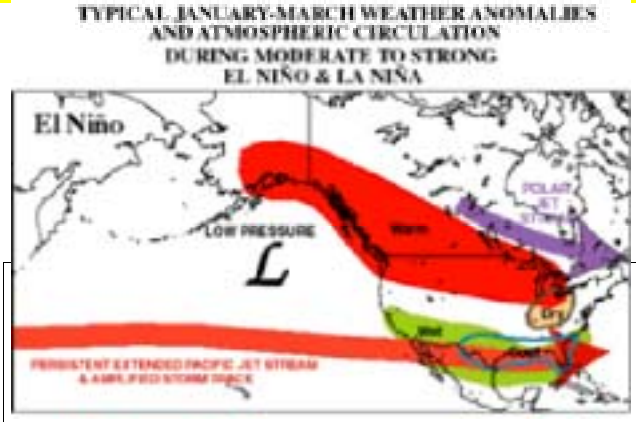
Some of the mildest winters on record have occurred in recent winters. Last winter (2001-2002), was the mildest winter on record for many areas in upstate New York and northeast Pennsylvania. The National Weather Service defines the winter season as the months of December, January and February. For these three months, the average temperature was well above average for the entire region.

At Syracuse, the average winter temperature was 34.0 F, which was .7 degrees above the previous record warm winter of 1932-1933. At Binghamton, the average winter temperature was 31.3 F, which was 1.4 degrees above the previous record warm winter of 1997-1998. At Scranton, the average winter temperature was 35.0 F, which was 1.5 degrees above the previous record warm winter of 1932-1933. Recent previous winters also have been very mild: 1997-1998, 1998-1999 and 1999-2000. Of the past 5 winters, only the winter 2000-2001 was near normal temperature-wise, the rest have been exceedingly mild! In fact, the decade of the 1990s, despite a few harsh winters, saw relatively mild winters when compared to the long-term mean for winter temperatures.

The obvious question that is on many people's mind is why? Is global warming finally eradicating our winters? Or is it some other natural cause, or a combination of man-made and natural causes? There are two major factors in inter-annual variability among our winter seasons: El Nino and the Arctic Oscillation. There are some that argue that the solar sunspot cycle also has an affect on the earth's climate including the winter season. The remainder of this article will discuss these three factors and how they may have affected our recent winters. The potential affect of human-induced global warming on winter will also be discussed to conclude this article.

El Nino is one contributing factor that determines what kind of winter we will experience in the Northeast. See the Winter Outlook article on p. 4 for a full explanation of El Nino. The stronger the El Nino, the stronger the Pacific Jet Stream and, in general, the milder the winter. Weak or moderate El Nino's tend to have less effect on our winters. The record warm winter of 1997-1998 was a result of a strong El Nino.

Another major contributor to variability in the winter season is the "Arctic Oscillation". The Arctic Oscillation is governed by two phases: a positive phase and a negative phase (see Figure p. 9). When the Arctic Oscillation is in a positive phase, the jet stream becomes strong and remains over the high latitudes of the northern



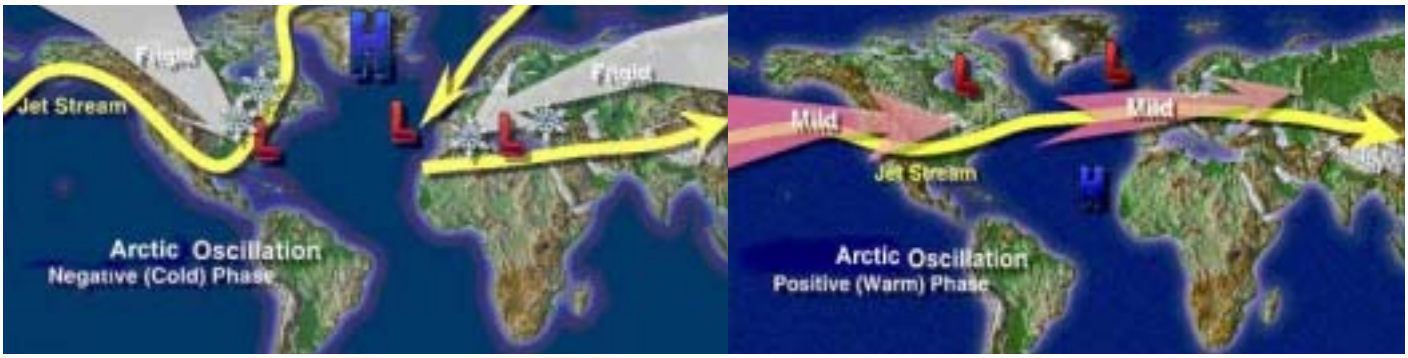
hemisphere "bottling" up bitter cold air over Greenland, northern Canada, northern Europe and Siberia . The rest of Europe, the United States and central Asia see milder winter conditions because the bitter cold air of winter remains to the north. When the Arctic Oscillation is in a negative phase, the jet stream over high latitudes becomes weaker and drops south into the U.S., Europe and central Asia. This allows frigid cold air to flow south to the middle latitudes which encompasses the United States, most of Europe and central Asia. In addition, the jet stream along the east coast becomes stronger than usual and nor'easters become more frequent. This brings heavy snows to our area in addition to the cold. Unlike El Nino patterns which last 1 to 3 years at a time, the Arctic Oscillation can change phase in one or two weeks time leading to rapid changes in winter conditions.

The past several winters and most of the winters in the 1990s have seen exceedingly positive Arctic Oscillation index values, which is indicative of milder winters. The 1960s and 1970s saw numerous winters having negative values for the Arctic Oscillation which coincided with much colder and snowier winters that many of us still can recall.

A third potential explanation for milder winters of late is the current solar sunspot cycle which is around its 11 year peak. This peak in the number of sunspots and solar activity began about two winters ago and has persisted through the past winter. The sunspot cycle is a natural cycle in which the number of sunspots reach a peak every 11 years or so. This peak is also referred to as the solar maximum. When there is a solar maximum, there is slightly more radiation received by the Earth.

During a solar minimum, which last occurred in the mid 1990, less radiation is received by the earth. The change in radiation from solar maximum to solar mini-

Mild Winters (continued from p. 8)



mum is small and many argue that it does not leverage much effect on the climate system. Others argue that it

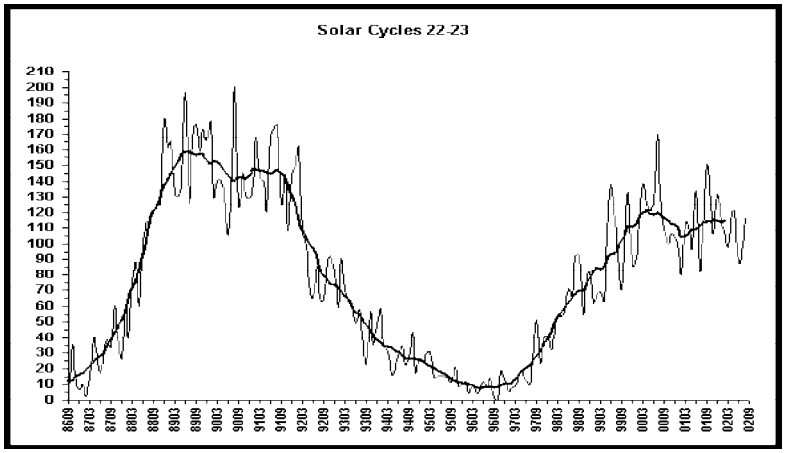
does affect amount of cloud cover globally, which in turn magnifies the affect of the solar radiation variations and therefore has a discernable impact on the climate system. During solar maximums, global low cloud cover is known to decrease by a few percent, which allows more solar radiation to reach the earth. During solar minimums, there is more cloud cover globally which leads to more solar radiation reflected back to space which produces a net cooling. It may not be a coincidence that the harsh winters of the mid 1990s were coincident with the last solar minimum.

What does this mean for the next several winters? The next solar minimum is expected to occur around 2006 which means the upcoming winters could become more severe. Time will tell and it will depend on how many El Ninos occur and the phase of the Arctic Oscillation.

There are many others who argue that the build-up of greenhouse gases, such as Carbon Dioxide (CO_2), are now affecting the climate system and leading to a net warming. CO_2 continues to slowly increase as nations continue to rely on fossil fuels for energy. CO_2 absorbs radiation emitted to space by the earth, not allowing it to escape. The energy is then radiated back to the earth leading to a net warming effect. However, the cumulative effect of increasing CO_2 is actually not that large and is most effective at temperatures well below zero. Therefore, theoretically, increasing CO_2 should be leading to rapid warming in the polar regions in the winter months which has not been observed. This is especially true in the Antarctic regions where 98 percent of the continent was found to be cooling, exactly contradicting this theory. Therefore, although increasing CO_2 should have some warming effect on the climate, it is still uncertain how much of an effect it has had in recent winters. Natural variability in the Arctic Oscillation, solar cycles and El Nino could explain a large part of our recent mild winters.

In closing, for the winter enthusiasts, my personal feelings are that some severe winters lie ahead in the near future. In the coming winters, there is evidence that the phase of the Arctic Oscillation is becoming more and more negative each year as we approach a solar minimum in a few years. So don't sell your skis yet and hold on to your snow blowers!!!

Dave Nicosia, WCM



Wind Chill

Last winter, the National Weather Service issued a new wind chill chart. This new chart was developed by the Weather Service in conjunction with several universities to better represent the effect wind had when chilling human skin. The new wind chill chart gives you specific information about the time it takes frostbite to begin. For example, at zero degrees Fahrenheit with a 15 mph wind, frostbite can begin in as little as 30 minutes. If the temperature drops to minus ten, a 25 mph can bring frostbite in as little as ten minutes.

If you will be outdoors, it's a good idea to consult the chart to help determine what you need to wear. If the temperature, wind, and time outdoors will cause you to be near the frostbite zone, consider limiting your exposure. The easiest way to do this is to limit your time outdoors. Also, leave as little flesh exposed as possible by wearing a mask, hat, and mittens in addition to your coat, heavy pants and boots.

Dave Morford
Meteorologist

Wind Chill Chart

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V=Wind Speed (mph)

Effective 11/01/01

"Finger" Lake Effect Snow in Central New York

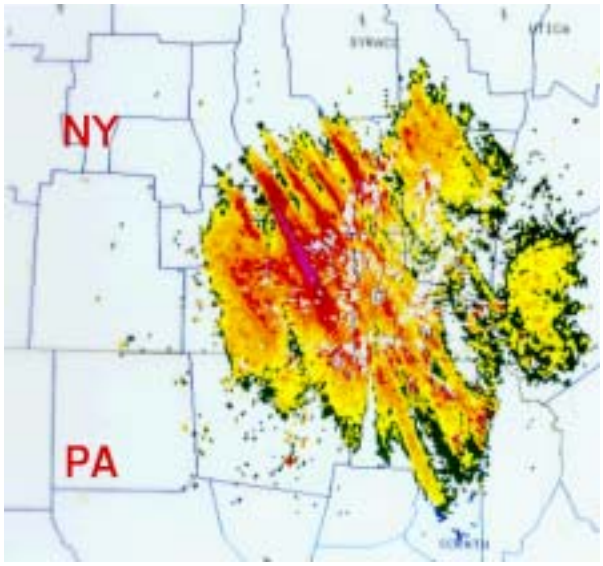


Figure 1—This Cayuga Lake snow band on Dec. 12, 1993 produced 5 inches of snow in Ithaca, NY.

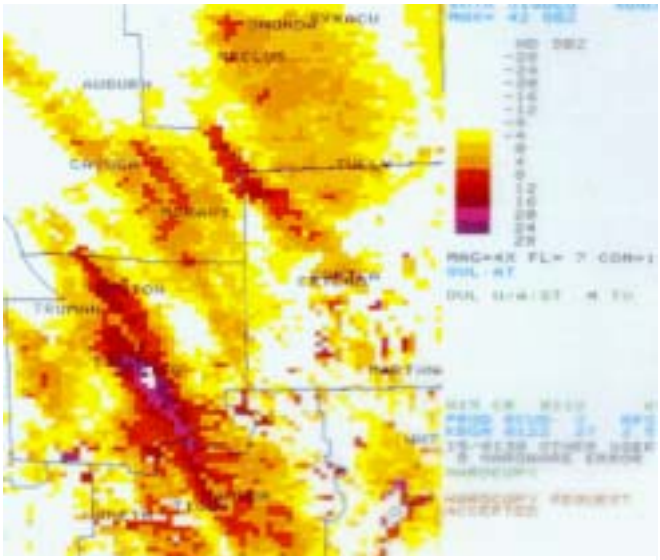


Figure 2 – This zoomed in shot displays a dominant Cayuga Lake band and smaller bands southeast of Owasco and Skaneateles Lakes.

When many people think of lake effect snow, they conjure up such mental images as a person trudging through the streets of Buffalo in a blinding squall and several feet of snow. Others would contend that the Tug Hill Plateau, Watertown, or even Syracuse would be equally worthy places to include in the Great Lakes "snow belt" region. But what about Ithaca, Burdett, or Brooktondale? A mention of these locales in reference to lake effect snow would likely incur some raised eyebrows and puzzled stares.

The fact is that lake effect snow can and does occur in the Finger Lakes region, although the intensity is normally less than what would be seen in a well developed snow band coming off either Lake Erie or Lake Ontario. Results of local research indicate that these Finger Lakes snow bands typically produce 1 to 3 inches of snow and last for up to 6 hours in any one spot. On rare occasions, as much as 6 to 8 inches of snow has occurred when the atmospheric conditions were just right.

Two of the main ingredients that produce lake effect snow are cold air and available heat energy from a relatively warm water surface. Since larger bodies of water have more heat to give off with their bigger surface areas, it stands to reason that the two longest Finger Lakes (Cayuga and Seneca) are most proficient at producing lake effect snow. This is not to say that the other smaller Finger Lakes cannot, but snowfall downwind of them is usually quite light and short lived by comparison. The radar images shown above (Figures 1 and 2) portray some of the areas that are typically affected by these snow bands. In these cases, a more pronounced snow band developed along and downwind of Cayuga Lake, with smaller and weaker bands originating near some of the other, shorter Finger Lakes.

It is theorized that the local terrain also helps to enhance these Finger Lakes snow bands. Steeper hillsides present on the eastern and western shores of both Cayuga and Seneca Lakes in particular are thought to help funnel the winds down the longer axes of these lake surfaces. This would create a situation where potentially more moisture could be picked up and eventually deposited as snow downwind. Also, the air is quickly forced upward once it moves off the bottom or southern ends of these lakes as it moves from the smooth water surface to the hilly landscape of central New York. This upward motion could well contribute to additional moisture being squeezed out.

This phenomenon is a good example of how local terrain features and even relatively small, narrow bodies of water can play an important role in our weather.

Michael L. Jurewicz, Sr.
Meteorologist

Spotter News

Greetings spotters of central New York and northeast Pennsylvania! As we head into the upcoming fall and winter seasons, I want to remind everyone of some of the winter guidelines for precipitation recording, and I'd also like to discuss some of my visions for improvement to the spotter programs during the coming year.

In addition to your regular daily measurement, please remember to take additional observations, that meet or exceed the special thresholds, and phone them into our NWS office via the toll-free number as soon as possible. Your real time measurements during a heavy rain or snow event are critical to the forecaster's job, and really do make a difference in the warning and forecast process. Please remember to call us at any time when a half inch or more of rain falls in less than 24 hours. Call in your regular morning report if one inch or more is in your gage.

For snowfall, please call us at any time when you observe the following:

- Three or more inches of snow has fallen since your last regular or special measurement.
- Snow falling at the rate of 1 or more inches per hour.
- Thunder or lightning observed with snow.
- Snow conditions are significantly different from what is in the official NWS forecast, such as the one heard on NOAA weather radio. For example, the forecast is for 2 to 4 inches and you've already measured 7 inches.

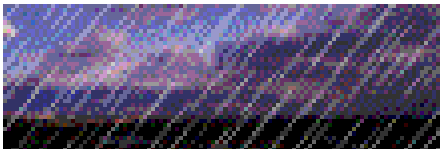
Rain spotters should remember to remove the inner, graduated tube before the freezing weather begins, as the freezing of precipitation in that tube may cause it to crack and leak.

Last fall, the snow spotters completed a feedback survey about the spotter program. As your new program coordinator, I will be using that input to make several changes to both spotter networks in the coming year. A large percentage of respondents desired an ability to input their data into our system via the Internet. Some also wished to have more timely access to their data through our web page. Currently, our web servers are not configured for the scripts needed to have interactive data entry. One of my goals this year will be to work with the folks that control those servers to get that issue resolved, and then we'll be able to offer web based data entry, which will save time and resources in many ways. I will be modifying the rain and snow spotter web pages to better meet the data access needs and work on loading your reports to those websites in a more timely fashion. There will also be a few administrative changes to the mailing of forms and envelopes. Thank you to those who have "spent your own dime" to send us your data. This truly shows the dedication of the volunteer spotters in our networks, but please do not hesitate to send a note or call us here at the NWS office before you are about to run out of forms or envelopes. I'll send more out to you as quickly as possible.

Thank you all again for your valuable service to us and your communities!

Jim Brewster
Meteorologist

SKYWARN



Outreach

Outreach is always a valuable learning experience for us as meteorologist, just as we hope it is for the public we meet. Outreach provides an opportunity for the public to give us feedback on our products and aids us in delivering them more effectively.

This July we were privileged to attend the Utica Boilermaker Health and fitness Expo. Over two days we met with over a thousand visitors to our National Weather Service booth. We handed out information on NOAA weather radio, boating safety, heat waves, severe weather safety, and a coloring book aimed at teaching youngsters about weather safety.

The Utica area is particularly sensitive to the hazards of lightning. A bolt of lightning took the life of a young woman running from her car toward her house. Many visitors to our booth knew the young woman and were grateful for the lightning safety guides we provide to coaches and event planners. It is estimated lightning kills 93 people per year, and injures 300 more.

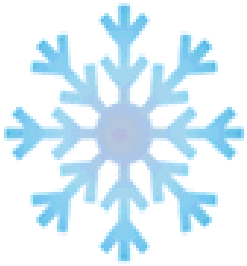
In June we attended the annual Whitney Point Lake Festival. We provided real time weather conditions using our new portable weather station. This was another good opportunity to educate the public about weather safety, and preview the coming NOAA weather transmitters. Since June we have installed new transmitters in Norwich, Call Hill, Mount Washington and Ithaca.

We are currently scheduling school talks for the Fall and Winter. If you are an educator and would like us to visit your school to discuss careers in meteorology or weather safety, please contact us soon. You may email me directly at *daniel.padavona@noaa.gov*.

Daniel Padavona
Meteorologist

Kids having a good time as they learn about weather and weather safety

Winter Weather Awareness Weeks



Winter Weather Awareness Week is set for November 3-9, 2002 in New York and November 17-23, 2002 in Pennsylvania

Governor George Pataki, in cooperation with the New York State Disaster Preparedness Commission and the National Weather Service, has declared November 3rd through 9th as Winter Weather Preparedness Week in New York State. In Pennsylvania, the National Weather Service in cooperation with the Pennsylvania Emergency Management Agency has designated November 17-23 as Winter Weather Awareness Week. The purpose of these weeks is to remind citizens that although winter is a time of beautiful scenery, holiday celebration, and outdoor recreational activities, the cold weather season can also be harsh and even dangerous if you are not prepared.

The National Weather Service in Binghamton will be issuing Public Information Statements over the NOAA Weather Wire and NOAA Weather Radio on each day of Winter Weather Preparedness Week in NY and Winter Weather Awareness Week in PA. The focus of these statements will be on weather safety and preparedness. For more information on winter weather safety, check out the following web site:

http://www.nws.noaa.gov/om/winter/index.shtml

Dave Nicosia
WCM

Winter Flood Threats.....

Late fall and winter flood statistics (Table 1.) show that our region is prone to flooding even in our cold season. March and April are our most active months for flooding due to the melting of the snowpack in combination with the transition to spring which brings widespread rains. November and December floods are usually caused by a weather pattern that brings an extended period of rain. This rain falls on a cold ground that produces more runoff, since cold season vegetation is dormant and the soil may be frozen.

Location	NOV	DEC	JAN	FEB	MAR	Stream
CONKLIN SINCE 1912	5	6	8	13	33	Susquehanna River
CAMPBELL SINCE 1918	0	3	4	4	14	Cohocton River
COOKS FALLS SINCE 1913	4	6	3	2	9	Beaver Kill
TUNKHANNOCK SINCE 1913	4	3	2	2	5	Tunkhannock Creek

Table 1. Historical Record of Floods by Month

Ice jam flooding is rare in December (Table 2.), and almost always causes only minor problems. Early winter is freeze-up time. This ice is normally thin which produces weaker jams. When this ice thickens or breaks up and refreezes in January or February and just breaks up and begins moving in March, ice jam flooding becomes a more serious threat.

Forecasting just where an ice jam will occur is nearly impossible. There are favored areas where ice jams will form. These places are in shallow sections of river, above islands, near sharp bends, and above bridges. We can forecast when the stable river ice breaks up by watching for warm spells and thaws or rain and runoff that can lift and break up river ice. Our biggest concern in the winter is snowpack melt and runoff. We watch the development of the snowpack closely. This is a time when we rely on the snow observations from our Volunteer Snow Spotter Network. There is no better way to measure snow than a person reading the snow depth off a yard stick or ruler. Technology has not found a better way, yet.

SOURCE ARMY CORPS OF ENGINNERS ICE JAM DATABASE	DEC	JAN	FEB	MAR	SINCE
SUSQUEHANNA RIVER IN NEW YORK ABOVE WAVERLY	0	5	3	8	1904
DELAWARE RIVER AND LITTLE, EAST AND WEST BRACH COMBINED	1	1	9	9	1875
CANISTEO RIVER	0	2	6	4	1939
COHOCTON	0	6	1	2	1920
SUSQUEHANNA RIVER AND TRIBUTARIES ABOVE WILKES-BARRE IN NORTHEAST PENNSYLVANIA	0	9	10	5	1893

Table 2. Serious Ice Jams by Month.

Continued on p. 15

Winter Flood Threats (continued from p. 14)

A few of our volunteers take snow water equivalent measurements by taking a sample of snow and measuring the melted snow. With the snow depth information and the water equivalent of the snowpack, we can calculate the density. By watching the density increase later in the winter, we can better time when the snowpack ripens to the point when it is ready to release its water.

In the late winter of 1994 there was nearly 10 inches of water equivalent in a deep snowpack widespread across our watersheds. Had this snowpack melted quickly, the region would have been devastated by flooding. The water from this snowpack did ease out slowly over a few weeks with several dry sunny days and cool nights. In January 1996 there was 3 to 6 inches of water equivalent across the region, which did melt extremely quickly. On top of the snowmelt runoff there was heavy rain. This combination of rain and snowmelt runoff did cause serious flooding in many areas.

Flooding can occur any time of the year in our region. We watch and monitor streams and the snowpack closely in the winter to be better prepared for our most active flood prone months in late winter and early spring. The help our volunteers provide to our cold season flood forecasting program is invaluable and greatly appreciated.

John Chiaramonte, Service Hydrologist

National Weather Service expands the NOAA weather Radio Network in Upstate New York

Four new NOAA weather radio transmitters can now be heard across upstate New York. The National Weather Service, in partnership with Steuben County Office of Emergency Services, the City of Ithaca Fire Department, Ithaca College and The City of Norwich Emergency Management Office has added the following new NOAA weather radio transmitters in upstate New York:

WXN-29 Call Hill near Canisteo, NY at 162.425 MHz
WXN-55 Mount Washington near Bath, NY at 162.450 Mhz
KHC-49 Norwich, NY at 162.525 MHz
WXN-59 Ithaca, NY at 162.500 Mhz

Funding for these transmitters was provided by grants from the United States Department of Agriculture's Rural Utility Service NOAA Weather Radio Program. These transmitters join the existing NOAA weather radio network maintained by NWS Binghamton and fill in critical gaps in NOAA weather radio coverage. With these new transmitters, most citizens in central New York can now receive these important potentially life-saving NOAA weather radio broadcasts. With the addition of these transmitters, NWS Binghamton now has 13 transmitters in the nationwide network of over 720 NOAA weather radio stations. For a complete list of NWR transmitters in central NY and northeast PA see the last page of this newsletter. For more information, contact Dave Nicosia, WCM, NWS Binghamton at **david.nicosia@noaa.gov**

Dave Nicosia
WCM

Legendary comic strip character Mark Trail, the official spokesperson for NOAA Weather Radio, has taught generations of Americans about life in the outdoors. The strip, syndicated by King Features in 175 newspapers nationwide, is written and drawn by Jack Elrod.

A Look Back: The February 2nd-5th, 1961 Blizzard

This intense Nor'easter came at the end of a 2-month period of below normal temperatures and persistent snow cover. On the 2nd, a day before the blizzard, strong high pressure was located over the region with many locations setting low temperature records. That morning, temperatures ranged from -15°F at Binghamton Regional Airport, to -28°F at Morrisville, NY and Walton, NY. Those records still stand today.

On the morning of February 3rd, an area of low pressure moved into the Ohio Valley, while another low developed off the coast of South Carolina. The low off the South Carolina coast rapidly intensified and moved to near Norfolk, Virginia by the evening of the 3rd, while the low in the Ohio Valley dissipated. At that stage, light snow had overspread all of central New York and northeast Pennsylvania, with heavy snow from Washington D.C. to Erie, Pennsylvania. The low continued to intensify overnight and by the morning of the 4th, was located just to the east of Atlantic City, New Jersey. By that time, heavy snow was falling over central New York and northeast Pennsylvania, as well as southeastern New York and southern New England. In addition to the heavy snow, hurricane force winds were battering coastal areas. By the evening of the 4th, the area of low pressure had moved to near Nantucket, and the snow was ending across central New York and northeast Pennsylvania.

Listed below are storm total snowfall amounts for central New York and northeast Pennsylvania, as well as storm highlights from around the northeastern United States.

Location	County	State	Snowfall (inches)
Binghamton	Broome	NY	23.1
Syracuse	Onondaga	NY	21.8
Scranton/W-B (Avoca)	Luzerne	PA	14.5
Boonville	Oneida	NY	18.0
Bath	Steuben	NY	30.0
Candor	Tioga	NY	26.0
Claryville	Sullivan	NY	18.0
Cooperstown	Otsego	NY	18.3
Cortland	Cortland	NY	40.0
Elmira	Chemung	NY	25.0
Hawley	Pike	PA	14.0
Ithaca	Tompkins	NY	26.0
Montrose	Susquehanna	PA	21.0
Towanda	Bradford	PA	19.0

(continued on p. 17)

1961 Blizzard (continued from p. 18)

Northeastern U.S. Highlights

- 86 mph wind gust at Blue Hill Observatory – Milton, Massachusetts
- 82 mph wind gust at Block Island, Rhode Island
- 74 mph wind gust at LaGuardia Airport, New York City

Location	State	Snowfall (inches)
Washington, D.C.	-	8.3
Baltimore	MD	10.7
Philadelphia	PA	10.3
New York (Kennedy Airport)	NY	24.0
Boston	MA	14.4
Newark	NJ	22.6
Providence	RI	18.3
Nantucket	MA	14.4
New Haven	CT	14.0

A scene from Long Island during the Blizzard of 1961

Jon Van Ausdall
Meteorologist

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National Weather Service, Binghamton, NY Volume 1, Issue 2, Fall/Winter, 2002

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You can monitor the latest weather conditions around the area, as well as our forecasts on:

NOAA Weather Radio

Operating on the following transmitters:

Binghamton	WXL38	162.475
Syracuse	WXL31	162.550
Scranton	WXL43	162.550
Elmira	WXM31	162.400
Cooperstown	WWH35	162.450
Walton	WWH34	162.425
Stamford	WWF43	162.400
Norwich	KHC49	162.525
Ithaca	WXN-59	162.500
Towanda	WXM95	162.550
Mt. Washington	WXN55	162.450
Call Hill	WXN29	162.425

This newsletter is published for Skywarn Spotters, schools, emergency managers, media, and other interested parties in the county area served by the National Weather Service in Binghamton, NY.

This publication, as well as our forecast products and a host of other weather information, are available on our internet page.