NOAA's National Weather Service

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The Lake Breeze

The Newsletter of the Buffalo Forecast Office

Thomas Niziol, Meteorologist In Charge
Judith Levan, Editor

Greetings!

As the Meteorologist-In-Charge of your National Weather Service (NWS) Office in Buffalo, NY, I welcome you to our inaugural edition of "The Lake Breeze", the official newsletter of the Buffalo Weather Office. I would like to take this opportunity to give you a bit of background information about your National Weather Service office here in Buffalo.

I use the term "your" office because we are indeed a federal agency that is funded by your tax dollars. In fact, we are one of the top agencies in the federal government when it comes to customer satisfaction. Because Mother Nature does not have a set schedule and the weather never takes time off, we are here every second of every day, "we never close". That means you can get information from us at any time of the day and year.

As part of the National Oceanic and Atmospheric Administration (NOAA), we are one of over 100 offices located throughout the U.S. Our mission is to provide weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. Our data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.

Buffalo has direct ties to the founding of the National Weather Service. We were one of 22 original federal weather offices that sent the first systemized weather observations by telegraph to Washington DC back in 1870. In addition, General Albert Myer, recognized by many as the "founder and father" of the US Weather Bureau, spent much of his childhood right here in Buffalo, and is buried here at Forest Lawn Cemetery as well.

Our office had its humble beginnings in the Brown Building Telegraph Office at Main and Seneca Streets in the city of Buffalo opening on November 1, 1870. After nearly 75 years in the city, the office moved out to the Buffalo Airport, 7 miles east of the city, in 1943. In April 1995, the new office was built adjacent to airport grounds and dedicated as the Albert J. Myer Forecast Office Building. This is where we call home today.

Buffalo Weather Office, January 1899

Locally, our office is responsible for much of Western and parts of Central and Northern New York and the adjacent waters of the Great Lakes. We are staffed by 22 individuals who do a lot more than just issue a weather forecast each day. Our personnel include 10 meteorologists who issue various forecast products for the general public, aviation and marine communities. Three hydrometeorological technicians are responsible for sending up weather balloons which carry a piece of equipment called a radiosonde, to gather all types of weather data from the atmosphere twice a day. To keep the equipment running, a staff of two electronics specialists can be found on any given day maintaining our Doppler weather radar or sophisticated instrumentation and observation platforms located both at our main office and in the field. Our computer software and networking requirements are tended to by our Information Technology Officer. The administrative staff rounds out the office and includes a Warning Coordination Meteorologist, Science and Operations Officer, Electronic Systems Analyst, Data Acquisition Program Manager, Administrative Assistant and yours truly, the Meteorologist-In-Charge.

We have a diverse staff that brings several specialties to the office. Some of our greatest accomplishments have come in the form of forecast methods that have been developed for the local lake effect snow storms that are common to our region each winter. The

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Greetings!

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Buffalo office is world renown for adding to the knowledge and operational forecasting techniques for this type of weather and it should come as no surprise. Of the 22 staff members in the office, over 80% are either natives of Western New York or have spent most of their career here. This is a great place to observe and forecast weather. Our four seasons and local effects from the Great Lakes, Finger Lakes, and the Allegheny and Adirondack Mountains make our jobs challenging and very rewarding at the same time. We get our greatest satisfaction though by providing service to our customers. If you have a question about the weather, contact us and hopefully we can provide an answer. We are **YOUR** National Weather Service and we are here to serve you.

Thomas Niziol, Meteorologist In Charge
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Waterspouts

There are basically two types of waterspouts. Those that develop from tornadic thunderstorms and those that form during general fair weather. **Tornadic waterspouts** generally begin as tornadoes over land in association with a thunderstorm, and then move out over water. **Fair weather waterspouts** form in unstable airmasses over open water. Unlike a tornado on land which forms from the sky downward, a waterspout forms from the water surface upward. They can last from 2 minutes to more than 20 minutes.

They typically form under cumulus congestus clouds with tops that do not extend higher than 10, 000 feet. The warm, moist air over the open water creates the instability and also aides in creating the updraft that is present under a cloud. This lifts the air prior to the formation of a waterspout. They develop at the surface and climb skyward in association with warm water temperatures and high humidity in the lowest several thousand feet of the atmosphere.

The funnel portion of a spout consists of clouds of condensed water vapor with winds aloft that are diverging, resulting in convergence at the surface due to the low surface pressure. These funnels do not actually draw water into its center or core. Instead, the spray created from the swirling vortex will be lifted several meters once the funnel is in contact with water at the surface.

The Great Lakes can serve as a perfect breeding ground for waterspouts. A wide temperature difference is needed between the lake surface and the air some 5000 feet above the lake. This will create low level instability, which is critical in producing “fair weather” waterspouts. While other parameters (such as wind shear and low level wind speeds) are important to consider when forecasting waterspouts, a general temperature difference of 16 degrees Celsius is needed between the lake surface and the air at 5000 feet.

The lake is the source of fuel and instability for these “fair weather” waterspouts, so once the spout moves inland and away from the warm water, the waterspout will dissipate.

People should take waterspouts seriously. If you are a boater or a person living along the coast of the Great Lakes you should be aware of their destructive potential. When warnings are issued for waterspouts, be prepared to quickly seek safe harbor, or find a shelter out of the path of the spout. Listening to the NWS NOAA Weather Radio is an excellent source of information, including forecasts and warnings for waterspout activity.

Waterspout off Sunset Bay. *Photo by Jim Sojka WB2TJO.*

The five stages of waterspout formation:
1. Dark Spot. A prominent circular, light-colored disk appears on the surface of the water, surrounded by a larger dark area of indeterminate shape and with diffuse edges.
2. Spiral Pattern. A pattern of light- and dark-colored surface bands spiraling out from the dark spot develops on the water surface.
3. Spray Ring. A dense swirling ring of sea spray, called a cascade, appears around the dark spot with what appears to be an eye similar to that seen in hurricanes.
4. Mature Vortex. The waterspout, now visible from water surface to the overhead cloud mass, achieves maximum organization and intensity. Its funnel often appears hollow, with a surrounding shell of turbulent condensate. The spray vortex can rise to a height of several hundred feet or more and often creates a visible wake and an associated wave train as it moves.
5. Decay. The funnel and spray vortex begin to dissipate as the inflow of warm air into the vortex weakens.

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NOAA Fact: The average U.S. household pays about $13 a year for NOAA’s weather services.

The NWS and Broadcast Media: Competitors or Partners?

Where can I get the most accurate and timely weather information? Which TV or radio station has to best meteorologist or weathercaster? Are their forecasts better than what you can get from the National Weather Service? I'm sure that many of you have asked these questions or even debated these issues with others. The fact is, there are many ways of receiving weather information, and that's a good thing!

While you may believe that the National Weather Service is in competition with the weather media, you might also be surprised to know that we rely on each other to do our jobs better, and we often work closely together to provide you with critical information when the weather turns severe.

So how does this partnership work? To answer this question let's review how forecasts are prepared. All forecasts are based on observations. NOAA (National Oceanic and Atmospheric Administration) agencies, including the National Weather Service, gather a vast amount of information on the atmosphere using surface observing systems, radiosonde instruments attached to so-called weather balloons, radar, and satellites. The information is then fed into large supercomputers which, using sophisticated models of the atmosphere, produce a basic forecast. National Weather Service meteorologists use this information along with their expertise of local atmospheric conditions to predict the weather for the next few hours up to the next several days, and even beyond.

All of the above observations, radar images, satellite pictures, computer output and NWS forecasts are available to the media, as well as the general public. Meteorologists and weathercasters employed by various media outlets have the option of using the NWS forecasts or preparing their own forecasts based on the raw observations and model data. While you might notice differences between the NWS forecast and the one you hear on radio or see on TV, most of the time, the differences are minor.

A big challenge for the media meteorologist is to be able to present the weather clearly and concisely, in a form his or her audience can understand, all within a 2 or 3 minute segment.

The National Weather Service relies heavily on the broadcast media during dangerous weather. When warnings are issued for tornadoes, severe thunderstorms, flash floods, or blizzards, getting the message out to the public quickly is critical so people can take action to protect themselves, their property, and their loved ones. It may even mean the difference between life and death. All National Weather Service warnings are relayed immediately to the media who, in turn, can rapidly get the information out to their listeners and viewers. The Emergency Alert System, or EAS, is sometimes used to expedite the flow of information.

It should also be pointed out that media reports of a storm's impact are often relayed to the National Weather Service. This information is used to update forecasts, or issue additional warnings to protect downstream communities. Some TV stations have privately owned radars and maintain spotter networks which enhance service to their viewers. The National Weather Service also has access to the data.

So as you can see, the partnership between the National Weather Service and the media is a benefit to both parties, and ultimately to you, our customers.

Stanley Levine, Warning Coordination Meteorologist
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Interested in a tour of our facility?

YES! Tours are available of the Buffalo Forecast Office of the National Weather Service! Our tour consists of a presentation of the history of the NWS, what we do, an overview of the equipment we use and a tour of our office facilities, with time for any questions. The tour last from 30 minutes to 1 hour.

Tour requests should be made at least 6 weeks in advance. Tours are conducted between 11:00 AM-1:00 PM and from 5:00 PM-8:00 PM, Monday through Saturday. The maximum size of a tour group will be 15 (if a mix of adults and children) or 10 (if adults only). If your group has more people, you may be able to schedule a second tour date to accommodate the extra people. The minimum age for a tour is 10 years old. We will respond to the online requests either through e-mail or a telephone call. Scheduled tours may be cancelled due to unforeseen staff shortages or an usually heavy workload due to weather. We will call if a tour needs to be cancelled or rescheduled.

The NWS is experienced in teaching our public, especially youngsters, about weather and weather safety. We encourage high school or college students who are interested in the field of meteorology to try a 2-4 hour shadow day with a meteorologist to get first hand experience of life at the National Weather Service. We can work with your Girl Scout or Boy Scout troop to earn weather badges. We may be able to schedule a presentation at your school or for your group (civic or social). You can schedule a tour online at on our website www.weather.gov/buf Select "TOURS" down the left hand column.

For more information you can contact Jennifer Mac Neil at 716-565-0204 or Jennifer.Sinatra@noaa.gov.

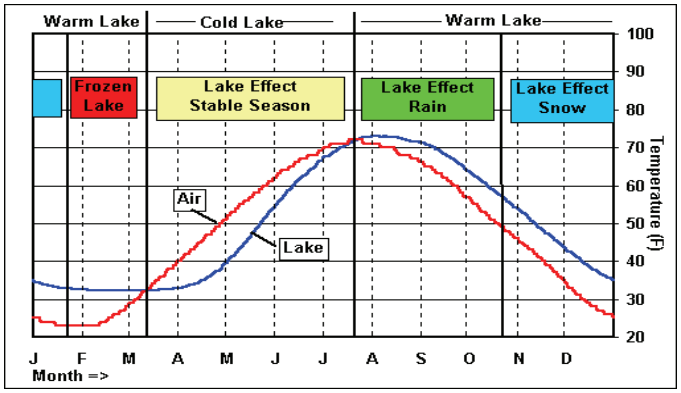
Lake Effect Rain

Residents of western and central New York are all very familiar with our infamous Lake Effect snows. Colder air advecting across the warmer lakes becomes saturated and eventually deposits its moisture downwind of the lakes in the form of snow. But did you realize we can get rain by the same process?

The Great Lakes are upwind of our area and have a major influence on our climate as most airmasses are modified in one form or another by their passage across the lakes. There are actually four lake effect "seasons", all determined by the temperature difference between the lake surface and the overlying airmass. The chart below highlights these "Seasons" in regards to Lake Erie.

Note that from late winter to mid summer the lake is generally cooler than the surrounding air, the "Stable Season", and it suppresses precipitation. But from about mid August until January, the lake is warmer than its surrounding air, the "Unstable Season". Evaporation and heat from the lakes is added to the colder air passing over it thereby enhancing precipitation.

This "precipitation" falls as snow in late fall and early winter, and we are all familiar with some crippling localized snowfalls off both lakes. During the autumn, similar situations develop but the air is simply not cold enough to produce snow, so rain falls instead. Theses lake effects "rains" usually are not as memorable as they are often embedded in general rains. Also remember that one inch of rain is approximately equivalent to a foot of snow but has far less impact!



These lake rains are more common than one may surmise. In fact, a recent study (Miner, 2000) of lake effect "events" off Lake Erie in the seven year period from 1988-1994 tallied a total of 32 lake effect rain events and only 20 lake effect snow events. The process is very similar—with rain predominating from September through mid November and snow thereafter.

Although few lake effect "rain" events had significant impact, one that stands out among them is the storm of September 11-15, 1996 which dropped over six inches of rain across Buffalo's northern suburbs and resulted in the most widespread flooding in memory in the Town of Tonawanda.

Although there are many similarities between lake effect rain and snow events, there are some differences. Rain events are embedded more in overall cold pools and upper level lows so cloudiness is prevalent, even outside the bands. Lake snow bands are often surrounded by clear skies and are much more evident on satellite.

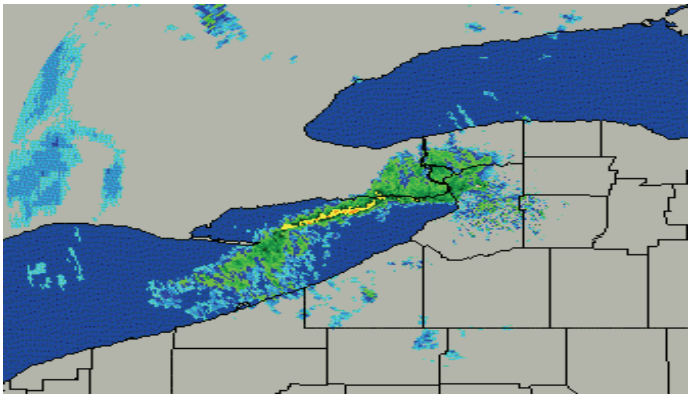


Image of lake effect rain band from the Buffalo Weather Radar
September 14, 1996

In addition, the overall Great Lakes' basin is very warm in early and mid autumn, so they enhance and strengthen approaching low pressure areas and fronts, so winds are almost always from the southwest by the time they reach our area. Thus, lake rain events tend to focus on areas northeast of the Lakes i.e. Buffalo's northern suburbs and Niagara County as well as the St. Lawrence Valley off Lake Ontario. Winter fronts and wind flows are predominantly west to northwest. So lake snows tend to focus east and southeast of both Lakes in the more traditional "snowbelts".

The next time it is raining heavily in October or early November, you might just be experiencing our "Other" lake effect!

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We're on the Web!
weather.gov/buf

NOAA's National Weather Service

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EDITORS NOTE:

I hope you found our first issue of "The Lake Breeze" interesting and informative. Published quarterly, each issue will contain articles about our operations, new products and services, and interesting local weather submitted by various members of our staff. Do you have an idea for something you'd like to see included? We welcome your comments and suggestions. You can email me at judith.levan@noaa.gov.

Enjoy our beautiful autumn season in New York!

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