Prevailing Winds

Volume 7, Issue 2 October 2017

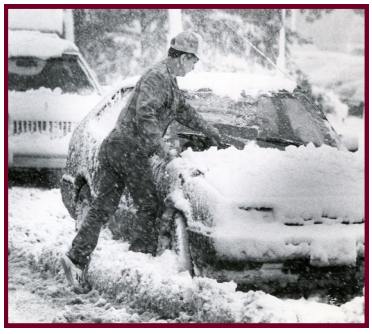
INSIDE THIS ISSUE:

The Historic October 3-4, 1987 Snow Event

By Hayden Frank, Lead Forecaster

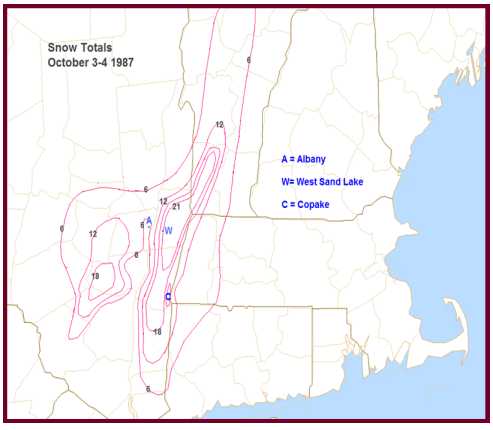
The first couple days of October usually deliver some of the best weather New England has to offer. High temperatures average between 65 and 70 degrees and the leaves may just be starting to show their autumn colors. Accumulating snow during the first half of October is quite rare, but has occurred on a few occasions. Narrowing the goal posts further, a significant snowstorm in the first week of October is very close to pushing the edge of what is even possible based on climatological records.

The freak destructive snowstorm of October 3-4, 1987 is the earliest accumulating snow on record for much of eastern New York, western Massachusetts, and western Connecticut. Not only was this the earliest snowfall on record for much of this region, the amounts were just staggering as some locations received 1 to 2 feet of snow. The bulk of the accumulations across western Massachusetts and western Connecticut were confined to the higher terrain. However, lower elevations across eastern New York, particularly just east of the Hudson River, received very significant and historic snowfall. 21" of snow was measured in West Sand Lake, NY at an elevation of only 500 feet.



This incredible snowstorm was preceded by 1 to 1.50 inches of rain across the region in association with a strong cold front. A secondary wave of low pressure developed along the cold front and intensified as it lifted northeast across southeast Massachusetts. The track of the low pressure system allowed much colder air to filter in on the backside of the system, changing the rain over to heavy wet snow. The snow was very destructive especially since the trees were basically fully leafed. This resulted in over 300,000 power outages across far western Massachusetts, western Connecticut and into eastern New York and Vermont. Numerous trees were brought down and many roadways became impassable. The track of the storm resulted in just a cold rain for most of our county warning area except for along the east slopes of the Berkshires.

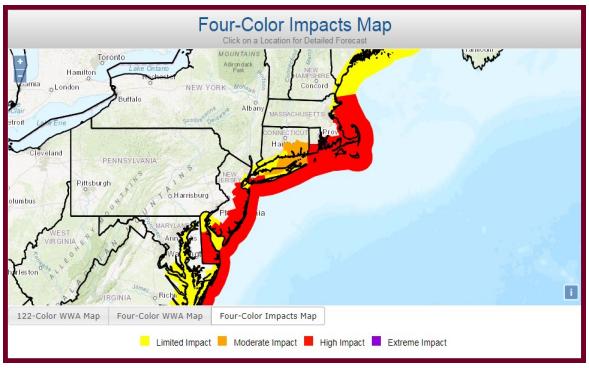
The forecasts from the National Weather Service at the time had mentioned unseasonably cold weather with snow showers possible, but a huge snowstorm was not expected. One might wonder how well forecasters would have handled an event like this with today's technology. It is impossible to say for sure, but we probably would have been aware of the potential for an historic and destructive snowstorm across the higher terrain. However, amounts would likely have still been well underdone and it is uncertain if we would have forecast any snow accumulations in lower elevations of eastern New York.



NWS Hazard Simplification

by Glenn Field, Warning Coordination Meteorologist

For decades, the NWS has used the Watch, Warning, and Advisory (WWA) system to alert users of forecasted hazards. In many ways, the WWA system has been highly effective in protecting life and property. With that said, as we have collected feedback during the course of this project, we have learned that some users find the WWA terms confusing. Also, users are sometimes confused about how to interpret and distinguish among the large number of individual WWA "products" (e.g., Wind Advisory, Flood Watch, Winter Storm Warning).



For the upcoming winter season, there are some important changes planned. All Winter products are likely to be reformatted into a "What, Where, When, Additional Details, and Precautionary/Preparedness Actions" format. Blizzard Watches will be discontinued and consolidated into a Winter Storm Watch product – the language of blizzard can be explained in the text. Similarly, the Freezing Rain Advisory will be discontinued and consolidated into a Winter Weather Advisory, the details of which will be explained in the body of the product. The project is called NWS Hazard Simplification and details can be found online at: www.weather.gov/hazardsimplification/

Enhanced Hazardous Weather Outlook

by Joseph Dellicarpini, Science and Operations Officer

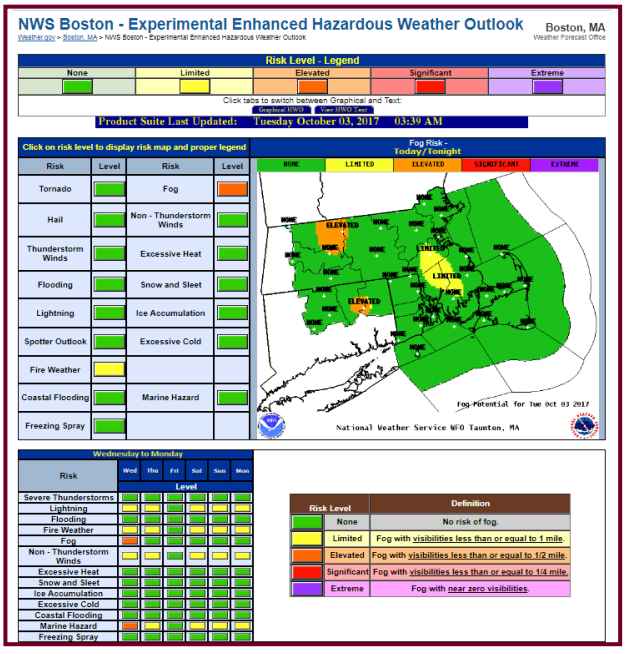
Do you know that our office produces a graphic that shows potential weather hazards out to the next seven days? The Enhanced Hazardous Weather Outlook, or EHWO, is a decision support service that is designed to provide a quick glance of the expected type, severity, and coverage of hazardous weather events.

To access the EHWO on our web page, go to the "Current Hazards" menu and select "Enhanced Hazardous Weather Outlook (EHWO)" at the bottom of the menu. This will bring you to the main EHWO web page.

For fog, "Limited" means visibility less than or equal to 1 mile, while "Elevated" means visibility less than or equal to 1/2 mile. The definitions of each level change based upon the hazard chosen.

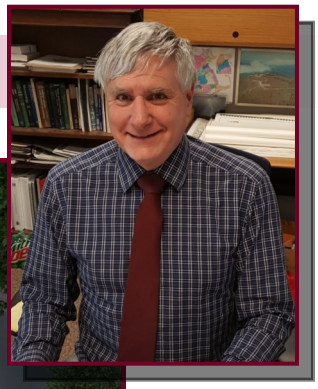
These graphics are automatically generated from our forecast database and are updated at least two times per day (around 5 am and 5 pm). Forecasters can update these graphics as needed at other times. You will always see what time the graphics were produced on the blue bar above the map. There is also the option to toggle to the text-based Hazardous Weather Outlook by clicking the button above the map.

We currently are producing the EHWO as an experimental service. We are interested in your feedback which will help us determine its usefulness, if modifications are needed, and whether the EHWO should become a regularly issued graphic. You can submit your feedback by clicking on the survey link at the bottom of the main EHWO page. Let us know what you think!



MIC Musings - A New Home

by Robert Thompson, Meteorologist-in-Charge



We're moving, albeit not far! We'll have a new zip code but will be essentially in the same neighborhood, just on the other side of our radar tower and barely across the political boundary in Norton. It is an exciting, although busy time.

Why move? We've been in our current facility since 1993, and our operations have evolved since then. This will be an opportunity to upgrade aspects of our operations such as the situational awareness display and design space more consistent with 21st century operations. We are also moving because our current facility has not been well maintained by the absentee lessor and can no longer be trusted to not leak or maintain a reasonable climate controlled environment essential for both people and equipment. We must maintain 24x7 operations and cannot gamble with an increasingly unreliable facility.

Exactly where to? Our new facility is under construction and expected to be complete by early 2018 in Norton's Commerce Center. Our new address will be 46 Commerce Way, Norton, MA 02766. We are quite literally moving to the other side of our radar tower, which will remain in place on Taunton land.

What will be different? The new office will be slightly larger than the current one. Although it will still house both the Weather Forecast Office (serving most of southern New England) and the Northeast River Forecast Center (serving NWS offices and partners throughout New England and most of New York State), the facility design will allow a more logical flow with operations separated from offices and much better natural lighting than currently exists. A state of the art situational awareness display will help keep forecasters in touch with what's happening now throughout our area, and a modernized HVAC system is expected to lead to better comfort for humans and a more reliable environment for machines.

Construction progress? Construction of our new facility remains on schedule, if not a little ahead of schedule. The images depict the steady progress made since groundbreaking in May. At the current rate, the building activity will be focused on the interior by the time the snow sticks. As of the beginning of October, the exterior masonry work was far along and concrete floor in place. Various utility tie-ins had been made, and conduits into the building are in place as planned.

August 3rd, 2017

September 7th, 2017

September 28th, 2017

Cont'd on page 4

MIC Musings - A New Home (Cont'd)

The Ground Breaking Ceremony, June 2017. Left to right: Frank Nocera (Forecaster), David Vallee (Hydrologist-in-Charge), Robert Thompson (Meteorologist-in-Charge), Michael Esip (Electronics System Administrator), and Norman Bingham-Maas (Hydrologist).

Planning tasks? The planning tasks for a new facility such as this are voluminous. Much of the focus last fall and winter involved the design (where will operations be, where will cubicles/offices be, where will the electronics shop be, where will the restrooms be, and so on). The spring featured specifics on the type, siting, and orientation of furniture, specifics on power, cabling, etc., especially between the equipment room and operations, conduit locations, and color patterns for floors and walls. Attention this fall will be on establishing the needed communication lines, including a connection to the radar, satellite communication dishes, amateur radio antennas/ connections, implementation of an entirely new phone system, etc. Then there are various administrative actions required due to new contracts, billing address changes, property disposal at the old site, moving company coordination, notifications to partners and customers, continuity of operations planning, etc.

Getting there from here? Moving a 24x7 operations, even a short distance, is not trivial. This needs to be a well-orchestrated move to minimize impact to operations and service to our partners and customers. The move will trigger an activation of our Continuity of Operations Plan, which calls for the dispatch of some staff to the neighboring forecast office in Gray, ME. Forecast services will need to be handled from another Weather Forecast Office while core computer/communications equipment is moved to the new site. This could take anywhere from 24 to 72 hours. Once all crucial equipment and software are checked out, forecast operations will transfer from Gray to the new Norton office. Attention to detail in the planning stage will yield less stress during the actual relocation period. The actual move is targeted for late February or early March 2018.

Concluding thought. There is much excitement associated with a move to a new facility which is built to suit. And we are looking forward to both facility and equipment upgrades associated with this move. In the end, however, the most important component to the forecast process does not change. That's the people. In the eyes of this MIC, a dedicated, passionate, and professional staff remains the most important ingredient for service delivery to our partners and customers.

Be sure to follow **@NWS Boston** on Twitter

Be sure to like U.S. **@NWS Boston** on Facebook

2017 Southern New England Weather Conference

By Glenn Field, Warning Coordination Meteorologist

Since 2000, the Southern New England Weather Conference has provided a place for both seasoned weather professionals and enthusiasts alike to meet and share their knowledge and expertise in a friendly learning environment. We pride ourselves in covering a wide variety of topics that are presented in ways that can be appreciated by everyone, such as winter weather forecasting, severe weather, hurricanes, advances in the science of meteorology, history, emergency preparedness, as well as numerous other topics. The conference is sponsored by the not-for-profit Blue Hill Observatory Science Center. The National Weather Service in Taunton, MA helps construct the agenda.

Meditech – Foxboro, MA auditorium

This year, the conference will be held at Meditech Corporation, located in Foxboro, MA, (adjacent to the Marriott Courtyard) on Saturday, November 4th. You can see a full agenda, abstracts/bios, and register online at http://www.sneweatherconf.org/. The price of registration includes a continental breakfast and hot buffet lunch by Rita's Catering of Boston.

Speakers include:

- Dr. Kevin Kloesel, from the University of Oklahoma, discussing severe weather preparedness for large venues
- Dr. Michael Folmer, from the NOAA Center for Climate and Weather Prediction in College Park, MD, discussing the new GOES-16 satellite
- Adam LeWinter, from the U.S. Army Corps of Engineers in Hanover, NH, who was the researcher/videographer for the calving of the icebergs in Greenland ("Chasing Ice")
- Dr. Isaac Ginis from University of RI and Stephen Conard from the RI Emergency Management Agency, discussing the Hurricane "Rhody" planning exercise
- Hayden Frank, from NWS-Taunton, discussing two unusual tornadoes – the 2016 Concord, MA tornado (at 3 AM in the morning) and the Conway, MA tornado (in February, 2017)
- Steve Lehmann, from the NOAA/National Ocean Service Office of Response and Restoration, discussing weather forecasting as relates to oil spill response
- Dr. Lodovica Illari, from the Massachusetts Institute of Technology, discussing the life of Pauline Morrow Austin, who was the pioneer of weather radar research
- A.J. Burnett, from Channel 5 in Boston, discussing weather in the classroom
- TV Meteorologist Panel Discussion – including Harvey Leonard, Barry Burbank, Jacob Wycoff, Shiri Spear, Ryan Hanrahan, Michael Page, and Chelsea Priest ! This is always a fun session, answering questions submitted by conference registrants.

In addition, this year, the field of meteorology lost one of its great meteorologists and communicators – Dick Albert. We will be honoring Dick's memory by having a tribute presented by long-time WCVB News Anchor Natalie Jacobson and by his great friend Harvey Leonard.

Hope to see you there!

Learn more about the Southern New England Weather Conference: http://www.sneweatherconf.org

Ernest F. Hollings Undergraduate Scholars

Jonathan O'Brien

For the second year in a row, I spent much of my summer at NWS Boston. This time, I worked at the office conducting research as part of the NOAA Hollings Scholarship program. I was joined by my fellow Hollings scholar Katrina, who had her own project at the office. My research project was titled "Improving the Detection of New England Tornadoes." While tornadoes in Southern New England are uncommon, they can and do occur, and can be especially hazardous due to the high population density in much of the region. Recent high profile tornado events in Revere, MA, and Concord, MA, come to mind.

Over the summer, I analyzed seventeen tornado events in NWS Boston's area of responsibility dating back to 2007 in an effort to find patterns in how these events unfold. In addition to looking at synoptic and mesoscale environments conducive for tornadoes, I conducted an extensive radar study of the twenty-two individual tornadoes produced in these seventeen events. Some of what I did was primarily an update of prior research done over 10 years ago, with some supplementation added in. While an important update, I most enjoyed branching the project out over this previous research such as through the use of higher resolution modern radar programs and through a fresh look at the meaning behind certain larger scale weather patterns. I am hopeful that the results of my project will prove useful for future tornado forecasting at NWS Boston. Research on synoptic and mesoscale environments for past tornadoes will help to heighten forecaster awareness days in advance of a potential severe weather event. In addition, I have worked on the development of some new, quantitative, radar-based guidelines for tornado formation and warning in hopes of improving the probability of tornado detection. All this has led to an update of the NWS Boston "Tornado Playbook", which forecasters can quickly access and reference. The goal of all this is to detect an impending tornado before it forms. That would allow for a better rate of tornado warnings being issued in advance of tornado formation, giving those in the path of a potential tornado precious minutes to seek shelter. Even before then, forecasters can communicate threats in advance, allowing people to be more weather-aware and recognize that watches and warnings have a higher than normal likelihood of being issued on a certain day.

While I spent a lot of time on my research, I also had plenty of time to experience the operational aspect of the NWS through shadowing the various forecast desks at the office and working with the AWIPS computer and data system. Active weather days in particular featured a lot of excitement. We had a few interesting severe weather days in June and July. Those days resulted in a lot of radar watching and a very busy office. It was interesting to see how all the meteorologists take on different roles during a severe weather event and to sample those roles myself. Some people monitor radar and issue warnings, some monitor social media, others prepare storm report products for the public, and still others carry on with routine forecasting. In addition to our work in the office, Katrina and I had the opportunity to attend a Skywarn training class and visit the Center Weather Service Unit in Nashua, NH with NWS meteorologists.

My internship experience culminated in a one week symposium at NOAA headquarters in Silver Spring, MD. Along with nearly 150 other Hollings scholars from across the country, we met to present our summer project findings. We all prepared either posters or PowerPoints (mine was a PowerPoint) which summarized our findings. The symposium week was a great way to cap off the summer's work. Seeing the various projects from other Hollings scholars was a valuable learning experience.

All in all this summer was a one of a kind experience, and a very rewarding one. I would highly recommend any college students studying in any NOAA-related field to look into the Hollings Scholarship and how it can propel your career forward. I owe a big thank you to the staff at the NOAA Office of Education for making that possible. I would also like to thank everyone at NWS Boston for their gracious hospitality this summer, and especially Joe Dellicarpini for his mentorship on my project. I'm sure our paths will cross again in the years ahead!

Ernest F. Hollings Undergraduate Scholars

Katrina Fandrich

This past summer I was fortunate enough to be one of two Hollings interns at the National Weather Service in Taunton, MA. As part of the Hollings program, I was required to complete a 10-week internship during the summer before my senior year. I was also required to work on a research project and present my findings at the Science and Education Symposium, in Silver Spring, MD, at the end of the summer. While I was searching for internships, I came across the "Tropical Reanalysis Project" at NWS Taunton and I knew right away that I wanted to spend my summer working on it. Hurricanes have always been fascinating to me and this was a great opportunity for me to pursue my interests. My project focused on hurricanes and other tropical systems that have impacted the New England area since 1851. I used data from the National Hurricane Center's HURDAT 2 file to determine exactly where each of these systems made landfall in New England. I then determined each system's position up to 120 hours before landfall. Ultimately, I was able to produce storm track maps that show the probabilistic location of a New England-affecting tropical system at a particular time before landfall. These maps are currently being used by FEMA Region I emergency managers to better prepare for and respond to future tropical weather events in the New England area. I really enjoyed working on this project and I hope to bring it to the Northeastern Storm Conference in Spring 2018.

NWS Hollings Scholars Katrina Fandrich and Jonathan O'Brien

In addition to working on my project, I got to learn about the National Weather Service and the different operations that go on there every day. By shadowing the different forecasters at the office, I was able to learn each person's duties and how those duties change in different weather situations. I learned how short and long term forecasts are made using the AWIPS system, how marine and aviation forecasts are made, and how forecast discussions are written. I even got to help out during severe weather events by monitoring social media and entering local storm reports into the system. It is extremely important that all of these tasks are done well and in a timely manner so that the public can have the most up-to-date and accurate weather information possible. When I wasn't working on my project or shadowing, I was doing other things such as attending office meetings and going on short field trips. For example, I completed a SKYWARN training session in Peabody, MA, where I learned how to spot severe weather and properly report it to the NWS. I also visited the Center Weather Service Unit in Nashua, NH, where aviation forecasters provide information to air traffic controllers in the area. During Hurricane Preparedness Week, I attended a conference call at the MEMA Region I office in Framingham, MA. This was a neat experience for me because I got to meet the director of MEMA and some of the emergency managers who respond to New England-affecting tropical systems. I also got to tour the Northeast River Forecast Center, which is located right inside the Taunton WFO. It was very interesting to see how the forecasters at the NWS and the RFC interact with each other to provide the best water forecasts possible. I never realized that there was such a strong link between hydrology and meteorology. Finally, at the end of the summer, I got to travel to NOAA Headquarters in Silver Spring, MD to present my project to the other Hollings scholars and the Hollings scholarship team.

Throughout my internship, the entire staff at NWS Taunton was extremely helpful and hospitable. Everyone was very enthusiastic and eager to show me what they were working on, even if they were busy. I am especially grateful for my mentor, Joe Dellicarpini, who selected me as an intern and helped me get my project moving by giving me all the materials I needed to complete it. Whenever I had questions about my project, or just in general, Joe was always available to help. I also want to thank my co-mentor, Matt Belk, who provided me with copious amounts of information and helped me complete some of the more difficult parts of my project. Last, I want to thank NOAA and the Hollings Scholarship Program for giving me such a great opportunity to learn and network. I look forward to starting graduate school next Fall and then hopefully pursuing a career with NOAA/NWS.

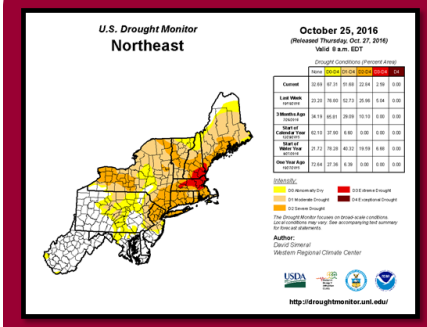


Figure 1

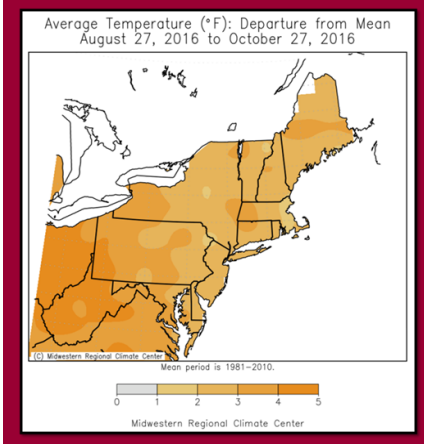


Figure 2

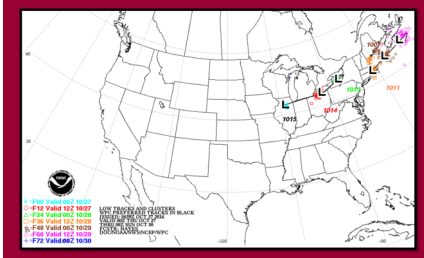


Figure 3

The Early Season Snow Event From October 27th, 2016

By Frank Nocera, Lead Forecaster

Last autumn featured extreme drought (figure 1) along with anomalous warmth as temperature departures were as high as +3 to +4 degrees Fahrenheit. warmer than normal from August through October (figure 2). This certainly set the stage for meteorologists and the general public to have low situational awareness for a potential early season snow event.

Many ingredients needed to come together for accumulating snow to materialize. Given the recent warm weather from previous months and the ground still warm (October), heavy precipitation would be required to cool the ground via melting snow for accumulations to eventually occur especially on paved surfaces. In addition, the duration of heavy precipitation would need to last at least several hours for sufficient cooling to occur. Lastly, timing was critical as parent low pressure over the Ohio Valley would need to weaken and given way quickly to a new area of low pressure over southeast New England (figure 3). This would be required to cut off low level warming into New England via southeast winds off the ocean.

Early on our snowfall forecast were light (figure 4), however later forecasts trended upward (figure 5).

As the event neared a Special Weather Statement (figure 6) was issued to increase public awareness on the potential for accumulating snow across western MA especially at elevations above 1000 ft. Details in the statement included the complexity of this potential snow event.

Cont'd on page 9

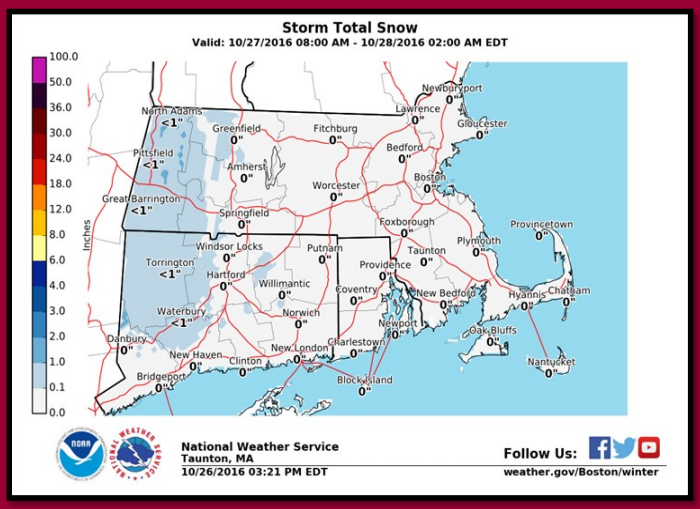


Figure 4

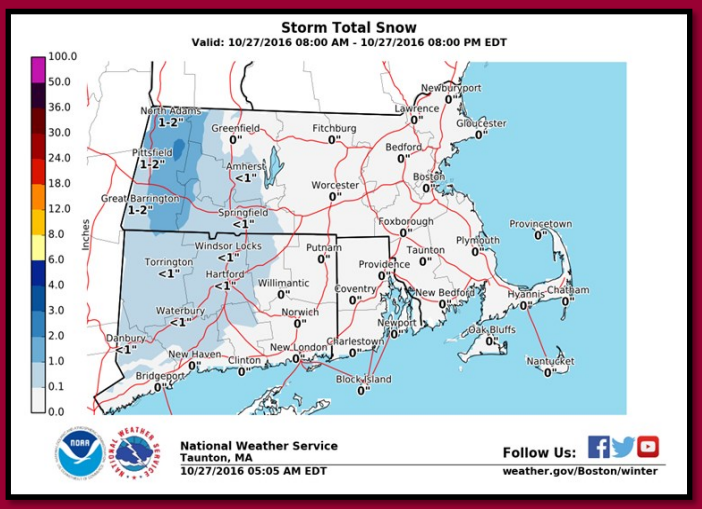


Figure 5

The Early Season Snow Event (Cont'd)

By afternoon the 27th radar (figure 7) confirmed that heavy precipitation would overspread northwest CT and western MA (reflectivity up to 50 dbz!), resulting in a period of heavy wet snow. Observed snowfall totals (figure 8) shows a large area of 3-6" of amounts across western MA, greater totals than expected. Even a few inches were observed down to the valley floor of northern CT into MA including Bradley International Airport.

Given the marginal temperatures the content of the snow was very wet and heavy that resulted in numerous down tree limbs and powerlines yielding many power outages in western MA (Figure 9), typical of an early season event.

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SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE TAUNTON MA
737 AM EDT THU OCT 27 2016

MAZ002-008-009-271600-
WESTERN FRANKLIN MA-WESTERN HAMPSHIRE MA-WESTERN HAMPDEN MA-
INCLUDING THE CITIES OF...CHARLEMONT...CHESTERFIELD...BLANDFORD
737 AM EDT THU OCT 27 2016

...ACCUMULATING SNOW POSSIBLE LATE THIS MORNING AND AFTERNOON ESPECIALLY
AT ELEVATIONS ABOVE 1000 FT...

SNOW WILL OVERSPREAD WESTERN MASSACHUSETTS LATE THIS MORNING AND
EARLY AFTERNOON. TEMPERATURES WILL BE AT OR JUST ABOVE FREEZING
DURING THIS TIME. THEREFORE ANY MINOR SNOW ACCUMULATIONS WILL BE
CONFINED TO NON PAVED SURFACES WITH MAIN ROADS REMAINING WET.

HOWEVER THERE IS A LOW RISK FOR A PERIOD OF MODERATE SNOW TOWARD
MID TO LATE AFTERNOON BEFORE SNOW CHANGES OVER TO SLEET AND THEN
ALL RAIN TOWARD SUNSET. ITS DURING THIS TIME THAT THE INCREASE IN
PRECIPITATION INTENSITY MAY RESULT IN TEMPERATURES FALLING BACK
TOWARD FREEZING AND SNOW BRIEFLY ACCUMULATING WITH ROADS BECOMING
SNOW COVERED. THE GREATEST RISK FOR THIS OCCURRING WILL BE MID TO
LATE AFTERNOON AT ELEVATIONS ABOVE 1000 FT ACROSS HAMDEN...
HAMPSHIRE AND FRANKLIN COUNTIES OF MASSACHUSETTS. SNOW
ACCUMULATIONS OF 1 TO 3 INCHES ARE POSSIBLE ACROSS THIS AREA.

ROAD CONDITIONS WILL IMPROVE BY THIS EVENING AS SNOW AND SLEET
CHANGE TO ALL RAIN TOWARD SUNSET ALONG WITH TEMPERATURES CLIMBING
THROUGH THE 30S AND INTO THE 40S.

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Figure 6

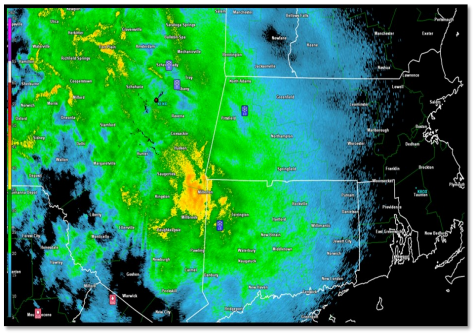


Figure 7

In summary, this was an anomalous early season heavy wet snow event that proved very difficult to forecast given uncertainty on multiple parameters (would snow intensity be great enough to overcome warm ground temperatures, marginal air temperatures to support snow & would duration of snow be long enough for significant accumulations to be realized?). This event is also a reminder that past weather trends are no indication of future weather trends. Anomalous weather events occur regardless of antecedent conditions.

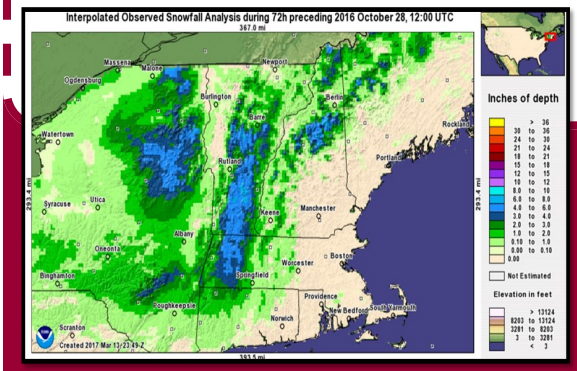


Figure 8

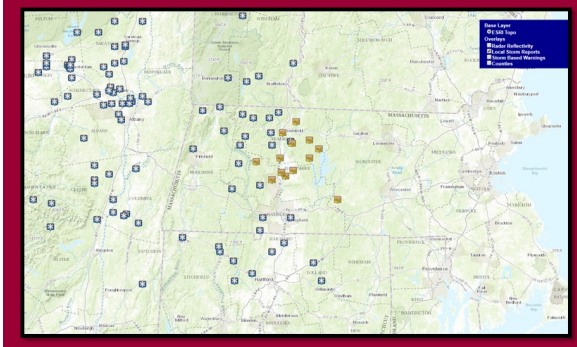


Figure 9—brown icons indicate downed tree limbs

Greenfield, MA - October 27th, 2016 Photo: Steve & Chris Gencarelle

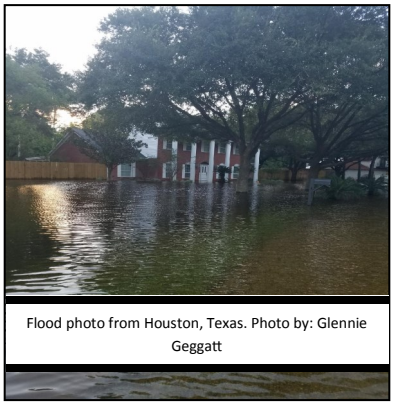
REMEMBER!:
Winter Weather Preparedness Week
Oct 30th — Nov 3rd

WX1BOX Amateur Radio Operators Support Hurricane Net Activations

By Robert Macedo, WX1BOX Amateur Radio Operator

Hurricane Harvey

The WX1BOX Amateur Radio team as well as SKYWARN trained amateur radio operators from several states supported the VoIP Hurricane Net during Hurricanes Harvey, Irma, Maria, and Tropical Storm Jose. The VoIP Hurricane Net is a net that utilizes hybrid amateur radio systems that can connect through the Internet to gather reports from the affected area of hurricanes.



Flood photo from Houston, Texas. Photo by: Glennie Geggatt

The VoIP Hurricane Net was activated during Hurricane Harvey as it made landfall in Rockport Texas. Wind measurement and damage reports were received from the affected area with structural damage reports from Rockport to Corpus Christi. As Harvey slowed down over Texas, heavy rainfall and flooding became the main threat and occurred across Houston as Port Arthur, Graves, and Beaumont, Texas. The VoIP Hurricane Net took the unusual step of staying active informally for several days to monitor the ongoing flooding situation and obtain rainfall reports for use by local National Weather Service Offices and the National Hurricane Center. Rainfall amounts in excess of 50" were recorded in Houston, Texas. This caused catastrophic flooding, resulting in flood rescues. These were handled by the Hurricane Net and passed on to the United States Coast Guard.

Hurricane Irma

The next activation was for Hurricane Irma, across the Caribbean islands and Puerto Rico. A weather station on Barbuda measured sustained winds of 108 mph with a gust to 155 mph before the wind instrument on the station malfunctioned. Initial damage reports that significant structural damage had occurred on the eastern end of the island of Barbuda were relayed into the VoIP Hurricane Net. On Antigua, reports of downed trees and wires and sustained wind speeds of hurricane force with wind gusts to around 100 mph were estimated by amateur radio operators on the island. There were downed trees and wires and power outages and some damage to a few roofs of homes but the worst damage in their region was on the island of Barbuda. As Irma made its way to St. Maarten/St. Martin and Anguilla, reports of structural damage, significant coastal flooding, trees, wires, poles down and power outages were received. A weather station run by VP2EL-Larry Scott and sponsored by the Anguilla Department of Disaster Management recorded a sustained wind speed of 82 mph with a wind gust of 117 mph before the wind gauge on the station malfunctioned. As Irma moved into the U.S. and British Virgin Islands and Culebra, Puerto Rico, widespread tree and wire damage was common along with structural damage to homes. In Bovoni, St Thomas U.S. Virgin Islands, sustained winds of 82 mph with gusts to 113 mph were reported before the weather station lost its wind instrument. In Culebra, Puerto Rico, a wind gust to 86 mph was recorded before the station went offline. Damage reports, photos and videos were forwarded from amateur radio and other social media sources to the National Hurricane Center.

Tree damage in Live Oak Florida from Hurricane Irma from KK4EYX-Alex Melia

Photo of storm damage from St Maarten from PJ2BR-Brett Ruiz and Family

The VoIP Hurricane Net reactivated on September 9th for Hurricane Irma as it approached Florida. Amateur radio operators from over a half dozen states assisted with running the net. The net handled a report of a tornado on the ground with damage to trees and wires in Homestead Florida. Reports of wind damage and measured wind gusts from the net included wind gusts as high as 133 mph at the University of Miami. Widespread wind damage was reported along with rainfall in the 4-8" range with rainfall totals in some locations close to and above 10". The Florida Keys sustained some of the most significant damage with coastal storm surge flooding and hurricane force winds causing structural damage to homes and buildings across that area. Power was out for over 5 million people in Florida with outages lasting up to a week in some areas. The net was in continuous operation for a little over 48 hours in formal net mode.

Hurricane Maria

The next major activation of the VoIP Hurricane Net was for Hurricane Maria as it approached the island of Dominica, the U.S. Virgin Islands, and Puerto Rico. Many citizens' homes were left with significant damage as Dominica took a direct hit from Hurricane Maria and overflowing rivers caused significant flooding across the entire island. These reports, along with others, were published in the National Hurricane Center Advisory on Monday September 18th at 11 PM. Some of the reports were recorded and can be heard at the following link: https://www.youtube.com/watch?v=OSdd4jo-MQk&feature=youtu.be

Tree and amateur radio antenna damage in San Juan, Puerto Rico – Photo by: NP3OD-Francisco Diaz

Hurricane Maria then moved across the U.S. Virgin Islands and Puerto Rico. Numerous amateur radio operators across the United States supported VoIP Hurricane Net activities during Hurricane Maria. Maria brought severe wind damage as well as heavy rainfall and significant flooding issues. Both NP3OD-Francisco Diaz and KB2WUS-Francisco relayed numerous reports from contacts in Puerto Rico of roof damage, storm surge, tree, power line and infrastructure damage. Wind reports from Juncos, Puerto Rico of sustained winds of 90 mph and a gust of 118 mph were recorded before the station went offline.

Following the destruction of Hurricane Maria, the American Radio Relay League (ARRL) received a nearly unprecedented request for 50 amateur radio operators to deploy to Puerto Rico to support communications for the Red Cross. In less than a week, the deployed amateur radio operators have been providing communications for police and fire departments, logistics support for supplies across Puerto Rico, and have put together Amateur Radio equipment infrastructure to support communications on the island. The "force of fifty" as is called by the ARRL has done tremendous work that has been noticed at the highest levels of the U.S. government and FEMA.

Tropical Storm Jose

Tree down in New Bedford Mass – Photo by: N1YLQ-Mike Leger

While Maria was impacting Puerto Rico and the United States Virgin Islands, Tropical Storm Jose passed close enough to the Southeast New England coast to bring tropical storm force conditions similar to a nor'easter to Southern New England. Amateur Radio Operators from WX1BOX handled reports from Jose in parallel with support for Hurricane Maria. Isolated to scattered pockets of tree and wire damage occurred in portions of Eastern New England with storm surge causing damage to a number of boats on Nantucket Island and Southeast Coastal Massachusetts. The highest wind gusts recorded were 63 mph in Wareham, Mass, 62 mph on Nantucket, and 60 mph in New Bedford. Rainfall was measured anywhere from 1-4" in Southeast New England with higher amounts over 6" on parts of Nantucket Island.

You can follow WX1BOX on Twitter and like our WX1BOX Facebook page. Our Facebook page also has photo albums from the various severe weather events from the Spring 2017 season and we also have our wx1box.org web site as a source for SKYWARN information. The links appear below:

WX1BOX Facebook Page: @WX1BOX

WX1BOX Twitter Feed: @WX1BOX

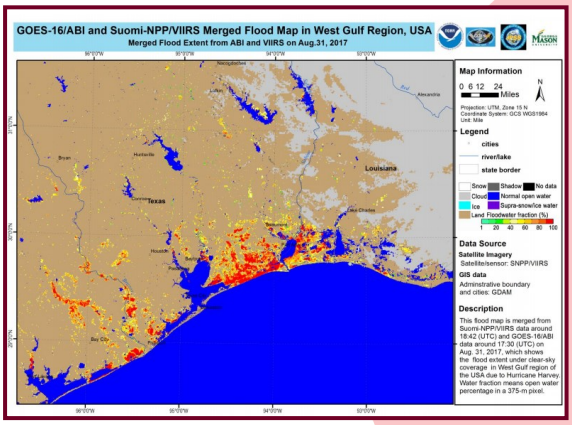
WX1BOX Web Site: http://www.wx1box.org

Thanks again to all SKYWARN Spotters for their support during the 2017 Spring/Summer Season including those who supported the VoIP Hurricane Net during a very active 2017 Hurricane Season. We look forward to working with everyone in the 2017-2018 winter weather season!

The One NOAA Hurricane Response

By Stephanie Dunten, Forecaster

The National Oceanic and Atmospheric Administration (NOAA) is a science-based federal agency within the Department of Commerce with regulatory, operational, and information service responsibilities. Through its long-standing mission of science, service, and stewardship, NOAA generates tremendous value for the Nation by advancing the understanding of and ability to anticipate changes in the Earth's environment, by improving society's ability to make scientifically informed decisions, and by conserving and managing ocean, coastal, and resources. This mission has been on display over the past few months as NOAA has been at the forefront of hurricane preparedness, response and recovery.



Since May of this year, NOAA has begun to use a new weather prediction tool – the dynamic core, Finite-Volume on a Cubed-Sphere (FV3), to provide high quality guidance to NOAA's Hurricane Center through the 2017 season. Developed by NOAA's Geophysical Fluid Dynamics Laboratory, the FV3 will be used to power experimental hurricane forecast models that will run parallel to the operational forecast models. This is a start of a major transition of the FV3 for NOAA operational weather forecasting, expected to be completed in 2019.

Miami-Dade police officers Abel Lopez and Levy Semino, with the NOAA Coast Survey MIST team Michael Annis,

This type of advancement in modeling has helped aid in improvement to hurricane forecasting. Ahead of Maria, the National Hurricane Center began posting advisories 5 days in advance. Irma had a similar amount of lead time before it made landfall on the Florida Keys. At the local weather forecast offices, briefing packets and heads-up e-mails were sent nearly a week in advance of each hurricane to state and local emergency managers as well as city officials and other federal partners. This information allowed for decision makers to prepared and brought in necessary resources ahead of the storms. Forecasters continued to work during the event to make sure this level of service continued. In fact, to help out affected offices, the National Weather Service deployed additional forecasters from other parts of the country to help operations during the storms.

Preflight briefing for the next flight into Irma on WP-3D Orion NOAA42 and G-IV NOAA49.

Forecasters were not the only ones wading out during the storms. NOAA Fisheries employees from the Galveston, Texas Laboratory went above and beyond the call of service to help during Hurricane Harvey. On August 27th, NOAA Fisheries' employees Kris Benson, Jennifer Doerr and Jen Leo helped saved lives in flood stricken Texas. This team was searching for Harvey survivors when Kris heard someone shouting for help. Grappling with disabilities, a couple needed aid as their home was threaten by rising water. Kris was able to navigate debris-loaded water to rescue them.

While models are improving, they wouldn't be where they are today without current observations. The NOAA Hurricane Hunter crews and scientists from the Office of Marine and Aviation Operations flew a number of missions on Hurricane Harvey, Irma & Maria aboard one of NOAA's Lockheed WP-3D Orion's and NOAA's Gulfstream IV-SP. These flight missions collected vital data that was used by NOAA researchers, modelers and forecasters to predict each hurricanes' paths and forecast the potential impacts.

The One NOAA Hurricane Response (Cont'd)

During the aftermath of the storm, several NOAA resources were used to help with recovery efforts. NOAA's GOES-16 and NOAA-NASA (National Aeronautics and Space Administration) Suomi NPP satellites were used to monitor the flooding from Hurricane Harvey & Irma. Images from the two satellites were merged to create a detailed and comprehensive flood zone map which covers vast areas. The maps allow officials to quickly determine where to employ limited resources during a flood. They also allow for insight into where water is receding. This highly valuable information was given to community officials to help them determine, in combination with other critical resources, when it was safe for people to return to their homes. The maps were provided to FEMA during the catastrophic flooding of Hurricane Harvey & Irma.

NOAA Fisheries' Kris Benson, Jennifer Doerr, and Jen Leo helped save lives in flood-stricken Texas. Kris rescued this couple on August 27 when their home, built 11 feet above ground, was threatened with fast-rising water. As NOAA's Galveston team searched for Hurricane Harvey survivors, Kris heard the couple's daughter shouting for help. Grappling with disabilities, the couple had only one way out of their home, and Kris navigated debris-loaded water to rescue them.

NOAA Coast Survey's navigation response teams (NRT), personnel and survey assets were positioned in preparation for the aftermath of each storm. Their response efforts and logistics were closely coordinated by Coast Survey's Navigation Services and Hydrographic Surveys divisions which include regionally located navigation managers, NRTs, and survey ships. This combination of expertise ensured that they were often the first ones on the water after each hurricane, making sure there is no hidden debris or shoaling that posed a danger to navigation. Once the teams notified the United States Coast Guard of their findings, the ports were reopened and resumed shipping, and homeland security or defense operations continued.

Lastly, the Office of Response and Restoration provided scientific support and assessment of pollution in the aftermath of each Hurricane. Principal tasks include vessel and hazardous waste identification in marine waters, sensitive habitat and species mapping, and prescribing best practices for environmental protection during vessel and hazmat removal operations. The NOAA Marine Debris Program supported recovery efforts by collecting and coordinating information on marine debris, including that of grounded and sunken vessels, orphan containers, household hazardous wastes, and general structural debris.

These are just some of the examples of how NOAA works together before, during and after a hurricane. While the recovery efforts are still ongoing, just know that NOAA is doing all that it can to help open ports, pinpoint the worst flooding and prepare emergency officials of any upcoming hazardous weather.

Be sure to find

NWS Boston

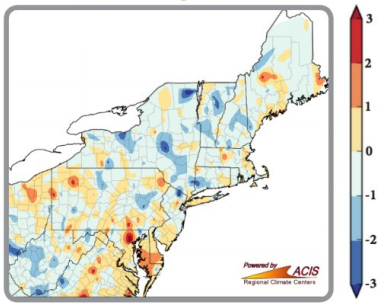
on YouTube

Quarterly Climate Impacts and Outlook – Northeast

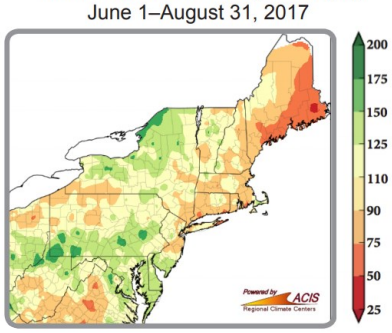
By Ellen Mecray, Regional Climate Services Director

Climate Overview for June–August 2017

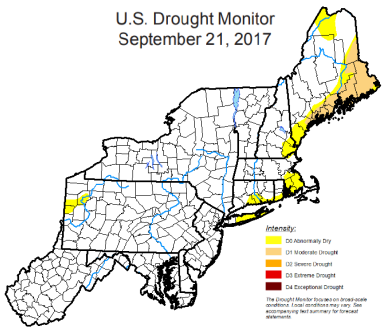
Departure from Normal Temperature (°F)
June 1–August 31, 2017



Percent of Normal Precipitation (%)
June 1–August 31, 2017



U.S. Drought Monitor
September 21, 2017



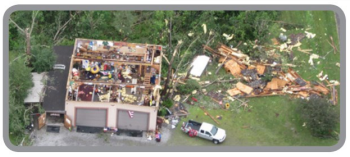
The Northeast received 107% of normal rainfall during summer. Seven of the twelve states were wetter than normal, with Delaware having its 13th wettest summer since 1895. June precipitation was 105% of normal, with six dry states and six wet states. Delaware and Maryland had their 7th and 19th driest Junes on record, respectively, while Vermont had its 8th wettest. The Northeast had its 18th wettest July with 120% of normal rainfall. This July ranked among the top 20 wettest for all six wetter-than-normal states. August precipitation was 92% of normal, with eight states seeing below-normal precipitation. Rhode Island had its 12th driest August on record, while Delaware had its 16th wettest.

Summer was 0.3°F colder than normal for the Northeast. Nine of the twelve states experienced below-normal temperatures. In June, the Northeast was 0.2°F warmer than normal. Nine states were warmer than normal, with Delaware having its 10th warmest June since 1895. The Northeast was 0.2°F warmer than normal in July. Six states were warmer than normal, with Maryland and Delaware ranking this July among their top 20 warmest on record. In August, the Northeast was 1.3°F colder than normal. It was the first time since March 2015 that all 12 states had a monthly average temperature that was colder than normal. Drought in the Northeast

Normals based on 1981–2010

The U.S. Drought Monitor released on June 8 showed the Northeast was free of abnormal dryness and drought. However, abnormal dryness was introduced in southern portions of the region mid-month and in Maine and Long Island by early July. As of July 4, 3% of the Northeast was abnormally dry. During July, dryness eased in southern areas, but expanded in Maine, southeastern New Hampshire, and Long Island. Moderate drought was introduced in Maine in early August. As of August 3, 2% of the Northeast was in moderate drought and 8% was abnormally dry. During August, dry conditions expanded in parts of New England. By September 7, 5% of the Northeast was in moderate drought and 8% was abnormally dry.

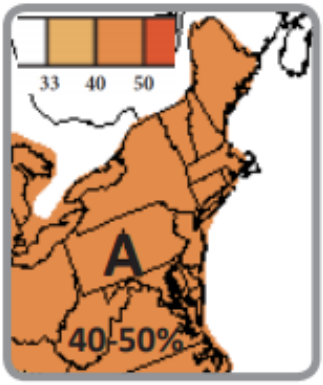
Severe Weather in the Northeast June– August 2017



In Maine, a state that averages only two tornadoes a year, the Gray National Weather Service office issued seven tornado warnings on July 1st, 2017, their greatest number ever for any day or year. Five weak (EF-0 or EF-1) tornadoes actually touched down, the most Maine has had in a single day. In mid-to late July, EF-2 tornadoes touched down in eastern Maryland and western New York, severely damaging homes. The New York tornado also caused up to $3 million (estimated) in damage at the Erie County Fairgrounds. The last EF-2 or stronger tornado in Maryland was in 2004 and in New York was in 2014. Clarion County, PA, had six tornadoes from January through mid-August 2017; however, between 1950 and 2016 the county only had eight tornadoes. Severe storms also produced straight line winds of up to 100 mph and large hail. The hail damaged crops in parts of the region.

Quarterly Climate Impacts and Outlook – Northeast (Cont'd)

Climate Overview for June–August 2017



A: Above-normal
EC: Equal chances of above-, near, or below-normal
#: Probability of above-normal

Normal October– December average temperatures range from the low 30s in northern New England to the low 50s in the Mid Atlantic. NOAA's Climate Prediction Center (CPC) is calling for an increased chance of above-normal temperatures (left map) for the Northeast for October–December. The precipitation outlook calls for equal chances of below-, near-, or above-normal precipitation for the entire Northeast. Normal October–December precipitation ranges from less than 8 inches in portions of western New York and eastern West Virginia to more than 14 inches in portions of New England and southeastern and northern New York. While ENSO-neutral conditions were in place as of mid-September, CPC said there is an increasing chance (55–60%) of La Niña during autumn and winter 2017–18. The U.S. Seasonal Drought Outlook indicated that drought conditions are expected to ease in Maine due to "the approach of the cold season and a climatological increase in widespread storm activity

Atlantic Hurricane Season

NOAA's 2017 Atlantic hurricane season outlook called for an active season. Already by mid-September, there have been 13 named storms, close to the season average. The outlook updated on August 9 calls for 14–19 named storms, including 2–5 major hurricanes, slightly more than the May outlook. Factors contributing to the updated forecast include storm activity through early August, the decreased likelihood of El Niño, warmer-than-normal waters in the tropical Atlantic Ocean, and computer model forecasts. The Atlantic hurricane season runs from June 1 to November 30, with the peak of the season from mid-August to late October. In mid-August, Hurricane Gert caused high waves, rough surf, and rip currents along the Northeast coastline. Two major hurricanes, Harvey and Irma, were record setting. Based on preliminary data, Hurricane Harvey dumped up to 51.88 inches of rain on southeastern Texas in late August, which could become the all-time greatest rain total from a single storm in the continental United States. In early September, Hurricane Irma maintained max winds of 185 mph for 37 hours, longer than any other cyclone across the globe according to a report from Colorado State University. These two storms did not significantly impact the Northeast.

	Through Sep. 20	Aug. 9 Outlook	Average Season
Number of Named Storms	13	14-19	12
Number of Hurricanes	6	5-9	6
Number of Major Hurricanes	4	2-5	3

Award Spotlight

10 years of Service: Timothy Morrissette, Site Supervisor at the Chatham Upper Air Site

After graduating from UMASS Lowell in 2006 with a Bachelor's Degree in Atmospheric Science, Tim knew he wanted to stay in New England to look for work. In the fall of 2006 he came across a job opportunity for a part-time upper air weather observer which eventually led him to landing the Site Supervisor position. Tim currently work for Condor Reliability Services, Inc. which has held the upper air contract for most of the time he has been employed at the Chatham Upper Air Site. Tim and his crew successfully launch weather balloons in all conditions (except thunderstorms) every 12 hours (every 6 hours when approved for severe weather, or when hurricanes/blizzards are approaching); monitor/edit all the upper air data that the radiosonde sends back (pressure, temp, humidity/dew point, wind speed and direction) and transmit that data to the National Weather Service to be used in the weather forecast models. The NWS upper air observation network remains critical for forecasting and is the backbone for weather forecasting. Recording/observing what is going on at all levels of the atmosphere through launching weather balloons is vital to the forecast process.

Tim currently lives in Dennis, MA with his wife (of 10 years) and 10-month old son, Preston. When he is not helping his wife care for his son, he enjoys playing softball on his church's softball team, watching the Patriots (of course), and playing with his dogs, or reading.

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The National Weather Service provides 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. NWS 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.

Meteorologist in Charge: **Robert Thompson**

Warning Coordination Meteorologist: **Glenn Field**

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Editor: **Lenore Correia**