FALL 2021 | SKYWARN NEWSLETTER

THE KEYSTONE CROSSWIND

National Weather Service
State College, PA

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WINTER SAFETY CAMPAIGN

Building a Weather-Ready Nation

The winter safety campaign began on December 1st. Help spread weather safety awareness!

Visit the links below for outreach resources:

- Weather-Ready Nation website: https://www.weather.gov/wrn/
- Social Media Plans: https://www.weather.gov/wrn/winter-campaign-sm-plan
- Infographics: https://www.weather.gov/wrn/infographics_winter
- Videos: https://www.weather.gov/wrn/Videos
- Spanish-Language Content: https://www.weather.gov/wrn/winter-espanol-sm

RETIREMENT OF OUR METEOROLOGIST-IN-CHARGE, BARB WATSON

by MIC Barb Watson

After 39 and a half years with the National Weather Service (NWS), I am retiring. I fell in love with weather as a kid growing up northeast of Philadelphia. I remember big snow storms, flooding from Agnes, thunderstorms and tornadoes. I went to Penn State receiving a Bachelors of Science in Meteorology and while a student, I got a summer job at the Anchorage Alaska Forecast Office. At that point my interests moved from research to forecasting. From there I got an internship at the World Weather Building in Camp Springs Maryland and Graduated in December 1983. I was offered a job at the NWS Forecast Office in Fairbanks, Alaska. I was 23 years old and my first solo forecast shift included an aviation forecast that Air Force One would use to land President Reagan for refueling on a flight from Japan.

From Fairbanks, I went to Albuquerque and then back to the DC area. I helped move the office to Sterling, VA and became the first woman Warning Coordination Meteorologist (WCM) in the country. As one of the first five WCMs, I got to help write the book so to speak on this new management position in the NWS - literally, the "WCM Job Aid". While in Sterling, I got to brief President George W Bush, as well as some Senators and Governors. I flew in helicopters over tornado damage, sailed on a Sloop (sail boat) with Cadets from the Naval Academy around the Delmarva Peninsula and did some work for the World Meteorological Organization (WMO) traveling to Geneva Switzerland. I designed the first multi-state hurricane exercise and designed and organized the Tri-Agency logoed weather hazard brochure layout, writing and publishing the first of the set "Winter Storms...The Deceptive Killers". I received a Bronze Medal for these efforts. I wrote the first comprehensive severe weather safety plan for schools which was adopted by FEMA and received the NWA Public Education Award.

After 14 years in Sterling, I became the Meteorologist in Charge of the NWS Binghamton Forecast office and after 10 years there, I returned to Happy Valley as the Meteorologist in Charge of WFO State College. It has been a wonderful 7 years here. I have worked with awesome people dedicated to a great mission of saving lives and property from hazardous weather and a vision for a Weather Ready Nation!

Weather Service and all of us at NWS State College will be sad to see her go. We all wish her a happy, healthy, and relaxing retirement - she's earned it!

- NWS State College

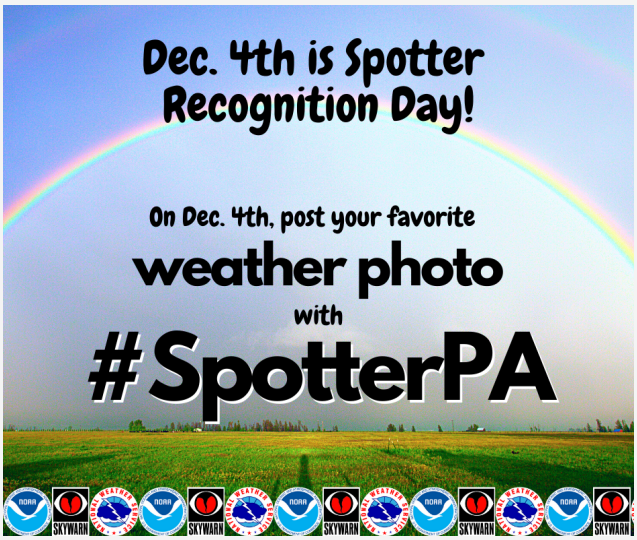
SKYWARN RECOGNITION DAY

by Lead Meteorologist Matt Steinbugl

SKYWARN Recognition Day will be held on December 4, 2021 from 0000 to 2400 UTC. SRD was developed in 1999 by the National Weather Service (NWS) and the American Radio Relay League (ARRL). It celebrates the contributions that SKYWARN volunteers make to the NWS mission: ***Provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy.***

Amateur Radio operators comprise a large percentage of the SKYWARN volunteers across the country. These Amateur Radio operators also provide vital communication between the NWS and emergency management if normal communications become inoperative.

All SKYWARN spotters provide critical weather information before, during, and after adverse weather strikes. This includes reports of rain and snow, ice and wind, storms and tornadoes, flooding and fire. This 24-hour period is the one way the NWS recognizes all of the SKYWARN spotters serving the nation!

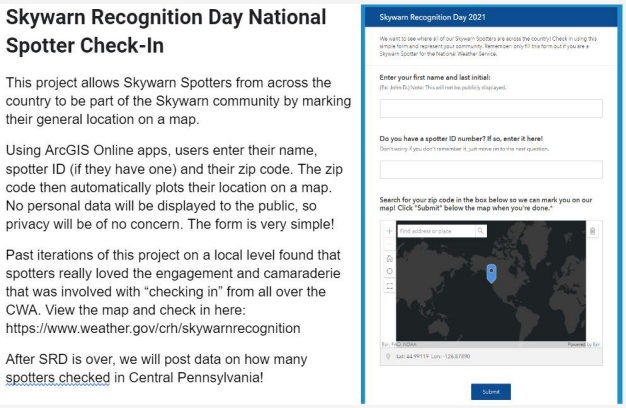


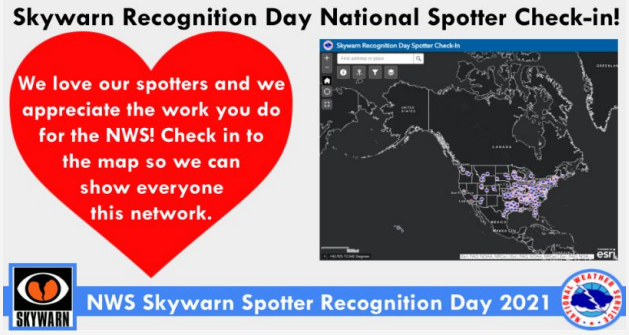
On December 4th, head on over to social media and post your favorite weather photo with the hashtag #SpotterPA.

The NWS State College station (WX3CTP) will be on the air between 11AM and 12PM (16-17UTC). We will broadcast a SKYWARN Recognition Day message around 1130AM (1630 UTC) and our primary amateur radio operators (Greg Guise K3HOT and Carmine Prestia K3CWP) will collect reports via SKYWARN nets on the 146.85 and 443.425 repeaters. Please use the following report format:

- Call-sign and Spotter # (if any)
- Time of observation
- Location
- City
- Temperature
- Relative Humidity
- Barometer (rising, steady, or falling)
- Winds: Beaufort Scale if not measured
- Rainfall (measured only)
- Conditions: clear, partly cloudy, cloudy, partly sunny, overcast, etc.

Stations operating HF can record their contacts and submit to SKYWARN Recognition Day page. For a list of participating NWS offices, go to the SKYWARN Recognition Day web site at https://www.weather.gov/crh/skywarnrecognition and click on "Participants" under "Event Resources. Additional event information is available there as well.





Check in and plot yourself on the map! Head on over to ***https://www.weather.gov/crh/skywarnrecognition*** *to add yourself.*

SNOW SQUALL AWARENESS WEEK

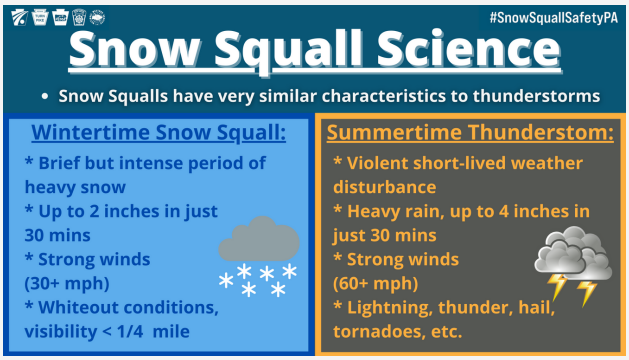
by Meteorologist Michael Colbert

When you think of winter weather hazards, what comes to mind? Do you think of big snow storms that drop a significant amount of snow? Do you think of ice storms that cover trees, powerlines, and roadways in a glaze of ice? Or maybe you think of flooding that can occur when a storm drops heavy rain on top of melting snow, overwhelming creeks, streams, and rivers with water.

Snow Squalls occur suddenly and are extremely dangerous to motorists. There is no safe place on a highway during a snow squall. Graphic by NWS Student Volunteer Nick Deamer

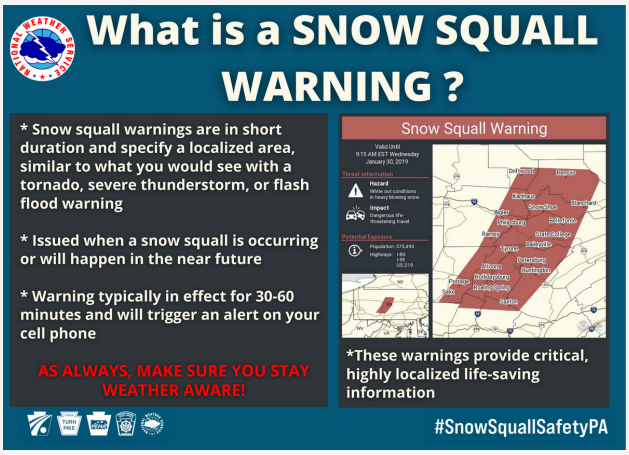
Pennsylvania sees many forms of hazardous winter weather. Here, we discuss snow squalls. A snow squall is a brief but intense period of heavy snow (up to 2 inches in 30 minutes), strong winds (30+ mph), and whiteout conditions (visibility less than ¼ mile). Snow squalls often occur on days with otherwise partly cloudy skies. Coming on suddenly, snow squalls can catch drivers off guard and lead to major transportation impacts, including deadly multi-vehicle accidents.

One of the things that makes snow squalls so dangerous is that they produce icy roadways. Since snow squalls usually occur on days with partly cloudy skies, road surface temperatures can start off well above freezing before snow squalls arrive. When snowflakes start to fall, they initially melt on the warm road surface, making the road wet. However, as the snow becomes heavier and air temperatures fall, the road surface cools and liquid water turns to ice. Ice can also form when moving traffic drives over fallen snow, packing it down and warming it just enough to become icy.



Graphic by NWS Student Volunteer Nick Deamer

The National Weather Service uses several tools to predict and detect snow squalls. First, they analyze weather model simulations and apply the latest forecast methods to diagnose setups that are favorable for the development of snow squalls. When snow squalls are anticipated, the NWS gets the word out through their forecast discussions, social media, and special weather statements. The National Weather Service briefs their partners, including PennDOT, PEMA, and many others in public safety and emergency management. Broadcast meteorologists also do a great job in getting the forecast out to the public.



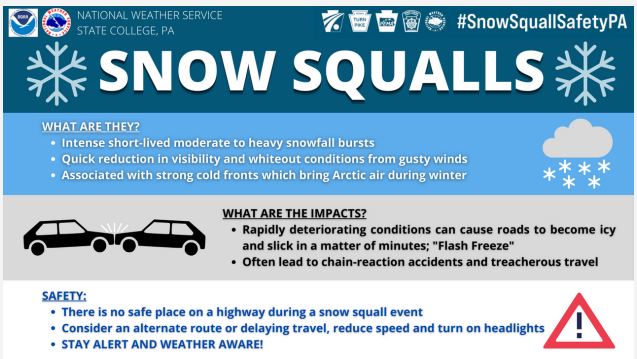
Graphic by NWS Student Volunteer Nick Deamer

As the snow squalls begin to develop, the NWS uses Weather Surveillance Radar and high-resolution satellite imagery to monitor their intensity and track their movement. The NWS also monitors ground-based weather observations from the Pennsylvania State Mesonet and the PennDOT Road Weather network. All of these instruments measure temperature, wind speed, and precipitation rate, and many of them also measure visibility and road surface temperature. SKYWARN observers also notify the NWS when they observe snow squalls.

In 2018, the National Weather Service began issuing Snow Squall Warnings to alert for the sudden onset of life-threatening conditions encountered by highway travelers during snow squalls. The warnings are "short-fused," only issued for up to about 1 hour, and are designed to be acted upon immediately. To make sure that the public receives them, these warnings activate the Wireless Emergency Alert system and will push audible alert notifications to smartphones.

If you are driving on an interstate when a Snow Squall Warning is issued, the best thing to do is to exit the roadway at the next opportunity. If you do get caught driving in a snow squall, avoid slamming on your brakes, turn on your headlights and hazard lights, stay in your lane, and increase your following distance.

Before you get on the road this winter, make sure you are weather-aware. Check the NWS forecasts at weather.gov and on social media. If a snow squall warning is issued by the National Weather Service, delay travel until after the snow squall moves through. Use the 511 PA App or visit 511pa.com to check the latest traffic conditions, traffic speeds, and live camera images.



Graphic by NWS Student Volunteer Nick Deamer

WINTER TORNADOES? IN PENNSYLVANIA?

by State Meteorologist Jeff Jumper (PEMA)

With a headline as such, you'd be pretty disappointed to find a one sentence article stating: "Of course not, it's winter." But in reality, Pennsylvania does have tornadoes tallied in the months of December, January, and February. What's more interesting is that about a third of them have occurred in the past decade! And prior to 2006, Pennsylvania even boasted a tornado-free winter month. Let's get down to business and dig-in to a little history of Pennsylvania's winter tornadoes.

We must begin with the caveats. First up, perspective. We didn't really begin counting tornadoes until 1950. There are spotty records from newspapers and other sources dating back to 1881, but the "official" story begins in 1950 when it comes to tracking these twisty 'naders. Even then, many went undetected until the advent of radar in the 1970s, with even more after improvements to radar in the 1980s. So, it shall be, the numbers will reflect the start of the Pennsylvania tornado era as 1950. Also, the F-scale was enhanced in 2007 to an EF-scale, so for the sake of consistency we'll refer to all on the EF scale in this article. Oh, and we're meteorologists and don't believe in that "astronomical calendar seasons" stuff…so we define winter as December through February. Ok, I think I laid out all the caveats…carry on.

Now, let's look at the raw numbers by month and then we can dig into to interesting stats, shall we?

PA Tornado Count by Winter Month:

December:	5	(1 EF-0 | 3 EF-1 | 1 EF-2)
January:	7	(2 EF-0 | 4 EF-1 | 1 EF-2)
February:	6	(0 EF-0 | 4 EF-1 | 2 EF-2)
TOTALS:	18	(3 EF-0 | 11 EF-1 | 4 EF-2)

December:

For decades, Pennsylvanian's lived without fear of tornadoes during the month of December. Then, in 2006, less than 24 hours into the month on December 1st, a line of severe thunderstorms ushered in meteorological winter. I, as a good meteorologist working his first TV job, did the proper thing and stood atop a four-story parking deck in Williamsport with my TV camera ready to capture history, (but for real…that was not the best idea). After one tornado early in Westmoreland County, the remaining four hit in the afternoon and early evening in Dauphin, Luzerne, and Pike counties. All five recorded December tornadoes touched down on that day! Sorry PA tourism…so much for marketing tornado-free PA visits in December. The lone EF-2 did some significant damage to grocery store in Luzerne County.

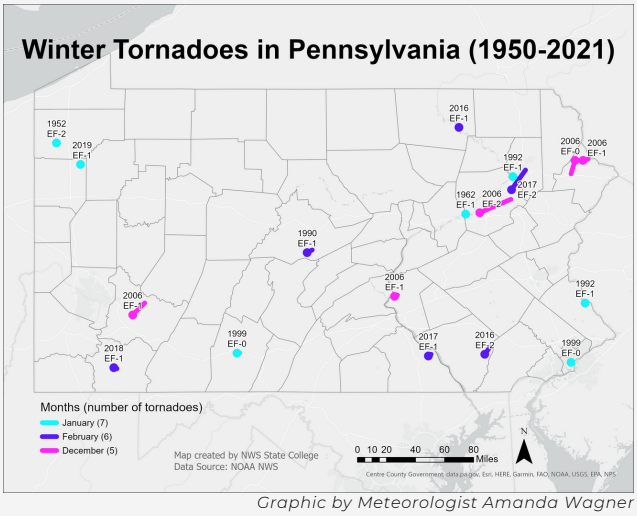
January

You don't have to flip the calendar back too far to grab the most recent January twister. Dateline: January 8, 2019 – Mercer County, PA, an EF-1 around lunch time. Now, we trek back to the '90s as the decade for January tornadoes. Albeit weak, a pair of EF-0 tornadoes were recorded in Bedford and Philadelphia counties in 1999 and a pair of EF-1 tornadoes hit Lackawanna and Bucks counties in 1992. Prior to the '90s, two additional tornadoes were recorded 1952 (Crawford) and 1962 (Luzerne).

February

Here's the kicker. Up until 2016, we only recorded ONE tornado in February. We go back to 1990, the decade for winter tornadoes it seems, to find the lone tornado, an EF-1 in Centre County. Fast forward to the 2010s, and in three back-to-back-to-back years, we recorded February tornadoes. In 2016 on the 24th, an EF-2 scarred the Lancaster County landscape, while an EF-1 damaged parts of Bradford County. One year and one day later, we repeat. On February 25, 2017, Luzerne and Lackawanna Counties are hit by an EF-2, crossing the northeast extension of the PA Turnpike, and leveling a horse barn near my hometown. I was there for the survey, and remember snow….yeah, snow, covering the damage. An EF-1 damaged York County near Wrightsville, also my old stomping grounds. I'm starting to think this is a personal attack. Finally, the day after Valentine's Day in 2018, the west sees an EF-1 in Fayette County. Five tornadoes in three years.

Damage from the Feb 2017 Luzerne EF-2 tornado.
Photos by Jeff Jumper



Graphic by Meteorologist Amanda Wagner

So, there you have it. Fifteen PA counties have recorded winter tornadoes, with Luzerne County recording three since 1950! Broken down further, a third of these winter tornadoes have occurred in the last five years, with five additional in the 2000s decade (all on one day), and five more on the books for the 1990s. We only have two winter tornadoes recorded prior to these recent events. A shift in weather patterns, warmer winters clashing with occasional bouts of cold weather are all playing a role in these tornado trends. So much for gathering dust on the tornado record books during the winter months.

A DRY FALL 2021 SO FAR

by Meteorologist Dave Martin

While the last few years have featured very wet months, some fall months not that long ago were on the dry side. Again, if one goes back only 10 to 15 years, we had periods of time in central Pennsylvania where we would have little precipitation for upwards of 3 to 4 weeks at a time. Research has shown that since the 1950s the climate has been getting wetter across the northeastern states, but drier across the southwestern states. Overall there has been wide swings in weather conditions across the country from decade to decade.

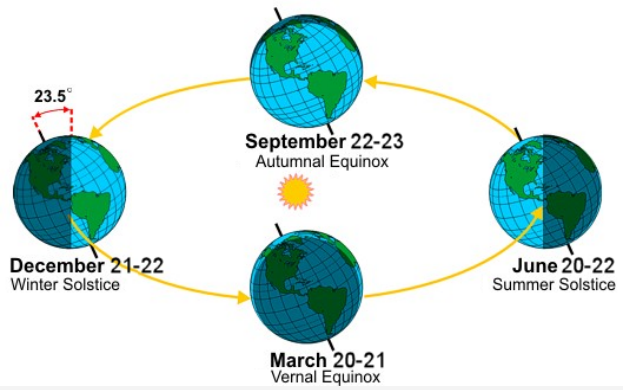
The 1800s were rather stormy and wet. My hometown of Rochester, NY saw some heavy rain events in 1872. This July Rochester, NY had 3.03 inches of rain on July 17th. This value broke the old record of 2.04 inches set back in 1873. The early 1900s were quite dry across the country. Forest fires were bad across the western states in some years. The 1930s featured the dust bowl era. The 1950s featured some rather hot temperatures, as was the case in the 1930s. The 1960s trended to be on the dry side as well. In the 1970s there was a trend toward wetter conditions. Many folks remember 1972, which was quite wet. Part of this was the excessive rains associated with Hurricane Agnes in June 1972.

What is interesting for central Pennsylvania that over half the driest Octobers and Novembers fall in the period of 1900 to 1931. For the month of October, five of the top ten driest Octobers at Williamsport fell between the years of 1900 to 1931. The driest in that range of years was 1930 with .25 inches of rain. For Williamsport, 7 of the top 10 driest Novembers fell in that same period. The driest was 1904 when .51 inches of precipitation occurred.

For Harrisburg, it was even more interesting. Five of the driest Octobers fell in the years of 1900 to 1931. The least was in 1924, when only .02 inches of rain fell in that October. For Harrisburg, 6 of the driest Novembers fell between the years of 1900 and 1931. The least amount of precipitation fell in 1909 with only 0.41 inches recorded.

Going back to October 1924 where only 0.02 inches of rain fell in Harrisburg; this was not only the driest October, but the driest month on record. Nearby Rochester, New York was dry in October 1924 as well. They had only 0.08 inches of precipitation in that October. Thus one was dealing with large scale patterns, just not a local minimum.

So far in this November we have seen a trend toward drier weather across the region as a whole. While frontal systems have been moving across the region, most of the time moisture is limited. The first third of this November was nearly dry for central Pennsylvania. The current pattern favors an active jet across the northern states, with a tendency not to tap much moisture from the southern part of the county.



The Winter Solstice will occur on December 21st, 2021. This will be the shortest day of the year in the northern hemisphere. After December 21st, days will become longer!

The Earth's tilt is responsible for the seasons. Without the tilt, the climate would feel the same all year long!

Given that Earth is tilted, this means that seasons are opposite in the northern and southern hemisphere. While we experience the Winter Solstice on December 21st, our friends south of the equator will be getting ready for pool parties on their Summer Solstice.

Fun fact: I had an international flight from Argentina to the USA in 2018, and I happened to be flying out on the Summer Soltice (southern hemisphere). I experienced both the Summer and Winter solstices on the same day!

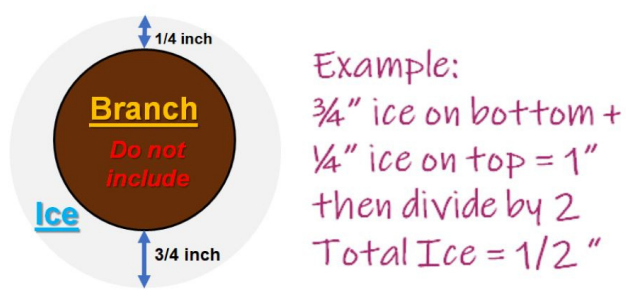
~ Meteorologist Rachel Gutierrez

WINTER WEATHER REPORTING

by WCM Jonathan Guseman

Winter or cold season SKYWARN reporting criteria is a bit different than that of the warmer seasons when we experience thunderstorms. The National Weather Service greatly appreciates any and all reports of snow and ice accumulations. The below graphic gives some general guidelines for measuring snow.

If ice accumulates on a radial surface, such as a tree branch, we ask that you please measure the ice on each side of the branch, average the two measurements, then send that average measurement into us.



If we are in a weather setup where we may be experiencing multiple precipitation types (rain, snow, sleet, freezing rain), we ask that you please let us know what precipitation type you are experiencing! This is very helpful in keeping our forecast and warning information as up-to-date and accurate as possible.

Of course, we always want to know about any flooding concerns, which in the winter may include flooding due to snow melt or ice jams. Wind damage is still solicited as well, even though it would likely be from non-thunderstorm winds in the winter months.

For additional information on the NWS State College Spotter Program, please visit https://www.weather.gov/ctp/SkyWarn.

Photo by Chelsea Newsock

HIGHLIGHTS OF THE SPRING AND SUMMER

by Meteorologist Dave Martin

After a rather sunny and dry March and April with quite a few days with low dewpoints and no severe weather, we saw our first round of severe storms on Tuesday May 4th. Up to this point we had not issued any severe thunderstorm or tornado warnings for the season. A tornado warning was issued for Elk County in the northwestern portion of Pennsylvania. Storms that formed were not real big, but developed quickly with tight rotation couplets. A short lived EF1 tornado did touch down.

As was the case the year before, the weather took a turn to below normal temperatures toward Mother's Day weekend. Snow flurries and record cold temperatures occurred across the region. There was not a lot more severe weather for the month, with one event just before Memorial Day weekend. Often Memorial Day weekend can be on the hot side with severe weather. This year Memorial Day weekend featured several days with cold temperatures and widespread rain and drizzle. Conditions did improve for Memorial Day.

June and July featured many days with storms. There were not a lot of days with dry weather; and the storms that occurred resulted in not only a lot of severe weather, but flooding as well. While August was not quite as active, there was still a lot of adverse weather. The second part of August featured several days with widespread storm activity due to the remnants of tropical systems. This trend carried over to the first day of September. The remnants of hurricane Ida dumped over 6 inches of rain across portions of southern Pennsylvania. This helped make this September one of the wettest on record.

Severe weather occurred past the typical ending date of Labor day into October this season. Tornadic storms were noted in western Pennsylvania on Saturday morning, October 16th. The feature that helped fire off this activity could be traced back to the central Great Plains. Tornado warnings were issued by the nearby office in Binghamton, NY for the Finger Lakes region of central New York. Warnings were issued all the way to the Syracuse area. The last tornado of the season so far for central Pennsylvania occurred in the same county, as the first one of the season. An EF-1 tornado touched down along the Clarion River that forms the border between Elk and Jefferson counties. About a week later, isolated strong winds occurred on Thursday, October 21st. Severe storms have just missed central Pennsylvania so far this November. Two rounds of severe storms have occurred just east of the Susquehanna Valley so far this November.

What has been interesting is that since 2018, it has been common to have months warmer than normal. At least in part this is due to low temperatures at night being well above normal. Also to note this summer was the number of days with abnormally high dewpoints. Thus while there has been rather long periods of dry weather the last few years, including this year, annual precipitation for many spots ends up being above normal anyway. Again we are seeing a lot of days with high dewpoints and nights were the temperature stays rather high. These mild nights are often when we have extensive cloud cover. The following are some precipitation values for each month.

April featured below normal rainfall for the month. May was a drier than normal month as well. While June featured a lot of severe storms, rainfall for much of the region remained below normal.

The month of July turned wet across much of the state, with many spots receiving upwards of 6 to 8 inches of rain during the month. Over half the days at Williamsport in July had at least 0.01 inches of rainfall. Nearby Scranton, had 14 days in July that featured thunder being recorded. Much of the rain for the month occurred on Saturday, July 17th. Many spots received 3 inches of rain on that day.

The wet trend continued into August, with many locations having over half the days in the month receiving at least 0.01 inches of rainfall. This led to many spots picking up over 6 inches of rain for the month.

The month of September was even wetter in most cases. The main change was the northwest portion of the Keystone State that featured drier than normal conditions. Much of the region picked up 8 inches of rain for the month of September. Harrisburg received 11.40 inches of rain in September. September 2011 remains the wettest on record. 2011 was the year that the remnants of tropical storm Lee dumped upwards of a foot of rain across the Susquehanna Valley.

The month of October saw a reduction in rainfall, but some spots still were above normal for the month. This October was the warmest on record for Harrisburg. The mean temperature at Williamsport for the month of October tied the record for the warmest there.

The first third of November has featured cooler temperatures to start, with plenty of sunshine and dry weather. For the same time period last year, we had record high temperatures for early November, with lots of sunshine. Normally November into December feature some of the cloudier weather in a typical year.

In summary, as of early November the weather service in State College has issued 31 flash flood warnings, 8 flood warnings, 21 river flood warnings, 289 severe thunderstorm warnings, and 11 tornado warnings for the year.

WINTER TERMINOLOGY

by the National Weather Service

Blizzard: Sustained winds or frequent gusts of 35 mph or more with snow and/or blowing snow, frequently reducing visibility to less than 1/4 mile for 3 hours or more.

Blizzard Warning: Issued for winter storms with sustained or frequent winds of 35 mph or higher with considerable falling and/or blowing snow that frequently reduces visibility to 1/4 of a mile or less. These conditions are expected to prevail for a minimum of 3 hours.

Blowing Snow: Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground that gets picked up by the wind. Blowing snow is usually accompanied by drifting snow.

Freezing Drizzle: Drizzle that falls as a liquid but freezes into a glaze or rime upon contact with the cold ground or surface structures.

Freezing Rain: Rain that falls as a liquid but freezes into a glaze upon contact with the ground.

Freezing Fog: Fog droplets that freeze upon contact with exposed objects and form a coating of rime and/or glaze.

Ice Storm Warning: Issued when freezing rain produces a significant and possibly damaging accumulation of ice. The criteria for this warning varies between regions, but typically will be issued any time more than 1/4-inch of ice is expected to accumulate in an area. Locally, this is the case for areas south of I-80, but the criteria is 1/2-inch of ice across the northern tier of PA.

Lake Effect Snow: Snow showers that are created when cold, dry air passes over a large warmer lake, such as one of the Great Lakes, and picks up moisture and heat.

Lake Effect Snow Warning: Issued when pure lake effect snow (this is where the snow is a direct result of lake effect snow and not because of a synoptic storm or low pressure system) is expected to produce 6 inches or more of snow in 12 hours.

Sleet: Rain or refrozen partially melted snowflakes that turn into ice pellets before reaching the ground.

Snow: Precipitation in the form of ice crystals, mainly of intricately branched, hexagonal form and often agglomerated into snowflakes, formed directly from the freezing [deposition] of the water vapor in the air.

Snow Squall: Brief, intense snow showers accompanied by strong, gusty winds. Visibilities of 1/4-mile or less may occur along with flash freeze conditions where the roadway turns into a sheet of ice.

Snow Flurries: Intermittent light snowfall of short duration (generally light snow showers) with no measurable accumulation (trace category).

Wind Chill Advisory: Issued when the wind chill could be life threatening if action is not taken. (wind chills of approximately -10F to -24F).

Wind Chill Warning: Issued when the wind chill is life threatening (Locally, wind chills -25F or colder).

Winter Storm Warning: Issued when a winter storm is producing or is forecast to produce heavy snow and/or significant ice accumulations. Local criteria is 6 inches of snow in 12 hours for much of central PA; 5 inches in 12 hours in the Lower Susquehanna Valley.

Winter Storm Watch: Issued when there is a potential for heavy snow and/or significant ice accumulations, usually at least 24 to 36 hours in advance.

Winter Weather Advisory: Issued for one of or a combination of winter weather hazards expected to remain below warning criteria. Local criteria for snow is 3 inches in 12 hours for much of central PA; 2 inches of snow in 12 hours in the Lower Susquehanna Valley. As far as ice is concerned, any impactful amount may justify an advisory.

WINTER OUTLOOK

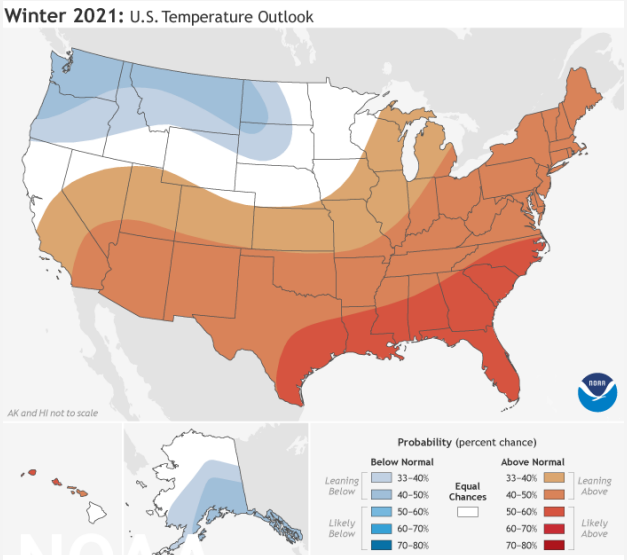
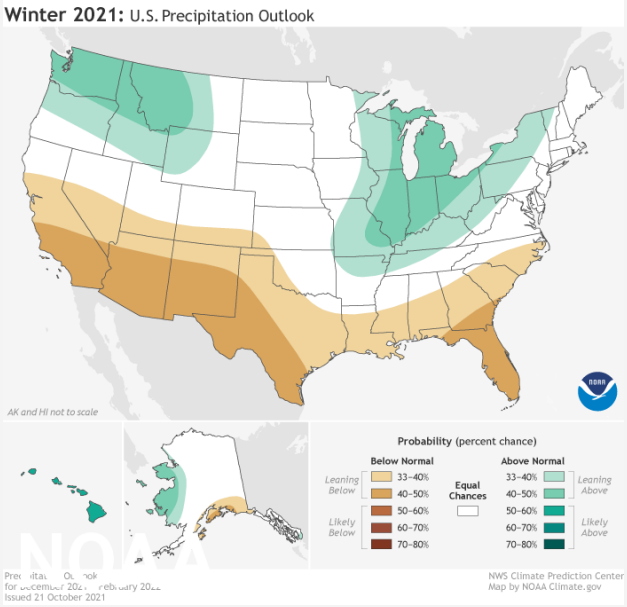
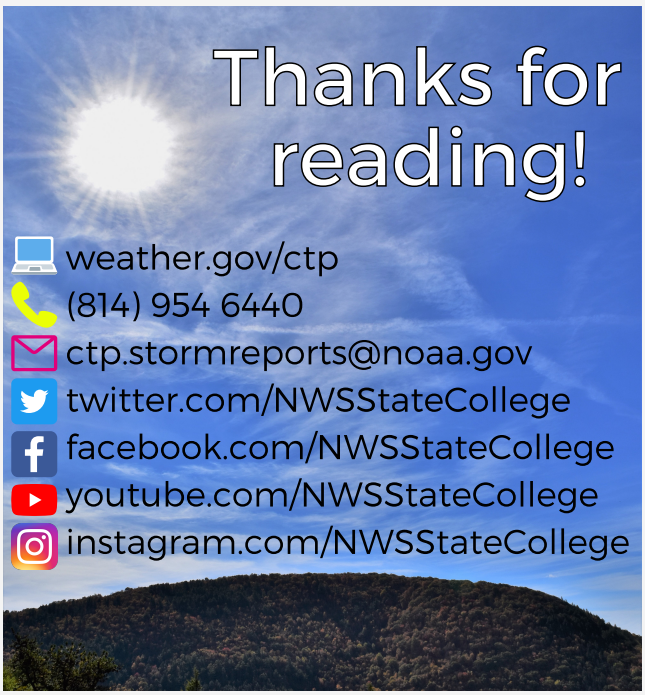
by NOAA

Temperature

- Warmer-than-average conditions are most likely across the Southern tier of the U.S. and much of the Eastern U.S. with the greatest likelihood of above-average temperatures in the Southeast.
- Below-average temperatures are favored for southeast Alaska and the Pacific Northwest eastward to the northern Plains.
- The Upper Mississippi Valley and small areas of the Great Lakes have equal chances for below-, near- or above-average temperatures.

Precipitation

- The Pacific Northwest, northern Rockies, Great Lakes and parts of the Ohio Valley and western Alaska have the greatest chances for wetter-than-average conditions.
- Drier-than-average conditions are favored in south-central Alaska, southern California, the Southwest, and the Southeast.
- The forecast for the remainder of the U.S. shows equal chances for below-, near- or above-average precipitation during winter months.

Drought

- Widespread severe to exceptional drought continues to dominate the western half of the continental U.S., Northern Plains, and the Missouri River Basin.
- Drought conditions are forecast to persist and develop in the Southwest and Southern Plains.
- The Pacific Northwest, northern California, the upper Midwest, and Hawaii are most likely to experience drought improvement.