

Weather Information & Links

ARES/RACES of Delaware County Pennsylvania

Exported on 12/30/2020

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Here you'll find general weather information, links to helpful websites and apps, as well as training that may be helpful.

Websites

- [National Weather Service Radar](#)(see page 90) official and newly revamped NWS site to show raw radar data in near real-time.
- [USGS Water Dashboard](#)(see page 30) this newly revamped dashboard can be extremely helpful in identifying or confirming flooding conditions when they occur.
- [USGS Steamflow Data](#)(see page 23) links to sensor sites in this area.
- [Weather Underground](#)(see page 38) provides the world's most accurate hyper-local weather forecasts in addition to an interactive weather radar, satellite maps and severe weather alerts. Powered by our unique community of weather enthusiasts reporting live data from over 270,000 personal weather stations, this crowd-sourced data generates accurate forecasts targeted to your precise location.
- [WunderMap](#)(see page 66) Weather Underground's WunderMap provides interactive weather and radar Maps for weather conditions for locations worldwide. By selecting a station nearest to your location, you can see real-time data points such as temperature, pressure, wind speed and gusts, along with much more.

Applications

- [Weather Underground](#)(see page 62) provides mobile apps for Android and iOS devices.
- [RadarScope](#)(see page 92) provides Windows and mobile apps on Android and iOS devices. RadarScope is a specialized display utility for weather enthusiasts and meteorologists that allows you view NEXRAD Level 3 and Super-Resolution radar data along with Tornado, Severe Thunderstorm, Flash Flood and Special Marine Warnings, and predicted storm tracks issued by the U.S. National Weather Service. It can display the latest reflectivity, velocity, dual-polarization, and other products from any NEXRAD or TDWR radar site in the United States, Guam, Puerto Rico, Korea, and Okinawa, as well as data from Environment Canada and Australian Bureau of Meteorology radars. These aren't smoothed PNG or GIF images, this is native radar data rendered in its original radial format for a high level of detail.

Training

- [Flooding - FEMA AWR-362 Flooding Hazards Course](#)(see page 21)
- [Hurricanes - FEMA AWR-343 Hurricane Awareness Course](#)(see page 72)
- [Tornadoes - FEMA AWR-326 Tornado Awareness Course](#)(see page 81)
- [Winter Weather - FEMA AWR-331 Winter Weather Hazards Course](#)(see page 96)

Tools

- [Measuring snowfall](#)(see page 98) where and how to measure snow for reports.
- [Hail Diameter Sizes](#)(see page 78) hailstone size is typically correspondent to the size of an object for comparative purposes.
- [Cloud Chart](#)(see page 36) for identifying types of clouds.
- [Personal Weather Station Buying Guide](#)(see page 37) recommendations from Weather Underground.
- [Using Radar](#)(see page 83) how to view and read raw NWS radar data.
- [Locate Tornado on Radar](#)(see page 87) using raw NWS radar data, here is how to look for a tornado debris field.
- [Locate Hail on Radar](#)(see page 85) using raw NWS radar data, here is how to detect hail on radar.

Measurements

- [Beaufort Scale](#)(see page 75) The Beaufort scale is an empirical measure that correlates wind speed to observed conditions at sea or on land.
- [Enhanced Fujita Scale](#)(see page 76) The Enhanced Fujita scale, an updated version of the original Fujita scale that was developed by Ted Fujita with Allen Pearson, assigns a numerical rating from EF0 to EF5 to rate the damage intensity of tornadoes.
- [Saffir-Simpson Hurricane Wind Scale](#)(see page 79) The Saffir–Simpson hurricane wind scale, assigns a numerical classification of hurricanes into five categories distinguished by the intensities of their sustained winds.
- [Wind Alert Terms and Signal](#)(see page 80)

Flooding

- [USGS Streamflow Data](#)(see page 23)
 - [Brandywine Creek at Chadds Ford, PA](#)(see page 24)
 - [Chester Creek near Chester, PA](#)(see page 25)
 - [Cobbs Cr at U.S. Hghwy No. 1 at Philadelphia, PA](#)(see page 26)
 - [Crum Creek near Newtown Square, PA](#)(see page 27)
 - [Delaware River at Chester, PA](#)(see page 28)
 - [Ridley Creek at Media, PA](#)(see page 29)
- [USGS Water Dashboard](#)(see page 30)

General Weather

- [Cloud Chart](#)(see page 36)
- [Personal Weather Station Buying Guide](#)(see page 37)
- [Weather Underground](#)(see page 38)
 - [Aston Township, PA Weather Conditions | Weather Underground](#)(see page 41)
 - [Brookhaven, PA Weather Conditions | Weather Underground](#)(see page 42)
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 - [Thornton, PA Weather Conditions | Weather Underground](#)(see page 59)
 - [Villanova, PA Weather Conditions | Weather Underground](#)(see page 60)
 - [Wayne, PA Weather Conditions | Weather Underground](#)(see page 61)
- [Weather Underground Application](#)(see page 62)
 - [Weather Underground on Google Play](#)(see page 64)
 - [Weather Underground on iTunes Store](#)(see page 65)
- [WunderMap | Interactive Weather Map and Radar | Weather Underground](#)(see page 66)

Hail

Hurricanes

Related Weather Scales

- [Beaufort Scale](#)(see page 75)
- [Enhanced Fujita Scale](#)(see page 76)
- [Hail Diameter Sizes](#)(see page 78)
- [Saffir-Simpson Hurricane Wind Scale](#)(see page 79)
- [Wind Alert Terms and Signal](#)(see page 80)

Tornadoes

Using Radar

- [Locate Hail on Radar](#)(see page 85)
- [Locate Tornado on Radar](#)(see page 87)
- [National Weather Service Radar](#)(see page 90)
 - [NWS Radar KDIX](#)(see page 91)
- [RadarScope Application](#)(see page 92)
 - [RadarScope on Google Play Store](#)(see page 93)
 - [RadarScope on iTunes Store](#)(see page 94)
 - [RadarScope on Microsoft Store](#)(see page 95)

Winter Weather

- [Measuring Snowfall](#)(see page 98)

Flooding

Flooding

Flooding hazards can threaten any community in any location in the United States. Flooding can occur over a period of weeks or days, or minutes.

You can check the [USGS National Water Dashboard](#)(see page 30) to get flow rates and gage height of rivers at certain positions in Delaware County and Southeastern PA. This newly revamped dashboard can be extremely helpful in identifying or confirming flooding conditions when they occur.

FEMA AWR-362 Flooding Hazards Course

Flooding hazards can threaten any community in any location in the United States. Flooding can occur over a period of weeks or days, or minutes, thus this course focuses the identification and assessment of hazards due to flooding to enable proper preparedness and response. As flooding is one of the top meteorological killers in the United States, and poses particular hazards to emergency responders, this introduction to recognizing flooding threats is essential for developing safe communities.

Flooding Hazards: Science and Preparedness is an awareness-level, eight-hour course that addresses the current science of the causes of floods (both meteorological and otherwise), flood forecasting, flood risk assessment, and best practices for preparation and mitigation for both short- and long-fuse flooding events. Key concepts and discussion topics will be reinforced with facilitator-led group activities that utilize real-world flood scenarios. These activities will illustrate the diverse challenges and complexities that can occur during actual flood events while building participants' experience and confidence in anticipating, heeding warnings, and responding to floods.

The goal of this course is to prepare participants to recognize the conditions that lead to flood events, evaluate their community's risk, and prepare appropriately.

Course Modules:

- Science of Flooding
- Flood Risk
- Flood Forecasting and Public Information
- Safe Preparation and Mitigation for Floods



PG_AWR-362_Flooding_Hazards.pdf

USGS Streamflow Data

- Brandywine Creek at Chadds Ford, PA(see page 24)
- Chester Creek near Chester, PA(see page 25)
- Cobbs Cr at U.S. Hghwy No. 1 at Philadelphia, PA(see page 26)
- Crum Creek near Newtown Square, PA(see page 27)
- Delaware River at Chester, PA(see page 28)
- Ridley Creek at Media, PA(see page 29)

USGS Water Dashboard

USGS Streamflow Data

USGS Data Links

[Brandywine Creek at Chadds Ford, PA](#)

[Chester Creek near Chester, PA](#)

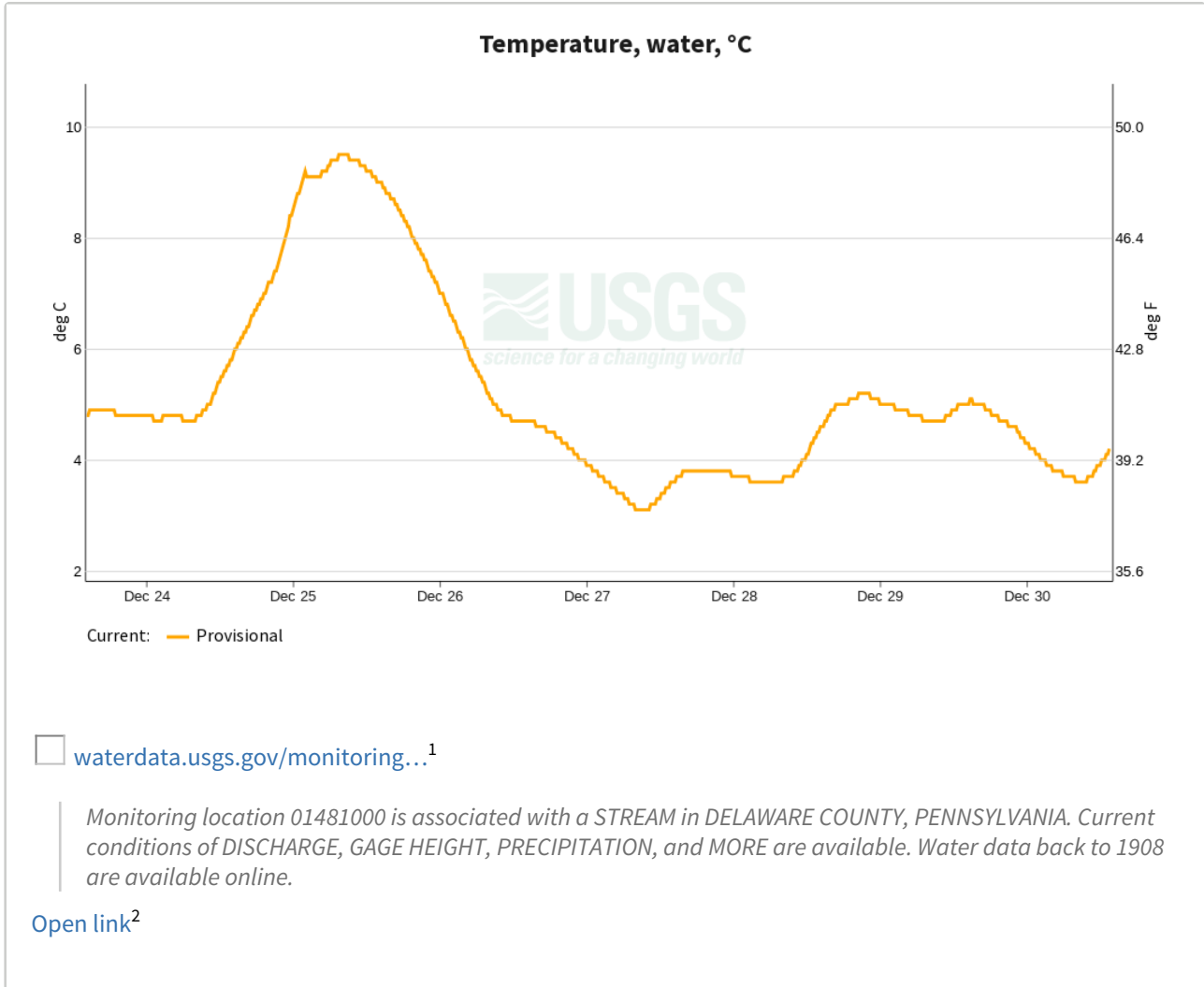
[Cobbs Cr at U.S. Hghwy No. 1 at Philadelphia, PA](#)

[Crum Creek near Newtown Square, PA](#)

[Delaware River at Chester, PA](#)

[Ridley Creek at Media, PA](#)

Brandywine Creek at Chadds Ford, PA



¹ <https://waterdata.usgs.gov/monitoring-location/01481000/>
² <https://waterdata.usgs.gov/monitoring-location/01481000/>

Chester Creek near Chester, PA

waterdata.usgs.gov/monitoring...³

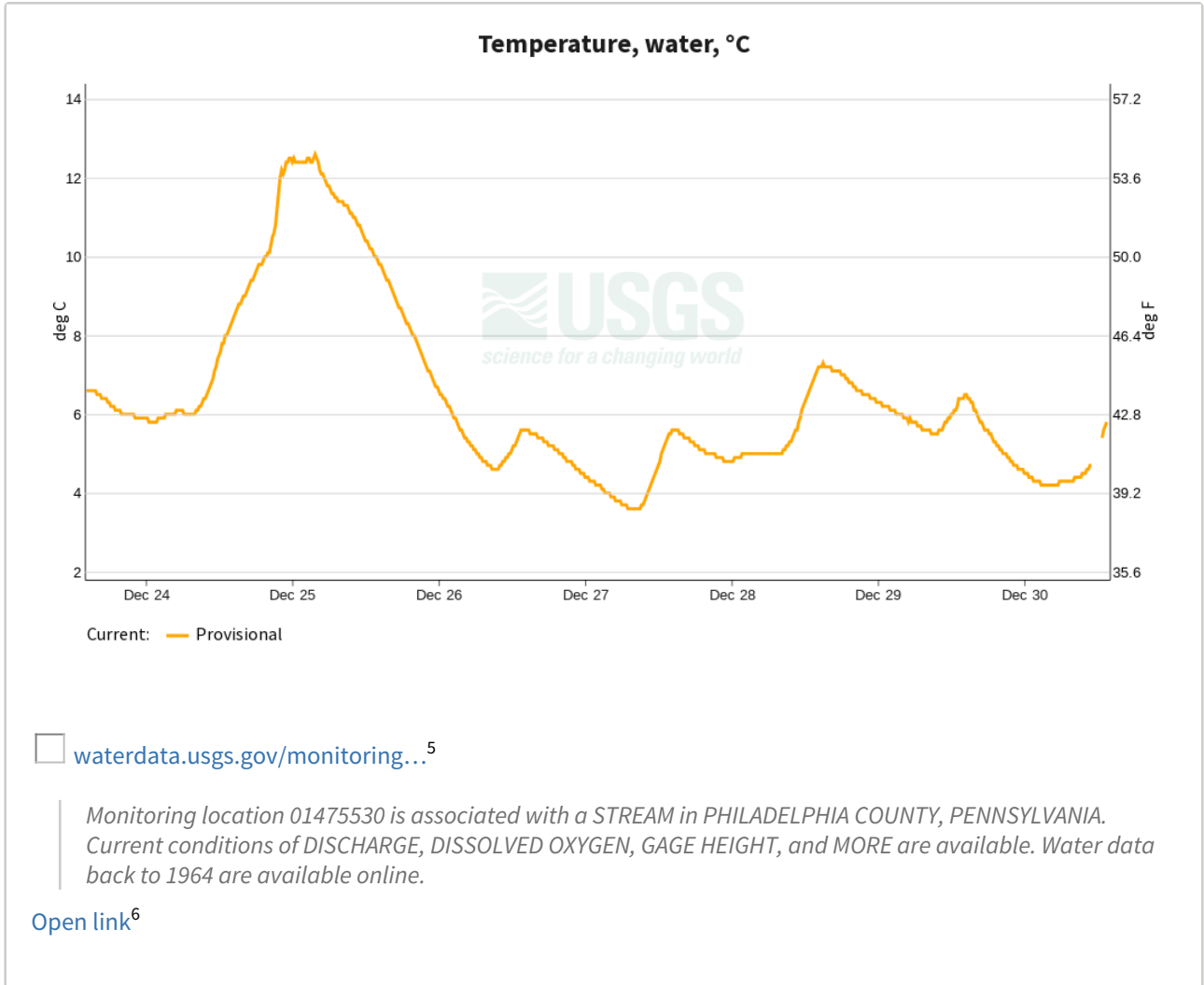
Monitoring location 01477000 is associated with a STREAM in DELAWARE COUNTY, PENNSYLVANIA. Current conditions of DISCHARGE and GAGE HEIGHT are available. Water data back to 1931 are available online.

[Open link](#)⁴

³ <https://waterdata.usgs.gov/monitoring-location/01477000/#parameterCode=00065>

⁴ <https://waterdata.usgs.gov/monitoring-location/01477000/#parameterCode=00065>

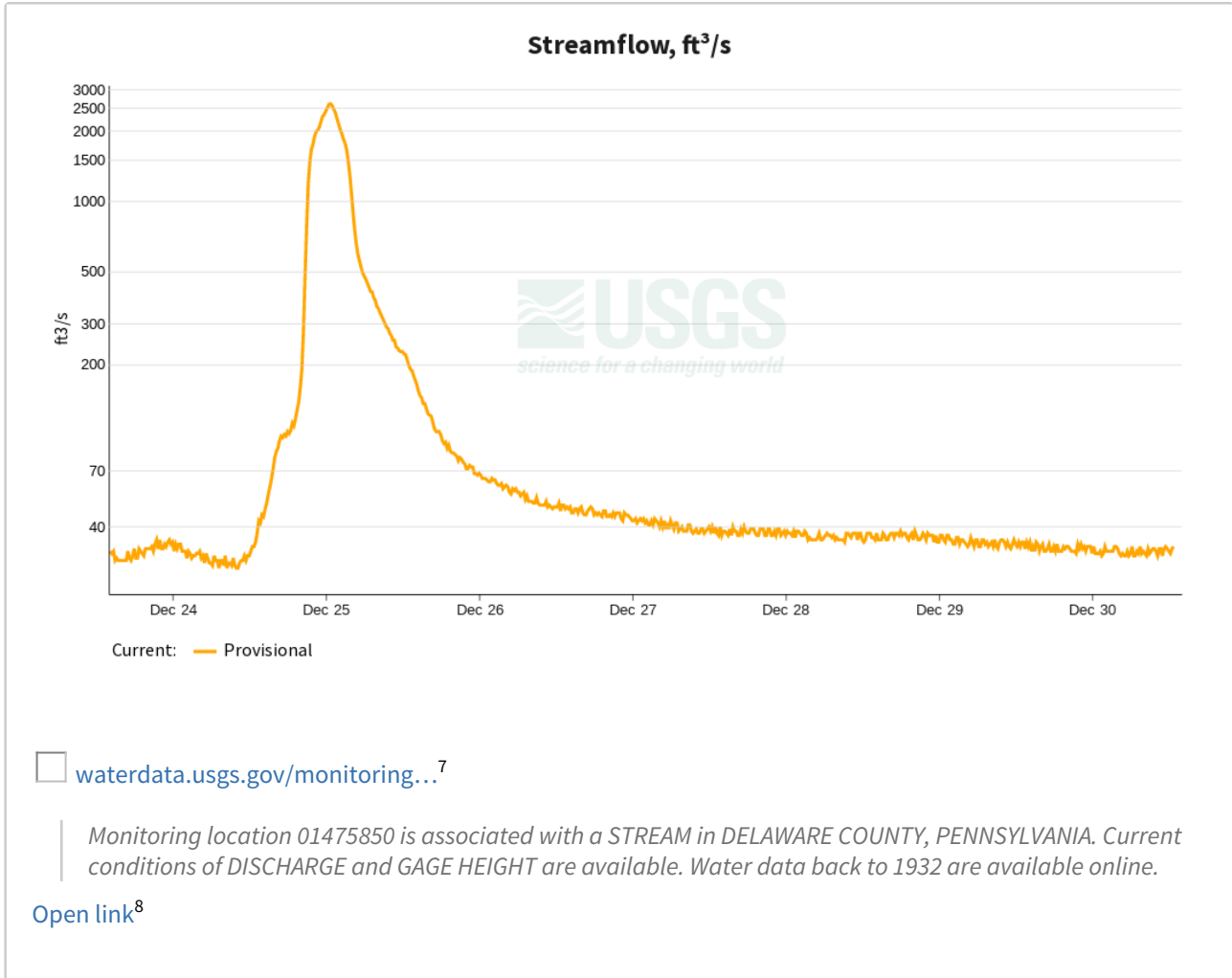
Cobbs Cr at U.S. Hghwy No. 1 at Philadelphia, PA



⁵ <https://waterdata.usgs.gov/monitoring-location/01475530/#parameterCode=00065>

⁶ <https://waterdata.usgs.gov/monitoring-location/01475530/#parameterCode=00065>

Crum Creek near Newtown Square, PA



⁷ <https://waterdata.usgs.gov/monitoring-location/01475850/#parameterCode=00065>

⁸ <https://waterdata.usgs.gov/monitoring-location/01475850/#parameterCode=00065>

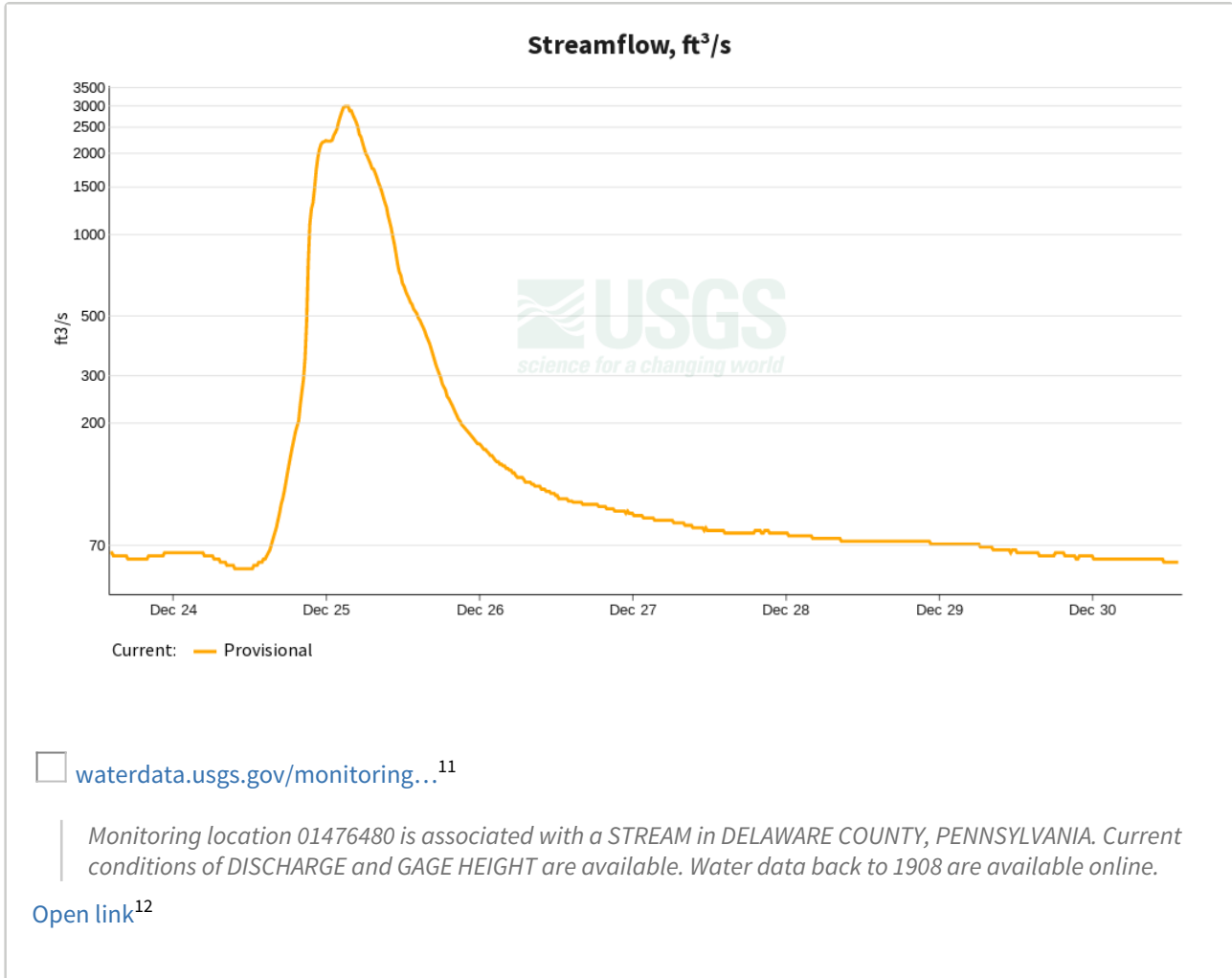
Delaware River at Chester, PA



⁹ <https://waterdata.usgs.gov/monitoring-location/01477050/#parameterCode=72147>

¹⁰ <https://waterdata.usgs.gov/monitoring-location/01477050/#parameterCode=72147>

Ridley Creek at Media, PA



¹¹ <https://waterdata.usgs.gov/monitoring-location/01476480/#parameterCode=00065>

¹² <https://waterdata.usgs.gov/monitoring-location/01476480/#parameterCode=00065>

USGS Water Dashboard

 <https://dashboard.waterdata.usgs.gov/>¹³

No link preview available. Please open the link for details.

[Open link](#)¹⁴

USGS Water Dashboard

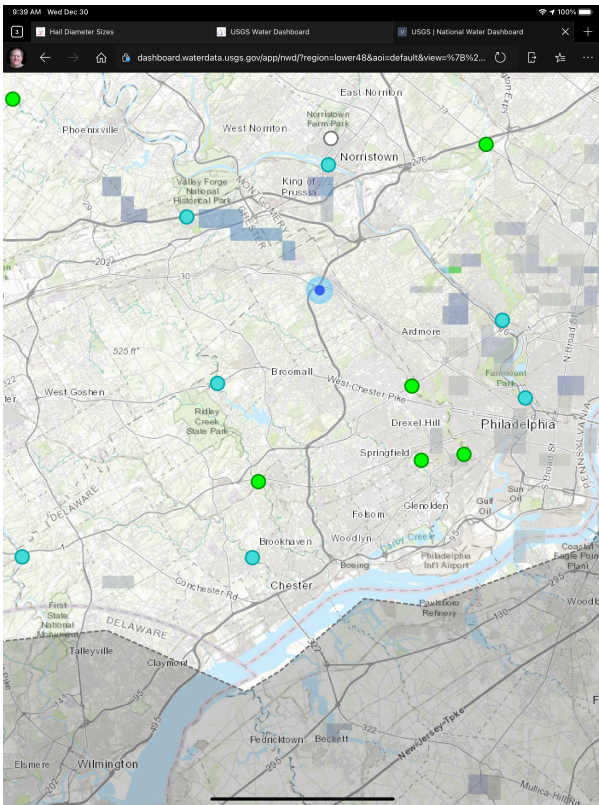
This newly revamped dashboard can be extremely helpful in identifying or confirming flooding conditions when they occur.

Dashboard View

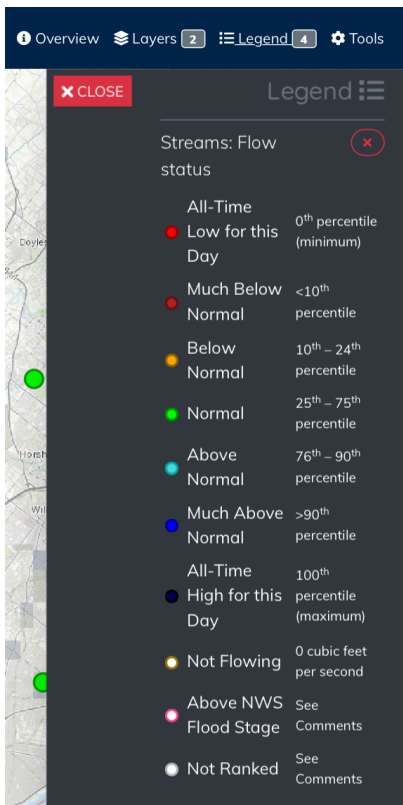
You can zoom in and reposition to a specific area in order to view all water sensor locations.

3 https://dashboard.waterdata.usgs.gov/app/nwd/?region=lower48&aoi=default&view=%7B%22bounds%22%3A%22-75.9532928466797%2C39.71141252523694%2C-74.84436035156251%2C40.12166558618828%22%2C%22basemap%22%3A%22esri_topo%22%2C%22insetmap%22%3Afalse%2C%22panelSelect%22%3A%220%3A0%2C1%3A0%2C2%3A0%2C3%3A0%2C4%3A0%2C5%3A0%2C6%3A0%2C7%3A0%2C8%3A0%2C9%3A0%2C10%3A0%2C11%3A0%22%2C%22panelRange%22%3A%220%3A1.0%2C1%3A1.0%2C2%3A1.0%2C3%3A1.0%2C4%3A1.0%2C5%3A1.0%2C6%3A1.0%2C7%3A0.3%2C8%3A0.5%2C9%3A0.5%2C10%3A0.5%2C11%3A0.5%2C12%3A0.5%2C13%3A0.5%2C14%3A0.5%2C15%3A1.0%2C16%3A1.0%2C17%3A1.0%2C18%3A1.0%22%2C%22panelCheckbox%22%3A%220%2C8%2C18%2C19%2C20%2C21%22%7D

4 https://dashboard.waterdata.usgs.gov/app/nwd/?region=lower48&aoi=default&view=%7B%22bounds%22%3A%22-75.9532928466797%2C39.71141252523694%2C-74.84436035156251%2C40.12166558618828%22%2C%22basemap%22%3A%22esri_topo%22%2C%22insetmap%22%3Afalse%2C%22panelSelect%22%3A%220%3A0%2C1%3A0%2C2%3A0%2C3%3A0%2C4%3A0%2C5%3A0%2C6%3A0%2C7%3A0%2C8%3A0%2C9%3A0%2C10%3A0%2C11%3A0%22%2C%22panelRange%22%3A%220%3A1.0%2C1%3A1.0%2C2%3A1.0%2C3%3A1.0%2C4%3A1.0%2C5%3A1.0%2C6%3A1.0%2C7%3A0.3%2C8%3A0.5%2C9%3A0.5%2C10%3A0.5%2C11%3A0.5%2C12%3A0.5%2C13%3A0.5%2C14%3A0.5%2C15%3A1.0%2C16%3A1.0%2C17%3A1.0%2C18%3A1.0%22%2C%22panelCheckbox%22%3A%220%2C8%2C18%2C19%2C20%2C21%22%7D

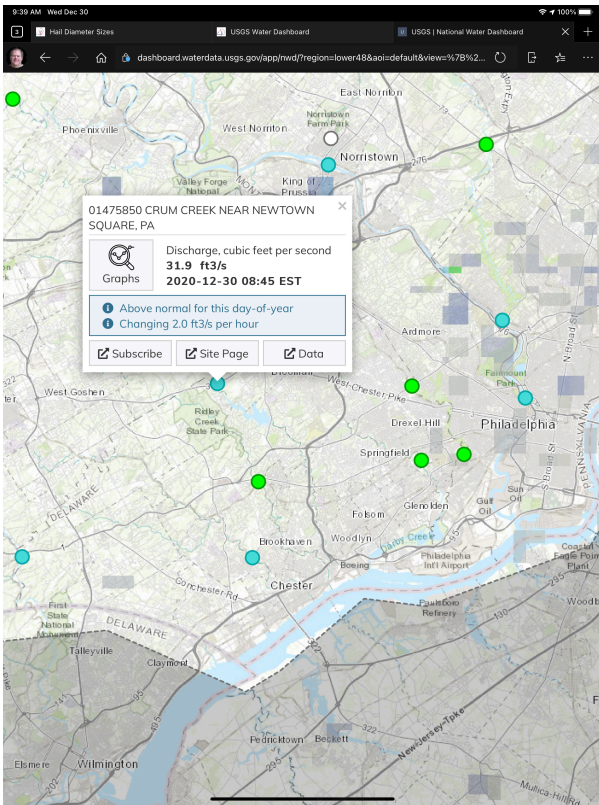


Each will be color coded to show current water flow. Most above are green, which is normal flow, but above normal is light blue, much above normal is blue and all-time highs are dark blue. Sites above NWS flood stage are circled in red, however only 1 or 2 sensors in Delaware County have defined flood stage levels, not all locations support this.



Details

If you click on a sensor location, you see a popup with more information. This includes the current discharge rate, sensor recording date/time, and may have notes if this rate is below/above normal and/or changing significantly since the last reading.

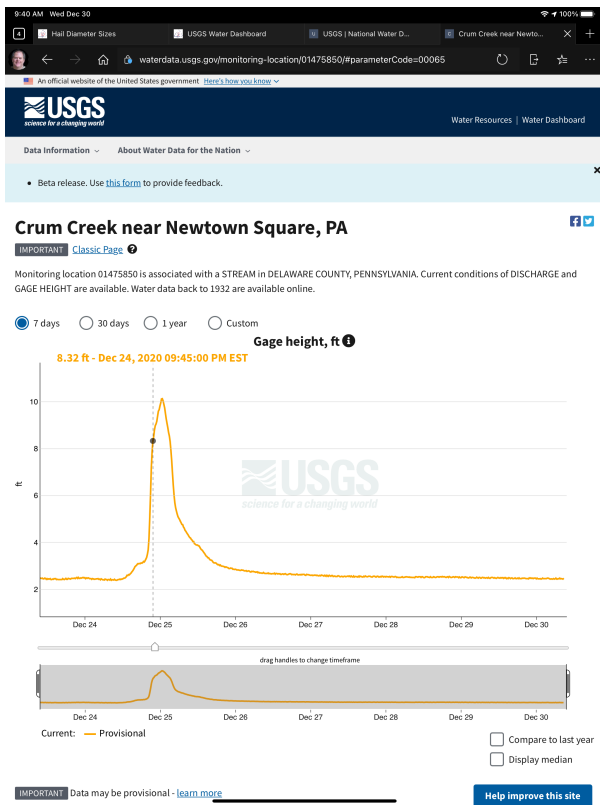


If you click on [Subscribe](#), you can receive email or text alerts on a number of conditions that you can define yourself.

If you click on [Site Page](#), you'll be taken to the details for that site. Make sure to go to the new layout if prompted.

Site Page

So we have links to each site's page here, or you can get to them from the details popup on the dashboard as well.



The site details will show options for a number of graphs (depending on what sensors are installed and collecting data), usually starting with the gage height over the last 7 days.

This sensor at Crum Creek near Newtown Square, PA clearly shows a significant jump in water height due to flooding conditions starting around the 9pm hour on December 24th, and dropping back to more normal levels a few hours later. One could have expected to have seen localized flooding in surrounding neighborhoods slightly preceding the times shown here.

General Weather

Cloud Chart

Personal Weather Station Buying Guide

Weather Underground

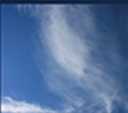



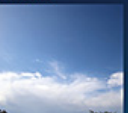


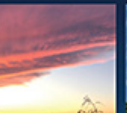


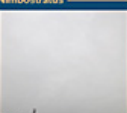
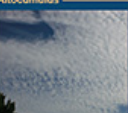
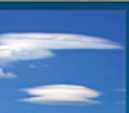




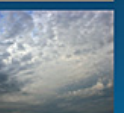





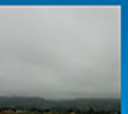
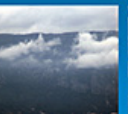


- [Aston Township, PA Weather Conditions | Weather Underground](#)(see page 41)
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Weather Underground Application

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WunderMap | Interactive Weather Map and Radar | Weather Underground

Cloud Chart

High Clouds	Cirrus  H101 Cirrus: Straight, nearly straight, or curved filaments, strands or hooks.				 H102 Cirrus: Dense white puffs with wispy edges.				 H103 Cirrus: Dense, anvil-shaped remains, which were originally the upper parts of Cumulonimbus.				 H104 Cirrus: Filaments, strands or hooks, increasing in coverage and generally thickening as a whole.				Cirrostratus  H105 Cirrostratus with or without Cirrus: Increasing density and coverage, but does not reach midway above the horizon.				 H106 Cirrostratus with or without Cirrus: Increasing density and covering much of, but not the entire sky.				 H107 Cirrostratus: Veil covering the whole sky, sometimes a halo around the sun or moon is present.				 H108 Cirrostratus: Veil not covering the whole sky nor increasing in coverage.				Cirrocumulus  H109 Cirrocumulus: Thin white ripples or small puffs, which may be accompanied by some Cirrus/Cirrostratus.				
	Middle Clouds	Altostratus  M101 Altostratus: Full or nearly full sky cover that is gray, shapeless and translucent, produces no halo.				Nimbostratus  M102 Altostratus: Thick opaque coverage, no precipitation, or Nimbostratus during precipitation or virga.				AltoCumulus  M103 AltoCumulus: Translucent bands or patches in a relatively continuous layer.				 M104 AltoCumulus Lenticularis: Lens or almond shaped, often formed by air moving over hills or mountains.				 M105 AltoCumulus: One or more layers of translucent or opaque bands.				 M106 AltoCumulus: A result of the spreading tops of Cumulus or sides of Cumulonimbus.				 M107 AltoCumulus: In one or more opaque layers, sometimes with Altostratus or Nimbostratus.				 M108 AltoCumulus: Small towers, which can be similar to small Cumulus with wispy trails of virga.				 M109 AltoCumulus: Chaotic sky with multiple layers and kinds of AltoCumulus at several altitudes.			
		Cumulus  L101 Cumulus: Thin and ragged with continuously changing edges; forms during fair weather by daytime heating.				 L102 Cumulus: Moderately tall with rounded puffy tops; may occur with Cumulus or Stratocumulus (L4).				Cumulonimbus  L103 Cumulonimbus: Very tall summits, which lack sharp outlines and are not anvil-shaped.				Stratocumulus  L104 Stratocumulus: Spread out Cumulus when vertical development stabilizes; sometimes can occur along with Cumulus.				 L105 Stratocumulus: One or more layers; not resulting from spreading Cumulus.				Stratus  L106 Stratus: In a continuous layer; or Stratus fractus; in ragged shreds, or both, without precipitation.				 L107 Stratus- or Cumulus- fractus: Ragged shreds during precipitation, usually seen below Altostratus or Nimbostratus.				 L108 Cumulus/Stratocumulus: Stratocumulus not from spreading Cumulus; with Cumulus base at a different level.				 L109 Cumulonimbus: Very tall summits with anvil-shaped upper part.			
Low Clouds		Sky cover The percent of sky covered by clouds. Clouds near the horizon appear to be lower, more numerous and closer together.				Other Cloud Phenomena																															
	Sky Clear 0%				Few 1 - 25%				Scattered 26 - 50%				Broken 51 - 99%				Overcast 100%																				
				Mammatus: Small pouch or pocket-like clouds sinking into drier air and often seen near thunderstorms.				Fog: A cloud on the ground which lifts from the surface and becomes Stratus or dissipates with heat from the sun.				Wall Cloud: Rotating, lowered, rain-free base of thunderstorm in area of strongest updraft, under which a tornado may form.				Shelf Cloud: Forms in a gust front from a squall line or thunderstorm.				Asperitas: Long waves that ripple through the base of the cloud near the drymoist air boundary of a thunderstorm.				Virga: Precipitation that evaporates before reaching the surface.													

Personal Weather Station Buying Guide

[www.wunderground.com/pws/buyi...](https://www.wunderground.com/pws/buying-guide)¹⁵

No link preview available. Please open the link for details.

[Open link](#)¹⁶

Personal Weather Station Buying Guide

Weather Underground has compiled a list of compatible stations in this buying guide. The personal weather stations listed below are integrated with Weather Underground.

When buying a new station you should consider the following criteria:

- Ease of installation and set-up
- Number and quality of sensors
- Ease of connecting data to Weather Underground
- Connectivity of device to internet (wifi or computer)

For Delco ARES members, we would recommend looking into the stations from [Davis Instruments](#)¹⁷, as these have proven to be very accurate and reliable with proper installation and site placement.

We also recommend putting your PWS onto the [Weather Underground](#)¹⁸ network for crowd sourcing hyper-local weather data. The [WunderMap](#)¹⁹ shows all of these sites.

¹⁵ <https://www.wunderground.com/pws/buying-guide>

¹⁶ <https://www.wunderground.com/pws/buying-guide>

¹⁷ <https://www.davisinstruments.com/>

¹⁸ <https://www.wunderground.com/>

¹⁹ <https://www.wunderground.com/wundermap>

Weather Underground

[Weather Underground](https://www.wunderground.com/)²⁰ provides the world's most accurate hyper-local weather forecasts in addition to an interactive weather radar, satellite maps and severe weather alerts. Powered by our unique community of weather enthusiasts reporting live data from over 270,000 personal weather stations, this crowd-sourced data generates accurate forecasts targeted to your precise location.

Links to Local Stations

²⁰ <https://www.wunderground.com/>

[Aston Township, PA Weather Conditions | Weather Underground](#)

[Brookhaven, PA Weather Conditions | Weather Underground](#)

[Broomall, PA Weather Conditions | Weather Underground](#)

[Chester, PA Weather Conditions | Weather Underground](#)

[Clifton Heights, PA Weather Conditions | Weather Underground](#)

[Drexel Hill, PA Weather Conditions | Weather Underground](#)

[Glen Mills, PA Weather Conditions | Weather Underground](#)

[Glenolden, PA Weather Conditions | Weather Underground](#)

[Havertown, PA Weather Conditions | Weather Underground](#)

[Lansdowne, PA Weather Conditions | Weather Underground](#)

[Marcus Hook, PA Weather Conditions | Weather Underground](#)

[Media, PA Weather Conditions | Weather Underground](#)

[Morton, PA Weather Conditions | Weather Underground](#)

[Newtown Square, PA Weather Conditions | Weather Underground](#)

[Prospect Park, PA Weather Conditions | Weather Underground](#)

[Ridley Park, PA Weather Conditions | Weather Underground](#)

[Springfield Township, PA Weather Conditions | Weather Underground](#)

[Swarthmore, PA Weather Conditions | Weather Underground](#)

[Thornton, PA Weather Conditions | Weather Underground](#)

[Villanova, PA Weather Conditions | Weather Underground](#)

[Wayne, PA Weather Conditions | Weather Underground](#)

Aston Township, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)²¹

Aston Township Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weather reports, maps & tropical weather conditions for the Aston Township area.

[Open link](#)²²

²¹ <https://www.wunderground.com/weather/us/pa/aston-township/KPAASTON12>

²² <https://www.wunderground.com/weather/us/pa/aston-township/KPAASTON12>

Brookhaven, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)²³

Brookhaven Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weather reports, maps & tropical weather conditions for the Brookhaven area.

[Open link](#)²⁴

²³ <https://www.wunderground.com/weather/us/pa/brookhaven/KPABROOK25>

²⁴ <https://www.wunderground.com/weather/us/pa/brookhaven/KPABROOK25>

Broomall, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)²⁵

Broomall Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Broomall area.

[Open link](#)²⁶

²⁵ <https://www.wunderground.com/weather/us/pa/broomall/KPABROOM2>

²⁶ <https://www.wunderground.com/weather/us/pa/broomall/KPABROOM2>

Chester, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)²⁷

Chester Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Chester area.

[Open link](#)²⁸

²⁷ <https://www.wunderground.com/weather/us/pa/chester/KPACHEST4>

²⁸ <https://www.wunderground.com/weather/us/pa/chester/KPACHEST4>

Clifton Heights, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)²⁹

Clifton Heights Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Clifton Heights area.

[Open link](#)³⁰

²⁹ <https://www.wunderground.com/weather/us/pa/clifton-heights/KPACLIFT8>

³⁰ <https://www.wunderground.com/weather/us/pa/clifton-heights/KPACLIFT8>

Drexel Hill, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)³¹

Drexel Hill Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Drexel Hill area.

[Open link](#)³²

³¹ <https://www.wunderground.com/weather/us/pa/drexel-hill/KPADREXE4>

³² <https://www.wunderground.com/weather/us/pa/drexel-hill/KPADREXE4>

Glen Mills, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...³³

Glen Mills Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Glen Mills area.

[Open link](#)³⁴

³³ <https://www.wunderground.com/weather/us/pa/glen-mills/KPAGLENM48>

³⁴ <https://www.wunderground.com/weather/us/pa/glen-mills/KPAGLENM48>

Glenolden, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)³⁵

Glenolden Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Glenolden area.

[Open link](#)³⁶

³⁵ <https://www.wunderground.com/weather/us/pa/glenolden/KPAGLENO5>

³⁶ <https://www.wunderground.com/weather/us/pa/glenolden/KPAGLENO5>

Havertown, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...³⁷

Havertown Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Havertown area.

[Open link](#)³⁸

³⁷ <https://www.wunderground.com/weather/us/pa/havertown/KPAHAVER16>

³⁸ <https://www.wunderground.com/weather/us/pa/havertown/KPAHAVER16>

Lansdowne, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...³⁹

Lansdowne Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Lansdowne area.

[Open link](#)⁴⁰

³⁹ <https://www.wunderground.com/weather/us/pa/drexel-hill/KPADREXE3>

⁴⁰ <https://www.wunderground.com/weather/us/pa/drexel-hill/KPADREXE3>

Marcus Hook, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)⁴¹

Marcus Hook Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Marcus Hook area.

[Open link](#)⁴²

⁴¹ <https://www.wunderground.com/weather/us/pa/marcus-hook/KPAMARCU6>

⁴² <https://www.wunderground.com/weather/us/pa/marcus-hook/KPAMARCU6>

Media, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)⁴³

Media Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Media area.

[Open link](#)⁴⁴

⁴³ <https://www.wunderground.com/weather/us/pa/media/KPAMEDIA30>

⁴⁴ <https://www.wunderground.com/weather/us/pa/media/KPAMEDIA30>

Morton, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)⁴⁵

Morton Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Morton area.

[Open link](#)⁴⁶

⁴⁵ <https://www.wunderground.com/weather/us/pa/morton/KPAMORT05>

⁴⁶ <https://www.wunderground.com/weather/us/pa/morton/KPAMORT05>

Newtown Square, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...⁴⁷

Newtown Square Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Newtown Square area.

[Open link](#)⁴⁸

⁴⁷ <https://www.wunderground.com/weather/us/pa/newtown-square/KPANewTO68>

⁴⁸ <https://www.wunderground.com/weather/us/pa/newtown-square/KPANewTO68>

Prospect Park, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...⁴⁹

Prospect Park Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Prospect Park area.

[Open link](#)⁵⁰

⁴⁹ <https://www.wunderground.com/weather/us/pa/prospect-park/KPAPROSP10>

⁵⁰ <https://www.wunderground.com/weather/us/pa/prospect-park/KPAPROSP10>

Ridley Park, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...⁵¹

Ridley Park Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Ridley Park area.

[Open link](#)⁵²

⁵¹ <https://www.wunderground.com/weather/us/pa/ridley-park/KPARIDLE6>

⁵² <https://www.wunderground.com/weather/us/pa/ridley-park/KPARIDLE6>

Springfield Township, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...⁵³

Springfield Township Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Springfield Township area.

[Open link](#)⁵⁴

⁵³ <https://www.wunderground.com/weather/us/pa/springfield-township/KPASPRIN99>

⁵⁴ <https://www.wunderground.com/weather/us/pa/springfield-township/KPASPRIN99>

Swarthmore, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)⁵⁵

| *Swarthmore Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Swarthmore area.*

[Open link](#)⁵⁶

⁵⁵ <https://www.wunderground.com/weather/us/pa/swarthmore/KPASWART3>

⁵⁶ <https://www.wunderground.com/weather/us/pa/swarthmore/KPASWART3>

Thornton, PA Weather Conditions | Weather Underground

www.wunderground.com/weather/...⁵⁷

Thornton Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Thornton area.

[Open link](#)⁵⁸

⁵⁷ <https://www.wunderground.com/weather/us/pa/thornton/KPATHORN5>

⁵⁸ <https://www.wunderground.com/weather/us/pa/thornton/KPATHORN5>

Villanova, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)⁵⁹

Villanova Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Villanova area.

[Open link](#)⁶⁰

⁵⁹ <https://www.wunderground.com/weather/us/pa/villanova/KPAVILLA3>

⁶⁰ <https://www.wunderground.com/weather/us/pa/villanova/KPAVILLA3>

Wayne, PA Weather Conditions | Weather Underground

[www.wunderground.com/weather/...](#)⁶¹

| *Wayne Weather Forecasts. Weather Underground provides local & long-range weather forecasts, weatherreports, maps & tropical weather conditions for the Wayne area.*

[Open link](#)⁶²

⁶¹ <https://www.wunderground.com/weather/us/pa/saint-davids/KPASAIN4>

⁶² <https://www.wunderground.com/weather/us/pa/saint-davids/KPASAIN4>

Weather Underground Application

Weather Underground provides the world's most accurate hyper-local weather forecasts in addition to an interactive weather radar, satellite maps and severe weather alerts. Powered by our unique community of weather enthusiasts reporting live data from over 270,000 personal weather stations, this crowd-sourced data generates accurate forecasts targeted to your precise location.

Check current & future weather conditions

- Temperature in the notification bar: instantly view current temperature and weather conditions
- View current weather conditions from your local weather station including temperature, feels like, wind speed & direction, humidity, dew point, visibility
- Plan for the week with 10-day daily & hourly weather forecasts
- Interactive weather map shows all the personal weather stations in your neighborhood with animated radar, satellite, and much more data
- Hurricane track maps
- Save your favorite locations and recent searches
- Smart Weather Forecasts - set your ideal weather conditions for outdoor activities and we'll tell you when to go
- Explore detailed weather data like air quality, UV index, sunrise & sunset and moonrise & moonset
- Keep an eye out for extreme weather with severe weather alerts
- Customizable weather widgets - choose from different colors, sizes and update intervals
- Personalize your app experience with light & dark modes, map types, units and rearrangeable tiles
- Discover real-time weather from webcams around the world

What makes Weather Underground different from other weather apps?

Accurate hyper-local forecasts

Our 270,000+ personal weather stations report the most accurate local weather conditions. The data that we collect from personal weather stations fills in the gaps between the airport weather stations that other weather services rely upon to generate forecasts - meaning our data is generated from actual data points in your neighborhood.

Interactive radar maps & severe weather

The most interactive weather map on mobile allows you to select from different weather overlays including current weather conditions, animated live radar, satellite, weather webcams and severe weather alerts. Customize the map by selecting specific weather data layers or choose from the various map presets. Keep an eye out for extreme weather and always be prepared with severe weather alerts.

Report your local weather

Tell us if the sky conditions we're reporting are what you're actually observing. If you see something different you can report the current weather conditions in your location for the benefit of other app users. Hazard reports allow you to report any hazardous road conditions to help other people in your area.

About Weather Underground

Founded in 1995 as the first online weather service, Weather Underground supplies weather data solutions to many of the leading media companies and millions of users across the globe through their mobile apps and website wunderground.com⁶³. Weather Underground is part of The Weather Company, an IBM business, and is based in San Francisco, CA.

⁶³ <http://wunderground.com>

[Weather Underground on Google Play](#)

[Weather Underground on iTunes Store](#)

Weather Underground on Google Play

[play.google.com/store/apps/de...](https://play.google.com/store/apps/details?id=com.wunderground.android.weather&hl=en_GB&gl=US)⁶⁴

No link preview available. Please open the link for details.

[Open link](https://play.google.com/store/apps/details?id=com.wunderground.android.weather&hl=en_GB&gl=US)⁶⁵

⁶⁴ https://play.google.com/store/apps/details?id=com.wunderground.android.weather&hl=en_GB&gl=US

⁶⁵ https://play.google.com/store/apps/details?id=com.wunderground.android.weather&hl=en_GB&gl=US

Weather Underground on iTunes Store



[apps.apple.com/us/app/weather...](https://apps.apple.com/us/app/weather-...)⁶⁶

Discover a reliable, real-time and hyper-local forecast that will always warn you about upcoming severe weather. Weather Underground combines data from over 250,000+ personal weather stations and a proprietary forecast model to give you the most accurate and hyperlocal forecasts, at a microclimate l...

[Open link](#)⁶⁷

⁶⁶ <https://apps.apple.com/us/app/weather-underground-local-map/id486154808>

⁶⁷ <https://apps.apple.com/us/app/weather-underground-local-map/id486154808>

WunderMap | Interactive Weather Map and Radar | Weather Underground

www.wunderground.com/wunderma...⁶⁸

Weather Underground's WunderMap provides interactive weather and radar Maps for weather conditions for locations worldwide.

[Open link](#)⁶⁹

WunderMap Interactive Weather Map from Weather Underground

The [WunderMap](#)⁷⁰ can be extremely helpful in identifying current conditions such as temperature and wind speeds around your location.

[Weather Underground](#)⁷¹ provides the world's most accurate hyper-local weather forecasts in addition to an interactive weather radar, satellite maps and severe weather alerts. Powered by our unique community of weather enthusiasts reporting live data from over 270,000 personal weather stations, this crowd-sourced data generates accurate forecasts targeted to your precise location.

Map View

You can zoom in and reposition to a specific area in order to view all available weather sensors around your location.

⁶⁸ [https://www.wunderground.com/wundermap/?isPresentationActive=0&renderer=2&Units=english&zoom=8&lat=40.042&lon=-75.341&covid19=0&wxstn=1&wxstnmode=tw&aq=0&aqvalue=NaN&radar=0&radarType=NaN&radaropa=0.7&satellite=0&satelliteopa=0.8&insertHurricaneNameHere=false&goes16opa=&storm-](https://www.wunderground.com/wundermap/?isPresentationActive=0&renderer=2&Units=english&zoom=8&lat=40.042&lon=-75.341&covid19=0&wxstn=1&wxstnmode=tw&aq=0&aqvalue=NaN&radar=0&radarType=NaN&radaropa=0.7&satellite=0&satelliteopa=0.8&insertHurricaneNameHere=false&goes16opa=&storm-cells=0&severe=0&severeopa=0.9&sst=0&sstopa=0.8&sstanom=0&sstanomopa=0.8&cam=0&fronts=0&hur=0&models=0&model=ecmwf&modelsopa=0.8&modelstype=SURPRE&lightning=0&fire=0&fireopa=0.9&fireRisk=0&fireRiskOpacity=0.9&firePerimeter=0&firePerimeterOpacity=0.9&smoke=0&smokeOpacity=0.9&rep=0&surge=0&tor=0&windstr=0&windstrDensity=undefined&windstreamSpeed=undefined&windstreamSpeedFilter=undefined&windstreamPalette=undefined&hurrArch=0&hurrArchBasin=undefined&hurrArchYear=undefined&hurrArchStorm=undefined)

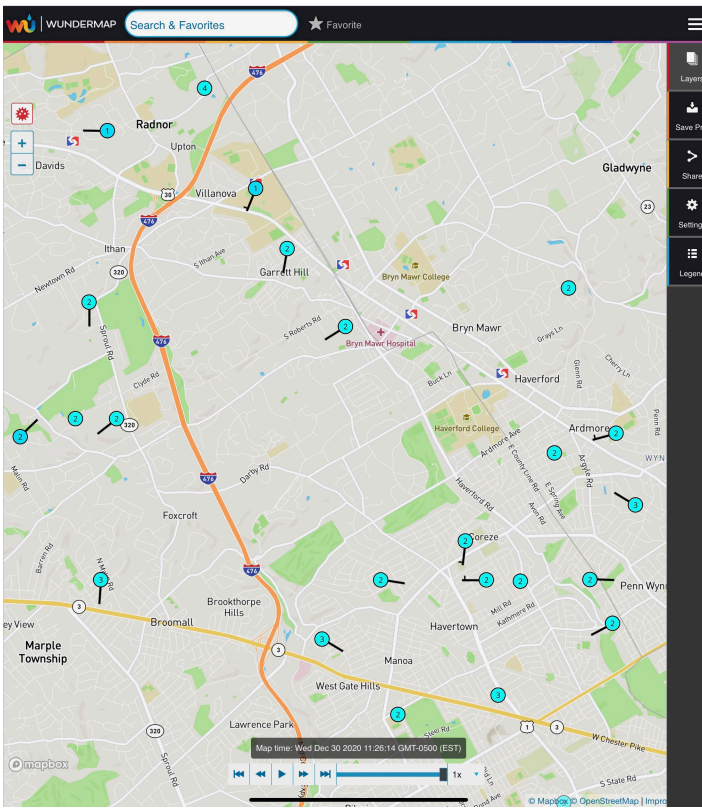
<https://www.wunderground.com/wundermap/?isPresentationActive=0&renderer=2&Units=english&zoom=8&lat=40.042&lon=-75.341&covid19=0&wxstn=1&wxstnmode=tw&aq=0&aqvalue=NaN&radar=0&radarType=NaN&radaropa=0.7&satellite=0&satelliteopa=0.8&insertHurricaneNameHere=false&goes16opa=&storm-cells=0&severe=0&severeopa=0.9&sst=0&sstopa=0.8&sstanom=0&sstanomopa=0.8&cam=0&fronts=0&hur=0&models=0&model=ecmwf&modelsopa=0.8&modelstype=SURPRE&lightning=0&fire=0&fireopa=0.9&fireRisk=0&fireRiskOpacity=0.9&firePerimeter=0&firePerimeterOpacity=0.9&smoke=0&smokeOpacity=0.9&rep=0&surge=0&tor=0&windstr=0&windstrDensity=undefined&windstreamSpeed=undefined&windstreamSpeedFilter=undefined&windstreamPalette=undefined&hurrArch=0&hurrArchBasin=undefined&hurrArchYear=undefined&hurrArchStorm=undefined>

⁷⁰ <https://www.wunderground.com/wundermap/>

⁷¹ <https://www.wunderground.com/>

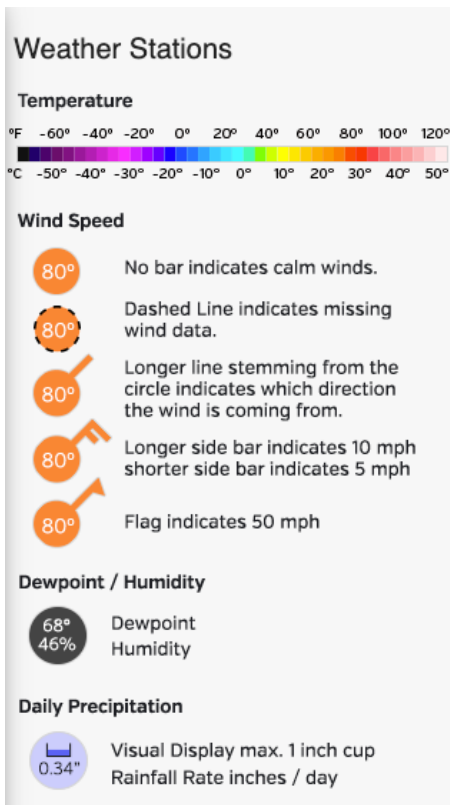
⁷⁰ <https://www.wunderground.com/wundermap/>

⁷¹ <https://www.wunderground.com/>



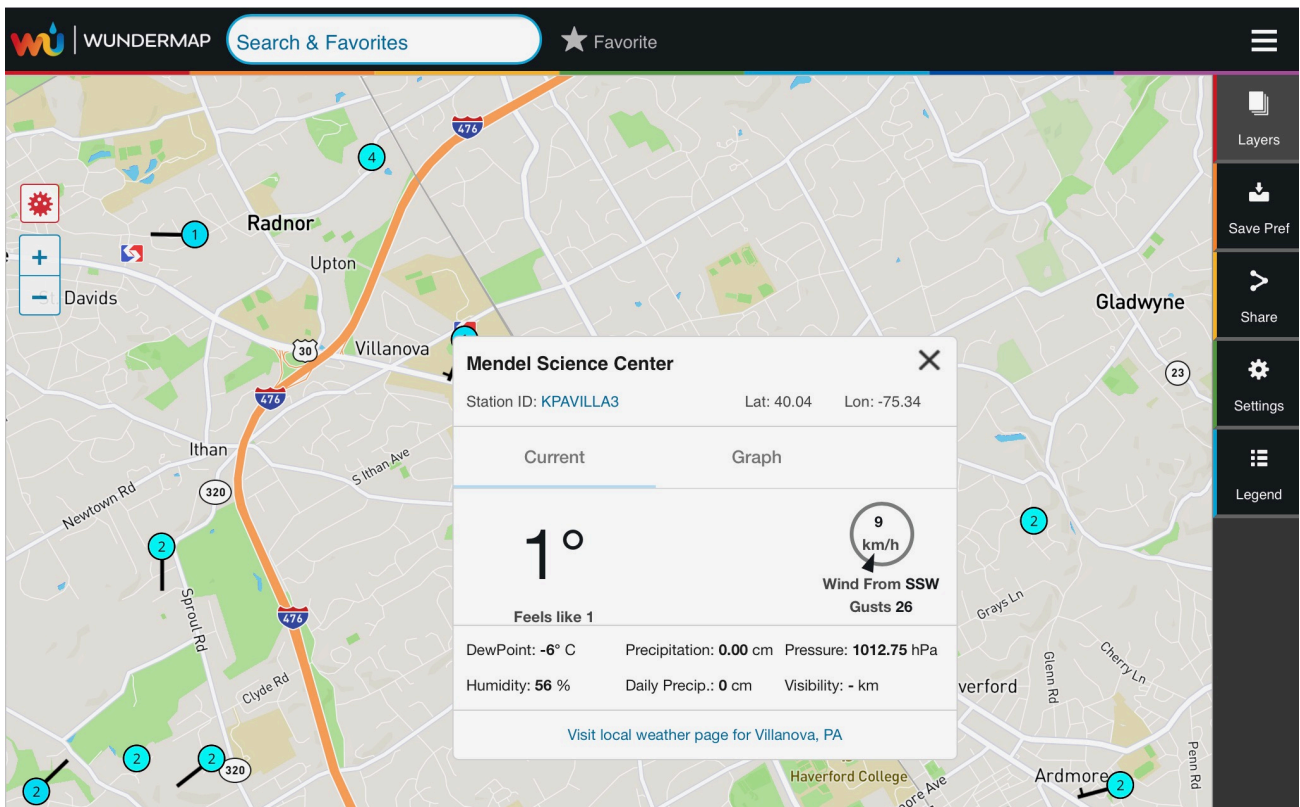
Legend

Inside of the colored circle is a number, which is the current temperature. If there are winds, a flag will indicate the general wind speed and direction.



Dashboard View

If you click on the circle indicating the weather station, you'll see a popup showing details.



Dashboard View

If you click on the "View local weather page" link at the bottom of the detail popup on the map, you'll load the weather station's detail page, showing even more information about the current and historical conditions recorded.

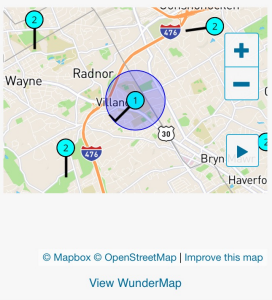
Elev 144 m, 40.04 °N, 75.34 °W

Mendel Science Center - KPAVILLA3 ⓘ

FORECAST FOR VILLANOVA, PA

Station Summary

● Online(updated 33 seconds ago)

CURRENT CONDITIONS		MAP
1.2 °C Feels Like -3.3 °	WIND & GUST 17.7 / 22.5 km/h	
DEWPOINT -6.1 °C	PRECIP RATE 0.00 mm/hr	
PRECIP ACCUM 0.00 mm	PRESSURE 1,012.53 hPa	
	HUMIDITY 56 %	
	UV --	

PWS CURRENT CONDITIONS

TEMPERATURE ⓘ	WIND ⓘ	PRESSURE ⓘ
1 °C CURRENT DEWPOINT -6.1 °C HUMIDITY 56 %	17.7 WIND FROM SW GUST 22.5 km/h	1,012.53 H CURRENT

Hail

Hail

Hail can strike anywhere in the United States with little or no warning and are capable of causing significant damages. It is important that every community be prepared by understanding hail and the associated dangers.

Locate Hail on Radar

Hail sizes

The [size of individual hailstones](#)(see [page 78](#)) that reach surface level is determined by speed of the updraft which create the individual ice crystals at atmospheric levels. Larger hailstones are capable of producing damage to property, and particularly with very large hailstones, resulting in serious injury or death due to blunt-force trauma induced by the impact of the hailstones. Hailstone size is typically correspondent to the size of an object for comparative purposes.

Hurricanes

Hurricanes

Hurricanes are among the deadliest and costliest of natural disasters.

Saffir–Simpson hurricane wind scale

The [Saffir–Simpson hurricane wind scale](#)(see page 79), assigns a numerical classification of hurricanes into five categories distinguished by the intensities of their sustained winds. The scale spans from Category 1 (winds of at least 74 miles per hour (119 km/h)) to Category 5 (exceeding 156 miles per hour (251 km/h))

FEMA AWR-343 Hurricane Awareness Course

Hurricanes are among the deadliest and costliest of natural disasters. This course will provide a basic understanding of hurricane science, forecasting, warning, and preparedness to help emergency managers, responders, government administrators, and community members make better, more informed decisions in hurricane planning and preparedness.

The course enhances the ability of participants to identify and describe the conditions of tropical cyclone formation, provide official watch and warning definitions and to make recommendations in preparation for a hurricane and the associated hazards such as high winds, heavy rain, and storm surge.

The goal of this course is to provide participants with the basics of hurricane science, forecasting, warning, and preparedness.

Course Modules:

- Hurricane Structure and hazards
- Hurricane Forecasting and Warning
- Hurricane Advisory Products



AWR-343_Hurricane_Awareness_PG.pdf

Related Weather Scales

[Beaufort Scale](#)

[Enhanced Fujita Scale](#)

[Hail Diameter Sizes](#)

[Saffir-Simpson Hurricane Wind Scale](#)

[Wind Alert Terms and Signal](#)

Beaufort Scale

The **Beaufort scale** is an empirical measure that correlates wind speed to observed conditions at sea or on land.

Wind category	Beaufort number	Wind speed	Conditions
Advisory-force	6	25–31 mph (40–50 km/h)	Large branches in motion; whistling in telephone wires.
Advisory-force	7	32–38 mph (51–62 km/h)	Whole trees in motion; inconvenience felt walking against wind.
Gale-force	8–9	39–54 mph (63–88 km/h)	Twigs break off trees; wind generally impedes progress. Tropical storm criteria begin.
Storm-force	10–11	55–73 mph (89–117 km/h)	Damage to chimneys and television antennas; pushes over shallow-rooted trees. Severe thunderstorm criteria begin (58 mph (93 km/h)).
Hurricane-force	12–13 [†]	74–112 mph (118–181 km/h)	Peels shingles off roofs; windows broken if struck by debris; trees uprooted or snapped; mobile homes severely damaged or overturned; moving cars pushed off-road. Hurricane criteria begin.
Major hurricane-force Extreme wind	14–16 [†]	113–237 mph (182–381 km/h)	Roofs torn off houses; cars lifted off ground; trees defoliated and sometimes debarked. Major hurricane criteria begin.

[†]:Beaufort levels above 12 are non-standard in the United States. Instead, the Saffir–Simpson hurricane scale (Category 1, Category 2, etc.) is used.

Enhanced Fujita Scale

The Enhanced Fujita scale, an updated version of the original Fujita scale that was developed by Ted Fujita with Allen Pearson, assigns a numerical rating from EF0 to EF5 to rate the damage intensity of tornadoes. EF0 and EF1 tornadoes are considered "weak" tornadoes, EF2 and EF3 are classified as "strong" tornadoes, with winds of at least major hurricane force, where EF4 and EF5 are categorized as "violent" tornadoes, with winds corresponding to category 5 hurricane winds and rising to match or exceed the strongest tropical cyclones on record. The EF scale is based on tornado damage (primarily to buildings), which makes it difficult to rate tornadoes that strike in sparsely populated areas, where few man-made structures are found. The Enhanced Fujita scale went into effect on February 1, 2007.

EF number	Wind speed	Comparable hurricane winds	Damage
0	65–85 mph (105–137 km/h)	Severe tropical storm – Category 1	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
1	86–110 (138–178 km/h)	Category 1–2	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111–135 (179–218 km/h)	Category 3	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
3	136–165 (219–266 km/h)	Category 4–5	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
4	166–200 (267–322 km/h)	Strong category 5	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.

5	>200 (>322 km/h)	Hurricane Patricia	Explosive damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (300 ft); steel reinforced concrete structures badly damaged; high-rise buildings have significant structural deformation; incredible phenomena will occur.
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Hail Diameter Sizes

The size of individual hailstones that reach surface level is determined by speed of the updraft which create the individual ice crystals at atmospheric levels. Larger hailstones are capable of producing damage to property, and particularly with very large hailstones, resulting in serious injury or death due to blunt-force trauma induced by the impact of the hailstones. Hailstone size is typically correspondent to the size of an object for comparative purposes.






Hailstone size	Measurement (in)	Measurement (cm)	Updraft Speed (mph)	Updraft Speed (m/s)
pea	0.25	0.6	40	18
penny	0.75	1.9	44	20
quarter*	1.00	2.5	49	22
half dollar	1.25	3.2	54	24
walnut	1.50	3.8	60	27
golf ball	1.75	4.4	64	29
hen egg†	2.00	5.1	69	31
tennis ball	2.50	6.4	77	34
baseball	2.75	7.0	81	36
tea cup	3	7.6	84	38
grapefruit	4	10.1	98	44
softball	4.50	11.4	103	46

* Begins hail sizes within the severe hail criterion.











† Begins hail sizes within the Storm Prediction Center's significant severe criterion.

Saffir-Simpson Hurricane Wind Scale

The **Saffir-Simpson hurricane wind scale**, assigns a numerical classification of hurricanes into five categories distinguished by the intensities of their sustained winds. The scale spans from Category 1 (winds of at least 74 miles per hour (119 km/h)) to Category 5 (exceeding 156 miles per hour (251 km/h)). Unlike the Enhanced Fujita Scale, which assigns ratings for tornadoes after damage has been incurred and thoroughly assessed, categories on the Saffir-Simpson scale are assigned to most active cyclones that reach the minimum hurricane threshold, even before landfall.

Category	Sustained winds	Storm surge	Central pressure	Potential damage
	33–42 m/s 74–95 mph 64–82 knot 119–153 km/h	4–5 ft 1.2–1.5 m	28.94 inHg 980 mbar	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.
	43–49 m/s 96–110 mph 83–95 kn 154–177 km/h	6–8 ft 1.8–2.4 m	28.50–28.91 inHg 965–979 mbar	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected anchorages may break their moorings.
	50–58 m/s 111–129 mph 96–113 kn 178–209 km/h	9–12 ft 2.7–3.7 m	27.91–28.47 inHg 945–964 mbar	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain may be flooded well inland.
	59–69 m/s 130–156 mph 114–135 kn 210–249 km/h	13–18 ft 4.0–5.5 m	27.17–27.88 inHg 920–944 mbar	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.
	70 m/s 157 mph 136 kn 250 km/h	19 ft 5.5 m	<27.17 inHg <920 mbar	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.

Wind Alert Terms and Signal

Wind speed	Marine or Beach Hazard Warning	Land Warning	Tropical Cyclone Warning(s)	Flags	Lights	Beaufort force
25 to 38 mph (22 to 33 knots)	Small craft advisory	Wind Advisory	Wind Advisory or Small craft advisory			6–7
39 to 54 mph (34 to 47 knots)	Gale warning	High wind warning	Tropical storm warning*			8–9
55 to 73 mph (48 to 63 knots)	Storm warning	High wind warning	Tropical storm warning†			10–11
74–110 mph (64 to 99 knots)	Hurricane Force Wind Warning	High wind warning	Hurricane warning			12–13
Over 110 mph (100+ knots)	Hurricane Force Wind Warning	Extreme wind warning	Hurricane warning and Extreme wind warning‡			14–16

* Tropical Storm Warning flags and lights will always be displayed the same as Storm Warning flags and lights.

† A tropical storm with winds in this range is sometimes referred to as a "severe tropical storm".

‡ The Extreme Wind Warning is issued shortly before the eyewall makes landfall

Tornadoes

Tornadoes

Tornadoes can strike anywhere in the United States with little or no warning and are capable of causing significant loss of life and billions of dollars in damages. It is important that every community be prepared by understanding tornadoes and the associated dangers.

Locate Tornado on Radar

Enhanced Fujita scale

The [Enhanced Fujita scale](#)(see page 76), an updated version of the original Fujita scale that was developed by Ted Fujita with Allen Pearson, assigns a numerical rating from EF0 to EF5 to rate the damage intensity of tornadoes. EF0 and EF1 tornadoes are considered "weak" tornadoes, EF2 and EF3 are classified as "strong" tornadoes, with winds of at least major hurricane force, where EF4 and EF5 are categorized as "violent" tornadoes, with winds corresponding to category 5 hurricane winds and rising to match or exceed the strongest tropical cyclones on record. The EF scale is based on tornado damage (primarily to buildings), which makes it difficult to rate tornadoes that strike in sparsely populated areas, where few man-made structures are found.

FEMA AWR-326 Tornado Awareness Course

Tornadoes can strike anywhere in the United States with little or no warning and are capable of causing significant loss of life and billions of dollars in damages. It is important that every community be prepared by understanding tornadoes and the associated dangers.

This awareness level course helps participants to better understand the basics of tornado science, the weather forecasting process, and the tornado warning process. Participants will also be better able to implement safety measures for themselves, their families and their organizations in preparation for tornado season.

The goal of this course is to provide participants with the basics of tornado science, forecasting, warning, and preparedness.

Course Modules include:

- Science of Tornadoes
- Weather Forecast Process
- Tornado Warning Process
- Tornado Safety



AWR-326_Participant_Guide_09.08.2020.pdf

Using Radar

Best Spotting Position

It is important to choose a good spotting position, one that provides the best view of a storm while staying safe and out of the path.

Always stay in communication with other spotters in the area. Different views of a storm are essential to provide the best reports to the National Weather Service.

It is important to choose a good spotting position, one that provides the best view of a storm while staying safe and out of the path.

Always stay in communication with other spotters in the area. Different views of a storm are essential to provide the best reports to the National Weather Service.

Always be aware of your surroundings and stay safe

Storm Prediction Center
Storm Reports

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Field Guide Series Rev 1

WSR-88D Dual Polarization Guide



WSR-88D Dual Polarization Guide.pdf

Radar Links

[Locate Hail on Radar](#)

[Locate Tornado on Radar](#)

[National Weather Service Radar](#)

- [NWS Radar KDIX](#)(see page 91)

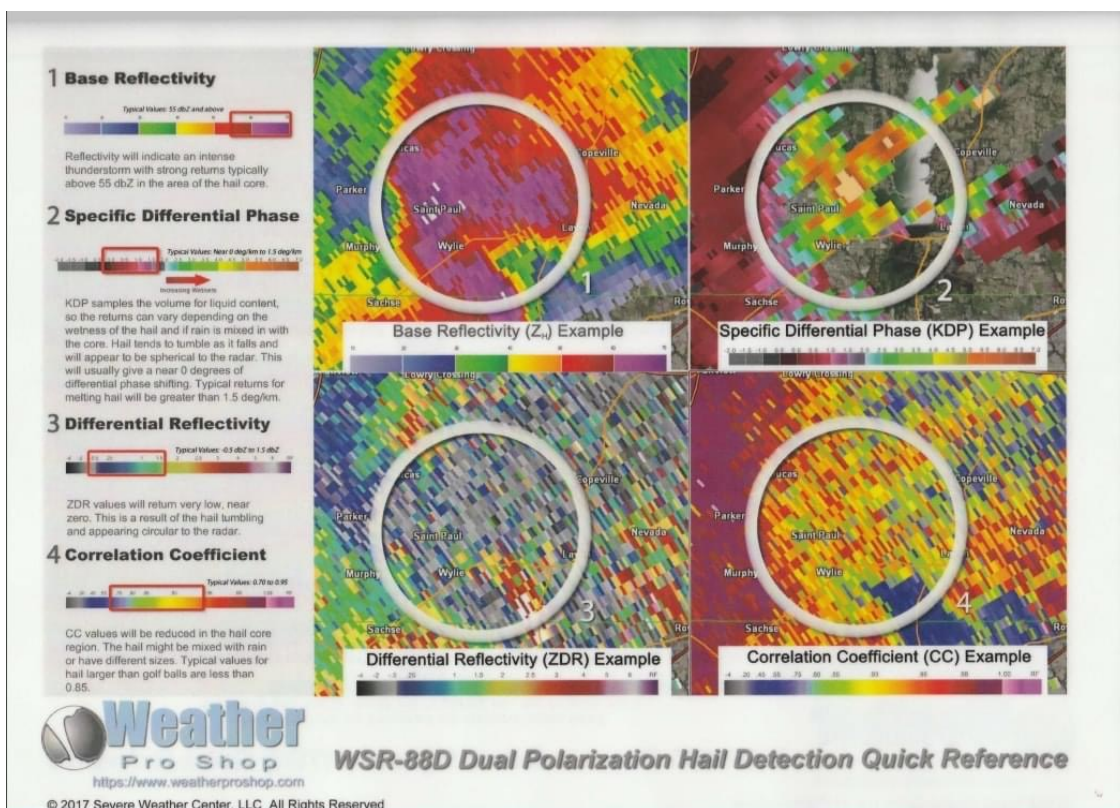
[RadarScope Application](#)

- [RadarScope on Google Play Store](#)(see page 93)
- [RadarScope on iTunes Store](#)(see page 94)
- [RadarScope on Microsoft Store](#)(see page 95)

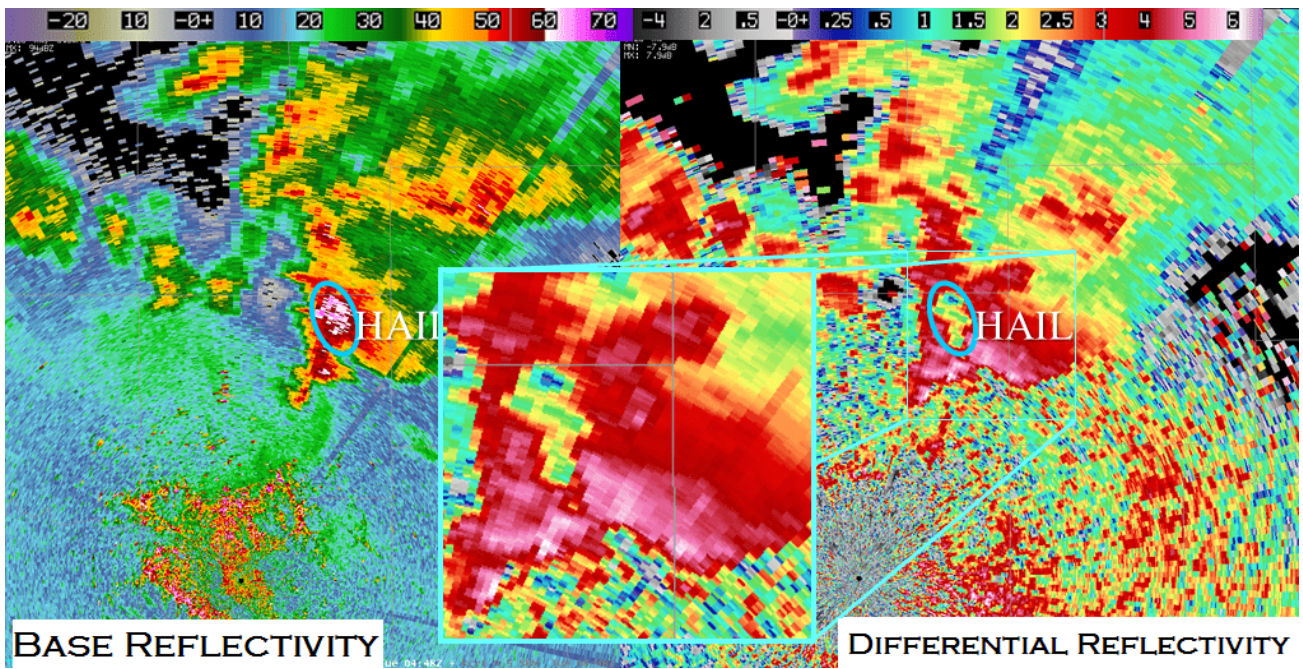
Locate Hail on Radar

Dual Polarization Hail Detection

1. **Base Reflectivity** - Reflectivity will indicate an intense thunderstorm with strong returns typically above 55 dbZ in the area of the hail core.
2. **Specific Differential Phase** - KDP samples the volume for liquid content, so the returns can vary depending on the wetness of the hail and if rain is mixed in with the core. Hail tends to tumble as it falls and will appear to be spherical to the radar. This will usually give a near 0 degrees of differential phase shifting. Typical returns for melting hail will be greater than 1.5 deg/km.
3. **Differential Reflectivity** - ZDR values will return very low, near zero. This is a result of the hail tumbling and appearing circular to the radar.
4. **Correlation Coefficient** - CC values will be reduced in the hail core region. The hail might be mixed with rain or have different sizes. Typical values for hail larger than golf balls are less than 0.85.



Example Radar Image

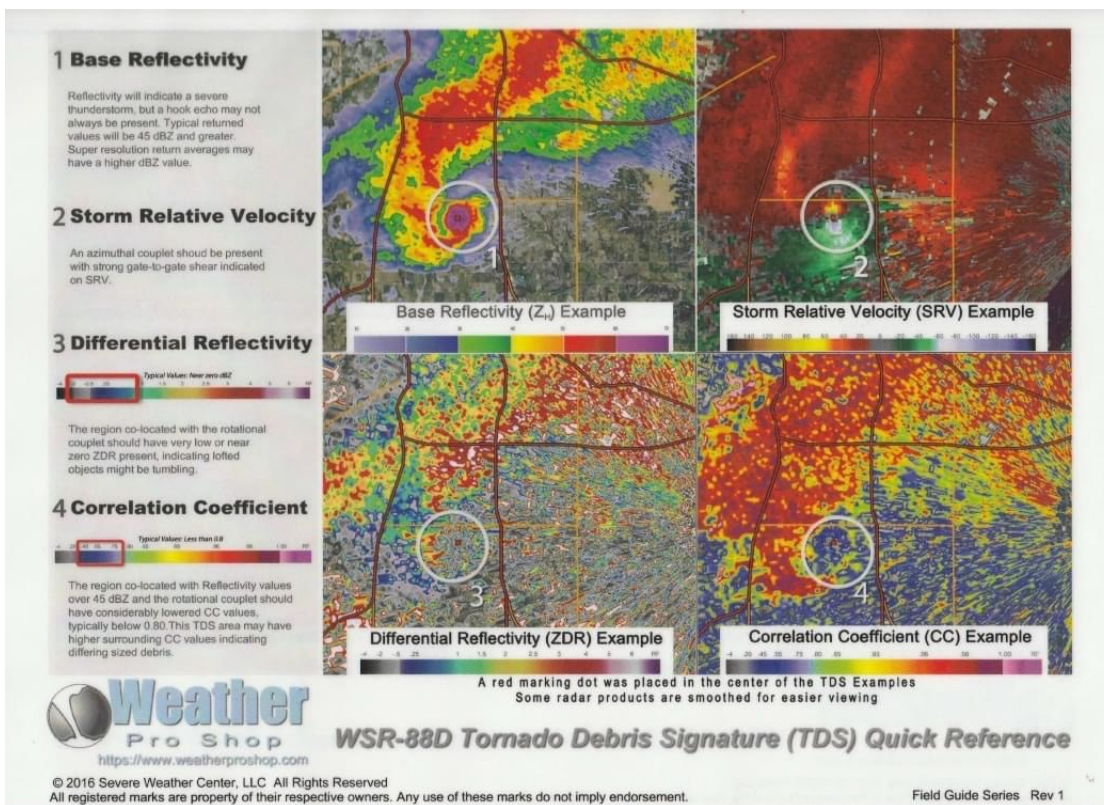


Locate Tornado on Radar

Tornado Debris Signature

1. **Base Reflectivity** - Reflectivity will indicate a severe thunderstorm, but a hook echo may not always be present. Typical returned values will be 45 dBZ and greater. Super resolution return averages may have a higher dBZ value.
2. **Storm Relative Velocity** - An azimuthal couplet should be present with strong gate-to-gate sheer indicated on SRV.
3. **Differential Reflectivity** - The region co-located with the rotational couplet should have very low or near zero ZDR present, indicating lofted objects might be tumbling.
4. **Correlation Coefficient** - The region co-located with Reflectivity values over 45 dBZ and the rotational couplet should have considerably lowered CC values, typically below 0.80. This TDS area may have higher surrounding CC values indicating differing sized debris.

WSR-88D Tornado Debris Signature (TDS) Quick Reference

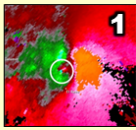


Tornado Intensity Guidance

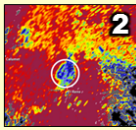
Radar Tornado Intensity Estimation Guidance

Identifying a Tornadic Debris Signature (TDS)

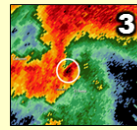
Provides radar confirmation of a damaging tornado in progress.



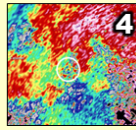
1 First, identify a valid velocity circulation.



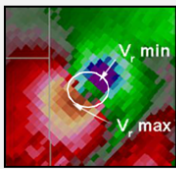
2 Next, ensure correlation coefficient (CC) is below 0.90



3 Next, ensure reflectivity is over 35 dBZ and co-located with #1/2



4 Not necessary but adds confidence: ZDR reduced to ~0 or below zero in spots.



$$V_{rot} = (|V_{in(max)}| + |V_{out(max)}|) / 2$$

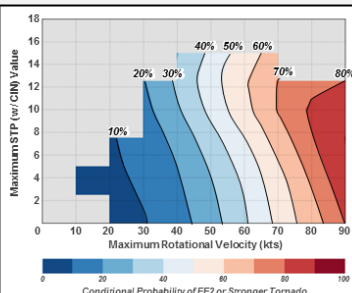
To determine rotational velocity, add the absolute value of the highest inbound and outbound velocity values in the couplet, and then divide by 2.

Considerations and Tips

- EF2+ tornadoes are likely if TDS has debris ball (reflectivity > 50-55 dBZ)
- With split cut mode VCPs, TDS can have a slight offset from velocity sig.
- Discriminating between supercellular weak and strong tornadoes** ★
Heidke Skill Scores maximized with LLRV in the 45-55 knot range.
- In borderline intensity cases, push up a category if:** tornado is moving fast, conditions very favorable for EF2+, or signature is poorly sampled.

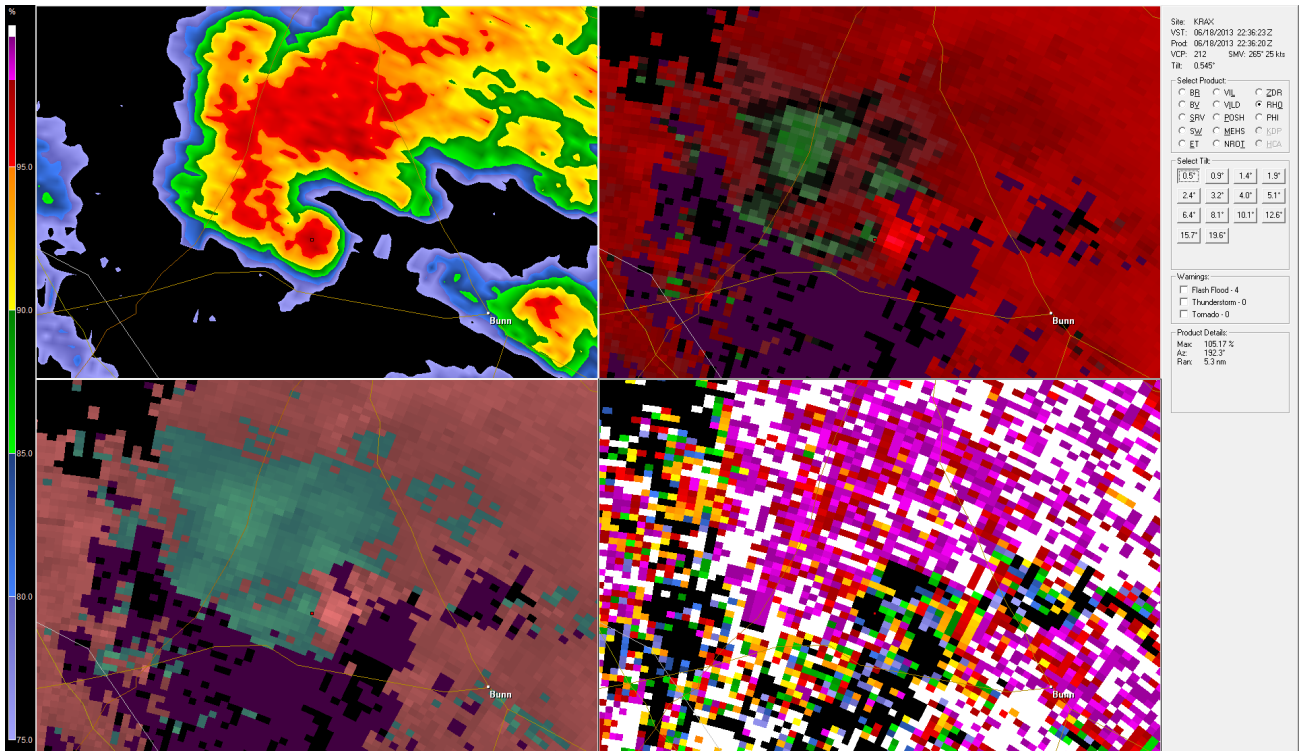
	Supercells Only	QLCS Only	MOST-RELIABLE
Tornado Intensity	Rotational Velocity (kts)		Maximum TDS Height
WEAK EF0/EF1	40 knots or less	30 knots or less	Under 8,000 ft
	★ Overlap 40-55 knots	Overlap 30-45 knots	Overlap 8-10 kft
STRONG EF2/EF3	55 to 75 knots	45 knots or more	10,000 to 15,000 ft
	Overlap 75-85 knots		Overlap 15-18 kft
VIOLENT EF4/EF5	85 knots or more	Insufficient cases	Over 18,000 ft

Conditional EF2+ Tor Probability



The graph plots Maximum STP (in./hr) Value on the y-axis (0 to 18) against Maximum Rotational Velocity (kts) on the x-axis (0 to 90). Contour lines represent conditional probabilities of 10%, 20%, 30%, 40%, 50%, 60%, 70%, and 80% for EF2+ or stronger tornadoes. A color scale at the bottom indicates the probability from 0% (blue) to 100% (red).

Example Radar Image



National Weather Service Radar

 radar.weather.gov/⁷²

No link preview available. Please open the link for details.

[Open link](#)⁷³

NWS Radar KDIX

⁷² <https://radar.weather.gov/>

⁷³ <https://radar.weather.gov/>

NWS Radar KDIX

 radar.weather.gov/?settings=v...⁷⁴

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[Open link](#)⁷⁵

⁷⁴ https://radar.weather.gov/?settings=v1_eyJhZ2VuZGEiOmsiaWQiOiJsb2NhbCIsImNlbnRlciI6Wy03NC40MTEsMzkuOTQ3XSwiem9vbSI6NywiZmlsdGVyIjoiV1NSLTg4RCIsImxheWVyljoiYnJlZl9yYXciLCJzdGF0aW9uIjoiS0RlJWCIslbnRyYW5zcGFyZW50Ijpb0cnVlLCJhbGVydHNPdmVybGF5Ijpb0cnVlLCJzdGF0aW9uSWNvbnpdmVybGF5Ijpb0cnVlFzZSI6InN0YW5kYXJkIiwiaWY291bnR5IjpbpmYWxzZSwiY3dhljpmYWxzZSwic3RhZGUlOmZhbnHNILCJtZW51Ijpb0cnVlLCJzaG9ydEZ1c2Vkt25seSI6dHJ1ZX0%3D#/

⁷⁵ https://radar.weather.gov/?settings=v1_eyJhZ2VuZGEiOmsiaWQiOiJsb2NhbCIsImNlbnRlciI6Wy03NC40MTEsMzkuOTQ3XSwiem9vbSI6NywiZmlsdGVyIjoiV1NSLTg4RCIsImxheWVyljoiYnJlZl9yYXciLCJzdGF0aW9uIjoiS0RlJWCIslbnRyYW5zcGFyZW50Ijpb0cnVlLCJhbGVydHNPdmVybGF5Ijpb0cnVlLCJzdGF0aW9uSWNvbnpdmVybGF5Ijpb0cnVlFzZSI6InN0YW5kYXJkIiwiaWY291bnR5IjpbpmYWxzZSwiY3dhljpmYWxzZSwic3RhZGUlOmZhbnHNILCJtZW51Ijpb0cnVlLCJzaG9ydEZ1c2Vkt25seSI6dHJ1ZX0%3D#/

RadarScope Application

RadarScope is a specialized display utility for weather enthusiasts and meteorologists that allows you view NEXRAD Level 3 and Super-Resolution radar data along with Tornado, Severe Thunderstorm, Flash Flood and Special Marine Warnings, and predicted storm tracks issued by the U.S. National Weather Service. It can display the latest reflectivity, velocity, dual-polarization, and other products from any NEXRAD or TDWR radar site in the United States, Guam, Puerto Rico, Korea, and Okinawa, as well as data from Environment Canada and Australian Bureau of Meteorology radars. These aren't smoothed PNG or GIF images, this is native radar data rendered in its original radial format for a high level of detail.

Whether you are scanning reflectivity for a mesocyclone's tell-tale hook echo, trying to pinpoint the landfall of a hurricane's eye wall, or looking for small features like velocity couplets in the storm relative radial velocity product, RadarScope gives you the power to view true radial weather radar data.

RadarScope displays tornado, severe thunderstorm, flash flood, and special marine warnings issued by the U.S. National Weather Service. You can browse the list of active warnings in the information sidebar, select a warning to view the details, and even zoom to the selected warning on the map.

Zoom and pan on the map using the mouse, trackpad, or touch screen. Select one of the 289 different radars in the United States, Canada, Australia, Korea, Puerto Rico, Guam, or Okinawa. Tap the play button to download and animate over recent images. Display the names of over 25,000 cities and towns on the map as you zoom and scroll. Move the cursor over the color legend to see the data value associated with each color. You can also export the currently displayed map to several common image formats.

Meanwhile, RadarScope will retrieve and display updated data automatically and intelligently (approximately every 2 to 10 minutes, depending on the radar scan strategy). You can display radar data from our servers, NOAA's public access web site, or your Allison House subscriber account.

[RadarScope on Google Play Store](#)

[RadarScope on iTunes Store](#)

[RadarScope on Microsoft Store](#)

RadarScope on Google Play Store

 [play.google.com/store/apps/de...](https://play.google.com/store/apps/details?id=com.basevelocity.radarscope)⁷⁶

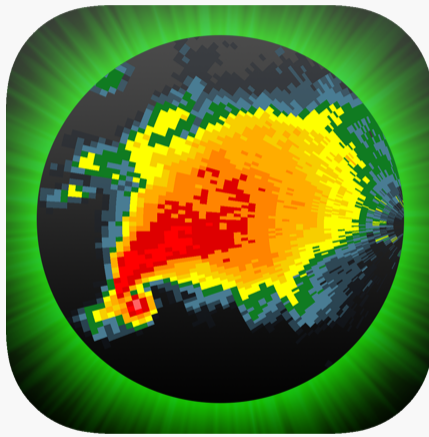
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[Open link](#)⁷⁷

⁷⁶ https://play.google.com/store/apps/details?id=com.basevelocity.radarscope&hl=en_US&gl=US

⁷⁷ https://play.google.com/store/apps/details?id=com.basevelocity.radarscope&hl=en_US&gl=US

RadarScope on iTunes Store



[apps.apple.com/us/app/radarsc...](https://apps.apple.com/us/app/radarscope/id288419283)⁷⁸

RadarScope is a specialized display utility for weather enthusiasts and meteorologists that allows you view NEXRAD Level 3 and super-resolution radar data along with tornado, severe thunderstorm, flash flood, special marine and snow squall warnings, and predicted storm tracks issued by the U.S. Nati...

[Open link](#)⁷⁹

⁷⁸ <https://apps.apple.com/us/app/radarscope/id288419283>

⁷⁹ <https://apps.apple.com/us/app/radarscope/id288419283>

RadarScope on Microsoft Store

 [www.microsoft.com/en-us/p/rad...](https://www.microsoft.com/en-us/p/radarscope/9mw4stn492s0)⁸⁰

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[Open link](https://www.microsoft.com/en-us/p/radarscope/9mw4stn492s0)⁸¹

⁸⁰ <https://www.microsoft.com/en-us/p/radarscope/9mw4stn492s0>

⁸¹ <https://www.microsoft.com/en-us/p/radarscope/9mw4stn492s0>

Winter Weather

Winter Weather

Winter storms can strike every state in the United States. It is important that every community be ready for the hazards associated with them.

FEMA AWR-331 Winter Weather Hazards Course

Winter storms can strike every state in the United States. It is important that every community be ready for the hazards associated with them. This course assists to provide emergency managers, first responders, and community members across all sectors with a basic understanding of the latest knowledge in winter weather science, forecasting, warning, and best practices in preparedness. The course enhances the ability of participants to identify and describe the hazards associated with winter weather and to better prepare for and mitigate the impacts of snow, sleet, freezing rain, and dangerously low temperatures.

The goal of this course is to provide participants with the basics of winter weather science, forecasting, warning, and preparedness.

Course Modules:

- Science of Winter Weather
- Winter Weather Forecast Process
- Winter Weather Warning Process and Safety
- Winter Storm Scenario



AWR-331_Winter_Weather_Hazards_PG.pdf

Measuring Snowfall

Measuring Snowfall

Where and How to measure snow

1. Ideally, you want to measure snow on a snow board. You can make your own. It is just a clean board (about 2 X 3 feet). Place the board on the ground away from trees, buildings, fences etc as much in the open as possible. Allow snow to accumulate on top of it and measure the depth with a ruler.
2. Less accurate alternatives include measuring on a deck or patio. These surfaces are more likely to be warmer and melt some snow or be sheltered by the house etc, but it is a second choice.
3. Measuring on the ground with no snow board works if there is no grass or the grass is extremely short and compact to the ground. If not, don't jam the ruler down too far so you don't measure the dirt and grass with the snow.
4. Measuring on a driveway might work if the temperatures before the snow are well below freezing so that all the snow falls accumulates and does not melt. If your driveway is paved, just use a ruler. If gravel, do not jam the ruler into the gravel, just penetrate the snow until you hit stone.
5. Don't wait too long to measure the snow. Snow packs down soon after it falls. This compaction process is faster for wet, heavy snow. Sleet also aids the compaction process.

Other Important Tips on Measuring Snow

1. Sampling – If you are not using a snow board, you should sample several locations and take an average. If windy conditions are causing drifting of snow, do not average the drifts. Measure the drifts separately.
2. Drifts –Only report if a drift is much greater than the snowfall. For instance, the wind blows all but a trace of snow off your board, but you have a 3 foot drift against your house. Report drifts in feet (not inches).
3. Reading the Ruler- Measure new snow to the nearest tenth of an inch. Measure snow depth to the nearest whole inch. If possible, average several readings together. Always round upward.
4. When to Report- Storm total amounts and snow rates of greater than 1” per hour.