Introduction to SKYWARN® and Storm Spotting







Today's Topics

- Overview of the NWS
- Operations & Services
- Why Do We Need Weather Spotters?
- Weather Hazards in the Mid Atlantic
- How to Report Hazardous Weather
- Practice
- National Capital Area SKYWARN Support
 Group Amateur Radio Users



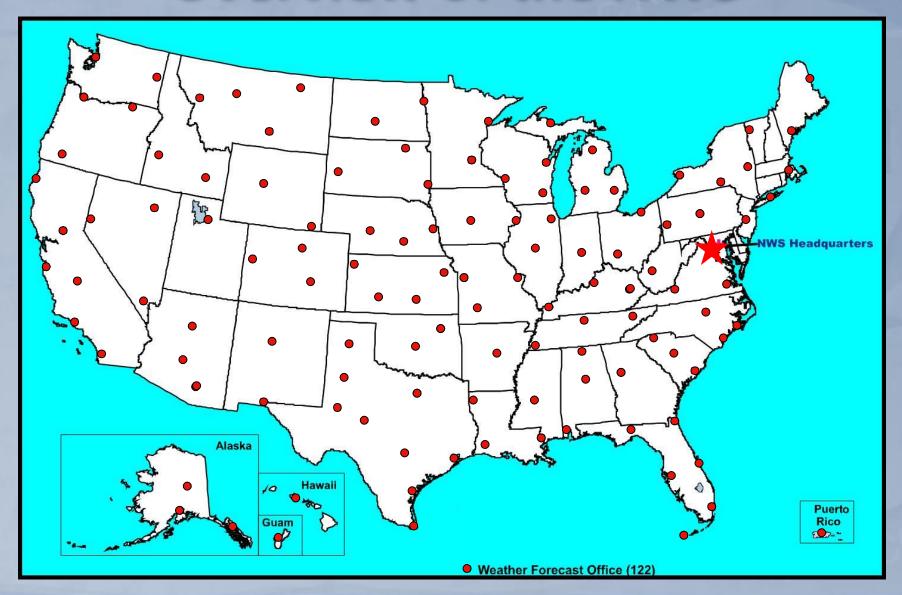
About the National Weather Service

- Provide climate, water, weather forecasts and warnings to protect life and property
- Data and products are used by other government agencies, the private sector, the public and the global community



NWS Baltimore/Washington Staff 2016

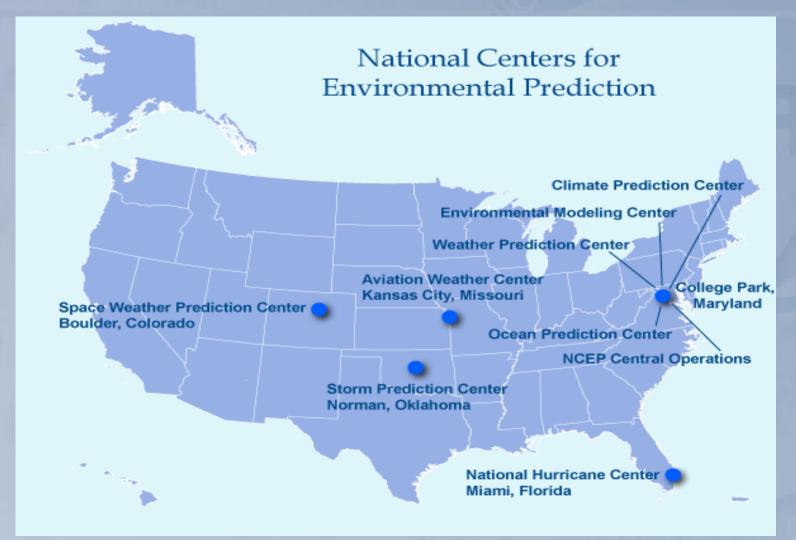
Overview of the NWS







Overview of the NWS

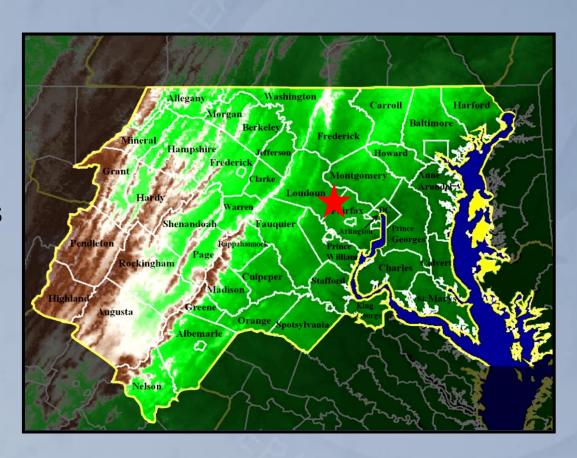


National Centers for Environmental Prediction



Land Area of Responsibility

- •13 MD Counties
- •8 WV Counties
- •23 VA Counties•11 Independent Cities
- District of Columbia
- The City of Baltimore

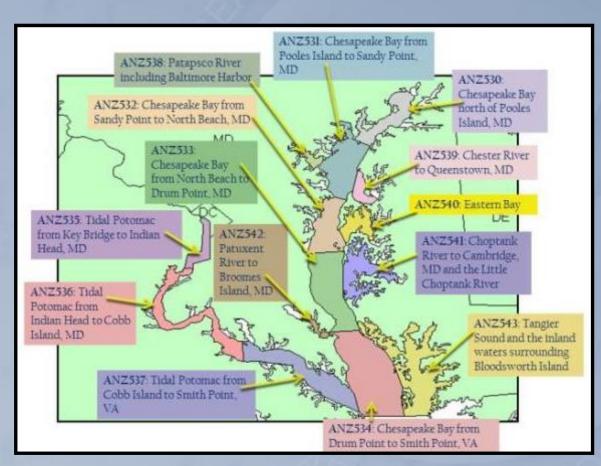


... nearly 10 million people to look out for!



Marine Area of Responsibility

- Upper Chesapeake Bay
- Tidal Potomac
- Wind and Wave
 Forecasts & Warnings
 issued for these areas

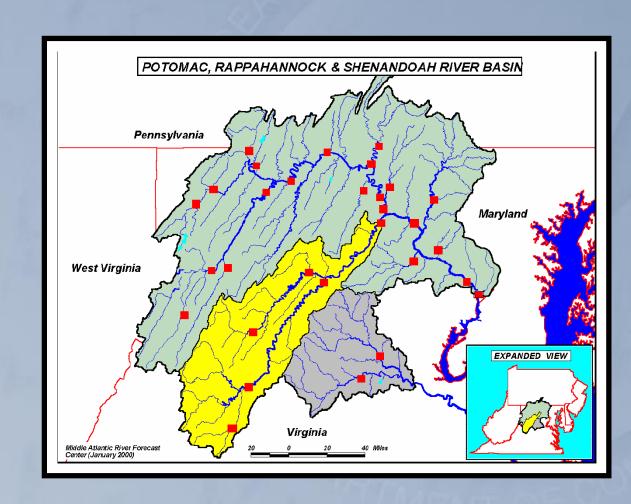




Hydrologic Area of Responsibility

River Basins

- Potomac11,600 Square Miles22 Forecast Points
- Shenandoah3,050 Square Miles6 Forecast Points
- Rappahannock1,580 Square Miles2 Forecast Points





Operations & Services

Forecasts

- Public
- Marine
- Aviation
- Fire Weather
- River
- Coastal

Data Collection

Climate

Cooperative Observers

Watch/Warnings/Advisories

- Convective
 - Tornado
 - Severe Thunderstorm
- Tropical Systems
 - Hurricanes
 - Tropical Storms
- Non-Precipitable
 - Heat
 - High Wind
 - Wind Chill/Excessive Cold
- Hydrological
 - Flash Floods
 - River Floods
 - Small Stream & Tributaries
- Winter Storms
- Coastal Flooding
- Wildfire (Red Flag)



Operations & Services

Watch/Warnings

Warning

- Action needed!
- Threat is imminent or occurring in warning area.
- Advisory = low level warning

Watch

- "Watch the weather"
- Conditions are favorable for the hazard to occur in the near future.
- Stay tuned for updates.
- Action may be needed soon.

No near term threats

• Check Outlook (thru 7 days)





Why Do We Need Spotters?

Spotters report observed weather to the NWS during potentially severe weather events.

Remember our mission? The protection of lives and property. We can't do it alone. We need you, the local experts!

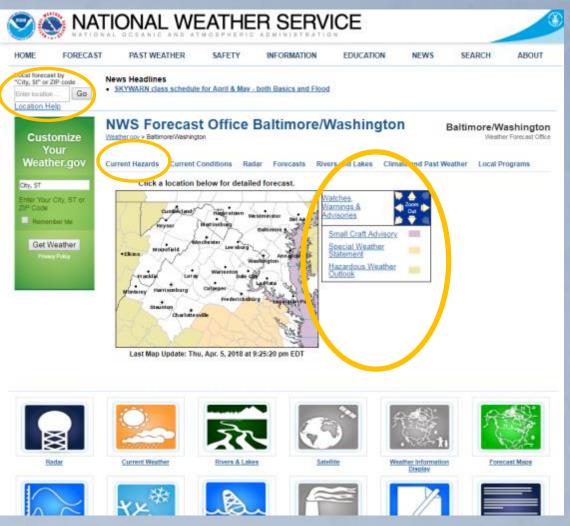


The information that you relay to us has the potential to save lives and property – helping us complete our mission.



NWS Web Page

weather.gov/washington or weather.gov/baltimore



Latest Watches,Warnings and Advisories

Local Forecast

Hazardous Weather
 Outlook





Hazardous Weather Outlook (HWO)

.DAY ONE...TONIGHT

A SEVERE THUNDERSTORM WATCH IS IN EFFECT UNTIL 1 AM INCLUDING WASHINGTON DC...THE I-95 CORRIDOR...AND THE ADJACENT WATERS OF THE POTOMAC RIVER.

.DAYS TWO THROUGH SEVEN...SATURDAY THROUGH THURSDAY

AN EXCESSIVE HEAT WATCH IS IN EFFECT SATURDAY FOR MUCH OF THE BALTIMORE AND WASHINGTON METRO AREAS. A HEAT ADVISORY IS LIKELY FOR HARFORD AND NORTHERN BALTIMORE COUNTIES. REFER TO THE LATEST HAZARD MESSAGE /NPWLWX/ FOR DETAILS.

HEAT INDICES MAY EXCEED 105 DEGREES ACROSS THE OUTLOOK AREA SUNDAY AND MONDAY.

A SIGNIFICANT SEVERE WEATHER EPISODE IS EXPECTED ON SATURDAY ACROSS THE OUTLOOK AREA. STORMS WILL BE CAPABLE OF PRODUCING DAMAGING WIND GUSTS AND VERY LARGE HAIL.

SCATTERED THUNDERSTORMS ARE EXPECTED TO DEVELOP SUNDAY AND MONDAY ALONG A STALLED FRONTAL BOUNDARY. SOME STORMS COULD BECOME SEVERE AND WILL BE CAPABLE OF DAMAGING WIND GUSTS AND LARGE HAIL.

.SPOTTER INFORMATION STATEMENT...

SKYWARN HAS BEEN ACTIVATED UNTIL 1 AM LATE FRIDAY NIGHT.

SPOTTER ACTIVATION IS LIKELY ON SATURDAY. LIMITED SPOTTER ACTIVATION MAY BE NEEDED TODAY AND SUNDAY THROUGH MONDAY. PLEASE RELAY ANY REPORTS OF STRONG WIND OR HAIL TO THE NATIONAL WEATHER SERVICE.

Short Term Hazards

Long Term Hazards

Spotter Activation

weather.gov/washington or weather.gov/baltimore



National Weather Service
Baltimore MD/Washington DC

Weather Hazards in the Mid-Atlantic

Severe Thunderstorms Tornadoes/Waterspouts Flooding & Flash Flooding **Tidal/Coastal Flooding Hurricanes Winter Weather Enhanced Fire Threat Dense Fog Non Thunderstorm Winds**



Severe Thunderstorms



Thunderstorm Ingredients

Moisture





Our moisture sources are the Atlantic Ocean, Gulf of Mexico and the Chesapeake Bay.

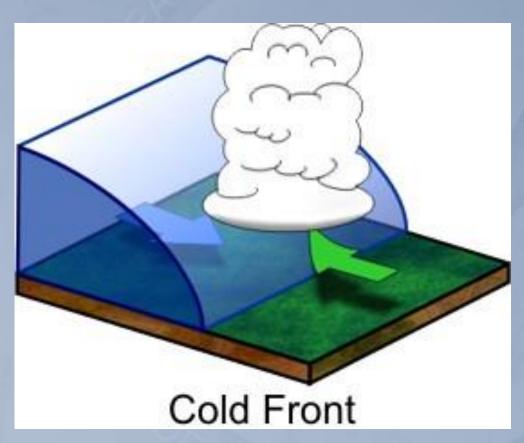


Thunderstorm Ingredients

For lift, you need a mechanism or boundary for convergence. Cold fronts are a good source of lift.

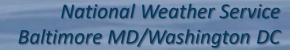
When air is forced upward along a front, it cools/condenses and precipitation forms.





Convergence of wind along the cold front.





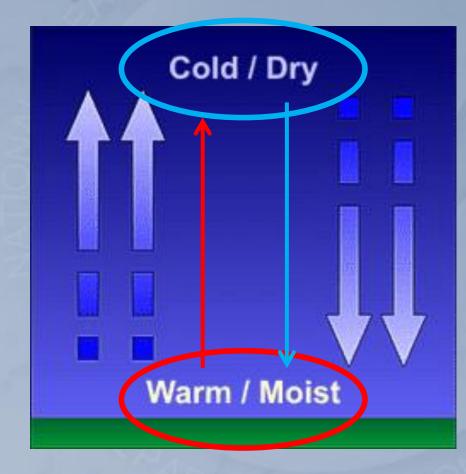
Thunderstorm Ingredients

Instability

Warm & moist air is less dense than cold & dry air. The less dense air rises up while the more dense air will sink.

An airmass is considered unstable if a parcel of air continues to rise when given a nudge upward (like when a cold front ushers in cold & dry air).

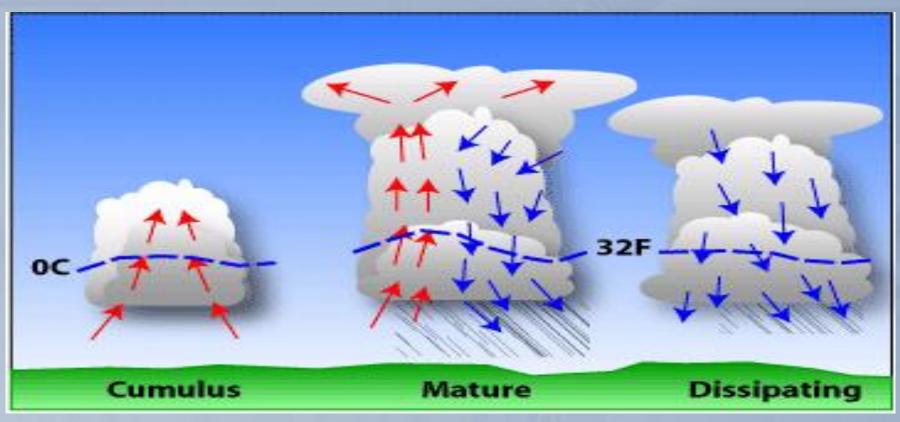
The more warm & moist the airmass is at the surface and the colder & drier the airmass is aloft, the more unstable the atmosphere is.







The Thunderstorm Life Cycle



Updraft

Updraft & Downdraft

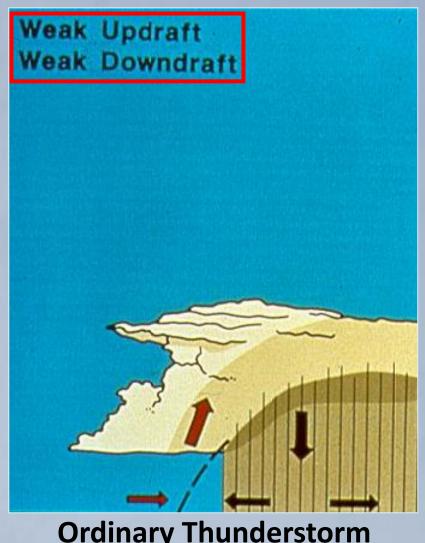
Downdraft

Graphic is from the University of Arizona

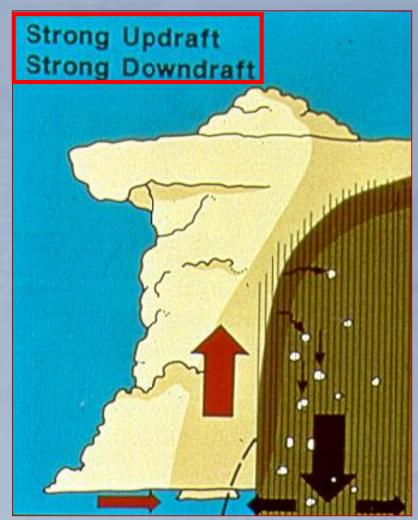




What is the Difference Between an Ordinary Thunderstorm and a Severe Thunderstorm?

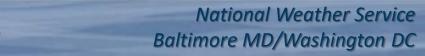






Severe Thunderstorm





Severe Thunderstorms

Warning Criteria: 1" Hail and/or 58 MPH Winds

- Damaging straight-line winds from an intense t-storm downdraft can cause extensive damage and loss of life
- Like a targeted "punch" of wind
- Often comes with heavy rain/hail
- Often confused with tornadoes especially at night





Difference between Shelf and Wall Clouds

Wall Shelf





- Slopes away from precip.
- Indication of Outflow/Downdraft.
- Accompanied by horizontal turbulent motion.
- Slopes toward precip.
- Indication of inflow/updraft
- Accompanied by vertical rotation





How to Report Hail



- Hail reports are the most difficult to gather. The hail shaft can be very narrow and short lived.
- Hail should be measured along the longest portion of the hail.

"Marble Size" hail is ambiguous. Do not report hail as marble sized.







More on Hail

The largest hail stone on record was 8" in diameter and weighed 1lb 15oz. The hail stone fell out of a severe thunderstorm in Vivien, SD on July 23, 2010.

We can even get large hail stones in the Mid-Atlantic. Baltimore County reported a 4 inch stone in June 2015.









Tornadoes, Funnel Clouds & Waterspouts

Tornado: A violently rotating then reporting a tornado, funnel cloud water spibult, please get to safety and then call us. If you are then able to, take a video, not a still picture and send it to Funnes Clave Are do to see rotation to determine rotating column of air
NOT in Wheathen iteis a tornado or scud cloud. ground. Some funnel clouds go on to become tornadoes, others do not.



Tornado Facts

Weak Tornado

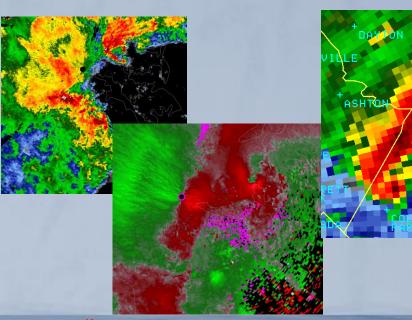
- Most frequent (90%)
- Brief
- •EF0/EF1 Winds < 111 MPH
- Few Fatalities
- More difficult to detect

Strong Tornado

- Much less frequent
- Typically lasts longer
- •EF2/EF3 Winds to 165 MPH
- Some Fatalities
- Easier to detect

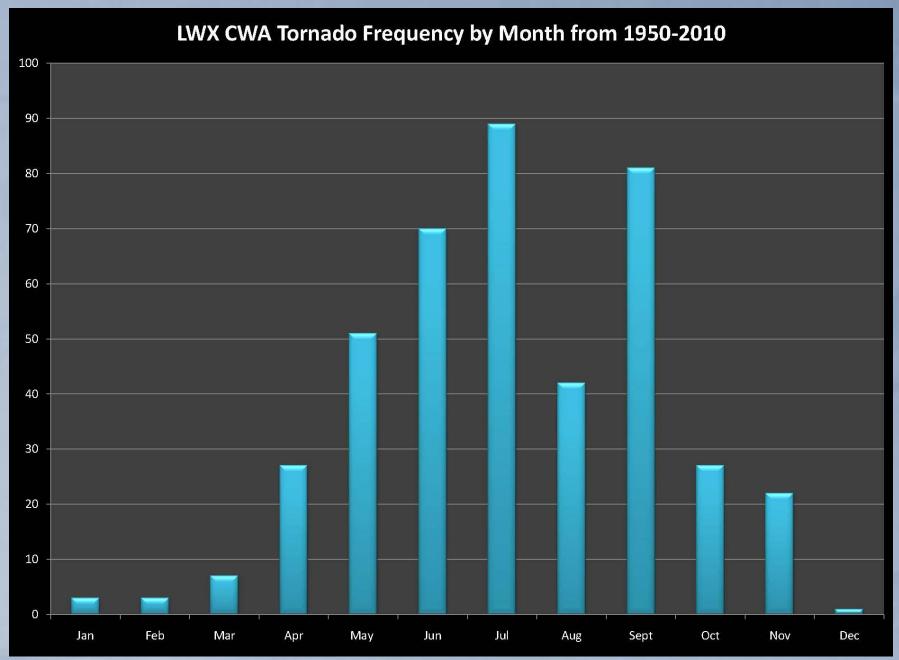
Violent Tornado

- •Rare
- Long lived
- •EF4/EF5 Winds > 165 MPH
- Many Fatalities
- Nearly always detected



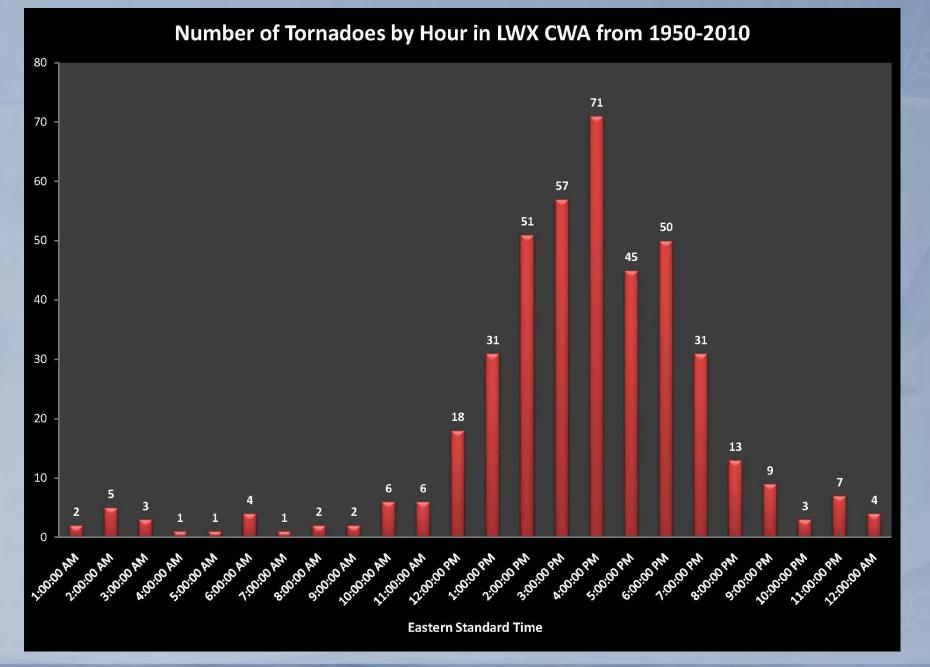




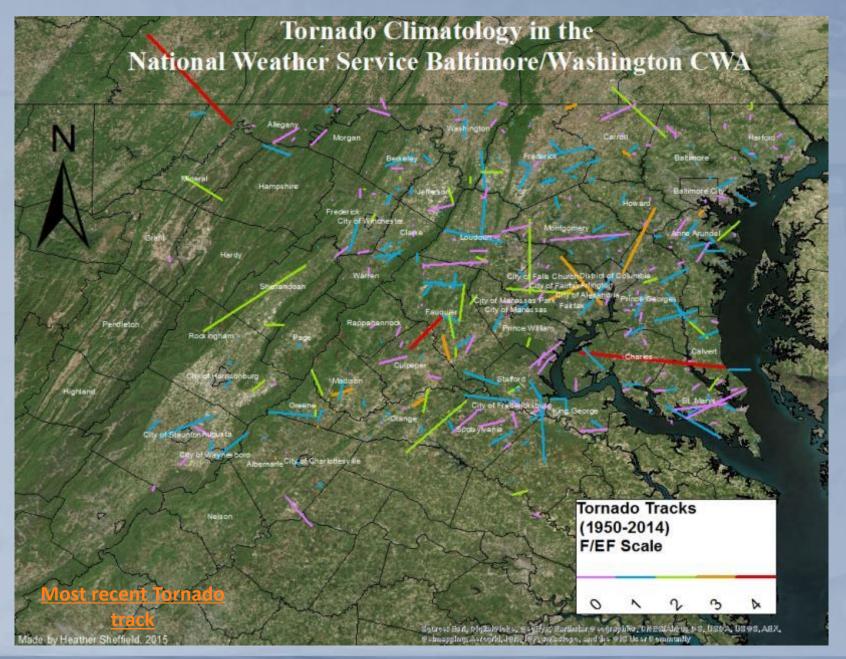
















Tornado Safety

Seek sturdy shelter in an interior room if a threadight of the shelter in the she





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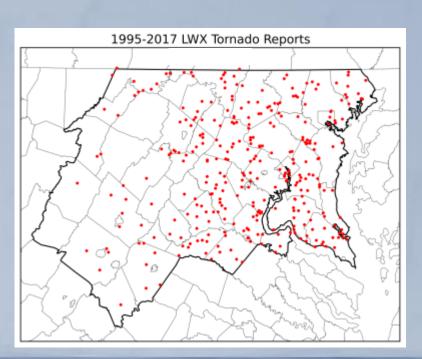
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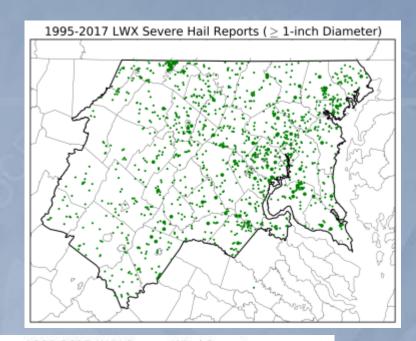


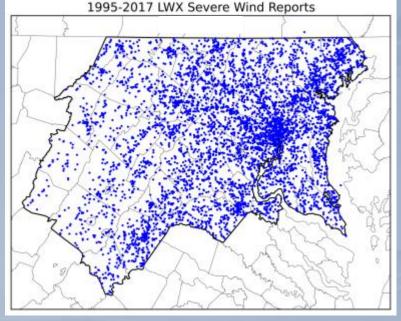




Breakdown of Severe Weather Reports Across Our Forecast Area









Spotter Responsibilities with Severe Weather

- Tornado/funnel cloud/waterspout
- Straight line wind damage
- Hail
- Lightning (don't call to just report it is happening. Call if there is damage as a result of a lightning strike)



Flooding



Flash Flooding

Flash Flood: A flood that follows within 6 hours of a heavy or excessive rainfall, dam or levee failure, or a sudden release of water impounded by an ice jam.

Flash Floods cause more deaths than tornadoes or lightning (30 year period)!



Baltimore, MD August 2014



Areal Flooding



Includes both river and stream flooding.

Flood: A flood that occurs more than 6 hours after the heavy or excessive rainfall event.







Coastal Flooding

Coastal Flooding: The inundation of land areas caused by sea waters over and above the level of normal tidal action.



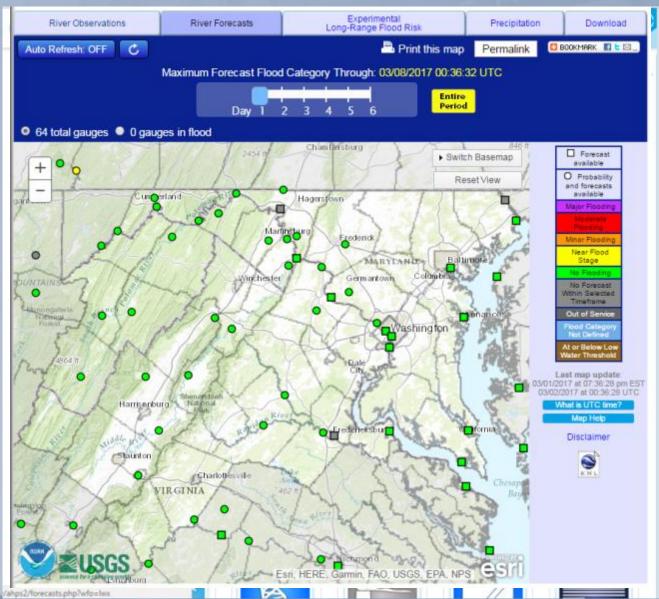
Annapolis, MD 2019

- Prolonged onshore flow
- Storm Surge from Tropical Systems
- Spring Tides:

 the highest tides in a lunar month, around
 new and full moon when the Earth, Moon and Sun are aligned



River Forecasts





Flooding Safety



- •Never enter water over a road if it is too deep to see the pavement.
- Be very careful at night.
 Visibility is greatly reduced and flooding is harder to recognize.

• 45% of the flood fatalities in the previous couple of years were the result of people attempting to drive through flooded roadways.

1 flood related death in MD in 2014

•If your vehicle stalls in unexpected high water, leave it at once and seek higher ground.





Spotter Responsibilities with Flooding

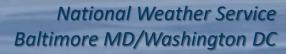
- How deep is the water (if safe to measure)
- Is the water moving or still?
- Any impacts?
- Location?





Winter Weather





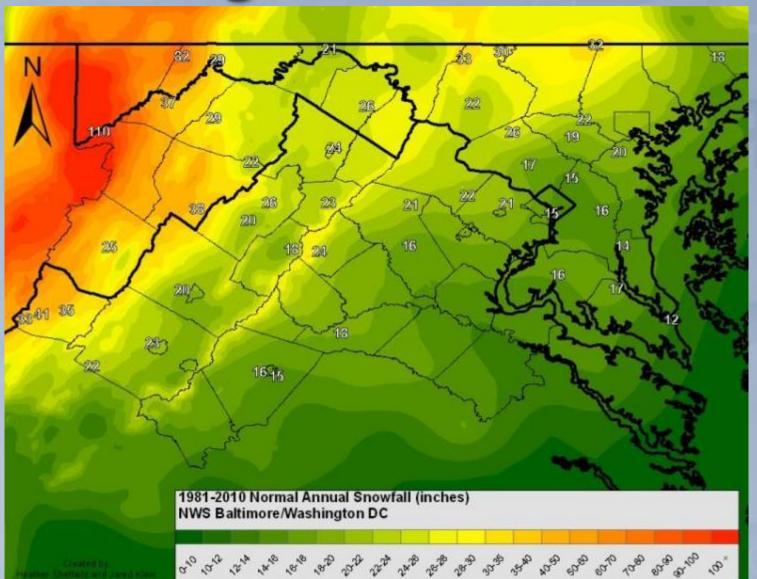
Winter Weather Concerns

- Heavy Snow
- Blizzard Conditions
- •lcing
- Extreme Cold





Average Snowfall Totals





Setting Up for Snow Reports





Ideally, a snowboard is the best measuring surface.

- •Can be as simple as a 2 ft square piece of plywood painted white
- •May want to place flags/markers near the board to help locate during snowy weather
- You can measure snow on a table if you don't have a board



Snowfall/Ice Reporting & Measurement

Phone

Email

Measure with a ruler

Please report your **STORM TOTAL** snowfall to the nearest tenth of an i after the event is over.

- •Ice Accumulation
 - Report Thickness
 - What kind of surface its on

- **Frequency of Measurements**
 - Every two to three hours is adequate
 - •Clean off your snowboard every six hours cleaning more often can lead to inaccurate measurements

- Snowfall Measurements
 - First two inches & every two inches
 - Total Snowfall
 - •Is it measured or estimated?
 - •If drifting becomes a problem, take several measurements and average them.

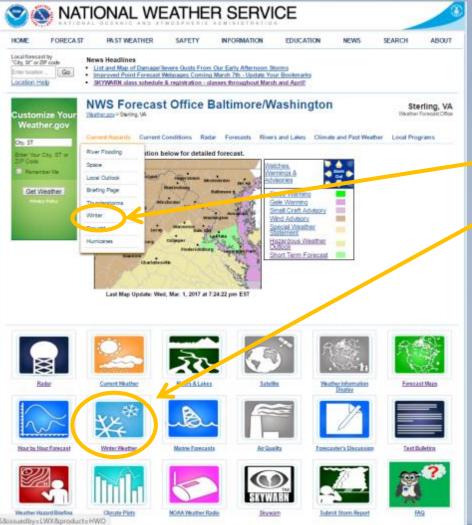




Preparing for Winter Weather



Local Winter Weather Webpage

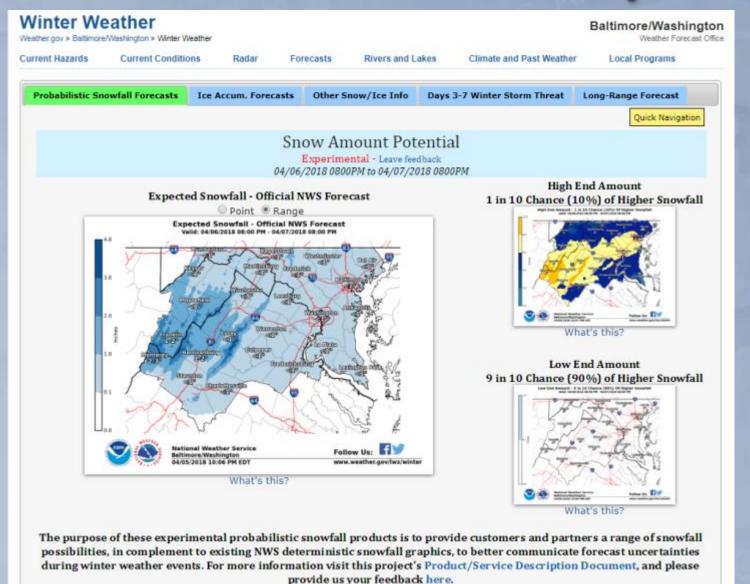


Winter Weather Page





Winter Probabilistic Graphics





Spotter Responsibilities with Winter Weather

- Snowfall amounts
- Ice amounts







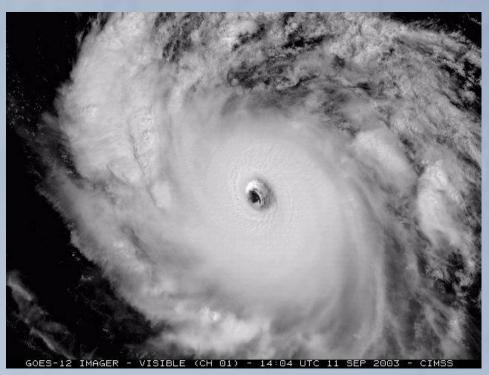


Tropical Weather



Tropical Weather

Hurricane Season is from June 1 -November 30



Hurricane Isabel

FOUR Threats:

- Inland Flooding (Rain)
- Storm Surge (Tidal)
- High Wind
- Tornadoes





Spotter Responsibilities in Tropical Weather

- Flooding
 - Fresh Water or Storm Surge
- Tornadoes
- Damage from winds or flooding



How to report to us?



Very Important Information

If your report is severe thunderstorm hail/wind/tornado/funnel cloud or flooding related, please DO NOT send your report via email!

This type of information is time critical and needs to be relayed to forecasters *immediately*.

The best means to get information to the NWS quickly is by the telephone or Amateur Radio

PLEASE DON'T WAIT FOR US TO CALL YOU!



Contact Information

- National Weather Service,
- Sterling, VA
- Phone: Our Spotter Hotline
- Email: <u>lwx-report@noaa.gov</u>
- Webpage: http://www.weather.gov/washington
- Report:
- http://ht.ly/gVpw305Nchl



Reporting Criteria

- Tornado or Funnel
- Hail Pea sized or larger
- Rotation within a storm
- Wind 50 MPH or greater (sustained/gust and measured/estimated)
- Damage Any weather related damage to trees or property. Give as many details as possible (t-storms or high winds).





Reporting Criteria

- Heavy Rain Measured 1" or More
- Flooding Streams, creeks or rivers out of banks of flooding of roads from poor drainage (including coastal flooding)





- Ice Accumulation Any glaze on surfaces
- Snow Accumulation Every 2" or any accumulation not reflected in the forecast, and final total





Reporting Criteria

- Fog Any fog resulting in hazardous driving conditions
- Tropical Flooding as a result of rain and/or storm surge, tornadoes, wind damage





Fire Weather – After calling
 911, report wildfires (especially during times of Red Flag conditions)





Making a Storm Report

- Who is making the report?
- What are you reporting?
- When did the event occur?
- Where is the location of the report?







How to Report Information

- 1. Call NWS Baltimore/Washington if weather is imminent or occurring: Our Spotter Hotline
- 2. Email *delayed* weather reports and pictures to: lwx-report@noaa.gov
- 3. Fill out online form for snow, ice and/or heavy rain
- 4. Contact local Emergency Management Officials
- 5. Relay your report through Amateur Radio when activated upcoming slides



Snow/Ice Reportir

Fill out Snow/Ice Report http://ht.ly/gVpw305Ncl

Reports automatically ge database

Submit a Rainfall, Snow and/or Ice Report

* Required



Skywarn ID *

Your answer

Enter your 5 or 6 character Skywarn Spotter ID (e.g., AB123 or ABC123). NO SPACE OR DASH. If your measurement was NOT taken at the location on file with us, you don't know your Spotter ID, or are have difficulty using this form, please email LWX-report@noaa.gov

Observation Date and Time * Eastern time (*** MAKE SURE TO SELECT AM or PM ***)	
Date	
mm/dd/yyyy	
Time	
: AM	₩

Snow (and/or Sleet) Amount

To the tenth of an inch, (ex. 2.5). Enter 0 for trace (less than measurable). Leave blank for none.

Your answer

Freezing Rain/Glaze Amount





What Happens to the Reports at the National Weather Service?

- 1. Received by the staff
- Integrated with other information (radar, satellite, & spotters)
- 3. Used to "calibrate" the radar
- 4. Helps in warning decision
- 5. The information you provide can be relayed in warnings, and real time storm reports!
- 6. Web, NOAA Weather Radio, and the media relay the information



It's all about getting information to the people so they can make the right decisions.



What Happens When We Issue a Warning?





NWS







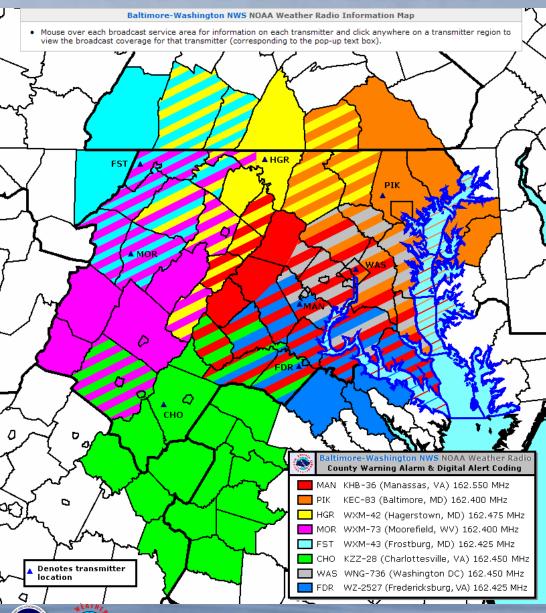








NOAA Weather Radio (NWR)



Is the best way to receive watch and warning information!

Receivers

Can be purchased in Nature and Electronic Stores and in Catalogs. They generally range in price from \$15 to \$75



Amateur Radio and SKYWARN



Capital Area SKYWARN [®] Support Group Webpage

www.wx4lwx.org



www.wxdlwx.org

Home Leadership Frequencies Weather Awarness Net Control Station Tools Scripts Links

What is Skywarn?

Skywarn is a network of volunteer severe weather spotters, who act as the "eyes and ears" of National Weather Service (NWS) offices throughout the county. The spotters are trained by local NWS. Forecast Offices on how to spot and report severe thunderstorms, formadoes, hall and fooding. In some areas, spotters also report snowfall and ice accumulation.

The National Capital Area Skywarn Support Group

NWS Baltimore / Washington Forecast Office in Sterring, Virginia, has been recruiting and training spotters into its expanded network since 1990, there are currently over 5,000 volunteers who cover 44 counties, plus Baltimore City and the District of Columbia.



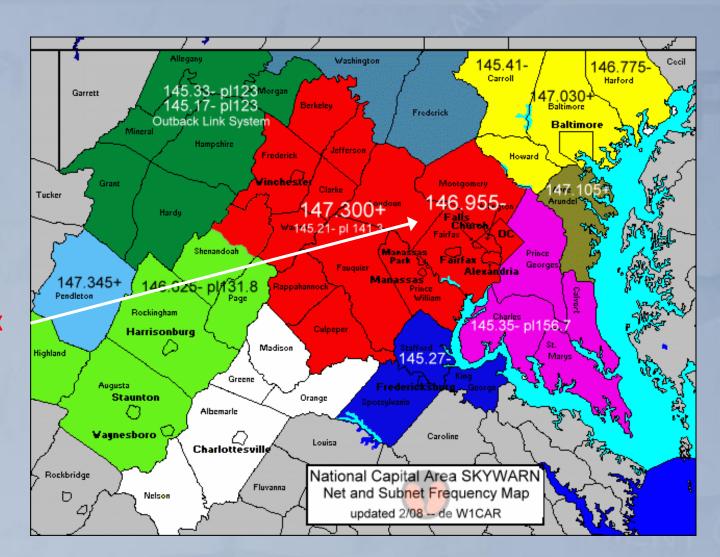
The network comprises an area from the west of the Susquetanna River and Chesapeake Bay to the Allegheny Mountains, and from the Mason-Dixon line down to St. Mary's, King George, Spotsylvania, Orange, Nelson, and Highland Counties.

Who Are Our Spotters?

Skywarn volunteers are a diverse group, ranging from weather enthusiasts or public-service oriented people such as amateur radio operators, REACT members, or emergency response personnel. Spotters are all ages, from 14 through retirement age, with many professions represented. Skywarn volunteers have a common interest in weather and a strong desire to help the community.



SKYWARN Frequencies







Questions or Comments?

Email main SKYWARN email address or call office lwx-report@noaa.gov

