



NWS Milwaukee Storm Spotter Training 2020



National Weather Service Milwaukee

Provide warning/forecast info for the protection of life/property



- 24/7/365 Operations
- 24 dedicated staff members



National Weather Service Milwaukee

Severe weather happens every year in Wisconsin



Caroline Reinwald
Waukesha 6-27-19



Browntown
4-7-20 3" Hail



Wales
10-1-19 EF-0



Who are storm spotters?

Volunteers that provide ground truth to what NWS meteorologists interpret on radar

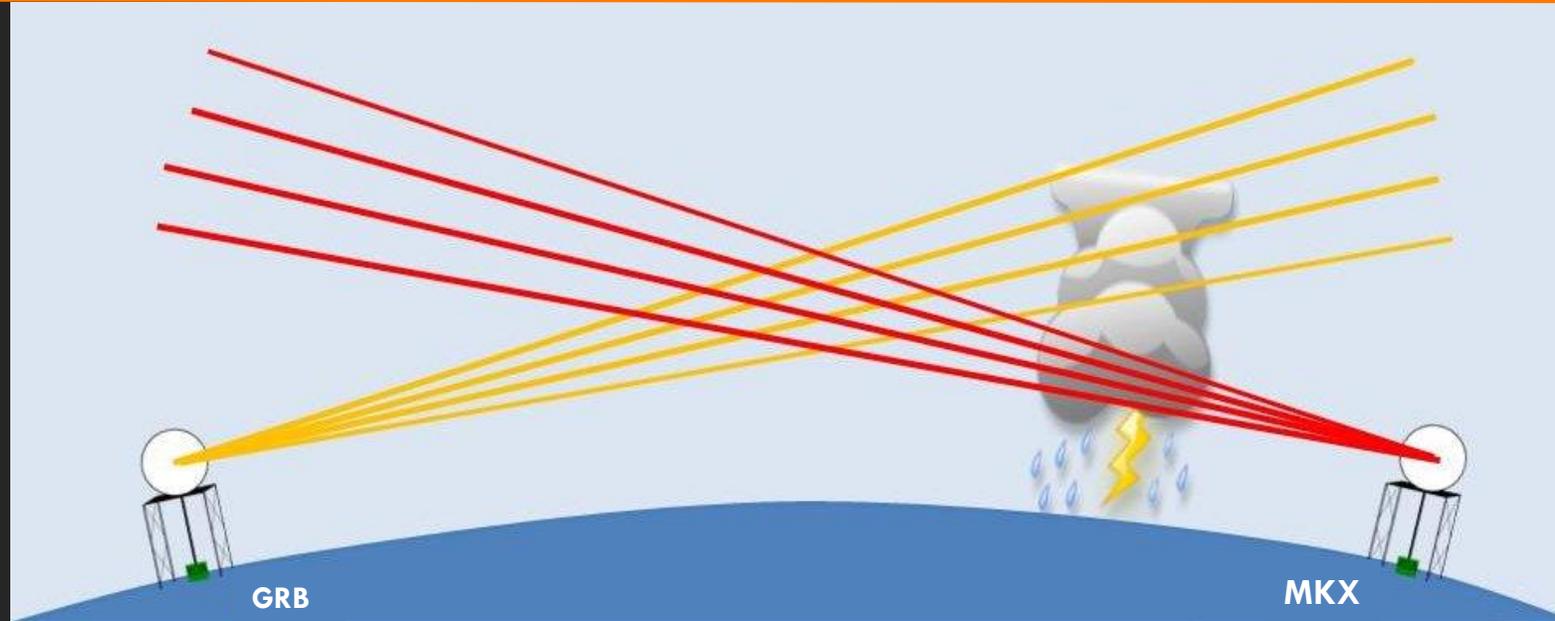


Weather enthusiasts with an interest in public safety

National Weather Service Milwaukee



How do storm spotters help?

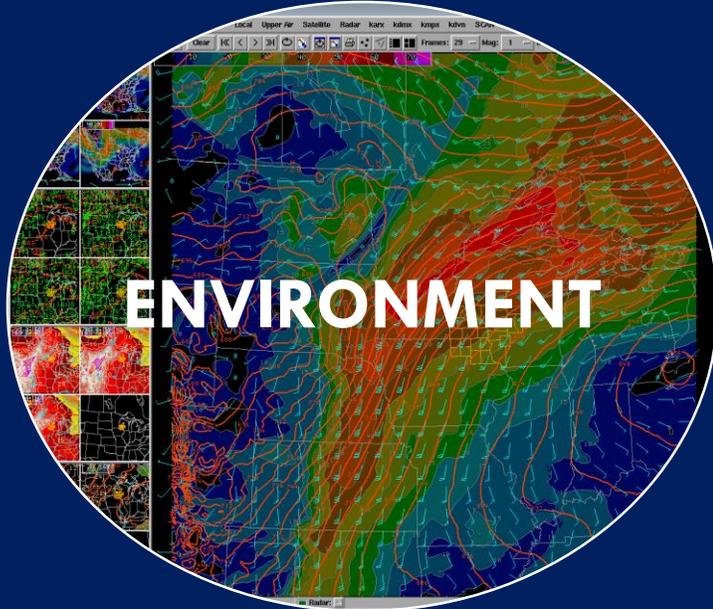


-Ground truth

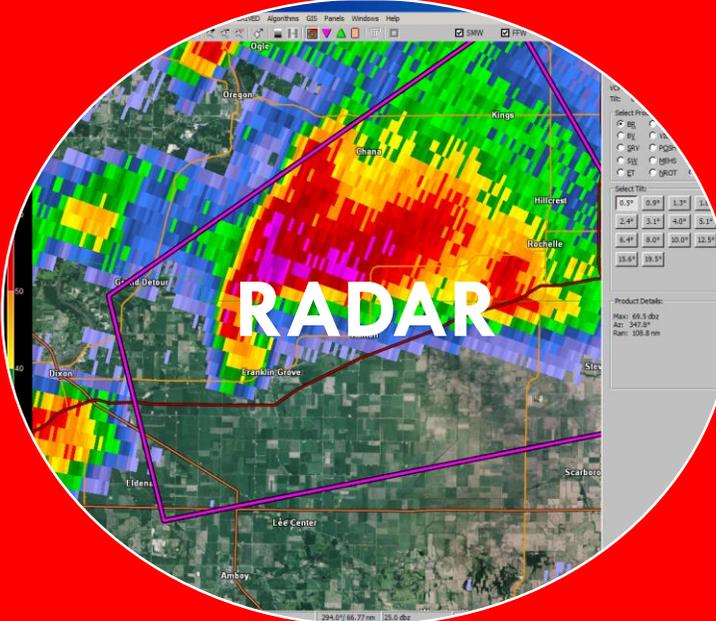
-Radar doesn't 'see' severe weather

-Radar guidelines/thresholds to trigger warning

What triggers a Warning from NWS?



What conditions or thresholds need to be met
Baseline/Background



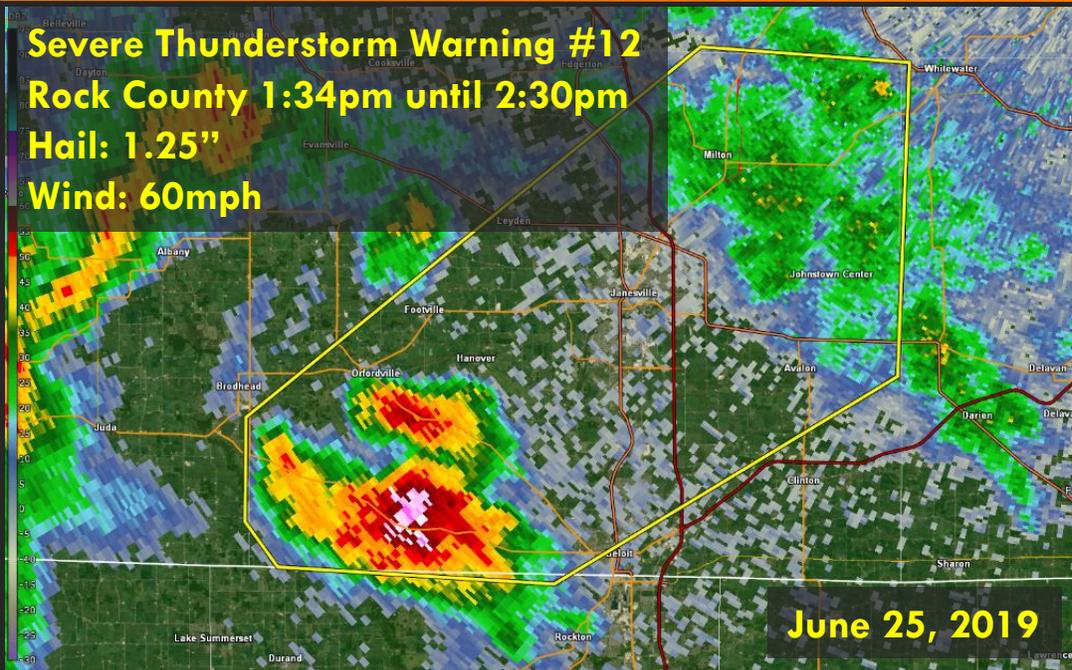
Analysis of reflectivity, velocity, other fields

Either one of these pushes us to issue the warning

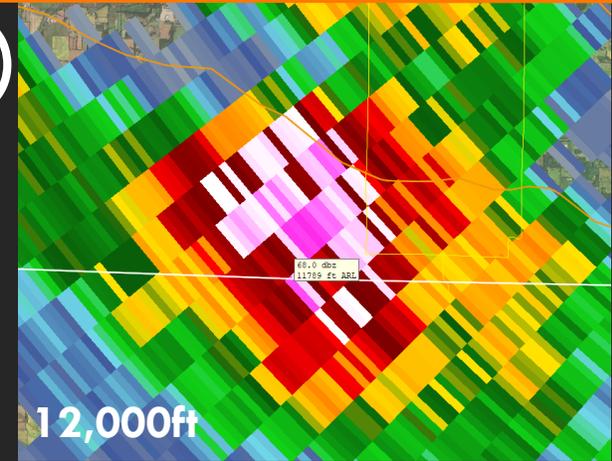


What is actually happening on the ground

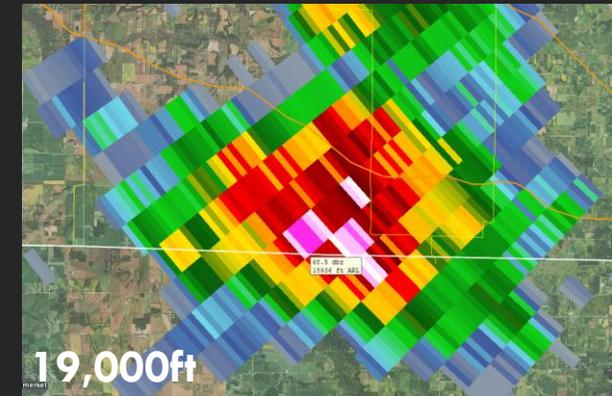
Example: Radar based Severe Thunderstorm Warning



Freezing Level (65dBz)



-20C Level (60dBz)



Severe Hail Thresholds (Environment):

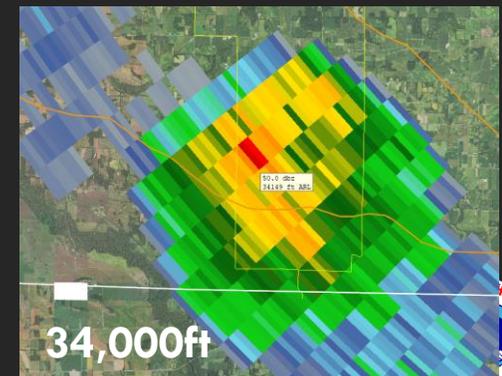
Freezing Level (65dBz): 10,900ft

-20C Level (60dBz): 19,000ft

'Donovan Heights' (50dBz): 25,000ft

National Weather Service Milwaukee

Donovan (50dBz)



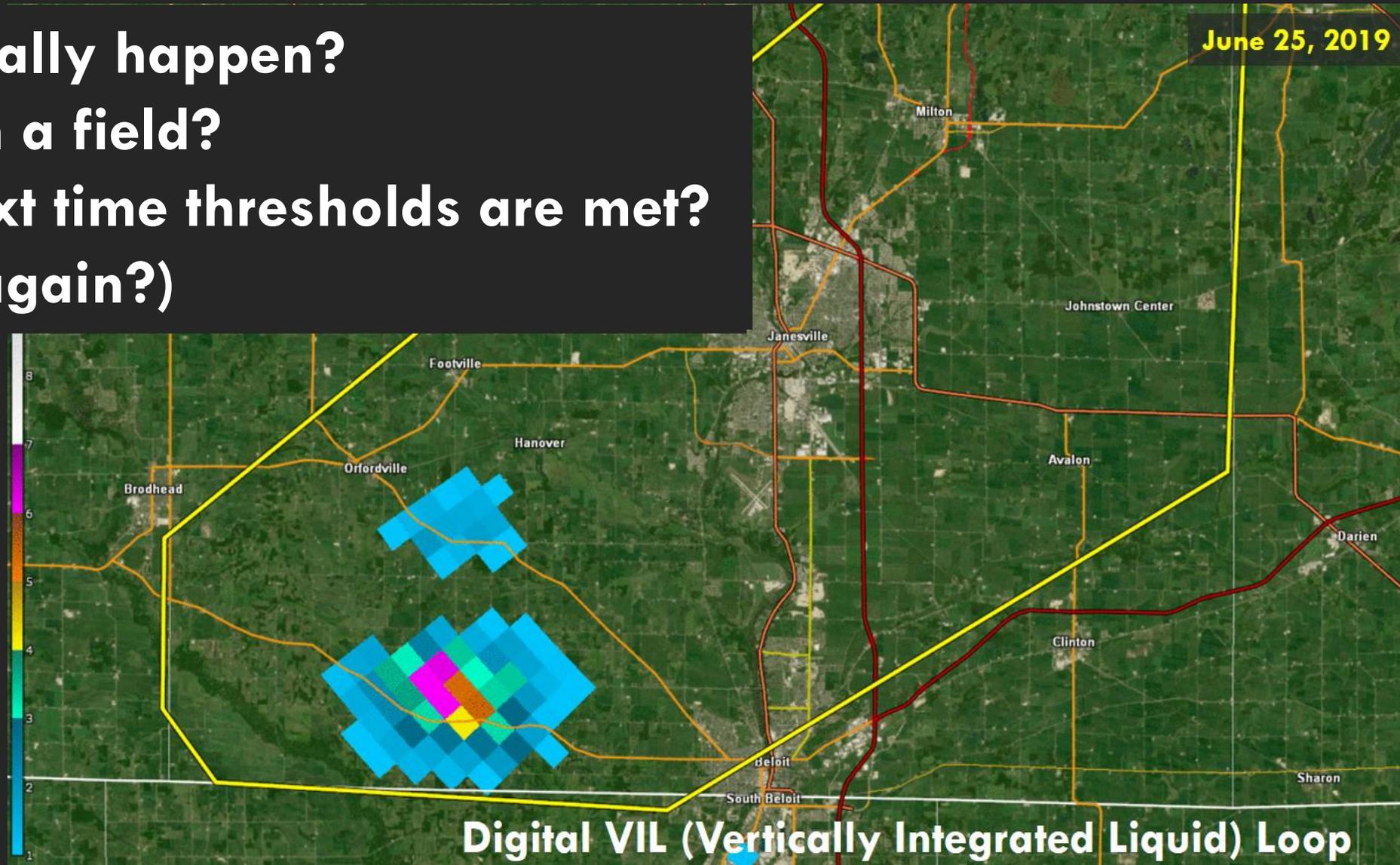
What happened? No reports.

Did anything actually happen?

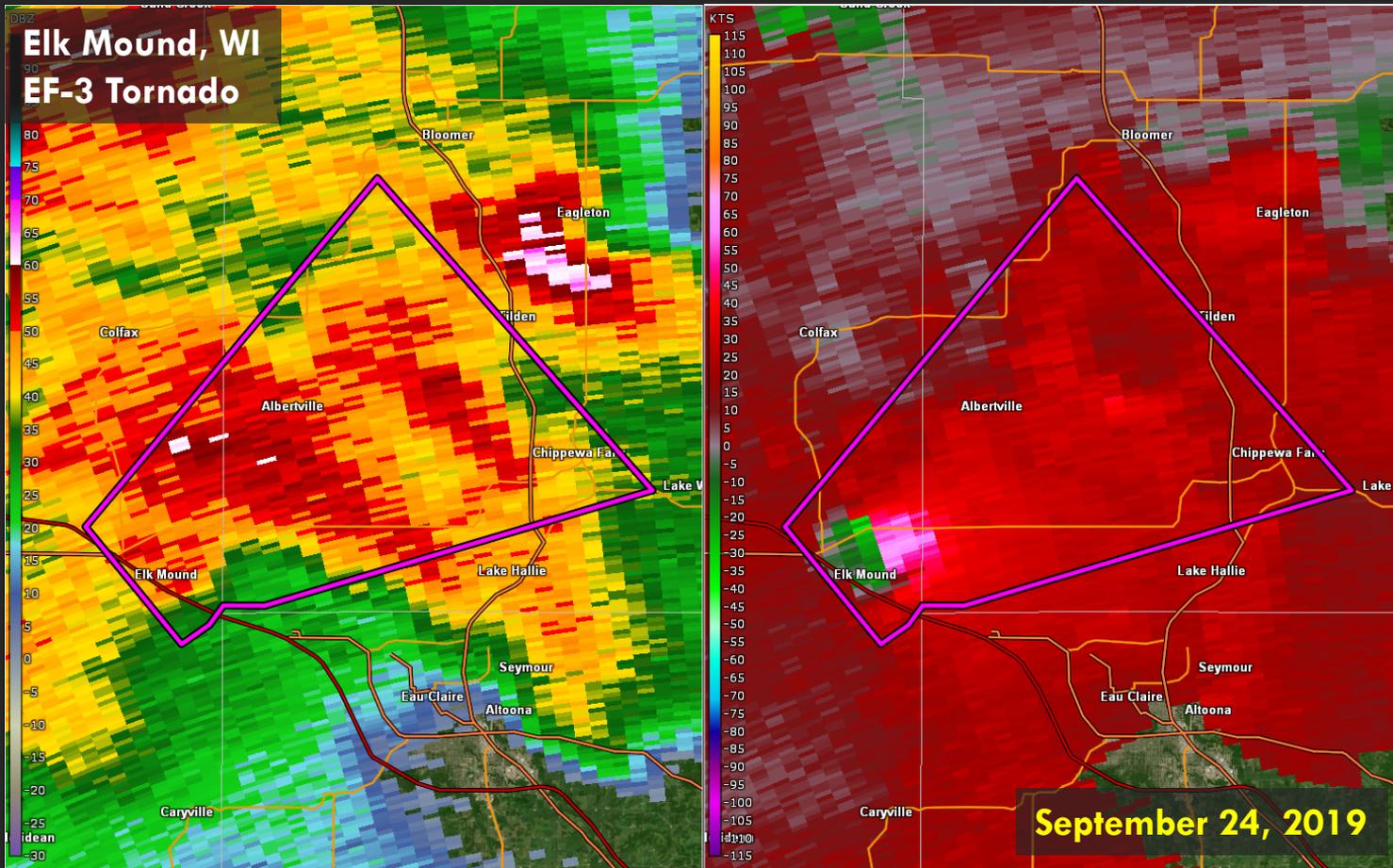
Did the hail fall in a field?

What happens next time thresholds are met?

(ie, Do we warn again?)



How do storm spotters help?



The National Weather Service in The Twin Cities has issued a

* Tornado Warning for...
East central Dunn County in west central Wisconsin...
Southwestern Chippewa County in west central Wisconsin...

* Until 815 PM CDT.

* At 745 PM CDT, a severe thunderstorm capable of producing a tornado was located over Elk Mound, or 10 miles west of Eau Claire, moving northeast at 30 mph.

HAZARD...Tornado and quarter size hail.

SOURCE...Radar indicated rotation.

...A TORNADO WARNING REMAINS IN EFFECT UNTIL 815 PM CDT FOR EAST CENTRAL DUNN AND SOUTHWESTERN CHIPPEWA COUNTIES...

At 752 PM CDT, a confirmed tornado was located near Elk Mound, or 9 miles northwest of Eau Claire, moving northeast at 30 mph.

HAZARD...Damaging tornado and quarter size hail.

SOURCE...Weather spotters confirmed tornado just east of Elk Mound at 750 PM CDT.

People **REACT** to reports! It's a confirmation source.

National Weather Service Milwaukee



How do storm spotters help?

Your report may be what sends someone to shelter...IF we get it in real-time.



Back Real-time Alerts Next

Tornado Warning issue...
Last week
...A TORNADO WARNING REMAINS IN EFFECT UNTIL 615 PM CST FOR SOUTH

We can use your current location to send you real-time tornado alerts for your area.

WGN-WEATHER SEVERE THUNDERSTORMS
Sunday 5:00 PM

EMERGENCY ALERT SYSTEM
TORNADO WARNING
08/18/05 22:10:00 CDT

1:40
Wednesday, August 10

Text from 555-78
ST. TAMMANY, LA - SEVERE THUNDERSTORM WARNING UNTIL 3:00 PM CDT. DETAILS AT IRVON.NET/IRBL

slide to view

All Hazards NOAA Weather Radio
NOAA's National Weather Service

National Weather Service Milwaukee



Storm Spotting Process

“A Day in the Life of a Storm Spotter”

Prepare

Deploy

Observe

Communicate



Storm Spotting Process

“A Day in the Life of a Storm Spotter”

Prepare

Deploy

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Communicate



Storm Spotting Process: **Prepare**

Have a professional source of forecast information

- **National Weather Service (weather.gov)**
- **TV Meteorologists**
- **Private Sector**

Use technology: Updates

- **Cell phones (Apps, WEA)**
- **Social Media/Internet**
- **TV/Radio**



National Weather Service Milwaukee



weather.gov/milwaukee

Prepare

Local focus on severe weather potential

City Forecast

Outlooks

Submit a Storm Report

Hazardous Weather Outlook

Skywarn

Local Storm Reports

Summer Weather Info

National Weather Service Milwaukee

The screenshot shows the National Weather Service Milwaukee website. At the top, there is a navigation bar with links for HOME, FORECAST, PAST WEATHER, SAFETY, INFORMATION, EDUCATION, NEWS, SEARCH, and ABOUT. Below this, there are several sections: 'Local forecast by City, SC or ZIP code' with a search box; 'News Headlines' listing '2010-2019 Top 10 Wisconsin Weather Events' and '2019 Top 10 Wisconsin Weather Events'; 'MY FORECAST' for '3 Miles ESE Milwaukee WI' showing 'Overcast' and '32°F'; 'Current Hazards' with a map of the region; 'Weather Map' showing radar and forecast maps; and a footer with social media links and additional resources like 'HAZARDS', 'CURRENT CONDITIONS', 'LOCAL FORECASTS', 'CLIMATE', 'DSS PROGRAMS', and 'ABOUT US'.

“Situation Report”

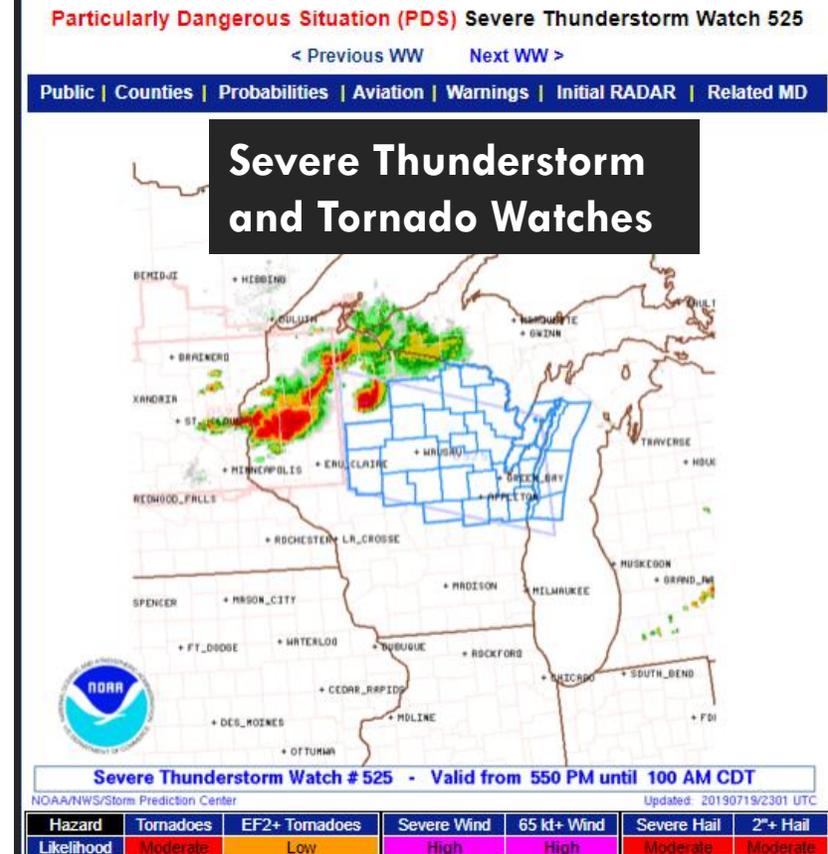
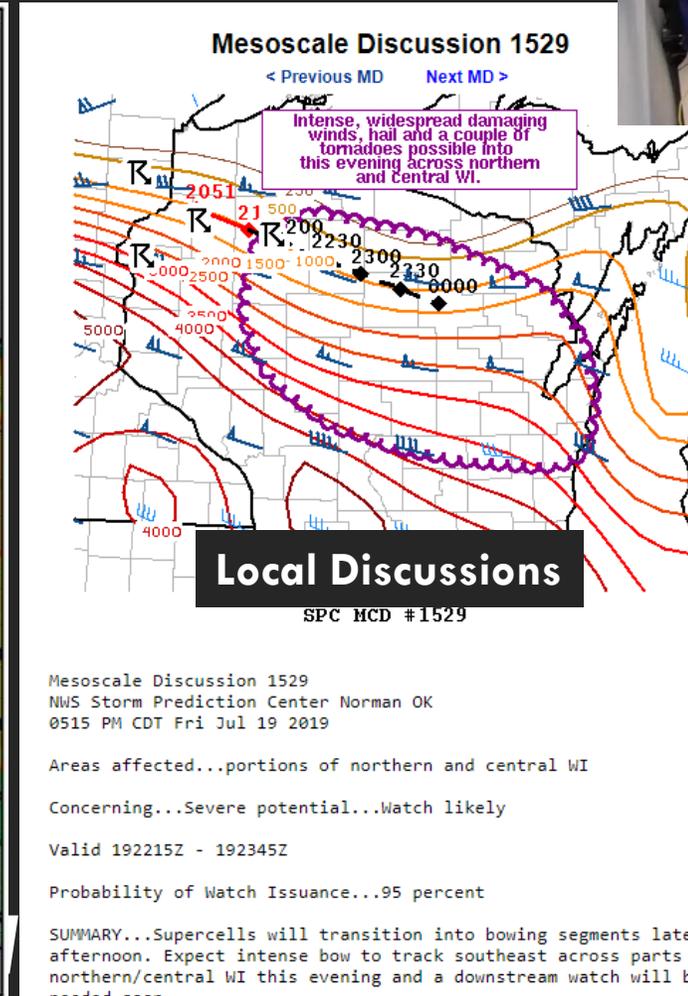
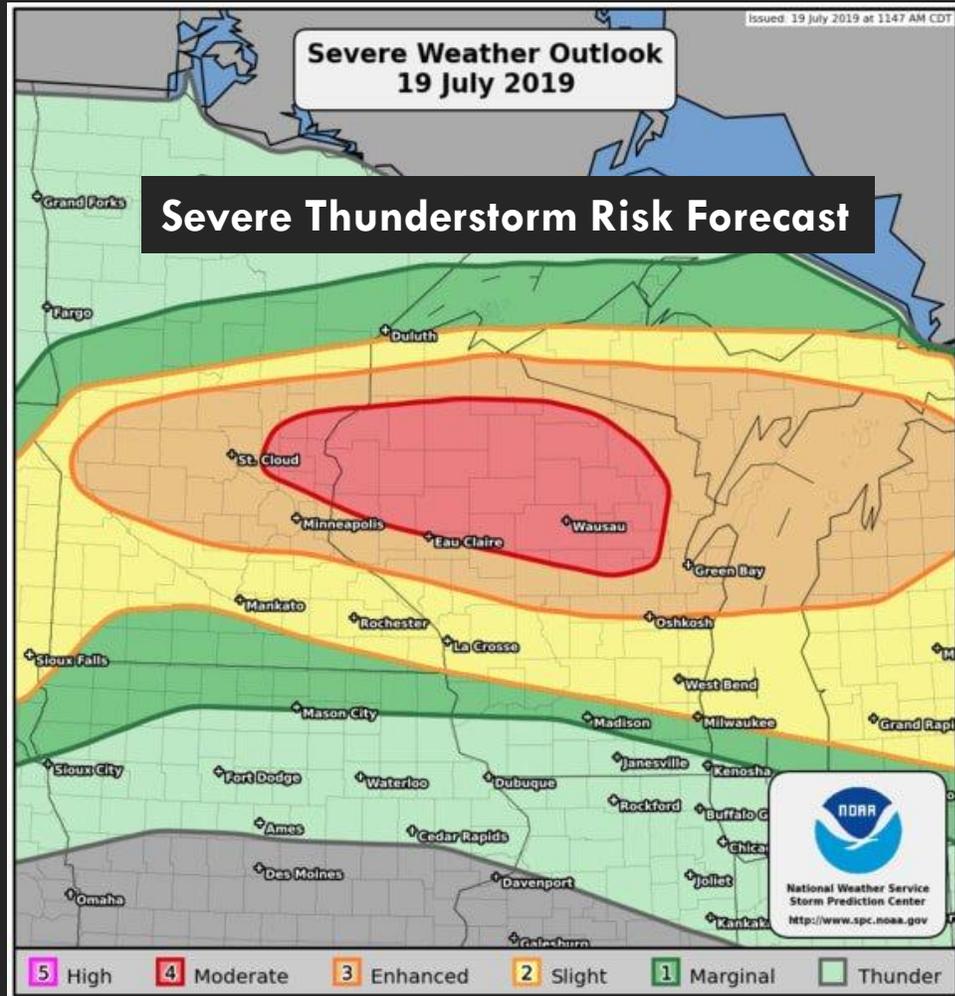
Clickable City Forecast

“Weather Story”

The 'Weather Story' graphic is titled 'Active Weather Continues into Tomorrow' and 'Severe storms and flash flooding threat for southern WI'. It features a weather forecast for 'TODAY' (74-82°F, LIKELY Flash Flooding 100%), 'TONIGHT' (53-59°F, LIKELY Flash Flooding 90%), and 'WED' (57-65°F, LIKELY Drizzling during morning 70%). A central map shows a 'Flash Flood Watch' area in southern Wisconsin. Text on the right states: 'Slight Severe Risk' with 'Main threat is damaging winds. Isolated small hail also possible.' and 'Thunderstorms will develop during late afternoon.' Below the map, it says: 'A flash flood watch is in effect for all of southern WI. Rainfall totals of 2-4 inches possible through Wed. afternoon. If you are in low-lying areas or along rivers, pay attention to changing environmental conditions!'

Storm Prediction Center

Watch and forecast products/information dealing w/severe weather



SPC Severe Thunderstorm Risk Outlooks

spc.noaa.gov/products/outlook (National-Today through Day 8)

spc.noaa.gov/public/cwa/images/MKX_swody1.png (Southern WI-Day 1)

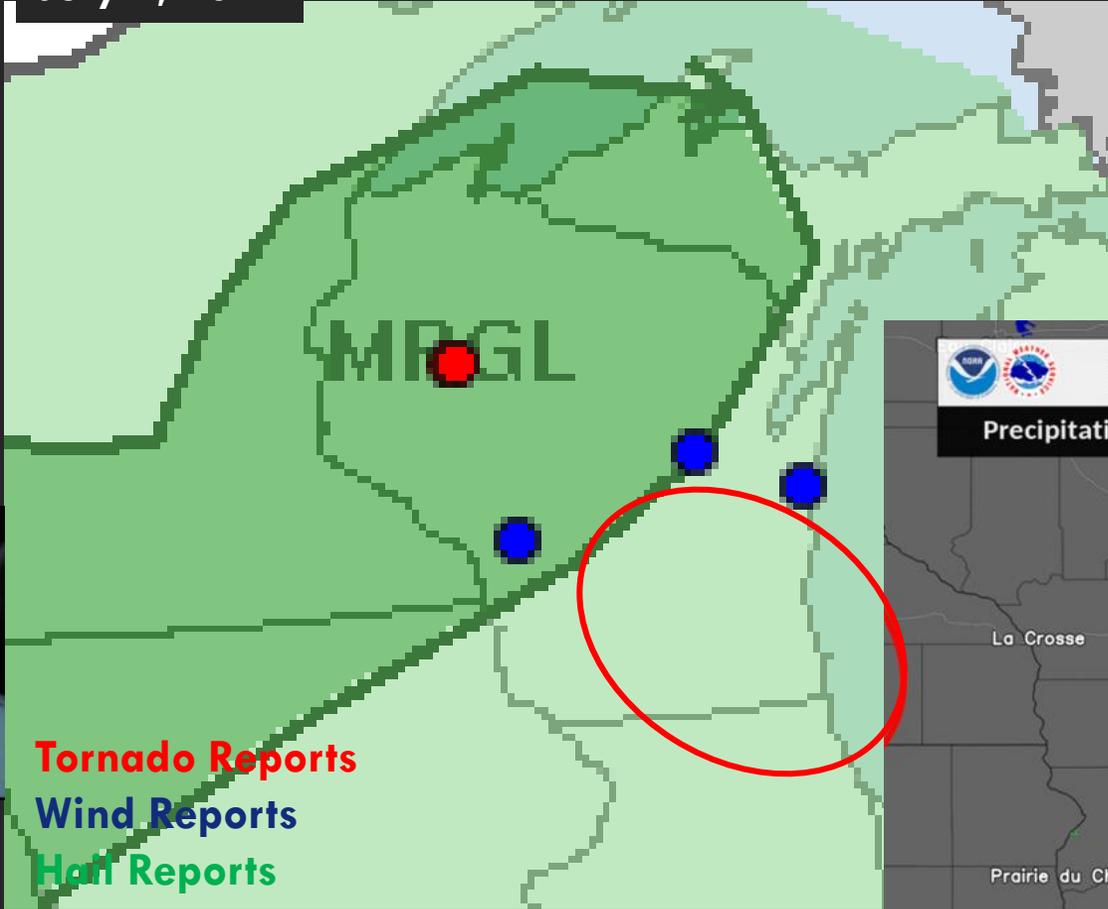
spc.noaa.gov/public/state/images/WI_swody1.png (WI-Day 1)

Thunderstorms	1-Marginal	2-Slight	3-Enhanced	4-Moderate	5-High
<p>No severe thunderstorms expected</p> <p>Lightning & flooding threats exist with <u>all</u> thunderstorms</p>	<p>Isolated severe thunderstorms possible</p> <p>Limited in duration and/or coverage and/or intensity</p>	<p>Scattered severe storms possible</p> <p>Short-lived and/or not widespread, isolated intense storms possible</p>	<p>Numerous severe storms possible</p> <p>More persistent and/or widespread, a few intense</p>	<p>Widespread severe storms likely</p> <p>Long-lived, widespread and intense</p>	<p>Widespread severe storms expected</p> <p>Long-lived, very widespread and particularly intense</p>
					

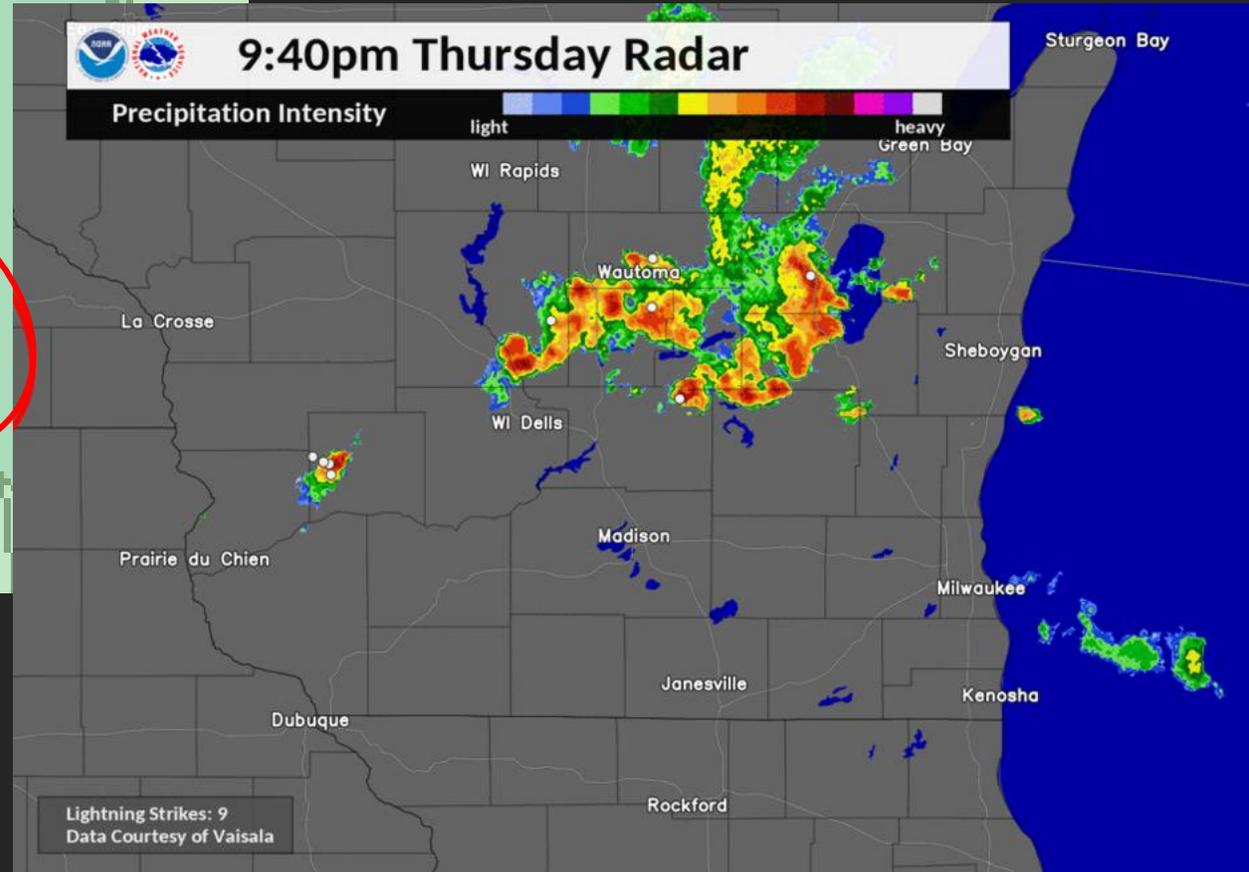
General Thunderstorms: 0 out of 5

0-General Thunderstorms
No severe thunderstorms expected.
Lightning & flooding threats exist with all thunderstorms.

July 4, 2019



- Winds to 40mph
- Hail up to 0.5"

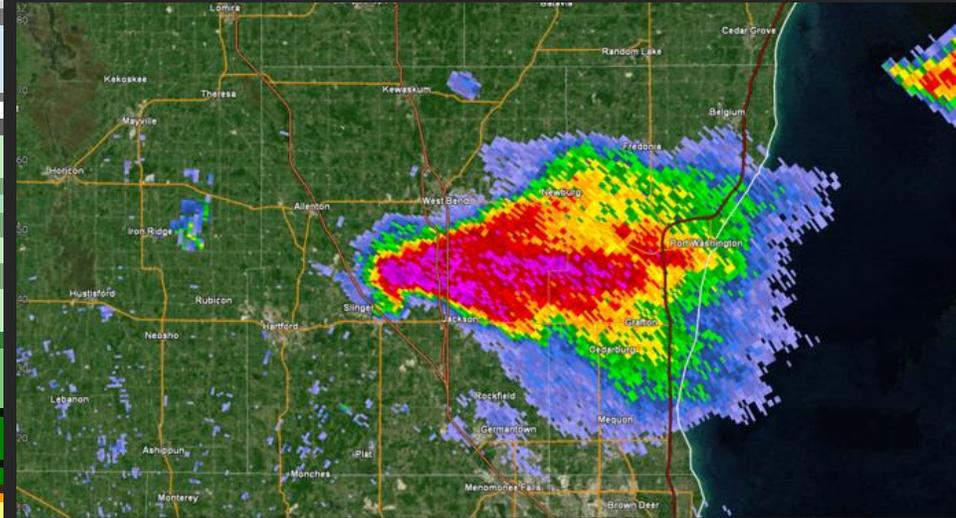
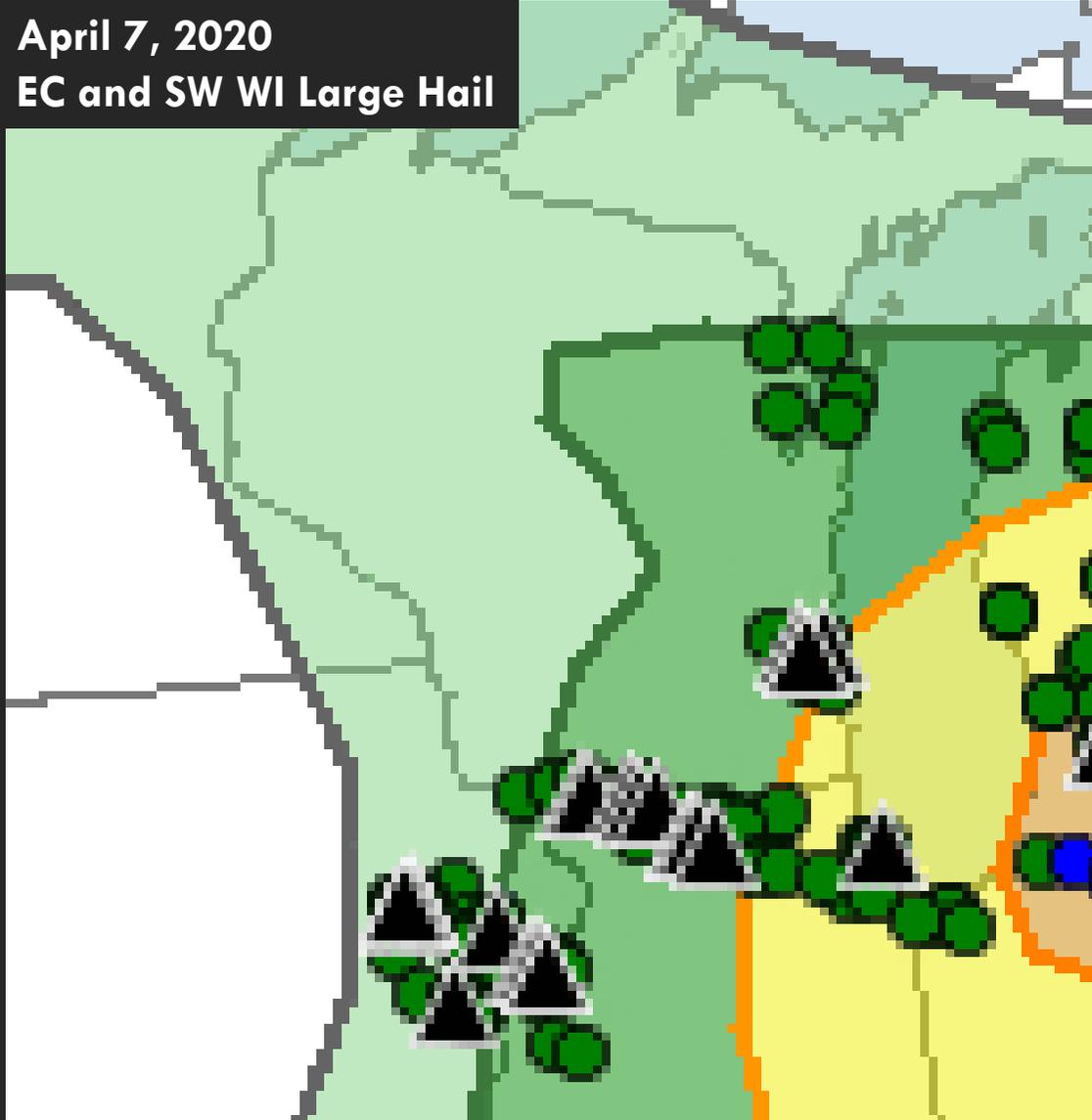


Marginal Risk of Severe Thunderstorms: 1 out of 5

**1-Marginal
(MRGL)**
Isolated severe
thunderstorms
possible

Limited in duration
and/or coverage
and/or intensity

April 7, 2020
EC and SW WI Large Hail



Tornado Reports
Wind Reports
Hail Reports
(Δ -2"+ Large Hail)



Matt Schoeneck
2" Hail
Jackson 4/7/20



- Winds 40-60mph
- Hail up to 1"
- Low tornado risk

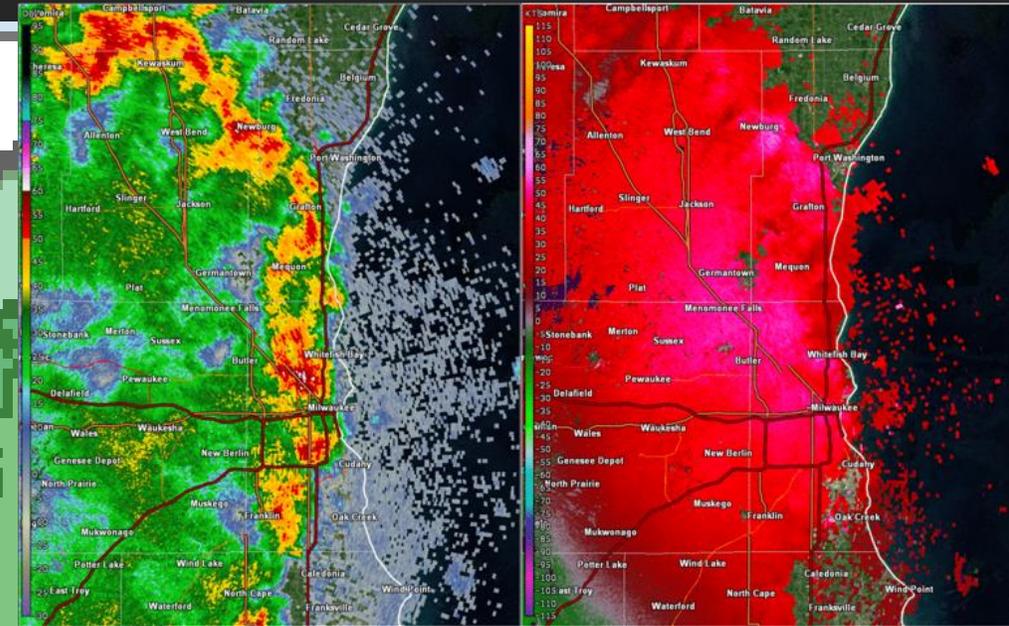
Marginal Risk of Severe Thunderstorms: 1 out of 5

**1-Marginal
(MRGL)**
Isolated severe
thunderstorms
possible

Limited in duration
and/or coverage
and/or intensity

**May 19, 2019
Milwaukee Wind Damage**

Tornado Reports
Wind Reports
Hail Reports



Milwaukee DPW
@milwaukeepw

Sunday's storm brought gusts of up to 59 mph. Emergency Forestry crews serviced 91 trees, including 70 with downed or hanging limbs and 17 requiring removal. Crews continue to address calls for service today. If you see a tree down or a limb hanging or down call 414-286-CITY.



8 10:57 AM - May 20, 2019

- Winds 40-60mph
- Hail up to 1"
- Low tornado risk



Slight Risk of Severe Thunderstorms: 2 out of 5

2-Slight (SLGT)

Scattered severe storms possible

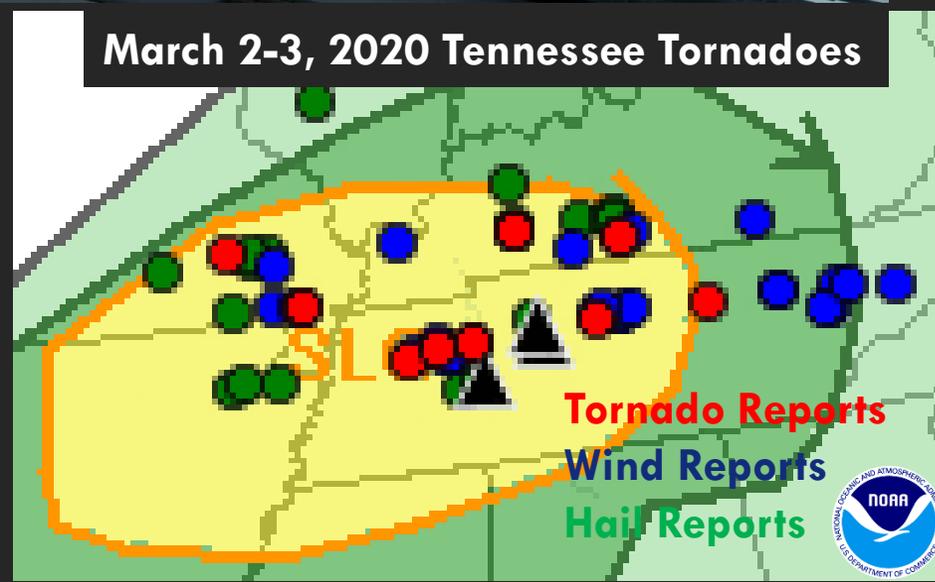
Short-lived and/or not widespread, isolated intense storms possible



Nashville, TN
3-3-2020



March 2-3, 2020 Tennessee Tornadoes



Tornado Reports
Wind Reports
Hail Reports



- One or two tornadoes
- Reports of strong winds/wind damage
- Hail ~1", isolated 2"

Enhanced Risk of Severe Thunderstorms: 3 out of 5

3-Enhanced (ENH)

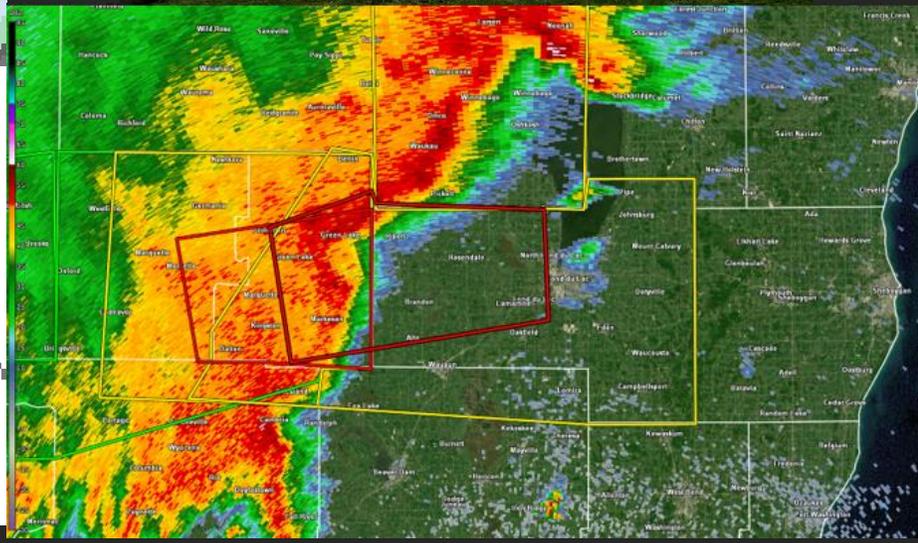
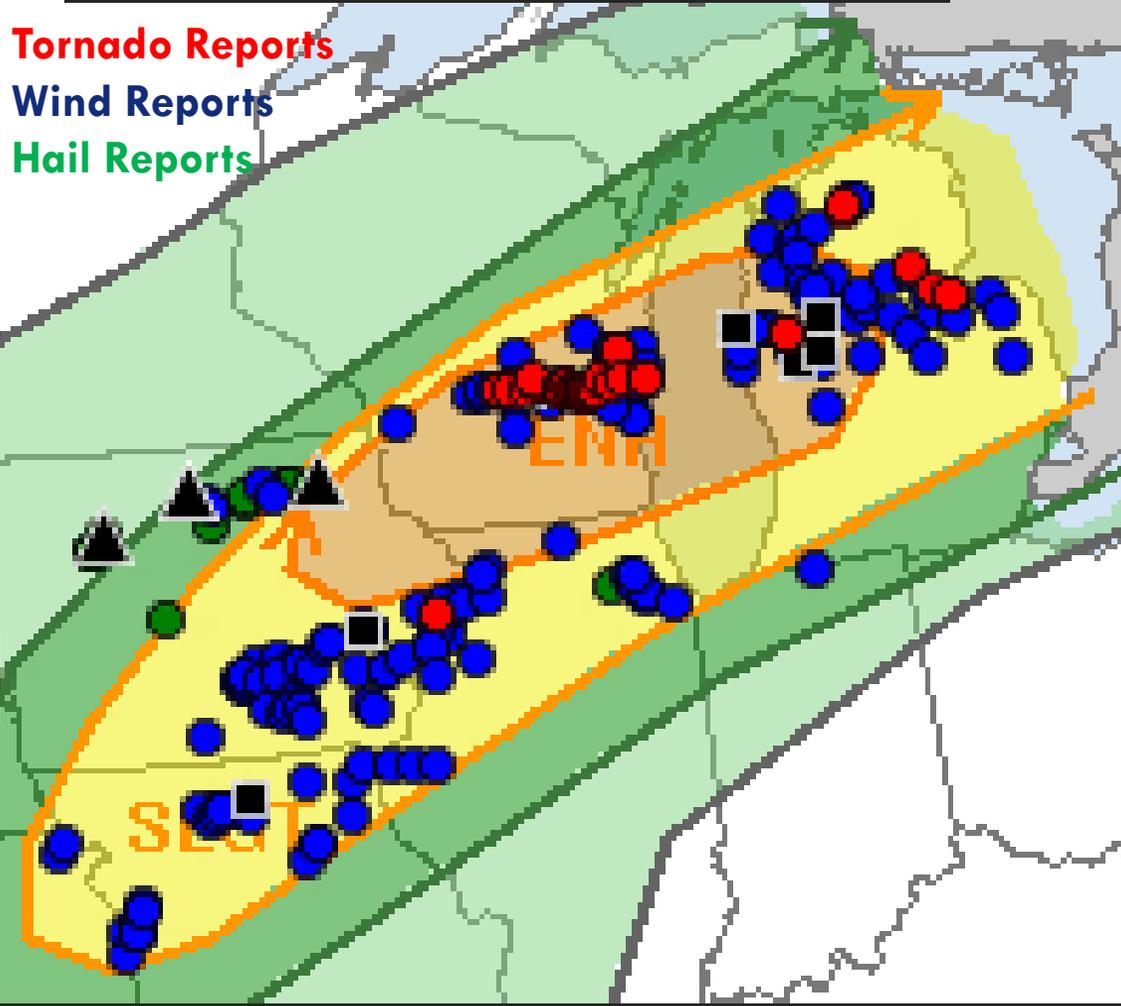
Numerous severe storms possible

More persistent and/or widespread, a few intense



- A few tornadoes
- Several reports of wind damage
- Damaging hail, 1-2"

August 28, 2018 Wind & Tornado Damage



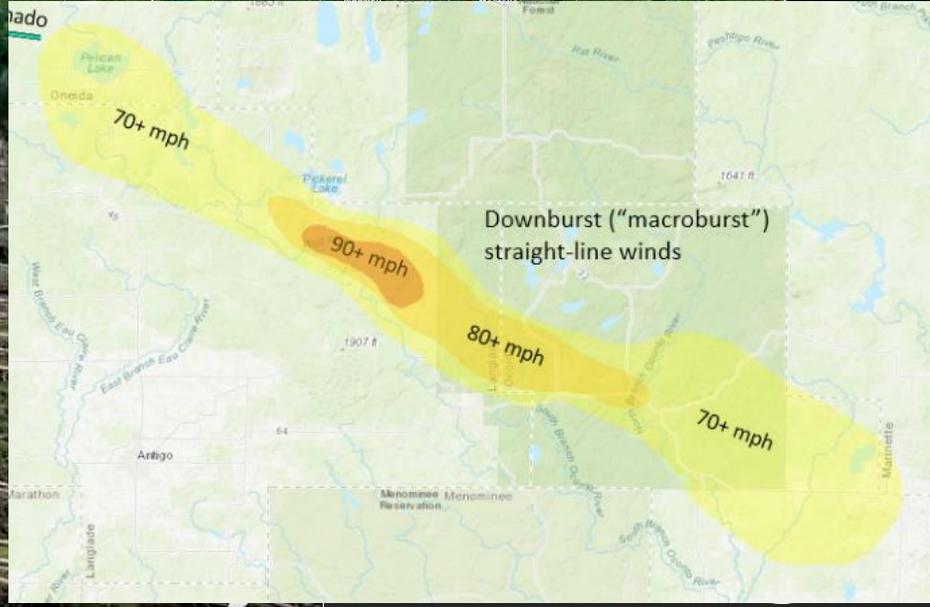
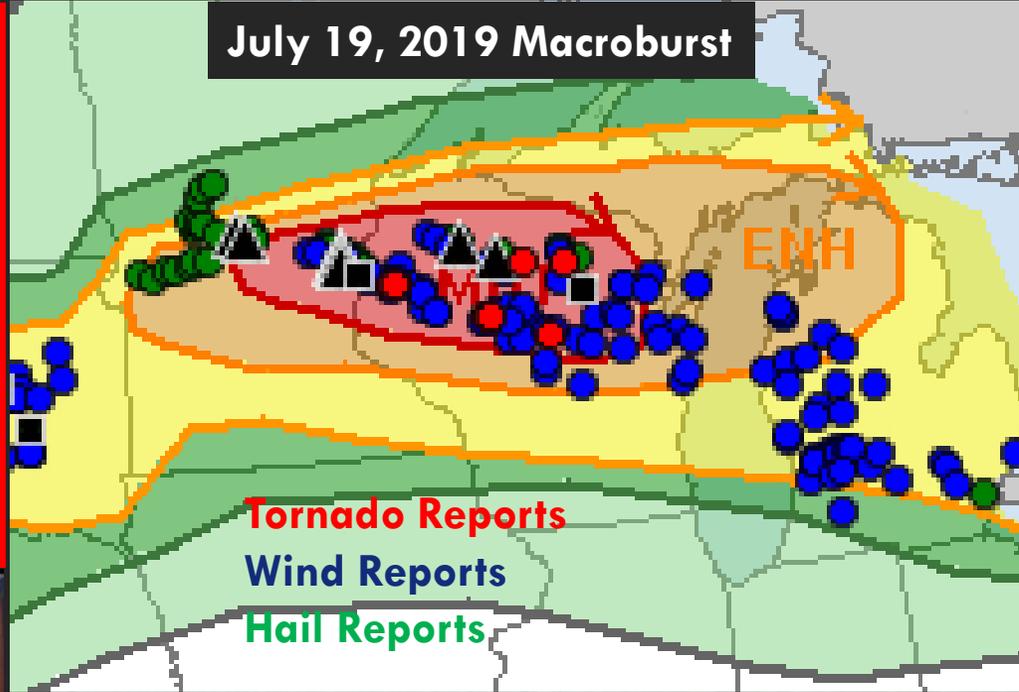
Moderate Risk of Severe Thunderstorms: 4 out of 5

4-Moderate

Widespread severe storms likely

Long-lived, widespread and intense

- Strong tornadoes
- Widespread wind damage
- Destructive hail, 2"+



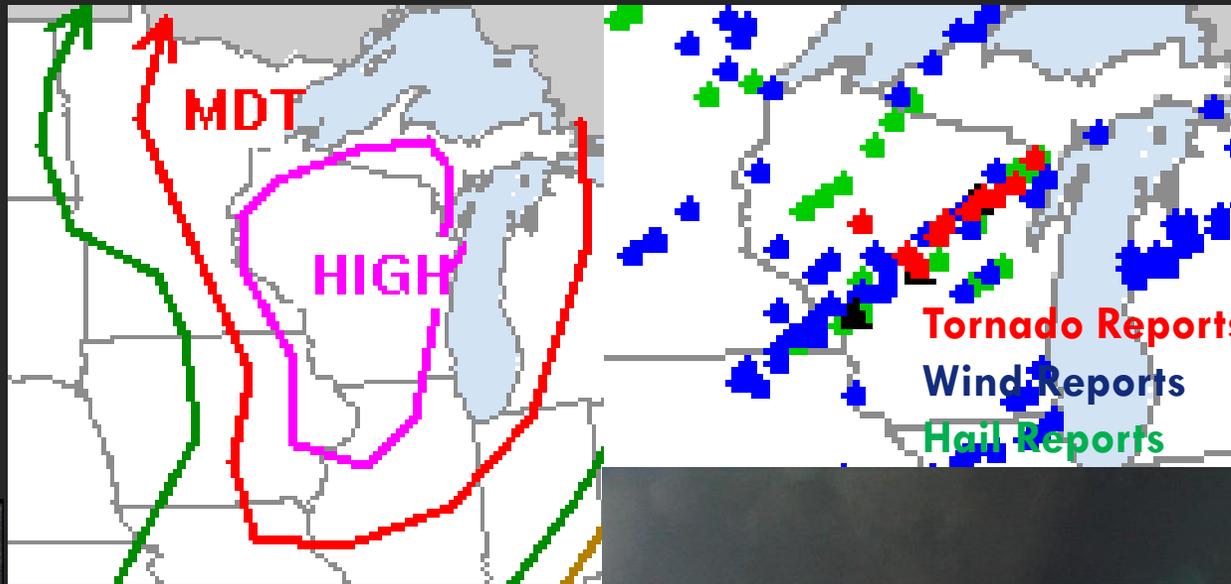
High Risk of Severe Thunderstorms: 5 out of 5

5-High

Widespread severe storms expected

Long-lived, very widespread and particularly intense

June 7, 2007 Long Track Tornado/Large Hail



DNR
Oconto County



- Tornado Outbreak
- Derecho



Bart McCarthy
Port Edwards



Jerome Wahleithner
White Lake

Local Hazardous Weather Outlook

Southern Wisconsin Specific Forecast

Prepare

weather.gov/crh/ghwo?sid=mkx

Hazard	Yes	No
Tornado	Yes	No
Hail	Yes	No
Thunderstorm Wind	Yes	No
Severe Thunderstorms	Yes	No
Excessive Rainfall	Yes	No
Lightning	Yes	No
Excessive Cold	Yes	No
Excessive Heat	Yes	No
NonThunderstorm Wind	Yes	No
Fog	Yes	No
Ice Accumulation	Yes	No
Snow Sleet	Yes	No
Fire Weather	Yes	No
Coastal Flood	Yes	No

Hazardous Weather Outlook
 National Weather Service Green Bay WI
 3:16 PM CDT Fri Jul 19 2019

WIZ005-010>013-018>022-030-031-035>040-045-048>050-073-074-202030-
 Vilas-Oneida-Forest-Florence-Northern Marinette County-Lincoln-
 Langlade-Menominee-Northern Oconto County-Door-Marathon-Shawano-
 Wood-Portage-Waupaca-Outagamie-Brown-Kewaunee-Waushara-Winnebago-
 Calumet-Manitowoc-Southern Marinette County-
 Southern Oconto County-
 3:16 PM CDT Fri Jul 19 2019

This Hazardous Weather Outlook is for north-central and northeast Wisconsin.

.DAY ONE...Tonight

A significant severe weather outbreak appears increasingly likely over parts of central, northcentral and northeast Wisconsin this evening. The primary severe weather threat will be damaging straight lines winds and large hail. A tornado or two is also possible, especially earlier in the evening over northcentral Wisconsin. As the evening progresses the threat will likely transition to damaging straight lines winds. Localized wind gusts to 70 mph are possible this evening especially north of highway 29.

Hazardous Weather Outlook

National

Watch vs. Warning

Prepare



Watch: Ingredients are there for something

Warning: It's there

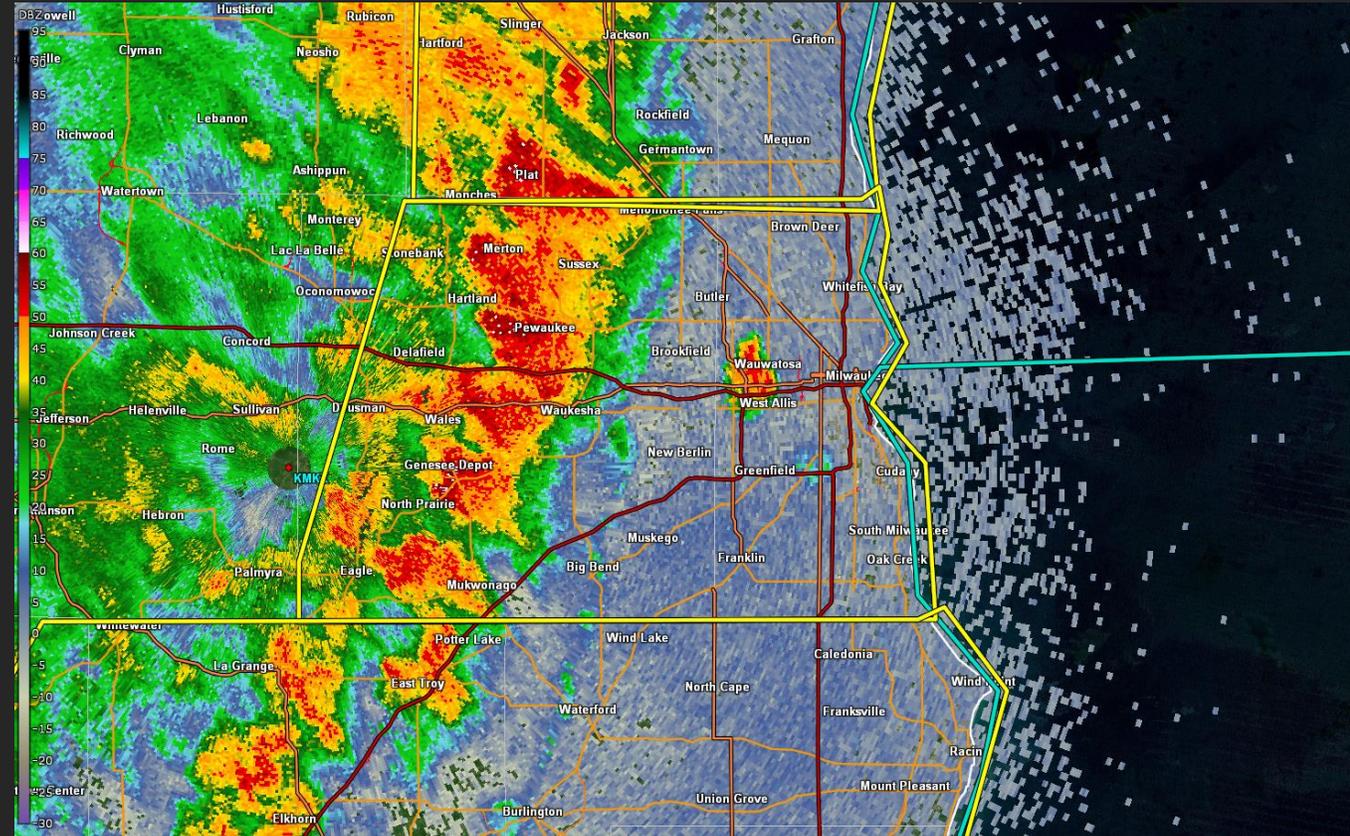
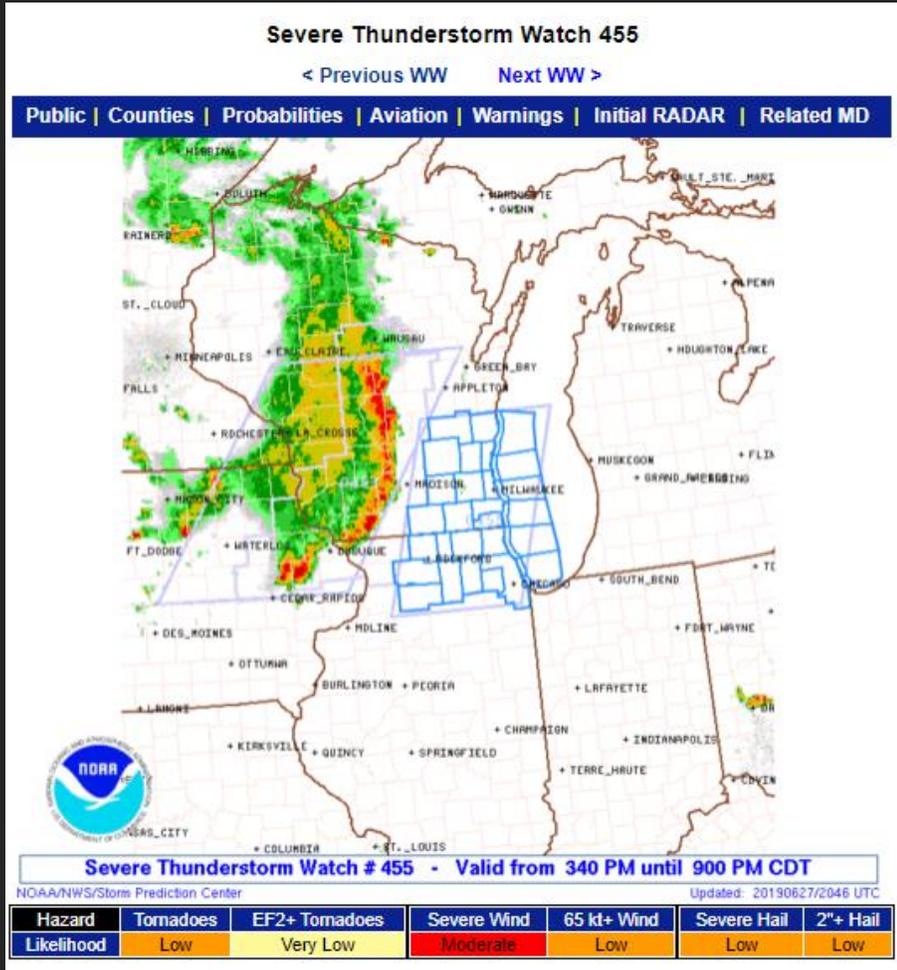
National Weather Service Milwaukee

Via Brad Panovich



Watch vs. Warning

Prepare



Watch: Ingredients are there for something

Warning: It's there

Via Brad Panovich

National Weather Service Milwaukee



Severe Thunderstorm Warning

Prepare

BULLETIN - IMMEDIATE BROADCAST REQUESTED
Severe Thunderstorm Warning
National Weather Service Milwaukee/Sullivan WI
425 PM CDT Tue Jul 2 2019

The National Weather Service in Milwaukee/Sullivan has issued a

* Severe Thunderstorm Warning for...
Milwaukee County in southeastern Wisconsin...
Southeastern Waukesha County in southeastern Wisconsin...

* Until 500 PM CDT.

* At 425 PM CDT, a severe thunderstorm was located over New Berlin, moving east at 35 mph.

HAZARD...60 mph wind gusts.

SOURCE...Radar indicated.

IMPACT...Expect damage to roofs, siding, and trees.

* Locations impacted include...
Milwaukee, Waukesha, West Allis, Wauwatosa, New Berlin, Brookfield, Greenfield, Oak Creek, Muskego, South Milwaukee, Cudahy, Greendale, Pewaukee, St. Francis, Hales Corners, Elm Grove, West Milwaukee, Big Bend, Milwaukee Hoan Bridge and Marquette University.

People attending Summerfest in Milwaukee, and The West Allis Independence Day Parade should seek safe shelter immediately!

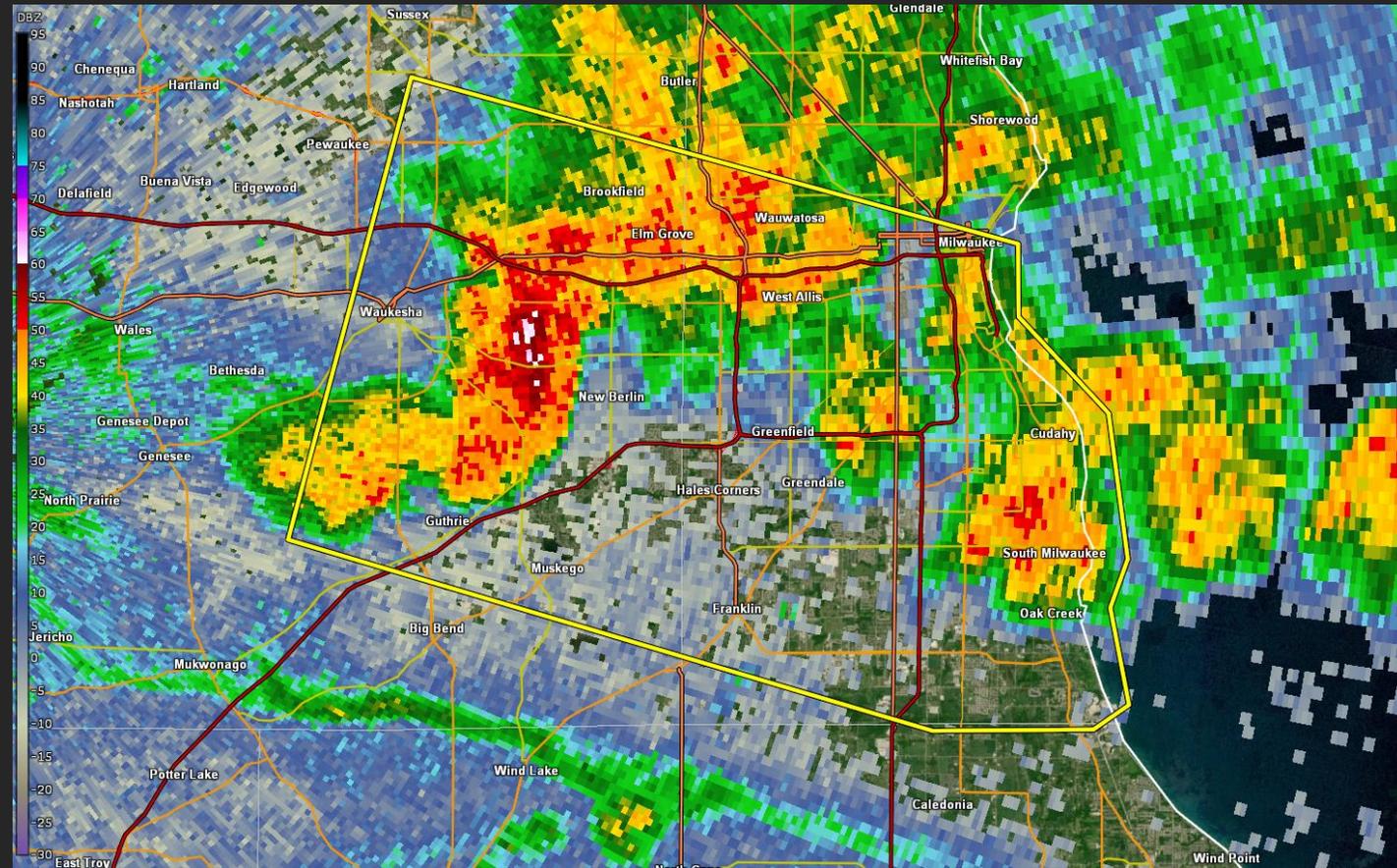
PRECAUTIONARY/PREPAREDNESS ACTIONS...

For your protection move to an interior room on the lowest floor of a building.

..

LAT...LON 4284 8784 4284 8793 4292 8829 4311 8822
4304 8788 4301 8788 4297 8783 4291 8782
4289 8783 4285 8782
TIME...MOT...LOC 2125Z 291DEG 31KT 4300 8816

CHAIL...<.75IN
WIND...60MPH



**Criteria: 58mph winds and/or
Hail larger than quarters (1")**

No Milwaukee



Tornado Warning

Prepare

BULLETIN - EAS ACTIVATION REQUESTED
Tornado Warning
National Weather Service Milwaukee/Sullivan WI
931 PM CDT Tue Oct 1 2019

The National Weather Service in Milwaukee/Sullivan has issued a

* Tornado Warning for...
Southern Jefferson County in southeastern Wisconsin...

* Until 1000 PM CDT.

* At 931 PM CDT, a severe thunderstorm capable of producing a tornado was located over Fort Atkinson, moving east at 45 mph.

HAZARD...Tornado.

SOURCE...Radar indicated rotation.

IMPACT...Flying debris will be dangerous to those caught without shelter. Mobile homes will be damaged or destroyed. Damage to roofs, windows, and vehicles will occur. Tree damage is likely.

* This dangerous storm will be near...
Jefferson around 935 PM CDT.
Whitewater around 940 PM CDT.
Palmyra around 950 PM CDT.

Other locations impacted by this tornadic thunderstorm include Rome, Sullivan, Nws Milwaukee/sullivan and Hebron.

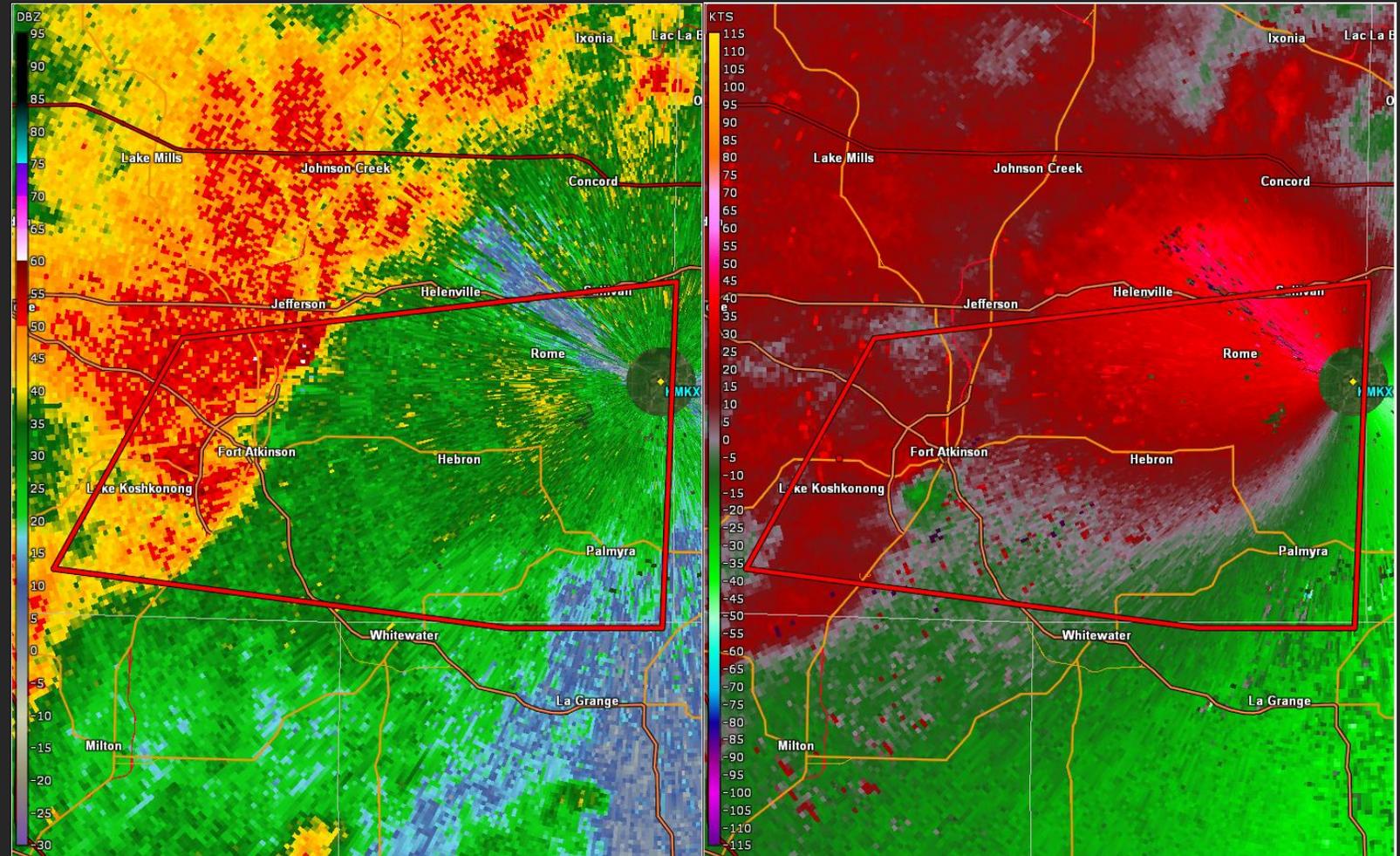
PRECAUTIONARY/PREPAREDNESS ACTIONS...

TAKE COVER NOW! Move to a basement or an interior room on the lowest floor of a sturdy building. Avoid windows. If you are outdoors, in a mobile home, or in a vehicle, move to the closest substantial shelter and protect yourself from flying debris.

&&

LAT...LON 4287 8898 4299 8889 4302 8854 4284 8855
4284 8866
TIME...MOT...LOC 0231Z 273DEG 38KT 4292 8888

TORNADO...RADAR INDICATED
HAIL...0.00IN



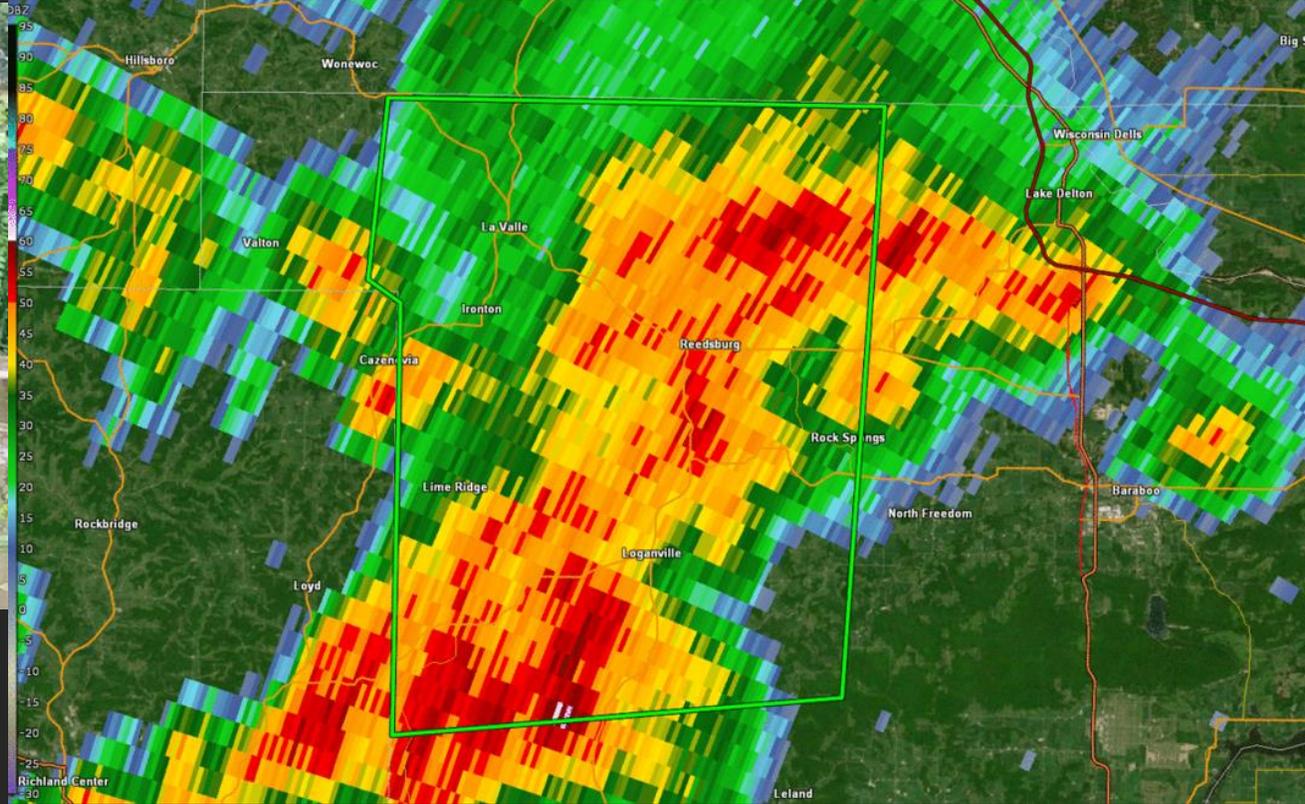
Criteria: Radar indicated or report

Milwaukee



Flash Flood Warning

Prepare



Criteria: Rapid rise of creeks/streams
Roads washed out or impassable

Impact Based Warnings

Prepare

Not all storms are created equal...



Do these storms warrant the same level of warning?

BULLETIN - EAS ACTIVATION REQUESTED
Tornado Warning
National Weather Service St Louis MO
1143 PM CDT Wed May 22 2019

...TORNADO EMERGENCY FOR JEFFERSON CITY...

The National Weather Service in St Louis has issued a

* Tornado Warning for...
Central Cole County in central Missouri...
Southern Callaway County in central Missouri...
Central Osage County in central Missouri...

* Until 1230 AM CDT.

* At 1143 PM CDT, a confirmed large and destructive tornado was
observed over Jefferson City, moving northeast at 40 mph.

TORNADO EMERGENCY for JEFFERSON CITY. This is a PARTICULARLY
DANGEROUS SITUATION. TAKE COVER NOW!

HAZARD...Deadly tornado.

SOURCE...Weather spotters confirmed tornado.

IMPACT...You are in a life-threatening situation. Flying debris
may be deadly to those caught without shelter. Mobile
homes will be destroyed. Considerable damage to homes,
businesses, and vehicles is likely and complete
destruction is possible.

* The tornado will be near...
Holts Summit and Lake Mykee Town around 1155 PM CDT.
Lake Mykee around 1200 AM CDT.
New Bloomfield around 1205 AM CDT.
Fulton around 1215 AM CDT.

Other locations impacted by this tornadic thunderstorm include
Wainwright, Carrington, Tebbetts, Osage City, Guthrie, Reform,
Steedman and Mokane.

This also includes Clarks Hill/Norton Historic Site and Jefferson
Landing Historic Site.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

tornado is on the ground. To protect your life, TAKE COVER NOW! Move
to an interior room on the lowest floor of a sturdy building. Avoid
windows. If in a mobile home, a vehicle or outdoors.. Move to the
closest substantial shelter and protect yourself from flying debris.

&&

LAT...LON 3865 9227 3864 9225 3865 9222 3870 9222
3886 9206 3876 9165 3843 9221 3857 9235
TIME ...MOT...LOC 0443Z 23ZDEG 34KT 3856 9220

TORNADO...OBSERVED
TORNADO DAMAGE THREAT...CATASTROPHIC
HAIL...<.75IN

Impact Based Warnings

Prepare

Check the 'tags' at the bottom

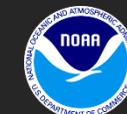
Tornado and Flash Flood Warnings:

- “OBSERVED” vs “RADAR INDICATED” line

Damage Threat:

- Base: Most Tornadoes/Flash Floods
- Considerable: Unusual severity of impact
- Catastrophic: Exceedingly rare, violent

TORNADO...OBSERVED
TORNADO DAMAGE THREAT...CATASTROPHIC
HAIL...<.75IN



Impact Based Warnings

Prepare

Tornado Warning

Catastrophic (Worst, Emergency)

Considerable

Base (Most)

Flash Flood Warning

Catastrophic (Worst, Emergency)

Considerable (WEA Level)

Base (Most)

Severe Thunderstorm Warning (Hail)

Giant Hail: >2.5"

1.5" – 2.5"

1" – 1.25"

Severe Thunderstorm Warning (Wind)

90-100 mph (Rare)

80 mph (Once per year)

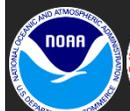
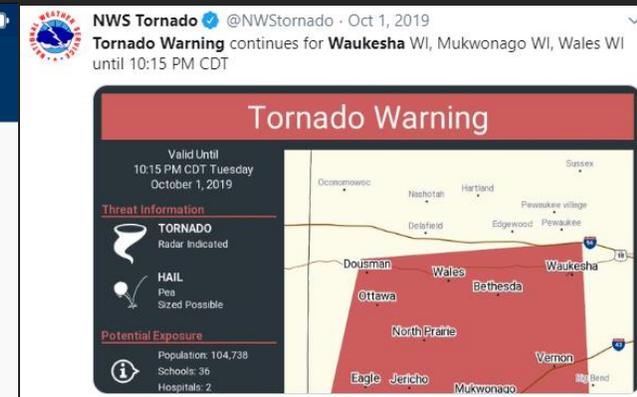
70 mph

60 mph

How to receive Warnings

Prepare

- Mobile Phones:
 - Download a weather app
 - WEA
 - All TOR, FFW-Cons/Cat
- NOAA Weather Radio
- Watch your TV
- Listen to radio
- Outdoor Warning Sirens
- weather.gov/milwaukee
- Twitter: @NWSMKX

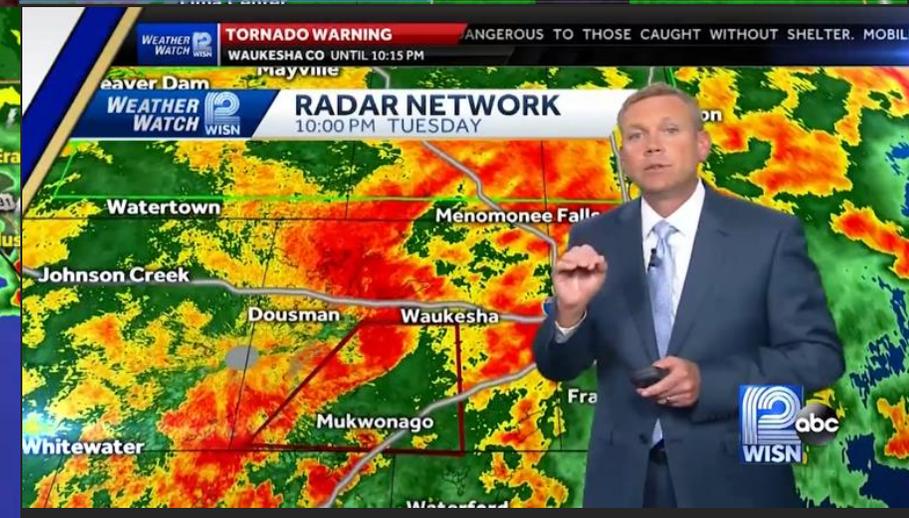


National Weather Service Milwaukee

Turn on your TV!!!

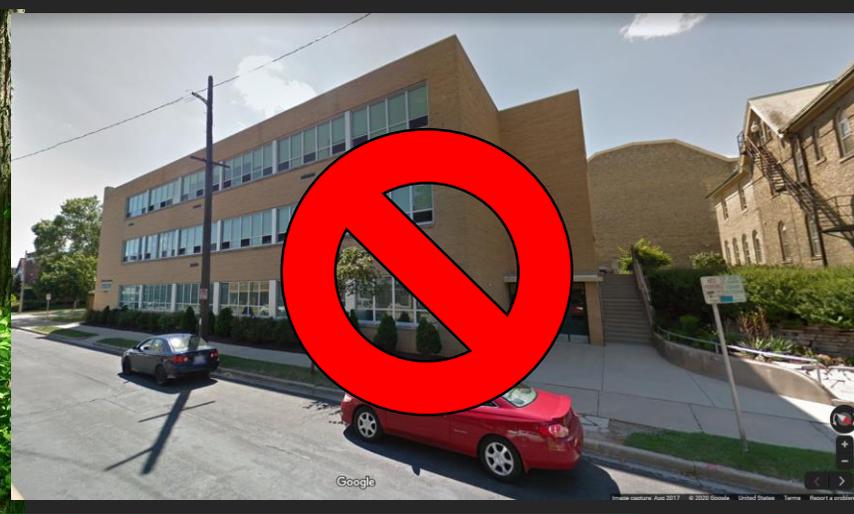
Prepare

- Cut ins for **ANY** Tornado Warnings
- Play by Play on storms
- A main source for warning information
- Free apps!



Pick Your Spotting location

- Stationary/Mobile
- Upstream from city
 - Avoid high traffic
- Good visibility
- High ground
- No trees
- No buildings
- Know your escape route
 - How long to get to shelter?



Storm Spotting Process

“A Day in the Life of a Storm Spotter”

Prepare

Deploy

Observe

Communicate



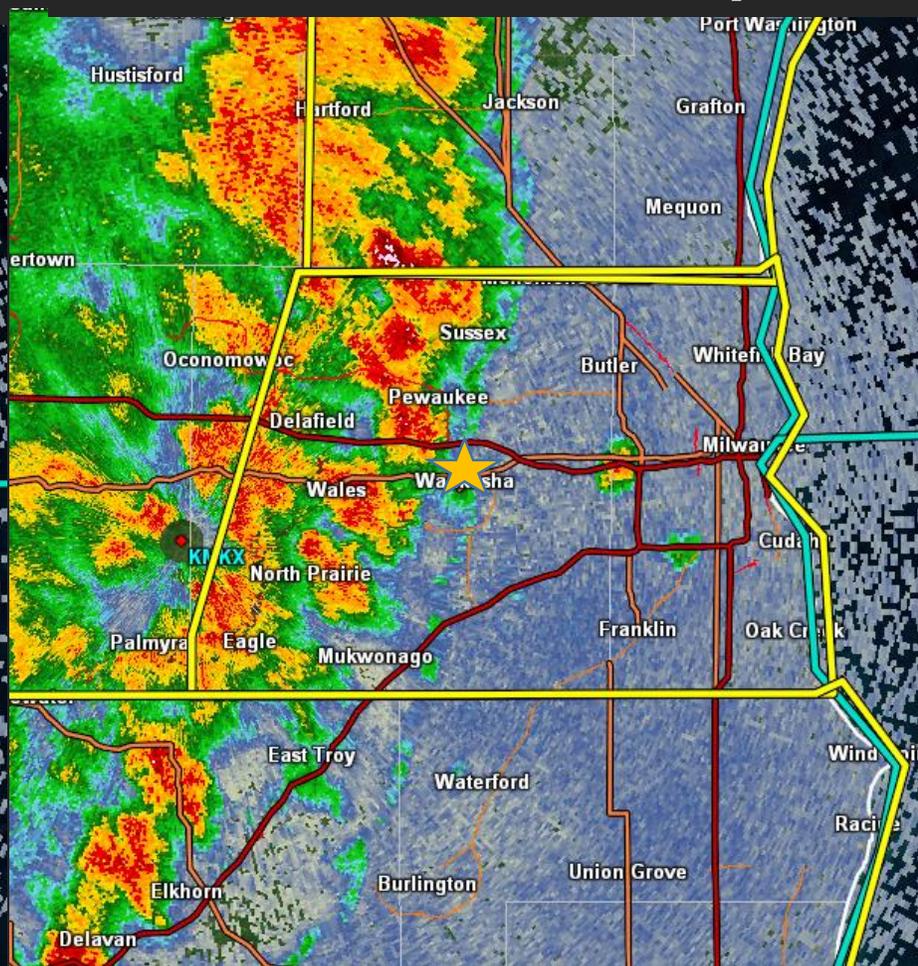
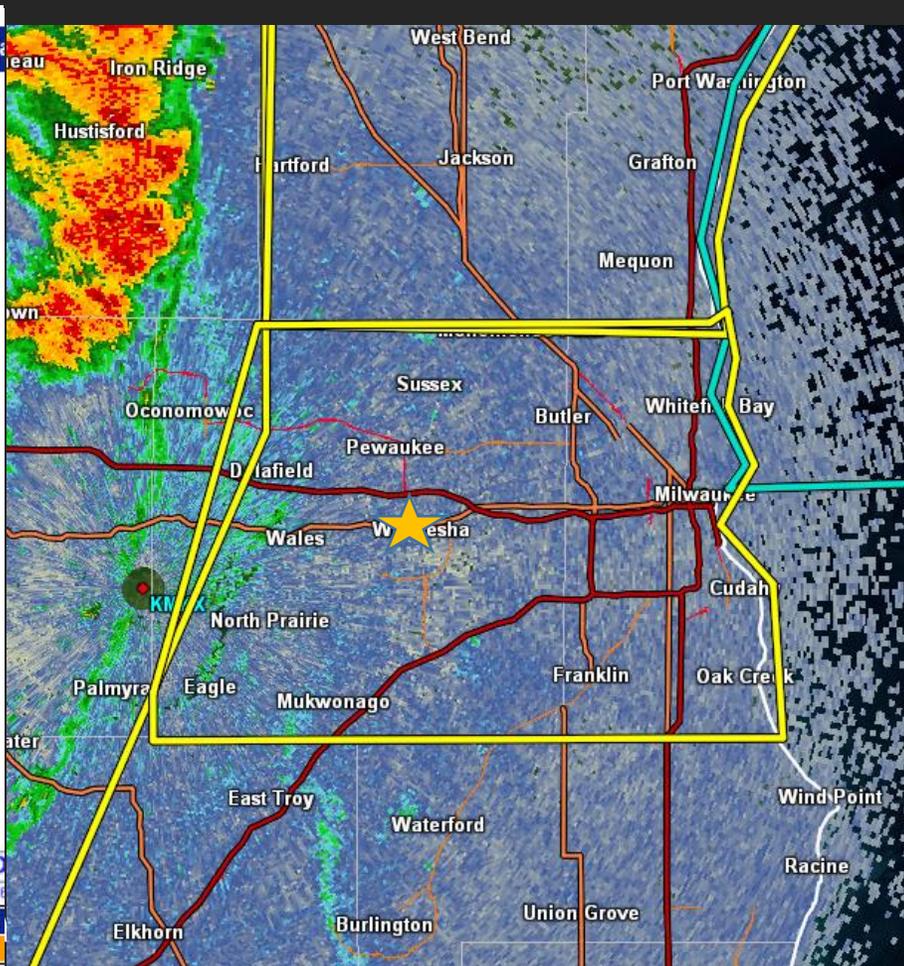
Storm Spotting Process: Deploy

When should I go out to spot storms?

Watch issued: 340pm

Warning issued: 441pm-6pm

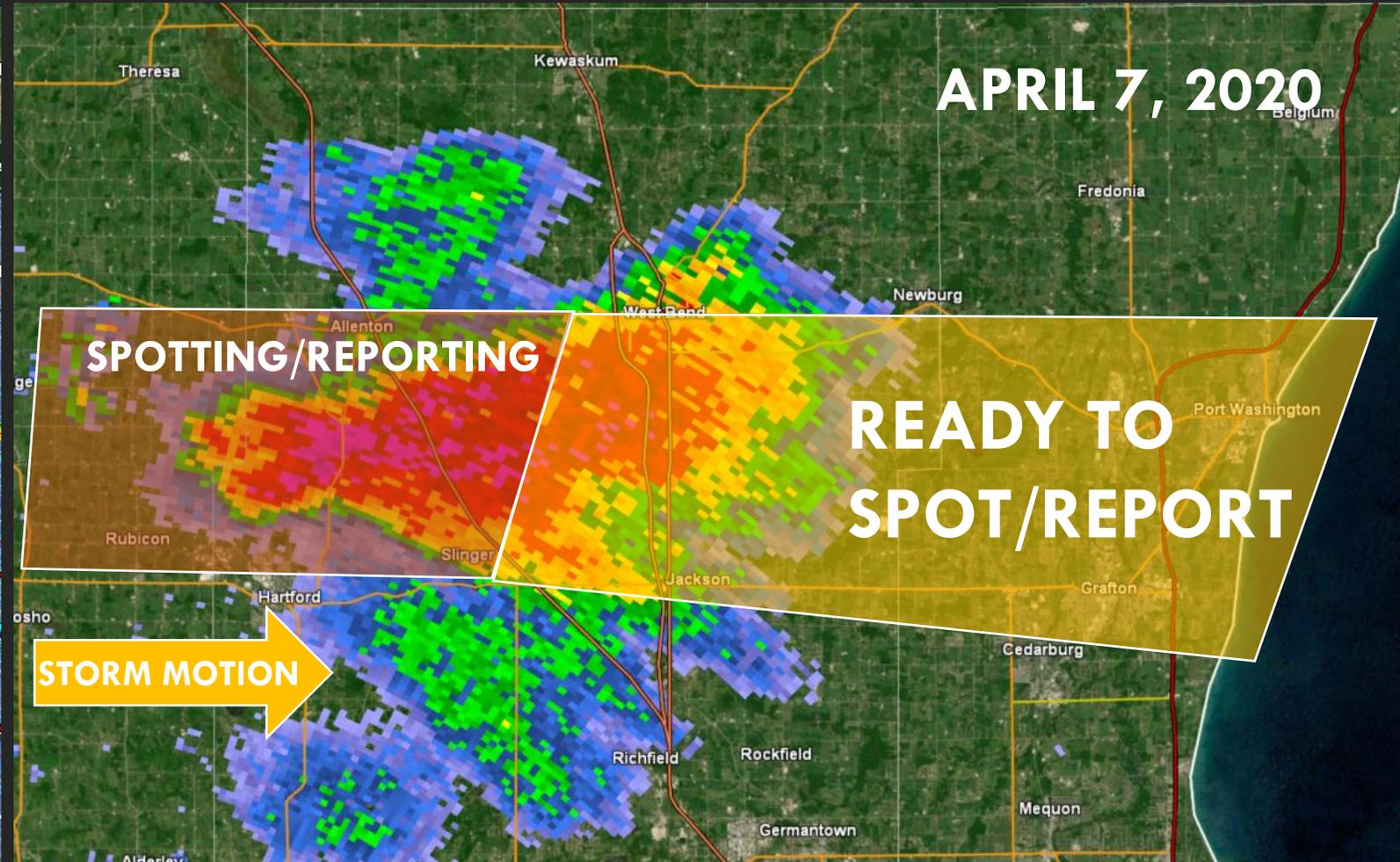
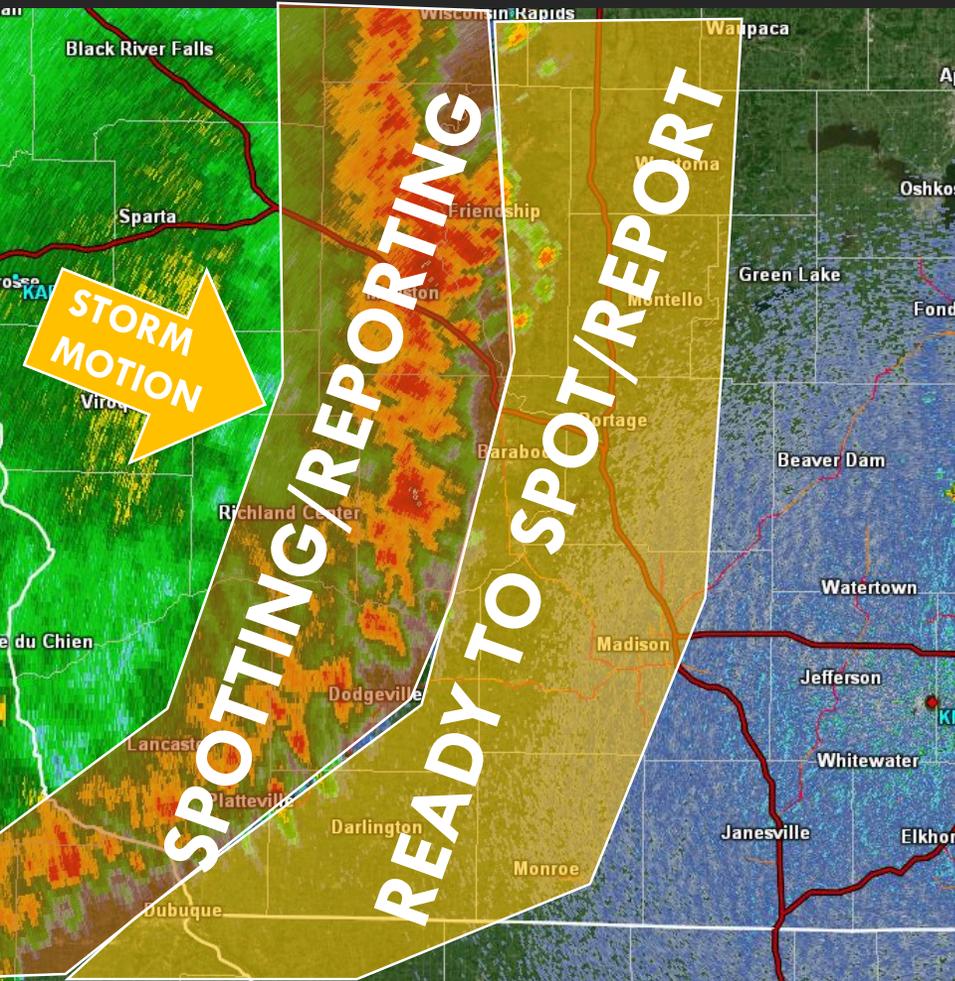
Storms arrive: 5:04pm



When to get ready to spot?

Deploy

After watch, before/around warning issuance

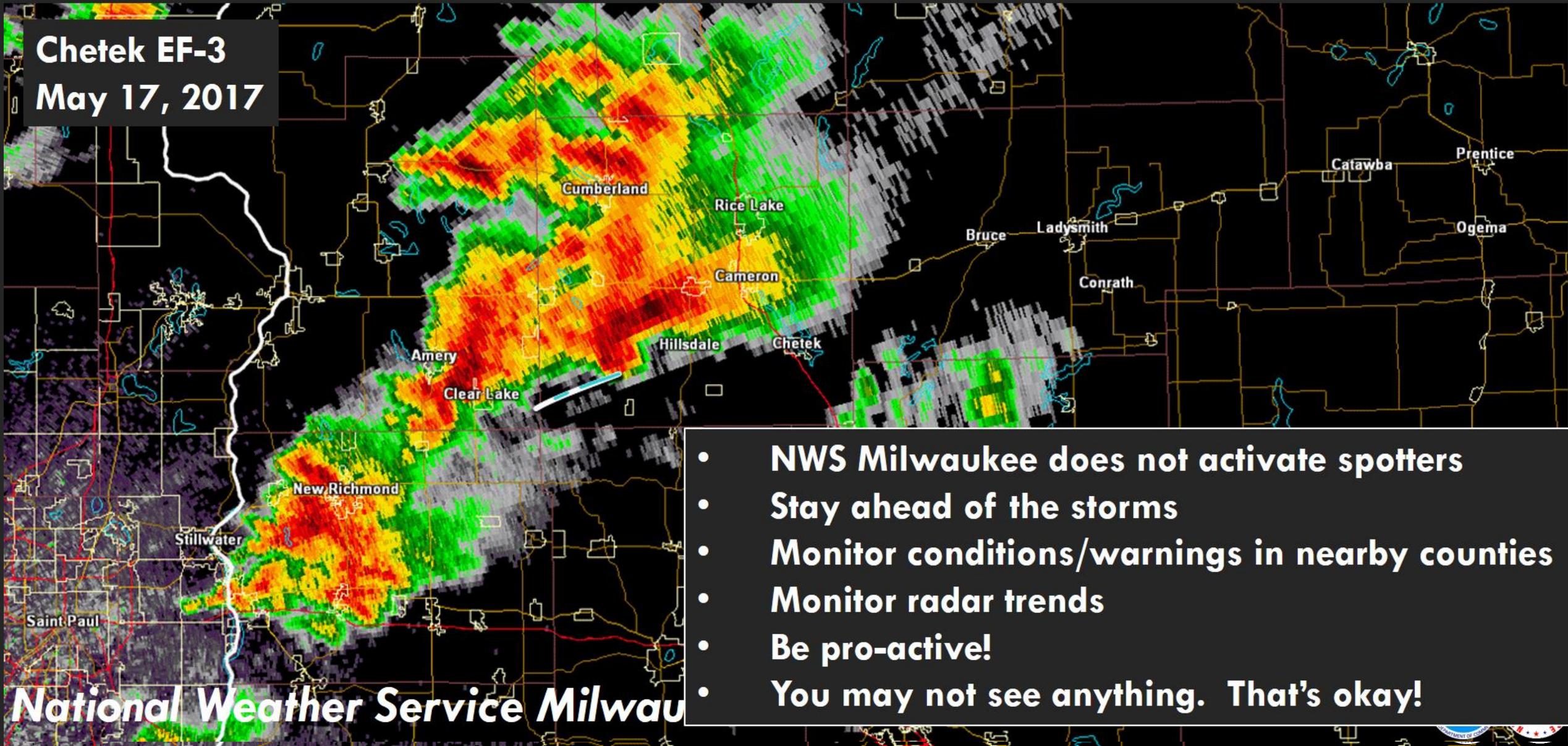


May not have watch or warning, Every situation is different

Self Activating

Deploy

**Chetek EF-3
May 17, 2017**

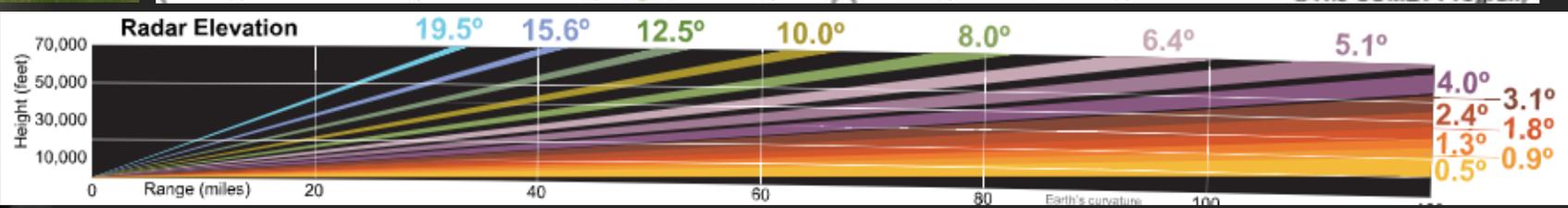
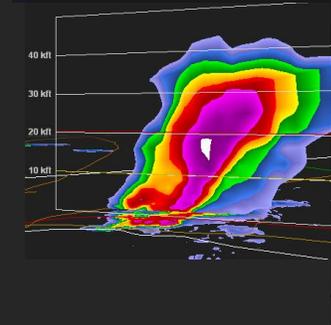
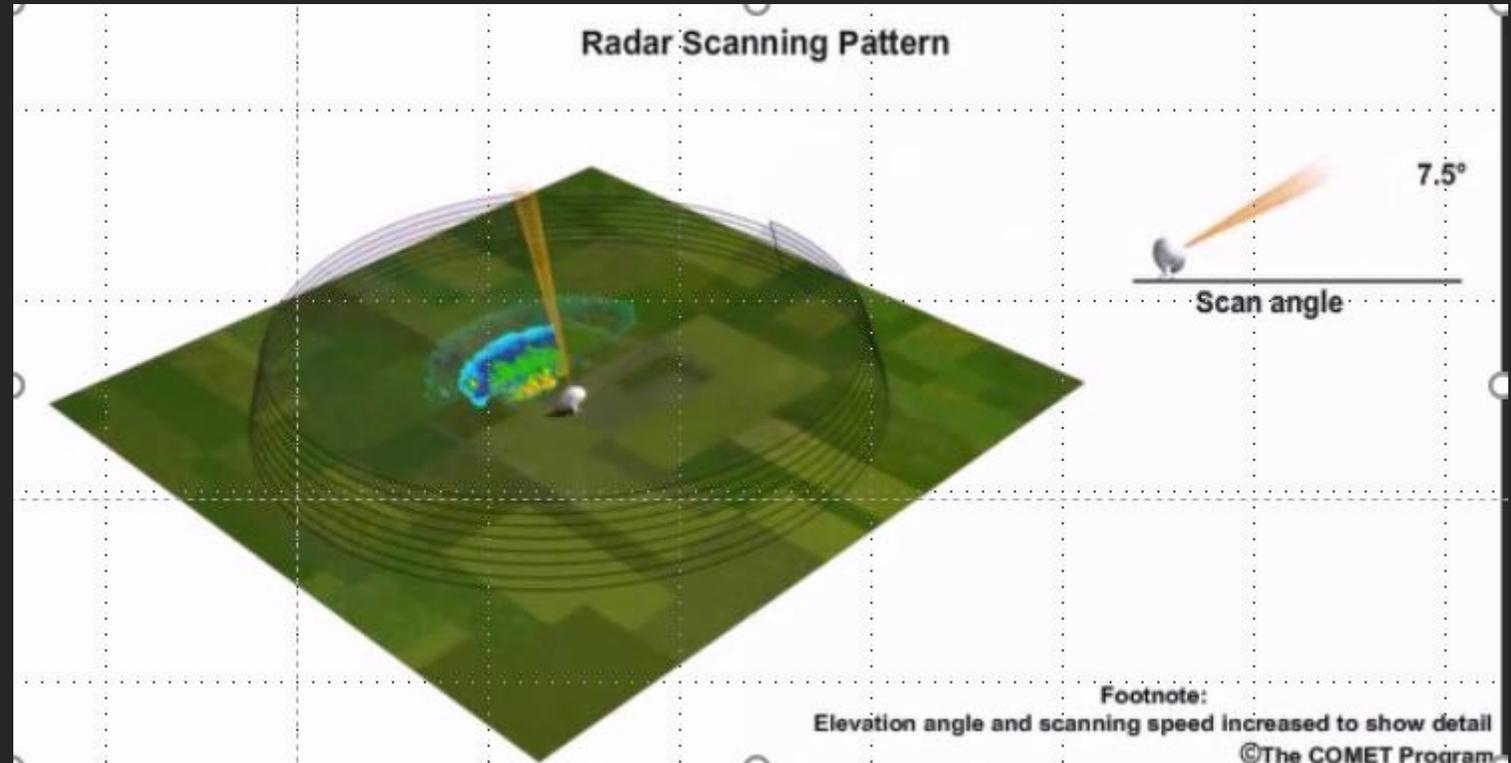


- **NWS Milwaukee does not activate spotters**
- **Stay ahead of the storms**
- **Monitor conditions/warnings in nearby counties**
- **Monitor radar trends**
- **Be pro-active!**
- **You may not see anything. That's okay!**

National Weather Service Milwaukee

Radar is your friend!

Deploy



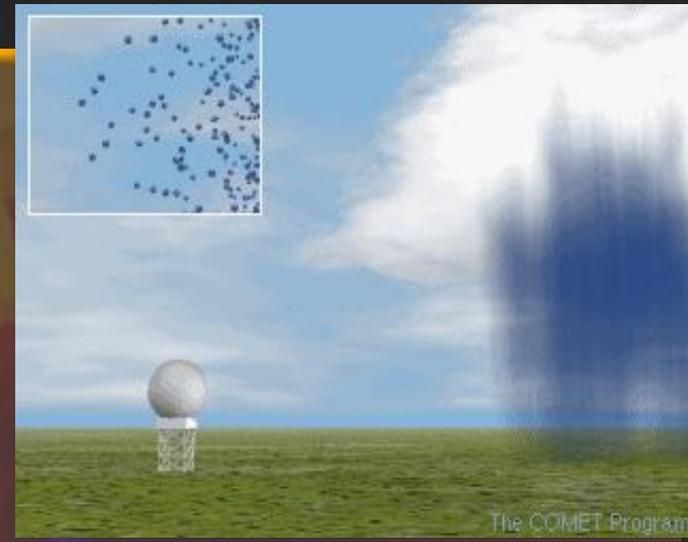
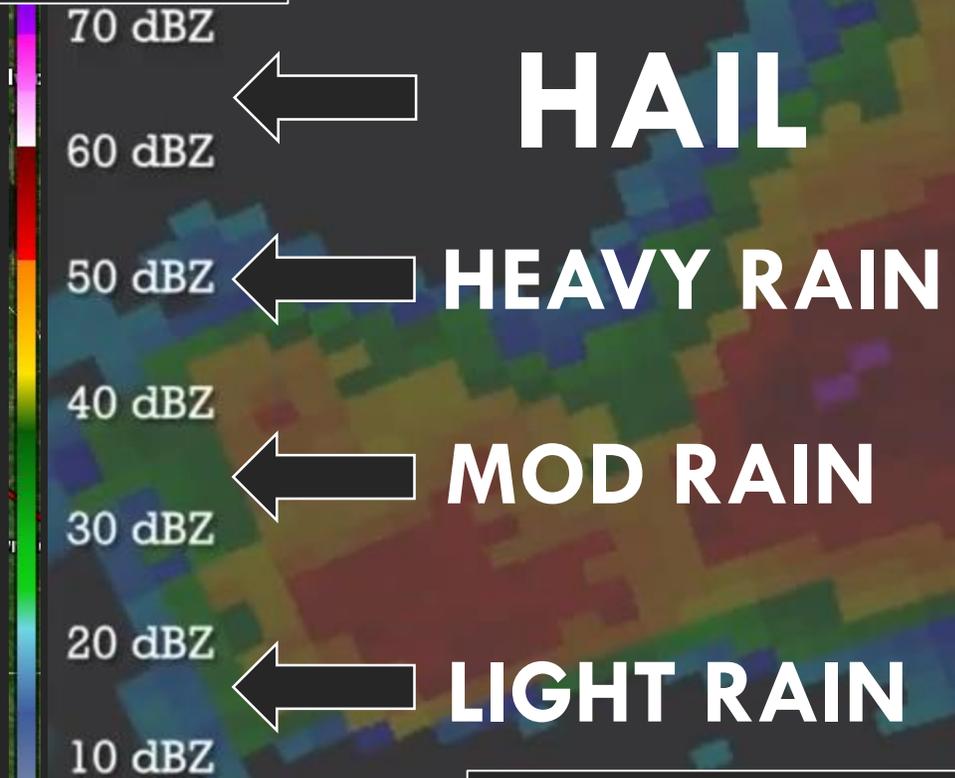
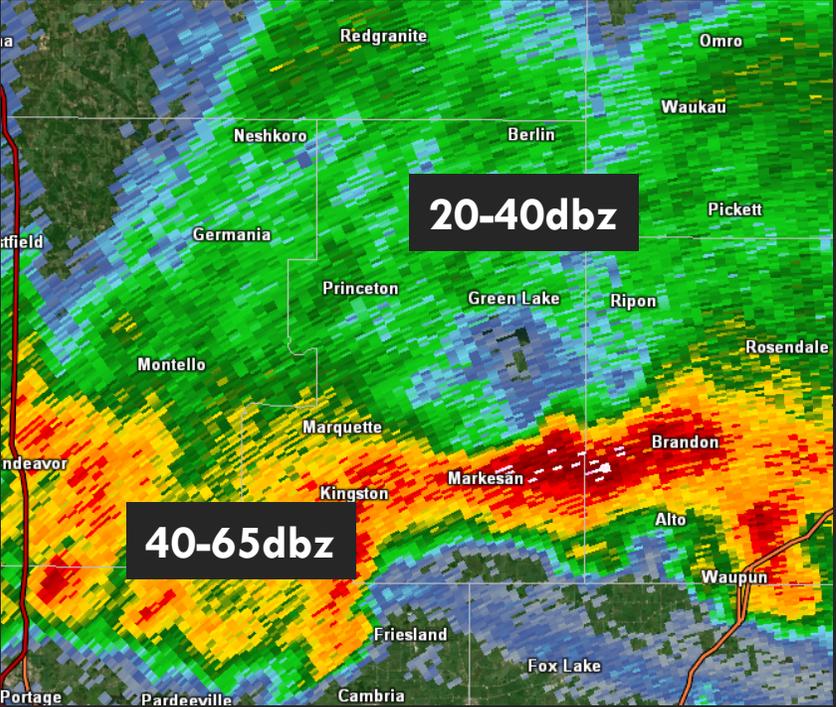
National Weather Service Milwaukee

Download a good radar app that shows your location relative to the storms

Radar Basics: Reflectivity

Deploy

How much "stuff" is there?



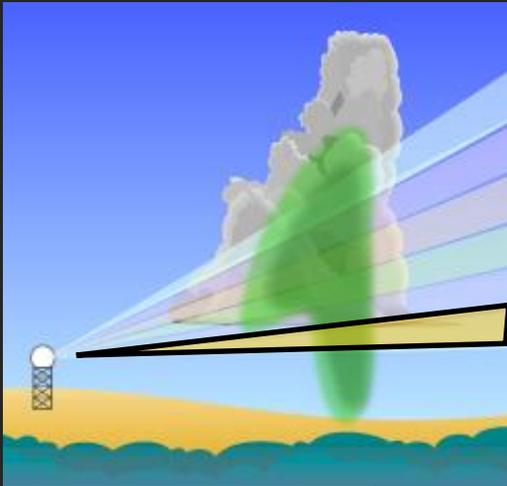
Check the color curve



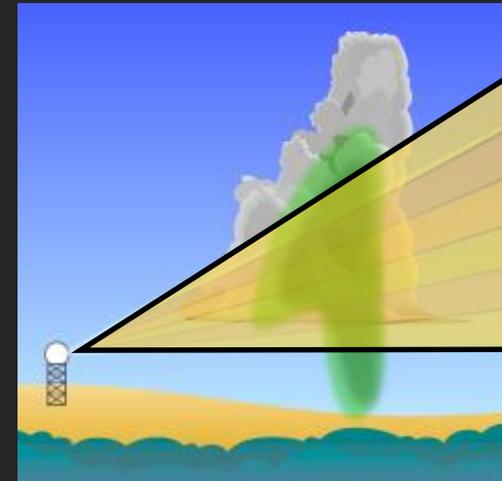
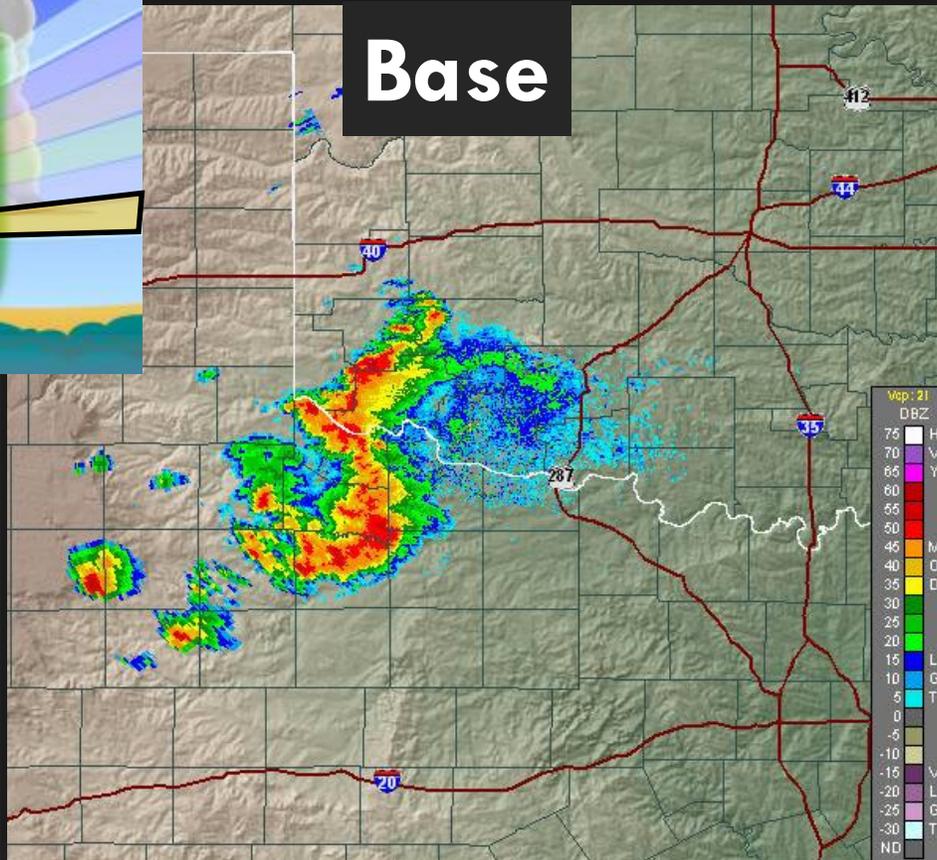
Radar Basics: Reflectivity

Deploy

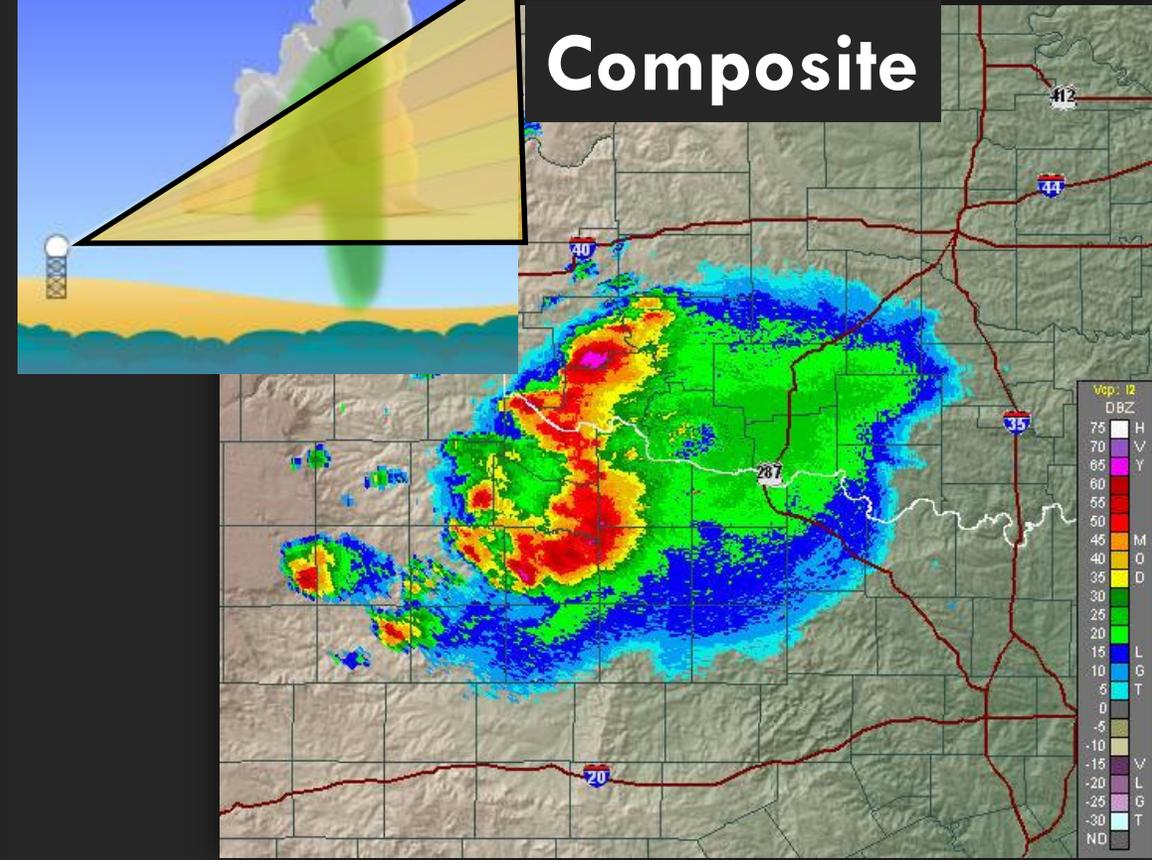
Base vs Composite Reflectivity



Base



Composite

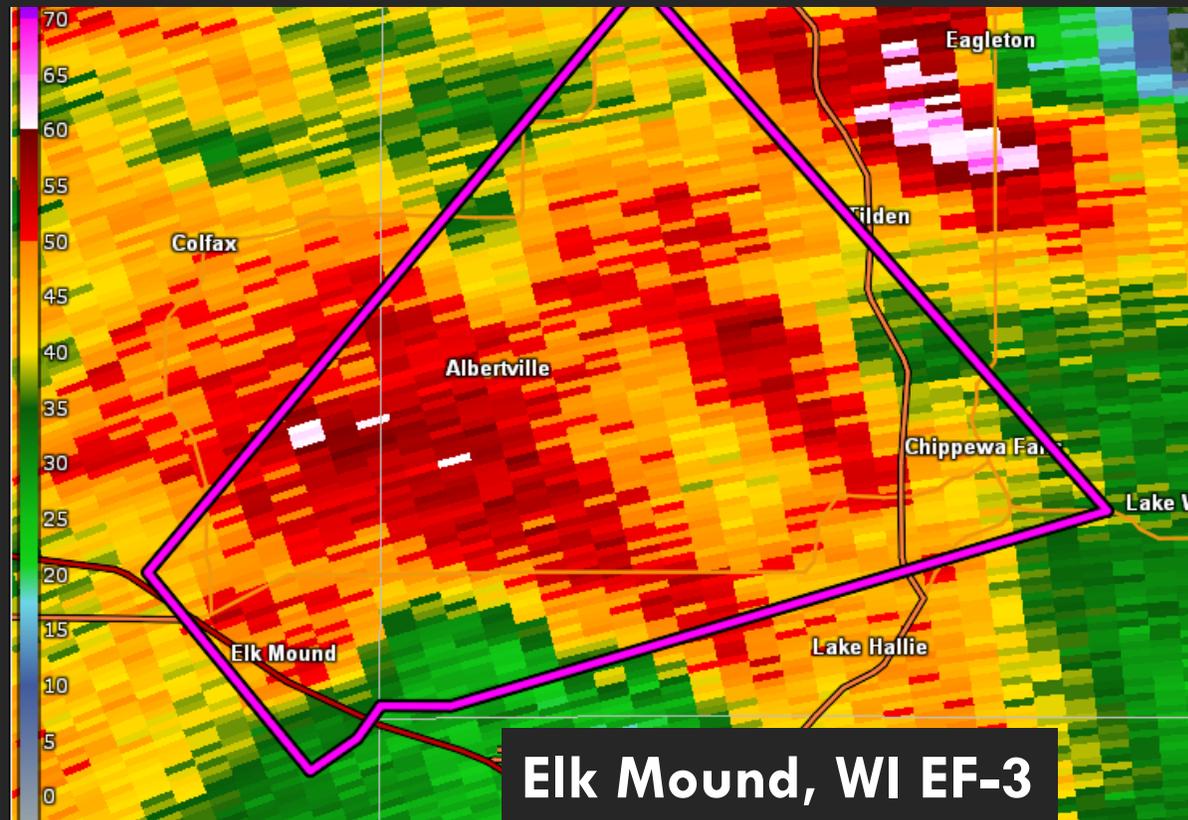


Radar Basics: Velocity

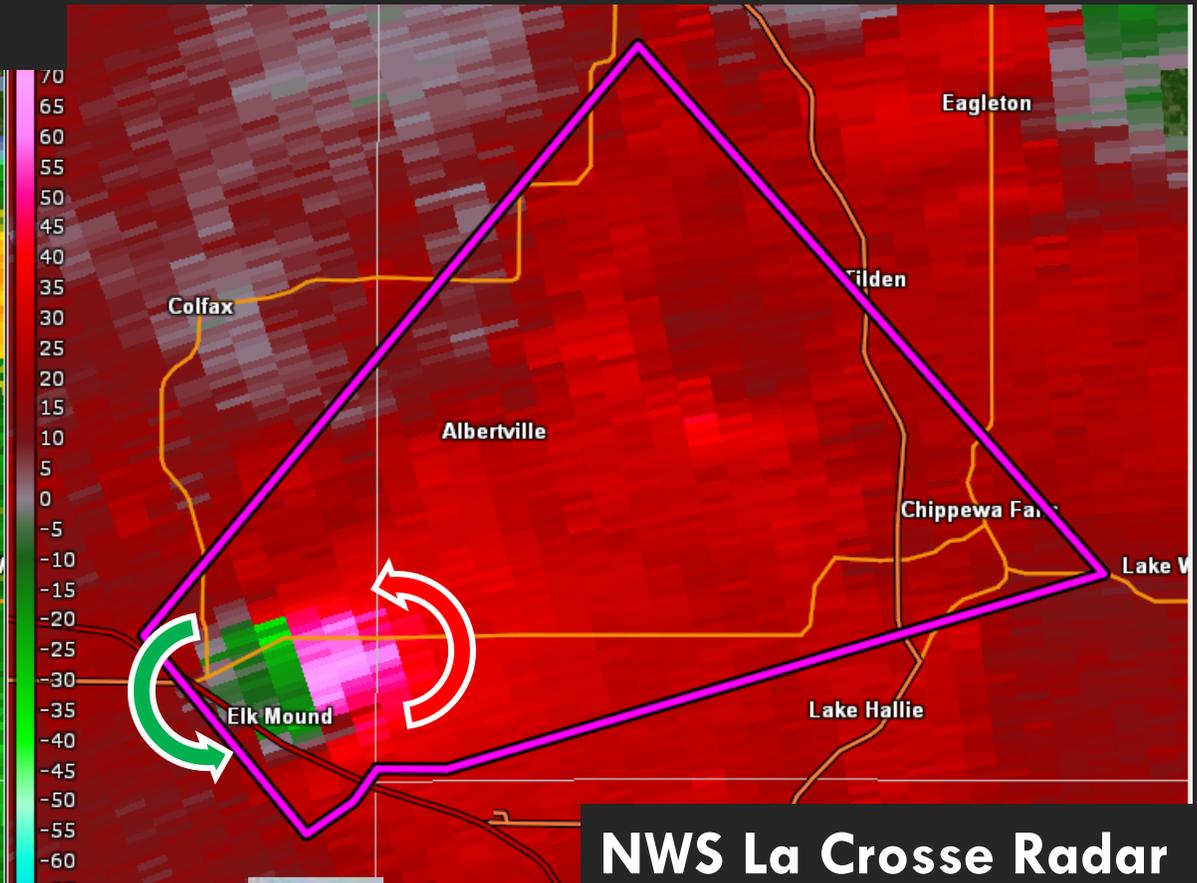
Deploy

Red: Moving away from radar

Green: Moving toward radar



Elk Mound, WI EF-3



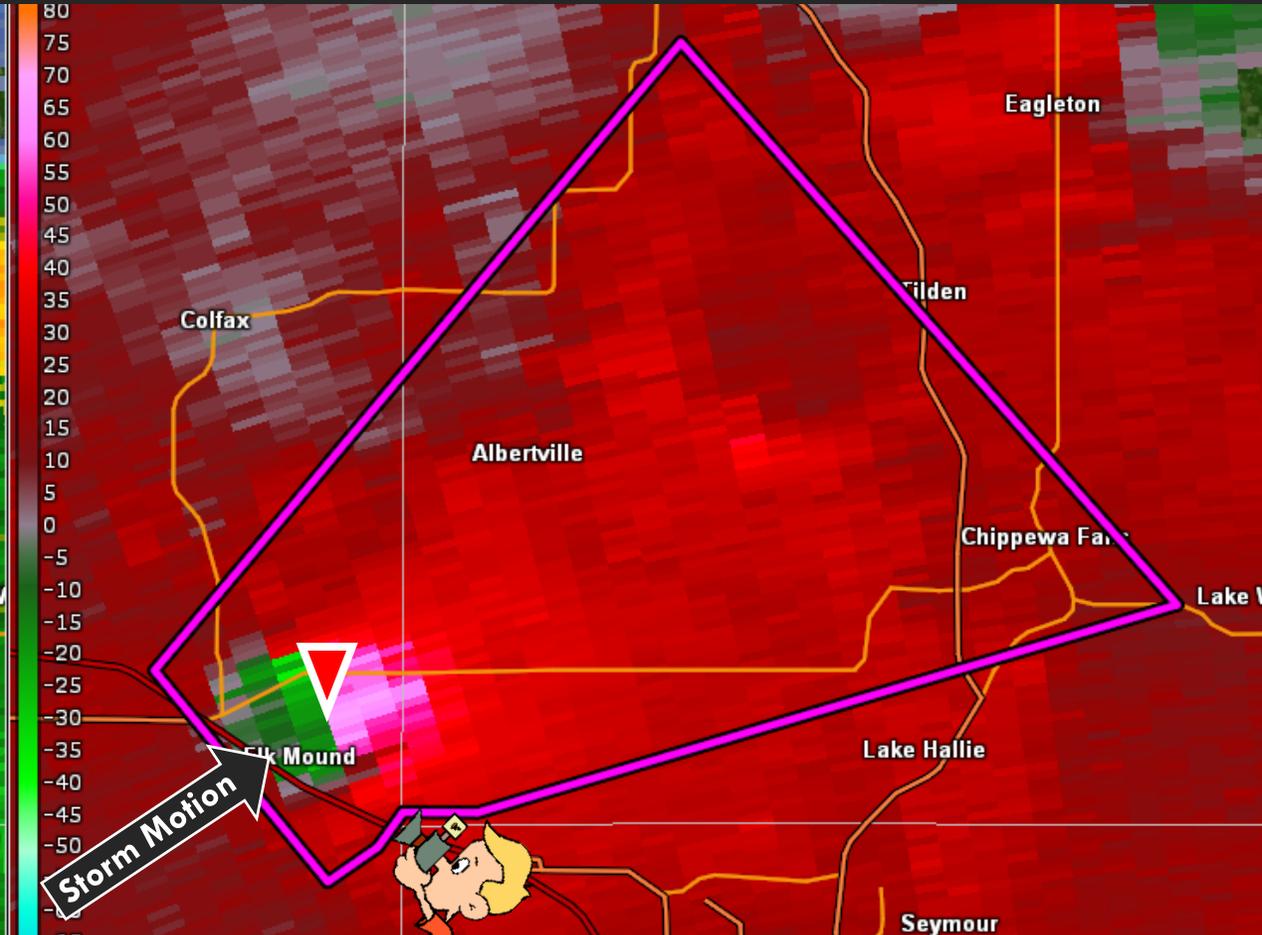
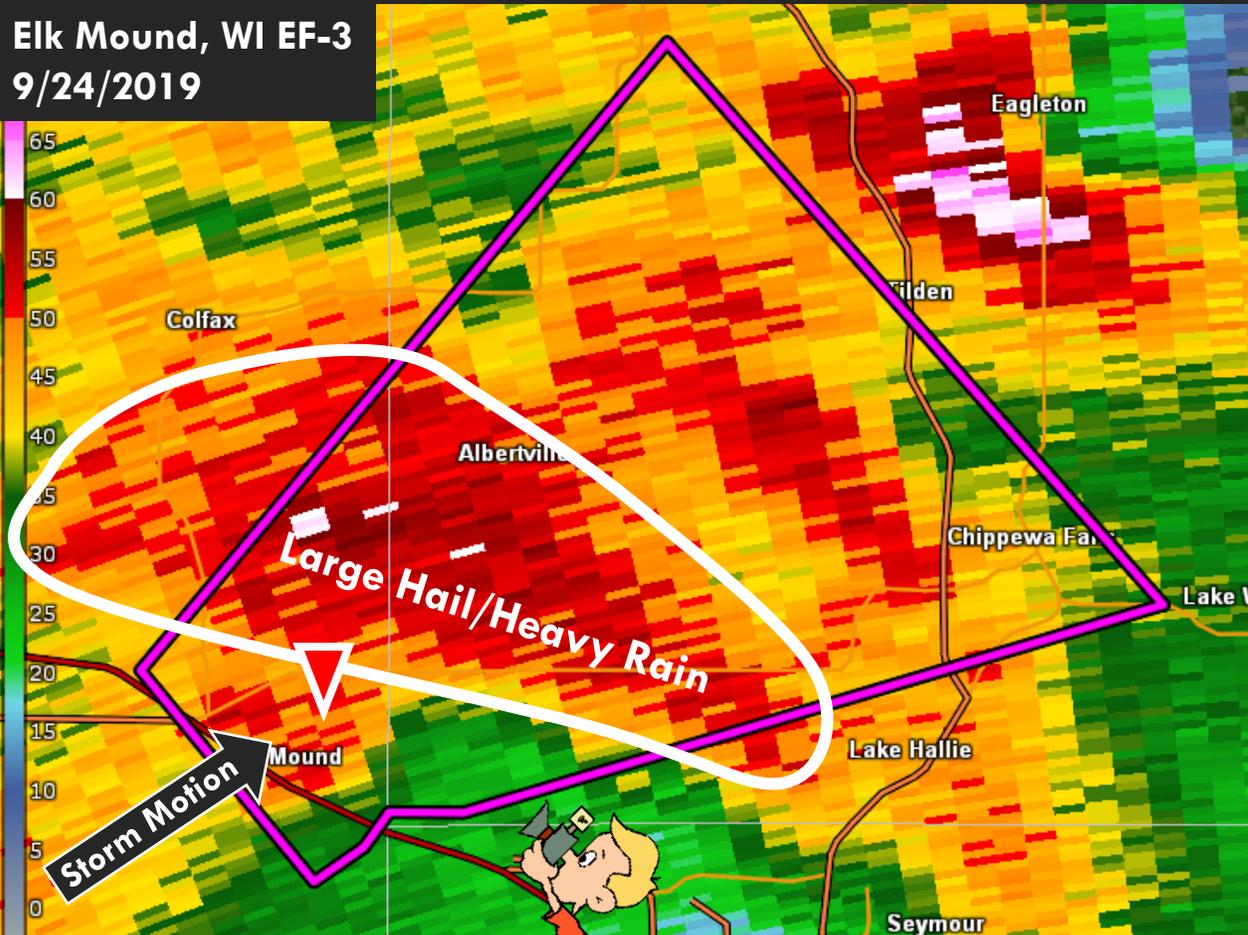
NWS La Crosse Radar



Storm Positioning

Deploy

Elk Mound, WI EF-3
9/24/2019



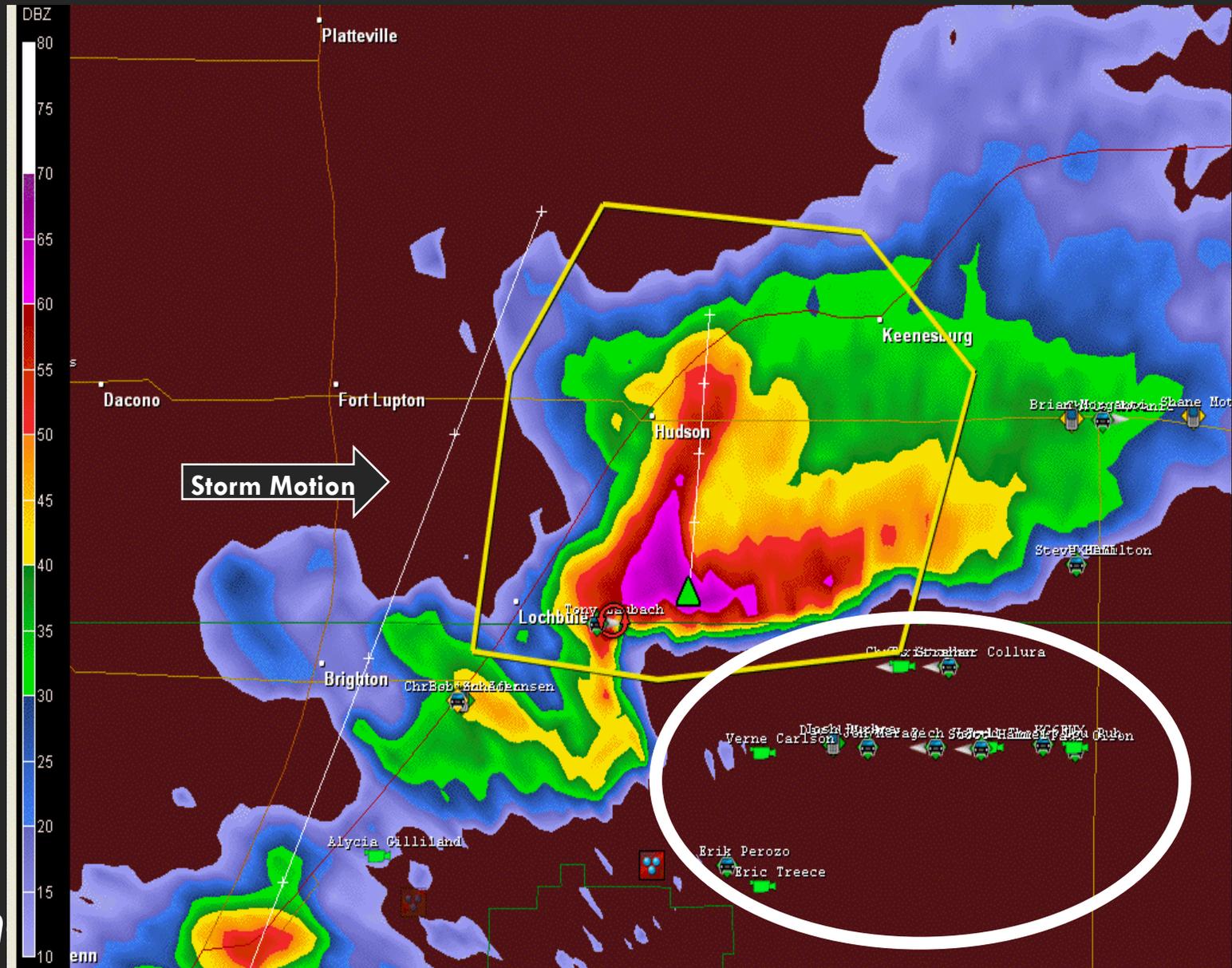
To view Tornado: Normally on SW side of storm, you want to be on the south side

National Weather Service Milwaukee



Storm Positioning

Deploy



Spotter Safety

Deploy

Your safety is more important than a report!



If you feel unsafe, seek shelter!

National Weather Service Milwaukee



Spotter Safety: Lightning

- Biggest threat to spotters!
- Be careful in open areas.
- Stay in vehicle.
- Do not report lightning.

When Thunder Roars, Go Indoors!



STOP all activities.

Seek shelter in a substantial building or hard-topped vehicle.

Wait 30 minutes after storm to resume activities.

 www.lightningsafety.noaa.gov 



Storm Spotting Process

“A Day in the Life of a Storm Spotter”

Prepare

Deploy

Observe

Communicate



Storm Spotting Process: **Observe**

What weather types need to be reported to us?

- Hail
- Flooding
- Heavy Rain
- Winds
- Tornadoes
- Funnel Clouds
- Wall Clouds
- Waterspouts



Storm Spotting Process: **Observe**

What weather DOES NOT need to be reported?

- Light rain
- Shelf clouds
- Lightning
- "Heavy Thunder"
- Second-hand,
unconfirmed info



Thunderstorm Ingredients

Observe

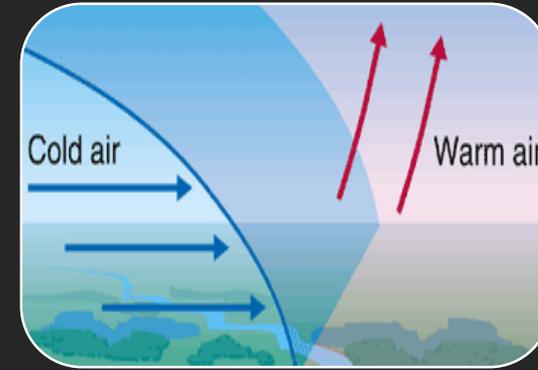
Moisture



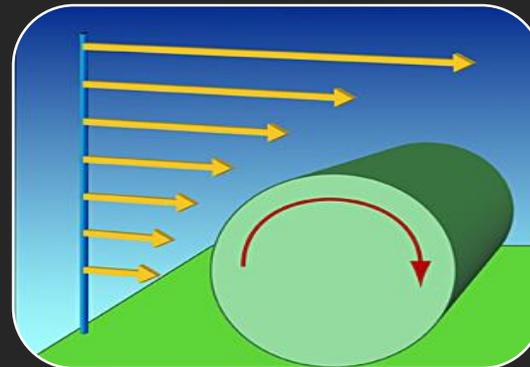
Instability



Lift



Wind Shear



For Severe
Thunderstorms:

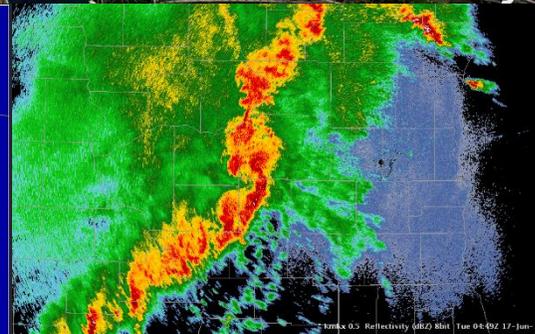
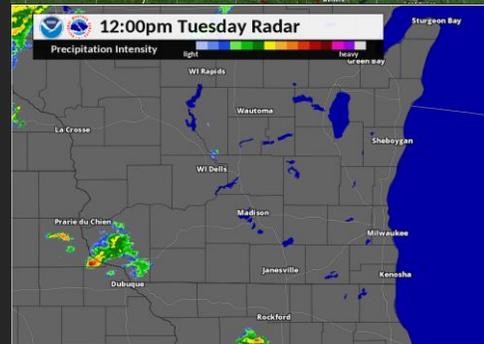
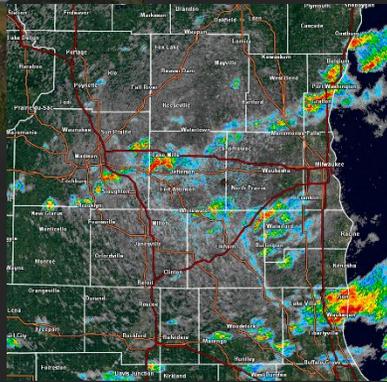
Storm Types and Features

Observe

Single Cell

Multicell Cluster or Line

Supercell



WIND SHEAR

National Weather Service Milwaukee



Hail

Measure the largest hailstones, use a ruler/object



Anna Mae Mlinar
Janesville 5/2/2018



Matt Schoeneck
2" Hail
Jackson 4/7/20



Amy Wuethrich
3" Hail Browntown
4/7/20



Alan Grahl
2" Hail
Jackson 4/7/20



Jeffrey Phelps
1" Hail
Saukville 4/7/20



Hail



PEA = 1/4"



PENNY = 3/4"



NICKEL = 7/8"

SEVERE



QUARTER = 1"

SEVERE



HALF DOLLAR = 1 1/4"



WALNUT = 1 1/2"



GOLF BALL = 1 3/4"



EGG = 2"



POOL BALL = 2 1/4"



TENNIS BALL = 2 1/2"



BASEBALL = 2 3/4"



GRAPEFRUIT = 4"



SOFTBALL = 4 1/2"



Wisconsin Record: 5.7" Wausau 5/1921

← 2nd Highest: 5.5" Port Edwards 6/2007



Flooding/Heavy Rain

Observe

“It has never been this bad before!!!”

- Impassable/Closed roads
- Washed out roads/bridges/railroads
- Rivers/Creeks out of their banks
- Flowing vs. standing water
- It has never reached this area?
- What is being threatened?
- What are the impacts?
- 1” per hour rainfall for 30 min +



Flooding/Heavy Rain

Measuring Rain? Join CoCoRaHS! cocorahs.org

View Data : List Daily Precipitation Reports US Units

Search Daily Precipitation Reports

Station Fields: Station Number Station Name

Location: USA Wisconsin DA - Dane

Date Range:

Start Date: 8/21/2018 End Date: 8/21/2018

Precip Value: All Precip Values Operator

Searched: Stations in Dane, Wisconsin. Report date on 8/21/2018.

Showing 24 Records.

Date	Time	Station Number	Station Name	Total Precip in. ▲	New Snow in. ❄️💧	Total Snow in. ❄️💧	State	County	View
8/21/2018	7:00 AM	WI-DA-45	Madison 6.1 W	11.63	NA NA	NA NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-46	Madison 6.4 W	11.19	NA NA	NA NA	WI	Dane	
8/21/2018	8:00 AM	WI-DA-63	Madison 7.0 WSW	11.02	NA NA	NA NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-49	Verona 5.5 WNW	10.47	NA NA	NA NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-3	Madison 5.0 SW	9.58	NA NA	NA NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-39	Madison 4.0 W	9.31	0.0 NA	0.0 NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-13	Madison 3.7 WSW	8.05	NA NA	NA NA	WI	Dane	
8/21/2018	7:05 AM	WI-DA-60	Middleton 0.8 SSW	8.05	NA NA	NA NA	WI	Dane	
8/21/2018	6:30 AM	WI-DA-59	Mount Horeb 0.7 S	7.32	NA NA	NA NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-10	Mount Horeb 3.6 SSW	5.60	NA NA	NA NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-29	Madison 4.8 NNW	5.32	NA NA	NA NA	WI	Dane	
8/21/2018	6:45 AM	WI-DA-69	Maple Bluff 1.7 N	5.09	NA NA	NA NA	WI	Dane	
8/21/2018	8:00 AM	WI-DA-35	Madison 5.5 N	4.84	NA NA	NA NA	WI	Dane	
8/21/2018	8:00 AM	WI-DA-56	Madison 4.4 NE	4.58	NA NA	NA NA	WI	Dane	
8/21/2018	7:00 AM	WI-DA-33	Oregon 0.4 SSW	4.24	NA NA	NA NA	WI	Dane	Classic New
8/21/2018	7:30 AM	WI-DA-31	Deerfield 0.6 N	4.20	0.0 0.00	0.0 0.00	WI	Dane	Classic New
8/21/2018	6:00 AM	WI-DA-52	Madison 2.8 NE	4.14	0.0 0.00	0.0 0.00	WI	Dane	Classic New
8/21/2018	7:00 AM	WI-DA-44	Brooklyn 0.9 NNE	4.02	NA NA	NA NA	WI	Dane	Classic New



CO-CoRaHS

CO-LR-610
Fort Collins 3.5 SW

Precipitation Report

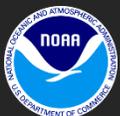
Observation Date: 2015-06-13

Observation Time: 07:00

Rain/Melted Snow: 0.00

Trace Precip. More Details

Metric Units (mm/cm)



Turn Around, Don't Drown

Observe

Only takes 2 feet of water to lift your car/truck



Watertown
August 17, 2019

National Weather Service Milwaukee



Damaging Winds

Observe



Damaging Winds

Most people over-estimate

- Measure or Estimate
- What part of the tree?
- Multiple trees?
- One rotted tree?
- Strongest winds can be ahead of rain (Outflow)



Estimating Winds

Observe

30-50mph: Whole trees in motion, Twigs or small branches breaking

50-58mph: Branches/Small Limbs Breaking

Severe Thunderstorm Wind Threshold

58-75mph: Visible structural damage, large branches broken

Over 75mph: Loss of roof/materials, trees uprooted/trunk snapped

Damaging Winds: Safety

Observe

Most frequent type of severe weather

- Camping (Under a tree)
- Boating (Motor or Canoe)
- Note: Strong winds can come before rain starts



Julie Collins
Pearson, WI
July 19, 2019

National Weather Service Milwaukee

Shelf Clouds

All Taken: June 27, 2019

No need to report



Eric Curtin
Belgium



Eric Curtin
Belgium



Gary Roof Jr.
Wisconsin Dells



Mario Barajas
Sheboygan



Jessica Kasinskas
Kewaskum

Storm Spotting Process

“A Day in the Life of a Storm Spotter”

Prepare

Deploy

Observe

Communicate



Tornadoes

Spotters add the most value with their spotting of tornado formation and prompt reporting directly to the NWS.



Fujita Scale

EF-0

Up to 85 mph

EF-0/1: Weak
Tornadoes

EF-1

86-110 mph

EF-2

111-135 mph

EF-2/3: Strong
Tornadoes

EF-3

136-165 mph

EF-4

166-200 mph

EF-4/5: Violent
Tornadoes

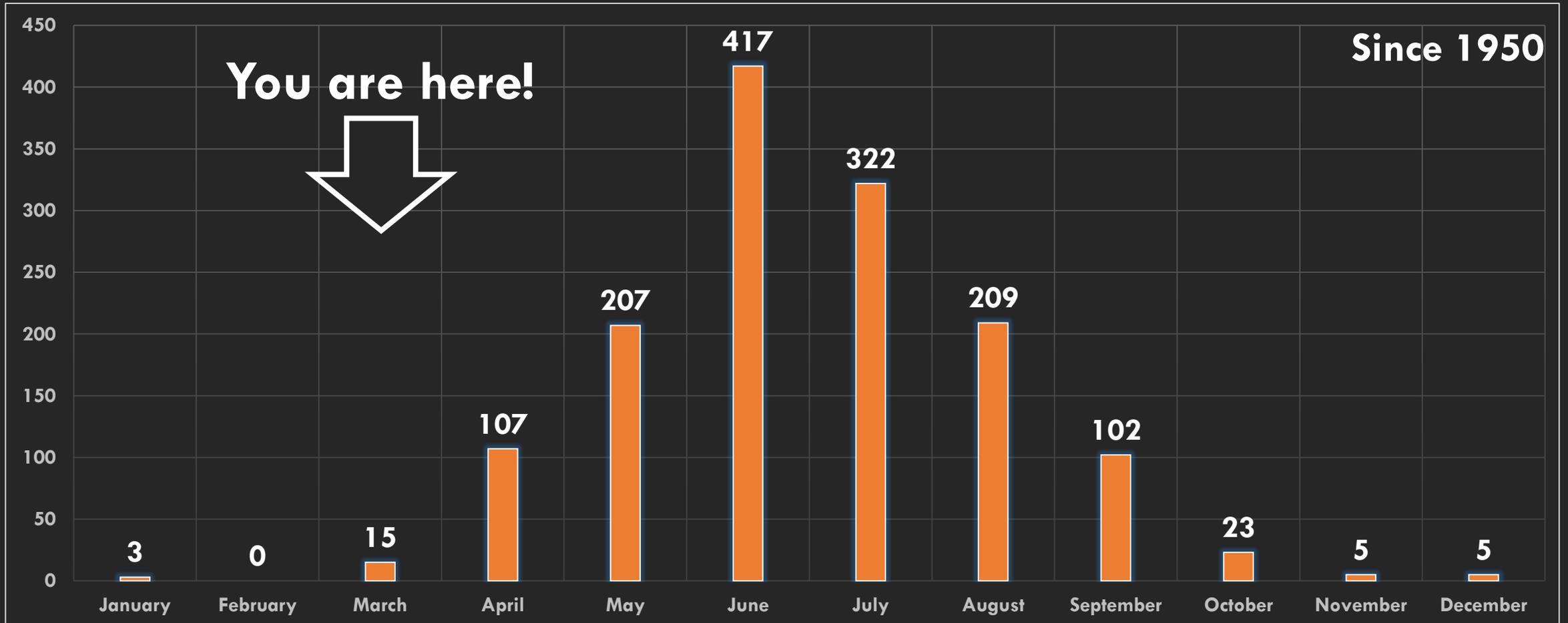
EF-5

Over 200 mph

- Tornado rating based on damage
- 95% of Wisconsin Tornadoes are EF-0, EF-1, or EF-2s
- 75% of US Tornado fatalities occur with EF-3, EF-4 and EF-5s
- Last Wisconsin Tornado at each EF Rating:
 - EF-2-Brownsville 2018
 - EF-3-Elk Mound 2019
 - EF-4-Manitowoc Co. 1994
 - EF-5-Oakfield 1996
- Last Year (2019):
 - 28 Tornadoes
 - 27 EF-0 or EF-1
 - 1 EF-3
 - Elk Mound Sep 24, 2019

Wisconsin Tornadoes By Month

Peak Time: 3-9pm, Can happen at any time of day though



Tornadoes

Call us to report!

- In contact w/ground?
 - **YES:** Tornado
 - **NO:** Funnel Cloud
- Look for debris at the base
- Power flashes
- Prior to Tornado (Report!):
 - Wall Clouds
 - Funnel Clouds



Funnel Clouds: NOT in contact with ground



Lana Swenson
Monticello
August 15, 2018

Wall Clouds

- **Isolated lowering**
- **Rear/SW portion of storm**
- **Updraft area (Up and In)**
- **Persistent?**
- **Rotation?**
- **Reportable**
- **NOTE: Movement does not mean rotation**
- **Having a wall cloud does not mean that a tornado will form**



Tom Purdy
Footville

Night Tornadoes

Caution! Spotting storms at night is dangerous!

- Need to be experienced
- Radar support

How to spot a tornado at night?

- Power flashes
- Lightning
- Roaring Sound



Shane Solo
Elk Mound, WI EF-3
September 24 2019

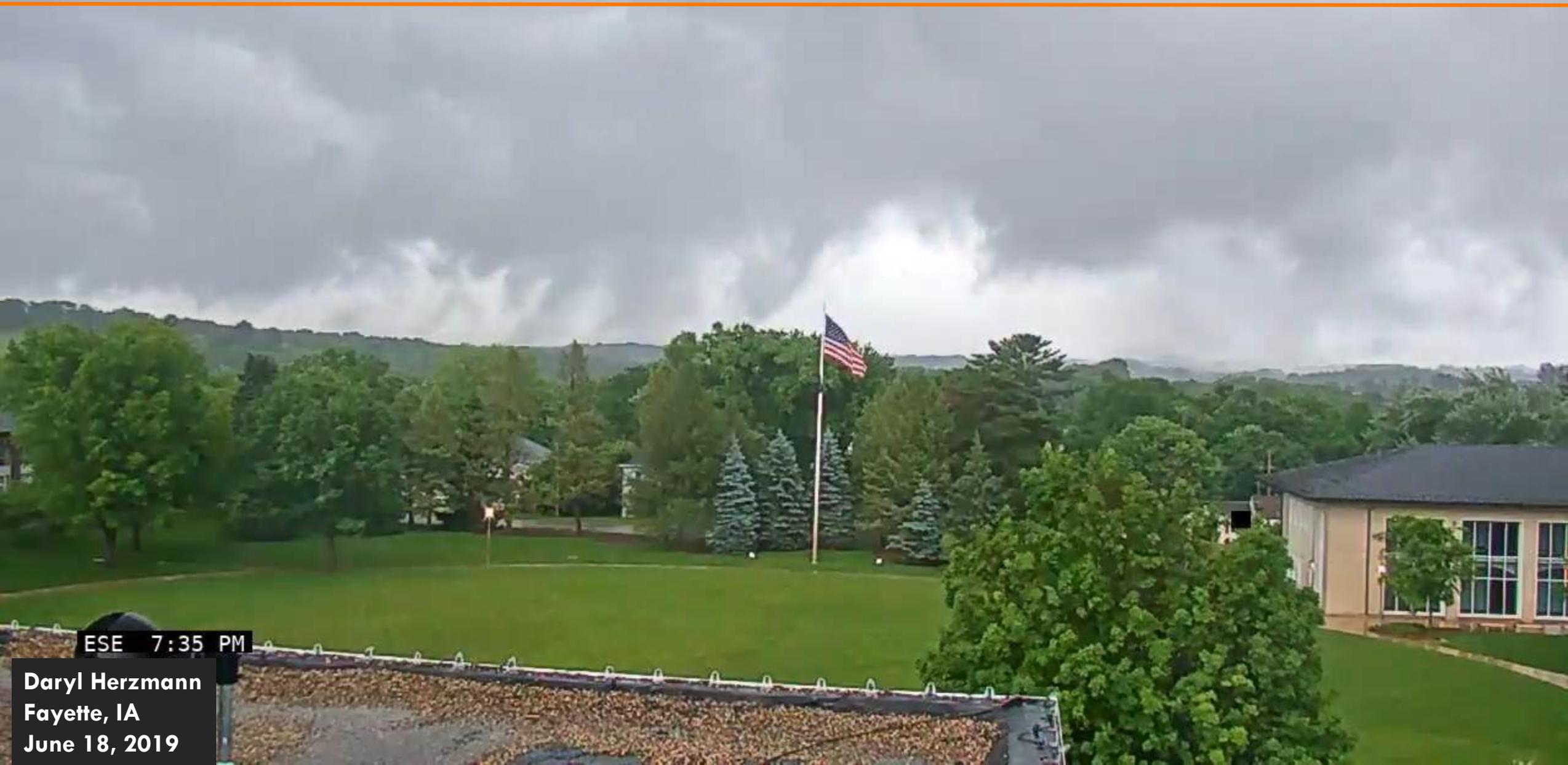
Tornado/Funnel Cloud Wannabe/Fakes

Rain Shaft

Virga



Scud Clouds



ESE 7:35 PM

Daryl Herzmann
Fayette, IA
June 18, 2019

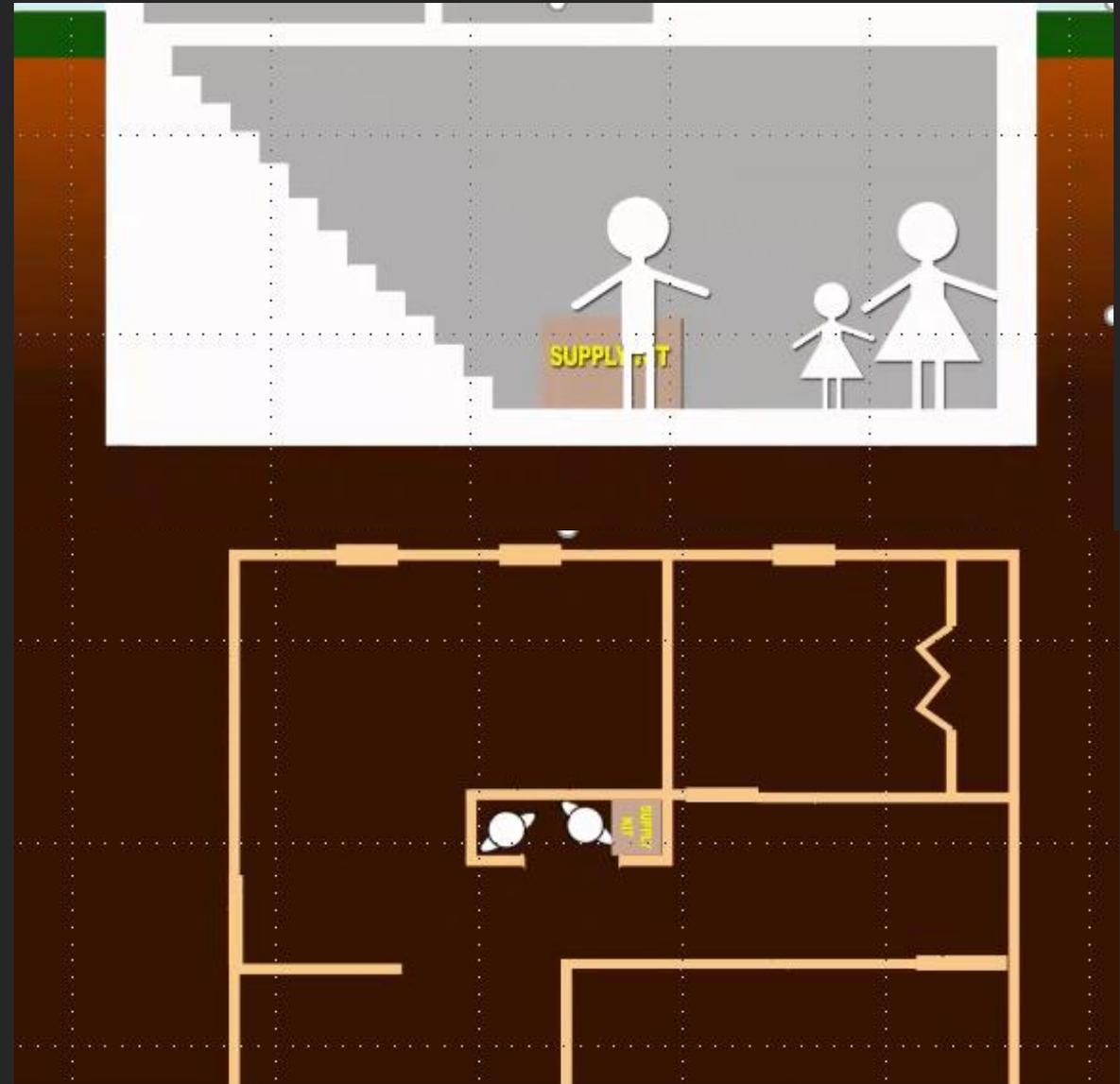
Gustnado

Nathan Gartz
Waukesha, WI
June 27, 2019



Tornado Safety

- **Have a plan ahead of time**
 - **Where is the safe place?**
- **Basement/Lowest Level**
- **Away from windows**
- **Center of building**
- **Put on shoes/boots**
- **Get under a table**
- **Cover with pillows/blanket**
- **Bike/Hockey/Motorcycle helmet**



Tornado Safety



Lowest Level of House



Interior Room

Storm Spotting Process

“A Day in the Life of a Storm Spotter”

Prepare

Deploy

Observe

Communicate



Storm Spotting Process: **Communicate**

MOST IMPORTANT! How you report the severe weather.

- Reports **MUST** get to the NWS!
- Do not assume we know!
- Call us! Not 911!
- Take a moment to take a deep breath and be calm.



Reporting Basics

Communicate

- WHO are you?
- Trained Spotter, Sheriff, Fire...
- WHAT occurred?
- WHEN was it?
- WHERE was it?



CALL US!

1-800-545-8197

REPORTS ONLY!

Tornadoes

Wall & Funnel Clouds

Flash Flooding

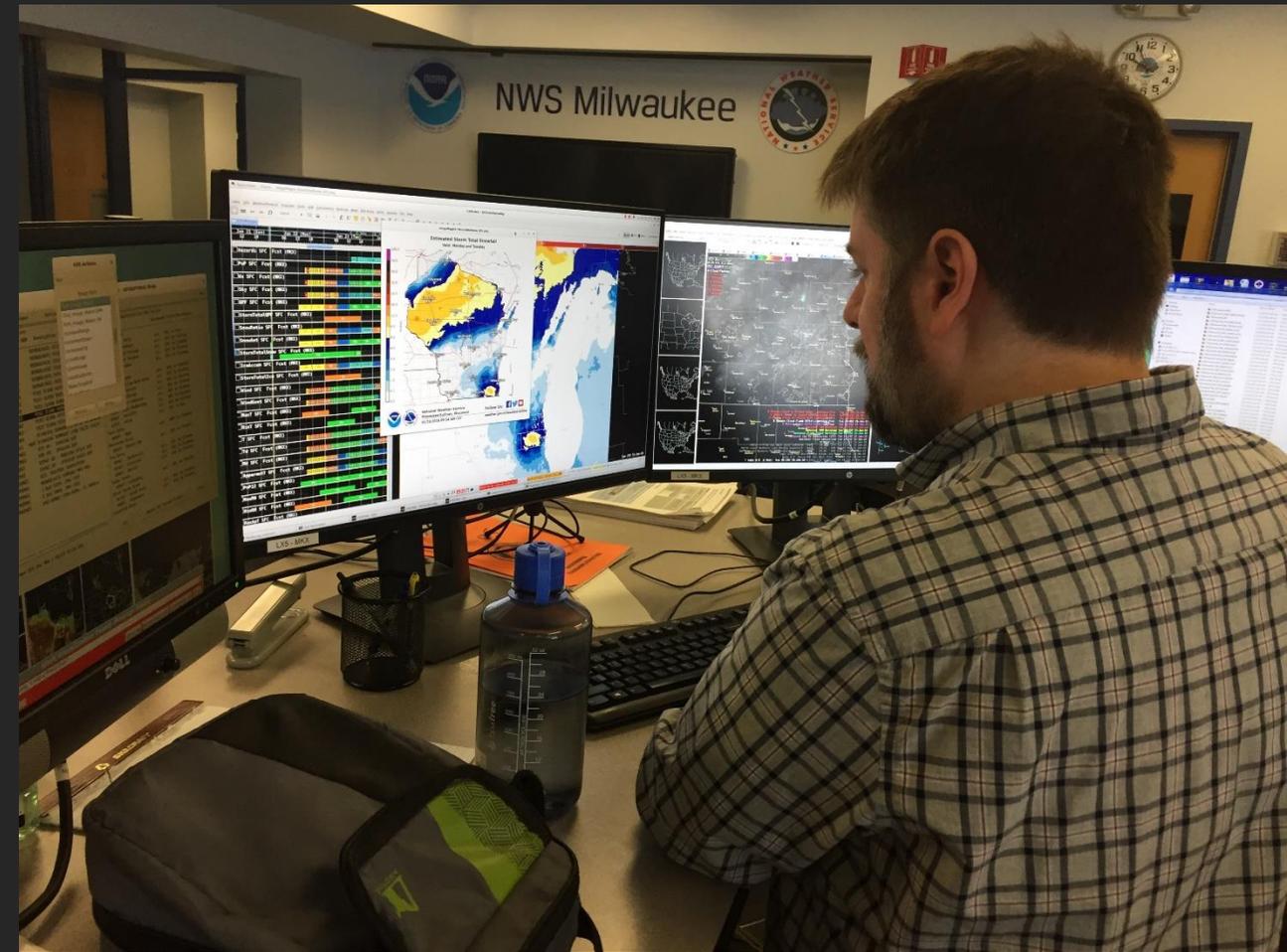
Structural Damage

Hail over 2"

Anything else if no other
options are available

National Weather Service Milwaukee

Communicate



Amateur Radio

Communicate

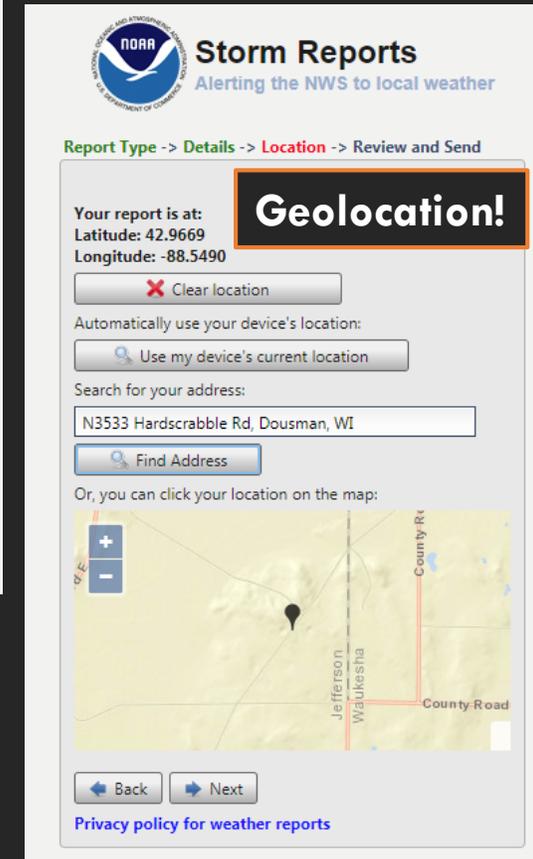
Columbia County ARES/RACES Richard Green: kc9fnm@gmail.com Tyler Letlebo: tletlebo@gmail.com	Dane County Midwest SSTRC Dale Bernstein: dale.bernstein@midwestsstrc.org	Dodge County ARES/RACES Ryan Klavekoske: ryantiff@charter.net	Fond du Lac County Sullivan Committee mkxsulcom@gmail.com
Green County Sullivan Committee mkxsulcom@gmail.com	Green Lake County Sullivan Committee mkxsulcom@gmail.com	Iowa County Midwest SSTRC Dale Bernstein: dale.bernstein@midwestsstrc.org	Jefferson County ARES/RACES Paul Marowsky: kd9pm.1@gmail.com
Kenosha County Racine Co ARES/RACES Randy Hansen: randalhansen@cs.com	Lafayette County Sullivan Committee mkxsulcom@gmail.com	Marquette County ARES/RACES Richard Green: kc9fnm@gmail.com Tyler Letlebo: tletlebo@gmail.com	Milwaukee County Milwaukee Area Skywarn Association Gregg Schulz: mkeskywarn105@gmail.com
Ozaukee County OZARES ARES/RACES Robert Eskola: K4WTH@yahoo.com	Racine County ARES/RACES Dave Whitham: vacuumtube.guru@gmail.com	Rock County Midwest SSTRC Dale Bernstein: dale.bernstein@midwestsstrc.org	Sauk County ARES/RACES Matt Noll: kc9upe@gmail.com
Sheboygan County OZARES/Washington County ARES/RACES	Walworth County Volunteer based spotter team Eli Larson: k9ilj.wx@gmail.com	Washington County ARES/RACES Steve Sundquist: realsnow@hotmail.com	Waukesha County MASA Gregg Schulz: mkeskywarn105@gmail.com

Web/Cell Phone

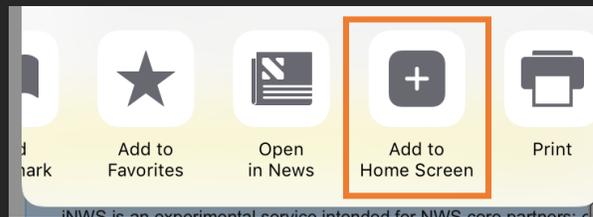
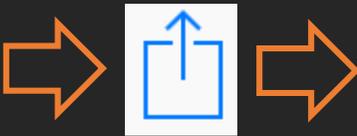
Communicate

<https://inws.ncep.noaa.gov/report/>

Use to report:
Everything!...
except tornadoes



Add to your home screen
via phone's browser

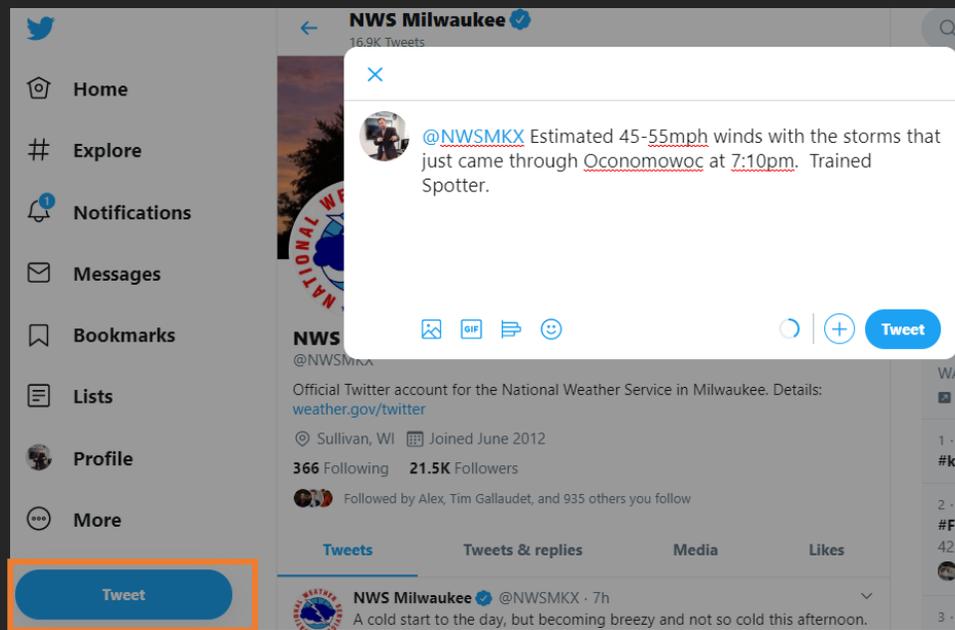


Twitter

Communicate

@NWSMKX

- Best for social
- Pictures!
- Don't forget:
 - Who, What, When, Where
- Mention @NWSMKX



National Weather Service Milwaukee

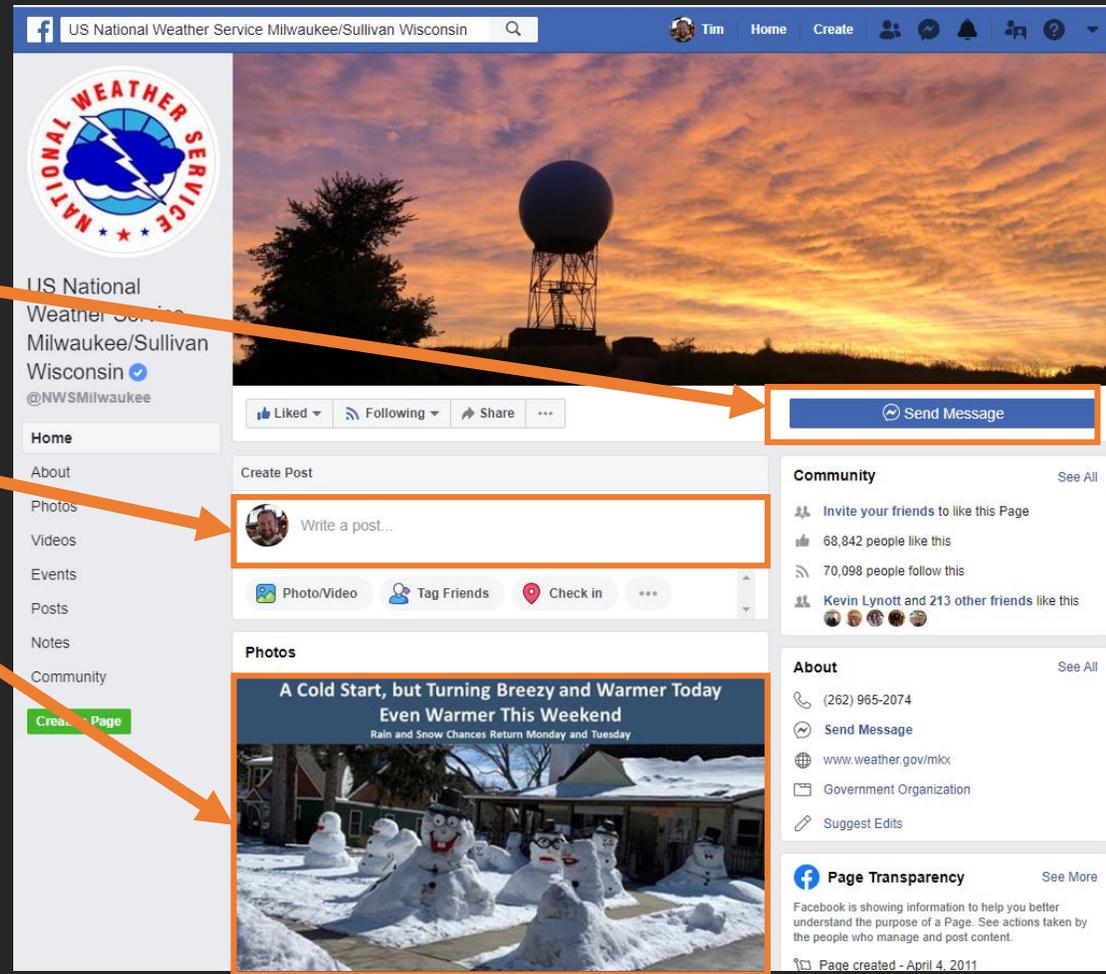


Facebook

Communicate

/nwsmilwaukee

- Messenger
- Post to page
- Comment on post
- Pictures/Video
- Don't forget:
 - Who, What, When, Where

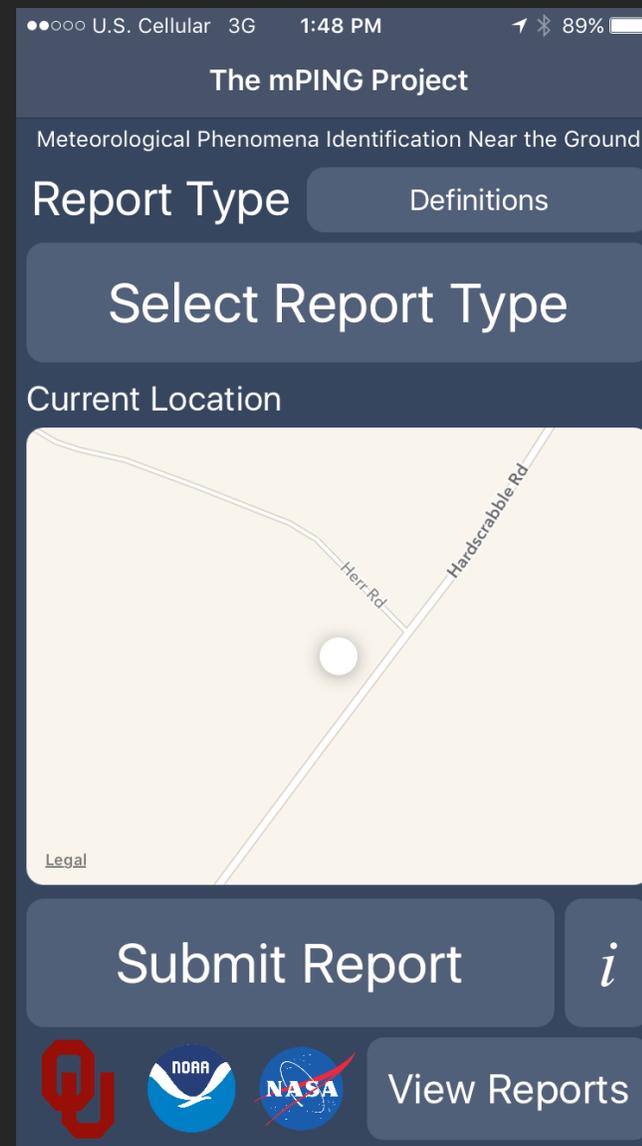


mPING

Communicate

Free App!

- **Geolocation**
- **Best for hail and precipitation types**
- **DON'T report tornadoes here**



CoCoRaHS

Communicate

cocorahs.org

- Rain/Snow measuring
- \$42 (includes shipping)
- Don't report using small/cheap gauges

COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK
"Because every drop counts"

Welcome to CoCoRaHS! "Volunteers working together to measure precipitation across the nation."

Who uses CoCoRaHS Observations?

7,688 daily precipitation reports received today as of 2/16/2016 2:49 PM EST

Daily Precipitation (inches x.xx)
USA
2/16/2016

Legend:
Trace
0.00 - 0.19
0.20 - 0.38
0.39 - 0.54
0.55 - 0.74
0.75 - 0.97
0.98 - 1.16
1.17 - 1.35
1.36 - 1.54
1.55 - 1.73
1.74 - 1.92
1.93 - 2.11
2.12 - 2.30
2.31 - 2.49
2.50 - 2.68
2.69 - 2.87
2.88 - 3.06
3.07 - 3.25
3.26 - 3.44
3.45 - 3.63
3.64 - 3.82
3.83 - 4.01
4.02 - 4.20
4.21 - 4.39
4.40 - 4.58
4.59 - 4.76
4.77 - 4.95
4.96 - 5.14
5.15 - 5.33
5.34 - 5.52
5.53 - 5.71
5.72 - 5.90
5.91 - 6.09
6.10 - 6.28
6.29 - 6.47
6.48 - 6.66
6.67 - 6.85
6.86 - 7.04
7.05 - 7.23
7.24 - 7.42
7.43 - 7.61
7.62 - 7.80
7.81 - 7.99
8.00 - 8.18
8.19 - 8.37
8.38 - 8.56
8.57 - 8.75
8.76 - 8.94
8.95 - 9.13
9.14 - 9.32
9.33 - 9.51
9.52 - 9.70
9.71 - 9.89
9.90 - 10.08
10.09 - 10.27
10.28 - 10.46
10.47 - 10.65
10.66 - 10.84
10.85 - 11.03
11.04 - 11.22
11.23 - 11.41
11.42 - 11.60
11.61 - 11.79
11.80 - 11.98
11.99 - 12.17
12.18 - 12.36
12.37 - 12.55
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HAIL & SNOW NETWORK
"Because every drop counts"

My Data Entry | Login

Date: 2018 Colors: Standard Get Map

Legend:
1 - 0.58
0.59 - 1.16
1.17 - 2.90
2.91 - 6.97
6.98 - 10.46
10.47 - 11.63



Safety is Your #1 Priority!

Stay safe...keep others safe!

Obey the law!

Know your escape route

How long does it take to get back?

Communicate your whereabouts



Thank you!

Websites shared in presentation:

weather.gov/media/mkx/WCM/links2018.pdf

nws.milwaukee@noaa.gov

Questions?

Email:

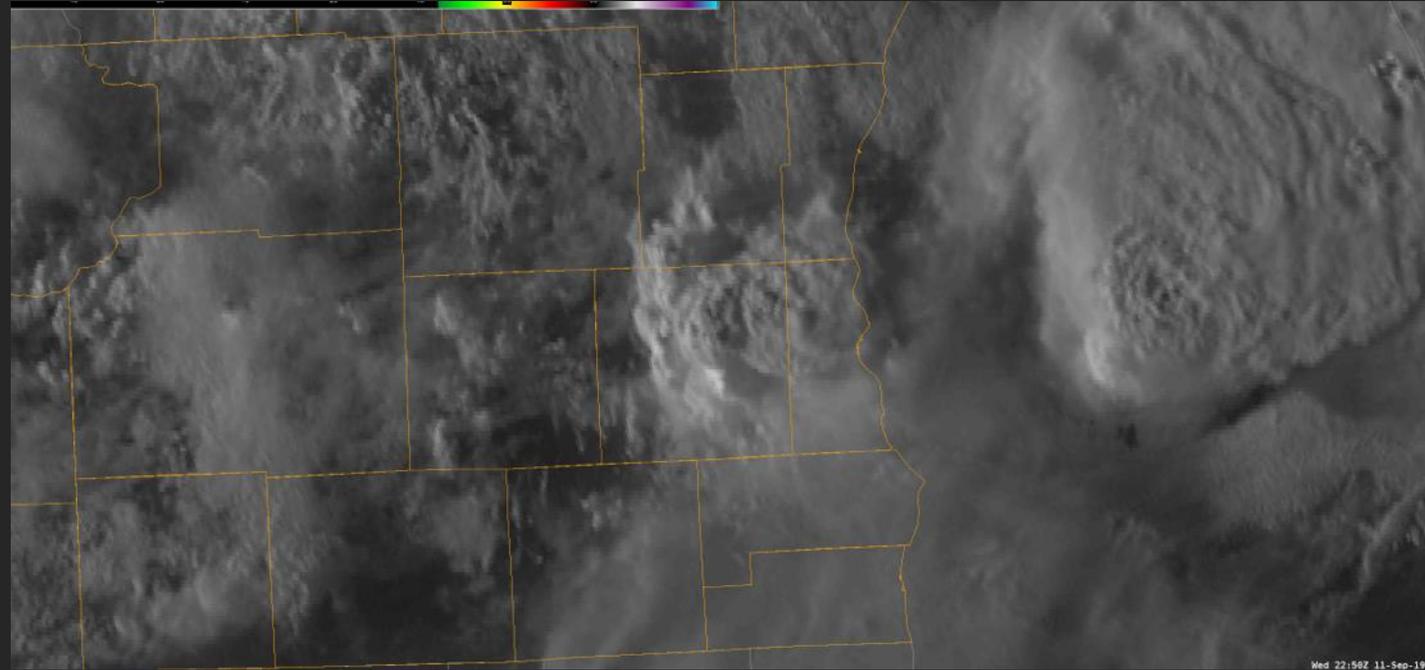
Tim Halbach

Warning Coordination Meteorologist

Timothy.J.Halbach@noaa.gov

[@timhalbach](https://twitter.com/timhalbach)

National Weather Service Milwaukee



Wed 22:50Z 11-Sep-19

