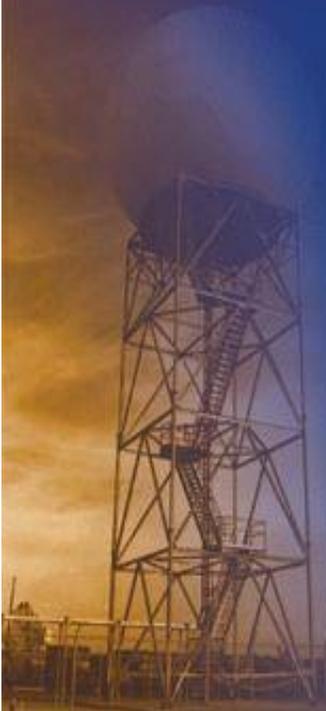


NWS Verification and Storm Data Breakout Session

Brenton MacAloney II
Performance Branch Meteorologist
National Weather Service Headquarters
Silver Spring, Maryland

Chance Hayes
Warning Coordination Meteorologist
National Weather Service
Wichita, Kansas





Session Outline



Storm Data and Severe Weather Reports

- What is storm data?
- Where do the reports come from?
- Uses of storm data
- Data availability

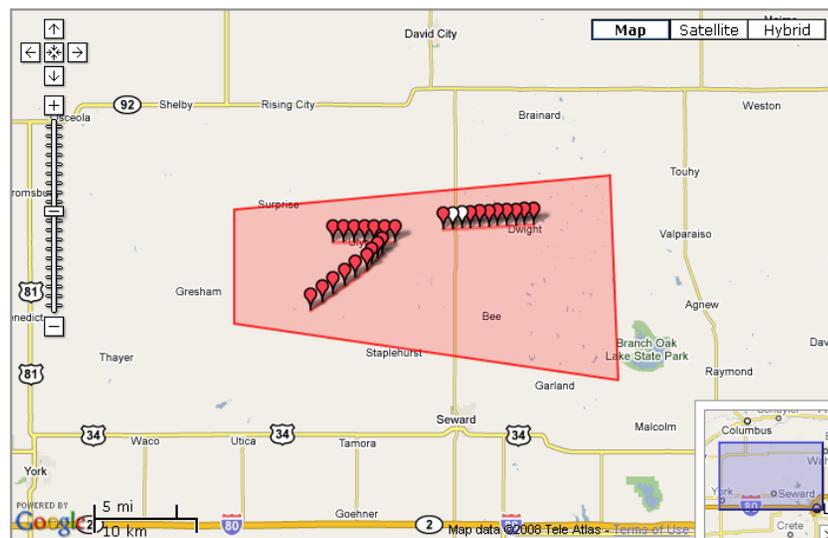
Storm Data and Unusual Weather Phenomena - September 2008

Location	Date/Time	Deaths & Injuries	Property & Crop Dmg	Event Type and Details
ATLANTIC SOUTH				
SAVANNAH GA TO ALTAMAHA SD GA OUT 20NM COUNTY --- 20.5 ESE ST. CATHERINE'S IS. [31.40, -80.87]				
	09/05/08 14:50 EST	0		Marine Thunderstorm Wind (MG 39 kt)
	09/05/08 14:50 EST	0		Source: Buoy
The Grays Reef Buoy 41008 measured a wind gust of 39 knots or 45 mph as Tropical Storm Hanna passed by to the east.				
SAVANNAH GA TO ALTAMAHA SD GA 20 TO 60NM COUNTY --- 36.8 SE OSSABAW ISLAND [31.38, -80.57]				
	09/05/08 16:32 EST	0		Marine Thunderstorm Wind (MG 51 kt)
	09/05/08 16:32 EST	0		Source: Buoy
The U.S. Navy Tower SPAG1 measured sustained winds of 47 mph or 41 knots, and a peak wind gust of 51 knots or 59 mph, as Tropical Storm Hanna passed by to the east.				
SAVANNAH GA TO ALTAMAHA SD GA OUT 20NM COUNTY --- 107.9 ENE TYBEE ISLAND [32.50, -79.10]				
	09/05/08 23:50 EST	0		Marine Thunderstorm Wind (MG 51 kt)
	09/05/08 23:50 EST	0		Source: Buoy
The Edisto Buoy 41004 measured a wind gust of 51 knots or 59 mph as Tropical Storm Hanna passed nearby over the buoy.				
Tropical Storm Hanna passed by to the east of the South Carolina coastal Waters, and resulted in strong winds and localized heavy rainfall across the area.				
SAVANNAH GA TO ALTAMAHA SD GA 20 TO 60NM COUNTY --- 48.3 ESE WASSAW ISLAND [31.53, -80.24]				
	09/19/08 17:35 EST	0		Marine Thunderstorm Wind (MG 35 kt)
	09/19/08 17:35 EST	0		Source: Buoy

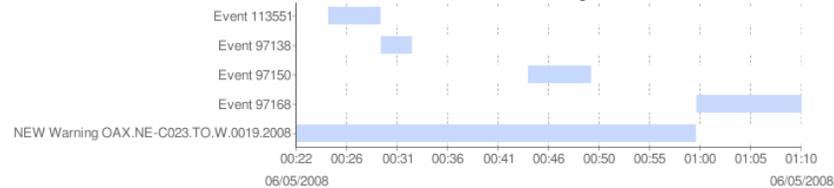


Session Outline (cont.)

Warning Polygon And Event Mapping



Event And Warning Timeline



Verification

- What is verification?
- Types of verification
- Uses of verification
- Future of verification



Storm Data and Severe Weather Reports

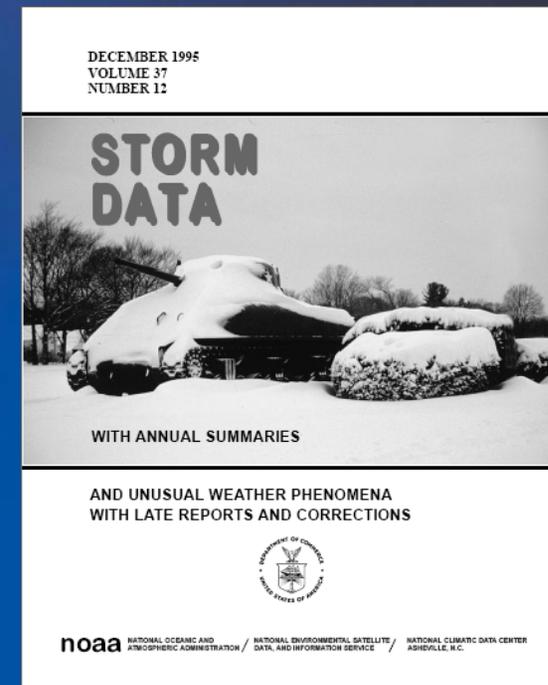
Storm Data and Unusual Weather Phenomena - September 2008

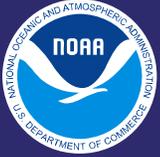
Location	Date/Time	Deaths & Injuries	Property & Crop Dmg	Event Type and Details
ATLANTIC SOUTH				
SAVANNAH GA TO ALTAMAHA SD GA OUT 20NM COUNTY --- 20.6 ESE ST. CATHERINE'S IS. [31.40, -80.87]	09/05/08 14:50 EST	0		Marine Thunderstorm Wind (MG 39 kt)
	09/05/08 14:50 EST	0		Source: Buoy
The Grays Reef Buoy 41008 measured a wind gust of 39 knots or 45 mph as Tropical Storm Hanna passed by to the east.				
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The Edisto Buoy 41004 measured a wind gust of 51 knots or 59 mph as Tropical Storm Hanna passed nearby over the buoy.				
Tropical Storm Hanna passed by to the east of the South Carolina coastal Waters, and resulted in strong winds and localized heavy rainfall across the area.				
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	09/19/08 17:35 EST	0		Source: Buoy



What is Storm Data?

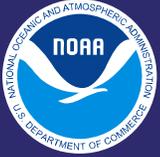
- Storm Data is the NWS's official collection of severe and unusual weather events.
- The NWS officially started collecting Storm Data reports in 1959.
- NCDC publishes the data in its monthly "Storm Data Publication".





History of Storm Data Collection

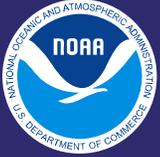
- 1850s – Earliest known storm data reports. Data collected by the military and sent to DC via telegram.
- 1959 – First NCDC published Storm Data Publication. Data documented using typewriter.
- 1993 – First electronic version of storm data collection. Data documented using WordPerfect 5.0.
- 1996 – StormDat program developed. Data documented using Paradox 7 database.



History of Storm Data Collection (cont.)



- 1999 – StormDat 2000 developed and data documented using Paradox 9 database.
- 2006 – Web-based StormDat is developed and data documented using database maintained on a web server.
- 2007 – Google Maps added to the StormDat
- 2010 – High Resolution StormDat program released



Where do reports in Storm Data originate?

- SKYWARN spotters
- Emergency Managers
- Insurance companies



- Official NWS obs.
- Broadcast media
- Utility companies
- Storm chasers
- ...and more!



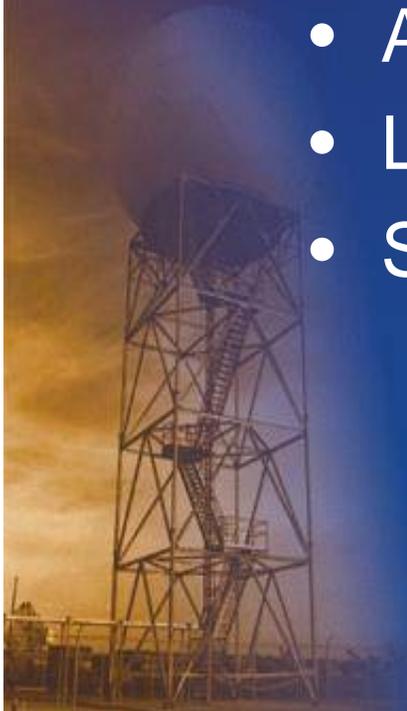


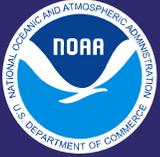
Importance of Severe Weather Reports



During severe weather events the NWS needs reports in real time....why?

- Warning decision making
- Alert locations in the path of the storm
- Local Storm Reports (LSR)
- Storm data

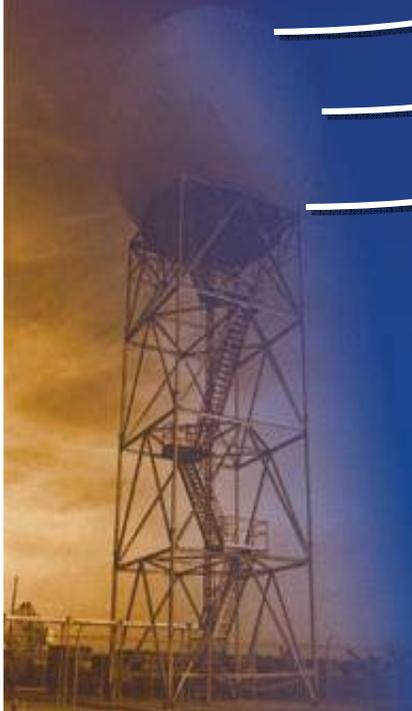


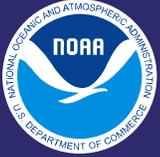


Detection



- Just because the radar detects it, doesn't mean we will issue a warning
- Spotters are just as important in the WDP
- We utilize a 2/3 approach (radar, spotter, environment)

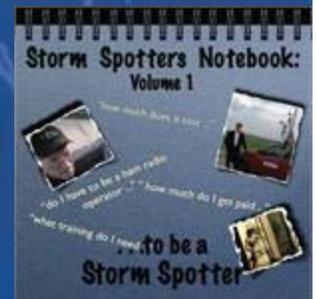


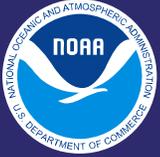


- Value of Storm Spotters -



John Utech – Weather Lab

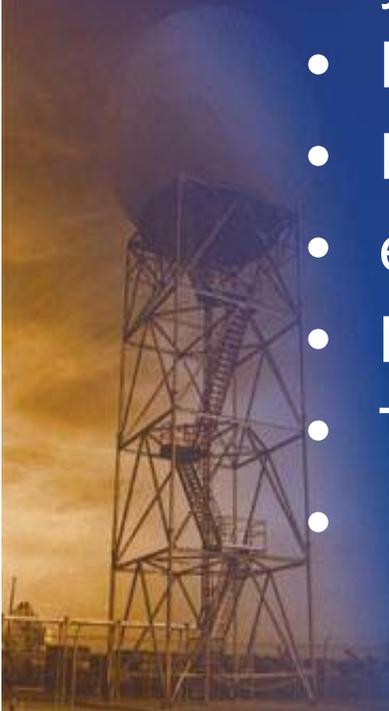




Reporting Severe Weather to your Local NWS Forecast Office



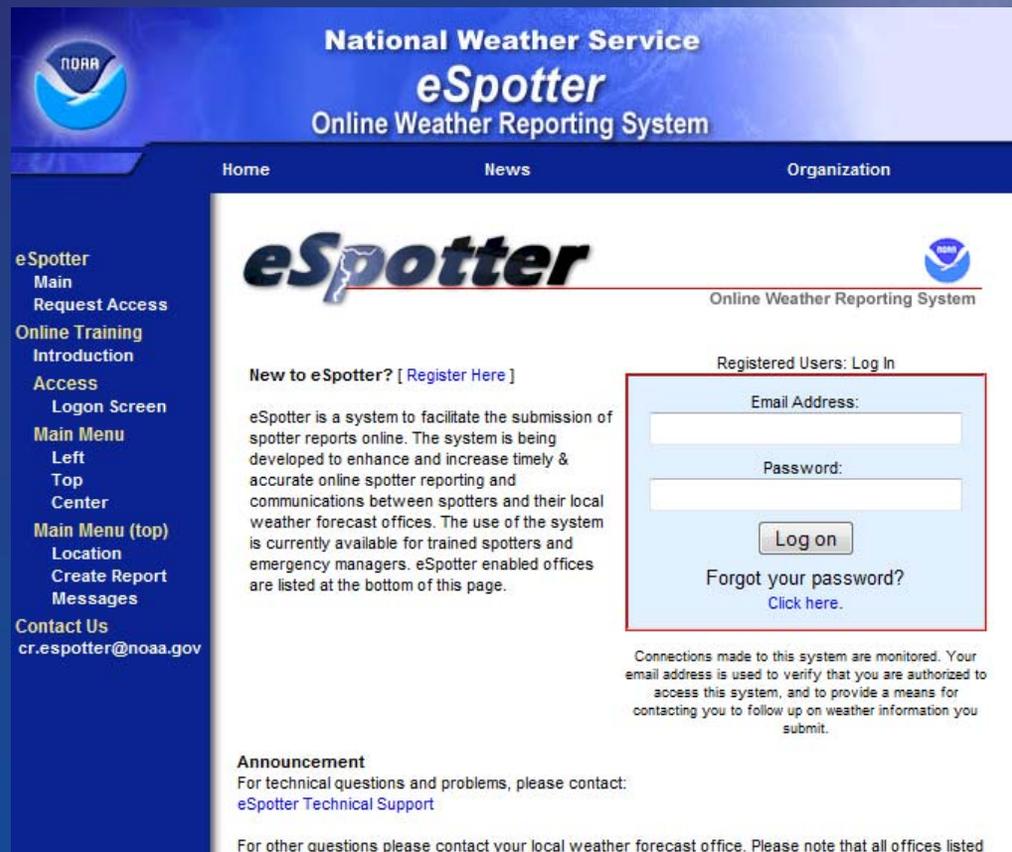
- Best way begins with taking a SKYWARN training course
- Ways to communicate:
 - Phone
 - E-mail
 - eSpotter
 - NWS Chat
 - Twitter
 - Amateur Radio





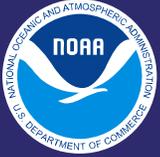
Reporting Severe Weather to your Local NWS Forecast Office

eSpotter



The screenshot shows the eSpotter website interface. At the top left is the NOAA logo. The main header reads "National Weather Service eSpotter Online Weather Reporting System". Below the header are navigation links for "Home", "News", and "Organization". On the left side, there is a vertical menu with links: "eSpotter", "Main", "Request Access", "Online Training", "Introduction", "Access", "Logon Screen", "Main Menu", "Left", "Top", "Center", "Main Menu (top)", "Location", "Create Report", "Messages", "Contact Us", and "cr.espotter@noaa.gov". The main content area features the "eSpotter" logo and "Online Weather Reporting System" text. It includes a "New to eSpotter? [Register Here]" link, a "Registered Users: Log In" section with input fields for "Email Address:" and "Password:", a "Log on" button, and a "Forgot your password? Click here." link. A disclaimer states: "Connections made to this system are monitored. Your email address is used to verify that you are authorized to access this system, and to provide a means for contacting you to follow up on weather information you submit." An "Announcement" section provides contact information for technical questions and problems, directing users to "eSpotter Technical Support". A final note at the bottom says: "For other questions please contact your local weather forecast office. Please note that all offices listed".

<http://espotter.weather.gov/>



Reporting Severe Weather to your Local NWS Forecast Office

NWSChat

NOAA's National Weather Service
NWSChat

Search NWS All NOAA Go

weather.gov

NWSChat Home Reset Password Documentation/Help Contacts Online Tools NWS Toolbox

EXPERIMENTAL, NON-OPERATIONAL

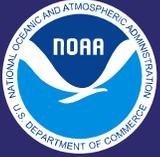
Options << Help Saved Items All Bots Talk

Available Rooms:
Select a Room...
 Show NWSBot Messages
 Enable Audio Alerts
Play Test Sound
Sound Volume:

Clear Room Log Export to HTML Print Log Save Selected View As HTML

Timestamp	Author	Message
03/04 3:39 PM	nwsbot	LOT issues Area Forecast Discussion .MARINE... 104 PM CST SURFACE RIDGE WILL INCH ITS WAY SLOWLY EASTWARD INTO...AND EVENTUALLY ACROSS THE WESTERN GREAT LAKES REGION THROUGH THE WEEKEND. THIS WILL PROVIDE LAKE MICHIGAN WITH A COUPLE MORE DAYS OF RELATIVELY LIGHT WINDS AND BENIGN CONDITIONS. AS THE RIDGE SHIFTS EAST TOWARD THE END OF THE WEEKEND LOOK FOR SOUTHERLY FLOW ON THE BACKSIDE OF THE HIGH TO RAMP UP A BIT...BUT NOT EXPECTING ANY TERRIBLY SIGNIFICANT WINDS AND CERTAINLY NO GALES THROUGH THE NEXT 5 DAYS. IZZJ
03/04 3:39 PM	nwsbot	LOT issues Area Forecast Discussion (AFD)
03/04 3:39 PM	nwsbot	MLB issues Zone Forecast Package (ZFP)
03/04 3:39 PM	nwsbot	LOT issues Area Forecast Discussion .DISCUSSION... 232 PM CST FORECAST PARAMETERS FROM T+0 THROUGH WEEKEND AND INTO EARLY NEXT WEEK HAVE ONLY BEEN ADJUSTED A BIT AS OVERALL PROGRESSION OF SYNOPTIC FEATURES AS DEPICTED BY LATEST MODEL RUNS SIMILAR TO PREVIOUS ONES. UPPER RIDGE AXIS SHIFTS FROM ITS CURRENT POSITION OVER THE PLAINS TO THE MID MS VALLEY BY EARLY SAT MORNING...WHILE UPPER LOW APPROACHING THE NV-UT BORDER REACHES THE CENTRAL PLAINS AT THAT TIME. THIS UPPER LOW TO SLOW AND OPEN TO...L...DURING SAT. AND SAT NIGHT...IT ENCOUNTERS THE

<https://nwschat.weather.gov/>



Reporting Severe Weather to your Local NWS Forecast Office

twitter



Have an account? [Sign in](#)



twitter™ Share and discover what's happening right now, anywhere in the world.

See what people are saying about...

[Search](#) [Sign up now](#)

Join the conversation

POPULAR TOPICS BY THE MINUTE, DAY, AND WEEK ?

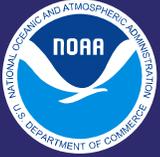
 [Haiti](#) [Justin Bieber](#) [Dear Internet](#) [I Love INDONESIA](#) [Shorty Award](#) [Hope For Haiti](#)

 [Haiti](#) [Jersey Shore](#) [Follow Friday](#) [Shorty Award](#) [TGIF](#) [Kobe](#) [Conan](#) [LeBron](#) [Top 3 Weekly](#) [Lakers](#)

 [Haiti](#) [Shorty Award](#) [Justin Bieber](#) [Follow Friday](#) [Haiti](#) [Massachusetts](#) [Scott Brown](#) [MLK](#) [Jersey Shore](#) [Cowboys](#) [Martin Luther King](#)

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<http://www.twitter.com>



How to use **twitter** for Significant Weather Reports

- If you do not already have a Twitter account, please go to www.Twitter.com to sign up.
- If you already have a Twitter account you can tweet via the web or a mobile phone.
 - Use the 'hash tag' **#wxreport** in your tweet to group your message in a specific searchable category



Local Storm Reports

NWUS51 KBOX 041506
LSRBOX

PRELIMINARY LOCAL STORM REPORT...SUMMARY
NATIONAL WEATHER SERVICE TAUNTON MA
1006 AM EST THU MAR 04 2010

..TIME...	...EVENT...	...CITY LOCATION...	...LAT.LON...
..DATE...	...MAG....	..COUNTY LOCATION..ST..	...SOURCE....
..REMARKS..			

1240 AM	STORM SURGE	SALEM	42.53N 70.87W
03/04/2010	E0.00 FT	ESSEX MA	AMATEUR RADIO

COASTAL FLOODING ACROSS COMMERCIAL AND BRIDGE STREETS

1245 AM	STORM SURGE	SALEM	42.53N 70.87W
03/04/2010	E0.00 FT	ESSEX MA	AMATEUR RADIO

NORTH RIVER OUT OF IT/S BANKS DUE TO SURGE

0106 AM	STORM SURGE	SALEM	42.53N 70.87W
03/04/2010	E0.00 FT	ESSEX MA	AMATEUR RADIO

COASTAL FLOOD WATERS OVER SEA WALL ON COLUMBUS AVE

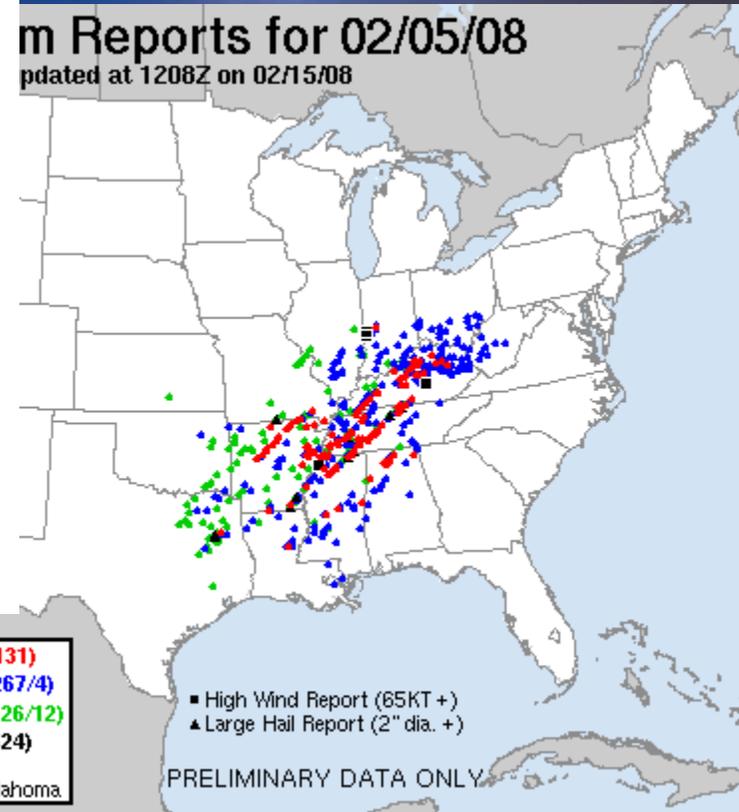
0109 AM	STORM SURGE	PLYMOUTH	41.96N 70.68W
03/04/2010	E0.00 FT	PLYMOUTH MA	AMATEUR RADIO

MINOR COASTAL FLOODING NEAR INTERSECTION OF LEYDEN AND WATER STREETS

0111 AM	STORM SURGE	PLYMOUTH	41.96N 70.68W
---------	-------------	----------	---------------

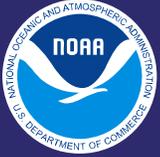
Storm Reports for 02/05/08

Updated at 1208Z on 02/15/08



	TORNADO REPORTS.. (131)
	WIND REPORTS/HI..... (267/4)
	HAIL REPORTS/LG..... (126/12)
	TOTAL REPORTS..... (524)
National Weather Service Storm Prediction Center Norman, Oklahoma	

PRELIMINARY DATA ONLY



LSRs into Storm Data

Once the credibility of the severe weather events are verified, they are entered into the storm data program.

Some of the information logged on these events:

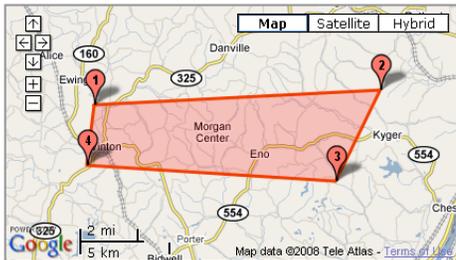
- Location
- Date / Time
- Magnitude
- Damage Caused
- Fatalities/Injuries

Add/Edit Event
Use this page to add or edit events.

EPISODE #19735: [August 1-2 in Ohio \(RLX, OH, 08/2008\)](#)
Out ahead of a cold front, with dew points on either side of 70 degrees, convection developed during the late afternoon on the 1st. A thunderstorm pulsed to severe limits during the evening hours over Vinton County.
Later, during the predawn ... [\[more\]](#)

Event Info >> **Location >>** Details >> Evidence >> Damages >> Fatalities >>

Flash Flood - (OH-C053) GALLIA



Format: Range/Azimuth Lat/Lon Address

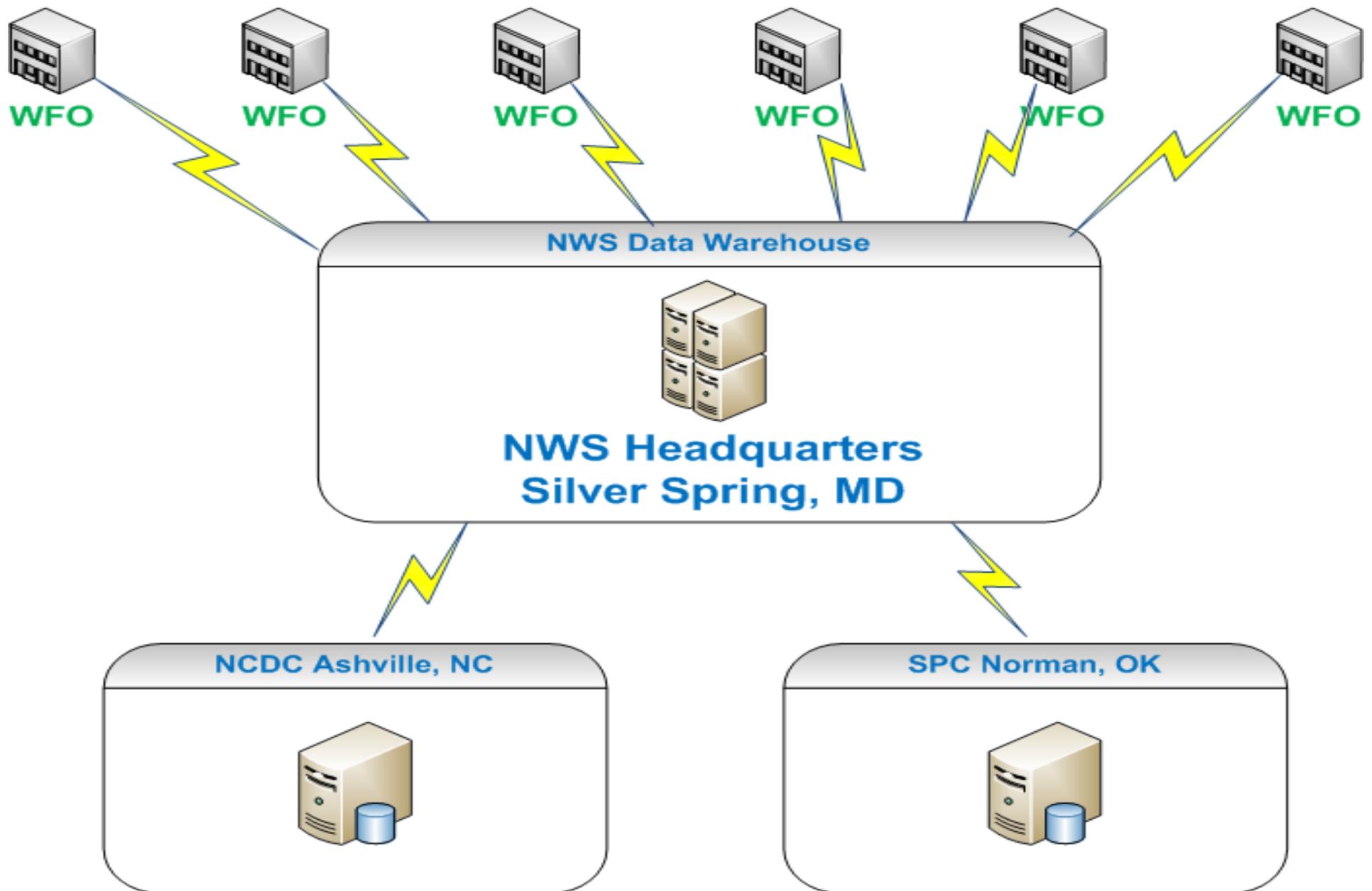
City:

Range/Azimuth: N

0.37mi SE of EWINGTON [38.9968, -82.3446]
1.72mi NNW of KYGER [39.004, -82.1589]
2.39mi ESE of ENO [38.9583, -82.188]
1.07mi WSW of VINTON [38.9664, -82.3494]

Location order matters for track events! Please add the start location first, end location - second. More in the [pdf guide](#).

Storm Data Process





Storm Data Uses

The information that logged in Storm Data has many uses. Here are a few...

- **NWS Verification Statistics**
- **Official NCDC Storm Data Publication**
- **SPC's Official Severe Weather Database**
- **NWS's Internal Service Assessments**
- **Academic Research Studies**
- **Disaster Reports**
- **Army Corps of Engineers**
- **Congressional and Other Gov Data Requests**
- **Public and Private Data Requests**



Data Availability

Storm Data is available to most people at no charge.

- NWS allows access to Storm Data to anyone with a .GOV, .EDU, or .MIL e-mail
- Otherwise NCDC makes data available on their website.

NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

National Climatic Data Center
U.S. Department of Commerce

DOC > NOAA > NESDIS > NCDC Search Field: Search NCDC

Enter Search Parameters for Oklahoma

Begin Date: 01/01/2009 [* 01/01/1950 thru 11/30/2009](#)

End Date: 11/30/2009 *If Different from Begin Date*

County: *All

Event Type: *All

- *All
- Drought
- Dust Storm
- Flood
- Fog
- Funnel Cloud
- Hail
- Hurricane & Tropical Storm**
- Lightning
- Ocean & Lake Surf
- Precipitation
- Snow & Ice
- Temperature Extremes
- Thunderstorm & High Wind
- Tornado
- Waterspout
- Wild & Forest Fire

Units: *All

Inches

Knots

Storm Events for Oklahoma

List Storms

Reset

New State

All States

Fujita Tornado Scale

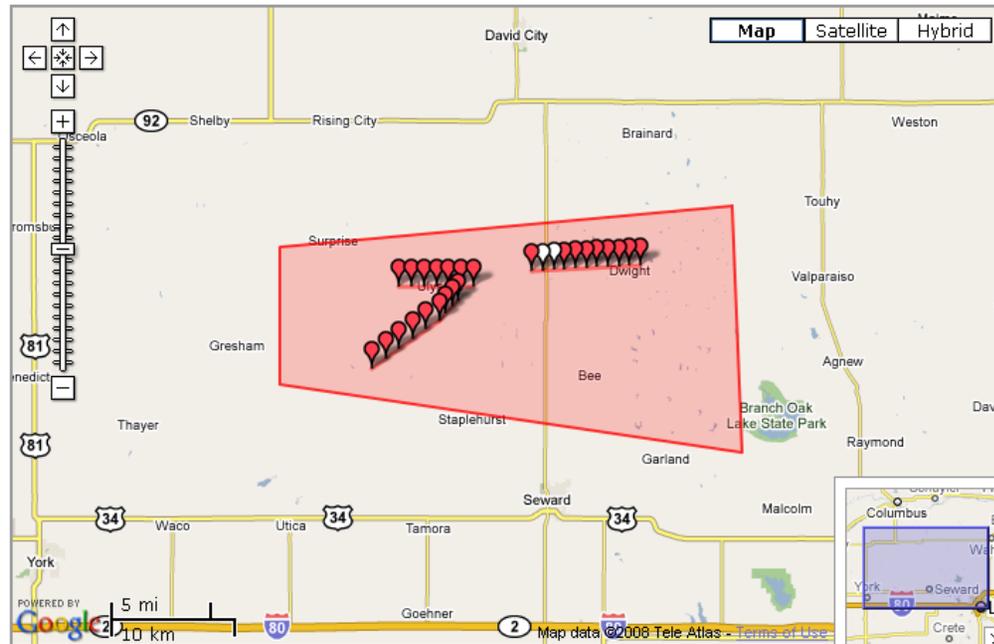
F0: 40-72 mph (35-62 kt)
 F1: 73-112 mph (63-97 kt)
 F2: 113-157 mph (98-136 kt)
 F3: 158-206 mph (137-179 kt)
 F4: 207-260 mph (180-226 kt)
 F5: 261-318 mph (227-276 kt)

[Reference Notes](#)

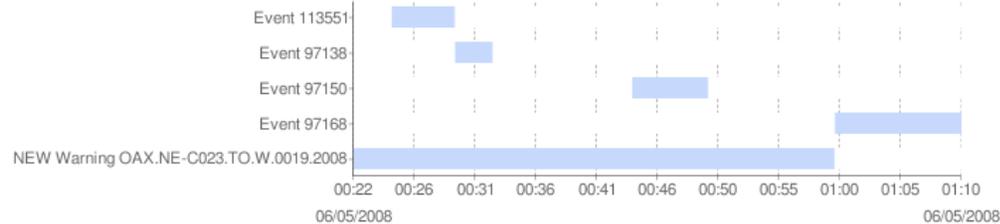
<http://www4.ncdc.noaa.gov/cgi-win/wwcgui.dll?wwEvent~Storms>



Warning Polygon And Event Mapping



Event And Warning Timeline



NWS Verification Program





What is Verification?

NWS's Performance Branch strives to ensure NWS employees are equipped with a suite of cutting edge tools and techniques for monitoring, measuring, and assessing performance of all warnings and forecasts.

Welcome, brentm! [Logout](#) | [Account](#) | [Admin](#)

PERFORMANCE MANAGEMENT

Performance Management >
Storm Data >
Data Archives >
Contacts >
Resources >
Forms

Performance Management Homepage

Welcome to the new home of NWS Performance Management! The goal of the Performance Branch is to make available the necessary tools and resources to help the NWS achieve its maximum forecast and warning performance. We hope you find this page a useful source of data and information. An account is required to access most of the site content. Please [login](#) or [register](#).

What's New in Performance Management?

Storm-based Special Marine Warning Verification - Now Available!
5/12/2008

The Performance Branch is pleased to announce the release of the Storm-based Special Marine Warning (SMW) Verification Stats on Demand program. This program will allow users to run detailed and summary reports showing performance when issuing warnings using the storm-based warning methodology.

Storm-based Severe Thunderstorm and Tornado Warning Verification - Now Available!
5/12/2008

The Performance Branch is pleased to announce the release of the Storm-based Tornado (TOR) and Severe Thunderstorm Warning (SVR) Verification Stats on Demand program. This program will allow users to run detailed and summary reports showing performance when issuing warnings using the storm-based warning methodology.

High Wind and Coastal Flood Warning Verification Overview
4/14/2008

The Performance Branch has recently developed a training module geared to explaining how high wind and coastal flood warnings will be verified. The presentation contains 20 slides, is approximately 16 minutes long, and is narrated by Brent MacAloney.

PFM Verification Data - Now Available in CSV Format!
4/14/2008

The Performance Branch is pleased to announce the release of a new interface that allows users to download temperature and probability of precipitation verification data in comma separated value (CSV) format. This will give users the opportunity to download the raw verification data to a database or spreadsheet of their choice. The benefit here is that users are no longer bound by the data being in HTML format and they can now analyze the data however they would like.

StormDat Images

This photo shows the long-lived Otton-Edmonson tornado early in its mature stage northwest of Halfway around 18:13 CST. Photo courtesy: Abby and Kevin Walter - via the Texas Tech University West Texas Mesonet.

[Refresh](#)

Newsletter

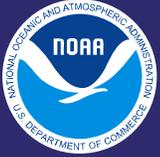
[Spring Edition Available NOW!](#)

WAS*IS
Weather & Safety * Integrated Studies
Coming from what WAS is what IS
The future of safety and weather studies

Training Info

Current opportunities

This is otherwise known as
VERIFICATION.

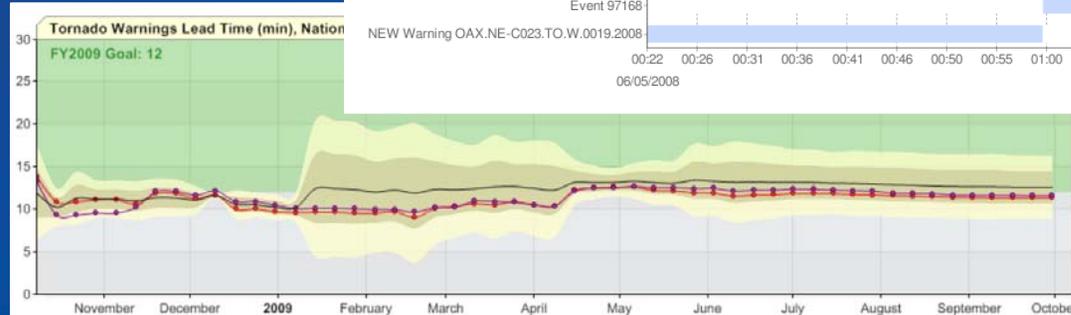
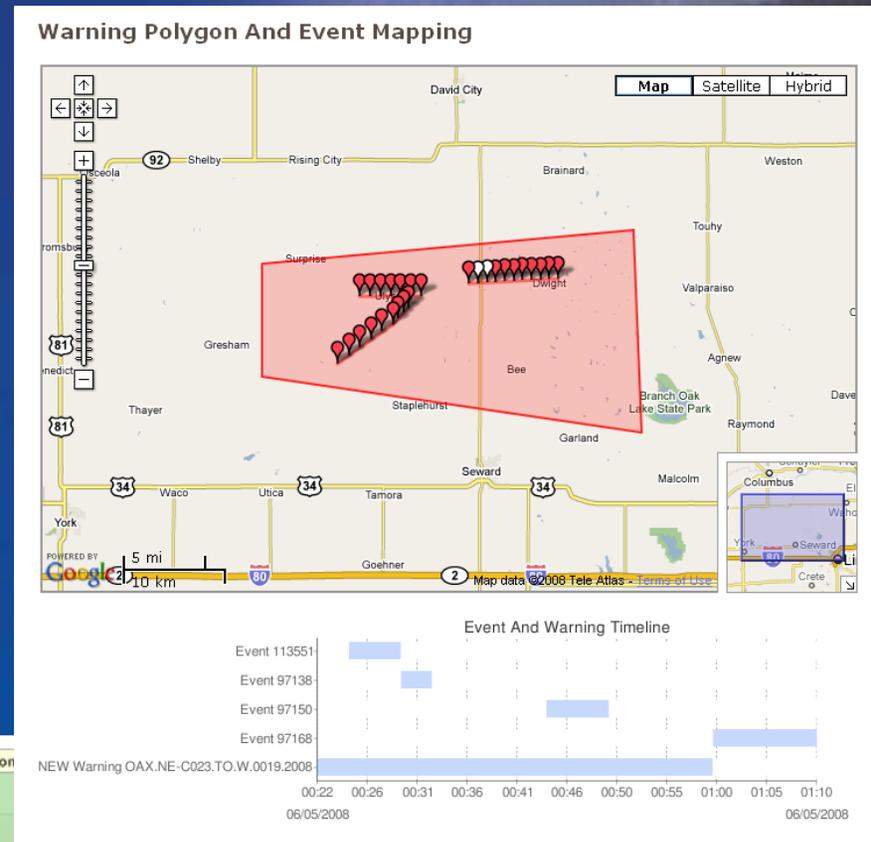


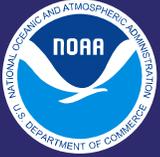
Types of Verification



Hazardous Events / Warnings Currently Verified

- Tornado
- Severe Thunderstorm
- Flash Flood
- Flood
- Winter Storm
- Blizzard
- High Wind
- Special Marine
- Coastal Flood



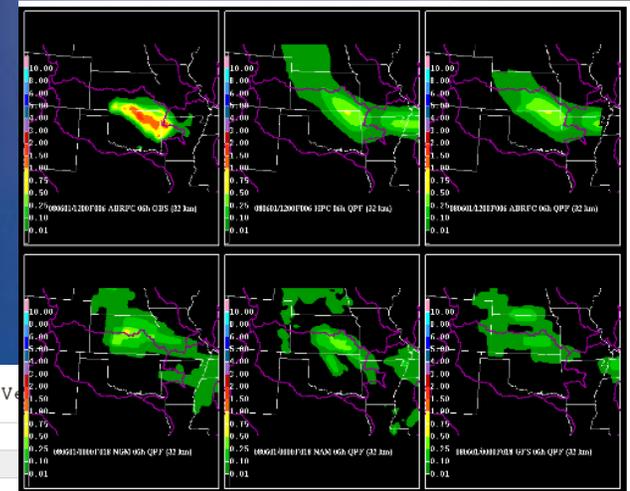


Types of Verification



Other Forecasts Currently Verified

- Temperature
- Probability of Precipitation
- Quantitative Precipitation
- Wind Speed/Direction/Gust
- Cloud Cover
- River Height
- Wave Height
- Ceiling
- Visibility



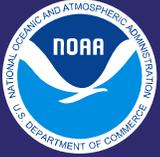
Gridded Marine V

Element/Forecast	Wind Speed / NDFD
Dates	09/01/2008 - 09/30/2008
Areas ?	Body Of Water - (C) East Coast
Cycles/Projections	All Cycles UTC / All Projections HR
Viewing Options	Toggle Format Toggle Legend

Hits (green)	Near Hits (olive)	Near Misses (yellow)	Misses (orange)	Total Misses (red)
--------------	-------------------	----------------------	-----------------	--------------------

Contingency Table (Observations vs Forecast)

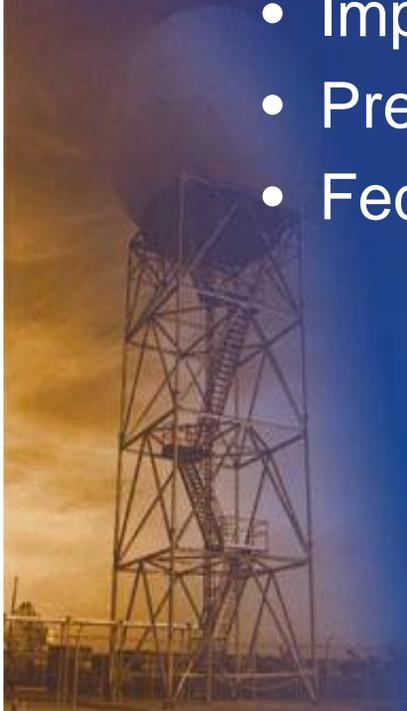
obs\FST	< 8	8 - 12	13 - 17	18 - 22	23 - 27	28 - 33	> 33	TOTAL
< 8	573,696	388,282	116,842	16,436	3,466	804	698	1,100,224
8 - 12	182,726	335,592	209,096	43,444	7,974	2,536	3,528	784,896
13 - 17	30,054	127,448	161,056	62,058	13,168	6,520	9,310	409,614
18 - 22	3,402	21,558	49,634	29,912	12,460	5,264	13,304	135,534
23 - 27	742	1,428	7,888	8,542	5,406	2,880	14,342	41,228
28 - 33	0	336	1,124	1,790	1,290	1,274	10,532	16,346
> 33	0	38	242	212	296	370	6,332	7,490
TOTAL	790,620	874,682	545,882	162,394	44,060	19,648	58,046	2,495,332



Uses of Verification

The NWS's performance and verification data has many uses, both within and outside the agency. Some of them are:

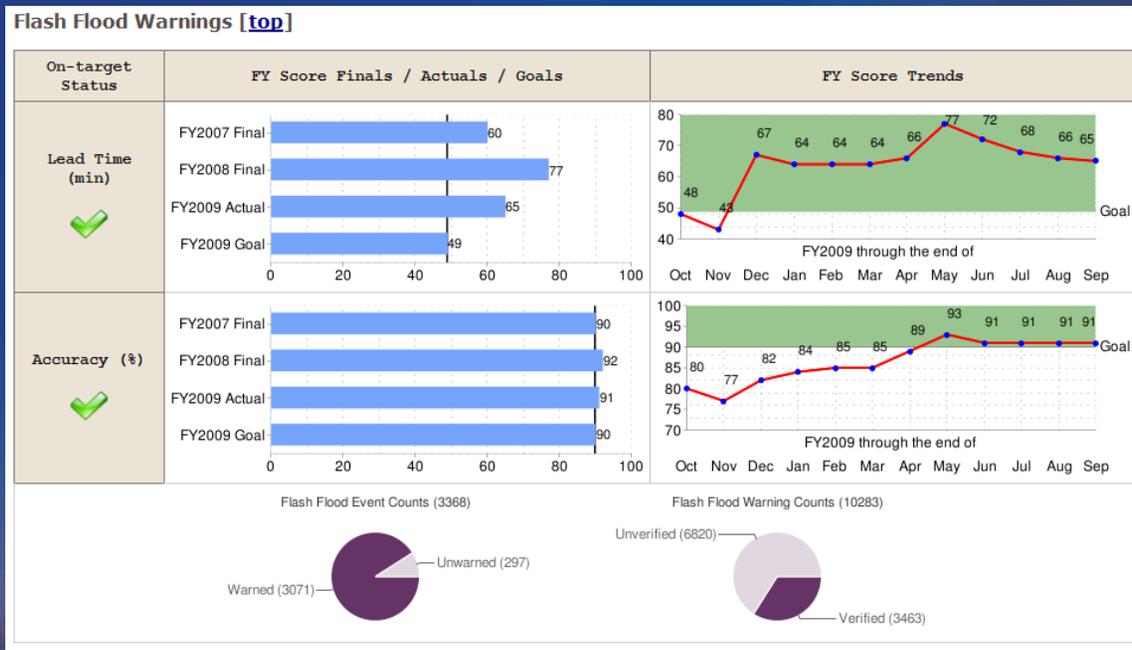
- Forecaster feedback
- Forecast office / regional performance tracking
- Impact research studies
- Preparedness planning
- Federal Government GPRA tracking





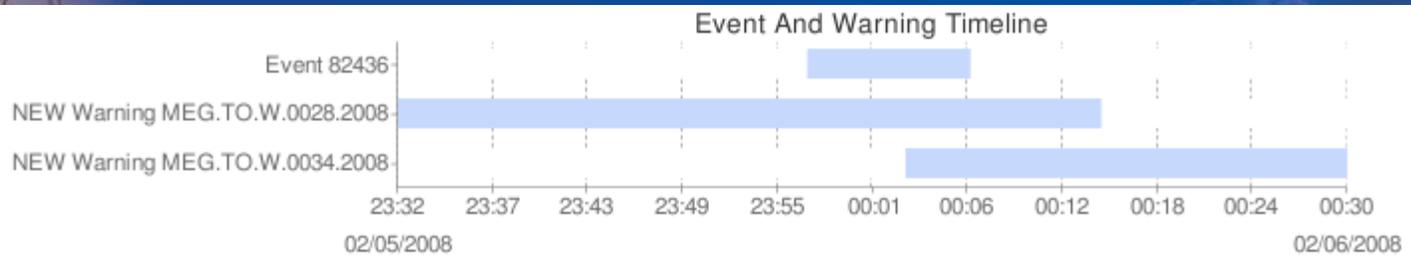
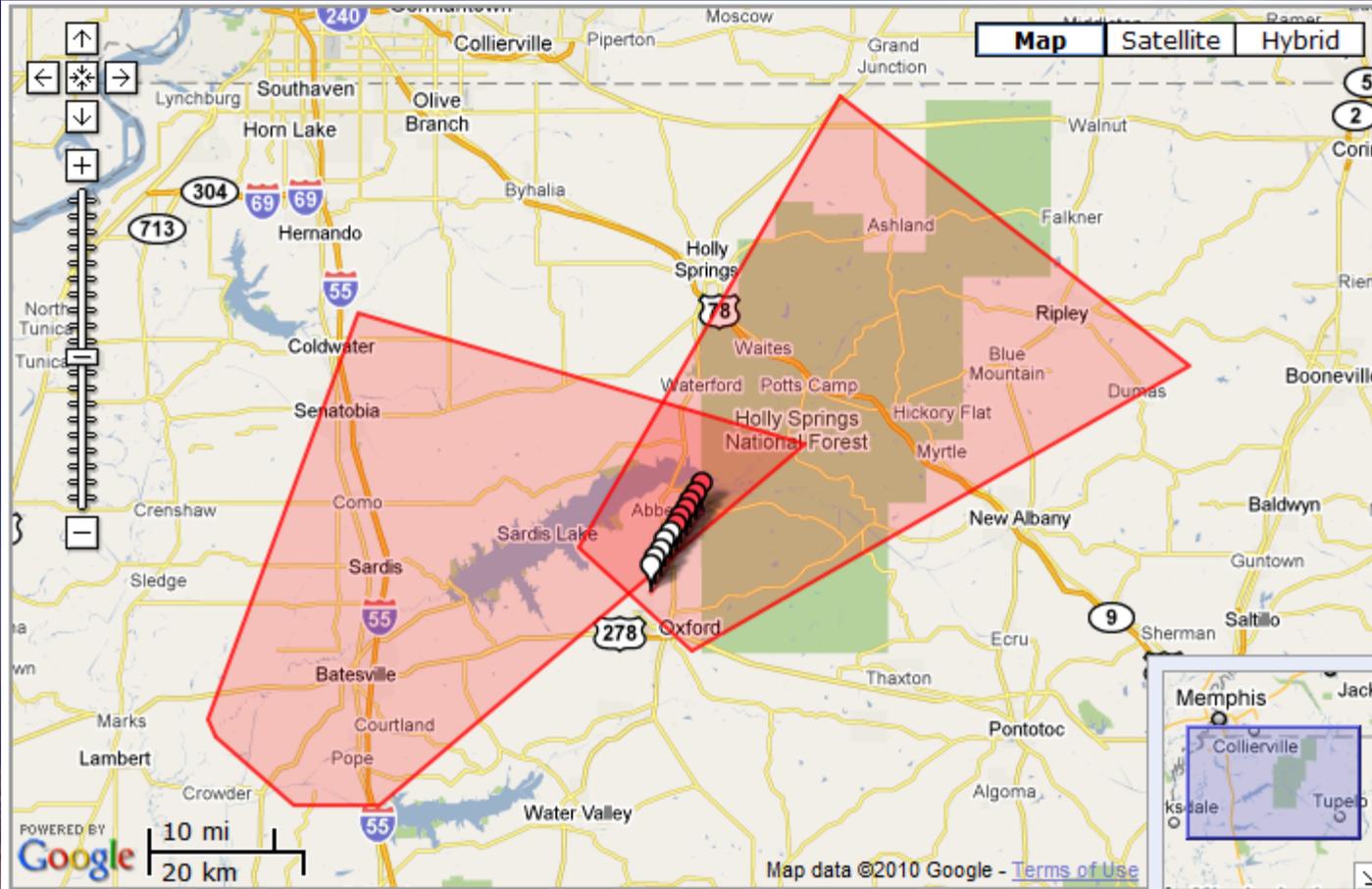
Uses of Verification

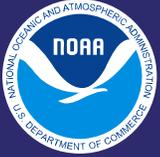
The Government Performance and Results Act (GPRA) was passed in 1993 and addressed a broad range of concerns about government accountability and performance. It required government executives to focus on defining missions, setting goals, measuring performance, and reporting accomplishments.



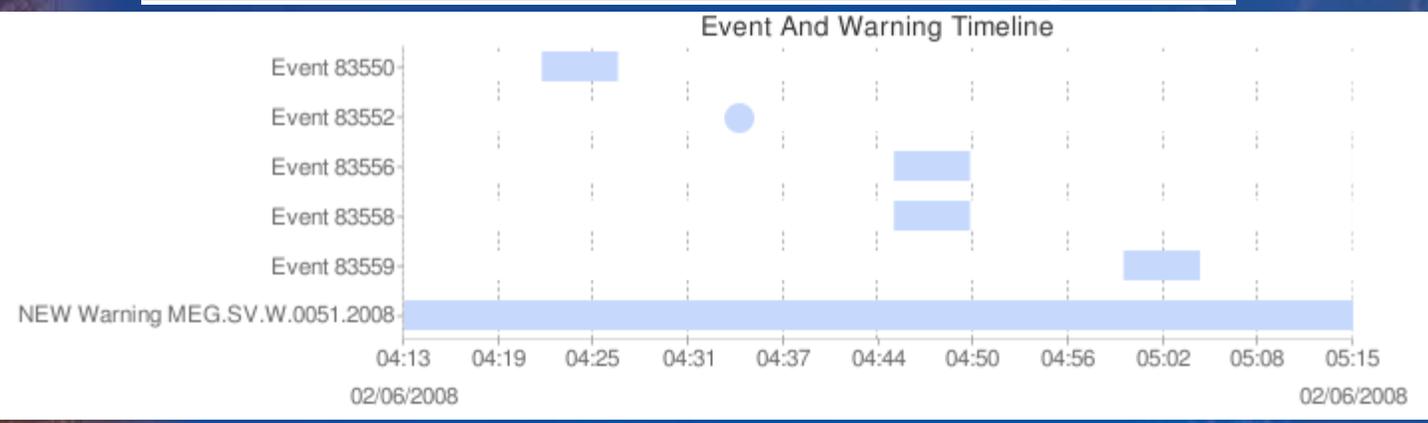
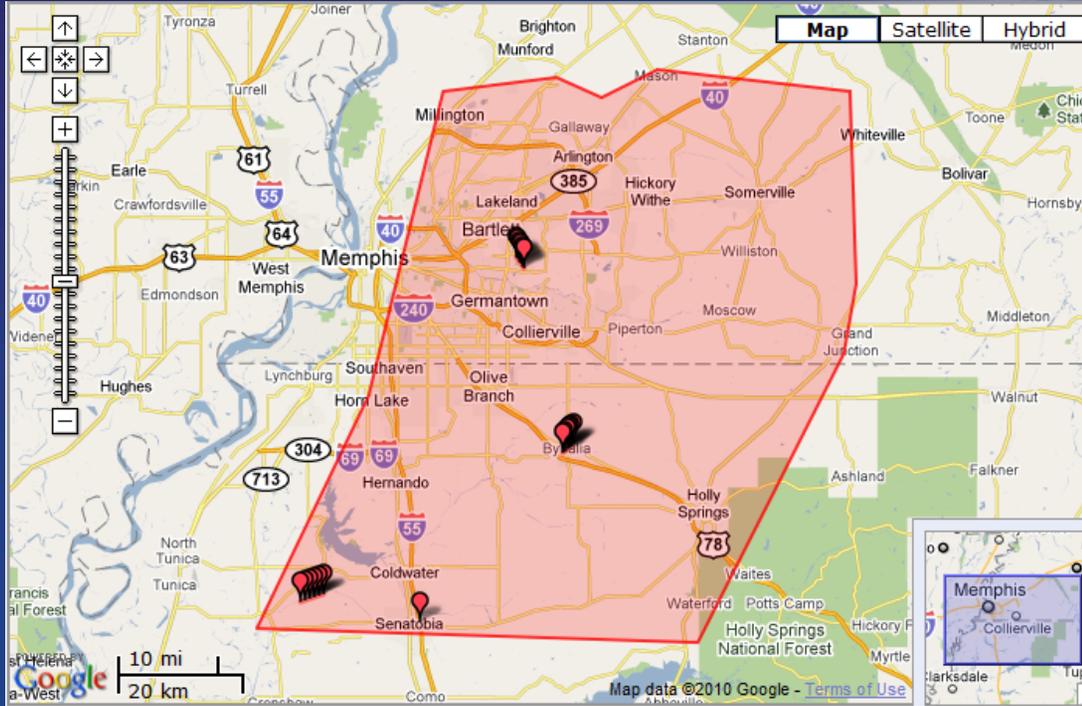


Tornado Verification



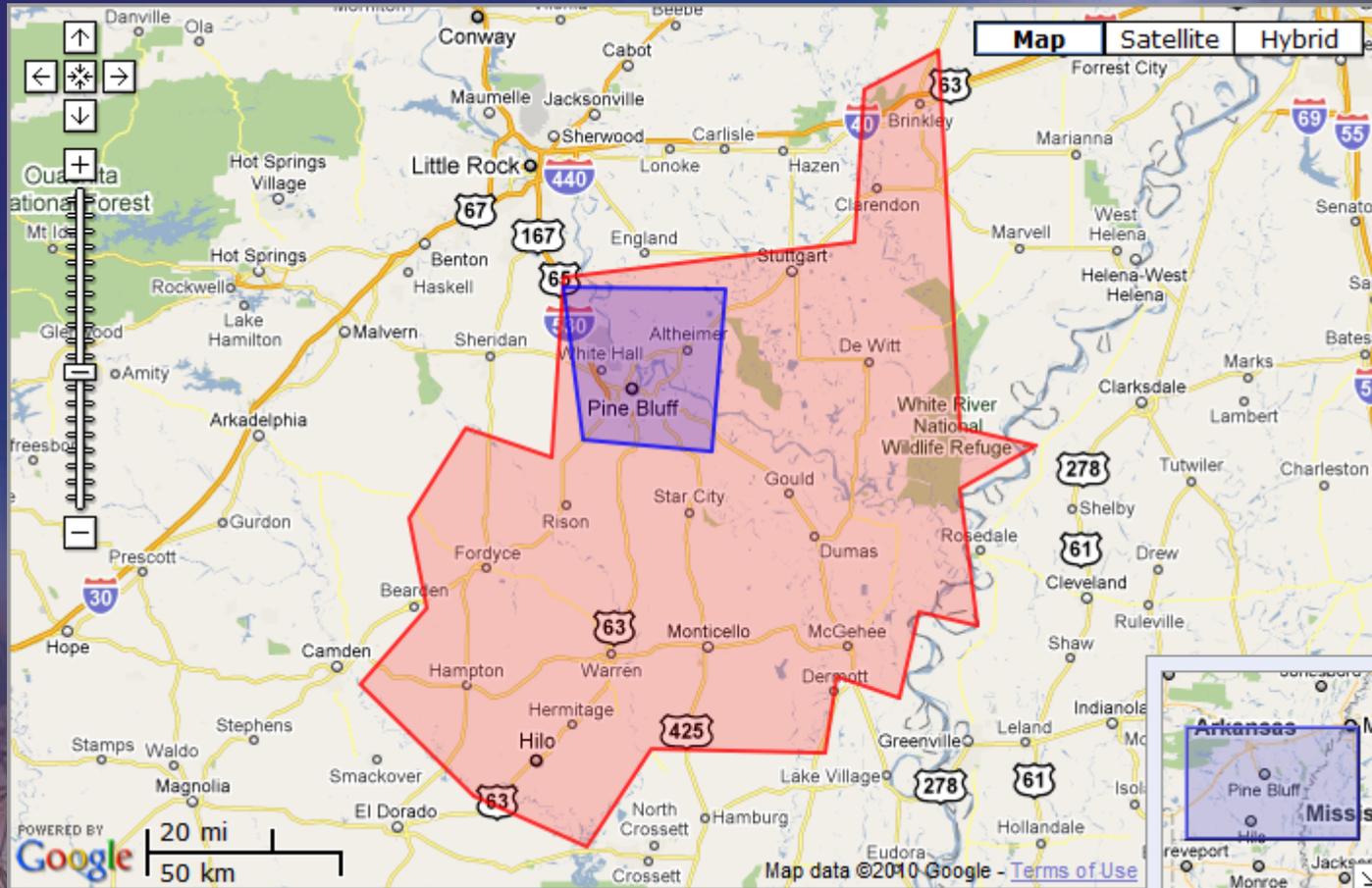


Severe Thunderstorm Verification





Flash Flood Verification



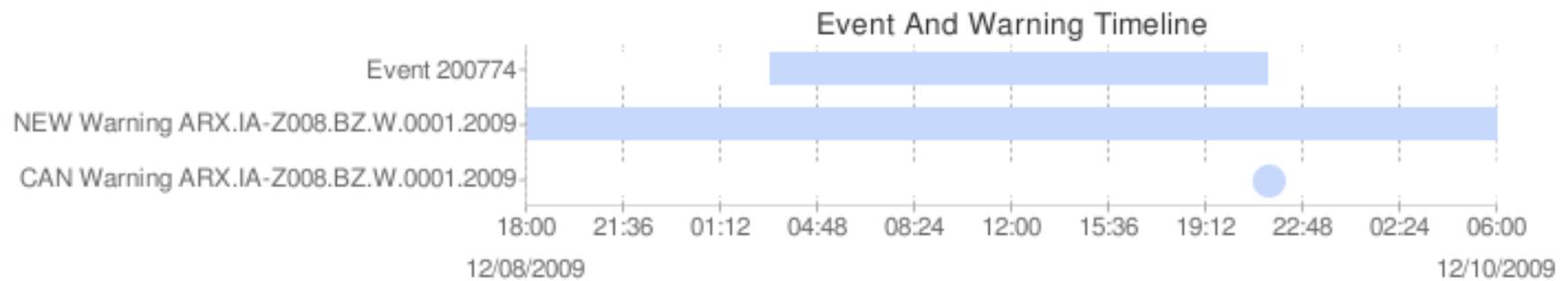


Winter Storm Verification

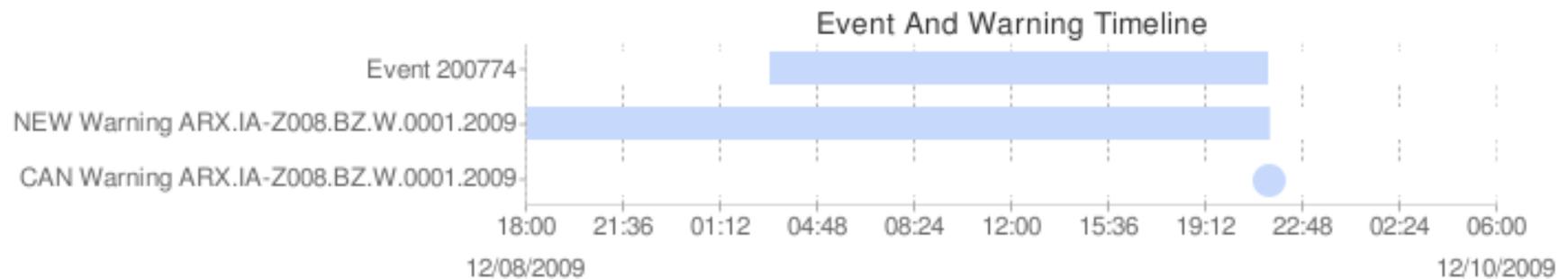


Winter Storm and High Wind Warning Verification

Original Timeline



Modified Timeline

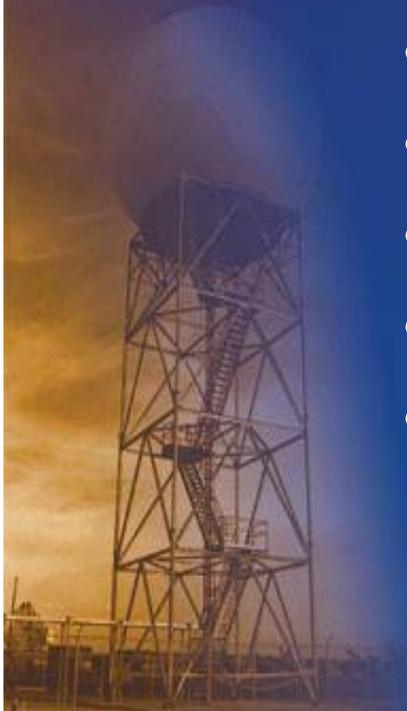




Typical Verification Scores

Below are some of the verification scores used to improve forecasts and warnings:

- **Probability of Detection**
- **False Alarm Ratio**
- **Critical Success Index**
- **Percent of Event Warned**
- **Lead Time**
- **Timing Error**
- **Bias**
- **Skill Score**





Future of Verification



The NWS will continue to strive to verify all warning and forecast products. Outside of this, the NWS is working to:

- **Make data output more GIS friendly**
- **Make data output more graphical**
- **Develop new verification skill scores**
 - **CHPI**

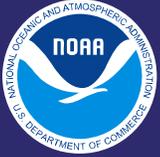




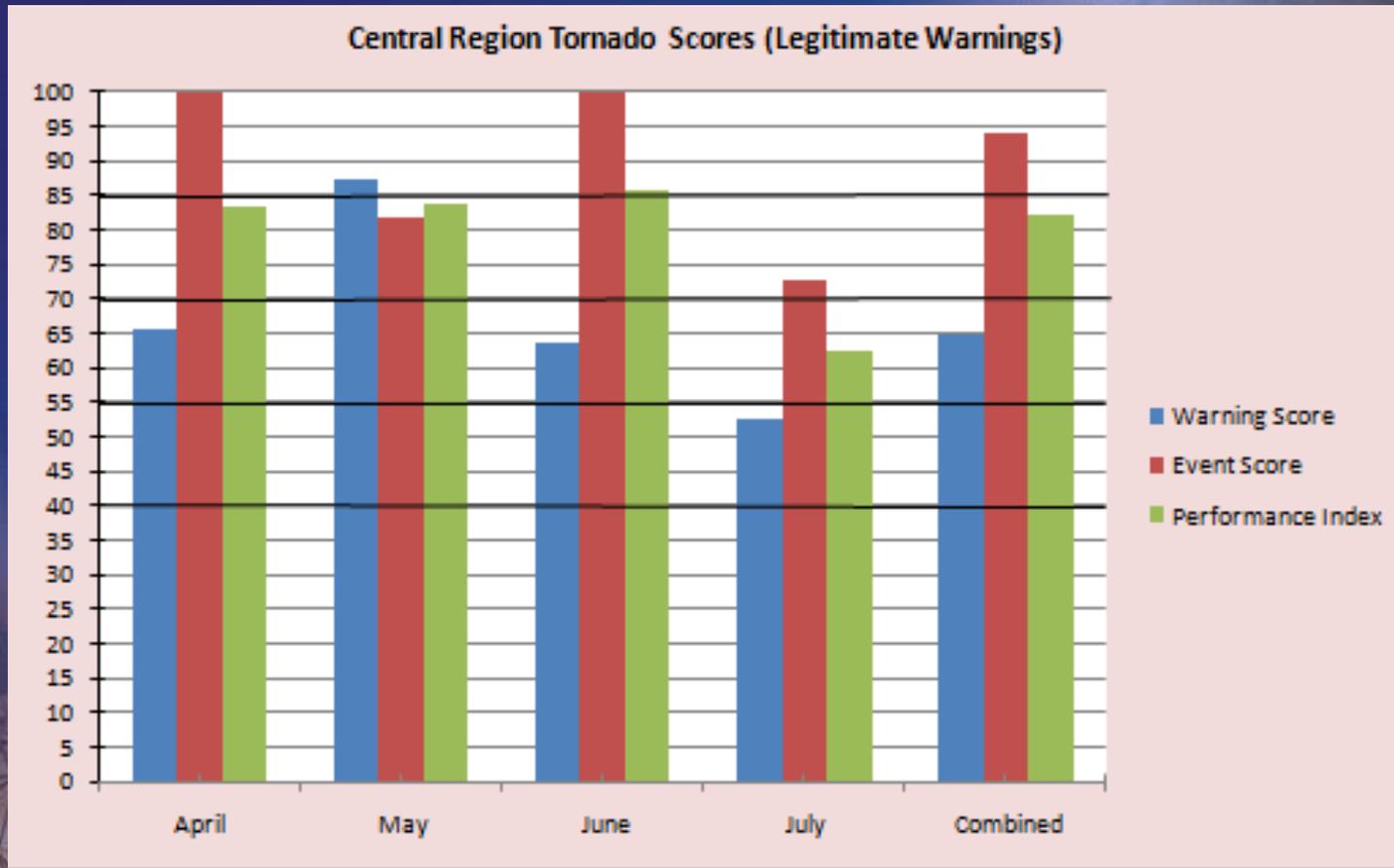
Coyne-Hayes Performance Index (CHPI)



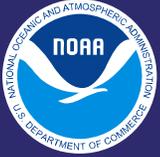
Central Region Office										
	April		May		June		July		Totals	
	Tornado	Severe	Tornado	Severe	Tornado	Severe	Tornado	Severe	Tornado	Severe
# Warnings	11	50	6	54	27	91	8	75	52	270
# Verified	6	23	5	36	14	52	3	45	28	156
# Not Verified	5	27	1	18	13	39	5	35	24	119
Warning Score	720	2948	524	4032	1712	6136	420	5030	3376	18146
Perfect Warning Score	1100	5000	600	5400	2700	9100	800	7500	5200	27000
Warning Performance Index	65.45	58.96	87.33	74.67	63.41	67.43	52.50	67.07	64.92	67.21
# Events	6	59	6	92	21	148	4	102	37	401
# Events Warned	6	47	5	84	21	136	3	83	35	354
# Events in Buffer	0	4	0	1	0	0	0	4	0	9
# Events Missed	0	8	1	7	0	12	1	11	2	38
Event Score	1200	9640	980	16760	4200	26960	580	16780	6960	70940
Perfect Event Score	1200	11800	1200	18400	4200	29600	800	20400	7400	80200
Event Performance Index	100.00	81.69	81.67	91.09	100.00	91.08	72.50	82.25	94.05	88.45
Performance Index Monthly	83.48	74.93	83.56	87.36	85.68	85.52	62.50	78.17		
Final Performance Index	Tornado		82.03		Severe		83.10		Combined 82.99	



Coyne-Hayes Performance Index (CHPI)



Scale for CHPI	
100 - 85	Excellent
84 - 70	Above Average
69 - 55	Average
54 - 40	Below Average
39 and Below	Poor



Contact Information

Thank you for your time.
Any questions?

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