# Nebraska Severe Weather Awareness Week
## March 24th - 28th, 2014

Across the country, the number of tornadoes reported in 2013 totaled 942. This number was down considerably compared to the last eight years which averaged 1478 tornadoes and was the lowest number of tornadoes in the 61-year annual Storm Prediction Center dataset. For Nebraska, the 2013 tornado season was below the 30-year average of 54 with 49 tornadoes. The severe weather season began March 19th with a brief landspout tornado that touched down near Shelton. In April, April 8th and April 9th were active wind and hail days. The severe weather took a break and a rare and historic early May snow was reported across parts of central and eastern Nebraska on the 1st and 2nd. The severe weather season really took off May 17th-19th and also the week of May 24th-30th. Typically, June is the peak month for tornadoes, however this year the peak of 23 tornadoes occurred in May, with only 9 in June. The 4 tornadoes reported in August was close to the long-term average of 6, however a second peak of tornadoes occurred in October with 9. Notably, the only EF4 for the year occurred on October 4th in Wayne.

As we move into spring 2014, it's been cold and dry so far, however the spring snows, rains, and severe weather will come as the temperatures warm and seasons transition. Now is the time to prepare for the inevitable severe weather, as each year brings it's own unique challenges.

**Weather-Ready Nation**
National Oceanic and Atmospheric Administration

The National Weather Service has declared **March 24th - 28th** as Severe Weather Awareness Week in Nebraska. This week, and really the whole month, gives us the opportunity to review our severe weather plan, brush up on severe weather terms and actually participate in the statewide Tornado Warning drill on **Wednesday, March 26th**. Now is the time to take this opportunity to prepare, even for just a few minutes. It could cost us all in the end.

All the National Weather Services offices serving Nebraska encourage you to be an active participant in this year's Severe Weather Awareness Week. Last year Wayne was hit by an EF4 tornado. Do you think the residents of that community won't be ready for the next tornado? You can bet they will be ready. Don't let disaster strike before you are ready. Use Severe Weather Awareness Week to make sure your area is "Weather-Ready" for whatever lies ahead.

Social media has grown tremendously over the last few years! Each National Weather Service office strives to have a strong presence on both Facebook and Twitter. If you would like to follow us on either, it is easy to do. Just go to the homepage of the office you want to follow and click on both logos in the upper left hand corner of the page.

Find us on Facebook

It is important to note that Facebook and Twitter are not the main channels for National Weather Service products, but a way to connect with our customers. We encourage you to post comments and photos of weather related events, and if you have questions, go ahead and ask away! Storm reports are more than welcome on our page, and fans can see other reports across the area as well.

**Tornado Safety Drill**

**Between**
**10 a.m. & 11 a.m. CDT**
**9 a.m. & 10 a.m. MDT**

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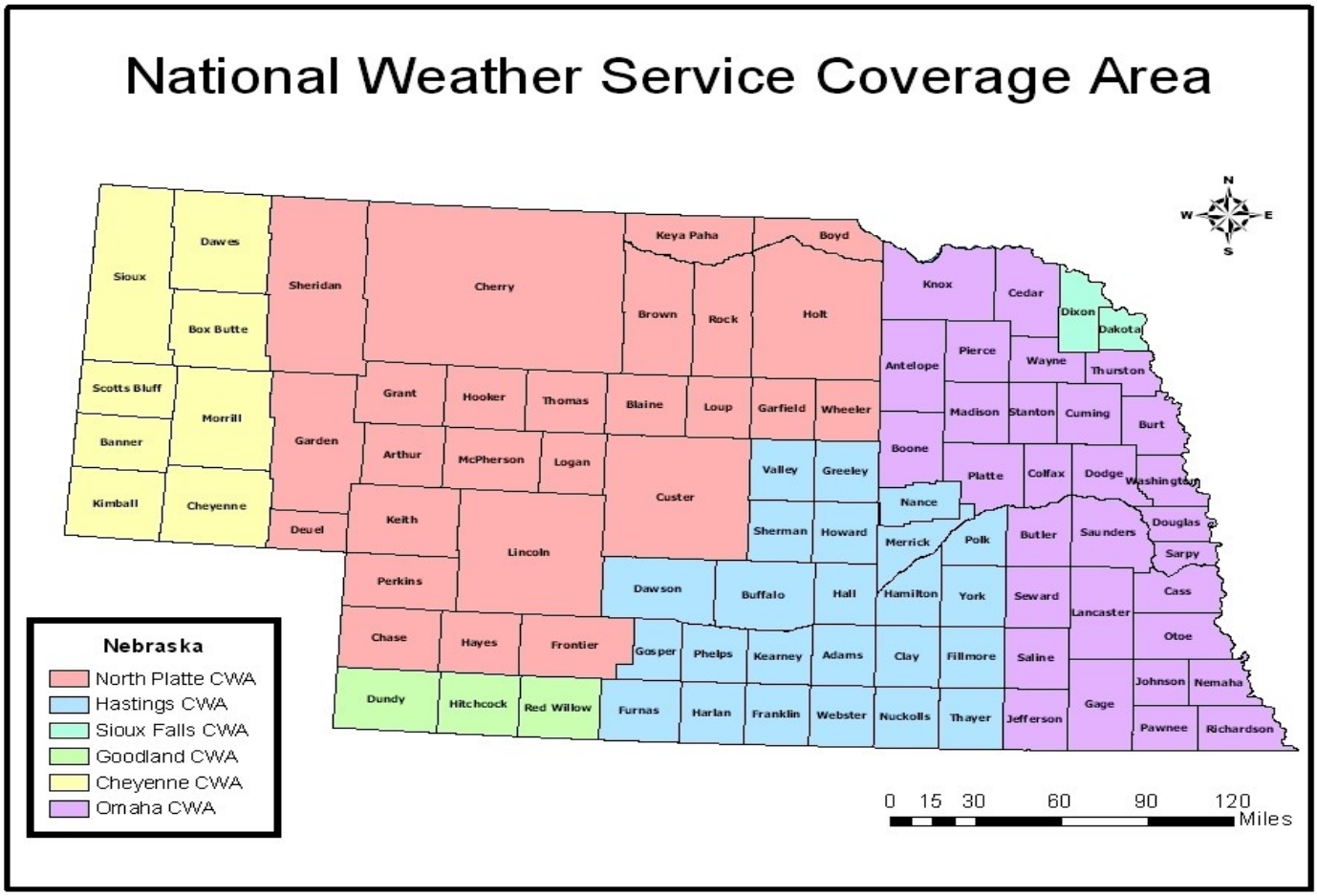
# National Weather Service Offices Serving Nebraska

*Severe Weather Awareness Week - March 24th - 28th*




| Far West | West and North Central | Far Southwest |
|---|---|---|
| National Weather Service<br>1301 Airport Parkway<br>Cheyenne, Wyoming 82001<br>(307) 772-2468<br><br>**http://www.weather.gov/cys** | National Weather Service<br>5250 E. Lee Bird Drive<br>North Platte, Nebraska 69101<br>(308) 532-4936<br><br>**http://www.weather.gov/lbf** | National Weather Service<br>920 Armory Road<br>Goodland, Kansas 67735<br>(785) 899-7119<br><br>**http://www.weather.gov/gld** |

| South Central | East | Far Northeast |
|---|---|---|
| National Weather Service<br>6365 North Osborne Drive West<br>Hastings, Nebraska 68901<br>(402) 462-4287<br><br>**http://www.weather.gov/gid** | National Weather Service<br>6707 North 288th Street<br>Valley, Nebraska 68064<br>(402) 359-5166<br><br>**http://www.weather.gov/oax** | National Weather Service<br>26 Weather Lane<br>Sioux Falls, South Dakota 57104<br>(605) 330-4247<br><br>**http://www.weather.gov/fsd** |

# 2013 Nebraska Tornado Facts

*Severe Weather Awareness Week - March 24th - 28th*

**Tornadoes**: **49** (7 above the 1950-2013 average of 42 & 5 below the 30 year average of 54)

**Deaths**: **0** **Injuries**: **17** (15 in Wayne and 2 in Macy - October 4th)

**Longest Track**: **19 miles** (8 SW Wayne to 6 NNW Wakefield on October 4th - Wayne to Dixon Counties)

**Greatest Width**: **1.38 miles** (8 SW Wayne to 6 NNW Wakefield on October 4th - Wayne to Dixon Counties)

**Strongest**: **EF4** (October 4th, Wayne in Wayne County)

**Most in a county**: **4** (Clay County)

**Days of occurrence (Days with 1 or more tornadoes)**: **17**

**Most in one day**: **10** (May 29th)

**Most active hour of the day**: **13** each from 3-4 p.m. & 4-5p.m. CST/ 2-3 p.m. & 3-4p.m. MST

**Most in one month**: **23** (May)

Wayne, Nebraska - EF4 WedgeTornado
October 4, 2013
Photo courtesy of Scott Blair.

**First tornado of the year** **March 19th** (EF0 - Near Shelton in Buffalo County)

**Last tornado of the year**: **October 4th** (EF0 - Willis - Dakota County)

## 2013 Monthly Tornado Totals

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 0 | 0 | 3 | 1 | 23 | 9 | 4 | 0 | 0 | 9 | 0 | 0 | 49 | 100% |
| EF5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| EF4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2% |
| EF3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2% |
| EF2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 5 | 10% |
| EF1 | 0 | 0 | 0 | 1 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 14% |
| EF0 | 0 | 0 | 3 | 0 | 17 | 7 | 4 | 0 | 0 | 4 | 0 | 0 | 35 | 72% |

## *2013 Season Peak…*

**Hail Size** - 3.00" (Teacup size) on May 26th - Westerville (Custer County)
June 16th - Logan (Logan County)

**Wind Gust** - Estimated: 110 mph on August 1st North Platte (Lincoln County)
Estimated: 100 mph on April 9th Bay State (Dodge County)
Estimated: 100 mph on June 21st Broken Bow (Custer County)
Estimated: 100 mph on July 24th North Loup (Valley County)

# Nebraska
# Tornado Facts

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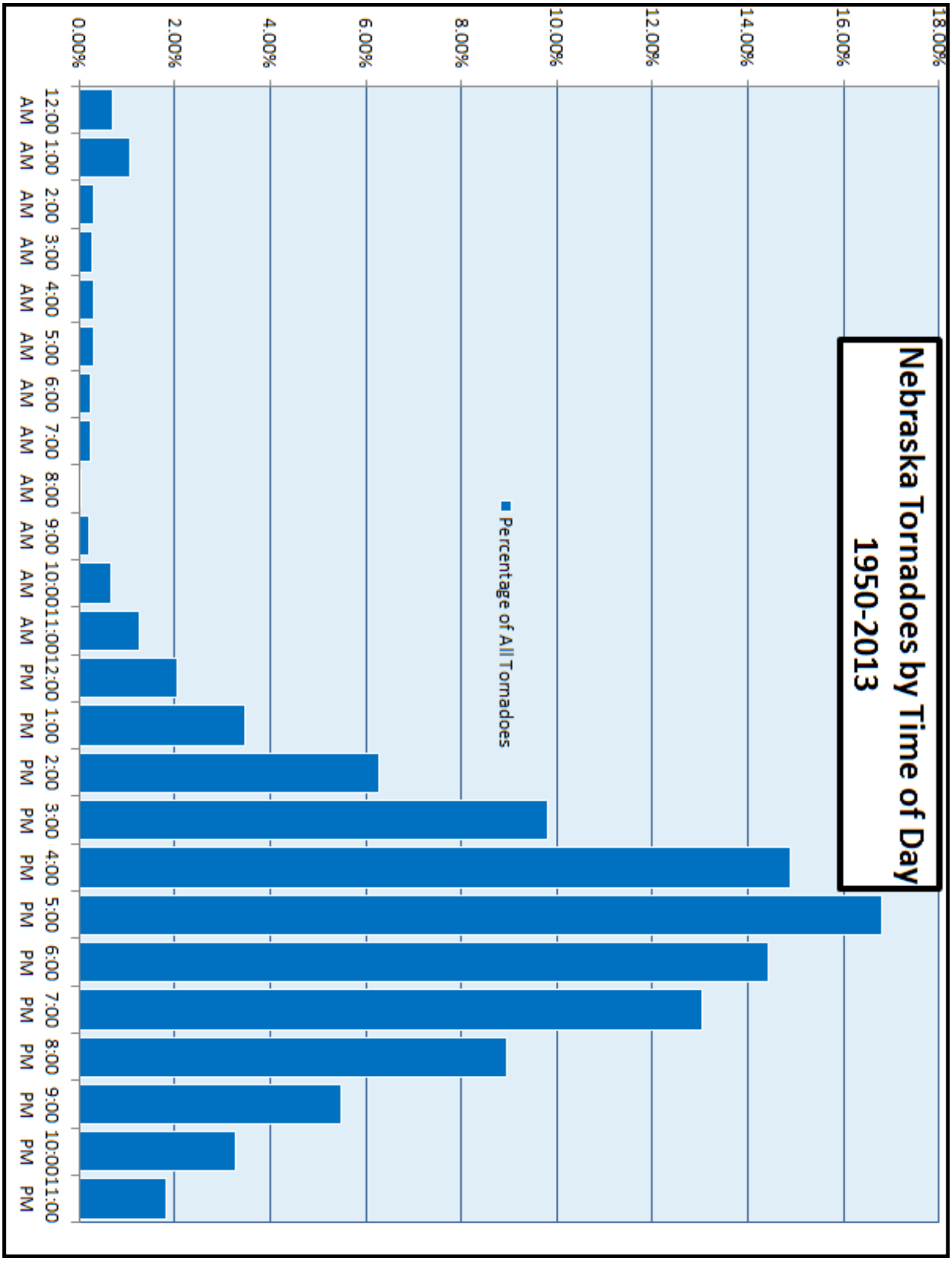

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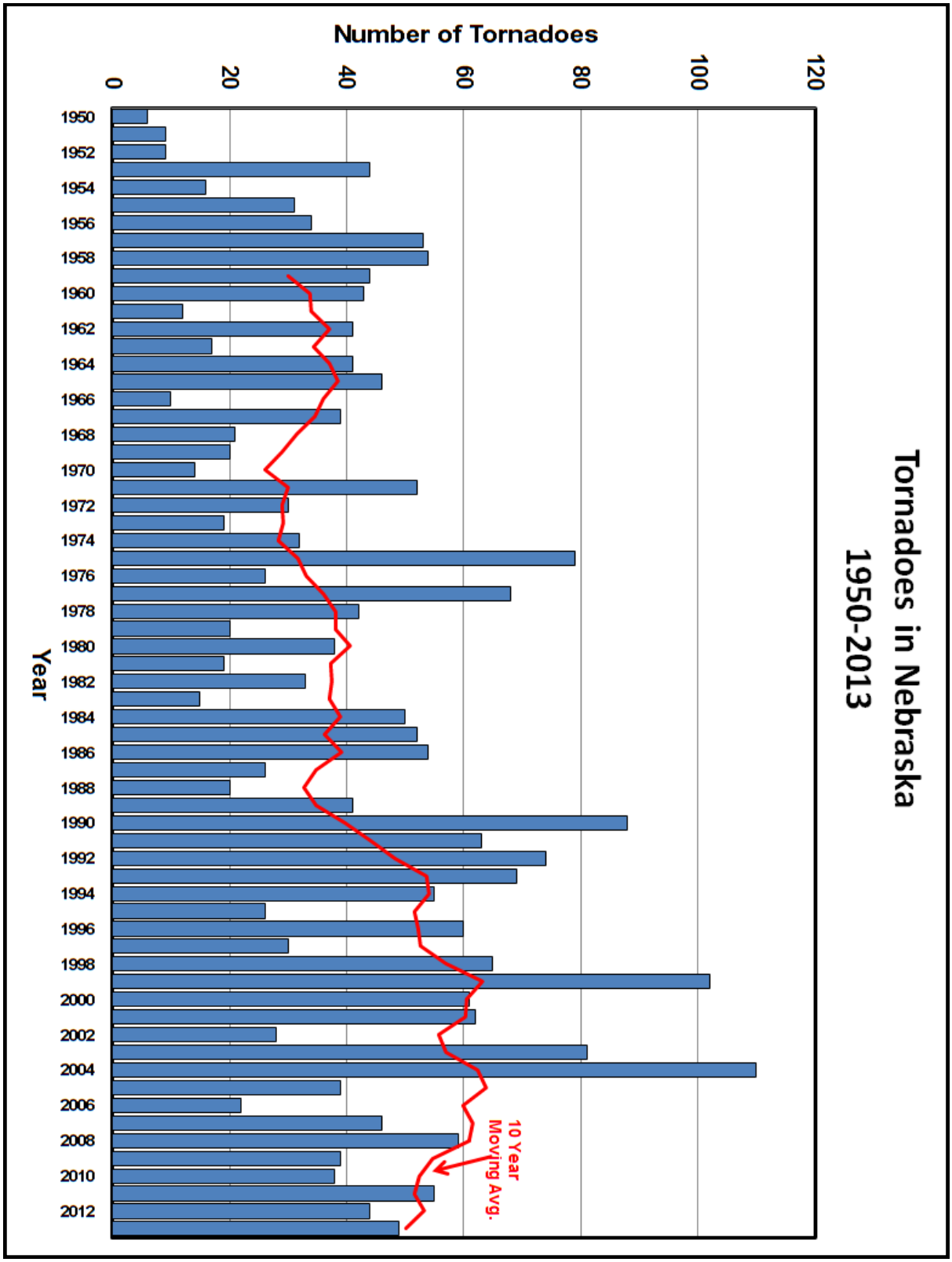

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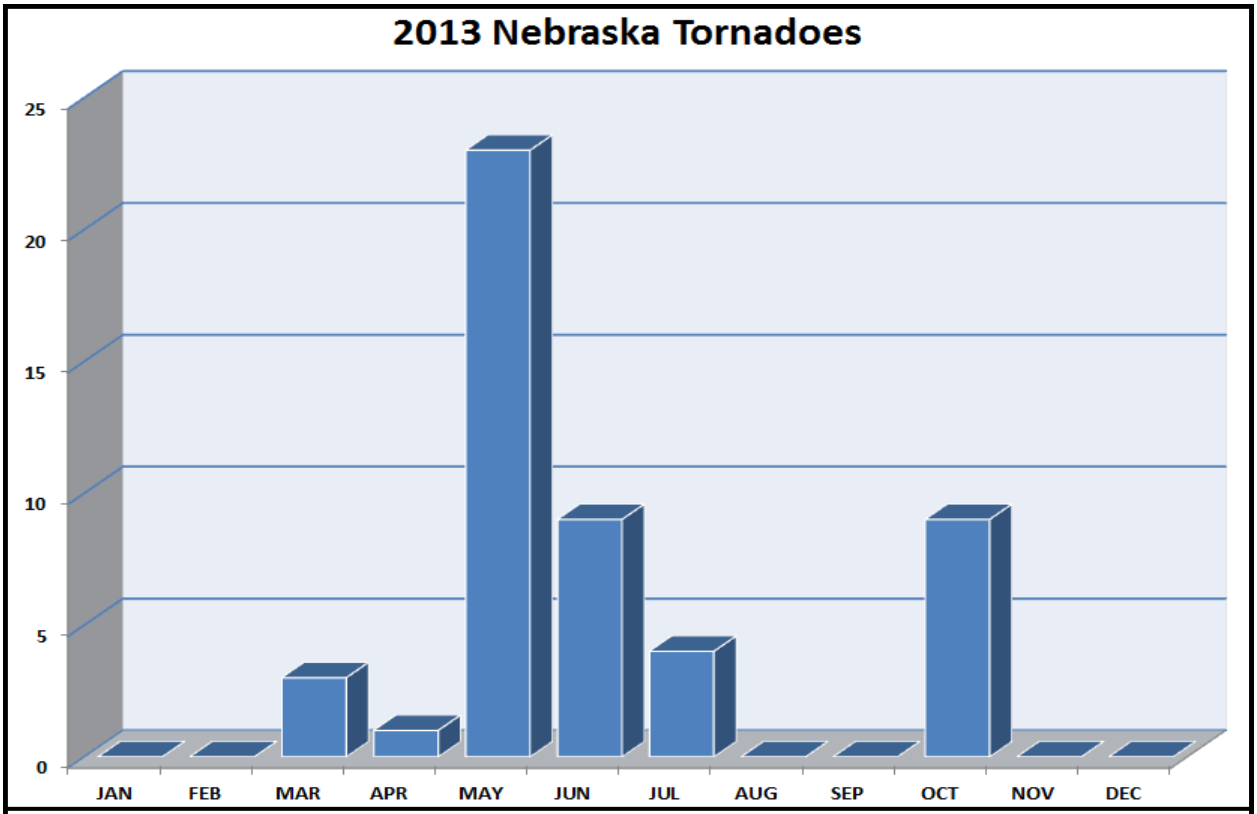


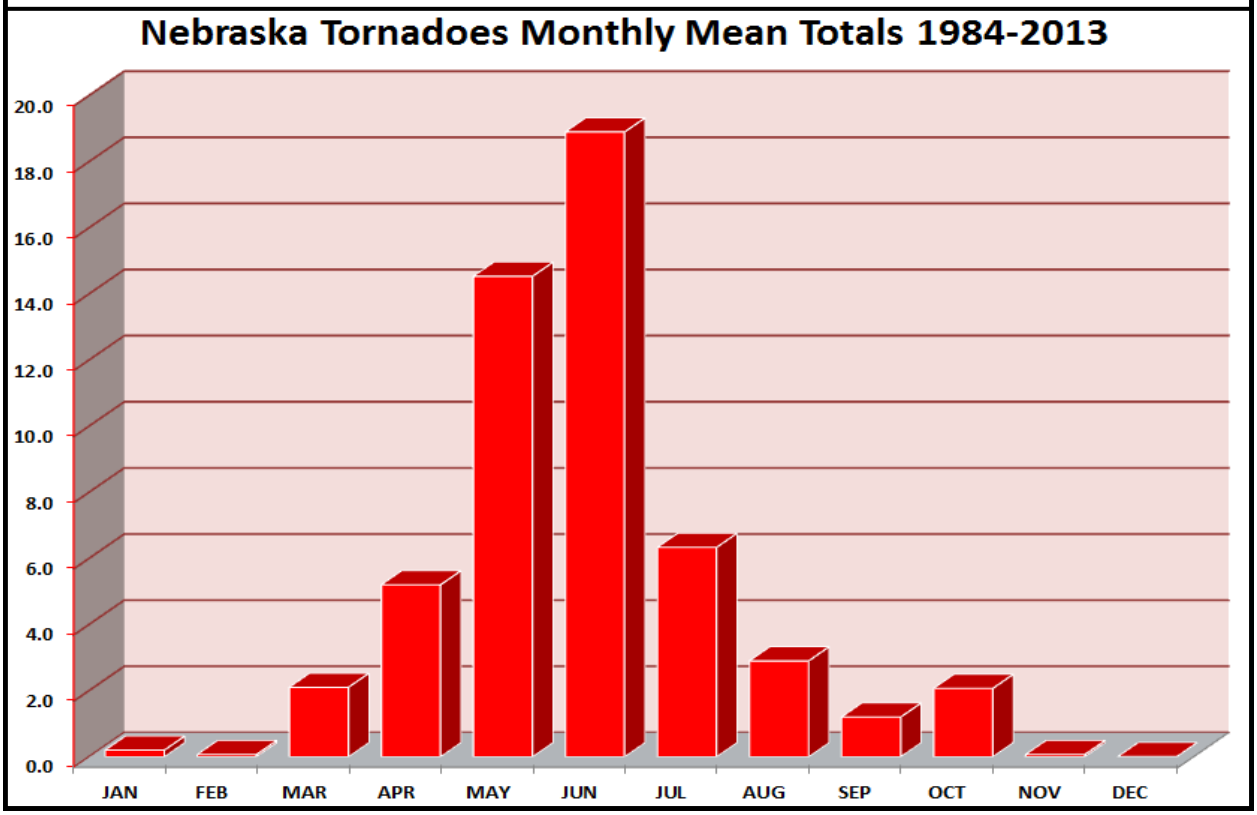

# Weather-Ready Nation

*http://www.nws.noaa.gov/com/weatherreadynation/*

NOAA's Weather-Ready Nation is about building community resilience in the face of increasing vulnerability to extreme weather and water events. Record-breaking snowfall, cold temperatures, extended drought, high heat, severe flooding, violent tornadoes, and massive hurricanes have all combined to reach the greatest number of multi-billion dollar weather disasters in the nation's history.

The devastating impacts of extreme events can be reduced through improved readiness, which is why the Weather-Ready Nation initiative is so important. Through operational initiatives, NOAA's National Weather Service is transforming its operations to help America respond. In the end, emergency managers, first responders, government officials, businesses and the public will be empowered to make fast, smart decisions to save lives and livelihoods.

The initiative includes improvements in a wide range of areas to support management of the nation's water supply, understanding of climate-related risks, economic productivity, healthy communities and ecosystems. Building on past successes in decision support services, the NWS is launching community-based pilot projects across the country, ranging in focus from emergency response to integrated environmental services, to enhance the nation's preparedness. NOAA's Office of Oceanic and Atmospheric Research and National Environmental Satellite, Data, and Information Service are moving new science and technology into weather service operations that will improve forecasts, increase lead time and ultimately increase weather-readiness.

Building a Weather-Ready Nation starts with these internal actions, but requires the action of a vast nationwide network of partners including other government agencies and emergency managers, researchers, the media, insurance industry, non-profits, the private sector, and more. Through a series of symposiums, the national dialog engages these partners in assessing why the nation is experiencing such extreme impacts. The goal of the dialog is to support the mission of the NWS by reducing risk and increasing community resilience for future extreme events. All of these actions fall under the umbrella of Weather-Ready Nation, and all support the same end goal: ***better information for better decisions.***

## A Few Frequently Asked Questions:

*Visit the website listed above for more information on how you can become Weather-Ready!*

**Who is involved in Weather-Ready Nation?**

Society's ability to prepare for natural disasters requires a societal response equal to the risk. Government cannot do this alone, which is why the NWS is leveraging its vast nationwide network of partners, and incorporating new partners who are beginning to share the vision of building a Weather-Ready Nation. Partners include other government agencies and emergency managers, researchers, the media, insurance industry, non-profits, the private sector and more.

**Why is America becoming increasingly vulnerable to weather events?**

The continued increase in the severity of impacts is attributable to societal changes represented in demographic trends, growing infrastructure threats, and an increased reliance on technology. U.S. population has almost doubled since 1954, which corresponds with higher property and infrastructure values. Trends such as urban sprawl and conversion of rural land to suburban landscapes increase the likelihood a tornado will impact densely populated areas.

The increased dependence on technology by both forecasters and the general public requires investments for regular updates, replacements and repairs.

More overlap in the U.S. economy means that a single weather event can have a significant effect on several industries. In fact, according to a study by the National Center for Atmospheric Research, weather can vary the economic output in the U.S. by $485 billion of the country's GDP annually. The study goes on to say that weather events affect "economic activity in every state and every sector."

# Severe Weather Terminology

*Severe Weather Awareness Week - March 24th - 28th*

**SEVERE THUNDERSTORM** - A thunderstorm is considered severe when it produces any of the following: Hail 1" (quarter size) or larger in diameter, winds which equal or exceed 58 MPH or a tornado.

**FUNNEL CLOUD** - A funnel shaped cloud, usually extending from a convective cloud, which is associated with a violently rotating column of air that is NOT in contact with the ground.

**TORNADO** - A violently rotating column of air that extends from a convective cloud and is in contact with the ground. The entire column of air associated with a tornado is not always visible. A tornado may only be visible once it has picked up enough dirt and debris.

**HAZARDOUS WEATHER OUTLOOK** - A product which is issued daily, highlighting any potential significant weather in the area for the next 7 days.

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**WATCH** - Issued when conditions are favorable for the development of severe weather in and close to the watch area. The size of the watch can vary depending on the weather situation and is usually issued for a duration of 4 to 8 hours. During the watch, people should review severe weather safety rules and be prepared to move to a place of safety if threatening weather approaches.

**WARNING** - Issued when severe weather is detected by radar or reported by storm spotters. Information in this warning will include the location of the storm, what areas will be affected, and the primary threat associated with the storm. People in the affected area should seek safe shelter immediately. Remember that severe thunderstorms can produce tornadoes with little or no advance warning. Warnings can be issued without a watch already in effect.

**SIGNIFICANT WEATHER ADVISORY or SPECIAL WEATHER STATEMENT** - Issued for "near" severe thunderstorms. Typically issued for storms with 3/4" (penny sized) hail and wind gusts near 50 MPH, but can also be issued for large amounts of small hail covering the ground. It is also used as a "heads up" for ongoing severe storms which may move into the area.

**SEVERE WEATHER STATEMENT** - A product issued which provides follow-up information on any severe weather warnings in effect and conditions which have occurred or are occurring. This information includes updated storm paths and any storm reports, such as hail size or damage, received from spotters.

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**FLASH FLOOD** - A rapid rise in water that occurs with little or no advanced warning, usually as the result of intense rainfall over a relatively small area in a short amount of time. Flash Floods can also be caused by dam or levee failures, ice jams, and topography.

**FLASH FLOOD WATCH** - Issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area. When a watch is issued, be aware of any potential flood hazards. Those in the affected area are urged to be ready to take quick action if a Flash Flood Warning is issued or flooding is observed.

**FLASH FLOOD WARNING** - Issued when flash flooding is in progress, imminent, or highly likely. Those in the affected area should evacuate immediately or move to higher ground if possible. Information in this warning will include the locations in the flood and any areas which may be impacted. Flash Flood Warnings can be issued without a Flash Flood Watch in effect.

# Lightning Safety

*http://www.lightningsafety.noaa.gov*

One dangerous aspect of weather that sometimes is not taken as seriously as others is lightning. Summer is the peak season for one of the nation's deadliest weather phenomena, but don't be fooled, lightning strikes happen at all times of the year. In the United States, an average of 53 people are killed each year by lightning. In 2012, 28 people died due to lightning. In 2013, 23 people were struck and killed, while hundreds of others were permanently injured. Of the victims who were killed by lightning in 2013:

- 91% were outside
- 74% were male
- 52% were between the ages of 20 - 39
- 30% were between the ages of 50 - 59
- 30% were in or near water
- 22% were near or under trees

**When Thunder Roars, Go Indoors!**

The reported number of injuries is likely far lower than the actual total because many people do not seek help or doctors do not record it as a lightning injury. People struck by lightning suffer from a variety of long-term, debilitating symptoms, including memory loss, attention deficits, sleep disorders, and numbness.

***Avoid getting caught in a dangerous situation!***
***If you can hear thunder, you are close enough to be struck by lightning!***

- Move into a sturdy building or an automobile with a metal top. The frame of the building or of a metal car body will allow the charge to be conducted away from you.
- Outdoor activities such as golfing and baseball can present a risk to those in attendance, as these take place on a fairway or ball field, both of which are wide open. Those attending rodeos or concerts in open arenas, sitting on metal bleachers or under a metal overhang, are also at risk.
- Get out of boats and away from water, as water is an electrical conductor. On the open water, you may become the tallest object and a prime target.
- When indoors, avoid using any corded and electrical appliances. Also stay away from pools, tubs, showers, or any other plumbing. Electricity can travel through wiring and plumbing, posing a risk to those in contact.
- If someone is struck by lightning, get medical help immediately. With proper treatment, including CPR if necessary, most lightning victims survive.

## ***Did you know…***

***Thunderstorms do not have to be large in size or even severe to create potentially fatal lightning strikes!***

As a thunderstorm grows, areas of rising and descending air cause a separation of positively and negatively charged particles within the storm. At the same time, oppositely charged particles are gathering on the ground below. The attraction between the particles in the cloud and at the ground quickly grows, and once the force is strong enough to overcome the air's resistance, lightning occurs.

# Flash Flood Safety

*http://www.floodsafety.noaa.gov*

On average, more people are killed by flooding than by any other single severe weather hazard, including tornadoes, lightning, and hurricanes. Most of these deaths occur at night, when it is more difficult to recognize flood dangers, and when people are trapped in vehicles. Do you and your family know what to do in case of a flood?

**Remember…**

- **DO NOT** drive onto a flooded roadway.
- **DO NOT** drive through flowing water.
- If you approach a roadway that is flooded, **TURN AROUND - DON'T DROWN**.
- Drive with extreme caution if roads are even just wet or it is raining. You can lose control of your vehicle if hydroplaning occurs, which is when a layer of water builds up between your tires and the road, causing there to be no direct contact between your vehicle and the road.

**If a Flash Flood Warning is issued for your area…**

- **If advised to evacuate, do so *immediately*!** Act quickly to save yourself, you may not have much time.
- Get out of areas that are subject to flooding and move to a safe area before access is cut off by flood waters. Low spots such as dips, canyons, and washes are not the places you want to be during flooding!
- **DO NOT** camp or park your vehicle along streams and washes, particularly during threatening conditions.
- **DO NOT** drive if not necessary. If driving is necessary, do not attempt to drive over a flooded road, as the depth of the water is not always obvious and the roadway may no longer be intact under the water. Never drive around a barricade, they are placed there for your protection! If your vehicle stalls, leave it immediately and move to higher ground before water sweeps you and your vehicle away.
- **DO NOT** try to walk, swim, or play in flood water. You may not be able to determine if there are holes or submerged debris, how quickly the water is flowing, and you may be swept away. If water is moving swiftly, as little as 6 inches of water can knock you off of your feet! There is also a danger of hazardous materials polluting the water. Also remember that water is an electrical conductor, if there are power lines down, there is a threat of electrocution.
- Always continue to monitor the situation through the National Weather Service website, your NOAA Weather Radio All-Hazards, or favorite local television or radio stations.

***Why is "Turn Around - Don't Drown" so important?***

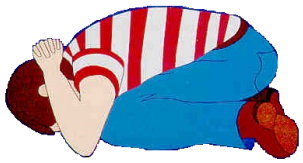
On average, more deaths occur due to flooding than from any other severe weather related hazard. The main reason is people underestimate the force and power of water. More than half of all flood related deaths result from vehicles being swept downstream. Of these, many are preventable.

# Tornado Safety

*Severe Weather Awareness Week - March 24th - 28th*

Tornadoes can happen at any time of the year, and at any time during the day or night. Though more common in the afternoon and evening hours, tornadoes can happen and have been reported at 2 or 3 o'clock in the morning! Many people think a tornado is always visible, but there are times in storms which have high amounts of precipitation, it can be completely wrapped in rain, making it indistinguishable from surrounding clouds. Contrary to what some may believe, tornadoes can and do cross rivers, mountains, and big cities. For these reasons, it is very important to have a plan of action in case of a tornado.

**What should I do when a tornado is approaching or a warning has been issued?**



- **SEEK SHELTER *IMMEDIATELY!* Once in shelter, take the protection position.**

**Where do I go?**

- **Reinforced shelters** – A basement or underground shelter is the best option. Protect your head and eyes from deadly flying debris. If no basement is available, go to an interior area on the lowest floor, such as a bathroom or closet. If possible get under something sturdy like a bench or table. ***Always stay away from windows!***

**What should I do if I am located...**

- **Outdoors** – If you can drive away from the tornado, do so. On average, tornadoes move at 35 - 45 MPH, so driving away would be the first course of action.

  If you can't drive away from the tornado, as would be the case if you were driving directly toward the tornado on a divided highway or were stuck in slow moving traffic, abandon your vehicle and seek shelter in a nearby structure, such as a house or other well built structure.

  If no buildings are available and driving away is not an option: Stay in the car with the seat belt on. Put your head down below the windows, covering with your hands and a blanket if possible. If you can safely get noticeably lower than the level of the roadway, exit your car and lie in that area, covering your head with your hands. **NEVER** seek shelter under a bridge or overpass.

  The important thing to understand is that if you find yourself outside or in a car and you are unable to get to a safe shelter, you are at risk from a number of things outside your control, such as the strength and path of the tornado and debris from your surroundings. This is the case whether you stay in your car or seek shelter in a depression or ditch, both of which are considered last resort options that provide little protection. The safest place to be is always an underground shelter, basement or safe room.

- **In a Mobile Home** – Evacuate immediately! Mobile homes are particularly vulnerable to overturning and destruction from strong winds and tornadoes. Tie-downs generally will not protect a mobile home from tornadoes. If possible, leave the mobile home and go to a community shelter. If none is available, a ditch, culvert, or other low lying area may offer better protection. Have a plan of action prepared before a storm hits.

- **At School, Work, Shopping or in Other Buildings** – Stay indoors! Avoid cars, buses, or any other vehicle. Follow plans made in advance to go to a basement, an interior room or hallway on the lowest floor. Avoid the end of any hallway that opens to the outside as well as rooms with windows or outside walls. Stay out of auditoriums or any other structure with wide free-span roofs, as these types of structures are quite vulnerable to tornadic winds. Once you are in shelter, crouch down and cover your head!

# NOAA Weather Radio
# All Hazards

*http://www.weather.gov/nwr*

NOAA Weather Radio All Hazards (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NWR broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week.

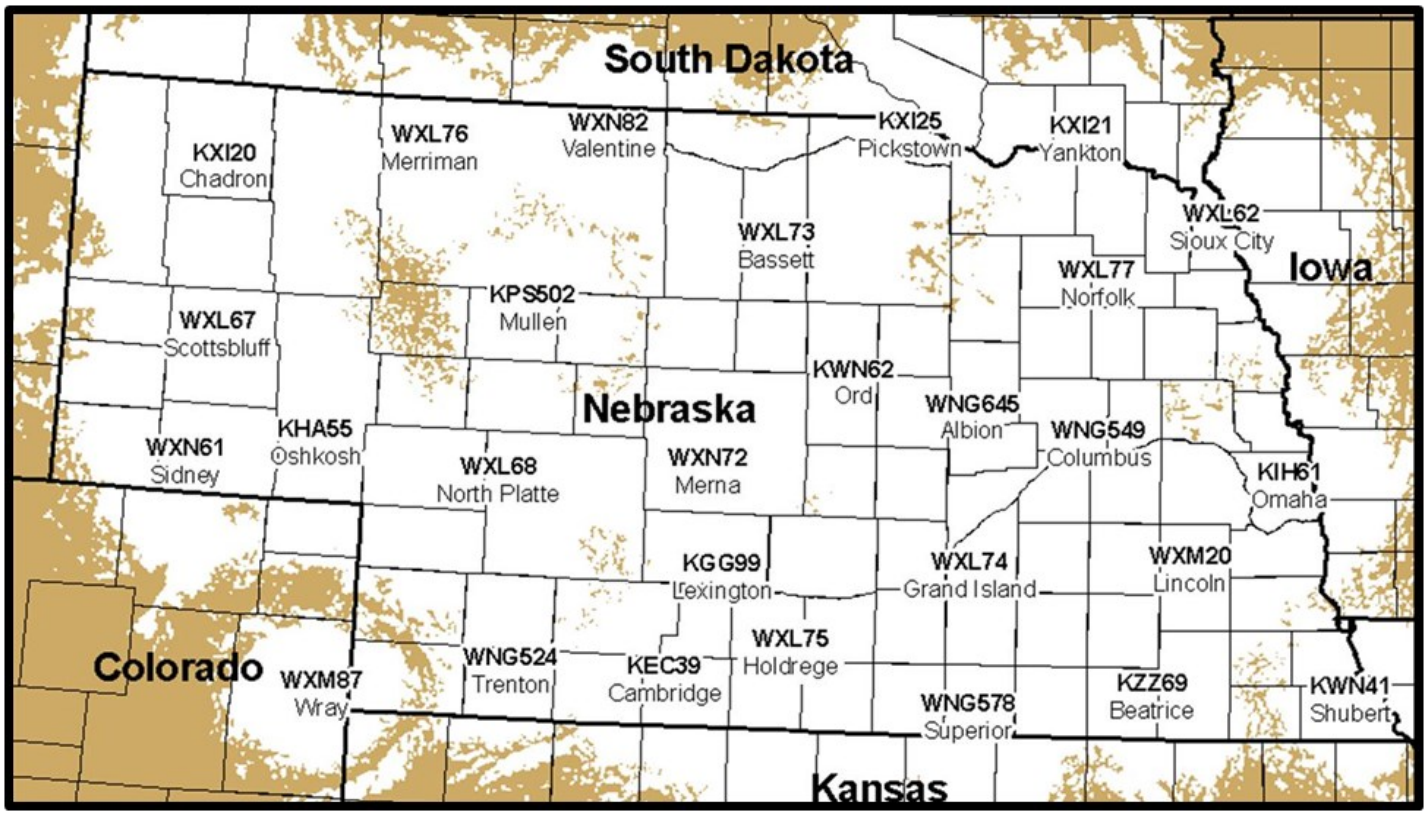
Working with the Federal Communication Commission's (FCC) Emergency Alert System, NWR is an "All Hazards" radio network, making it your single source for comprehensive weather and emergency information. In conjunction with Federal, State, and Local Emergency Managers and other public officials, NWR also broadcasts warning and post-event information for all types of hazards, including natural (such as tornadoes or floods), environmental (such as chemical releases or oil spills), and public safety (such as AMBER alerts or 911 Telephone outages).

Known as the "Voice of NOAA's National Weather Service," NWR is provided as a public service by the National Oceanic and Atmospheric Administration (NOAA). NWR includes 1000 transmitters, covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. NWR requires a special radio receiver or scanner capable of picking up the signal. Broadcasts are found in the VHF public service band at these seven frequencies (MHz):

| | | | | | | |
|---|---|---|---|---|---|---|
| 162.400 | 162.425 | 162.450 | 162.475 | 162.500 | 162.525 | 162.550 |

Coverage information and SAME Codes for every county in Nebraska can be found at:

***http://www.weather.gov/nwr/Maps/PHP/nebraska.php***



# 2013 Nebraska Severe Weather Summary

*http://www.weather.gov/cys*

## Nebraska Panhandle - NWS Cheyenne, WY

The spring and summer of 2013 saw considerably more active severe thunderstorm activity across the Nebraska Panhandle than was observed in 2012, which was one of the least active seasons on record. A relatively moist pattern in part aided the increased activity, with the season turning out closer to an average season, if not a little above average.

The season started on **April 21st** when an unusual late night thunderstorm produced some large hail west-northwest of Hemingford in Box Butte County. That was the only severe report received for the Nebraska Panhandle in April.

Activity picked up in May with 6 days seeing severe storms that month. The first tornado of the 2013 season was reported north of Crawford on **May 17th**. A more significant outbreak of severe weather occurred on May 27th when several tornadoes were reported over parts of Kimball, Sioux and Box Butte counties. The tornadoes remained over open country and produced little, if any, damage.

June saw 7 days with severe thunderstorms with the most active time of the season being **June 21st - 22nd** where many reports of large hail and several tornadoes were received. A house northwest of Harrisburg was damaged by a tornado on **June 22nd**, while hail up to baseball size fell east of Harrisburg on **June 21st**. The last tornado of the season was reported on **June 23rd**.

July recorded the most number of severe weather days with 9, but the overall number of events was less. The number of severe days fell to 4 in August, with the last report of the season being severe winds recorded to 78 mph in and around Sidney on **September 9th**, causing power outages and damage to trees and power lines. That was the only day for September.

All in all there were a total of 28 days with severe weather reported across the western Nebraska Panhandle in 2013. Of those, 7 days with tornadoes were reported with a total of about 14 tornadoes for the season. The most active period was **June 21st - 22nd** with numerous severe wind and hail reports along with about 5 tornadoes. The tornadoes were typically small and short-lived, causing only minor damage as they remained generally over open rangeland.

## Beat the Heat - Check the Backseat!

In 2013, **43 children died** from heat stroke from being left in cars. This is up from 2012 when 34 children died when they were left in cars.

One of the biggest weather related risks during the summer months is the possibility of a child dying in a vehicle from heat stroke. The inside of a car acts like a greenhouse, where the actual temperature inside the vehicle can reach 120ºF in minutes and approach 150ºF in as little as an hour.

Of the children that die, half were forgotten by a parent or other caregiver. Nearly 20% died when parents knowingly left their child in a vehicle. The rest died playing in an unattended vehicle.

For more information on heat safety go to:
http://www.nws.noaa.gov/om/heat/index/shtml

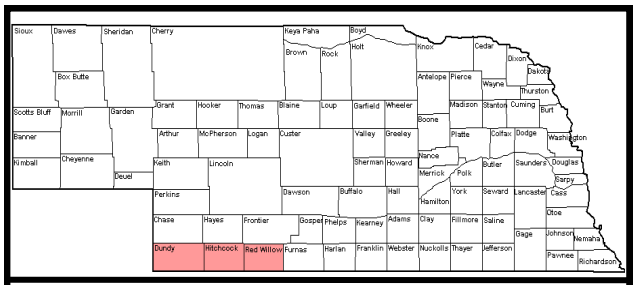
# 2013 Nebraska Severe Weather Summary

*http://www.weather.gov/gld*

## Far Southwestern Nebraska - NWS Goodland, KS

In southwest Nebraska, three weather events took center stage in 2013:

- Continued drought conditions
- An early season tornado damaging a farm operation east of Benkelman.
- Flash flooding and hail 18" deep west of Palisade in early August.



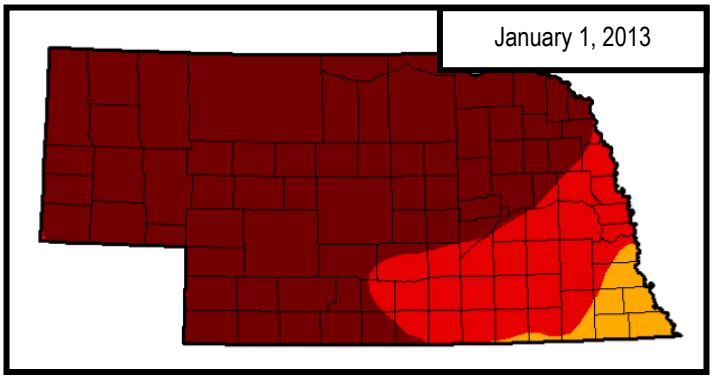
Nebraska Counties Served By WFO Goodland

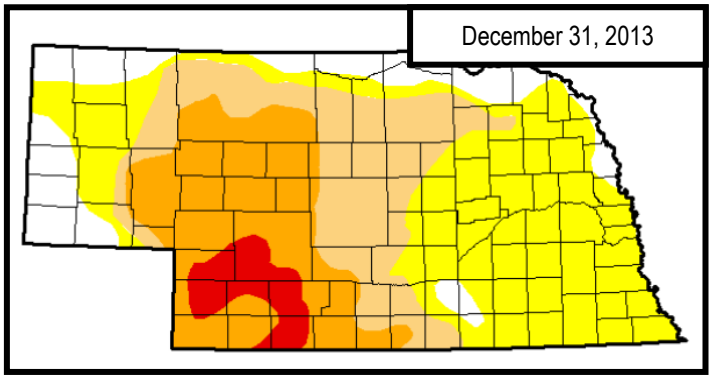
Several significant snow events occurred across extreme southwest Nebraska in February and March which seemed to indicate the year was off to a good start in terms of moisture. A late February snowstorm dropped 8-10 inches of snow across Hitchcock County while a foot of snow fell in McCook. This was followed in March by blizzard conditions on the **9th** and another round of snow totaling 8-9 inches on the **22nd**.

But, despite the spring snows and more frequent rain opportunities during the summer compared to the previous year, precipitation in 2013 fell short of normal once again. Stratton was closest to normal while McCook came in nearly ten inches short of normal supplies as shown in the table to the right.

| Station | 2013 Precip | Normal | Percent |
|---|---|---|---|
| Haigler | 12.76" | 18.65" | 68 |
| Benkelman | 15.65" | 19.75" | 79 |
| Stratton | 19.23" | 19.65" | 98 |
| Trenton Dam | 15.77" | 21.52" | 73 |
| Palisade | 17.52" | 21.52" | 81 |
| McCook | 12.83" | 22.53" | 57 |

The year began with all of southwest Nebraska rated as being in Exceptional (D4) Drought. There was improvement statewide over the course of the year, but southwest counties continued to fare the worst in the state in late December with a rating of Severe to Extreme (D2-D3) Drought.




*Intensity:*

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The thunderstorm season arrived in earnest on **April 8th** when a strong spring storm system brought a round of severe weather, including a fast-moving tornado after dark. A farming operation east of Benkelman suffered extensive damage to outbuildings and farm implements. Several livestock were either injured or killed.

**Far Southwestern Nebraska - NWS Goodland, KS Con't.**

Photo by NWS Storm Survey Team

On **August 5th**, a slow-moving thunderstorm moved southeast into Hitchcock County during the evening hours, producing severe weather, flash flooding and pea to penny sized hail which lasted 45 minutes. When the storm finally subsided, fields and gardens were flooded and hail had accumulated to a depth of 18 inches north of Stratton! The photos below are courtesy of Andrea Biberstein.

As it turns out, the storm listed above proved to be one of Mother Nature's last gasps of severe weather for southwest Nebraska in 2013. Strong winds produced damage in McCook **August 7th**, and penny-sized hail occurred in McCook on **September 27th**.

The fall months were quiet. The only weather story in October, November and December was the persistent drought which continued to plague the region.

# 2013 Nebraska Severe Weather Summary

*http://www.weather.gov/lbf*

## Western & North Central Nebraska - NWS North Platte, NE

In 2013, the season's first tornado was confirmed on **March 29th** and the last severe thunderstorm was on **October 14th**. Officially, there were six tornado days, with nine confirmed tornadoes; the greatest number occurred in July. However, the year is best remembered for the easing of the exceptional drought conditions, impacts from severe storms, and the record flooding on the South Platte and Platte rivers. The greatest impacts were from damaging winds and large hail. Numerous days saw large hail that destroyed crops and broke out windows. The largest hail observed was 3 inches in diameter, or the size of baseballs, that fell a half of a mile west of Westerville on **May 29th**.

| Tornado Day | # Tornadoes | County | Date |
|---|---|---|---|
| 1 | 2 | Lincoln | March 29th |
| 2 | 2 | Custer<br>Wheeler | May 29th |
| 3 | 1 | Cherry | June 16th |
| 4 | 1 | Sheridan | June 21st |
| 5 | 2 | Custer | July 9th |
| 6 | 1 | Sheridan | July 20th |

### Tornado Days - Less Than Normal

Typically, 11 tornado days occur. In 2013, there were six tornado days. On those days, the tornadoes mainly touched down in open fields with no damage produced. On **June 21st**, a tornado formed about 5 miles south southeast of Gordon in Sheridan County. The tornado touched down in a corn field and moved southeast, damaging crops, overturning a center irrigation pivot system, snapping six power poles and damaging a tree line before dissipating. All nine tornadoes confirmed were rated an EF-0 on the Enhanced Fujita Scale. Images of a few of the tornadoes are shown below.

Near Sutherland Reservoir on March 29th.
Photo courtesy of Stephanie Rodgers.

SE of Gordon on June 21st.
Photo courtesy of Neal Ziller.

14 S of Callaway on July 9th.
Photo courtesy of Clifford Badgley.

| Location | 2013 Rainfall |
|---|---|
| O'Neill | 30.23" |
| Butte | 29.78" |
| Gordon 6N | 26.42" |
| Broken Bow 2W | 24.75" |
| Valentine | 23.59" |
| North Platte | 21.77" |
| Ogallala | 20.25" |
| Oshkosh 8SW | 15.37" |
| Imperial | 13.26" |

### Feast or Famine - Heavy Rain Leads to Flash Flooding

Convective rains eased the exceptional drought in 2013. Heavy rainfall along with training of thunderstorms, led to flash flooding. In May, the highest rainfall totals were recorded as some communities received between 8 to 10 inches of rain, which produced flash flooding in parts of Custer, Keith and Lincoln counties. The flooding included washed out sand roads, a bridge on the Callaway Road in Custer County and flooded fields. The highest rainfall totals for 2013 were across north-central Nebraska and the least were in southwest. A few of the 2013 rainfall totals are provided in the table to the left.

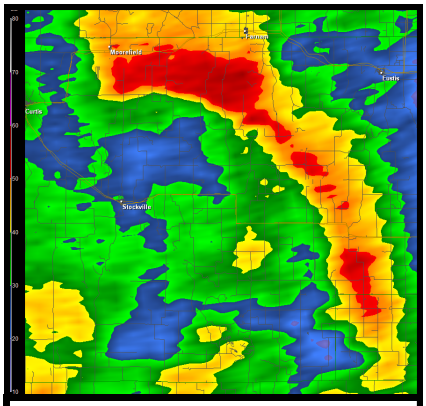
# 2013 Nebraska Severe Weather Summary

*http://www.weather.gov/lbf*

**Western & North Central Nebraska - NWS North Platte, NE Con't.**

**Thunderstorm Winds - Greater Impacts**

Several communities felt impacts from severe thunderstorms which produced straight-line winds or damaging downbursts. Events when winds reached 80 MPH or higher stood out. On **April 8th**, storms lit up the radar across southwest Nebraska. In Frontier County, one thunderstorm bowed out (radar image shown right) producing winds estimated at 80 miles per hour for nearly 30 minutes. The wind damage extended over 50 square miles, where 12 farmsteads saw damage. The damage included storage buildings that were destroyed and a few livestock killed. For several miles, the shear number of pivot irrigation systems overturned or mangled, was a significant loss.



KLNX Radar Image from April 8th.

On **May 29th**, straight-line winds to 90 MPH destroyed a large pole barn southwest of North Platte. The debris from the barn damaged a home and strong winds carried the tin from the roof up to a mile away.

In June, the hardest hit was Custer County. On **June 21st**, damaging winds were estimated up to 100 MPH. The storms produced damage from near Callaway to Comstock, with the greatest damage in Broken Bow. There, the strong winds downed power lines, produced extensive tree damage, blew several roofs off buildings and overturned several center pivot irrigations systems as well.

During July, one of the bigger impact days was **July 30th**, as storms moved from near Merriman southeast through the North Platte area. Hail up to 2 inches in diameter, or the size of limes, damaged over 300 cars in Valentine alone. In North Platte, Meteorologist Cory Martin captured on camera one massive supercell as it moved over the airport (shown right). This storm produced winds to 97 MPH just north of North Platte. The winds destroyed three metal buildings and downed large tree limbs.

On **August 1st**, severe thunderstorms developed, producing extensive tree damage in North Platte. A storm survey team reviewed the wind damage and estimated winds up to 110 mph.

**Record River Flooding**

From **September 18th - 23rd**, historic Colorado flood waters moved through the South Platte and Platte rivers. Dry river beds were quickly changed to raging currents as rises of up to a foot an hour were observed. Record river flooding was recorded at three river gages; shown right. The record river stage at North Platte broke the previous record set back on June 3, 1935.

| Gage Site | River | Record Stage |
|---|---|---|
| Roscoe | South Platte | 12.2 Feet |
| North Platte | South Platte | 14.4 Feet |
| Brady | Platte | 9.8 Feet |

# 2013 Nebraska Severe Weather Summary

*http://www.weather.gov/gid*

## South Central Nebraska - NWS Hastings, NE

The first tornado in Nebraska of 2013 occurred in south central Nebraska near Shelton. This EF-0 rated "landspout" type tornado was visible for only a few minutes, but several people in the area noted its translucent funnel. No damage was reported.

A few weeks later on **April 8th**, the first widespread severe weather event struck south central Nebraska with large hail, damaging winds and even some flooding. This roughly 7-hour event was focused northwest of an Alma to Osceola line. Some of the more extensive damage, coincident with a measured 76 mph wind gust, occurred on the University of Nebraska-Kearney campus. Several buildings were damaged, including the library where over 6,000 books sustained water damage. Trucks were blown over on I-80 and hail was reported to be the size of golf balls at several locations. Heavy rain in excess of three inches in Sherman and Howard counties resulted in some minor lowland flooding.

The calendar went deep into May before severe weather attempted to make a stranglehold on south central Nebraska. On **May 19th**, baseball size hail fell in Gibbon. There were several vehicles with broken windshields in the area. A weak EF1 tornado destroyed an empty mobile home near Wolbach in Greeley County. About a week later, three to five inches of rain fell across Sherman, Howard and Hall counties. That was followed by golf ball to baseball size hail in western Dawson County near Gothenburg on **May 25th**.

A large storage shed was totaled by a tornado in Edgar on May 27th.

When it comes to Memorial Day and severe weather across south central Nebraska, those two events often go hand-in-hand. On this **Memorial Day, May 27th**, an EF2 rated tornado caused extensive damage to the south half of Edgar in Clay County with wind damage throughout southern Clay County. The tornado itself was on the ground for eight minutes and estimated to be 250 yards wide as it snapped power poles and wreaked havoc on center irrigation pivots. Further east, wind gusts of 90 mph resulted in numerous reports of property and tree damage between Geneva and Hebron.

Tornadoes inflicted the area again on **May 29th**. A total of four tornadoes occurred, with the strongest, an EF-1 tornado tracking north of Clay Center in Clay County. Minor damage occurred on its 4 mile path, which included crossing U.S. Highway 6. There were 2 other tornadoes in the Clay County area that day and a brief tornado northwest of Elba in Howard County.

Jumping into June, the middle of the month was the most active time. On **June 14th**, severe thunderstorms toppled a semi-tracker trailer west of Overton in Dawson County. Heavy rain from the same storms caused minor flooding on the Thompson Creek near Riverton. A week later on **June 21st**, Valley County took the brunt of the storms. Measured wind gusts in excess of 60 mph blew through the county, knocking down power poles and taking down a machine shed northwest of Ord. The next day, severe weather was rampant across Dawson and Gosper counties. Of particular note, were the millions in dollars of crop damage in Gosper County due to golf ball size hail driven by 60-80 mph winds. Interestingly enough, severe weather occurred on **June 23th and 24th**, making it four straight nights with severe weather in south central Nebraska.

## South Central Nebraska - NWS Hastings, NE Con't.

Roof damage suffered at a home 4 miles east-southeast of Ord on Highway 11 on July 24th. Photos courtesy of Matt Geiser.

July was dotted with severe weather reports as the depths of summer started to take hold. 70 mph winds caused major tree damage at the Arapahoe Golf Course on **July 8th**. On **July 9th**, a brief EF-0 rated tornado occurred in Dawson County. This was another "landspout" type tornado which resulted in no damage. Later in the month, Valley County was again the main recipient for high winds. In fact, a two-story barn was heavily damaged by 80-90 mph winds near North Loup. Roof damage was reported near Ord. The combination of hail and wind resulted in millions of dollars of crop loss in Valley and Howard counties as the storms moved southeast.

It had been awhile since August brought a major severe weather event to the region, but in 2013 it started off with a "bang" on **August 1st**. Heavy rain, high winds and hail plowed across most of the region during the late afternoon and evening hours. In Clay County, literally thousands of acres of corn and soybeans were completely lost due the combination of large hail and wind. Soybean fields appeared as though they had been "mowed down" by the hail. Dollar losses easily reached the tens of millions of dollars. The town of Edgar was front and center again as 80+ mph winds tore through the town, this time across the north side. Huge trees fell and roofs were damaged. Some sort of property or crop damage occurred across nearly all of Clay County.

The year wrapped up with two somewhat unique events; River Flooding along the Platte River and flash flooding from heavy rain in early October. The most interesting thing about the Platte River flooding was the fact it didn't rain in south central Nebraska. The flooding actually resulted from an epic rainfall in the upper reaches of the Platte River Basin near Boulder and Estes Park, CO. Though it took some time, the flood waters eventually reached south central Nebraska and changed the Platte from a dry river bed to bank full and overflowing in spots. Most of the flooding was confined to areas upstream of Kearney, and in particular the KOA campground near Gothenburg. River flows of 10-15,000 cubic feet per second (CFS) cleaned out the channel all the way to the Missouri River. Finally, very heavy rain of 3"-7" fell in early October, resulting in flooding across parts of Adams, Howard, Greeley and Sherman County. Though extremely heavy, the rain was welcome and substantially improved the soil moisture profile for the ensuing winter.

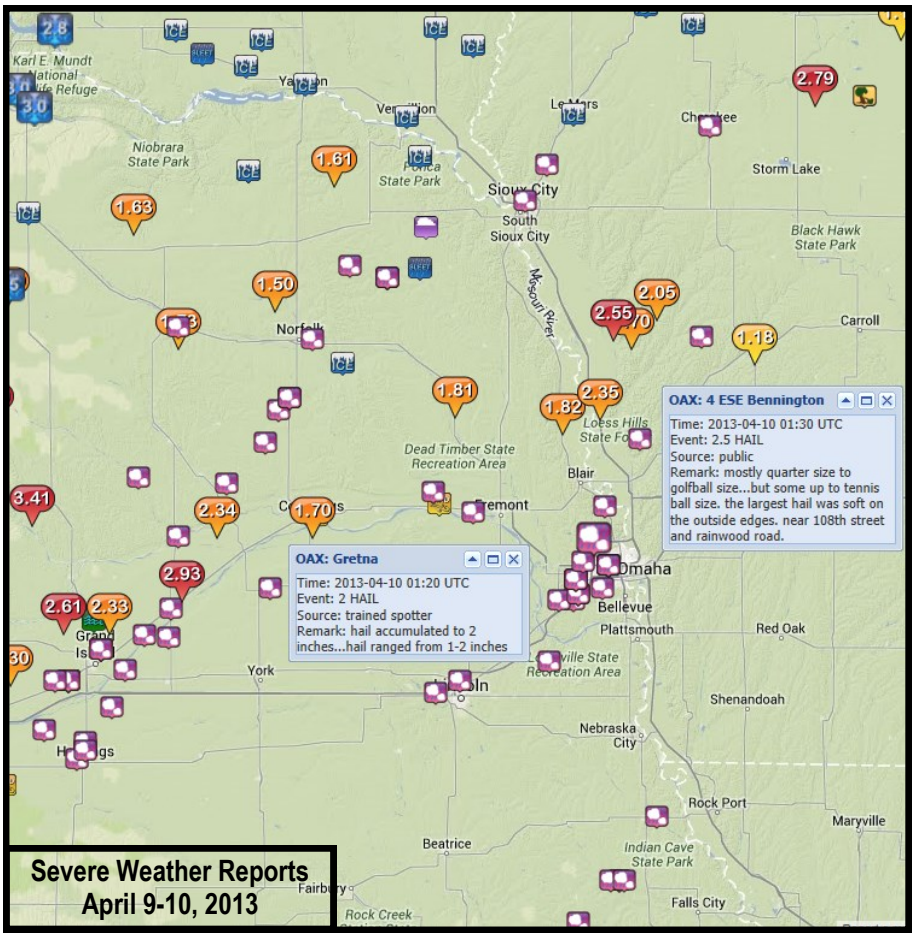
Roads were closed in the Gothenburg area due to the late September Platte River flood.

Platte River near Gothenburg - September 23rd. Photo courtesy of Julia Berg.

# 2013 Nebraska Severe Weather Summary

*http://www.weather.gov/oax*

## Eastern Nebraska - NWS Omaha, NE




An atypical and below normal severe weather season was experienced across eastern Nebraska in 2013. Although there were a total of 11 tornado events recorded, the majority of these occurred in October. In addition, of the 11 tornado events, greater than 60 percent were significant, including the violent Wayne EF4 tornado on October 4th.

The severe weather season started with an unusual event on **April 9th**. A storm system brought damaging winds, estimated near 100 mph, in the early morning hours in a swath from Platte to Dodge County including the city of North Bend. Later in the afternoon on the 9th, behind a strong cold front, supercell thunderstorms developed and were extremely efficient hail producers. As these thunderstorms occurred temperatures at the surface ranged from the upper 20s into the lower and mid 30s allowing for both the hail to remain on the ground for days after the event, and also for some of the precipitation from the thunderstorms to fall as freezing rain. Hail up to the size of tennis balls was reported in the Omaha metro area that evening, with numerous reports of golf balls across eastern Nebraska.

The largest number of severe weather reports came in the month of May, mainly during the last week of the month when a persistent pattern produced several events. The most significant of these occurred on the **May 27th** when an EF2 tornado moved just south of Harbine. There were also two other EF0 tornadoes the same evening, one in Jefferson County, and the second in Gage County. Besides the event on the 27th, severe weather in the form of hail and wind damage was reported on the **26th, 28th, 29th, and 30th**. Due to the persistence of these episodes, minor flooding also occurred across eastern Nebraska, which included Turkey Creek, Big Blue River, Big Nemaha River, and the Missouri River from Nebraska City downstream to Rulo.

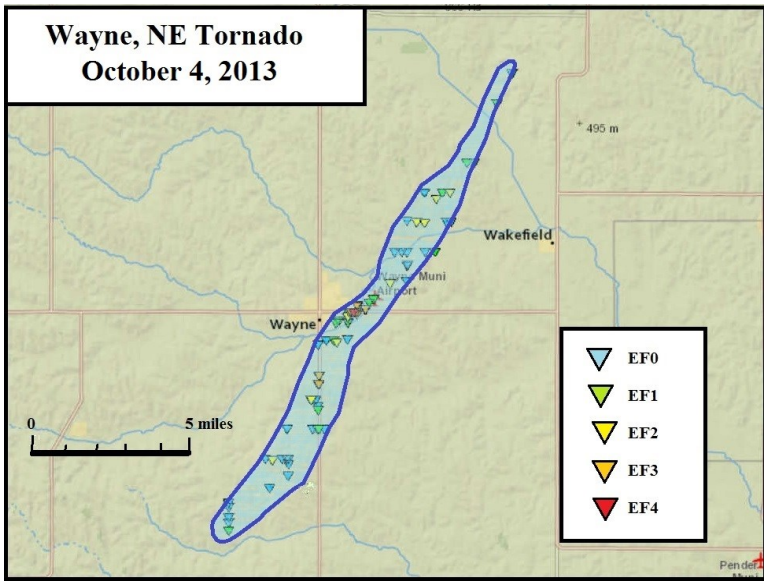
The month of June, normally an active severe weather month, was generally quiet across eastern Nebraska. Non-significant severe weather did occur on several days scattered about the month. The highest impact event took place on **June 14th** when a cluster of thunderstorms, with embedded supercells, produced large hail and damaging winds, prompting an early end to the opening ceremonies of the College World Series in Omaha. As typical, the months of July and August were relatively quiet severe weather wise with a few isolated non-significant events.

# 2013 Nebraska Severe Weather Summary

*http://www.weather.gov/oax*

## Eastern Nebraska - NWS Omaha, NE Con't.

As the seasons transitioned to fall, eastern Nebraska saw the two most significant weather days of the year. On the evening of **October 3rd**, as a warm front lifted north across southeast Nebraska, supercell thunderstorms developed along this boundary. Along with very large hail, some up to baseball size, two tornadoes occurred, with one of those rated EF2. This tornado produced significant damage near the town of Bennet to businesses and residences. The next day, **October 4th**, more supercells developed along a dry line over northeast Nebraska. These storms also produced large hail up to baseball size, but also significant tornadoes, including the violent long track Wayne EF4 tornado.




Although this tornado produced violent damage on the east side of the city of Wayne, amazingly only 15 people were injured. Other strong tornadoes produced EF2 damage near Royal, EF3 damage near Creighton, and EF2 damage in the city of Macy.

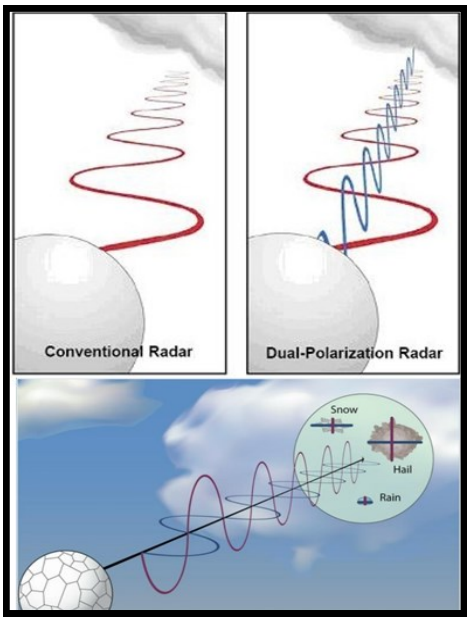
Wayne EF-4 Tornado
Photo Courtesy KTIV

Grossenburg Implement Damage - Wayne, NE.
Photo Courtesy of NWS OAX Storm Damage Team.

Pacific Coast Feather Company Damage - Wayne, NE.
Photo Courtesy of NWS OAX Storm Damage Team.

# Dual-Pol Radar and Severe Weather

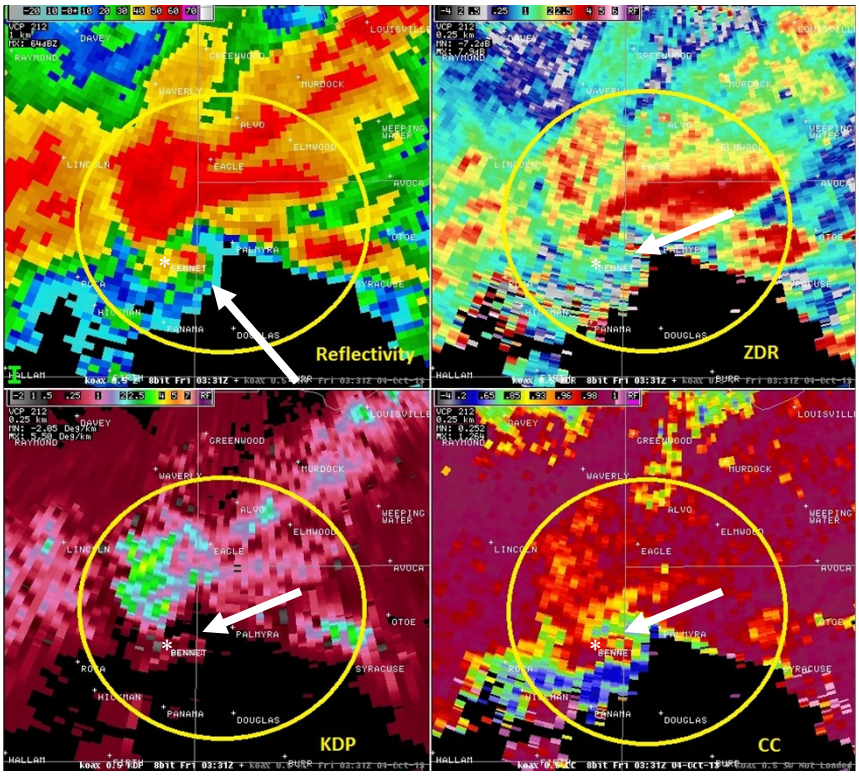
Over the last three decades, the WSR-88D Doppler radar has been an invaluable tool to National Weather Service meteorologist and their partners, allowing them to know more about the character and location of precipitation, whether it be rain, snow, sleet, or hail, along with detailed storm structure and the rotation in a storm. Dual-polarization (dual-pol) radar is an upgrade to the current operational Doppler radar. The new hardware and software is an enhancement to the current system. Doppler radar transmits horizontal pulses and dual-pol radar transmits both horizontal and vertical pulses.




The benefits of dual polarization radar are:
- Improved accuracy in identifying precipitation types and precipitation estimates.
- Improved identification of the melting layer.
- Improved detection of non-precipitation targets.
- Improved ability to detect hail.
- Improved ability to detect lofted tornado debris.

The upgrades began with the first upgrade to the Vance Air Force Base radar near Enid, OK on March 8th, 2011 and were completed May 22nd, 2013. The Nebraska NWS office radars were upgraded in March and April of 2013.

The radar example below is from the Bennet tornadic storm from **October 3, 2013**. This is what the storm looked like using our WSR-88D legacy reflectivity and the new dual-pol products. Dual-pol products are meant to be used side-by-side with legacy reflectivity and velocity products. The EF2 tornado touched down 2.5 miles southwest of Hickman near Stagecoach Lake State Recreation Area, moved through the Wagon Train Lake state recreation area, moving 1 mile south of Bennet to 1 mile northwest of Palmyra. The reflectivity panel to the left shows a classic pendant shape with enhanced reflectivity on the tip of the hook just east of Bennet. This corresponds to low ZDR (Differential Reflectivity) values in the upper right and low CC values in the lower right. The KDP (Specific Differential Phase) was too low to plot and shows up as black.




Four-panel WSR-88D radar display of reflectivity/ZDR– Differential Reflectivity/KDP-Specific Differential Phase/CC-Correlation Coefficient

For a Tornadic Debris Signature (TDS) we look for reflectivity (generally 30 dBZ or greater) and rotational signatures in the velocity, a CC around 0.8 and ZDR near 0 dB.

For detailed dual-pol training information go to: http://www.wdtb.noaa.gov/courses/dualpol/outreach/

# Central Plains Severe Weather Symposium and Family Weatherfest

## University of Nebraska - Lincoln's 14th Annual Family Weatherfest and Central Plains Severe Weather Symposium

**Saturday, April 5, 2014**
**9 a.m.– 4 p.m.**
**3310 Holdrege St.**
**Hardin Hall - East Campus**
**Lincoln, Nebraska**
**Hosted by**
**UNL's School of Natural Resources**

The Central Plains Severe Weather Symposium (CPSWS) began in Lincoln in 2000, and is a free public event open to the public with information for all ages. CPSWS events are organized by the High Plains Regional Climate Center, UNL's School of Natural Resources and the Lancaster County Office of Emergency Management as a combined effort to increase severe weather awareness. It is the commitment of CPSWS to create an outlet that puts severe weather information into as many homes and businesses in the region as possible.

The CPSWS has been able to bring together broadcast meteorologists from all major local network broadcast stations on an annual basis. CPSWS encourages the media's responsibility to the public in disseminating severe weather information. The CPSWS is closely tied to the efforts associated with Nebraska Emergency Management's Severe Weather Awareness Week.

The underlying theme for all CPSWS events is: "Surviving the Storms". Exhibitors and Severe Weather Experts are brought in each event to touch upon this theme and its varying aspects. One unique aspect of the CPSWS has been its ability to bring together different organizations and agencies under one roof to promote its underlying theme.

In an effort to keep the event a free event, the CPSWS has been sponsored by several businesses and organizations since the beginning. CPSWS has always been, and will always remain, a free public event in order to reach as many people as possible.

**For more information, please visit:**

**http://www.cpsws.unl.edu/**

WEATHERFEST

CPSWS
Central Plains Severe Weather Symposium