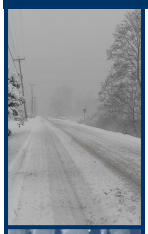
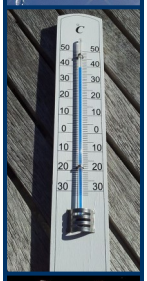
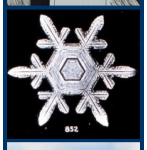
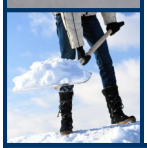
Nebraska Winter Weather Awareness Day

Thursday, November 7, 2019







2018-19 Snowfall

Not everybody loves snow, but it's worth repeating the fact that last winter was a snowy one, especially in February. Page 20 of this year's packet highlights the snowfall across Nebraska last winter, including large areas of 60"+ of snowfall in the Sandhills and the Panhandle. On the east side, both Omaha and Lincoln basically doubled their normal snowfall last winter.

Winter Storm Severity Index (WSSI)

How can we categorize how severe a winter storm may be? Well, it's not all about snow amount. There are a lot of things, and the Winter Storm Severity Index (WSSI) helps highlight some of those impacts. Pages 7-8 explain how the WSSI works, from "no impacts" to "extreme impacts", and its basis upon six different winter weather components.

Winter Outlook 2019-20

NOAA's winter outlook is highlighted on pages 11-12. There are a lot of factors which go into the winter outlook. We should all keep in mind an outlook like this is not site specific, nor is it really meant to be a forecast prediction. It's designed to give a broad overview of the temperature and precipitation patterns most likely to occur during the December-January-February timeframe.

Learning from Last Winter

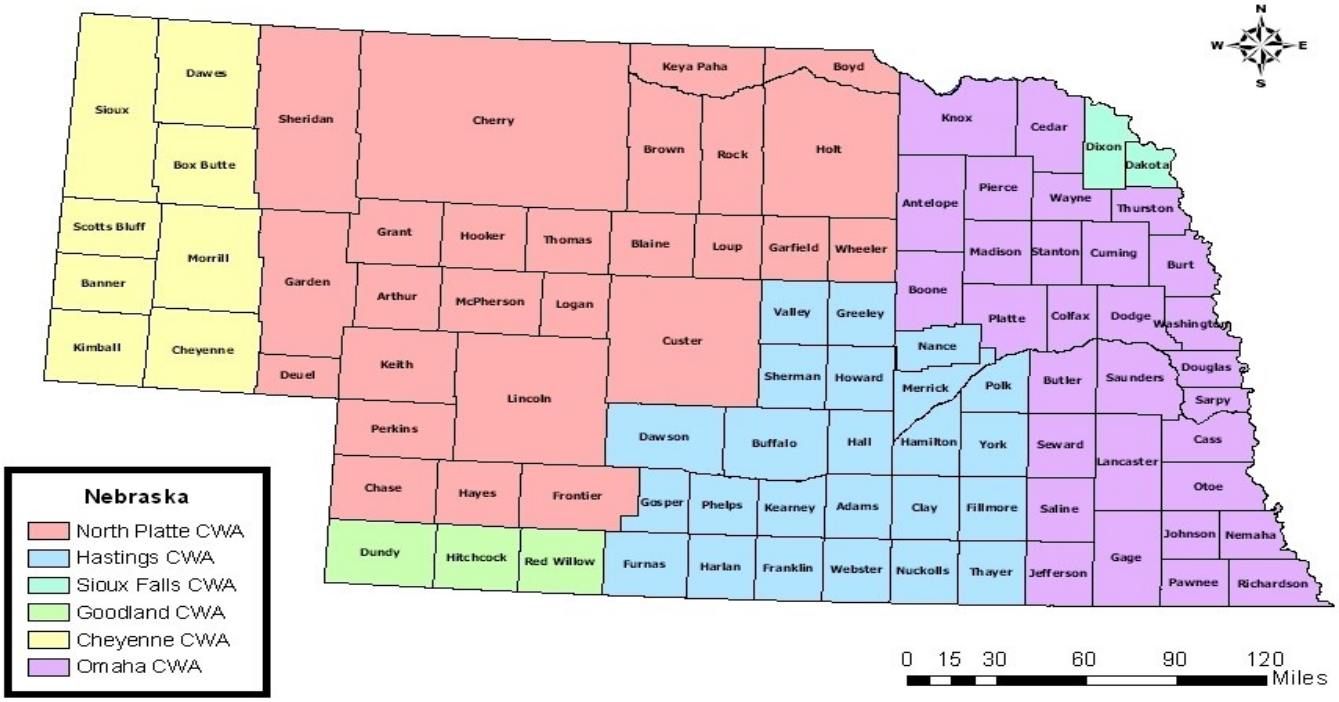
Simply put: "Anything Can Happen". The NWS does our best to forecast the weather, water and climate impacts for the area, but the winter of 2018-19 showed us all how extreme and unprecedented those impacts can be. In fact, we will continue to deal with last winter's onslaught for years to come. That's why it's a good time to take stock of the hazards of winter, plan ahead to mitigate those hazards and make all Nebraskans as "Weather-Ready" as we can be.

What's Inside?

National Weather Service Offices Serving Nebraska

Winter Weather Awareness Day - November 7, 2019

National Weather Service Coverage Area



Panhandle Cheyenne, WY 1301 Airport Parkway Cheyenne, WY 82001 (307) 772-2468 www.weather.gov/cheyenne	**West and North Central** North Platte 5250 E. Lee Bird Drive North Platte, NE 69101 (308) 532-4936 www.weather.gov/northplatte	**Extreme Southwest** Goodland, KS 920 Armory Road Goodland, KS 67735 (785) 899-7119 www.weather.gov/goodland
South Central Hastings 6365 N. Osborne Drive West Hastings, NE 68901 (402) 462-4287 www.weather.gov/hastings	**East** Omaha/Valley 6707 N. 288th Street Valley, NE 68064 (402) 359-5205 www.weather.gov/omaha	**Extreme Northeast** Sioux Falls, SD 26 Weather Lane Sioux Falls, SD 57104 (605) 330-4247 www.weather.gov/siouxfalls

NOAA Weather Radio All-Hazards (NWR)

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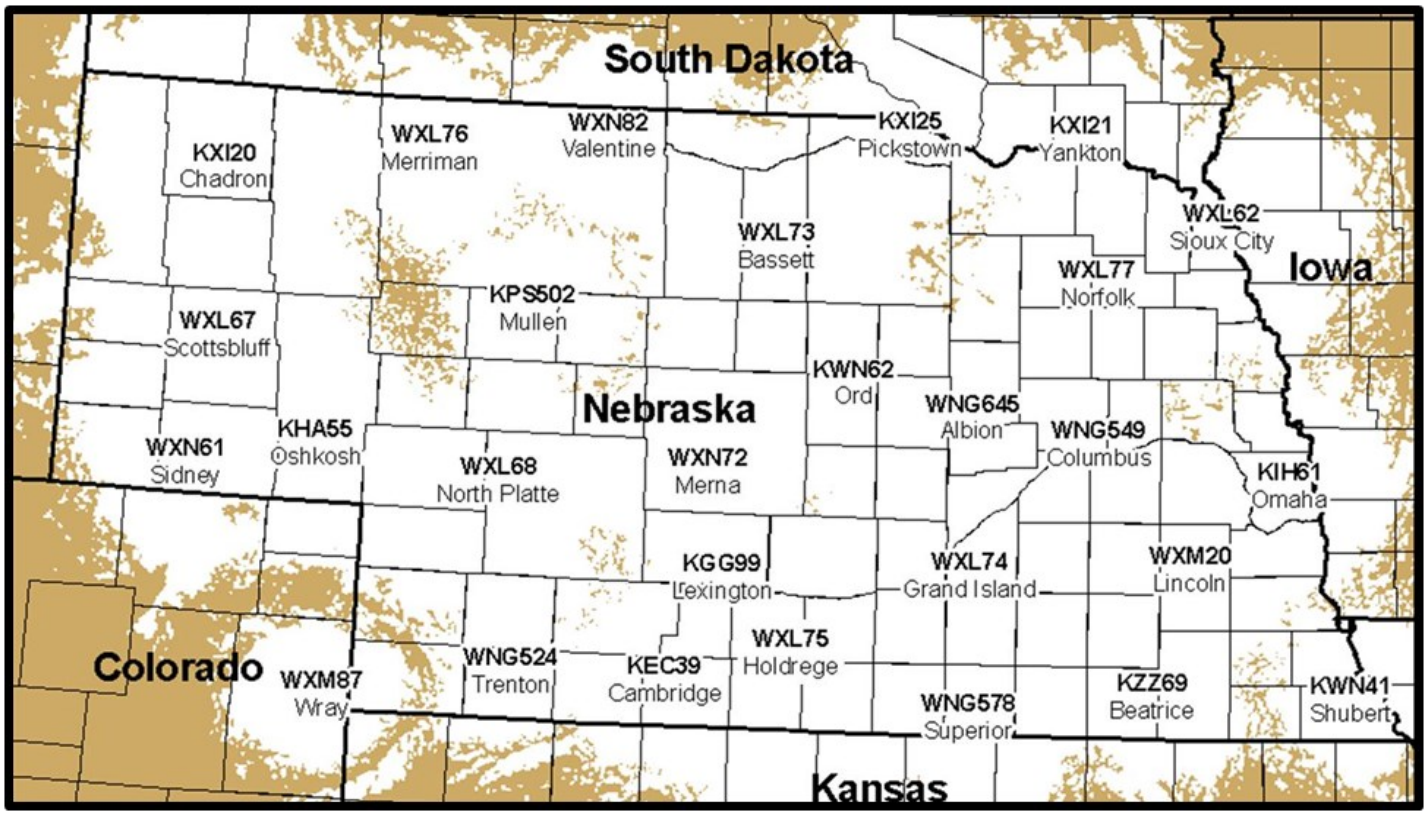

NOAA Weather Radio All-Hazards (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NWR broadcasts official NWS warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week.

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 the U.S. can be found at:

www.weather.gov/nwr/Maps

National Weather Service Social Media

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Have you found us on your favorite social media platform?

Do you have a Facebook page or a Twitter account?

Did you know that your local National Weather Service office is on social media? Each office in the NWS has a Facebook and Twitter account. Find your local NWS office and check it out!

Each office's Facebook and Twitter account keeps you informed and up-to-date with the latest forecasts, watches and warnings for your local area. Be a part of the process, we always need ground truth reports and we love to see your pictures. Comment on our Facebook posts, or send us a tweet, with your information, report or question and we will respond to it as quick as we can.

Follow your local office...		
NWS Cheyenne, WY	**@NWSCheyenne**	**NWS Cheyenne**
NWS Goodland, KS	**@NWSGoodland**	**NWS Goodland**
NWS North Platte, NE	**@NWSNorthPlatte**	**NWS North Platte**
NWS Hastings, NE	**@NWSHastings**	**NWS Hastings**
NWS Sioux Falls, SD	**@NWSSiouxFalls**	**NWS Sioux Falls**
NWS Omaha, NE	**@NWSOmaha**	**NWS Omaha**

Social media information about other NWS offices can be found at:
www.weather.gov/socialmedia

Pathfinder: Improving Winter Road Messaging For The Public

Winter Weather Awareness Day - November 7, 2019

NEBRASKA
Good Life. Great Journey.
DEPARTMENT OF TRANSPORTATION

The Nebraska Department of Transportation (NDOT) and the National Weather Service (NWS) offices serving Nebraska will continue the program called "Pathfinder" this winter across the entire state. This program is sponsored by the Federal Highway Administration (FHWA), and is a collaborative strategy to proactively manage the transportation system ahead of and during adverse weather events, and translate weather forecasts and road conditions into consistent transportation impact messages for the public.

Pathfinder is a unique public-private partnership. It brings to the collaborative table private sector meteorological services, in this case the Iteris Corporation, to team with the NWS and NDOT to provide a consistent message to the traveler. Born out of the 2002 Winter Olympics in Salt Lake City, Pathfinder combines the resources of the NWS with Iteris road-weather forecasts to provide NDOT with information about road-weather impacts across Nebraska. NDOT will continue to lead a collaborative effort with the NWS to create a "shared impact message" for the public. This message will be focused on how the weather will impact road conditions, be consistent among each entity, and shared across the various dissemination platforms of all parties involved.

Pathfinder is a state-wide project, involving all eight NDOT districts and all six NWS offices serving Nebraska. While its initial focus is on winter weather, Pathfinder will be able to address all types of weather impacts across the state, including high-end wind events and dust.

In the end, Pathfinder is geared toward two specific outcomes:
1) providing the traveling public consistent road-weather messaging for safer, smoother travel

2) continuing to foster relationships among the various public and private sector entities involved in information the traveling public.

For more information about the Pathfinder project in Nebraska, contact either of the following:

Jesse Schulz
NDOT Meteorologist
402-479-4609

Mike Moritz
Warning Coordination Meteorologist
NWS Hastings
402-462-2127 ext. 726

Pathfinder Website (link to videos, fact sheets and case studies): **https://go.usa.gov/xPDQZ**

Probabilistic Winter Forecast - Range of Possibilities -

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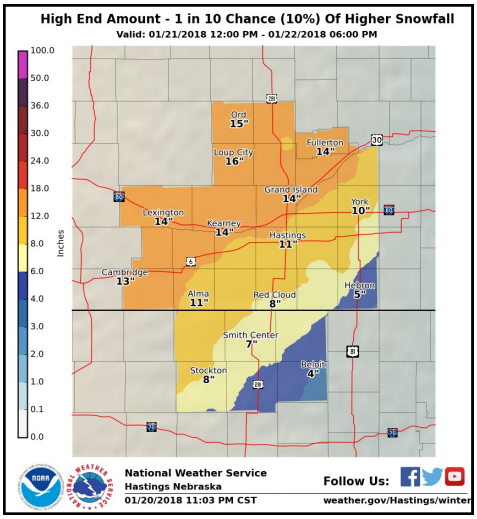
What Is The Probabilistic Winter Forecast?

Forecasting snowfall amounts is challenging and inherently laden with uncertainties of the strength of the system, the forecast track, rain, snow or a mix, pavement temperatures, and the duration. The "Probabilistic Snow Experiment" ramped up in the 2017-18 season across the region, providing forecasts that communicated a range of snowfall possibilities and confidence along with the usual complement of snowfall graphics. Named the "Probabilistic Winter Forecast" on local NWS pages, it continues to aid forecasters as well as allow customers to make better plans and decisions.

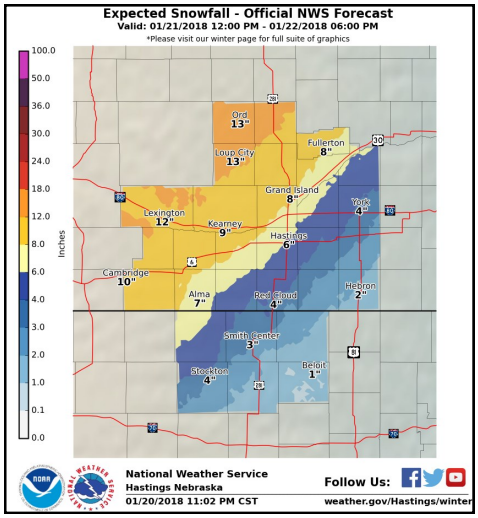
What You Will Find...Snow Amount Potential

High End Amount



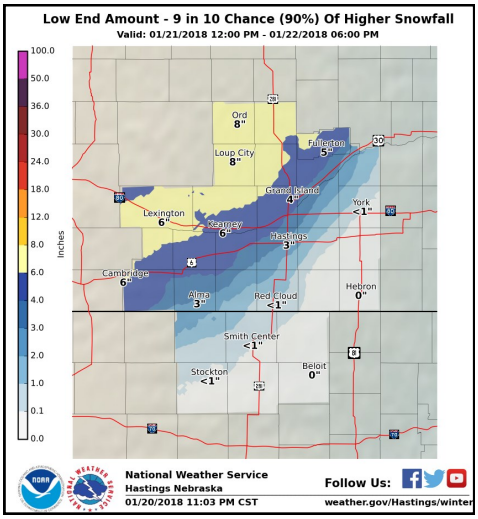
There is only a 1 in 10 chance (10%) of snowfall amounts greater than those shown above.

Official NWS Forecast



This is the snowfall amount currently forecast by the NWS.

Low End Amount



There is a 9 in 10 chance (90%) of snowfall amounts greater than those shown above.

Also available on this page...

Percent Chance That Snow Amounts Will Be Greater Than...: This is a series of maps shows the probability (that is, the likelihood) that snowfall will equal or exceed specific amounts during the time period shown on the graphic. These forecasts are based on many computer model simulations of possible snowfall totals.

Snowfall Totals By Location: Tables that show the snowfall forecast for individual locations.

Find The Latest Probabilistic Winter Forecast For Your Local Area At:

Omaha/Valley: www.weather.gov/oax/winter
Hastings: www.weather.gov/gid/winter
North Platte: www.weather.gov/lbf/winter
Sioux Falls, SD: www.weather.gov/fsd/winter
Cheyenne, WY: www.weather.gov/cys/winter
Goodland, KS: www.weather.gov/gld/winter

What Is The Winter Storm Severity Index?

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The Winter Storm Severity Index (WSSI) is a spatial assessment of the societal impacts of winter storms. It highlights regions and localities with the forecasted potential of damaging and life-threatening effects brought on by winter weather. This includes, but is not limited to tree damage, school closures, transportation issues like flight cancellations, traffic accidents, and road closures. These winter storms can create a direct risk to life and property and cause millions of dollars in damages.

The WSSI product allows forecasters, emergency management, and the general public to make informed and tactical decisions about the potential for significant weather related impacts. Using the winter storm severity index, experts are able to effectively assist in preparing the public for upcoming winter hazards.

Considerable time and discussion was put into the verbiage of the potential impacts scale (right). This is due to the importance of communication in meteorology. Meteorologists may produce an accurate forecast, but the public will not take appropriate action unless there is successful communication between both parties. Visuals are just as important as verbal communication when conveying hazards, which is where the WSSI product becomes an effective tool for weather personnel.

Potential Winter Storm Impacts	
	No Impacts Impacts not expected.
	Limited Impacts Rarely a direct threat to life and property. Typically results in little inconveniences.
	Minor Impacts Rarely a direct threat to life and property. Typically results in an inconvenience to daily life.
	Moderate Impacts Often threatening to life and property, some damage unavoidable. Typically results in disruptions to daily life.
	Major Impacts Extensive property damage likely, life saving actions needed. Will likely result in major disruptions to daily life.
	Extreme Impacts Extensive and widespread severe property damage, life saving actions will be needed. Results in extreme disruptions to daily life.

The WSSI and its Components...

The WSSI is comprised of six individual, but equally weighted components of winter storms. The summary graphic (Overall WSSI) is the maximum forecasted impact from any of the six impact components. The six components are:

- Blowing Snow
- Flash Freeze
- Ground Blizzard
- Ice Accumulation
- Snow Amount
- Snow Load

The goal of the product is to summarize multiple winter weather impacts from a storm into an easily consumable graphic. The WSSI creates a 72 hour summary graphic with 24 hour breakout graphics. The data comes from the NWS National Digital Forecast Database (NDFD) and is updated every 2 hours.

What Is The Winter Storm Severity Index?

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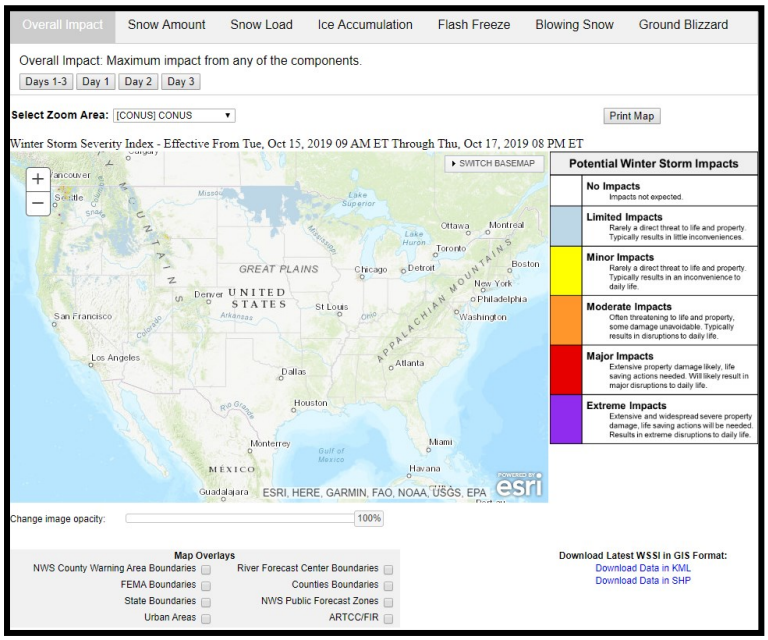
What The Winter Storm Severity/Impact Index Is NOT…

- It is not a specific forecast for specific impacts. For example, a depiction of "moderate" severity does not mean schools will have to close.
- It is not meant to be the sole source of information about a Winter Storm. It should always be used in context with other NWS forecast and warning information.
- The WSSI does not account for conditions that have occurred prior to the creation time. It only uses forecast information. Therefore during an ongoing winter weather situation, the WSSI will not be representative of the entire event.

Learn more about this product at **www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php**

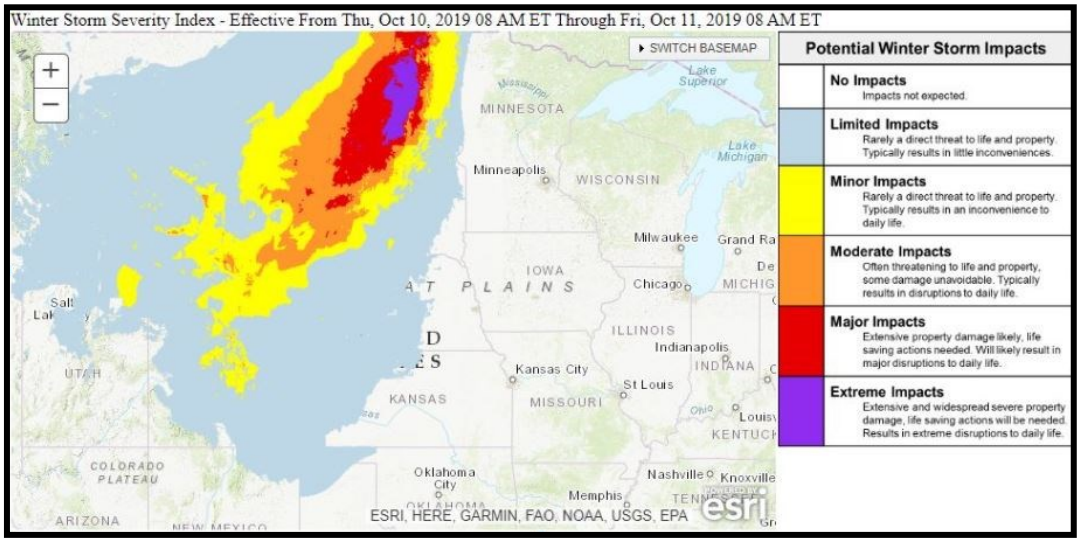


This is a view of the WSSI home page.

This is an example of the WSSI output when winter weather is forecast.

You can zoom in/out as needed.

This example is from the blizzard that affected the Dakotas around October 10th.



Determining Winter Precipitation Types

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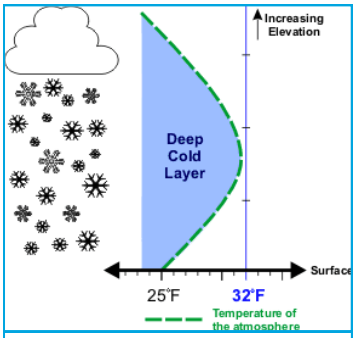
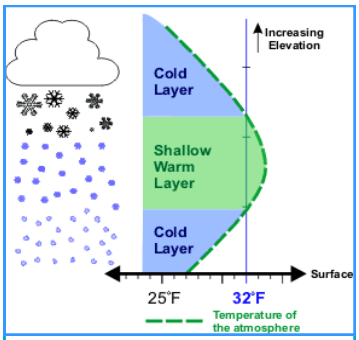
One of the difficult tasks for a forecaster is trying to figure out what type of precipitation is going to occur in the winter. An important piece of the puzzle involves determining the temperature throughout the troposphere (basically the lower 7-8 miles of the atmosphere) where the temperature usually decreases with height. However, there are times when the temperature actually increases with height in the lower troposphere and this can cause problems for the forecaster.



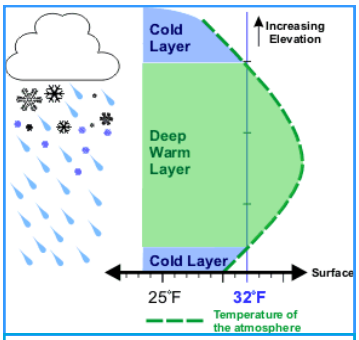
Vertical temperature profile needed for snow

Snow/Rain Process: How does the temperature affect the precipitation type? Ice crystals form at heights where the temperature is several degrees below freezing. As they fall, the crystals grow by several times, eventually forming snowflakes. If the entire column of the atmosphere remains below freezing all the way to the ground, we get **snow**. However, what happens if the snowflakes encounter a warm layer in the atmosphere that is above freezing? If the layer is warm and/or deep enough, the snowflakes melt and we get **rain**.

Sleet Process: If the warm layer is not quite as warm or as deep (let's say a degree or two above freezing for 500 feet) the snowflakes will partially melt, and then refreeze as they encounter a cold layer closer to the ground. By the time they hit the ground, they look like tiny frozen ice balls known as sleet.



Vertical temperature profile needed for sleet



Vertical temperature profile needed for freezing rain

Freezing Rain Process: This process is similar to sleet formation except that the warm layer completely melts the snowflakes into raindrops. But before reaching the ground, the rain falls through another cold layer. If the temperature in this layer and at the ground is several degrees below freezing, the rain drops will instantaneously freeze wherever they land (on trees, sidewalks, roads, power lines, etc.), causing a potential hazardous situation known as freezing rain.

Forecasters use information from radiosondes (weather balloons) to determine the temperature profile of the atmosphere. Due to cost factors, radiosondes are normally only launched twice per day at NWS sites across the country. In Nebraska, they are launched from the North Platte and Omaha offices. Due to the sparse coverage in both space and time, one can see why it might be tough to determine whether we will get snow in Chadron, while those in York may see a mixture of sleet, rain, and freezing rain.

Challenges Of Forecasting Snowfall Amounts

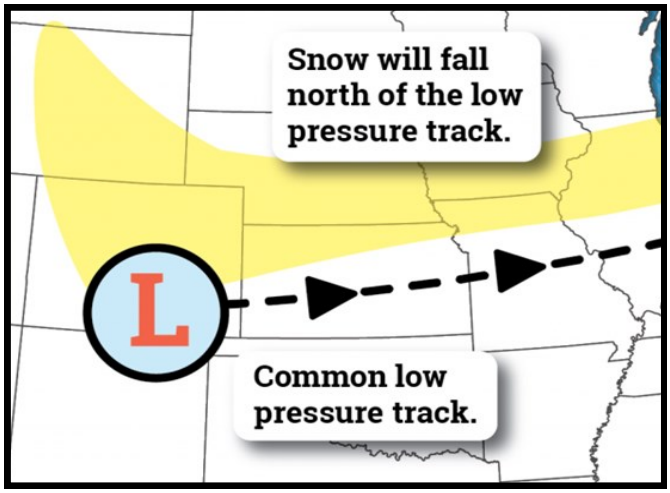
Winter Weather Awareness Day - November 7, 2019

Forecasting the amount of snowfall is challenging for meteorologists. Most people do not understand why forecasts for heavy amounts of snow can become a bust, or when little is expected you get dumped on. There are several factors involved in forecasting snow amounts. Let's take a look at some of them.

Surface Temperature - A ground temperature above freezing can cause much of the snow to melt upon impact. However, if it is snowing very hard, the snow could still accumulate and may get deep in some cases.

Precipitation Type - The temperature and moisture profiles in the lowest 10,000 feet of the atmosphere are critical in determining what type of precipitation you will have. The temperature at the surface does not necessarily indicate what sort of precipitation one will have. Refer back to the previous page for more detailed information about determining various precipitation types.

Storm Track - Another important consideration in forecasting snow amounts where the storm (low pressure) track is. The heaviest snow band typically occurs north-northwest of the surface low pressure track (see image to right). A shift north or south of the low can result in a shift of this band as well. Forecasters use their best judgement based on guidance from various computer models to determine the location of the heaviest band of snow.



Snow to Liquid Ratio - Many people use the rule of thumb that 1" of liquid water equals 10" of snow. This is not always the case, especially in the Plains states. Snow in this area is more typically 14 to 1 (or 14" of snow for every 1" of liquid water), but can vary quite a bit depending on the moisture content of the atmosphere. Very wet snows may have less than a 10 to 1 ratio and dry snows can have a 20 to 1 ratio! This can be an important factor in determining snowfall amounts.

Thunder Snow - There are times when a low pressure system moves across the area will have enough moisture and instability aloft to create thunder snow. In these cases, snowfall rates can increase tremendously and pile up 2 to 3" of snow per hour.

All of these factors are taken into consideration when forecasting snow amounts. Any changes to the factors listed, as well as some others not mentioned, can lead to a change in the amount of snowfall that was originally forecasted. It is important for everyone to pay close attention to updates to the forecast during a winter storm event to see if there are changes.

The latest forecast, no matter the season, can always be found at **www.weather.gov**

ENSO and the 2019-20 Winter Outlook

Winter Weather Awareness Day - November 7, 2019

2019-2020: Winter of "La Nada"

ENSO (El Niño Southern Oscillation) is a periodic variation in winds and sea surface temperatures across the tropical Pacific. ENSO is known to have an influence on weather patterns across the globe, and generally has its largest impact during the winter months. While the warm and cold phases of ENSO (El Niño and La Niña) tend to have well studied impacts, ENSO neutral conditions (when the temperature variation in the tropical pacific is within 0.5°C of normal) can also be impactful. Across Nebraska, ENSO neutral winters have a tendency to be statistically cooler and wetter than average, although it should be noted that there have been years when drier and warmer than normal conditions have occurred during ENSO neutral winters. Therefore, while there is no guarantee of a cool and wet winter, the odds are tilted in that direction, with plenty of variability expected due to short term influences of other teleconnection patterns that are less predictable and operate on shorter time scales.

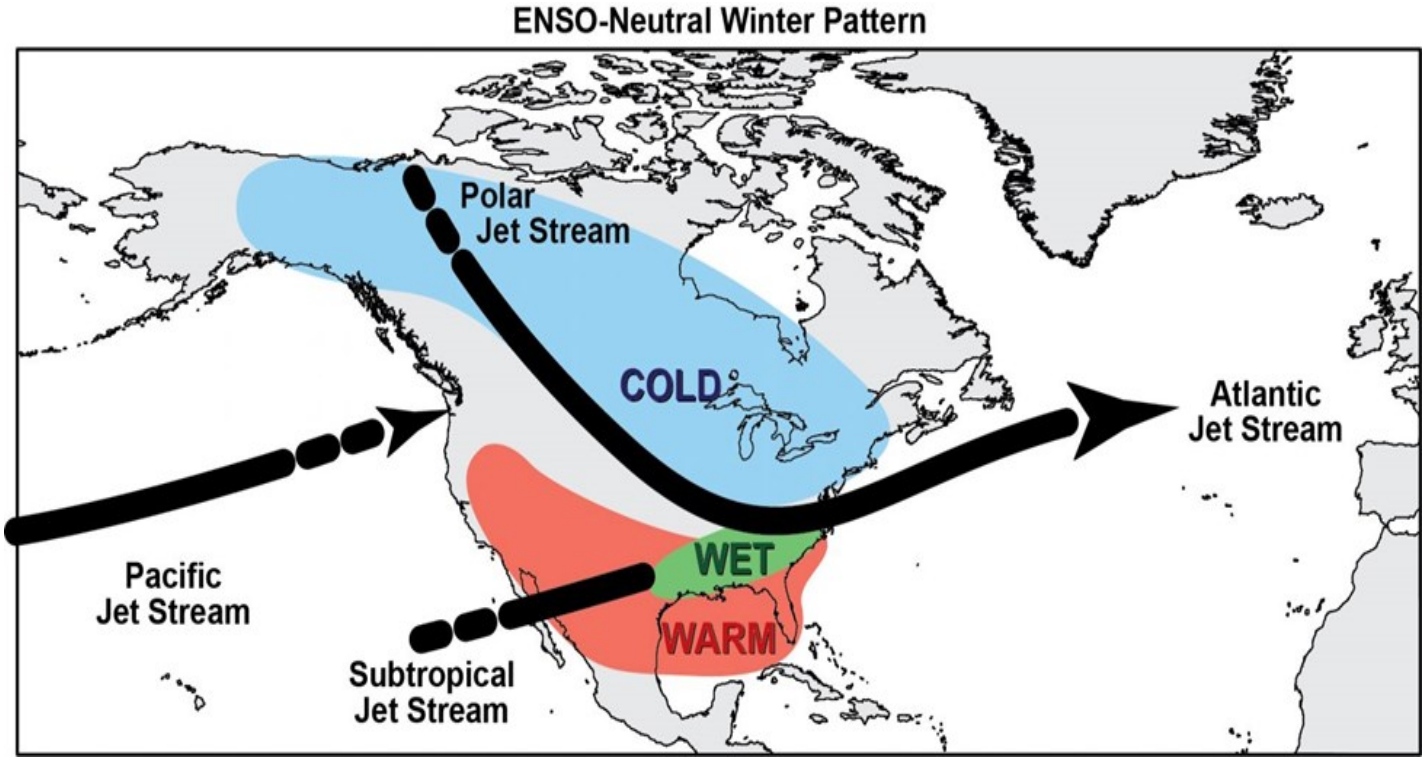


Image taken from "Relationships between Climate Variability and Winter Temperature Extremes in the United States," by R.W. Higgins, A. Leetmaa, and V.E. Kousky

Now that the official winter outlook has been issued by the Climate Prediction Center (CPC), current forecasts for the December through February period do favor above normal precipitation with a tendency of near to above normal temperatures across portions of the state. Keep in mind that the temperature forecast is strongly influenced by recent trends in both temperature and precipitation, this forecast is consistent with previous ENSO neutral winters as depicted in the map above.

ENSO and the 2019-20 Winter Outlook

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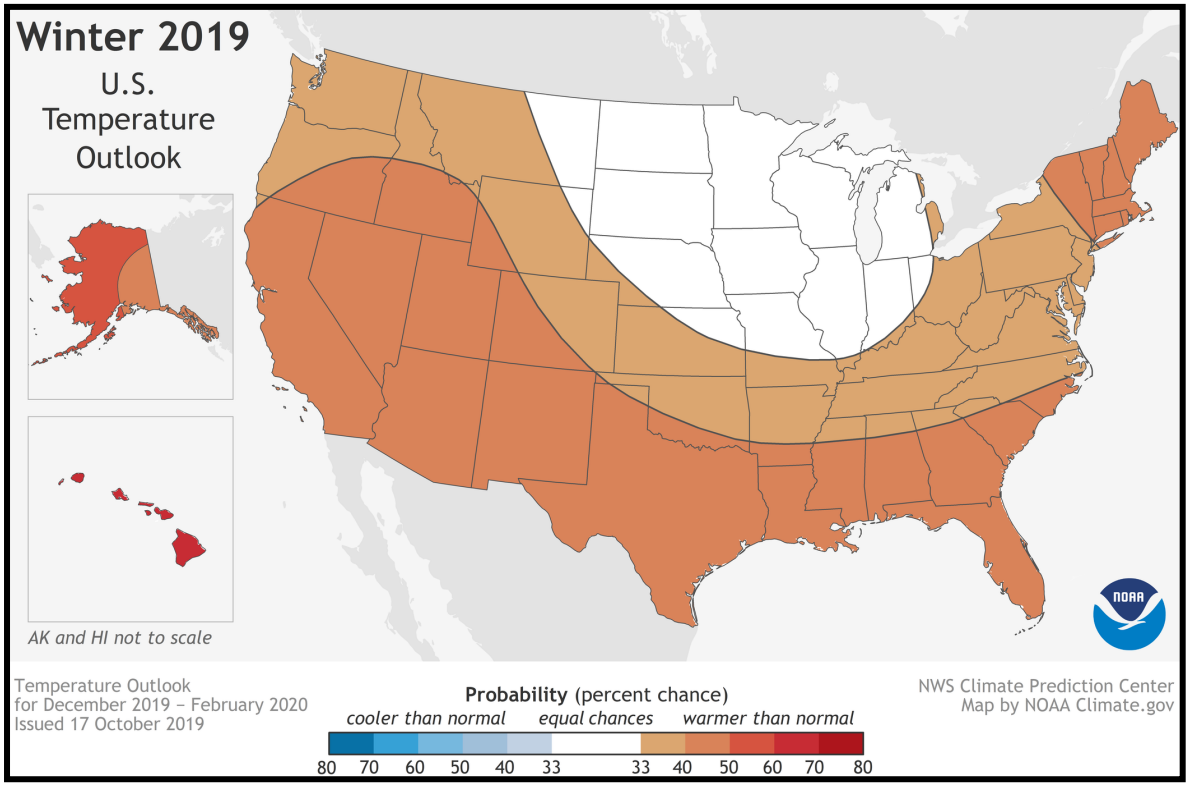

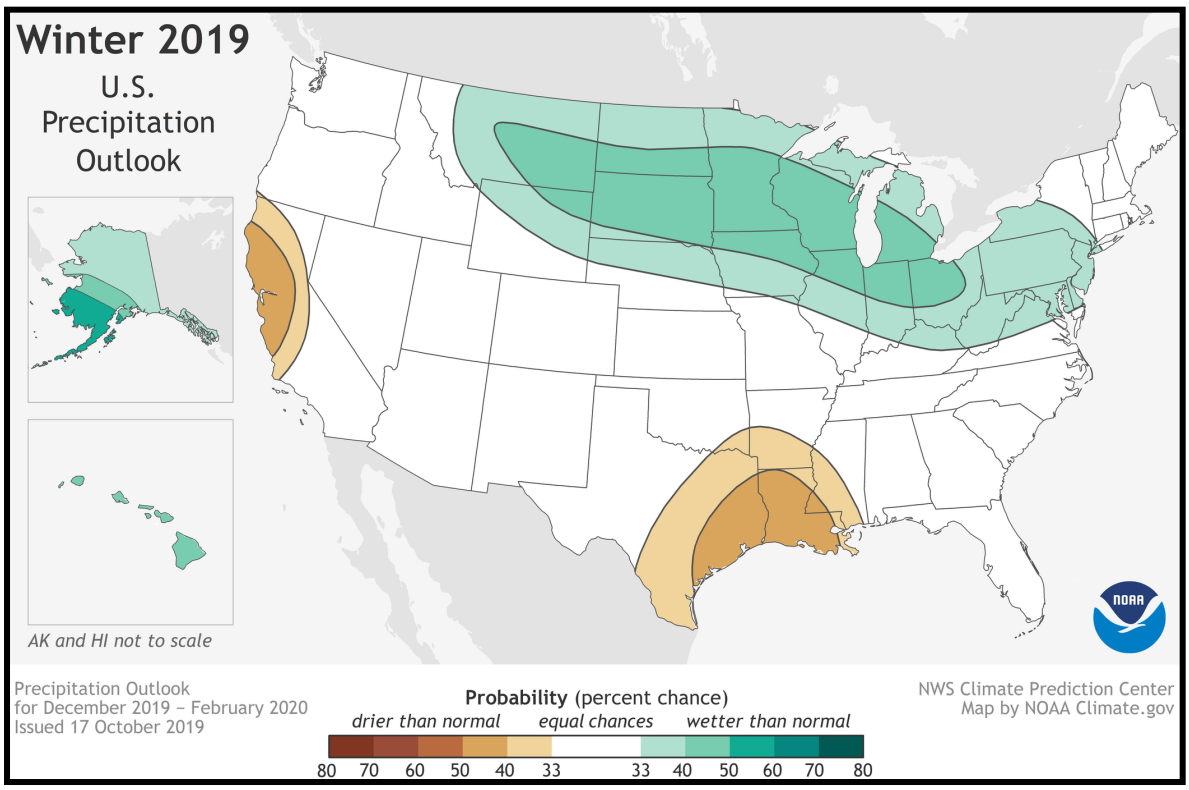

Winter Weather Dangers

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Exposure to cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible. What constitutes extreme cold varies in different parts of the country. In the south, near freezing temperatures are considered extreme cold. Further north, extreme cold means temperatures well below zero. Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat.

Wind Chill

- Is not the actual temperature, but how the combination of wind and cold feels on exposed skin.
- It is based on the rate of heat loss from exposed skin. As the wind speed increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.
- Wind chill will also impact animals!
- The only impact on inanimate objects (cars or pipes) will be to shorten the time it takes for that object to cool, they cannot cool below the actual air temperature.

More information about the Wind Chill Index can be found at :
www.weather.gov/safety/cold-wind-chill-chart

Temperature (°F)

Wind (mph)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

Winter Weather Dangers

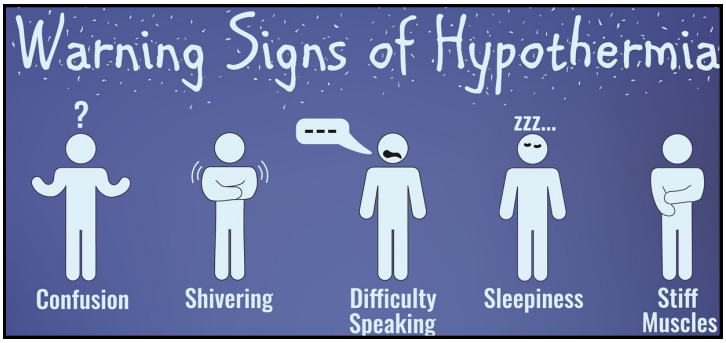
Winter Weather Awareness Day - November 7, 2019

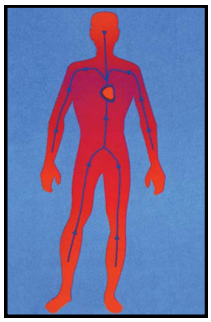
Frostbite

- Damage to body tissue caused by extreme cold.
- Can cause a loss of feeling and a pale appearance in the extremities. Your body cuts circulation to the extremities to protect the vital organs.
- Can occur in a matter of minutes!

Hypothermia

- It is a potentially dangerous drop in body temperature (below 96°), caused by a prolonged exposure to the cold.
- It can cause long lasting health issues, or could even result in death!
- Age (children and elderly), certain illnesses or even certain medications can make one more susceptible to hypothermia.





If You Need To Provide First Aid

- Get indoors as quickly as possible. Seek medical attention!
- Warm the person slowly, starting with the body core. Warming extremities first drives cold blood toward the heart and can lead to heart failure!
- Get the person into dry clothes and in extra layers. Remove any tight items.
- Drink warm liquids. Do not give alcohol, drugs, coffee or anything hot.

Are You Prepared For The Cold?

- Before heading out the door, make sure you check the forecast so you'll know what to expect.
- Adjust your schedule (if possible) to avoid the coldest part of the day.
- Dress for the cold! Layer your clothes and protect your head and extremities.
- Make sure your pets and livestock have enough food and water!
- Is your home and vehicle prepared?

Learn more at: www.weather.gov/safety/winter

Winter Weather Safety Tips

Winter Weather Awareness Day - November 7, 2019

Be Prepared Before the Storm Strikes!

When preparing your home or workplace for the upcoming winter season, keep in mind that the primary concerns deal with the loss of heat, power and telephone service, along with a shortage of supplies if a winter storm continues for an extended period of time.

Make sure to have the following supplies available:

- Flashlight and extra batteries
- Battery-powered NOAA Weather Radio and portable radio to receive emergency information - these may be your only links to the outside world.
- Extra food and water. Have high energy food, such as dried fruit, nuts and granola bars, and food which doesn't require any cooking or refrigeration.
- Extra medicine and baby items
- First-aid supplies
- Heating fuel. Refuel BEFORE you are empty. Fuel carriers may not reach you for days after a winter storm.
- Emergency heat source: fireplace, wood stove, space heater
  - Use properly to prevent a fire and remember to ventilate properly.
- Fire extinguisher and smoke alarm
  - Test smoke alarms once a month to ensure they work properly.

On the farm and for pets:

- Move animals into sheltered areas.
- Shelter belts, properly laid out and oriented, are better protection for cattle than confining shelters.
- Haul extra feed to nearby feeding areas.
- Have plenty of water available. Animals can die from dehydration in winter storms.
- Make sure your pets have plenty of food, water and shelter.

Winter Weather Safety Tips

Winter Weather Awareness Day - November 7, 2019

I'm caught outside:

- Find shelter!
- Attempt to stay dry.
- Cover all exposed body parts.
- If there is no shelter available:
  - Build a lean-to, windbreak or cave to protect yourself.
  - Build a fire for heat and to attract attention.
  - Place rocks around the fire to absorb and reflect heat.
  - Melt snow for water, eating snow lowers body temperature.

I'm caught in a vehicle:

- Stay in the vehicle! You could quickly become disoriented in wind-driven snow and cold.
- Run the motor about 10 minutes each hour for heat.
- Open the window a little for fresh air to avoid carbon monoxide poisoning.
- Make sure the exhaust pipe is not blocked.
- Be visible to rescuers!
  - Turn on the dome light at night when running the engine.
  - Tie a colored cloth, preferably red, to your antenna or door.
  - After the snow stops falling, raise the hood to indicate you need help.
- Exercise from time to time, move arms, legs, fingers, and toes vigorously to keep blood circulating and to keep warm.

I'm caught inside:

- Stay inside! If using alternate heat from a fireplace, wood stove, space heater, etc., be sure to use fire safeguards and properly ventilate.
- If you don't have heat available:
  - Close off unneeded rooms.
  - Stuff towels or rags in cracks under doors.
  - Cover windows at night.
- Eat and drink, providing the body with energy and preventing dehydration.
- Wear layers of loose fitting, lightweight, warm clothing. Remove layers to avoid perspiration and subsequent chill.

Winter Weather Travel Tips

Winter Weather Awareness Day - November 7, 2019

Along with your home and workplace, vehicles also need to be prepared for the upcoming winter season. It is very important to fully check and winterize your vehicle, which includes having a mechanic check your battery, antifreeze, wipers, windshield washer fluid, ignition system, thermostat, lights, exhaust system, heater, brakes, and oil levels.

If you must travel during winter conditions, it is best not to travel alone. Try to plan your travel during the day, and make sure to let others know your destination, route, and when you expect to arrive. Make sure to keep your gas tank near full to avoid ice in the tank and fuel lines.

Always carry a Winter Storm Survival Kit in your car!!

- Mobile phone, charger and batteries
- Flashlight with extra batteries
- First-aid kit
- Knife
- Shovel
- Tool kit
- Tow rope
- Battery booster cables
- Compass and road maps
- A windshield scraper and brush or small broom for ice/snow removal
- Blankets and sleeping bags, or newspapers for insulation
- Rain gear, extra sets of dry clothes, socks, mittens, and stocking caps

- Large empty can to use as emergency toilet. Tissues, paper towels, and plastic bags for sanitary purposes
- Small can and waterproof matches to melt snow for drinking water
- Cards and games
- High calorie, non-perishable food, such as canned fruit, nuts, and high energy "munchies" (Include a non-electric can opener if necessary)
- A small sack of sand or cat litter for generating traction under wheels and a set of tire chains or traction mats.
- A brightly colored (preferably red) cloth to tie to the antenna

Road Condition Information

Winter Weather Awareness Day - November 7, 2019

Before you travel, check out the latest road conditions. Road report information across Nebraska can be found at the Nebraska Department of Roads web site at:

511.nebraska.gov

Nebraska: When in-state, call 511.
When out of state call: 1-800-906-9069

If you are located inside the states listed below, you can dial 511 for road information.

South Dakota: www.safetravelusa.com/sd/
Out of state: 1-866-MY-SD511 (1-866-697-3511)

Wyoming: map.wyoroad.info/
Out of state: 1-888-WYO-ROAD (1-888-996-7623)

Colorado: www.cotrip.org/home.htm
Out of state: 1-303-639-1111

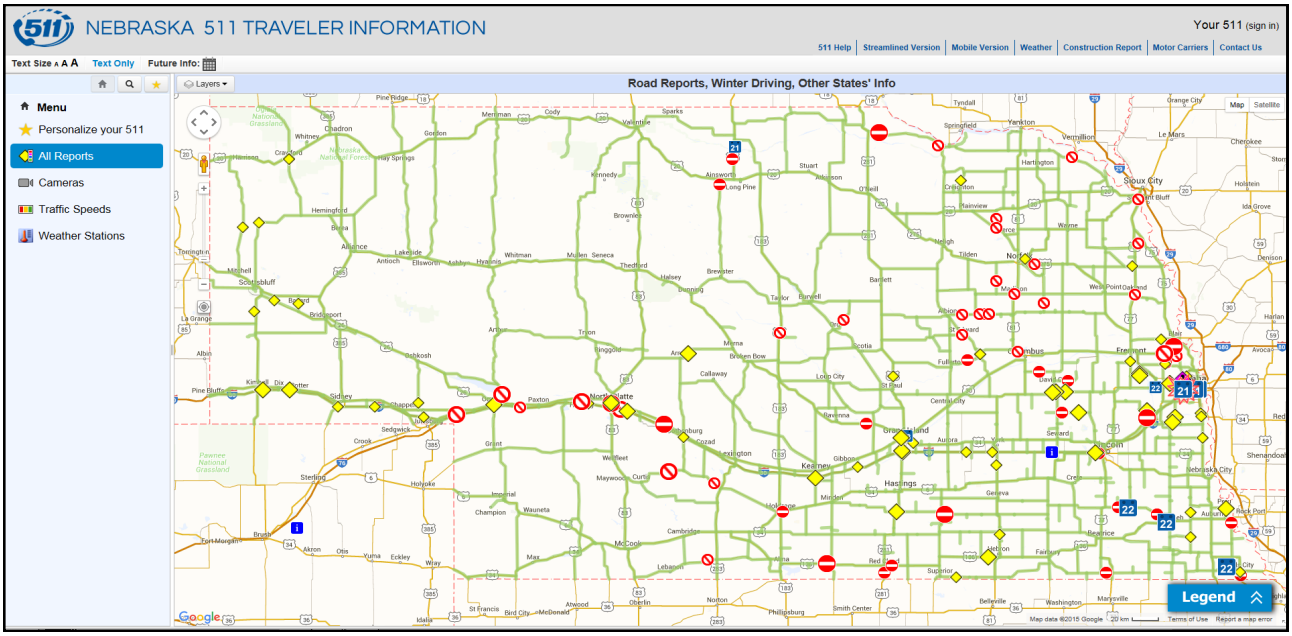
Kansas: www.kandrive.org/kandrive/
Out of state: 1-866-511-KDOT (1-866-511-5368)

Missouri: traveler.modot.org/map/
Out of state: 1-888-ASK-MDOT (1-888-275-6636)

Iowa: 511ia.org/
Out of state: 1-800-288-1047

National Traffic and Road Closure Information can be found at:

www.fhwa.dot.gov/trafficinfo/index.htm



Winter Preparedness For Schools

Winter Weather Awareness Day - November 7, 2019

Gathering Information

- Know where to get weather information: Utilize NOAA Weather Radio, local Media sources, Internet and paging services.
- Know how to get road information: State Highway Departments or Law Enforcement are often your best sources for road conditions. City and county transportation or school officials and drivers or security teams are also excellent sources.

Alerting Students and Staff

- Alert students and staff to take action: Use mobile communications for bus drivers and a PA system for school staff and students.

Activating a Plan

- Determine when to activate a plan: Gather information about the type of winter storm, expected impact and time of impact on the school district. The primary decision will be whether to cancel, delay or hold classes as usual. In Watch situations, immediate action will usually not be required. When a Warning or Advisory is issued, assess the weather situation by monitoring forecasts, current weather conditions and road conditions.

Canceling or Delaying Classes

- Determine when to cancel or delay classes: How much time do you have before the storm impacts the area? Not only must students be transported to school safely, but also back home via bus, car or on foot. What kind of an impact will the storm make? Will roads be impassable or will road conditions just have a minimal effect on transportation of students, causing only small delays?

School Bus Driver Actions

- For heavy/blowing/drifting snow: Be familiar with alternate routes, stay up to date on the latest forecast, and maintain communication with school officials.
- For ice storms: Remain alert for downed trees, utility lines, and other road hazards. Be familiar with alternate routes. Stay up to date on the forecast and maintain communication with school officials.
- Extreme cold: Learn to recognize and treat symptoms of hypothermia and frostbite.

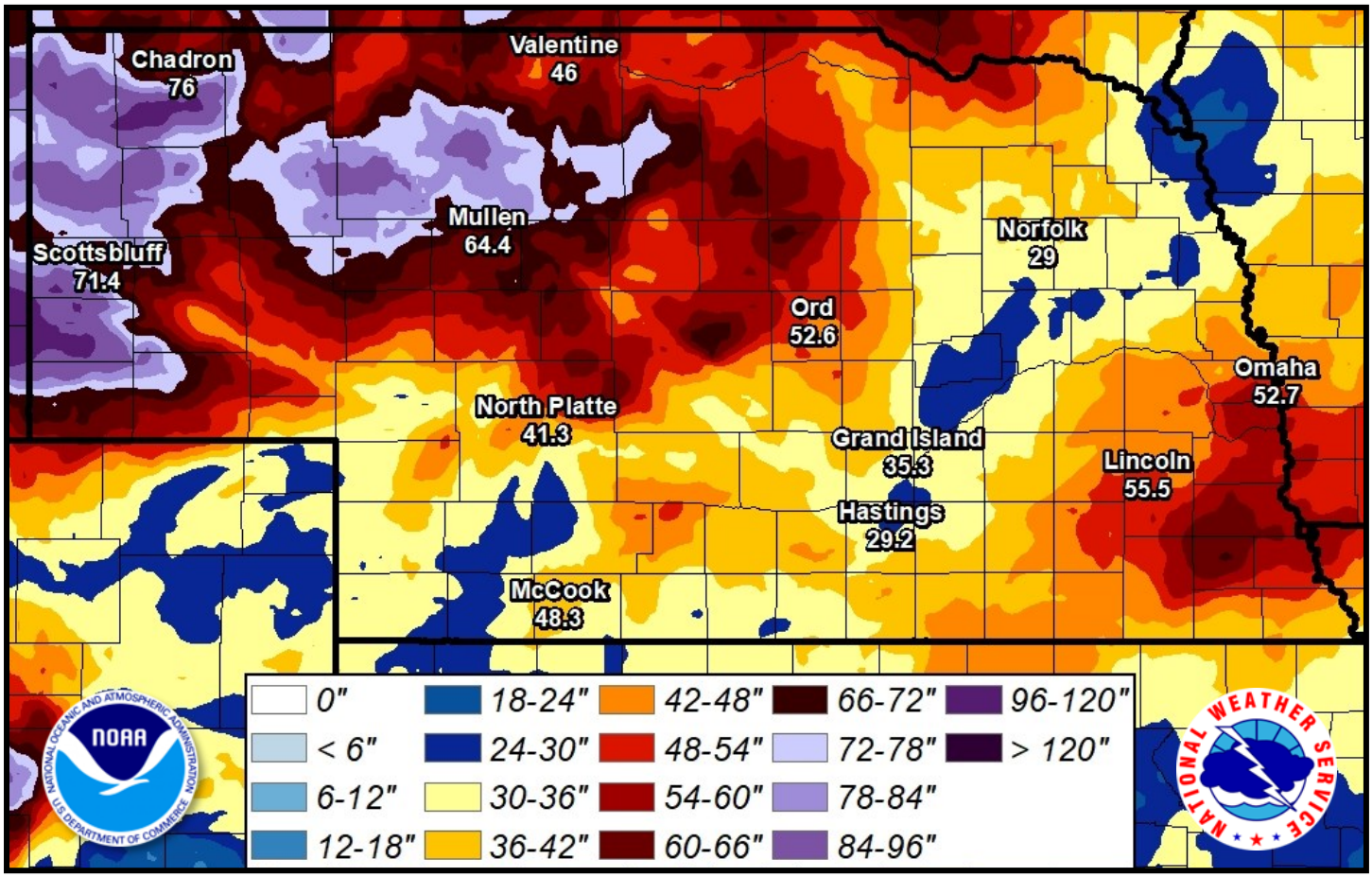
Safety Instruction

- Educate school staff and students: Conduct drills and hold safety programs annually.
- Participate in annual Winter Weather Preparedness Day campaigns.
- Contact your local Emergency Manager or National Weather Service Office for a speaker to discuss winter weather safety.

2018-19 Nebraska Winter Weather Summary

Winter Weather Awareness Day - November 7, 2019

2018-19 Season Statewide Snowfall Map



Location	Normal	2018-19 Total	% of Normal
Scottsbluff	42.1″	71.4″	170%
North Platte	28.5″	41.3″	145%
Valentine	33.3″	46.0″	138%
McCook	28.8″	48.3″	167%
Grand Island	29.0″	35.3″	122%
Norfolk	30.5″	29.0″	95%
Omaha	26.4″	52.7″	199%
Lincoln	25.9″	55.5″	214%

2018-19 Nebraska Winter Weather Summary

Winter Weather Awareness Day - November 7, 2019

Nebraska Panhandle - NWS Cheyenne, WY

A strong cold front and upper level disturbance produced periods of moderate to heavy snow across the western Nebraska Panhandle on **October 13-14th**. Snow totals ranged from 6-8".

Heavy snow fell across portions of Scotts Bluff and Banner counties from the evening of **November 16-17th**. Snow amounts of 6-8" were observed at Gering, Melbeta and Harrisburg.

On **November 24-25th**, a winter storm produced 6-8" of snow across Dawes, North Sioux and Morrill counties.

Four to eight inches of snow accumulated over parts of Sioux, Morrill and Cheyenne counties on **December 1st**.

On **New Year's Day**, early morning wind chills dropped to -20° to -30° degrees.

On **January 21st-22nd**, strong gusty winds and heavy snow impacted travel across Banner County.

Cold arctic air produced wind chill temperatures from -30° to -40° degrees during the morning hours of **February 7th**.

A strong arctic cold front and upper level disturbance produced heavy snow, gusty winds and wind chills as low as -30° degrees from **March 1st-3rd**.

Wind chills between -30° and -40° degrees were observed during the early morning hours of **March 4th**.

On **March 8-9th**, snow bands deposited over a half foot of snow over portions of Scotts Bluff and Dawes counties.

On **March 13-14th**, widespread heavy snow, strong winds and blizzard conditions closed Interstate 80 and many state and county roads. Snow totals exceeded a foot with snow drifts over 10 feet tall in some areas.

Snow bands produced heavy snowfall across Dawes, Box Butte and Morrill counties on **March 29-30th**.

On **April 10-11th**, widespread heavy snow and blizzard conditions closed several highways, including Interstate 80. The heavy wet snow and strong winds caused power outages over parts of Dawes County

Widespread moderate snow fell across Scotts Bluff County on **April 29-30th**. Up to 5" of snow was observed at Scottsbluff and Gering.

A late season winter storm produced gusty winds and moderate to heavy snowfall across northern and western portions of the Panhandle on **May 21st-22nd**.

2018-19 Nebraska Winter Weather Summary

Winter Weather Awareness Day - November 7, 2019

West and North Central Nebraska - NWS North Platte, NE

After a harsh winter during the 2017-2018 season, weak El Niño to neutral conditions developed for the winter of 2018-2019. With the exception of far southwestern Nebraska, snowfall for the season was above normal and temperatures below normal for the winter season. Frozen ground conditions and thick snow cover, coupled with heavy rain, led to widespread flooding of historic proportions in March. At the same time, blizzard conditions ravaged the panhandle and the northwestern Nebraska Sandhills. Winter conditions spilled over into April and measurable snow was even recorded in late May in the eastern Panhandle.

After benign conditions in November, a tandem of winter storms hit the region in December.

On **December 1st**, a closed area of mid level low pressure, tracked from the Four Corners into Kansas. North of the low, widespread snow developed across western and north central Nebraska and became heavy at times during the afternoon hours of December 1st. By the time the storm exited the region on the 2nd, snow totals of 6-14" were reported across western and north central Nebraska. The heaviest snow fell at Brownlee and south of Seneca, where 14" was reported.

Quiet conditions followed for the next three weeks through Christmas Day. On the **26th**, a winter storm hit portions of central and north central Nebraska. Snow totals ranged from 5-12" with the heaviest snow reported in Broken Bow. Very windy conditions continued into the 27th-28th, leading to significant blowing and drifting of snow. This led to the closure of Interstate 80 west of North Platte.

January started off mild, with bitterly cold temperatures and snow developing toward the end of the month into February.

Fairly mild temperatures developed across western and north central Nebraska early to mid January. Toward the end of the month, and arctic cold front and high pressure built into the Northern Plains and Upper Midwest. On the morning of **January 29th**, wind chills of 30 to 35 below zero were reported across portions of north central Nebraska.

Mild conditions returned to the region for the first three days of February. By the **4th**, an arctic cold front passed through the forecast area. Cold conditions continued for the next several days. A second, stronger arctic front brought light snow and bitterly cold temperatures to western and north central Nebraska on the **15th**. The cold and snowy conditions continued into the end of the month as temperatures remained well below normal. At North Platte, February 2019 was the 9th coldest February on record, while Valentine saw its 8th coldest February on record.

Bitterly cold temperatures continued into March with a historic storm on March 13-14th.

Cold temperatures continued into the first couple weeks of March. Bitterly cold wind chills of 30 to 40 below zero were reported on the morning of **March 3rd**.

March Continued…

On **March 13th-14th**, a historic winter cyclone tracked across the Central Plains. Very strong low pressure, brought blizzard conditions, flooding and high winds to western and north central Nebraska. Heavy rain developed across portions central and north central Nebraska. As this rain fell on snow covered and frozen ground, flooding and flash flooding resulted. In addition, rapid breakup of river ice, led to the failure of Spencer Dam and numerous bridge failures across the area. Flooding was reported in Lynch, Anselmo, Newport, portions of Holt and Boyd counties and Sargent. In the cold portion of the storm, blizzard conditions were reported in the eastern Nebraska Panhandle and northwestern Sandhills. Across western Cherry county, 10" of snow combined with 50 to 60 MPH winds producing drifts of 4 to 6 feet. Numerous roads were closed in these areas. In addition to snow and heavy rain, strong winds were also reported. Broken Bow reported a peak gust of 77 MPH and North Platte a 71 MPH gust.

Spring snowstorm impacts western and north central Nebraska in mid April.

An area of upper level low pressure tracked from the southern Rockies into the central plains **April 10th-11th**. Heavy snow and gusty winds developed on the northern side of the low pressure system. Snowfall amounts generally ranged from 4-8", however some reports of 10-14" were received. The cooperative observer in Kilgore reported 14" of snowfall from the storm, while 13.5" of snow was reported in Butte.

Location and Normal Snowfall	2018-19 Total Snowfall	Departure From Normal
Gordon 6N-39.9 Inches	66.7 Inches	+ 26.8 Inches
Ainsworth-36.9 Inches	53.5 Inches	+ 16.6 Inches
Oshkosh-24.0 Inches	51.5 Inches	+ 27.5 Inches
Eustis 2NW-30.9 Inches	49.8 Inches	+ 18.9 Inches
Broken Bow 2W-30.9 Inches	47.5 Inches	+ 16.6 Inches
Valentine-33.3 Inches	46.0 Inches	+ 12.7 Inches
O'Neill-26.3 Inches	45.2 Inches	+ 18.9 Inches
North Platte-28.5 Inches	41.3 Inches	+ 12.8 Inches
Imperial-29.8 Inches	30.6 Inches	+ 0.8 Inches
Ogallala-27.6 Inches	25.5 Inches	- 2.1 Inches

Snow Totals for Select Stations for the 2018-19 Winter Season

2018-19 Nebraska Winter Weather Summary

Winter Weather Awareness Day - November 7, 2019

Extreme Southwest Nebraska - NWS Goodland, KS

The 2018-2019 winter season was characterized by near to above normal snowfall and across extreme southwestern Nebraska. The season started out slow with all three sites reporting little to no snowfall in September and October. Across the three COOP sites, snowfall amounts drastically increased in November and December, stemming in large part from three winter weather events. A post-Thanksgiving blizzard blanketed areas of southwestern Nebraska in 2-5" of snow with the highest amounts being reported near Stratton, and a post-Christmas blizzard brought additional rain and snow to southwestern Nebraska.

October and **November** recorded below normal temperatures across southwestern Nebraska. Temperatures warmed up a little in **December**, returning to near normal in McCook and Culbertson. The warmer conditions continued into **January** with monthly average temperatures 1 to 3 degrees above normal. After a warm start to **February**, temperatures took a downward turn for the second half of the month with daily average temperature departures ranging from 15 to 30 degrees below normal. A cold start to **March** transitioned into a warming trend for the area. Despite the warming trend in the second half of the month that continued into April, March temperature departures remained below normal.

Monthly Temperature Departure From Normal							
Station	**Oct 2017**	**Nov 2017**	**Dec 2017**	**Jan 2018**	**Feb 2018**	**Mar 2018**	**Apr 2018**
Culbertson	-3.6	-3.1	0.0	1.4	-11.0	-5.5	2.0
Trenton Dam	-4.6	-2.8	1.3	1.7	-10.2	-5.2	2.3
McCook	-1.8	-2.2	0.3	2.4	-9.9	-3.6	2.7

Temp. departure from (1981-2010) normal. Red shading above normal, blue shading below normal, white background within half a degree of normal.

Snowfall across southwestern Nebraska was near to above normal for the 2018-2019 winter season. Trenton Dam was less than one half of an inch away from normal and received above normal snowfall in November and February. Culbertson and McCook received above normal snowfall in November, December, and February which led to above normal snowfall totals for the winter season. McCook received ten inches of snow with the post-Christmas blizzard, bringing the December monthly snowfall total to 18 inches. This ranks December 2018 as the fourth snowiest December on record for the McCook site with records dating back to 1894.

Station	Sep 2018-May 2019 Snowfall	1981-2010 Normal	Percent of Normal
Trenton Dam	**22.9**	**23.37**	**98%**
Culbertson	**30.5**	**28.5**	**107%**
McCook	**48.3**	**28.8**	**167%**

Sept. 2018 - May 2019 Snowfall, Normal, Percent of Normal Snowfall. Green is above normal, tan is below normal.

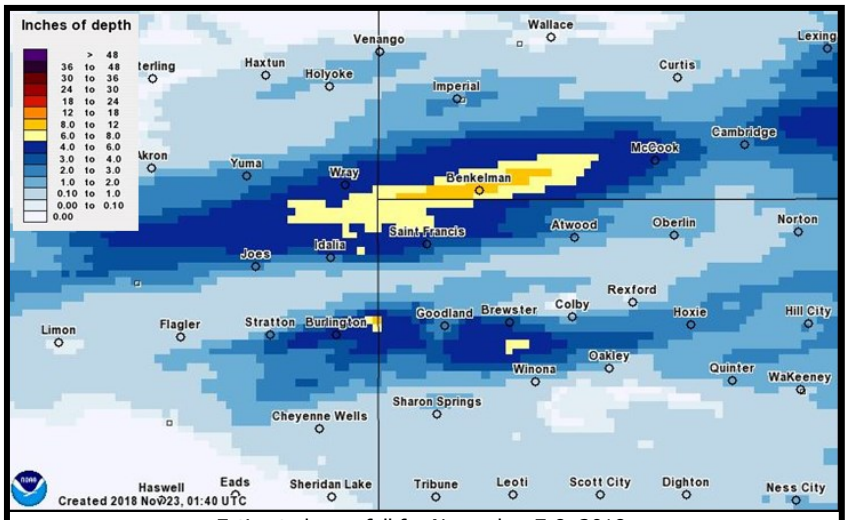
2018-19 Nebraska Winter Weather Summary

Winter Weather Awareness Day - November 7, 2019

Extreme Southwest Nebraska - NWS Goodland, KS Cont.

November 7th-8th, 2018 Winter Event

The first of the larger scale events to impact southwestern Nebraska during the 2018-2019 winter season was an early November heavy snow event. On the morning of the 7th, several bands of snow moved across southwestern Nebraska. The snow continued through the afternoon and evening hours, before tapering off after midnight on November 8th.

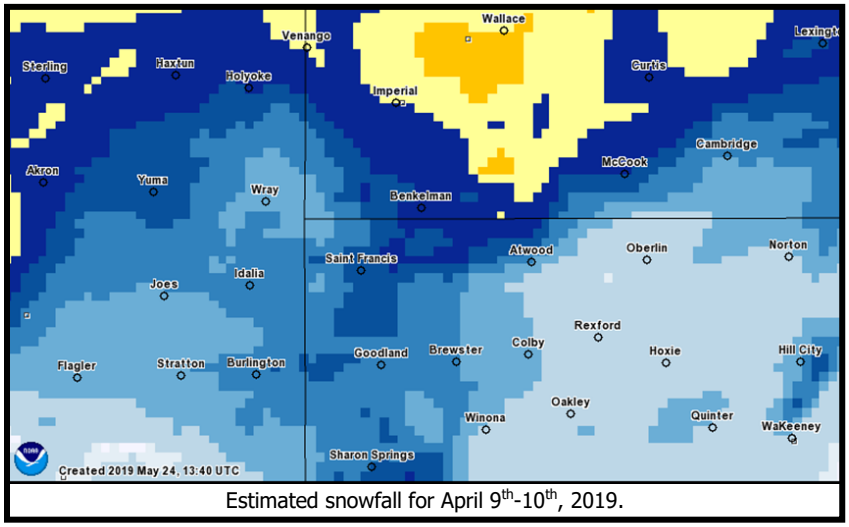


Estimated snowfall for November 7-8, 2018.

Snowfall amounts of up to one foot of snow were reported across eastern Dundy County and western Hitchcock County. A report of 12" of snow came in from Stratton, Nebraska. Eight inches of snow was reported in Culbertson, which is more than double the normal snowfall amount of 3.9" for the month of November and accounted for most of the monthly snowfall total for the site.

April 10th-11th, 2019 Blizzard

The final large snow storm of the season occurred in mid-April as a low pressure system developed over eastern Colorado on the evening of April 9th. A warm front extended from a second low pressure system over southeastern Wyoming into southwestern Nebraska. As the system over eastern Colorado continued to develop and move to the northeast over northeastern Nebraska, the warm front became stationary along the Kansas-Nebraska border.



Estimated snowfall for April 9th-10th, 2019.

A small band of heavy snow moved over Red Willow and Hitchcock counties accompanied by strong winds. The combination of snow and winds led to blizzard conditions overnight and into the morning of April 10th.

2018-19 Nebraska Winter Weather Summary

Winter Weather Awareness Day - November 7, 2019

South Central Nebraska - NWS Hastings, NE

Snow near Waco - October 14th. Photo by Bert Smith.

October 14th brought the earliest autumn snow for most locations since 2009, but for a few spots, it was the most significant early-season snow in decades! It was the only notable snow of the month, and while most locations ended up with just 1-2" for the event, there was a swath of higher totals ranging anywhere from 3-7" south of a line from Ayr-Harvard-Gresham.

November featured just 2 notable events, one on each side of the area. Western areas woke up to 2-7" of snow on **November 7th**, with the highest totals in Minden, Cambridge and Elwood. It was a narrow band, with an observer in Wilsonville (not far from Cambridge) only reporting a Trace!. Blizzard conditions struck far southeastern areas on **November 24th**. The heaviest snow band had totals of 3-6", and wind gusts of 35-50 MPH were common. Zero visibility was reported at Geneva, Clay Center and Hebron.

The month of December saw its wintry events at the very start and toward the end, including the first true blizzard of the season. On **December 1st**, a longer-duration snow event dropped 1-4" of snow along/east of Highway 281, and 3-5" to the west. Post-Christmas travel was snarled as blizzard conditions struck much of the area on **December 27th**. The storm was unusual, as it started off with a soaking 1-2" of rain on the 26th! As the cold air blasted in, wet roads experienced a flash-freeze, with rain then quickly turning over to snow. Locations northwest of an Alma-Kearney-Fullerton line saw the brunt of the snow, with 4-9" reported. Wind gusts of 40-50 MPH resulted in plenty of blowing snow and travel headaches.

January and February of the new year saw a handful of events with lower snow amounts, generally in the 2-5" range. Mid-February had 3 such events in a span of 5 days, between **February 15-19th**. One fatality occurred due to a 11-car pile up on I-80 in Hamilton County early on the 20th. More notable snow amounts of 6-9" impacted the southeastern corner of the area on **January 11th** and again **February 23rd**. Combined with higher wind gusts, more accidents and travel issues were reported on these days, including another pile up on I-80 near Aurora on February 23rd. While not accompanied by any snow, **January 28th** was an interesting event, when a pair of strong cold fronts swept through the region, ushering in numerous wind gusts ranging anywhere from 50 to 70 MPH!

Pile-up on I-80 near Aurora - February 23rd. Photo by Nebraska State Patrol.

The spotlight of the entire 2018-19 season occurred mid-March, involving historical flooding (see next page). Prior to this, snow amounts ranging anywhere from 3-8" fell on **March 2nd** and **March 6th**. Portions of I-80 were closed on the 6th due to 2 separate accidents. The latter portion of March was fairly quiet, with only a few inches of snow falling on the **29th** across the north.

The 2018-19 winter season came to a close on **April 10th**, with a classic clash of winter and spring. What started out as a burst of thunderstorms (and some hail!) gave way to a varied mix of sleet, freezing rain and eventually snow. Far northwestern areas measured 4-8" of snow, including 7.7" south of Cozad and 6" at Ord.

South Central Nebraska - NWS Hastings, NE Cont.

By far, the main event of the winter season was the historical flooding event which peaked between **March 13-17th**. Several counties endured widespread flooding, ranging from minor to historical. The worst flooding occurred along several primary rivers, including the Loup River system, Cedar River and Wood River. Not only was this flooding characterized by high water levels, but in many areas damage was also augmented by an unusually-severe break-up of *thick* river ice. Taking a back seat to the widespread flooding in terms of impacts, much of the local area also endured a winter storm with high winds and blizzard conditions on the night of the 13th into the morning of the 14th.

One could say the events that set the stage for disastrous flooding were a "perfect storm". Several stations recorded either their 2nd or 3rd-coldest period on record between Feb. 15-March 15, and the coldest since at least the early-1960s. Because of this cold, river ice became very thick, setting the stage for potentially serious ice jam flooding issues. Soil frost levels became unusually deep. For example, at the NWS Hastings office, the March 11th observation revealed that the ground was frozen to a depth of 25". Several snow events in February & early March resulted in a fairly deep snow pack, especially within counties north of Interstate 80.

Because of these factors, the widespread 2-3+ inches of rain/liquid equivalent that fell across much of the area March 12-14th was the proverbial "last straw". Because of the frozen ground, the vast majority of this precipitation quickly ran off, not only promoting quick rises in water levels, but also resulting in a dramatic break-up of river ice into large chunks.

The impacts from the flooding were immense. Rivers and fields looked like lakes, and record crests occurred on several rivers. Water covered hundreds of gravel and paved roads, including state and federal highways. Dozens of bridges were washed out. Large slabs of ice were also deposited and jaggedly piled-up by flood waters onto bridges and adjacent road leading up to the bridges. Pasture land and fields were covered in inches of sand and silt, many livestock perished.

Much more detailed information about this event can be found here:
www.weather.gov/gid/march2019flood

Ice chunks on Highway 14 near Fullerton.
Photo by Nebraska State Patrol.

HWY 39 bridge south of Genoa.
Photo by Nebraska State officials.

Highway 30 flooding in Gibbon.
Photo by Buffalo County Sherriff's Office.

Rural road damage south of Arcadia.
Photo by Sarah Forbes.

2018-19 Nebraska Winter Weather Summary

Winter Weather Awareness Day - November 7, 2019

Eastern Nebraska - NWS Omaha/Valley, NE

The winter of 2018-2019 across eastern Nebraska and western Iowa was considered "severe" to "extreme" on the Accumulated Winter Season Severity Index (AWSSI). The AWSSI accounts for temperature as well as snowfall and snow depth. When you look at the months of December, January, and February, at Omaha, Lincoln, and Norfolk temperatures were colder than normal. Record snowfall occurred at Lincoln. The 5th highest snowfall total occurred at Omaha. However, Norfolk was slightly below normal for snowfall.

	Omaha	Lincoln	Norfolk
DJF Ave Temperature (DJF cumulative dep)	23.9 (-3.9)	24.7 (-5.2)	21.2 (-9.6)
DJF Total Precipitation (DJF departure)	5.82" (+3.21")	5.66" (+3.3")	4.09" (+1.99")
Total Snowfall (2018-2019 season)	52.7" (+26.3")	55.5" (+29.6")	29.0" (-1.5")

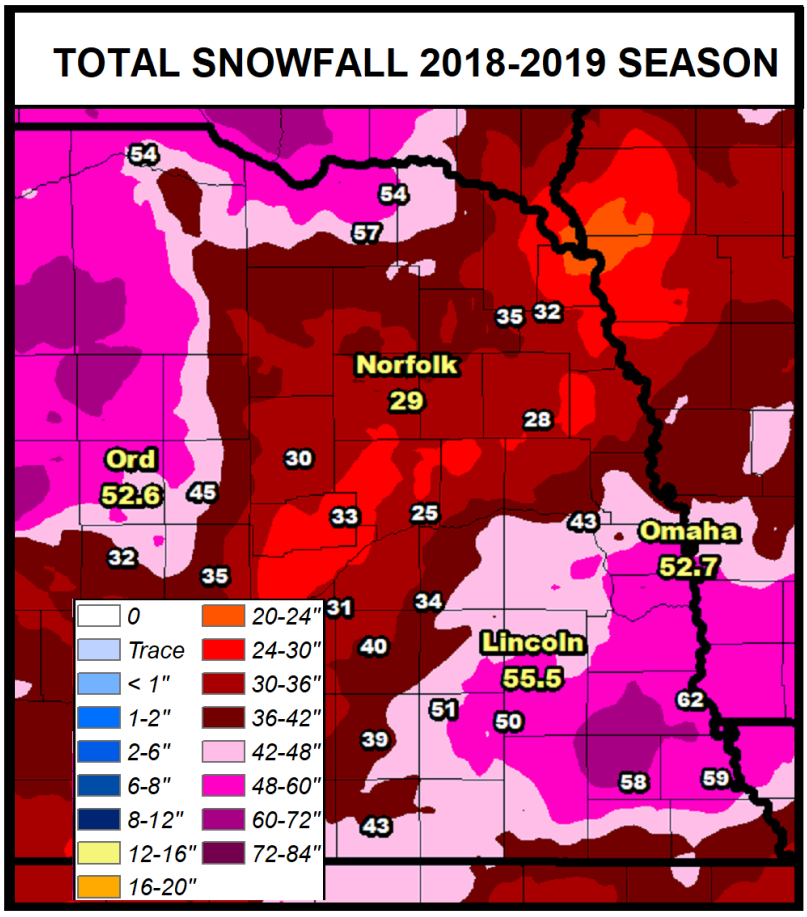
October 2018 was wetter and cooler than normal. The first snowfall of the season came on **October 14th** where Lincoln received 3.5" of snow. Omaha recorded 1.4" and Norfolk had 0.5". November was colder than normal with slightly drier conditions. December started with a major winter storm on the **1st-3rd**. Parts of northeast Nebraska had between 5-11" of snow. Much of the month then was dry until the **26th-27th** when another storm system moved across the area and produced 2-8" of snow. Overall, the month of December was above normal temperature-wise.

After starting out cold on New Year's day, January had near normal temperature readings. A snowstorm brought between 4-12" across the southeast on **January 12th**. Another storm on the **22nd** and **23rd** produced 4-8" of snow across southeast Nebraska and southwest Iowa.

A Cold and Snowy February

February was a cold and snowy month. Omaha set a monthly record for snowfall with a whopping 27". Lincoln had 23.2" and Norfolk had 13.7".

After an initial quiet start to February, major winter storms began impacting the area by mid month. On **February 16th-17th** a major winter storm dropped 3-9.5" across southwest Iowa, east central and southeast Nebraska. Another system on the **19th-20th** produced another 2-8". A major winter storm on the **23rd-24th** caused widespread blizzard conditions, 24 hours worth of freezing fog, and between 6-12" of snow. The heaviest snow fell from just southwest of Lincoln to just east of Omaha.

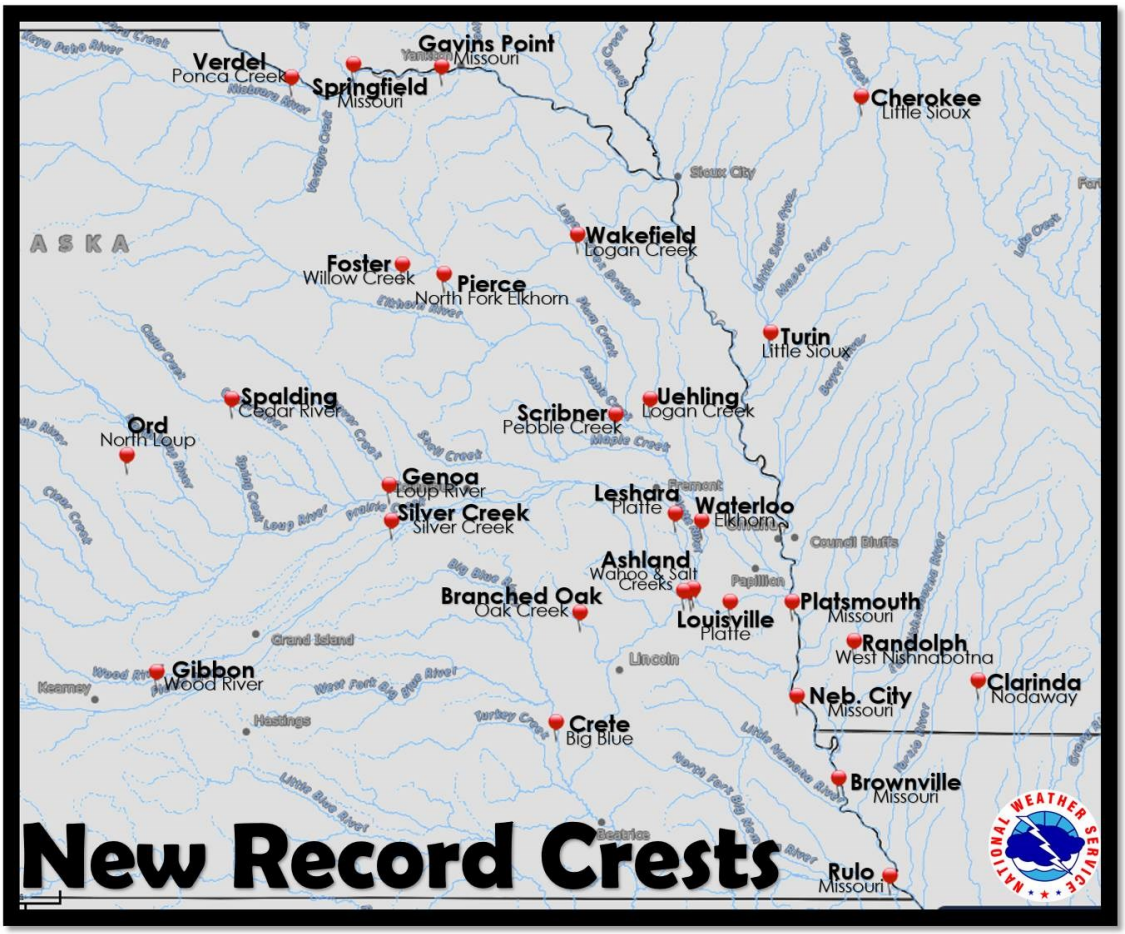


Eastern Nebraska - NWS Omaha/Valley, NE Cont.

March: Some Snow early, the Big Meltdown, Bomb Cyclone, and Record Flooding

The beginning of March was basically a continuation of February: snowy and cold. On **March 6th-7th** a storm system produced 2 to over 7 inches of snow. The heaviest amounts occurred from Seward to Millard. A shift in the upper level weather pattern allowed for warmer weather conditions and set the stage for an intense low pressure system to develop across the Central Plains. Prior to the storm moving into the area, mild temperatures created rapid snow melt of the deep snow cover (4-16" deep).

As the storm system deepened into a intense low pressure system called a "bomb cyclone", widespread heavy rain fell on the deep snow cover. The combination of warm temperatures and rainfall allowed snow to melt in a matter of a couple days. All of the water from the rain could not permeate into the ground due to a deep frost depth of 16" to 20" over eastern Nebraska and western Iowa. Thus, all of this melted water and rain water created runoff that ran into streams and rivers. In addition, many rivers had ice jams that broke up rapidly. Major flooding occurred on most rivers in Eastern Nebraska and western Iowa. Over 30 record river crests were recorded across central and eastern Nebraska, and western Iowa. Five people lost their lives in the flooded waters.



Eastern Nebraska - NWS Omaha/Valley, NE Cont.

The damage created by the flooding and broken ice jams was tremendous. Bridges were swept away. Roads were torn apart by flooded waters. Homes and businesses were destroyed by water and huge ice chunks. Even the National Weather Service in Valley was affected as a levee broke on the Platte River, and rising flooded waters forced the office to evacuate.

An aerial view of the NWS Omaha/Valley office on March 17th. Flood waters came to within 2" of overtaking the building. Photo by Juston Brazda.

Aerial view of the bridges on the approach to the Elkhorn River bridge. The force of the moving flood waters caused the damage. Photo by the Nebraska State Patrol.

Although the rain and warm temperatures melted nearly all of the snow cover, winter was not done yet. On April 11th, another strong low pressure system brought blizzard conditions with 2-8" of snow over Knox, Cedar and Antelope Counties in northeastern Nebraska. The last snow in Norfolk and Lincoln occurred on **April 11th** when a trace of snow fell. A trace of snow fell in Omaha on **April 28th**. The last day of freezing temperatures in Norfolk occurred on **April 19th**, in Omaha and Lincoln on **April 14th**.

Extreme Northeast Nebraska - NWS Sioux Falls, SD

Extreme northeast Nebraska, including Dakota and Dixon Counties, experienced multiple impactful snow events during the 2018-2019 winter season. The first occurred on **December 1st-2nd** when after a brief period of freezing rain and light icing, heavy snow fell for many hours. Emerson reported 8.0", Concord reported 11.1", and Newcastle reported 6.0". Winds gusted to 30 to 40 MPH, producing areas of blowing snow and reduced visibility below ½ mile making local travel hazardous. The second occurred on **February 16th-17th** with periods of light to moderate snowfall. Emerson reported 6.5" and Newcastle reported 6.3". The area experienced another moderate snowfall two days later on **February 19th-20th**, when Emerson reported 7.5", Wakefield reported 7.0", and 6.5" fell in Concord and Newcastle. Winds were relatively light with this storm. In addition to snowfall, extreme wind chills impacted northeast Nebraska on **January 28th-29th** with 39 below reported at Wayne and 44 below reported at Sioux City.

One of the more impactful storms from last winter did not include snow, but rather excessive rainfall. One to three inches of rain and ongoing snowmelt on top of still frozen ground resulted in ponding of water and flooding across the area on **March 13th-14th**. The mid-April blizzard spared northeast Nebraska, with precipitation falling mainly as rain. Significant amounts of snow and/or ice impacted areas just to the north across southeast South Dakota into northwest Iowa.