

Winter-Ready Northland

Joe Moore
NWS Duluth, MN



Welcome!

Audio Issues?

Can't hear us? Audio breaking up?

You can call in for audio:

Call: +1 (631) 992-3221

Access Code: 885-951-638#

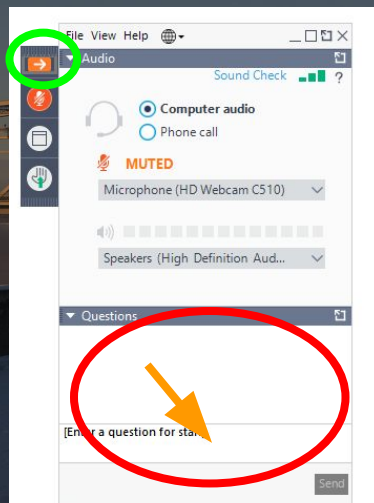
No microphone needed - everyone will remain muted.

Have a question?

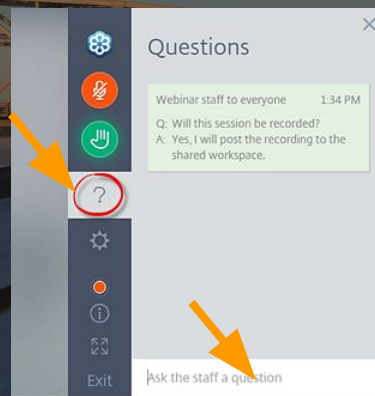
Use the Questions Box [?] to send in

⇒ ALL questions WILL be answered by the end of the class!

PC/Mac



Web App



iOS/Android App



Hello!



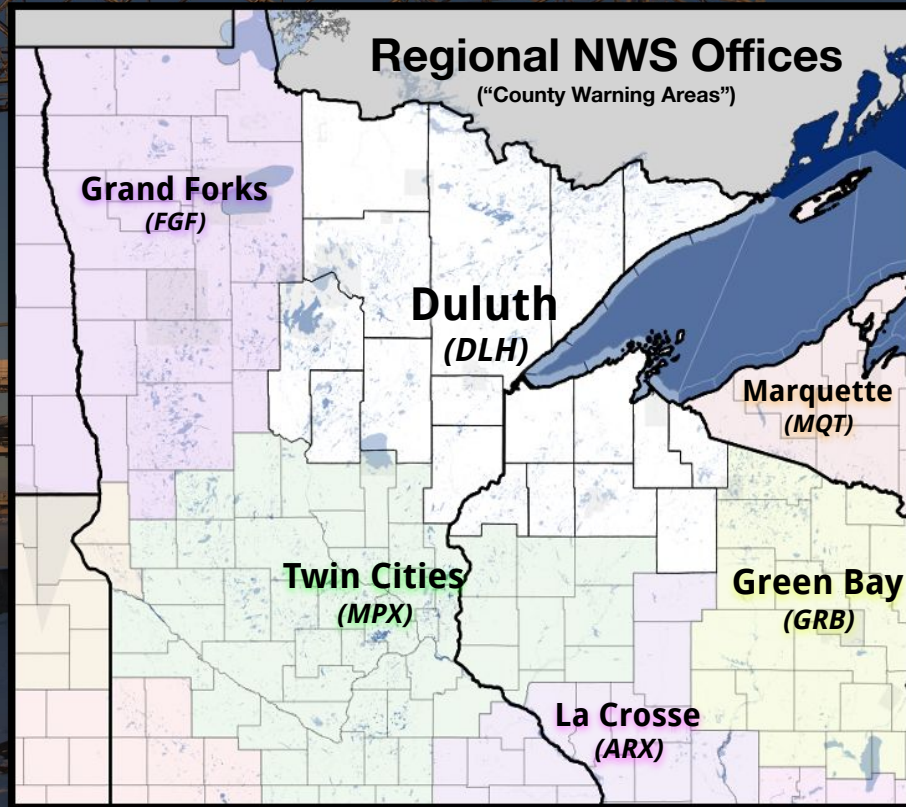
Joe Moore

Warning Coordination Meteorologist (WCM)

- ✓ Have worked at NWS Duluth for 6 years (5 years as forecaster, 1 year as WCM)
- ✓ Previously worked at NWS Goodland, KS (2.5 years) and NWS Headquarters in Silver Spring, MD (1 year)
- ✓ Originally from Philadelphia, PA

Office Overview

- Dedicated team of ~20 staff (~16 meteorologists) focused on northeast Minnesota, northwest Wisconsin, and western Lake Superior
- Locally Staffed 24x7x365
- Public weather forecasts and warnings
- Special services for marine, fire, aviation, and other sectors



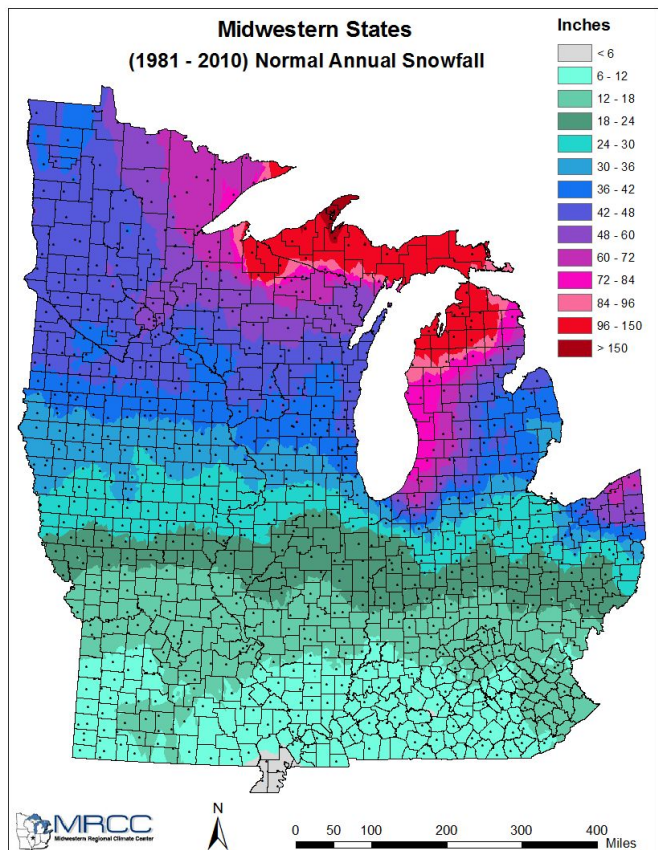
How We're Going to Get You Ready!

1. What's winter like in the Northland?
2. Winter Weather **Safety**
3. The **Science** of Winter Weather
4. **Measuring & Reporting** Winter Weather
5. How to get the **latest forecast!**

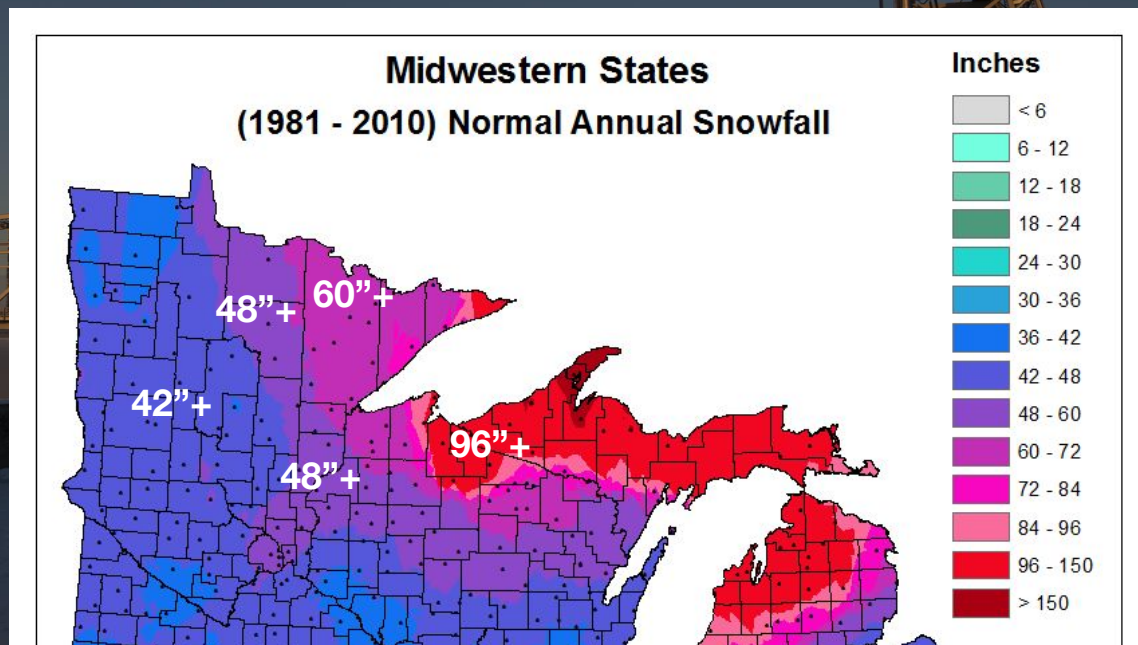
POLL

Will this be your first winter in the Northland?

What's Winter Like? Lots of snow!



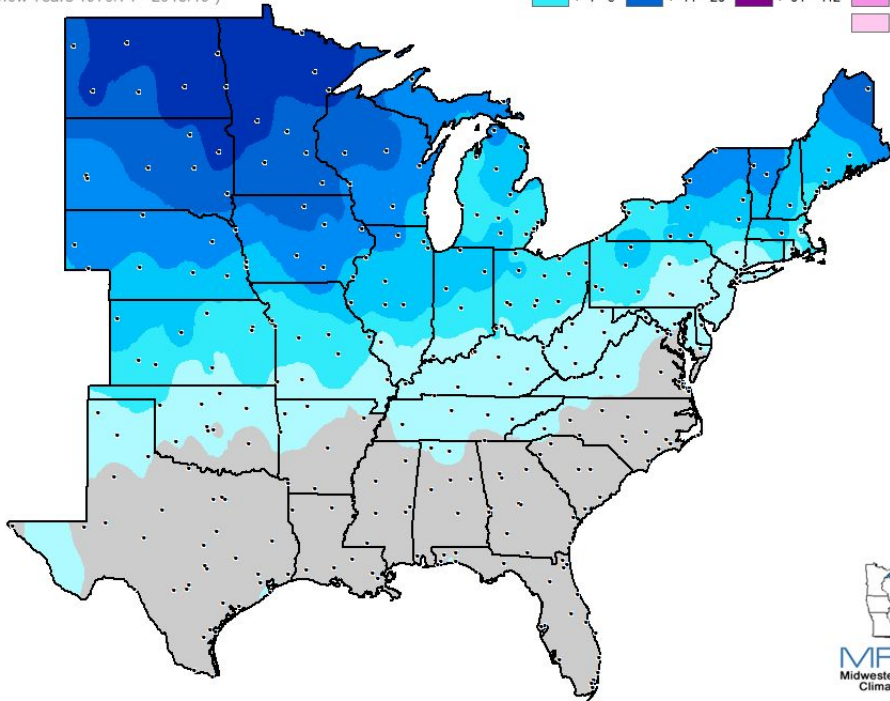
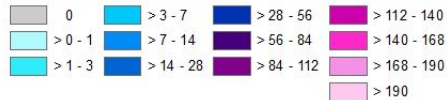
Duluth	Int'l Falls	Brainerd	Hayward	Ironwood
86.1"	71.0"	~43"	~55"	~145"



What's Winter Like? Cold!

Average # of Days with ≥ 1 Hour at Wind Chill $\leq -20^{\circ}\text{F}$
that occurred during Any Month

(Snow Years 1973/74 - 2018/19)



	Duluth	Int'l Falls
Highs 32F or colder	96	97
Highs 0F or colder	6	11
Lows 0F or colder	43	60
Lows -20F or colder	6	18



Winter Weather Safety

Before The Storm: Prepare!

- All winter, be ready for **3 days** “**off the grid**” in case of a major storm
- When a storm is coming, ensure your supplies are stocked up!



Preparing Your Vehicle

- If you must venture out in winter weather, be prepared in case you get stranded!
- Fill up your gas tank before the storm in case of power outages



CELL PHONE,
CHARGER



FIRST AID KIT



JUMPER CABLES



TIRE CHAINS
OR SNOWTIRES



FLARES

BUILDING AN EMERGENCY SUPPLY KIT FOR YOUR CAR



WATER,
SNACKS



FLASHLIGHT



BOOTS, MITTENS,
WARM CLOTHES



BLANKET



TOW ROPE



SHOVEL,
ICE SCRAPER,
SNOW BRUSH

WHY?

BECAUSE YOU NEVER
KNOW WHEN YOU WILL
ENCOUNTER WINTER WEATHER
OR AN EMERGENCY ROAD
CLOSURE.

AMERICA'S
PrepareAthon!

BE SMART. TAKE PART. PREPARE.



FULL TANK
OF GAS



BAG OF SAND
OR CAT LITTER

During The Storm

- **Stay put!** Fewer cars on the road means roads get cleared faster
- Be careful with alternate heat sources like wood-fire stoves and candles - they're a major contributing factor in **fires**



Indoor Winter Safety

Check your smoke/carbon monoxide (CO) detectors. The danger of CO poisoning is greater during the winter when doors and windows stay closed and fireplaces and gas heaters are in use. You can also be exposed to deadly CO levels when “warming up” your car in the garage or when snow covers your tail pipe.

Stay put during the storm!

2019 Thanksgiving Blizzard (Cloquet Police Dept)



NOAA | National Weather Service Duluth, MN



After the Storm

- Take it easy - take **frequent breaks** and **stay hydrated**
- Stay **warm** and **dry**!
- Be neighborly



4 / 15 Surrounded by snow, a car is immobile on East Fifth Street in Duluth after a blizzard on Sunday, Dec. 1, 2019. (Submitted photo)



Ashland, WI
2013 December 23rd
-Photo Courtesy Rick Olivo/Ashland Daily Press

Hypothermia Danger

Hypothermia is an abnormally low body temperature

Who's most at risk?

- Older adults with inadequate food, clothing, or heating
- Babies sleeping in cold bedrooms
- People who remain outdoors for long periods - homeless, hikers, hunter, etc.
- People who drink or use illicit drugs

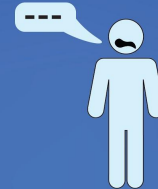
Warning Signs of Hypothermia



Confusion



Shivering



Difficulty
Speaking



Sleepiness



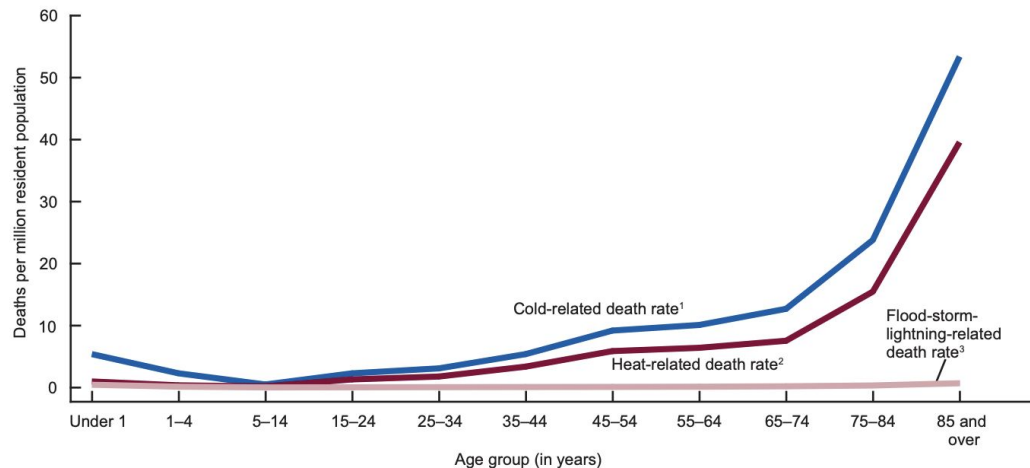
Stiff
Muscles

weather.gov/winter



Hypothermia Kills

In extreme cold, check on your neighbors & family!



¹Deaths attributed to exposure to excessive natural cold (X31) (underlying or contributing cause of death or both), to hypothermia (T68) (contributing cause of death), or to both, according to the *International Classification of Diseases, 10th Revision*.

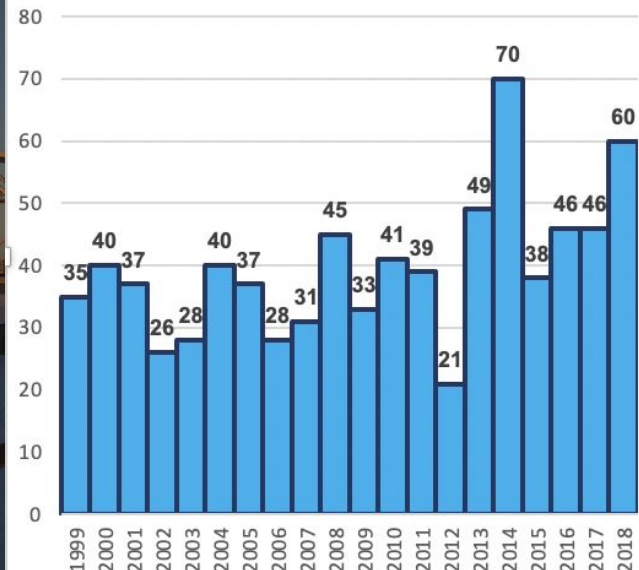
²Deaths attributed to exposure to excessive natural heat (X30) (underlying or contributing cause of death or both), to heat stroke or sunstroke (T67) (contributing cause of death), or to both, according to the *International Classification of Diseases, 10th Revision*.

³Deaths attributed to floods (X38), cataclysmic storms (X37), or lightning (X33) (underlying or contributing cause of death or both), according to the *International Classification of Diseases, 10th Revision*.

SOURCE: CDC/NCHS, National Vital Statistics System, 2006-2010.

Figure 1. Crude death rates for weather-related mortality, by age: United States, 2006-2010

MN+WI Hypothermia Deaths



Data: CDC WONDER dataset

Frostbite danger

Frostbite is a type of injury caused by freezing. It can lead to loss of feeling and color of skin along with permanent damage to the body.

Signs of frostbite:

- White or grayish-yellow skin
- Skin feels unusually firm or waxy
- Numbness



Wind Chill Chart



Wind (mph)	Temperature (°F)																			
	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

Wind Chill Advisory = Frostbite in 30 minutes
Wind Chill Warning = Frostbite in 10 min or less!

SPOT

FROSTBITE

A victim is often unaware of frostbite because frozen tissue is numb.



Signs & Symptoms

- Redness or pain in any skin area may be the first sign of frostbite.

Other signs include:

- a white or grayish-yellow skin area
- skin that feels unusually firm or waxy
- numbness

Usually OK to do
e-visit or walk-in clinic
for treatment

HYPOTHERMIA

Hypothermia often occurs at very cold temperatures, but can occur at cool temperatures (above 40°F), if a person is wet (from rain, sweat or cold water) and becomes chilled.



Signs & Symptoms

Adults:

- shivering
- exhaustion
- confusion
- fumbling hands
- memory loss
- slurred speech
- drowsiness

Infants:

- bright red, cold skin
- very low energy

CALL 911!



If a person's temperature is below 95° get medical attention immediately.

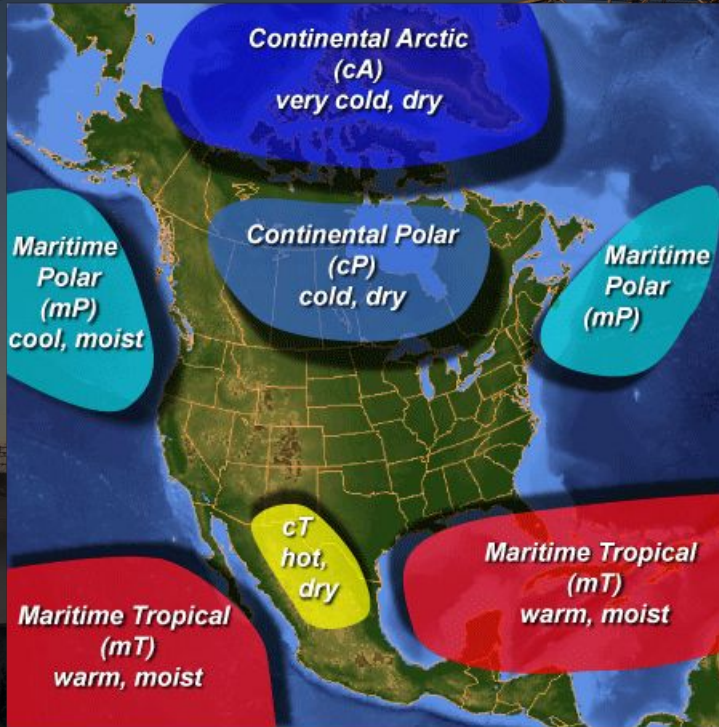
Top 5 Tips to Stay Safe in Winter

1. Wear appropriate clothing - layers are best, cover your head and hands, and stay dry
2. Be ready for living 3 days off the grid anytime!
3. If you notice signs of frostbite or hypothermia, take action immediately!
4. Stay tuned to the latest forecast - it WILL change!
5. When a winter storm is happening, stay put!



Winter Weather Science

Air Masses of Winter



- Our typical air mass is Continental Polar (**cP**) - dry and cold, but not as cold as the arctic (**cA**)
- For snowfall, we often get moisture from the Maritime Polar air (**mP**) of the Pacific Ocean or from the Maritime Tropical air (**mT**) of the Gulf of Mexico

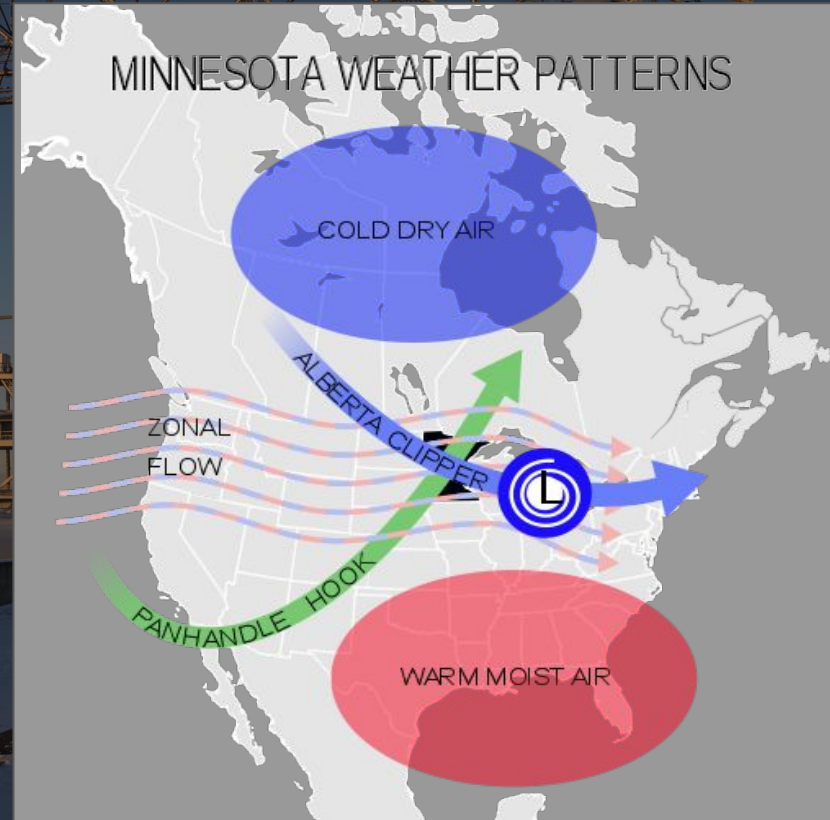
Big Picture: Winter Storm Tracks

“Clipper”

- More Common
- Light amounts (usually)
- Lake effect (south shore)

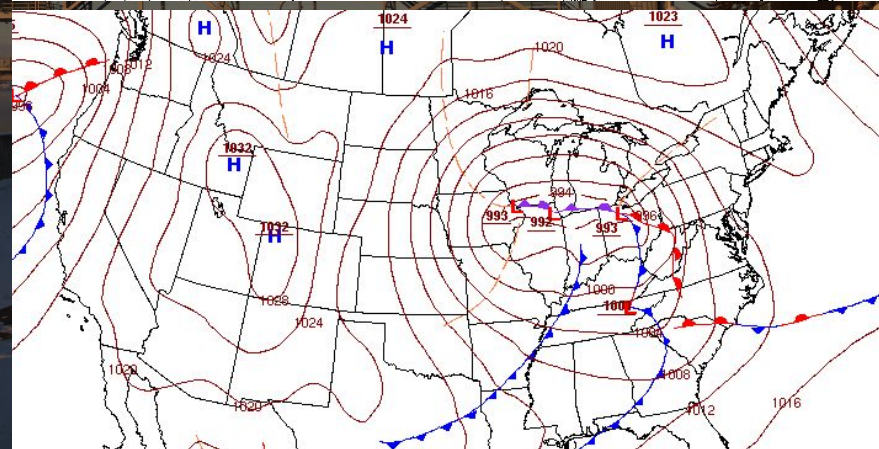
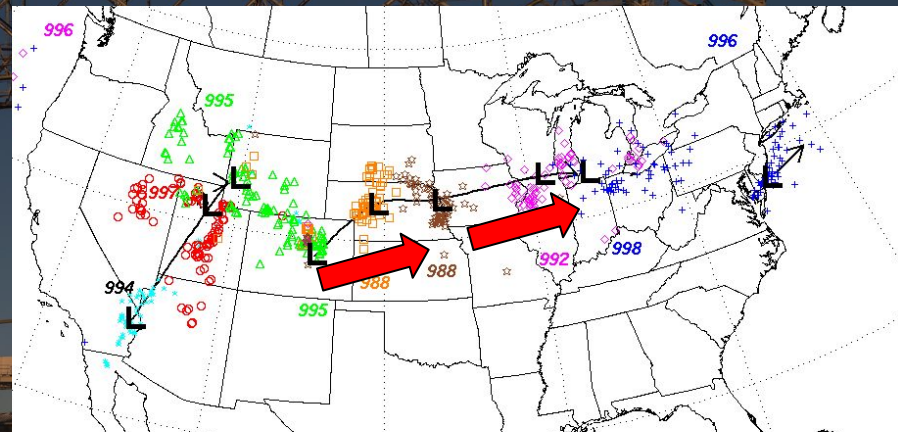
“Panhandle Hook” (Or “Colorado Low”)

- Less Common
- Potential for higher amounts
- Warm southerly flow can result in mixed precipitation types



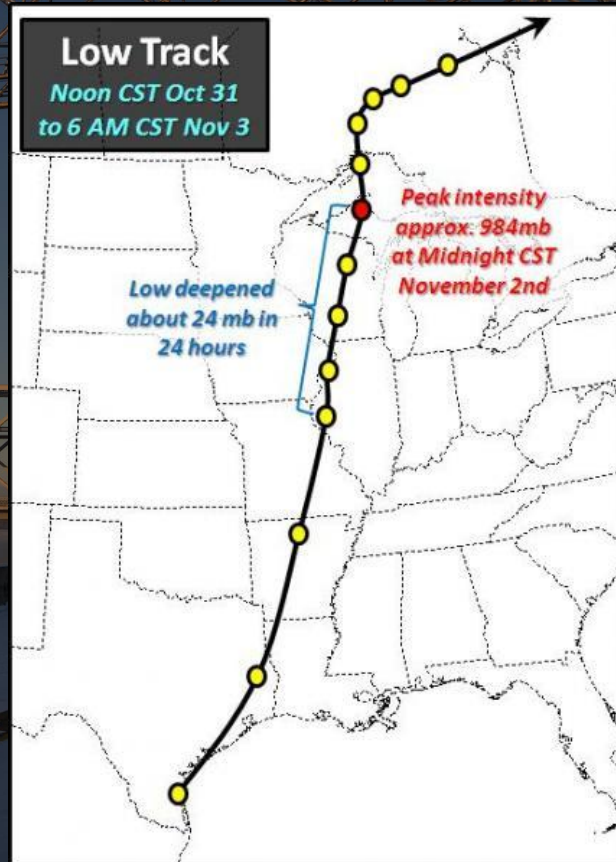
Example: 2019 Thanksgiving Blizzard

- **21.7"** in Duluth
- A fairly typical "Colorado Low" track
- Low location allowed for a long period of strong northeast winds across western Lake Superior



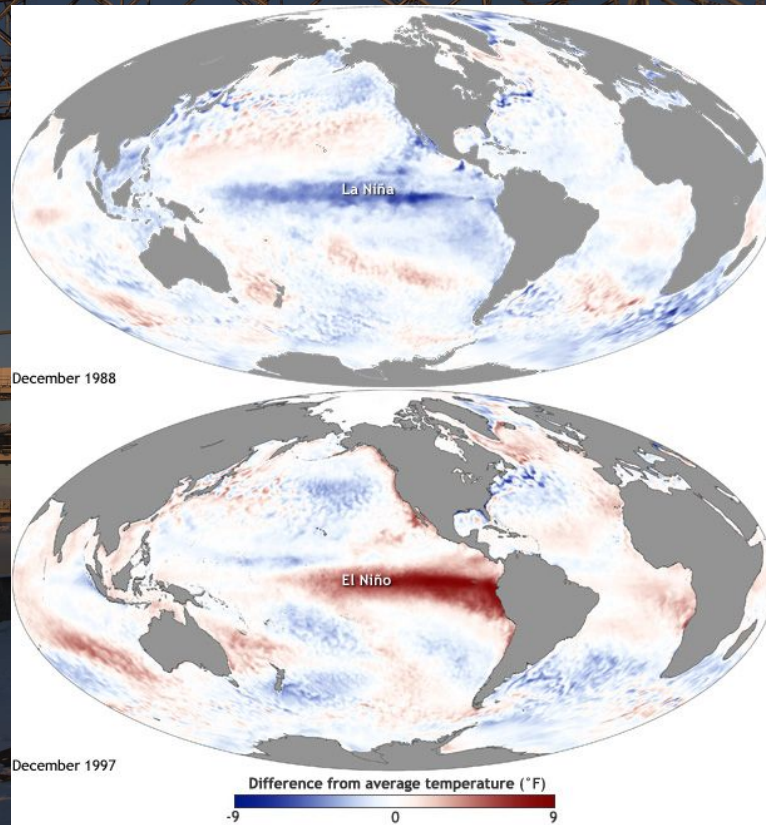
Example: 1991 Halloween Blizzard

- 36.9" in Duluth
- More of a true “hook” storm track
- Rapidly deepened as it approached Lake Superior
- Brought rich Gulf of Mexico moisture along with it



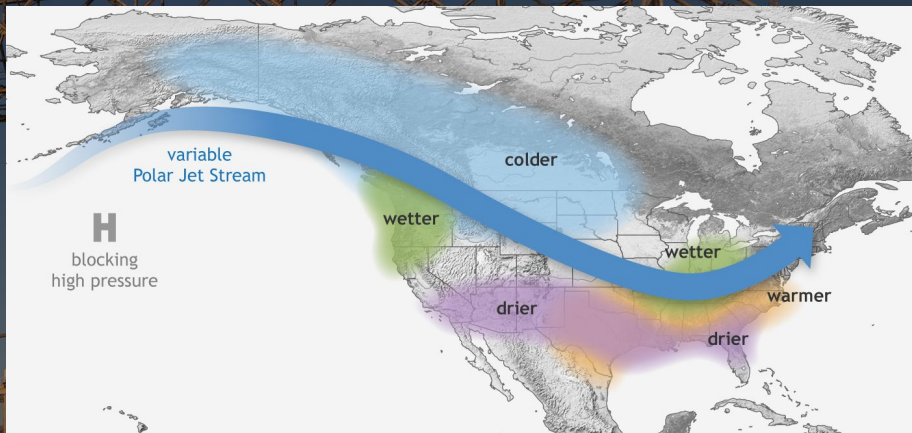
El Niño & La Niña?

- **El Niño** and **La Niña** are an ocean-atmosphere phenomena driven by water temperatures along the Equator in the Pacific Ocean
- Change in water temperature changes where jet stream(s) set up, influencing temperature and precipitation patterns



This Winter Favors La Niña

- Typical impacts for us:
 - General increased “storminess” → more storms, more chances for **precipitation** (yes, more **snow**!)
 - Increased frequency of significant **cold-air outbreaks** (but not always cold all winter long)
- These are typical impacts, but every winter is unique!

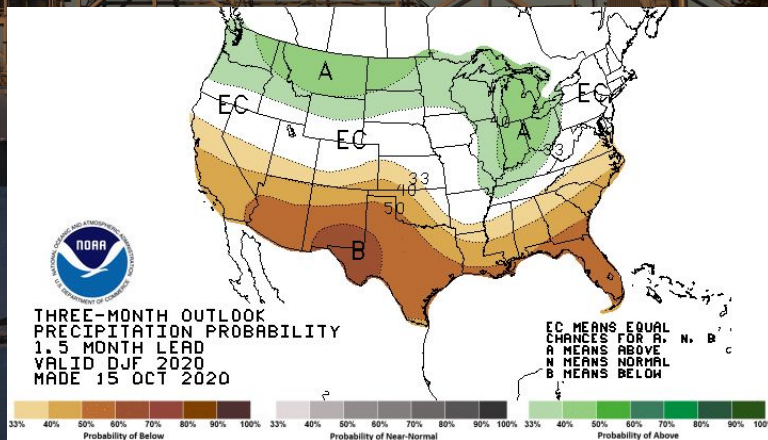
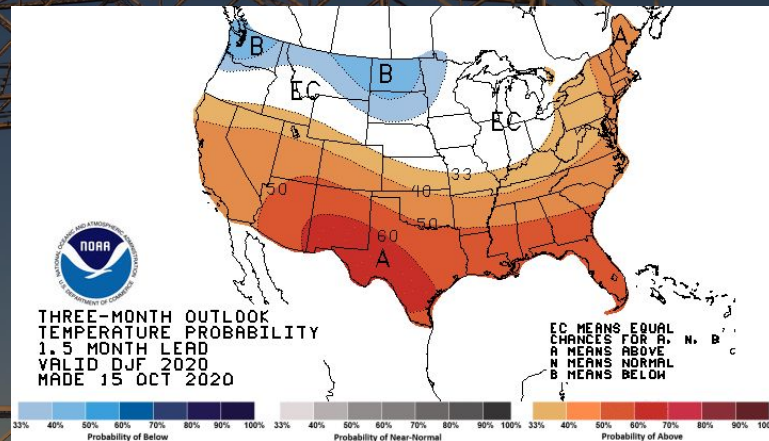


Year	Strength	DJF Temps	Precip	Snow
2017-2018	Weak	-2.75°F	+0.28"	-1"
2016-2017	Weak	+4.75°F	+2.12"	+3"
2011-2012	Moderate	+7.75°F	-0.57"	-15"
2010-2011	Strong	-1.85°F	+0.59"	-8"
2008-2009	Weak	-4.8°F	+0.54"	+6"

Winter Outlook

🌡️ **Temperatures:** Overall near normal BUT occasional arctic air outbreaks with frigid temps

💧 **Precipitation: Above Normal** This could be above-normal snowfall OR just more “wet” snow events



Winter Precipitation

Rain: All liquid

Freezing Rain: Liquid rain that freezes on ground (often occurs as **freezing drizzle**)

Sleet: Hard, translucent balls of ice (Almost like teeny-tiny hail - they bounce!)

Snow: Ice crystals (frozen)

Winter Precipitation Types



Springfield
Forecast Office



Cold Rain

Freezing Rain

Sleet

Snow

Lesser Known Winter Precip Types

Graupel: Snowflake that collects supercooled water droplets on its surface - white, soft, and crumbly

Diamond Dust: Suspended ice crystals, Common in VERY cold conditions

Wintry Mix: A catch-all term for any and all types of wintry precipitation



"Graupel" vs. "Hail" vs. "Sleet"

What Do These Terms Mean?

Graupel



Heavily-rimed snow particles or snow pellets that can be irregularly-shaped. Riming process acts to "glue" snow crystals together and rain or partial melting adds an icy outer layer. Graupel is usually less than 5mm in diameter and is typically white, soft, and crumbly and resembles snow more than hail or sleet.

Hail



Hail forms via convective processes that exist in showers and cumuliform clouds. Hail tends to be opaque/white while sleet is usually more transparent. Generally, if a "ball of ice" is greater than 5mm in diameter, it is considered hail as only convective processes would allow for such growth of the ice.

Sleet



A hard, translucent ball of ice less than 5mm in diameter that bounces when it falls may be called sleet if it is formed by the refreezing of liquid raindrops or partial melting of a snowflake. This can occur via convective processes (when in a shower there is partial melting) or stratiform processes (i.e. overrunning of a stationary front).

The term "ice pellets" may be used to describe either small hail or sleet, but not graupel.

weather.gov/iln

[@NWSWilmingtonOH](https://www.facebook.com/NWSWilmingtonOH)

[/NWSILN](https://www.youtube.com/channel/UCNWSILN)

[YouTube /NWSWilmingtonOH](https://www.youtube.com/channel/UCNWSILN)

10/25/2017 10:12 AM

Not all snow is the same...

Rain

Wet Snow

Normal/Usual Snow

Dry Snow

Snow:Liquid Ratio 1:1

5:1

10:1

15:1

20:1

30:1

example: 10:1 means 10" of snow has 1" of liquid if you melt it

"Concrete"

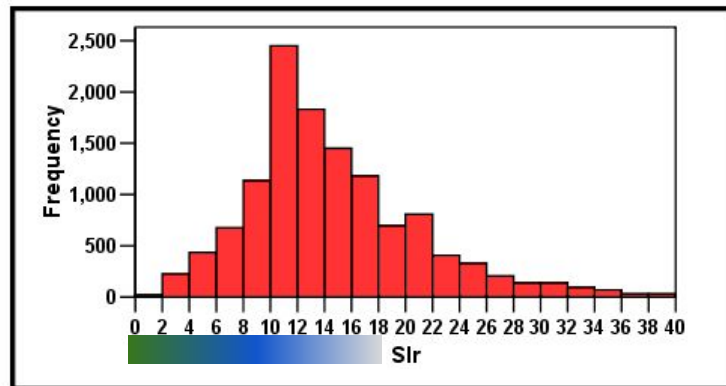


Powder

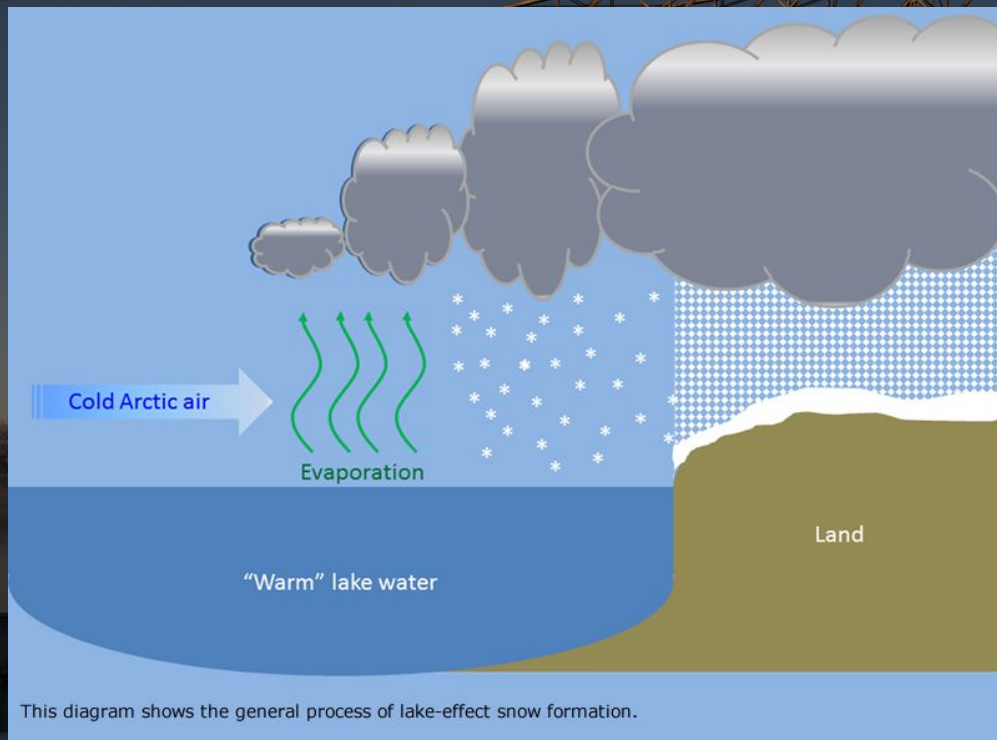


Most Duluth snowfall is between 10:1 and 15:1

Lake effect snowfall is more light/powdery (higher ratio)



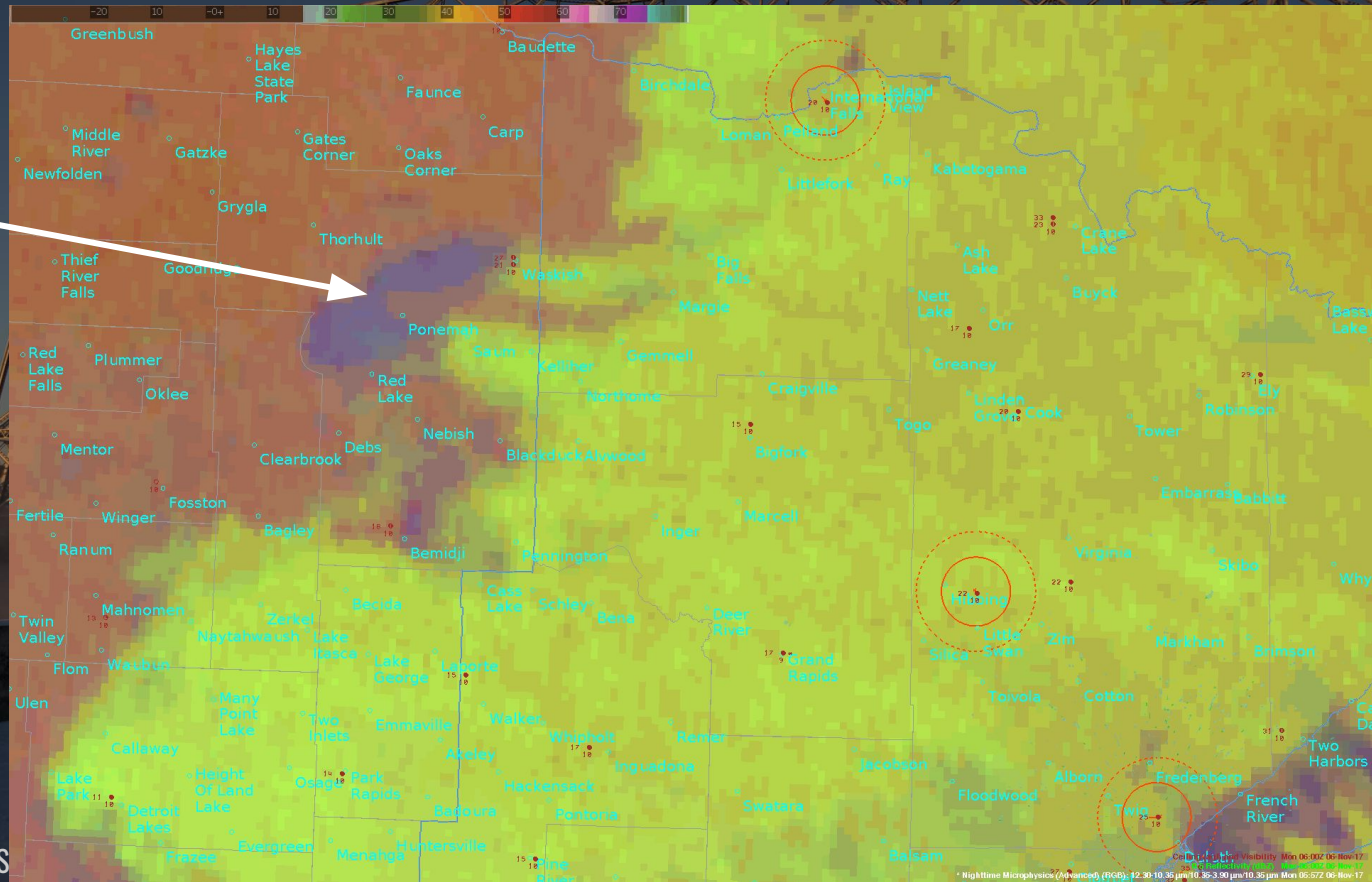
Lake Effect Snow



- Lake effect snow is most common when cold arctic air moves across relatively “warm” lake water
- Can occur on any lake! But typically happens on south shore of Lake Superior due to typical storm patterns
- Usually need a difference of about 13°C (23°F) between the water temp and the low-level air

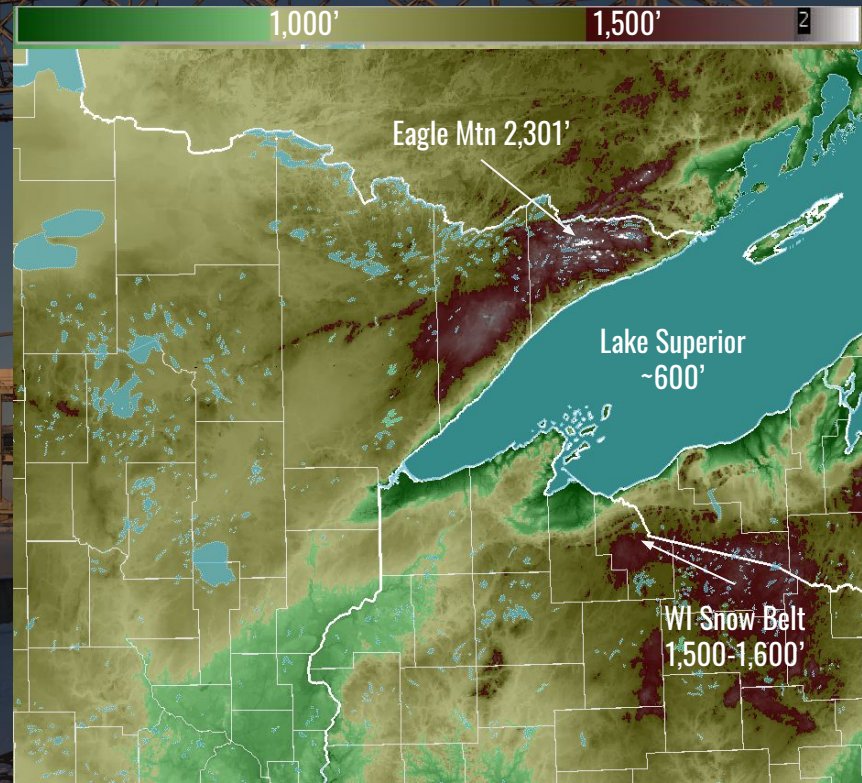
Inland Lake Effect Example

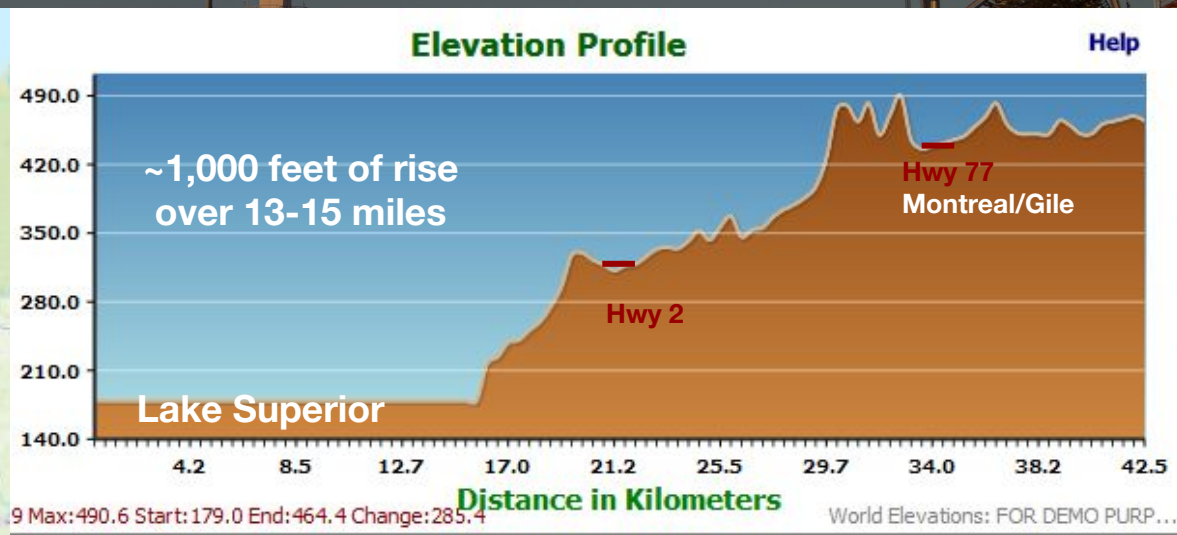
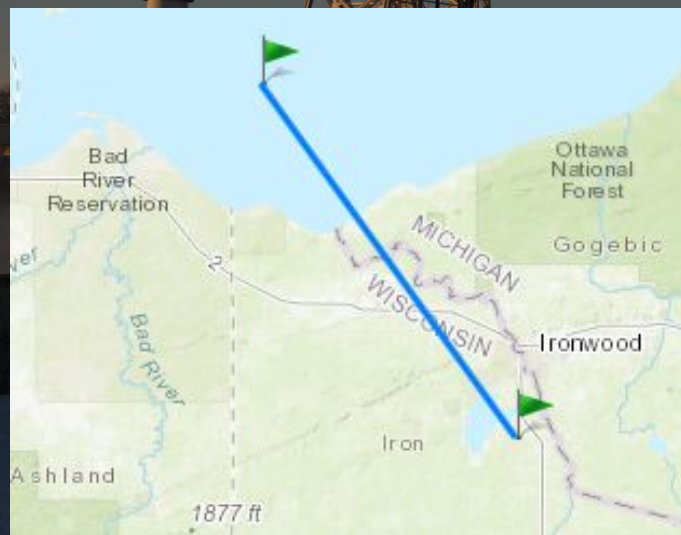
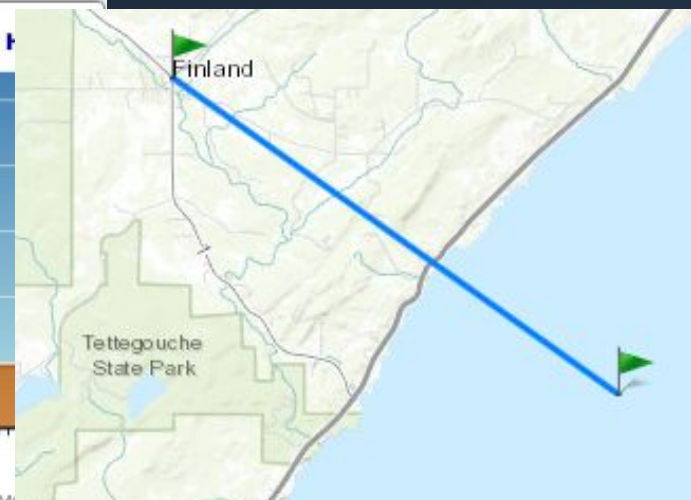
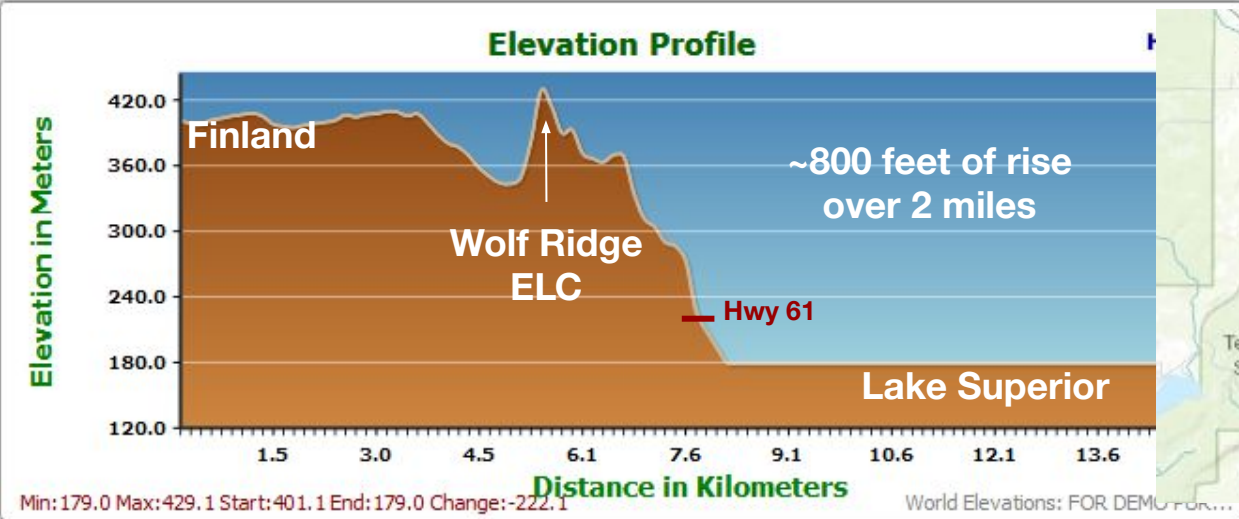
Red Lake



Steep Terrain Enhances Lake-Effect

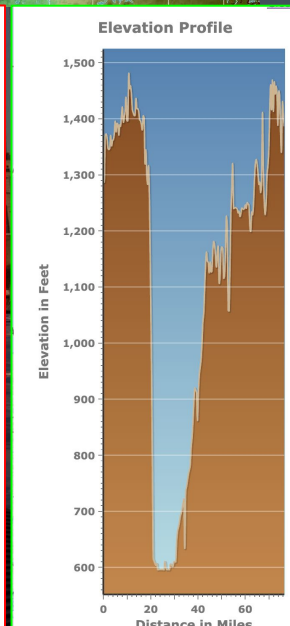
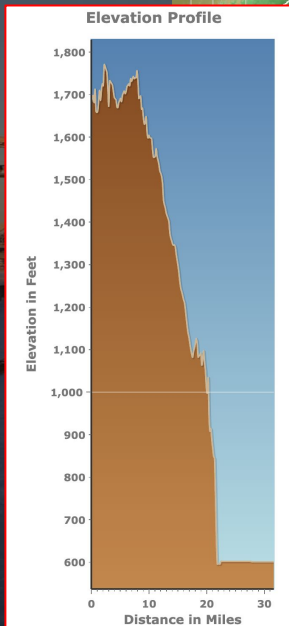
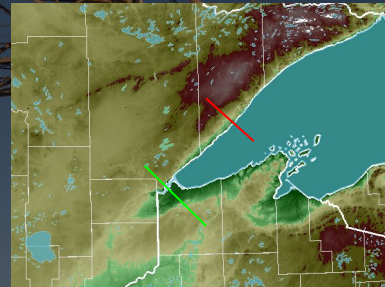
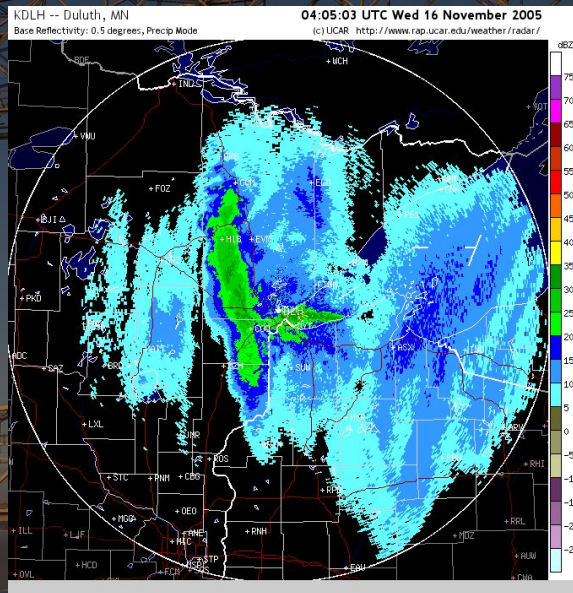
- Steep rise in elevation around the lake aids in precipitation development and intensity through **orographic lift**





“Gravity Wave” Snow Band

- While it may seem like lake-effect at first glance, it's actually driven by the higher elevation change (slope) of the terrain
- May shift back/forth across Douglas/Bayfield counties
- Sometimes snowfall band reaches as far west as Pine County MN!



Gravity Waves on satellite imagery

**Lake effect clouds help visualize the waves*

GOES VISIBLE SATELLITE 4 JAN 17 19:00

Auto-Refresh Disabled



Measuring Winter Weather

...And Reporting It!

Snowfall Measurement

You Will Need...

1. Ruler/Measuring Stick
2. Snow Board (2'x2' plywood painted white)
3. Flag/reflective marker (to find the snow board!)
4. Standard 4" Rain Gauge (Optional, ~\$40, Visit cocorahs.org)

Good



36" Yardstick

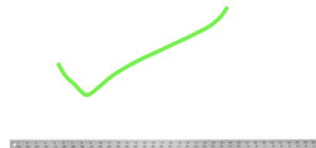
☐ Compare ☐ Add To List

Sku # 2441500

\$0.87

You Save \$0.11 After Mail-In Rebate

Better



36" Aluminum Yardstick

☐ Compare ☐ Add To List

Sku # 2441493

\$2.22

You Save \$0.27 After Mail-In Rebate

Where to measure snowfall?

- Open area away from obstructions (trees, buildings, etc.)
- Ideally twice as far as obstruction height (i.e. Two-story home is 25' tall, so board should be 50' away)
- *Do your best!*



POLL: Where to measure snowfall?

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- *Do your best!*



Measurement Location FAQs

Q: Can I just measure on my deck/patio?

A: Sometimes - if there was little wind/drifting it might be OK, but measure from a surface at least 2'x2' (No deck railings!)

Q: Will I always measure snowfall in the same spot?

A: Not necessarily. Find a place where snow is least drifted and about average depth for the location. Use your best judgement.

Snowfall Vs. Snow Depth

How much snow fell
since last measurement

Inches (tenths) - i.e. 3.4"

Usually measure ~7am
each morning OR at the
end of a storm

How deep is the
snowpack?

Inches (whole) - i.e. 8"

Snowfall How To

- 1) Take a few measurements, ideally on a **snow board**

No snow board? OK to use other surfaces, but take a few measurements and be aware of possible measurement errors



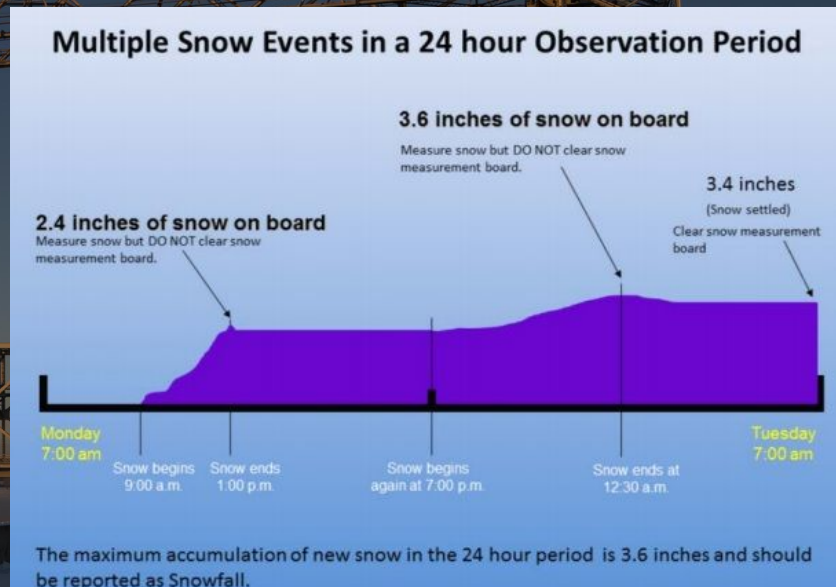
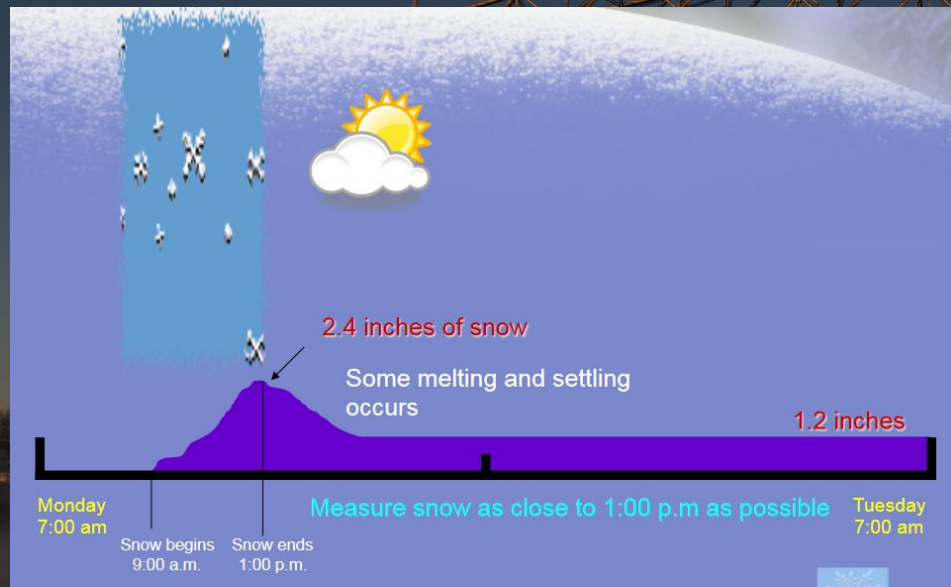
Snowfall How To

2) Clear **snow board**

Only once per day OR
at the end of the
storm - do not clear
often or your
measurement will be
too high



Snowfall Measurement Challenges



We want the maximum snowfall accumulation for the day (or entire storm).
NO DRIFTS!!!!

Ice (Freezing Rain)

- Ice is incredibly difficult to measure - *but you can do it!*
- Report:
 - Measurement of ice (Tenths of an inch)
 - Where you measured
 - Any impacts

Two Types of Ice:

1) Flat Ice



Ice on elevated surface like deck railing. Ideally surface is flat. Measure thickness to tenth of an inch.

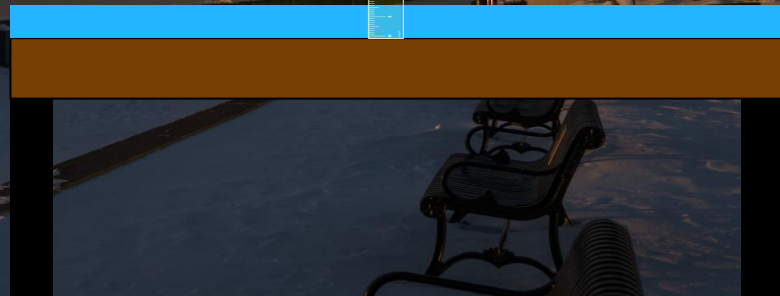
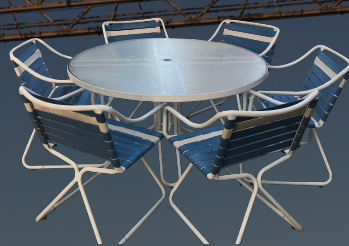
2) Radial Ice



Measure the radius of ice on the branches. Take a few measurements and report the average.

Flat Ice Measurement

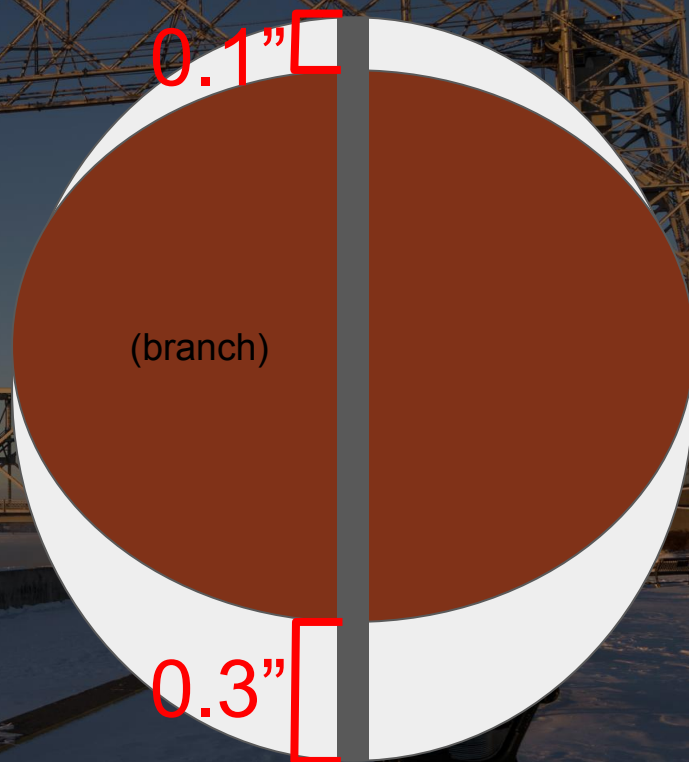
1. Find elevated flat surface with ice
2. Measure to the tenth of an inch (*estimate if your ruler has 1/8th or 1/16th marks*)
3. Repeat on other surfaces - take an average
4. Report to NWS (*More details are better, pics are great!*)



Radial Ice Measurement

Average = 0.2"

Too small to measure?
Just a report a glaze of
ice!



Share your report with NWS

Report Everyday

Best Option: Become a regular reporter by joining CoCoRaHS!

Enter report into CoCoRaHS website or App

OR

One-Time Reports

★ **NWS Online Storm Report Form:**
<https://inws.ncep.noaa.gov/report/>



nws.duluth@noaa.gov



Social Media



218-729-6697



**Don't forget to include
your location!**



Photos welcome!

Winter Reporting Tips

- Be safe!
- An estimate is better than no report at all (but tell us if it's an estimate!)
- We are always happy to help if you have questions
- We appreciate each and every report!



Join CoCoRaHS!

- **The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS)** is a non-profit organization sponsored by NOAA
- Standard equipment and reporting time
- Easy to send daily reports via website or a free app
- Your reports will be used well beyond our office
- Volunteers of all ages welcome
- Training/help available!





POLL

Have you heard of CoCoRaHS?

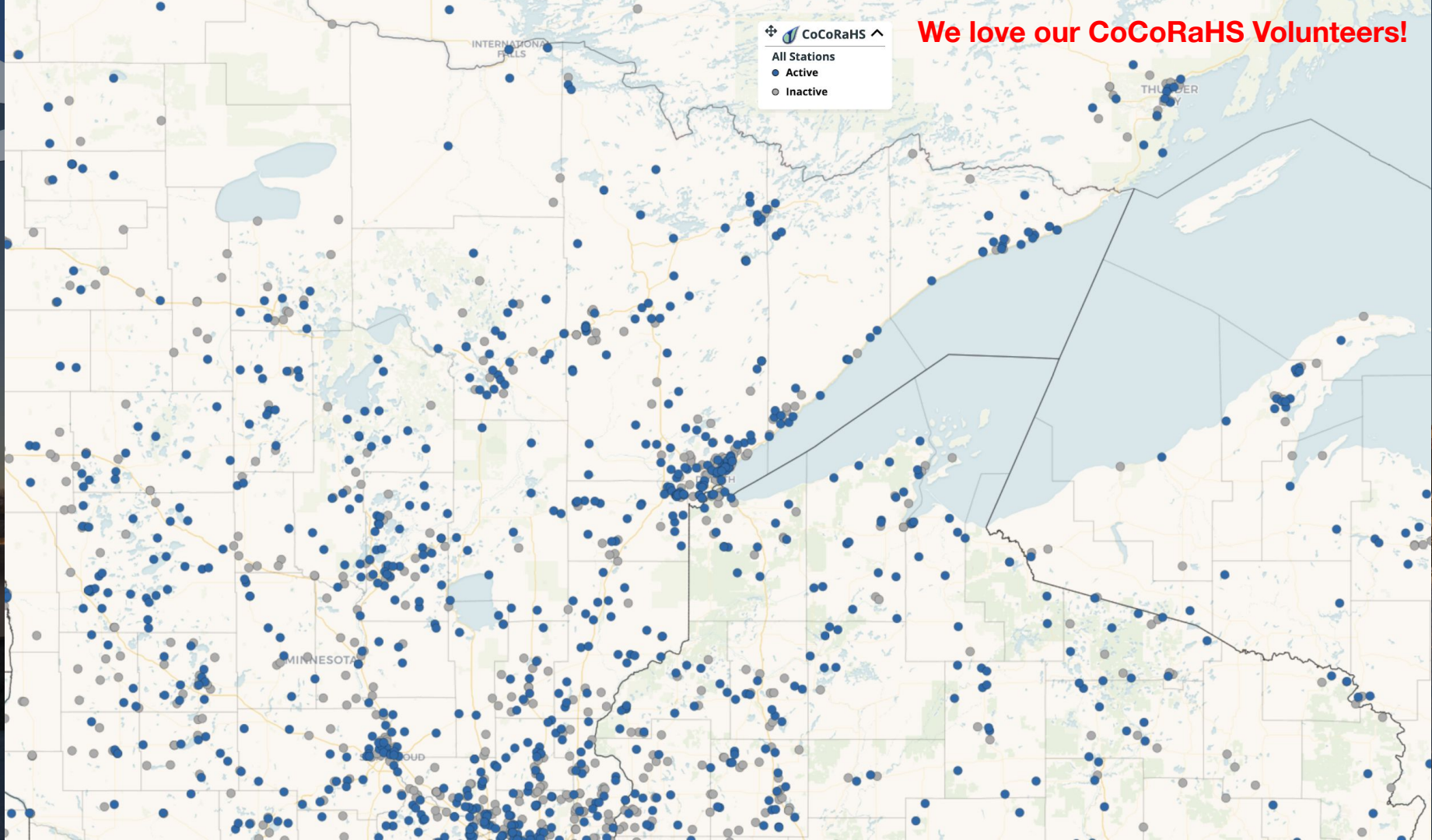
CoCoRaHS ^

All Stations

● Active

● Inactive

We love our CoCoRaHS Volunteers!



A large steel truss bridge, likely the A. W. C. Brown Bridge, spans a body of water. The bridge's intricate steel lattice structure is prominent. To the left, a small lighthouse stands on a rocky outcrop. The foreground shows a snowy walkway with several black metal benches. The sky is a clear, pale blue, suggesting a bright day. The overall scene is a winter or early spring setting in Duluth, MN.

Keeping up with the Forecast

NWS Terminology

Statement	FYI - Some kind of localized/minor weather issue
*Advisory	Use Caution - Minor Disruptions



**We may get rid of the “Advisory” term due to confusion - survey happened this summer, announcement for official proposal coming in November*

Winter Hazard Products

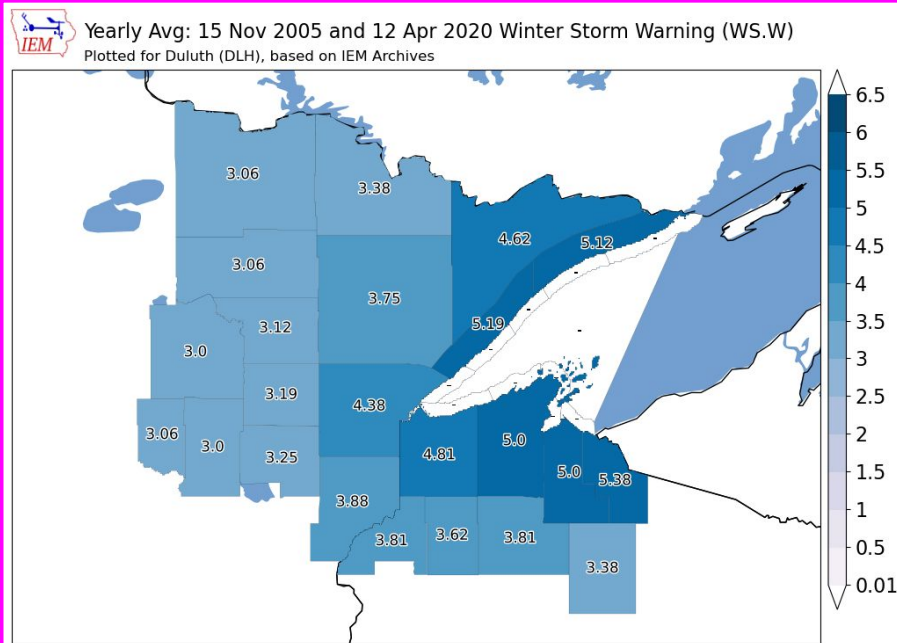
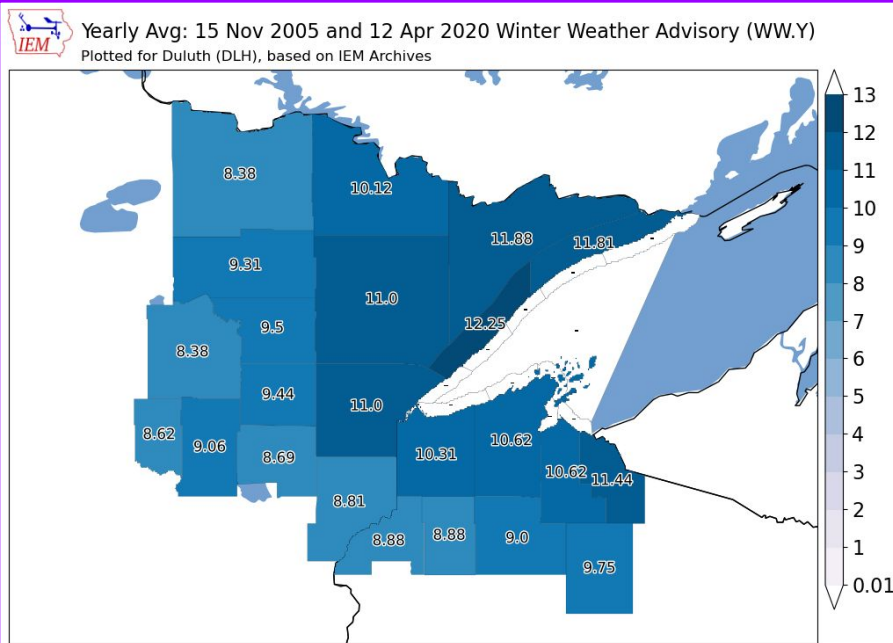
COLD-SEASON WEATHER	**Average # per Year	THRESHOLDS
WINTER STORM WARNING For snow, sleet, or mixed hazards	8-10	Winter storm with more than one hazard or only heavy snow (6"+ within 12 hrs , or 8"+ within 24 hrs), or a combination of wind-driven snow, sleet and/or freezing rain
BLIZZARD WARNING	0-1*	Sustained winds or frequent gusts ≥35 mph <u>and</u> visibilities < 1/4 mile due to falling or blowing snow for ≥3 hrs
ICE STORM WARNING	0-1*	Ice accumulations ≥ 1/4 inch
WIND CHILL WARNING	2-4*	Wind chills ≤ -40° with winds > 4 mph (i.e. for any wind other than calm)
WINTER WEATHER ADVISORY For: snow, snow and blowing snow, blowing snow only, sleet, or mixed	15-20+	Winter event with more than one hazard or only snow (3-5" in 12 hrs, or 5-7" in 24 hrs) , or a combination of wind-driven snow, sleet and/or freezing rain, or sleet accumulating < 1/2 inch
WIND CHILL ADVISORY	14-16	Wind chills -25° to -40° with winds > 4 mph (i.e. for any wind other than calm)

★ Forecasters may deviate from these thresholds if impacts warrant, such as holiday travel or particularly dangerous conditions during commute hours.

*Many seasons have none!
 **For our office, not just the Twin Ports

What to expect?

Twin Ports: 10-12 “Winter Weather Advisories” & 3-5 “Winter Storm Warnings”



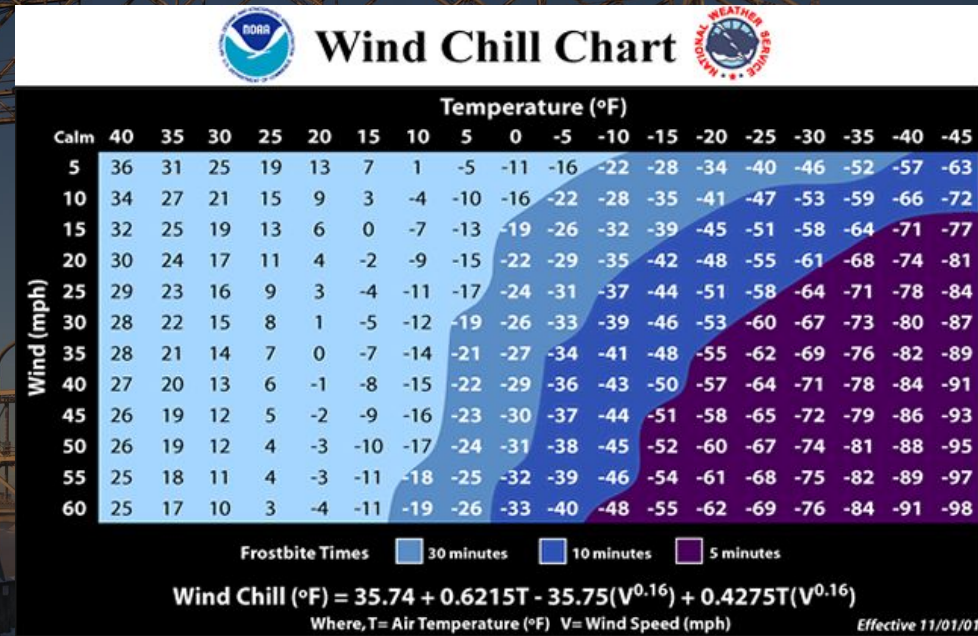
Wind Chill Hazards

Wind Chill Advisory

- Wind Chill -25 to -40F
- Frostbite time 15-30 minutes
- Common: 10-12/year

Wind Chill Warning

- Wind Chill -40F or colder
- Frostbite time 10 minutes or less
- Rare: 0-3/year



Criteria is to reach these values for only an hour, but each warning is unique - we can provide details like hours below -40F wind chill.

Snow Squall Warning

What is it? (Criteria)

- ★ A short period of time (30-60 minutes) with **rapid reduction in visibility due to snow** and **sub-freezing road conditions** in otherwise benign conditions (i.e. sunny day)

Why?

- ★ The **near-zero visibility** combined with **cold or rapidly falling temperatures** can cause roads to quickly become snow-packed and icy
- ★ Sudden onset of these conditions causes dangerous multi-vehicle crashes

- **New product** as of last winter
- Snow Squall Warnings are short-fused:
 - ◆ Small Geographic Area
 - ◆ Short Amount of Time (30-60 minutes)
- Think: Like a Tornado Warning, but for quick onset of dangerous blizzard-like conditions
- Will not be issued during Winter Storm or Blizzard Warnings, and unlikely during an Advisory
 - ◆ **SUDDEN** onset of these dangerous conditions in otherwise benign weather



Will “tone alert” weather radios and alert most cell phones via Wireless Emergency Alerts (WEA)

Snow Squall Example

I-35 @ Allworth Bldg (MNDOT)

Snow Squall Warning

Valid Until
8:30 AM CDT Thursday
April 9, 2020

Threat Information



Hazard
White out conditions
in heavy blowing snow

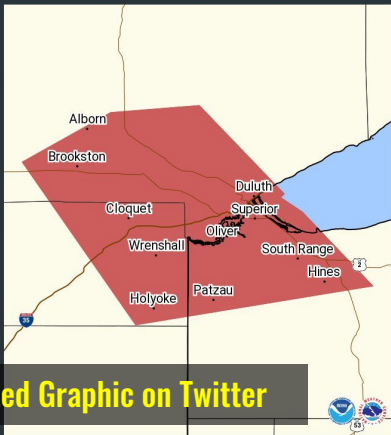


Impact
Dangerous life-
threatening travel

Potential Exposure



Population: 184,046
Highways: I-35
I-535
US-2



Auto-Posted Graphic on Twitter



EMERGENCY ALERTS

Emergency Alert

Snow Squall Warning til 8:30 AM CDT. Sudden whiteouts. Icy roads. Slow down! -NWS

Wireless Emergency Alert (WEA)

NOAA | National Weather Service Duluth, MN

BULLETIN - IMMEDIATE BROADCAST REQUESTED

Snow Squall Warning
National Weather Service Duluth MN
730 AM CDT Thu Apr 9 2020

MNC017-137-WIC031-091330-
/O.NEW.KDLH.SQ.W.0001.200409T1230Z-200409T1330Z/
St. Louis MN-Carlton MN-Douglas WI-
730 AM CDT Thu Apr 9 2020

The National Weather Service in Duluth MN has issued a

* Snow Squall Warning for...
South central St. Louis County in northeastern Minnesota...
Eastern Carlton County in northeastern Minnesota...
Northwestern Douglas County in northwestern Wisconsin...

* Until 830 AM CDT.

* At 736 AM CDT, a dangerous snow squall was located along a line extending from near Hermantown, to near Saginaw, to 7 miles south of Canyon, to near Brookston, to Fond Du Lac Reservation, moving southeast at 25 mph.

HAZARD...Heavy snow and blowing snow. Wind gusts up to 30 mph.

SOURCE...Radar indicated.

IMPACT...Dangerous travel. Visibility will deteriorate rapidly to one-quarter mile or less.

* This includes US Highway 53 between Mileposts 26 and 1 in Minnesota and between Superior and Wentworth in Wisconsin, and Interstate 35 between Mileposts 230 and 259.

Locations impacted include...

Duluth, Superior, Cloquet, Hermantown, Proctor, Scanlon, Carlton, Poplar, Wrenshall, Oliver, Holyoke, Thomson, Brookston, Wisconsin Point, Pike Lake Near Duluth, South Range, Saginaw, Foxboro, Fond Du Lac Reservation, and City of Rice Lake.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Slow Down! Rapid changes in visibility and road conditions are expected with this dangerous snow squall. Be alert for sudden whiteout conditions.



Park Point (INFOS Duluth)

2020-04-09 12:07:15

Before, During, and After the Storm

- weather.gov/duluth →

- 1) Situation Reports
- 2) Official Forecast
- 3) Weather Story Graphics

- NWS Duluth on **Facebook** and **Twitter** (@NWSDuluth)

- Local Media (TV, Newspaper, Radio, Social Media, Apps)

1 Situation Report

2 Official NWS Forecast
(Click on map or enter city/zip)

3 Weather Story Graphics

POLL

Best time for a Facebook Live briefing?

Reliable Weather Sources

- ✓ NOAA/NWS
- ✓ Local Media Outlets
- ✓ National Media Outlets
- ✓ Reliable apps



*“SUPER WX STORM
FORECAST PAGE”* on
Facebook



*“WI XTREME SNOWCAST
EXPERTOLOGISTZZ”* on
Twitter



Some news station in a
far-away state that posted
a crazy snow map

New: Forecast Points (Experimental)

- New way to visualize NWS Forecast - uses the same forecast data as weather.gov
- Click anywhere on map to update forecast
- Scroll through color-coded hourly forecast details
- Can also view radar and hazards on map
- Bookmark desired location and settings

Weekly Summary

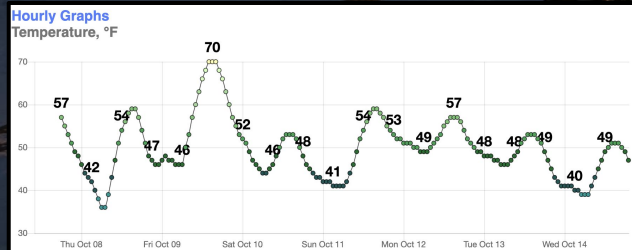
	Wed Oct 7	Thu Oct 8	Fri Oct 9	Sat Oct 10	Sun Oct 11	Mon Oct 12	Tue Oct 13
Max Temp, °F	61	59	72	56	60	58	55
Min Temp, °F	36	36	46	42	39	46	41
Min Wind Chill, °F	45	33	42	38	36	46	35
Max Wind, mph	7	6	12	9	13	9	12
Min Wind, mph	6	3	7	6	8	6	7
Max Wind Gust, mph	20	12	22	16	21	21	20
Max Cloud Cover, %	54	66	83	21	69	75	58
Min Cloud Cover, %	11	4	16	7	19	53	48
Max Prob. of Precip., %	4	13	43	2	22	35	33
Max Prob. of Thunder, %	1	0	21	1	12	12	10
Max RH, %	66	89	83	86	89	89	93
Min RH, %	47	40	55	54	59	62	61
Max Dew Point, °F	38	37	54	43	48	47	44
Min Dew Point, °F	37	32	33	37	38	44	37

Weekly Summary

Hourly Details

Day of week: Friday 10/9

Time:	6M	7PM	8PM	9PM	10PM	11PM	12AM	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM
Weather:	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀
Temperature (°F):	7	54	51	48	47	46	46	47	48	47	47	46	46	46	50	53
Wind Chill, °F:	7	54	49	47	45	43	44	44	44	44	43	43	42	43	47	53
Wind Speed (mph):	5	5	5	5	6	6	7	7	7	7	7	7	7	7	8	9
Wind Gust (mph):	8	7	7	8	10	10	12	12	12	12	12	12	13	14	15	16
Wind Direction (°):	10	160	140	140	140	140	140	140	150	150	150	160	170	180	190	200
Wind Direction:	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀
Prob. of Precip. (%):	5	3	3	3	5	13	34	43	43	43	43	43	43	7	7	7
Prob. of Thunder (%):	0	0	0	0	0	0	0	0	15	21	19	20	16	2	2	2
Precip. Amount (in.):						0.00					0.18					0
Snow (in.):						0.0					0.0					0
Ice (in.):						0.00					0.00					0
Dew Point (°F):	5	34	34	33	32	32	32	33	35	37	37	39	41	45	47	49
RH (%):	3	48	52	55	57	57	56	55	56	61	68	70	77	81	83	80
Sky Cover (%):	4	38	41	47	52	58	66	75	83	82	81	80	77	75	62	59



Hourly Graphs

New: Winter Storm Severity Index (WSSI)

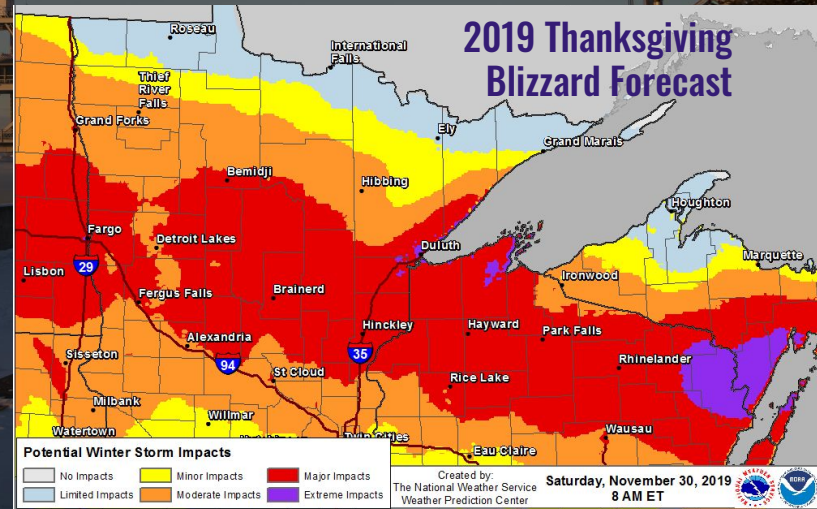
- Combines NWS Forecast & Climatology to convey impact of forecast
- ***More sophisticated than just a snowfall forecast!***
- Can better depict where it will be a “typical” winter storm to a historic/extreme storm, which can vary across the region
- We plan to use these graphics occasionally in our messaging

WSSI Components:

- Snow Amount
- Snow Load (Weight)
- Blowing Snow Possible?
- Ground Blizzard Possible?
- Flash Freeze Conditions
- Ice Accumulation

Potential Winter Storm Impacts

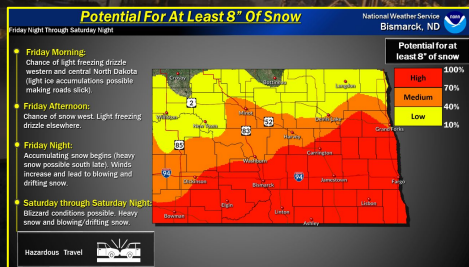
No Impacts	Impacts not expected.
Limited Impacts	Rarely a direct threat to life and property. Typically results in little inconveniences.
Minor Impacts	Rarely a direct threat to life and property. Typically results in an inconvenience to daily life.
Moderate Impacts	Often threatening to life and property, 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.



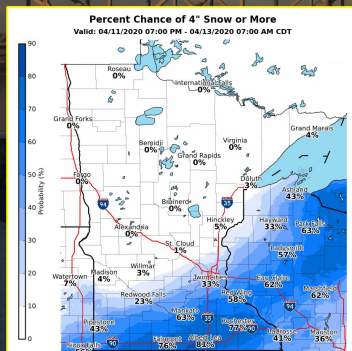
Advanced: Snowfall Probabilities (Experimental)

- ✓ Uses our forecast and 60+ models
- ✓ Low & High End Amounts
- ✓ Probabilities for thresholds (*i.e.* chance for 6" of snow)
- ✓ We'll be experimenting with different ways to communicate this data

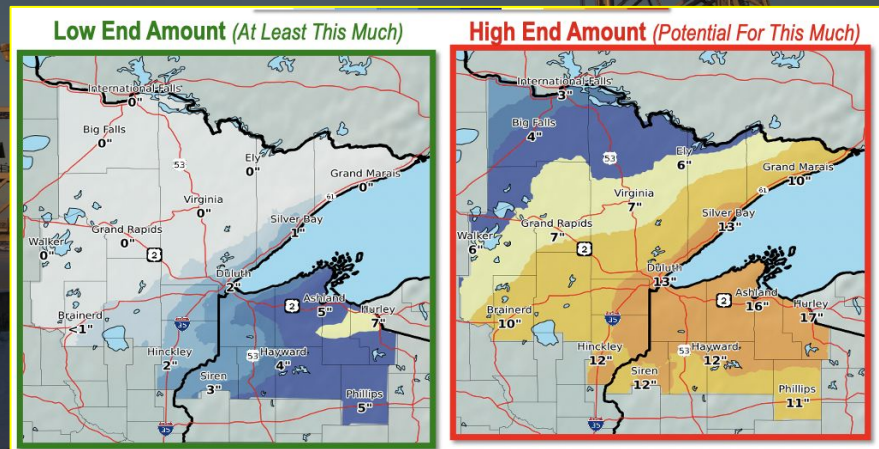
Snow Amount Potential			Chance of Seeing More Snow Than							
Low End Snowfall	Expected Snowfall	High End Snowfall	≥0.1"	≥1"	≥2"	≥4"	≥6"	≥8"	≥12"	≥18"
0	0	0	0%	0%	0%	0%	0%	0%	0%	0%
0	0	0	0%	0%	0%	0%	0%	0%	0%	0%
0	0	0	0%	0%	0%	0%	0%	0%	0%	0%
0	0	0	0%	0%	0%	0%	0%	0%	0%	0%
0	0	0	0%	0%	0%	0%	0%	0%	0%	0%



Vs.

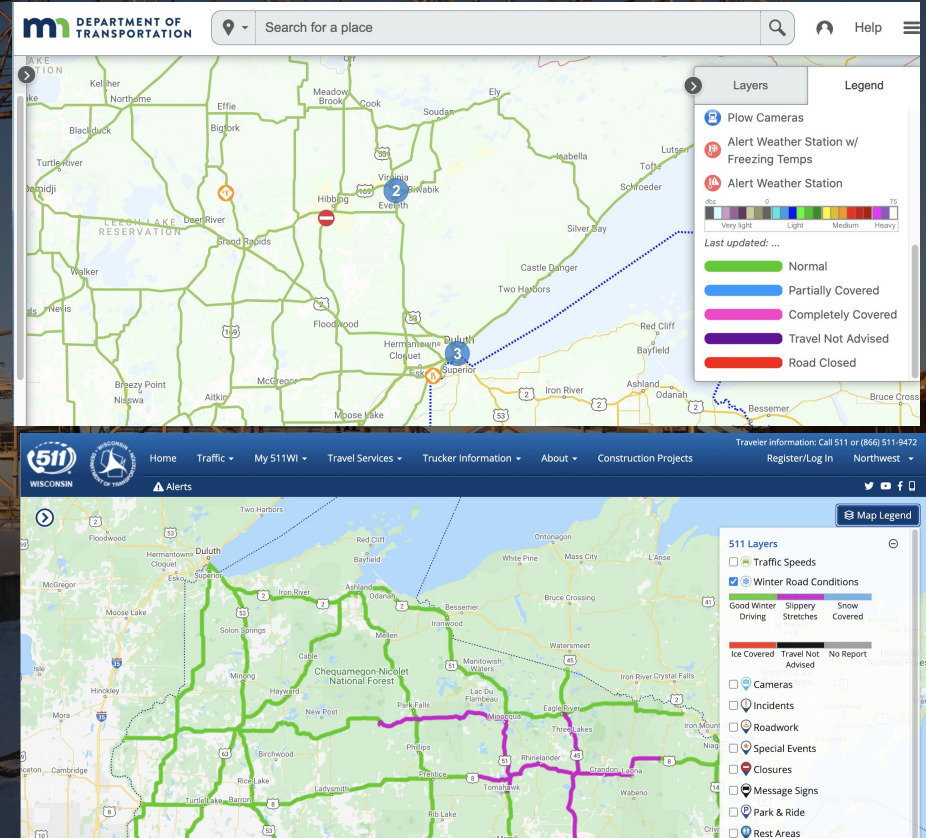


Vs.



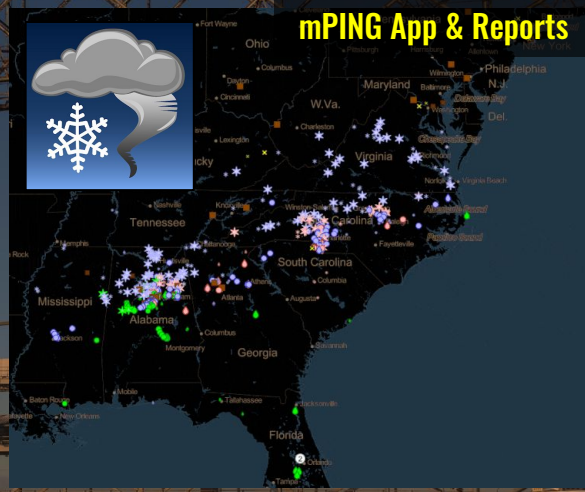
During The Storm

- Monitor NWS Duluth Website and Social Media
- Monitor Local Media (TV, Radio, Newspaper, Social Media, Apps)
- Check 511 Websites/Apps for Road Conditions, Cameras, and More!
 - MN: [511mn.org](https://www.511mn.org)
 - WI: [511wi.gov](https://www.511wi.gov)



During the Storm: mPING App

- Report current precipitation type to NOAA/NWS
- Choose from rain, snow, mixed types, etc.
- Completely anonymous
- Report as often as you'd like!
- Only for currently falling precipitation, not for measurements



✓	None
^	Rain/Snow
Rain	
Freezing Rain	
Drizzle	
Freezing Drizzle	
Ice Pellets/Sleet	
Snow/Graupel	
Mixed Rain and Snow	
Mixed Ice Pellets and Snow	
Mixed Rain and Ice Pellets	



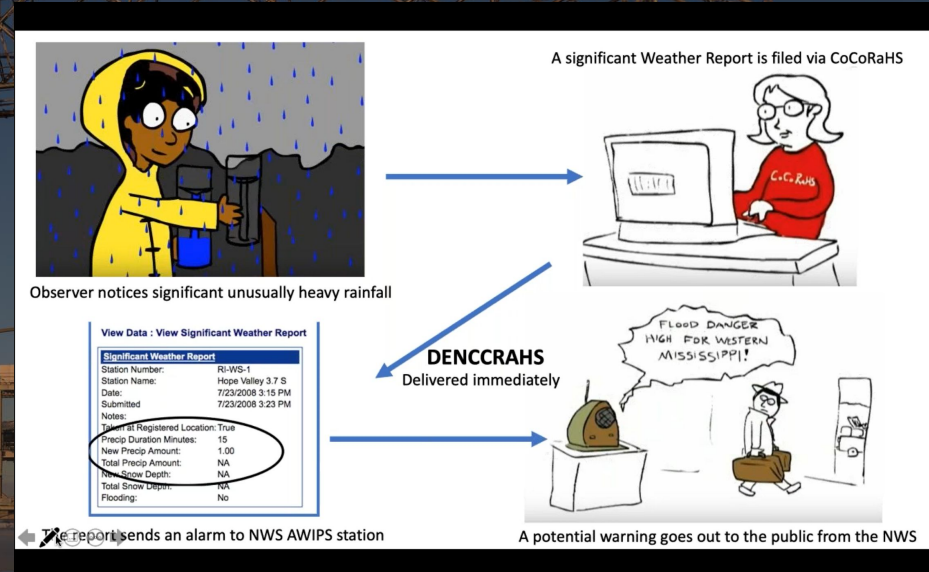
Download on the
App Store



GET IT ON
Google play

During the Storm: CoCoRaHS

- During the storm, CoCoRaHS Observers can send updates using the **Significant Weather** Reporting Form
- These irregular “Significant Weather” reports are immediately delivered to NWS Forecasters
- *PERFECT for an update with snowfall measurement so far when heavy snow is falling!*



After The Storm

***Report snow & ice measurements
and winter storm damage to NWS!***

Non-CoCoRaHS Observers

- Report to NWS Duluth via **online form**, social media, email, or phone
- Photos are GREAT!
- More Details = More Trust in your report

CoCoRaHS Observers

- Use CoCoRaHS website or app to enter measurements around 7am each morning
- Can send in final storm total as a *Significant Report*, too!

Online Reporting Form



Storm Reports

Alerting the NWS to local weather

Report Type -> Details -> Location -> Review and Send

Snowfall

Back Next

[Privacy policy for weather reports](#)



Storm Reports

Alerting the NWS to local weather

Report Type -> Details -> Location -> Review and Send

Time you observed this weather

1041 AM 11/02/2020

Snowfall (inches): 5.0

- ☒ I'm estimating the snowfall
☐ I measured the snowfall
☐ I don't have a reading, just some details below

Please provide any details such as if the snow is blowing or drifting

Snow is blowing and drifting. This is an estimate from my deck – some parts of the yard are down to grass, but there's a huge drift next to my shed!!

Back Next

[Privacy policy for weather reports](#)



Storm Reports

Alerting the NWS to local weather

Report Type -> Details -> Location -> Review and Send

Your report is at:

Latitude: 46.8371

Longitude: -92.2106

Clear location

Automatically use your device's location:

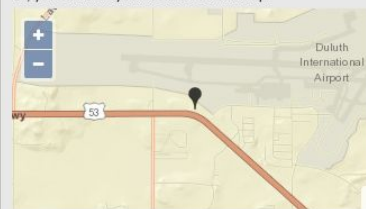
Use my device's current location

Search for your address:

5027 Miller Trunk Highway, Duluth, MN

Find Address

Or, you can click your location on the map:



Back Next

[Privacy policy for weather reports](#)



Storm Reports

Alerting the NWS to local weather

Report Type -> Details -> Location -> Review and Send

Here is the information you'll be sending:

Report time: 1041 AM 11/02/2020

Latitude: 46.8371

Longitude: -92.2106

You are reporting: 5.0 inches of snow (estimated).

Details:

Snow is blowing and drifting. This is an estimate from my deck – some parts of the yard are down to grass, but there's a huge drift next to my shed!!

If you wish to provide a name, spotter ID, or contact info, you can do so here.

This is optional, and if provided, will only be used if additional information is needed.

Joe Moore, NWS Employee – joseph.moore@noaa.gov

Back Send Report!

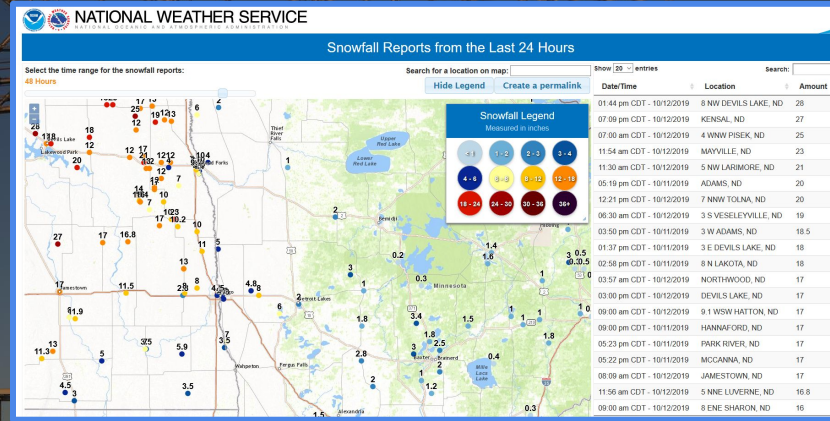
[Privacy policy for weather reports](#)

Details. Details. Details!

After The Storm

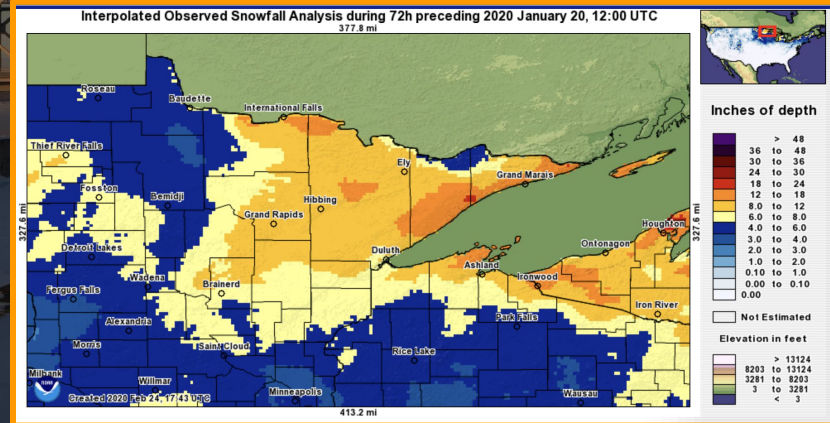
✓ Snowfall Reports Map

- YOUR REPORTS show up on this map! Help us fill in the gaps!
- CoCoRaHS Reports are automatically reported to NWS



✓ NOAA Snowfall Analysis Map

- Simple & Advanced Versions available
- Estimate using various sources, including YOUR REPORTS



Changes on the Horizon

NEW

New NWS radar website
(December)

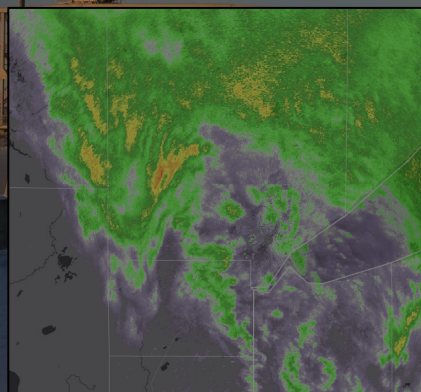
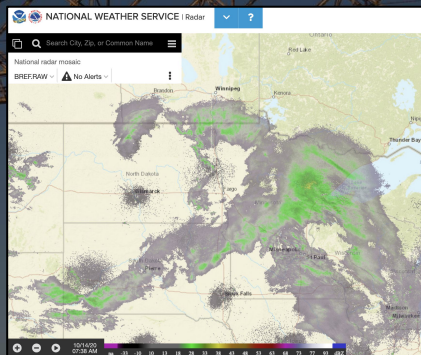
NEW

Addition of **new low-level radar scanning level** (0.2 degree) - this means better detection of snowfall

NEW

Hazard Simplification

- Possible major change to get rid of “**Advisory**” product (More info in November)
- Consolidation of **flood** products (Next spring)



Improved Radar Coverage at Low Levels



Final Review

1. Be Prepared

- Prepare your home and vehicle for winter NOW!

2. Be Informed

- Know where to find the latest reliable forecast information (weather.gov/duluth, NWS Duluth social media, and local media)
- Know that the forecast WILL change over time
- See a friend or family sharing a bad forecast? Help them find the latest forecast info from NWS!

3. Report to NWS!

- Sign Up for CoCoRaHS to be a volunteer observer!
- If you're not a CoCoRaHS Observer, you can still share your reports with NWS - we appreciate it!
- Use mPING App to report precipitation type



Thank you!

Joe Moore

Warning Coordination Meteorologist

@wxjoe

joseph.moore@noaa.gov

NWS Duluth

weather.gov/duluth

@NWSDuluth

218-729-0653 / nws.duluth@noaa.gov