

# Update on Winter Weather Initiatives



## Partner Webinar October 30, 2018

*Randy Graham*  
*Acting Winter Weather Program Lead*



# Outline

- Hazard Simplification
- Snow Squall Warnings
- Probabilistic Winter Precipitation Forecast Experiment
- Winter Storm Severity Index
- Winter Storm Watch Collaboration
- New Outreach Materials



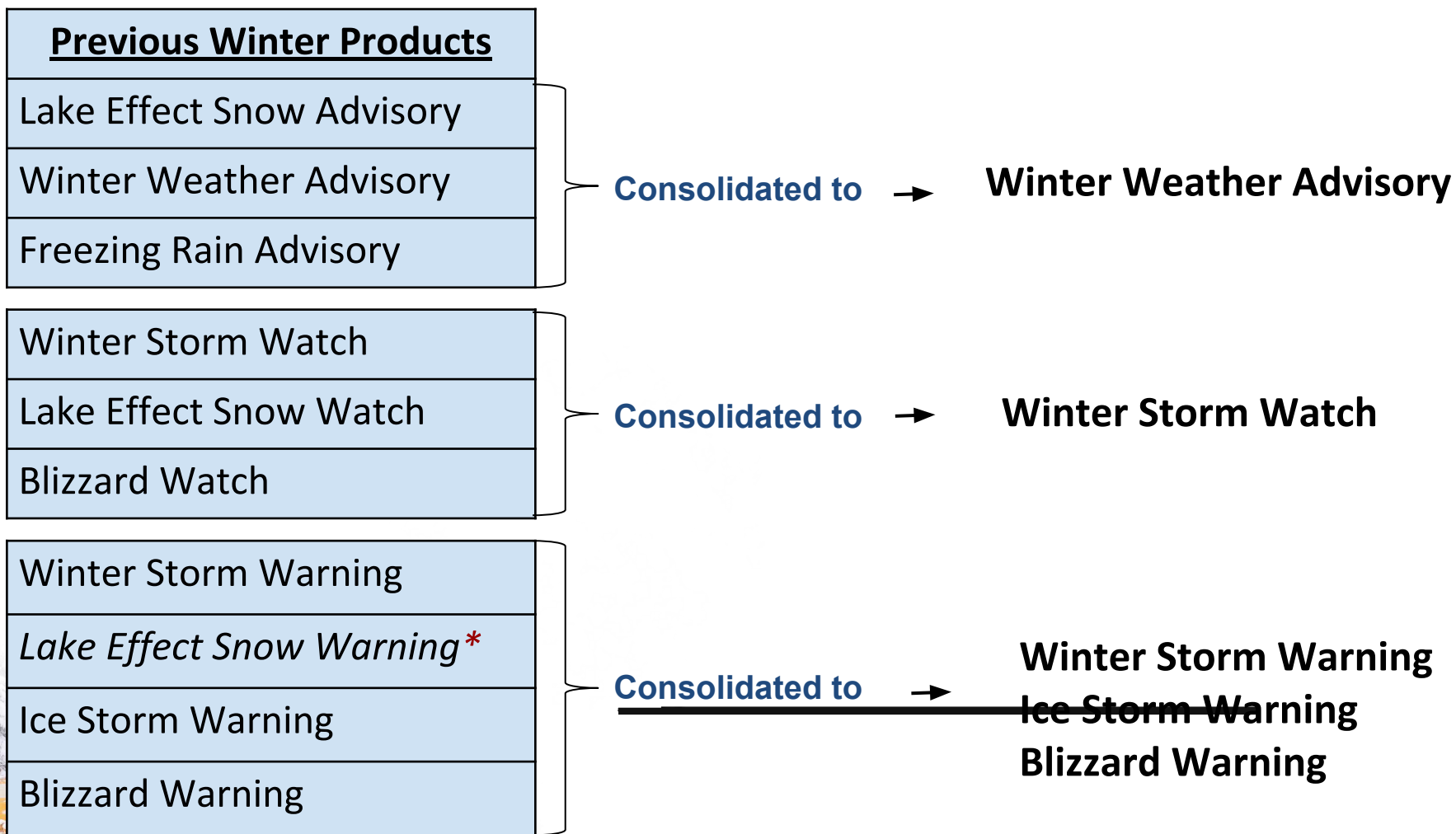
# Hazard Simplification Project

- Some users have found Watch, Warning, Advisory terms confusing
- NWS working with social and behavioral scientists to explore better ways to communicate hazard messages
- Large number of available product types can lead to complicated map depictions of hazards and can potentially be confusing
- Encouragement during HazSimp Workshops and through surveys to reduce suite of hazards and to simplify text formats

Term Used in Question	Number Who Answered Question	Response Options		
		A storm is possible, and may pose a threat to life and/or property	A storm is certain, and may pose a threat to life and/or property	A storm is certain, but does not pose a direct threat to life and/or property
Winter Storm Warning	422	42.2%	43.8%	14.0%
Winter Weather Advisory	432	60.4%	22.2%	17.4%
Winter Storm Watch	444	68.9%	19.8%	11.3%

*“Cold Region” Survey Responses - Source ERG (2018)*

# Hazard Simplification Project: Winter Product Consolidation



*\*Consolidated in select Regions during 2017/18 season and consolidated in all Regions during 2018/19 season*

# Hazard Simplification Project

## Poll Time:

- ***Hazard consolidation has made it more difficult for you, or your organization, to clearly understand or convey winter threats.***
  - Strongly agree
  - Agree
  - Neither agree nor disagree
  - Disagree
  - Strongly disagree





# Hazard Simplification Project: Winter Warning Consolidation

## Current Warning products

Winter Storm Warning

Ice Storm Warning

Blizzard Warning

Consolidate →

## Consolidated Option 1

Winter Storm Warning

## Consolidated Option 2

Winter Storm Warning

Ice Storm Warning

Blizzard Warning

Consolidate →

Winter Storm Warning: (for) Accumulating Snow

Winter Storm Warning: (for) Mixed Precip

Winter Storm Warning: (for) Significant Icing

Winter Storm Warning: (for) Blizzard Conditions



# Hazard Simplification Project: Winter Warning Consolidation

Hazard Simplification Project: Winter Warning Consolidation Survey available here:  
<https://www.surveymonkey.com/r/winterwarning>  
Survey available through November 10, 2018

1. Please indicate the degree to which you agree or disagree with the statements below.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	I don't know
NWS should consolidate its Winter Warning products (Winter Storm Warning, Ice Storm Warning, Blizzard Warning) to one Winter Storm Warning product <b>as shown in Option 1.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NWS should consolidate its Winter Warning products (Winter Storm Warning, Ice Storm Warning, Blizzard Warning) to one Winter Storm Warning product with four headline options <b>as shown in Option 2.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NWS should do <b>no further consolidation</b> of the Winter Warning (precipitation) products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. If you have any additional comments, suggestions or concerns with the proposed Winter precipitation warning products consolidation, please describe them below.

# Hazard Simplification Project: Wind Chill Consolidation

Survey closed - June 2018  
Potential implementation - Feb. 2021\*

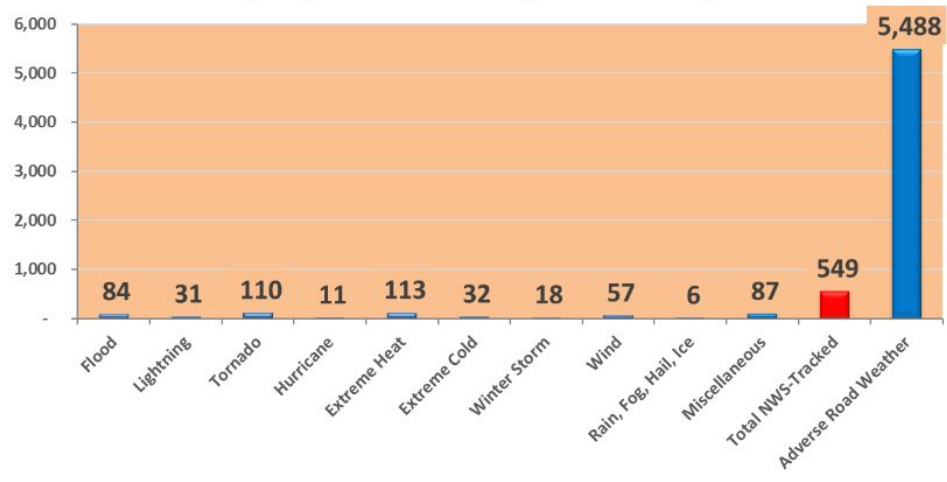


*\*Implementation timeline coincides with internal NWS software upgrade*



# New Product: Snow Squall Warning

Adverse Weather-Related Fatalities  
(10-yr. Annual Average 2006-2015)



- Approximately 21% of all auto accidents are weather-related
  - 1.2M weather-related crashes per year
- Annually, weather-related accidents result in\*:
  - ~5,000 deaths and 418K+ injured
  - Estimated costs =
    - \$5B+ in property damage
    - \$3B+ for medical care
    - \$8B+ for lost productivity

- Variable speeds are a common source of accidents, especially multi-vehicle accidents

\* Source Federal Highways Administration



# New Product: Snow Squall Warning

- Short-lived burst of heavy snowfall resulting in a rapid onset of near zero visibilities and slick roads
  - Often accompanied by gusty winds
  - Intensity similar to short-term blizzard
- Snow squalls responsible for many significant chain-reaction accidents
  - Variable speed much more likely as drivers go from clear/dry conditions to a white-out
  - Typically a daytime phenomena
- Also issued for plunging temperatures and gusty winds behind cold fronts sufficient to produce flash freezes and blowing snow

What is a

## SNOW SQUALL?

Intense burst of snow and winds

Short duration (1-3 hours)

Whiteout visibility

Rapidly deteriorating road conditions



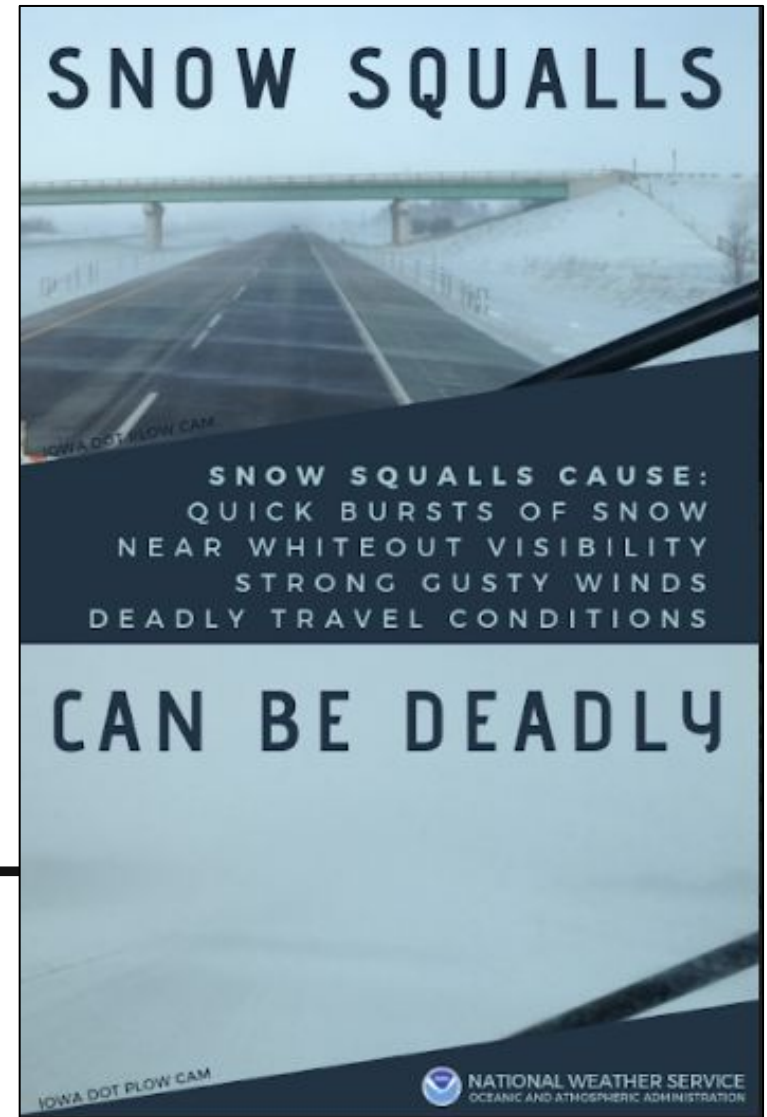
 NATIONAL WEATHER SERVICE  
WWW.WEATHER.GOV/SAFETY

IOWA DOT



# New Product: Snow Squall Warning

- Available nationwide November 1st, 2018
- Issued for areas with no winter weather headlines or within ongoing Winter Weather Advisories
- Valid time will typically be 30-60 minutes
- No EAS activation at this time. WEA notifications are expected by winter of 2019-20.



# New Product: Snow Squall Warning

**Snow Squall Warning**

Valid Until  
9:45 AM EDT Friday  
March 16, 2018

**Threat Information**

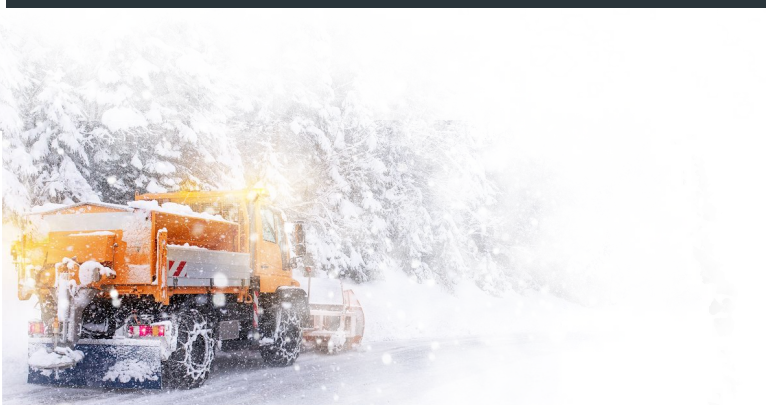
**Hazard**  
White out conditions  
in heavy blowing snow

**Impact**  
Dangerous life-  
threatening travel

**Potential Exposure**

Population: 135,894  
Highways: I-81  
I-88  
US-11

- Polygon issued for a portion of a county or counties
- WFOs will update the product for an extension in area or time by issuing a new Snow Squall Warning
- Product will be cancelled or allowed to expire when conditions no longer meet criteria
- Snow Squall Warning will provide three discrete information segments
  - HAZARD...White-out conditions in heavy snow and blowing snow
  - SOURCE...Radar indicated and webcams
  - IMPACT...Dangerous life-threatening travel





# New Product: Snow Squall Warning

BULLETIN - EAS ACTIVATION REQUESTED  
Snow Squall Warning  
National Weather Service Burlington VT  
647 PM EDT Wed Apr 4 2018

NYC033-089-042345-  
/O.NEW.KBTV.SQ.W.0001.180404T2247Z-180404T2345Z/  
Franklin NY-St. Lawrence NY-  
647 PM EDT Wed Apr 4 2018

The National Weather Service in Burlington has issued a

- \* Snow Squall Warning for...  
Franklin County in northern New York...  
Southeastern St. Lawrence County in northern New York...
- \* Until 745 PM EDT
- \* At 647 PM EDT, a dangerous snow squall was located along a line extending from near South Bombay to near Balmat, moving east at 25 mph.

HAZARD...Visibility of less than one quarter mile in brief heavy snow and blowing snow. Wind gusts in excess of 45 mph. Higher elevation roads will become snow covered and slippery.

SOURCE...Radar and webcams.

IMPACT...Dangerous life-threatening travel.

- \* Locations impacted include... Tupper Lake, Adirondack Regional Airport, Oswegatchie, Moira, Bangor, Parishville, Colton, Piercefield, Bryants Mill, Wawbeek, Degrasse, Carry Falls Reservoir, Cranberry Lake, Brushton, Lawrenceville, Malone, Debar Mountain, Horseshoe Lake, Lake Ozonia and Star 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.

&&

LAT...LON 4482 7400 4463 7395 4410 7448 4405 7504  
4420 7541 4489 7461  
TIME...MOT...LOC 2247Z 285DEG 23KT 4487 7462 4417 7545





# Snow Squall Warning

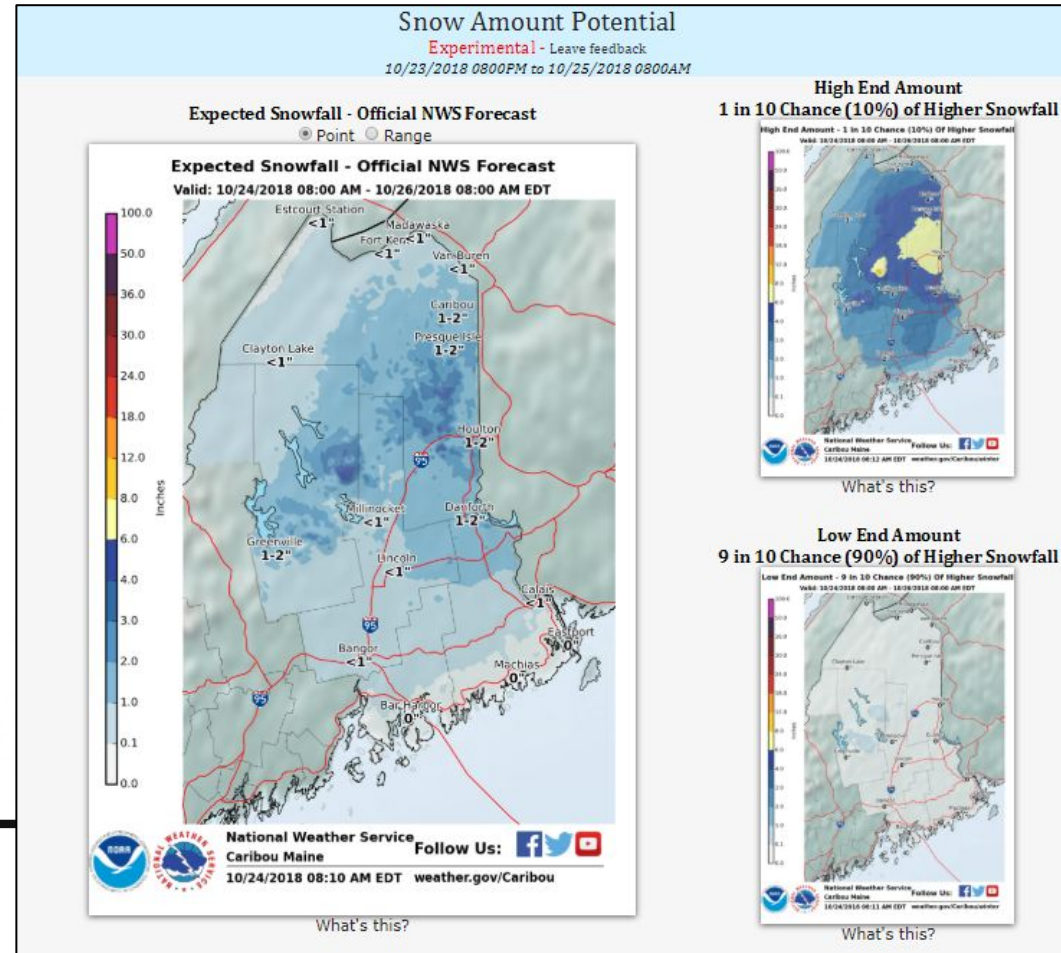
## Poll Question:

- ***Do you intend to give the Snow Squall Warnings high visibility similar to other short fuse convective threats, such as SVRs?***
  - Yes
  - No
  - Not sure



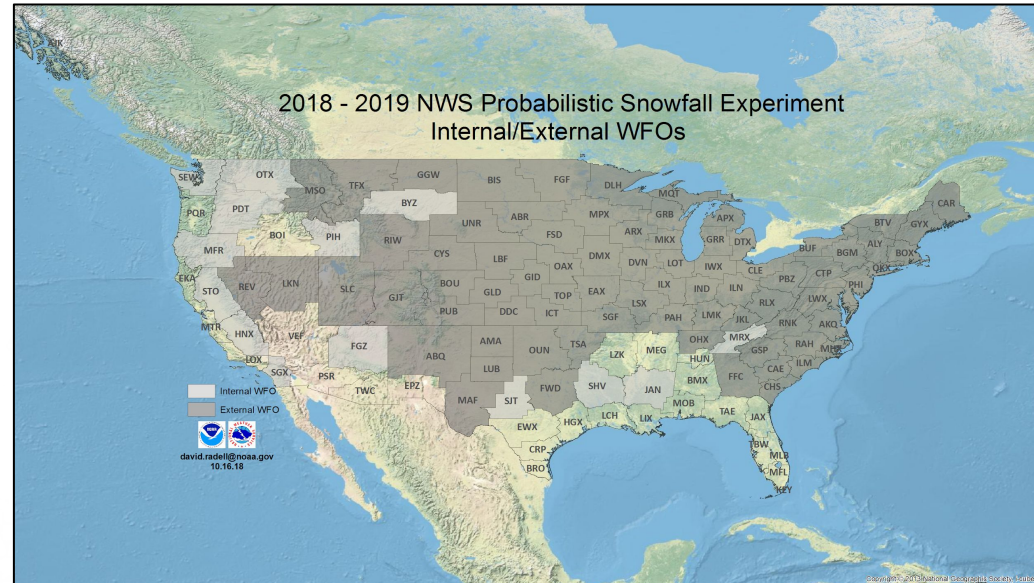
# Probabilistic Winter Precipitation Forecast (PWPF) Experiment

- Goal: Provide customers and partners a range of snowfall and icing amounts to better communicate forecast uncertainty during winter weather events
- 46-member ensemble (45 models + WPC)
  - Expert first guess forecast provided by WPC; WFOs add local knowledge
- Significant model diversity contributes to a range of possible outcomes



# Probabilistic Winter Precipitation Forecast Experiment

- Experiment expanding to 76 offices sharing output externally
  - 14 offices conducting internal reviews
- Minor change to membership for 2018-19
  - Changes incorporate more high-res members in short term
  - Better captures snowbands, complex terrain
- Will post the 24/48/72-hour 10% and 90% probabilities on Experimental NDFD Site
  - Date TBD




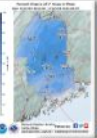

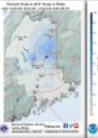
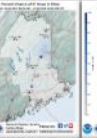

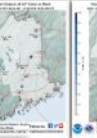



# PWPF Experiment

- Snowfall range probability tables have been removed
  - Social scientists reviewed comments and found limited use of this data
- Tables now only include exceedance probabilities
  - Probability of  $\geq 1"$ ,  $\geq 4"$  etc.
- Snowfall range between 10th & 90th percentiles are generally not large
  - *Can be wide if event timing, precipitation type, or location of heavy snow band is uncertain*
  - *Note that a couple of outlier models can impact the 'tails' of the ensemble distribution*

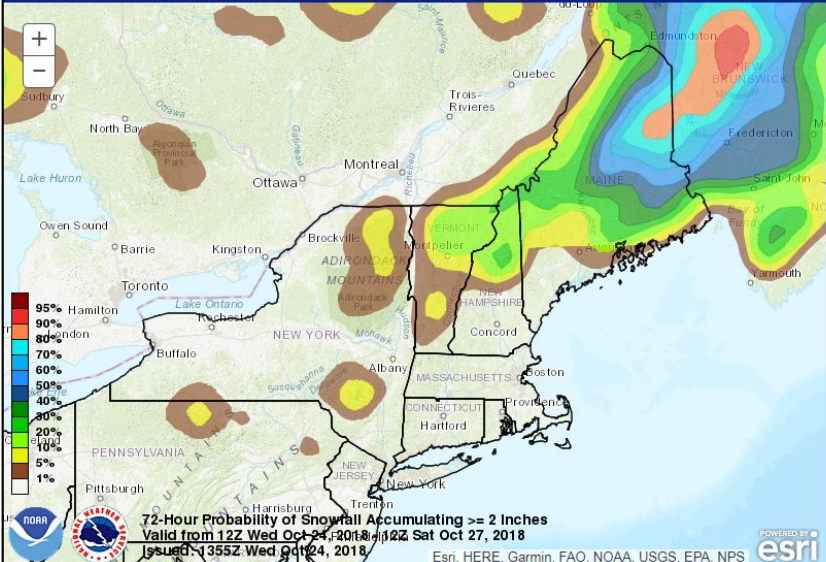


**Percent Chance That Snow Amounts Will Be Greater Than...**  
 Experimental - Leave feedback  
 10/23/2018 0800PM to 10/25/2018 0800AM  
 What's this?  
 Hover over thumbnails below to view larger image.

**Percent Chance of 0.1\" Snow or More**  
 Valid: 10/24/2018 08:00 AM - 10/26/2018 08:00 AM EDT

**72-Hour Probability of Snow Accumulating  $\geq 2"$**   
 Valid 12 UTC Wed October 24 through 12 UTC Sat October 27



**72-Hour Probability of Snowfall Accumulating  $\geq 2$  Inches**  
 Valid from 12Z Wed Oct 24, 2018 to 12Z Sat Oct 27, 2018  
 Issued: 1355Z Wed Oct 24, 2018

Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS  
 10/24/2018 08:12 AM EDT weather.gov/Caribou/winter

**Viewing Options**

Choose an accumulation for the specified time:

- $\geq 2"$
- $\geq 4"$
- $\geq 8"$
- $\geq 12"$
- $\geq 18"$
- $\geq 24"$
- $\geq 30"$

**Map Overlays**

- State Boundaries

[Back to top](#)

**Snowfall Totals by Location**  
 Experimental - Leave feedback  
 10/23/2018 0800PM to 10/25/2018 0800AM  
 What's this?  
 County: **Aroostook, ME**

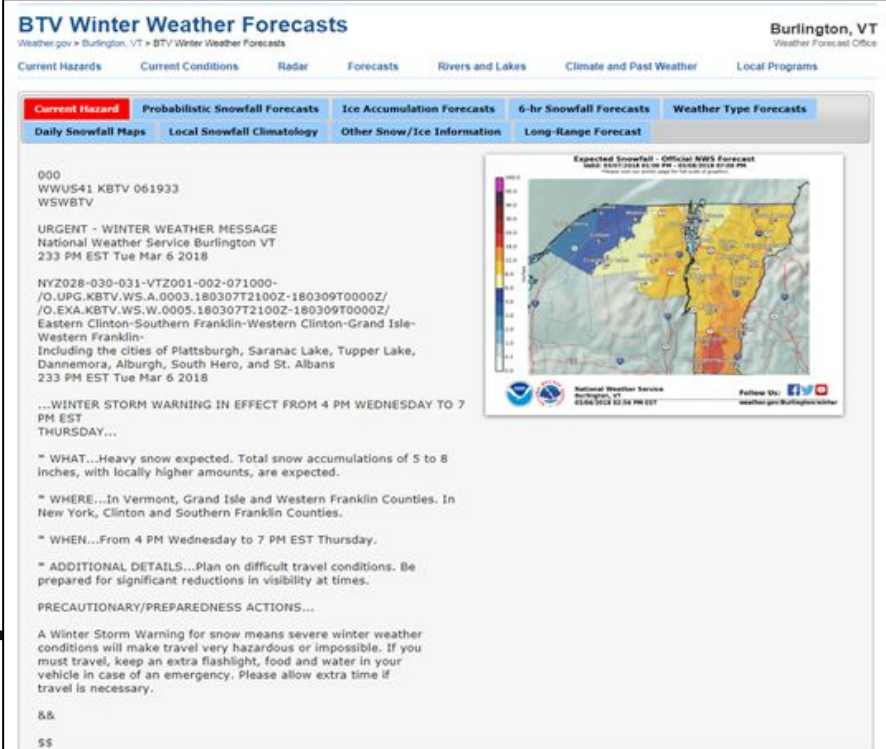
For cities in Aroostook, ME county

Location	Snow Amount Potential			Chance of Seeing More Snow Than							
	Low End Snowfall	Expected Snowfall	High End Snowfall	$\geq 0.1"$	$\geq 1"$	$\geq 2"$	$\geq 4"$	$\geq 6"$	$\geq 8"$	$\geq 12"$	$\geq 18"$
Caribou, ME	0	1	4	69%	56%	41%	17%	5%	1%	0%	0%
Fort Kent, ME	0	<1	3	75%	51%	27%	4%	0%	0%	0%	0%
Houlton, ME	0	3	7	76%	68%	58%	36%	18%	7%	1%	0%
Madawaska, ME	0	<1	2	74%	46%	21%	2%	0%	0%	0%	0%
Presque Isle, ME	0	2	6	69%	60%	48%	26%	11%	3%	0%	0%

# Probabilistic Winter Precipitation Forecast Experiment

## New approach to handling events “in progress”

- Offices have option to add a tab to the PWWF webpage during winter storms
- Tab (“Current Hazard”) will contain current WSW as well as storm total snowfall (past & future) graphic when WSW headline is issued
- Probabilistic Snowfall Forecasts tab would then contain only future snowfall using a time window selected by the forecaster (24-h, 48-h, etc)

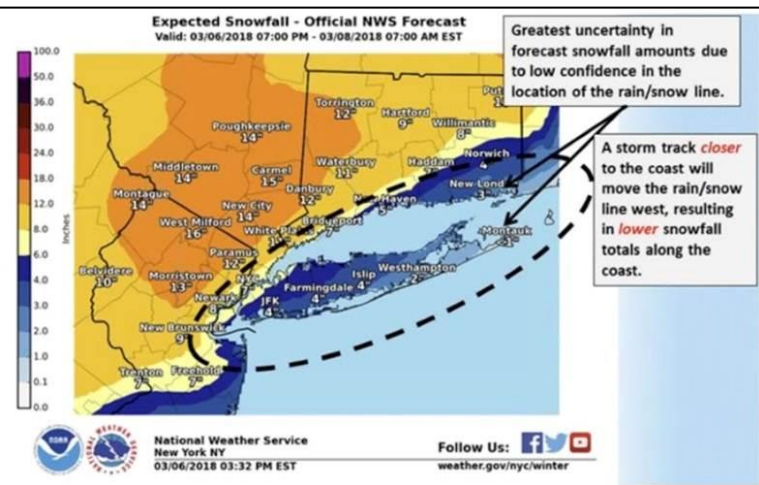


The screenshot displays the BTV Winter Weather Forecasts webpage. At the top, it shows the location as Burlington, VT and the Weather Forecast Office. Navigation tabs include Current Hazards, Current Conditions, Radar, Forecasts, Rivers and Lakes, Climate and Past Weather, and Local Programs. A secondary set of tabs highlights Probabilistic Snowfall Forecasts, Ice Accumulation Forecasts, 6-hr Snowfall Forecasts, and Weather Type Forecasts. The main content area features a 'Current Hazard' tab with a red background, displaying a 'WINTER STORM WARNING IN EFFECT FROM 4 PM WEDNESDAY TO 7 PM EST THURSDAY...'. Below this, there is a 'WHAT...' section describing heavy snow expectations, a 'WHERE...' section listing affected areas in Vermont and New York, and a 'WHEN...' section. A 'PRECAUTIONARY/PREPAREDNESS ACTIONS...' section provides travel advice. To the right, a map titled 'Expected Snowfall - Official NWS Forecast' shows snowfall amounts in inches across the region, with a color scale from 0.0 to 100.0. The map shows higher snowfall amounts (yellow and orange) in the western and southern parts of the region.

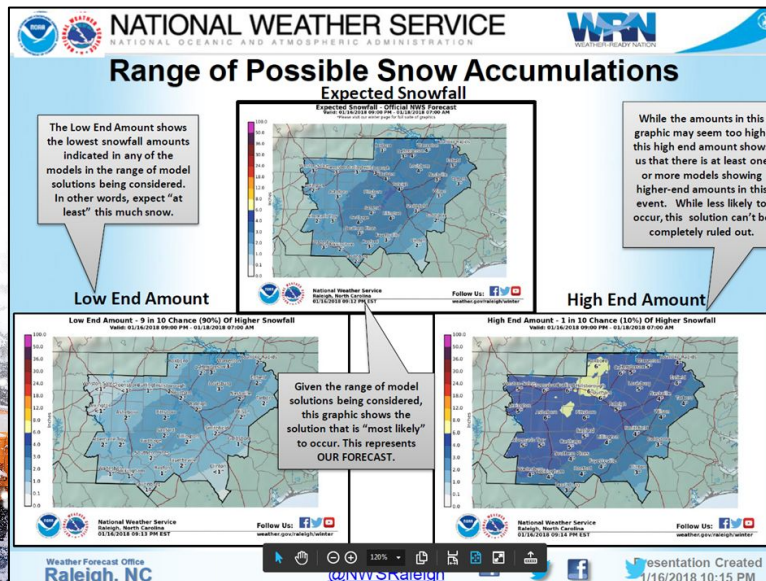




# Probabilistic Winter Precipitation Forecast Experiment - Lessons Learned



- Highlighting areas of greatest uncertainty (eg., rain/snow line) can provide additional information to core partners, in context
- Reinforcing the most likely/expected snowfall as our “official forecast” within the “range of possibilities” with ProbSnow
  - Short descriptions are helpful if audience is new to the products



Slide material provided by Dave Radell

# Probabilistic Winter Precipitation Forecast Experiment - Feedback

- Having different display types is a positive
  - Survey respondents expressed different favorites (data versus text)
    - Expected amount and 10th & 90th percentiles most preferred
  - Many positive comments about exceedance probabilities and tables
- Users liked changes in web page design/layout and labeling of graphics
- Large majority understood (and like) the concept of depicting the range of possibilities / uncertainties
  - A few comments about taking some time to learn, but once they figured it out they really got it



# Probabilistic Winter Precipitation Forecast Experiment

## Poll Time:

- ***Having the 'Low End', 'High End' & 'Expected Amount' will help me better understand, or convey, the range of possible outcomes.***
  - Strongly agree
  - Agree
  - Neither agree nor disagree
  - Disagree
  - Strongly disagree

---

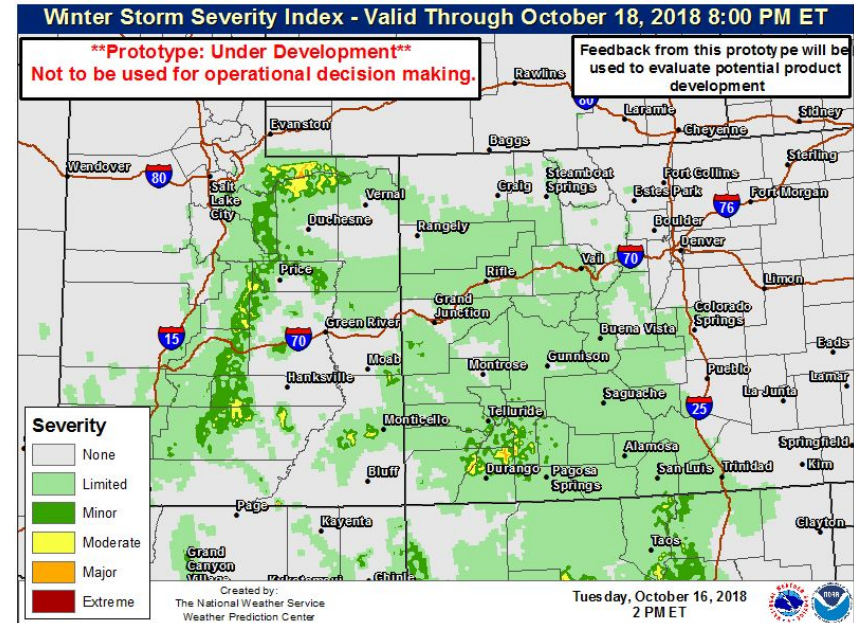
**WPC page:** [https://www.wpc.ncep.noaa.gov/pwpf/wwd\\_accum\\_probs.php](https://www.wpc.ncep.noaa.gov/pwpf/wwd_accum_probs.php)  
**Local office:** <https://www.weather.gov/btv/winter>





# Ongoing Prototype: Winter Storm Severity Index (WSSI)

- Winter Storm Severity Index:
  - Assists NWS forecasters in maintaining situational awareness regarding potential significance of weather related impacts based upon the current forecast
  - Enhances communication to external partners, media and general public of an event's expected severity (e.g., societal impacts) and spatial extent
- Provides winter storm "impact" info out to 72 hours
  - Includes meteorological & non-meteorological factors
  - Six levels of impact provided in color-coded scale
- 62 prototype offices will display output this winter



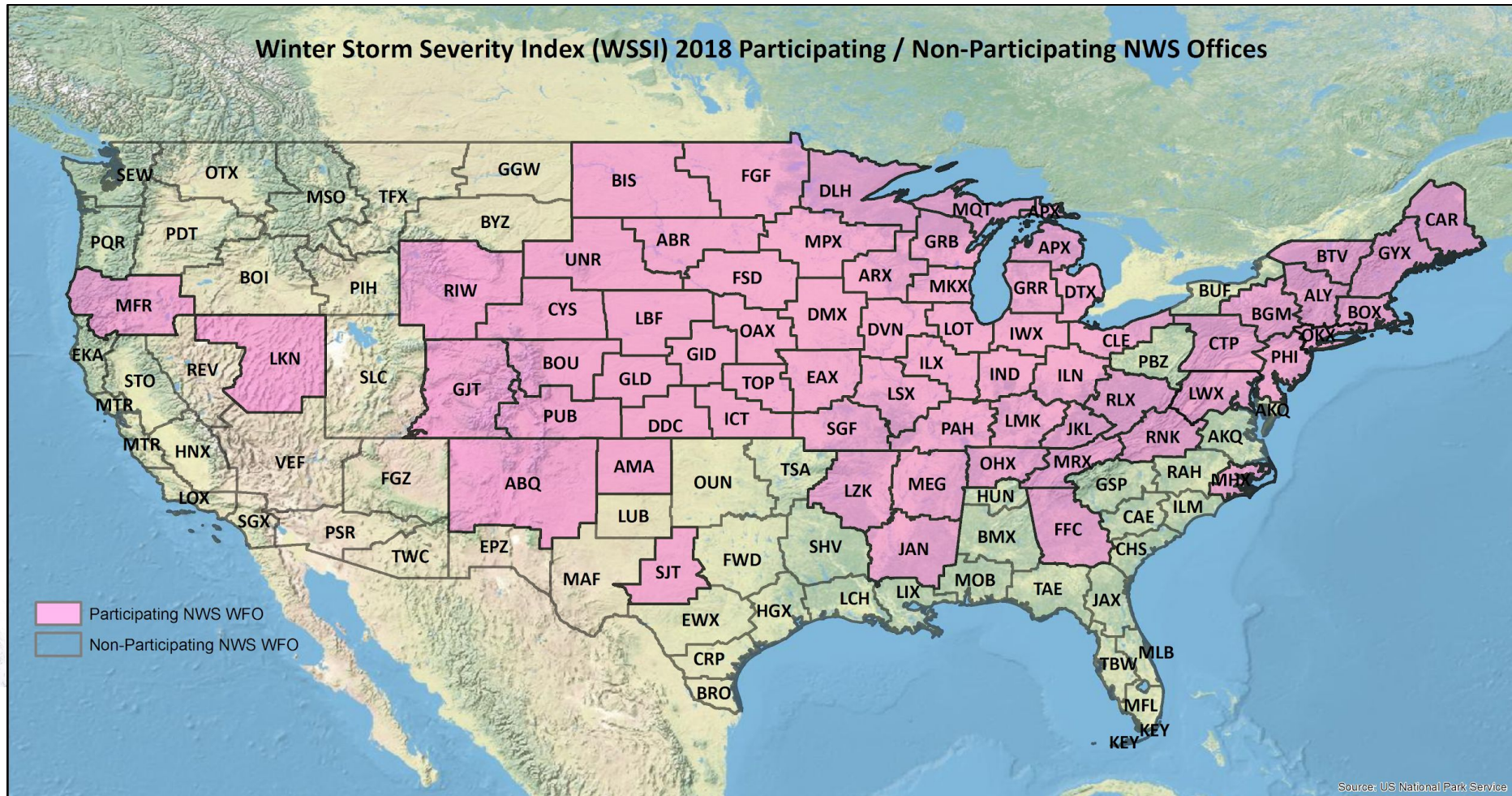
Output available here:

<https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php>





# Winter Storm Severity Index: Participating Offices





# Winter Storm Severity Index: Overview

- Goal of the Product
  - Summarize multiple winter weather impacts from a storm into an easily consumable graphic
  - 72 Hour forecast
    - Data comes from the NWS National Digital Forecast Database (NDFD)
    - Updates every 2 hours
  
- Summary graphic is a composite of the maximum impact from any of the six components

## WSSI Impact Description

WSSI Descriptor	General Description of Expected Storm Severity Impacts
None	No snow or ice forecast. No potential for ground blizzard conditions
Limited	Small accumulations of snow or ice forecast. Minimal impacts, if any expected. In general, society goes about their normal routine.
Minor	Roughly equated to NWS Advisory Level criteria. Minor disruptions, primarily to those who were not prepared. None to minimal recovery time needed
Moderate	Roughly equated to a NWS Warning Level criteria. Definite Impacts to those with little preparation. Perhaps a day or two of recovery time for snow and/or ice accumulation events.
Major	Significant impacts, even with preparation. Typically several days recovery time for snow and/or ice accumulation events.
Extreme	Historic. Widespread severe impacts. Many days to at least a week of recovery needed for snow and/or ice accumulation events.



# Winter Storm Severity Index: Overview

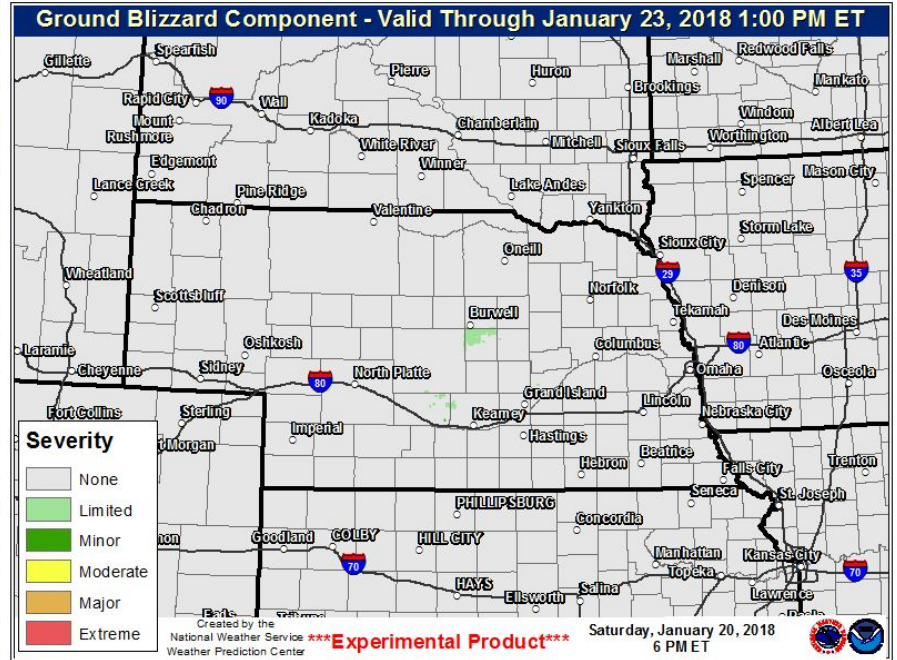
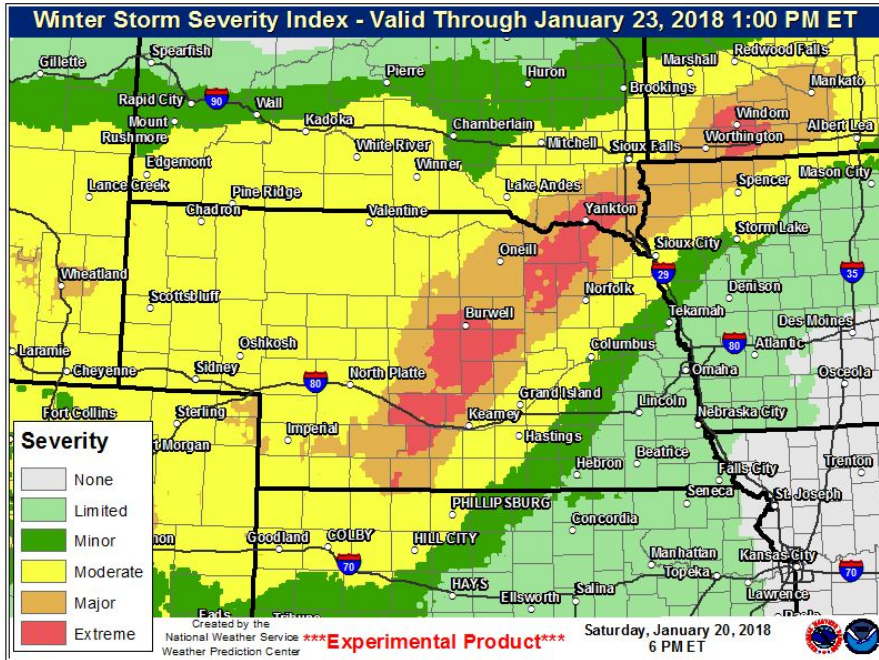
WSSI consists of 6 different storm components

- Snow Accumulation
  - Total amount or rate will heavily impact transportation system
- Ice Accumulation
  - Combined effects of accretion and wind on utilities, foliage, transportation
- Snow Load
  - Where weight of snow could result in damage to trees and power line
- Blowing Snow
  - Identify where blowing snow may impact transportation
- Ground Blizzard
  - Where pre-existing snow and strong winds combine to impact transportation
- Flash Freeze (regional)
  - Identifies areas with potential for roads to become ice covered





# Winter Storm Severity Index: Example



# Winter Storm Severity Index: 2017-18 External Survey

- Positive External Feedback
  - Usefulness
  - Quality
- Most users visit daily throughout the season
- 95% would like to see this product nationally

*"I think this is a fantastic product/service, it may just need some calibration for higher impact events."*

"The detailed descriptions of the severity level give a good indication of probable weather conditions. The six components in the storm severity index will help me to make more informed decisions for travel and participation in outdoor activities."

"I particularly like that the product focuses on impacts. I think users can get lost in the details and deterministic forecasts for various types of wintry weather precipitation. This is what people..."

"I really think it's designed ideally for partner communication and clarity with regards to winter weather precipitation."



# Winter Storm Severity Index

## Poll Question:

- ***Do you find the severity index for the six individual storm components (e.g., snow accumulation, blowing snow etc.) valuable?***
  - Yes
  - No
  - Not sure



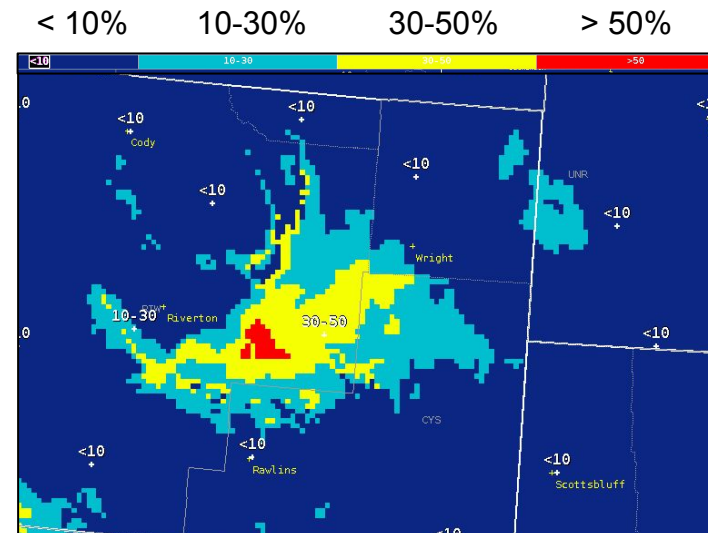
---

Output available here:  
<https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php>



# Winter Storm Watch Collaboration

- Internal test which leverages expertise at the national and local levels to aid Winter Storm Watch decision making
- Weather Prediction Center will provide experimental Winter Storm Outlooks to WFOs for snow & freezing rain
  - Probability of exceeding warning criteria
  - Contours of 10, 30 and 50 percent
  - Days 1 through 3
- 30+ percent chance of meeting warning criteria triggers enhanced coordination between WPC & affected WFOs



# NWS Winter Seasonal Safety Campaign

- NWS Winter Seasonal Safety Campaign launches on December 1 (first day of meteorological winter)
- Contains content on winter hazards including infographics, social media plans, presentations and videos
- Encourage partners to use and share this information
- See: [https://www.weather.gov/wrn/winter\\_safety](https://www.weather.gov/wrn/winter_safety)





# Updated Outreach Materials

**WINTER DRIVING KNOW BEFORE YOU GO**

**Check road conditions.**  
Call 511 or visit your state's DOT webpage to check on road conditions. Choose a different route or adjust your travel plans if road conditions are poor.

**Pack an emergency supply kit.**  
Stock your vehicle with a mobile phone, charger, batteries, blankets, flashlight, first-aid kit, high-calorie, non-perishable food, candle to melt snow for drinking water, sack of sand or cat litter for traction, shovel, scraper, and battery booster cables.

**Get the weather forecast.**  
Change your travel plans if hazardous weather is expected.

**Ready your vehicle.**  
Check your battery, wipers, coolant, and other systems affected by cold temperature. Make sure your tires have good tread. Clear snow, ice or dirt from your windows, lights and camera.

**WINTER DRIVING WHILE ON THE ROAD**

**Change the way you drive.**  
Drive slower than normal and leave more room between you and surrounding vehicles when roads are wet, snowy or icy. DO NOT use cruise control, brake quickly or take sharp turns.

**Stay alert.**  
Make sure you keep your gas tank over half full and keep a close eye on road conditions, which can change rapidly. On road trips, take breaks often so you can stay focused on the road.

**Don't crowd the plow.**  
The road behind an active plow is safer to drive on. Give them plenty of room to work and only pass when it is safe to do so.



**WINTER DRIVING FOCUS ON SAFETY**

**Prevent a bad situation from getting worse.**  
If you're involved in an accident, try to pull your vehicle off the road and use hazard lights, flares, reflectors or flashlights to warn other drivers. STAY OFF THE ROAD, dial 911, and wait for the police to arrive. These actions can help prevent multi-vehicle crashes in winter weather.

**Avoid risky driving behavior.**  
Always avoid risky behavior such as texting or phone calls, speeding, or drug/alcohol use. These activities are always dangerous, but the risk is much higher in winter weather.

**Wear your seatbelt.**  
Accidents happen more frequently with wet and icy roads. Always wear your seatbelt and ensure everyone in your vehicle does the same, including young children in proper car seats.





# Update on Winter Weather Initiatives

## Contributors:

Greg Carbin  
Rob Cox  
Chris Franks  
Danielle Negele  
Michelle Hawkins  
Josh Kastman  
Jim Nelson  
Dan Petersen  
Jeff Waldstreicher

## Links:

WPC PWWF page:  
[https://www.wpc.ncep.noaa.gov/pwvf/wwd\\_accum\\_probs.php](https://www.wpc.ncep.noaa.gov/pwvf/wwd_accum_probs.php)

Local office PWWF page:  
<https://www.weather.gov/btv/winter>

WSSI:  
<https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php>

Hazard Simplification Project Survey:  
<https://www.surveymonkey.com/r/winterwarning>

Questions? [michelle.hawkins@noaa.gov](mailto:michelle.hawkins@noaa.gov) or [randall.graham@noaa.gov](mailto:randall.graham@noaa.gov)

