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Operations and Services

Public Weather Services, NWSPD 10-5

NATIONAL WINTER WEATHER PRODUCTS SPECIFICATION

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SUMMARY OF REVISIONS: This instruction supersedes NWSI 10-514, “National Winter Weather Products Specification,” effective October 12, 2022. The following revisions were made to this instruction:

1. Added a section on the Probabilistic Winter Storm Severity Index (WSSI-P).
2. Replaced image for Winter Storm Severity Index (WSSI) and updated impact categories.
3. Removed 72-Hour Low Tracks Graphic information.
4. Removed Non-Technical 72-Hour Low Tracks Graphic information.
5. Minor wording updates and edits are included throughout the document.

March 4, 2025

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Date

National Winter Weather Products Specification

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1 Introduction

This procedural directive describes the winter weather products issued by the Weather Prediction Center (WPC) for the contiguous United States (CONUS), guidelines associated with these products, detailed content and format for each product type.

2 Probabilistic Heavy Snow and Icing Discussion (product category QPFHSD)

2.1 Mission Connection

WPC issues a heavy snow and icing discussion that provides the meteorological reasoning for

the 24-hour probabilistic heavy snow and icing guidance graphics for Days One, Two, and Three. This text message is used by National Weather Service (NWS) field offices, the aviation industry, and the general meteorological community (private sector and the media). Key Messages for major winter storms, which are collaborated with affected Weather Forecast Offices (WFOs), Regional Operations Centers (ROCs), and other National Centers, are also provided to users.

2.2 Issuance Guidelines

2.2.1 Creation Software

WPC uses a text editor to issue the QPFHSD.

2.2.2 Issuance Criteria

The QPFHSD discussion follows the issuance of scheduled or event-driven updates to the probabilistic heavy snow and icing graphics. The discussion is routinely issued from late September to early May, and is event-driven at other times.

2.2.3 Issuance Time

See Table 1, below.

2.2.4 Valid Time

See Table 1, below.

<i>WPC Probabilistic Heavy Snow and Icing Discussion</i>				
<i>Issuance Time (UTC)</i>	<i>Valid Time (UTC)</i>	<i>AWIPS ID</i>	<i>WMO Header</i>	<i>Product Description</i>
0930	1200 Day 1 to 1200 Day 3 (72 hour valid period)	QPFHSD	FOUS11 KWBC	Text providing meteorological reasoning for 24-hour heavy snow and icing probabilistic graphics for Days 1, 2, and 3
2130	0000 Day 1 to 0000 Day 3 (72 hour valid period)	QPFHSD	FOUS11 KWBC	Text providing meteorological reasoning for 24-hour heavy snow and icing graphics for Days 1, 2, and 3

Table 1. Product Schedule and Valid Times for Heavy Snow and Icing Discussion

2.2.5 Product Expiration Time

The product expires after either the valid time ends or a new product is issued.

2.3 Technical Description

The HSD follows the format and content described in this section.

2.3.1 Universal Geographic Code (UGC) Type

Not applicable.

2.3.2 Mass News Disseminator (MND) Broadcast Instruction Line

Not applicable.

2.3.3 MND Product Type Line

The QPFHSD header is Probabilistic Heavy Snow and Icing Discussion.

2.3.4 Content

WPC issues a heavy snow and icing discussion that provides the meteorological reasoning for the 24-hour Days One, Two, and Three probabilistic heavy snow and icing guidance graphics. When applicable, Key Messages to users are also provided at the bottom of the discussion.

2.3.5 Format

Probabilistic Heavy Snow and Icing Discussion
NWS Weather Prediction Center College Park MD
231 AM EST Wed Jan 15 2025

Valid 12Z Wed Jan 15 2025 - 12Z Sat Jan 18 2025

...Great Lakes & Central Appalachians...
Days 1-2...

Ongoing lake-effect snow over the eastern Great Lakes will wind down today as a new shortwave moves in from the northwest, bringing light snow to the Upper Midwest/Western Great Lakes on WAA. As the warm front passes, winds will switch to NW as the cold front makes its approach but weakens across the region in response to height rises from the west. Regardless, some lake enhancement or lake effect snow is likely over much of the region but with overall light amounts over the U.P. and into western Lower Michigan.

East of Lakes Erie and Ontario, system will bring in some light snow followed by a period of lake enhanced/effect snow D2 before ending D3. To the south, shortwave will swing right through the central Appalachians, maximizing upslope into eastern WV where several inches of snow are likely D2. WPC probabilities for at least 6 inches are high (>70%) especially over 2000ft.

...Northern/central Rockies/High Plains...
Day 3...

As an upper ridge builds across the Northeastern Pacific Thursday into Friday, downstream response will be digging troughing out of western Canada nearly due south through the High Plains via a strong cold front ("blue norther"). Though moisture will be

limited, strong northerly flow will support upslope enhancement into some of the terrain over central/western Montana (esp the Little Belts and Big Snowy Mountains) southward into the Bighorns, Absarokas, and into the southeastern WY ranges.

As the front dives southward, steeper lapse rates will support snow squalls along the front Friday in Montana progressing into Wyoming. Snow squall parameter per the guidance still shows values >1 (and even >3) suggesting the possibility of bursts of snow with sharply reduced visibility leading to near whiteout conditions. CAM guidance should shed a little more light on the threat over the next two days, but we have outlined this area in our Key Messages (see below). WPC probabilities for at least 4 inches of snow over Montana/Wyoming are moderate (40-70%) and mostly over the terrain with light snow (1-2") elsewhere.

As the system races southward, cold front will slow a bit across the Rockies but continue to plunge through the High Plains, favoring upslope enhancement into the Front Range late Fri/early Sat. Snow will expand through the I-25 corridor into the Denver Metro area with higher amounts across the Front Range as temperatures fall into the teens, helping to increase SLRs from ~12:1 up toward ~18:1. Additional snowfall is likely past 12Z Sat. Through then, WPC probabilities for at least 4 inches of snow are at least 50% across the Front Range.

For the Day 1-3 period, the probability of significant icing of at least 0.10" is less than 10 percent across the CONUS.

...Winter Storm Key Messages are in effect. Please see current Key Messages below...

https://www.wpc.ncep.noaa.gov/key_messages/LatestKeyMessage_1.png
https://www.wpc.ncep.noaa.gov/key_messages/LatestKeyMessage_2.png

2.4 Updates, Amendments, and Corrections

Products are updated, amended, or corrected, as necessary.

3 Probabilistic Heavy Snow & Icing Forecasts (prod cat. D[1-3]P [04S, 08S, 12S, 25Z]).

3.1 Mission Connection

WPC issues probabilistic heavy snow and icing guidance products to support the NWS winter weather Watch / Warning / Outlook program, and to indicate heavy snow and icing threats to external users and partners. These products are issued in probabilistic form to better represent the forecast uncertainty associated with a particular event, and are also known as the Probabilistic Winter Precipitation Forecast (PWPF). A full suite of thresholds and accumulation periods is issued in probability of exceedance and percentile displays, available in both graphical and digital formats. A subset of the probability of exceedance data is derived and shown as separate graphics distributed on Advanced Weather Interactive Processing System (AWIPS) and the Satellite Broadcast Network (SBN) .

3.2 Issuance Guidelines

3.2.1 Creation Software

WPC uses AWIPS and specialized post-processing software to generate these products.

3.2.2 Issuance Criteria

These are routine, schedule-driven products, issued as specified in Table 2. Charts are routinely issued year-round.

3.2.3 Issuance Time

The full probabilistic winter precipitation forecast suite is issued 6-times daily at 0200 Coordinated Universal Time (UTC), 0630 UTC, 0830 UTC, 1400 UTC, 1830 UTC, and 2030 UTC. The subset of graphics distributed on AWIPS are noted in Table 2.

3.2.4 Valid Time

Day 1 encompasses the forecast period from 12 to 36 hours on the 00 / 12 UTC model forecast cycle (00 UTC for the 0900 issuance and 12 UTC for the 2100 issuance), Day 2 encompasses the forecast period from 36 to 60 hours on the 00 / 12 UTC model forecast cycle, and Day 3 encompasses the forecast period 60-84 hours on the 00 / 12 UTC model forecast cycle. The full suite of probability data are specified at this link:

https://www.wpc.ncep.noaa.gov/pwpf/WPC_PWPF_WMO_Headers.pdf

The subset of graphics distributed on AWIPS are noted in Table 2.

WPC Probabilistic Heavy Snow and Icing Graphical Guidance Product Schedule				
Issuance Time (UTC)	Valid Time (UTC)	AWIPS ID	WMO Header	Product Description
0900	1200 – 1200	D1P04S	PSBB04 KWNH	Day 1 Probability of Receiving at least 4” of Snow Accumulation
	1200 – 1200	D1P08S	PSBB08 KWNH	Day 1 Probability of Receiving at least 8” of Snow Accumulation
	1200 – 1200	D1P12S	PSBB12 KWNH	Day 1 Probability of Receiving at least 12” of Snow Accumulation
	1200 – 1200	D1P25Z	PSBB25 KWNH	Day 1 Probability of Receiving at least .25” of Ice Accumulation
2100	0000 – 0000	D1P04S	PSBB04 KWNH	Day 1 Probability of Receiving at least 4” of Snow Accumulation
	0000 – 0000	D1P08S	PSBB08 KWNH	Day 1 Probability of Receiving at least 8” of Snow Accumulation
	0000 – 0000	D1P12S	PSBB12 KWNH	Day 1 Probability of Receiving at least 12” of Snow Accumulation
	0000 – 0000	D1P25Z	PSBB25 KWNH	Day 1 Probability of Receiving at least .25” of Ice Accumulation
0900	1200 – 1200	D2P04S	PSBC04 KWNH	Day 2 Probability of Receiving at least 4” of Snow Accumulation
	1200 – 1200	D2P08S	PSBC08 KWNH	Day 2 Probability of Receiving at least 8” of Snow Accumulation
	1200 – 1200	D2P12S	PSBC12 KWNH	Day 2 Probability of Receiving at least 12” of Snow Accumulation
	1200 – 1200	D2P25Z	PSBC25 KWNH	Day 2 Probability of Receiving at least .25” of Ice Accumulation
2100	0000 – 0000	D2P04S	PSBC04 KWNH	Day 2 Probability of Receiving at least 4” of Snow Accumulation
	0000 – 0000	D2P08S	PSBC08 KWNH	Day 2 Probability of Receiving at least 8” of Snow Accumulation
	0000 – 0000	D2P12S	PSBC12 KWNH	Day 2 Probability of Receiving at least 12” of Snow Accumulation
	0000 – 0000	D2P25Z	PSBC25 KWNH	Day 2 Probability of Receiving at least .25” of Ice Accumulation
0900	1200 – 1200	D3P04S	PSBD04 KWNH	Day 3 Probability of Receiving at least 4” of Snow Accumulation
	1200 – 1200	D3P08S	PSBD08 KWNH	Day 3 Probability of Receiving at least 8” of Snow Accumulation
	1200 – 1200	D3P12S	PSBD12 KWNH	Day 3 Probability of Receiving at least 12” of Snow Accumulation
	1200 – 1200	D3P25Z	PSBD25 KWNH	Day 3 Probability of Receiving at least .25” of Ice Accumulation
2100	0000 – 0000	D3P04S	PSBD04 KWNH	Day 3 Probability of Receiving at least 4” of Snow Accumulation
	0000 – 0000	D3P08S	PSBD08 KWNH	Day 3 Probability of Receiving at least 8” of Snow Accumulation
	0000 – 0000	D3P12S	PSBD12 KWNH	Day 3 Probability of Receiving at least 12” of Snow Accumulation
	0000 – 0000	D3P25Z	PSBD25 KWNH	Day 3 Probability of Receiving at least .25” of Ice Accumulation

Table 2. Probabilistic Heavy Snow and Icing Chart Issuance and Valid Times**3.2.5 Product Expiration Time**

The product expires after the valid time ends or a new probabilistic heavy snow and icing forecast is issued, whichever comes first.

3.3 Technical Description

Charts should follow the format and content described in this section.

3.3.1 UGC Type

Not applicable.

3.3.2 MND Broadcast Line

Not applicable.

3.3.3 MND Header

Not applicable.

3.3.4 Content

The PWPF forecasts provide information in the following formats:

Probabilities of exceeding a threshold display color filled contour levels of probabilities that the 24-hour, 48-hour, or 72-hour accumulation of winter precipitation (snow and ice) will equal or exceed the given threshold. As an example, consider the 6-inch threshold for snowfall. If a point of interest falls within the 40% contour on the probability map, then the chance of snowfall exceeding 6 inches is 40% or greater. As the threshold values increase, the probabilities of exceeding them either stay the same or decrease.

The above probability of exceedance data are used to derive a subset of graphics distributed on AWIPS and the SBN in more simplified format:

- a. Snowfall - closed lines represent the probability (slight, moderate, and high) that enclosed areas will receive equal to or greater than a specific threshold accumulation (4", 8" or 12") of snowfall in a 24-hour period.
- b. Freezing Rain - depicts the probability in the same manner and time period as snowfall, but with an accumulation threshold of 0.25" (one quarter of an inch) of freezing rain.
- c. The probability thresholds are:
 - (1) SLIGHT (SLGT): 10% to less than 40% chance of occurrence within the outlined area.
 - (2) MODERATE (MDT): 40% to less than 70% chance of occurrence within the outlined area.
 - (3) HIGH: 70% or greater chance of occurrence within the outlined area.

Percentile accumulations for 24-, 48-, or 72-hour intervals display color filled contours of snowfall or freezing rain amounts for which the probability of observing that amount or less is given by the percentile level. For example, if the 75th percentile map shows six inches of snow at a location, then the probability of getting up to six inches of snow is 75% at that location. Conversely, there is only a 25% probability of snowfall exceeding six inches at the location in this example. Percentile accumulations increase as the percentile level increases. To illustrate this point, given the previous example, instead of the 75th percentile map, consider the 10th percentile map showing two inches of snow at the location. In this case, the probability of getting up to but no more than two inches of snow is just 10%. Conversely, the probability of getting more than two inches is 90%. Therefore, a significant accumulation of snow is likely in this case.

3.3.5 Format Examples

Examples of Days 1-3 Snow and Ice Accumulation charts follow.

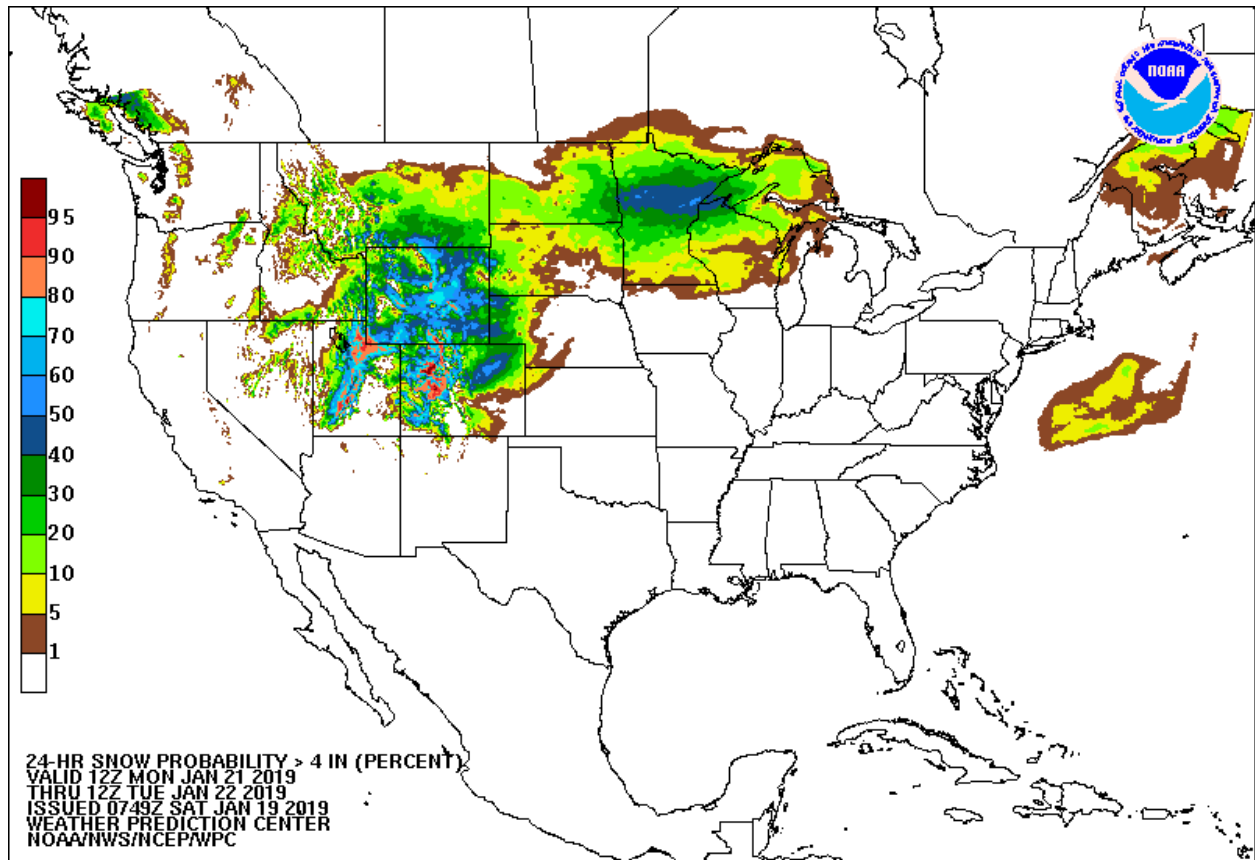


Figure 1. Probability of Greater than 4 inches of snow in a 24-hour period Chart.

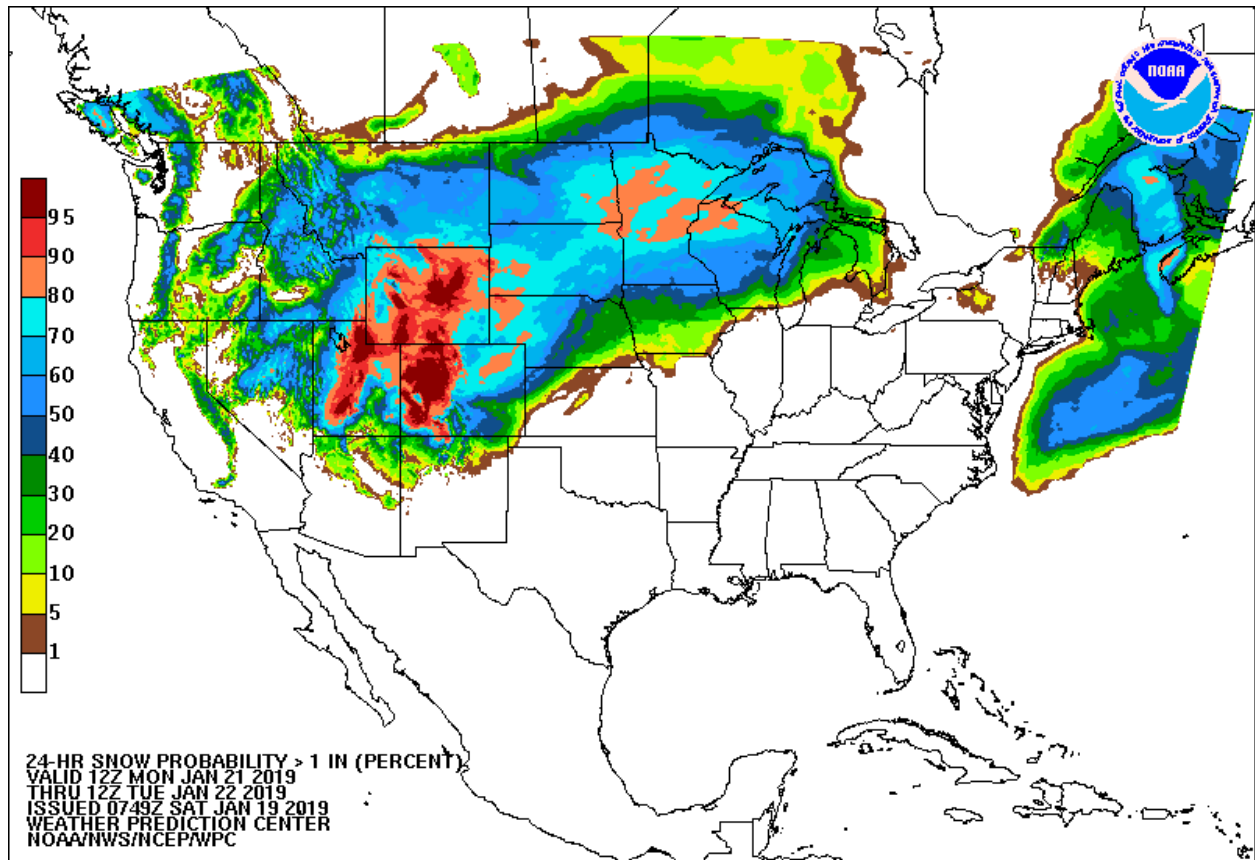


Figure 2. Probability of Greater than 1 inch of snow in a 24-hour period Chart.

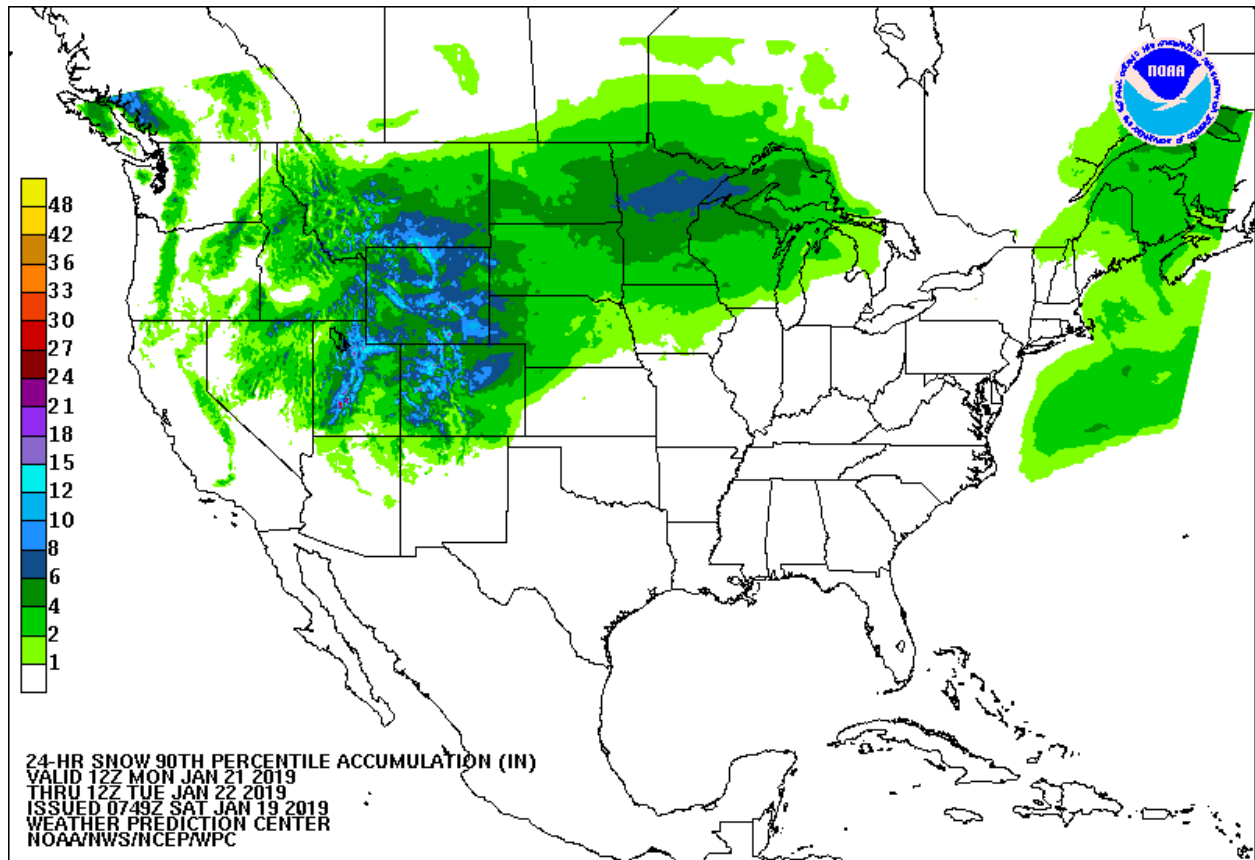


Figure 3. 90th Percentile Snow Accumulation in a 24-hour period.

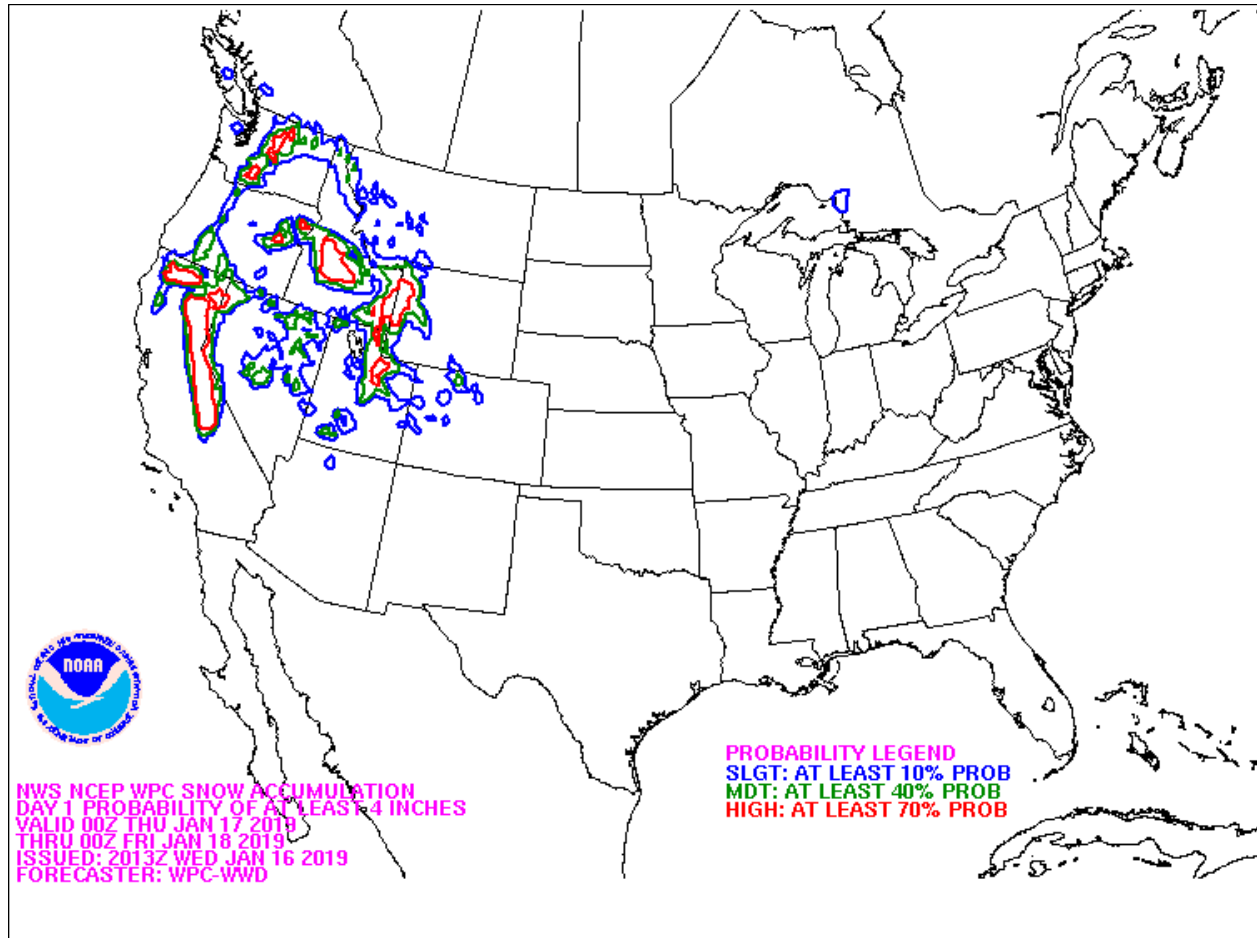


Figure 4. Probability of at least 4 inches of snow accumulation in 24 hours Chart.

3.4 Updates, Amendments, and Corrections

WPC updates the product for formatting or other changes as necessary.

4 Day 4-7 Winter Weather Outlook

4.1 Mission Connection

The Day 4-7 Winter Weather Outlook is a probabilistic forecast depicting the probability of winter precipitation (snow/sleet) exceeding 0.25 inches (~6 mm) water equivalent over a 24-hour period (12 UTC – 12 UTC). This graphic is used by NWS field offices and the general meteorological community, including the private sector and the media, to support advanced planning of hazardous winter weather.

4.2 Issuance Guidelines

4.2.1 Creation Software

WPC uses the AWIPS software to generate this product.

4.2.2 Issuance Criteria

This is a year-round product.

4.2.3 Issuance Time

The Winter Weather Outlook is issued no later than 0900 UTC and 2100 UTC daily, or when any corrections or amendments are needed.

4.2.4 Valid Time

The Winter Weather Outlook is valid until expiration time or until a new Winter Weather Outlook is issued.

WMO Header	Product Description	Valid Time (UTC)	Format
RHUE12 KWNH	WWO Prob ≥ 0.25	Day 4 (1200-1200)	GRIB2
RHUF12 KWNH	WWO Prob ≥ 0.25	Day 5 (1200-1200)	GRIB2
RHUG12 KWNH	WWO Prob ≥ 0.25	Day 6 (1200-1200)	GRIB2
RHUH12 KWNH	WWO Prob ≥ 0.25	Day 7 (1200-1200)	GRIB2

Table 3. Day 4-7 Winter Weather Outlook WMO headers and valid times and format.

4.2.5 Product Expiration Time

The product expires at expiration time or when a new product is issued, whichever comes first.

4.3 Technical Description

The chart should follow the format and content described in this section.

4.3.1 UGC Type

Not applicable.

4.3.2 MND Broadcast Instruction Line

Not applicable.

4.3.3 MND Product Type Line

Not applicable.

4.3.4 Content

The Day 4-7 Winter Weather Outlook is a probabilistic forecast depicting the probability of winter precipitation (snow/sleet) exceeding 0.25 inches (~6 mm) water equivalent over a 24-hour period (12 UTC – 12 UTC). The product is comprised of 4 products (graphical and digital) displaying the forecast for Day 4, Day 5, Day 6, and Day 7. The outlook is prepared twice daily by WPC medium range forecasters.

4.3.5 Format

The forecasts are presented on an interactive WPC webpage at the following URL: http://www.wpc.ncep.noaa.gov/wwd/pwpf_d47/pwpf_medr.php as Probability of Exceeding 0.25 inch liquid equivalent of snow/sleet. An example is shown below.

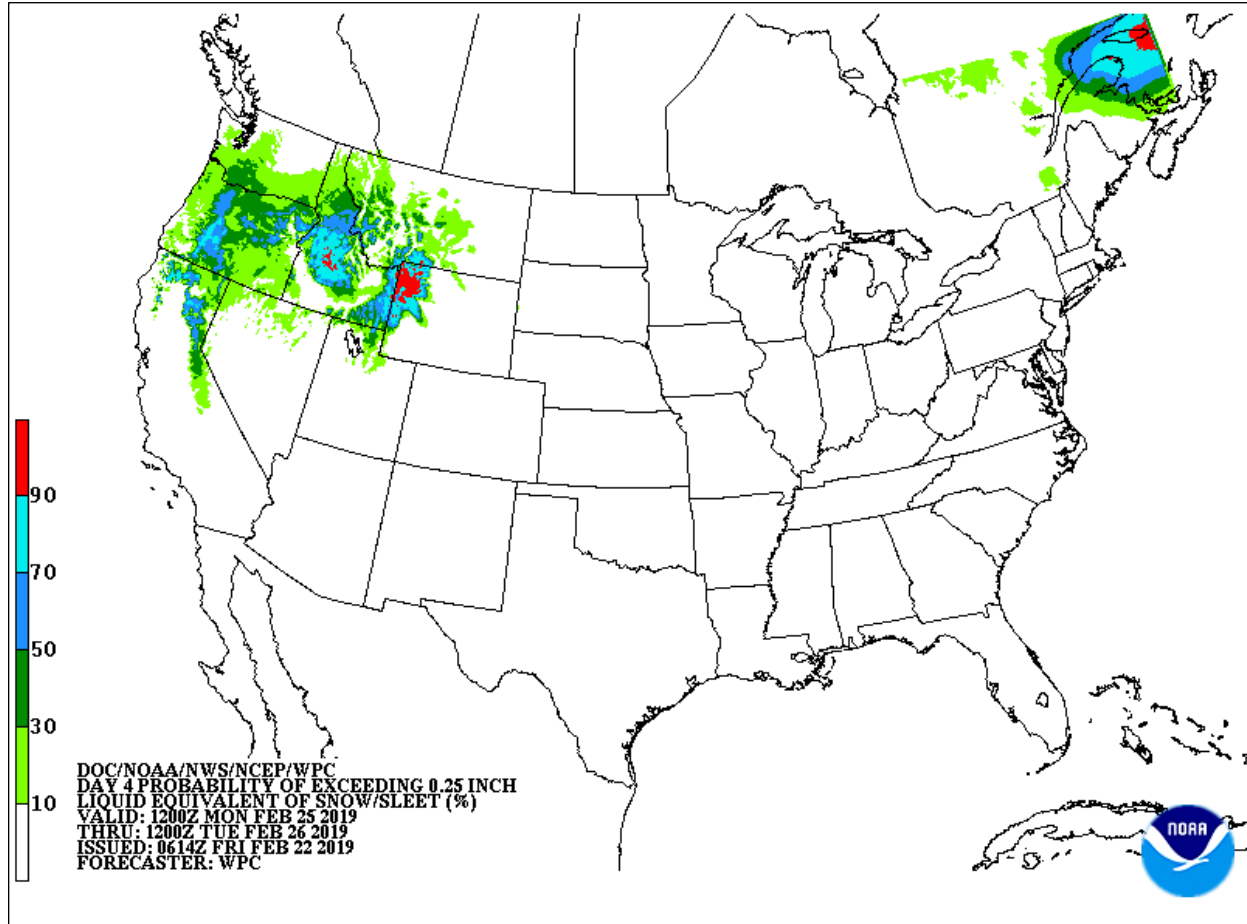


Figure 5. Day 4 Probability of Exceeding 0.25-inch Liquid Equivalent of Snow/Sleet Chart.

4.4 Updates, Amendments, and Corrections

WPC updates the product as necessary for format or other changes as necessary.

5 Winter Storm Severity Index (WSSI)

5.1 Mission Connection

The purpose of the WSSI is to provide NWS forecasters, partners, and the public with an indication of the severity of winter weather hazards and the potential for related societal impacts. The WSSI does not depict official warnings and should always be used in context with official NWS forecasts and warnings.

5.2 Issuance Guidelines

5.2.1 Creation Software

WPC creates this product through the use of Geographic Information Systems (GIS) by screening the official NWS gridded forecasts from the National Digital Forecast Database (NDFD) for winter weather elements and combining those data with non-meteorological or static information datasets (e.g., climatology, land-use, urban areas) to derive potential impacts.

5.2.2 Issuance Criteria

This is a year-round product.

5.2.3 Issuance Time

The WSSI will be updated every two hours at approximately 0100 UTC, 0300 UTC, 0500 UTC, etc. No communication system changes are required to view this web-based information.

5.2.4 Valid Time

This product is valid until a new graphical product is issued.

5.2.5 Product Expiration Time

The product expires when a new graphical product is issued.

5.3 Technical Description

The product should follow the format and content described in this section.

5.3.1 UGC Type

Not applicable

5.3.2 MND Broadcast Instruction Line

Not applicable

5.3.3 MND Product Type Line

Not applicable

5.3.4 Content

The WSSI comprises six individual, but equally weighted components of winter storms derived from both official NWS Forecast datasets from NDFD and non-meteorological datasets. These raw and calculated forecast values are then used for a series of additional calculations to compute individual WSSI components, which are then categorized to impact scale. The final WSSI value is the maximum from among all components for each grid point at the native 2.5 km NDFD resolution. 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 five levels of impact are: Winter Weather Area, Minor Impacts, Moderate Impacts, Major Impacts, and Extreme Impacts.

5.3.5 Format

The graphics are available for the 116 WFOs on individual websites along with one national viewer that encompasses the CONUS. These pages depict local and national views of the WSSI for Day 1, Day 2, and Day 3 as well as a combined Days 1-3 image. These webpages are updated every two hours at approximately 0100 UTC, 0300 UTC, 0500 UTC, etc. The publicly-shared output is available as static images and in GIS format (KMZ and SHP). WFOs will include links to the WSSI on their local web pages. The WSSI is presented on a WPC webpage at the following URL: <https://www.weather.gov/wssi>.

5.4 Updates, Amendments, and Correction

WPC does not update/amend this product.

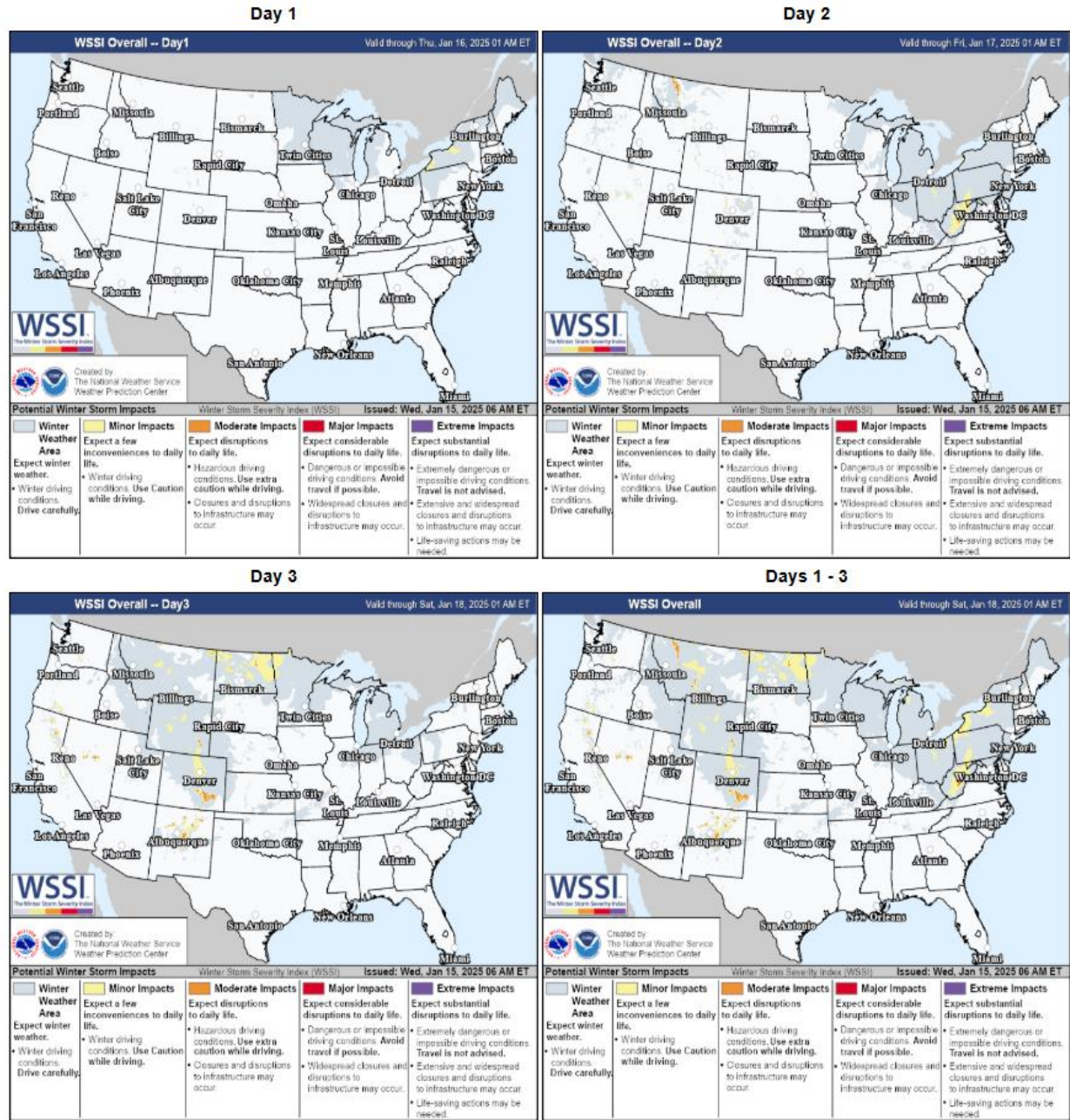


Figure 6. Example of WSSI Static Images for Day 1 (top left), 2(top right), 3 (bottom left) and Days 1-3 combined (bottom right)

6. Probabilistic Winter Storm Severity Index (WSSI-P)

6.1 Mission Connection

The purpose of the WSSI-P is to enhance communication with external partners, media, and the general public of the potential for winter weather hazards and the related societal impacts, along with their geographical and temporal distributions. The WSSI-P also assists NWS operational forecasters in maintaining situational awareness regarding the possible significance of winter weather-related impacts based upon the PWWF input, thus informing the winter watch/warning

decision process. Unlike the deterministic-based WSSI, the WSSI-P allows for detailing the likelihood of potential impacts. The WSSI-P output conveys a range of possibilities of impacts, enabling enhanced preparedness and decision making as they pertain to winter weather. The WSSI-P does not depict official warnings, and should always be used in context with official NWS forecasts and warnings.

6.2 Issuance Guidelines

6.2.1 Creation Software

WPC creates this product through the use of GIS by using the PWPF gridded information and combining those data with non-meteorological or static information datasets (e.g., climatology, land-use, urban areas) to derive potential impacts.

6.2.2 Issuance Criteria

This is a year-round product.

6.2.3 Issuance Time

The WSSI-P products will be available at approximately 0200 UTC, 0500 UTC, 1400 UTC and 1700 UTC. No communication system changes are required to view this web-based information.

6.2.4 Valid Time

This product is valid until a new graphical product is issued.

6.2.5 Product Expiration Time

The product expires when a new graphical product is issued.

6.3 Technical Description

The product should follow the format and content described in this section.

6.3.1 UGC Type

Not applicable

6.3.2 MND Broadcast Instruction Line

Not applicable

6.3.3 MND Product Type Line

Not applicable

6.3.4 Content

The WSSI-P uses an ensemble of meteorological data as input into the component algorithms to arrive at a range of impact scenarios for each component. The ensemble of impact levels is used to generate a probability of reaching each impact severity level of the components. This

probability of reaching an impact level for each component will be displayed on the web page. A WSSI-P value for each constituent is calculated for each ensemble member; probabilities are defined as a percentage of available members that yield a given WSSI-P outcome. The Overall Winter Storm Impacts graphic is the maximum percentage impact from any of the five impact components. The WSSI-P components are:

- Snow Rate
- Snow Load
- Snow Amount
- Ice Accumulation
- Blowing Snow

The range of “Likelihood of Impact” probabilities range from <5%, 5%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, and >95%. This range applies to four possible levels of impacts: Minor Impacts, Moderate Impacts, Major Impacts, and Extreme Impacts.

6.3.5 Format

The output is available through a national viewer that encompasses the CONUS. This page depicts the WSSI-P for Day 1-Day 7 in six-hour time intervals. The publicly-shared output is also available in GIS format (KMZ and SHP). WFOs can include links to the WSSI-P on their local web pages. The WSSI-P is presented on a WPC webpage at the following URL:

<https://www.weather.gov/wssi-p>.

6.4 Updates, Amendments, and Correction

WPC does not update/amend this product.

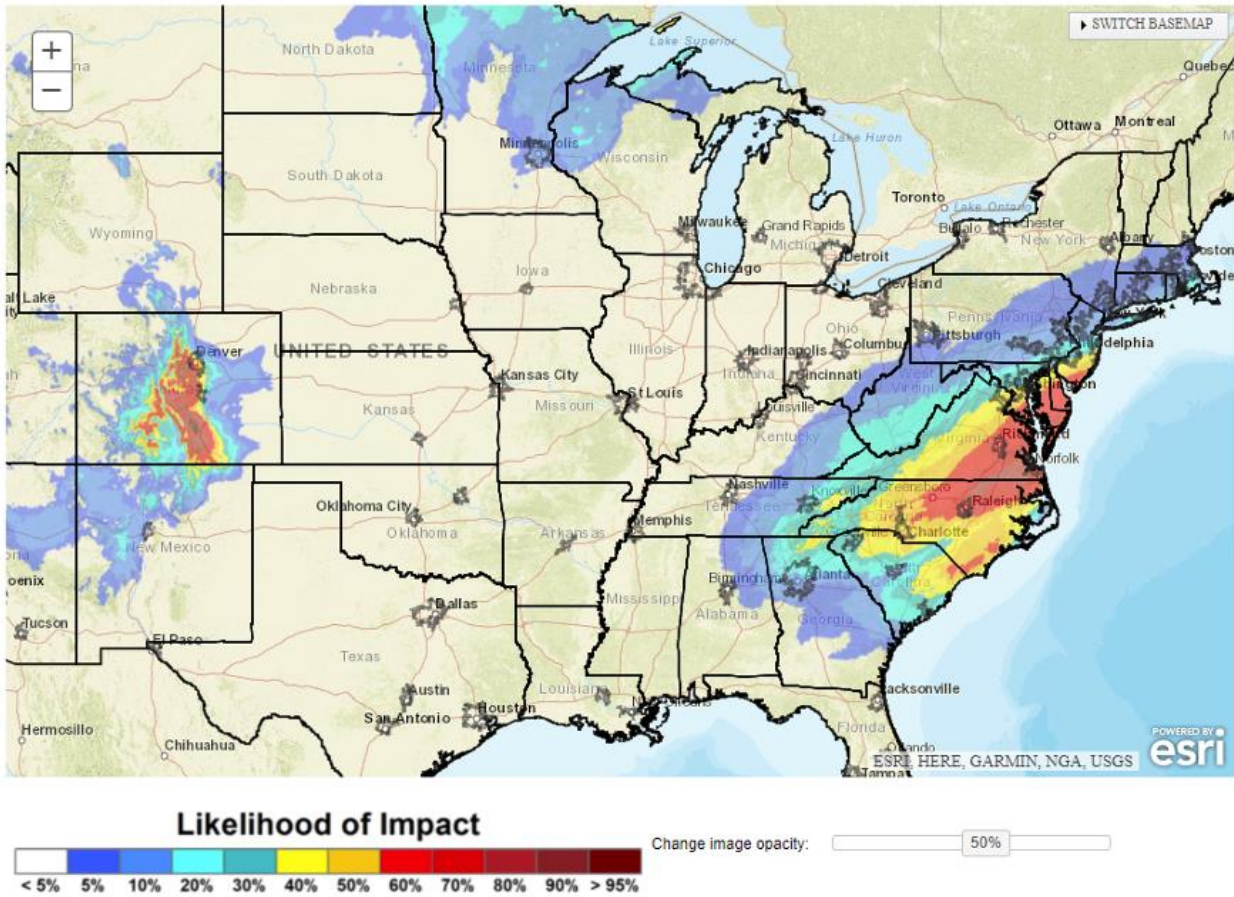


Figure 7. Example image of WSSI-P Image of Minor Impacts