

# NWS Winter Weather Products 

$$
\text { Updated: } 2023
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A summary of winter weather products \& services available online from the National Weather Service


## Probabilistic Snow Graphics

## https://www.weather.gov/box/winter



# Expected Snowfall Official NWS Forecast 

This map is the official NWS snowfall forecast in inches during the time period shown on the graphic. This snowfall amount is determined by NWS forecasters to be the most likely outcome based on evaluation of data from computer models, satellite, radar, and other observations.


## Low End Amount

## 9 in 10 Chance ( $90 \%$ ) of Higher

 SnowfallThis map depicts a reasonable lower-end snowfall amount for the time period shown on the graphic, based on many computer model simulations of possible snowfall totals. This lower amount is an unlikely scenario with a 9 in 10 , or $90 \%$ chance that more snow will fall, and only a 1 in 10 , or $10 \%$ chance that less snow will fall. This number can help serve as a lower-end scenario for planning purposes.


## High End Amount

 1 in 10 Chance ( $10 \%$ ) of Higher SnowfallThis map depicts a reasonable upper-end snowfall amount for the time period shown on the graphic, based on many computer model simulations of possible snowfall totals. This higher amount is an unlikely scenario, with only a 1 in 10 , or $10 \%$ chance that more snow will fall, and a 9 in 10 , or $90 \%$ chance that less snow will fall. This number can help serve as an upper-end scenario for planning purposes.


National Oceanic and Atmospheric Administration

## Percent Chance That Snow Amounts Will Be Greater Than...

## https://www.weather.gov/box/winter

Percent Chance of 1" Snow or More Valid 8 PM Wed Nov 02, 2022 through 8 PM Sat Nov 05, 2022 EDT

Weather Forecast Office
Boston/Norton, MA
Issued Nov 02, 2022 11:11 PM EDT


## Percent Chance That Snow Amounts Will Be Greater Than

This series of maps shows the probability (that is, the likelihood) that snowfall will equal or exceed specific amounts during the time period shown on the graphic. These forecasts are based on many computer model simulations of possible snowfall totals.


## Icing Forecast

## https://www.weather.gov/box/winter

Expected Ice Accumulation - Official NWS Forecast
Weather Forecast Office Boston/Norton, MA Valid 7 PM Sat Dec 03, 2022 through 7 PM Sun Dec 04, 2022 EST

Issued Dec 03, 2022 11:00 PM EST


## Expected Ice Accumulation - Official NWS Forecast

Represents our official ice forecast in inches within the next one to three days. The ice accumulation amounts are provided in ranges. This is the elevated flat surface ice accumulation. It is not radial/line ice. Radial/line ice is typically 39\% of the elevated flat surface ice.

## Precipitation Onset/End Timing

## https://www.weather.gov/box/winter



## Precipitation Onset Timing

Most likely time of winter precipitation onset (snow, sleet, freezing rain). Rain is not included here. This information is provided when we issue a Warning or Advisory for expected snow or ice accumulation; typically six to 24 hours in advance.

## Precipitation End Timing

Most likely time of winter precipitation ending (snow, sleet, freezing rain). Rain is not included here. This information is provided when we issue a Warning or Advisory for expected snow or ice accumulation; typically six to 24 hours in advance.


# Graphical Hazardous Weather Outlook 

## https://www.weather.oov/erh/ahwo?wfo=box


Public Marine
24 Hr Hazard Risks
(i) Severe Thunderstorm
(i) Tornado
(i) Thunderstorm Wind
(i) Hail
(i) Lightning
(i) Excessive Rainfall
(i) Wind
(i) Frost/Freeze
(i) Fog
(i) Fire Weather
(i) Excessive Cold
(i) Ice Accumulation
(i) Snow/Sleet


## Graphical Hazardous Weather Outlook

The gHWO is designed to provide decision makers with convenient access to the expected type, severity, coverage, and potential impacts of hazardous weather events by graphically depicting the risk of weather hazards out through seven days.

## Access it under the Current Hazards tab



A Few Clouds
$52^{\circ} \mathrm{F}$
$11^{\circ} \mathrm{C}$ Get Detailed into


Mostly Clear Low: $50^{\circ} \mathrm{F}$

NWS Forecast Office - Boston / Norton, MA
Weather.gov > Boston / Norton, MA

Boston / Norton, MA
Weather Forecast Office



# Winter Storm Severity Index (WSSI) 

## https://www.wpc.ncep.noaa.qov/wwd/wssi/wssi.php?id=BOX



| Potential Winter Storm Impacts |  | Winter Storm Severity Index (WSSI) Issued: Fr |  | Nov 11, 202207 PM ET |
| :---: | :---: | :---: | :---: | :---: |
| $\square$ <br> Winter <br> Weather <br> Area <br> Expect winter <br> weather. <br> - Winter driving <br> conditions. <br> Drive carefully. | $\square$ Minor Impacts Expect a few inconveniences to daily life. <br> - Winter driving conditions. Use Caution while driving. | Moderate Impacts | Major Impacts | Extreme Impact |
|  |  | Expect distruptions to daily life. | Expect considerable disruptions to daily life. | Expect substantial disruptions to daily life. |
|  |  | $\begin{aligned} & \text { - Hazardous driving } \\ & \text { conditions. Use extra } \\ & \text { caution while driving. } \end{aligned}$ | - Dangerous or impossible driving conditions. Avoid travel if possible. | - Extremely dangerous or impossible driving conditions. Travel is not advised. |
|  |  | - Closures and disruptions to infrastructure may occur. | - Widespread closures and disruptions to infrastructure may occur. | - Extensive and widespread closures and disruptions to infrastructure may occur. <br> - Life-saving actions may be needed. |

> Images are available for the next 3 days. These webpages are updated every two hours at approximately 7 PM EST, 9 PM EST, 11 PM EST, etc. The publicly-shared output is available as static images and in GIS format (KMZ, SHP, REST Service). Index impact definitions

## Winter Storm Severity Index (WSSI)

The purpose of the Winter Storm Severity Index (WSSI) is to provide NWS partners and the general public with an indication of the level of winter precipitation (snow and ice) severity and its potential related societal impacts. The WSSI does not depict official warnings, and should always be used in context with official NWS forecasts and warnings.

## Potential Winter Storm Impacts

## Winter Weather Area

Expect Winter Weather.

- Wirter driving condfions. Drive carefully.

Minor Impacts
Expect a few inconveniences to daily life.

- Winter driving condifions. Use caution while driving.


## Moderate Impacts

Expect disruptions to daily life.

- Hazardous driving conditions. Use extra caution while driving.
- Closures and disruptions to infrastructure may occur.


## Major Impacts

Expect considerable disruptions to daily life.

- Dangerous or impossible driving conditions Avoid travel if possible.
- Widespread closures and disruptions to infrastructure may occur.


## Extreme Impacts

Expect substantial disruptions to daily life. - Extremely dangerous or impossible driving conditions. Travel is not advised.

- Extensive and widespread closures and disruptions to infrastructure may occur.
- Life saving actions may be needed


## Winter Storm Severity Index (WSSI) <br> https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOX



## The WSSI uses non-meteorological data along with meteorological data to help forecast impacts

The non-meteorological data, or factors used are:

## - Urban areas

- Used in the Ice Accumulation Index and Snow Amount Index
- The give a $25 \%$ increase to impact
- Defined from US Census Bureau
- Land Use / Coverage
- Decreases impacts for areas of reduced wind (e.g. forests, high density
commercial/residential areas) compared to areas without reductions (e.g. cropland, grassland)
- Used in the Blowing Snow Index
- Forest Classification
- Demarks forestland described as conifer vs deciduous
- Conifer trees can handle more snow than deciduous trees
- Used in the Snow Load Index



## Winter Storm Severity Index (WSSI) <br> Sub Components <br> https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOX



Snow Amount
Indicates potential impacts due to the total amount of snow or the snow accumulation rate. This index also normalizes for climatology, such that regions of the country that experience, on average, less snowfall will show a higher level of severity for the same amount of snow that is forecast across a region that experiences more snowfall on average. Designated urban areas are also weighted a little more than non-urban areas.


## Snow Load

Indicates potential infrastructure impacts due to the weight of the snow. This index accounts for the land cover type. For example, more forested and urban areas will show increased severity versus the same snow conditions in grasslands.


## Ice Accumulation

Indicates potential infrastructure impacts (e.g. roads/bridges) due to combined effects and severity of ice and wind. Designated urban areas are also weighted a little more than non-urban areas.

## Sub Components <br> https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOX



## Blowing Snow

Indicates the potential disruption due to blowing and drifting snow. This index accounts for land use type. For example, more densely forested areas will show less blowing snow than open grassland areas.

## Flash Freeze

Indicates the potential impacts of flash freezing (temperatures starting above freezing and quickly dropping below freezing) during or after precipitation events.


## Ground Blizzard

Indicates the potential travel-related impacts of strong winds interacting with pre-existing snow cover. This is the only sub-component that does not require snow to be forecast in order for calculations to be made. The NOHRSC snow cover data along with forecast winds are used to model the ground blizzard.

Drag the slider to display the 24 hour forecast forecast for WSSI impacts.

Forecast Initialized: $06 Z$ Thu 03 Nov, 2022 | Forecast HR: 24 | Valid at $06 Z$ Fri 04 Nov, 2022


## Rolling 24 Hour Winter Storm Severity Index (WSSI)

This display shows the WSSI for a period of 24 hours. Each time-step forward is 6 hours. As you move forward in time using the slider bar you can see how the WSSI is changing every six hours out to the end of the day 3 timeframe. This can assist the user to better determe when the projected impacts will be at their maximum.


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## Probabilistic Winter Storm

## Severitu Index (Prob WSSI)

## https://www.wpc.ncep.noaa.qov/wwd/wssi/prob wssi.php



## Experimental Probabilistic Winter Storm Severity Index (ProbWSSI)

This display shows the Probabilistic WSSI for a period of 24 hours. Each time-step forward is 6 hours starting at 24 hours and extending to 7 days. As you move forward in time using the slider bar you can see how the ProbWSSI is changing every six hours out to the end of the end of day 7 . Select the tab with the element name of interest and then select the impact level you are interested in.


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## Experimental Winter Storm Outlook (WSO)

## https://www.wpc.ncep.noaa.gov/wwd/wsol

Snow Freezing Rain
Probability of Exceeding Warning Criteria (Snowfall)

| Day 1 | Day 2 | Day 3 | Day 4 | Days $1-4$ More Info |
| :--- | :--- | :--- | :--- | :--- |
| WPC PWPF Snow Forecast | Proposed Event-based Winter Storm Warning Criteria: Criteria |  |  |  |
| WPC PWPF Ice Forecast I NWS Winter Storm Warning Freezing Rain Criteria: 12 HR / 24 HR |  |  |  |  |

Select Zoom Area: CONUS $\checkmark$

Map Overlays
CWAs $\square$
RFCs $\square$
States $\square$
URWS Forecast Zones $\square$
Urban Areas $\square$
Download WSO Data in KMZ/KML
Download WSO Data in SHP
Print Map

CWAs
RFCs $\square$
States $\square$ Urban Areas $\square$ Urban Areas $\square$ Download WSO Data in KMZ/KML Download WSO Data in SHP

## Print Map

Winter Storm Outlook - Valid for the 4 Days ending 12Z Mon Nov 072022
Winter Storm Outlook - Last Update: 0216Z Fri Nov 042022
SWITCH BASEMAP

\section*{| + |
| :--- |
| - |}



Maximum Probability of Exceeding Warning Criteria

```
<10% 10-30% 30-50% 50-80% >80%
```


## Experimental Winter Storm Outlook (WSO)

The Experimental WSO is based on a combination of the Weather Prediction Center's (WPC's) Probabilistic Winter Precipitation Forecasts (PWPF) and local National Weather Service (NWS) snow and ice accumulation warning criteria. Therefore, the WSO provides an early alert to hazardous winter weather conditions (out to 4 days).


National Oceanic and Atmospheric Administration <br> \title{
WPC's Probabilistic Winter <br> \title{
WPC's Probabilistic Winter Precipitation Forecast (PWPF) <br> <br> https://bit.lu/3DE5adZ
} <br> <br> https://bit.lu/3DE5adZ
}

Product Selection

| Precipitation Type Snow Freezing Rain | Forecast Product <br> - Probability Forecasts <br> Accumulation by Percentile | Forecast Duration 24-Hour 48-Hour 72-Hour | User Interface ESRI Maps GIF Images |
| :---: | :---: | :---: | :---: |



## WPC's Probabilistic Winter Precipitation Forecast (PWPF)

The Weather Prediction Center (WPC) creates 24-hr forecasts of snowfall and freezing rain accumulations for each of three consecutive 24-hr periods (days) extending 72 hours into the future. The probabilistic forecasts found on the WPC PWPF page are based on the deterministic accumulation forecasts and are generated automatically using an ensemble of model forecasts together with WPC's forecast.



## Probability Forecasts

Probabilities of exceeding a threshold show filled contour levels of probability that the 24-hour, 48-hour, or 72 -hour accumulation of winter precipitation will equal or exceed the given threshold.

## Product Selection

| Precipitation Type Snow Freezing Rain | Forecast Product <br> Probability Forecasts <br> Accumulation by Percentile | Forecast Duration 24-Hour 48-Hour 72-Hour | User Interface <br> ESRI Maps <br> GIF Images |
| :---: | :---: | :---: | :---: |


| 24-Hour Snowfall Accumulation - 50 ${ }^{\text {th }}$ Percentile |  |  |  |  |  |  |  |  |  | Viewing_Options <br> Choose a percentile for the specified time: |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Day 1 |  | Day 2 |  |  |  |  |  | Day 3 |  |
| Valid for the $\mathbf{2 4}$-hour period ending: | $\begin{aligned} & 00 \mathrm{Z} \text { Sat } \\ & \text { Nov } 05 \end{aligned}$ | 06Z Sat Nov 05 | $\begin{aligned} & \hline \text { 12Z Sat } \\ & \text { Nov 05 } \end{aligned}$ | $\begin{aligned} & \text { 18Z Sat } \\ & \text { Nov } 05 \end{aligned}$ | $\begin{aligned} & \text { 00Z Sun } \\ & \text { Nov } 06 \end{aligned}$ | 06Z Sun Nov 06 | $\begin{aligned} & \text { 12Z Sun } \\ & \text { Nov } 06 \end{aligned}$ | $\begin{aligned} & \text { 18Z Sun } \\ & \text { Nov } 06 \end{aligned}$ | $\begin{aligned} & \text { 00Z Mon } \\ & \text { Nov } 07 \end{aligned}$ |  |
|  |  |  |  |  |  |  |  | Nov 0 |  | $5^{\text {th }}$ $10^{\text {th }}$ $25^{\text {th }}$ $50^{\text {th }}$ $75^{\text {th }}$ $90^{\text {th }}$ $95^{\text {th }}$ |

## Accumulation by Percentile

Percentile accumulations for 24-, 48-, or 72-hour intervals show 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 point. 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.


## CPC's 8-14 Day Hazard Outlook

https://www.cpc.ncep.noaa.gov/


## CPC's 8-14 Day Hazard Outlook

The Climate Prediction Center (CPC) U.S. Hazards Outlook is released every weekday and targets the Day 8-14 forecast period for potential hazardous conditions related to temperature, precipitation, and wind. The forecast is mainly represented in probabilistic format, with the exclusion of a few variables (e.g. frozen precipitation and flooding), which are denoted in categorical format without associated probabilities. Forecasters use statistically post-processed (bias corrected and calibrated) ensemble model forecasts to estimate the likelihood of that event occurring, and indicate a confidence or "risk of occurrence."


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| Winter Product | Works Best When | Use Caution When |
| :---: | :---: | :---: |
| Probabilistic Snow | Prior to the event commencing | Once the storm has started, the the $10 \%$ and $90 \%$ accumulation chances only represent additional possibilities and does not include snow that has already occurred. |
| Snow Amount Chances | Prior to the event commencing | Once the storm has started, the probabilities depicted are only for additional snowfall. |
| Ice Accumulation | Prior to the event commencing. Ice accumulation forecast is compared with ice accumulation on flat surfaces. | Once the storm has started, the forecast depicted may only depict future accumulations, not what has already occurred. |
| Precipitation Onset/Ending | Onset times: prior to the storm commencing. Ending time through the entire storm | Timing can have errors in rain to snow/snow to rain situations. Light precipitation can start prior to onset times and continue past the ending times depicted. |
| Graphical Hazardous Weather Outlook | Used as a general examination of potential issues during depicted 24 hour periods | Trying to determine specific impacts at a specific time in a specific location. |
| Winter Storm Severity Index (WSSI) | Prior to the event commencing | Derived from official forecast information created by NWS meteorologists, so errors in the forecast will result in errors in WSSI. Additionally, once a storm has started, previous weather conditions are not accounted for, only forecast conditions |
| Probabilistic WSSI | Used to determine the relative risk of potential winter weather situations for planning purposes | Strictly based on model guidance, which may not reflect official forecasts. Does not account for previous weather conditions. If winter weather is ongoing, it will not account for what has already occurred. |
| Winter Storm Outlook | Used as guidance for where Winter Storm Watches may be needed | Other aspects beyond just snow and/or ice totals may have a role in the impact the storm could cause and are not necessarily included |
| Probabilistic Winter Precipitation | Used as general guidance to assist in awareness of possible upcoming weather | Based on model guidance, which may not reflect official forecasts nor have highly detailed resolution |
| 8-14 Day Outlook | Used as general guidance for potential significant weather events | By default, inherent uncertainty in forecasting weather conditions at this time range means errors can be considerable |

National Oceanic and Atmospheric Administration
.NEAR TERM /UNTIL 6 AM FRIDAY MORNING/...
930 PM update...
No changes to current forecast. Leaning on hi-res guidance which shows high probs of stratus and patchy fog developing after midnight, especially across CT/RI and SE MA. The challenge is how far north does it get. Some lower clouds could eventually get into Boston and expand north up the CT valley but confidence is lower here.

Previous discussion...
Surface high pressure continues to move to our east out across the Gulf of Maine. Guidance has really honed in on the stratus potential this evening as dewpoints increase into the upper 405 and low 50 s after about 07Z. Based on bufkit soundings, stratus and mist is favored over fog south of the MA Turnpike.

North of the MA Pike, skies will remain generally partly cloudy to cloud free, which will allow some radiation fog to develop in the typical locations, such as along the CT River Valley.
NWS Boston Forecast Discussion
The Area Forecast Discussion (AFD) is updated at least every 3 hours and is a fantastic resource to retrieve details not conveyed in graphical products. Things like forecaster confidence, uncertainty, \& scientific reasoning behind the forecast are readily available here..

| Local forecast by "City, St" or ZIP |  | News Headlines <br> - Winter Weather Preparedness Week Oct 31 - Nov 4,2022 <br> - NWS Boston Will Test Winter Storm Warning Criteria Changes <br> - Mariners - Give Us Your Feedback On A Proposed New Format for Marine Forecasts <br> - Want to Learn More About Weather? Check Out Our Webinar Schedule! |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Enter location ... | Go |  |  |  |  |  |  |
| Location Help |  |  |  |  |  |  |  |
| MY FORECAST Boston MA |  | NWS Forecast Office - Boston / Norton, MA Boston / Norton, MA |  |  |  |  |  |
|  |  | Current Hazards Current Conditions RadarClick a location below |  | Forecasts Rivers and Lakes |  | Climate and Past Weather | Local Programs |
|  |  | Forecasters Discussion |  |  |  |
|  |  |  |  |  |  |  |  | Hourly View |  |
| Fair |  |  |  |  | Map View |  |  |
| E2OE |  |  | Aviation |  | There are no watches, |  |  |

# Winter Weather Forecast Discussion 

(Latest Discussion - Issued 1916 Z Nov 03, 2022)

| Version Selection |
| :--- |
| Latest Previous Next  Print Discussion   <br> Versions back from latest: 0 1 $\underline{2}$ $\underline{3}$ $\underline{5}$ $\underline{5}$ $\underline{6}$$\underline{8} \quad \underline{9}$ |

Probabilistic Heavy Snow and Icing Discussion NWS Weather Prediction Center College Park MD 314 PM EDT Thu Nov 032022

Valid 00Z Fri Nov 042022 - 00Z Mon Nov 072022
.Four Corners and Central Rockies...
Day $1 .$.
Shortwave trough will continue to dig through the base of an anomalous longwave trough centered over the Great Basin through tonight and is expected to close off east of the Four Comers region by Friday morning before taking on a negative tilt and quickly ejecting into the Plains through the end of the Day 1 period. Height anomalies are between -2 and -3 sigma. Strong height falls, downstream divergence with accompanying PVA, and increasing upper diffluence within the left exit region of a 130 kt poleward streaking jet will produce strong UVVs, and lead to lee cyclogenesis later today across Colorado. As the lee low develops, moist flow originating from the Gulf will lift isentropically along the 295-300K surface with additional lift due to upslope enhancement. There is the potential for heavier snow rates, on the order of $1-2^{\prime \prime} / \mathrm{hr}$ rates, across much of Colorado west of the Front Range and into southern Wyoming thanks to the overlap of saturation in the DGZ and stronger lift. Crashing snow levels as colder air seeps south will bring the threat of accumulating snow eastward into the High Plains including the I-25 urban corridor where a few inches may accumulate.

Based on the latest WPC probabilities, the heaviest additional snowfall will be found for the higher peaks with additional accumulations of 2-4 inches likely (isolated higher amounts up to $6-8$ " possible). Across the Front Range, High Plains, and into Nebraska panhandle, WPC probabilities for 2" remain slight in the 20-30 percent range.

## WPC Probabilistic

 Heavy Snow and Icing DiscussionThe Weather Prediction Center’s (WPC) Probabilistic Heavy Snow and Icing Discussion is yet another resource to dig deeper into forecaster confidence and uncertainty, as well as digging deeper into the science behind the forecast. This discussion is on a national and regional scale.



## NWS Chat

The NWS Chat platform is a valuable communication tool for back-and-forth between the forecasters at NWS Boston and our media/Emergency Management partners. This will be the last winter that we utilize the current version as a completely revamped and improved NWS Chat 2.0 powered by Slack is set to be implemented during 2023. This will bring much more functionality and stability to the platform.


National Oceanic and Atmospheric Administration


# Questions? Reach Out To Us! 

## If you would like:

- Clarification about any forecast products you see online
- Insight into the forecaster confidence in storm magnitude, timing, etc
- To talk about the forecast for your municipality
- To ask any questions about how we can assist your decision making process regarding weather
please don't hesitate to reach out to us via phone (508.622.3280), email (box.operations@noaa.gov), or NWS Chat.


