

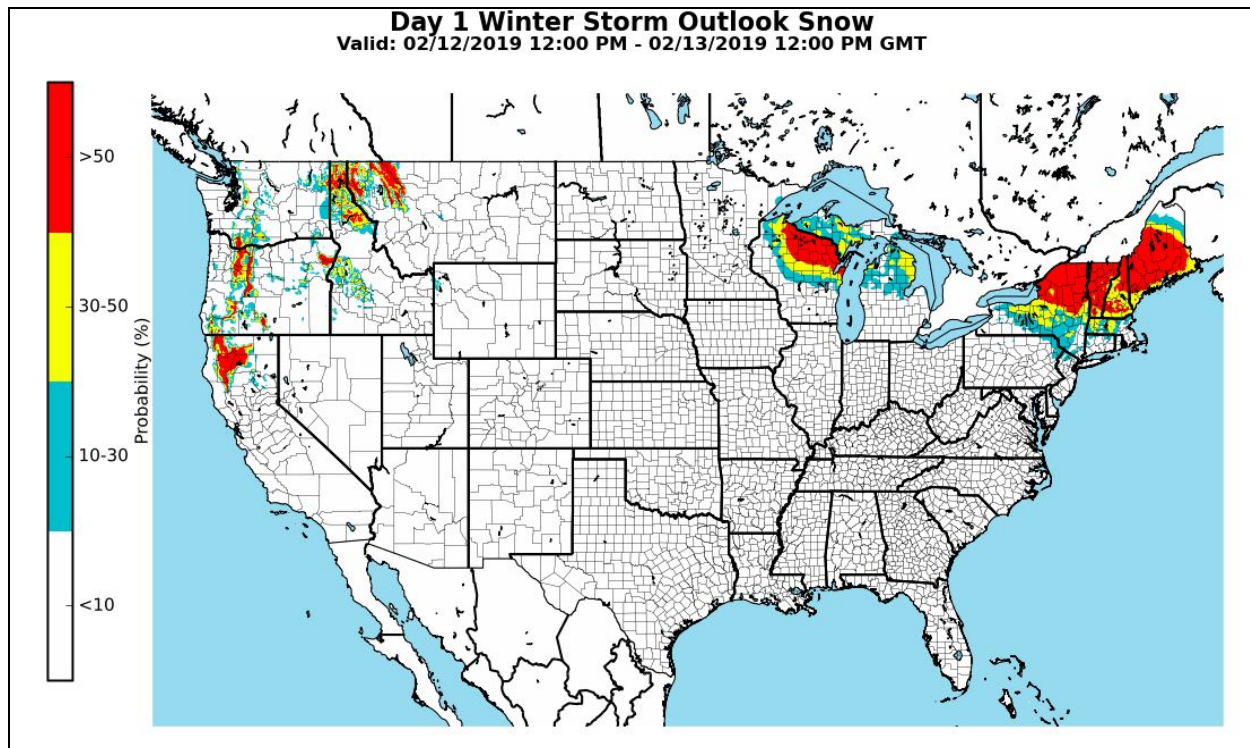
Experimental Winter Storm Outlook (WSO)

Product Description Document (PDD)

October 1, 2020

Part I - Mission Connection

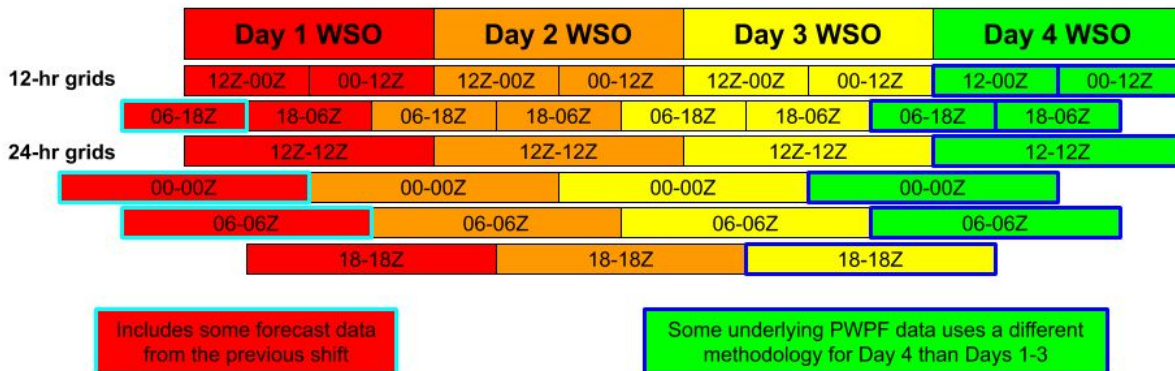
a. Product Description – The WSO builds upon the Winter Weather Watch Collaborator which characterizes the probability of exceeding winter storm warning criteria. The concept of a Winter Weather Watch Collaborator was first developed at the Weather Prediction Center (WPC) in 2014 and is based on a combination of WPC's Probabilistic Winter Precipitation Forecasts (PWPF) and local National Weather Service (NWS) 12- and 24-hour snow and ice accumulation warning criteria. The WSO acts as an aid to assist NWS Winter Storm Watch/Warning decision making as well as an early alert to hazardous winter weather conditions. An example of the WSO is shown below and is subject to change.



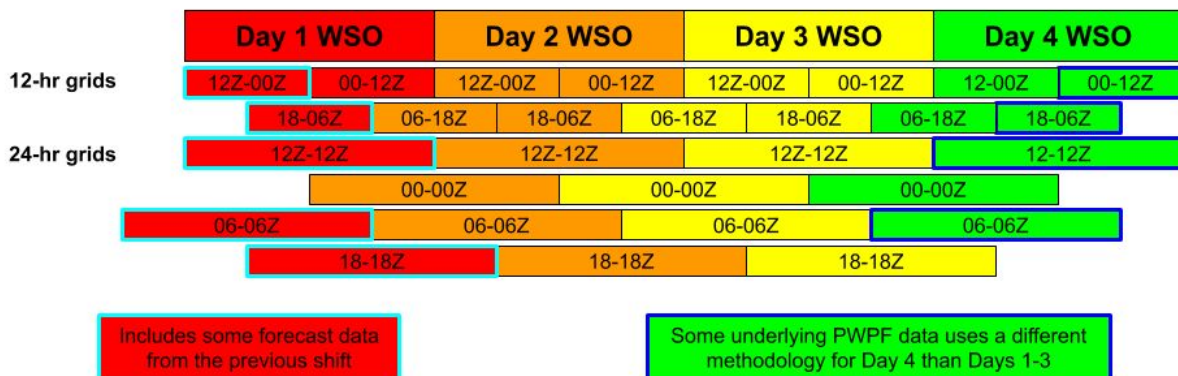
Similar to convective outlooks issued by the Storm Prediction Center (SPC), the WSOs will exploit a robust winter weather ensemble specifically tuned to Weather Forecast Office (WFO) winter storm warning criteria. The outlooks will indicate the probability of exceeding winter storm warning criteria (for snow and ice) during 12-hour and 24-hour time periods over the next four days for any given location in the contiguous United States (CONUS). This season an 80% level will be added to highlight areas of especially high confidence. PWPF, already utilized by WFOs across the NWS, form the foundation of WPC's WSOs while WFOs retain Winter Storm Watch issuance responsibility.

For the upcoming 2020-2021 season, WPC will issue 4 (previously 3) individual 24-hour outlooks on the night shift (one each for Day 1, 2, 3, and 4 with 12 to 12 UTC valid times). The underlying data for the 12- and 24-hour probabilities of exceeding local warning criteria is produced for each 6-hour time step, and these grids will be assigned to an outlook period to provide an initial WSO (see images below). The time assignments will help to identify events that cross the 12 UTC threshold. These four outlooks will be subsequently updated on the day shift for the same valid times. Also new for this season, WPC will produce a maximum probability across all time ranges (Days 1 to 4). The WPC forecaster will edit and send these outlook forecasts using the Advanced Weather Interactive Processing System (AWIPS) and Graphical Forecast Editor (GFE).

WSO Grid Time Assignments (Night Shift)



WSO Grid Time Assignments (Day Shift)



Deadline for Day Shift Issuance of WSO: 2100 UTC.

Deadline for Night Shift Issuance of WSO: 0900 UTC.

WPC will team with the NWS Winter Program, Regions, and WFOs to conduct evaluation and verification of both winter storm outlooks and watches. In addition to developing technical tools to enhance the collaborative forecast process, other changes to the process may occur, including adjusting timelines to better align winter storm outlook issuance with key WFO decision deadlines.

b. Purpose – The WSO grids are shared via GFE/InterSite Coordination (ISC) and serve as an important tool for the improvement of NWS Winter Storm Watch consistency and accuracy across the CONUS. If these activities show continued promise and are accepted and aligned with a fully integrated NWS field structure, then WPC WSOs can serve as the foundation for greater Winter Storm Watch collaboration. Continued development and evolution of the WPC winter weather outlook products will also serve the agency mission to merge probabilistic hazards information with winter weather impacts information.

c. Audience – The product is intended to serve as an enhancement to decision support services being provided to NWS core partners in emergency management, broadcast/electronic media, and transportation categories, as well as the general public.

d. Presentation Format – The WSO debuted December 16, 2019 as a public facing experimental product for the 2019/2020 winter for all CONUS WFOs. During the 2020-2021 winter season, the WSOs for Days 1-4 will be displayed as web-based maps updated twice daily at <https://www.wpc.ncep.noaa.gov/wwd/wso>. KML and SHP files will be available for download later in the season.

e. Feedback Method – Feedback from users will be collected via a NWS web-based survey at:

https://www.surveymonkey.com/r/ExpWinterStormOutlook_2020

Comments or questions regarding the experimental WSO can be also addressed to:

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Part II – Technical Description

a. Format and Science Basis – The WSO will depict areas of equal point probabilities (10%, 30%, 50%, 80%) for meeting 12 and/or 24 hour Winter Storm Warning criteria (over a set 24 hour period). WPC will issue outlooks daily: Day 1, 2, 3, 4 (12-12 UTC) for meeting WFO Winter Storm Warning criteria for snowfall and Day 1, 2, 3, 4 (12-12 UTC) for meeting WFO Winter Storm Warning criteria for ice. WPC will also produce a maximum probability across all time ranges (Days 1 to 4).

The WSO is supported by the WPC PWPF, which is based on an ensemble of model forecasts and the deterministic snow and ice forecasts from the WPC Winter Weather Desk (WWD). For the Day 1 to 3 period, the model forecasts provide the variance of the probability distribution, while the WWD forecast sets the mode of the distribution. For the Day 4 period, the methodology used to create the WSO is similar to that for Days 1-3. However, since WPC does not produce deterministic snow and ice forecasts for Day 4, the ensemble-mean (derived from the same ensemble membership of the PWPF) snow and ice forecasts are used as the distribution mode. More detailed technical information on PWPF is available at the following link: https://www.wpc.ncep.noaa.gov/pwpf/about_pwpf_products.shtml

PWPF for 12- and 24-hour snow and ice accumulation is compared to local warning criteria to produce a probability of exceeding that criteria at each six hour time step. These detailed probability grids are then assigned to a specific WSO period based on the timing of maximum expected accumulation, as described in the graphics above. The time assignment of all the underlying grids improves the alignment of winter storms with expected accumulations across two successive WSO periods (i.e., the timing of the heaviest expected accumulation is centered close to the 12 UTC time boundary).

To mitigate the limitation of updates to the PWPF causing the WSO to be non-reflective of current winter storm events at Day 1, some probability grids from the previous shift will be used for the start of the Day 1 period. This ensures a more accurate picture of the ongoing winter storm threat.

b. Availability – The WSO will be provided externally to users through a WPC webpage at <https://www.wpc.ncep.noaa.gov/wwd/wso/>. KML and SHP files will also be available for download later in the season. WPC will develop verification statistics and a WSO product archive.

