

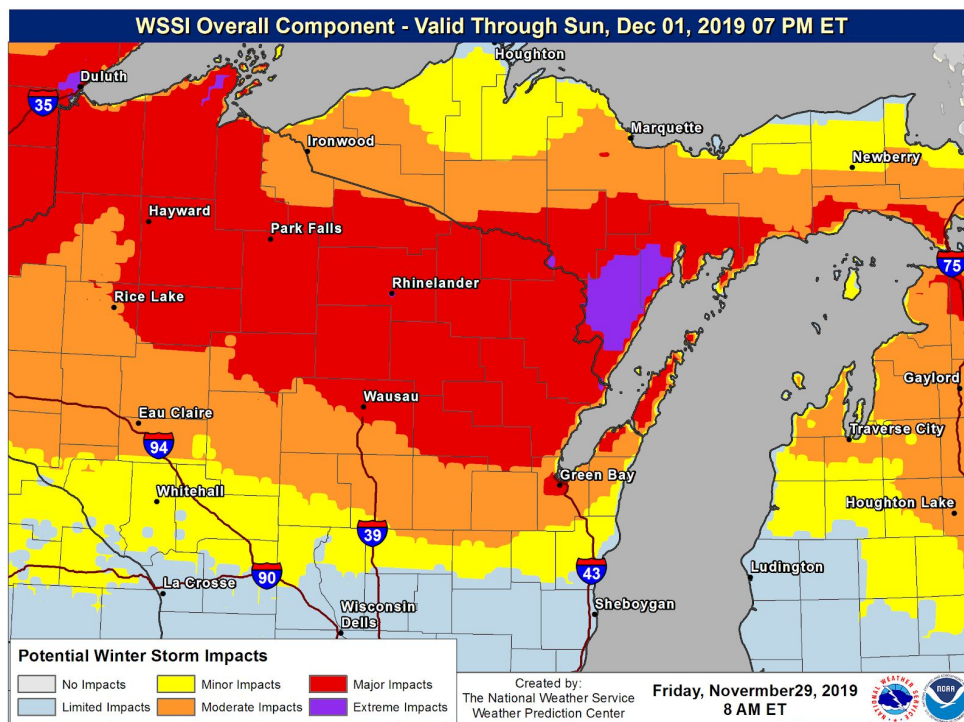
Winter Storm Severity Index (WSSI)

Product Description Document (PDD)

August 2020

Part I - Mission Connection

a. Product Description – The WSSI is created through the use of Geographic Information Systems (GIS) by screening the official National Weather Service (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). This process creates a graphical depiction of anticipated overall impacts to society due to winter weather. The underlying structure of the WSSI allows it to potentially use other meteorological datasets as inputs (e.g., deterministic or ensemble model output) to create additional guidance products that cover periods beyond those covered by the NDFD. The WSSI provides a classification of the overall expected severity of winter weather using the following terminology: “None,” “Limited,” “Minor,” “Moderate,” “Major,” and “Extreme.”



Potential Winter Storm Impacts	
	<p>No Impacts Impacts not expected.</p>
	<p>Limited Impacts Rarely a direct threat to life and property. Typically results in little inconveniences.</p>
	<p>Minor Impacts Rarely a direct threat to life and property. Typically results in an inconvenience to daily life.</p>
	<p>Moderate Impacts Often threatening to life and property, some damage unavoidable. Typically results in disruptions to daily life.</p>
	<p>Major Impacts Extensive property damage likely, life saving actions needed. Will likely result in major disruptions to daily life.</p>
	<p>Extreme Impacts Extensive and widespread severe property damage, life saving actions will be needed. Results in extreme disruptions to daily life.</p>

b. Purpose – The WSSI has been developed to have a two-fold focus. The first is for use as a tool to assist NWS operational forecasters in maintaining situational awareness of the possible significance of weather-related impacts based upon the current official forecasts. The second is to enhance communication to external partners, media and the general public of the expected severity of potential societal impacts due to expected winter hazards and their distribution.

c. Audience – The WSSI is intended for operational use by 116 NWS Weather Forecast Offices (WFOs) and Weather Prediction Center (WPC) staff as an enhancement to decision support services, as well as for use and evaluation by NWS partners, the media and the general public.

d. Presentation Format – The graphics are available for the 116 WFOs on individual websites along with one national viewer that encompasses the Contiguous United States (CONUS). These pages depict local and national views of the WSSI. These webpages are updated every two hours at approximately 0100 Coordinated Universal Time (UTC), 0300 UTC, 0500 UTC, etc. The publicly-shared output is available as static images and in GIS format (KMZ, SHP). Participating WFOs will include links to the WSSI on their local web pages. The websites are listed below:

Winter Storm Severity Index (WSSI)

Feedback from this experimental product will be used to evaluate product development. The WSSI does not depict official warnings and should always be used in context with official NWS forecasts and warnings. Because this product is experimental, it may not update in a timely fashion. Always check the creation and valid times. For more information, please refer to the following links: Product/Service Description Document, WSSI Users Guide, Interactive ESRI Story Map, WSSI Future Work

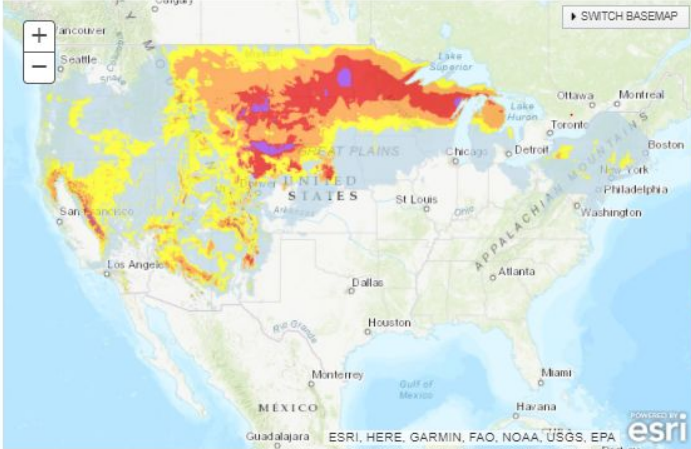
Please provide us your feedback [here](#).

Overall Impact
 Snow Amount
 Snow Load
 Ice Accumulation
 Flash Freeze
 Blowing Snow
 Ground Blizzard

Overall Impact: Maximum impact from any of the components.

Select Zoom Area:

Winter Storm Severity Index - Effective From Tue, Sep 29, 2020 05 PM ET Through Thu, Oct 01, 2020 08 PM ET
 Last Updated: Tuesday September 29, 2020 05:16 PM ET



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.

Download Latest WSSI in GIS Format:
[Download Data in KML](#)
[Download Data in SHP](#)

Change image opacity:

Map Overlays <input type="checkbox"/> NWS County Warning Areas <input type="checkbox"/> FEMA Boundaries <input type="checkbox"/> State Boundaries <input type="checkbox"/> Urban Areas <input type="checkbox"/> River Forecast Center Boundaries <input type="checkbox"/> Counties Boundaries <input type="checkbox"/> NWS Public Forecast Zones <input type="checkbox"/> ARTCC/FIR	Retrieve Static Images Select WSSI Element <input checked="" type="radio"/> WSSI Overall <input type="radio"/> Blowing Snow <input type="radio"/> Flash Freeze <input type="radio"/> Ground Blizzard <input type="radio"/> Ice Accumulation <input type="radio"/> Snow Amount <input type="radio"/> Snow Load Select Zoom Area: <input type="text" value="CONUS"/>
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To retrieve static images please select a zoom area and WSSI element.
 Please Note Static images only update at 01, 09, 13, 19 and 21 UTC

CONUS WSSI Page: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php>

Aberdeen, SD: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=ABR>

Albany, NY: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=ALY>

Albuquerque, NM: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=ABQ>

Amarillo, TX: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=AMA>

Austin/San Antonio, TX: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=EWX>

Baltimore/Washington: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=LWX>

Billings, MT: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BYZ>

Binghamton, NY: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BGM>

Birmingham, AL: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BMX>

Bismarck, ND: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BIS>

Blacksburg, VA: <http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=RNK>

[Boise, ID: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOI](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOI)
[Boston, MA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOX)
[Brownsville, TX: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BRO](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BRO)
[Buffalo, NY: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BUF](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BUF)
[Burlington, VT: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BTV](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BTV)
[Caribou, ME: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CAR](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CAR)
[Chanhassen, MN: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=MPX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=MPX)
[Charleston, SC: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CHS](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CHS)
[Charleston, WV: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=RLX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=RLX)
[Cheyenne, WY: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CYS](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CYS)
[Chicago, IL: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=LOT](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=LOT)
[Cleveland, OH: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CLE](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CLE)
[Columbia, SC: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CAE](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CAE)
[Corpus Christi, TX: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CRP](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=CRP)
[Davenport, IA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DVN](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DVN)
[Denver, CO: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOU](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=BOU)
[Des Moines, IA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DMX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DMX)
[Detroit, MI: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DTX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DTX)
[Dodge City, KS: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DDC](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DDC)
[Duluth, MN: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DLH](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=DLH)
[El Paso, TX: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=EPZ](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=EPZ)
[Elko, NV: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=LKN](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=LKN)
[Eureka, CA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=EKA](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=EKA)
[Flagstaff, AZ: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=FGZ](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=FGZ)
[Fort Worth-Dallas, TX: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=FWD](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=FWD)
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[Glasgow, MT: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GGW](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GGW)
[Goodland, KS: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GLD](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GLD)
[Grand Forks, ND: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=FGF](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=FGF)
[Grand Junction, CO: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GJT](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GJT)
[Grand Rapids, MI: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GRR](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GRR)
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[Green Bay, WI: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GRB](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GRB)
[Greenville-Spartanburg, SC: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GSP](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=GSP)
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[Houston/Galveston, TX: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=HGX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=HGX)
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[Norman/Oklahoma City, OK: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=OUN](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=OUN)
[North Platte, NE: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=LBF](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=LBF)
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[Pueblo, CO: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=PUB](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=PUB)
[Raleigh, NC: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=RAH](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=RAH)
[Rapid City, SD: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=UNR](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=UNR)
[Reno, NV: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=REV](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=REV)
[Riverton, WY: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=RIW](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=RIW)
[Sacramento, CA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=STO](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=STO)
[Salt Lake City, UT: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=SLC](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=SLC)
[San Angelo, TX: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=SJT](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=SJT)

[San Diego, CA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=SGX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=SGX)
[San Francisco Bay Area, CA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=MTR](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=MTR)
[Hanford, CA: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=HNX](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=HNX)
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[Wilmington, OH: http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=ILN](http://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php?id=ILN)

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NOTE:

NWS has implemented the WSSI to provide the public with a tool that attempts to convey the complexities and hazards associated with winter storms as they relate to potential societal impacts. NWS acknowledges contributions to the field of ice impact forecast graphics made by Sidney Sperry (Oklahoma Association of Electric Cooperatives) and Steven Piltz (NWS) in the development of the “Sperry-Piltz Ice Accumulation Index” or SPIA® Index.

Part II – Technical Description

a. Format and Science Basis – The WSSI output consists of graphical image files (.png), and GIS files (.shp, .kmz) though the core calculations are done in a GIS environment. The following datasets are used or derived as part of calculating the WSSI.

Official NWS Forecast datasets from NDFD of:

- 6-hour snow accumulation
- 6-hour ice accumulation
- 6-hour precipitation accumulation (Quantitative Precipitation Forecasts)
- Wind gust (hourly time steps)
- Temperature (hourly time steps)

Additional derived forecast parameters from other official NWS NDFD fields:

- Total snowfall
- Total ice accumulation
- Maximum wind gust within each 6-hour period
- 6-hourly snowfall accumulation rate
- 6-hourly snow-liquid ratio
- Average snow-liquid ratio

Daily National Snow Analyses is obtained from the NWS National Operational Hydrologic Remote Sensing Center (NOHRSC) which includes:

- Snow depth
- Snowpack temperature
- Snow water equivalent

Non-forecast datasets include:

- Urban area designation
- Land-use designations
- National Oceanic and Atmospheric Administration (NOAA)/National Centers for Environmental Information (NCEI) gridded annual snowfall climatology

The WSSI consists of a series of component algorithms, each of which use meteorological and non-meteorological data to model predicted severity of specific characteristics of winter weather. Each of the components produce a 0 to 5 output scale value that equates to the potential severity based on the winter weather hazards. The final WSSI value is the maximum value from all the sub-components. The 6 levels are given the following descriptors: None, Limited, Minor, Moderate, Major, and Extreme. The specific sub-components are:

- Snow Load Index
 - 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.

- Snow Amount Index
 - 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.
- 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. Please note that not all NWS offices provide ice accumulation information into the NDFD. In those areas, the ice accumulation is not calculated.
- Blowing Snow Index
 - 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 Index
 - 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. Adjustments are made based upon the land cover type. For example, heavily forested areas will have a lower ground blizzard severity than the same conditions occurring across open areas.

These raw and calculated forecast values are then used for a series of additional calculations to compute individual WSSI components which are then categorized internally on a 0 to 5 scale. The final WSSI value is the maximum from among all components for each grid point at the native 2.5 km NDFD resolution.

b. Availability -- The WSSI products will be available via a CONUS and WFO-centric view at 116 selected WFOs.