

# The Winter Storm Severity Index (WSSI)

## A Guide for Users

*WSSI Project Lead: James Nelson*  
*Contact: [james.a.nelson@noaa.gov](mailto:james.a.nelson@noaa.gov)*



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

The National Weather Service  
Weather Prediction Center

# What The Winter Storm Severity/Impact Index Is

- **A tool** to assist NWS operational forecasters in maintaining situational awareness of the possible significance of weather related impacts based upon the current official forecast.
- **A tool** to help communicate a general level of potential societal impacts and their spatial distribution.



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

The National Weather Service  
Weather Prediction Center

# What The Winter Storm Severity/Impact Index Is NOT

- It is not a specific forecast for specific impacts.
  - For example, a depiction of “moderate” severity does not mean schools will or have to close.
- It is not meant to be the sole source of information about a Winter Storm. It should always be used in context with other NWS forecast and warning information.
- The WSSI does not account for conditions that have occurred prior to the creation time. It only uses forecast information. Therefore during an ongoing winter weather situation, the WSSI will not be representative of the entire event.



# Motivation – To Better Depict Aspects of Winter Storms

- Current NWS Procedures:
  - Winter weather Watches/Warnings/Advisories are raised based primarily on “yes/no” thresholds of accumulation and generally at the level of individual counties.
- Reality of Winter Weather:
  - Severity/impacts from winter weather are due to more than just amounts (one 5” snowstorm is not like the next 5” snowstorm) Great variation in weather conditions frequently occur with individual counties.



# WSSI Scale

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



# WSSI Components

## Snow Amount Index

**PURPOSE:** This component is designed to highlight areas in which impacts, especially transportation, could become overwhelmed due to either:

- 1) The total amount of snow.
- 2) The rate at which the snow is falling.

Prior to making calculations based upon the amount or rate of snow, climatology based factors are determined. Climatology is an important aspect to the level of impacts a winter storm brings. Those areas of the country less accustomed to snowfall will be less prepared to deal with snow, resulting in higher level of impacts compared to the same amount of snow in a snowier part of the country.

## Snow Load Index

**PURPOSE:** This component is to highlight areas where the weight of the snow could result in damage to trees and powerlines. In general, the lower the snow-liquid ratio (SLR) is and the greater the total snow accumulation, the higher the index.

## Blowing Snow Index

**PURPOSE:** This component highlights areas where blowing/drifting snow is expected to occur and result in transportation related problems. In general, the blowing snow significance increases as the SLR and winds both increase. Prior blowing snow research indicates that in general it takes just under 20 mph of wind to start to move snow around.



# WSSI Components

## Ground Blizzard Index

**PURPOSE:** This component is to highlight areas where pre-existing snow combined with very strong winds results in ground blizzard conditions, which result in a significant impact to transportation.

## Flash Freeze Index

**PURPOSE:** The component depicts severity primarily to transportation of situations where temperatures rapidly fall below freezing during or just after precipitation.

## Ice Accumulation Index

**PURPOSE:** This component was developed to account for the combined effects of ice accumulation and wind which can produce widespread tree damage, transportation shutdowns and utility problems.

**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.**



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

The National Weather Service  
Weather Prediction Center

# Using Non-Meteorological with Meteorological Data

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

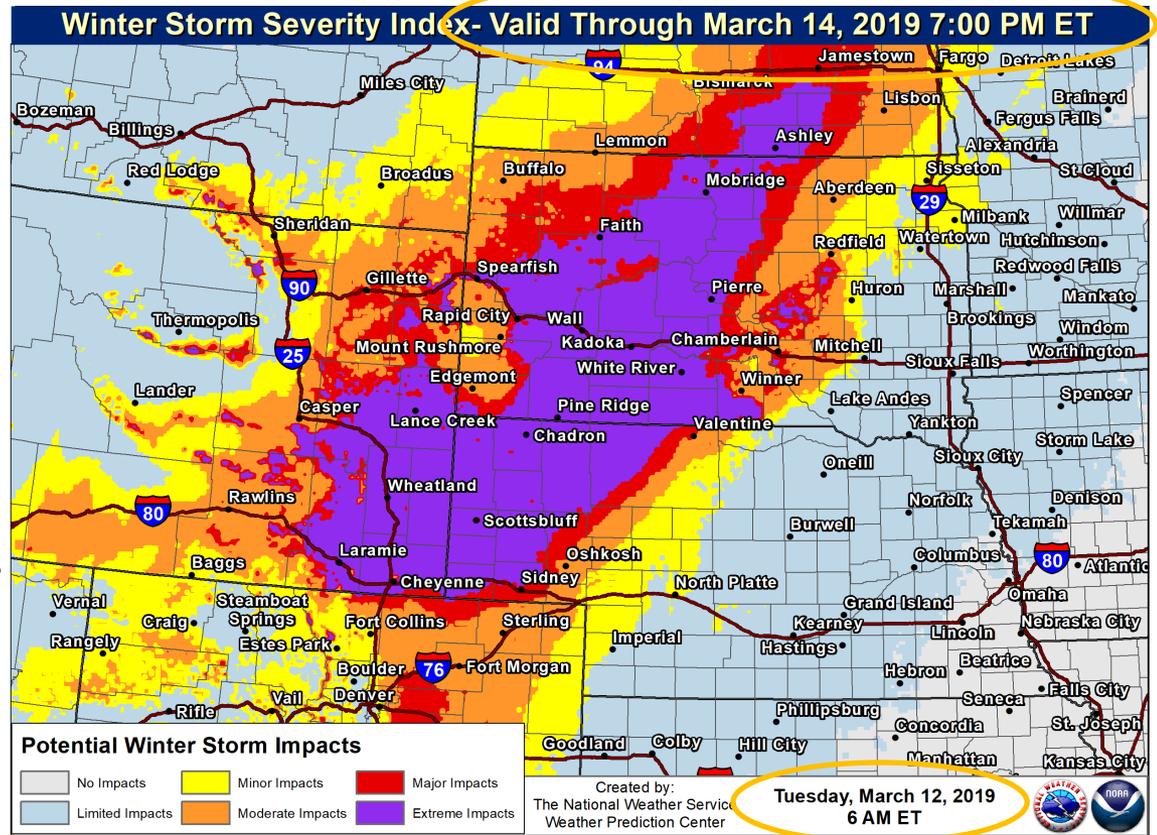
The non-meteorological data, or factors used are:

- Urban areas
  - Used in the Ice Accumulation Index and Snow Amount Index
  - They 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 and Ground Blizzard Index
- Forest Classification
  - Delineates forestland described as conifer vs deciduous
    - Conifer trees can handle more snow than deciduous trees
  - Used in the Snow Load Index

# WSSI – How to Interpret

The map on the right depicts the WSSI for expected winter weather occurring between 6 AM ET Mar 12 (time stamp at the bottom) to 7 PM Mar 14 (valid time at the top)

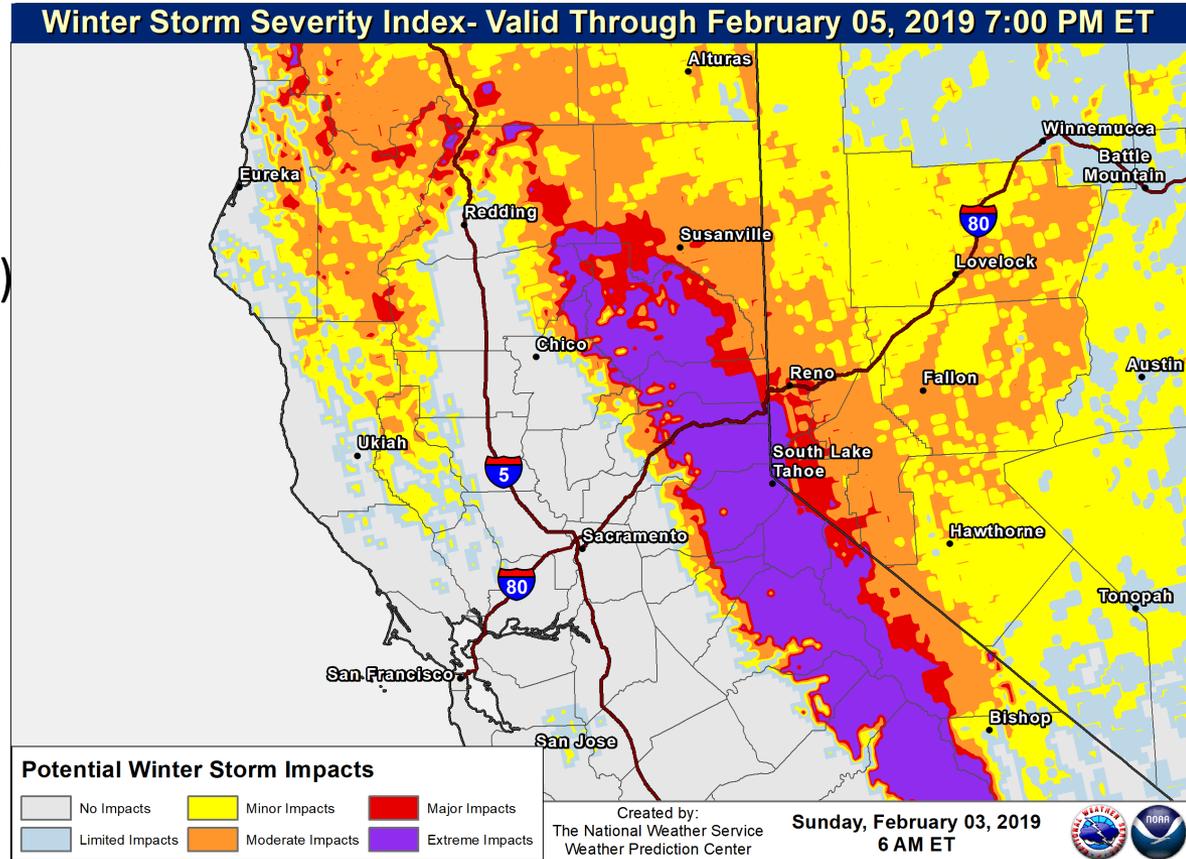
It does NOT indicate specifically when the weather will occur during the period. Refer to other NWS forecast data for that information



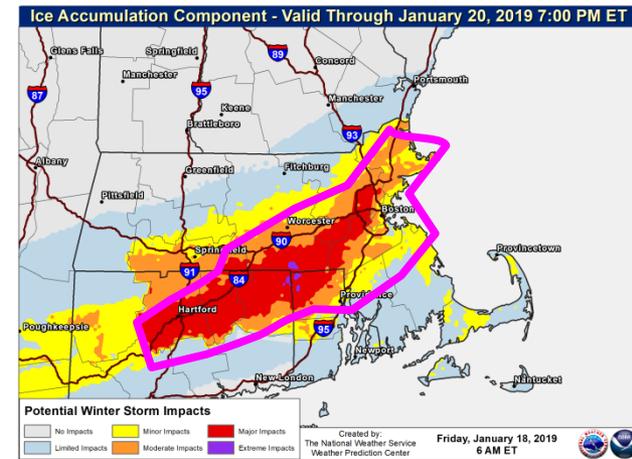
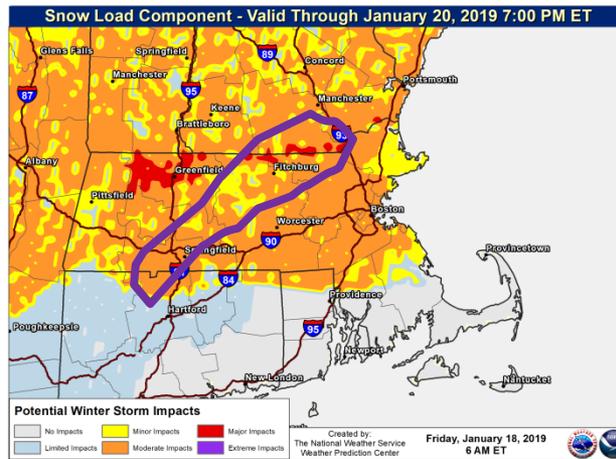
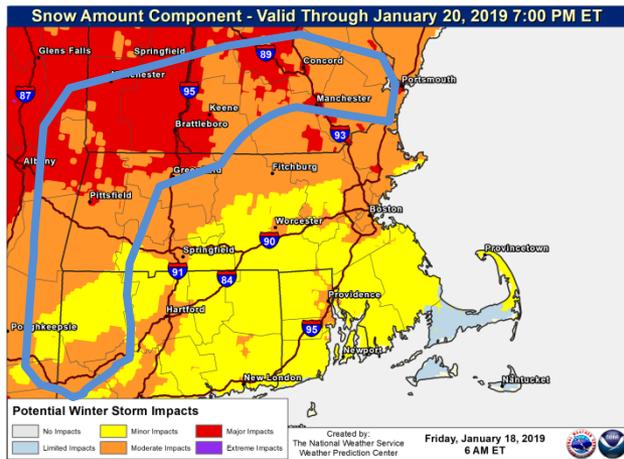
# WSSI – How to Interpret

The areas where the most significant winter weather is expected are denoted by the orange (Moderate), red (Major) and purple (Extreme) colors.

To understand what is the underlying cause of the final severity depiction, refer to the individual WSSI component maps



# WSSI – How to Interpret (Example)



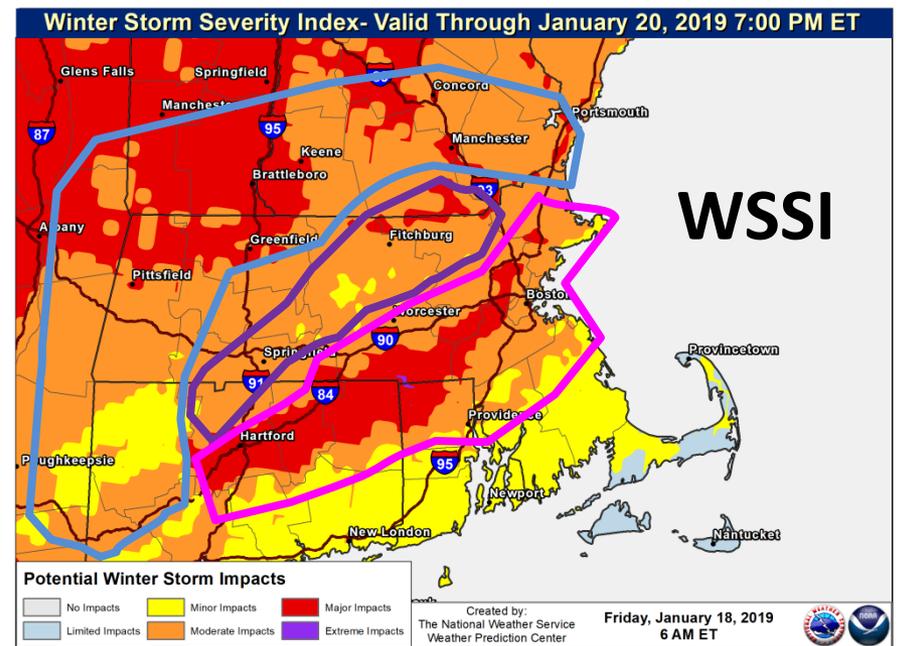
Bottom Right: WSSI depiction of all threats.

Top Left: The snow amount component matches the total WSSI around southern VT, western MA and NY.

Top Right: The ice accumulation component matches the WSSI for southeastern MA and northern RI.

Top Middle: The snow load component matches the WSSI for central MA and southeast NH.

Final interpretation: Expect the primary impacts to come from ice accumulations across northern RI northeastward toward Boston, MA. Expect impacts to come from heavy snowfall for VT and NY. There is a major threat for impacts from snow load across central MA through southeast NH.



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

The National Weather Service  
Weather Prediction Center

# WSSI – Please Provide Feedback

We want to hear from you regarding this experimental product. Does it meet your needs? Does it need improvements? Please click on the survey link (as highlighted) on the WSSI webpage.

**WEATHER PREDICTION CENTER**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

CEP: AWC · CPC · EMC · NCO · NHC · OPC · SPC · SWPC · WPC

HOME ▾ FORECASTS & ANALYSES ▾ ARCHIVES ▾ VERIFICATION ▾ INTERNATIONAL ▾ DEVELOPMENT ▾ ABOUT ▾ SEARCH

### 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.

Days 1-3   Day 1   Day 2   Day 3

Select Zoom Area: [CONUS] CONUS   Print Map

Winter Storm Severity Index - Effective From Fri, Sep 25, 2020 09 AM ET Through Sun, Sep 27, 2020 08 PM ET  
Last Updated: Friday September 25, 2020 09:16 AM 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: 70%

**Map Overlays**

NWS County Warning Areas  River Forecast Center Boundaries   
FEMA Boundaries  Counties Boundaries   
State Boundaries  NWS Public Forecast Zones   
Urban Areas  ARTCC/FIR

**Retrieve Static Images**

Select Zoom Area: [CONUS] CONUS   Select WSSI Element

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

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

# WSSI – Website Overview

- Clickable tabs
  - Loads WSSI components upon click
  - Day Period tabs
- Revised definitions
- Zoom to WFO
  - Dropdown Box
- Print Image button
  - Creates a PDF of the map with your specifications
- Variety of basemaps
  - Switch basemap dropdown button
- Links to GIS Data
- Retrieve Static Images
  - CONUS & WFO

**WEATHER PREDICTION CENTER**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

CEP: AWC · CPC · EMC · NCO · NHC · OPC · SPC · SWPC · WPC

HOME ▾ FORECASTS & ANALYSES ▾ ARCHIVES ▾ VERIFICATION ▾ INTERNATIONAL ▾ DEVELOPMENT ▾ ABOUT ▾ SEARCH

### 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 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.

Days 1-3 | Day 1 | Day 2 | Day 3

Select Zoom Area: [CONUS] CONUS

Print Map

Winter Storm Severity Index - Effective From Fri, Sep 25, 2020 09 AM ET Through Sun, Sep 27, 2020 08 PM ET  
Last Updated: Friday September 25, 2020 09:16 AM ET

SWITCH BASEMAP

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: 70%

**Map Overlays**

NWS County Warning Areas  River Forecast Center Boundaries   
 FEMA Boundaries  Counties Boundaries   
 State Boundaries  NWS Public Forecast Zones   
 Urban Areas  ARTCC/FIR

**Retrieve Static Images**

Select Zoom Area: [CONUS] CONUS

Select WSSI Element

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

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

# WSSI – Website Interactive Layers

- Map overlay options
- Toggled via checkbox

- CWA
- FEMA
- State
- RFC
- Counties
- Public Forecast Zones
- ARTCC
- Metro Areas

**WEATHER PREDICTION CENTER**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

CEP: AWC · CPC · EMC · NCO · NHC · OPC · SPC · SWPC · WPC

HOME ▾ FORECASTS & ANALYSES ▾ ARCHIVES ▾ VERIFICATION ▾ INTERNATIONAL ▾ DEVELOPMENT ▾ ABOUT ▾ SEARCH

### 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 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.

Days 1-3 | Day 1 | Day 2 | Day 3

Select Zoom Area: [CONUS] CONUS Print Map

Winter Storm Severity Index - Effective From Fri, Sep 25, 2020 09 AM ET Through Sun, Sep 27, 2020 08 PM ET  
Last Updated: Friday September 25, 2020 09:16 AM ET

**Potential Winter Storm Impacts**

<b>No Impacts</b>	Impacts not expected.
<b>Limited Impacts</b>	Rarely a direct threat to life and property. Typically results in little inconveniences.
<b>Minor Impacts</b>	Rarely a direct threat to life and property. Typically results in an inconvenience to daily life.
<b>Moderate Impacts</b>	Often threatening to life and property, some damage unavoidable. Typically results in disruptions to daily life.
<b>Major Impacts</b>	Extensive property damage likely, life saving actions needed. Will likely result in major disruptions to daily life.
<b>Extreme Impacts</b>	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**

NWS County Warning Areas  River Forecast Center Boundaries   
 FEMA Boundaries  Counties Boundaries   
 State Boundaries  NWS Public Forecast Zones   
 Urban Areas  ARTCC/FIR

Select Zoom Area:

**Retrieve Static Images**

Select WSSI Element

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

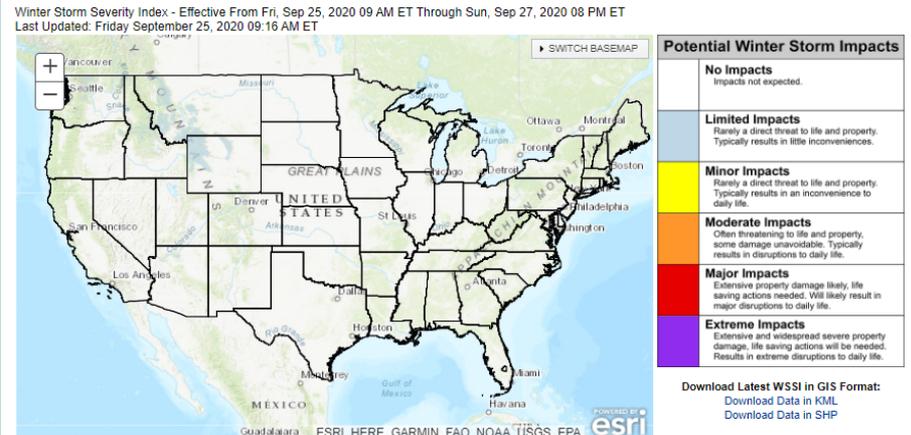
To retrieve static images please select a zoom area and WSSI element.  
**\*Please Note\*** Static images only update at 01, 09, 13, 19 and 21 UTC

# WSSI – Website Static Images

## Retrieve Static Images

- Select the area of interest
  - CONUS, WFO or IL,MI,NE,NY State perspectives
- Select WSSI element
  - Clicking the radio button loads the images for the selected element
- Click the image for an enlarged version
- Downloadable static PNG file
- Static images only update 01, 09, 13, 19 and 21 UTC

Winter Storm Severity Index - Effective From Fri, Sep 25, 2020 09 AM ET Through Sun, Sep 27, 2020 08 PM ET  
Last Updated: Friday September 25, 2020 09:16 AM ET



**Potential Winter Storm Impacts**

<b>No Impacts</b> Impacts not expected.
<b>Limited Impacts</b> Rarely a direct threat to life and property. Typically results in little inconveniences.
<b>Minor Impacts</b> Rarely a direct threat to life and property. Typically results in an inconvenience to daily life.
<b>Moderate Impacts</b> Often threatening to life and property, some damage unavoidable. Typically results in disruptions to daily life.
<b>Major Impacts</b> Extensive property damage likely, life saving actions needed. Will likely result in major disruptions to daily life.
<b>Extreme Impacts</b> 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: 70%

**Map Overlays**

NWS County Warning Areas <input type="checkbox"/>	River Forecast Center Boundaries <input type="checkbox"/>
FEMA Boundaries <input type="checkbox"/>	Counties Boundaries <input type="checkbox"/>
State Boundaries <input checked="" type="checkbox"/>	NWS Public Forecast Zones <input type="checkbox"/>
Urban Areas <input type="checkbox"/>	ARTCC/FIR <input type="checkbox"/>

Select Zoom Area: CONUS

**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	

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

**Day 1**  
WSSI Overall - Valid From Fri, Sep 25, 2020 09 AM ET To Sat, Sep 26, 2020 08 AM ET  
Experimental Product



**Day 2**  
WSSI Overall - Valid From Sat, Sep 26, 2020 08 AM ET To Sun, Sep 27, 2020 08 AM ET  
Experimental Product



**Day 3**  
WSSI Overall - Valid From Sun, Sep 27, 2020 08 AM ET To Sun, Sep 27, 2020 08 PM ET  
Experimental Product



**Days 1 - 3**  
WSSI Overall Component - Valid Through Sun, Sep 27, 2020 08 PM ET  
Experimental Product



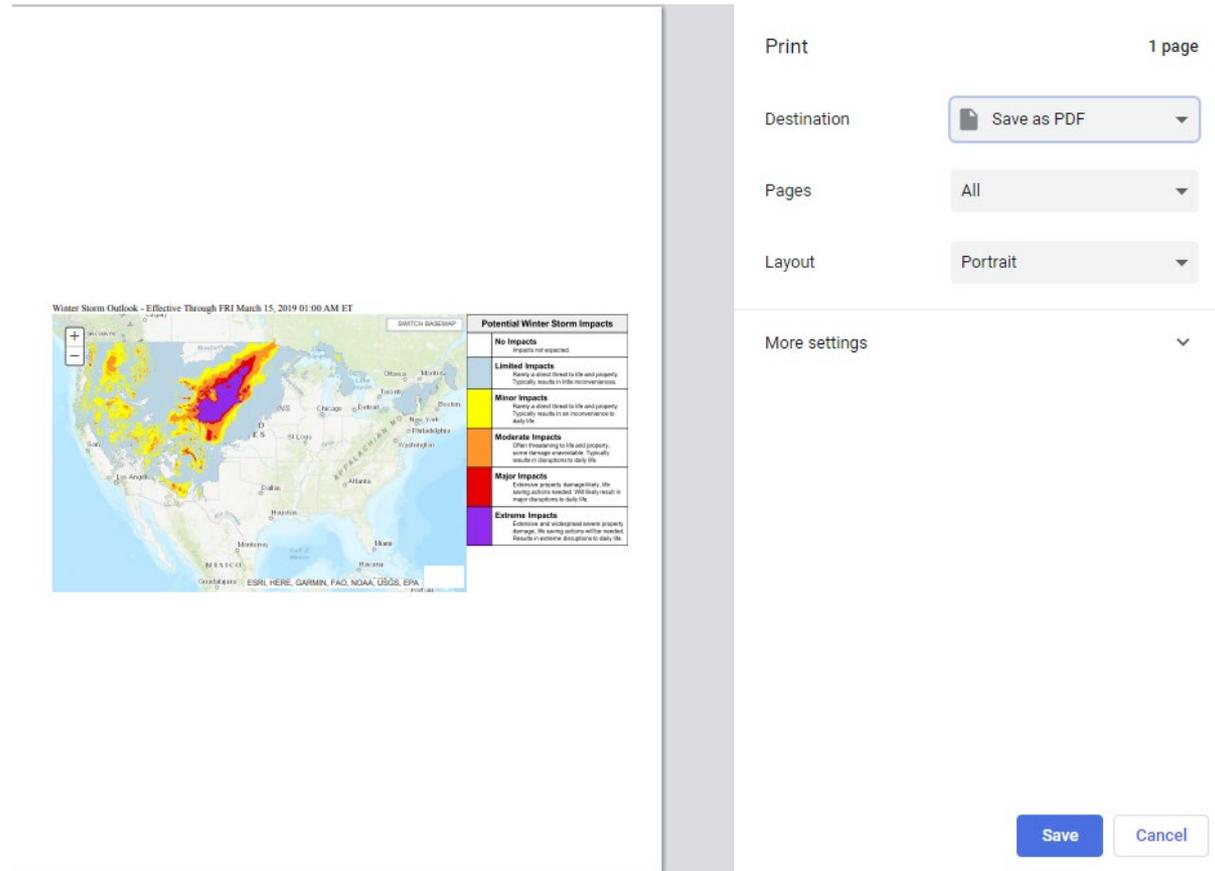
**Potential Winter Storm Impacts**

No Impacts	Moderate Impacts
Limited Impacts	Major Impacts
Minor Impacts	Extreme Impacts

Feedback from this experimental product will be used to evaluate product development.  
Friday, September 25, 2020 9 AM ET

# WSSI – Website Print Button

- When you click the print button the image on the right will be displayed.
- Make sure to change destination to 'Save as PDF'
- Portrait layout option works better than landscape



The screenshot displays a web interface for a Winter Storm Outlook. The main content area features a map of the United States with a color-coded overlay indicating potential winter storm impacts. A legend titled "Potential Winter Storm Impacts" is positioned to the right of the map, detailing five levels of impact: No Impacts (white), Limited Impacts (light blue), Minor Impacts (yellow), Moderate Impacts (orange), and Major Impacts (red). Below the legend, there is a section for "Extreme Impacts" (purple) with a brief description. The map includes a "SWITCH BASEMAP" button and a zoom control. The print settings sidebar on the right includes a "Print" button, a page count of "1 page", a "Destination" dropdown menu set to "Save as PDF", a "Pages" dropdown menu set to "All", and a "Layout" dropdown menu set to "Portrait". At the bottom right of the sidebar, there are "Save" and "Cancel" buttons.

Potential Winter Storm Impacts	
<b>No Impacts</b>	Impacts not expected.
<b>Limited Impacts</b>	Minor impacts to life and property. Typically results in minor inconveniences.
<b>Minor Impacts</b>	Minor impacts to life and property. Typically results in minor inconveniences to daily life.
<b>Moderate Impacts</b>	Other than to life and property, some damage unavoidable. Typically results in minor inconveniences to daily life.
<b>Major Impacts</b>	Extensive property damage likely, life-saving actions needed. Will likely result in major disruptions to daily life.
<b>Extreme Impacts</b>	Extensive and widespread severe property damage. Life-saving actions will be needed. Results in extensive disruptions to daily life.

# Summary

- The WSSI tool is designed to help maintain situational awareness and to help communicate a general level of potential societal impacts and their spatial distribution for winter weather.
- This tool uses both meteorological and non-meteorological data to forecast impacts for Snow Amount, Snow Load, Ice Accumulation, Blowing Snow, Ground Blizzard, Flash Freeze and a Summary graphic, which is a composite of the maximum impact from any of the six components.



# Contact Information

- Questions or Comments? Please Reach out to:
- NWS WSSI Project Lead:
  - Jim Nelson ([james.a.nelson@noaa.gov](mailto:james.a.nelson@noaa.gov))
- NWS Winter Weather Service Program Lead
  - Stephen Baxter ([stephen.Baxter@noaa.gov](mailto:stephen.Baxter@noaa.gov))
- WSSI Lead Scientist and Developer
  - Josh Kastman ([joshua.kastman@noaa.gov](mailto:joshua.kastman@noaa.gov))

