



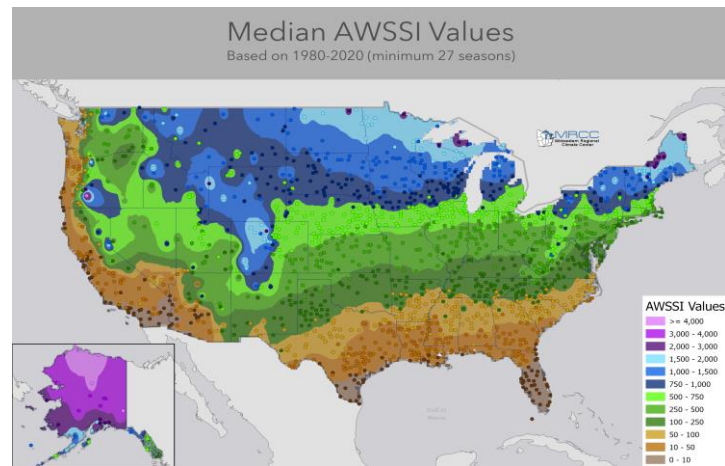
# AWSSI

## Accumulated Winter Season Severity Index

[mrcc.purdue.edu/research/awssi](http://mrcc.purdue.edu/research/awssi)



Winter seasons have significant societal impacts across all sectors ranging from direct human health and mortality to commerce, transportation, and education. The question “How severe was this winter?” does not have a simple answer. At the very least, the severity of a winter is related to the intensity and persistence of cold weather, the amount of snow, and the amount and persistence of snow on the ground. The **Accumulated Winter Season Severity Index (AWSSI)** was developed to objectively quantify and describe the relative severity of the winter season.



### Goals of AWSSI

- \* Use max/min temperature, snowfall, and snow depth to objectively index winter weather conditions.
- \* Create historical database of AWSSI for locations with available temperature, snowfall, and snow depth.
- \* Compare season to season AWSSI for a particular location in climatological context.
- \* Allow users access to objective data to make winter-informed decisions, especially pertaining to snow removal, commerce, and transportation.

### Defining the AWSSI Season

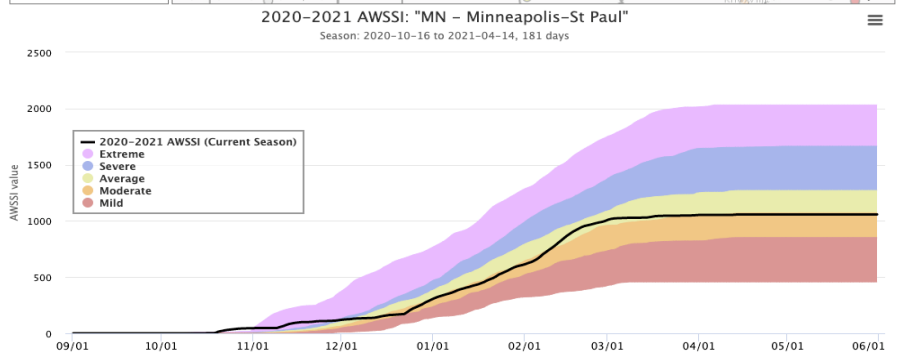
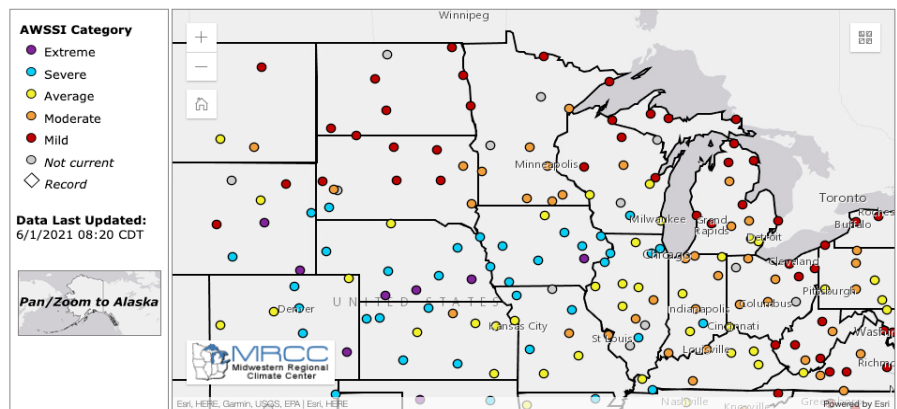
The **AWSSI** is not limited to meteorological winter (December – February) but is intended to capture winter weather from its earliest occurrence to its last.

**Winter season begins with the first occurrence of any one of the following:**

- \* First measurable snowfall ( $\geq 0.1$  inch).
- \* Maximum temperature  $\leq 32^\circ\text{F}$ .
- \* Winter season begins on December 1 if conditions above have not been observed.

**Winter season ends at the last occurrence of any one of the following:**

- \* Last measurable snowfall ( $\geq 0.1$  inch).
- \* Last day with 1 inch of snow on the ground.
- \* Last day with a max temperature  $\leq 32^\circ\text{F}$ .
- \* Winter season ends February 28/29 if the above conditions have occurred.



# AWSSI - Accumulated Winter Season Severity Index

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## How the AWSSI Works

Daily scores are calculated based on temperature, snowfall, and snow depth thresholds (pictured right). Daily scores are accumulated through the winter season, allowing a running total of winter severity in the midst of a season, as well as a final, cumulative value characterizing the full season.

Accumulations of the temperature and snow components of the index are computed separately and then added together for the total index. This allows comparison of the relative contribution of each to the total score.

The AWSSI has been processed for 365 locations across the continental U.S. to provide a variety of locations in different climate regimes for analysis. The AWSSI is calculated for each season from 1950-1951 to the current winter season. The seasonal data is then subject to quality control, and seasons missing data that would contribute to 5% or more of the season's AWSSI are removed. Averages and standard deviations are calculated for running accumulations of daily temperature and snow scores as well as the total AWSSI.

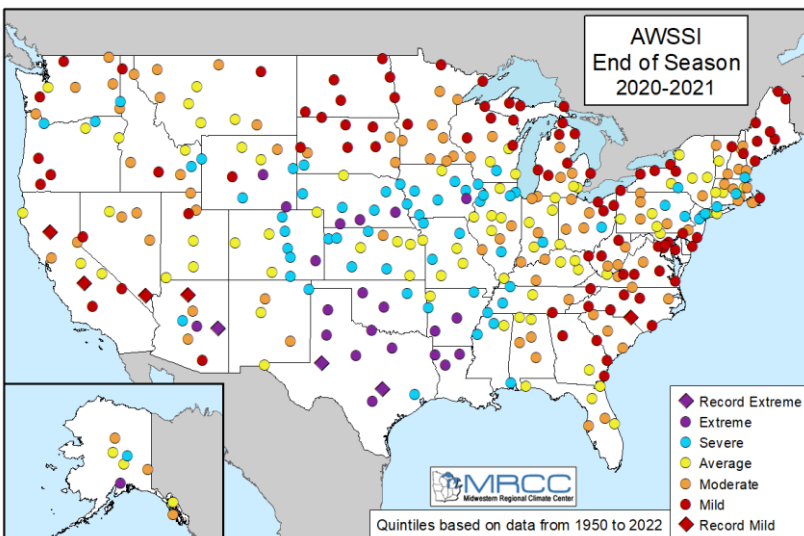
Quantiles of AWSSI scores were determined for each location. Descriptive categories were assigned to each quantile (pictured to the right).

## Limitations of AWSSI

- \* Does not include wind (e.g. wind chill, blowing snow).
- \* Does not include mixed precipitation or freezing rain explicitly.
- \* Thresholds have been set with impacts in mind and are subject to adjustment in the future.

AWSSI Point Thresholds				
Points	Temperature °F		Snow (in)	
	Max	Min	Fall	Depth
1	25 to 32	25 to 32	0.1 to 0.9	1
2	20 to 24	20 to 24	1.0 to 1.9	2
3	15 to 19	15 to 19	2.0 to 2.9	3
4	10 to 14	10 to 14	3.0 to 3.9	4 to 5
5	5 to 9	5 to 9	-	6 to 8
6	0 to 4	0 to 4	4.0 to 4.9	9 to 11
7	-1 to -5	-1 to -5	5.0 to 5.9	12 to 14
8	-6 to -10	-6 to -10	-	15 to 17
9	-11 to -15	-11 to -15	6.0 to 6.9	18 to 23
10	-16 to -20	-16 to -20	7.0 to 7.9	24 to 35
11	-	-21 to -25	-	-
12	-	-	8.0 to 8.9	-
13	-	-	9.0 to 9.9	-
14	-	-	10.0 to 11.9	-
15	<-20	-26 to -35	-	≥ 36
18	-	-	12.0 to 14.9	-
20	-	<-35	-	-
22	-	-	15.0 to 17.9	-
26	-	-	18.0 to 23.9	-
36	-	-	24.0 to 29.9	-
45	-	-	≥ 30	-

AWSSI Quantiles	
Percentile	Category
20th	W1 - Mild
40th	W2 - Moderate
60th	W3 - Average
80th	W4 - Severe
99th	W5 - Extreme



## Available AWSSI Features

- \* Monitor current winter season AWSSI scores.
- \* Download current and historical daily AWSSI scores.
- \* Analyze end of season summaries through maps and tabular data downloads.
- \* Access the 1980-2020 AWSSI climatology map.

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