

RESEARCH SUMMARY

Severe Weather Index

WHAT WAS THE NEED?

Accurately assessing winter operations is a challenge faced by many state departments of transportation (DOT). One tool that has shown promise for addressing this need is the severe weather index (SWI) tool. The tool can be used to assess the performance and related costs associated with winter maintenance operations that considers the relative severity of each weather event and the relative severity of weather for that season.

WHAT WAS THE GOAL?

The objective of this research effort was to develop a methodology and calculate the SWI for each weather event and a winter season. The end goal is to allow MDOT SHA to apply the calculated SWI value to winter maintenance operation costs and effort that can be compared to historical storm severity baseline.

WHAT DID THE RESEARCH TEAM DO?

The Maryland SWI was developed based in part on the Maine DOT's SWI, other SWIs that have utilized road weather information systems (RWIS) based data, and with significant input from MDOT SHA. The developed RWIS-based SWI utilized data including location, date and time, air and surface temperature, wind speed average, and precipitation differential.

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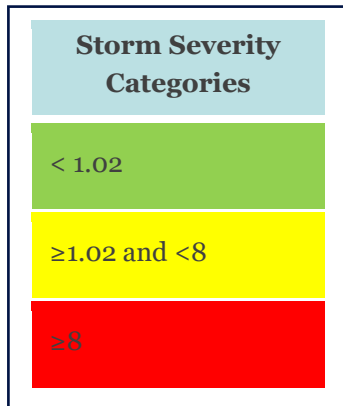
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The developed SWI model has an overall adjusted $R^2 = 0.67$. Using the information available from 2012-2019 (2012-2013 winter through 2018-2019 winter) the storm severity bounds as defined by the developed SWI model are low (green, 0 – 1.02), moderate (yellow, 1.02 – 8), and severe (red, $8 \geq$).



The model was tested using the 2019-2020 winter data and compared to the visual assessment of severity and effort by maintenance personnel. Based on the data resolution and quality, the SWI model considers variations in the climate across the State and provides regional SWI values that apply to pre-defined climate zones.

WHAT WAS THE OUTCOME?

Key outcomes of this effort include the developed SWI model that can be applied to assess costs and effort of winter maintenance operation compared storms and seasonally. Additional outcomes include the detailed review of the current RWIS and historic network and the data provided, the identification of locations where blowing and drifting snow that impacts the road network, survey results showing how RWIS data is used by MDOT SHA maintenance crews, and the identification of future sites for RWIS

stations to support a more robust network for MDOT SHA use.

Detailed recommendations are provided on improvements to RWIS, data collection and management, changes in reporting to the Emergency Operations Reporting System, and improvements that can be made to the SWI model.

HOW WILL MDOT SHA USE THE RESULTS?

The MDOT SHA is evaluating and implementing the developed SWI tool. During the coming 2020-2021 winter season, maintenance managers will start calculating SWIs for storm events, and comparing operator-defined effort and severity to the calculated SWIs. This will allow for quicker calibration of the SWI tool.

The better definition of the moderate severity category (yellow, 1.02 – 8) will also be explored. The identification of locations where blowing and drifting snow impacts the road network and the identification of future sites for RWIS stations will be further incorporated into the tool in the coming years.

LEARN MORE

To view the complete report, click [here](#).