



ROAD WEATHER MANAGEMENT PROGRAM

2019 ROAD WEATHER MANAGEMENT PROGRAM'S PERFORMANCE MEASURES UPDATE

The Federal Highway Administration's (FHWA's) [Road Weather Management Program](#) (RWMP) seeks to better understand the effects of weather on roads and promotes strategies to mitigate safety and mobility impacts. For more than 10 years, the RWMP has periodically evaluated its effectiveness in improving the transportation system's performance during adverse weather using various sources such as RWMP records, literature reviews, internet searches, and a State DOT survey.¹ Presented here are the highlights of the latest progress, successes, and national state of the practice relating to implementation of road weather strategies.

Road Weather Management Impacts Assessment

Nationwide implementation of various road weather management (RWM) strategies has potential to provide meaningful improvements in highway performance during adverse weather. State DOTs are working to understand the performance of their transportation systems and the effects of road weather management. Some examples include publishing winter maintenance reports, providing online dashboards, calculating a winter severity index (WSI), and evaluating the return on investment of RWM strategies.

The RWMP also monitors some overall nationwide trends relating to weather expenditures, delays, and safety. While this information provides insight into the effects of weather, it is difficult to attribute any long-term nationwide trends to RWM strategies specifically. However, examples of RWM implementations were identified that demonstrate significant benefits, including:

- Virginia DOT implemented a variable speed limit system to combat reduced visibility associated with fog events on the I-77 corridor in Fancy Gap by reducing travel speeds on the corridor when fog was present. Prior to the installation, driver speeds remained relatively constant with non-fog conditions. After the installation, Virginia DOT found that drivers were willing to reduce speeds to the posted level, and that the reduction in speed within the corridor did not have a significant impact on travel into or out of the corridor.²



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Application of Road Weather Management Tools and Technologies

The RWMP promotes a variety of innovative RWM tools and technologies for adoption by transportation agencies. One set of tools pertains to the collection of fixed and mobile road weather observations, which can be real-time or archived road weather data. Overall, the number of State agencies that use these types of data collection systems have remained constant with previously observed levels for the majority of the tools assessed, which suggests progress toward widespread adoption.

State DOTs reported high usage for products or services that support their advisory, control, and treatment strategies. (Note: An asterisk (*) denotes a strategy with higher usage since the last update.)

- Fixed Agency Sensors – 95%
- National Weather Service Products – 85%
- Agency Field Personnel – 80%*
- Private Weather Service Providers – 67%
- Mobile Agency Sensors – 56%*
- Public/Social Media – 77%*

More than 75 percent of the States surveyed collect real-time data from maintenance vehicles, with the most common being plow status and material usage. This growth is attributed to the promotion of the [Weather-Savvy Roads Initiative](#) as part of Every Day Counts (EDC)-4. Further growth is anticipated due to the promotion of [Weather-Responsive Management Strategies](#) as part of EDC-5.

The use of [mobile-based observations](#) and connectivity in road weather management is growing. About 17 percent of State DOTs reported development of applications or tools that leverage both real-time data from vehicle fleets and infrastructure-to-vehicle (I2V) or vehicle-to-infrastructure (V2I) connectivity. Another 28 percent reported development of applications that use just real-time data from their vehicle fleets, and another 47 percent are considering developing an application.

[Maintenance decision support systems](#) (MDSS) have shown significant benefits to agencies, including cost-savings and improved highway operations. One-third of States surveyed reported using an MDSS statewide, and an additional 13 percent use an MDSS on a smaller scale. The percentage of agencies reporting not having an MDSS decreased from 58 percent in 2017 to 46 percent in 2019.

Analysis and Modeling of WRM Strategies: The RWMP developed, tested, and evaluated analysis, modeling, and simulation (AMS) procedures for road weather connected vehicle strategies. The project evaluation report [FHWA-JPO-16-387](#) and summary report [FHWA-JPO-16-388](#) are available from the NTL. Implementation of the AMS tools in transportation agencies is currently underway.

Transportation System Resilience to Extreme Weather: The number of States participating in extreme weather or resilience activities has increased across the board. One-quarter of all agencies have conducted a vulnerability or risk assessment for their road weather management infrastructure, and nearly half (47 percent) have developed a process for responding to extreme weather events.

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More outreach and education for weather-responsive analysis and simulation tools may be needed.



Road Weather Management Capacity Building

Capacity building refers to providing RWMP stakeholders with flexible, accessible learning and growth through training, technical assistance, and educational resources. The RWMP accomplishes this through stakeholder meetings, road weather research and development (R&D) projects, training programs, conferences, webinars, and other means. From 2017 to mid-2019, representatives from the RWMP have attended or presented at more than 130 events.

Road weather-related meetings have been well attended since the last update: The RWM stakeholder meetings and the Weather-Responsive Traffic Management meeting attracted 29–32 State DOTs per event. In 2015, the RWMP launched its [Road Weather Roundtable](#) webinars, and hosted nine webinars during 2017 and 2018, each with 10–15 States attending. The EDC-5 summits, which introduced the [Weather-Responsive Management Strategies](#), brought 48 States.

Developed in 2014, the [RWM Capability Maturity Framework tool](#), which helps agencies develop action plans for implementing improved road weather management, has generated interest among States. Sixteen States have already conducted the capability maturity assessment workshops, and another four States have expressed interest.

Partnerships and Stakeholder Collaboration

Through partnerships and stakeholder collaboration, the RWMP utilizes a multidisciplinary approach to address road weather challenges. By partnering with State DOTs on research projects and attending and presenting at conferences, workshops, or meetings, the RWMP strives to build partnerships that will advance road weather innovations and practices. The RWMP also promotes data sharing and information exchange opportunities to create a comprehensive program.

The RWMP is partnering with transportation agencies to advance various R&D projects, such as the [Pathfinder](#), [RWM Capability Maturity Framework](#), [Weather Data Environment](#), and [Integrated Mobile Observations \(IMO\)](#) programs. Overall, the number of States that are conducting at least one R&D activity has increased slightly, to 43 States.

The RWMP also supports the National Oceanic and Atmospheric Administration (NOAA) by working with State DOTs to secure data sharing agreements and helping to ensure data quality by integrating quality-checking algorithms into NOAA's Meteorological Assimilation Data Ingest System (MADIS). Participation in MADIS is tracked by the number of State DOTs that have signed a data sharing agreement and has experienced a slowdown in uptake among State DOTs.

The level of coordination between State DOTs and the National Weather Service has also greatly increased since the last assessment. Every agency surveyed reported some level of coordination with the National Weather Service (NWS) local forecast office, with 72 percent describing their coordination as "routine." This coordination effort reflects a strong commitment to enhancing the performance of road weather management and operations.

What's Ahead for the Road Weather Management Program?

The results of this performance measures update show an engaged stakeholder community, new and strengthened partnerships, and sustained use of available technologies for RWM. This assessment continues to be important for the RWMP and provides direction for the program to advance road weather strategies. As a result, the RWMP will consider and investigate the following recommendations to:

- Continue to showcase the value of road weather management strategies by developing case studies on material management practices.
- Re-engage State DOTs around Road Weather Information Systems (RWIS) data sharing.
- Support the overall maturity in the collection of real-time field data from vehicle fleets.
- Continue the emphasis on winter weather-related management strategies, while expanding efforts to engage non-winter weather States by looking at road weather impacts beyond snow and ice control.

For more information on the 2019 RWMP Performance Measures Update and the complete results, visit <https://ops.fhwa.dot.gov/weather/>

¹ A total of 39 State DOTs participated in the survey during the spring of 2019. State DOT statistics presented are based on these responses.

² Gonzales D, Fontaine M (2018) Impact of a Variable Speed Limit System on Driver Speeds During Low Visibility Conditions. Available at: <https://pubsindex.trb.org/view/2018/C/1495670>



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