



RESEARCH SERVICES & LIBRARY

OFFICE OF TRANSPORTATION SYSTEM MANAGEMENT

TECHNICAL SUMMARY

Technical Liaison:

Dan Gullickson, MnDOT
Daniel.Gullickson@state.mn.us

Project Coordinator:

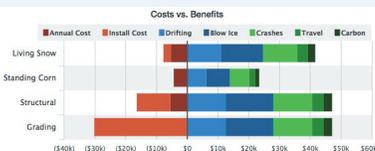
Dan Warzala, MnDOT
Dan.Warzala@state.mn.us

Principal Investigator:

Gary Wyatt, University of Minnesota Extension

PROJECT COST:

\$65,925



The Living Snow Fence Payment Calculator details the costs (in red) and benefits (in blue and green) of standing corn rows and other treatment options.

Putting Research into Practice: A Web-Based Cost-Benefit Tool to Expand the Living Snow Fence Program

What Was the Need?

Minnesota and other cold-weather states put extensive effort into clearing snow and ice from roads during the winter season. Keeping the roads navigable through the winter is critical to preserving economic activity and transportation safety.

While plowing, anti-icing and deicing efforts are largely effective at clearing roads after winter storms, MnDOT has inventoried 3,700 sites across the state that experience problems with blowing and drifting snow. These sites require extra effort beyond routine plowing, often including extra equipment such as motor graders or bulldozers to push snowbanks off the road.

In recent years, MnDOT has operated the blowing snow control program, which provides payments to farmers with land adjacent to problem sites to leave standing corn rows through the winter. These standing corn rows—or other treatments, including structural (permanent) snow fences, living snow fences made of shrubs or conifers, or highway grading to trap snow—help to improve safety and reduce maintenance costs at problem roadways by trapping snow before it blows across the road.

The various types of blowing snow treatment options are most effective at sites with superelevated curves. Previous research found that any type of snow fence reduced crash severity at these sites by 40 percent. But these options are not cost-effective at sites with less traffic or no crash history. An earlier MnDOT research project developed an Excel-based cost-benefit calculator for standing corn rows and living snow fences to better estimate appropriate payments to farmers in exchange for using their land for these purposes. That tool, however, was limited by its format and could only be used on computers where it had been downloaded.

What Was Our Goal?

The purpose of this project was to adapt the Living Snow Fence Payment Calculator to a Web-based format that can be accessed and utilized by any computer, including tablets and smartphones in the field.

What Did We Implement?

This project enhances the Living Snow Fence Payment Calculator developed in project [2012-03](#), Economic and Environmental Costs and Benefits of Living Snow Fences: Safety, Mobility, and Transportation Authority Benefits, Farmer Costs, and Carbon Impacts.

How Did We Do It?

Investigators translated the existing Excel-based tool to a Web resource: snowcontroltools.umn.edu. This work included both programming the tool and developing Web-based databases and a user management system to allow users to import data and save and edit their analyses.

The Living Snow Fence Payment Calculator, adapted via this effort from an Excel spreadsheet to a mobile-friendly, Web-based application, has helped MnDOT more than double the number of standing corn row contracts in the state. MnDOT plans to continue using the tool to grow the living snow fence program.

“It takes one-to-one contact or word-of-mouth communication with landowners to get them to participate. Farmers are a lot more receptive to creating a snow fence if they know the plow driver and realize a road is a problem for the driver or neighbors.”

—Gary Wyatt,
Agroforestry Extension
Educator, University of
Minnesota Extension

“With this tool, we consider the farmer’s economic vitality as well as benefits related to crash reduction, travel time and carbon sequestration in the decision-making process.”

—Dan Gullickson,
MnDOT Living Snow
Fence Program
Coordinator

Produced by CTC & Associates for:

Minnesota Department
of Transportation
Research Services & Library
MS 330, First Floor
395 John Ireland Blvd.
St. Paul, MN 55155-1899
651-366-3780
www.mndot.gov/research



Living snow fences are effective at trapping snow before it drifts across roadways. They also produce benefits related to carbon sequestration, erosion prevention, bird and pollinator habitat, and water quality.

Investigators beta-tested the Web-based tool with MnDOT users and college students. Feedback from these tests helped to refine and improve the user interface to make it more intuitive.

What Was The Impact?

Investigators held a number of training programs in Arden Hills, Minnesota, and in MnDOT districts to help inform MnDOT and county staff about the tool and its value. After these training sessions, the number of standing corn row contracts in Minnesota more than doubled—from 17 in 2013 to 43 in 2014. The research team has also presented the tool at several conferences. Many other promotional tools have been developed, including fact sheets and other materials on the University of Minnesota Extension Agroforestry [website](#), along with a [webinar](#) and other videos about the tool.

Previously, MnDOT offered payments to farmers based on the market price of corn plus a small premium as an incentive to participate. As a result, when prices rose, payments exceeded the program’s budget. The new tool calculates payment by acre, which makes it easier to calculate an accurate return on investment and justify payments to landowners.

What’s Next?

MnDOT has contracted with the University of Minnesota Center for Transportation Studies to maintain snowcontroltools.umn.edu. The maintenance process should refine and improve the tool over time.

Standing corn rows are typically the easiest treatment to persuade landowners to install. However, one of MnDOT’s long-term goals is to increase the number of living snow fences because the hedges and conifers also have benefits for wildlife and water quality. Many landowners can also qualify for payments under the [Continuous Conservation Reserve Program](#) if they plant native plants in the snow catch area that attract beneficial pollinators and native wildlife. MnDOT hopes that the tool can be used to help start conversations about treatment options that will eventually lead to more living snow fences.

Current efforts are developing promotional aids that can be used statewide and to train staff to encourage landowners near problem roadways to participate in the program. A MnDOT study, Expanding the Adoption of Blowing and Drifting Snow Control Treatments on Private Lands, anticipated for completion in 2017, will examine the results of this training in hopes of adapting it into a statewide outreach program to expand living snow fence adoption.

This Technical Summary pertains to Report 2015-21, “Web-Based Preventative Blowing and Drifting Snow Control Calculator Decision Tool,” published May 2015. The full report can be accessed at mndot.gov/research/TS/2015/201521.pdf. The online calculator tool is available at snowcontroltools.umn.edu.