

# Web-Based Preventative Blowing and Drifting Snow Control Decision Tool

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EXTENSION

## Issues

Blowing and drifting snow on Minnesota's roadways are transportation efficiency and safety concerns. Establishing standing corn rows, living and structural snow fences or proper grading during road construction improves driver visibility and road surface conditions and has the potential to lower costs of road maintenance as well as crashes attributed to blowing and drifting snow. These snow control solutions can also provide environmental benefits including carbon sequestration and lower carbon emissions from snow removal operations. In recent years, the Minnesota Department of Transportation (MnDOT) has paid farmers to establish snow control practices to protect identified snow problem roadways. Using public funds to pay landowners to establish land practices, which benefit the public and reduce MnDOT winter costs, needs to be justified.

Our research team created a cost-benefit-payment calculator to estimate payments to farmers that includes safety and snow removal cost savings to the public and the transportation agency. This calculator is now a web-based tool that can be used on laptops, smartphones and tablets. Outreach plans will inform transportation agencies of this tool and the cost-benefit analysis it offers.

## Snow Fences Do Work



Without

With

## Objectives

1. Survey agency staff and landowners to identify constraints in establishing living snow fences and standing corn rows.
2. Estimate MnDOT cost savings related to snow removal from roadways and the reduction in crashes/accidents and highway safety issues.
3. Develop a snow fence cost-benefit tool to help justify paying landowners for snow fences to protect state highways.

## Snow Control Tools

(Two Decision Tools)



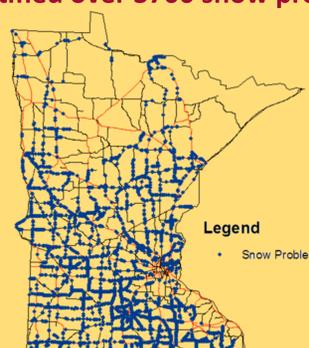
Cost-Benefit

Design

[snowcontroltools.umn.edu](http://snowcontroltools.umn.edu)

## Results

- 118 staff from Farm Service Agency (FSA), Natural Resources Conservation Service (NRCS), and Soil and Water Conservation Districts (SWCD) completed an online survey.
- 45 Minnesota landowners participated in five focus groups.
- Costs of living snow fence (LSF) mentioned included: establishment, maintenance, rejuvenation and removal.
- Constraints were: risk (plant mortality, liability), hassle to farm around, time to manage and contract is not flexible enough to reflect changing land values.
- Positive factors influencing adoption: awareness of LSF program, personal and local contacts, targeted recruitment, promotion of landowner's objectives, incentives and compensation.
- Our research team created a cost-benefit calculator to estimate payments to farmers that included safety and snow removal cost savings to the public and the transportation agency.
- MnDOT has identified over 3700 snow problem sites.



If 40% of these sites had snow fences:

- Net savings to MnDOT of \$1.3 Million (equipment use, sand and salt application).
- Economic/Social and MnDOT net benefits of \$14 Million (reduced carbon, accidents and travel time).



## Outcomes

1. A collaborative multi-agency Memorandum of Understanding was created with MnDOT, FSA, NRCS and SWCD officials to complement federal and state cost share programs for living snow fences.
2. Five BETA Tests with 25 participants. Two recorded webinars, website.
3. Collaborative long-term partnership between MnDOT and U of M Center for Transportation Studies (CTS) in maintaining and hosting the snow control tools website.
4. An increase in standing corn row and structural snow fence contracts with MnDOT.
5. Procedures documented for groups to hand pick corn in standing corn row contracted strips. ([z.umn.edu/hpcorn](http://z.umn.edu/hpcorn))
6. The success of this program is greatly attributed to U of M Extension staff and graduate students who gave leadership in conducting and implementing this research.

## Snow Control Practices



Living Snow Fence



Standing Corn Rows



Structural



Grading

## Conclusion

The snow control tool allows transportation agencies to analyze snow problem areas and determine snow fence benefits directly to the agency such as reduced snow removal equipment usage and reduced sand and salt application, broader social benefits such as avoided/sequestered carbon, avoided accidents and reduced travel time, and the costs to landowners.

As a result of this tool more snow fences should be established which will reduce snow removal cost, benefit the environment and increase public safety.

