



Living Snow Fence Payment Calculator

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Issue

Blowing and drifting snow on Minnesota's roadways is a transportation efficiency and safety concern. Establishing standing corn rows and living snow fences (LSF) on private lands, improves driver visibility, road surface conditions, has the potential to lower costs of road maintenance and accidents attributed to blowing and drifting snow; sequester carbon and avoid the carbon emissions of snow removal operations. Despite the effectiveness of living snow fences, there has been limited adoption of the practice leaving large areas of the state's roadways susceptible to blowing and drifting snow problems.

In recent years the Minnesota Department of Transportation (Mn/DOT) has paid farmers to establish living snow fences and to leave standing corn rows to protect identified snow problem roadways. They have paid farmers \$1.50 per bushel above market rate. With higher corn prices, paying \$1.50 per bushel above market rate may not be sufficient incentive for leaving standing corn rows. Also, with Mn/DOT's memorandum of understanding with USDA to plant living snow fences through the Conservation Reserve Program (CRP) now is an opportune time to review Mn/DOT's annual payment program to farmers and to develop helpful tools to figure fair and equitable payments for farmers and Mn/DOT.

Tasks

- 1. Survey landowner costs of standing corn and Living Snow Fence adoption:** Identify landowner costs and constraints in establishing and maintaining standing corn rows and living snow fences.
- 2. Financial cost analysis of landowners who have standing corn and Living Snow Fences:** Record financial costs to the landowner of standing corn and living snow fence plantings.
- 3. Calculating carbon emissions from highway maintenance equipment and carbon sequestration by standing corn and Living Snow Fences:** Estimate the carbon footprint of snow removal and maintenance equipment plus the carbon sequestration of living snow fence vegetative plantings.
- 4. Estimate Mn/DOT cost savings related to snow removal from roadways and the reduction in accidents and roadway safety issues:** The avoided costs associated with removing blowing and drifting snow and costs avoided from crashes caused by blowing and drifting snow based on Mn/DOT data on those costs will be documented.
- 5. Develop a LSF Payment Calculator:** To develop a payment calculator which will include:
 - a) data on costs of establishment and maintenance of LSF;
 - b) avoided road maintenance and safety costs; and
 - c) carbon emissions and carbon sequestered by LSF plantings.

Results

- 118 staff from FSA, NRCS and SWCD completed the online survey.
 - 45 Minnesota landowners participated in 5 focus groups in 2010.
 - Costs of LSF most mentioned included: implementation, maintenance, rejuvenation and removal.
 - Constraints were risk (plant mortality, liability), hassle to farm around, time to manage and contract is not flexible to reflect changing land values.
 - Factors influencing adoption: awareness of LSF program, personal and local contacts, targeted recruitment, promotes landowners objectives, incentives and compensation.
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- Possible decrease in production (crop yields) adjacent to LSF.
 - Labor and time to manage the tree/shrub LSF planting not fully compensated.
 - Cost of spring harvest and tillage for standing corn rows (\$31/A and \$15/A plus mileage).
 - Inconvenience cost of \$100/acre.
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- Diesel CO² emissions are figured at 22.20 lbs./gallon (EPA).
 - Social value of carbon, \$43/ton.
 - Carbon sequestration with LSF plantings.
 - Avoided carbon emissions with less highway maintenance equipment.
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- With over 3700 snow problem sites, there are only 40 LSF contracts.
 - Net benefits to Mn/DOT of \$1.3 Million (equipment use, sand and salt application).
 - Economic/Social and Mn/DOT net benefits of \$14 Million (carbon, accidents, reduced travel time).
 - Mn/DOT Coordination with conservation agencies and programs yields an additional \$400,000 in net benefits for Mn/DOT.
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- Highway officials input variables to arrive at a realistic cost benefit dollar amount that can be saved by using standing corn rows or LSF plantings.
 - The payment calculator uses databases to retrieve data: 1) Soil Rental Rates (MN FSA); 2) Land Rent (MN Land Economics); 3) Crop Yields (USDA); 4) Snow Prioritization Database (Mn/DOT); 5) Average Annual Daily Traffic (Mn/DOT).
 - Physical and Economic Outputs.
 - Payment Range (minimum payments to landowners and maximum benefits to Mn/DOT).

Minnesota State Highway 212 near Bird Island, MN



Without LSF



With LSF

(Photos are taken the same day showing the visibility and blowing snow improvement provided by LSF planting)

Assessing Carbon Emissions and Storage



Carbon Emissions from Snow Removal Equipment will be Documented



Living snow fences planted to perennial vegetation provides carbon storage. The amount of carbon storage and return from carbon credits will be calculated.

Conclusion

The living snow fence (LSF) calculator allows transportation agencies to analyze snow problem areas and determine 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. Results in Minnesota suggest expansion of the LSF program from 1% to 67% of snow problem areas, 40% of which have net benefits directly to Mn/DOT. To achieve this the LSF program must be improved to address landowner costs and constraints such as: more flexible contracts, easier, paperwork, inflation adjusted or index tied payments, more competitive incentives, alternatives for maintenance (contracted or pay landowner more), insurance against risk and decreased landowner liability.

