Transportation Agency Tool to Analyze Benefits of Living Snow Fences

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Abstract

A benefit and cost analysis tool was developed for the Minnesota Department of Transportation’s (MnDOT) living snow fence (LSF) program. This transportation agency tool calculates global and site-specific economic, transportation and environmental benefits and the opportunity costs to landowners. This aids in prioritizing snow problem areas and developing landowner payment programs. Results from the application of the tool on U.S. interstate and U.S. and Minnesota (MN) highway snow problem areas in MN suggests an expansion of the program in the study agency and to other states with snow precipitation is justified. LSF are plantings of trees and/or shrubs set back from the right of way along the upwind roadside to minimize drifting and blowing snow problems on the roadway.

Blowing and drifting snow are costly realities for transportation agencies in regions with significant snow precipitation. Drifts that are large and heavy enough to be unmovable by standard plows require specialized equipment to keep roadways passable. Blowing snow can require extra trips by standard plows, increased plow time, and increased usage of sand and salt. Analysis of automatic vehicle location (AVL) system data and field surveys are used to estimate these cost savings from LSFs.

Snow fences can decrease travel time and reduce the severity and number of snow related accidents. The number and type of vehicles affected during these events is estimated from average daily traffic flows. A study in Wyoming shows that snow fences along interstate 80 have reduced accidents during blowing snow conditions by seventy percent (Tabler 1982). An analysis of accidents in Minnesota from 1995 to 2005 found over nine thousand snow related accidents in snow problem areas including sixty four fatal and one hundred and thirty one incapacitating accidents (URS Corporation 2008).

In addition LSF also provide environmental services such as wildlife conservation, hunting opportunities, and carbon storage and sequestration. The MnDOT LSF program includes collaboration with Soil and Water and Conservation Districts (SWDC), the USDA Farm Service Agency and the Natural Resources Conservation Service (NRCS). Coordinating the LSF program with the Conversation Reserve Program (CRP) and the Environmental Quality Incentives Problem (EQIP) provides additional resources that can reduce the transportation agency’s share of the landowner payments by sharing in the cost of establishment and annual landowner payments. This lowers financial barriers to development and expansion of a program with substantial economic net benefits.

Key words: benefit cost tool; blowing; environment; fence; drifting; snow

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