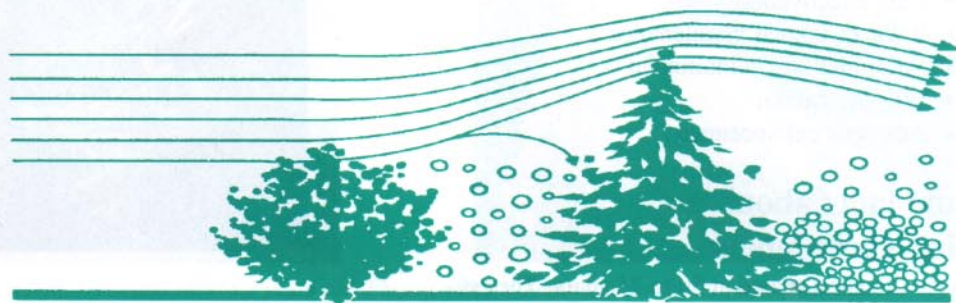


Living Snow Fences



Blowing and drifting snow has created problems for people ever since they started their trek to the West. Pioneers left Missouri in early spring to avoid deep snow in the mountains and blizzards on the plains. As early as 1905, railroad companies planted trees as barriers to control blowing snow along rights-of-way. By 1915, the Great Northern Railway Company reported it had planted half a million tree seedlings.

Winter winds and snow still have the power to disrupt our lives. Almost every year we hear local radio stations announce schools closures because of blowing and drifting snow. Sometimes it's only a small segment of a road subject to drifting that causes miles of the road to be closed. Snow drifts jeopardize public safety and emergency services, interrupt businesses, and increase livestock and wildlife mortality.

Snow fences are a proven technique for reducing the impact of blowing and drifting snow. These structural barriers, commonly made of slated or picket fences, are placed to interrupt blowing snow. With an action similar to a rock placed in a flowing stream, they cause an eddy effect that alters wind speed and direction, allowing snow to settle out.

Snowplows provide a fast, efficient way to keep roads open, but annual costs are often high. When roads are subject to recurring snow blockage, a more permanent, cost-effective solution is desirable and often needed.



Growing Solutions

Another kind of snow fence, made of living plant materials such as grasses, shrubs and trees, can be used to improve public safety and reduce road closures. Often called living snow fences, they are actually densely planted windbreaks that have been specifically designed and planted to reduce blowing and drifting snow. Like a structural barrier, they cause blowing snow to settle in a designated area.

Living snow fences are more cost-effective than structural barriers and provide a wide array of benefits beyond snow control.

Growing Benefits

Living snow fences offer a wide range of options and will meet many objectives. These benefits continue to improve and multiply as a living snow fence grows and matures:

- Longevity
- Cost-effectiveness
- Reduced annual maintenance
- Snow and dust containment
- Wildlife habitat
- Aesthetic enhancement

Some facts about living snow fences

Service life is estimated at 50 to 75 years. The estimated life of a slat snow fence is 5 to 7 years; over a 50-year span, the installation and maintenance costs would be 4 times more.

Average cost is \$3 per mile per year for each unit of snow trapped compared to \$185 per mile per year for a 4-foot slat fence.

More efficient in capturing snow. When mature, a living snow fence may capture up to 12 times more snow than a slated fence.

Provide habitat for birds to nest, eat, and escape. Small mammals—even deer—are attracted to the habitat created by a living snow fence.

Can be designed to conserve energy for farmsteads, feedlots, and community facilities.

Some disadvantages to consider

Living snow fences require more space than slat snow fences.

New plantings must be protected from grazing.

It takes from 5 to 7 years for living snow fences to provide effective snow control and 20 years to fully mature.

Site conditions such as shallow soils and pH (acidity or alkalinity) may prohibit plant establishment.



Planning Living Solutions

Living snow fences must be well planned and located to achieve the myriad of benefits they offer. For example, a snow fence located in the wrong place could cause snow to accumulate on the road instead of protecting it.

Follow these 10 steps to ensure success

Step 1: Determine planting objectives. Your objective may be as simple as the control of blowing and drifting snow-or more complex with multiple objectives such as providing livestock protection or wildlife habitat, enhancing the beauty of the landscape, or water harvest and storage.

Step 2: Take an inventory of all on-site physical factors, including:

- Annual precipitation, average snow volume to be stored
- Topography and aspect, distance upwind available for planting
- Soil type, fertility, depth, and pH
- Current and potential land uses, land ownership, easements, restrictions

Step 3: Determine planting stock needed by species and number and who will order them.

Step 4: Decide what site preparation work is needed and who will do it.

Step 5: Determine fertilizer needed. Most windbreaks and living snow fences are not fertilized unless a deficiency shows in the growth and foliage of the trees and shrubs.

Step 6: Determine type of irrigation system needed to ensure plant establishment and survival. An irrigation system will need to be considered in areas with less than 20 inches of annual precipitation.

Step 7: Determine fencing needed to protect young plants from grazing livestock or wildlife. Decide who will install and maintain it.

Step 8: Decide what kind of weed barrier or mulch will be used and who will install it.

Growth rates are significantly faster when weed barrier is used. Newly planted trees can't compete with annual weeds and grasses so make plans for cultivation, chemical weed control or mulching.

Step 9: Plan for proper maintenance

- Frequent inspections of irrigation systems and fences to allow speedy repairs when needed.
- Frequent inspection of plants to spot weed and pest problems to allow quick remedial action.
- Prompt replacement of any dead plants.

Step 10: Make a plan by listing decisions made, date actions will need to take place, and who will carry out each action.

Who should be involved in planning?

Living snow fences often involve multiple landowners or jurisdictions that can make planning more complex. Involve key decision makers and partners early in the planning stages.

Possible partners include private landowners, county commissioners, county road departments, conservation districts, Resource Conservation and Development councils, State Department of Highways, State Department of Lands, State Forester, and federal, state, or local land managing agencies.

Living Designs

Height, density, length, and plant protection are key elements in the proper functioning of a mature living snow fence. To avoid problems, carefully consider these factors during the design phase.

Height

Determine barrier height by the tallest row in a planting. Barrier height affects snowdrift depth and length. Snow storage potential can be manipulated by barrier height. Doubling the barrier height will increase snow storage by four times—an important economic factor to consider in species selection.

Density

Determine the density of a living snow fence by the species, number of rows, spacing between rows, and spacing of plants in a row. A 50 percent dense barrier stores the greatest amount of snow if other factors are equal. Between row spacing can vary depending on design criteria and objectives. Twin row high-density plantings are recommended. Preferred species are evergreens, shrubs, and low growing broadleaf trees.

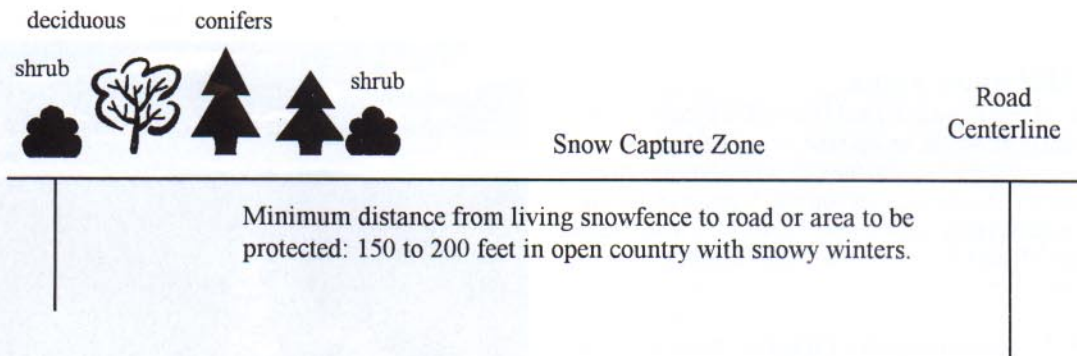
Length

Length determines the maximum area that can be protected if winds are perpendicular to it. Snow storage at the ends of a barrier is significantly less than near the center. Barrier design must extend far enough beyond the protected area to intercept winds that deviate 25 degrees from either direction of perpendicular. Extending a snow fence 100 feet beyond the area to be protected will mitigate this "end effect."

Planting Protection

If livestock can access the site, then fencing will be necessary to plantings. Significant damage can occur from trampling, rubbing, and browsing. Fencing will avoid soil compaction as well as physical damage to the irrigation system and weed barrier.

Key Design Elements



Orient living snow fence at right angles to prevailing winter winds.

Doubling the **height** will more than quadruple the amount of snow captured.

Vegetation with about **50% density** will capture and store the greatest amount of snow.

Conifers are ideal **species to plant** because of their height and year-round foliage.

Many **deciduous trees and shrubs** also work well, especially in combination with conifers.

There are hundreds of site-specific **design options**.

Living Examples

Interstate 84 Snow Fence



Photo on left: Trees and shrubs 2 years old. Photo on right: Trees and shrubs 20 years from now.

"The Most Dangerous Freeway in America" is how *USDA Today* described the 41-mile stretch of Interstate 84 that runs from near Burley, Idaho, southeast to Salt Lake City, Utah. When the wind blows, snow and dust can cut drivers' visibility to zero. A local task force studied the problem and decided to test a living snow fence on a 2.5-mile section of the highway.

Installed in 1996, the living snow fence includes two twin rows of high density shrubs and trees, a drip irrigation system, and fabric mulch to conserve moisture and control weeds. Rocky Mountain Juniper, Skunkbush Sumac, and Siberian Peashrub were selected because of their tolerance to site conditions and effectiveness for controlling snow and dust. Total footage of the snow fence is 40,720 feet. In 1998, the Natural Resources Conservation Service field staff reported a 97 percent survival rate for the trees and shrubs planted.

Many partners worked together to plan, fund, and install the snow fence. Three local landowners provided easements, labor, and equipment. Other partners included the East Cassia Soil and Water Conservation District, Mid-Snake Resource Conservation and Development Council, Idaho Departments of Transportation and Fish and Game, USDA National Agroforestry Center, and the Natural Resources Conservation Service.

Jolly Hill Snow Fence

Jolly Hill Road, located in rural Bonneville County, is the only maintained winter access road for residents of the small community of Bone to get to the Greater Idaho Falls Area. But it has a 1.75-mile long section that is prone to drifting snow. Annual county snow removal costs were high. During the winter of 1991-92, it cost the County \$18,774 to keep the road open.

In 1993, the County installed a living snow fence to reduce future costs and improve safety. The design called for 2 rows planted 75 feet apart. Siberian Peashrub and Rocky Mountain Juniper were selected for use on the site. Fabric mulch was placed in the rows to conserve moisture and control weeds.

The County trucks water to a buried holding tank which supplies a drip irrigation system. Partners for this project included a private landowner, East Side Soil and Water Conservation District, High Country Resource Conservation and Development Council, Bonneville County Commission, and the Natural Resources Conservation Service.



Living Plant Selection

Use of site-adapted plant species is critical to the success of a living snow fence. Consult your local office of the Natural Resources Conservation Service or Cooperative Extension System for site-specific recommendations.

Some commonly recommended species

Evergreen

Eastern redcedar, Austrian pine, Blue Spruce
Rocky Mountain juniper and Utah juniper are very drought hardy
Scotch pine and Ponderosa pine on soils under 7.90pH



Low Broadleaves

Siberian crabapple, Manchurian crabapple
Russian olive on upland sites only because species can spread in areas with high water tables

Shrubs

Amur honeysuckle, Blueleaf honeysuckle, chokecherry, golden current, Peking cotoneaster, Western sandcherry
American plum, common lilac, and Silver buffaloberry can spread by suckering
Fourwing saltbush, Siberian peashrub (caragana), Skunkbush sumac and Sagebrush

Where to get technical and financial help

The Natural Resources Conservation Service, Cooperative Extension System, or state forester can provide valuable on-site planning and design assistance. Resource Conservation and Development councils and conservation districts can help with project coordination.

USDA programs like the Conservation Reserve Program, Environmental Quality Incentives Program, and the Stewardship Incentives Program may provide help. Contact the Natural Resources Conservation Service, your local conservation district, state department of lands, or state forester for more information and assistance.

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