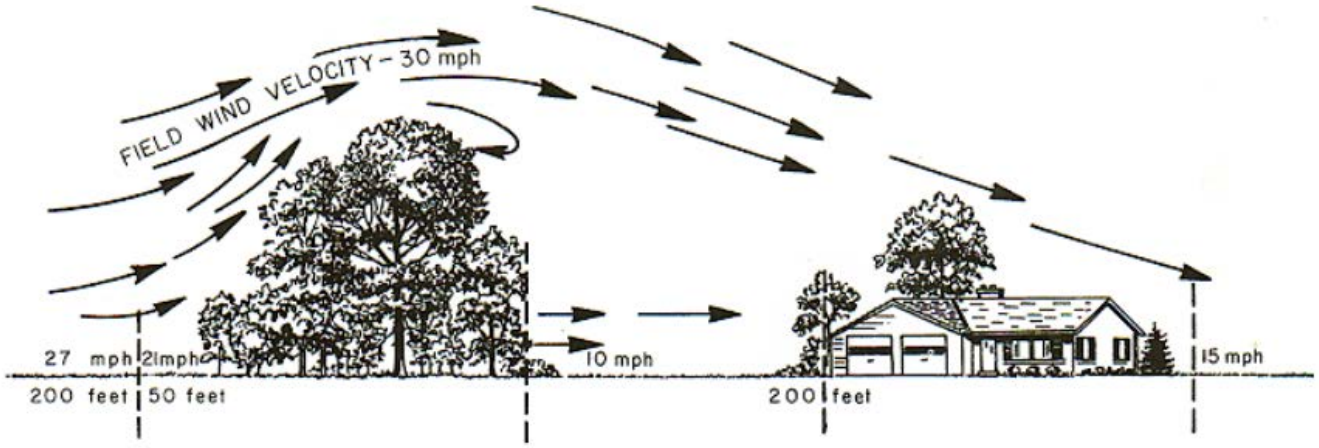


Windbreak protection zone. (Source: U.S. Department of Agriculture's Natural Resources Conservation Service.)

Outsmart Wyoming's winter weather with a windbreak

Not much can be done to stop the notorious Wyoming wind from blowing, but it can be manipulated to provide relief. Windbreaks are critical pieces of infrastructure that redirect drifting snow and reduce wind chill and its negative consequences. Strategic placement of windbreaks can help keep roads and driveways clear, improving driving conditions and reducing the time and effort required to maintain these spaces during the winter.

A well-designed windbreak provides shelter by cutting down the velocity of air movement and, in the case of blizzard conditions, directing blowing snow away from a protected space. In harsh blizzard conditions, having access to space out of the wind can mean the difference between life and death for livestock. Properly placed windbreaks also improve efficiency for heating homes and outbuildings by decreasing energy demand.

With the ground frozen and the wind howling, it's too late to pursue a long-term windbreak installation project this winter. But don't despair—the winter months are an excellent time to make observations and conduct a site analysis. Taking advantage of this opportunity can help inform your plans for the installation of a windbreak during the warmer months.

Windbreak designs

The effective area of a windbreak is determined by its height, length, and density (relative amount of open space or gaps). A taller structure creates a relatively larger downwind protected space.

The density of a structure influences the movement of air over or through it, which in turn affects the pattern of snow drifting. Solid structures increase wind velocities over and around them, which results in a slight vacuum on the downwind side. Snow will accumulate first on the upwind side and then in the immediate downwind space as the slight negative pressure causes it to fall out of the air.

Porous structures allow some air to pass through, which reduces the vacuum effect and disperses blowing snow over a larger area. At less than 50% solid density, windbreaks lose much of their wind-slowing effects. A wooden snow fence with gaps as wide as the planks, for example, has 50% density; building a structure with wider gaps is not recommended.

One of the most effective windbreak designs for livestock features two solid arms set at a 90-degree angle "V" with the point oriented directly into the prevailing wind. Research shows that to maximize the shelter space, the length between the ends of the two arms should be at least 10 times the height of the

structure and no more than 15 times the height of the structure.

For example, if planning a 10-foot-tall windbreak, the minimum width between ends is 100 feet and the maximum is 150 feet. Using the Pythagorean theorem and a little high school algebra, the structure should have sides at least 71 feet long and no more than 106 feet long to fall within the targeted range. In this way, structures can be customized to any desired height or length.

Windbreaks are also commonly used to provide protection to rural residences. These structures may be of the two-armed design described above, or several parallel rows of windbreaks that are positioned upwind and perpendicular to the prevailing wind. To view a map displaying the direction of local prevailing winds across Wyoming, visit https://bit.ly/WYwind.

Shelterbelts

Shelterbelts, which consist of rows of trees and shrubs, make excellent porous windbreaks. The efficacy of shelterbelts depends on several factors, including plant spacing, species composition, and number of rows. Shelterbelts typically have at least one row of evergreen trees to provide year-round protection, but they can feature any combination of evergreen, deciduous, and shrub species in one or more parallel rows. This type of planting is sometimes referred to as a living snow fence.

Wyoming's dry climate and cold winters can make it difficult to keep trees alive long enough for them to establish. In sites without access to supplemental water, manufactured windbreaks are often a better choice than shelterbelts.

In places where access to water is not limiting, selection of appropriate tree and shrub species is critical. Plants native to Wyoming are well adapted to the soil and climate, but good non-native options are also available. For assistance with plant selection, contact a local UW Extension office or conservation district, or check out online resources from Barnyards & Backyards at https://bit.ly/bb-tree-shrub.

Proper spacing

Optimal spacing between plants varies according to the tree and shrub species. Research shows that allowing 3–4 feet between shrubs, 6–15 feet for deciduous trees, and 6–20 feet for conifers maximizes wind shelter without overcrowding the plants.

Remember, the plants will grow taller each year until they reach maturity. Closer spacing will provide effective wind reduction earlier, but may impact the stand's long-term health.

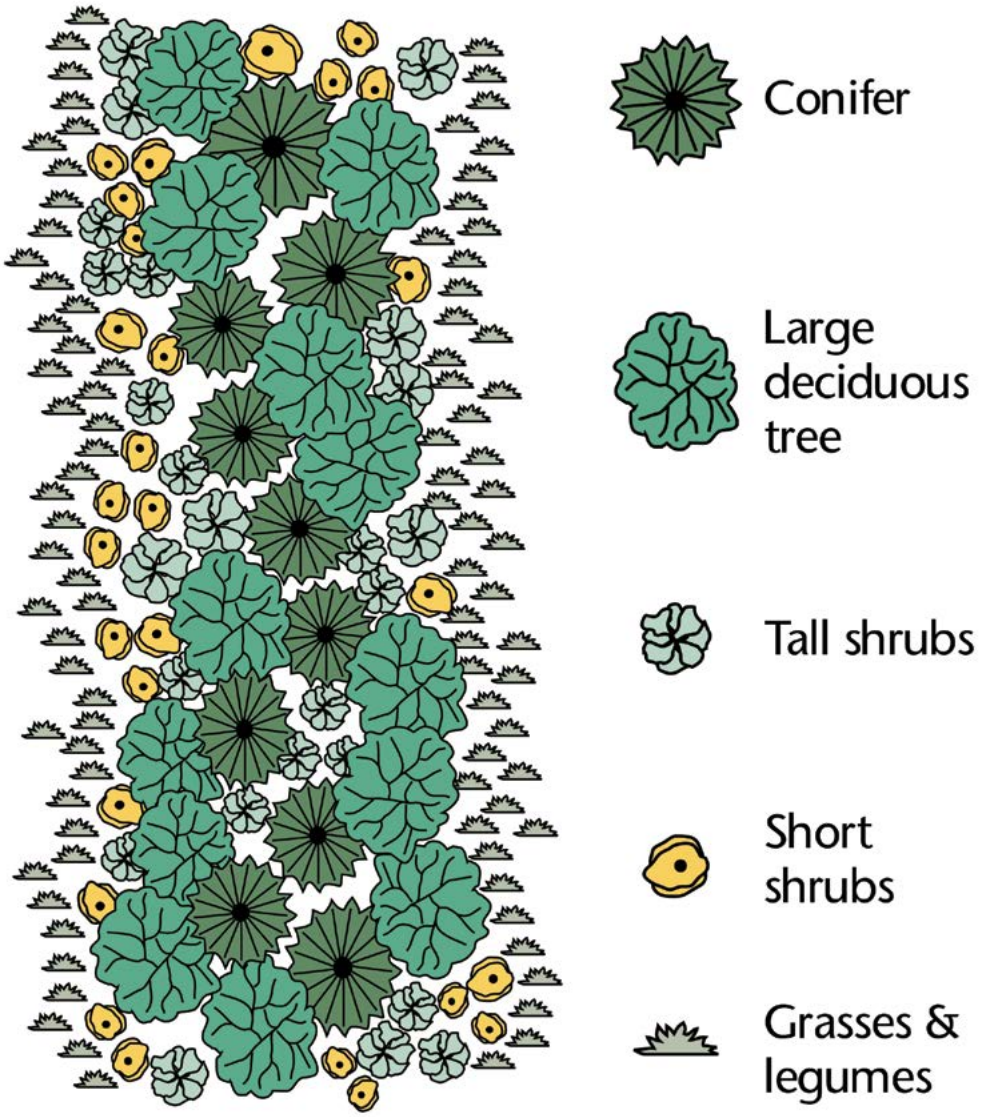
Keep in mind, also, that wind and snow behavior will change as trees and shrubs in a living snow fence grow toward their mature height. When the plants are young, it can be beneficial to use a temporary manufactured snow fence upwind of a living snow fence; the snow deposited during the winter months will provide the plants with essential moisture. Once the living snow fence is established and approaching full functionality, the temporary snow fence can be removed.

A common issue with windbreaks and shelterbelts is spacing them too close to the areas targeted for protection, which causes snow to drift around feed bunks, sheds, barns, houses, and roads. The general recommendation is to place the windbreak at least 150 feet away from the area to be protected. The exact distance can be calculated according to the specific height and density of a windbreak structure on a case-by-case basis (visit https://bit.ly/unl-windbreak or https://bit.ly/bb-rural-living-windbreak to learn more). The downwind protected area will be 10–12 times the height of the windbreak.

For living snow fences, use the mature height of the tallest species planted for the calculation. Constructed windbreaks can be moved, while planted shelterbelts cannot—due diligence in the planning phase will save time, money, and headaches. For assistance with windbreak calculations and design, contact a local conservation district, Natural Resources Conservation Service (NRCS) office, or extension office.

Benefits of shelterbelts

In addition to their wind-reducing effects, shelterbelts provide wildlife habitat, homeowner privacy, aesthetic value, and more. Healthy, mature trees can also add value to a property. To learn more, visit https://bit.ly/arbor-day-tree-benefits.



Windbreaks designed primarily for wildlife can have more plant diversity for a natural look. (Source: U.S. Department of Agriculture's Natural Resources Conservation Service.)

Start planning now

If you are planning to install a windbreak or living snow fence next summer, take advantage of your indoor time this winter by making observations of wind and snowdrift patterns on your site. It might be helpful to print out a map of your property and make notes. Places where snow does not currently accumulate are just as noteworthy as places where drifting occurs. For example, a driveway that currently blows clear of snow may become buried if a tree line that captures snow is planted too close in the upwind direction.

Making observations over a period of several months prior to installing any windbreak or living snow fence can help rural homeowners avoid many of the pitfalls that result from hasty construction. Plus, the colder weather this time of year leaves extra time for contemplation. With notes in hand and a well-developed course of action, work can begin immediately once the ground warms in the spring.

As the UW Extension agriculture and natural resources educator serving Johnson County, **Micah Most** experiences a mostly north-northwest prevailing winter wind. He can be reached at mmost@uwyo.edu or (307) 684-7522.