Windbreak Habitats for Wildlife

Habitat Extension Bulletin No. 12

Windbreaks for a farm or ranch provide benefits both to the landowner and wildlife inhabiting the area. Increased land value, aesthetic beauty, and wind protection are some benefits landowners derive from properly designed and planted windbreaks. A well- planned windbreak provides more pleasant living conditions around the farm or ranch by offering protection from the hot, dry summer wind and the frigid winter wind (figure 1). Studies show that reduced wind speeds result in a considerable savings of normal cooling and heating costs. Other benefits provided by windbreaks include an increase in soil moisture, reduced soil erosion, control of blowing and drifting snow, and livestock protection.

Wildlife benefits derived from windbreak establishment include protected travel corridors, increased food sources, and escape, winter, and nesting cover. White-tailed and mule deer, ring-necked pheasant, sharp-tailed grouse, cottontail rabbit, and fox squirrel all use windbreaks for food and cover. Windbreaks provide elevated song and display perches for breeding grassland and woodland birds as well as feeding and nesting sites for these species.

Wildlife benefits are maximized by providing one large windbreak greater than 1.5 acres rather than several small ones. Studies have shown that as windbreak size increases, wildlife species' richness and abundance also increase. The diverse habitat provided by large windbreaks attracts edge as well as forest-interior bird species. Windbreak size will generally be dictated by the land available for windbreak planting, but remember that a windbreak can never be too large for wildlife. However, do not be discouraged if small windbreaks are all the land space or your budget will allow. Several small (less than 1.5 acres), properly designed and constructed windbreaks can become unique wildlife habitats and benefit species able to survive in smaller areas.

Initial Preparations

Location and design are the two most important factors landowners must consider when planning a windbreak. Initially, the landowner should identify existing habitats and surface features that should not be disturbed. Aerial photos, available for viewing at local Soil Conservation Service (SCS) offices, will help landowners readily identify these areas.

After identifying areas to be preserved, suitable windbreak locations should be mapped to determine the area available for windbreak establishment. Remember that a windbreak at least 100 feet wide and 150 feet long has more appeal to wildlife than a smaller planting.

Plant windbreaks on the windward side of areas

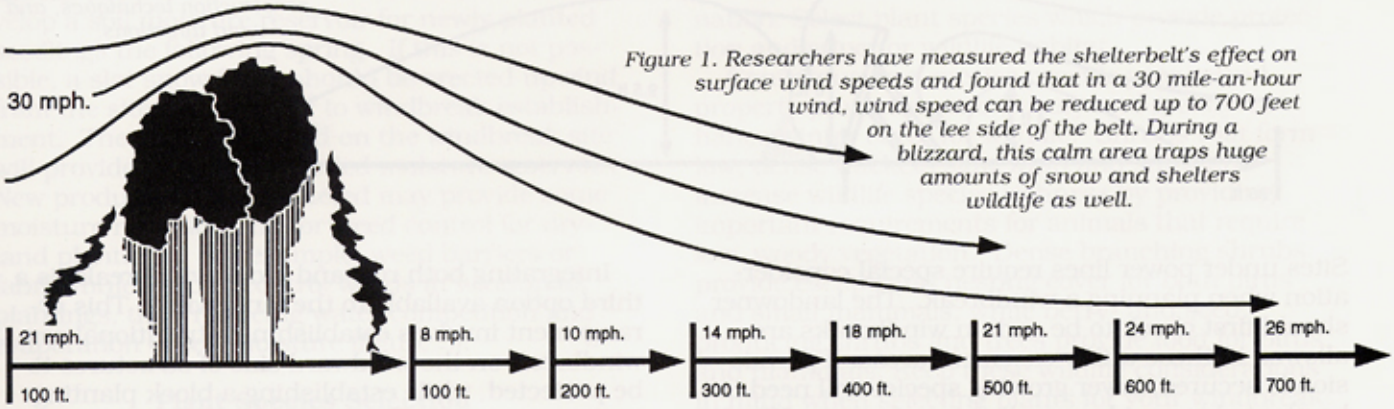


Figure 1. Researchers have measured the shelterbelt's effect on surface wind speeds and found that in a 30 mile-an-hour wind, wind speed can be reduced up to 700 feet on the lee side of the belt. During a blizzard, this calm area traps huge amounts of snow and shelters wildlife as well.

to be protected such as farm or ranch houses, work buildings, feed lots, or fields. In Wyoming, windbreaks are generally established on the west and north sides of areas to be protected, but windbreaks should be continuous as well as perpendicular to prevailing winds. Determine local wind patterns before planting.

A windbreak should be planted at least 150 feet upwind from the structure it is designed to protect. Some wind protection will extend to 20 or 25 times the mature height of the windbreak, but the maximum effective distances extend to only ten times the mature height. Plan the windbreak so the slope created by the shrub and tree canopies faces prevailing winds. The windbreak should also extend past the area to be protected, as wind and snow will swirl around the end of the planting, reducing the overall effectiveness and protection from the windbreak.

Avoid constructing roads through a windbreak; openings reduce windbreak effectiveness and allow snow to funnel through. If roads are necessary, plan construction to preserve the wind speed reducing ability of the windbreak as much as possible. Avoid planting windbreaks too near areas that need to remain snow free. Snow drifts develop in and on the leeward side (protected zone) of windbreaks during winter storms (figures 2 & 3).

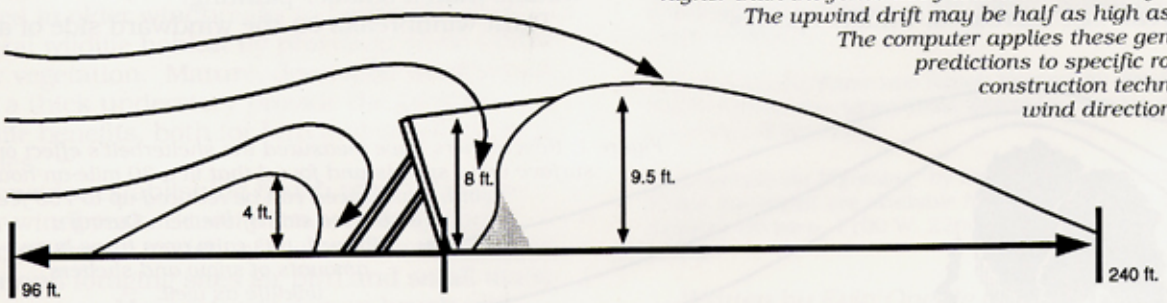
In most cases, windbreaks should not be established within 100 feet of roadway intersections. Vegetation can interfere with a driver's vision and cause snow to drift across the roadway. avoid windbreak establishment in these areas.

Once a location is selected and the purpose determined, the windbreak can be designed. Row and block plantings are the two basic windbreak designs, row (linear) plantings being more traditional. Rows should follow natural land contours to provide maximum "edge effect" for wildlife and protection from water erosion ("edge" is defined as the interface between two or more different vegetation heights or types. It results in more habitat diversity and increased wildlife use of the area). Where a field corner is involved, the windbreak should be planted in a gently curving arrangement rather than at a right angle. This configuration will provide more effective wind reduction, ease of maintenance, increased wildlife benefits, and a more aesthetically pleasing appearance.

A multi-row windbreak normally consists of three to seven rows. As a rule, as the number of rows in a windbreak, wildlife benefits will also increase. Available space, the objective(s) of the planting, and the budget of the landowner usually influence this decision.

Block plantings are usually established to create habitat for a variety of wildlife species. While other windbreak benefits are derived, the principal objective of a block planting is to provide food and cover for wildlife. Block plantings normally consist of 15 to 20 rows of alternating trees and shrubs, covering an area 250 feet by 800 feet in size (4.6 acres). In selecting plant species, choose those which provide maximum food and cover benefits for targeted wildlife species.

Figure 2. The Wyoming Transportation Department has computer models that accurately predict the amount of snow a board fence will trap, but there is no comparable model for a living snow fence. This idealized drawing shows that the downwind drift may be even higher than the fence itself and well over 200 feet long. The upwind drift may be half as high as the fence. The computer applies these general predictions to specific road sites, construction techniques, and wind directions.



Sites under power lines require special consideration when planning a windbreak. The landowner should first check to be certain windbreaks are allowed in these utility easement areas. If permission is secured, lower growing species will need to be planted to avoid power line interference. Windbreaks should never be planted over water wells or near sewage systems or septic tanks. Developing root systems can crack wells and clog sewer lines, requiring constant maintenance. Remember that any repairs to utilities, sewers, etc., may result in removal or damage to the windbreak. If possible,

Integrating both row and block windbreaks is a third option available to the landowner. This arrangement involves establishing a traditional row windbreak on the windward side of structures to be protected, while establishing a block planting in the protected zone, downwind from the row planting.

Windbreak Site Preparation

Proper site preparation is essential prior to planting to provide optimum growing conditions for the first few years. The planting site should be

Figure 4. Tree seedlings are not very well equipped to compete with other plants for light and water. Tilling the site (above) will drastically improve seedling survival. Weed barriers or mats in Figure 5 (upper right) have proved to be a major breakthrough in windbreak establishment. Figure 3. A mature windbreak made up of the right species provides all the water it needs by trapping snow (right).

summer fallowed a year before windbreak establishment. Competing vegetation should be removed by applying herbicides, tilling, plowing, or disking the soil. The site can be left rough-fallowed over winter and reworked again the following spring just prior to planting (figure 4). If the soil is sandy and susceptible to wind erosion, prepare the site as above and plant cover crops such as sorghum to stabilize the soil and minimize weed growth.

If possible, the site should be heavily irrigated the fall prior to windbreak establishment to develop a soil moisture reservoir for newly planted seedlings the following spring. If this is not possible, a slat snow fence should be erected upwind from the site the fall prior to windbreak establishment. The snow deposited on the windbreak site will provide this much needed moisture reservoir. New products being marketed may provide some moisture retention and/or weed control for dryland plantings. For example, weed barriers or fabric mulches can control weeds in windbreak plantings, thus reducing water competition and evaporation of soil moisture (figure 5).

Plant Species Selection

Plants selected for windbreak plantings can protect structures, livestock, and/or fields and at the same time provide wildlife shelter and food. Native plants acclimated to local soil and weather conditions and resistant to drought are good choices. Seedlings of native plants obtained from local sources should be selected over exotics to insure the greatest chance of survival.

When selecting plants for your windbreak, choose a combination of trees and shrubs. Using trees or shrubs exclusively in windbreak establishment result in limited wildlife habitat. In addition, neither of these choices offers the protective measures available from a tree/shrub combination. Select plant species which provide protection and superior wildlife habitat.

Coniferous tree species provide year-round property protection and beauty and greatly enhance winter cover for wildlife. Shrubs that form low, dense thickets slow wind and snow and increase wildlife species richness by providing important requirements for animals that require low, woody vegetation. Dense branching shrubs provide escape and nesting cover for both birds and small mammals, while berry- and seed-producing shrubs and trees provide food for birds and mammals. Keep these wildlife considerations in mind when selecting plants for your windbreak.

Because of varying soil and water requirements among plants, select a variety of plant species to increase the chances of windbreak success. A selection of six or more drought-tolerant, woody species is a good start. The differing levels of resistance to disease and insect attack among different plant species will also minimize the inci-

Figure 6. Bareroot plants should be soaked in a mud slurry or hydrated polymer right up to the moment they are planted.

dence of insect and disease infestation. Selecting a variety of plants also meets the needs of a greater number of wildlife species. In most cases, greater wildlife diversity will be found in windbreaks with greater plant diversity.

Ordering Plants

Plants for your windbreak should be ordered in early spring, and arrangements made for delivery or pickup on or near a planned planting date. Planting should take place just after the frost leaves the soil, normally in late April or early May.

The size and age of plants purchased depends on the budget of the landowner. Seedlings are the least expensive, easiest to handle and plant but take longer to produce desired results. Larger plants are more expensive and more difficult to plant, but produce some immediate wind reduction and wildlife benefits.

Seedlings are shipped either as bareroot, balled and burlapped, or container-grown plants. Larger plants are only available as containerized or balled and burlapped. For best survival, it is recommended that containerized (potted) evergreens be used instead of bareroot stock. Containerized evergreens are approximately the same size and age as bareroot evergreens but are grown in small pots or containers. Containerized evergreens suffer less from transplant shock, and they can be stored longer.

Of the three types, bareroot stock is the least expensive but requires the most care before and during planting. Bareroot stock can be left in the protective shipping packaging if planted within two to five days after receipt. However, plants should be thoroughly watered, and stored in a cool place (below 40 degrees Fahrenheit if possible). If planting delays of more than seven days are expected, plants should be removed from their protective packaging and "heeled in." Place the plants in a trench, spread soil over the root, pack firmly, and water thoroughly. Plants will survive a short time under these conditions, but should be permanently planted as soon as possible.

Planting

Prior to planting, windbreak rows should be staked to maintain straight rows, and spaced at least 16 to 25 feet apart to allow farm equipment to cultivate between rows during the early stages of development and create storage space for blowing snow. Distances between plants in the same row are critical for development and longevity of the windbreak, as well as wildlife survival. Hardwood shrubs should be spaced three to five feet apart, juniper and evergreen shrubs five to seven feet apart. Space hardwood trees 12 to 18 feet apart, and evergreen trees ten to 14 feet apart.

Plant dense branching shrubs in the first (windward) row of the windbreak, followed by two or more rows of evergreens, two or more rows of deciduous trees, two or more rows of evergreens, and two rows of shrubs. Fruit-bearing trees and shrubs should be planted on the leeward side of the windbreak for maximum availability to wildlife. If the windbreak is L-shaped, use a different species in the north-south leg of a row from that in the east-west leg.

When planting bareroot stock, keep the plants in a bucket of thin mud or hydrated powder polymer, removing individual seedlings as they are planted. Exposure to sun and air even for a brief period may kill young seedlings. Planting holes should be large and deep enough to adequately accommodate the plant roots without cramping or bending. After setting the seedling to the proper depth, fill the hole half full of soil, pack it firmly, and water (figure 6). After the water is absorbed, finish filling the hole, pack the soil firmly, and again water thoroughly. Mulch around the plant to retard soil drying and cracking. If the windbreak is to be irrigated by hose or bucket, construct a ring of soil around each plant to help collect and hold water near the seedling.

Survival of balled and burlapped and container-grown plants is normally quite high. Like bareroot stock, these plants should be thoroughly watered when received. Balled plants can simply be soaked with water, while containerized plants should be placed in a large, water-filled container (such as a washtub) for a few minutes.

The planting hole for a balled or container-grown plant should be large enough to accommodate the entire soil ball. The hole diameter should be at least twice the diameter of the root ball, but should only be dug to the same depth as the height of the root ball. With tarpaper-potted

evergreens, the tarpaper should either be removed from seedlings when planting or be split open on opposite sides and folded back to allow water passage and root growth. Do not destroy the soil ball! Additional care should be taken to avoid cutting too deeply into the soil ball and possibly damaging the root system. With burlap-wrapped seedlings, remove at least the top portion of the burlap before backfilling the hole. With both types, avoid knocking soil from the roots when removing the protective coverings or planting the seedlings. If soil begins to split, crumble, or fall away from the ball, remove as much of the protective material as possible while packing soil around the root ball. Fill the hole half full of soil, pack firmly, and water. After the water has been absorbed, the hole should be filled, the soil firmly packed and thoroughly watered again. Mulch the soil surface to prevent drying and cracking.

If a reliable water source is lacking, you may elect to add water-retaining polyacrylamide (polymer) in crystal form to the backfill soil at planting time. The polymer swells as it hydrates (fills with water), and holds moisture in the root zone and is believed to aid seedling survival and growth. Care must be taken to thoroughly mix the polymer and soil and not to add too much polymer per planting hole. The addition of too much polymer may lift seedlings out of the planting hole when hydrated or create large air spaces in its dehydrated state. These air spaces prevent root growth, resulting in plant mortality.

Tree planting machines help make planting seedlings faster and easier. These machines may be available from your local conservation district or county extension agent. If hand planting is the only option, one person can plant up to 500 seedlings in a single day if the site has been properly prepared.

Management Following Windbreak Planting

It is imperative to fence the windbreak area to exclude livestock. In the early years of windbreak establishment, livestock can kill young seedlings by uprooting, trampling or browsing. After plants are established, livestock will browse and rub out areas in the windbreak, forming a "browse line," inhibiting the windbreak's ability to reduce wind velocities at ground level, control blowing snow, or support wildlife. Soil is also compacted in the root zone when livestock is allowed in windbreaks.

Watering following windbreak establishment may not be imperative but will enhance survival and growth of the plants. Erecting a slat snow fence along the windward side of a newly established windbreak will result in snow deposition throughout the windbreak, providing soil moisture for the newly planted trees and shrubs, while providing some wind protection during establishment.

Evergreens must be protected from sun and wind in the first two to three years after planting. The drying effects and physical damage from sun, blowing soil and snow can stunt or kill young evergreen seedlings. Following evergreen planting, wooden shingles or other similar material placed on the northwest and southwest sides of young plants will provide effective shade and wind protection for two or three years (figure 7).

Small trees and shrubs can be protected from rodent and deer browsing by placing wire screen or vexar netting around the plants. Newly-established plants should be checked periodically for browsing damage and corrective actions should be taken when necessary. There are a number of repellents in the form of sprays, dips, and systemics which have proven effective at reducing or eliminating damage by browsing wildlife. Contact your extension agent, state forester's office, conservation district office, or local game warden for recommendations.

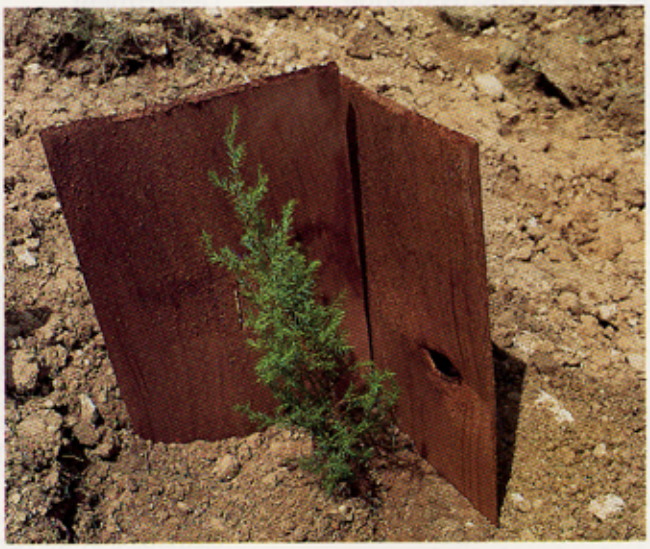


Figure 7. The effect of wind on evergreen seedlings is often underestimated. Wind dries young plants and physically punishes them. A couple of shingles on the windward side of each young tree (left) drastically improves its chances of survival.

Some trees and/or shrubs in the windbreak may die, particularly in the first three years of windbreak establishment. Dead trees or shrubs should be replaced as quickly as possible. Gaps in the windbreak decrease its effectiveness in reducing wind speeds and protecting structures.

Avoid removing dead mature trees; instead, trim these "snags" and leave them standing. Snags are valuable wildlife structures, provid-

Figure 8. It's a good idea to leave room for a disk or spring-tooth between rows of a windbreak. Periodic cultivation helps young trees as much as it does seedlings.

ing foraging, denning, and nesting sites for a variety of bird and mammals. Using a technique called "high-stumping," cut off the crown of the tree approximately 15 to 20 feet above the ground, leaving the major limbs intact. This technique reduces the risk of the snag falling and damaging structures or injuring people, allows a newly planted replacement tree to receive sunlight, and retains wildlife values.

Areas between plant rows must be kept weed free in the early years of windbreak establishment. Periodic disking or spring-toothing between rows will remove weeds that compete with desirable plants for water, minerals, and space. Within rows, weed suppression is also important during the first five to ten years following establishment (figure 8). Caution should be taken not to disk or harrow more than four inches deep to avoid root damage. This practice may be discontinued or limited in older windbreaks to better simulate natural wildlife habitat by providing some understory vegetation. Mature, developed windbreaks with a thick understory provide the greatest wildlife benefits, both for bird and small mammal species.

Consider establishing brush piles within an older windbreak. Brush piles are easily constructed from a variety of materials and serve as cover and foraging sites for bird and small mammal species. More information on brush pile placement and construction can be found in the Wyoming Game and Fish Department habitat extension bulletin number 11, "Brush Piles and Rows for Wildlife Management."

Croplands more ideally than pasturelands should be located adjacent to windbreaks. In addition to the cover provided, food resources will be more readily available to resident wildlife. Establishing wildlife food plots close to the windbreak will further enhance the area for wildlife. This may involve planting crops specifically for wildlife consumption or simply leaving a few unharvested rows next to the windbreak. If the decision is made to provide food plots specifically for wildlife, position them on the leeward side(s) of the windbreak where they will be most available.

Conclusion

Following these guidelines should lead to a windbreak that is functional, attractive, and provides wildlife benefits. With windbreak maturity, both the number and diversity of wildlife species should increase. Thus, the landowner can look forward to enhanced wildlife viewing opportunities for many years to come, while enjoying other windbreak benefits.

Technical assistance with windbreak design, plant species selection, and other factors is available from several sources. Contact personnel from your local conservation district office, the USDA Soil Conservation Service, the Wyoming State Forestry Division, or the Wyoming Game and Fish Department.

For additional information regarding windbreak establishment, weed barriers, polymers, and drip irrigation systems, refer to these documents.

"Trees for Conservation: Planning, Planting and Care" by the Colorado State Forest Service. This document is available from the Wyoming State Forestry Division, 1100 W. 22nd St., Cheyenne, WY, 82002, or the Wyoming Association of Conservation Districts, 1750 Westland Road, Cheyenne, WY, 82001, or your local conservation district.

"Trees for Conservation: A Buyer's Guide" by the Colorado State Forest Service, is available from the Wyoming State Forestry Division, 1100 W. 22nd St., Cheyenne, WY, 82002, or the Wyoming Association of Conservation Districts, 1750 Westland Road, Cheyenne, WY, 82001, or your local conservation district.

"Windbreaks for Farm and Ranch Homes" by Jim Cook, is distributed by the Agricultural Extension Service at the University of Wyoming.

"Windbreaks for Wyoming" by Dale Shaw. Limited numbers of this document are available from the Wyoming State Forestry Division, 1100 W. 22nd Street, Cheyenne, WY, 82002.

Written by Evin Oneale of the Wyoming Cooperative Fish and Wildlife Research Unit and Dan Perko of the Wyoming State Forestry Division through the Wyoming Cooperative Fish and Wildlife Research Unit.

This publication is one in a series of habitat extension bulletins produced by the Wyoming Game and Fish Department. Call 1-800-842-1934 for additional information or assistance.