# Snow Way

BY MATT NELSON

Late winter or early spring snow removal from putting greens is a common practice in the Rocky Mountains of the U.S.

Winter injury to putting greens can affect playing conditions at high elevation or northern golf courses for an entire season. Experienced golf course superintendents and course officials usually will try to implement every reasonable precaution possible to limit the potential for winter damage, but specific weather conditions may, and often do, thwart the best preventative programming. While there are no guaranteed methods to prevent winterkill on golf course turf, late winter/early spring snow removal has become widely practiced at moutainous and northern golf courses to help prevent damage associated with snow and ice cover. Sans the slide guitar of Joe Walsh, this article will address snow removal practices the *Rocky Mountain Way.*

Winterkill of putting green turfgrass usually occurs as a result of desiccation, disease, or freeze injury. Of these, freeze injury is typically the most difficult to prevent. Freeze injury may occur from exposure to lethal temperatures without snow cover or other insulation when ice crystals form within and around cells of meristematic tissue. During freeze/thaw events, water may be drawn out of plant cells as ice crystals form around them, causing dehydration and membrane collapse. Mitigating damage from the latter form of freeze injury usually is accomplished by limiting surface moisture in late winter or early spring by removing snow and ice.

## DON'T REMAIN IN THE DARK!

There are three factors commonly associated with freeze injury: shade, poor surface drainage, and significant populations of *Poa annua* (annual bluegrass). Removing trees, adjusting grade or design, and establishing creeping bentgrass are successful methods of reducing the potential for winter injury associated with freeze/thaw events. ***Never*** plant spruce or other evergreen trees within 125 feet to the southeast, south, or southwest of greens. This is a recipe for eventual disaster at northern locations where extensive shade will be cast when the sun angle is low during winter months. If evergreen conifers already exist in the aforementioned proximity of putting greens, cut them down.

Shade in the late summer and fall limit a turfgrass plant's ability to achieve maximum winter hardiness by compromising photosynthesis necessary for energy fixation and carbohydrate storage. Stored energy enables a plant to tolerate cold temperature exposure and maintain hardiness for a longer period of time, which is critical to survival during freeze/thaw events of late winter or early spring. Shade during the winter prolongs snow and ice cover and may cause more freezing events. Shade during spring delays soil warming necessary for growth and recovery. Shade will exacerbate winterkill problems on greens with a northerly slope aspect. Snow removal alone will not consistently prevent winter injury to shade-affected greens; thus, allowing for sunlight penetration is an important component of winter turf survival.

## PULLING THE TRIGGER

Removing snow and ice from putting surfaces involves experience with the site and local climate conditions, judgment, and some confidence in the weather forecast. At most sites across the Rocky Mountain region of the U.S. (and high-elevation sites in the Sierra and Cascade mountains), this will occur in early to mid/late March. Snow provides insulation that buffers turf from temperature extremes; thus, removal too early may expose the turf to lethal cold temperatures or unseasonably warm temperatures that cause a rapid loss of winter hardiness and potential damage if temperatures drop again significantly. Ice layers that form early in the winter pose a unique challenge, since relatively little is known about the factors contributing to turf failure under ice, including the condition of the turf when ice formed, ice composition, and how long

Shovels may be necessary to get the final few inches of snow off of a green.

the turf can safely tolerate ice cover. Creeping bentgrass will tolerate ice much better than annual bluegrass. Some superintendents have removed an ice layer in midwinter and blown snow back onto the greens to provide insulation.

On the other hand, waiting too long to remove snow can result in increased disease activity and expose turf that has already broken dormancy. Regular monitoring of turf through the winter is a good idea as a method to gauge its condition and also help determine when to remove snow. Dormant turf will be more tolerant of cold night temperatures once snow is removed.

Most turf managers implement late winter snow removal when the weather forecast calls for melting temperatures and sun. Although severe weather may still occur, the likelihood of extreme cold is at least lower as spring begins. Favorable weather allows turf to gradually break dormancy as the days begin to warm. The benefits of removing snow from putting green turf include the following:

- Reduced turf exposure to melting snow and ice and less chance of freeze injury.
- Enhanced disease control at sites with extended snow cover. Disease prevention products may begin to lose efficacy after many months, and additional applications are usually made following snow removal.
- The turf can begin growth and/or recovery if favorable weather conditions occur. This can be valuable if winter injury exists, often a result of rapid and/or severe freezing in fall without ample hardening time.
- Some golf course superintendents will conduct core cultivation at this time of year to minimize disruption to golfers. This typically requires plenty of available labor, a means to transport cultivation equipment to greens, permeable covers to accelerate warming and recovery, and decent weather.

## TECHNIQUES

A myriad of snow removal tools and practices can get the job done effectively. At most mountain golf courses, large, tractor-mounted snow blowers are used to clear deep snow packs to within a foot or less of the putting surface. These same machines also are used during the winter to clear paths to the greens for monitoring and access when snow removal is initiated. Smaller, walk-behind snow blowers can then be used to more safely remove snow closer to the turf. Shovels will take care of the rest if rapid melting is not likely. Keep these tips in mind for optimal results:

- Set poles or other marking devices in the fall to delineate putting green perimeters and abrupt contours, bunkers, streams, etc. Marking will help avoid mechanical injury when blowing or plowing snow, and it will indicate that removed snow is far enough from the green to not obstruct


Tractor-mounted snow blowers, walk-behind snow blowers, and green covers are tools commonly used to remove snow from greens and safeguard turf health in the Rocky Mountains.

surface drainage. Clear snow far enough from the greens to prevent snow on banks from melting back onto the greens or cause a shade problem if the banks are high enough. Avoid burying sprinkler heads or quick-couple valves.

- Have at least one person probe the snow pack out in front of the blower or plow to help the equipment operator gauge depth settings.
- Start snow removal early in the morning or on cloudy days when the snow is cold and firm. The snow will be lighter and can be blown away more easily from the green. Working while the turf is frozen also will reduce the potential for mechanical injury. Use warm afternoons to remove snow from tees and cart paths.
- Finish removing as much snow as possible from one green before going on to the next. Use small, walk-behind snow blowers after using larger equipment. Use shovels to remove remaining snow to the extent possible. Snow that is not removed will set up and become very firm and more difficult to remove than with the first attempt. At the least, cut paths for surface drainage off of the green.
- Darkening agents, including colored sand, compost, humates, or fertilizers, can expedite melting of the final inches of snow and ice. The more inert the product, the better.
- Realize that snow may need to be removed several times in the spring.
- Monitor the greens closely after they are cleared. Any standing water on the greens in the afternoon may freeze and could damage the turf. Use shovels or roller squeegees to eliminate puddles.
- Keep an eye on soil moisture between snow removal and activation of the irrigation system. Covering may be helpful, and snow can be added to high spots or crowns to prevent desiccation. Charge the irrigation system as early as possible and hand water if necessary.
- Sleds may be useful to haul mowers, spreaders, aerators, etc. out to greens cleared of snow while a significant snow pack remains across the rest of the course.
- Don't be afraid to damage the turf. A few nicks and dings will be easier to repair than widespread turf loss from disease or freeze injury.

## NO GUARANTEES!

Although snow removal from putting greens is a common practice at golf courses throughout the Rocky Mountains with significant snow pack, clearing the greens does not guarantee that winter injury has not or will not happen. This program, however, does appear to increase the chances of turf survival and accelerate growth and recovery in most years. Improved winter management techniques, including snow removal, covering, disease control, winter watering, sunlight assessment, turfgrass renovation, and drainage, have helped reduce springtime crying that the greens are bad, and modern winter management in the Rocky Mountains is better than it used to be.

## ADDITIONAL REFERENCES

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