incubator for snow mold as it keeps the temperature of the soil/surface interface at about 40° F. At this temperature, the fungi can readily infect and colonize the semidormant foliage of creeping bentgrass and annual bluegrass, a.k.a. *Poa annua*. In their semidormant state, these turf species have no active defenses to ward off snow molds nor can they recover from infection via new growth.

While snow molds are most often associated with snow cover because its provides the perfect microenvironment for their growth and development, it is not an actual requirement for them to wreak havoc on golf courses. With this in mind, the proliferation (especially of pink snow mold) will likely continue well into early spring or as long as the temperature hovers between 32° F and 45° F and there is ample free moisture. This simply means that, for the many courses that did not treat on a preventive basis last fall because they lack a consistent history with snow molds, considerable expense will be required this spring for curative treatments.

In addition to revealing snow mold activity, the spring-like fluctuations in temperature during late February will, if followed by freezing temperatures in either March or early April (a highly probable event according to the long-range forecast), cause many courses to suffer from crown hydration. This form of winterkill is by far the most destructive because little can be done in terms of prevention. For example, ice cover that produces a toxic build-up of respiratory gases (CO_2) can be broken up and removed during early spring to minimize turf losses. Equally, areas of the course that are exposed to drying winter winds can be covered or irrigated periodically with a water wagon to prevent desiccation. Unfortunately, when it comes to crown hydration damage, sometimes wishful thinking is the first and only line of defense.

The name crown hydration is somewhat of a misnomer for a phenomenon whose lethal outcome is actually due more to dehydration. In the process of freezing, ice crystals form outside the hydrated cells of crown tissue and as they expand, the growing crystals extract moisture from within the cell. The resulting loss of moisture causes dehydration and a contraction of the cell. Upon thawing, the crown cells will die off if they cannot reabsorb enough water to regain full turgor.

The mechanics behind crown hydration have yet to be completely unraveled; however, it is a problem most often associated with turf growing in wet soil conditions. The damage occurs when crown tissue (no longer dormant because of spring-like weather conditions in late winter) fails to survive repeated freeze/thaw cycles during early spring. In Chicago, the critical time frame for crown hydration development is late March as the turf begins to lose its winter hardiness and semifrozen soils, along with fluctuating temperatures, allow standing water to persist and refreeze.

The genesis of this year's severe snow mold outbreak can be traced back to December . . .

Early identification of turf that has been damaged by crown hydration requires removing a plug from suspect areas and placing it in a warm, sunny location.

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The reason for this action is that cool-season turf retains a certain amount of green color during winter dormancy and it is not until the crown tissue has been sufficiently warmed in the spring that chlorophyll in damaged cells degrades and turns brown. Because of this fact, many courses will not know the full extent of crown hydration damage until the turf begins to truly green up in late March or early April.

Even newer, sand greens can suffer from the ravages of crown hydration when the importance of full sunlight exposure and good surface drainage are ignored during construction. In this case, shady growing conditions prevented the turf from hardening-off in the fall and the underlying drainpipe froze during the winter, thus trapping standing water on the surface.

Courses that are especially vulnerable to crown hydration have a few characteristics in common. First, they have bowl-shaped greens constructed with poorly draining soil that holds surface water during the winter months. This is not to say that newer, sand greens are immune to crown hydration, as underlying drainpipe can easily freeze during the winter and prevent water from escaping.

Second, vulnerable courses have a substantial population of *Poa annua* as opposed to creeping bentgrass (no doubt due to shade and poor drainage, both of which discourage creeping bentgrass). In a controlled study by Dr. J. M. Roberts at the University of New Hampshire, complete kill of *Poa annua* was achieved with three alternating freeze/thaw cycles in which the soil temperature was dropped to 20° F. These same environmental conditions produced only a 5 to 30% injury of creeping bentgrass. The difference in mortality between the two species has yet to be determined; however, the differing characteristics of the plasma membrane surrounding the crown tissue cells is thought to play a central role during freeze/thaw cycles.

Unfortunately, when it comes to crown hydration damage, sometimes wishful thinking is the first and only line of defense.

When greens are damaged by winterkill, be it crown hydration, prolonged ice cover or desiccation, promoting recovery is a must for everyone involved. Both superintendents and golfers have an obvious interest in the course and therefore need to work cooperatively to ensure the swiftest possible healing. One of the best places to start is by establishing an open line of communication between all parties so that everyone is kept up-to-date on the ongoing progress.

Once the news of the situation has been properly disseminated, incorporating the following 10 steps into the recovery plan should yield optimal results:

1. Avoid sodding damaged areas, if at all possible. Note: While many often believe that sod for a putting green is heaven-sent, it can require months of light topdressing applications before the surface trueness is restored. Further, if the sod is not harvested from an onsite nursery with identical physical characteristics to the damaged green, a semipermanent scar will be created for all to see during the next couple of years.

2. Close the most heavily damaged greens **immediately**. Note: The benefit of this action may seem inconsequential at first, but come late spring there will be little doubt that closed greens recover much faster than those that remain open to play.

3. Start seeding damaged areas as early as possible. Note: While some may argue that the soil and air are too cold to promote fast germination, the fact remains that the sooner a damaged area is seeded, the sooner it recovers.

Courses that are especially vulnerable to crown hydration have a few characteristics in common.

4. Use either an aerator or mechanical seeder to establish good seed-to-soil contact. Note: The choice between these two pieces of equipment has much to do with personal preference, although aerators tend to work better on greens that remain open because the deeper depression made in the putting surface provides security for the emerging seedlings.

5. Avoid the temptation to seed at a rate greater than 2 lb./1,000 ft^2. Note: Using excessive seeding rates to quickly regenerate damaged areas often creates overcrowding of seedlings in aeration holes or seeder furrows that in the long run actually delays full recovery.

6. Warm the soil with covers to encourage seed germination. Note: Some superintendents have produced excellent results with a sheet of clear plastic perforated with an aerator for ventilation. As the temperature can rise quickly under a plastic sheet, it is important to remove it during warmer midday temperatures.

7. Prevent decaying foliage from forming an impervious crust over the soil. Note: Many superintendents have had good success breaking up crust formations by spiking damaged areas at least once each week.

8. Mow with a sharp walk-behind mower equipped with either a solid or sectional roller. Note: While triplex mowers are arguably more efficient, the added wheel traffic and inability to easily maneuver around damaged areas are a great disadvantage when recovering from winterkill.

9. Apply light applications of a liquid fertilizer every seven to ten days until recovery is complete.

10. Syringe, syringe, syringe . . .

By U.S. Open weekend (or, for you nongolfing types, Father's Day weekend), the spring-like effect of late February will hopefully be a forgotten experience. Areas of the course damaged by either snow mold or crown hydration should be almost fully recovered. Of course, the debate over the spring-like effect of the new generation of metal drivers will probably still be raging on. Maybe someone should write about a 10-step recovery for golfers addicted to distance.

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When greens are damaged during the winter months, it is important to establish an open line of communication with golfers to keep everyone up-to-date on the recovery process.

Rich Daly *Chicago Turf & Irrigation*

Here's Johnny!

Sure, *The Shining* was terrifying. But algae strikes fear into our hearts, too.

Last spring's rains caused many different feelings, from concern over prolonged lush growth of grass into the heat of summer to possible flooding to confusion about what was happening to the bodies of water we had to contend with on a daily basis. Those of us charged with maintaining "water quality" in the lakes and ponds probably felt like Jack Nicholson's character in The Shining *was reincarnated as an algae bloom on a weekly basis. The frequent rains regularly loaded nutrients into the water and fed our unsightly friend a steady diet. This was more of a problem for some than for others.*

The most frequent cause of problems in a pond, lake, water hazard, etc., is the design and construction of the body of water itself, which sometimes doesn't provide for the natural cycles of the seasons and their effects on the ecology of the aquatic environment.

Various options are available to deal with the conditions we experienced, including chemical treatments and aeration. I don't intend to go into either of those directly here. My intention is rather to share some observations and help achieve a better understanding of what happens to cause the problems.

The most frequent cause of problems in a pond, lake, water hazard, etc., is the design and construction of the body of water itself, which sometimes doesn't provide for the natural cycles of the seasons and their effects on the ecology of the aquatic environment. For example, a pond (a small lake with a depth of 7-8 feet or less) doesn't go through the normal temperature cycles that occur in all deeper bodies of water in temperate climates. There is no temperature layering, but rather a gradient of temperatures from top to bottom. There is no formation of a thermocline, dividing the lake into upper and lower levels. As a result, the warm upper layer extends all the way to the bottom, allowing the algae to develop throughout the profile.

Fish and other aquatic animal life require oxygen in varying amounts. Most fish require 4.0 milligrams per liter for survival, and more than that for adequate growth and activity. The factors of temperature, pH, concentrations of carbon dioxide and oxygen and the decomposition of organic matter work against one another. The cycle of the photosynthesis process, wherein plants take in carbon dioxide and give off oxygen in the presence of sunlight, is also an important issue.

During the warmer summer days, the water at the surface increases in temperature, expands slightly and becomes less dense. Because of its exposure to sunlight and the surface-available oxygen and carbon dioxide, this "lighter" water will support the greatest level of photosynthesis and growth of microscopic plants—namely algae. These organisms have short life spans, so many generations of them end up on the bottom of the pond by season's end. In the shallower ponds, the resulting decomposition of organic matter increases the carbon dioxide and reduces the pH, creating an environment in which fish cannot take up oxygen as rapidly. There is less oxygen because the warm water doesn't dissolve as much as colder water and because the aerobic bacteria use it much more rapidly to decompose the organic matter.

In deeper, colder water, however, bacteria consume oxygen less rapidly. Even though oxygen is more soluble in colder water, and colder water has a greater capacity to hold oxygen, there is less oxygen in the lower level of the lake because it doesn't pass through the thermocline from the upper layer. This causes the fish to stay in the upper layer of the profile. The oxygen supply in this layer can be quickly depleted. The dead organisms that fall to the bottom from the upper level increase the demand for oxygen and increase the production of carbon dioxide. In addition, when the photosynthesis process of the various aquatic plants stops each evening, carbon dioxide uptake and oxygen production stop. Oxygen uptake and carbon dioxide production continue slowly until morning, sometimes reaching disastrously low levels of oxygen for fish by the time there is sufficient sunshine to reverse the process.

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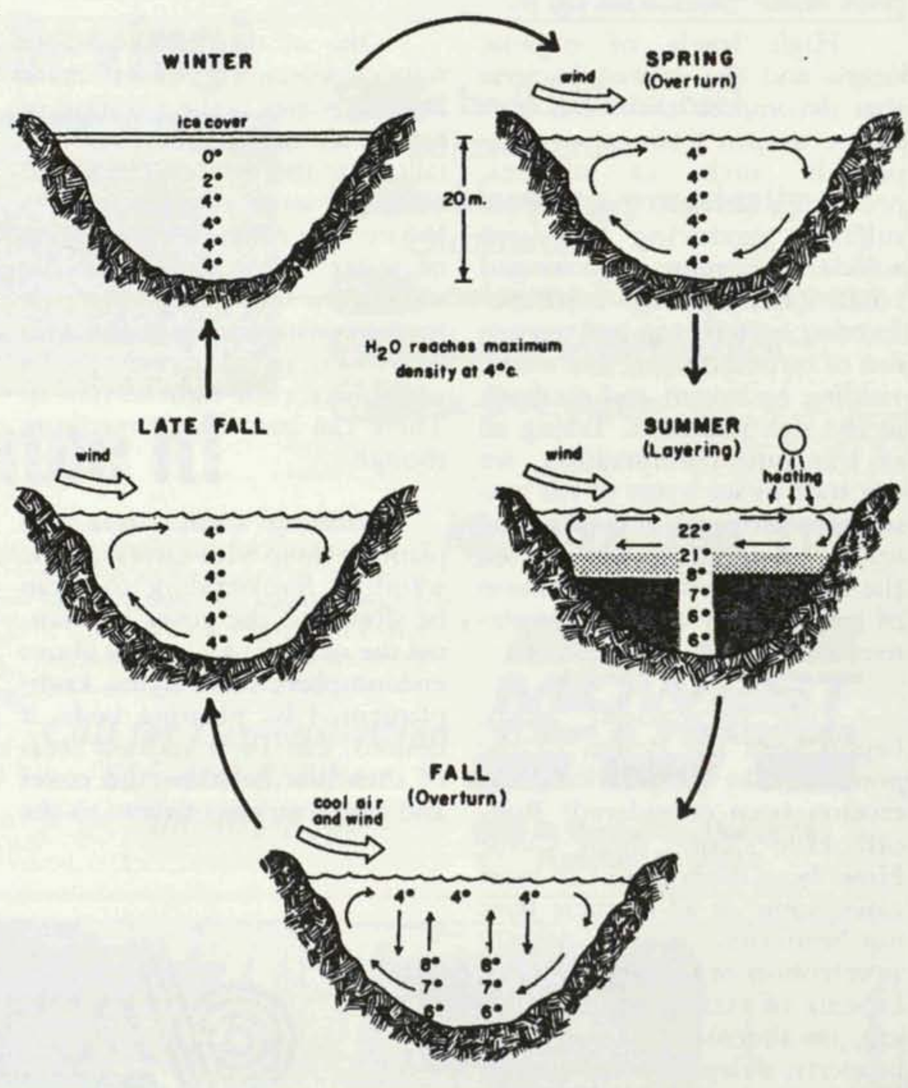

TEMPERATURE CYCLES IN A LAKE

Typical events of warming, cooling and stratification in a temperate lake.

High levels of organic debris and the related bacteria that decompose them can start to use oxygen from other compounds such as nitrates, producing nitrogen gas, or from sulfates, producing hydrogen sulfide. In extreme or prolonged conditions, special methane-forming bacteria can pull oxygen out of carbon dioxide and water, yielding hydrogen and methane in the rich sediment. Taking all of this into consideration, we can start to see some of the reasons for mixing and cooling the water. In addition, we can see the relative need for prevention of pollution by a variety of elements.

This prevention, again, begins with the design of the pond or lake in question. Has erosion been considered? Run-off? How 'bout them Cubs? How 'bout them geese? In most cases, some or all of these have not been given as much priority as retention or holding capacity, expense of excavation and hauling, or alternative uses for the property, all legitimate concerns. However, considering a little remodeling or rework can have some long- and short-term benefits.

Shoreline erosion prevention can be addressed in many different ways with as many different costs. Formal and informal settings have different requirements. Important to remember, though, is that the shoreline treatment does not have to be continuous and uniform. Stone or block walls are ideal in areas of high water movement. Segments of seawall can be used as well. A less expensive alternative is rip-rap. None of these are effective deterrents to run-off, however.

One of the most efficient ways of preventing run-off into a body of water is the planting of cattails along the shoreline. Cattails slow the flow of solids and consume some of the nutrients before they reach the main body of water. They also block the view of the water, in many cases, to the consternation of the residents who, in many cases, paid a premium for the right to view it. There can be a happy medium, though.

Forming small coves and planting them with cattails is one solution. Surrounding turf can be sloped to the coves to channel the run-off. Any of the above erosion-prevention styles, complemented by planting beds, if desired, can then address areas of shoreline between the coves and give a variety of views to the water. In addition, any of the plantings that could theoretically harbor predators can be a passive deterrent to our beloved geese. Anything of this nature is a bonus. Periodic cleaning of the coves can prevent a majority of the unwanted pollutants from reaching the main body of water.

Any effort to minimize man's effect on the life span of a body of water should be considered. That life span, from lake to pond to swamp to bog, etc., gets shorter everyday. Despite the title of this column, there are no experts, just a lot of people who keep trying.

Bob McCallum, CGCS *Orchard Hills G.C.*

Dan Albaugh -N- Ruffled Feathers Golf Club

Dan and Chesapeake Bay retriever Bubba.

Dan Albaugh, who has been golf course superintendent at Ruffled Feathers in Lemont since 1994, will host his second monthly meeting there on April 23. Dan last played host in September 1997, when Ruffled Feathers was the venue for the MAGCS championship event.

Dan was literally born and raised between the ninth and 18th holes at Westmoreland Country Club where his father, Julius Albaugh, has been golf course superintendent for 38 years. When he began laboring on the golf course at the tender age of five, Dan knew that he would one day become a golf course superintendent. During his tenure as assistant golf course superintendent to "the late great" Bruce Sering at Glen View Club from 1987 until 1994, Dan worked towards his bachelor's degree, majoring in both geography and plant soil and minoring in environmental science. Dan achieved the title of "master gardener" upon completion of a 12-week cooperative education program with the University of Illinois in 1993. Dan achieved CGCS status with the GCSAA in January 1999. Now 37 years old, Dan is single.

Ruffled Feathers Golf Club opened in 1992 and was nominated as "Best New Private Golf Club" in the country. However, with only 12 of the $50,000 memberships ever purchased, the private club went public in 1994. Since 1995, American Golf Corporation has owned and operated this championship golf course, which is currently ranked 23rd among the state's top 25 by *Golf Digest*. Moreover, Ruffled Feathers is the only Chicago-area golf course designed by architects Pete and P.B. Dye. Creating this fabulous layout, which features water coming into play on 17 of its 18 holes, required moving 1 million cubic yards of earth. The 175-acre course also boasts 30 acres of wetlands and is surrounded by a 350-acre residential community. Designed to accommodate tournament play, the course features undulating greens, severely contoured fairways and 117 sand traps.

The biggest challenges Dan faces in trying to maintain the course are the high expectations of himself, the management company and the golfers. Ruffled Feathers was designed to accommodate only 10,000 rounds per year, but is currently receiving 32-35,000 rounds per year. Dan explains that the tees are too small to handle all of this traffic. In 1998, Pete and P.B. Dye were the architects when Dan and crew enlarged the tees on nos. 2, 10 and 16 and the green of no. 15.

Dan is proud to be certifying the course with the Audubon Cooperative Sanctuary system. He completes the last requirement for certification

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John Gurke, CGCS *Aurora C.C.*

The Roaring Twenties

The Birth of the Mid-West Greenkeeper's Association

Editor's Note: One article couldn't possibly do justice to 75 years of history. So, in honor of the Midwest's 75th anniversary, On Course *presents a special decade-by-decade retrospective. This first installment examines the Association's founding and the personalities and events that colored its early years. Coming in May: the 1930s.*

Two of America's doughboys prepare to return home from the war in Europe. On the right is the author's grandfather, Alfred Gurke.

The first 60 greenkeepers—a group that included one woman—gather at the Sylvania Country Club in Toledo, Ohio to found what today is the GCSAA.

An Association is Born

The 1920s were a time of great change worldwide. At the decade's onset, America was enjoying the spoils of victory, as the Great War was over and the victorious troops were coming home to enjoy the post-war boom. By the end of the decade, vast fortunes would be lost as the Stock Market crash of October 1929 sent America reeling into a Great Depression felt throughout the country and the world for the next 10 years. Between these two extremes of plenty and impoverishment, an event that has had an impact on every reader this publication serves—the founding of the Mid-West Greenkeeper's Association—took place on December 24, 1926. This historic date 75 years ago marked the birth of what we know today as the Midwest Association of Golf Course Superintendents.

The story actually begins several months earlier, when, on September 13, 1926, a group of 60 greenkeepers convened at the Sylvania Country Club in Toledo, Ohio and formed the National Association of Greenkeepers of America (NAGA). At that first meeting of the NAGA, officers and directors were chosen to direct the affairs of the fledgling organization. Among these were Colonel John Morley, the association's founding father and first president, and John MacGregor, the greenkeeper of the Chicago Golf Club in Wheaton, Illinois. When Col. Morley asked John MacGregor to convene superintendents in his area for a meeting with the purpose of organizing the district, John and his family spent two weeks getting notices out (with the help of the Frazer Golf Yearbook) to the 500 clubs in the states of Illinois, Iowa, Wisconsin and Indiana. Those 500 invitations attracted 16 interested men to the first meeting, held at the Great Northern Hotel at Jackson and Dearborn Streets in November 1926. Those 16 chose the organization's first officers and decided upon a name. President John MacGregor, vice-president Alex Binnie (Shoreacres), secretary Ed B. Dearie (Ridgemoor C.C. and Oak Park C.C. superintendent who later went on to a successful career in golf course architecture) and treasurer