ASK THE "EXPERT"

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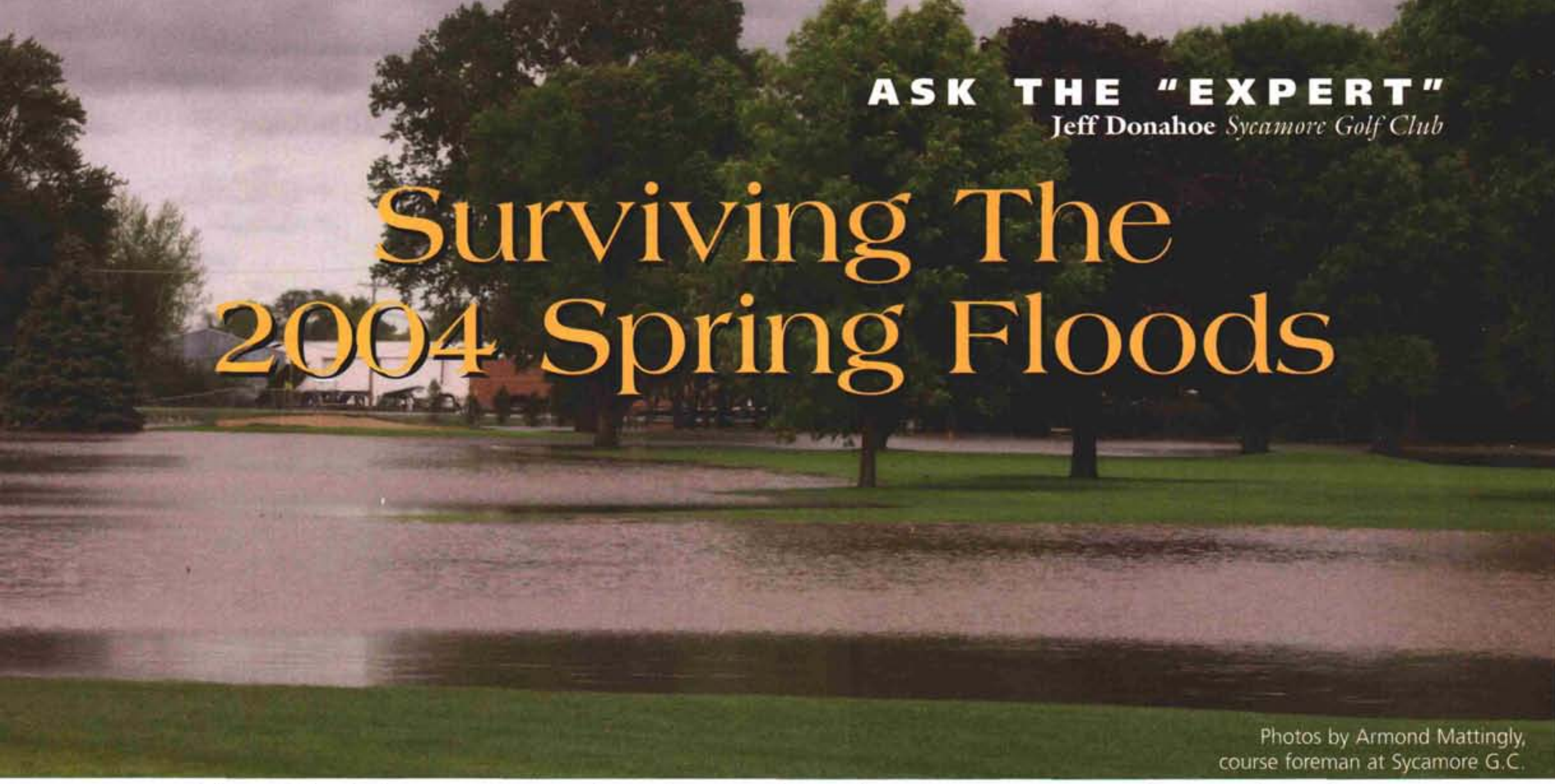
Surviving The 2004 Spring Floods



Photos by Armond Mattingly, course foreman at Sycamore G.C.

View of flooded no. 11 fairway and no. 12 approach. No, these are not supposed to be water hazards.

Late spring is a busy enough time for golf course superintendents. Every aspect of golf course management is taking place around the middle-to-end of May. Presummer projects, fertilizing, aerating, landscaping, irrigation work, spraying and just keeping up with all the fast-growing turf throughout the course all combine to make late spring the busiest time of year for many of us. Mother Nature decided to add to the workload at Sycamore Golf Club this year by flooding the golf course two times in a two-week period. In my 14 years of working at golf courses, I have never had an experience like the flood-recovery process the crew and I went through this summer.

Par-3 10th hole from the tee box. The Kishwaukee River, which is just beyond the tee, is now part of the golf course.

For those who do not know, Sycamore is located on Route 64 about 20 miles west of St. Charles. The town is basically connected to the northeast corner of DeKalb. This area started the year wet when six inches of rain fell in March on top of several inches of melting snow. Saturated soils were present throughout the course when the golf season started. Luckily, the first three weeks of April were very dry, allowing the turf to firm up and soak in all the March moisture. This would be the last dry stretch of weather for our area for some time, as two-and-a-half inches of rain fell during the last 10 days of April. Now, the again-moist soil conditions had us set up for the disaster that was soon to follow.

Here is a little more background on the geography of the Sycamore and DeKalb areas. The lovely Kishwaukee River flows through this area. The main branch flows through DeKalb and the east branch through Sycamore, where it separates our back nine from the front nine holes. The branches meet north of town and flow to Rockford, where the river water spills into the Rock River and eventually into the Mississippi. The Kishwaukee is one of the only rivers in this hemisphere that flows north. The branch that flows through the golf course is 20 to 25 feet wide and maintains a normal depth of about three feet, depending on how much rain the area has received. The river has flooded in the past,

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the worst case being back in July of 1996, the year before I started working at Sycamore. I have experienced a few minor floods during the past eight years as the river will rise rapidly during very heavy rain periods. The result of these floods was just some cornfield residue and not a loss of turf.

Our fun this year started the second week of May when the course received 2.5 inches of rain in four days. No problem here since the top two inches of soil had dried out a lot during the April drought, but now the soil was almost fully saturated. Now the rains were falling almost every day. All of this sudden precipitation pushed the river over its banks, accounting for flood number one. On May 23, at which point the tally amounted to six inches in 12 days, the river went over its banks, affecting six holes—five of which are on the back nine of the course east of the river. We closed the entire course for three days and the back nine stayed closed another four days. As with other floods we have experienced, the river receded quickly and the water drained out with the lowering of the river level. We spent a lot of time pumping out low turf areas and bunkers to keep the turf from being submerged any longer than it needed to be. The flood left behind a lot of cornfield debris but not any mud, so the turf was just dirty and not matted down. This was key, as we did not lose any turf from the flood. We were able to mow some turf five days after the flood with smaller mowers. We were happy that the back nine was open so quickly after being underwater for three days. Our happiness was short-lived, though, as the back nine had been open for just one day when the other shoe dropped.

On May 30, another 3.2 inches of rain fell in three hours. The river, which had receded several feet, quickly overran its banks once again. The water covered the same five holes of the back nine as before. One problem with this second flood was that the water took five days to recede. The second and most destructive problem with the second flood was the quarter- to half-inch of solid mud the floodwaters left on the turf. The mud was a problem we had not encountered after the first floodwaters departed the golf course. We removed the mud layer with hoses as soon as possible, but the turf was already dead. We also tried using squeegees on some areas and also not doing anything in other turf areas just to see if any of the turf would survive. Not any of these affected areas did survive. The combination of being submerged for eight out of 14 days and being coated with mud was too much for the grass to survive. In total, we lost about 10 acres of turf. Two or three of these acres were Penneagle bentgrass fairways; the remaining portion was rough areas. We also lost about a quarter of our 11th green.

Water recedes from the 18th green, leaving muddy turf and cornstalk debris behind.

Looking at several acres of soggy, rotting, smelly and muddy dead turf at the beginning of June can make any superintendent question his or her career choice. The analogy of feeling like you just got punched in the stomach was very fitting at that point. Here it was the beginning of June, the start of the busiest and most important time of year as far as revenue for a public course is concerned, and our back nine was going to be severely limited indefinitely. While feeling down about our situation, I also couldn't help feeling a bit excited about the challenge we now faced. This was not going to be our usual maintenance summer at the golf course. Our goal was to produce a decent turf stand by the end of July, when our club championship was scheduled as well as the start of a string of several important outings. Now it was time to get to work on flood recovery.

We opened the back nine again on June 10, to walking traffic only. Not many people wanted to play, though, because of the many roped-off areas and the stench that still filled the air throughout the back nine. This affected revenue as word spread of the damaged turf conditions. Bottom line: we were losing money at the golf course. Now our maintenance goal was to recover the back nine as quickly as possible at the lowest cost possible. We considered many options for the recovery process. Sodding, slit-seeding, germination blanket, hydro mulch and big-roll sod all came under discussion as methods to aid in flood recovery. We maintain our own 2,000-square-foot Penneagle bent nursery at a half-inch mowing height. We stripped this area and placed it on the 11th green and approach area until we ran out of sod. The decision was then made to slit-seed all the remaining areas of dead turf, both on the fairways and in the rough. Slit-seeding would be the least expensive option for recovery. We knew if certain areas had trouble germinating, blanket could always be put down later.

We used three different slit-seeders to do the seeding. A Ryan Mataway walk-seeder was used on all bentgrass areas and on some sloped rough areas. We put down a pound to a pound-and-a-half per thousand square feet of Penneagle seed at two different angles in the fairways. No dead turf material was removed; the slit wheel on the seeder cut through

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The recovery process begins: slit-seeding and fertilizing dead turf areas on the 18th fairway.

the dead material and surface mud, so the seed was actually secured by this dead turf. The seeding worked best when the surface was moist, so the fairways were seeded first as soon as the conditions were dry enough for the Mataway to operate. After the fairways were seeded, we spread a moderate coating of sand topdressing over the repaired areas to help protect the seed from washout and to aid in germination.

The rough was seeded with both a walking Lesco turf renovator and a Jacobsen tractor-mounted box slit-seeder used in open, flat areas of rough. We used 15 bags of 60/40 blue-rye seed and five bags of Penneagle seed in the recovery process. All the seeded areas received starter fertilizer, and the bent areas also received granular pythium control to prevent damping-off. We reapplied these materials at two-week intervals. The seeding process, including clean-up, took three full weeks for all areas. The main play areas were seeded first and out-of-the-way rough areas done last. We accomplished all of this recovery while the remaining 90% of the course was being maintained as normal. The crew, led by assistant superintendent Steve Tritt and foreman Armond Mattingly, put in a lot of overtime and hard work in seeing this recovery process through.

Now the seeding was done, and within a few days some germination was visible on the fairways. Several hard rains provided moisture, but also washed some seed from its planting location. Five or six thousand square feet of bent seed had to be replanted, but never needed germination blankets. Constant use of the irrigation system and roller-base irrigation stands kept the seeded areas moist once the rains stopped. We were also fortunate that this summer was so cool, as heat stress and disease were never factors in the grass growing to maturity. The course stayed open during the entire seeding process, and as stated, not a lot of people wanted to play on the damaged back nine anyway, which allowed us to perform the seeding operation without too many disruptions. We roped off all seeded areas on the back nine with a lift-and-drop rule in place for all the under-repair locations.

Carts were allowed back by the third week of June, when we had somewhat of a complete 18-hole golf course in operation again. We first mowed the new fairway areas by the end of June. The seed had perfect growing conditions most of the summer; by the middle of July, a lot of the ropes had been removed and the main play areas were being fully utilized. The rough areas took longer to fill in as our irrigation does not reach most of these spots and the rain became sparse during July and August. We also found out that receding floodwater likes to leave behind a good dose of yellow nut sedge, as quite of bit of this coarse weed came up with the blue-rye seed in certain lower areas of the rough.

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We will be eliminating the nut sedge through this fall. Almost all the ropes were removed by the end of July, allowing us to meet our goal for recovery. As I write this in mid-August, we still have some thin areas in remote rough portions of the course. We will continue to add seed to these spots this fall.

The reaction from our golfing customers has been very positive. Several of our pass-holders were skeptical about having a complete course this year, but they are now very happy with the results. Looking at the flood areas now compared to just eight weeks ago is like night and day. All the prearranged outings went off as scheduled and revenue has increased steadily throughout the summer. We were able to keep recovery costs to a minimum, and the weather this season greatly aided the reseeding effort. A large-scale drainage project done in this flooded area in 2001 allowed for the water to exit the course once the river finally went down, thus eliminating the need to pump all the trapped water into the river as had been done in the past. We know the river will flood again at some point in the future since we are located in a natural state-designated flood plain, but hopefully not as severely as we just experienced.

Recovering from a large-scale loss of turf has to be one of the last projects any superintendent wants to face. Pressure to recover the course to playable conditions as quickly as possible can cause many sleepless nights. Keeping a positive frame of mind and looking at the work as a challenge for yourself and the crew is one way to get through the process of flood recovery. Communication with golfers, the golf pro and board members is important to keep everyone on the same page with the recovery effort. While we are far from experts at flood recovery, the crew and I feel tremendously proud of the efforts put forth to make the course complete again. If we could just keep Mother Nature from making us practice the flood-recovery process, we wouldn't have to worry about becoming experts, and that would be just fine with us.

Sodding no. 11 approach with Penneagle bentgrass from the homegrown nursery.

Back to normal: no. 11 approach two months later!

View of the newly seeded 18th fairway two months after the floods.

Making Sense of "Alphabet Soup"

Author's Note: This is the second of a series of articles discussing water quality.

The issue of water quality is not going away. Between the impact it has on your turf and the impending environmental considerations, it's something to which we have to pay growing attention.

A number of acronyms show up on water quality reports and in articles that in general are poorly explained. This alphabet soup of indices has been developed to help but can be tough to understand.

Last month, we talked in broad generalities about the importance of understanding and considering water quality as part of your overall turf management program. I would guess that each of you at some level recognizes that to be true. I also have had enough conversations on the subject with many of you to know that the industry hasn't made it easy for you to make an assessment of your water. A sample is taken, it is sent to a lab for testing, a written analysis along with some recommendations are returned to you, but can you truly make sense of them?

I'd like you to be able to make your own assessment or at least have some solid background information to help you get a feel for how your water stacks up against generally accepted control limits.

There is an alphabet soup of indices that have been developed to help. They can be tough to understand and even harder to calculate if you don't know what goes into them. We are going to get started on breaking down the more meaningful indices and begin to get a feel for what goes into them and review why those parameters are important to turf quality.

A number of acronyms show up on water quality reports and in articles that in general are poorly explained. Each of them has a purpose and has been developed from years of experience and some research.

You may be working with or have seen the following indices:

SARw – Sodium Adsorption Ratio
adj.SARw – Adjusted Sodium Adsorption Ratio
TDS – Total Dissolved Solids
ECw – Electrical Conductivity of Water
SI – Saturation Index
Ca:Mg – Calcium-to-Magnesium Ratio
RSC – Residual Sodium Carbonate
pHc – Calculated pH

So which one of these indices is the best? Which is most important? Who knows! There are so many interrelationships at work in your water, you ought to consider them all!

Before we tackle the formulas, though, we need to take a step back. For you to have a full understanding of this important element of your management program, simplifying key water issues is critical. Let's begin with a demystification of the water analysis.

Taking a look at typical water analysis, each parameter is compared to desired guidelines. These guidelines are generally expressed as:

pH = 6-7	Chloride = <140 ppm
Alkalinity HCO_3 = <120 ppm	TDS = 125-500 ppm
Alkalinity CO_3 = 0	Sulfur = <180 ppm
Calcium = 40-120 ppm	Iron = 2-5 ppm
Magnesium = 6-24 ppm	Potassium = .5-10 ppm
Sodium = <40 ppm	

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You can see that the parameters for some elements are strictly controlled limits while others have huge ranges! How can you have calcium be okay at 120 ppm **and** 40 ppm? Or TDS be in range at four times the lower control limit? This is because of the interrelationships that exist. A simple check against these desired values isn't enough. We need to know how they relate to each other.

As we review the analysis, we often see the results expressed in mixed terms. Some are ppm, some are meq/l and some are mg/l. Furthermore, the indices used to tell you whether or not you have a problem are based on formulas and terms that calculate seemingly "magical" numbers, but what you really need is to understand each number in context of the full water analysis. Only then will you be able to make sense of the recommendations.

The indices' desirable parameters most commonly seen are:

SAR (Sodium Adsorption Ratio)	< 3*
Adjusted SAR	<6*
pHc (Calculated)	>8.4
RSC (Residual Sodium Carbonate)	<0*

*meq/l

Since these critical values are frequently expressed and calculated in meq/l, we ought to know how to convert ppm to meq/l.

(ppm to meq/l)

Divide ppm by equivalent weights.

HCO3	.61
SO4	.48
CO3	.30
Na	.23
CL	35.4
Mg	12.2
Ca	.20

So, if your calcium is reported as 80 ppm, you divide by 20 to get a meq/l of 4. By breaking everything down to meq/l, we begin seeing things in equal terms (relating apples to apples) that help us understand the volume relationships better. This will help when we work through the index calculations that will show you whether or not you have a potential problem.

It is widely accepted that many of the problems caused by poor water quality are traced to higher pH and alkalinity values, when the potential for sodium to become the predominant cation increases. This is due to the calcium and magnesium being "tied up" by the alkalinity and made unavailable to soil-exchange sites; since these "good guys" cannot get to the ion-exchange sites, they are replaced with sodium. This seals the soil and dramatically reduces the ability of the turf to take up nutrients. The balance between cations (positively charged ions) and anions (negatively charged ions) is important and relatively easy to get a handle on.

CATIONS +	ANIONS –
Calcium Ca^{++}	Bicarbonate HCO_3^{--}
Magnesium Mg^{++}	Carbonates CO_3^{-}
Sodium Na^{+}	Chlorides Cl^{-}
Potassium K^{+}	Sulfates SO_4^{--}
	Nitrates NO_3^{-}
	Boron B_3^{--}

The balance is important. For example, if the bicarbonate and carbonate (alkalinity) ions outnumber the calcium and magnesium ions, it's certain that they (Ca & Mg) will be tied up, therefore allowing the sodium to fill the cation-exchange sites at the soil particle. This is bad news. Once again, we can use the meq/l conversion to get all these relationships on equal terms to determine the severity of the potential problem.

They key parameters that are examined most closely by the collective group of control indices are:

- pH
- Alkalinity
  (Carbonates and Bicarbonates)
- Hardness
  (Calcium and Magnesium)
- Total Dissolved Solids (Total Salts)
- Sodium

These are the main parameters on which we need to focus our initial review. Next time, we'll review the impact of these critical components and how they are accounted for in the control indices.