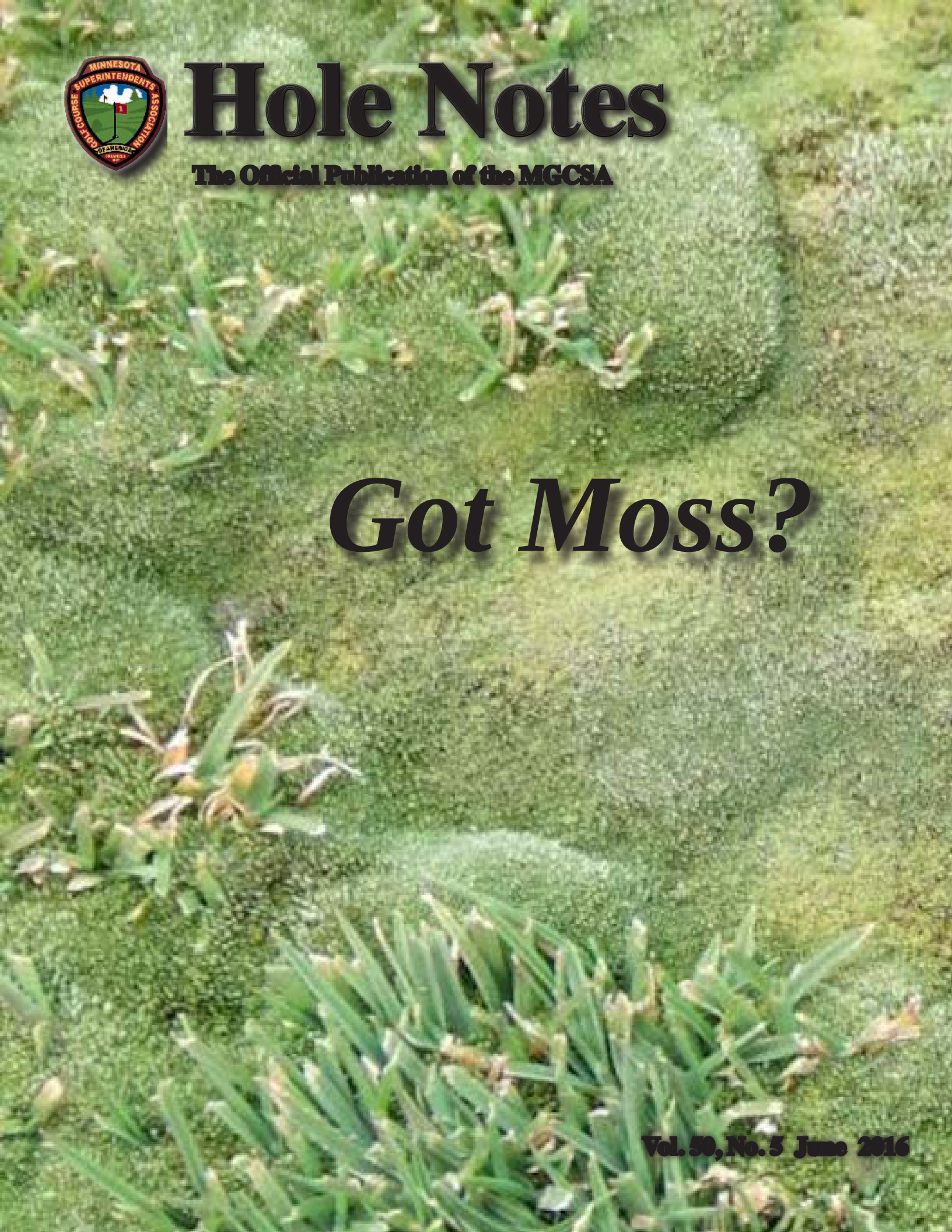

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Vol. 50, No. 5 June 2016

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Presidential Perspective

by Dave Kazmierczak CGCS, Superintendent at Prestwick Golf Club

Rain, rain go away, come again some other day. Like maybe next week late at night and only about a third of an inch? Is that too much to ask?

While this June has rendered irrigation systems stale and useless for the third year in a row we all know Mother Nature's spigot will soon turn off and we golf course types will have to turn to ground and surface water sources to keep our courses alive and viable. These sources have been granted to us in the form of allocations by the DNR, and can and will be revoked at their discretion in the time of drought. This is what the Environmental Stewardship Committee, spearheaded by the MGCSA, has been working very long and hard at overcoming, or at least finding a way to have some water allowed to us in these times to keep greens, tees alive minimally. It has been a long road, but there is finally light at the end of the tunnel, and it seemingly is getting brighter and brighter.

Pokegema Golf Club located in Grand Rapids is a surface water user. They draw from a reservoir next to their property. Last year they received notification that that source would not be available to them in times of drought, and an alternative water source (drilling a well at great expense) would be needed. This plan would obviously be very taxing to the golf course and with really no assurances that the groundwater source might not meet the same fate in the future.

Discussions with the DNR ensued. In the end, Bob Cahill PGA/Pokegema and Rian Reed, the area DNR hydrologist came to an agreement that a contingency

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plan of water reduction, supported by Permit and Allocation Directors in St. Paul, not the installation of a ground water drawing pump, would take place in the event of drought, with the provision that Pokegema have a meter in place, looked into another water source and have a written drawdown/drought management schedule in place. This is the very thing that the ESC has been working for for the last seven years and it is now in writing and going to be implemented. Fantastic news!

However, it is only one golf course. This is the very thing the ESC is striving for all of the courses in Minnesota. It should be noted that the Grand Rapids Area Director was not exactly keen on the idea, but ultimately left the authority up to Reed. The important part is that a precedent has been set, and it can be trumpeted statewide as an example of how an agreement can be accomplished. The key is to get everybody on board, which can and will be a challenge.

It is now doubly important that the ESC and Jack MacKenzie, Executive Director continue to work with the DNR as well as Legislators to try and get a similar agreement or legislation to ensure access to water for every golf course in the state provided they abide by established water use guidelines. That is exactly what we intend to do.

The important part here is that something finally happened. After seven years of trying to figure out a way or method to have our voice heard, find somebody to help solve a very critical issue and get the results we are looking for we finally have a tangible, positive outcome to what could have been a dire situation. All the work has paid off, if only for a small crumb of the rather large cake.

Rest assured, we are going after a bigger slice. Jack is set to meet with Tom Hovey and Julie Ekman from the DNR on June 28th

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for further discussion on the matter. The idea at Pokegema was actually of their suggestion from an earlier meeting in March, so it will be interesting to hear what comes of that meeting.

The DNR's willingness to listen, and in the case of Pokegema, act coincides with the positive response those who attended the Day-On-The-Hill in March received regarding legislation enactment to help the process of water procurement. On that day, many Legislators were all for crafting a bill to ensure common sense water regulation. Simply put, things are finally moving on this issue, and it is very gratifying from my personal viewpoint, as I am sure it is from everybody else who is involved to see real progress being made.

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In Bounds

by Jack MacKenzie, CGCS

The cacophony of loud and tremulous cries awoke me from deep slumber last night. A local pair of nesting loons was in celebratory mode as I dreamily imagined their nest finally gave up a loonling or better yet, two. "Please keep the revelry down my feathered friends," I mumbled, rolling over to grab a couple more ZZZZs.

While some would say it is an insignificant puddle at just 74 acres, the lake adjacent to our home is actually a gem in the Comfort Lake Forest Lake Watershed District. With seike reading (water clarity) of consistently over 18 feet, Sylvan Lake is a pristine pool of clean water. The lake does not drain (it's landlocked) and it has rich fen floating mats south of the lake that have been identified for preservation. The lake likely maintains its high quality through relatively low pollutant concentrations entering from its drainage area and a high rate of exchange with groundwater.

When my wife and I moved to this Forest Lake property 13 years ago, we had little idea of the diversity our taste of Minnesota, Land of Ten Thousand Lakes, offered. We considered ourselves fortunate to have lucked onto the for-sale-by-owner sign while meandering the back roads during a Sunday drive.

After a fine cup of morning joe, graced by my wife's company, I totted the canoe down to the shoreline and headed out for a bout of exercise and an investigation into the pervious evening's excitement. Sure enough, on the far edge of the lake there, riding upon a parent's back, was a small puff of feathers that could only be a loonling. Keeping my distance, I continued my morning adventure with stealth and was rewarded by another pair local vocalists; two swans.

For the first eight years of residence my former job as superintendent

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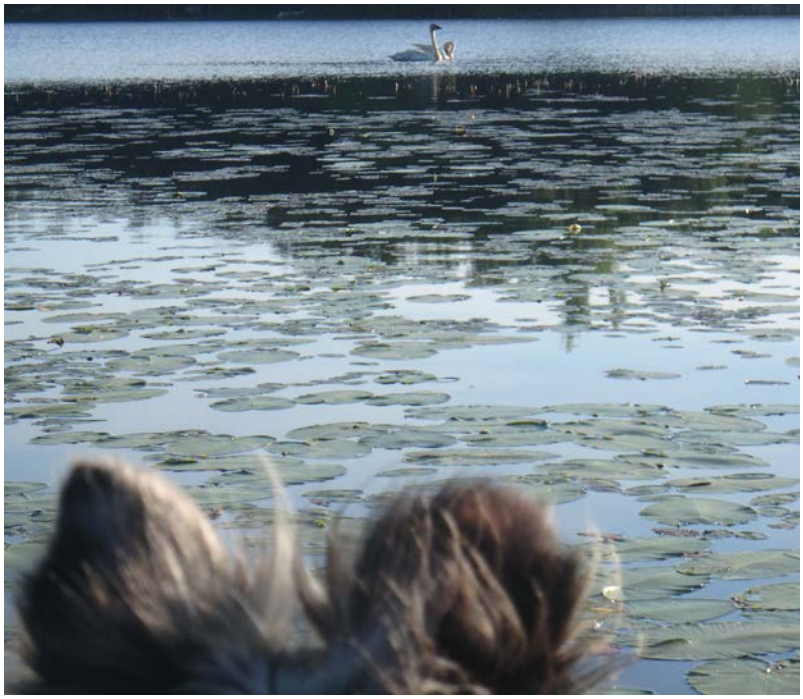
prevented me from appreciating our wet refuge to its potential. Dips to cool myself during hot summer days and perhaps wetting a line in search of bass or northern pike were all too infrequent. Truth be told, most of my "lake use" came in the form of cross-country ski loops upon the frozen and snow-covered surface in the winter. Thoughts of environmental stewardship never crossed my mind, I hadn't the time to be bothered, or so I thought.



Switching from single to double blade paddle, I began my workout in earnest and propelled my solo craft at a heart healthy pace while watching the shoreline for deer, muskrats, mink and for the otter that made Sylvan its summer home a couple of years ago. Lightly populated with home sites, the waters edge provides many opportunities for the fauna to gain access to the pristine lake.

My new position as Executive Director had kept me very busy learning the ropes and developing a comfortable work pattern from 2012 through 2014. At the conclusion of this three-year period I felt ready to expand my horizon and begin a journey to "give back" to my community while strongly supporting an industry that I love, that of professional golf turf management. Considering the relationships developed though water resource conservation and management topics over the past few years, applying for membership on the Comfort Lake Forest Lake Watershed Citizen Action Committee as well as the Forest Lake Parks, Trails and Lakes Commission made

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perfect sense. Surely these two endeavors would take a ton of my time and round out my civic urgency while providing another 'angle' for MGCSA support.

Quietly I paddled up to the now abandoned loon nest. With a bit of sadness I find one whole and undisturbed egg amongst the shell of another, hatched. The odds of a loon fledgling making it to adulthood was already cut in half, this from an already very late hatch. In a typical year, the first loonlings make their appearance in late May. Following the wing beats of a Great Blue Heron, I continue.

What I have found curious about pursuing volunteer and civic advocacy is the keen interest and respect the industry garners after the "good story" of golf and environmental stewardship is told. Another BIG observation I have made is the small amount of time I put into the voluntary charges. Thus, the return on investment potential is huge. In retrospect, I wish I had proffered my abilities much earlier in my career. Really, what is three hours a month in the grand scheme of things, especially if the rewards can enhance your livelihood?

In the north bay, I am greeted by the deep-throated thrum of the "rubber-band" frogs, so named by my wife because of their low and rumbling twang of a mating call. Suddenly they stop, only to resume their chorus after I'm once again well on my way.

Should you have any spare time (really Jack? Come on!), please consider supporting your local watershed citizen action committee. With a likely guarantee of position acceptance, you will create and educate new friends about the benefits

Page 12

of turf, enhance your watershed, consider opportunities for your golf course to pursue regarding water use, reuse and pollution management as well as bring positive notoriety to the golf industry. As I mentioned, it is easy, light in duty and really something I had pursued when I thought I "didn't have the time." Through the process I have learned a lot about our watershed and politics in general.

Just ahead is the purple loosestrife overgrown peninsula where, with help from my neighbors, the CLFLWSD transplanted purple loosestrife eating beetles and weevils earlier this week. The bugs will soon populate the area and manage the invasive plant naturally. With a smile, I stroke quietly home.

Okay, that project did consume some time…four hours. Hmmm, when I look upon this lake, and any lake, creek, stream, river or grove of trees for that matter, I have a greater appreciation of what a small commitment of mental and physical activity can do for the environment. And, when compounded with the fact that I am doing it on behalf of our industry, the rewards return grander dividends.

Just last night at the CLFLWSD BOD meeting, broadcast on cable too, "golf" was mentioned in a positive light not once, not twice, but nine times. All because of a little environmental initiative and a sudden appreciation of how important civic advocacy can be for the golf industry and me personally.

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Wild Marsh to Host MGCSA 20

By Eric Ritter CGCS, Host Superintendent

On July 18th Wild Marsh will play host to the 2016 MGCSA Championship. The entire staff is eager to share our facility, on a day that proves to be an annual golfing battle of epic proportion.

I am in my fifth season at Wild Marsh. As the Course Manager, I oversee the agronomics of the course and the golf shop operations as well. Wild Marsh's Assistant Superintendent, Anthony Oldfather, has been here since 2013 and does a fantastic job in managing the day to day operations on the course. Clarence Asfeld serves as our ace mechanic. Clarence can repair anything from replacing string on a weed whip to overhauling an undercarriage on a D10 (he is a retired Caterpillar mechanic). The rest of our staff is filled with a rock solid crew of retirees and students, some who have worked here for as many as 12 years. Jerry Kroc, our PGA

016 “The Championship”

Professional, even lends a hand to course maintenance from time to time. Jerry is equally suave with a Husqvarna chain saw as he is with a pair of teaching shoes and a sweater vest.

Wild Marsh Golf Club was originally built and named Buffalo Run, which opened circa 1994. The original design left a lot to be desired and the original ownership subsequently went out of business. The course was purchased by Landscapes Unlimited, who completely reconstructed and reopened the course in 1999. Whether the new name was derived from the proximity to all the marsh land integrated within the layout or its architect-PGA tour player Graham Marsh, or both, has never been determined. Five years later the facility was sold once again and was slated for development, at which time the City of Buffalo purchased it to preserve it

Sixth green at Wild Marsh

as a golf course and valuable green space in a growing community.

Today, the City continues to operate the golf course and leases the restaurant and banquet space to a private purveyor. Beyond a golf course, the facility serves as a walking park during periods of course closure and cross country ski and snowshoe trails are groomed in winter for free public use. The natural setting provides a unique experience, bordered by two lakes with numerous natural wetlands and wooded areas. Wildlife abounds the property and high emphasis is placed on environmental stewardship. The clubhouse offers a full service restaurant year-round with wedding and banquet space.

Wild Marsh was constructed as a "member for a day" facility, with a modern championship style design including bentgrass tees, greens and fairways, and well bunkered greens with high-flashed faces that were such a popular trend at the time. In recent years, the facility has refocused the business model to fit a more broad scale of golfer to be more in line with a municipal course. While we still pride ourselves as offering one of the best conditioned tracts in the area, we

have implemented several design changes to improve the playability and ease of maintenance of the course.

Last fall, a two year in-house bunker renovation was completed. During the bunker renovation, nearly all of the fairway bunkers were repositioned for the distance of today's modern golf equipment. The bunkers are now positioned so as not to punish the high handicapper, but provoke thought for the skilled players on shot placement. Other bunkers that received little (if any) play were removed, including several green side bunkers that were converted into bentgrass chipping/collection areas. At the end of the project, the reduced overall bunker count went down from 47 to 32. The high-flashed bunker faces were grassed down with fescue, eliminating the frequent washouts and necessity of maintaining a defined edge.

Other improvements included a new tee complex on the course's

signature par-5 seventh, moving the tees up along the shoreline of Mink Lake. This design change improved the safety factor of errant shots finding their way onto the first tee, while dramatically improving the aesthetics and views of Mink Lake. The new fairway front on hole six was raised several feet to mitigate flooding issues and also doubles as a tee complex for the white and red tee locations, eliminating the most difficult forced carry for those playing the red or white tees. A new red/white tee complex was also constructed on the 12th, again eliminating another forced carry.

Today, Wild Marsh offers a true test of golf for players of all abilities. While the scorecard yardage of 6,543 may tend to provoke thought that the course is relatively short, there are seven forced carries when playing from the back tees. Natural water hazards come into play on nearly every hole.

That being said, with safe tee shots players can find many opportunities to score. The green complexes are rather large and receptive. The multi-tiered greens do place emphasis on proper shot placement for those seeking birdie

Seventeenth green at Wild Marsh

Still time to register for this exceptional event at MGCSA.org

opportunities.

Some advice for those teeing it up on Championship Monday, don't let the forced carries scare you. Focus on putting a safe shot in the fairway (driver is not always best play) and you'll have opportunity for par every time. The front nine plays relatively fair and straightforward, until you reach the courses two signature holes that happen to follow each other, the sixth and seventh. The sixth is a 353 yard par four that requires a well placed tee shot across a marsh. For the 616 yard par five seventh, only a well-hit drive favoring the left side of the fairway will put you into position to reach in two. Most will lay up to the hazard and accept par as a good score.

The back nine requires even more restraint as you navigate holes eleven through thirteen. Eleven and twelve are both par fours. While relatively short, they require accurate tee shots to find the fairway. Thirteen is the longest of the par threes at 213 yards to a narrow elongated green. The only safe miss here is short and right in the approach where most players are ecstatic to make par. Even if you miss your opportunities early, the 17th and 18th will offer some late-round salvation as both are very reachable par fives.

If you haven't played in a MGCSA Championship recently, I would encourage everyone to do so. It is always a fun and friendly competition and one of the few golf events I look forward to each and every summer. The staff here at Wild Marsh hopes you can make it out for an enjoyable day with your fellow MGCSA brethren.

From the U to You

Trends in Turfgrass: Wear Tolerance Characteristics

by Ryan Schwab- Research Technician, University of Minnesota Extension

Wear stress can be defined as an abiotic stress caused by any tearing, shearing, or smashing of a plant usually from foot or vehicle traffic in concentrated areas (Shearman and Beard, 1975a). These actions remove photosynthetic tissues important for energy accumulation. Deep damage can harm a plant's crown where meristematic activity arises, consequently killing the plant. In addition to the aboveground damage, soil compaction frequently occurs under traffic initiating stress on roots. This increases soil bulk density and decreases pore space for water and oxygen flow which is crucial for uptake of nutrients and water, and respiration.

Symptoms of wear stress vary, but generally include thinning or dead turfgrass, as well as prolonged spring recovery. To deal with dead or thinned turf caused by wear, golf course superintendents regularly purchase replacement sod or seed for problematic areas; a practice that can impact a large portion of their annual budget.

Due to problems that arise from wear stress, the search for wear tolerant genotypes are pursued by golf course superintendents, researchers, and breeders. Wear tolerance trials with the use of a variety of traffic-mimicking tools have had a commonplace in turfgrass research since the 1960s. These trials have been used to compare wear severity between species and cultivars within a species and are often ranked qualitatively following wear simulation. A quicker process for selection would be the identification of morphological, anatomical, or physiological features that are key indicators of enhanced wear tolerance.

What makes a turfgrass wear tolerant? Due to variation in traffic simulation, as well as different cultural methods and soil types used in scientific literature, the answer is not simple. Results of tested wear tolerant features of turfgrasses are inconsistent, however the trends of total cell wall content, water content, and leaf angle in research may be influential in wear tolerance.

Cell Wall Content

Cell walls are rigid shells of plant cells that are primarily made up of cellulose and hemicellulose that aid in cell protection, resisting maximum turgor pressure, and maintaining the overall structure of the plant. Through secondary growth these cell walls may become more rigid with additional hemicellulose and introduction of lignin. Lignin is a cell wall constituent found in sclerenchyma cells that tightly packs cellulose and hemicellulose, contributing to wall thickening and rigidity. These cells make up a plant's fiber content, which tend to surround vascular tissues in grasses. The content of cell walls can differ throughout the plant and fluctuate over time. In the seven cool-season species studied, Shearman and Beard (1975b) found that sheaths contained higher cell wall content than leaf blades. They also observed an increased total cell wall content (TCW) as seedlings aged, but would decrease shortly before winter.

Cell wall constituents and TCW are two of the most studied characteristics in turfgrass wear tolerance. They remain a focus in research because these characteristics are often correlated and readily measured. The hypothesis that a plant with strong leaves will display less wear symptoms is speculated in much of the literature. If this is true,

then rigid cells made up of strong cell wall constituents will contribute to leaf strength. It has been observed that plants high in sclerenchyma cells and fiber counts have increased leaf strength (Vincent, 1991; Lulli et al., 2011; Greenburg et al., 1989).

Black bear damage on a newly seeded Kentucky bluegrass field gives a whole new meaning to wear damage (credit: Sam Bauer)

The truth about TCW and cell wall constituents is that they have shown both positive and negative correlations to wear tolerance. Either TCW or one of its components may take part in increasing a turfgrass's resistance to damage. These trends are present both at the species and variety level. The top ten wear tolerant Kentucky bluegrass varieties of the 173 evaluated through the 2000 National Turfgrass Evaluation Program (NTEP) possessed higher TCW and lignocellulose than the bottom ten performers (Brosnan et al., 2005). Glab et al. (2015) linked the higher number of vascular bundles within a leaf's cross-sectional area to increased wear tolerance in comparisons of cool-season turfgrasses. Velvet bentgrass has a higher TCW than creeping bentgrass, which accounted for its increased wear tolerant variation (Dowgiewicz et al., 2011).

Cell walls and its components have also been shown to negatively correlate to wear tolerance or have no correlation. Shearman and Beard (1975b) noticed no association between lignin content and wear tolerance of seven cool-season species. As TCW increased in seashore paspalum varieties, they displayed decreased traffic tolerance (Trenholm et al., 2000). The authors

argue that wear tolerance may be enhanced in seashore paspalum with reduced rigidity and increased elasticity. Elasticity refers to the ability of a plant to maintain its structure after bending from outside forces. It has been suggested that along with rigidity and strength, wear tolerant plants must have elasticity, and a balance of each may be needed (Sun and Liddle, 1993). Due to differences in correlations, it may be more important to assess wear tolerant features at the variety level.

Water Content

Water content of a turfgrass plants can have significance in wear tolerance. As plant moisture content rises, cell turgidity and symplastic water content increases, making tissues more succulent and therefore cuticle thickness decreases and stomatal conductance increases. As with cell wall content, the relationship of water content and wear tolerance is inconsistent in the literature.

Most research in this area supports the characteristic trend of lower moisture content contributing to wear tolerance. Vincent (1983) noticed an increase in leaf stiffness and strength when moisture became limiting in perennial ryegrass and timothy. Logically, if the positive trend of leaf strength and wear tolerance is exhibited in a given species, then limited water content could be a major factor. Brosnan et al. (2005) found a relationship of lower water content and increasing

Fine fescues do not tolerate golf cart traffic in the heat of the summer, especially in an unmowed situation (credit: Sam Bauer)

wear tolerance in their evaluation of Kentucky bluegrass cultivars. An instance in which higher plant water content associating with increased wear tolerance was reported by Trenholm et al. (2000), who found this to be the case in both seashore paspalum and bermudagrass.

If water content is playing an integral part in wear tolerance, then superintendents have the ability to modify environmental factors through cultural practices to improve turfgrass wear performance. With a given species, irrigation practices and soil moisture monitoring are important to improve wear tolerance and recovery from wear.

Nutrient programs can also alter turfgrass water functions, especially with the incorporation of potassium. Potassium is important for plant osmotic potential, turgor pressure and stomatal action. It has been found to decrease Kentucky bluegrass osmotic potential, thus allowing more water movement into the plant and increasing turgor pressures (Carroll and Petrovic, 1991; Carroll et al., 1994). Water content correlations with wear tolerance and its osmotic factors are inconsistent among C3 and C4 grasses and further research should remain focusing on intraspecific relations.

Leaf Angle

Leaf angle is a morphological characteristic that is influenced by both genetics and environment. For example, Brosnan et al. (2005) measured a difference in leaf angles of 27.23˚ between wear tolerant and intolerant genotypes of Kentucky bluegrass grown in a greenhouse setting. Abiotic factors such as light quality and intensity can change the normal morphology of a plant through shade avoidance or light stress.

With lower light intensities, Merion Kentucky bluegrass grew at more upright angles, as it is less shade tolerant than other turfgrass species (Wilkinson and Beard, 1974). Since variability in leaf angle exists as observed by Brosnan et al. (2005) and that leaf angle may be a contributing characteristic of wear tolerance, then this morphological feature should continue to be explored in turfgrass breeding efforts.

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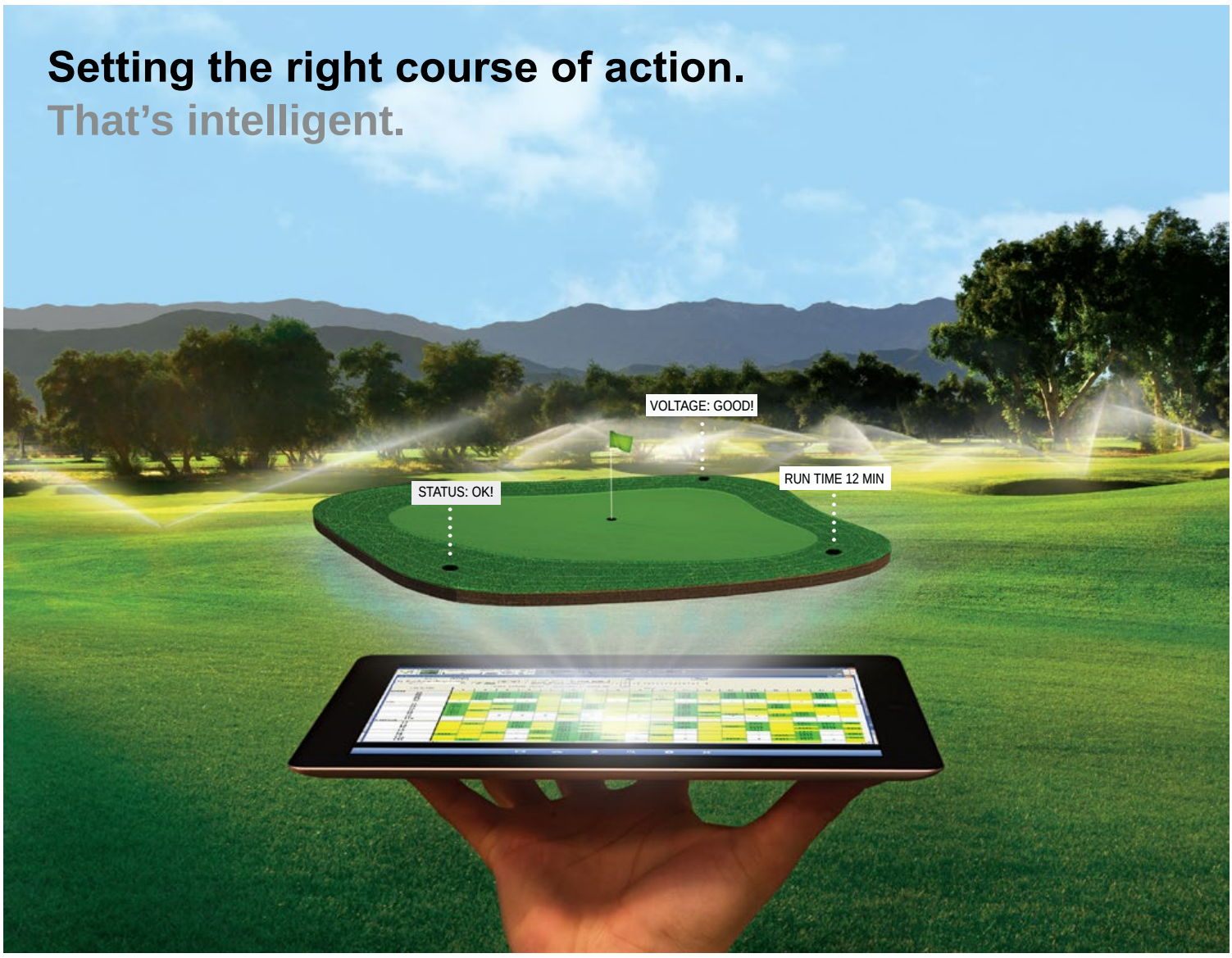

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Leaf angle has been shown to be positively correlated with wear tolerance; that is more upright genotypes tend to show less wear symptoms in trials than horizontal-leaved genotypes. Glab et al. (2015) observed this trend in their analysis of seven cool-season turfgrass wear tolerance characteristics. Velvet bentgrass had more upright leaf angles compared to creeping bentgrass and showed more wear tolerance (Dowgiewicz et al., 2011). Brosnan et al. (2005) developed the 1-4 scale to label leaf angle of Kentucky bluegrass varieties terming them horizontal, semihorizontal, semivertical, and vertical. They found that leaf angle accounted for most of the variation and that larger angles (more vertical than horizontal) were amongst the most highlighted possible feature of wear tolerance. Kowalewski et al. (2015) used the same scale in categorizing leaf angles of hybrid bermudagrass, however they found no correlation between angle and wear tolerance. This may have been due to very little variability amongst the bermudagrass genotypes evaluated, as they all fell under the semihorizontal category.

Wear damage from a golfer standing in one spot while practice putting (credit: Sam Bauer)

It has been suggested by Brosnan et al. (2005) that there may be a practical reason why upright leaf angles correlate with less wear damage. Plants with horizontal leaf angles present more surface area, thus more biomass on the horizontal plane in which it grows. With more biomass exposed to vertical forces, increased wear damage may occur than with biomass less exposed. However, this

is dependent type of wear taking place and should be researched further.

Conclusions

Wear tolerance is desired by many who deal with turfgrass stress caused by repeated traffic. It is a very complicated attribute that may involve countless turfgrass features morphologically, anatomically, and physiologically. The literature describes cell wall content, water content, and leaf angle amongst many others as showing trends in turfgrass wear tolerance. Cell wall content and water content show both association and dissociations with wear tolerance. Leaf vertical orientation is shown to have a possible relationship with the avoidance of traffic stress. These correlations may interspecific (species level) or intraspecific (variety level). Inconsistencies in evaluations should influence future research into assessing intraspecific characteristics.

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Troubleshooting Shorts, Corroded, and Damaged Single and Multivalve Wire Circuits – Part Two

By Andrew Lindquist, Link Systems Inc.

Last month, the first of a two-part article was presented, covering the use of a multimeter to measure various wire faults. The unhealthy wire connections (faults) reviewed were the result of shorts, corrosion, and nicks to the wire's insulating housing or the wire itself. This second part of the two part article deals with the use of a multimeter to measure wire faults due to shorts in multivalve circuits and concludes with a brainteaser. The brainteaser provides the opportunity to apply your understanding of variations in multimeter measurements in distinguishing between the various types of faulted circuits presented in both articles.

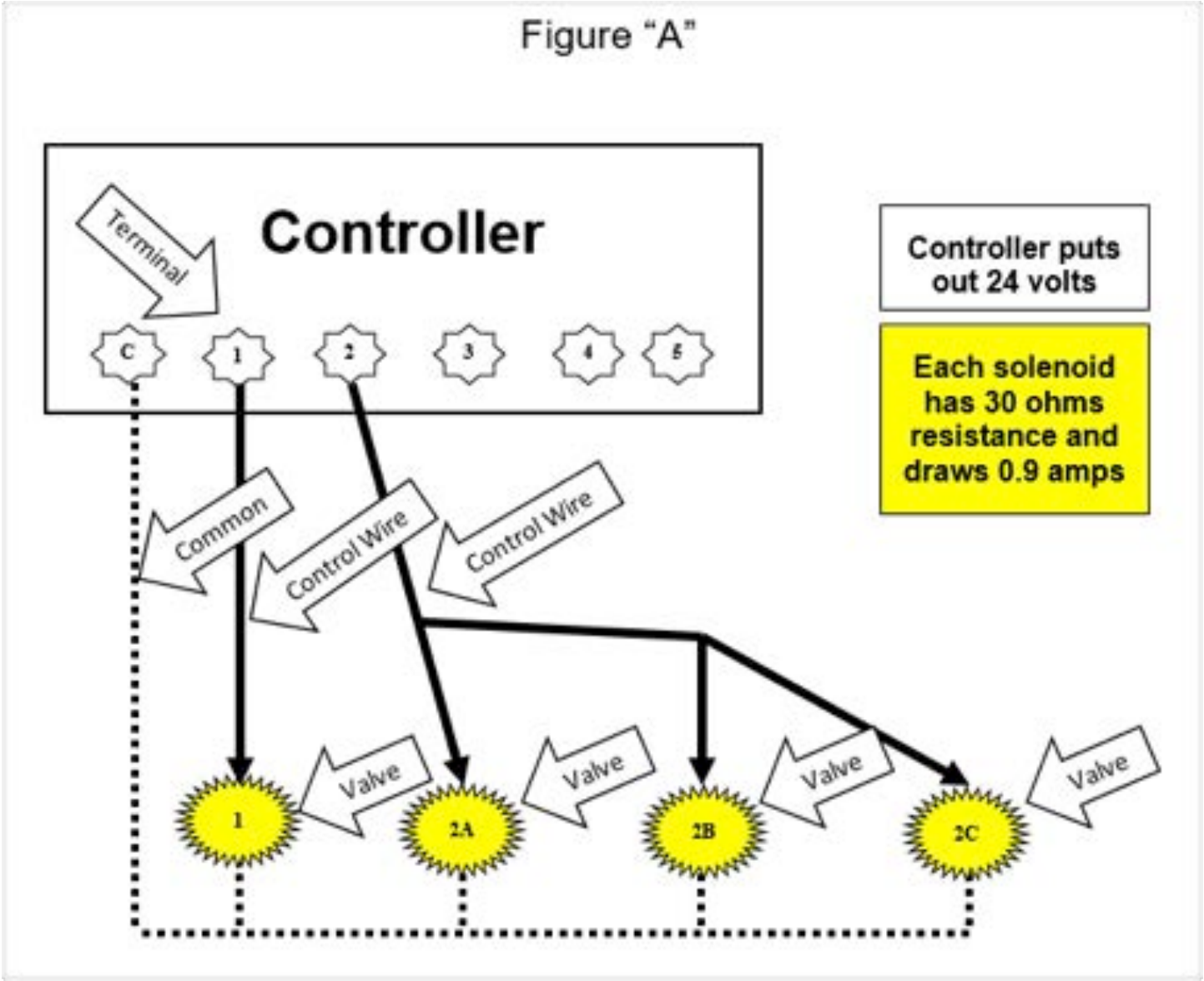
We will be referencing the same five circuit (station) controller layout used in the first part of this article. That is: of the five circuits available, we will be analyzing only the first two circuits. As shown in Figure "A", Terminal (Circuit) ** contains one electric valve and Terminal (Circuit) 2 contains three electrical valves wired in a parallel configuration. (Circuit) Connecting these valves in a parallel configuration will cause all three valves to energize simultaneously when Circuit 2 is activated.

Shorts within a multivalve circuit:

Referring to Figure "B", if a short occurs at Point "CC", a multimeter resistance measurement

***** Irrigation valves should be wired in a parallel, not in a series configuration. Incorrectly wiring the circuit into a series configuration will increase the resistance of the circuit. Increased circuit resistance can easily create excessive load (amount of amps drawn) when activated and can potentially cause malfunctioning valves, blown fuses, and damage to the controller's internal components or wiring.***

Figure "A"



for the three valve in Circuit 2 is expected to be 10 ohms. However, the short's location creates a short "least resistance" path that allows the majority of electrons to bypass all solenoids. This shorter (lower resistance) path lowers the measured resistance of Circuit 2 to one ohms or less, thereby indicating a short. However, this may not always occur. As mentioned in the first half of this article, electrons follow paths of least resistance, of which there may be several paths available, not just one path.

As with "forked" lightning bolts, the actual electron path(s) in Circuit 2 depends upon the amount of resistance present in each available electron path. Therefore, in this scenario, you could have a situation where valves 2A, 2B, and 2C work, but your circuit's ohms resistance measurement is higher than expected - perhaps due to the short actu-

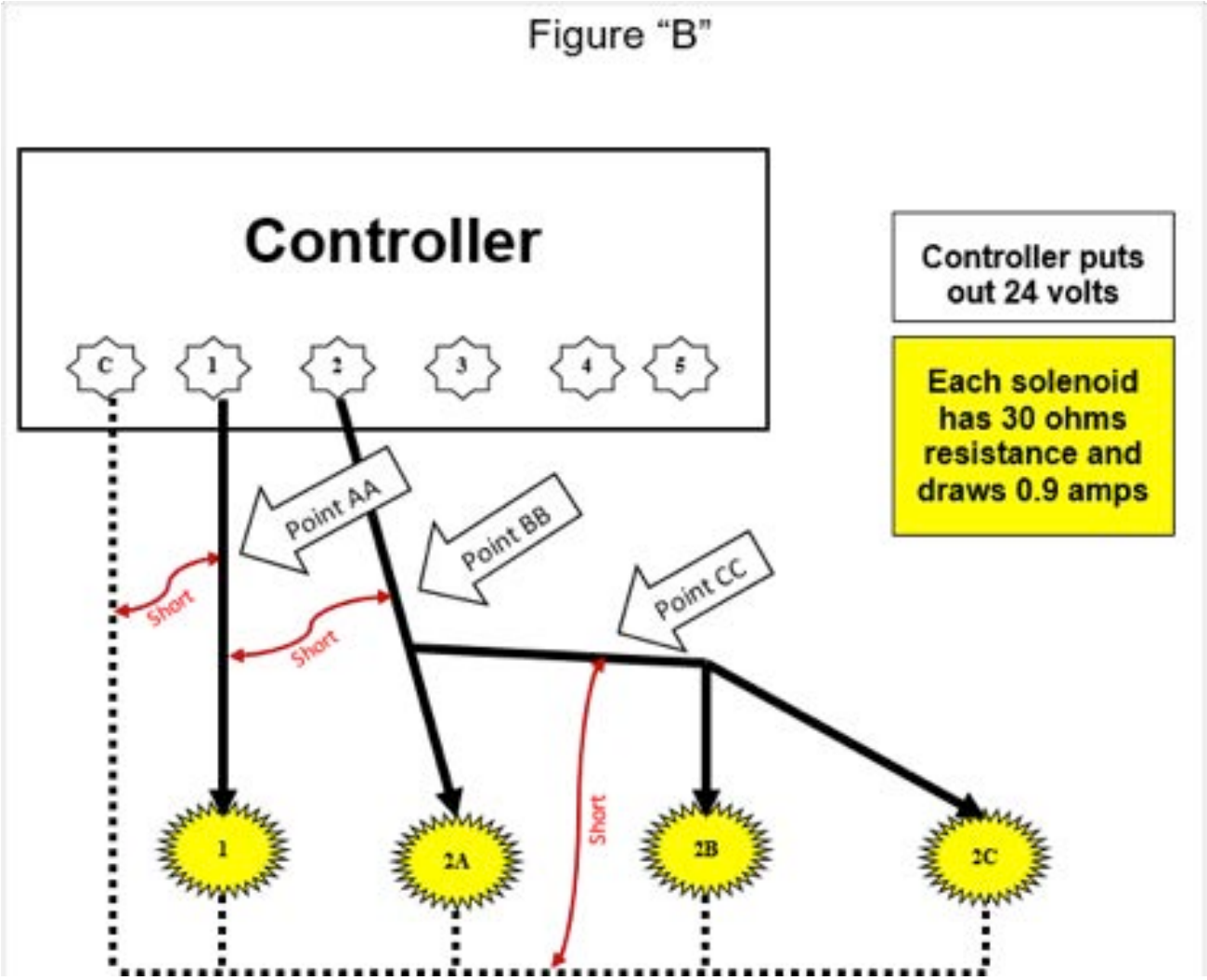
ally having high resistance. That is, not all shorts have low resistant connections.

Sometimes a short may have a higher resistance than one ohm. Additionally, you may have a situation where only 2A operates but not valves 2B or 2C. Basically, there can be quite a few variations of what can happen with shorts in multivalve circuits. So, overall, the circuit may operate entirely, partially, or not at all. The circuit ohms resistance measurements may be 'weird' and almost 'unfathomable.' A situation such as this can really challenge your troubleshooting abilities.

The best way to trouble shoot a complicated faulty multivalve circuit is to isolate the circuit's components as best you can and troubleshoot each of these isolated components separately.

For example: as shown in Figure "C", you could isolate the vari

Figure "B"



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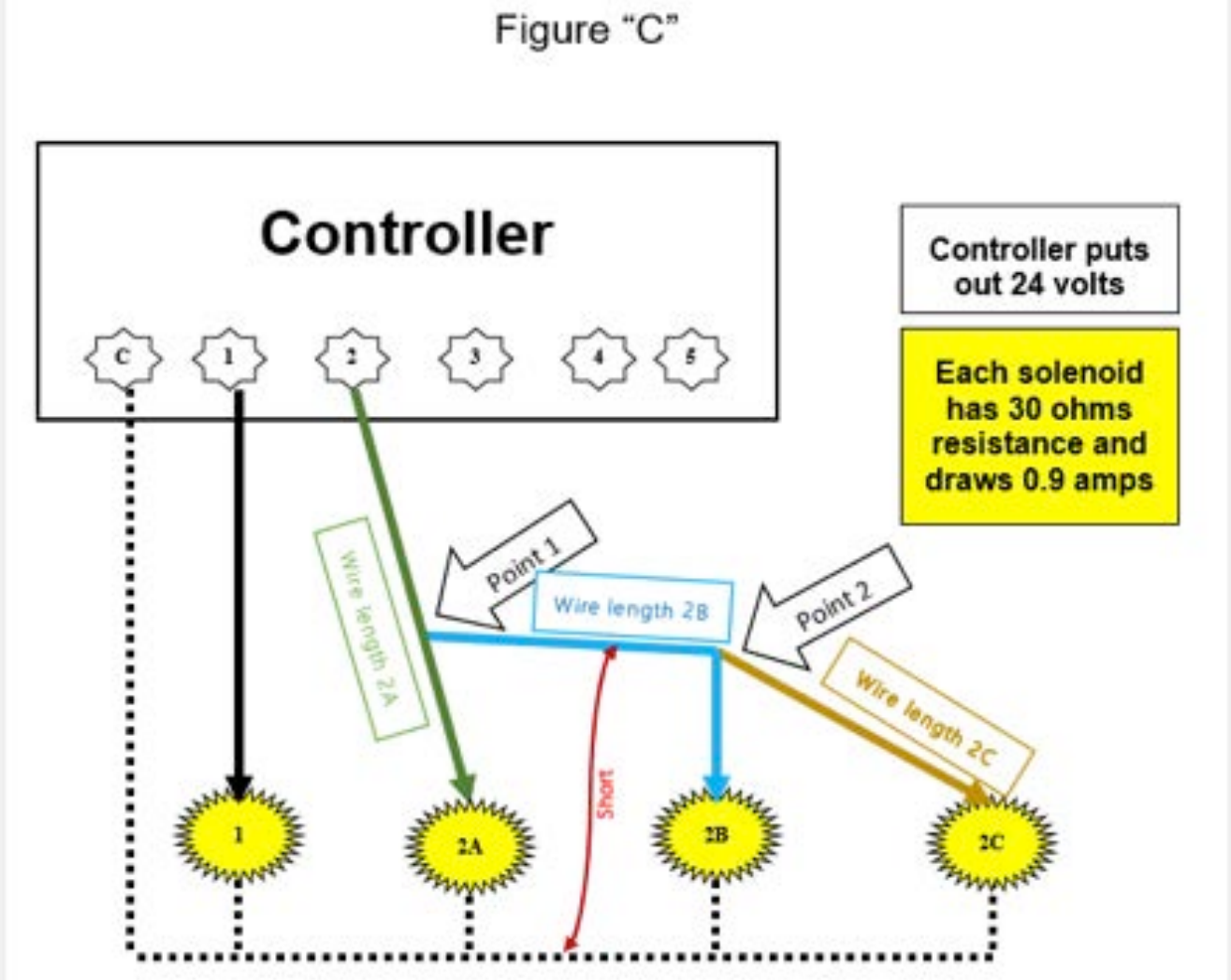
ous components of Circuit 2 as indicated by the various colored wire paths. The process would be to disconnect the field wires at the terminal strip, Point 1, and Point 2. Disconnecting at these locations will provide you with three isolated wire lengths: 2A (in green), 2B (in blue), and 2C (in gold). Once isolated, you can check the resistance of each isolated circuit, looking for incorrect resistance measurements. In this situation, the green-colored 2A wire circuit would expect to measure at 30 ohms resistance from the terminal strip through valve 2A and back to the common.

In checking this circuit with your multimeter, it does measure 30 ohms, and therefore ok. The blue-colored 2B wire circuit, when measured from Point 1 back to the common, expects to measure at 30 ohms resistance. However, this wire circuit actually measures a very low resistance of less than 1 ohm, thereby indicating a short circuit. To verify the integrity of the remaining gold-colored 2C wire circuit, when measured from Point 2 back to the common, you expect it to measure

at 30 ohms. You check this and it does measure at 30 ohms, therefore a good circuit. The result of your circuit isolation process is that you have identified that the short's location is in the blue-colored wire circuit 2B.

Part of good troubleshooting and repair goes beyond just fixing the issue. Akin to the process of using sod to "solve" a dead spot in a lawn, unless us you do something to prevent the instigating factor, the issue will reoccur. For example, chewed wires can be reduced by protecting exposed wires with conduit (PVC or metal), and/or reducing rodent/gopher populations. Confirm that there is no exposed wire at any connection that the waterproof wire connect completely encapsulates the wire nut and wire housing. At the controller, only strip off enough wire to adequately attach to the terminal strip. Always emphasize to the installation/maintenance crew to carefully excavate when near control wires and, if they 'bump' (nick) a wire, carefully in-

Figure "C"



spect the wire for nicks or cuts. The following is a brainteaser applying to the troubleshooting concepts covered in this two-part article and ignores issues caused by shorts going to ground (ground faults). The brainteaser does review back to the very first article covering cut wires. The answers to this brainteaser can be found on Page 50.

Brainteaser Scenario:

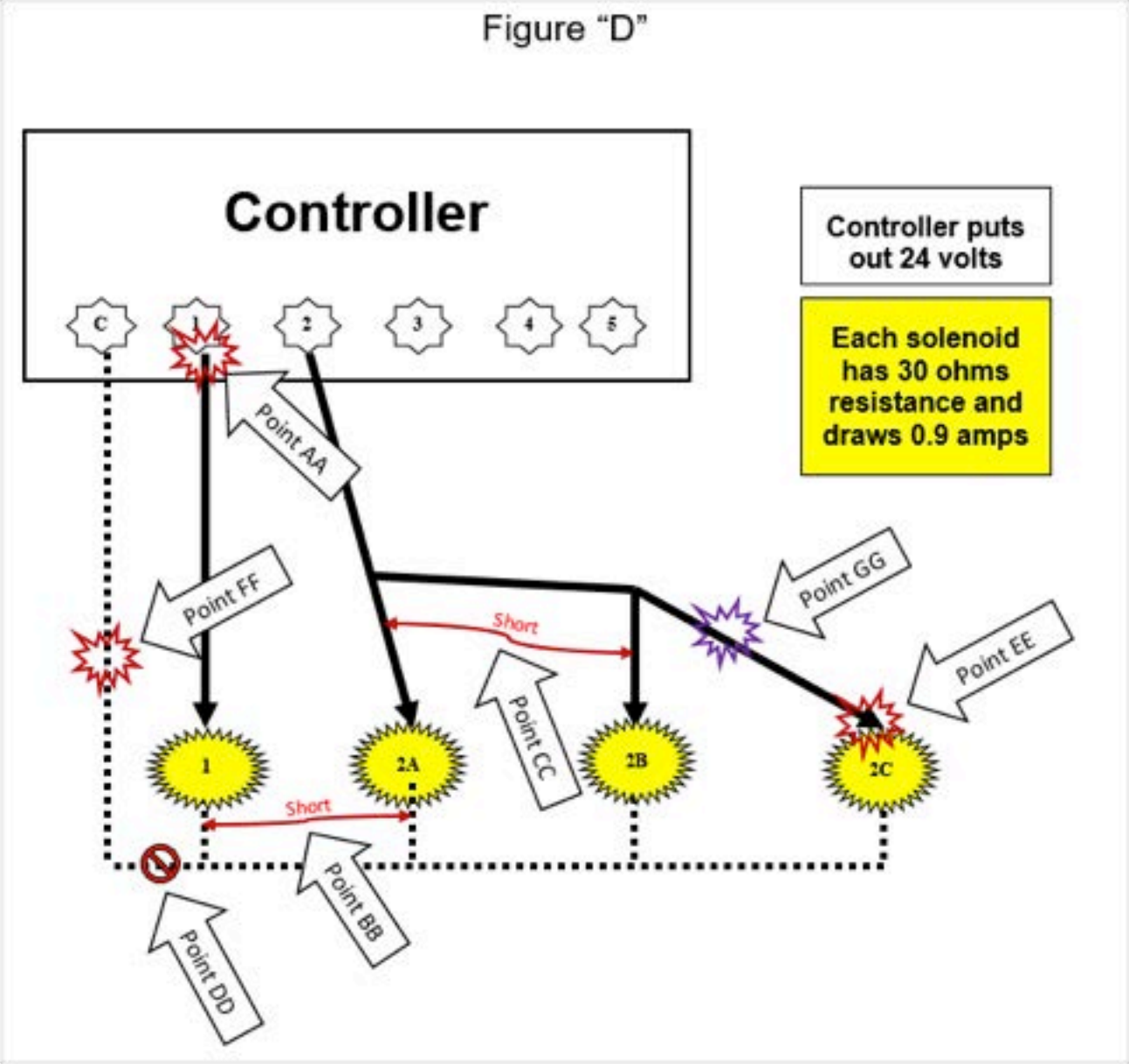
Background information: Figure "D" illustrates an electrically troubled irrigation system. The system has one common wire that is "commonly" attached to all valves. This malfunctioning system has seven distinct damaged (shorted, corroded, poorly connected, nicked, or cut) circuit situations at point AA thru point GG. Each of the situations are unique. That is, each situation (AA through GG) represents only one damaged location with that damaged location indicated by that situation's arrow. For example: The damage at Situation "AA" is located at Circuit 1's terminal strip with all other troublesome points (BB thru GG) not present during the "AA" situation. A properly operating valve (valve's solenoid) creates 30

ohms of resistance and creates a 0.9 amp load when energized.

The short length of the control (field) wires for this system does not increase ohms resistance to any appreciable degree unless there are poor connections due to corrosion or nicked wires existing in the circuit. Additionally, for this scenario, any shorts that exist are shorts between wires, not shorts going to ground (ground faults). Ground faults will be covered separately in a later article and other brainteaser.

Site Story: There has been recent digging, gopher, and lightning activity in and about the customer's irrigation landscape. Also, last year they repaired a cut wire to the common wire, with its location at Point FF. Also, they recently planted a tree near point GG, where the crew

Figure "D"



exposed the irrigation wire while digging but can't remember if they hit (nicked) any wire or had to repair any inadvertently cut wire. The customer states that some irrigation zones are not working or working erratically. You have not been to the site before, but the customer has provided you with an accurate diagram (as-built) that is visually accurate but not drawn to scale.
Prior to testing any irrigation circuits, you have correctly taken the first troubleshooting steps and discussed the history of the site with the customer and then reviewed the irrigation system as a whole, verifying that any non-electronic controller issues (power, damage, programming, sensors, etc.) are not causing any of the malfunctions. Additionally, you verified the accuracy of the as-built (didn't assume it was correct) and used your multimeter to verify that 24 volts AC is available at all controller terminals (which meet manufacture's specifications).

Using the information provided and Figure D, answer the following fourteen questions. Answers can be found on page 50.

(1) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 1 terminal if there is a poorly connected/loose control wire located only at Point AA?

(2) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 2 terminal if there is a poorly connected/loose control wire located only at Point AA?

(3) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 1 terminal if there is a short in the common wire located only at Point BB?

(4) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 2 terminal if there is a short in the common wire located only at Point BB?

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(5) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 1 terminal if there is a short in the control (field) wire located only at Point CC?

(6) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 2 terminal if there is a short in the control (field) wire located only at Point CC?

(7) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 1 terminal if there is a cut to the common wire located only at Point DD?

(8) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 2 terminal if there is a cut to the common wire located only at Point DD?

(9) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 1 terminal if Valve 2C solenoid's internal wire's coating was melted (most likely due to a lightning strike) at Point EE?

(10) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 2 terminal if Valve 2C solenoid's internal wire's coating was melted (most likely due to a lightning strike) at Point EE?

(11) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 1 terminal if an earlier repair to the common used non-waterproof wire connects at Point FF?

(12) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 2 terminal if an earlier repair to the common used non-waterproof wire connects at Point FF?

(13) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 1 terminal if, during an earlier digging activity, the (field) wire was nicked, but not completely cut at Point GG?

(14) What would be the ohms resistance measurement expected and actual when taken at the controller's Circuit 2 terminal if, during an earlier digging activity, the (field) wire was nicked, but not completely cut at Point GG?

The MGCSA thanks Andy Lindquist for his expertice and inight into electrical circutry. Andy owns and operates Links Systems Inc. and can be reached at alindquist@linkssystemsinc.com.

Managing Moss in Turfgrass

Mosses are difficult-to-control weeds in both taller-cut lawns and low-mow golf course putting greens. Several different species of moss can infest lawn-height stands of turfgrass, but silvery-thread moss (*Bryum argenteum* Hedw.) is the most common species found in close-cut turf, such as golf course putting greens (Figures 1-2).

Figure 1 and 2: Silvery-thread moss in a creeping bentgrass putting green. *Top photo by Cole Thompson, bottom photo by Zane Raudenbush*.

Moss Biology

Mosses are bryophytes, and sometimes called "lower plants." Unlike desired turfgrass species and other common grassy and broadleaf weeds, mosses are nonvascular plants, lacking conductive tissues (xylem and phloem) and roots.

Instead, most mosses are "ectohydric" meaning they absorb water and dissolved nutrients over their entire leaf surface. Additionally, mosses produce an extensive rhizoid system, allowing them to anchor to almost any stable substrate. Rhizoids resemble the roots of vascular plants (Figures 3-4), but typically lack the ability to absorb water and nutrients from the soil rootzone. Mosses can spread through asexual (vegetative) propagation. Both rhizoids and leafy, green tissue of mosses (thallus) develop from a slimy, black mat (protonema) that can be mistaken for algae, especially on golf course putting greens.

Figure 3 and 4. Moss rhizoids anchoring silvery-thread moss into a thatch layer, and close-up view of rhizoids and shoots. *Top photo by Cole Thompson, bottom photo by Zane Raudenbush*.

As with most weeds, mosses most commonly occur where voids are present in

turf canopies. Shady, wet conditions favor some mosses.

Moss Management

Mosses can be difficult to control once established. Promoting turf health and a dense turfgrass stand is one of the best ways to prevent moss.

Lawn-height turf

Cultural practices that promote healthy turf are essential in any weed control program. Irrigating deeply and infrequently, aerating, maintaining a proper mowing height (e.g. 2½ to 3½ inches for tall fescue), and having a well-balanced fertility program will yield a more healthy lawn, and limit avenues for moss establishment. Mosses may out-compete turf species in shady areas, regardless of management strategies. It might be necessary to consider utilizing shade-tolerant turf species like fine fescues (Creeping, Chewings, and Hard fescue) or other landscape plant species that are even more competitive in very shady environments.

If moss encroachment is extreme, applying an herbicide might be an option. Quicksilver (active ingredient carfentrazone-ethyl) is a broadleaf herbicide that is labeled for silvery-thread moss control in lawns and on golf courses, and it has shown moss suppression in some studies of putting green turf. Terracyte (sodium carbonate peroxyhydrate) is a peroxide product with formulations labeled for lawn and golf course and moss reductions have been shown in some studies on golf course turf, but phytoxicity has been reported. While these products are options in lawns, the cultural practices outlined above should be the primary strategy. Keep in mind that most products have been tested on and are labeled for silvery-thread moss, but many other moss species can occur. Mechanical weed control options may be necessary when herbicides are not available/desirable. In this case, turfgrass managers can use a metal leaf rake to remove the moss thallus from the desirable turfgrass. However, most mosses can spread vegetatively, so the removed plant material should be transported off-site. In most instances, mosses are often a symptom of abiotic stress (poor soil fertility, inadequate drainage, over watering, dense shade, etc.), so turfgrass managers will need to address these factors in order to obtain long-term control.

Low-Mow Golf Course Turf

Mosses are invasive weeds in closely mown golf course putting greens. Increased moss encroachment has been observed with lower (0.125 inches) compared to higher (0.157 inches) mowing heights. Over fertilization can lead to excessive organic matter development, disrupt water infiltration, and favor moss development. Additionally, fertilization with sprayable nitrogen sources (urea and ammonium sulfate) has been found to increase silvery-thread moss encroachment. Promotion of turf health with aeration, balanced fertility, deep and infrequent irrigation, and (if possible) a higher mowing height will limit moss encroachment.

Quicksilver and the fungicide Junction (Section 2ee label; active ingredients mancozeb and copper hydroxide) are labeled for silvery-thread moss control in golf course turf. Several researchers have observed reductions in silvery-thread moss in putting-green height bentgrass with applications of Quicksilver, with no phytotoxicity to creeping bentgrass. In our research at Kansas State University, a management program including both core aerification and Quicksilver applications over several years significantly reduced moss coverage. Higher rates of Quicksilver can injury *Poa annua*, so be sure to consult the label before making an application.

Some control has been observed with Junction though phytotoxicity of creeping bentgrass is of concern. As mentioned above, Terracyte is a labeled product that has shown some efficacy, but with potential phytotoxicity. Many other chemicals have been evaluated for controlling silvery-thread moss but few are labeled. Currently, no refereed publications have reported the complete control of silvery-thread moss with *any* products. Again, remember that most products have been tested on and are labeled for silvery-thread moss, but many other species can occur.

Publication prepared by Cole S. Thompson and Zane Raudenbush, Former Graduate Research Assistants, and Megan M. Kennelly, Associate Professor, Dept of Plant Pathology; Kansas State University, Revised 2015.

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MGCSA Welcomes New UMN Staff: Parker Anderson

Parker Anderson has been chasing the sun in the golf business for the last 12 years, but his roots are deep in Minnesota. He is the newest team member of the University of Minnesota Turfgrass Research Lab as part of the Science of the Green Initiative (www.scienceofthegreen.org). Parker's office at the St. Paul campus is, ironically, just a few buildings away from where his grandfather, Parker Oscar Anderson, taught as a Professor of Forestry and served as State Extension Forester for many years.

Parker recently completed a dual-master's degree program in Landscape Architecture (MLA) and Sustainable Systems (MS) from the School of Natural Resources and Environment at the University of Michigan. His field of study focused on golf's interaction with the

environment, the economy, and society, finding opportunities for the industry to demonstrate its value to human, plant, and animal communities.

Parker is a PGA member as well as a member of the GCSAA. His varied experience gives him a unique perspective to the important issues facing the golf industry today.

Last summer, Parker worked with Tom Doak building "The Loop," at Forest Dunes Golf Resort in Roscommon, MI. The Loop is a very unique golf course design because of its reversible 18-hole layout. While in graduate school, Parker consulted for Kemper Sports to assist in their Green-to-a-Tee Program which identified ways to increase environmental awareness and practice among the clubs that they manage.

At the University for Michigan, Parker served as the school's first Campus Farm Manager. Additionally, he founded UMBees, the first University of Michigan student organization created to promote, protect, and propagate honeybees. As a Graduate Student Instructor, Parker taught an undergraduate class titled Global Change: the Science of Sustainability as well as a graduate level course on landscape construction materials and methods.

Previous to his time at the University of Michigan, Parker served as Director for the Hawaii State Junior Golf Association, a rewarding experience as mentor to over 600 young golfers throughout the state of Hawaii. From 2005 to 2010, Parker was employed as a PGA professional, certified in instruction and golf operations. During this period, Parker was employed by The Reserve Club and Thunderbird Country Club in Palm Desert, CA, the Onwentsia Club in Lake Forest, IL, and Oak Ridge Country Club in Hopkins, MN. Parker also competed on various professional golf tours in California and the Midwest.

Parker earned his bachelor's degree from UCSB in Economics and Environmental Studies. Growing up he loved to compete in amateur golf tournaments, playing in several MGA events as well as the Birchmont, Pine to Palm, and the Resorters tournaments in Minnesota.

Parker loves to surf, camp, hike, and be outdoors and looks forward to spending a few summer weekends at his family's cabin on the Whitefish Chain of lakes near Brainerd.

Please feel free to contact Parker to introduce yourself, or if you have any questions about your course, the industry, or the future of the game at parkerta@umn.edu.

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Irrigation Brain-teaser answers

Good! You remembered to make sure that the circuits were not energized while using your multimeter to measure resistance, so you are set to go. For this scenario, any faults due to shorts, are confined to either control wire to control wire or control wire to common wire shorted circuits. None of the shorts in these scenarios are going to ground (a ground fault scenario).

(1) Circuit Terminal 1 – Poor terminal connection at Point AA: Expected resistance reading is 30 ohms. If the terminal connection is loose, you should have found this out when checking the integrity of the controller during your initial inspections. If you measured the circuit's resistance when the field wire is attached to the terminal connection but there is corrosion between the field wire and the terminal, you would measure a higher than expected resistance of about 60 ohms or more. Therefore, you have determined that you have a faulty connection. To locate this fault, you disconnected the field wire at the controller and tested the circuit which now measures at the expected resistance of 30 ohms. Perplexed, you reattach the wire to the terminal and measure circuit resistance; the circuit's resistance test checks-out OK at 30 ohms. Thinking through why the problem went away you realize that you most likely 'solved' the issue when reconnecting the field wire. The fault was due to either a loose or corroded connection. Causes of corroded connections inside a controller are: An indoor only controller was installed outdoors; the controller has a damaged/leaky weather resistant seal; an employee may have mistakenly left the controller cover open for a period of time and allowed moisture to enter which would be difficult to verify; the field wire/terminal connection wire was never tightly attached. At this point, if it is a leaky controller seal, repair as needed. If a loose wire, confirm that it is now tight. Also check all other terminal connections for loose and corroded terminal connections.

(2) Circuit Terminal 2 – Poor terminal connection at Point AA: Expected resistance reading is 10 ohms. Loose wire connection at Terminal 1 has

no effect upon Circuit 2. Therefore Circuit 2 checks out correctly at 10 ohms.

(3) Circuit Terminal 1 – Short in common at Point BB: Expected resistance reading is 30 ohms. In this scenario, a short between common wires would have no measurable (or operational) affect upon either circuit. The only issue would be opportunity for moisture to enter into the wires at the short's locations and create corrosion of the wire. If corrosion was occurring, you would measure a higher ohms resistance (perhaps 60 or above). If the short allowed electrons to go to ground (a ground fault) then there would be issues. These issues will be covered in subsequent articles and is not a factor in this scenario.

(4) Circuit Terminal 2 – Short at Point BB: Expected resistance reading is 10 ohms. See number three (previous) response for explanation.

(5) Circuit Terminal 1 – Short at Point CC: Expected resistance reading is 30 ohms. The existing short would have no effect upon this circuit and you would measure 30 ohms resistance.

(6) Circuit Terminal 2 – Short at Point CC: Expected resistance reading is 10 ohms. The short at Point CC is between control wires of the same circuit. The short would not have any appreciable effect upon this circuit's resistance or its operation. However, as with Scenario BB, Circuit 2 is now prone to corrosion fault issues.

(7) Circuit Terminal 1 – Cut at Point DD: Expected resistance measurement is 30 ohms. Cut common wire location will prevent this (and other circuits) from operating and would measure as infinite resistance. Actual location of cut can be located by using a wire tracker.

(8) Circuit Terminal 2 – Cut at Point DD: Expected resistance measurement is 10 ohms. This scenario's cut common wire location will prevent this (and other circuits) from operating and would measure as infinite resistance. Actual location of cut can be located by using a wire tracker.

(9) Circuit Terminal 1 – Lightning damaged solenoid at Point EE: Expected resistance measurement is 30 ohms. The issue of a damaged solenoid at Point EE has no effect upon Circuit 1. Therefore this circuit

would measure at 30 ohms.

(10) Circuit Terminal 2 – Lightning damaged solenoid at Point EE: Expected resistance reading is 10 ohms. The varnished coated (insulated) wire present inside the solenoid easily melted from the excess heat created by an electrical lighting entering the circuit. The melting of the solenoid's insulating coating creates shorts within the solenoid. The effects of the solenoid's internal shorts is typically to act as if the solenoid is not present. That is, the circuit will measure as a two valve (solenoid) system at 15 ohms (1/2 of the 30 ohms resistance of a single solenoid). Sure enough, your multimeter reading is 15 ohms.

To locate where the short is, you will need to isolate various segments of the circuit and measure resistance as described earlier in this article. One alternative is to assume that the issue is a shorted solenoid, so rather than isolating the system components, you could go to each valve and test its solenoid.

As a note, lightning will slightly short, completely short, melt, or vaporize the solenoid's internal wires. A slightly shorted solenoid will have slightly higher than expected ohms resistance. Completely shorted, melted or vaporized solenoids will eliminate that solenoid's resistance from the circuit.

(11) Circuit Terminal 1 – Non-waterproof connect at Point FF: Expected resistance measurement is 30 ohms. The use of non-waterproof connects creates opportunity for corrosion of wires and wire connections. Corrosion will increase the resistance of the circuit. In this case, the measured resistance of this circuit would be higher than expected, perhaps 100 ohms or more. If corrosion is severe enough, the resulting effect would be similar to a cut wire showing an infinite amount of resistance. This corrosion effect at Point FF will be affecting all circuits.

(12) Circuit Terminal 2 – Non-waterproof connect at Point FF: Expected resistance measurement is 10 ohms. As stated in response #11, the measured resistance reading will be higher than expected and will be increasing the resistance for all other circuits.

(13) Circuit Terminal 1 – Nicked

control wire at Point GG: Expected resistance measurement is 30 ohms. The nicked wire location has no effect on Circuit 1. Therefore, you will have a resistance measurement of 30 ohms.

(14) Circuit Terminal 2 – Nicked control wire at Point GG: Expected resistance measurement is 10 ohms. In this case, measuring the circuit's resistance, you would get measurements much higher than expected… perhaps 30 ohms or more. Remembering that the owner said he couldn't remember if they had damaged or repaired any wire at Point GG, you would conclude that: (1) they used a non-waterproof wire connect and corrosion may have occurred, or (2) they may have nicked the wire during their repair process and corrosion of the wire has occurred or the diameter of the wire was reduced. Therefore, you could go directly to the 'repaired' location and inspect it or you could isolate and test Circuit 2 components as described earlier. As tempting as it may be to go directly to the repaired location, it usually is more efficient to isolate and measure the separate components of this multivalve circuit as described earlier in this article.

Bluffs Exposure Golf Event
Eastwood Golf Course
Host Jeff Minske
Thank You

Affiliate Spotlight:

GenNext
Vital Reactions for Soil & Plant Health

GenNext Biotech, LLC is a company based in Minnesota with manufacturing being done in Chicago, in its sixth year of selling extracellular enzyme complex formulas to aid in plant fertility. The technology started as a research project over 40+ years ago by a group of agronomists, biologists, and geneticists who were trying to find the essential common strains of all microbes, bacteria, and fungi that provide total sustainability to plant life. They touched upon areas of microbiology in the research, like plant defense activators…finding that enzymes, the digestive juices of microbes, were an important part of initiating the vital reactions necessary for plants to thrive.

After 40+ years of consulting, creating custom blends, the formulation was standardized. These extracellular enzyme complexes were now available on commercial basis

Tim Brink, GenNext Biotech Inc.

throughout the U.S. in 2010. Over the last six years, the company, known as GenNext Biotech, has gained a cult following from the East Coast to the West Coast and everywhere in between. It has distribution in all 50 states, all Canadian provinces and services customers worldwide.

What makes GenNext unique is that its compost derivative contains no live microbes, as the proprietary technology extracts the proteins which can survive outside the microbial parent and stabilizes it with soil minerals. This procedure bypasses the entire organic process and the "waiting game" is finally over. The extracellular enzyme complexes are catalysts that immediately stimulate existing soil bacteria and mycorrhizae, fueled by a proprietary blend of soluble humic and fulvic acids. By stimulating existing soil microbes, the GenNext products promote a synergy with plant consumption and soil decomposition, thus, harmonizing a plant's ability to survive.

The 40+ years of research unlocked the potential for maximizing

Frank Zamazal, GenNext Biotech Inc.

soil fertility, providing a technology that replicates the most powerful microbiological reactions to increase plant uptake and soil respiration. The product line GenNext has produced is cutting edge, will perform consistently, is not perishable, and can be stored indoors at room temperature.

GenNext is now comprised of three partners: Tim Brink, managing general partner, Jon Flicher, director of production & product development, and Frank Zamazal, director of agronomy & new business development. Together, their vision to become a leading global enterprise

specializing in sustainable biotechnology that enhances plant development while maintaining an environmentally and socially conscious footprint is running on all cylinders.

Their company mission to create, manufacture, and distribute premium quality products that promote soil and plant health, while exceeding the expectations of their customers and vendor partners, has made a huge splash in the market in the last six months, with product interest steadily increasing nationwide.
The addition of Frank Zamazal has provided hands-on field experience and given the company the ability to provide recommendations to superintendents. Frank has a Master's degree in turfgrass management from Penn State and has consulted for Brookside Laboratories. Frank also has 20 years of golf management experience as a superintendent, with extensive construction and grow-in experience, along with expertise in championship conditioning and desert over-seeding. This background, both operational and technical, allows GenNext become a partner with customers and distributors, providing solutions for all turf problems that arise.

There are currently three products formulated for the turfgrass industry:

GenNext A&B is our cornerstone product formulated with a fertilizer blend of urea triazone and potassium nitrate. It is designed to function as a low volatile, non-burning, slow release with its potassium functioning as an enzyme activator.

GenNext C&D is our base extracellular

enzyme complex and humic acid, designed to be integrated into your own fertility program.
GenNext AM is a lower viscosity version of our base extracellular enzyme complex designed to be administered through fertigation or larger area spray applications.

Whatever choice you make with the GenNext product line will instantly help your carbon to nitrogen ratio while stimulating the existing microbes in your soil profile to perform the vital reactions necessary for sustainable plant life. These reactions allow the plant to persevere through stressful abiotic and biotic conditions. Whether dealing with high heat and humidity, or winter kill from spring emergence, the GenNext technology will provide consistent, superlative results season after season.

Hey Affiliates!
If you are interested in filling the Affiliate Spotlight, contact Jamie Bezanson and learn how to shine, shine, shine for the MGCSA membership

2016 FIELD DAY

PRESENTED BY

Extension Turfgrass Science

AUGUST 11 REGISTRATION FORM

The TURF & GROUNDS FIELD DAY is back on the St. Paul campus this year as the University of Minnesota once again partners with the Minnesota Turf and Grounds Foundation to produce this popular event at TROE Center and UFore Nursery.

MAKE PLANS TO JOIN US ON THURS., AUG. 11 for outdoor education presented by University of Minnesota faculty and staff working in turfgrass science, horticulture and forestry. The Field Day will run from 7 a.m. to 1 p.m., with presentation topics ranging from turfgrass species for natural areas to disease management in turf and trees.

Our research and extension programs at the University of Minnesota are constantly evolving. This spring we had several graduate students defend their thesis projects and new students have entered the program. We have also had several new staff hires, and we are looking forward to showcasing their work.

FIELD DAY AGENDA - AUG. 11, 2016

7:00 - 8:00 - Coffee, Donuts and Vendor Time
8:00 - 11:00 - Turf and Grounds Tracks
11:00 - 11:30 - Networking and Vendor Time
11:30 - 12:30 - Catered Lunch
12:30 - Networking and Vendor Time

EDUCATION POINTS
CEU's for Certified Arborist, Municipal Specialist, BCMA - Science, .GCSAA-approved Education Points will be available and announced.

COMPLETE AGENDA ON BACK

FIELD DAY IS LOCATED ON THE NORTHEAST CORNER OF LARPENTEUR & CLEVELAND IN FALCON HEIGHTS

MTGF minnesota turf and grounds foundation

Please register _____ people at $25 ea. for a total of $ _____

Name(s) _____

Employer / Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ Email _____

Check Association(s): ❑ MGCSA ❑ MPSTMA ❑ MSA ❑ MASMS ❑ MAC ❑ MTA ❑ MTSC ❑ MNLA ❑ STUDENT

TOTAL ENCLOSED: $ _____ MAKE CHECK PAYABLE TO: MINNESOTA TURF AND GROUNDS FOUNDATION

QUESTIONS: 952-473-3722 www.mtgf.org

MAIL TO: MTGF FIELD DAY P. O. BOX 617 WAYZATA, MN 55391

TURF TRACK

TROE CENTER

8:00 -9:00 a.m. - GOLF FOCUS

Dr. Brian Horgan and Parker Anderson
"Science of the Green Initiative"

Dr. Angela Orshinsky
"EIQ Reduction Programs
for Dollar Spot Management"

Ben VanRyzin
"Curative Applications
and Intervals for Dollar Spot"

Sam Bauer
"Soil Wetting Agents for Water Conservation"

9:00 -10:00 a.m. - TURFGRASS SPECIES

Dr. Eric Watkins
"The Potential of Tall Fescue in MN"

Andrew Hollman
"Fine Fescue No-Mow Grasses
and Consumer Mixtures"

Garett Heineck
"Perennial Ryegrass Breeding
and Seed Production"

Yinji Qui
"Fine Fescue Allelopathy and Snow Mold"

10:00 -11:00 a.m. - SPECIAL TOPICS

Dr. Vera Krishik
"New Insecticides for White Grubs"

Dr. Jon Trappe
"Carbon Sequestration of Turf"

Jonah Reyes and Ryan Schwab
"Irrigation Systems for Boulevards
and Roadsides"

- James Wolfin
"Pollinator Friendly Lawns"

GROUNDS TRACK

UFORE NURSERY

8:00 -9:00 a.m.
Jeff Hahn
"IPM Programs for Insect Management"

Michelle Grabowski
"IPM Programs for Disease Management"

9:00 -10:00 a.m.
Chad Giblin
"Dutch Elm Disease Research"

Andrew Jenks and Dan Heins
"Use of Drones in Landscape Management"

10:00 -11:00 a.m.
Dr. Gary Johnson
"Community Gravel Beds: An Option
for Developing Better Root Systems
and Reforesting Landscapes on a Budget"

Eric North
"Planting, Staking, Watering, and Pruning:
The First Year of Tree Maintenance"

Extension
Turfgrass Science

MTGF
minnesota turf and grounds foundation

ON-LINE REGISTRATION AVAILABLE AT www.mtgf.org

Within the Leather

by Onna O'Conner, daughter of Donnacha O'Conner, Superintendent at Alexandria Golf Course

For me, Alexandria Golf Club will always be "The Golf Course," or "Dad's Work." That was what I called it when I was a child and that is still what I call it now. As a Senior in high school, my thoughts on the golf course have changed quite a bit, but looking back, some things have stayed the same. One belief that remains untouched by time is that the golf course is a place to give things your all, in play and in work.

As a little kid, I would often go for rides with my dad while he did his rounds. Some of our most entertaining spins were when dad would go out to turn on the irrigation system. My dad would let me hop off the cart and run through the massive sprinklers to my heart's content. I would end up soaked and cold, but I remember on at least one occasion when he chose to help me out by giving me his massive shirt to use as a dress-blanket hybrid. Another, more messy activity that I engaged in, was playing in the sand used for refilling the bunkers. When you are a small child, and there are huge piles of sand just outside of your dad's shop, who could possibly resist the temptation? I couldn't. Playing 'ruler of all I see' is pretty fun, but what I remember the most was being hosed down by my dad afterwards.

Even as a kid, the golf course was also a place of work. There used to be a program called Spring Clean Up. Members would go out once a year in the very early morning to pick up refuse around the course. That program meant a lot to me. I was the youngest person there and probably the most enthused. I would be so proud to have contributed to something that mattered and I would not

stop talking about it for days. I looked forward to it every year. As things do as we age, it disappeared, and I forgot about it. But the work ethic, and the confidence that work instilled in me, is something that I treasure.

I am now working at the golf course during my summer holidays. A strong work ethic is highly valued at the golf course. You do your work fast, carefully and thoroughly. It might sound rigid, but I have come to find it rewarding. The more effort I put into it, the more connected to my work I become. You start to notice things about the course. Like the condition of the grass, the impact of other people's work and seeing what should be done to improve course conditions. You begin to appreciate the effort put into making the place function as it should.

This is something that I couldn't grasp as a child and am only just beginning to understand and explore.

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Finally, and possibly most importantly, this is the place where I was taught how to golf and where I continue to learn. From junior golf to competing in high school meets, this course has been the epicenter of my golfing experience. I have made connections with people who have taken an interest in developing my game here, which is something that I think is crucially important for any sort of progress.

Golf is an individual sport, but the way we interact with others because of it, builds a community. I've grown up involved in this course, like I'm sure many others have, and it is incredible to look back and see how my relationship and role has changed the older I have gotten.

Editor's note: This article was written by Onna O'Conner, daughter of Donacha O'Conner,Superintendent Alexandria Country Club. While it was written by her, it may as well have been written by any number of children who grew up with a father or mother in this business. It sums up the wonderful relationship between families, the course and the sport we all have grown to love.

Are you interested in writing a Within The Leather column? How about a family member, staff or even inspire your shop dog to create something fun, educational or inspirational for the Hole Notes Magazine? It is always better when YOU write it. Contact Dave Kazmierczak CGCS to join the fun and speak out.