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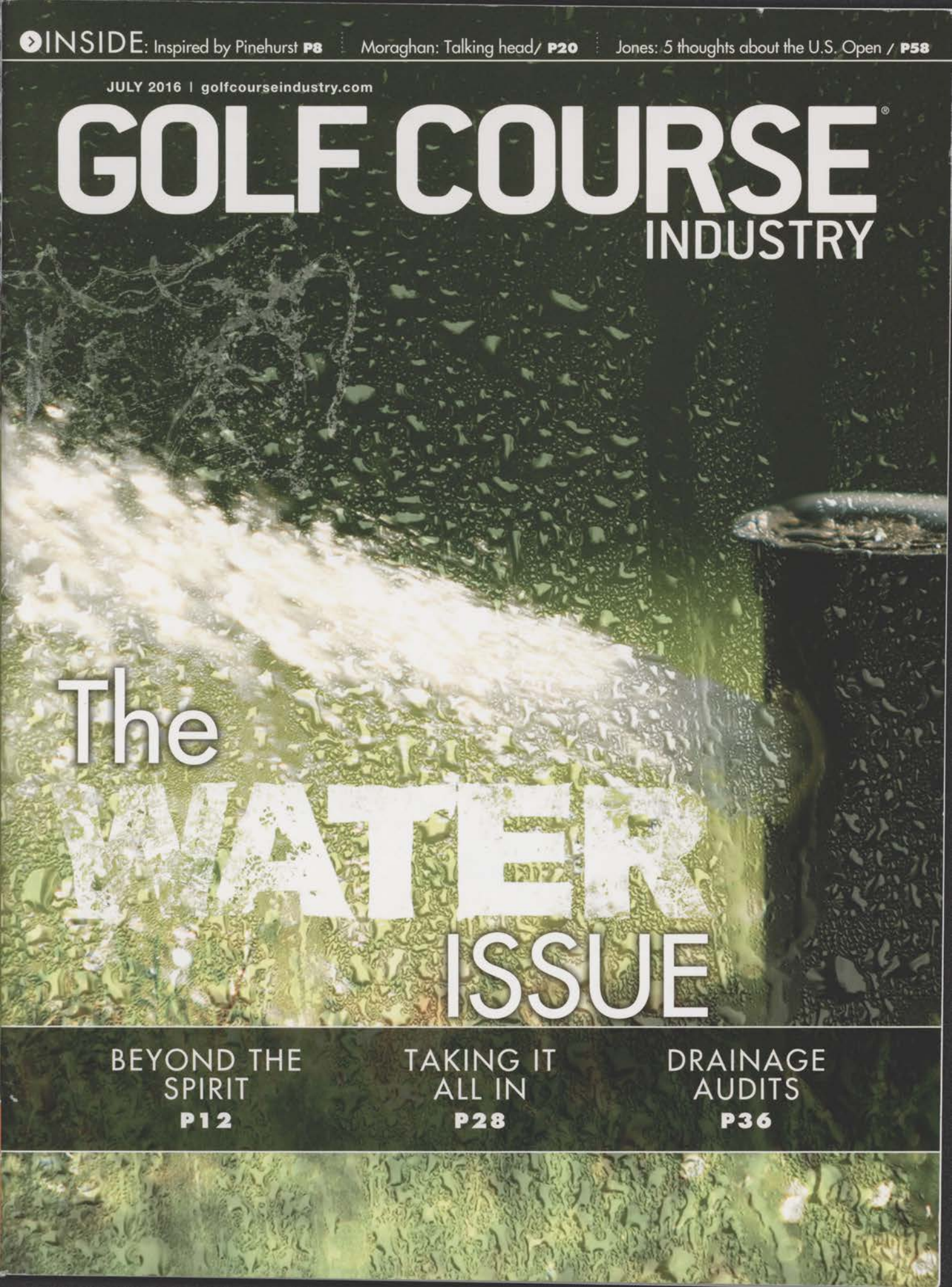

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VOL. 28 NO. 7

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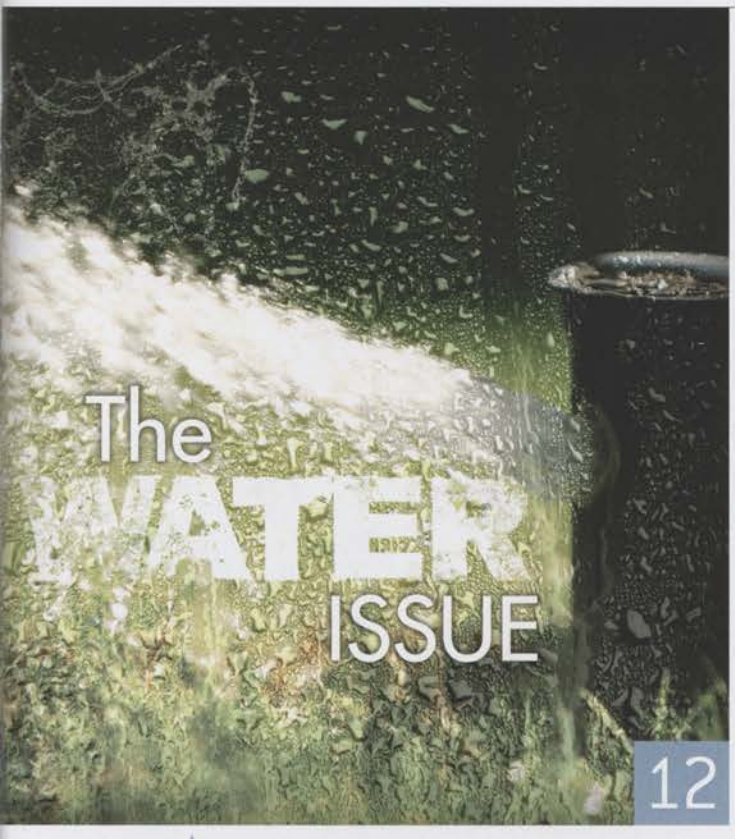

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DEPARTMENTS

THE WATER ISSUE

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WATER-LOGGED MIND

I'm a water junkie, especially this time of year.

A pool sits a flop shot from my townhouse and Lake Erie defines the northern stretch of our region. I spend little time at either place. Perhaps I should get a life away from the golf course.

When spring shifts into summer, we produce the issue resting in your hands. The goal each July is to provide content exploring all sides of the industry's water conundrum. Nothing about managing the resource on golf courses will become easier, something I'm reminded whenever I visit sites, speak with superintendents, watch golf on TV and read about the resource (while never sitting by the pool or on the beach).

Guy Cipriano
Associate Editor

Consider the story by our editorial intern Patrick Williams beginning on page 28: "Taking it all in." Using effluent water seems like a brilliant idea for courses in dry regions – until realizing the quality of water they are receiving can, well, suck. Simple gets complicated, and superintendents are scrambling to find solutions to a problem with major financial, political and environmental consequences. Disclaimer: We warned you in our June cover story "Pace of change" the next decade will bring massive challenges for superintendents. Water ranks high on the list.

I created a list of water-related items observed, heard or read during the past six weeks. Because it's July, let's make the list an external one.

• Severe flooding forced the PGA Tour to cancel The Greenbrier Classic scheduled for July 7-10. TPC Louisiana superintendent Brandon Reese has started a fundraising effort to help members of The Greenbrier's agronomic team affected by the disaster. The goal is to raise $8,000. Donations can be made by entering www.gofundme.com/2b5ivbo into your web browser. Having visited The Greenbrier twice this year, it's harrowing to ponder the plight facing director of golf course maintenance Kelly Shumate and his team. The staff is tight-knit, prideful, determined and unselfish. I'm confident we will hear more heroic stories originating from Greenbrier County, W.Va., as the summer progresses.

• The team of Oakmont staffers and volunteers assembled for the U.S. Open couldn't have handled a wicked 24-hour stretch better. Over 3 inches of rain interrupted the tournament's first day. The intensity level inside the maintenance facility between storms surpassed anything I witnessed during 10 years

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of covering professional, college and high school sports. That personal period includes a decade of covering college and high school wrestlers, the most intense dudes on campus. Storms temporarily altered Oakmont, yet failed to wreck a masterpiece. Superintendent John Zimmers cemented himself as the Dan Gable of modern agronomy with his performance last month. The biggest lesson the average superintendent can learn from Zimmers and his team? Don't sulk when the radar looks nasty.

• Seth M. Siegel's "Let There Be Water" and Peter Annin's "The Great Lakes Water Wars" are solid summer reads. Siegel's book describes the role proactive water management and investment played in making Israel a pillar of stability in an unstable region. Americans operating water-reliant businesses, including golf courses, can learn from Israel's ways. Annin's book focuses on a region with plentiful water. It will also scare anybody who believes they are working in a place immune to water supply problems.

• The first thing I noticed when walking Muirfield Village Golf Club three days before the start of the Memorial Tournament were crew members pulling "runners" along water features. Water features are a prominent part of Muirfield Village, and they are enhanced by a crew driven by details. Few things are a bigger turnoff to casual golfers than untidy streams, ponds and lakes.

• The wise men who manage turf at Pinehurst are experiencing another transformation that will decrease the resort's water usage. The greens on the No. 5 course are being converted from bentgrass to Champion Bermudagrass. Greens on five of Pinehurst's nine courses, including the famed No. 2 course, will now feature Champion Bermudagrass. Bentgrass covered every Pinehurst green less than a decade ago. "There is a different mentality now as far as keeping the greens alive vs. making the greens better and being better suited for our environment and our play demands," says John Jeffreys, superintendent of the No. 2 course. "We get more play June, July, August now than we probably did 10, 15 years ago. We are able to focus on better conditioning when we are at our highest levels of golf and not necessarily putting them on life support."

As I complete this note, parts of 43 states are "abnormally dry," according to the U.S Drought Monitor. Our sliver of the world falls into this category. It doesn't make me want to visit the pool or lake. But I'm enjoying the extra 25 yards of roll on my drives. **GCI**

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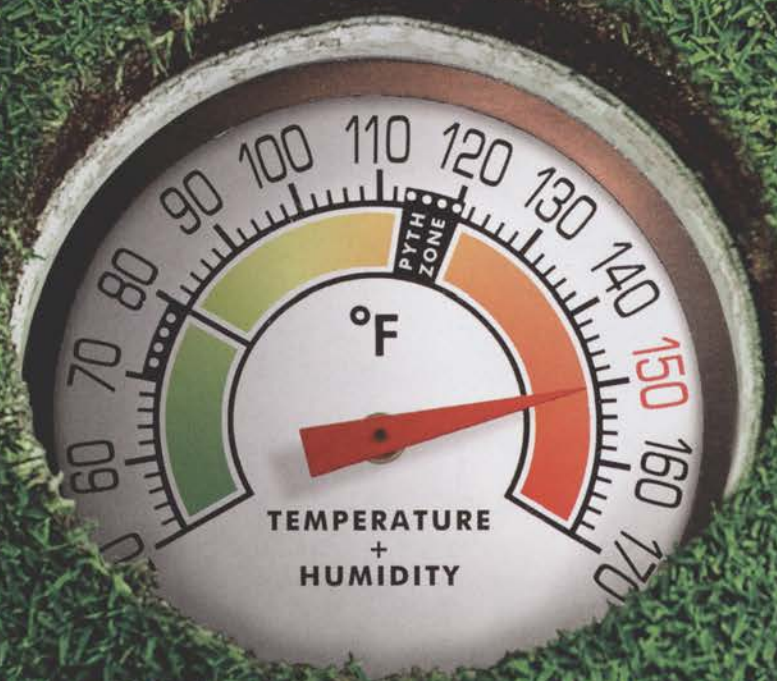

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Los Robles Greens in Thousand Oaks, Calif., used examples from Pinehurst No. 2 (pictured above) to educate community members about the changes created through a turf reduction.

Inspired by **Pinehurst**

By Guy Cipriano

Pinehurst No. 2 hums with activity in late May as superintendent John Jeffreys walks a four-hole loop on the famed course he manages. After returning to his utility vehicle, Jeffreys travels opposite play along the second hole.

Jeffreys spots a quartet of employees working in native areas. Two are driving carts; two are carrying backpacks. "There go our rough mowers," Jeffreys tells a visitor.

Selective spraying replaced mowing turf in 35 acres following a Bill Coore- and Ben Crenshaw-led project started in 2010 and completed in 2011. The design and maintenance of Pinehurst No. 2's native areas offers the industry an evolving case study of what happens when turf goes away.

Superintendents and architects are frequently seeking guidance from members of the Pinehurst team on how to handle the aftermath of a turf removal. In a move designed to further understand their own project, architect Jason Straka and members of the team involved in the turf removal at Los Robles Greens in Thousand Oaks, Calif., (page 12) visited Pinehurst to learn from the experiences of Jeffreys and director of golf course and grounds management Bob Farren. "One of the things that I truly wanted to learn was how they manage it, how they maintain it and what impacts and decisions we were going to be making from the design side of things had on maintenance

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and playability," Straka says.

Thousand Oaks and Arcis Golf officials had agreed on reinventing Los Robles before the trip, but Pinehurst No. 2 served as an example of the looming changes for Los Robles customers. Infoboards, including one describing the changes at Pinehurst, were placed in prominent areas of the pro shop. "It gave us confidence," Arcis Golf vice president of construction Ed Easley says. "They were in their fourth year into it, which is hugely important because they were at that point we knew we needed to get."

The fourth year of less turf at Pinehurst No. 2 didn't resemble the first, second or third years, according to Farren and Jeffreys. And the fifth year didn't resemble the fourth. "There are so many variables with the golf course, whether it's the weed pressure or undesirable plant pressure in the native areas," says Jeffreys, who was promoted to superintendent after the resort named Kevin Robinson golf course maintenance manager in fall 2014. "It's an ever-changing thing."

If there's such a thing as normal for the revamped Pinehurst No. 2, then the crew experienced it last summer. The majority of the maintenance efforts following the restoration focused on preparing the course for hosting the 2014 U.S. men's and women's opens. A conversion from bentgrass to Champion Bermudagrass greens followed the women's open. The summer of 2015 proved wet, and Farren says they learned "it can go two days without rain and we are great, and then it could rain for two days and stuff is popping up everywhere."

Jeffreys calls learning how to manage native areas "a thorough process." Pinehurst gives employees a yardage-book sized guide to plants and weeds they might encounter while working on the course. Experienced workers guide newcomers through the native areas. After observing test plots in fall 2014 and spring 2015, a pre-emergent spray program was implemented for the first time this year and it has shown positive results controlling crabgrass and goosegrass, Jeffreys says.

The changes at Pinehurst No. 2 stemmed from ownership's decision to return to the original Donald Ross look, and Farren says the USGA made "a lot bigger deal" out of the water conservation angle than anybody at the resort expected. "Come U.S. Open I was overwhelmed with the amount of conversations they wanted to have about water," he adds.

Quantifying water savings related to the restoration is tricky, because Pinehurst lacked specific numbers about its water usage before 2010 and irrigation records also include data about usage at the resort and landscaping within the village. Annual rainfall totals in Pinehurst can experience sharp fluctuations. Farren, Jeffreys and Robinson are gracious with their time, and they urge colleagues and other industry figures perils are attached to emulating Pinehurst's turf removal.

"Bill Coore said it best," Jeffreys says. "He said, 'John, there's no textbook on these things. You have to learn as you go. You will be able to pass information along and share what your mistakes have been and what your successes have been.' That would be the first thing I would tell somebody – there is no textbook. There are going to be things you are going to learn."

History is another separator between Pinehurst No. 2 and other courses. How many courses rest across the street from where Ross lived? Pinehurst No. 2's native areas also receive little cart traffic because of the widespread use of caddies, an often overlooked separator.

Still, as long as operators see value in removing turf, anecdotes from Pinehurst No. 2 will be used in places such as Thousand Oaks, Calif. "Very seldom does a week go by that we don't reflect on '14 and certainly the restoration," Farren says. "It still has legs as far as people having an interest in it." **GCI**

From THE FEED

It's become a U.S. Open Sunday tradition. We ask our followers their thoughts about the course. Oakmont easily passed the turf community's viewing test.

Ryan Mosley
@rhino_deuce
Length of rough and keeping the greens at a very fast speed.

Cory Janzen
@westmountgreens
What didn't impress me was turf people criticizing Oakmont for achieving greatness. Don't understand it.

Tyler Bloom
@tbloom_SPCC
Relentlessness of JZ, DD and staff. Never quit no matter what Mother Nature threw at them. Highest level of conditioning

Kevin Hicks
@golfsuper1992
Spectacular conditions from tee thru greens. I clearly have rough envy, and greens are amazing. Glad I don't have to putt them

Gary Myers, CGCS
@basfpinehurst
@golfsuper1992 I totally agree. Golf course was impeccable and some of the healthiest turf I have seen. Greens healthy at 15.

Matt Carmeci
@Bunkboy5
Everything. What an amazing job by John Zimmers, his crew, and volunteers. Unbelievable playing conditions!

WHAT MIGHT YOU EXPECT?

Brian Vinchesi, the 2015 Irrigation Association Industry Achievement Award winner, is President of Irrigation Consulting, Inc., a golf course irrigation design and consulting firm with offices in Pepperell, Massachusetts and Huntersville, North Carolina that designs golf course irrigation systems throughout the world. He can be reached at bvinchesi@irrigationconsulting.com or 978-433-8972 or followed on twitter @bvinchesi.

Are you like many other golf courses at the moment, finally getting to the point with your membership/board that a new or upgraded irrigation system is a possibility or necessity? The number of new irrigation systems being installed on existing courses is certainly on the rise. Since the economy tanked in 2008 and the golf business was hit hard, many courses put off making any course improvements, including new irrigation systems. Now in 2016, this pent up demand is quickly resulting in new irrigation systems. If your course is thinking about a new irrigation system, you need to start your planning now. Plotting three to four years ahead is not too soon to start and not uncommon. A shortage of qualified golf course irrigation installation contractors available to install your new system may occur as quickly as next year. More golf irrigation work will add new golf irrigation contractors to the market, but that is not necessarily a good thing as the contractor is the most essential part of any irrigation system installation and they come from experience.

If you're about to start an irrigation system project, here are some things you need to think about so that your designer can give you what you want. For piping: PVC, HDPE or a combination of the two? Today's systems can be all PVC, all HDPE or PVC mainlines with HDPE laterals so there are no solvent weld cemented joints.

Probably the biggest decision in today's irrigation system is field controllers versus decoder/2-wire. The systems are quite different and you need to make your decision based on which of the two meets your management style and provides a comfort level in terms of reliability and functionality. Today you can mix them a bit – you can install remote interfaces on the golf course to connect the wire paths to, which reduces the amount of wire needed from the maintenance facility. You then radio from the central computer to the remote interfaces.

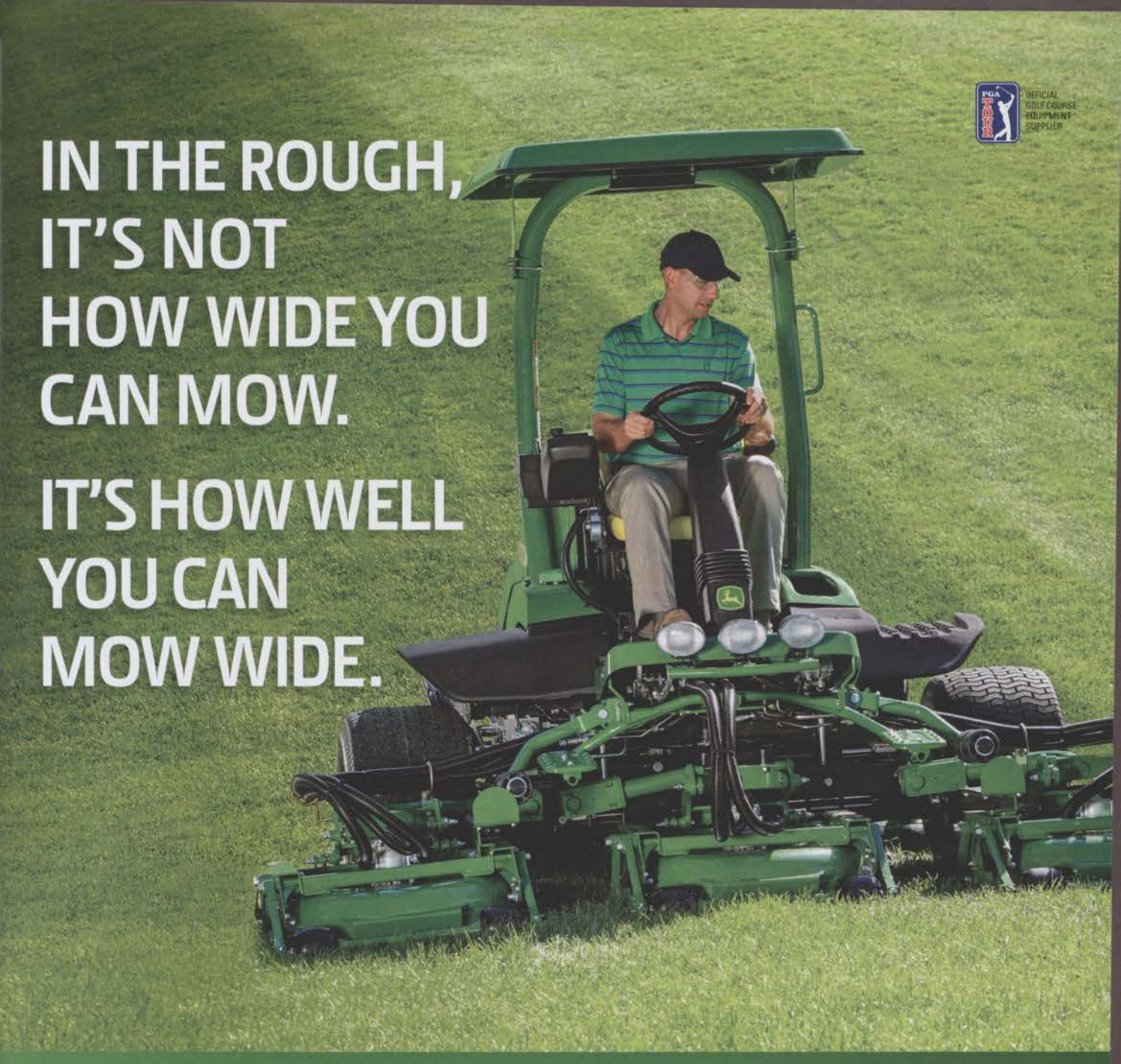
For years, greens were full-circle sprinklers, then in order to keep the greens drier designs were full circles with part-circle sprinklers out for the surrounds. This morphed into parts in and parts out so greens could be watered completely separate from the surrounds. Now, there is a trend back to full circle on the greens and part circles out for the surrounds. Your choice will be somewhat dependent on how you're treating the approach, as full circles at the front of the greens may not be possible. You also need to decide if you want your bunker faces irrigated.

Consider installing equipment that provides information that helps you make smarter decisions when it comes to irrigating more efficiently and saving water. Weather stations seem to have outlived their usefulness given the availability of weather apps. Portable and dedicated soil moisture sensors provide more timely and accurate data that can be reacted to more quickly. These sensors also can graph trends and when programmed correctly provide alarms to bring problems to your attention. Tipping bucket rain gauges spread throughout the golf course can provide local area (several holes) rain measurements that can then adjust your irrigation schedule based on the amount of rain that fell for specified areas of the golf course.

Take a good look at your hand watering needs. For many years, pump stations have been a small pressure maintenance pump and two or three main pumps depending on the required flow; all the same horsepower. Now consider a pressure maintenance pump, the main pumps and a jockey pump sized just for hand watering and any other constant demands such as green cooling systems or waterfalls on its own VFD drive. Avoid purchasing a pump station that requires a main pump to operate for low flows such as hand watering.

With a proposed new system you need to budget, budget and budget. Make sure your budget includes all the potential components of your irrigation system project. This includes rock excavation, design fees, permitting, lightning protection systems, renovation costs, paving repair, boring costs, electrical updates and extended warranties or service contracts. If you're a few years off, build in an escalation cost per year for price increases.

Today's systems are getting more expensive each year, but money spent now will pay for itself over many years in terms of water and energy savings. Unfortunately, as more courses are looking to install irrigation systems, the cost of labor is on the rise, so the sooner you can get an idea of your project schedule, the better off you are. A system that is to be installed in the fall of any given year should be bid out in January or February of that year to secure a place on a good irrigation contractor's schedule. **GCI**



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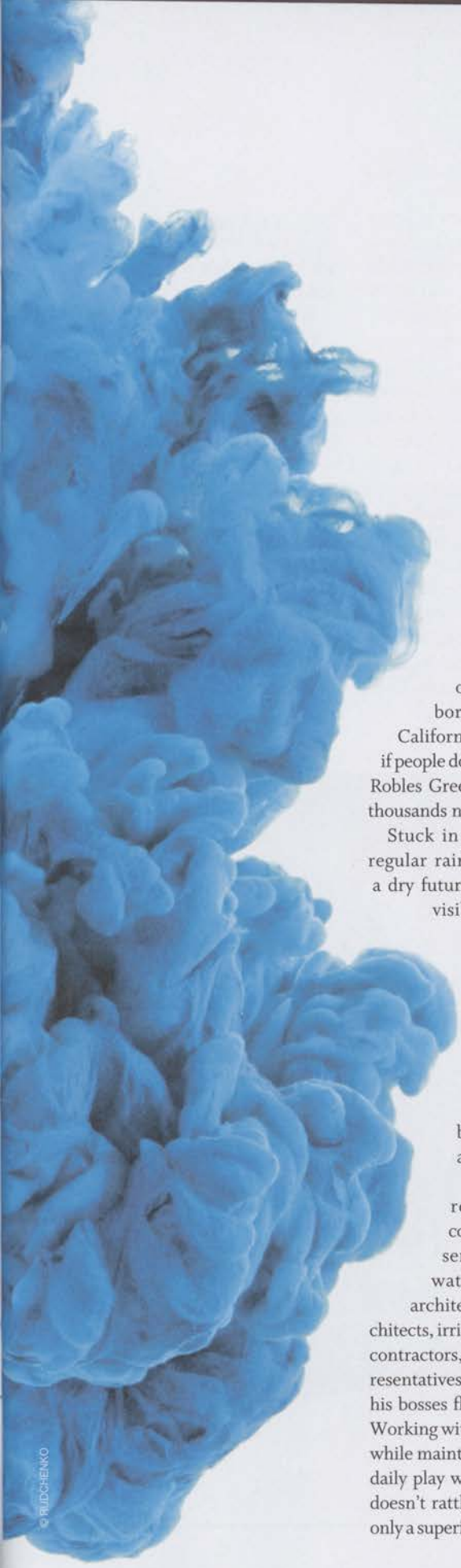
BEYOND THE SPIR

By **Guy Cipriano**

A Southern California mega-collaboration demonstrates how water conservation projects are being taken to the next level.



© RUDCHENKO

Ron Kerley is a superintendent who works for a management company operating a course bordering an iconic California highway. Even if people don't experience Los Robles Greens, Kerley knows thousands notice the course.

Stuck in a region lacking regular rainfall, thoughts of a dry future are shaping the visible course's present. Los Robles, a municipal facility along the Ventura Freeway in Thousand Oaks, Calif., recently reinvented itself by removing 41.6 acres of turf.

The project represented a mega-collaboration to conserve water. Kerley watched golf course architects, landscape architects, irrigation consultants, contractors, water district representatives, city officials and his bosses flock to the course. Working with a bevy of entities while maintaining a course for daily play with a crew of nine doesn't rattle Kerley. "I'm not only a superintendent," he says, "I'm a business-minded superintendent. With the water costs almost doubling in the nine years that I have been here, I knew there was something that needed to be done."

For all the chatter about El Nino, increasing Sierra Nevada snowpack and the lifting of state-mandated water restrictions, golf remains a tricky, unpredictable and cutthroat business in Southern California. A facility such as Los Robles, which is owned by the City of Thousand Oaks and managed by Arcis Golf, appeared to be a tap-in for future success, using solid conditions, a desirable location, affordable green fees and interesting layout to attract 75,000 rounds per year before the renovation.

But the city and Arcis Golf determined complacency might not yield a prosperous future. They saw themselves competing with a dozen public courses within a 20-mile radius for a customer base showing no signs of expanding. They also saw the course's annual bill for low-quality potable water surge past $500,000.

On the eve the Metropolitan Water District was set to expire in May 2015, city and Arcis Golf officials contacted Fry/Straka Global Golf Course Design's Jason Straka at his Dublin, Ohio, home. They wanted a plan by midnight. "I was like, 'Wow, OK. Let's get a

Ron Kerley

POSITIVE THOUGHTS

Major renovations are grueling for any superintendent. Changes become even trickier when a course remains open during construction.

Breaking the process into small parts allowed superintendent Ron Kerley to endure what he encountered at Los Robles Greens.

"You just have to stay positive," he says. "That's the main thing. It's easy to get distracted with all of this going on. If you remain positive through this and persevere through this, it's only going to be that much easier, because negativity brings you down. You have to say each day we are one step closer to getting to that final product."

plan done in the next four or five hours,'" Straka says. "Talk about making phones calls to staff that were having dinner or whatever."

Thousand Oaks finance director John Adams says the potential of receiving a more than $1.5 million rebate spurred the action, although the parties started exploring options nine months before concocting a formal plan. Their goal extended beyond making the project a rebate-securing cash grab.

"The easiest way to do it would have been to take the turf out, put landscaping plants in, fix the irrigation and call it good," says Arcis Golf vice president of construction Ed Easley. "But we all collectively stood out on a plank and said, 'Let's do something different and unexpected to not only put Los Robles on the map from a conservation standpoint, but from a design and remodeling of what Los Robles really could be.'"

MORE THAN THE MINIMUM

Los Robles' first hole runs north. The 18th hole heads south. A steep bank separates the first tee and 18th green from a staging area for golf carts below the clubhouse. Los Robles incudes space for weddings, banquets, meetings and community events. Visitors who never step on the course notice the view of the holes. Today they see a landscape epitomizing the intent of the project: vast clusters of mulch created from green waste dotted with young plantings where turf once rested.

California fescue was planted in March, and landscape architect Brian Brodersen of Brodersen Associates Landscape says the fescue requires no water after establishment. The fescue provides temporary challenges for Kerley and his crew, and employees are being added until the native areas mature. "It's going to be a learning process for the whole team the next 18 months to maybe even two years," Kerley says. "And it's going to be more of a not just sitting on a mower and mowing grass, but weeding and spot spraying and watering stuff that needs water."

In addition to California fescue, Brodersen says manzanitas, salvias and oak understory plantings are among the primary plants being established at Los Robles. The total number of plants added through the project will exceed 35,000. "What this course does which is really a departure from what I have seen and been involved in thus far is that once you get onto the golf course itself, everything we are planting should never need another drop of water and should do a fairly good job of

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providing some aesthetic benefit to the golf course and the golfer experience," Brodersen says. "It makes perfect sense."

Covering native areas with appealing, drought-tolerant plants instead of leaving decomposed granite or recycled green waste alone and hiring an expert such as Brodersen, a landscape architect since 1990, are among the examples of Los Robles going "beyond the spirit" of a rebate program. Filling the team assembled to complete the project with industry veterans further illustrated the commitment to using the rebate to improve the golfer experience.

Straka, who completed a turf removal in 2013 at Camelback Golf Club in Scottsdale, Ariz., that reduced the irrigated acreage on the resort's Ambiente course to 90 acres, used two decades of design experience to craft architectural plans for Los Robles. Bryant Taylor Gordon Golf reconfigured the irrigation system to fit the new landscape. American Landscape served as the contractor and developed ways to complete work while the course remained opened. Everybody selected for the project had what Easley calls a previous "working relationship" with Arcis Golf.

The acreage removed exceeded 21 acres, the maximum total covered by the MWD

WAIT ON IT

Longtime landscape architect Brian Brodersen says don't expect an immediate water savings when replacing turf with native areas consisting of plantings and grasses.

"What courses are finding right now is the water use is not going down. Part of that is because there's so much water intensity at establishment," says Brodersen, who guided plant selections at Los Robles Greens. "For instance, everything at Los Robles, every grass, is being handwatered to establishment. That's not going to last very long and then we are going to be home free. But I think a lot of the courses have not taken the same strategy and they have a lot more garden intense plantings so they are taking the same amount of water because they are using it to establish the plantings. Down the road, all that savings should come back to California and we should have a water reduction."

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A pond was drained and removed on the ninth hole at Los Robles Greens and replaced by a waste area filled with sand, mulch, native plants and rocks.

© LEFT: GUY CIPRIANO
RIGHT: ED EASLEY

rebate. The city and Arcis removed an additional nine acres. Los Robles also included 11.6 acres of existing non-turf areas. Before the renovation, the course had 85 irrigated acres and used an average of 78 million gallons of water per year. Officials are projecting the renovation to reduce water usage by 20 to 25 percent.

'SAVING WATER IS BETTER!'

Kerley continuously evaluated Los Robles' water situation during his first eight years as superintendent, and proactive measures such as not irrigating driving range turf and turning heads off in wayward areas put Los Robles in a tricky spot when Gov. Jerry Brown announced state-mandated water restrictions last year. The water district serving Los Robles required 32 percent usage reductions, 7 percent higher than 25 percent target for most of the state. Kerley and his bosses all asked the same question: How does Los Robles hit mandated targets without removing turf when

it had already significantly trimmed its water usage? In a surprising move, Brown lifted the mandatory restrictions this past May, leaving local water districts to decide appropriate conservation targets.

Arcis Golf manages courses in 15 states, but Easley says nothing compared to the mandate California experienced. The lifting of the mandate offers little protection for the price of water, which everybody involved with Los Robles only sees increasing. The cost of water was $2.70 per unit when Kerley arrived in 2007. That number has swelled past $6. Los Robles' operators budget for dry weather. "We make money when it rains," Easley says.

"Water is never going to get less expensive," Adams adds. "It's going to become more and more of a commodity in the infrastructure that's going to be needed to support Southern California going forward. This is a major step in that direction. Who knows? Maybe as time goes on and we learn from this renovation and turf reduction, there might be other areas that we are going to have to trim. Going forward Ron is going to be looking at other opportunities to reduce water wherever we can, but not necessarily impact play."

Customers are playing a revamped course, with 37 bunkers surrounded by kikuyugrass faces. A pond in front of the ninth green was drained, removed and replaced with a naturalized area. Giant oak trees frame numerous holes and offer barriers between the hilly course and the Ventura Freeway. The trees guzzle water, but local ordinances make them near impossible to remove. Los Robles, coincidentally, means Oaks in Spanish.

The project represented Los Robles' first major renovation of the existing footprint since the course opened in 1966. "In looking back, we should have made the decision sooner," Adams says. "I think what happens is the course is doing 75,000 rounds, it's busy, people are enjoying it. There is no reason to change it, so you are afraid. You don't want to remodel a course and lose a lot of rounds, a lot of regulars."

Perhaps nobody has embraced the changes more than Kerley, who energetically scurried between holes during a crisp, sunny March day. Everywhere he traveled, he encountered a stop-worthy scene: a pond being eliminated, bunkers taking shape, plants arriving at staging areas and teenagers playing twilight nines. So much to process. So much to anticipate. Kerley's Twitter profile reads: "Green is Good ... Saving water is better!" The course Kerley manages – the one everybody sees along the Ventura Freeway – is now positioned to achieve the exacta. **GCI**

TALKING HEAD

Tim Moraghan, principal, ASPIRE Golf (tmoraghan@aspire-golf.com). Follow Tim's blog, Golf Course Confidential at www.aspire-golf.com/buzz.html or on Twitter @TimMoraghan

Yo! Down here. Yeah, in the grass. The round plastic thing. Jeez, watch it. You stepped on me and didn't even look first. It's like you were trying to scratch me with those spikes. Oh, OK, they're rubber nubs. They still hurt. The second you turn around, I'm hosing your ass.

See me? 'Cuz I'm talking to you, and I've got some things to say about sitting here for 35 years spraying water. You know what? I'm tired.

Tired of being in the ground, tired of these long winters. I want to go south, get outta here, no more frost and snow. Jersey winters are the worst. And it doesn't make it any better if you're not going to take care of me.

No, nobody died and made me king, but on behalf of every irrigation system on every golf course everywhere, someone's got to speak up. And I'm from Jersey, y'know, Springsteen country. And yeah, I'm born to run, too. But if you don't take care of me and the other old sprinkler heads, we're not going to run at all. And it's gonna be your head on the chopping block, buddy. Not mine.

So let's talk about water. And moving it around a golf course. Not even on the course, under it. In the ground, all this time, cold and wet and bugs and dirt. It's a hard life. I'm no different from you. I've got a heart, a circulation system, and my joints need to be lubricated on occasion. And if one of my bones breaks, it doesn't heal. Someone has to dig me up and replace it.

Blowing out my system every fall takes its toll. Firing me up every spring is no piece of cake, either. You know what they say after you turn 50, but in my case it's after 30. If you think you can get an old system to run like some young kid, you're wrong. I've been slowing down for a few years already, and the components don't work like they used to. So if you want to keep me going, here's what you gotta do.

I know money isn't easy to come by at clubs these days. I spray water, but I'm not wet behind the ears: We're talking golf clubs, not the Bada Bing. I get it. Budgets are tight so finding a replacement for me is an uphill battle. Replacing me and the whole system is a multi-million-dollar job, and even though we all know it's a good idea, it's probably not going to happen; unless you're in the waste management business. So you should be treating me better. With respect.

Start with my diet. Eat too much pasta and it'll clog your arteries. Same with me: If the quality of the water running through me isn't good, it'll screw up my valves, nozzles and gear drives. The better the water, the cleaner the arteries.

We Jersey guys have got a big heart. Mine's the pump station, and it needs some TLC to run efficiently. The older I get, the more you have to check it. All those changes in the weather, the heat and cold, they take their toll on my ticker now that I've matured. Remember, when my pump is running efficiently, your costs go down. Fewer repairs, less labor, not as many service calls.

You better keep my circulatory system clean. I need screens on my system intake. Muscles and clams belong on linguini, not in my pipes.

Something else about getting old. Listen to the doctor. You go to the urologist to keep your system from leaking. My guy, Dr. Mike Huck, says exercise in moderation is a good idea. Exercise my valves, open them, shut them, open them, shut them. You can't leave them open for 20 straight years or my threads will corrode. You want to see stiffness and irrigation arthritis? Old bones need lubrication.

When I went in the ground back in the '70s, not many clubs had weather stations. Now they're everywhere, which is good. But that doesn't mean they're always right. If they aren't temperature correct, they go off too frequently or not enough. Most of the modern stations are run by small solar panels, so keep them clean.

At my age, I can't turn it on at moment's notice … and I don't need to wake up every hour just to irrigate. Ya know what I'm sayin'? This ain't a Viagra commercial.

Speaking of flow, if you really want to disrupt mine, put a head in the ground so it isn't level. Or forget to keep me clean, jammed with grass clippings. It's not too good for the nozzles, gear drives, and internal workings, either. I have to work harder if you and your crew don't work on me. Don't leave it to chance that I'm gonna be alright. I won't. Trust me.

And make sure the irrigation tech has the latest equipment, not an old rusty shovel. Puh-leeze.

With us irrigation systems, 30 is the new 60. We're aging faster than you think, which means I'm getting real close to retirement. So protect me before I head south. By which I mean dead. Buried. Kicking up fescues instead of watering them.

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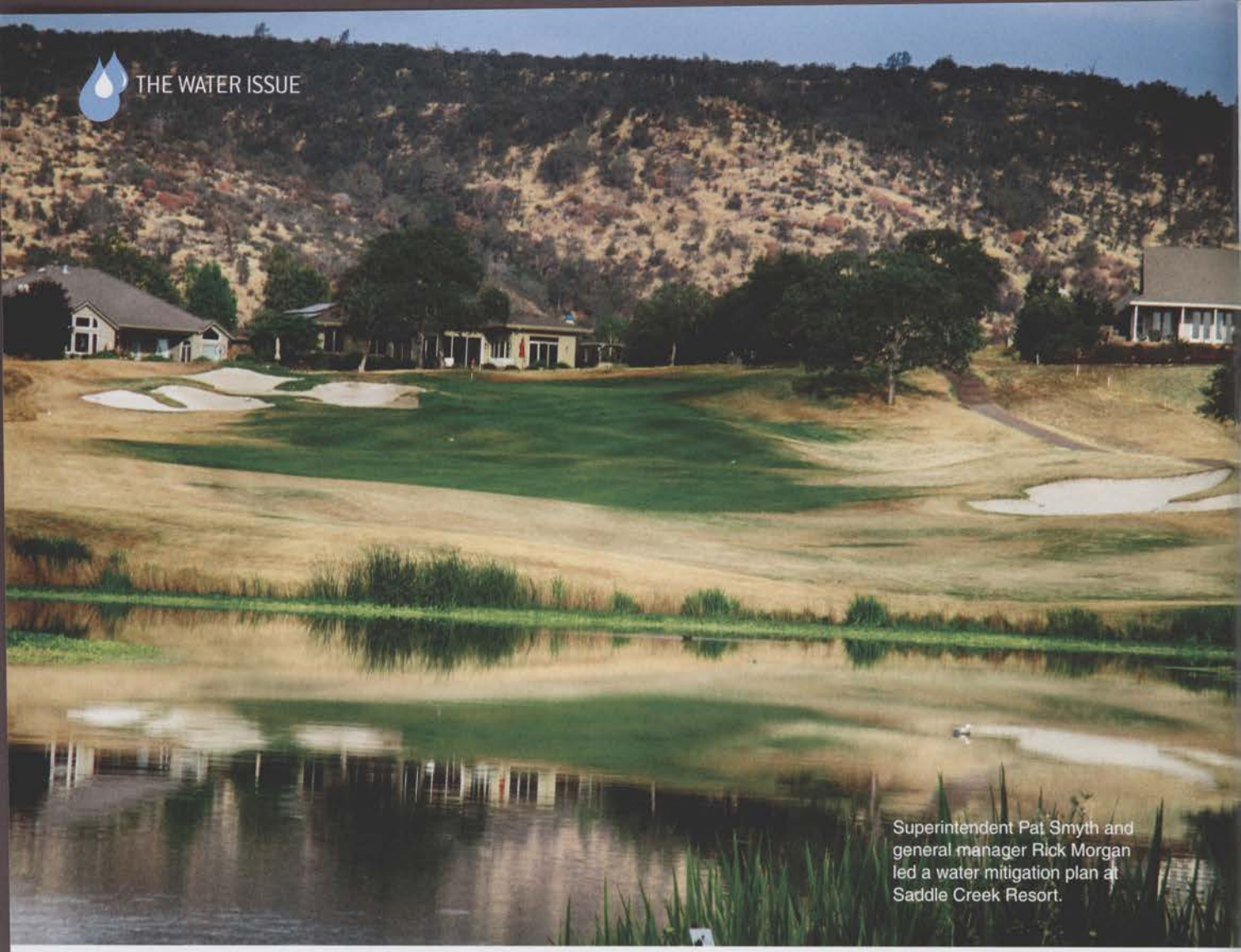

Superintendent Pat Smyth and general manager Rick Morgan led a water mitigation plan at Saddle Creek Resort.

FAST AND AFFIRMED

Management at **Saddle Creek Resort** see new savings and increased play upon mitigating water during the California drought.

By **Patrick Williams**

In California's Sierra Foothills, near the southern pointed tip of Calaveras County, Saddle Creek Resort wears dead rye rough grasses like badges of honor.

The golf course is easily distinguishable now from its comparatively green state in 2012 and 2013, before what became one of California's worst recorded droughts started heating up and management spent more than $60,000 and 10-hour-day, seven-day work weeks on water conservation.

Together, superintendent Pat Smyth and general manager Rick Morgan spearheaded a water mitigation program that is equal parts moral and economic. They have altered their irrigation practices to

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purposely allow more than half of the course's maintained acreage to die. Paired with other measures, like creating paths for golf carts so as not to tear up the dead turf, the team have embraced new aesthetics, all while saving costs on water and maintenance and keeping golfers satisfied.

Designed by Carter Morrish, Saddle Creek's 18-hole championship course opened in 1996. Before the drought, the course, which sits on Castle & Cooke-owned property, touted about 120 acres of maintained acreage. Not long after the drought hit in 2012, management allowed that number to decline, until it hit about 55.

Prior to the drought, Saddle Creek's irrigation supply consisted of about 70 percent raw water pumped from nearby Lake Tulloch and about 30 percent recycled water. The first of the major water conservation efforts at Saddle Creek took place in 2013, Smyth says. Crew members began to water fewer outer bank areas and adjust a number of full-circle irrigation heads to part circle.

In 2014, Gov. Jerry Brown requested statewide voluntary water cuts of 20 percent. The Calaveras County Water District issued a water shortage contingency plan, cutting water use by 35 percent at schools, parks and commercial landscapes, such as golf courses, says Joel Metzger, water conservation coordinator for the district.

In compliance, management at Saddle Creek took new chances, such as adopting the use of wetting agents, and continued to conserve water. "It was actually the first time in my 10 years here that we were irrigating on an as-needed basis in December, which is kind of crazy," Smyth says.

Saddle Creek Resort has decreased its irrigated acreage from 120 to 55. Allowing rough to turn dormant was one of the water-saving practices implemented by superintendent Pat Smyth and general manager Rick Morgan.

Then, in April 2015, Brown issued an executive order mandating statewide water cuts of 25 percent. That spring, the Calaveras County Water District cut Saddle Creek's water use to recycled water only, which Smyth says was not enough to irrigate tees and greens. Following talks between the course and the water district, the district agreed to give the course 100,000 gallons of raw water a night, and later increased it to 200,000 gallons a night – a fraction of the course's previous flow of 800,000 to 1 million gallons a night.

At the crux of Smyth's conversation with Morgan and the resort's golf professional at the time, Tyler Brown, was how to comply with these regulations while maintaining the course's aesthetic look. An "obvious answer," Morgan says, was to let the driving range die, while continuing to maintain the tee box. However, that wasn't going to be nearly enough. The team decided to allow more than 40 acres of rough to turn dormant and yellow to make it contrast with the plush green of the rye fairways and tees and bentgrass greens.

"We didn't have much of an alternative, other than allowing the entire golf course to go somewhat green, and just cutting everything back and losing the look of the golf course," Morgan says.

So the crew completely cut out irrigation to the rough. Out of the course's 1,500 to 1,600 irrigation heads, Smyth and crew took about 450 of them completely offline and limited about another 350 of them to 180-degree turns to water the fairways. They replaced approximately 200 irrigation heads to make them part circle. Smyth, assistant superintendent Brandon Russell and then-irrigation technician Josh Fleck spent 10 hours a day, seven days a week for multiple weeks altering the irrigation system, while three to four other employees hand watered. Additionally, Smyth and crew built low-flow sprinkler sets and put two on each hole; lawn and needle tined; put mobile moisture meters on tees, greens and some fairways; and installed turf guards. They also incorporated about 15 acres of dead fescue grasses around greens, tees and bunkers.

In worries that golf carts driving on the dead turf would turn a significant amount of it into dirt or mud, the team designed cart access and exit areas to and from the fairways, and advised drivers to stay within the parameters of the cart paths. At first it was difficult convincing players to stay off the rough. As intended, though, the unorthodox method worked and helped maintain the course's new aesthetics.

It wasn't cheap or effortless to overhaul long-established management practices. Irrigation heads alone cost about $40,000, and labor and other expenses cost at least another $20,000 to $30,000, Smyth says. "It was definitely a stressful time for me, because I'm having to run the operation and

make this work," he says. "I fell into it and I believed in it, but it was tough to know if it was going to work until we got down to it."

Over time, the water mitigation program proved successful. The course has saved several million gallons of water—$20,000 worth in 2015—and 7 to 10 percent of its maintenance budget. "We're not only saving on water," Smyth says. "We're saving on our electricity because our pumps aren't running 12 hours a night and then all day long. They're pretty much running 20 hours a day because our water window is shortened. So we're saving on electricity, we're saving on water, we're saving on labor, because it's dead—we don't have to mow it—we're not having to fertilize, we're not having to put any herbicides or pesticides out there."

What's more, play has actually increased. Golfers like how the ball rolls farther and they often roll back into the fairways because the rough areas slope toward them, Morgan says. "There's a lot to be said about ensuring that it is about the golfers, and golfers love to be able to hit the ball down the fairway and have it bounce and roll," he says.

Following long-awaited winter rainfall and snowpack, the early spring of 2016 brought green grass growing up in the dead turf, Morgan says. In a move that might not have made sense in years past, the crew went out to kill the healthy grasses that were popping up to keep the boundaries defined and less splotchy.

In May, the Calaveras County Water District lifted the gallon water restrictions on Saddle Creek, Metzger says. The district will continue to provide the course with water from Lake Tulloch, as long as it first uses its recycled supplies.

In case the drought does linger, Smyth says, it would be in everyone's best interest, including his own, to ease back into regular water use rather than just watering what they used to.

Crew are again maintaining target areas on the driving range with a negligible amount of water, Smyth says. They also are considering switching to drought-tolerant grass rather than cool-season grass.

FOLLOW THE LEADER

The days of soft and mushy golf courses are gone because golfers are going to find that soggy courses in the summertime immediately transition into water abusers, says Saddle Creek Resort general manager Rick Morgan.

Many Californians outside of its golf community perceive courses take advantage of water resources, says superintendent Pat Smyth. They point fingers at courses and farms for being water wasters, while they keep water buckets in their showers and can't water their yards.

Smyth and Morgan agreed conserving all that water was the right thing to do. They wanted management at other courses to know they were taking initiative. "What we really wanted to try to establish is that, if your course wasn't brown in some areas, you're really not doing your part," Morgan says.

If the water situation continues to improve throughout the year, the crew will overseed in the fall and bring some of the dead areas back online, says Morgan, who estimates water use will be around 30 percent less than pre-drought levels. That usage will be higher than it was in the height of the drought of 2015, but about the same as what most clubs in the area were using at that time, he says.

"If you want plush grass on your lawn and you want water coming out of your tap, everybody needs to take a serious look on just how much water is being put on your golf course," he says. "What you can comfortably cut back on is going to help everybody. The industry is having a tough time, and things like this, I think, are going to help the overall impression of what golf is all about." GCI

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Jeffrey D. Brauer is a veteran golf course architect responsible for more than 50 new courses and more than 100 renovations. A member and past president of the American Society of Golf Course Architects, he is president of Jeffrey D. Brauer/GolfScapes in Arlington, Texas. Reach him at jeff@jeffreydbrauer.com.

I came across some 50-year-old green details from my mentors, Killian and Nugent, last week, at the same time I was preparing two new green details for a current renovation project. It was a great chance to take a step back and reflect on how golf course design has evolved over half a century!

The Green Detail plan has been a staple of golf design since at least the Golden Age, with Ross and MacKenzie, among others, preparing plans to convey their design ideas. Greens are the most important design elements, and they deserve/require more detail to convey their nuances as best as possible to those constructing the greens. That was especially true in the days when train travel limited the number of site visits an architect could make to a site.

Post-WWII architects kept that business model going, even with air travel coming of age, preparing more plans and making site visits from once per week to once per month, and letting their plans speak mostly for them, although most would also "wave their arms" and make field changes when they could. As travel became relatively inexpensive and design became more of a celebrity status, the final green design today is more likely to look less and less like the original plan.

Even the post-war green details evolved from the Roaring Twenties version. After the war, more golf course architects were trained as landscape architects and knew how to do a grading plan with contour lines. In earlier times, many golf course architects were immigrant Scots and their plans were covered with outline shapes of green, fairway and bunkers, some drainage flow arrows and notations like "Bunker (-3) feet below green surface."

In comparing my 2016 green details to 1966 Killian and Nugent green details, much is the same, and much is different.

PLAN SCALE/SIZE

In 1966, they drew green details at 1 inch=20 feet. Their mentor (Robert Bruce Harris) drew them at 1 inch=10 feet. They referred to those huge plans as "bed sheets." Their primary motivation to cut the size in half was ease of use in the field. Even those 24 by 36 inch sheets were hard to manage in the wind. Most of us, myself included, have reduced green detail plans to 1=30 feet, which easily fit on 11- by 17-inch sheets, or 40 scale, which fits on 8.5- x 11-inch sheets.

CROSS SECTIONS

Cross sections were a staple of those plans, at four different angles, intended to give the builder an idea of how much cut or fill they should expect in different areas. These have typically been eliminated or replaced by CAD generated plans that can shade areas of cut and fill differently to provide a similar graphic representation.

Robert Trent Jones (and later his sons) provided elegant birds eye view pencil sketches of greens as a further visual guide to their design intentions. Artistically inclined architects still do these, while most have used the 3D capability of their CAD software to generate similar views, with the advantage that one site model can generate many angles of views.

DIMENSIONS AND QUANTITIES

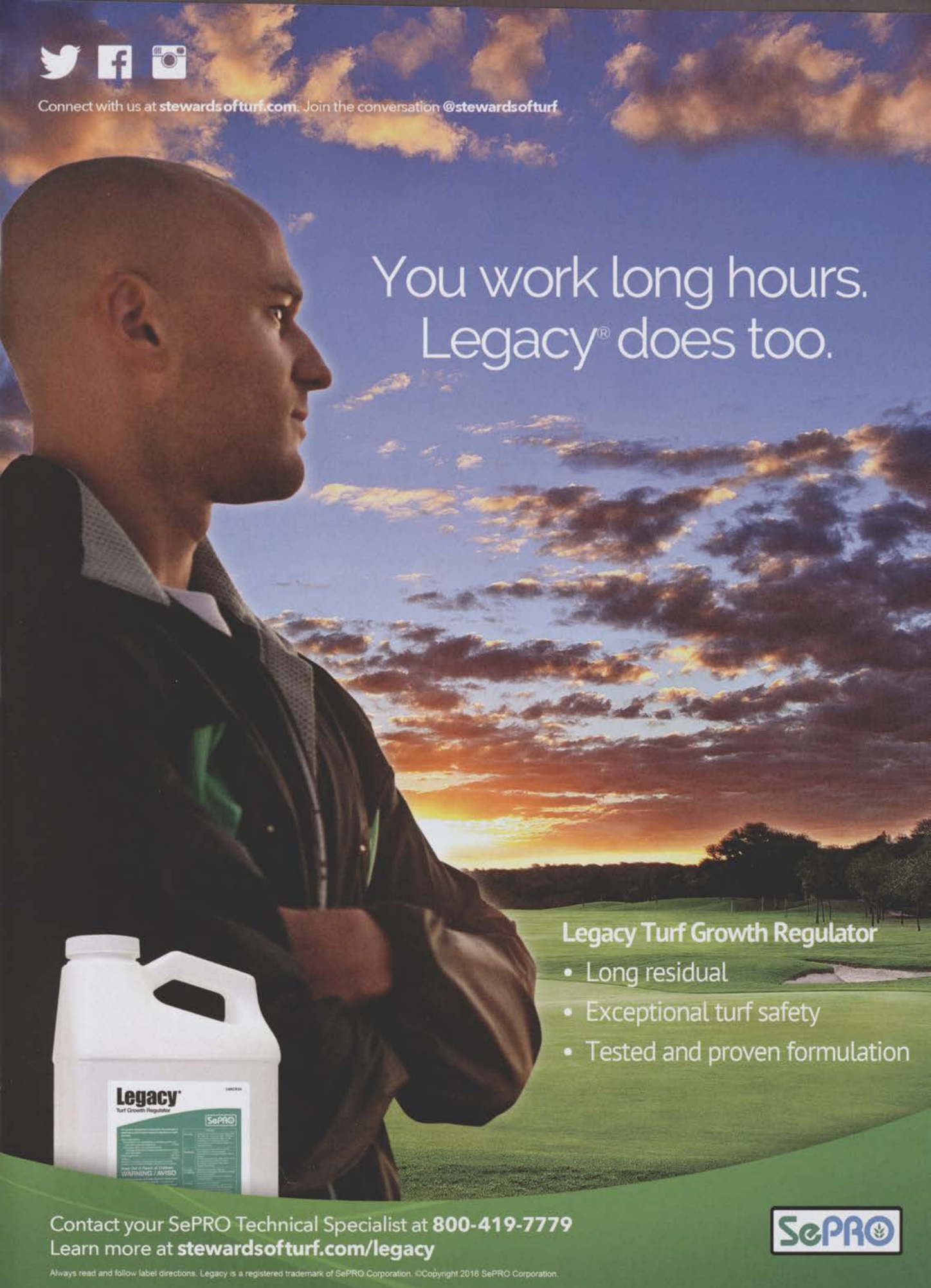
The Killian and Nugent green plan has staking dimensions from the center point out on several angles. These days, measuring and staking is generally left to the contractor, originally (I think) as a time saver in the hand drawn plan days (CAD could provide these in minutes) and more recently, due to the trend of field changes rendering most dimensions less relevant. On the other hand, modern green details probably provide more in the way of quantities of sand, pipe, liner, etc.

DRAINAGE PLAN

In 1966, USGA greens were new, as was the idea of herringbone tiles. They are standard now, and most often left off the plans just to keep them more readable. It's also hard not to notice the changes in actual pipe material. The 1966 plans call for long obsolete "Vitrified Sewer Pipe."

GREEN DESIGN

It's hard not to notice some theoretical shift in the overall green design, starting with the contours and slopes. Those squares are 20 feet. Looking closely at many of the contours, shows they are not much more than a square apart, or 4 to 5 percent. They would be half that today. Even with bunker liners, sand bunker faces are built with less slope than shown on these plans. I believe the large distance between green and sand bunkers was a function of the turn radius of greens mowers 50 years ago, and sand bunkers are usually placed much closer to the greens now. **GCI**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For all its benefits, recycled irrigation water can contain chemicals that damage turf and foliage. Once superintendents become aware of what those chemicals are and how they got there, they can take the right steps on and off the course to manage them.

TAKING IT ALL IN

By **Patrick Williams**

Water is a fundamental component for sustaining any known form of life. But depending on the quality of water and what it is being used for, it could lead to unintended consequences.

Salty irrigation water causing trees to lose their leaves, for example, raises alarm. It used to happen to the oak and fruit trees at Royal Poinciana Golf Club in Naples, Fla., when superintendent Matt Taylor irrigated with 100 percent recycled water provided by the city. "It would be the most bizarre thing," he says. "Wherever the irrigation water hit, it would turn them brown and they would defoliate. And then in a period of time they would come back. You always knew when you would turn the irrigation water back on."

Although the city of Naples has since taken measures to improve the quality of its recycled water, water providers continue to unintentionally spell misfortune onto superintendents by supplying them with less than desirable recycled supplies. Water treatment facilities abide by different guidelines than golf courses when monitoring the beneficial and harmful qualities of recycled water, so irrigation water often contains high concentrations of salts and nutrients that can have an adverse effect on turf and foliage. Superintendents can address these issues by monitoring salt and nutrient levels, implementing the right cultural practices and developing relationships with local government officials.

Irrigating a course with recycled water – also known as reclaimed water, effluent water, treated effluent water and treated wastewater – does have its benefits. It is often cheaper than irrigating with raw or potable water and can have the sus-

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tainable benefit of filtering out waste and springing up healthy turf. "The percentage of golf courses using effluent has been increasing every single year," says Bill Nauroth, owner of Golf Maintenance Solutions. "I think it should in some respects because it's a use of that water that may free up water for other uses. I don't think it's a bad thing. I think it just has to be able to be managed, and everyone has to understand at the properties what needs to happen to be able to take that water and make it work."

The Naples Water Treatment Plant began supplying recycled water to about 10 golf courses in 1988, says Bob Middleton, the city's utilities director. The initiative has expanded so that every golf course in Naples irrigates with all, or nearly all, reclaimed supply, he says. Some courses use irrigation ponds; others hook up directly to the city's feed.

While the city expanded the program, the local ocean tide continued to ebb and flow, and saltwater in the ground infiltrated into the city's wastewater collection system.

Once residences were put on recycled water, customers addressed concerns that its high salt contents would kill their plants, Middleton says. In response, city workers installed liners on gravity pipes where chlorides were entering the sanitary sewer system, pushing chloride levels from 600 parts per million to below 200.

The irrigation water at Royal Poinciana recorded bicarbonate levels that were nearly 1,000 parts per million and sodium levels close to 600 parts per million, Taylor says. Since the sewer repairs, those numbers have decreased to 206 and 95, respectively.

Salt levels in a recycled water supply are usually directly related to the quality of the potable source the water district has reclaimed, says Mike Huck, principal at Turf & Irrigation Services in Orange County, Calif.

Recycled water users in the Southwestern U.S. typically see salt levels that are roughly double that of the potable supplies within the same area, Huck says. Coinciding with the California drought, southern Orange County potable water salt levels have increased from a range of 450 to 500 parts per million closer to 600 parts per million, and recycled supplies have increased from a range of 1,000 to 1,200 parts per million to a range of 1,200 to 1,400 parts per million. This is in part due to drought measures that reduce the dilution of water, such as reductions in shower times, toilet flushes, and washing machine and dishwasher

usage. Some regions have also been impacted by increased usage of water from the saline Colorado River.

"Recycled water quality varies hourly and daily as well as between locales and even between treatment facilities in the municipality," Huck says. Various water districts and facilities treat recycled water differently, depending on a number of factors, including the footprint of the water treatment plant, soil, drainage, the presence of percolation ponds, the presence of water softeners and saltwater intrusion into sewers.

If there is an abundance of water softener use in an area, for instance, it could have a major impact on recycled water supplies, and ultimately, turf quality, Huck says. Water softeners replace calcium and magnesium with sodium through ion exchange processes, and in significant concentrations the sodium can be toxic to plants and damaging to soil. Water softeners discharge all the added salts and the exchanged salts – sodium, chloride, calcium and magnesium– into the sewer system, increasing the water's total dissolved solids and electrical conductivity, sodium concentration, and sodium adsorption ratio.

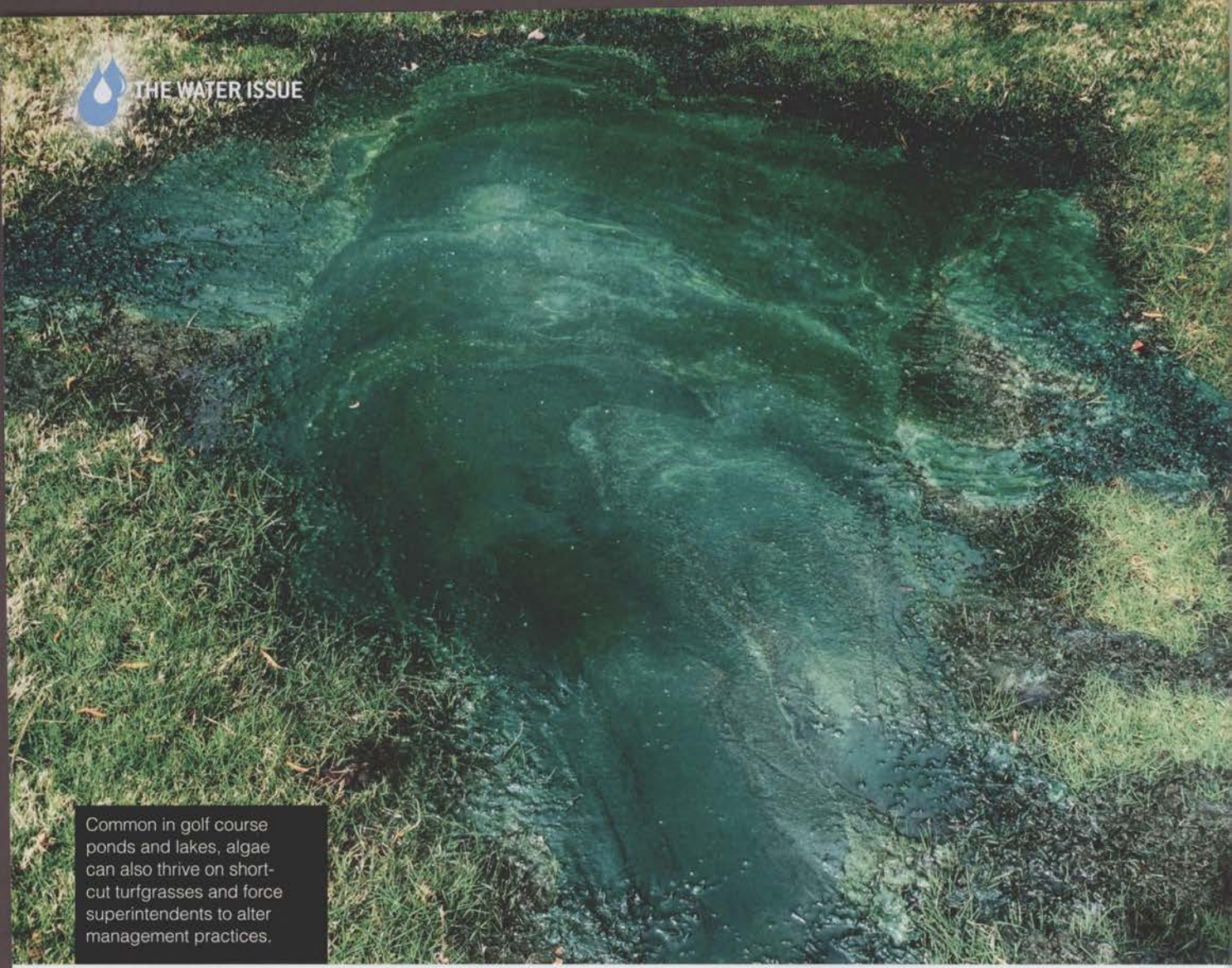
Superintendents new to a recycled water system should test their water quarterly to see what comes through their sewer shed at a given time, Huck says. Water quality could be seasonally impacted by an increase in the number of local tourists or from procedures at food processing plants or manufacturing sites.

In irrigation ponds holding recycled, or any, water, salt and dissolved oxygen levels can stratify according to water temperature, Huck says. Microdiffusers and other efficient aerators can help address some of those problems.

Recycled water can contain ammonium nitrogen, which is not measured in standard irrigation suitability tests, Huck says. While not typically present in significant amounts in natural water sources, ammonium can be converted to nitrate in surface water through natural aeration processes, and when applied to soil, it attaches to soil exchange sites. It is possible that a significant portion of nitrogen in the water – sometimes as much as 50 percent or more – could be in the ammonium form. In addition to performing their regular irrigation tests, superintendents should request an additional ammonium test when submitting samples to a laboratory, he says.

Some California water districts have been disposing of

(continues on page 54)



Common in golf course ponds and lakes, algae can also thrive on short-cut turfgrasses and force superintendents to alter management practices.

TOUGH TO COVER UP

The battle between algae and turf could go deeper than many superintendents think.

By **Patrick Williams**

Coming out of dormancy in February and early March of this year, The Bear Trace at Harrison Bay in Harrison, Tenn., showed signs of a promising spring, says superintendent Paul Carter.

Then rain fell, causing water to sit on the course's Champion Bermudagrass greens. A "black, slimy film" of algae began to "glass up" and integrate with the thatch, sand and nematodes.

Carter, who took over as superintendent of The Bear Trace in 2001, oversaw a no-till renovation from bentgrass to the Champion Bermudagrass in 2003, which reduced issues with thatch buildup.

However, he had never seen algae as troublesome as they were this year. "I guess what's happened over time is, it'll rain, we'll get a little bit of algae and then we'll put some sand on top of that and then some more algae and then some more sand on top of that," he says.

Algae are common in golf course ponds and lakes, but they also thrive on putting greens and short-cut turfgrasses, particularly ones that are wet, shady, disease-prone or -infested, exposed or highly fertilized—or some hole-in-one concoction of these or other factors. Superintendents often tend to view algae as byproducts of turf conditions gone awry, but they can serve as root causes of numerous

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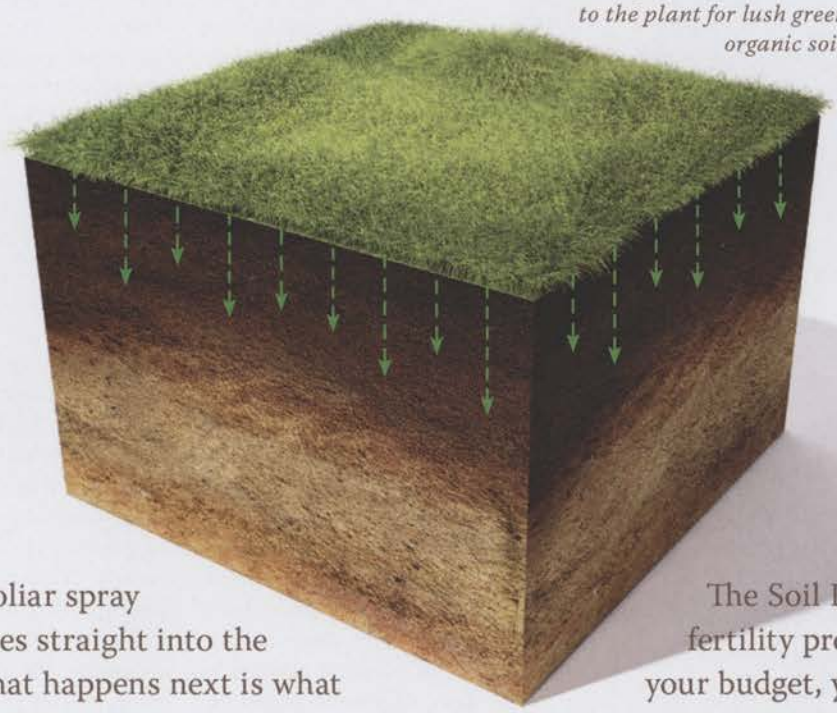

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issues on course turf that require specific management techniques.

"That's the way people think of algae most commonly, as sort of a secondary issue," says Syngenta senior technical representative Dr. Lane Tredway. "I tend to believe, though, that algae can be more of a primary issue as well, in terms of competing with the turf for air and nutrients, perhaps even forming a layer in the thatch that inhibits the movement of water and air down through the soil profile."

Algae that contain cyanobacteria, often termed blue-green algae, can produce toxins, Tredway says. These cyanobacteria have contaminated water systems and drinking water sources, so the potential exists that they could directly harm turf, he says.

Toxic cyanobacteria can also cause discoloration and negatively affect shoot and root impact, says West Bishop, algae scientist and water quality research manager at SePRO. "Aesthetics is another factor," Bishop adds. "It looks bad, it feels bad, certainly it impacts how the ball can roll. Also, having the algae on the turfgrass could smother it, impede light penetration. Additionally, having that extra organic matter, depending on the type of algae you have, can impact infiltration of water, can cause more of that black layer, that anoxic zone as well, for water drainage."

The application of chemicals that effectively control algae on turf, has shown turf quality improvement that surpasses the expected results of just killing the algae, Tredway says. "When we consistently apply a fungicide or another product to control algae, we consistently see improved turf quality, above and beyond what we can explain by control of other diseases or whatever other effects that product may have," he says.

Products containing the active ingredients of either chlorothalonil or mancozeb are effective against turfgrass algae, says Dr. James A. Murphy, specialist in turf management at Rutgers University's Department of Plant Biology and Pathology. Between the two chemicals, chlorothalonil has stronger suppressing characteristics, he says. Neither will completely rid turf of algae, but they will help suppress them and prevent them from worsening, he says.

The Bear Trace's most successful treatment against the algae was not a chemical treatment, but rather to hose them off with a 1-inch syringe hose with a fire nozzle, and then to take a roller across them, Carter says. "Once we took our water hose and peeled the algae and the sand and the mat and everything and got that layer of sand and just funk, out of the top half-inch, three quarter-inch of the green, then they started draining right away," he says.

East Lake Golf Club in Atlanta, Ga., also had issues on one green with algae and organic matter buildup resulting from a lack of drainage, says superintendent Ralph Kepple, who informed Carter about the hose method. After taking largely unsuccessful measures plugging and cut-

ting out turf, Kepple and his crew contended with a "dam" that had formed at the bottom of the problematic green. "We had to lower that lip of the green so the water would drain off better," he says.

Superintendents often have to improve drainage to fight turfgrass algae, Bishop says. "If you can find that balance of keeping the grass there and healthy and not having too many wet areas, too much water on it, to improving the drainage, for example, can help prevent proliferation of some of those turf algae," he says.

When combatting algae, superintendents should follow a number of cultural practices, Tredway says. "Superintendents just want to make sure that they're using those hollow tine and solid tine aerifications on a regular basis as needed—sand topdressing as well—to maintain good air and water exchange in the soil profile and also to minimize soil compaction," he says.

East Lake's MiniVerde Bermudagrass greens develop a significant amount of organic matter, so Kepple and crew frequently verticut for control. In the process, however, the turf canopy becomes exposed. "If you just happen to have verticut and then maybe get a week of cloudy, wet weather, something like that, then there's tendency to get algae just because you've got an open canopy and that's a good place for it to get started," Kepple says.

The Bear Trace is a public course, which requires it to stay open more often than many private courses, so weekly verticutting and topdressing applications are not always met with typical aerification practices, Carter says. "At this golf course we're open every day but Christmas and New Year's," he says. "We're going 363 days out of the year."

The course's top inch of soil has bound up with more than 6 percent organic matter, more than twice the amount it should, he says. The sand, fine grasses and very fine grasses are over the USGA recommended rate, he says.

Algae always remain in the thatch layer of turf, Tredway says. "And really, a lot of our turf management practices create an ideal environment for algae to persist, with the routine irrigation, the regular fertilization, with nutrients like nitrogen and phosphorus," he says. "We're, to some extent, growing algae as well as growing turf."

Using more labor is often a more effective treatment against algae than using less, Tredway says. Turf growth needs to outcompete that of algae, which is possible through both product application and practices such as improving drainage, avoiding overirrigation and maintaining good and balanced soil fertility, he says.

Now that The Bear Trace crew have removed much of the thatch and sand from the turf through improved drainage and spraying, firmness of the greens has increased, Carter says. "They're good and firm right now," he says. "They roll pretty good."

The few remaining weak areas will continue to improve — as long as the weather does the same. **GCI**

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CREATIVE ACCOUNTING

Considering the alternatives – damaged turf, excessive labor hours and lost revenue – you can't afford to overlook a drainage audit.

by **Rob Thomas**

Golf course superintendents spend countless hours and a seemingly endless stream of money on irrigation — from installing the right system to replacing and repairing heads to adjusting the flow so all necessary areas of the course are receiving the right amount of water. But what about the byproduct of all that water, drainage?

Courses can expect a certain amount of standing water following a heavy, persistent rain, but when simple showers leave lasting reminders of past precipitation, maintenance professionals must take notice. And the wise superintendent won't wait until it's too late — choosing to be proactive, rather than reactive.

Allen Storie, director of agronomy at Hound Ears Club in Blowing Rock, N.C., and his staff perform drainage audits monthly, or when they see a drainage problem occur. Playability, aesthetic appearance or declining maintenance performance are all excellent reasons to take action, he says.

From depressions or low areas in the turf to impermeable soil or the existence of a high water table, reasons for standing water are plentiful.

Tripp Davis' team takes a complete look at the drainage of a golf course during creation of a master plan or if there is a need to look specifically at the drainage.

"Most of the time the drainage on a golf course is thought of as a collection of drainage systems, so the focus tends to be specifically where the problems are," says Davis, principal at Tripp Davis and Associates and a member of the American Society of Golf Course Architects. "We prefer to develop a complete evaluation of the entire course and prepare a master plan for everything. This helps to best prioritize the areas of greatest need, which very often involves drainage enhancements."

Ray Richard, a golf construction consultant with Richardgolf.com in Cape Cod, Mass., addresses drainage concerns on a regular basis. "Twenty or 30 times a year a client asks about drainage remediation," he says. "Some have small water pockets on green surfaces or others have large-scale drainage issues caused by inferior construction. I recall touring an 18-hole course after a September rain and seeing 10 fairways with standing water, conditions that severely impacted course revenues.

"Plugged golf balls or soggy shoes anger golfers," he adds. "Club decision makers want the problem solved the first time with common-sense methods, although the cost usually shocks them. Sometimes I identify existing tile lines that worked decades ago but need replacement. Other times, the drainage problem isn't obvious so subsurface exploration provides the solution. By coring test holes in a grid pattern and identifying subsurface water flow, piping strategies that intercept the flow solve the problem."

Doug Myslinski, XGD Systems' vice president of business development, a golf course drainage systems provider, says the company performs audits every time it visits a golf course. "Our goal is to assess each drainage problem situation and develop a solution that works best for the long-term benefit of the club," he says. "A true

solution to a drainage problem has three components: the superintendent is given a better opportunity to provide pristine conditions; the golfers are provided accessibility to the golf course in spite of poor weather; and the playing conditions of the golf course complement the intended design. An audit can be performed on a single problematic green or an entire golf facility."

When assessing the situation, Davis agrees an extra pair of expert eyes is beneficial. A facility should have a golf course architect work with the superintendent, and possibly a local civil engineer, to evaluate the current drainage and prepare a master plan, even in broad concepts, quite simply if they had not gone through this exercise in the last 10 years, or if there have been major changes or recent issues.

"It's very important with drainage on a golf course to know where your problems are, how they could be interrelated, and to have a master plan that prioritizes what needs to be done first," he says.

A proper audit should provide an understanding of where issues exist, how to solve them, how to prioritize solutions and what it will cost, Davis says. The steps taken before and during an audit are as varied as the issues at hand, however.

"Every situation is different, but it is critical to evaluate the entire golf course drainage before trying to develop a solution for just one part," Davis says. "Drainage is very interrelated and you generally need to solve the entire problem or at the very least have a well-thought-out plan to address issues in phases."

For Richard, the value is in the end game. "[Drainage audits] provide details that will work," he says. "The resulting construction scenario will often result in curvy piping patterns that intercept flow, not straight-line herringbone patterns installed without subsurface exploration."

A superintendent knows a drainage audit is needed, but convincing the higher-ups isn't always easy. It's important for all clubs to have a sound master plan in place at all times so they know what they are working toward and what it will cost.

The convincing comes in the form of declining turf conditions or increased limitations of accessibility to the golfers. "These are not always evident to the 'bosses' as the superintendent may be taking significant steps to minimize the impacts," Myslinski says. "Spending is occurring on either turf inputs or additional man hours to negate the impacts. A cost/benefit analysis

BIGGER AND BETTER

For larger scale audits or master drainage plans that encompass an entire golf facility or a large portion of it, a full-scale graphic plan is developed, says Doug Myslinski, vice president of business development at XGD Systems.

"The plan is developed on high-resolution aerial photography with existing conditions such as irrigation, drainage, vegetation and topography incorporated when possible," Myslinski says. "Soil mapping and geological data can be incorporated if available.

The detailed graphic also contains construction details and methods of each type of drainage solution.

"Verbal communication is also presented that further explains the means of solutions, expectations of the club and an itemized cost assumption for each of the components," he says. "Costs can be broken down into phases or a one-time implementation."

can be produced that will show how the up-front investment of the improvements can reduce the long-term chemical or labor budgets. Costs can also be associated with golf cart revenue that may typically be reduced due to rain events.

Storie was blunt with his advice to colleagues. "If they don't perform audits, and damage is done to the course by a storm, I suspect they will be convinced to start doing them," he says.

Once an audit is performed, the results and a coordinated plan to remedy the situation must be presented to the owners, members and/or stakeholders. This varies depending on how severe the issues are, and can vary with how the club wants to present it to the membership, Davis says. "The key when presenting anything relative to drainage to a club is to focus as much on why things need to be done as you focus on what to do," he says. "Drainage issues are very cause and effect, so it helps to explain why."

Audits or master drainage plans provide the most cost effective solutions to problematic areas at a golf facility. "They can be 'road maps' to improvements and used as a form of communication to the golfers/members, boards, and committees," Myslinski says. "Costs of implementation are typically associated with the plans so that the golf facility can evaluate the timing of the implementation, whether it be all at once or phased in over a period of time." **GCI**

Rob Thomas is a Cleveland-based writer and frequent GCI contributor.

YESTERDAY, TODAY AND TOMORROW

Henry DeLozier is a principal in the Global Golf Advisors consultancy. DeLozier joined Global Golf Advisors in 2008 after nine years as the vice president of golf for Pulte Homes. He is a past president of the National Golf Course Owners Association's board of directors and serves on the PGA of America's Employers Advisory Council.

The 23-story billboard looming above Times Square proclaims Nike's brand message of engagement and commitment in four simple words: "Yesterday…you said tomorrow."

Tomorrows come like clockwork, and soon we've forgotten about yesterday's promise. It happens to all of us, despite our best intentions. We're procrastinators by nature.

So what are you putting off? Maybe it's some research on changing demographics in your market. Maybe it's that strategic plan that your board has been asking for. Or a way to measure the results of a fertilization program scheduled for next spring.

If the hot summer months are your off-season, now's the perfect time to pull those back-burner projects to the front. Here are three opportunities.

RESEARCH AND PLAN. There's no off-season for collecting and analyzing information that will become the backbone of future decision-making.

While busy season lessons remain fresh in their minds, Sun Belt managers should review and refresh strategic and business plans. Sun Belt agronomic professionals should begin converting consumption statistics into next year's procurement plan. Empower your suppliers to work with you to locate better volume-purchase discounts and programs that will save money. Your suppliers are your partners, if you treat them that way.

Cool-weather superintendents should focus on the pressing demands of summer. Leverage new photographic apps that enable you to show your assistants problems and locations in real time, instead of waiting until a break.

Club managers can study the ebb and flow of labor costs and alternatives that allow increased self-service for members and regular golfers. As labor costs escalate, self-service will expand and become more commonplace.

Club managers can get ahead of budget and financial planning during summer months. The budgeting cycle starts again in most clubs after Labor Day; allowing an hour to two per week during the summer will make the process more manageable.

TEST AND MEASURE. Everyone has heard the quote about things that get measured are the things that get managed. Most superintendents are in their prime growing season. Summer is the right time for them to test new turf types, pesticides, fertility options and application rates. With the right information, management becomes much easier.

Explore methods to do more with less. Study your labor plan for efficiencies. Summertime is also the best time to evaluate labor patterns, effectiveness and organization of management.

Superintendents can review consumption rates on fuel, pesticides, chemicals and water. These volatile expense categories require regular attention and measurement.

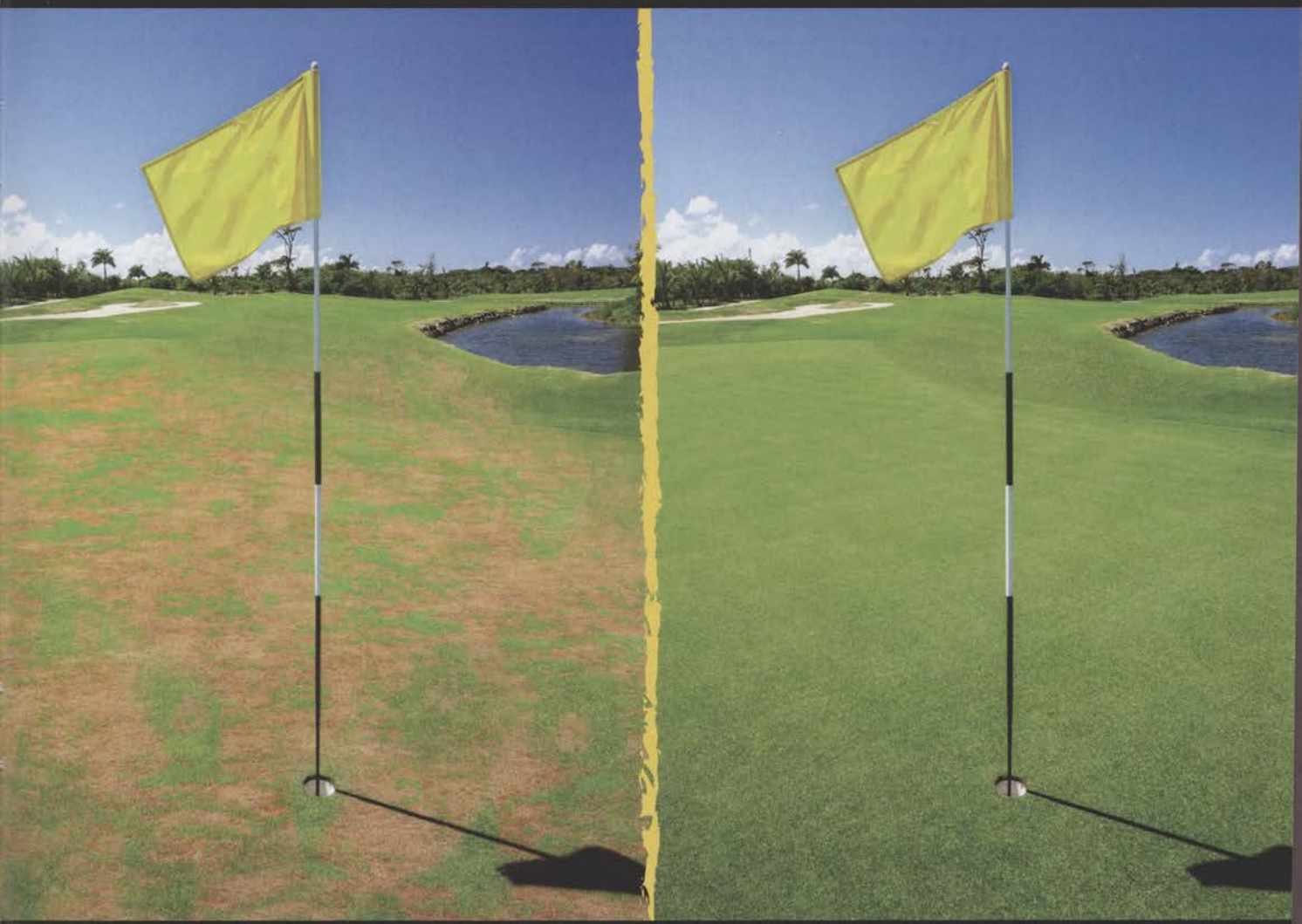
Effective strategy is formulated during the off-season and alert managers watch usage trends and patterns at their facilities during busy times. Ask the following questions and pay attention; your customers, members and competitors will show you what actions you should take.

- What use patterns are changing and in what segments?
- Is our club more active and productive this year? Why and why not?
- What are the best practices being used by the leaders in my segment?
- How do the top-performing clubs and courses address the same problems and opportunities?
- Are there examples of new ideas from outside of my specialty that I should adapt?

RECOGNIZE AND PERSONALIZE. Every member or golfer wants to be treated as special. Take time now to develop your own recognition and personalization programs. As an example, professionals can see that every child in their junior program has a personalized bag tag, even if they don't have a bag yet. Every parent will appreciate that you recognized their child and encouraged them to enjoy golf.

Review the contents of members' golf bags with them. Set an appointment and invite each golfer to walk you through his or her bag. Do they need hybrids? Will new grips help? If they are planning a summer golf trip, will they need rain gear and waterproof shoes? Can you make a call to a fellow professional to get them on a special course? Let your golfers experience how knowledgeable and enthusiastic you are about your role and how much you want to help. **GCI**

IT'S YOUR CHOICE



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CALIFORNIA *Reality*

It's not a dream anymore. Dry is still the norm in the nation's most populated state. GCI's Bruce Williams reveals how the golf course industry is collaborating to handle water challenges.

Several Southwestern states have felt the effects of drought for more than a decade. While Arizona, Nevada and New Mexico have felt the pain, it appears as though California has set the trends for regulations, collaboration and problem solving by working with regulators to come up with the best solutions. There is no single simple answer, but a set of broad initiatives has proven to work best.

THE HISTORY

California is a state with a variety of climates. Within 100 miles of Los Angeles, temperatures can vary by as much as 35 degrees on any given day. Snow can fall in the mountains while people are surfing in the ocean and temps can exceed 114 degrees in the Palm Springs area. Rainfall in Southern California averages less than 10 inches annually and that can occur with a couple of two-inch rains and maybe a dozen other rain days in the year.

Northern California differs in its climate. Along the coast there is much more rain and a series of rivers and deltas that can supply water throughout the year. East of the Sierra mountains the conditions are arid like the southern part of the state.

Visitors to California see all the greenery throughout the state and believe there is more than enough water to fulfill the needs of the growing population. Nothing could be further from the truth. Without water being diverted from the Bay Area through an engineered aqueduct, the southern half of the state would be much less populated. Aside from the aqueduct, parts of So Cal get water from the Colorado River as designated in treaties prior to the 1950s.

Few desalinization plants exist at this time and aquifers are challenged with the competition for water from residents, industry, greenspace and agriculture. Water is distributed by 3,000 individual water districts in the state. Getting everyone on board with the same game plan can be complicated.

California is no stranger to drought. We saw a drought emergency declared by then-Gov. Jerry Brown in 1976-77. Brown declared his second drought emergency in 2014. Hopefully we have learned lessons from not only 1976 but also the Dust Bowl droughts of 1928-35 and multiyear droughts in 1947-50 and 1959-60.

EL NIÑO

This was supposed to be the year when rainfall would be above normal and hopes of filling the many reservoirs would be fulfilled. While the North received some much needed rain, the South is about 50 percent of the average rainfall. The most important part of the wet season is the snowfall. With the snowpack in the mountains up North, it can provide water flow into the summer months when water is most needed. The snowpack was better than in the past, but still not enough to fill reservoirs that were recently at all-time lows.

While other parts of the United States have received torrential downpours and serious flooding, the Southwest has seen no such thing. The closest thing was a recent downpour in Las Vegas that flooded the streets for a few hours. Climatologists have estimated that it would take more than three years of above average rainfall for reservoirs to be at full capacity.

MANDATES AND REGULATIONS

Several years ago, Brown had the foresight to put into effect a state of emergency regarding water usage in California. His original mandate was to have a 20 percent reduction in water consumption by the year 2020. This would include all com-

ponents of water usage. The first reaction was, "No way!" It took a while for it to sink in that the drought was not a short-term situation but a future way of life for Californians.

About 10 years ago, a task force was developed with the Los Angeles Department of Water and Power and the golf community. Thirty-two golf courses exist within the jurisdiction of the LADWP. Those golf courses received their water from a variety of sources, including groundwater, potable water and canal water. It took many meetings over a couple of years to develop strategies to reduce water by as much as 25 percent in the Los Angeles golf market.

The most important thing about the task force with the LADWP is that golf and the water agency were working together to achieve a desired goal. It became apparent more can be accomplished when you are in the room with decisions being made than just accepting the outcomes from a regulatory agency.

METHODOLOGY TO ACCOMPLISH GOALS

Early discussions involved recommendations from engineers who did not really understand the complexities of golf course management and growing high-quality turfgrass. Through a proper dialogue, it quickly became apparent that the concept of watering on specific days of the week and no more than 10 minutes per head would not work.

The golf community stated its case that as long as there was a 20 percent or greater reduction in water, what would it matter how it was accomplished? It quickly became apparent golf course superintendents were well educated and had sophisticated irrigation systems in which they could accomplish this goal in a short period of time.

With mutual respect and trust a lot can be accomplished.

A VARIETY OF METHODS TO ACCOMPLISH GOALS

Turn reductions

Hundreds of acres of irrigated turf were removed among the 32 golf courses and replaced with drought-tolerant plants and woodchips, pine straw or decomposed granite among. Superintendents worked with landscape and golf course architects. It didn't hurt that the LADWP was offering cash incentives for achieving turf reduction. This did not achieve the 20 percent plus reduction but it was a huge head start and could be done with little or no negative financial impact. The key was long term sustainable water reduction.

Irrigation system improvements

Older or poorly designed systems were audited and found to have less than 60 percent distribution uniformity. In an area where there is little rainfall, it is necessary to make sure your pumping system is operating optimally and also using reduced amounts of electricity. Water agencies had been offering rebates for replacement of worn nozzles on irrigation heads and this too would show immediate returns on investment or little or no cost if rebates were available.

Evaluating grass choices

In the Transition Zone, there is no single grass that will provide high quality year around. Years of overseeding saw many courses with more cool-season grasses than warm-season grasses. Gradually we saw cultural programs favoring Bermudagrass on many of the golf courses and that resulted in much less water required. In all areas but the desert we seldom see fairways overseeded and that also results in a lesser water requirement.

Judicious watering practices

There has been a change in watering practices for golf greens in the last decade. Moisture sensors are either planted in greens or individual sensing tools are used daily to accurately find out the percentage of moisture in the root zone. Each course sets its own parameters for moisture content and then hand waters accordingly rather than using all the irrigation heads to possibly overwater areas with sufficient moisture just to cover the droughty areas.

Golfers have adjusted to the changes in watering practices. Firm and fast not only refers to greens, but through the green as well. There is no need to have lush Bermudagrass fairways so overall water reduction not only accomplishes the goals of the regulations but provides improved playing conditions.

Other agencies follow the lead of the LADWP

Once a practical plan has demonstrated the success of collaboration with an entity like golf and a water agency, it is much easier to mold plans in some of the larger agencies in the state of California. Currently talks are ongoing with San Diego and the Coachella Valley Water District. Discussions have also taken place with several water agencies in the northern half of the state. It takes a lot of time and energy to devote to water issues. The state is fortunate to have Craig Kessler working on behalf of golf with our many water issues. Kessler is the director of governmental affairs for the Southern California Golf Association. He handles more than water, but nobody in the state knows more about the inner workings of regulations and how to work together to accomplish mutual goals. Kessler has been spending up to 80 percent of his time on golf water issues but now finds

> "I think that the state will be better positioned in the future due to decisions that are being made now. We should use this slight breather that Mother Nature gave us to work together to replenish our overall water supplies. **The long-term success of the golf industry in California depends on it."**
>
> *— Craig Kessler, Southern California Golf Association*

that more like 60 percent of his workload.

"I think that the state will be better positioned in the future due to decisions that are being made now," Kessler says. "We should use this slight breather that Mother Nature gave us to work together to replenish our overall water supplies. The long-term success of the golf industry in California depends on it."

Jeff Jensen, GCSAA regional staff, is a familiar face and voice at water agency meetings. "I think that it will be paramount for the golf industry to continue to develop and use alternative supplies of water," Jensen says. "While 45.5 percent of courses in the Southwest agronomic region have adopted some form of recycled water, other technologies like scalping plants, desalinization, stormwater collection and treated brackish water will assist in supplying courses with a reliable and dependable sources of irrigation water. These new technologies are expensive and it will be important for the golf industry to work with their local water providers and the state to obtain potential funding through grants and other programs."

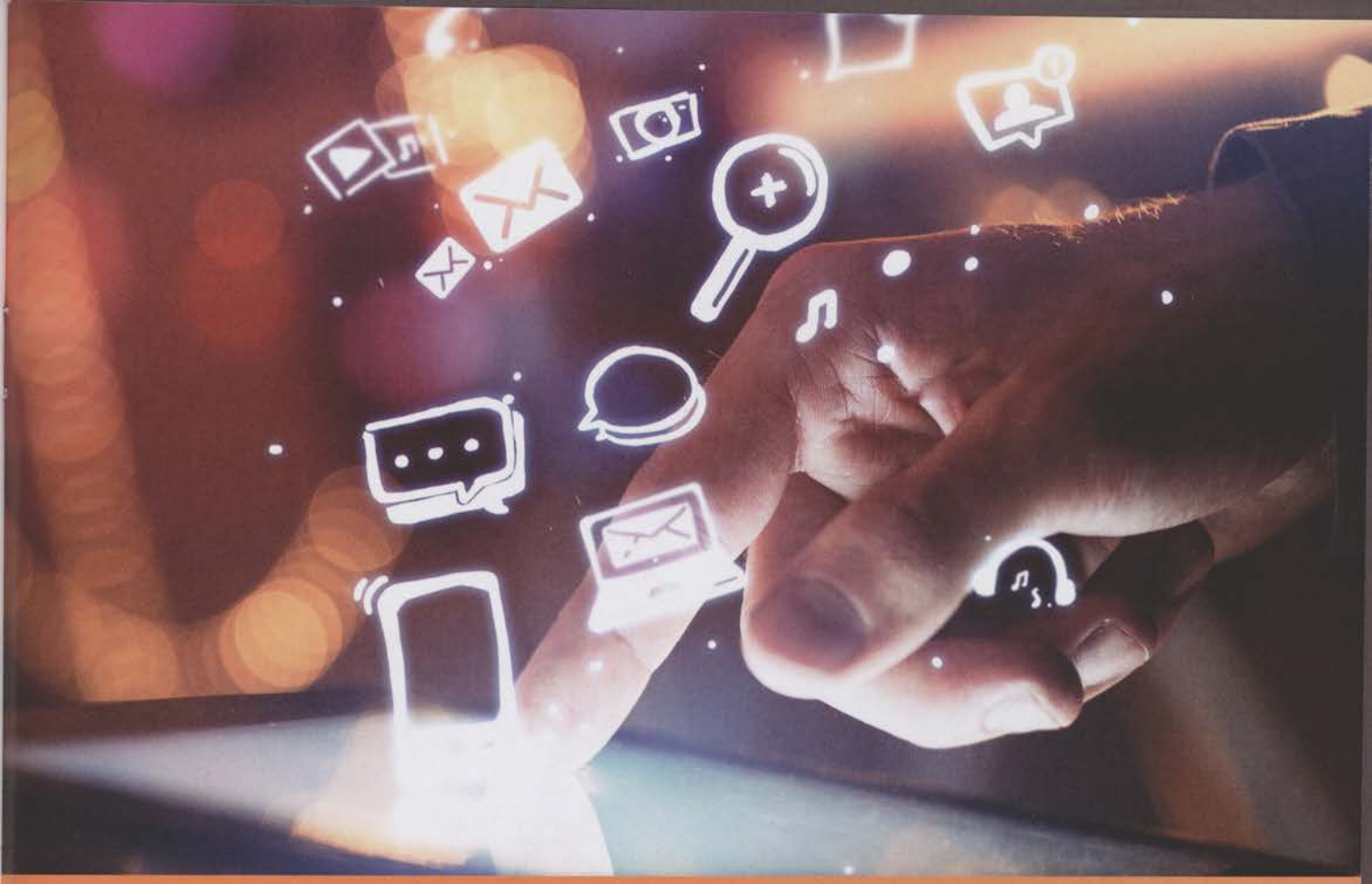
Mike Huck, of Irrigation and Turfgrass Services, is another key voice in California regarding water usage, quality and regulations. "Some byproducts of less residential water usage is an increase of salt levels in recycled water," Huck says. "There is also less volume of flow into treatment facilities resulting in less recycled water for golf courses. We are also seeing some courses that used potable water on greens now switching to recycled as a result of regulations and availability."

FINAL THOUGHT

California has seen drought conditions before. Through thorough analysis, the state knows it is imperative to conserve our water. This can and will be done in a variety of ways. Golf has been at the forefront of these efforts. The California Alliance for Golf has been critical in working on these initiatives both on the local level and also in Sacramento.

When it comes to problem solving, nobody does it better than the people in golf. We became a part of the dialogue and sat at the table when many regulations were made to ensure regulations were not onerous and were achievable. It is hopeful that those actions taken in California will help to establish Better Management Practices for many other states across our country. **GCI**

Bruce Williams is GCI's senior contributing editor.



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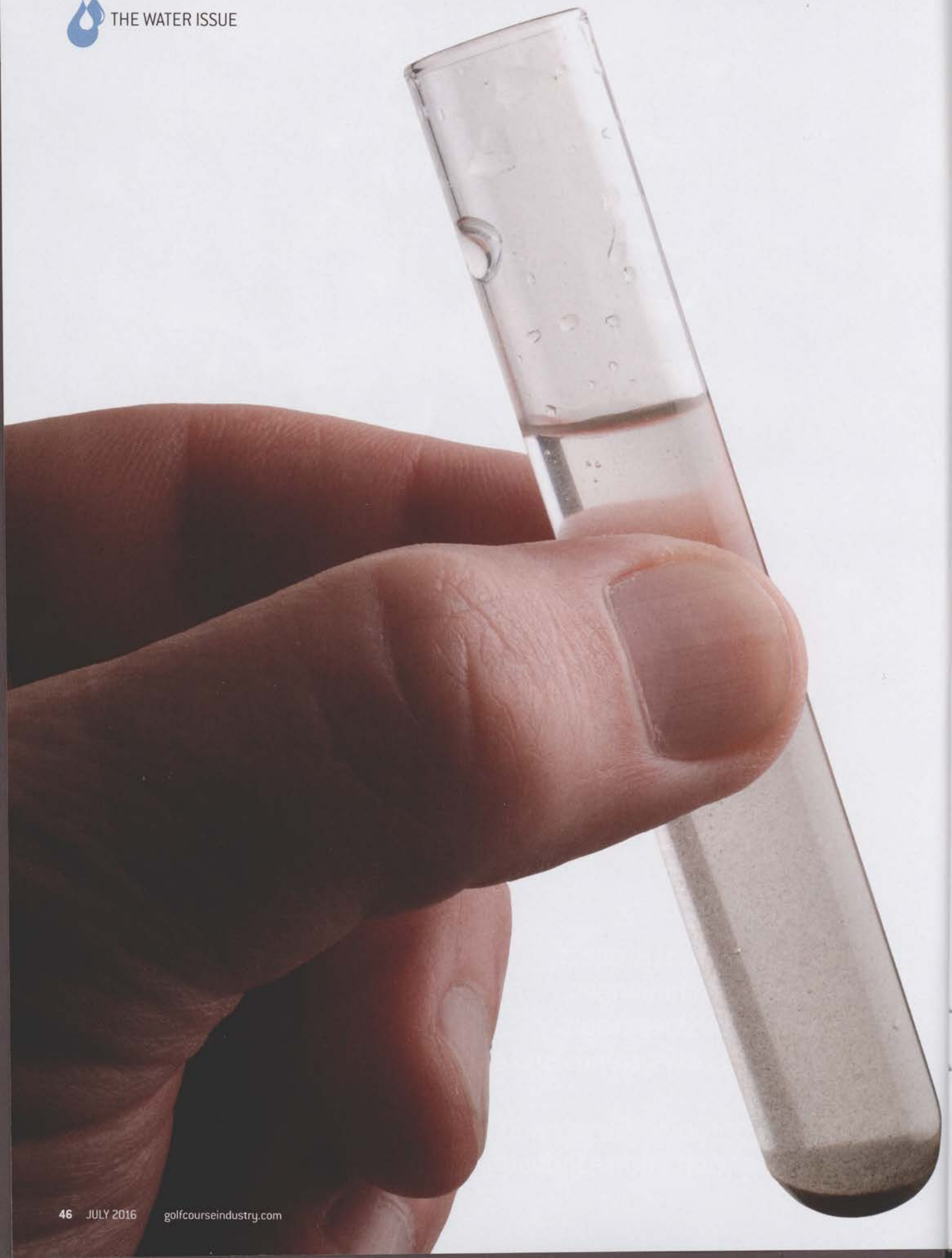


QUALITY CONTROL

Poor water quality can negatively impact the mixing of various pesticides and fertilizers in tanks and reduce their efficacy.

By **John Torsiello**

Tank mix with subquality water and you run the risk of rendering some active ingredients inactive. And as a result, it is unlikely fertilizers, fungicides, herbicides and pesticides will be utilized by target organisms (such as weeds, pathogens and insects) or be further degraded by soil or soil microorganisms.

Unwanted chemicals can be transported along with runoff or percolating waters to receiving waters that can contaminate natural water resources, says Dara M. Park, assistant professor, turfgrass, soil and water quality at Clemson.

Poor spray water quality can negatively impact some products or active ingredients, says Dr. Michael Fidanza, Penn State professor of plant and soil sciences. For example, some chemicals can break down in spray water with high pH in the sevens or eights. "This is known as alkaline hydrolysis, where chemical bonds are 'severed,' thus rendering the active ingredient useless against the target pest," he says. "Thiophanate-methyl fungicide can break down in alkaline water. Product SDS' list pH stability ranges, so be sure to review that information."

Fidanza advises superintendents use spray water additives to adjust the pH so it's near neutral before adding any products.

Most herbicide labels show registered pesticide tank mixes that are allowed, says Dr. Richard Zollinger, extension specialist in North Dakota State University's Department of Plant Sciences. In addition, most pesticide labels recommend a compatibility or "jar test" where the applicator will mix the pesticides in a jar to make sure there is no negative affect when mixed with water, he says.

Following label directions is strongly advised when mixing pesticides. "Adding fertilizer to pesticide mixtures rarely has any negative effect on the water quality and may improve herbicide enhancement," Fidanza says. "Fertilizer usually contains a nitrogen component and may contain a water conditioning component, both of which have positive effects on water quality."

Improper tank mixing can lead to incorrect application rates, phytotoxicity, reduced active ingredient activity, excessive foaming or sludge formation in the tank, says David Loecke, PBI-Gordon market development manager for turf and ornamental products. "Any combination of these can have a negative effect on performance, equipment or the environment," he says.

In addition, an improper tank mix can cause problems that hit a superintendent's bottom line. "If too much product is added, it will likely be a waste of money," Loecke adds. "Too little product and a re-spray may be necessary. And in the case of physical incompatibility, there may be disposal cost of the unusable solution."

A common misconception among turf managers is that water only consists of H2O and has no other constituents. In fact, says Park, water can have many other minerals in it that may react with certain

pesticides.

"The most common problems are associated with water pH," Park says. "Many pesticides breakdown when pH is greater than 7 (some even at a slightly lower pH). This process is called alkaline hydrolysis. By simply testing water pH and correcting the problem, many water quality issues can be avoided. Besides actual water treatment, there may be other options."

For example, if the water source is from a surface water body, consider filling the tank in the early morning hours. Surface water pH fluctuates throughout the day from the organisms that live within it. It is lowest during the early morning. Well water tends not to fluctuate as much unless the well experiences saltwater intrusion during dry periods.

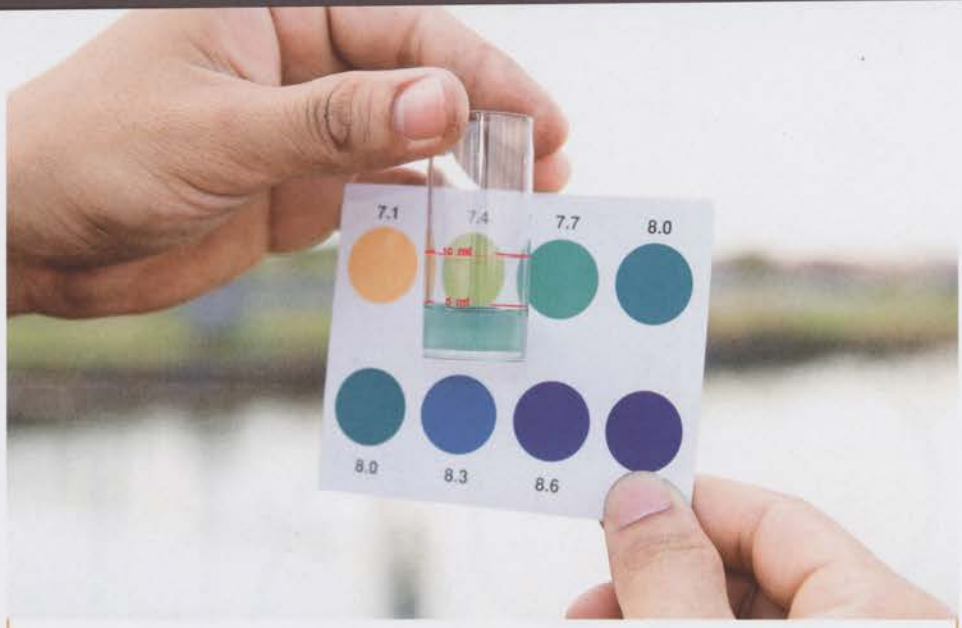
"Another option may be to switch to a different water source, or to blend two water sources," Park says. "If the water needs to be treated, there are many different options on the market. Some change the carrier water color to let you know you are in the right pH range. Others require you to retest the pH. Some pesticides even recommend on their label certain water conditioners to be used with the product."

Superintendents can guard against improper tank mixing by checking compatibility, the modes of action, the order of adding chemical to the tank, calculations, and then using test strips to see the effect, says Dr. Deying Li, associate professor in the North Dakota State University's Department of Plant Sciences.

In an effort to save time, labor and equipment wear, several products are added to the spray tank to "cover" many "targets" at the same time, Fidanza says.

"For example, these products could be two or three fungicides (one for dollar spot, one for pythium blight, maybe one for rhizoctonia blight), one or two plant growth regulators depending on the program, an insecticide, three or four plant/soil health products such as a fertilizer, or a phosphite, or iron, or various biostimulants, maybe a broadleaf herbicide or a post-emergence crabgrass herbicide and maybe one other product that may not have an actual agronomic value but helps one sleep at night," he says. "And there's value to a good night's sleep."

When tank mixing, it is important to know how pesticides or other components will react when mixed together in the same tank. In many cases, unknown tank mixes may cause physical or chemical incompatibilities, which can provide unexpected results or equipment damage, Loecke says. "When tank-mixing an unknown combination, conduct a jar compatibility test to determine whether the components are physically compatible, and whether you need to consider a compatibility agent," he says. "A jar test only uses a small amount of each product, so you eliminate the risk of mixing an entire tank of spray solution." **GCI**



ACCESSING **QUALITY**

Many products have a preferred pH for long-term storage and they can degrade when not properly mixed and stored at the right pH. However, in almost all cases, the products used in the turf industry work effectively when mixed and sprayed with local water sources (well, municipal, pond, lake, rain) regardless of their pH.

While some products do degrade when mixed in high pH water, this degradation takes time and will occur only at very small levels (too small to affect product performance) when mixing and applying the products within a few hours as is typical on the golf course.

"Some labels suggest the best pH range for the product (such as 3336F, Certainty, Iprodione (Canadian labels), Junction, Monument, Octane, Quicksilver, Revolver, Rhapsody, Rimsulfuron, Scimitar), but there is very little to no data that suggests their efficacy is reduced when golf course superintendents follow typical mixing and application schedules (mixing and applying within 24 hours) with a wide range of typical water sources." says Dr. Aaron Patton, associate professor of horticulture and turfgrass extension specialist at Purdue University's Department of Horticulture & Landscape Architecture

To measure the pH and hardness of spray tank water, superintendents can send a sample to a laboratory and request a spray water quality test, which costs $25 to $50. If it is anticipated there will be testing of multiple samples, there are waterproof, handheld, portable pH meters that cost between $50 and $250, although these meters do not measure hardness. The most economic option is to use test strips. Pool, spa and aquarium water test strips work nicely and only cost $7 to $18.

"These test strips usually measure multiple parameters and you should purchase strips that test for pH, hardness and alkalinity," Patton says. "They may also measure chlorine and other factors, but pH, hardness and alkalinity are the most important parameters that you will want to test for your spray water. If you anticipate testing multiple samples for their hardness, you can test your own water using a Hach 5-B titration kit ($18)."

KEEP ON TRUCK'N

Monroe Miller retired after 36 years as superintendent at Blackhawk CC in Madison, Wis. He is a recipient of the 2004 USGA Green Section Award, the 2009 GCSAA Col. John Morley DSA Award, and is the only superintendent in the Wisconsin Golf Hall of Fame. Reach him at groots@charter.net.

It was exciting news in the old neighborhood where I grew up. Recently, a bona fide NFL All-Pro player, who graduated from Wisconsin, bought a farm not far away. He plans on retiring there, doing some farming and lots of hunting and fishing. The land is especially good for the latter two.

An acquaintance owns a Ford dealership and sold our new favorite NFLer (although not a Packer) a used pickup truck. It had quite a few miles on it, but it was in good shape. The new owner decided to have a bed liner sprayed on the inside of the box. He planned on using it as a work truck. He liked the look so much that he had the dealer spray the entire truck with bed liner.

It reminded me of my 25 years as a Packer season ticket holder. Often we would go to Green Bay early and wait outside the player parking lot to catch a glimpse of our favorites. It was interesting to see what vehicles the players drove. It broke down into two general groups – expensive, sometimes foreign and new cars/SUVs, and pickup trucks. The good ol' boys drove the trucks – Brett Favre drove a beautiful new Ford pickup. One of our players was an alumnus of the University of Iowa – Aaron Kampman – and he drove an old farm truck. His vehicle was all about work, not flash. It was probably a farm truck in the off-season. That impressed me almost as much as his playing ability.

In my life and career, starting sometime under the age of 16, I've had (or driven) 10 different trucks. That is not counting my grandfather's 1930 Ford Model A farm truck. It was, in fact, the first truck I drove. I was grossly underage, of course, and only drove it full of milk cans from the barn to the cooling spring tank after milking. Most farm kids were driving their dad's truck by 14 or 15. It seems so impossible to think about a Model A as actually a working truck, but it was probably less than 30 years old when I drove it, and it likely had low mileage. He eventually upgraded it with a used 1948 Ford F-1

Eight of those 10 trucks were Fords, one was a Dodge and one was a Datsun. I inherited the Datsun when I was first hired as a superintendent, and it was gone in less than a year. My dad owned the Dodge for a while until he replaced it with a 1954 Ford F-1. Two of the Fords were mine, and the rest were owned by the club as part of our essential equipment inventory. Four of these vehicles had manual transmissions; the rest were automatics. Four of these trucks were six cylinders; the rest had eight lungs. We graduated from an AM radio only to the present day CD player along with AM/FM (but still no Sirius radio).

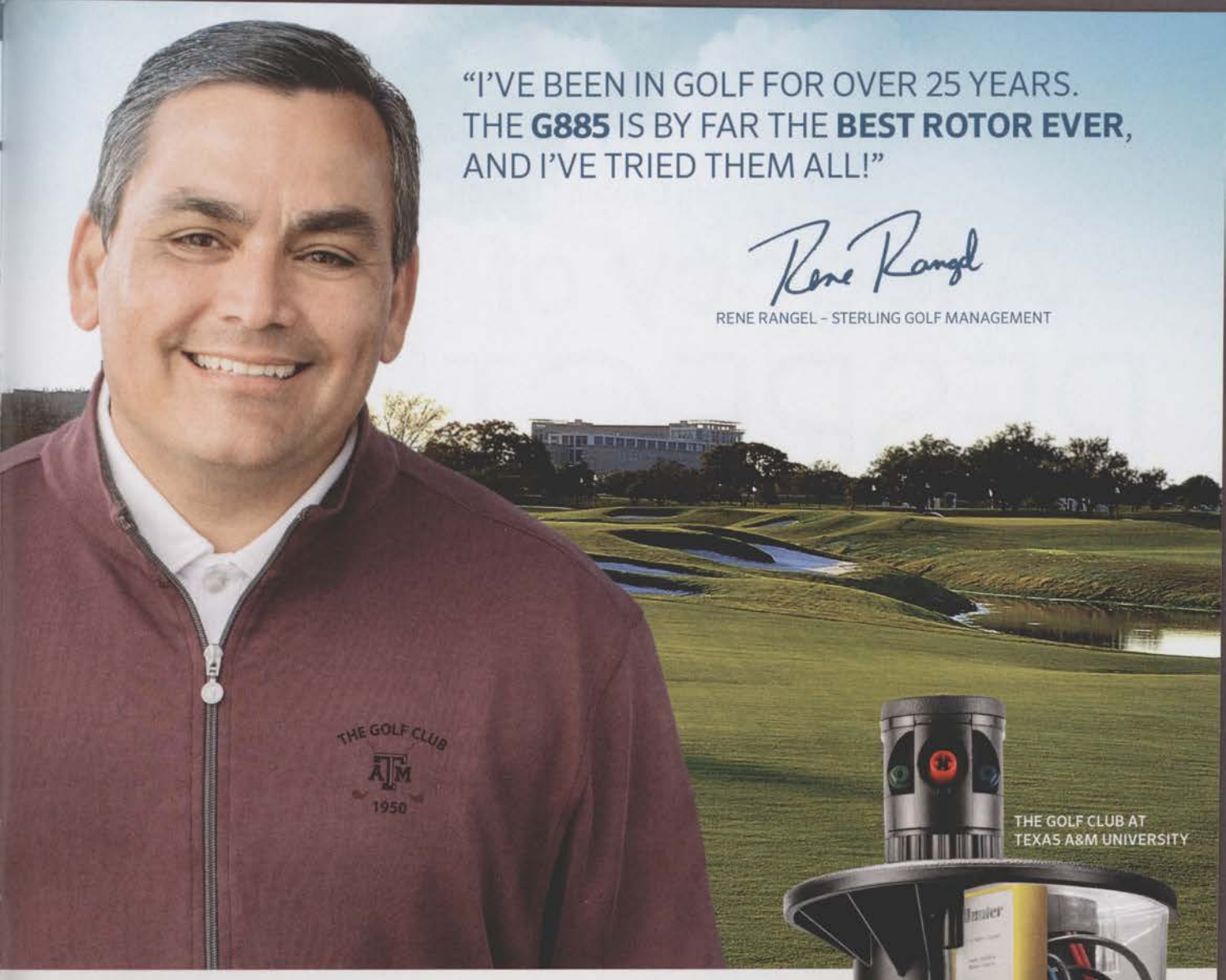
The golf course trucks were work vehicles, used to actually haul things or tow loads behind. The last two – my personal trucks – seldom ever did any work. In fact, my 2012 F-150 has never towed anything and never really hauled anything of consequence (other than me).

My favorite was probably the 1954 F-1. There are a lot of sentimental things about that truck. It was from the days of oversized V-8s and 100+ octane gas. The F-1 was a minimalist truck, like most of the 1950s. There was no automatic anything and the floor was rubber matting, no air conditioning and often no radio. The heater didn't work well, and the windshield wipers were worse than that. It was light in the rear and rear-wheel drive required a couple of burlap bags of grain for weight in the winter. But I still loved that spartan truck.

It makes no sense for me, retired and at the age of 70, to be driving a truck, albeit a beautiful, comfortable one. The mileage isn't very good, it is almost impossible to park in a ramp and the hood is so big that I'm really never sure where it is on the road. But every time I climb into it I am glad I have it to drive. Maybe it's a matter of old habits dying hard or old habits are hard to break. It could simply be one of my life's comfort zones. It clearly isn't status. I would drive a Lincoln if that were the case.

I think it is a little bit of the personality of many, maybe most, golf course superintendents. Many times, unsure if I was at the right course or hotel for a superintendents' meeting, I was reassured when I drove in and saw a lot or a ramp full of pickup trucks. Trucks, hats (most free), golf clubs and comfortable clothes are obvious parts of our identity. So are happy faces and endless talk about golf turf.

We have a good regional author in Wisconsin named Michael Perry. He is a hick from rural western Wisconsin, part-time farmer and full-time writer of things rural. He wrote a book titled "Truck." It is not what I thought, but rather a love story centered on a guy who wants to rehab his old junky truck. Still, the title says a lot about what kind of people who see having a truck as an important component to a happy life. I guess you'd have to count me among them. **GCI**



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By **Debbie Clayton**

A legacy of RESPECT

One New York resort finds a BASF chemical solution for switchgrass that allows it to adhere to its strict environmental mandate.

Sustaining and preserving the vitality of the land is of cultural importance to the Oneida Indian Nation, owners of Turning Stone Resort Casino in Verona, N.Y. Respect for the land dominates all operations of this central New York state property.

"To accomplish this goal, we've participated in the Audubon Cooperative Sanctuary Program from Day 1 on four of our golf courses," says Matt Falvo, director of golf courses and grounds for the resort. "Three courses are Certified Bronze Audubon International Signature Sanctuaries, making Turning Stone one of only 74 properties in the world to achieve this status."

Spread across 3,400 acres of rolling terrain, the property encompasses 72 holes of golf, as well as four hotels, a 125,000 square foot casino, a top-rated RV Park, a 1.2-mile walking trail and much more. Falvo oversees care and maintenance of all of the grounds, including landscaping along roadways and an indoor garden in the main lobby.

Fescue on the Turning Stone Resort Casino course treated with Segment.

Though the casino opened its doors in 1993, the first golf course, Shenendoah, wasn't completed until 2000. Designer Rick Smith created a wooded Scottish links-style course, incorporating the area's natural landscape. Falvo arrived at the resort a year later, starting as assistant superintendent of Shenendoah.

RETURNING TO HOME BASE

"I got my bachelor's degree in turf management from SUNY Cobleskill and worked in Vermont for a few years before returning to my home base," says Falvo, who grew up 12 miles from Turning Stone in Rome, N.Y. "So I was here for the grow-in of the other two 18-hole courses, Kaluhyat, designed by Robert Trent Jones, Jr., which opened in 2003, and Atunyote, a Tom Fazio design that opened in 2004."

Falvo quickly worked his way up the ranks at Turning Stone. He became superintendent of Atunyote in 2006, then senior superintendent in 2008, overseeing all golf courses, including two nine-hole courses, and resort grounds. He earned his current title in 2010.

All three championship courses feature bentgrass greens, tees and fairways, and Kentucky bluegrass roughs. While Atunyote is a parkland-style course, both Shenendoah and Kaluhyat are links-style designs with 100 acres of naturalized fescue areas between them.

"Golfers love to stand on the tee box and look out to the naturalized areas," Falvo says. "The contrast of the deep green bentgrass and the tan fescue blowing in the wind is a really beautiful look in midsummer. Our goal is to grow the fescue up to about two feet without water, fertility or other inputs. But when our guests hit a ball into naturalized areas overgrown with weeds, they are not too happy."

SWITCHGRASS SIGNALS TROUBLE

One grassy weed in particular gave Falvo and his crew fits – switchgrass. A peren-

From far left: Turning Stone's Shenendoah course; BASF'S Segment is used to control grassy weeds in wildflowers planted along the roadside; fescue with switch grass.

nial plant that can grow up to seven feet tall in a season, switchgrass is so thick that golf balls are easily lost in it. "We've had switchgrass as long as I can remember," Falvo says. "I believe it was in the original seed blend planted in the naturalized areas. Until recently, we had no effective way of controlling it."

In 2009, one of Falvo's superintendents heard about a BASF product called Segment herbicide, a selective, postemergence product for use on grassy weeds without harming the turf. He tried it on a small area and it worked so well that Falvo and his team have been using it every year since then.

"Segment works great. We apply it mid-May to early June – whenever fescue is four to five inches high," Falvo says. "We find that switchgrass grows at the same pace so it's good to catch it early. We don't want the weed growing so tall it's over the spray booms. Segment is the only product I'm aware of that will control switchgrass without injuring the desirable grass or plants."

In addition, Segment conforms to the strict environmental standards required by the Audubon Program. The product has a caution label, the lowest toxicity rating for a pesticide. Since only 40 acres of the naturalized fescue areas come into play on the two courses, Falvo and his crew limit their use of Segment to those acres.

EXCELLENT TOOL FOR NATURALIZED AREAS

"We like to create areas of pure fescue where golfers can stand and still see their feet," Falvo adds. "Segment allows us to do that – it's an excellent tool for use in maintaining our naturalized areas."

Falvo also uses Segment to control grassy weeds in wildflowers planted along the roadside leading into the resort. "We have a mile-and-a-half long winding drive planted with perennial wildflowers," he says. "Within a month after the flowers come up each spring, they are overgrown with weeds. We spray Segment as soon as we see four inches of weed growth. It works like a charm and doesn't affect the flowers."

Turning Stone has a maintenance team of 100 employees during peak season, but, not surprisingly, the crew dwindles during the off-season. "We typically close on Nov. 1 and turn our attention to snow removal," Falvo says. "It's a good break from golf. I actually like to see that first snowflake fall, but within two months, I'm ready to get back to golf."

To comply with Audubon Program, Turning Stone prepares an annual report each year, detailing how the courses incorporate reusable resources into everyday practices. It specifies how they control waste products, reduce pollution and promote sustainability of the land, as well as outline goals such as community outreach.

As CEO Ray Halbritter says, "At Tuning Stone, we pride ourselves on maintaining the natural beauty of the courses; it plays an important role in creating the ultimate golf experience, which our team works extremely hard to achieve." **GCI**

(continued from page 31)

recycled water at "agronomic rates" without performing nitrification and denitrification, Huck says. The potential problem, he says, is the high concentrations of nitrogen that remain in the water supply. "It's not going into a stream or a creek or out into the ocean where it would cause algae problems and other problems with fish and the frogs and the flora and fauna of those native areas," he says. "So when it's going on landscape, they go, 'Well, hey, free fertilizer for you guys!' But it's a ton of it at times."

Different chemicals that travel through a recycled supply will create different stresses, Nauroth says. "Whatever your water is, is what your soil will become," he says. To remediate those stresses, superintendents should perform more cultural programs, such as aerifying and amending soil with gypsum or wetting agents, he says.

Elevated bicarbonates could result in turf suffering from yellowing and a lack of root production. Water providers sometimes unintentionally spell misfortune onto superintendents by supplying them with less than desirable recycled supplies.

Before Naples lined the sewers, bicarbonates at Quail Run Golf Club in Naples, Fla., were between 700 and 800 parts per million, and turf suffered from yellowing and a lack of root production, says superintendent Jeff Plourde.

Although Florida soil is sandy, bicarbonate levels have decreased to between 400 and 500. Plourde has reduced his gypsum applications from two to one per summer, and has seen pH levels decrease from between 7.6 and 7.8 levels to between 7.1 and 7.2 levels.

At Dairy Creek Golf Course in San Luis Obispo, Calif., total dissolved solid levels are relatively high, says superintendent Josh Heptig. "We've always used wetting agents and flushing practices to try and remove those salts from the greens, as well as synthetic acids and things like that to try and push those chemicals, or bicarbonates, through the soil," he says.

Due to a decrease in overall water flow, crew have had to flush less. If they have an area with high salt, they will put a hose stand with a pop-up head on a green and run it overnight at a low volume.

For Heptig, the pros of using recycled water – namely sustainability and a sense of solidarity with water-deprived Californians – outweigh the cons. "We're happy that we have the reclaimed sources, and I think that's where things are going to go," he says.

In efforts to reduce negative effects of recycled water on turf, it is best for superintendents to keep an open dialogue with executives at their water treatment plant, Huck says. If superintendents have concerns about salt and nutrient levels, they should address them in conversation. Even if treatment plant executives don't choose to alter their practices, they will at least understand that superintendents have different notions about water quality.

Bring water quality reports to meetings and steer conversation through the presentation of facts to see you can find common ground, Taylor says. Above all, don't be adversarial.

Royal Poinciana and the City of Naples have maintained a positive relationship, Taylor says. Representatives from the club attend commission and city council meetings where they inform officials of their role in the once-again eco-friendly procedure. "We continue to sing the message that, 'Look, we're recycling this water,'" he says. "'We're providing a benefit to the city. We're taking this water in large quantities and we are recycling it for you. We are finishing the process. And there is no better filter than turfgrass.'" **GCI**

Patrick Williams is GCI's contributing editor.

CHECK RIGHT REEL

Paul F. Grayson is the Equipment Manager for the Crown Golf Club in Traverse City, Mich., a position he's held for the past decade. Previously, he spent 8½ years as the equipment manager at Grand Traverse Resort & Spa. Prior to that, he worked as a licensed ships engine officer sailing the Great Lakes and the oceans of the world.

WARNING: This is a sea story. It is a work of pure fiction, a hair-raising horror story, purely for your entertainment and education. If you try to check the facts and figures in this sea story, they will be vigorously disputed and denied by all parties involved. People will question my ability, my motives, my integrity, my favorite color, and more ... to discredit this story.

It does not matter who the equipment manufacturer is because all mower companies are moving in the same direction – drive by wire. This is where the operator moves the controls and the signal goes to an array of onboard computers that interpret the operator's intentions and then, via complex software, cause the mower to act.

Designers love this kind of stuff because, like the Tesla automobile, the physical machine is simpler – just sensors, actuators and computers. The real magic happens in the software. Change the software and you can change the behavior of the machine.

That is how Tesla put 70,000 self-driving cars on the road overnight. For years, they have offered customers a technology package option for $4,000 that was a self-driving car without the software. For the past several years, these cars have been on the road collecting about 750 million miles of driving data and phoning it in. One night in October last year, Tesla downloaded the self-driving software to the cars and next morning 70,000 owners had cars that could drive themselves. You can see why designers would like such things. The same is happening in the turf industry. Every mower company is switching to drive-by-wire. It is cheaper, mechanically simpler, offers more features that you can charge for and is the easiest way for manufacturers to meet air pollution requirements.

THE STORY BEGINS

At engine hour 2979 #4 mower stopped mid stripe on green 13. The driver was unable to get it started using the normal procedure of shutting it off and waiting for the computers to reset and then restarting it 20 times before calling for help. This was early in the morning, so the message was that it would be waiting on the green for me there when I arrived at 7 a.m.

At 7 a.m., I found that the driver had been able to get it running well enough to limp it back to the shop. When I tried it, I could not get it to start and was looking at how to move it inside. The jacking bolts to release the automatic parking brake didn't work the last time I tried to do that and the steering chain needs to be unhooked before trying to tow it. I was considering bringing in my set of roller skates (car dollies) from my home shop to move when the thing started and ran long enough for me to get it inside the door before it quit running.

The trouble shooting and repair lasted 33 days, involved dealer tech support (now a factory store since they were bought out by the manufacturer), factory tech support, a site visit by a factory tech and discussions with one of the engineers who designed the mower.

The $4,000 I spent on parts, the 264 shop hours I put in trying to get the mower to work, the time the two different tech support departments put in over the phone and the onsite visit by a factory technician did not fix the problem. The mower still had the same constantly changing symptoms it started with.

There was no getting around it. It was time to yell "Uncle!" The only thing left to do was to turn it over to the factory store's service department and pay the $150 hauling fee, an opened-ended $98/hour, parts extra, for an unknown length of time which when pressed could end up being about $10,000 total.

I was so frustrated that I parked the mower outside to wait for the truck that would pick it up. When the factory store called to say they would be able to pick it up a week earlier than scheduled, I went to move the mower and it started working. I tried mowing a test patch with it and it worked. An experienced driver mowed an entire green with it and got no faults or alarms. The good news is that it has been mowing for a couple of weeks now without one alarm or error message.

What fixed it? My best guess is that baking in the sun for the days that it was outside the shop waiting for the factory store to pick it up cured it. We now make baking #4 in the sun part of each day's routine. **GCI**

Travels with Terry

Globetrotting consulting agronomist Terry Buchen visits many golf courses annually with his digital camera in hand. He shares helpful ideas relating to maintenance equipment from the golf course superintendents he visits – as well as a few ideas of his own – with timely photos and captions that explore the changing world of golf course management.

Terry Buchen, CGCS, MG, is president of Golf Agronomy International. He's a 41-year, life member of the GCSAA. He can be reached at 757-561-7777 or terrybuchen@earthlink.net.

HOMEMADE TRIPLEX GREENS MOWER BRUSHES

Three used stiff-bristled shop brooms were successfully mounted in front of the cutting units on this Jacobsen Eclipse 322 Riding Greens Mower. Six used bed knives; three pieces of 1-inch square tubing; six sets of bolts, nuts and washers; six small "L" brackets and 2 feet of all-thread were used to mount the three brooms in front of the cutting units using parts already in inventory (less than $100 worth). The brooms are doing a great job of standing-up the creeping bentgrass plant before being mowed off. The task is performed one time per week, with additional brooming as needed. Brushing and topdressing is preferred over verticutting or grooming by Matt Hall, superintendent, and Adam Osbourne, assistant superintendent, at the Burlington (Iowa) Golf Club. It takes about five to 10 minutes to mount this attachment that is raised and lowered by being attached to both sides of each cutting unit. It took about four to five hours to build — two to three hours of trial and error to get it just right.

ADDITIONAL LIGHTING

This John Deere 825i XUV 4 x 4 is equipped with additional very bright lighting along with a roof that was installed by the local distributor. The sport light option is comprised of a OPS poly roof ($476.94), front light kit ($311.37), roof light harness ($85.60), rear light kit ($230.06), rear light harness ($85.60) and a OPS switch kit ($71.69). There are separate light switches mounted above the driver's head on the ROPS framework that are labeled "front work lights," "sport lights" and "rear work lights." The additional lights are used during the early morning and late evenings to provide very bright lighting while checking the greens for any mycelium, insect damage and foreign debris before mowers start mowing. It also checks equipment for quality of cut, hydraulic leaks, tire pressure and rear roller brush functioning. Three vehicles are equipped for Jim Vajen, superintendent, Richard Garcia, assistant, and Jaime Molina, crew foreman, at The Golf Club at Fiddler's Creek, Creek Course, in Naples, Fla. A fourth one is being built for Brian Weaver, equipment/shop manager, with a 4,500-pound winch.

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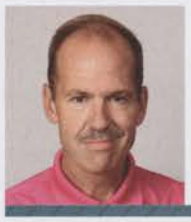
FIVE THOUGHTS ABOUT THE U.S. OPEN



Pat Jones is editorial director and publisher of Golf Course Industry. He can be reached at pjones@gie.net or 216-393-0253.

A year ago, the world watched as the USGA nearly killed a perfectly good golf course to make a point. This year, they decided to turn the gun on themselves.

But before we get to that, here are a couple of happier thoughts.

1. The golf course was absolutely perfect. Let me put this simply: the conditions at Oakmont were the best I've seen in 30 years of tromping around championship courses. Period. The mowing lines and presentation were unbelievable. The rough was just luscious, thick and upright. The bunkers were amazing. And whatever secret program John Zimmers and his team use to get nearly 100 percent *Poa* greens to remain that healthy through a regimen of 4x mowing (at .09") and 2x rolling daily (plus handling 3" of rainfall) is pure magic.

2. Yes, the greens were uber-fast but that's Oakmont. There was some Twitter debate about whether they were truly stimping at 15 Sunday afternoon, but it really doesn't matter. They were exactly the right speed for the task, which was to identify the best players in the world. I heard the usual grumbling from some turfheads about crazy speeds creating crazy expectations. Frankly, I doubt the average club member will "demand" supers try to recreate those conditions. They're (mostly) not that stupid. Plus, a good superintendent should view that kind of dumbass suggestion as an opportunity to educate golfers on the realities of creating Oakmont-style conditions.

3. The mass media coverage of the turf team was the best I remember. The preview stories on the now famous tree removal program should help many in our business succeed in selling the idea at their courses. Many reporters went out of their way to talk about why conditions at Oakmont were special and impossible to duplicate at nearly anyplace else. The volunteers and team were celebrated widely by big golf publications. This U.S. Open was another "win" for the image of the superintendent and wider understanding of good golf agronomy.

4. FOX sucked with one notable exception. What sucked? The commentators still spent way too much time yapping at each other on camera. They were constantly presenting tape-delayed coverage and pretending it was live. The silly computer-animated thingy that supposedly showed contours and directions on greens was distracting and gave me a headache. Their camera operators were never quite sure if they were supposed to follow the ball flight or if ShotTracker was doing it for them. On the bright side … Paul Azinger. I've always liked Zinger for telling it like it is and he delivered, particularly on Sunday.

5. Finally, the USGA is still run by lawyers. Only a bunch of lawyers could conclude that it was a good idea to abandon fairness for a misguided and mean-spirited sense of "rightness." Only lawyers could decide that it was acceptable to impugn the honesty of players and observers on the shakiest of evidence. And only lawyers could say, "It's more important to enforce the arcane letter of a rule instead of the spirit of the rule." In a matter of a few hours, the egos of a handful of rules "experts" destroyed a decade of goodwill and image-building by the association. It was a brain fart of colossal proportions.

It was unfair to everyone, but it was perhaps most unfair to the members of Oakmont and the fabulous efforts of their staff and volunteers. Had this ended differently, it might have seriously jeopardized the long relationship between Oakmont and the USGA. As it is, I'm pretty sure that a few Oakmont members are shaking their heads right now and wondering, "Are we really going to let these people back on our course again in 2025?"

All that said, I'm probably going to shock you by urging you not to throw the USGA under the bus. The USGA does so many important things so well in our business. They've been extremely supportive of superintendents publicly and they really are committed to educating golfers about the importance of sound agronomy. They are well-intentioned folks who sincerely care about the future of the game and who value what turfheads do every day.

So what happens now? What could be changed to prevent stuff like this in future? I'm just one USGA member, but I'd vote that we start by following the very old-school guidance of a non-golfer named William Shakespeare who wrote, "First thing we do, let's kill all the lawyers." **GCI**

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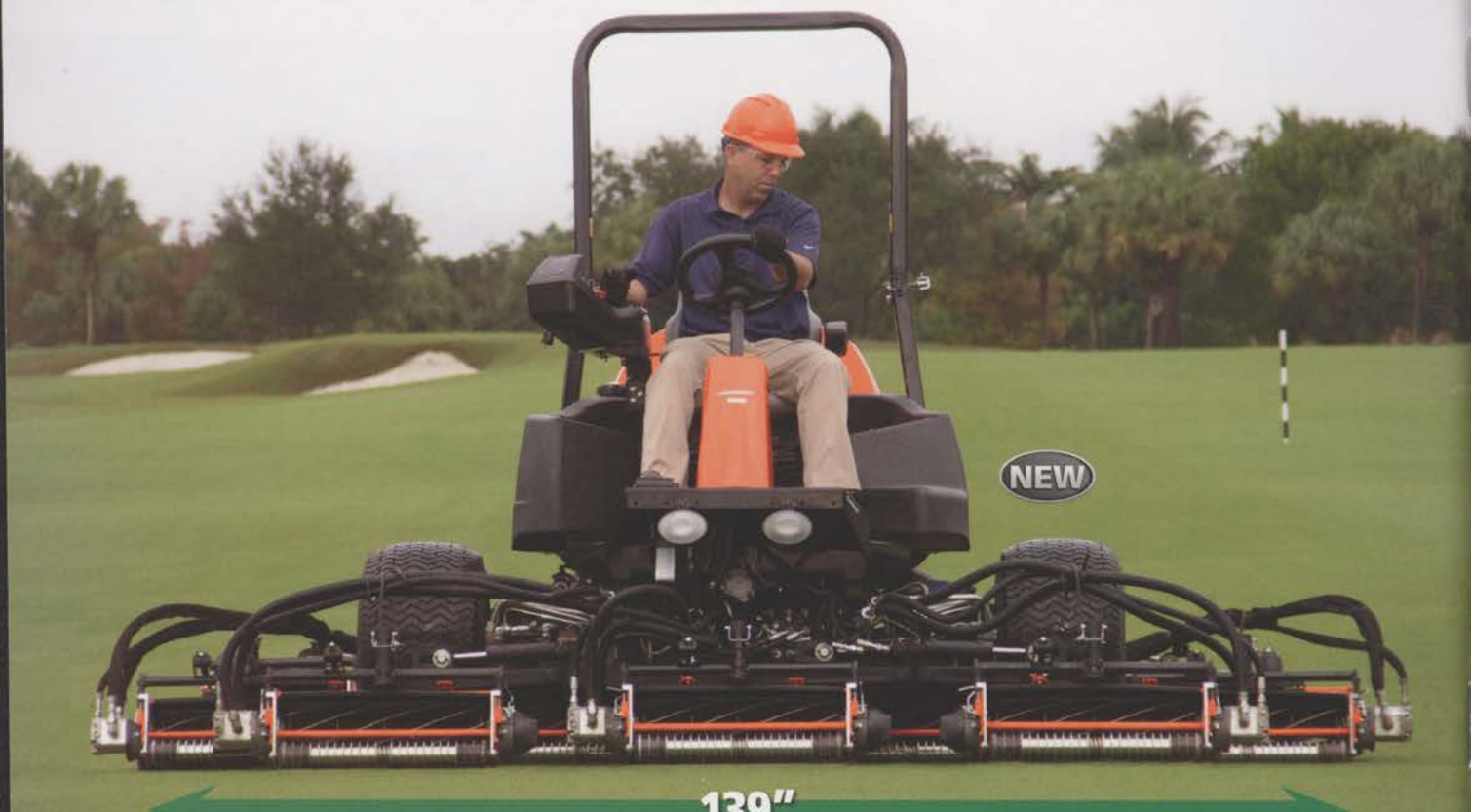

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