SINCE 1927—The Resource for Superintendents // Golfdom.com

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WHAT'S OLD IS NEW AGAIN

Superintendent John Zimmers Jr. presents a fully restored Oakmont for the courses' ninth (ninth!) U.S. Open

PLUS

Q&A WITH USGA'S JIM MOORE

BEING PROACTIVE ON PROTOZOA

NEFF'S GRASS TIMES AT TURFMONT HIGH

A NORTH COAST MEDIA PUBLICATION
VOL. 72 // NO. 5

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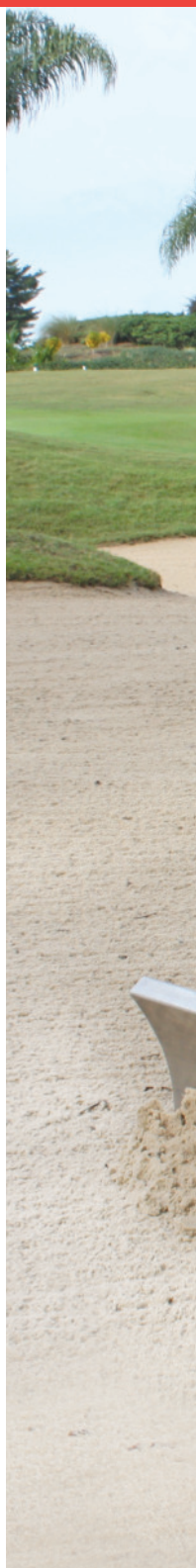

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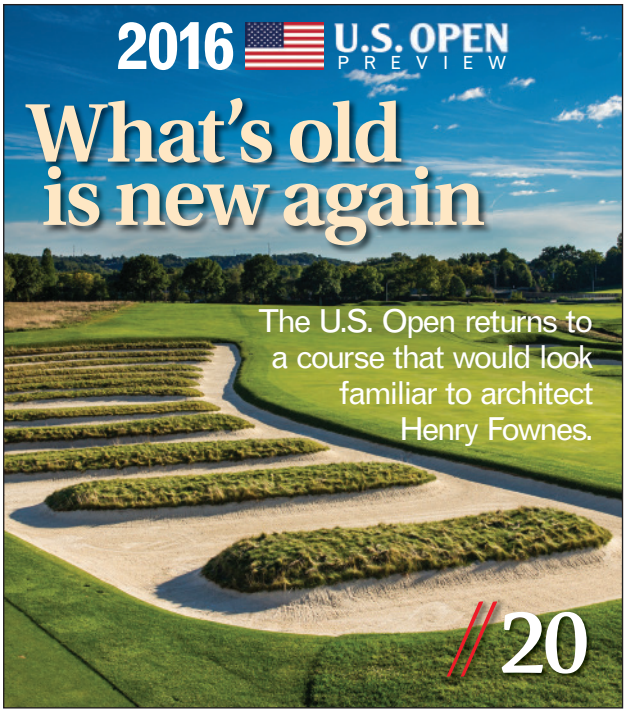

COLUMNS

DEPARTMENTS

SUPER SCIENCE

COVER PHOTO: BRIAN KALDORF

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"...I've been thinking about history lately, with Oakmont on the verge of hosting its ninth U.S. Open. ...I was thinking about the history I've seen, the history I've seen and forgotten and the history that's died."

SETH JONES, *Editor-in-Chief*

Write this down

Two guys with 30 years between them — who've only recently met — said almost the exact same thing to me. ¶ Mike McCormick, assistant superintendent at Oakmont (Pa.) CC said to me about the restoration of the course, "I felt like I was a part of history." ¶ A week later, discussing a future issue of the magazine, *Golfdom* contributor Karl Danneberger, Ph.D., said to me, "The good thing about getting old — if you can remember things — is you become a part of history."

The coincidence struck me because I've been thinking about history lately, with Oakmont on the verge of hosting its ninth U.S. Open. I was thinking about the history I've seen, the history I've seen and forgotten and the history that's died.

First, the history I've seen: I rolled through the gates at Oakmont CC last month to get to work on this month's cover story. The last time I was there was for my first U.S. Open, when Oakmont hosted the tournament in 2007.

Some memories came back right away... even the parking lot brought back memories. Hard to believe that was my first U.S. Open. I've been to four of the last five Opens, but Oakmont will always be my first.

It felt like old times visiting with John Zimmers Jr. and Dave Delsandro. I feel lucky to have survived in this industry long enough to "come back" to Oakmont, even though it had been only nine years since its last U.S. Open.

The history I've forgotten? It comes back in flashes, sometimes telling stories over beers, but most often when I go back and read past stories, particularly blog posts.

I went back and re-read the blog posts I wrote in 2007 when I was at that U.S. Open reporting for my previous employer. (You can check out those posts by clicking over to gcm.typepad.com and clicking on June 2007.) At the time I was writing about whatever I could, because it all seemed so important. And then time fades away and it seems trivial, until I come back and I'm suddenly happy I took the time to write it all down back then.

Delsandro mentioned to me that from time to time he still reads those old blog posts as a reminder of what they accomplished. It's cool for me, to paraphrase McCormick and Danneberger, to be a part of history — at least Oakmont's history.

And what about the history that dies? I think about how many of the interesting stories my dad told me when I was growing up, about him playing high school basketball in Indiana in the 1960s, or working in the old steel mills in the 1970s. Those stories mostly died with him, unless my sister and I try to cobble them together when we're with each other. Even then, the tales lack detail, they're half forgotten.

Which brings me back to the blog and writing these things down. It might seem trivial at the time, but in hindsight, the stories, the emotions, the details are valuable, especially in hindsight.

The same can be said about any day, for any of us. What might seem like a trivial thought today could strike us as profound 10 years later.

Have you ever come across an old to-do list and shaken your head at what was on it? About a third of the list is still haunting you, a third you laugh at because it's a distant memory you're happy to be done with it, and the last third seems completely trivial.

That's the way it goes for me, at least.

It's my job to write things down. But even if it wasn't, I can't help but see the value in it.

Don't let your history die. Take the time — write it down.

Email Jones at: sjones@northcoastmedia.net.

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NEWS, NOTES AND QUOTES

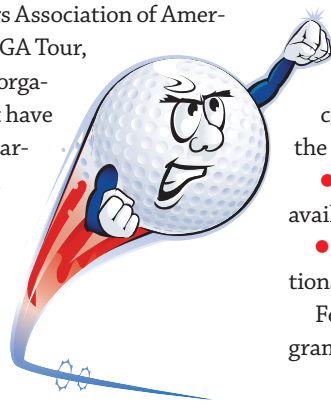
//GENERATION GOLF

MOVE OVER AVENGERS: MILLENNIAL TASK FORCE ASSEMBLES

A new task force has been created to help bring more millennials to golf.

If a golf course is looking for a new well of golfers to tap into, it's time to start taking a hard look at millennials. The generation, ages 18-34, is having an impact on the golf industry. According to the National Golf Foundation, there are 6.2 million participants from this age group, or 28 percent of all golfers, and they play about 100 million rounds per year in the U.S.

In an attempt to bring more of this generation to the game, Golf 20/20 created the Millennial Task Force (MTF). The 12-person group represents industry organizations — the Club Managers Association of America (CMAA), PGA Tour, USGA — and organizations that have had success marketing toward millennials, like Google, GoPro, Topgolf and Twitter.



The MTF currently is developing customized strategies for members of the CMAA, Golf Course Superintendents Association of America, National Golf Course Owners Association and PGA of America with "best practices" and important questions to ask of an operation to determine if their facility is "millennial ready," according to a press release.

An initial list of questions has been released by the MTF that golf courses can ask themselves. Some of these include:

- Is there a relaxed dress code? Can golfers listen to music on the course?
- Is there a 9-hole or twilight rate available?
- Is Footgolf or another non-traditional form of the game offered?

For more information on the program visit **Golfdom.com.**

//FLORIDA FOREVER

HARRELL'S NAMES NEW FLORIDA REGION SALES MANAGER

Jason Frank

Harrell's LLC has named Jason Frank as its new turf sales manager for the Florida Region.

Frank has worked in the turfgrass industry for 16 years with combined experience in research, direct management, operations, sales and leadership positions. After years of hands-on agronomic experience in both golf course and landscape management, he spent six years with the Bayer Crop Science team in Florida.

After earning his Bachelor of Science in turfgrass from the University of Florida, Frank completed three Master's degrees – Soil and Water Science, MBA and Horticulture Sciences. He also maintains licensure in Florida as a Florida commercial applicator and is certified as a professional agronomist, crop advisor and horticulture professional.

"Having worked with our Florida team for the past several years, Jason is well acquainted with our sales representatives and our Florida customers. We are excited to see what he brings to this team of 13 veteran sales representatives covering golf courses, turf & landscape companies and sports turf organizations," says Greg Nicoll, vice president of turf sales – east.

//SAFETY IN NUMBERS

TEAM *GOLFDOM* HEADS TO U.S. OPEN

Taking a week off to head to Oakmont, Pa., for the 2016 U.S. Open isn't an easy thing to pull off during peak golf season.

But that's OK, your friends at *Golfdom* will take the trip for you.

Check in at Golfdom.com beginning on Sunday June 12th for complete behind-the-scenes coverage of the U.S. Open from a maintenance point of view. Both *Golfdom* EIC Seth Jones and Associate Editor Grant B. Gannon will be posting to the blog with regular updates.

And if you do make it to the U.S. Open? Be sure to say hello, and maybe we'll give you a *Golfdom* hat.

ISTOCK.COM: WELLGLAD, (GOLF BALL), ANDREW PENNERGOLFER), &#169 ATOMA (BALL CHARACTER)

//THE PRO-BONO SIX

USGA, ASGCA to take hands-on approach at six U.S. courses

The United States Golf Association (USGA) and American Society of Golf Course Architects (ASGCA) Foundation together have selected six public golf courses to receive pro-bono consulting visits this year from USGA agronomists and ASGCA-member architects.

Through the USGA-ASGCA Site Evaluation Program, the agronomists and architects will make recommendations including improvements to the turf quality of greens and determining the best locations for forward tees. "An important mission for the USGA is to strengthen the future of golf by providing solutions for golf facilities, and we are excited to provide direct assistance to these courses," says Mike Davis, executive director/CEO of the USGA. "Additionally, the lessons learned from this unique collaboration with the ASGCA have the potential to impact many more facilities around the world."

THE COURSES SELECTED ARE:

- Carolina Springs Golf Club, Fountain Inn, S.C.
- Connecticut National Golf Club, Putnam, Conn.
- Carey Park Golf Course, Hutchinson, Kan.
- EdgeBrook Golf Course, Brookings, S.D.
- Point University Golf Club, Lanett, Ala.
- Simsbury Farms Golf Course, West Simsbury, Conn.

The USGA and ASGCA Foundation will accept more applications later this year, and interested facility owners, operators and managers can go to asgca.org for more information.

//EXTENDED STAY

JACOBSEN, MARRIOTT PROPERTIES ENTER AGREEMENT

Jacobsen, a Textron Inc. company, has recently signed a national account agreement with Avendra allowing all U.S.-based Marriott properties to purchase Jacobsen equipment at exclusive member pricing.

Marriott currently has 18 properties with 24 golf course facilities in the U.S.

Avendra selected Jacobsen after the company spent several months testing and reviewing Jacobsen's full-line of turf maintenance equipment.

"We're very excited to be working with Avendra and Marriott properties," says David Withers, president and CEO of Jacobsen. "We look forward to helping Marriott properties throughout the U.S. present superior conditions for their customers."

Avendra, headquartered in Rockville, Md., is a procurement services provider serving the hospitality and lodging industries in North America.

PHOTO BY: SETH JONES (MOWER); COURTESY OF AUDUBON INTERNATIONAL

//BLITZED BY NATURE

GOLF COURSES SHOW OFF NATURE DURING 2016 BIOBLITZ

Golf courses across the world participated in BioBlitz, a free program hosted by Audubon International, from Earth Day, April 22, to International Migratory Bird Day, May 14.

BioBlitz is a species-counting competition designed to create awareness among golfers and the general public about the environmental value of the habitats supported by golf courses. The program was open to any golf course worldwide, including those unaffiliated with Audubon International.

"A BioBlitz is a great way for golf courses to bring naturalists and families out to see the natural beauty golf courses provide in their towns," says Doug Bechtel, executive director of Audubon International.

Participating golf courses could invite any amount of participants, such as golfers and their families, community members and local experts, to count plant and animal species located on the property. Awards will be given in the categories of Most Species, Most Participants and Best Photo. Following BioBlitz, Audubon International will compile the lists of plant and animal species recorded and report on the findings.

ABOUT THE COVER

This month's cover photo shows Oakmont CC Superintendent John Zimmers Jr. standing alongside the area recently restored by the Oakmont crew. The photo was taken by Pittsburgh-based photographer Brian Kaldorf.

Hole

Pasatiempo Golf Club has as rich a history as any course in the U.S. From its beginning it was destined for greatness with Alister MacKenzie as its architect and Bobby Jones playing in the original foursome when the course opened in 1929.

The 13th hole at this celebrated course is a 531-yard, par-5. It's the sights from the approach shot that Superintendent Justin Mandon says makes this hole special.

"I think the approach shot in is one of the best views of the golf course," Mandon says. "The bunkering around that green is amazing, and it's a massive green that has trouble all the way around it."

While the bunkers surrounding the green add to the aesthetics of the hole, the trouble that Mandon mentions applies to more than just golfers. No. 13 has two fingers that extend off of the back left and back right of the green and it's not uncommon for a pin to be cut in one of those tight corners.

This is a challenge for players because the green is shaved into the bunker and even a putt can easily slide into the sand. The challenge extends to the maintenance team because there is very little space between the green and bunker — if they're not careful while mowing or rolling they can fall in just as easily.

When it comes to disease pressure on the course's *Poa annua* turf, Mandon says he relies on Syngenta products like Primo Maxx and Instrata. He calls Primo one of the biggest game changers in golf in the last 25 years, but Instrata is the one that is critical to him and some of his colleagues in Northern California.

"With the really wet winters we have here Instrata is extremely important for us managing the fungus on the greens," Mandon says. "It has turned out, because of recent difficulties with other products, Instrata has been a go-to for a lot of superintendents in this climate for snow mold control."

Justin Mandon
SUPERINTENDENT

Hole No. 13

Pasatiempo Golf Club SANTA CRUZ, CA

▶ 531 YARDS, PAR 5 RYE & *POA ANNUA* FAIRWAY AND *POA ANNUA* GREEN

of the Month

Golfdom Gallery

1 Pilot to co-pilot Not a bad way to travel to the Masters: a private plane. They even let *Golfdom* EIC Seth Jones fly shotgun.

2 Sweeney and the Lion You've got to buy a trinket from John Daly when his RV is parked outside the Hooters of Augusta, right? Just ask Rich Sweeney, CGCS, of the Plant Food Co.

3 Bird's Eye View Rafael Barajas, CGCS, Boca Grove Plantation & CC, Boca Raton, Fla., had a nice view of Augusta National.

4 Augusta Air Security must have been pretty lax to let this group board a plane. Preparing for takeoff are: (L to R) Nate Spence, Trump National GC, Bedminster, N.J.; Kevin Stoltman, North Coast Media CEO; Russell Harris, Galloping Hill GC, Bloomfield, N.J.; Pat Roberts, *Golfdom* publisher; Sweeney; Mike the Pilot; Tyler Otero, North Jersey CC, Wayne, N.J.; Jones; and Lance Rogers, CGCS, Colonia CC, Robbinsville, N.J.

5 Mr. Grass and Co. Instead of talking turf, we gabbed with Grass: GCSAA President Pete Grass, CGCS, Hilands GC, Billings, Mont., Darren Davis, CGCS, Olde Florida GC, Naples and John Fulling, CGCS, Kalamazoo (Mich.) CC, at Augusta National.

6 He is the Keymaster Jacobsen's Kody Key and Galloping Hill's Russ Harris take a break from the course at the Jacobsen guest house in Augusta.

7 Bill Murray sighting Dave Mishkin, Howell Park GC, Farmingdale, N.J., with Bill Murray, Pinebrook GC, Belmar, N.J. Wait, who did you think we were talking about?

8 Green jackets, Green Section Jones caught up with the USGA's Director of Championship Agronomy, Darin Bevard, at the Masters.

PHOTOS BY: SETH JONES (1-3, 6); TOM WEINERT (4); NATE SPENCE (7, 8)

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"For folks in Los Angeles and points south, it is maddening to watch the nightly newscast showing the bands of rain work south time and time again only to peter out around Santa Barbara and then fade or move eastward."

JOEL JACKSON, *Senior Contributing Editor*

Is El Niño a boom or a bust?

California ranks No. 2 nationally in total number of U.S. golf courses, behind No. 1 Florida. After the recent multi-year drought, which sparked mandatory water restrictions to all sectors of water users from homeowners to the agriculture industry, the 2016 El Niño was heralded as the potential savior for all.

California water authorities anxiously awaited the forecasted 2016 El Niño promise of increased rain to help the state recover from the drought conditions, which have prevailed the past five years. Unfortunately, California's traditionally wet season of October to March has mostly been a bust, especially for Southern California.

Northern California has received a fair amount of rain and good snowfall amounts, causing some improvement to the state's reserve water supplies. Meanwhile, the high- and low-pressure systems have combined to steer most rainstorms eastward before they get to Southern California.

I contacted several superintendents in Northern California and they reported decent rainfall amounts, however, most said the rainfall totals were below last year's amounts for this same time period.

Troy Flanagan, superintendent of the Olympic Club, was my first NorCal contact. He said the El Niño effect on golf concerns was premature. "In 2014 during our traditionally wet season we received around 18 inches," he said. "This year we are at 12.25 inches and counting."

Seventy miles to the south, Justin Mandon, superintendent at Pasatiempo GC, reported rainfall amounts ranging from 30 to 40 inches for October 2015 through March 2016. When I asked him to explain the big difference between Pasatiempo and Olympic, Mandon said, "We have a mountain range close to the coast, and it causes the fronts to drop more of their rain on us."

I'm learning the weather patterns of California since our move in October 2015. When we got the first of the January rains, it only took 24 to 48 hours for the sparse brown hillsides surrounding the San Fernando Valley to sprout grass and other plant life. Then Mother Nature pulled one of her "gotchas." February turned warmer and less rain fell during the month. The green-up didn't disappear, but the encouraging snowpack began to melt and give up its promise of providing longer-term drought relief.

For folks in Los Angeles and points south, it is maddening to watch the nightly newscast, showing the bands of rain work south time and time again only to peter out around Santa Barbara and then fade or move eastward. Since I've been here I can count on one hand the numbers of times rain events have exceeded half an inch in the Van Nuys/Sherman Oaks area.

Pressure to conserve water in California builds with every missed rainstorm. The golf industry here has responded with typically positive cooperative actions. While the misconception of golf as a big water user persists, actual statistics show nationally and state-by-state that golf water usage is much less compared with agriculture, public usage, business and industry.

California mandated a statewide 26-percent water use reduction for most of the classes of water users. These reductions include most of the municipalities and businesses, including golf. The majority of homeowners responded by reducing their consumption, with the exception of a few wealthy folks. Their rates have since been raised and increased penalties are being imposed, including shaming over-users in the press.

Meanwhile, California golf course superintendent chapters like the Hi-Lo Desert GCSA have been praised in the media for their cooperation and for detailing the conservation steps they take.

Water issues across the United States are becoming ever more critical for the agriculture and green industries. Reach out and start dialogues with your state and local regulatory agencies, and maybe also ask Mother Nature for a little help, too.

Joel Jackson, CGCS-Ret., is senior contributing editor for *Golfdom*. Email him at flrgn@aol.com.

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The Golfdom FILES

FROM THE ARCHIVE

In the June 2015 *Golfdom,* Karl Danneberger, Ph.D., highlighted a trip he took to Egypt and described golf course maintenance in that country. While there, he noted that some local superintendents use the English metric system, learned from U.S. superintendents who have since left. ¶ It's interesting that in Egypt, a country among the majority of countries that use the metric system, some superintendents follow a measurement system used by only three countries: Myanmar, Liberia and the United States. ¶ The metric system is foreign to most in this country, but it has always seemed logical that the United States eventually would join the majority of the world. That conversion is exactly what Fred V. Grau predicted would happen… in the October/November 1971 *Golfdom.* ¶ A legend in the industry, Mr. Grau was the director of the USGA Green Section from 1945 to 1953. He died in 1990 at the age of 88. The switch to metric didn't happen in his lifetime, or in the 26 years since, but it's still an interesting read. To see the full article visit **golfdom.com/exclusive.**

The metrics are coming

BY FRED V. GRAU

In the months and years to come there will be many heated discussions, both pro and con, regarding the proposed conversion to the metric system in the United States. The proposal, made in July by the Commerce Department, asked Congress to create a "central coordinating body" to guide the nation through a 10-year conversion to the metric system. America is the last major industrial country in the world to cling to the archaic "inch-pound" English system. The exception is our decimal monetary system, which is based on 10s and is very workable.

Metric refers to the meter, which is one ten-millionth of the distance along a meridian from the North Pole to the equator. A meter is rational, precise and constant…

Metrics have been with us, if only peripherally, for a long time. The push is on, however, for a widespread conversion to this system…

It may come as a shock to many taxpayers that the National Bureau of Standards, which is part of the Commerce Department, released an 11-volume report on July 29th that cost $1.3 million and took three years to complete. The title is "A Metric America: A Decision Whose Time Has Come." The report proposes a 10-year plan to convert the nation to metrics — "predominantly, though not exclusively …" The conversion would begin in education and international engineering standards. The over-all cost to manufacturers might run from $10 billion to $40 billion and could increase export trade to metric countries by $1 to $2 billion a year. To allow the nation casually to drift into metrics might take 50 years and would cost far more than the 10-year Government coordinated plan. In two or three decades, the United States would recoup the cost if it worked at it. If we drift, it may take eight or nine decades to recover the costs.

It is of more than passing interest that the states, not the Federal government, are largely responsible for enforcing weights and measures and for assuring uniformity. It is significant also that the Government does not seem to be determined to eradicate customary measurements, even though the tide of metrication proceeds relentlessly. Beauty contestants undoubtedly will continue to be publicized as "36-23-36" (or similar) rather than the metric equivalent. Turfgrass devotees undoubtedly will cling to "1,000 square feet" for a long, long time.

Sod growers, though, may find it less difficult to market "square meters" of sod rather than square yards. Gallons of spray material will become liters and chemicals will be measured by grams and kilograms, which will introduce greater accuracy. (Hashish always is measured in metrics.) Computers undoubtedly will be more easily programmed with greater accuracy in metrics. Shoppers will find it far easier to compute mentally the cost per-unit of foodstuffs when metrics become the law of the land.

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"In light of the current labor situation, we should be more proactive in spreading the word, especially to students who already have an interest in this type of work."

MATT NEFF, *assistant superintendent, Wedgewood G&CC, Powell, Ohio*

Grass times at Turfmont High

I recently had the opportunity to speak to a high school class about a career in golf course maintenance. It was a turf and horticulture class, so most of the students were interested in green industry careers. Given the current labor situation in our business, I was excited to have the chance to tell them more about what we do, and, I hoped, persuade a few of them to seriously consider a career on the golf course.

I was also a little nervous, because public speaking isn't my favorite thing to do. This undoubtedly is a direct result of the time in elementary school when I completely froze — and I mean *completely* froze — in front of the entire class during a speech competition. The teacher had to come up to the front of the room and walk me back to my desk, where I sat, catatonic, for at least an hour.

In the ensuing years I've progressed from paralyzing fear to mild discomfort, but to be honest, I found speaking to a group of high school students to be more difficult than speaking to a group of peers or a search committee in an interview setting.

Having interacted with several high school kids on the crew over the years, I know that they sometimes can be a tough group to connect with and keep engaged. However, this class was extremely polite. About a quarter of them were truly interested in the talk, another quarter were slightly interested and the rest were courteous enough to feign interest for the hour I was given.

I certainly gained a newfound respect for teachers, and now feel a little guiltier for all the times I was less than attentive in class. So, to all my former teachers — some of whom probably think I ended up working at a convenience store, not as a part-time college job, but as a career – I'm sorry. That especially includes my French teacher, who likely as a result of my repeated assertions (which have thus far proved correct) that I would never actually need to know French, flat-out hated me.

I didn't necessarily seek out the chance to speak to these students, but maybe our industry should be seeking out these opportunities. I believe this is an awesome profession, and I'm quite certain most people in this business agree. In light of the current labor situation, we should be more proactive in spreading the word, especially to students who already have an interest in this type of work.

The demand for qualified people seemingly well outpaces the supply. It takes only one look at the industry job boards to see that people are leaving the business in relatively high numbers, and because turf program enrollments are way down it's become increasingly difficult to replace them.

This might be the best time in the last 10 to 15 years to get into golf course maintenance. There is opportunity everywhere, and that opportunity presumably will continue up the career ladder in the coming years as more long-tenured assistants leave the business and veteran superintendents retire or move on to other opportunities. In short, I think people entering the profession now won't encounter the same difficulty advancing as those who came in within the last 10 years.

I realize that labor availability can be cyclical and that there are trends in popular college majors. (Is every other seasonal guy you hire lately a sports management major?) But I've heard more than a few people who have been in this business for a long time say they haven't seen anything like this during their careers.

If superintendents and assistants are truly the caretakers of the game, then we need to do what we can to ensure the long-term success of our profession, and ultimately, the game of golf itself.

Matt Neff (mneff4@yahoo.com) is assistant superintendent at Wedgewood G&CC in Powell, Ohio.

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Putting Chemistry to the Test

BASF creates chemistry geared to help superintendents keep their golf courses in the best condition in all environments. To share these chemistries with more superintendents, the company, in partnership with Golfdom, has invited four properties to take part in its inaugural **Elite Rejuvenation** program. Each course will be introduced to new technology and re-introduced to some products they're familiar with.

The four participating superintendents and their courses are:

- Chris Ellsmore, Mohegan Sun Golf Course, Baltic, Conn.
- Shawn Gill, Prince Williams Golf Course, Nokesville, Va.
- Nick Janovich, Oglebay Resort, Wheeling, W.Va.
- Matthew Stout, LuLu Country Club, Glenside, Pa.

Their guide during the **Elite Rejuvenation** program will be Kyle Miller, Senior Market Development Specialist at BASF. He will discuss each superintendent's spray program and find ways to maximize results using BASF products. Together they will decide what products to try and when and where the application should happen.

"We've got new technology, like Lexicon and Xzemplar, that are so successful in university trials for disease control and make the case for improved plant health," says Miller. "I don't want superintendents to miss out on that. They can give their members and the golfing public a better golf experience."

The first course Miller visited was Oglebay Resort, and Superintendent Nick Janovich. During that trip the pair analyzed an issue on his fairways and decided to try an application of Emerald fungicide because of its long-lasting disease control for dollar spot.

Janovich says because of the **Elite Rejuvenation** program he is ready to step out of the comfort zone of his previous spray program.

"It's a great opportunity to change the fungicide programs that we're currently using," he says. "After a while you can get complacent. This was the perfect opportunity for us to take a step back and try some other products that we typically would not have."

"We want the superintendents to stand back at the end of the season and go, 'Wow, my course looks as good as it has ever looked and it's thanks to integrating BASF products," Miller says.

Check back for updates on these four courses and the **Elite Rejuvenation** program in future issues of *Golfdom*.

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What's old is new again

Back again at legendary Oakmont, the U.S. Open returns (for a record ninth time!) to a course that would look familiar to architect Henry Fownes.

BY SETH JONES

Oh, it's on now.

After two U.S. Opens celebrated for experimentation, the 2016 U.S. Open returns to Pittsburgh — steel country — and promises only one thing: an old-school battle of man versus championship golf.

The old classic, Oakmont (Pa.) CC, host of 21 national championships, including eight U.S. Opens, versus the best golfers in the world, many under the age of 30.

Talk about old versus young. But be warned, young upstarts. For a 113-year-old course, Oakmont is looking pretty spry these days.

Set-up redux

When the 2016 U.S. Open arrives at Oakmont the week of June 13, don't expect to see much difference in the set-up of the course from when the Open was last there in 2007.

"The differences from '07 to '16, and in talking with Mike (Davis, USGA executive director) about how we want to approach this… we would sign up for

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PHOTO BY: BRIAN KALDORF

"I always ask myself, 'What would Mr. Fownes think? How would he feel today if he was here looking at this golf course?'" Zimmers says. "I'd like to think he'd be very, very proud of what's been accomplished in the last several years."

As seen in these before-and-after photos taken by Dave Delsandro, Oakmont's director of U.S. Open operations and projects, the image on the left shows the view from No. 11 looking toward holes 2 through 8 prior to the restoration project. On the right is the same view following the completion of the project.

More before-and-after photos courtesy of Delsandro. Though the Pennsylvania Turnpike isn't easily seen from most vantage points on the course, trees had been planted around it over the years in an effort to hide it (left). Those trees have all been removed and replaced with evironmentally efficient fescue mounds (right), work that Assistant Superintendent Mike McCormick calls "a beast."

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almost identical conditions and course set-up from 2007," says John Zimmers Jr., superintendent at Oakmont. "The thing to look for is the weather. If Oakmont can be firm and fast, it's going to be really fun golf, a true test."

Zimmers expects the rough to be something both the USGA and golf fans will hone in on.

"We follow two U.S. Opens where rough was not a prominent feature — that's not meant to sound negative," Zimmers says, "but coming off Pinehurst and Chambers Bay, it won't be sand or fescue that the players can just whack out of. If a player misses a fairway here, they'll be in some gnarly stuff."

There are some minor changes to the course that only the keenest architecture geeks will note: The back portion of 6 green has been restored to Fownes' original design, adding new hole locations. Two bunkers were removed on the par-5 No. 12, and a new cross bunker was added 80 yards out.

But the major story at Oakmont to entertain everyone from golf architecture geeks to casual golf fans is what architect Tom Marzolf calls "dramatic" and Zimmers calls "one of the best stories in golf:" Namely, the restoration work completed since the 2007 U.S. Open.

The once and future course

Oakmont CC perennially has been regarded as a classic American golf course. So what did the membership decide to do to the course? Go back to the beginning.

Consulting architect Tom Marzolf of Fazio Design applauds what he describes as a bold move for Oakmont to undergo a transformation when it was already a top-10 course.

"Back when (Ernie) Els won in 1994, it was a tree-lined golf course, wall-to-wall trees on every hole," Marzolf says. "There have been a lot of trees taken down, even since (Angel) Cabrera won in 2007. For a club to change its identity like this, it's a dramatic step. People are going to be shocked when they see it."

To get Oakmont back to the way it looked when Henry Fownes built the course in 1903, 14,500 trees were removed — 7,500 trees just since the '07 Open. Trees had been overplanted over the years to hide the Pennsylvania Turnpike, which bisects the course. That's all been removed — a massive undertaking for sure — and replaced with environmentally efficient and aesthetically pleasing fescue mounds.

Dave Delsandro, director of U.S. Open operations and projects for Oakmont, has seen a lot of these changes in person, starting out when he volunteered for the 2003 U.S. Amateur as an 18 year old fresh out of high school.

Dave Delsandro

"I think it's fantastic, not only from an aesthetics standpoint, but also agronomically," Delsandro

PHOTOS BY: DAVE DELSANDRO

The church pews on the fourth hole of Oakmont Country Club in Oakmont, Pa.

says. "The work that was done along the Pennsylvania Turnpike, the additional clearing work and restoration, the addition of fine fescue and the environmental initiatives… we've restored the property to Mr. Fownes' original vision." *(Editor's note: to view a video of Delsandro discussing these changes, visit Golfdom.com.)*

Zimmers is equal parts impressed and flattered that the Oakmont membership greenlighted the project on his watch.

"To have such foresight, and the confidence they've put in myself, Dave and our whole team, has been magnificent," Zimmers says. "We've been working with the Fazio firm to guide us and restore what this piece of property is, because it's really about Mr. Fownes' vision. That's what's so unique about this property. There's no water, no waterfalls, no glamour. It's just smack in front of you. And it's widely considered to be one of the toughest tests of championship golf in the world."

…the harder they fall

Removing all those trees also was a tough test of maintenance. Enter the young blood on the crew, Assistant Superintendent Mike McCormick, a Bostonian with a degree from UMass Amherst in plant and soil science, as well as a master's from Superintendent Dick Bator's school of hard knocks.

"It was a beast, a lot of guys put a ton of time into it," says McCormick. "It was an unbelievable project to be involved in. Now you look at the result, all the fescue is grown in. Looking across that view everyday for someone like me, I feel like I was a part of history."

Mike McCormick

The easy part was cutting down the trees, McCormick says. With the turnpike and railroad tracks both within striking distance, the crew had to be cautious to chain each tree and pull it in the opposite direction as it was being cut down. After all the trees were dragged up the hill and the stumps were ground out, they were left with 6 inches of organic

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PHOTO COURTESY: @USGA/JOHN MUMMERT (TOP)/ PHOTO BY: DAVE DELSANDRO

"You couldn't see the clubhouse or the other side of the property from here much at all," Delsandro says. "We've restored the course to Mr. Fownes' original vision. In additon, the mound installation has added a great element in keeping with the history of the golf course."

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matter that had to be hand-raked and loaded into 500-pound bulk fertilizer bags. Those were all then dragged up the hill by a track hoe.

"It was such a big story going into 2007 when they took down trees on the interior of the course," McCormick says. "I came here feeling disappointed that I wasn't a part of that, I felt like there wasn't a lot of work left to be done. I was clearly quite wrong."

McCormick had just put in a 14-hour day when he spoke to *Golfdom* in mid-April. He said the course had been enjoying a pleasant spring, and the crew was in the fine-tuning stage. After the last few years, the good weather is well deserved.

"The past couple (winter seasons) have been pretty rough in the Pittsburgh/northern mid-Atlantic region," Delsandro says. "Golf courses in the area, including us, have battled winter damage, ice damage, crown hydration. But this year we've had relatively benign weather."

Delsandro himself falls into the "old-yet-new" category. He first interned at the course in 2004-2005, was hired full-time in 2006 and worked his way up to first assistant. Following the 2010 Women's U.S. Open, Delsandro left to become superintendent of Nassau CC in Glen Cove, N.Y.

Oakmont has a number of unique greens throughout the course, that's what makes it so memorable. The 9th green, one of the largest greens in golf, is also the putting green for the clubhouse.

After three years at Nassau, Oakmont called him home, and he accepted the wordy title of director of U.S. Open operations and projects… or "D.O.P.E.," as Zimmers likes to joke.

"It was a tough decision to leave (Nassau), but getting the opportunity to work with John, one of my best friends and mentors, and chase around another U.S. Open, was an opportunity I couldn't pass up," Delsandro says. "I'm not a guy who gets caught up in paperwork or titles. I like to work. I knew what Oakmont was about."

Zimmers himself is now in his 17th season at Oakmont. The 2003 U.S. Amateur, the 2007 U.S. Open, the 2010 U.S. Women's Open, and soon the 2016 U.S. Open, will have happened under his supervision. He says it doesn't get old.

THE PREPARATION BEFORE THE CHAMPIONSHIP PREPARATION

Visitors to Oakmont (Pa.) Country Club during the 2016 U.S. Open should expect to see a lot of green on the golf course, and that goes beyond the turf. A fleet of equipment colored John Deere Green will be used to maintain the course leading up to and during the championship. Before the various mowers and utility vehicles make the journey from a John Deere factory to Oakmont they have to make a stop in northeast Ohio at Shearer Equipment.

Joe Reiff, certified master technician at Shearer Golf, works on one of the 10 John Deere E-Cut Hybrid Riding Mowers at the company's Burbank, Ohio location.

Jim Keller, golf operations manager, and his team at Shearer Equipment are the distributors entrusted with making sure everything is exactly how Oakmont Superintendent John Zimmers wants it for the championship. Shearer has seven locations in northeast Ohio but the Golf Division is found at the company's newest building in Burbank, Ohio. When *Golfdom* visited the office, converted from an old car dealership, in mid-April, a crew of seven was building and making adjustments to the equipment.

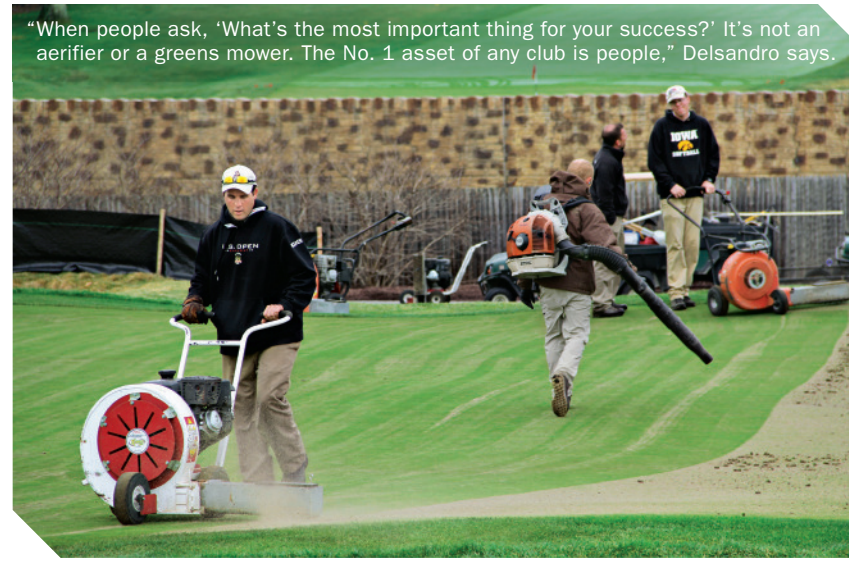
In all, we counted 10 2500 E-Cut Hybrid Riding Mowers, eight 220 SL walk-behind mowers, eight TX Turf Gators with matching trailers, six 2020A ProGators and six 8800 Terraincut mowers being housed at Shearer's 27,000-square foot facility waiting for the call from Zimmers to be delivered.

"We are proud and excited about the level of tournament support that John Deere and Shearer Equipment are providing to the 2016 U.S. Open," says Keller. "We expect to hear from John in mid-May that he is ready for the equipment to be delivered."

—Grant B. Gannon

PHOTOS BY: PETE SELTZER (TOP), GRANT B. GANNON (LEFT)

"You just try to learn from those experiences and be organized," Zimmers says. "You have to manage yourself through it on a daily basis. It's an experience (hosting the U.S. Open), and on some days it can weigh on you, you feel like you didn't achieve what you wanted to achieve. Other days, you feel like you overachieved. You just have to plot your way along."


"When people ask, 'What's the most important thing for your success?' It's not an aerifier or a greens mower. The No. 1 asset of any club is people," Delsandro says.

And yes, the greens

All the work restoring Fownes vision is fine and good, but what is it about Oakmont that makes it so special? In a word: greens.

"Oakmont's putting greens are almost legendary," says Jeff Hall, USGA managing director, rules. "They might be the finest *Poa annua* putting greens I have ever seen. They come in a variety of shapes and sizes, and the movement within the 18 putting greens range from bold and dramatic to subtle."

Marzolf agrees, calling the greens a "throwback in time."

"They're a very unique design. With holes like the 1st and 10th, greens on long par 4s, the greens actually drain to the back and tip away from the player — that's a very unique green. Very few courses have a green that actually drains in the opposite direction of the course of play," Marzolf says. "Oakmont has a number of unique greens throughout the course, that's what makes it so memorable. The 9th green, one of the largest greens in golf, with a combination of the 9th green also being the putting green for the clubhouse. The 18th green has been restored with the rectangular squared corners... so it has a uniquely old-style appearance, back when greens were mowed in that manner back in the teens and '20s."

Zimmers reiterates an earlier point — keeping the ball in the fairway.

"If guys don't keep it in the fairway they're going to struggle if we get the conditions we want," he says. "I'll never forget in '07. I thought we were in fantastic conditions. There's a small difference where the line is drawn in firmness, and they can hold it. It's amazing how good these guys can be."

"I define U.S. Open success by asking if we did the best we possibly could have done," Zimmers says.

PHOTOS BY: SETH JONES

The clock's ticking

So the countdown is on. McCormick says he doesn't even look at the countdown clock in the maintenance building anymore because it's moving so fast.

"I can't even imagine what I'm in for, but I'm excited," he says.

Delsandro knows his wish for the week of the U.S. Open: 75 degrees, sunny, 50 percent humidity. Zimmers just hopes for a good and safe week, and for creating more memories for his crew and golf fans everywhere.

"Some of the experiences people had in '07 and '10, I have a few staff, maybe their father has passed since the '07 Open," Zimmers says. "Those are memories that will never ever be forgotten, where they were that week, Father's Day week.

"We all need a little luck and the good Lord upstairs to look over us, give us a little shot," he continues. "It is an outdoor sport. You hope everybody has something special and unique to help grow the game of golf. When you have great venues, great championships and great events, it can't be anything but good for growing the game."

Jason Straka, architect, Fry/Straka Global Golf Course Design, says his challenge from the Oaks Club membership was to design a course that was playable for all members, but at the same time they didn't want him to "dumb the golf course down."

Giving new life to an old bird

A needed update on the Heron Course, along with some creative communications, makes this course soar above its counterpart at the Oaks Club in Florida.

BY GRANT B. GANNON

Before reconstruction work began at The Oaks Club, Osprey, Fla., architect Jason Straka of Fry/Straka Global Golf Course Design was playing a round on the club's Heron course with Director of Golf Tim Beckwith. On one hole, Straka's shot rested in front of a greenside bunker, and he had to contend with water on the other side of the green. He struck the ball and made a "pretty good" lob onto the green, which provoked a response from Beckwith.

"He looked at me and said, 'I want you to remember something,'" Straka recalls. "'Over 90 percent of our members do not have the physical skill or strength to hit that kind of shot.' That moment stuck with me, and the project evolved into not so much designing the best golf course I possibly could, it became a much more targeted design."

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New beginnings

Straka first got involved with the renovation project in 2012, but it took multiple years of planning and obtaining permits before construction began. The Heron Course is one of two 18-hole courses at the Oaks Club. A look at the tee sheet before the renovation showed a majority of the rounds were being played on its counterpart, the Eagle Course.

The Heron opened in the 1980s and received some updates in the early 2000s, but as Beckwith told Straka, its design didn't match its current members' abilities. It forced them to play an aerial game down narrow fairways lined with too many trees onto built-up greens complexes that were surrounded by large chipping areas. There were also issues present below the turf, including an aging irrigation system and "horrific" drainage, according to Straka.

In this chicken-or-the-egg scenario, the Heron was built first, and the present-day housing development gradually surrounded the course. The course's fairways initially were built up to allow for water to move off to the sides, but the housing plots lining the course were also raised up. This caused an issue for both the course and the homeowners.

"Essentially they created these huge swales between the golf course and the homes that couldn't drain," Straka says. "Summertime in particular, you can get several feet of sand and water for days on end, and the cart paths would be horrific."

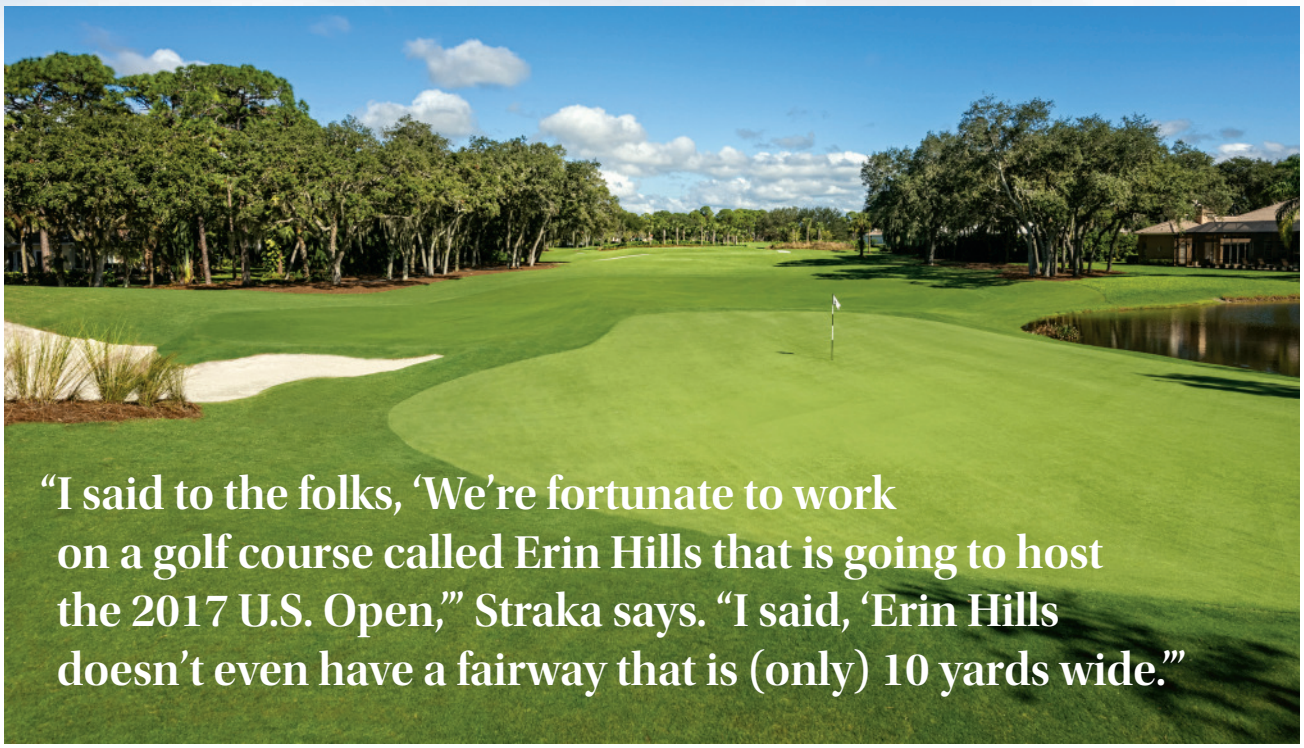
When it came time for construction in mid-2014, Straka's renovation of the course was designed to make the Heron easier to maintain and play. A new wall-to-wall HDPE irrigation system was installed and the course was reshaped to direct water that used to sit between the course and the houses to catch basins or rivers.

To create more of a ground game, the plateaued greens were lowered and backstops added, and the surrounding greens complexes were given contours that lean up to greens.

"Better players are looking at these ground contours and they're thinking they've got to bump and run it up these to get it to stop 2 to 3 feet from the hole," Straka says. "Somebody that's not that skilled can turn a little different angle on the same shot and hit it into the slope of a green to get it back into the middle of the green. Now, if they're walking away with a bogey rather than a 7 or an 8, they're thrilled."

The course's fairways were widened by removing trees to cre-

Only bermudagrass can be found on the Heron. Celebration was installed on the tees, fairways and rough, and Tifeagle on the greens. Tifgrand was picked for the chipping areas because it can be cut short to create a firm and fast surface, and support the bump and run style of play.



"I said to the folks, 'We're fortunate to work on a golf course called Erin Hills that is going to host the 2017 U.S. Open,'" Straka says. "I said, 'Erin Hills doesn't even have a fairway that is (only) 10 yards wide.'"

ate more open shots for golfers. The 13th fairway sticks out in Straka's mind. During construction he measured its width before taking members on a tour of the construction. It was only 10 yards wide at the time.

"I said to the folks, 'We're fortunate to work on a golf course called Erin Hills that is going to host the 2017 U.S. Open,'" Straka says. "I said, 'Erin Hills doesn't even have a fairway that is (only) 10 yards wide.' You have to drive those points home, and those people are more accepting about widening these fairways to make it more reasonable."

Frequent communication

Straka's tours were frequent. His contract stated that he had to be on the course every week during construction, and he usually would stay for two days. Over the next year he racked up frequent flyer miles traveling from his office in Columbus, Ohio to Florida. When he arrived, it typically was Oaks Club Director of Green and Grounds Nick Kearns there to greet him and provide a ride to the site.

"Each visit there would be specific areas he would be focusing on, and after Jason would get the days' project fine tuned he would ask my opinion to make sure I approved," says Kearns, who began his current role in 2013. "We always wanted to make sure it was going to be best for both parties."

There also was a third party, of course: the members. During his visits, Straka and Kearns would take a group of five to 30 members around the course. Some members consistently took

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ALL PHOTOS BY: DAVE SANSOM

Straka was told that the Heron's greens were built to USGA specifications prior to the renovation. When they looked beneath the soil they found inconsistent depths of sand and gravel. After construction was finished the greens were returned to top shape.

"Jason continually told them that the course was going to be more playable. I think that's probably one thing that they really didn't comprehend when he was saying it," Kearns says.

Continued from page 29

the tours to keep an eye on the progress, while others would come every couple of months because they wanted to be surprised.

"I enjoyed giving the tours, I enjoyed the interaction and I think it keeps rumors down," Straka says. "What would happen is we were building this huge network of supporters at the club."

In the summer, more than half of the Oaks Club membership was unable able to attend the tours because they are "snowbirds," traveling elsewhere to escape the Florida summer heat. To keep those members updated, the team of Straka and Kearns took to the sky with a drone.

Kearns would fly the course-owned drone over parts of the project under renovation to create a four- to five-minute video that was sent to the entire membership each week. The video included information such as the development of grading processes or bunker renovations.

"When we first start doing it, people didn't really understand the concept, but the more I was able to show them that high view they normally wouldn't see, they really appreciated it," Kearns says. "There's no way I could count how many times I heard how much they enjoyed seeing those videos, and it improved their trust in the project."

Warm reception

The official opening of the renovated Heron was last November, and the results have yielded positive reviews from the membership. Straka has received multiple letters from members congratulating him on the project.

"I even got a personal letter from a former LPGA Tour player," Straka says. "She said the renovation was exactly what the membership needed and that better players still find it to be challenging but all of the members find it to be extremely playable."

According to Kearns, in the months following the renovation the amount of rounds played on the Heron course has started to soar.

"Jason continually told them that the course was going to be more playable. I think that's probably one thing that they really didn't comprehend when he was saying it," Kearns says. "Now every time I see somebody or talk to somebody about their golf round on either golf course it never seems to fail — it comes back to something about the Heron."

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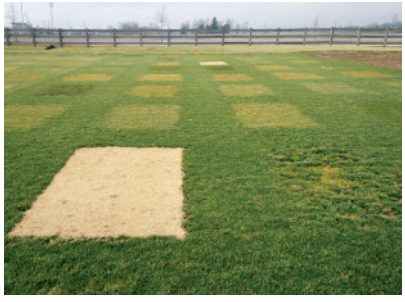
LOW-INPUT FAIRWAY SPECIES FOR THE COOL-HUMID REGION

By Cale A. Bigelow, Ph.D.

The availability of water to properly maintain turf is one of the biggest resource challenges superintendents presently face, and it will present additional challenges for decades. Further, as superintendents evaluate their budgets and maintenance programs to save money, grasses that require less water may be one area that pays dividends.

Most golf courses intensively manage their putting greens, tees and fairways. Of these, fairways represent the largest acreage and greatest potential impact for overall savings. Thus, the species and cultivar being managed will have a large impact on water use.

In the cool-humid region, numerous cool-season and warm-season species are fairway options. Most commonly cultivated, however, is creeping bentgrass. Other species such as Kentucky bluegrass, zoysiagrass, fine-leaf fescue and even some of the newer turf-type tall fescues may have merit.



Although warm-season grasses like zoysiagrass and bermudagrass did better in a severe drought year (2012), they also suffered major winterkill in winter 2013-2014, and their persistent dormant color may be undesirable to golfers.

To explore which species is best for a low-input fairway, we established two fairway trials (1/2-inch versus 3/4-inch mowing heights) in full sun on a silt-loam soil at Purdue University's W.H. Daniel Turf Research and Diagnostic Center. We planted 20 species and cultivars. They included four creeping bentgrasses, colonial bentgrass, chewings fescue, colonial bentgrass plus chewings fescue, six turf-type tall fescues, three Kentucky bluegrasses, Meyer zoysiagrass, two cold-hardy bermudagrasses and naturalized annual bluegrass.

We grew these grasses with minimal inputs — no supplemental irrigation beyond establishment, 2 pounds of nitrogen per 1,000 square feet per year and no fungicide or insecticide applications. After four growing seasons each species had weaknesses. For example, the three warm-season grasses all had exceptional performance in an extremely dry 2012 summer but suffered substantial winterkill during the "polar vortex" winter of 2013-2014. The bentgrasses performed adequately but not well at the higher mowing height.

Cale Bigelow, Ph.D., is a turf scientist at Purdue University. Reach him at cbigelow@purdue.edu for more information.

PHOTO BY: C. BIGELOW

NEWS UPDATES

UNITED TURF ALLIANCE DEBUTS TWO NEW HERBICIDES

The United Turf Alliance (UTA) has added two herbicides to its ArmorTech line of professional turf management products.

ArmorTech Sulf 396 is a herbicide designed to provide control of sedges and many other weeds, the organization says. It can be used on established cool-season and warm-season turfgrass and applied in early spring, late summer and fall. It is labeled for use on golf course fairways and roughs.

ArmorTech Trione is a herbicide absorbed through roots, shoots and leaves, and offers preemergence and postemergence control of grassy and broadleaf weeds. It's often used during turf establishment and renovation projects to prevent or eliminate weeds and reduce competition with emerging turfgrass, UTA says.

ArmorTech Trione contains the active ingredient mesotrione, a naturally occurring byproduct of the bottlebrush plant. It is labeled for use on all parts of the golf course except greens.

Both herbicides are available from UTA members and partners.

"COPPER KILLS PROTOZOA, AND EXPOSURE TO AS LITTLE AS 1 PPM OF COPPER MAINTAINED FOR SOME HOURS DOES THE TRICK. COPPER SULFATE FREQUENTLY IS USED IN GOLF COURSE AQUATICS, ALTHOUGH OFTEN INEFFECTIVELY OR INEFFICIENTLY."

Chip Howard, Ph.D.
(see story on page 34)

//SPRINKLERS UNPLUGGED

Being proactive on protozoa

By Chip Howard, Ph.D.

A superintendent who hasn't encountered protozoa-related sprinkler head plugging can count his or her blessings.

I may have been the first to encounter the problem in 1986, when my employer wanted to pioneer the use of effluent for golf course irrigation but didn't do a lot of research in preparation. Effluent that went to the irrigation reservoir had only secondary treatment. Three days after effluent delivery began, irrigation stopped. It didn't slow down, it stopped. If I could have snapped my fingers and had the sprinklers cleaned within 10 minutes of operation, they would have completely plugged again.

The sprinkler filters were plugged by large amounts of a stringy material that was new to me. Fortunately, I have a background in limnology (fresh water ecology) and a friend who is a phycologist, an algae specialist. Using a microscope, we discovered that the culprit was live protozoa, the genus *Epistylis*.

THE NIGHTMARE BEGINS

Effluent discharged from sewage treatment plants is loaded with nutrients, the most problematic of which is phosphorous, which results in algal blooms. If the treatment is not thorough — which it may not be if it's used locally for irrigation rather than returned to the environment — it may also contain undigested organic material. When you have water, nutrients and light, something is going to live in the water, especially algae. So algae proliferate when effluent discharges into the irrigation reservoir and remains there in the daylight. Both the organic debris and live algae cells are then a gourmet buffet for things that like to eat organic material as their energy source.

One of the objectives at a sewage treatment plant is to remove organic debris — measured as "biological oxygen demand" — from the water. To accomplish this, water is bubbled with air inside a digestion tank or drooled over large beds of rock (trickle filters), which are the large round beds that we are accustomed to seeing. An organism known as protozoa then attaches to the rocks or surfaces in the digestion tank. The job of the protozoa is to eat anything organic as the water trickles over. In the sewage treatment plant, protozoa are the good-guy superstars at cleaning water, and they are known by laymen for obvious reasons as "filter feeders."

Many species of protozoa inhabit these trickle filters, but the most common look like a tulip when examined under a microscope. A root-like structure attaches to the rock surfaces, with a long stem resembling a tulip on the far end.

As a piece of organic debris or an algal cell floats by, the protozoa extends toward it and the "tulip" envelops it with the help of cilia (hair-like structures) that help draw the food inward. Once inside the "tulip," the prey is digested and fuels the existence of the protozoa. If you're ever short on entertainment, you can watch the whole ingestion process under a microscope.

There are plenty of protozoa inoculums in the water as it leaves the sewage plant. They are carried to the irrigation reservoir and then to our irrigation pipes, where they attach to the walls of the pipes and joyfully eat remaining organic debris, bacteria and algal cells as they float by. The protozoa "colonies" can become quite substantial in size, sometimes such that the high-flow velocity inside the pipes can tear wads of the material from the interior walls of the pipes.

If your pipes are clogged with protozoa, it doesn't matter how many crew members you have. It won't be enough to keep the sprinklers unplugged.

ALL PHOTOS BY: MIKE HUCK AND CHIP HOWARD.

This is when our nightmare begins, when the masses of material become trapped in the sprinkler head filters and plug the heads. During an outbreak of protozoa accumulating in the filters you will not have enough crew members to keep the heads functioning, no matter how large your staff. It is crippling.

Unavoidably, we accept that using effluent means conditions always will be prime for protozoa presence in our pipes. We then ask how we pull the plug on the stuff, and once gone, how do we prevent the return of problem amounts of protozoa?

POTASSIUM PERMANGANATE

When you wake up and find yourself crippled with protozoa, recognize that just killing the protozoa isn't enough, because when it dies and releases from the walls of the pipes, a wave of it ends up in the sprinkler heads.

Partially vaporizing it can lessen the problem. For this purpose, you may use potassium permanganate ($KMnO_4$). This is an industrial oxidizer, essentially swimming pool shock on steroids. When dissolved in water, the material oxidizes almost anything organic, such as protozoa, and turns it into CO_2. The remaining elements become potassium and manganese fertilizer. In fact, potassium permanganate routinely is used in sewage treatment plants to reduce the biological oxygen demand of water before release.

However, potassium permanganate is extremely unpleasant to use. It arrives as a fine powder in a 5-gallon pail. When you open the pail, the dust goes everywhere and oxidizes everything it touches. Yours truly even ruined the vinyl top on a car 100 yards downwind. Obviously, you need good personal protection. Using it inside a pumphouse will put dust on everything in the building.

However, the material is effective. (A side note: If you have an important lake or water feature that is too green to tolerate, potassium permanganate is an express route to cleaning it up. That said, if you overdo the treatment, the lake will be purple for a couple days until the residual material reduces.)

When protozoa are flushed from the interior walls of your pipes they end up in sprinkler filters.

COPPER

Copper kills protozoa, and exposure to as little as 1 ppm of copper maintained for some hours does the trick. Copper sulfate frequently is used in golf course aquatics, although often ineffectively or inefficiently.

When you dissolve copper sulfate in water with a pH of 7.5 or above, it complexes with dissolved carbonate to form $CuCO_3$. This precipitates from the solution and renders the copper for our purposes. Considering that this reaction happens within about 30 minutes, using straight copper sulfate in high-pH water is not fruitful. Someone came up with the idea of adding citric acid to the water at the same time as adding copper sulfate. This indeed keeps the copper in solution, but the acid adds to the cost and hassle of the treatment. Also, the acid is corrosive. One good friend of mine just replaced his pump station prematurely because the pumps and skid were severely corroded from routine citric acid use.

Killing protozoa is a perfect application for chelated copper sulfate. The chelate keeps copper in solution for a long time by preventing the precipitation with carbonate, regardless of high pH. Though chelated copper is more expensive, it is more effective and much easier to use because it's sold as a liquid, typically in 2.5-gallon containers.

PIPE TREATMENT

The name of the game for killing protozoa with either potassium permanganate or copper is: 1) Treat all of the piping system, 2) Expose it to the highest copper concentration intended, 3) Maintain that exposure for as long as possible.

Constantly feeding copper into the pumping stream beginning at the wet well during routine irrigation is not effective. Most of the copper is in the system for only a short time. Additionally, you have to use a lot of copper to get a meaningful exposure. Not only is that expensive, but you needlessly put a lot of copper on your turf.

A more effective and efficient approach is to treat the system when you don't plan on using it for a few days, such as when rain is forecast. That way, once the copper solution is inside the pipes it can be kept there, allowing it do its dirty deeds to the protozoa for a long time. A little bit of copper can give you a high concentration if you keep it within the relatively small volume inside the piping system.

My favorite copper or potassium permanganate treatment is to add material directly into the wet well at the pump station. Someplace on the pump station there usually is a hose bib just downstream from the pumps, often on the exhaust manifold. I attach a garden hose to the bib and run it into the wet well so I can see the water stream. I then dump chelated copper

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solution into the wet well. At the same time, I dump in an amount of commercially available blue lake dye. Almost immediately I see dark blue water being returned from the hose into the wet well. This is my non-precise method of determining when I need to add more solution. It's indicated by the water becoming less blue.

I then have crew members go to distant ends of the golf course and start running water, either through sprinklers or a lake-fill line. (If they are filling a lake, they run a sprinkler immediately upstream to watch for blue dye). When the blue dye (and copper) arrive, the crew clearly sees the blue streams flowing from the sprinklers. At that point, the mainline to that location is filled and we turn off the lake fill and/or sprinklers. The crew members then go to each clock and operate each valve until they see blue flowing from each sprinkler. At that point, all mainlines and laterals are filled with copper solution.

While the sprinkler venting is taking place I am at the wet well monitoring the flow from the hose and adding copper and dye to maintain a near-constant color. I could, I suppose, rig a pump injector to do a more precise introduction of copper/dye. It even could be automated by a variety of techniques, however, being the dinosaur I am and as cheap as I am, my manual method works. Once all valves are turned off, it's time to let the copper do its deadly job on the protozoa.

FLUSHING THE SYSTEM

When the exposure is completed it's time to flush the piping system. If you used copper, it's hoped that any protozoa in the pipes are now corpses. If you used potassium permanganate, it will not only be dead, but at least partially vaporized (it never gets it all). Eventually, though more likely sooner than later, the dead protozoa will break loose from the pipe walls and flow along with the water. It can be a bad day when large quantities end up in the sprinkler filters. If you are lucky enough to have remote lakes with large fill valves, you can use them to your advantage. Before you run any water through the sprinklers, open the lake-fill valves completely. The objective is to get a high enough flow velocity through the piping system to tear the dead protozoa from the pipe walls and blow them out into the lakes.

The higher the flow velocity the better for flushing protozoa or snails (dead or alive) from the walls of pipes.

You may have to do some creative mainline valve strategy to ensure that water is routed throughout all of the mains.

MAINTENANCE TREATMENTS

I follow the above procedure when the system is infected enough that performance suffers, along with the suffering of the crew members assigned to clean filters. One treatment hits it hard but probably doesn't completely wipe out the bad guys. In that case, it may be beneficial to retreat the system one to two weeks later to finish off the survivors. Eventually the corpses that don't flush away will rot away. However, as we discussed above, more protozoa inoculum will constantly enter the system, quickly reestablish the population and leave you with the same problem.

Recognizing that protozoa in some amount always will be in the system, the maintenance object is to periodically kill the protozoa before the population gets large enough to create a problem. In the South, that likely will be monthly during the warm months when the organisms are most active. During the cooler months, a three-month interval may be appropriate.

Aside from protozoa, a few other unwanted organisms in pipes haunt superintendents. Those are usually mollusks (snails or clams). Snails in particular can be at least as crippling as protozoa. Fortunately, mollusks are also sensitive to copper. In most cases, 1 ppm of copper will be lethal to mollusks, so a protozoa treatment also will cure your mollusk problem. If you find worms in your sprinkler filters, you may or may not have a public health issue. In my earlier superintendent days, we used effluent that was not sufficiently sanitized. My sprinkler repairman brought me a cup with worms to show what he had been finding in the filters. I immediately recognized them from freshman zoology as *Ascaris*, a human parasite.

This mainline strainer is plugged with a combination of protozoa and mollusks.

If you find worms in the filters, consult your public health department for identification. But before you do, consider the public relations problem that may follow if the worms happen to be the wrong ones.

COLLATERAL COPPER EFFECTS

I've never witnessed copper toxicity on turf from the above treatments, but somewhere, someone will try hard to make that happen. One item is more concerning. Some species of fish, such as carp, may be killed with copper concentrations as low as 1 ppm. Though the copper you flush from the pipes into a lake will become extremely diluted, it's a thought to keep in the back of your mind.

EFFECT OF SULFUR BURNERS ON PROTOZOA

Agricultural endeavors (including turfgrass culture) are most successful when the soil pH is approximately 7. In some regions, particularly arid regions, soils are usually way above pH 7 and can benefit by correction. A popular method for lowering the soil pH is to lower the pH of the irrigation water you apply. Eventually, the soil chemistry (including the pH) will become a reflection of the irrigation water.

The most favored method of acidifying irrigation water today uses sulfur burners. These ingest dry sulfur pellets and convert them into sulfuric acid. However, water continuously is pumped through the burner and fed back into the reservoir, carrying the acid with it. So neither concentrated acid nor its hazards exist.

There is an interesting collateral effect from using a sulfur burner. Lakes became much cleaner and algae is greatly reduced, even when using effluent. I don't know if anyone has fully explained this phenomenon, but it has long been observed that cleaner lakes greatly reduce protozoa problems. So if you want to lower pH for agronomic reasons, acidifying the irrigation reservoir may be the method of choice if issues of protozoa and poor reservoir water quality can also be cleaned up.

LAKE AERATION

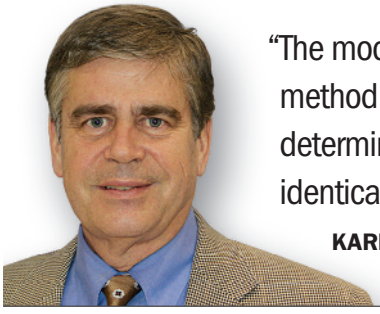
In addition to a sulfur burner, perhaps the single most fruitful method for improving the water quality in a reservoir lake is the use of bubblers for water aeration. You typically use one ¾-hp air compressor to blow bubbles through four bubble emitters placed on the lake bottom. The misconception is that their purpose is to bubble oxygen into the water. In reality, effective oxygen exchange naturally happens at the water surface. However, lakes tend to develop layers of water that do not mix readily. Water at the surface layer has a high oxygen content and is relatively warm, whereas water in the lower layers is cooler and may be oxygen deprived. It is in these oxygen-deprived layers that undesirable organisms exist and negatively impact the water quality.

Bubble emitters create a column of rising water, much like a thunderstorm does in the atmosphere. The rising column brings the cool, oxygen-deprived water to the surface, where it exchanges gasses with the atmosphere. These same emitters are widely used in most sewage-treatment plants. The digestion tank of a plant I recently visited had hundreds of these emitters. Any effort that results in cleaner reservoir water will translate to fewer protozoa problems. Don't overlook the effective and cost-efficient results of bubblers.

Chip Howard, Ph.D., CGCS, is president of Phoenix, Ariz.-based Turfscience, Inc. and is a certified professional agronomist and a certified crop advisor. Reach him at turfsci@cox.net or at www.turfscience.net.

Ad Index

Companies featured in this issue



"The mode of reproduction and preferred method of propagation for a species determines whether we have a genetically identical or genetically diverse cultivar."

KARL DANNEBERGER, PH.D., *Science Editor*

Making a cultivar

For northerners, one of the best times to watch golf on TV is during winter and spring months, culminating with the Masters Tournament. Watching golf on high-definition television while the snow is flying relieves stress. The locations are warm and sunny, and the perfectly manicured — and green — golf courses on TV stand in stark contrast to the cold weather and brown, dormant turf outside the window.

Looking closer at the green turf — on the level of a putting green, where in some cases more than 150 million shoots reside — I can't help but think of all the breeding work that has gone into these grasses, both cool-season and warm-season. To golfers and casual observers, an appreciation of what goes into creating these unique turfgrass plants often is lost.

The term cultivar takes on slightly different meanings depending on the turfgrass species, but the term in general refers to a reproductive collection of plants sharing a number of important agronomic characteristics like drought resistance, shade tolerance or an attractive appearance. However, the genetic similarity of cultivar members can range from one in which each individual genetically is identical in the population to a synthetic variety in which no two plants genetically are the same.

The mode of reproduction and preferred method of propagation for a species determines whether we have a genetically identical or genetically diverse cultivar. Reproduction in grasses is classified as sexual or asexual.

Sexual reproduction refers to the production of progeny via the union of male and female gametes. Unless the male and female are homozygous (the same alleles at the location of the gene on the chromosome), various combinations of genes will occur in the offspring as a result of the cross. Species that reproduce sexually may be further subdivided into those that are predominantly cross pollinators and those that naturally self-pollinate.

In asexual reproduction, no new gene combinations occur and all offspring are identical to the parent plant. Asexual reproduction can occur through vegetative propagation like springs, stolons or rhizomes or via apomixis. Apomixis is the production of seed without the union of the male and female gamete. The seed produced by apomixis genetically is identical to the female parent. Apomixis is the means of reproduction in Kentucky bluegrass.

Bermudagrass cultivars like Tifway and Tifgreen are a result of a cross between *Cynodon dactylon* and *C. transvaalensis*. This type of cross often is difficult to make, with the end result often sterile offspring, which in some cases is a benefit. In fact, the lack of seedheads or production of non-viable seeds can be seen as an advantage. Because the offspring are sterile, establishment of cultivars like Tifway are vegetatively established.

Mutations can cause variation to occur in offspring from the cross of *C. dactylon* and *C. transvaalensis*. Mutations often result in inferior characteristics or severe injury to the offspring. However, mutations occasionally result in improved characteristics. It's most likely that Tifdwarf occurred as a natural mutation in Tifgreen. AuCentennial centipedegrass is a vegetatively propagated centipedegrass cultivar that arose from a single mutated plant.

Except for Kentucky bluegrass, turfgrasses sold as seed are synthetic cultivars. Synthetic cultivars arise through sexual reproduction from crossing heterozygous parents. Considerable breeding time is devoted to finding superior parents. In addition, we must consider the seed yield of the parents as well as the performance of the offspring. Seeded cultivars take considerable time to develop.

Each type of reproduction lends itself to a different breeding strategy, and ultimately to either a cultivar of identical individuals or a population of visually similar individuals that are genetically unique. Those green plants growing on a putting green, whether on a tournament golf course on TV or at your local municipal course, have much more going on internally than just a green color.

Karl Danneberger, Ph.D., *Golfdom*'s science editor and a professor at The Ohio State University, can be reached at danneberger.1@osu.edu.

It's always about the fundamentals

Jim Moore is director of education for the USGA Green Section. He began his career in the golf industry as a superintendent and has worked with the USGA for more than 30 years. Jim is retiring June 1, 2016, and I thought it would be a good time to catch up with him and get his take on the future of the golf industry. You can reach Jim at jmoore@usga.org for more information.

Q What are the biggest advances in golf course maintenance you have seen during your career?

The vast increase in knowledge by superintendents and their desire to keep learning is the most striking advancement. The formal education and internship experience by those entering the profession is so much improved compared to when I started in the business. Plus, the opportunity to gather information online is an incredible resource.

Improved irrigation control is the second biggest advance that I have experienced. Personal computer control of the irrigation system that allows for flow management, global adjustment and variable frequency drive are just a few benefits. We still need to change our thinking from minutes of irrigation applied to amount of water applied (precipitation rate) and make much greater use of ET data.

Improvements in aerators and topdressers are third on my list. The equipment is faster, more reliable and with many more options to address specific needs on the golf course.

Q What are the greatest challenges facing golf course maintenance?

Water and dollars. Golf is dependent on affordable — and in many cases, cheap or no cost — plentiful water. This luxury is most likely not going to last, at least not in many areas of the country. The cost of maintaining golf courses at the level expected by today's golfers is, in a rapidly growing number of cases, not a sound business model.

Q If you were czar of golf, what changes would you make to the game?

I would try to get golfers to accept that sand bunkers are a hazard, and it is not reasonable to expect a perfect lie in a hazard. The amount of money spent maintaining sand bunkers is staggering.

I am pleased that the leadership of the game, which is the USGA and the R&A, are open to considering changes to the game, rules and championships. They are addressing pace of play, expense to maintain a golf course, and (are) ensuring that golf courses are good environmental stewards.

THE MOST IMPORTANT THING I LEARNED IS THAT TURF 101, INCLUDING AMPLE SUNLIGHT, GOOD DRAINAGE AND GOOD AIR MOVEMENT, WILL SOLVE 90 PERCENT OF THE PROBLEMS ENCOUNTERED ON A GOLF COURSE.

Q If you were the czar of golf, what changes would you make to golf course maintenance?

I would encourage those in a leadership role at the golf course to prioritize the areas of the golf course that are most important to the play of the game, and to spend their money making the high-priority areas great. During my UGSA course consulting visits I would frequently ask those taking part in the visit to prioritize the areas of the golf course. The stock answer was greens, tees and fairways.

I think that greens, approaches, green surrounds and greenside bunkers are the highest priority, since the majority of strokes are played on or near the green. Have great greens and green complexes. Spend your money on great greens and green complexes.

Too many golf courses are acceptable everywhere on the course, but are not great anywhere.

Q Is there anything else you would like to add?

The most important thing I learned is that Turf 101, including ample sunlight, good drainage and good air movement, will solve 90 percent of the problems encountered on a golf course. Diagnosing the problem often is straightforward. Implementing the solution may be difficult. We often seek complex answers while overlooking the basics.

Clark Throssell, Ph.D., loves to talk turf. Contact him at clarkthrossell@bresnan.net.

The 19th Hole

Johnny Walker

DIRECTOR OF GOLF COURSE MAINTENANCE // Bentwater Yacht & CC, Montgomery, Texas

After 18 holes, what are you drinking? Well, if I'm buying, it's beer. If someone else is buying, it's bourbon.

Congratulations on being elected to the GCSAA Board. Thank you, it's something I've been working on for 25 years. I enjoy every minute of it, the issues we discuss are A to Z. Those 20-plus years serving the South Texas GCSA and the Lone Star GCSA prepared me.

Houston has been getting hammered with rain. How are you guys holding up? We've got another 4 to 6 inches coming today and tomorrow on top of, in some cases, 18 to 20 inches. I'm going to guess there are a dozen courses still under water. We're 45 minutes north of Houston, so we didn't get the heavy stuff.

What's the best thing about sharing a name with a famous scotch? Strangers pay attention to you immediately.

Any negatives? Most of them don't believe that's my name.

Do you like drinking Johnnie Walker? I hate it. I've tried to like it, I just don't. It's like every great once in a while I try to eat liver and onions, and I still don't like it.

What are your sports teams? I graduated from Texas A&M, so anything Aggies. I grew up in Dallas, so I have to pull for my Cowboys. And now I live in Houston, so I have to pull for the Texans.

What's the best thing about living in Texas? Both of the seasons: hot and cold.

You don't miss fall and spring? Well I don't know about it, I've never seen it!

What was on the radio on the way to work this morning? I start every day with classic rock. My all-time favorite is ZZ Top.

What's the coolest thing you've ever seen on a golf course? Tons. I've witnessed a lot of nature's cool stuff. Thirty years ago I saw a hawk swoop down and pick up a squirrel. As he was flying away with his meal, a bald eagle swooped in on the hawk, the hawk dropped the squirrel and the eagle picked the squirrel up before it hit the ground! It was a one-in-a-gazillion chance of me being there. I was in awe to have witnessed the whole thing.

"I WAS LOOKING AT A JOB TRANSITION THREE YEARS AGO AND I LOOKED AT SOME OPPORTUNITIES OUTSIDE TEXAS... BUT STAYING CLOSE TO THE KIDS AND GRANDKIDS WAS THE MOST IMPORTANT THING."

Fill in the blanks: At my funeral, they'll serve _____ and I hope someone says _____? They got to serve barbecue, that's a rule — my dad owned a barbecue place for 47 years. And I heard this from a friend: You have a recording of yourself inside the casket, and it's motion activated, so as people walk by it, it says, "Thanks for coming!"

As interviewed by Seth Jones, April 26, 2016.

MAIN PHOTO BY: PETE SELTZER / ISTOCK.COM, CG-CREATIVE (CASKET), ZZ TOP PROMOTIONAL PHOTO

IT'S YOUR CHOICE

PYTHFUL or BLISSFUL?

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It's hard to be happy when Pythium disease damages your turf. So don't let it. Segway® Fungicide SC delivers outstanding protection against Pythium root dysfunction, Pythium blight, and Pythium damping-off. Segway works fast and lasts up to 28 days for healthier turf. Healthier turf means happier golfers, and happier golfers mean happier Supers.

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Everything is on the line. Fortunately, **Lexicon Intrinsic** brand fungicide delivers performance under pressure. This foundational product for greens provides control of 27 diseases for up to 28 days. Your turf will be physically fit, with plant health benefits that enhance growth efficiency and enable turf to rebound faster from stress. The result is healthy, resilient, quality turf.

Lexicon Intrinsic brand fungicide, for turf that's tournament-ready.
For details, visit betterturf.basf.us.

BASF
We create chemistry

Always read and follow label directions.

** The 27 diseases includes spring dead spot. See BASF's FIFRA Section 2(ee) Recommendation for spring dead spot; see www.CDMS.net for BASF Technical Information Bulletin.*