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10 TRUE TALES OF TERROR!

In honor of the Halloween season, a collection of wild stories only superintendents could believe

// 14

COLUMNS

// 5 **Keeping up with The Jones**—Seth Jones
Jones shares his own tales of terror from 25 years of working as a journalist

// 31 **The Turf Doc**—Karl Danneberger, Ph.D.
Danneberger delves deep into the history of innovation in the game of golf

// 34 **Off the Record**—Mike Kenna, Ph.D.
Kenna explains how golf courses can be a valuable habitat for turtles

DEPARTMENTS

// 8 **Starter**

// 12 **Golfdom Gallery**

// 36 **The 19th Hole**



// 32

SUPER SCIENCE

// 24 **Protecting golf course ponds**

// 25 **Factors influencing stormwater pond nutrients and algae**

// 32 **How to protect greens this winter — with snow cover**

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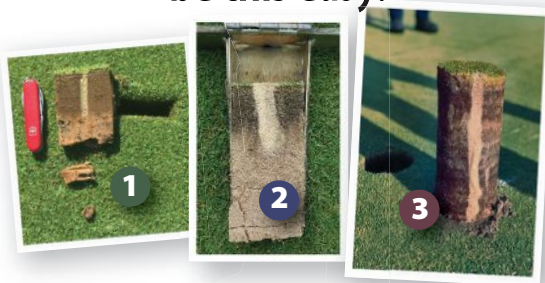
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POSTMASTER: Please send address change to GOLFDOM, PO Box 2090, Skokie, IL 60076.

Subscription rates: For US, Canada and Mexico, 1 year \$58.95 print and digital; two years \$88.95 print and digital. All other countries, 1 year print and digital \$109.95, 2 years \$169.95. For air-expedited service, include an additional \$75 per order annually. Single copies (prepaid only) \$10 plus postage and handling. For current single copy or back issues, call 847-513-6030. Printed in the U.S.A. All rights reserved. No part of this publication may be reproduced or transmitted in any form by any means, electronic or mechanical including by photocopy, recording, or information storage and retrieval without permission in writing from the publisher. Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients is granted by North Coast Media, LLC for libraries and other users registered with the Copyright Clearance Center, 222 Rosewood Dr, Danvers, MA 01923, phone 978-750-8400, fax 978-750-4470. Call for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law.





"In honor of this 'True tales of terror' issue, I'll share some of my own biggest work horror stories ..."

SETH JONES, *Editor-in-Chief & Associate Publisher*

Tales from the FOGs

I have wanted to do a Halloween-themed issue of *Golfdom* for years now. With this issue, we finally pulled it off.

It seems like I always hear crazy stories about something that happened on the golf course. These stories are typically told over dinner or drinks, and they're off-the-record stories — just industry folks having fun telling tales.

For this issue, on a Friday afternoon, I texted 25 Friends of *Golfdom* (FOGs) and gave them the story prompt: I'm looking for horror stories from your years on the golf course that, at the time, may have made you mad ... but now, you can look back and laugh about it.

Ten of those stories made this issue (a few got left on the cutting room floor). Thanks to all the FOGs who helped me out with this project. I hope you enjoy reading the cover story as much as I en-

joyed being told these stories. And if you have a good story for me for next year, you know how to reach me.

In honor of this "True tales of terror" issue, I'll share some of my own biggest work horror stories:

First, I was on a trip to give a presentation at a GCSAA chapter event, I arrived in the clubhouse, PowerPoint presentation ready to go on my laptop, only to find that the set-up wasn't for a projector but for a flatscreen TV — and I didn't have the proper gear to connect the two. I had to give my 45-minute presentation with no photos. I could feel myself just dying on the stage in front of the room. I can tell a story as good as the next guy, but when you don't have the photos you planned on sharing to support your story, it's a fail.

I'll also never forget the one and only time I met Arnold Palmer. He was in his office, fussing with his hearing aids on his desk when I walked in. He shook my hand, I thanked him for his help on a story, and his receptionist told me, "Oh, honey ... you're going to have to talk a lot louder if you expect Arnie to be able to hear you." So, I proceeded to awkwardly shout at the King in his office. Not the experience I was hoping for!

But my biggest fail is one that still makes me cringe, probably because I was young in my career and trying hard to make a name for myself. My side hustle at the time was as a journalist covering the comic book industry.

I was given the opportunity for a one-on-one interview with the guest of honor at a convention, a big-time

comic book writer who had some pull in Hollywood. I waited outside his penthouse suite at the Marriott, anxious for the interview.

Finally, a handler opened the door, and a cloud of smoke came wafting out. The room is dark; my celebrity author apparently brought his own curtains, black lights and other various decorations with him. I set my voice recorder down, and we start talking, and my questions are so beneath him, he's just shooting me down, over and over again, because I clearly don't understand the cosmos to his level. After about 20 minutes of getting smoked out by this guy, I grabbed my voice recorder, said thank you and left.

As soon as I got to the elevator, I pushed rewind on my voice recorder so I could listen to the interview, only to discover ... my batteries had gone dead. I only got a few minutes of the interview. The room was so dark that I couldn't see that my recorder had stopped.

This is why, to this day, I constantly check my voice recorder during interviews.

That is the key. Even though these horror story moments defeat you at the time, you learn from them. And that's what, with time, changes these tales from terror to terrific. ☺

Email Jones at:
sjones@northcoastmedia.net.

SPONSORED CONTENT



Some of Quali-Pro's notable product innovations



INTRODUCING DR. BOBBY KERR

Golf course experience and a technical background: a win-win for superintendents

Superintendents face various challenges that demand innovative solutions and reliable partnerships. Dr. Bobby Kerr, a seasoned expert in turfgrass science and the newest member of CSI's Quali-Pro division, provides the support superintendents need to maintain their courses effectively.



Bobby Kerr

"I have equal parts practical experience and technical knowledge. I think that differentiates me," says Dr. Kerr. "I can speak to superintendents and help translate problems into economical solutions."

Dr. Kerr's journey into turfgrass science began in childhood when he spent a lot of time on golf courses. "I learned early on I was not the best golfer. So, I knew I had to find another way to spend time on a golf course as an adult," says Dr. Kerr. He started as an apprentice greenskeeper in Scotland and has since worked on various golf course maintenance crews in several countries around the world.

Kerr received his Bachelor of

Science in turfgrass science at Myerscough College in England and completed his Ph.D. at Clemson University in 2019. He's held positions at the Chicago District Golf Association and Bayer before joining Quali-Pro in 2023.

"I can offer a unique perspective on the daily challenges superintendents face, and at Quali-Pro, we are committed to developing solutions that address these challenges head-on," he adds.

Dr. Kerr emphasizes the importance of collaboration with superintendents to ensure that Quali-Pro's innovations meet their real-world needs. "By working with end-users, we can identify areas that need to be addressed and develop solutions that truly meet their needs. We don't want to create products that sit on the shelf," he explains.

Regarding Quali-Pro's innovations, Dr. Kerr says Suprado, Nimitz Pro G and Enclave are proprietary products that have proven themselves as leaders in the marketplace.


"Suprado is the go-to ABW option; we're continually finding new uses. For example, we now have a 2EE for bermudagrass mite control," he adds. "Another great feature about Suprado is it provides superintendents a new mode

of action in the fight against resistance."

Nimitz Pro G has recently relaunched for the warm-season market. "It continues to get strong reviews from our customer base while providing a much-needed tool for both resistance management and control for nematodes," he says.

Enclave is a patent-protected product. "It delivers our quad-control technology where four active ingredients act synergistically, providing preventative and curative control of diseases," he explains.

"As the regulatory system becomes increasingly complex and the development of new active ingredients slows, we are focused on enhancing existing formulations to reduce environmental impact and improve efficacy. I envision Quali-Pro's product offerings expanding as we continue to innovate in response to the evolving needs of golf courses," Dr. Kerr reports.

"I am the boots on the ground at Quali-Pro, and superintendents' feedback in terms of the challenges they're facing and the type of solutions they would like to see is key to Quali-Pro's innovations," he adds. "We regularly engage with a group of superintendents; their input is key to our success." 



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Starter

NEWS, NOTES AND QUOTES



//THE BRITISH ARE COMING



Bernhard Academy's successful webinars and workshops in the U.K. has Education Director Sami Strutt confident that the same will happen in the U.S.

BERNHARD ACADEMY PREPARES FOR EXPANSION INTO THE US

BY NATHAN MADER // Associate Editor

 Sami Strutt moved to Bernhard Academy just a few months ago. She's already planning another move, this time bringing the company with her.

Strutt, who joined Bernhard Academy in April as the education director, has big ambitions in her new position. She says she's really excited about expanding the academy's services to the U.S.

Bernhard Academy was created in 2019 to provide turf industry professionals with the necessary skills and knowledge to advance their career prospects. The academy provides workshops, webinars and other growth opportunities at various high-end courses throughout the U.K., such as Royal Norwich, Gleneagles and Moortown GC.



Sami Strutt

Target areas of development include agronomy, leadership and management. Strutt says the cutting unit set-up workshop, for example, has been particularly successful in the U.K.

Strutt says the academy doesn't have a timeline for the full expansion yet. However, work is already being done to test the waters. The academy has taken a number of initiatives to start producing content, such as meeting with American superintendents during the GCSAA Conference and Trade Show and hosting a pilot program at the 2025 U.S. Open host course, Oakmont CC.

"We hope to be able to deliver some workshops either later this year or into the early part of next year with the view of launching a fuller program," Strutt says. "The Bernhard name is synonymous with quality, and we want to ensure we're still delivering that quality."

//FOREIGN EXCHANGE STUDENTS

TEN GCSAA MEMBERS HEADED TO BTME IN 2025

Ten members of the Golf Course Superintendents Association of America (GCSAA) have been selected for the Bernhard Academy Links to Success United Kingdom 2025, and they will attend the 2025 BTME conference in Harrogate, England, in January.

While in the U.K., the GCSAA delegation will experience traditional links golf courses, get an inside look at an Open Championship golf course, discover the heritage of the first Ryder Cup venue, attend the BTME annual conference, have global networking opportunities and more.

The members of the Bernhard Academy Links to Success United Kingdom 2025 class are:

- Brent Downs, CGCS, MG
- Tyler Miget
- Matt Gourlay, CGCS, MG, AGS
- Cole Miedema
- Matthew Overton
- Emily Casey
- Matt Earhart
- Clay Payne
- Ryan Franklin, CGCS
- Carol Turner

//ENSHRINED IN PARADISE

ARIZONA SUPERINTENDENT JOINS HALL OF FAME

The Arizona Golf Association (AGA) recently inducted four members into its hall of fame, including longtime Paradise Valley CC superintendent Rob Collins.

Since joining the Paradise Valley team in 1995, Collins has led a number of water conservation initiatives and projects. These range from renovations that have focused on improved irrigation and turfgrass reduction to a case study that was heavily featured by the USGA.

Collins also currently serves as the Arizona Alliance for Golf's Water Policy Committee chairman. He has also held several roles with the Cactus & Pine GCSA and is currently the board treasurer.

//FRIENDLY COMPETITION

GCSAA, FFA partner for turf competition

➔ The Golf Course Superintendents Association of America (GCSAA) and FFA agreed to host the 2025 National Turfgrass Science Invitational, providing a competitive event for high school agricultural education students emphasizing skills in turfgrass science.

The 2025 National Turfgrass Science Invitational will take place Feb. 3-5 during the GCSAA Conference and Trade Show in San Diego, Calif., with participants having access to professional development opportunities at the conference and trade show in addition to the competition.

During the event, competitors will

engage in individual and team activities on turfgrass identification, playing surface set-up, equipment operation and best management practices. They will also travel to a San Diego-area golf course for practicums, which test the hands-on and observational skills of the competitors.

The winners of the competition will be announced Feb. 5 during the GCSAA conference and show.

As part of the agreement, the event will alternate between the GCSAA and Sports Field Management Association (SFMA) conferences.

Registration for the event is now open. For more info, visit GCSAA.org.

X #TurfPostoftheMonth

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Jonathan Heywood
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Ask Thad

BY THAD THOMPSON

Superintendent
Terry Hills GC, Batavia, N.Y.



After a hectic golf season and things start to ease up, is there anything you recommend I do to recover from the burnout of the summer months?

In the Northeast, we are heading into our favorite time of year: autumn! Cool nights, lower humidity, moderate temperatures, shorter days and less pressure on the turf and superintendent. The struggles and challenges of the big three months are slowly fading into another year, and it's time to regain our sanity and become normal members of society again.

Set one night a week aside and go out! Dinner, drinks, line dancing, ax throwing, break dancing ... whatever floats your boat. We get lost in the job in season sometimes, and it's important to be aware of that and make a conscious effort to get back to real life. Reconnect on a deeper off-season level with family, friends and coworkers. I go out to dinner on Fridays and bowl one night a week in the off-season. I absolutely suck at bowling, but that's not the point.

Root for your teams. The NFL season is underway, and it's the start of a long, fun journey for many and the continuation of humiliation for others, but fandom never dies. Hockey is right around the corner and the conclusion of the baseball season is in sight. I'm a Buffalo sports fan. I don't miss any Bills games and very few Sabres games. See? I have fun and humiliation all in one city.

Look forward to your off-season education. Local associations, vendor-sponsored events and, of course, the GCSAA Conference and Trade Show are wonderful opportunities to round out your professional talents and open your mind. Never forget the social aspect of meetings and educational days. You are out with your peers; they have had the same struggles and challenges you had all summer. Learn about how they handle stress, have a drink, relax, forgive yourself and prepare to do it all again.

Got a question for Thad? Tweet to @TerryHillsMaint and @Golfdom or email Thad at thadthompson@terryhills.com

Starter

Friends in High Places

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Harrison Smith, Safety, Minnesota Vikings

THE TENNESSEE GATORADE PLAYER of the Year in 2006, Harrison Smith has enjoyed a decorated football career.

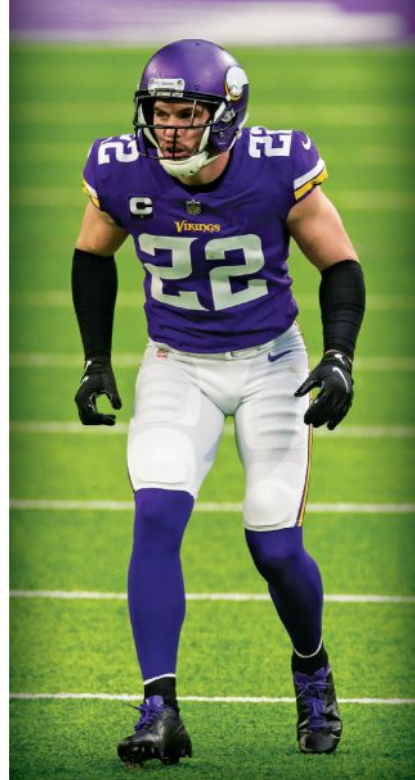
Smith started 47 of his 51 games at Notre Dame. He was the team's sole captain in 2011, an honor shared with only three other players over the last 40 years. Selected No. 29 overall by the Minnesota Vikings in the 2012 NFL Draft, he led all safeties in his rookie season with two interceptions returned for touchdowns. Smith is a six-time Pro Bowler, a two-time All-Pro selection and has 34 interceptions since entering the NFL in 2012.

— **Seth Jones** // Editor-in-Chief

"I'm always trying to fix as many ball marks as I can."

"I love the challenge of (golf.) Being a football player, it's a different mindset — trying to work on different shots, make good decisions, don't get too crazy. It's a good way to test yourself.

One of my biggest pet peeves is when you get up to a green, and there are about 50 ball marks that are not repaired. I'm always trying to fix as many ball marks as I can. Somebody hits a good drive, and you're sitting in the middle of the fairway, sitting in a divot? I understand as the game grows and more people play, it gets harder and harder to keep everything



pristine. But — respect the course, respect the player.

I play back home at Cherokee CC (Knoxville, Tenn.) It's always pristine. That work doesn't go unnoticed by me."

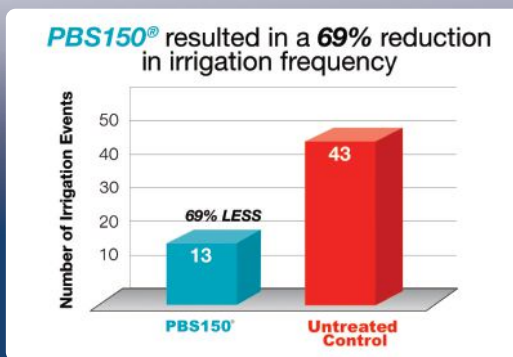
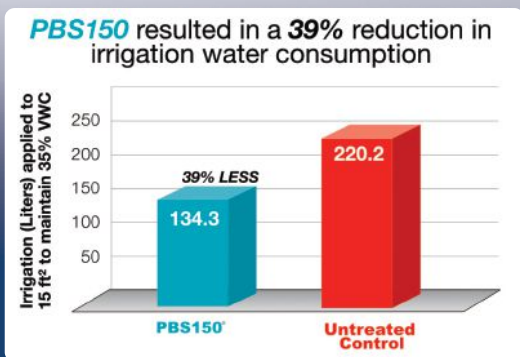
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Evaluation of Two Soil Surfactants for Soil Water Management of Creeping Bentgrass on a Wettable Clay Loam Rootzone During a Dry-down Period

Nolan, G. and M. Fidanza. 2024. *Journal of Environmental Horticulture*

Penn State University research study showed that creeping bentgrass plots treated with **PBS150** resulted in a **39% reduction in irrigation water consumption** over a 63-day dry-down period versus plots only treated with irrigation water.

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Golfdom Gallery

WE CAME.
WE SAW.
WE TOOK PICTURES.



1 The Plaza's the place The Golfdom team met with their friends at Albaugh Specialty Products while everyone happened to be in Kansas City. From left to right are Krystal Maldonado, Albaugh; Bill Roddy, Scott Hollister and Jake Goodman, Golfdom; April Allenbrand, Albaugh; and Seth Jones, Golfdom.



2 TurfMend + Greene County Fertilizer (Left to right) Jeff Stahman, CEO and co-founder, TurfMend; John Perry, founder and CEO, Greene County Fertilizer Co.; and Jones on a recent golf trip to Park City, Utah. To learn more about TurfMend and Greene County Fertilizer, visit Golfdom's sister website, AthleticTurf.net.



3 Coming out to see the Shadow Goodman (right) and Roddy got an exclusive tour of one of Kansas City's finest golf clubs, Shadow Glen GC, Olathe, Kan., from Spencer Roberts, CGCS.



4 KC barbecue It's not a complete trip to Kansas City until you've grabbed some local barbecue. Thankfully, Jack Stack Barbecue isn't far from PBI-Gordon's office in Shawnee, Kan. Joining the Golfdom guys are Callie Zevecke, Dani McFadden, Ph.D. and Melissa McDonald. Seth took home the leftovers!



5 Visiting Deere friends Clearly the team at Golfdom ate well on this trip, as they were joined by their friends at John Deere at Louie's Wine Dive and Kitchen before the meetings wrapped up. With Bill, Scott, Jake and Seth are John Deere's Darius Lane (third from left) Brian Torrey and Sasha Fuerstenberg (fifth and sixth from left).

PHOTOS BY: GOLFDOM STAFF

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10 TRUE TALES OF TERROR!

In 25 years of traveling to visit with golf course maintenance teams around the country, you can imagine some of the stories I've heard — stories that are wild, weird and sometimes almost unbelievable. Bizarre stuff tends to happen on a golf course, and, for whatever reason, usually, the superintendent and the maintenance crew are the ones who witness the chaos.

In what I hope starts a new tradition here at Golfdom, I'm sharing, with their permission, stories of some of the crazy things superintendents I know have seen over the years.

— Seth Jones, Editor-in-Chief

In honor of the Halloween season, a collection of wild stories only superintendents could believe

THE MAN IN THE LAKE

As told by Anthony Williams, CGCS, MG, vice president, Invited Clubs

Will be honest: Everywhere I went in my career, I felt like I was a lightning rod for the odd.

Everyone knows Friday the 13th. At PineIsle (Atlanta, now closed), we had what we forever referred to as Saturday the 14th. Lake Lanier was on the course, and it always had a reputation for being haunted, with the native burial grounds nearby and whatnot.

Continued on page 16

ILLUSTRATION BY: BILL MORRISON

// FALL FUN



Continued from page 14

My assistant calls me on Saturday, Oct. 14th. We're jamming, and the course is going full bore with a packed tee sheet. He says, 'There's a car parked right next to the lake on 18, the engine is running and the car stereo is blasting classic rock. But there's no one here.' I got down there, and by then, my assistant had discovered a full set of men's clothing, including shoes and socks, neatly folded and placed on the edge of the lake.

These are the days when you used to have to register your car license plate with the resort. I called the front desk and asked, 'There's a rental car down here ... is this car registered to the resort — is this a guest?' Turns out it is and he's staying on property. I tell them, 'You need to call security and do a wellness check.'

Security gets to the room, and they make a gruesome discovery written on the bathroom mirror, in blood, 'I'm sorry.' There's a suicide note nearby.

So now we've called 911, and the 18th green is a crime scene. There's yellow tape everywhere, an army of police and detectives. We can't get anywhere near it.

Turns out this guy was wanted by several bad characters for various reasons, had multiple aliases and the police are convinced

that this was a poorly staged fake suicide.

They never did find the guy, to my knowledge. Every Oct. 14th, we'd remind each other of the craziness, and sometimes we'd even wonder ... do you think something bad maybe really did happen there?"

THE DEVIL, YOU SAY?

As told by Mike Bavier, CGCS-Retired, longtime Chicagoland superintendent

"We had a young guy, I still remember him well, who was our night waterman ... until he wasn't.

I get to work one morning, and this kid is sitting there, shivering and pale white. I instantly get worried because it looks like something bad has happened, and I'm about to learn something I don't want to. He tells me he's done with the night watering, never again is he going out there after dark.

I ask him what happened, and that's when he tells me he saw the devil himself come out of the lake on No. 15.

I laughed and told him, that's the scuba diver who comes out to steal golf balls that come up short on the par 3! Not the devil! Still, that kid never night watered for us again."



WHAT'S THAT SOUND?

As told by Bill Larson, CGCS, Town & CC, St. Paul, Minn.

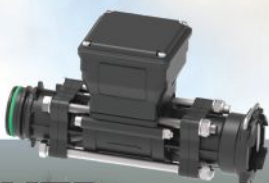
"We used to do this big bash at the club every Halloween. About a thousand people would come out. We'd do hayrides, people would get dressed up, everything.

I'm manning the gate. The cops are there to manage traffic. It's dark out, and I hear a noise. As a superintendent, you recognize the various pieces of equipment in your shop based on sound alone. I can tell that's my Sand Pro that just fired up. But why? The shop is closed, and there's no one up there.

I drive up there, and here's this woman wearing a Clint Eastwood-style jacket, driving the Sand Pro, and she's really ham-


Continued on page 18

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Continued from page 16

mered. I reach over and pull the key out. She stands up, and all this peanut butter, jelly and even a loaf of bread falls out of her jacket. The jars of jelly are rolling down the hill.

I said, "You can keep the PB&Js, but that's my Sand Pro."

THE BACKWARDS BALL

As told by Patrick Affolder, superintendent, McAllen (Texas) CC

The scariest thing I ever saw on the golf course was on the range. A mother was teaching her young son, a first-timer, how to hit a golf ball. I don't know how he managed to do it, but somehow, he hit a ball straight backward and it hit her right in the mouth, knocking her teeth out.

She was in a lot of pain, bleeding everywhere, so we called for an ambulance.

I often think about that kid. I wonder if he ever played golf again. And did his parents give him up for adoption?"

A PAINFUL RIDE

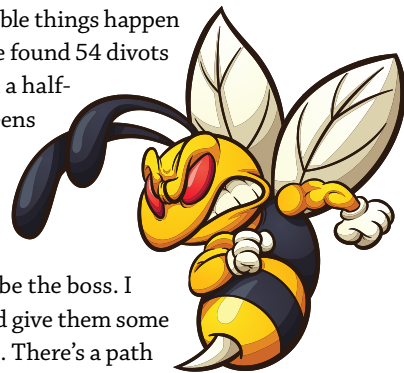
As told by Thad Thompson, superintendent, Terry Hills GC, Batavia, N.Y.

I have had some terrible things happen to the course. I once found 54 divots taken on a green in a half-moon pattern. I've had 14 greens damaged by a four-wheeler.

But the worst thing that ever happened to me? That's easy. I was a new superintendent, and I was trying to be the boss. I needed to talk to my guys and give them some direction. They're over on 18. There's a path through the woods between 17 and 18. I decide to stop before I get there and take a leak.

Suddenly, I feel like I'm on fire. I look down, and there's a baby hornet trapped in my underwear, stinging the hell out of me.

I didn't talk to my guys. That was a long drive back to the shop."



WHAT DID YOU DO?

As told by Rick Mooney, vice president of maintenance and development, Shore Lodge | Whitetail Club, McCall, Idaho

One of my worst nightmares almost came true. The owner of our facility bought the Grand Del Mar in San Diego. Once in a while, he'd ask me to head out there to help out during the winters, which was fine. There's nothing bad about San Diego in the winter.

But the housing situation there was a little goofy. He was building these spec homes — only two of them were fully functional. There's one that he used when he was there; it's a beautiful place. Then there's the other place, and there's not a stitch of furniture in it, no plates, no cups in the cabinets. The only thing there were two twin beds in the main bedroom. This is where I stayed.

On Sundays, I'd go to his house to do my laundry. The fridge is, of course, fully stocked. You know me — I'm doing laundry by myself, so I'm going to grab a couple of beers and watch *Sunday Night Football*.

One Monday, I got a call from the owner, and he was irate. "What the hell did you do to my house? You ruined it!" My stomach drops, and I'm instantly thinking, "What did I do to ruin a multi-million-dollar home?" He tells me that I left the upstairs bathtub water running, and now the upstairs is flooded, and water is leaking through the ceiling.

Continued on page 20



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Grow a better tomorrow

Continued from page 18

I told him, 'You know I wasn't up there taking a bath.' It turns out his maid was there, got distracted somehow, and tried to blame the guy who shows up on Sundays to do laundry. Needless to say, I talked my way out of that one."

WHERE'S THE WICKER?

As told by Matt Shaffer, superintendent emeritus, Merion GC, Ardmore, Pa.

"W"hen I was at Merion, we had wickers (wicker baskets instead of flags) on the East Course. Red on the front nine, orange on the back nine. We had a 'wicker wagon' and would go out before dusk and pick up all the wickers and put out white flags with a wicker stitched on them.

On a Halloween weekend, we came in and our East Course had a flag from every different course in the Philadelphia area on the greens, except for No. 13 and No. 18, near the clubhouse.

Can you imagine the time it took to pull this off? I always suspected it was a coordinated effort by the area interns, but I never

heard a peep. We returned everyone's flags, but we didn't get all of ours back."

THE FIRST-EVER SNOW-OUT

As told by Shawn Emerson, associate principal, agronomic services, Ethos Golf

"W"e were getting ready for the 2009 Tradition at Desert Mountain, a Senior Tour major, and we're very excited. It's been 85 to 90 degrees every day, and everything is looking good.

Then we started getting weather — all of a sudden, it turned into hail, then snow. We've suddenly got three to four inches of snow in Arizona! The thing is, who has snow shovels or gloves in Arizona? I had to send the guys to Home Depot. They looked at them like they were crazy, buying 50 snow shovels.

What made it really strange was that the members were playing golf at the Renegade (Course) and Apache (Course). They didn't even know what was going on at Cochise. There's a parkway that goes by all the courses, and just past the curve — we were at 2,700 feet elevation — was where the snow started.

I sent everyone home and told them to come back at midnight, and we'd start removing snow. And then it snowed again! Two of the four days of the Tradition were snowed out — it was the first time in history that a PGA Tour event had rounds that were snowed out."

BEWARE OF THE FOG

As told by an anonymous Florida superintendent

"T"his was not a proud moment for me. It was early in my career, a rookie superintendent, working at a multi-course property. I had full reins on all agronomic decisions and I'm trying to make good decisions and impress people. I made the decision to spray a herbicide on all 18 collars.

At first, everything was fine. And then we had what's called a temperature inversion. It's like a heavy fog. I've seen 'temperature inversion' on labels before, but I really didn't know what it was.

Sure enough, I killed all my collars. I still have nightmares about it. The weather that day was spooky, and as a superintendent, this is as spooky as it gets. It was in a perfect line on every collar, like I sprayed Roundup.

I can still vividly remember that morning — the low clouds and the fog. I don't know if I was ever taught about temperature inversions in college; I had to learn the hard way. But my director had my back, and I didn't lose my job. It's a good lesson for any readers: be careful of a temperature inversion!"



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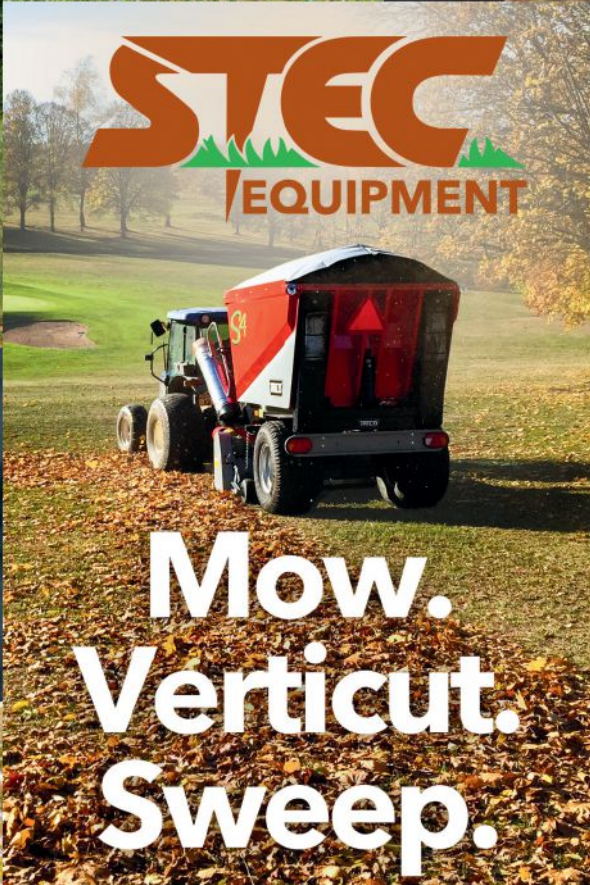
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Continued from page 20

BLACK HAWK DOWN

As told by Steve Sarro, superintendent,
Kelly Plantation GC, Destin, Fla.



I was at the Broadmoor in Colorado Springs. Fort Carson is nearby, so we had a big military presence there. One day, I was at work, and I saw this Black Hawk helicopter coming down fast — it was making an emergency landing, and it came down hard on the No. 17 fairway.

I drive right over, and by then, the pilot is out surveying the damage. He told me there was some kind of en-

DO YOU HAVE YOUR OWN TRUE TALE OF TERROR?

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gine malfunction and there is a massive oil leak about the size of a small car — all over the fairway. I ask him if everyone's OK, and he says yes. They know he had to put the copter down there, and help is on the way.

I look back, and there is a group on the No. 17 tee. I asked, 'Is it OK if these guys keep playing golf, or should I move the tee to the other side of the helicopter so a golf ball doesn't hit it?' He looks at me and says, 'This thing is designed to take on gunfire. A golf ball sure as hell isn't going to hurt it.' ©

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Super Science

// PROTECT AND SERVE

PROTECTING GOLF COURSE PONDS

By Mike Kenna, Ph.D.

Golf course superintendents know that consistent, quality playing conditions require input. Labor input for mowing and other maintenance tasks is number one, but there are chemical inputs for nearly all golf courses. These include using fertilizers to maintain healthy turfgrass growth and pesticides to protect turf from damage caused by weeds, diseases and insects.

In the late 1980s, environmental protection advocates asked, “What happens to nutrients after fertilizers are applied? To what extent can these nutrients be transported to groundwater or surface waters, and what are the ecological effects? What can be done to minimize this risk?”

For two decades, from 1990 to 2010, the USGA funded research to quantify the fate and transport of nutrients and pesticides applied to turfgrass. Toward the end of the research support, the focus turned toward evaluating the adverse ecological effects (e.g., eutrophication) when nutrients are transported from the application site. The two nutrients receiving attention in this regard are nitrogen (N) and phosphorus (P), and much was learned about how to effectively limit the risk of these nutrients finding their way to ground and surface water.

Several studies involving a range of scales, from small-plot research to entire watersheds, yielded important results that minimize the extent to which applied pesticides and nutrients run into surface waters. The following best management practices are a direct result of those studies.

- Schedule fertilizer applications to avoid rainstorms.
- Do not apply fertilizer on dormant turf or too early or late in the growing season.
- Phosphorous-containing fertilizers should be applied in small amounts based on soil-test recommendations.
- Controlled-release products can reduce nitrogen leaching and runoff.
- Established turfgrass requires lower fertilization requirements than newer turf.
- Use vegetative buffer strips around surface water.

The research information was great but needed to be put into practice with documentation. Years later, the GCSAA implemented the *Best Management Practices: A Guide for Environmental Stewardship*. Best management practices (BMPs) offer guidelines for superintendents to manage their facilities efficiently and environmentally sustainable. BMP manuals for all 50 states document the science-based practices and professional course management many people need to see. While superintendents spearhead BMP efforts, the use of BMPs benefits everyone in the community that a golf course serves.

References

Nus, Jeff, and Kenna, Mike. 2011. Reviewing USGA-Funded Research: Nutrient Fate and Transport. *Turfgrass and Environmental Research Online*. Volume 10, Number 21 November 1, 2011, n21.pdf (msu.edu)

Golf Course Superintendent Association of America. *Best Management Practices* | GCSAA



This project was funded in part by the USGA Green Section.

NEWS UPDATES

HARRELL'S DEBUTS NEW WARM-SEASON HERBICIDE

Harrell's recently launched ProtectMax Southside Broadleaf and Sedge Herbicide, a unique combination product designed for selective postemergence control of annual and perennial sedges, grasses and broadleaf weeds in warm-season turfgrass.

Harrell's ProtectMax Southside is designed for broad-spectrum control of key sedges and 110 other grassy and broadleaf weeds. This product can be used alone or in tank mixes and is safe on warm-season grasses, including bermudagrass, zoysiagrass, St. Augustinegrass and centipedegrass.

“Harrell's ProtectMax Southside Broadleaf and Sedge Herbicide is a novel formulation of two proven active ingredients,” said Jeff Atkinson, Ph.D., director of agronomy for Harrell's. “By systemically controlling a wide array of broadleaf and sedge species at an affordable price, Southside provides tremendous value to golf course superintendents, lawn care operators and field managers alike.”

Harrell's ProtectMax Southside is now available and can be integrated into current weed control programs.

GIVEN THE COMPLEXITIES OF NUTRIENT IN STORMWATER PONDS, IDENTIFYING VARIABLES IMPACTING TN, TP AND CHLOROPHYLL-A IS ESSENTIAL.”

Charles Nealis, Ph.D.
(see story on page 25)

// **STORMWATER STRUGGLES**

Factors influencing stormwater pond nutrients and algae

By Charles Nealis, Ph.D.

Nutrient-algae response relationships, primarily measured by chlorophyll-a concentration, help predict algal blooms and lake eutrophication. Key drivers of algal biomass include nitrogen (TN) and phosphorus (TP). While regression models have successfully predicted algal blooms in natural lakes using TN, TP and chlorophyll-a concentrations, the nutrient-response dynamics in stormwater ponds differ significantly due to additional influencing variables.

Stormwater pond management practices affect nutrient concentrations differently than in natural lakes. Pond managers typically control algae and vegetation using chemical treatments, which can suppress chlorophyll-a responses to nutrient levels. This artificial suppression complicates the prediction of algal blooms based solely on TN and TP concentrations.

Vegetation within and surrounding ponds also influences nutrient dynamics. Vegetated littoral shelves, for example, can reduce water column nutrient concentrations by increasing water-vegetation contact and slowing runoff, which promotes particle settling. However, these areas can also contribute nutrients as plant tissue decomposes, particularly when they are managed with herbicides.

Landscape maintenance and land use near stormwater ponds also affect nutrient loading. Impervious surfaces and intensified land use contribute to increased runoff, erosion and nutrient input, degrading water quality. Shoreline erosion, which adds phosphorus and nitrogen to the pond, further elevates

“This research highlights the need for pond-specific nutrient models for clear and colored-water conditions. These models would provide more accurate predictions of algal blooms ...”

nutrient levels. Turfgrass management around ponds can exacerbate these issues, with runoff containing nutrient concentrations from fertilizers and organic debris such as grass clippings, which can contribute to eutrophication.

Given the complexities of nutrient dynamics in stormwater ponds, identifying management variables impacting TN, TP and chlorophyll-a concentrations is essential. Factors such as pond design, vegetation control and landscape practices must be considered for effective management and to ensure that ponds meet water quality standards.

This research highlights the need for pond-specific nutrient models for clear and colored water conditions. These models would provide more accurate predictions of algal blooms and better inform stormwater pond management strategies aimed at reducing nutrient levels and preventing eutrophication. Such an approach would enhance water quality in stormwater ponds and help balance aesthetic goals and ecological health.

METHODS

This study was conducted in a large residential community in the Tampa Bay watershed. Stormwater ponds are an important feature in the community

as more than 300 ponds provide water storage, water treatment and aesthetic, recreational and economic value to community members.

A single community pond manager is tasked with making all stormwater pond management decisions, and a single pond management company is contracted to implement those decisions, including chemical and mechanical interventions applied to the stormwater ponds. Landscape management surrounding the stormwater ponds may be conducted by a community-contracted company, individual private contractor or homeowner.

We sampled 36 stormwater ponds in a large residential community in southwest Florida. For four months, we measured water column TP concentration, TN concentration, color and chlorophyll-a concentration at three predetermined locations within each pond monthly. A representative subsample of 12 ponds was then selected from the 36 original ponds and sampled for an additional eight months.

These data established nutrient-response relationships for TP and TN in clear and colored stormwater ponds. These relationships provide an estimate for quantifying the nutrient removal capacity within a stormwater pond.

Continued on page 27

TABLE 1

Management and landscaping variables evaluated for significance as predictors of total phosphorus, total nitrogen and chlorophyll-a concentrations in stormwater ponds.

Variable	Code	Description
Chemical treatment	CT	Presence of chemical treatment was determined at each site by blue water column coloring, indicating dye for clarity and/or algae treatment, or if chemical treatment was performed and recorded.
Residential landscape fertilizer application	RF	Residential application of fertilizer containing nitrogen and/or phosphorus was assumed to cease during the months of the Manatee County fertilizer ordinance, from June 1 to Sept. 30 (35).
Aeration	AE	The presence of aeration devices within the stormwater pond was coded with "1" and absence of aeration was coded with "0."
Chlorophyll-a concentration	CHL	Concentration of chlorophyll-a ($\mu\text{g}\cdot\text{L}^{-1}$) were measured at a depth 0.60 m using the WET Labs ECO Triplet optical instrument.
Natural land/open water land use	NL	Percent coverage of land in open water, upland, or wetland with very low manipulations within 100 meters of the stormwater pond (8).
Recreational/open land, low intensity	RL	Percent coverage of land in areas maintained as natural areas and undeveloped land with natural within 100 meters of the stormwater pond (8).
Single family residential, high density	HD	Percent coverage of land in areas used for residential units with a density of more than 20 units/ha within 100 meters of the stormwater pond (8).
Commercial, low intensity	CL	Percent coverage of land in areas used for commercial business within 100 meters of the stormwater pond (8).
Transportation, low intensity	TL	Percent coverage of land in driveways and paved roads with no more than two lanes within 100 meters of the stormwater pond (8).
Stormwater pond	SW	Area of stormwater pond of interest in proportion to surrounding 100 meters.
Floating filamentous algae coverage	FA	Percent coverage of shoreline water in floating filamentous algae.
Submerged aquatic vegetation	SAV	Percent coverage of the visible sub-surface sediment by submerged aquatic vegetation.
Bank erosion	BE	The presence of surrounding bank erosion was documented and coded with "1" if there was any evidence of soil erosion within five meters of the stormwater pond perimeter. The absence of erosion was coded with "0."
Grass clippings	GC	The presence of grass clippings within the stormwater pond was documented and coded with "1" if clippings were identified on the pond surface or settled to the pond sediment. The absence of grass clippings was coded with "0."
Littoral shelf coverage	LS	The percent coverage of total stormwater pond area consisting of littoral shelf.
Littoral shelf plantings	LP	The percent of the littoral shelf planted in emergent vegetation was visually evaluated during each sampling event.
Shoreline plantings	SP	The percent of the stormwater pond shoreline edge planted with vegetation other than turfgrass. Shoreline edge was defined as 1 upland meter from the water's edge.
Adjacent homes	HO	The percent of the area immediately surrounding the stormwater pond in residential homes, lawns and driveways.
Adjacent natural area	NA	The percent of the area immediately surrounding the stormwater pond preserved as a natural area.
Pond size	PS	The total area of the pond as defined by community development and pond management documents.
Nutrient limitation	LM	Using corresponding TN and TP concentrations (Nealis, Clark, Monaghan, Hochmuth, & Frank, 2016), ponds were categorized as nitrogen limited ($\text{N:P} < 7:1$), phosphorus limited ($\text{N:P} > 20:1$) and co- limited ($7:1 < \text{N:P} < 20:1$) (Guildford & Hecky, 2000).
Total nitrogen concentration	TN	Concentration ($\text{mg}\cdot\text{L}^{-1}$) analyzed by the University of Florida Analytical Research Lab (38) following EPA Methods 351.2 (TKN) and 353.2 ($\text{NO}_x\text{-N}$) to determine TN Not included as predictor of total nitrogen or total phosphorus.
Total phosphorus concentration	TP	Concentration ($\text{mg}\cdot\text{L}^{-1}$) analyzed by the University of Florida Analytical Research Lab (38) following EPA Method 365.1 and not included as predictor of total nitrogen or total phosphorus.

Continued from page 25

Still, low coefficients of determination for each model suggest that there are other factors influencing nutrient and response dynamics.

Concurrent with the previous study, additional variables were measured at each stormwater pond sample site during the 12 sampling events, including field assessments of landscaping and management decisions. The variables and methods used to quantify the variables are described in Table 1.

Visual evaluation of land use adjacent to stormwater ponds was conducted on-site, and spatial analysis of land use within a 100-meter buffer of the stormwater ponds was performed using ArcGIS Desktop and landscape disturbance gradients identified in the Landscape Development Intensity index.

These variables were evaluated for their significance as predictors of TP, TN and chlorophyll-a concentrations in clear and colored stormwater ponds using a stepwise regression fit model, mixed option, with the probability to

“Understanding the role of these variables in driving nutrient dynamics in stormwater ponds can improve predictions of TN, TP and chlorophyll-a, leading to better management.”

enter and leave set at 0.15. Once the significant variables were identified, a fit least squares model procedure was conducted to identify variable coefficients and the model equation.

RESULTS AND DISCUSSION

The stepwise regression model identified significant predictors for TP, TN and chlorophyll-a concentrations in clear and colored stormwater ponds. This model was refined using least squares fitting, which provided variable coefficients, model equations and coefficients of determination for each model. Predictive models evaluating the impact of different management and landscaping variables for clear and colored stormwater ponds are presented

in Table 2, with summary statistics for each significant variable in Table 3.

Two variables, littoral shelf coverage and grass clippings, emerged as significant drivers of TP, TN and chlorophyll-a concentrations in both clear and colored stormwater ponds. Littoral shelf coverage in the ponds ranged from 0 to 60 percent, with a median of 15 percent.

Littoral shelf coverage demonstrated different effects depending on pond type and nutrients. It negatively correlated with TP in colored ponds, positively correlated with TN in clear ponds, and negatively correlated with TN in colored ponds. Additionally, it was positively correlated with chlorophyll-a concentrations in both pond types.

Continued on page 29

TABLE 2

Empirical models and summary statistics describing the association of monthly average nutrient and chlorophyll concentrations using significant management and landscaping predictors from stormwater ponds in southwest Florida (38).

Variable	Pond	Model	n	F	p > F	r ²
Phosphorus (mg·L ⁻¹)	Clear	TP = 0.075 - 0.005RF + 0.001CHL - 0.010SAV - 0.009BE + LM(0.068 IF N-Limited, or -0.021 IF Co-Limited, or -0.047 IF P-Limited) TP = 0.109 - 0.116SW + 0.001CHL - 0.016GC - 0.041LS + 0.004PS	87	42.92	<0.001	0.76
	Colored	+LM(0.079 IF N-Limited, or -0.016 IF Co-Limited, or -0.063 IF P-Limited)	120	71.03	<0.001	0.82
Nitrogen (mg·L ⁻¹)	Clear	TN = 1.06 - 0.19RF + 0.63AE + 1.28TL - 2.76CL + 0.01CHL - 2.65FA - 0.24BE + 0.56LS - 0.18LP	87	8.08	<0.001	0.49
	Colored	TN = 1.02 - 0.15RF - 0.25AE + 5.27TL - 1.63HD + 2.88NL - 0.18GC - 0.57LS - 1.42NA	120	6.25	<0.001	0.31
Chlorophyll-a (µg·L ⁻¹)	Clear	CHL = -2.90 - 1.62CT + 27.41RL - 39.24CL - 2.62SAV + 2.33GC + 12.46LS + 6.31HO + 1.07LM + 50.40TP	87	8.87	<0.001	0.51
	Colored	CHL = 10.48 - 26.29HD + 20.38NL + 7.81LS - 4.45SP + 6.71HO - 8.28NA - 2.07LM	120	7.54	<0.001	0.32

Coefficient abbreviations are identified in Table 3-3.

TABLE 3

Summary statistics for significant predictor variables of total phosphorus, total nitrogen and chlorophyll-a stormwater pond models in southwest Florida.

Model	Variable		Estimate	SE	t-ratio	> t
Phosphorus, Clear (mg·L ⁻¹)	Residential Fertilizer	RF	-0.005	0.003	-1.56	=0.12
	Chlorophyll-a	CHL	0.001	0.001	2.88	<0.01
	Sub. Aquatic Veg.	SAV	-0.010	0.004	-2.81	<0.01
	Bank Erosion	BE	-0.009	0.004	-2.41	<0.05
	N-Limited	LM	0.068	0.006	11.32	<0.001
	Co-Limited	LM	-0.021	0.004	-5.78	<0.001
	P-Limited	LM	-0.047	—	—	—
Phosphorus, Colored (mg·L ⁻¹)	Stormwater Pond	SW	-0.116	0.043	-2.71	<0.01
	Chlorophyll-a	CHL	0.001	0.001	2.95	<0.01
	Grass Clippings	GC	-0.016	0.005	-3.41	<0.001
	Littoral Shelf	LS	-0.041	0.015	-2.72	<0.01
	Pond Size	PS	0.004	0.003	1.54	=0.13
	N-Limited	LM	0.079	0.005	14.46	<0.001
	Co-Limited	LM	-0.016	0.004	-3.81	<0.001
	P-Limited	LM	-0.063	—	—	—
Nitrogen, Clear (mg·L ⁻¹)	Residential Fertilizer	RF	-0.188	0.07	-2.73	<0.01
	Aeration	AE	0.625	0.21	2.97	<0.01
	Transportation, L.I.	TL	1.278	0.63	2.02	<0.05
	Commercial, L.I.	CL	-2.759	1.09	-2.54	<0.05
	Chlorophyll-a	CHL	0.014	0.01	2.06	<0.05
	Filamentous Algae	FA	-2.651	0.67	-3.96	<0.001
	Bank Erosion	BE	-0.237	0.09	-2.70	<0.01
	Littoral Shelf	LS	0.563	0.37	1.53	=0.13
	Littoral Shelf Planted	LP	-0.191	0.83	-2.28	<0.05
Nitrogen, Colored (mg·L ⁻¹)	Residential fertilizer	RF	-0.147	0.08	-1.86	<0.10
	Aeration	AE	-0.248	0.12	-2.07	<0.05
	Transportation, L.I.	TL	5.269	1.16	4.55	<0.001
	Residential, H.D.	HD	-1.625	0.81	-2.02	<0.05
	Natural/Wetland	NL	2.882	0.78	3.69	<0.001
	Grass Clippings	GC	-0.176	0.10	-1.83	<0.10
	Littoral Shelf	LS	-0.573	0.26	-2.23	<0.05
	Adj. Natural Area	NA	-1.425	0.38	-3.75	<0.001
Chlorophyll-a, Clear (µg·L ⁻¹)	Chemical Treatment	CT	-1.625	0.86	-1.54	=0.13
	Recreational, L.I.	RL	27.405	5.51	4.97	<0.001
	Commercial, L.I.	CL	-39.235	13.80	-2.84	<0.01
	Sub. Aquatic Veg.	SAV	-2.619	1.06	-2.47	<0.05
	Grass Clippings	GC	2.330	0.89	2.61	<0.05
	Littoral Shelf	LS	12.464	4.51	2.76	<0.01
	Adj. Homes	HO	6.312	2.06	3.06	<0.01
	Nutrient Limitation	LM	1.071	0.63	1.69	<0.10
	Total Phosphorus	TP	50.400	20.32	2.48	<0.05
Chlorophyll-a, Colored (µg·L ⁻¹)	Residential, H.D.	HD	-26.295	10.25	-2.57	<0.05
	Natural/Wetland	NL	20.382	8.66	2.35	<0.05
	Littoral Shelf	LS	7.807	3.14	2.48	<0.05
	Shoreline Plantings	SP	-4.445	1.83	-2.43	<0.05
	Adj. Homes	HO	6.713	3.39	1.98	<0.10
	Adj. Natural Area	NA	-8.281	4.73	-1.75	<0.10
	Nutrient Limitation	LM	-2.069	0.46	-4.46	<0.001

Descriptions of variables located in Table 1.

Continued from page 27

Grass clippings, a byproduct of turf management, were significant predictors of nutrient levels. Grass clippings in 73 percent of the ponds also influenced nutrient dynamics. While they decompose and release nutrients into the water, the study found inverse correlations between grass clippings and TP and TN concentrations but a positive correlation with chlorophyll-a.

Littoral shelves play a crucial role in nutrient and chlorophyll dynamics. These areas, shallow enough to allow sunlight penetration, increase the interaction between the water column, soil and vegetation, promoting nutrient assimilation and particle settling from incoming runoff.

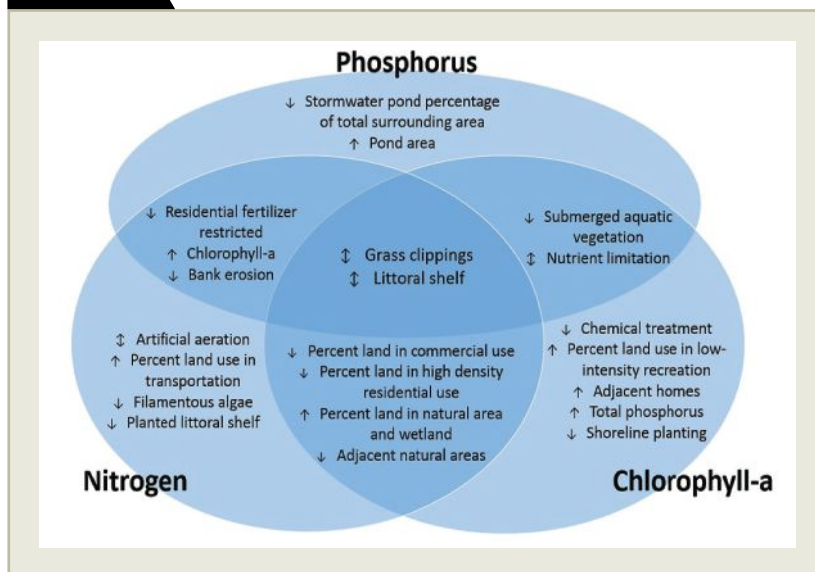
Emergent vegetation in littoral shelves and shoreline plantings also significantly influenced nutrient concentrations. In clear ponds, littoral shelves strongly predict TN, with increased plant coverage correlating to lower TN concentrations. Similarly, shoreline vegetation coverage was inversely correlated with chlorophyll-a concentrations, suggesting that shoreline plantings reduce algal growth.

Submerged aquatic vegetation was also important, inversely correlated with TP and chlorophyll-a concentrations in clear ponds. Previous research supports this, noting that submerged plants obtain phosphorus from sediments rather than the water column, potentially precipitating nutrients out of the water.

Residential fertilizer application was another significant predictor, influencing both TN and TP concentrations. As regulated by local ordinances, the impact of fertilizer restrictions during certain months was also assessed. These restrictions were inversely correlated with TP and TN concentrations in the ponds, suggesting that such regulations may effectively reduce nutrient loads from non-point sources.

Chlorophyll-a concentrations were significant predictors of nutrient levels in stormwater ponds. The

FIGURE 1



Variables identified as significant predictors of phosphorus, nitrogen, and chlorophyll-a concentrations in stormwater ponds. Arrows indicate positive, negative or both positive and negative variable coefficients.

concentration of chlorophyll-a was positively correlated with TP in both clear and colored ponds and with TN in clear ponds, reflecting the known relationships between these nutrients and algal growth in freshwater systems.

Filamentous algae coverage, although often seen as an aesthetic problem, was a significant predictor of TN in clear ponds, with a negative correlation to TN concentrations. This result suggests that filamentous algae may play a role in nutrient dynamics, which warrants further study.

Bank erosion around the ponds was another significant factor influencing nutrient concentrations. Contrary to expectations, erosion was inversely correlated with TP and TN concentrations. Soil erosion typically contributes nutrients to water bodies, especially during rain events that cause runoff. However, the results suggest that more subtle processes may be at play, where erosion impacts are not directly reflected in increased nutrient levels in the water column.

Nutrient limitation status also played a crucial role in predicting nutrient and

chlorophyll-a concentrations. Ponds were categorized as nitrogen-limited, phosphorus-limited, or co-limited based on the nitrogen-to-phosphorus ratio. The limitation status significantly influenced nutrient dynamics, with nitrogen-limited ponds correlating with higher TP concentrations. Phosphorus-limited and co-limited ponds, on the other hand, showed inverse correlations with TP concentrations, indicating that the limiting nutrient concept is essential for understanding nutrient dynamics in stormwater ponds.

Land use surrounding the ponds also significantly predicted nutrient and chlorophyll-a concentrations, though not entirely in line with conventional understanding. More intensive land use and increased impervious surfaces are expected to increase nutrient runoff. However, the models revealed the opposite effect, except in areas with low-intensity transportation.

Natural areas and wetlands were positively correlated with TN and chlorophyll-a, while low-intensity commercial and high-density residential

Continued on page 30

Research Takeaways

- The stepwise regression model identified key predictors for total phosphorus (TP), total nitrogen (TN) and chlorophyll-a concentrations in clear and colored stormwater ponds, refining variables through least squares fitting.
- Littoral shelf coverage and grass clippings emerged as significant predictors, with complex relationships between pond type and nutrient concentrations impacting TP, TN and chlorophyll-a levels.
- Littoral shelves and submerged vegetation influence nutrient dynamics, with higher plant coverage generally reducing TN and TP concentrations while affecting chlorophyll-a in varying ways.
- Residential fertilizer application and management practices such as chemical treatments and aeration were significant factors influencing nutrient levels, with restrictions on fertilizer use effectively reducing TP and TN concentrations.
- Surrounding land use, including natural areas and wetlands, contributes to nutrient dynamics and shows complex relationships that sometimes contradict conventional expectations regarding runoff from developed areas.

Continued from page 29

land use showed inverse correlations. These results suggest that land use around stormwater ponds affects nutrient dynamics in complex and context-dependent ways.

Chemical treatments, often used to manage algae in ponds, significantly predicted chlorophyll-a concentrations. The inverse correlation between chemical treatment and chlorophyll-a indicates that chemical interventions suppress algal growth, masking the true relationship between nutrients and chlorophyll-a. This suggests that stormwater ponds without chemical treatments may experience more significant nutrient responses, complicating efforts to develop standardized nutrient management thresholds.

Similarly, artificial aeration was a significant predictor of TN concentrations, with mixed effects depending on the pond. Aeration can increase the oxidation of organic sediments, affecting nutrient release and removal processes, but further research is needed to understand its full impact on nutrient concentrations.

Understanding the role of these variables in driving nutrient dynamics in stormwater ponds can improve predictions of TN, TP and chlorophyll-a concentrations, leading to better management practices. The findings emphasize the importance

of site-specific management strategies tailored to individual stormwater ponds, particularly regarding littoral shelf design, vegetation management, grass clipping control, and land use practices. These strategies can mitigate nutrient loading and algal blooms, helping to maintain water quality and ecological balance in stormwater ponds.

CONCLUSION

This study evaluated the impact of management and landscaping decisions on stormwater pond nutrient and chlorophyll-a concentrations to identify significant predictor variables of TP, TN and chlorophyll-a water column concentrations within clear and colored stormwater ponds. Models were developed using the significant predictor variables to provide more accurate, site-specific nutrient and water column algae predictions to aid and improve stormwater pond function, use, and aesthetics management. **G**

The author of this article is Charles Nealis, Ph.D., who completed his graduate work at the University of Florida.

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Adapted from: Nealis, Charles Patrick. 2015. Chapter 3, Identifying Significant Factors Influencing Stormwater Pond Nutrient And Algae Concentrations, In *Managing Expectations: Creating a Community Based Stormwater Pond Nutrient Management Program*. Doctoral Dissertation, Graduate School of the University of Florida.

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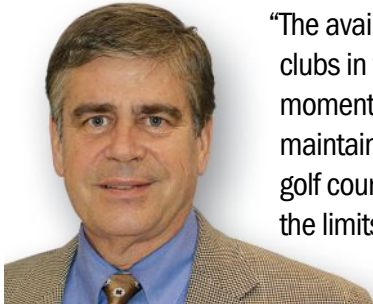
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"The availability of the USGA Stimpmeter to clubs in the late 1970s became a watershed moment, both a curse and a blessing for maintaining putting greens. On a broad scale, golf course superintendents began pushing the limits on putting green quality."

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

Be a leader, not a follower

The game of golf is reactive and responsive to technological changes and advancements. New science into the golf swing, material advancements and golf ball technology have allowed golfers, especially the best, to hit the ball further, straighter and more precisely.

In response, the game has set rules, including equipment standards for maintaining the integrity of the game. A famous example is the "square groove" controversy, which led to the introduction of Ping Eye 2 irons in 1982 and their ban from 1985 through 1989. The Ping Eye 2 remains iconic and is still the most popular iron ever sold.

In response to the technological advancement of golf, superintendents use course setup and maintenance to provide resistance. Course changes can consist of lengthening golf holes, narrowing fairways and raising the height of cut for the rough. Bunkers continually evolve to fortify the course further, often becoming deeper and more challenging to meet increasing distances.

Putting greens have evolved into the last defense against the best golfers. The availability of the USGA Stimpmeter to clubs in the late 1970s became a watershed moment, both a curse and a blessing for maintaining putting greens. On a broad scale, golf course superintendents began pushing the limits on putting green quality.

Slope, speed, smoothness and firmness became golf course superintendents' weapons for defending the green.

Maintenance practices are often responses to changes in the game. I believe the improvements in the putting green surface were a catalyst for a more in-depth study and understanding of the science of putting.

Prior to the Stimpmeter, the putters available to golfers, even the best players, were based on a trial-and-error method. Some famous putters were Bobby Jones' "Calamity Jane" and Arnold Palmer's Wilson 8802.

Although iconic, these putters could never be replicated.

In the late 1940s, a teaching professional named James Reuter invented a putter that "swung like a pendulum," which he called the "Bulls Eye." Reuter joined Titleist in 1958 to mass-produce the putter, which became the most popular of the time. In my teenage years, the "Bulls Eye" was the putter of choice. Although not cheap by yesterday's standards, the putter cost 16 dollars.

Most putters, however, were not

much more than a flat blade with a shaft stuck near the heel. That changed in 1961 when Karsten Solheim created the Ping A1 putter, followed in 1966 by the revolutionary Ping Anser. Karsten Solheim was an engineer at General Electric when he released his first putter. Through his work, he applied scientific principles to his putters to allow for a more consistent uniform roll. Solheim's lasting legacy will be the investment dye casting method he introduced to golf club making and concurrently advancing the science of club making.

In the 1980s and '90s, professional golfers were looking for better putters that were more consistent and had a desired feel to better putt on the continually improving putting green quality. At this time, the first CNC (Computer Numerical Control) milled putter was developed. Instead of manual operation, CNC machines use computer code to move and monitor milling tools. This allowed for more precise cutting, faster speeds and cleaner finishes than traditional milling. The advantages of milled putters are more design options, greater precision and a softer feel. The disadvantage is the higher, often much higher, cost associated with them.

In the early 1990s, Scotty Cameron, a Mizuno club maker, went out on his own and created custom-made milled putters for golfers. His expertise and understanding of the milling process improved putter technology significantly for both professional and average golfers.

Today, golf course superintendents, present and past, should be proud of how they have led and impacted golf by advancing agronomic management practices, given the nature of that profession, which will continue in the foreseeable future. **G**

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



Thawed soil is better equipped to handle melted snow than frozen soil, making some snow cover on turf beneficial.

How to protect greens this winter — with snow cover

To guard greens from winterkill, the length of snow cover is just as important as the amount

By Chris Lewis

As superintendents determine how much snow should cover their golf course's greens this winter, they must first learn which type of snow has fallen.

Fluffy, aerated snow is the most ideal for snow cover,



E. J. Chea

according to E.J. Chea, superintendent of Portsmouth, N.H.'s Pease Golf Course. After all, once snow compacts, it can become an ice layer, which may lead to winterkill.

Carey Hofner, a Big Sky, Mont.-based superintendent, agrees that her region's snowfall tends to be light, airy and fluffy compared to the Midwest's and East Coast's heavy, wet snowfalls. Therefore, the likelihood of ice layers is lower in the Rockies.

Nonetheless, she stresses that superintendents must monitor their course's snow coverage carefully, regardless of their locations. While striving to ensure there aren't any ice layers, they should decide whether they'll remove snow manually or let Mother Nature "take its course" instead.

"Superintendents should find the right fungicide program for snow mold, use moisture sensors like Spiio and have backup plans for their snow



Carey Hofner

removal," she says. "If a green is prone to snow mold, snow should be removed before a normal melt occurs. From there, a fungicide should be applied for additional protection."


Chea advises superintendents to have anywhere from 6 inches to 3 feet of snow cover at a time, depending on superintendents' situations. Greens should also be covered throughout most of winter, as the length of snow cover is just as important as the amount.

"They should avoid mistaking snow cover for ice cover too," he says. "Even if there is 3 feet of snow, there could be an ice layer at the bottom."

To determine exactly what's occurring, superintendents can acquire a test plug of turf underneath the snow, bring it inside and observe what grows. According to Chea, they'll not only learn how much their greens have been damaged but also have enough time to create a proper recovery plan.

Additionally, superintendents based in regions with inconsistent snow cover can purchase green covers. Pease GC has utilized covers on some greens while enabling Mother Nature to take its course on others.

No matter what happens this winter, Hofner thinks superintendents should communicate any issues and plans with their board and club members.

"Mother Nature has a mind of her own," she adds. "Open dialogue will help any winter-related situations ultimately end on good terms." 

PHOTOS COURTESY OF CAREY HOFNER

Envu

ZAC REICHER, PH.D.

Team Manager, Green Solutions
Team, West Region



Winter damage can be caused by a number of factors, including animals, desiccation, golfer traffic and temperature swings. Thankfully, snow cover, especially when it's moderate, will protect courses from many of these factors. Moderate snow cover (of a foot or so) over frozen soil is perfect for turfgrass survival through the winter. Conversely, deep, wet snow cover — particularly over unfrozen soil for 100-plus days — will create an ideal environment for snow molds.

On the other extreme, winters with no snow cover will enhance desiccation but limit snow molds and vole damage. Then there's the chance for mid-winter rain or snow melt, which will create an ice layer, leading to a buildup of toxic gases and turf damage after 60 days or so. If a substantial ice layer forms, superintendents will need to either aerify or implement another type of intervention to break up the ice.

Nufarm

RICK FLETCHER

Technical Services Manager,
Turf and Ornamentals



When it comes to snow cover and golf course protection during the winter, superintendents must focus on two aspects in particular. First, they need to guard their courses against desiccation-related turf damage. Second, they must protect them from any potential for suffocation related to ice formation. These are more often green/tees concerns versus fairways — and variable threats, based upon course turf species. For example, higher levels of *Poa annua* are especially at a greater risk.

A consistent snow cover has the effect of insulation, keeping the temperature under the snow more consistent while also providing protection by shielding against winter wind desiccation and ice suffocation. Superintendents may not be able to have consistent snow cover, depending on their region. Whenever a consistent snow cover is not reliable, many superintendents can rely on man-made turf covers for vulnerable areas instead to achieve similar protection against these two winter-related problems.

Quali-Pro

BOBBY KERR, PH.D.

Technical Services Manager



There's no set amount of snow cover required. In fact, a lot of superintendents are now removing snow cover from the greens as it falls over the winter months. The primary reason? It reduces the chances of ice during springtime thaw-refreeze events, which can be detrimental to courses with a large percentage of *Poa annua* greens.

During the spring, *Poa* comes out of winter dormancy quicker than creeping bentgrass. As a result, the crowns rehydrate; when temperatures decrease and a refreeze event happens, *Poa* is then killed. Meanwhile, creeping bentgrass is still dormant and unharmed by the event.

There are situations where snow cover can't be removed as it falls. In these circumstances, it offers protection from desiccation. Historically, superintendents have thought that a small amount of snow helps insulate turf in the winter. In my opinion, this is changing, especially with fungicides like Enclave.

Syngenta

MATT GIESE

Technical Services Manager



Because depth and duration are highly dependent on golf course's local weather conditions, elevations, orientations and prevailing winds, it's challenging to determine the ideal amount of snow cover.

From an abiotic perspective, snow cover acts as an insulating layer in freezing or sub-zero temperatures. Without snow cover, freezing conditions can result in various levels of turf loss, ranging from low-temperature kill to desiccation injury. *Poa annua*'s early emergence from dormancy, followed by refreezing events, can lead to damaged crowns from ice crystal formation within the plant cells. Snow cover does not prevent these from completely occurring, but may reduce injury.

Courses in climates that receive "feet" of snowfall — with snow cover for 150-plus days — are not exempt from winter injury. Warm winter days or spring melt provide plenty of moisture in poorly drained areas, contributing to crown hydration injury. Moisture under snow cover can also be conducive to pathogens, like gray or pink snow mold.



“While golf course wetlands offer some protection from road mortality and over-harvesting due to restricted access and minimal traffic, there is room for improvement.”

MIKE KENNA, PH.D., *Research Editor*

Making golf courses turtle friendly

Over a two-year study, researchers from Columbia University and the State University of New York explored how golf courses, urban areas and wildlife refuges influenced snapping turtles (*Chelydra serpentina*) and painted turtles (*Chrysemys picta*) in Onondaga County, N.Y. The USGA funded the research through the Wildlife Links Program.

Although this ancient group of reptiles has existed for more than 220 million years, nearly half of the approximately 300 turtle species are threatened or endangered today. As freshwater turtles face global declines, primarily due to habitat loss and degradation, the researchers set out to determine if golf courses could serve as critical habitats in increasingly urbanized landscapes.

The study conducted habitat analyses of sampled wetlands using aerial photos, field inspections and on-the-ground measurements. Using mapping software, researchers analyzed landscape composition, including land cover types and road extent. Turtle population and individual parameters (e.g., occurrence, abundance, sex and age, body length and mass) were integrated with wetland characteristics across different landscapes.

In Onondaga County, 25 percent of the 80,000 acres of wetlands were in

urban areas with the highest road densities. Wildlife refuges had the most significant percentage of wetlands, while golf courses and urban areas had comparable amounts.

Wetlands in wildlife refuges were surrounded by the highest percentage of forest and herbaceous land cover. At the same time, golf courses had the least because they classified grass greens, tees, fairways and rough as developed land. They sampled 88 wetlands using a standardized trapping effort (three baited hoop nets per wetland for three nights, totaling nine trap nights per wetland). They checked traps daily and marked turtles with a single notch on their shell to identify their wetland of capture before being released within 30 minutes.

Researchers used species, sex and various physical traits to identify turtles. Throughout their study, they captured and marked 249 snapping and 164 painted turtles. Then, in

2009 and 2010, they measured turtle habitats at 88 wetlands in urban areas, on golf courses and at wildlife refuges near Syracuse, N.Y.

Their research found wetlands on golf courses had the smallest area, the most circular shapes, predominantly inorganic substrates and the greatest extent of rooted vegetation. Uplands surrounding the golf course wetlands had relatively little forest and grassland and much lower road densities.

The probability of occurrence and fraction of female turtles captured did not vary among golf courses, urban areas and wildlife refuges. The capture success for both species was lowest in golf course wetlands, and the relative mass of individuals was greater in wetlands than in wildlife refuges.

The researchers concluded that while golf course wetlands offer some protection from road mortality and over-harvesting due to restricted access and minimal traffic, there is room for improvement. Enhancing these habitats by increasing wetland area, diversifying wetland shapes, promoting native vegetation and expanding nearby forests and grasslands could help bolster turtle populations in these semi-natural environments.

Kristin Winchell of Columbia University, who received her master's degree on this project, commented, “The habitat measures fell short of the quality provided by wildlife refuges. Despite this, we did not note any major turtle population anomalies in the golf course wetlands, and we believe that some modest habitat enhancements can lead to big improvements in habitat for freshwater turtles on golf courses.”

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**United States Postal Service Statement of Ownership, Management, and Circulation
(Requester Publications Only)**

1. Publication Title: **Golfdom**
2. Publication Number: 1526-4270
3. Filing Date: 09/10/2024
4. Issue Frequency: Monthly
5. Number of Issues Published Annually: 12
6. Annual Subscription Price (if any): \$58.95
7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4®):
North Coast Media LLC, 1360 East 9th St., Tenth Floor, Cleveland, OH 44114
Contact Person: Antoinette Sanchez-Perkins Telephone (Include area code): 216-706-3750
8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer):
North Coast Media LLC, 1360 East 9th St., Tenth Floor, Cleveland, OH 44114
9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank)
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☐ Has Not Changed During Preceding 12 Months
☒ Has Changed During Preceding 12 Months (Publisher must submit explanation of change with this statement.)
13. Publication Title: **Golfdom**
14. Issue Date for Circulation Data Below: August 2024
15. Extent and Nature of Circulation: Free to Qualified

a. Total Number of Copies (Net press run):
b. Legitimate Paid and/or Requested Distribution
(By mail and outside the mail)

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c. Total Paid and/or Requested Circulation (Sum of 15b (1), (2), (3), and (4)): 12,934 13,099
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(4) Nonrequested Copies Distributed Outside the Mail (Include pickup stands, trade shows, showrooms, and other sources): 109 62
e. Total Nonrequested Distribution (Sum of 15d (1), (2), (3) and (4)): 5,302 5,346
f. Total Distribution (Sum of 15c and e): 18,236 18,445
g. Copies not Distributed (See Instructions to Publishers #4, (page #3)): 5 5
h. Total (Sum of 15f and g): 18,241 18,450
i. Percent Paid and/or Requested Circulation (15c divided by 15f times 100): 70.9% 71.0%
* If you are claiming electronic copies, go to line 16 on page 3. If you are not claiming electronic copies, skip to line 17 on page 3.
16. Electronic Copy Circulation

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3,478	3,230
16,412	16,329
21,714	21,675
75.6%	75.3%

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The 19th Hole



Joshua Stutts

SUPERINTENDENT // Lane Tree GC, Goldsboro, N.C.



Joshua, what are you having?

I'll have a lemonade and Blackberry Crown.



My wife, Ashley, is an eighth-grade teacher; she teaches language arts, she has my daughter in her class — so that's been fun. I get to hear it from both sides. "Guess what momma did in class today?" Come Friday afternoon, most of the time, my daughter comes home and says, "I'm packing my bag and going to Grandma's!" Grandma lives across the road from us.

That sounds pretty good! Yeah, and dangerous.

Tell me about Lane Tree GC. It's about 10 minutes outside Goldsboro, which is the home of Seymour Johnson Air Force Base. It's a John LaFoy design on about 130 acres — it's a big property. The same guy who built it in 1992 has owned it since day one. I've known his family for a long time; I went to school with his grandson. I'm only the fifth superintendent here, and the third is the general manager.

Tell me about your family. I'm married and have two daughters. Carlyne is in eighth grade, and Nora is in fourth.

We have a Halloween theme in this issue. Anything in your mind stand out as particularly spooky or horrifying, from your years working in the industry? It's pretty typical for our industry to rely on retirees for labor. I had a guy out mowing greens, and he called me and said, "My mower stopped!" "Why so?" "Well, I'm out of hydraulic fluid ... I busted a line three greens back."

What do you and the family do for fun? My kids wanted N.C. State (football) season tickets for Christmas last year, so that was a win-win.

What is your favorite thing you own? Probably my side-by-side. I can just go and ride, turn the music on and go. Mine is a Hisun. It's a cheapo off-brand, but it's made in Texas. It gets the job done. I bring it out to the course some, but my best friends are big farmers, so I hunt most of their property. It stays at their farm more than it stays at the house.



What is your favorite spot for lunch? We've got a really good restaurant here at the club. The girls in the kitchen have kind of spoiled me. On Fridays, we get seafood, and I'll go into the kitchen and get a wrap — fish, shrimp, whatever. I'll come back out, and everyone's looking at me, "Where'd you get that? That's not on the menu ..."

As interviewed by Seth Jones, Sept. 23, 2024.

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