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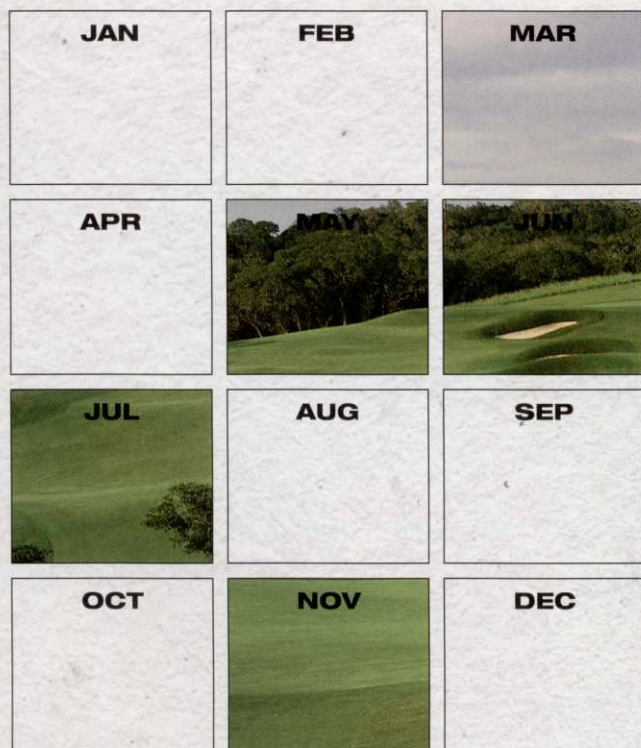
A large, clear glass filled with water, showing a dynamic splash and numerous bubbles. The water is splashing out of the top and bottom of the glass, creating a sense of movement and freshness. The background is a light, neutral color.

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CARRY THE TORCH

Another day, another media event.

That's kind of what I was thinking as I drove through the sunny South Carolina morning to Greenville Country Club for Turf Science Live.

"He would have loved this more than anybody."

That's what Dr. Kimberly Erusha, national director of the Green Section, told me when I asked her what Stanley Zontek would think about the way things turned out at the U.S. Open at Merion.

Stan was there in spirit, all right. The week began with Matt Shaffer dedicating the turf team's work to his memory. The week ended with the American golfing public being reminded of the traditional values of the USGA that Stan loved so much.

As I looked around Merion's maintenance compound, I realized how many folks there had been close to Stan. His successor, Darrin Brevard, obviously, and the rest of the Green Section folks like Chris Hartwiger and Kim who were there. Penn State faculty like John Kaminski, Andy McNitt and Tom Watschke. Trailblazers like Latshaw, Zimmers, Roney and Jennings. Penn State alumni too numerous to name. And dozens of other supers and assistants who've gained wisdom – both about turf and about life – from him. It was a celebration of Stan even though there was no shrine or no big deal made other than Matt's comments early in the week.

I showed up at Merion on Tuesday with a plan to somehow announce the winner of GCI's first Stanley Zontek Scholarship Award during the event. I had been carrying the

entries around with me in my backpack for weeks, agonizing about who to choose and, on the plane out to Philly, I had finally made my decision.

Frankly, the entrants were all great. I mean great. Outstanding grades, amazing recommendations and essays about Stan and what he meant to our community that brought tears to my eyes. (Several of them ended with Stan's trademark "Go Golf!") I narrowed the list of finalists for the \$2,500 scholarship down to three and just couldn't decide. They all deserved the award.



Pat Jones
Editorial director and publisher

Finally, sitting on the plane on the way to the Open, it occurred to me to ask, "Who would Stan pick?" Then I realized, all other factors being equal, he'd pick the Nittany Lion.

So, it is with great pleasure that I announce that Collin Harley, a second-year student in the Penn State two-year program, is the first recipient of the Stanley Zontek Schol-

arship. Collin is #1 in his class with a 3.89 GPA, a leader in the school's turf club and is currently interning at Aronimink GC. Prior to that, he worked for several years at Linfield National GC.

Mostly, what caught my attention in reviewing his essay that he really went out and learned about Stan. He talked to alums and folks around the school to capture the essence of the man: humor, common sense and a passion for the pure joy of golf.

I look forward to meeting Collin in person soon. I plan to tell him that the quid pro quo for accepting the scholarship is to do this one important thing:

Carry the torch. GCI

Finally, sitting on the plane on the way to the Open, it occurred to me to ask, "Who would Stan pick?" Then I realized, all other factors being equal, he'd pick the Nittany Lion.

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[WATER MANAGEMENT]

Reduce, Reuse, Recycle



To curb its water woes, Pasatiempo Golf Club is negotiating with its water district to access unused, reclaimed water being sent to the Pacific Ocean. by Katie Tuttle

Water is a big part of maintaining courses' pristine esthetics, especially in the stress of summer heat and drought. So what happens when water restrictions in your area prevent you from irrigating as often as you need?

A lot of California courses use recycled water as part of their irrigation regimen. In the past, this water was just piped out to the ocean. Now, it's being used to replace fresh water.

Pasatiempo Golf Club hopes to join the ranks or recycled water users in late 2014. Currently, the California course gets its water from the city of Santa Cruz, and is under a constant threat of a water shortage. Because of this, Pasatiempo is seeking an alternative that is both environmentally friendly, as well as the best choice for the course.

"If we have another drought year, we'll be in a fairly severe water restriction next year," says Scott Hoyt, Pasatiempo general manager. "It will definitely affect the condition of the course."

In steps Scotts Valley. The city produces more reclaimed water than it has customers for, so the access water is sent out to the Pacific Ocean. Pasatiempo is already in the position to have the water piped to the course for irrigation, but there is still one big step they have to take first.

"We have to put in an underground tank to store the water," says Hoyt. The underwater storage tank will have three separate chambers: one for the fresh water from Santa Cruz, one for the recycled water from Scotts Valley, and one for the well water from the well on the course. "To ensure our long term future, we want to use all three sources and mix them, depending on the exact quality of the water, and where it's being put: on the greens or

fairways or roughs. No matter what happens, meaning if one of our sources has a problem, we're still in good shape to keep the golf course in the type of condition we need to keep it in."

Another step the course needs to take is to negotiate a final price on the recycled water.

"We have not finalized any kind of negotiating with the [Scotts Valley Water District] relative with the price they want to charge us, or guarantee of supply," he says. "If we're going to spend all this money and go through all of this, obviously we want a fair price. We need them to guarantee supply for 50 years, meaning if they expand their system and decide they have other customers, they can't cut us off."

Money seems to be the only downside of the project. The club has currently invested five million dollars in the project, meaning they have had to cut back on money being spent elsewhere.

"[It] hinders us from making any further improvements and it slows down any other necessary improvements. We need to focus on this; we need to figure out how to pay for it," Hoyt says. "It's going to take us 10 to 12 years to pay it off, so it certainly hinders any future improvement."

Still, there's no reason for anyone to be against the project.

"There's no reason not to be supportive of the idea," says Hoyt. "There can't be one person that's not supportive of the idea. We want to take something that's currently being shipped out into the Pacific Ocean, that [Scotts Valley] is getting zero dollars for. We're going to save fresh water. We could save 40 million gallons a year of fresh water for the city of Santa Cruz."

Katie Tuttle is GCI's assistant editor.



From THE FEED



GCI had the U.S. Open covered from every angle last month. Of course, Matt Shaffer got to show off Merion Golf Club from the cover of our June issue (and if you haven't gotten to see it in motion, now's the time to check out the GCI app!) but our own Pat Jones was also reporting live from the ground. Though superintendents had plenty of nice things to say about the course, not as many thought enough recognition was given to the crew's hard work.

Jerry Coldiron@CaribeTurfman

Seriously, Johnny Miller & his grain comments are so ridiculous!! He made this marathon US Open nearly unbearable. Will be muted tomorrow!!



Tim Walker@timwalkercgcs

I think it's funny everyone is killing miller - Matt shaffer has been bragging about the old bent grain



Jerry Coldiron@CaribeTurfman

Matt knows his greens Just seems on TV more inconsistent grass types & soils leading to dry/wet areas, Not grain



Pat Jones@GCIMagazine

"Superintendents make choices on a daily basis" affecting pace but "sometimes their hands are tied" - Rand Jerris of #USGA



Sean Wilson@mseanw67

The superintendents' hands are always tied. They set the course up the way they are told.



Mr. O'Mell@spartygrad95

OK. Berman IS WORSE than Miller.



Pat Jones@GCIMagazine

Tough choice...equally awful?



Mr. O'Mell@spartygrad95

I'd rather listen to stories of 63s. Anne grain than stupid nicknames



Join the conversation
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JUST ANOTHER TOOL

The next time you're about to throw away an old set of blades, stop and ask yourself "could these still be useable?" If the answer is yes, you could be able to make some money off of them, while also helping out someone who needs them.

Back in May, Stephen Tucker started partschanger.com, a site similar to ebay, where superintendents can sell old parts, equipment, build a store, or put up wanted ads, among other things.

"I think we are all trying to find ways to not just save money but be more economical," Tucker says. "I am always trying to figure out better ways to do things, and so I figured maybe this could help some of us get rid of some clutter, put a few dollars back into the budget and in the end help another club who may need it."

Tucker doesn't just see the site as a resource for superintendents. He also sees people such as technicians, dealers and sports turf managers using it as a place to sell and buy cheaper products.

"With parts prices going up, equipment prices going up, etc, I think any way we can save money we should do it. It's just another tool for the tool box."



U.S. Open Photo Recap

GCI's Pat Jones and John Kaminski were on the ground at Merion CC and behind the scenes during last month's U.S. Open. Check out the iPad or iPhone app version of the July issue for a candid look at the big event.





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

H₂O, NO...NOT AGAIN

What more is there to say about water? We know that we need it, that there's not enough of it, that our profession depends on it, and that we get charged for it so it has tremendous impact on owners, members, and golfers.

Why don't I like water? Because as important as it is to what we do, it is fickle.

When there's too much water, a golf course becomes too wet, creating a fertile breeding environment for insects and diseases.

Ask Matt Schaffer, the superintendent at Merion, if he's a fan of water. After seven inches of rain fell during the week of the U.S. Open, probably not. I'm fairly sure Matt and his crew didn't sleep much that week, working non-stop to save the course.

When there's not enough water, turf won't grow, bare patches of dirt are unsightly and hard to play from, and golfers complain that they want Augusta – not Arizona desert. Those of us in charge of keeping courses playable prefer to keep golf courses a little dry, so they are healthier while actually aiding golfers who benefit from a playing field that is "firm and fast." I don't think we've done a very good job explaining that truth to golfers. But even if we did, it takes just one freak storm (a more and more common occurrence these days) to wash that philosophy down the drain.

No matter what we do, no matter how much planning and preparation, ultimately we are all victims of water. Watch the news and you're guaranteed to see back-to-back stories about floods in one part of the country while other areas parch. The recent rash of tornadoes doesn't help, nor do the ongoing battles with farmers, environmentalists, government agencies, and amateur gardeners.

There is only one thing we can all

agree upon regarding water: There's not enough of it to go around. As natural resources go, it is most important. And most in trouble.

I also don't like water hazards, especially when they're on the right side of a course because I occasionally fade the ball. Okay, that's a little

Why don't I like water? Because as important as it is to what we do, it is fickle.

personal, but most golfers regularly fade – make that slice – the ball, and seeing water down the right side of a hole is frightening.

But you know what I really don't like about water? How much we talk about it. I'm tired of the conversation, of the hand wringing, of having to explain to those same owners, members, and golfers that water is mostly out of our control.

And yet we have to keep telling them, again and again, just how important water is. Educating the golf audience about water's uses and abuses is one of our most critical tasks. Just because you and I know that water is our most valuable resource does not mean everyone does. So keep saying it. Keep talking about water. And keep educating yourself on better ways to live with water where you are, whether it's in short supply or overabundance.

Here are a few ideas for superintendents everywhere to better manage the water they have.

Take the guesswork out of your water use. As management consultant Peter Drucker said about the business world, "If you cannot measure it, you cannot manage it." Those words are especially relevant to water. Measure what you use, factoring in ET and rainfall. Keep a record of use in inches

per acre, including a calculation of the actual annual percentage of ET replacement.

Keeping accurate records may save you someday when asked to prove if your course is as efficient as our industry claims. In my travels around the country working with courses

and superintendents in different climate zones, I'm amazed how many courses irrigating with groundwater and surface water don't keep accurate measurements of their water use or only meter at their water source. That's just not good enough, and at the risk of trying to be funny, someday that lack of evidence will leave you high and dry.

When you do keep records, remember to account for lake, pond, or water feature evaporation. Water features generally evaporate at almost the same rate as turf covering the same area (factors affecting evaporation include climate, wind, temperature, and lake depth). If you're not sure about evaporation rates, hire an expert to help.

If you're drawing water from an aquifer large or small, you need to be concerned with groundwater overdraft and subsidence. Once settling from subsidence occurs, that storage space is gone forever.

I know you probably don't want to attend any more conferences, but I've been to a number of irrigation and water-management meetings lately and a prime topic is long-term groundwater management. I guarantee the golf industry will be in the middle of this discussion very soon.

(MORAGHAN continues on page 79)

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WATER PRESSURE

by Brian Vinchesi

Irrigation is a complex issue on so many levels for superintendents. The industry's largest irrigation suppliers weigh in on future trends, availability issues and how this industry will be forced to cope.

Water is a limited resource and the pressure on golf courses to use less water continues to rise.

With this in mind, I thought it would be interesting to place reps from the three major irrigation equipment manufacturers – Jon Truttman, director of market development at Hunter Golf; Paul Roche, national sales manager – golf division for Rain Bird; and Steve Snow, director of golf irrigation sales and service at Toro – in the hot seat and get their perspectives on water issues and our industry.

"If you had asked the same question 20 years ago, I am not sure the answer would not have been the same," says Truttman about the complexity of today's water issues. "It is still about ET, uniformity and efficiencies. Golf courses are already the most efficient users of water and most superintendents do



"Superintendents will need to do a better job of **showing how efficient they are** with their water use to help stave off even more regulation."

– Jon Truttman, Hunter Golf

a good job of working with what they have, as they are very incentivized to water in the most efficient way possible. They are under pressure to keep reducing use in certain geographical areas and that will occur everywhere over time."

Snow concurs. "Less water availability will require better quality irrigation components to push the envelope to squeeze more water out of each irrigation system using new technology and to optimize water use," he adds.

Roche foresees superintendents under

continued pressure to reduce their water use. "Regulations limiting water use are becoming more common," he says. "To help manage new restrictions, water 'budgeting' based on a percent of ET is commonplace for golf and the trend is moving towards measuring moisture at the soil level."

Golf course irrigation will continue to evolve and change as new technologies and regulation shapes its future, the trio concurs. Integration between various systems and components will have a huge affect on systems even in the near future. Clubs that can afford new technologies will lead the way, the group says, but over time the cost of technology will lower and a large majority of courses will be integrated. At the same time using water as efficiently as possible will be the priority and expect to measure and report that use.

How do you see the immediate future of water in terms of quality?

Roche: Twenty years ago, when reclaimed water was starting to become a water source for golf irrigation, water departments couldn't wait to get rid of it. Today they are starting

"Spacing and sprinkler locations will be closely managed to ensure uniformity."



to believe that it is too valuable a water supply. This will force golf courses to less quality supplies such as rain water capture systems. The use of grey water from clubhouses, restaurants and other facilities on the property is probably not too far into the future.



"The tighter spacings on most designs today are providing the **control and uniformity** needed to reduce water use."

— Paul Roche, Rain Bird

Snow: It's important to focus on things that the superintendent can control. Monitoring and measuring the quality of the water and having better tools to affect its manipulation are needed. Technology can provide more information to make better decisions, resulting in better water quality.

Truttmann: Practices will have to change as water quality decreases. The superintendent will need to be more in tune with the daily and weekly changes occurring in their water. They will have to learn more about their water treatment options and how various treatments affect both their water and agronomic practices.

From a water-use standpoint, how will regulation impact golf course irrigation systems in the future?

Snow: Regulation will vary market to market, but especially in areas with drought. There will be more regulation on everything; emission controls, pesticides, noise and water. With more regulation will come more reporting requirements and golf courses need to prepare.

Roche: All use will be metered and accurate reporting on use will be mandatory. Golf course water budgets will be enforced with penalties for overuse [similar to how electrical demand charges are imposed for electrical consumption].

Truttmann: There will be more water regulation, not just because it is a real issue, but also because it is a political issue. Superintendents will need to do a better job of showing how efficient they are with their water use to help stave off even more regulation.

How will regulation impact golf course irrigation systems from a design/equipment/installation standpoint?

Roche: Irrigation systems will be required to undergo periodic audits and comply with uniformity and management targets. Spacing and sprinkler locations will be closely managed to ensure uniformity. Irrigation consulting services to help maintain compliance

will be common. Golf sprinkler nozzles will need to have large "sweet spots" to ensure uniformity across the variable conditions seen on a golf course. Contractors will have maintenance contracts to ensure the sprinkler grade stays consistent over time.

Snow: The water industry is trying to be prescriptive for golf as it is already for residential irrigation. Water restrictions make

it incumbent on the industry to educate the water provider that golf courses are good water users and water managers. Compromise, like what occurred in Los Angeles, needs to be the norm and not the exception.

Truttmann: The golf industry will be better served if they develop their own metrics in terms of monitoring and reporting water use as opposed to being told how they need to

OUTLOOK

WATER ISSUES IN 5 YEARS...

Roche: Change is already underway in the arid southwest and the southwest will most likely lead the way as they did with the adoption of reclaimed water. With continued pressure on water resources, on site treatment of grey water will become a strong consideration as a supplemental water source. More courses will be required to have Drought Management Plans that can be easily implemented as water use restrictions become more common.

Snow: Water quantity and quality will always be important, not only now, but well into the future.

Truttmann: There will not be many changes in the immediate future, unless there are extreme weather conditions.

WATER ISSUES IN 10 YEARS...

Roche: Soil sensing will be commonplace and, by this time, integration with the central control system may even be mandated. Superintendents will be breaking up their courses into site specific management zones to specifically target the volumetric water content targets for various areas across the golf course. Water management specialists that manage irrigation systems remotely, with input from site personnel will play a larger role in golf.

Snow: It's hard to look past five years as technology develops very fast and water regulation is not a stable situation. Regulation will be ongoing and continue to be tweaked so the results are hard to predict.

WATER ISSUES IN 20 YEARS...

Roche: Golf equipment and machinery, drones and other vehicles with positioning based soil-moisture sensing and photography that detects plant stress will gather information for the golf course superintendent and their management teams to analyze and respond accordingly. Map based soil moisture data will sync with the irrigation management software. Water capture systems will be much more common, collecting water lost from the root zone and returning it to the central water source.

Snow: It's hard to imagine 20 years out in the future, as technology can move faster than implementation but implementation will move at the pace the superintendent is willing to accept and pay for.

Truttmann: Evolution will continue. In some places water use has come a long way in 20 years and in others it will take 20 years to catch up. Water use and its regulation vary regionally and with what type of golf course it is. You can pretty much bank on water being more expensive to use and to pump and the quality will be lower. This will drive innovation such as drought tolerant turf and better irrigation equipment which will hopefully drive costs down.



"It's important to focus on things that the superintendent can control... Technology can provide **more information to make better decisions** resulting in better water quality."

— Steve Snow, Toro

do the measuring and reporting. All courses will have to monitor, measure and report their water use in the future.

From a design standpoint, what is lacking in today's golf course irrigation systems?

Roche: Designs today have evolved to a point where application uniformity is of major importance. The tighter spacings on most designs today are providing the control and uniformity needed to reduce water use. We

are starting to see more designs that take into consideration drought management needs with the use of more and more full/part circle sprinklers.

From an equipment standpoint, what does today's golf course irrigation system lack?

Truttmann: Manufacturers continue to strive to improve efficiencies with specific uniformity goals and to drive down the scheduling coefficient. There is a

need to have one sprinkler cover a wider range of spacings while maintaining high uniformity. Golf courses need to provide ongoing maintenance of worn out sprinklers and nozzles and keep sprinklers level and at grade. Maintenance is required so the equipment provides good uniformity throughout its life.

From an installation standpoint, what is lacking in golf course irrigation systems?

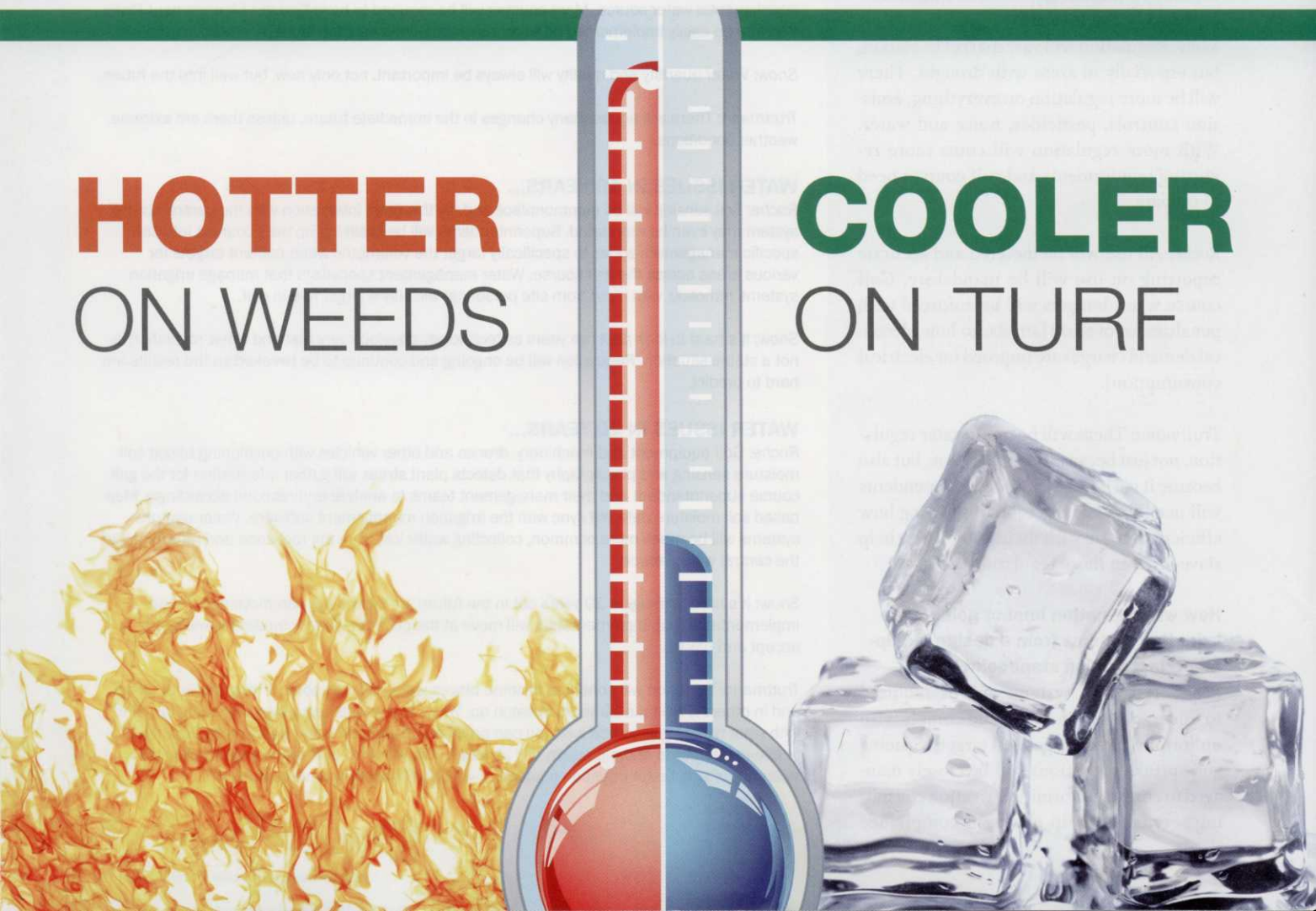
Snow: Contractors have not

caught on to working with newer technologies such as two wire systems. They need to stay connected to the manufacturer and communicate with them up front on a project. One person should be doing all the splicing or grounding for consistency and reliability which is critical on today's systems.

Roche: Professional irrigation contractors do a great job. Many offer extended service contracts that help ensure that the system

HOTTER ON WEEDS

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continues to operate at peak efficiency for the years after the initial system installation.

Truttmann: Irrigation contractors today are better than ever as the bad economy flushed out some of the poor installers. Most are okay at installing, which is a lot better than it was 15 years ago.

Current technology aside, where is irrigation system equipment development headed for golf?

Roche: Saving water, energy and labor will continue to be top priorities. This will be achieved with integration with sensors and mobile devices. Today's busy golf course superintendents need information at their fingertips. Sprinkler uniformity and dura-

bility will always be a priority.

Snow: More integration and control will be the norm. Sensing everything and having connectivity to sense even more things such as chemicals to improve water quality is needed. Systems will provide a convenient way to provide more predictive modeling in the future; anticipated flow and weather conditions for example. Control needs to be easy and on the same platform for integration.

Truttmann: There will be more use of off the shelf technology such as the internet and the cloud to react to the needs of the superintendent faster. The manufacturer has to evolve too, so that they are quicker to use technology and innovation and

to get to market with it quicker.

Will future irrigation systems be sold differently than today?

Snow: Value-added services that can be charged for is changing selling. Technology is helping distributors to be more effective and efficient, such as troubleshooting remotely even for service people. Distributors are more connected to the manufacturer so the distributor can be more connected to the customer.

Roche: The cost of an irrigation system has always been important consideration. We see more of a push to two wire control where signal and power are both communicated across the wire path. Superintendents today are also concerned about future coverage and control needs and

two wire provides an easy way to modify and expand the system as needed.

Truttmann: The overall cost of irrigation system renovations need to be reduced because new systems are too expensive for most facilities. The irrigation system as a whole needs to be a smaller asset of the overall golf course. **GCI**

Brian Vinchesi is president of Irrigation Consulting Inc., headquartered in Pepperell, Mass., and writes GCI's irrigation column.

FOR MORE...

For more of this interview, as well as additional insights into water-usage trends and the golf industry, check out the iPad or iPhone app version of this story.

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Brian Vinchesi, the 2009 EPA WaterSense Irrigation Partner of the Year, is president of Irrigation Consulting Inc., a golf course irrigation design and consulting firm headquartered in Pepperell, Mass., that designs irrigation systems throughout the world. He can be reached at bvinchesi@irrigationconsulting.com or 978/433-8972.

MORE OR LESS?

Over the last few years there's been discussion, some might say controversy, regarding whether our industry uses too much water because newer irrigation systems have too many sprinklers.

This has been fueled by Pinehurst's recent remodel and its decision to remove a large number of sprinklers and to go with what is basically a single-row fairway system. I've never bought into the less-sprinklers-is-a-good-thing premise, or that it's the easiest way to save water. I believe more sprinklers provide more control and provide greater overall efficiencies which save water. Throughout my career, my design premise has been "control is the key." So let's look at a well-documented example of adding sprinklers and saving water.

Essex County Club is an 18-hole course located in Manchester by the Sea (Manchester), Mass. Established in 1893, it was Donald Ross's second course. Ross was actually the pro at

1991 utilizing mechanical controllers. The controllers were upgraded to solid state in 1995. The system Eric inherited didn't irrigate some areas of play, threw water on many of the fescue areas and had inconsistent sprinkler rotation speeds and unreliable controls. In 2008, Essex CC decided it was time to upgrade and planned for new irrigation and pump systems.

The existing system utilized 355 sprinklers to water the Par 70, 18-hole course, a practice facility, 11 grass and 10 clay tennis courts. The irrigation system operates from the beginning of May to the end of September. From 2002 to 2012, Essex CC received an average rainfall of 20.92 inches. In 2008 (old system), with 25.43 inches of rainfall (wet year), the irrigation system used 9,486,100 gallons of water. In 2007 (old system), with 16.05 inches of rainfall (dry year), the irrigation system used 14,723,100 gallons.

The new system, completed in spring 2011, consists of 1,100 valve-



Check out the iPad or iPhone version of this column to view a slideshow of Essex County Club.

(wet year); the system used 7,070,974 gallons of water. In 2012, with 18.75 inches of rainfall (dry year), the irrigation system used 11,892,660 gallons.

Doing the math, the new system added 745 large golf-course-type sprinklers to the system and reduced water use in the wet year by 2,416,126 gallons (25.5 percent) and in the dry year by 3,831,340 gallons (26 percent). Although Essex CC does not pay for water, groundwater is pumped into their irrigation pond and then out to the course through its new pump station, so electrical savings are realized. But having more sprinklers does not just save water. The added sprinklers allow targeted water applications and greater control of water placement.

Additionally, before the system was installed, Essex CC was spending \$20,000 a year in parts. And even with 1,000 hours of labor expended, the staff was not keeping up with repairs.

As many as 250 hours irrigation labor were spent in one week alone. The staff also spent 2,000 hours in 2007 hand watering.

(VINCHESI continues on page 79)

I believe more sprinklers provide more control and provide greater overall efficiencies which save water. Throughout my career I've had, my design premise has been and is that "control is the key."

Essex CC at one time. It also hosted the first Curtis Cup, the Curtis sisters being club members. Essex is a links-style course located near, but not on, the ocean. Superintendent Eric Richardson started at Essex CC in 2007.

The club's first irrigation system was quick couplers. It was upgraded to an automatic system from 1989-

in-head sprinklers, along with bunker spray zones and many other smaller blocked irrigation zones to keep the water off the fescues. Along with the course, practice facility and tennis courts, additional rough areas and the clubhouse and pool-area landscapes were irrigated. In 2011, the system's first year, with 26.62 inches of rainfall

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Just the Facts, JACK

Depending on its source, water quality can be a real crapshoot. What you need to know about water monitoring that might just save your turf.

By Jason Stahl

Active monitoring of irrigation water quality is becoming an increasingly important activity for superintendents to undertake for the health of their turfgrass. In fact, experts say that unless you have a really great domestic water supply (and even some of those, they say, aren't as great as they used to be), you should be testing either on a monthly, quarterly or twice-annual basis based on the type of water.

"You could be brewing some problems under the surface if you don't monitor your water," says Jeff Bowman, senior project manager for Irrigation Consulting. "Poor water quality, at least certain constituents of it, may not manifest itself to the casual eye, even the superintendent's, until things reach a tipping point. And once that tipping point is reached, things could start to decline more rapidly where the soil structure no longer promotes good filtration and good leaching or penetration of water."

The other tricky thing is that water quality changes over time. You might notice something about your turfgrass, realize you need to get your water tested and then determine the quality. But you can't just assume the water will never change from that point on.

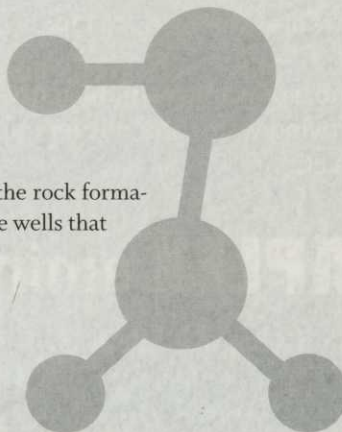
"Let's say you're in a coastal environment and on the fringe of the saltwater/freshwater interface and you're not monitoring the groundwater table," Bowman says. "You could get to the point where you're transitioning from fresh to brackish water. It's not common, but it could happen."

Bowman also cited the example of using effluent water where you're relying on a water purveyor to give you a certain quality, but you end up getting a bad plug from the wastewater treatment plant.

"You would want to know that," he adds.

Bowman sees the most critical need to monitor water at courses that use reclaimed water. However, he witnesses more and more courses that use wells as a source, cautioning that they need to be careful, too.

"I've seen wells in the Northeast where there is weathering within the rock formations that can add dissolved solids," he says. "I'm seeing more and more wells that aren't as clean as we would like them to be."





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WATER QUALITY



Poor water quality could result in a soil structure that no longer promotes good filtration.

Brian Whitlark, agronomist with the USGA Southwest Region, agrees that regular water monitoring is especially important for courses that use recycled water.

"Water coming from wastewater treatment plants has a tendency to change over the course of a year depending on the waste stream coming into the plant," says Whitlark. "The amount of nutrients that come from washing clothes and things like that all con-

tribute to salts in the water, and that fluctuates sometimes pretty significantly throughout the course of a year. That's why I recommend that courses that use recycled water test on a monthly or quarterly basis – especially if you're a superintendent who has just taken over a course and you aren't familiar with the quality of water your course is receiving."

For those courses not on recycled water that are maybe pumping a saline source of well



See problem. Fix problem.

One of the most common water quality problems is high salinity. Unfortunately, there is no treatment outside of reverse osmosis that will reduce the amount of total salts in water – and reverse osmosis is too expensive for most courses.

"Depending on how much water a course is using, it could be upwards of \$1 million," says Brian Whitlark, agronomist with the USGA Southwest Region.

"And then you have to dispose of the waste product called the 'brine,' and if you're not near an ocean, that could be challenging."

But Whitlark recounts one story about courses in Scottsdale, Ariz., that banded together to lessen the cost of a reverse osmosis system. Eleven of them were using reclaimed water from the Roosevelt Irrigation District and were unhappy with the quality of water they were receiving.

"They recognized that elevated salinity in the water was having negative ramifications on turf quality," says Whitlark. "Instead of putting in a reverse osmosis system, they had the wastewater treatment plant do it, but they paid for it. Politically, it was a battle, but if you establish a good relationship with your water supplier, you can have a discussion of the methods a plant can institute to improve the quality of water through reverse osmosis."

Jeff Bowman agrees that soluble salts in water is the biggest issue superintendents face – and it's probably the most difficult to solve, too. A lot of times, he says, soil is the key.

"You can deal with much higher concentrations of salt if you have good draining soil and an under-drain system that can convey those salts out from under," says Bowman. "You would over-irrigate or leach to force the salt down beneath the rootzone so it wouldn't affect the plant."

The ratio of sodium to magnesium and calcium, or the sum of magnesium and calcium, is important to consider, too.

"Soils that have higher concentrations of clay can be improved by calcium and magnesium," Bowman says. "So if there were active sites on clay particulates that the calcium and magnesium could attach to, then that's good because they will out compete the sodium. But if they're low, then sodium can build up in the soil and deflocculate the clay particles and, over time, you would start to have a deleterious effect on the soil structure."

One way to add more calcium is to treat with gypsum. Leaching, aerifying, plugging with sand and reducing thatch are also ways to mitigate but not necessarily solve the problem. Another method is to use sulfuric acid, or use a sulphur burner which burns elemental sulphur to produce sulfuric acid, and add it to the soil to alter the pH.

"In the end, the idea is the same, and that is to reduce the pH of the water and, more importantly, the carbonates and bicarbonates," concludes Brian Whitlark.

water, Whitlark believes testing once or twice a year is enough to be able to make decisions on the quality of that water and whether or not you need to treat it.

As far as the testing itself goes, Whitlark advises superintendents to send a sample to a local lab. Samples should be obtained at the source or incoming pipe, if it's accessible. If you have multiple irrigation lakes, a sample should be obtained from each. A sample should also be taken from a quick coupler or sprinkler furthest away from the pump station.

“Poor water quality, at least certain constituents of it, may not manifest itself to the casual eye, even the superintendent’s, until things reach a tipping point.”

*– Jeff Bowman,
Irrigation Consulting*

“You want to get an idea of the source, what’s sitting in the lake and ultimately what’s going out on the turf, because in some cases the quality can be very different,” Whitlark says. “It could mean you’re collecting salt somewhere in the irrigation lake, and typically that’s what happens.”

Because irrigation is considered a non-potable use of water, it can have a certain level of bacteria in it, so when taking a sample you don’t need to use a sterile container, according to Bowman. A lab will test it for the constituents that could make a difference in turf health – because there are a lot of constituents that wouldn’t make a difference. Also, the average well or pond wouldn’t need to be tested for bacteria, but a lab would want to test effluent water for it.

Once the results are in, you can do your homework and interpret them yourself and or have someone else do it.

“It depends on how much time you have to educate yourself,” Bowman says. “There are many good resources available via the Web. Extension services and universities have publications on interpreting water quality data. If you don’t want to do it yourself, then consultation is something you should consider.” **GCI**

Jason Stahl is a Cleveland-based writer and frequent GCI contributor.

Mythbusters: Golf Edition

The word “myth” tends to have a negative connotation, and rightly so. For example, the idea that carbonates and bicarbonates by themselves will cause soil- or turf-related problems is one myth Brian Whitlark, agronomist with the USGA Southwest Region, claims is widespread. As such, courses will use acid or expensive acid systems for the sole purpose of reducing carbonates and bicarbonates.

“I see a lot of people make that mistake,” says Whitlark. “They tend to blame bicarbonates and carbonates for whatever reason and make management decisions that cost the facility money based on the bicarbonate numbers in the water. The point I would like to make clear is that bicarbonates and carbonates themselves are not the problem. They are really only a problem when the water contains elevated sodium levels.”

If the sodium levels are high, Whitlark explains, the carbonates and bicarbonates will render calcium and magnesium less active; thus, they’re not able to improve the soil or exchange in the soil for sodium.

“Calcium and magnesium are the good guys in the soil because they have really strong flocculating power,” Whitlark says. “Sodium is the opposite in that it’s a very poor flocculator of soil. So when water that contains high sodium and low calcium hits the soil, it tends to run the soil structure or disperse the soil. In such cases, if the water contains high carbonates and bicarbonates, it will make that condition worse. But if sodium is not a problem in the water, then bicarbonates and carbonates are not an issue.”



Whitlark advises superintendents to send a water sample to a local lab for analysis.

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John E. Kaminski, Ph.D. is an associate professor, Turfgrass Science, and director of the Golf Course Turfgrass Management Program at Penn State University. You can reach him at kaminski@psu.edu.

COMBINING THE ART WITH THE SCIENCE

Coming off an amazing trip to the US Open, I can't help but think of what would have been had the rains stayed away and the course truly firmed up. The announcers wouldn't have asked Merion's director of grounds, Matt Shaffer, about the possibility of players shooting 17 to 19 under par (which Matt immediately laughed off by saying "That's not going to happen."). Instead they would have probably asked whether the winning score would have been par.

As it turns out, Merion got over six inches of rain during the week and was still able to fend off the best golfers in the world, leaving Justin Rose the winner at an astounding 1 over par. Had it been dry, the winning score may have embarrassed most of the pros, as well as the USGA.

Regardless of the US Open outcome, water management is probably one of the most important aspects of turfgrass management. More importantly, it's not just about how to add water, but how to remove it as well.

At universities across the country, we all share the same mantra of "deep and infrequent" when it comes to the application of water to turfgrass. We sometimes talk about replenishing the system to a set percentage of the ET. We may even go into detail about the current techniques and technology that allows for rapid movement of water through soil profiles.

While overviews and generalities (along with some hard facts) can be offered to students, the practice of adding water as well as removing it is as much of an art as it is a science.

I often hear of students coming back from their internship stating how they "dragged hose all summer." My initial reply is, "Wow! That must have been a great internship." When I say this, I am not being facetious. Most

superintendents I know in the cesspool that is the mid-Atlantic region of the U.S. trust only their best employees to chase wilt on the greens.

As with many agronomic practices, there's no one right way to irrigate. Every golf course is different and in some cases each putting green may react differently to moisture. Some superintendents rely on their overhead irrigation to replenish the system. While not an ideal solution (hand-watering and syringing is generally a better practice), economics and limited staff often make it impossible to micromanage your moisture.

In the past (and currently for many seasoned veterans), the right time to water or syringe is often left to non-scientific methods such as pulling soil cores, watching for "foot-printing", or a variety of other methods learned through years of experience.

The science of water management on a golf course, however, is slowly evolving. In-ground moisture sensors can provide real-time readings of volumetric water content. The use of handheld moisture meters continues to increase and many superintendents are having staff use these to assist in determining water requirements.

While there's no doubt that these tools are improving our ability to limit our water use (remember, overwatering probably kills more grass than anything else), there are still subtleties among greens and even areas on greens that require the operator to make some judgment calls.

One question I often get when I pull out a moisture meter is "What should my percent moisture be?" The answer is "it depends." It depends on the soil type (sand vs. native), the species (creeping bent vs. annual bluegrass), the specific areas on and around the green and other factors. While some putting greens may not

begin to wilt until percent volumetric water content dips into the single digits, others may wilt in the upper teens. There is no universal number everyone can use to determine water requirements at their course.

Water management isn't only about putting supplemental water into a system. In the case of Merion last month, it was about getting the water out. Merion was constructed in the 1800's and has excellent surface drainage. Leading up to the U.S. Open, the club also installed internal drainage to help remove excess water from the greens.

A variety of practices were implemented on the greens leading up to the U.S. Open, including drill and fill, dryjecting, conventional coring and use of the grade. According to Shaffer, "installation of the XGD was the ticket" when it came to moving water through the greens.

In addition to the practices implemented on the greens, fairway programs were critical to keep the course playable during the storms. Beginning in 2005, Shaffer solid tined the fairways twice a year and applied 15 tons of sand per acre after each coring. An additional 20 tons were applied annually in a series of "dustings."

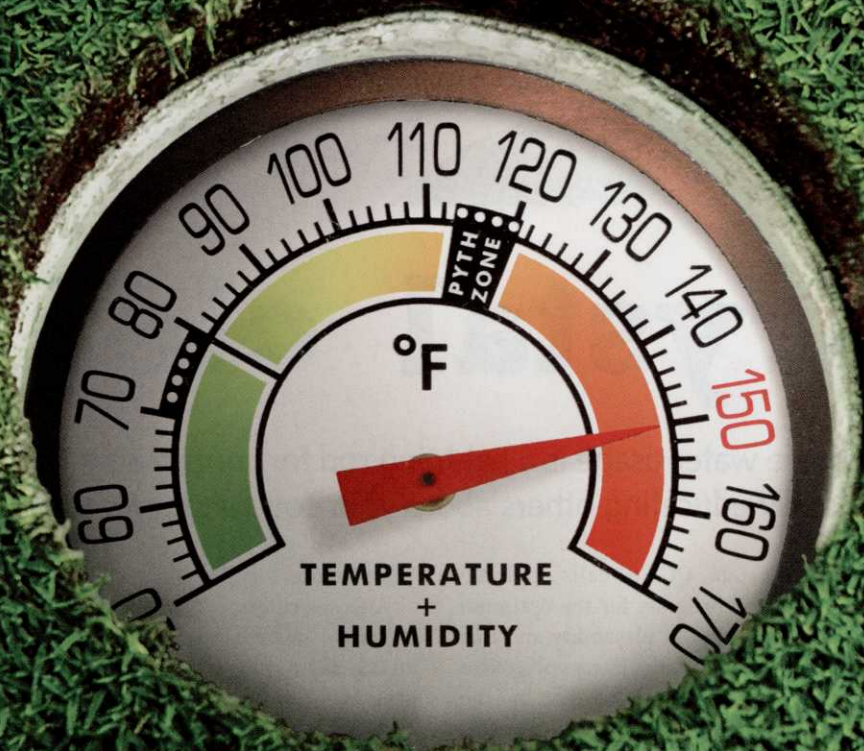
One of the biggest saviors for the fairways during the Championship was the use of the fairway rollers to squeegee water out of the fairways. "I'm not sure if this would be considered a sound agronomic practice, but it helped the fairways dry out faster," said Shaffer. These decisions for the greens and fairways allowed his crew to stay within their planned heights of cut and cut or double cut at least once a day, despite the periodic rains throughout the week.

The combination of internal and surface drainage, the many years of

(KAMINSKI continues on page 79)

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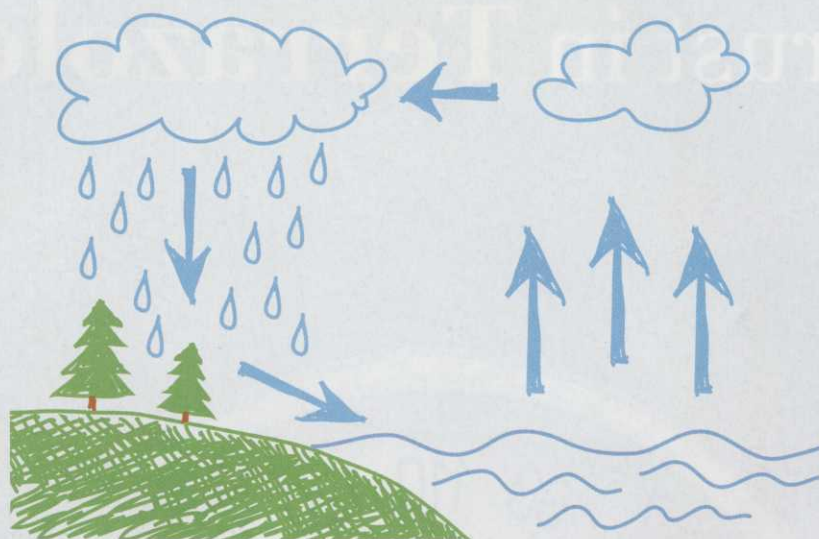
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Crystal clear

By Jason Stahl

Golf course water usage is a lightning rod for controversy. Tips for successfully educating others about your course's water strategy.

Mark Esoda, CGCS, calls applying water to turfgrass for the optimum combination of playability and turf health "insanely difficult" to do. Every golf course superintendent on the planet knows that, but the trick is getting members to grasp that concept.

"They get enlightened when you tell them how many sprinkler heads you have and how much control you have and how often you scout and change and adjust each day," says Esoda of Atlanta Country Club. "It becomes a real eye opener for any layman who doesn't manage water for a living."

Esoda says the conversation at committee meetings at his club typically revolves around playability, with members expressing their preference for drier conditions. Esoda and his crews will then make

adjustments to achieve those conditions.

Another common concern among Atlanta CC members is whether the course has enough water. In this day and age when everyone falls under restrictions at some point or another, this is becoming a frequent worry.

"Our general response is, 'Yes, we have enough for the grass, but not for the aesthetics,'" Esoda says. "And we tell them you can't pump water just to keep a lake full; you have to manage your volume and how much you use. That tends to turn people into supporters where they'll say, 'Hey, it has been really dry and I can't believe the course is so good!'"

The key is to communicate early and often so members are kept apprised of what's going on. A monthly newsletter goes a long way in this regard;



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the July edition will often talk about water conservation and how members can play their part by restricting watering at home.

"The regulatory community likes for us to pass along information to our constituents to help them understand to not use irrigation as a toy but as a limited resource," Esoda says.

Esoda says he has a good relationship with the local homeowners association, so for

the most part they understand the course's water needs. Their main concern is not the club's water use but the flooding that occurs in the lower parts of the course near the Chattahoochee River. If a resident did accuse the club of stealing water out of a pond, they could put an article in the homeowners association's magazine to clear things up.

"If you start your relations early and use



them, you'll have a better chance of getting people on your side when there are issues of completely dry lakes and the fingers first get pointed at the course when all my neighbors are actually pulling the water out and not me," he says.

Esoda also encourages superintendents to join water associations as a way to spread the truth about golf courses' water use. He belongs to the Georgia Association of Water Professionals and the Chattahoochee Riverkeeper. "The message to the community is that we are a business and have unintended benefits to them: green space, wildlife habitat, etc," he says. "And we support the community through jobs. The difference between the grass in your front yard and my course is jobs – it doesn't need more water or fertilizer, we just mow it more. When we're attacked and our water use is called 'non-essential consumptive,' we say imagine going to dirt. The unintended consequences would be worse: runoff, silt, loss of habitat, etc. It's better to encourage good management, use and conservation then cut somebody off. Then what do you do with those people now out of work in this economy?"

Ken Gorzycki, director of agronomy at Horseshoe Bay Resort in Horseshoe Bay, Texas, also finds it pays off to be involved in local water associations. He serves on water conservation and water management committees of the Lower Colorado River Authority.

"Staying involved allows you to handle things on a proactive rather than reactive basis," he says.

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Top Left: Drilling a well at ACC. Above: Adding wire for more stations for greater irrigation efficiency.

That proactive approach – and keeping emotions out of the conversation – has helped him avoid battles with the members and community when the topic of water comes up.

"I just stick to the facts," Gorzycki says. "I let it be known that we all need to be conserving water, not just on the course but on home lawns as well. I keep reminding members and area residents that we're in the middle of a drought and we all need to do our share to get through it."

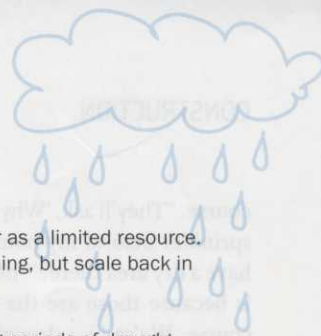
Gorzycki tells people that he uses mostly reclaimed water, and he only supplements it with raw water out of the lake when absolutely necessary. Like Esoda, he believes the golf industry has a good story to tell when it comes to using water.

"We're perceived as being this big, huge water hog, but in fact we only use half of one percent of the available water, and any good water conservation plan is looking for a 10 to 20 percent reduction at minimum," he says. "We don't need to apologize for our water use; we need to take credit for the things we're doing well with water conservation."

The question Gorzycki gets most often from members regarding water has to do with their own personal lawns versus the

Key points

- Remember, most people have no idea what goes into managing water as a limited resource.
- Be up front and honest about why decisions are made to water one thing, but scale back in other areas.
- Be proactive and get involved in your community.
- Maintain constant communication about water issues, not only during periods of drought.
- Keep your emotions in check when discussing water-usage policy. Advise members to do the same if they engage in water-usage conversations with community members.
- When appropriate, dispel the stereotype that golf courses are water hogs and pass along the positive story of how the golf industry is a responsible steward of water resources.
- Stick to layman's terms when discussing water-related issues



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course. "They'll ask, 'Why don't you run that sprinkler behind my house more because I have a dry area there?'" he says. "My answer is because those are the perimeters of the course. We're in a drought, so we're maintaining more down the middle of the course, and the perimeters will scorch some during the heat of summer. We will put some irrigation [on the perimeters], enough to keep them alive but not enough to keep it lush. We need to be reducing our irrigated area, not increasing it."

Another frequent request from people is to put water into near empty streams behind their houses to flush them out, but Gorzycki must again put on his water steward hat.

"I explain to them that it's just not a good use of the water," he says. "I tell them that when we get a rainfall, it will flush those streams out and make them healthy again to support wildlife. It's not a good perception in the community either to see water running down a creek to flush it out."



Mark Esoda: "The message to the community is that we are a business and have unintended benefits to them: green space, wildlife habitat, etc."

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Email: turfdiag@turfdiag.com

A NATURAL REFLECTION

Palos Verdes Golf Club with Black Onyx lake & pond colorant.

BLACK ONYX PREMIUM BLACK LAKE & POND COLORANT

A clean, clear water feature can improve the overall aesthetics and enjoyment of a golf course. Used at some of the world's most famous golf venues, Black Onyx lake and pond colorant adds a dark, reflective finish to your water feature for lasting impact. The highly concentrated formulation is safe for fish, aquatic waterfowl and irrigation water usage.

For your convenience, both liquid and WSP® (water soluble packets) formulations are available.



Scan to learn more.

800-232-5907

beckerunderwood.com

**BECKER
UNDERWOOD**
Inventing the Future

"If you start your relations early and use them, you'll have a better chance of getting people on your side when there are issues of completely dry lakes and the fingers first get pointed at the course when all my neighbors are actually pulling the water out and not me."

— Mark Esoda, Atlanta Country Club

Even the mayor once asked Gorzycki if he could put water in certain areas he felt could use it, and he had to remind him that they were still in a huge drought and that wouldn't be a smart use of water.

"A lot of people get tunnel vision. Our golf course community has a constant level lake, but the lakes that feed it are not constant level. Also, we have a power plant on our lake that has to maintain a certain level. Because our lake is full, they forget that other lakes are below 40 percent capacity. You have to keep reminding them that just because our lake is full doesn't mean we have unlimited water to use."

Gorzycki gets the word out to members via a weekly email that features a column written by him, and a monthly newsletter.

"Even during cooler, wetter times when water use is not much of a focus, I keep trying to remind them that we still need to conserve water even though we just got a rain a few weeks ago because we're still under a drought," he says.

John O'Keefe of Preakness Hills Country Club in Wayne, New Jer-

sey, says his members for the most part understand his water strategy, but they do often ask why his crews are still "pulling hoses" after installing a \$1.4 million irrigation system 10 years ago.

"Then I go into a dissertation on how they still don't have many irrigation systems with a set of eyeballs, and you don't want to turn on a head that will irrigate a 120-foot diameter circle when you only need to water two or three spots on a green," he says.

Once in awhile, members will also ask general watering questions, and O'Keefe will explain to them in layman's terms why a plant sometimes needs help.

"I use the analogy of working out. If you're really starting to get hot and sweaty, what's the first thing you do? You take a light drink of water. A plant is no different. If it's a hot day out there, the plant is trying to keep up with its cooling process and it just doesn't do enough, so you have to give it a light shot with a syringing."

One question O'Keefe doesn't receive is, "Why aren't you putting more water down?" Like the members at Atlanta CC, his members prefer dry conditions for more roll.

"They don't want to see the whole place golden brown, but they would rather see it a little firm with a little wilt here or there or off color rather than lush green and really wet," he says. "We try to provide that the best we can. I have three assistants, and we're out there watching the course on a daily basis." GCI



Rain water harvesting at ACC.

Jason Stahl is a Cleveland-based write and frequent GCI contributor.



It's here!



- NEW Products for 2013
- Underhill Bestselling Products
- Handy 20-page Reference

— GOLF MASTER STOCKING DISTRIBUTORS — NATIONAL CATALOGS



eagleonegolf.com

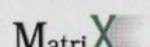
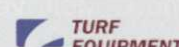


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LOCAL DISTRIBUTORS



Atlantic Irrigation (CT/DE/NJ/NY/PA/VA) atlanticirrigation.com

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Colorado Golf & Turf (CO) 303-917-4141

Grassland (NY/VT/PA) grasslandcorp.com

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JRM, Inc. (NC/SC/TN) 888-576-7007

Matrix (NY) matrixturf.com

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Sierra Pacific (No. CA) sierrapacificturf.com

Smith Turf (VA/NC/SC/TN) smithturf.com

Spartan (MI) 1-800-822-2216

Sports Turf (So. CA) sportsturfirrigation.com

Turf Equipment (DE/MD/PA/VA) turf-equipment.com

Products that work...smart.™ • www.underhill.us



Underhill®

PROFESSIONAL WATERING PRODUCTS 2013

When a product does its job day in and day out - **it works.**

When it saves you time, money, or water - **it's smart.**

When it does both - **it's from Underhill.**

Products that work...smart.™



Magnum™ UltraMAX

MADE IN
USA 

PREMIUM HOSE-END NOZZLES & ACCESSORIES

Step up to the most professional nozzle you can buy - MAGNUM™ UltraMax. Firefighter quality for professionals in any field, these variable flow, multi-function nozzles are virtually indestructible and leak proof. The innovative TURBO SHIFT models provide two distinct GPM ranges. And the outstanding distribution patterns of all MAGNUM UltraMAX nozzles make them excel in high demand areas like greens/tees, infield conditioning and equipment and stadium washdowns.



features / specifications

- Multi-Pattern Spray: Fog, Jet Stream, Fan
- Built for 1" and 3/4" Hose Flow Rates (range: 7-43 GPM)
- Materials: Aircraft Aluminum, Stainless Steel, TPR Rubber

FULL THROTTLE

Single Variable Flow: Delivers steady, maximum volume fog, jet stream and fan patterns.

Low Flow (Residential Use) Model:
12-19 GPM (45-72 L/min)

High Flow Model:
15-40 GPM (57-151 L/min)

Super High Flow Model:
39-100 GPM (148-379 L/min)

NEW!

**Super High Flow
UP TO 100 GPM!**



TURBO SHIFT

Dual Variable Flow: Delivers light fog and low volume jet stream patterns before shifting to high volume jet stream and fan patterns.

Low Flow (Residential Use) Model:

Opens with 7-12 GPM (27-45 L/min)
Turbo Shifts to 14-17 GPM (53-64 L/min)

High Flow Model:

Opens with 12-17 GPM (45-64 L/min)
Turbo Shifts to 20-43 GPM (76-163 L/min)

Super High Flow Model:

34-104 GPM (129-394 L/min)



Pistol Grip

Firefighter Grip

UltraMAX Valves

Heavy duty ball valve, push-pull on/off control handle and exceptional build quality for long life under demanding use. Available in Firefighter Grip for two-handed operation or ergonomic Pistol Grip for comfortable, extended use. **Nozzles sold separately.**

ordering

All flow rates based on 80 psi (5,5 bar)

Part # NG550-DFH-75	Turbo Shift 12-43 GPM (45-163 L/min) - 3/4" FHT inlet
Part # NG550-DFH-10	Turbo Shift 12-43 GPM (45-163 L/min) - 1" FHT inlet
NEW! Part # NG550-DFSH-10	Turbo Shift 34-104 GPM (129-394 L/min) - 1" FHT inlet
Part # NG550-DFL-75	Turbo Shift 7-17 GPM (27-64 L/min) - 3/4" FHT inlet
Part # NG550-DFL-10	Turbo Shift 7-17 GPM (27-64 L/min) - 1" FHT inlet
Part # NG500-SFH-75	Full Throttle 15-40 GPM (57-151 L/min) - 3/4" FHT inlet.
Part # NG500-SFH-10	Full Throttle 15-40 GPM (57-151 L/min) - 1" FHT inlet
Part # NG500-SFL-75	Full Throttle 12-19 GPM (45-72 L/min) - 3/4" FHT inlet
Part # NG500-SFL-10	Full Throttle 12-19 GPM (45-72 L/min) - 1" FHT inlet
NEW! Part # NG500-SFSH-10	Full Throttle 39-100 GPM (148-379 L/min) - 1" FHT inlet
Part # SVPG-75	Pistol Grip Valve - 3/4" FHT inlet
Part # SVPG-10	Pistol Grip Valve - 1" FHT inlet
Part # SV-75	Firefighter Grip Valve - 3/4" FHT inlet
Part # SV-10	Firefighter Grip Valve - 1" FHT inlet

Magnum™

SOLID METAL HOSE NOZZLE

Underhill® Magnum™ contains no plastic internal parts to break, stick or wear out. Our unique ratchet mechanism easily adjusts from gentle fan to powerful jet stream and prevents over-tightening damage. Precision-machined, incredibly smooth operation and outstanding distribution patterns make it ideal for high-demand areas like greens and tees. Magnum™ is also an excellent equipment wash-down nozzle.

features

- Multi-pattern sprays - effortless control with hydraulic assist on/off
- Solid metal internal - no plastic parts to break or wear out
- Ratchet mechanism prevents over-tightening damage
- Ultra-durable construction withstands any abuse
- Fire hose quality nozzle feels great in your hands
- Beautiful, consistent spray patterns for life
- Built for 1" and ¾" flow rates

specifications

Materials: stainless steel, aluminum, TPR rubber

Flow: 37 GPM at 80 psi

Inlet: ¾" hose thread (1" brass adapter available, see Page 4)



Magnum™ nozzle pictured with 1" brass adapter (sold separately on Page 4)



solid metal internal body

Won't stick...won't break



fan



jet



soak



Perfect for tournament play, CoolPro™ puts down only enough water to cool the turf canopy. It prevents wilting while maintaining good ball speed. CoolPro is a great tool for protecting grass on hot days without damaging roots.

CoolPro™

COOL WITHOUT OVER WATERING - NO ROOT DAMAGE

A hot summer day can be murder on your greens. Use too much water and you risk damage to the roots. CoolPro™ is the first nozzle specifically designed for the single purpose of lightly misting the turf canopy to cool without over watering. And its 25 foot fogging pattern gets the job done quickly.

features

- Precision™ nozzle fogs at 70 psi to deliver a 25 ft. pattern with only 4-6 GPM
- ¾" inlet (1" brass adapter available, see Page 4)
- Ergonomic handle/valve provides easy grip and variable on/off control.
- Durable solid metal design: zinc, aircraft aluminum and stainless steel.

ordering

Part # NG450	MAGNUM™ Hose Nozzle
Part # HNC075	CoolPro™ Valve and Nozzle
Part # HN0600	CoolPro™ Nozzle only
Part # CV075L	CoolPro™ Valve only

Precision™

SOLID METAL, SPECIFIC TASK HOSE NOZZLES

Underhill® Precision™ nozzles deliver millions of soft, uniform droplets to provide rapid yet surprisingly gentle water application over a huge range of flow rates. From soft watering to powerful drenching, patented Precision nozzles are designed with ideal flow rates and droplet sizes to fully irrigate without disturbing turf, dirt, seeds, etc., providing a precise solution for every hand watering application.



precision watering for specific tasks



Rainbow™ TASKS: Greens, tees, seed beds, transplants, delicate landscaping (15 GPM)



Rainmaker™ TASKS: Syringe and spot watering turf and hardy landscaping (23 GPM)



Cloudburst™ TASKS: Dry spots, drenching, and wetting agent application (35+ GPM)



Cyclone™ Pre-game skins watering, heavy watering of large areas, ideal for hydroseeding (50+ GPM)

Note: GPM will vary with pressure at nozzle.



high-flow valves



COMPOSITE / STAINLESS STEEL: ¾" hose thread inlet/outlet, oversized handle, up to 55 GPM

SOLID BRASS: ¾" hose thread inlet/outlet, up to 50 GPM



hose adapters / quick-connectors



ordering

Part # HN1500CV Precision™ **Rainbow™** Nozzle Kit
Part # HN2300CV Precision™ **Rainmaker™** Nozzle Kit
Part # HN4800CV Precision™ **Cloudburst™** Nozzle Kit
Part # HN5000CV Precision™ **Cyclone™** Nozzle Kit

Nozzle Kits include brass High Flow Control Valve and ¾" MHT x 1" FHT Adapter.
To order nozzle only: remove "CV" from part number.



Part # CV075H High-Flow ¾" Valve - Brass
Part # A-BV77FM High-Flow ¾" Valve - Composite/Steel
Part # A-BA107FM 1" FHT x ¾" MHT Brass Hose Adapter
Part # A-BA107MF 1" MHT x ¾" FHT Brass Hose Adapter
Part # A-BQ7M ¾" Quick-Connect, male end
Part # A-BQ7F ¾" Quick-Connect, female end
Part # HN075W replacement washer, ¾" hose

NEW! DrainBlaster™

HIGH PRESSURE DRAIN CLEANING NOZZLE

This unique hose-end, high pressure nozzle guides itself in cleaning out drains, to remove debris with ease. Special feature includes a wire attachment connector for using wire locator to determine drain route.

features

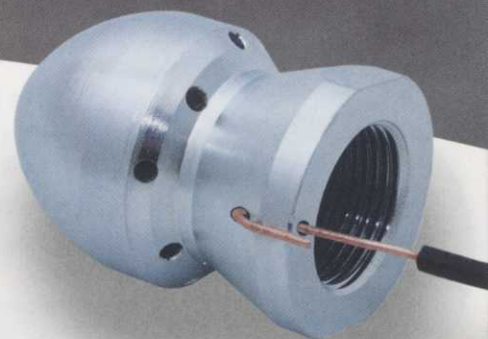
- Front jet cuts through blockage
- Rear jets propel nozzle upline
- Two stage flushing action
- Minimum water pressure: 70 PSI
- Heat treated grade 303 stainless steel for long life



Great for cleaning under sidewalks or cart paths



Ideal for 4"-6" drains and catch basins



Wire attachment connector for mapping drain location under greens, bunkers and other locations using a wire locator.

NEW! RainPro™

SOLID METAL SHOWER NOZZLE

A truly revolutionary shower nozzle for soaking turf or other landscapes... featuring an exclusive solid brass nozzle plate for outstanding pattern and special rubber bumper for nozzle protection.

features

- Ultra durable construction withstands any abuse
- Beautiful, consistent and uniform spray pattern
- Materials: zinc alloy, brass and TPR rubber
- Flow: 40 GPM @ 80psi (built for 1" and 3/4" hose flow rates)
- Nozzle assembly unscrews for easy cleaning



RainPro™ nozzle pictured with 1" brass adapter and 3/4" high-flow valve (sold separately on Page 4)



Tough TPR rubber bumper protects nozzle



Excellent for golf greens or other turf and landscape applications



ordering

Part # DN-75	DrainBlaster™ Drain Cleaner Nozzle – 3/4" FHT Inlet
Part # DN-10	DrainBlaster™ Drain Cleaner Nozzle – 1" FHT Inlet
Part # SHN-75	RainPro™ Shower Nozzle – 3/4" FHT Inlet
Part # SHN-10	RainPro™ Shower Nozzle – 1" FHT Inlet



PelletPro™

APPLICATOR GUN FOR SOLID WETTING AGENT TABLETS

Our heavy-duty surfactant applicator, high-flow valve and Precision™ Cloudburst™ nozzle combo comprises the finest wetting agent gun available. PelletPro™ accepts all wetting agent tablets and provides a high volume, yet soft spray for watering or applying surfactants to tight, hydrophobic soils.

features

- 35+ GPM to get the job done faster!
- Ultra Heavy-Duty construction: brass fittings, aircraft aluminum, stainless steel, precision engineered glass
- Pellet rotation (1 RPS) evenly dissolves/applies tablets
- Patented Cloudburst™ nozzle delivers large droplets in an outstanding fan pattern



PelletPro™ rotates pellets at one revolution per second (RPS) to evenly dissolve/apply wetting agent



IN-LINE APPLICATOR OPTION

Connect directly to a water source (quick coupler, HoseTap, etc.) to get the benefits of PelletPro with less handheld weight.



PelletPro's bowl works great as an in-line filter replacement for most spray rigs. Heavy-duty, transparent bowl shows fluid levels, won't crack during winter storage.

Two products in 1!

PelletPro and LiquidPro's Precision™ Cloudburst™ nozzle and high-flow valve quickly assemble to create a powerful, 35+ GPM syringe nozzle.







With the included 1" FHT x 3/4" MHT brass adapter, PelletPro™ and LiquidPro™ work with both 3/4" and 1" hoses.

LiquidPro™

APPLICATOR GUN FOR LIQUID WETTING AGENT

LiquidPro's chemical-resistant, UV-protected, lightweight siphon/mixing system can cover 1000 square feet in less than a minute! With unmatched speed and uniformity, you can virtually "paint" your turf with liquid wetting agent, fertilizers, and micronutrients. Adjustable metering dial offers 10 additive settings including "Water Only."

ordering

Part # A-PPWA50K	PelletPro™ Applicator Gun (with 1" FHT x 3/4" MHT adapter)	
Part # A-PPWA50K-E	PelletPro™ Applicator Gun (with 3/4" quick-connect adapter)	
Part # A-PPQ-075	PelletPro™ In-line Applicator: 3/4" FHT inlet, 3/4" MHT outlet	
Part # A-PPQ-100	PelletPro™ In-line Applicator: 1" FHT inlet, 1" MHT outlet	
Part # A-PPB	In-line Filter Bowl	
Part # A-PPBG	Gasket	
Part # A-LPWA50K	LiquidPro™ Applicator Gun (with 1" FHT x 3/4" MHT adapter)	
Part # A-LPWA50K-E	LiquidPro™ Applicator Gun (with 3/4" quick-connect adapter)	
Part # A-LPWAB-6	6-Pack of 32 oz. Polybottles and Carrier	

MADE IN USA 





NEW! ProLocker™

THE MOST POPULAR ASSORTMENT ALL IN ONE COMPLETE KIT

Keep all of your Underhill® professional watering tools secure and safe in this handy kit. ProLocker attaches easily to any utility vehicle for easy access. Case is ultra-durable, made of high-strength composite material and is lockable.

kit includes

- Entire Precision™ nozzle series and brass high-flow valve
- CoolPro™ fogging nozzle
- Magnum™ UltraMax nozzle
- PelletPro™ wetting agent applicator
- SuperKey XL™ golf sprinkler multi-tool
- Gulp™ UltraMax syringe pump
- Gulp™ UltraMax pump
- TurfSpy™ stress detection glasses
- HeadChecker™ nozzle discharge pressure gauge, flex hose and pitot tube



NozzleLocker™

THE VERY BEST NOZZLES - KEEP THEM SECURE (and handy)

kit includes

- Entire Precision™ nozzle series (Rainbow™, Rainmaker™, Cloudburst™ and Cyclone™)
- Solid Brass High-Flow Valve
- CoolPro™ with Precision™ fogging nozzle
- Your choice of MAGNUM™ multi-pattern nozzle (original, UltraMAX Turbo Shift, or UltraMAX Full Throttle)
- Unbreakable, lockable, corrosion-proof case to keep these tools safe and secure

**STOP LOSING
YOUR NOZZLES!**

ordering

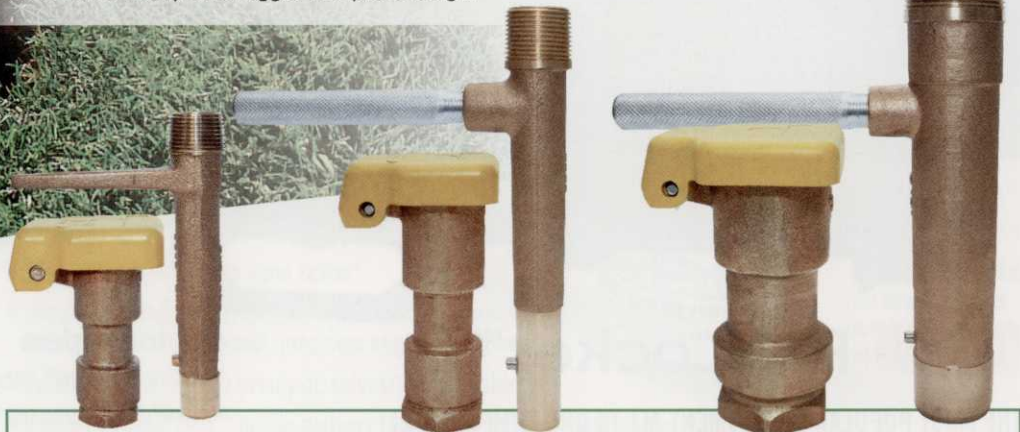
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| Part # PL-K2 | ProLocker™ with ¾" Magnum UltraMAX Full Throttle nozzle |
| Part # PL-K3 | ProLocker™ with ¾" Magnum UltraMAX Turbo Shift nozzle |
| Part # PL-K4 | ProLocker™ with 1" Magnum UltraMAX Full Throttle nozzle |
| Part # PL-K5 | ProLocker™ with 1" Magnum UltraMAX Turbo Shift nozzle |
| Part # HP-K1 | NozzleLocker™ with ¾" Magnum (yellow) nozzle |
| Part # HP-K2 | NozzleLocker™ with ¾" Magnum UltraMAX Full Throttle nozzle |
| Part # HP-K3 | NozzleLocker™ with ¾" Magnum UltraMAX Turbo Shift nozzle |
| Part # HP-K4 | NozzleLocker™ with 1" Magnum UltraMAX Full Throttle nozzle |
| Part # HP-K5 | NozzleLocker™ with 1" Magnum UltraMAX Turbo Shift nozzle |



Quick Coupler Valves & Keys

SOLID BRASS, SINGLE SLOT/LUG ESSENTIALS

Built to last, Underhill® valves and keys are constructed of solid red brass and stainless steel. Valves incorporate rugged one-piece design.



Valve: Part # QV-075R
($\frac{3}{4}$ " FPT inlet)

Key: Part # QK-075
($\frac{3}{4}$ " MPT x $\frac{1}{2}$ " FPT outlet)

Valve: Part # QV-100R
(1" FPT inlet)

Key: Part # QK-100
(1" MPT x $\frac{3}{4}$ " FPT outlet)

Valve: Part # QV-150R
($1\frac{1}{2}$ " FPT inlet)

Key: Part # QK-150
($1\frac{1}{2}$ " MPT x $1\frac{1}{4}$ " FPT outlet)

hose swivels

Part # HS-075 $\frac{3}{4}$ " FPT x $\frac{3}{4}$ " MHT outlet
Part # HS-100 1" FPT x $\frac{3}{4}$ " MHT outlet
Part # HS-101 1" FPT x 1" MHT outlet
Part # HS-151 $1\frac{1}{2}$ " FPT x 1" MHT outlet

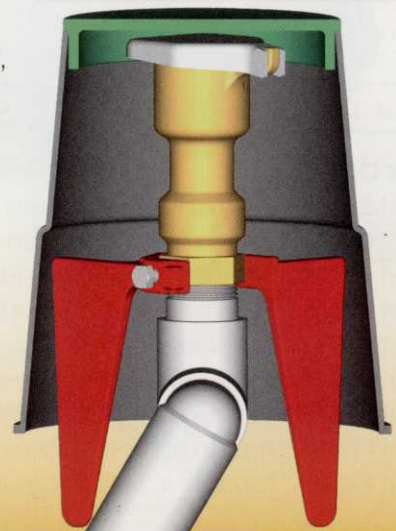


The Claw™

QUICK COUPLER MOTION RESTRAINT

When quick coupler valves become unscrewed from swing joints, it's more than just a hassle - it can be dangerous. The Claw™, new from Underhill®, offers a simple solution. Embedded in the soil below the quick coupler, and then securely attached to its base, The Claw provides significant resistance to rotational, vertical and horizontal motion, preventing the valve from moving. Made from high strength ductile iron, this compact anchor attaches easily with a single steel bolt.

EASY RETROFIT! Installs without removing valve or valve box!



The Claw™ pictured with 1" quick coupler, key and hose swivel.

ordering

Part # QCA-075100 The Claw™ for $\frac{3}{4}$ " and 1" valves
Part # QCA-150 The Claw™ for $1\frac{1}{2}$ " valves

Impact Sprinklers

SOLID BRASS, ULTRA-RELIABLE WORKHORSES

For reliable, trouble-free, high-performance year after year, you just can't beat our brass impact sprinklers. Available in full circle and full/part circle, in inlet sizes of 3/4", 1" and 1 1/4".

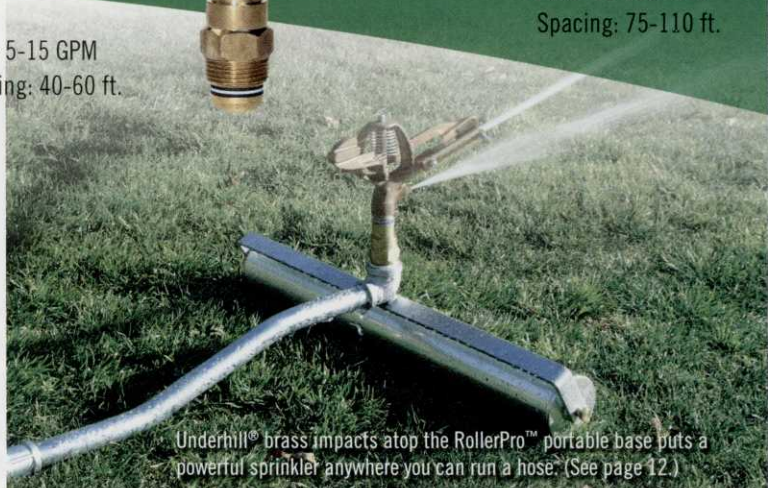
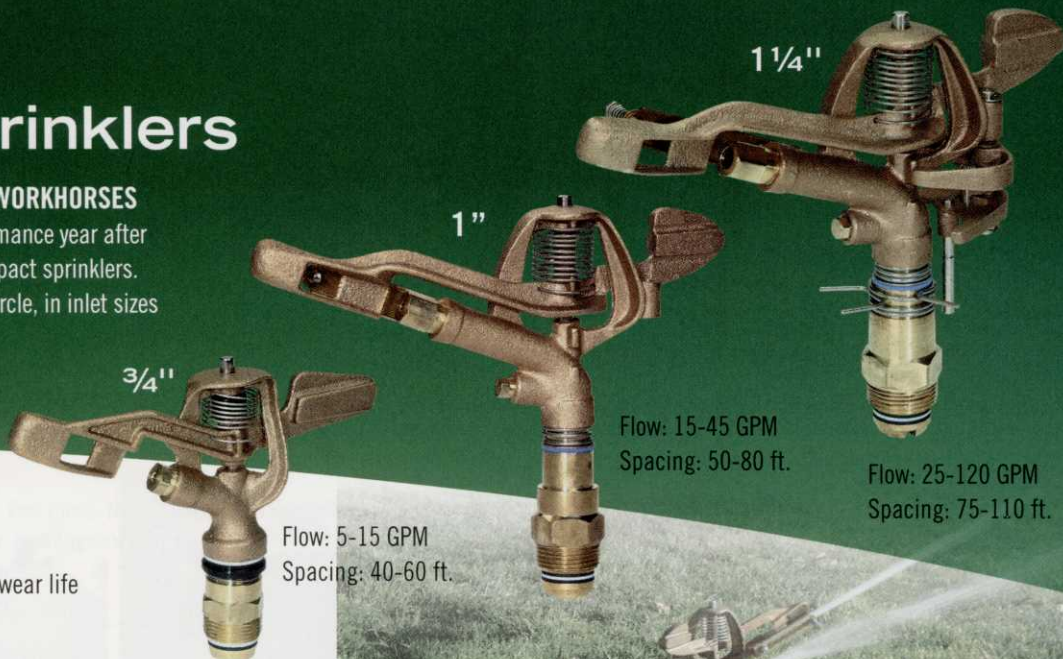
features

- Solid brass construction
- Stainless steel drive spring
- Bearing assembly hood for longer wear life
- Chemical resistant bearing seals
- Solid brass nozzle

ordering

		GPM	Radius (ft.)
Part # SI075F	3/4" MPT Full Circle	13	57
Part # SI075P	3/4" MPT Part/Full Circle	11	48
Part # SI100F	1" MPT Full Circle	23	71
Part # SI100P	1" MPT Part/Full Circle	23	71
Part # SI125F	1 1/4" MPT Full Circle	51	96
Part # SI125P	1 1/4" MPT Part/Full Circle	54	78

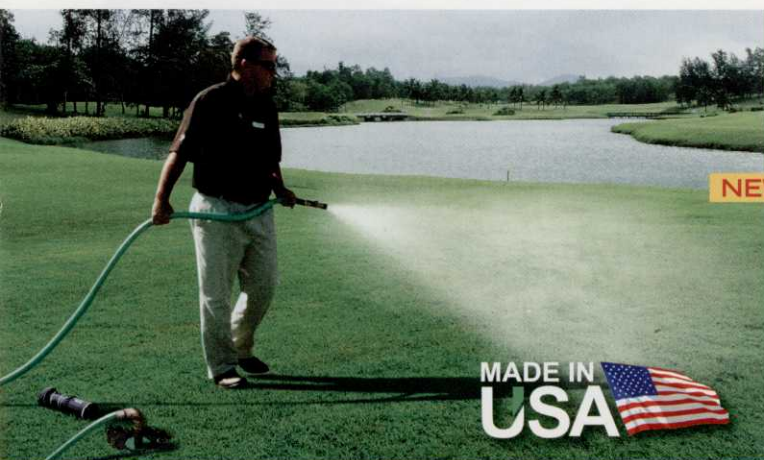
Performance data shown at 80 psi. GPM and radius will vary with pressure at sprinkler



HoseTap™

SOLID METAL HOSE ADAPTER

HoseTap™ gives you a hose connection anywhere you have a Toro® or Rain Bird® electric, valve-in-head sprinkler... a fast connection when quick-couplers or hose bibs are not available. Includes aircraft aluminum body (won't break or wear out like plastic) anodized with sprinkler manufacturer color, o-ring, riser, 1" brass swivel and 3/4" adapter. Also available without brass swivel/adapter.



ordering

- Part # HN-T100S HoseTap™ for Toro® 1" inlet golf sprinklers
- Part # HN-T150S HoseTap™ for Toro® 1 1/2" inlet golf sprinklers
- Part # HN-R125S HoseTap™ for Rain Bird® Eagle 700 Series sprinklers
- NEW!** Part # HN-R150S HoseTap™ for Rain Bird® Eagle 900 Series sprinklers
- Includes 1" brass swivel and 3/4" adapter. Add "B" for BSP thread.
- To order without brass swivel: Remove "S" from part number.

REPLACEMENT O-RINGS

- Part # OR-100 Fits Toro® 1" inlet and Rain Bird® Eagle 700 Series golf sprinklers / HoseTap
- Part # OR-150 Fits Toro® 1 1/2" inlet golf sprinklers / HoseTap
- Part # OR-150R Fits Rain Bird® 1 1/2" inlet golf sprinklers / HoseTap



Serious about saving water?

Profile™

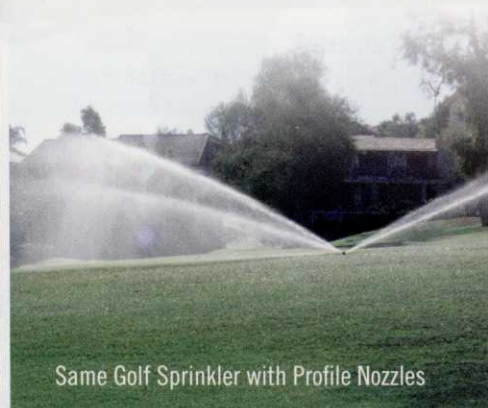


SOLID METAL GOLF SPRINKLER NOZZLES

Upgrade your sprinklers with Profile™, the ultra-high uniformity, water conserving, solid metal nozzles from Underhill®. You will see improved results immediately, save millions of gallons of water every year and improve the playability of your course at the same time...guaranteed.



Golf Sprinkler with OEM Nozzles

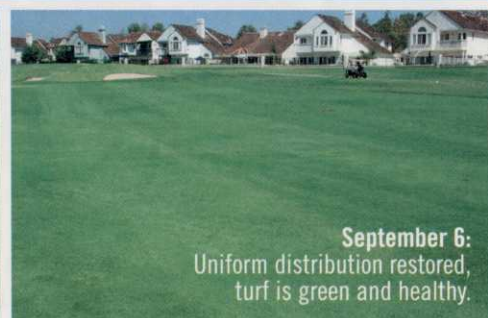


Same Golf Sprinkler with Profile Nozzles

Use less water, less energy and less manpower and get better course playability.



August 14:
Profile nozzles installed
in problem area.



September 6:
Uniform distribution restored,
turf is green and healthy.

"Profile nozzles lived up to our expectations and eliminated patchy dry spots and donuts. We retrofitted all our fairways and now run a more efficient irrigation program."

Logan Spurlock

Superintendent, Sherwood Country Club

"It was like putting in a new irrigation system. I became a believer overnight."

Mike Huck

Irrigation & Turfgrass Services
Former USGA Staff Agronomist
Former Superintendent,
Murrieta Hot Springs Resort

"The real power is knowing that retrofitting sprinklers with Profile nozzles can be phased in to work within a course's operating budget."

Kurt Thompson

K. Thompson and Associates,
Irrigation Consultant and Trainer
Huntersville, North Carolina and Pace, Florida

"The Profile retrofit program has also extended the life of our Toro system while improving course appearance and playability."

Dennis Eichner

Assistant Superintendent,
Silverado Resort - Napa, California

See how Superintendents are upgrading their entire golf courses! Video online now at www.underhill.us





Profile nozzles for Toro®

730 SERIES

Full Circle: Front/Rear Nozzle Set

Part #	Nozzle Color # range/spreader	Toro Noz #
T730-3313	Brown 33 / Gray 13	33
T730-3413	Blue 34 / Gray 13	34
T730-3515	Violet 35 / Red 15	---
T730-3515L (50 psi)	Green 35 / Red 15*	35
T730-3615	Red 36 / Red 15*	36
T730-3617	Red 36 / Lavender 17	

* For square spacing, specify #17 (lavender) nozzle with the #35 and #36 range nozzles



Profile nozzles are so consistent, with distribution patterns so uniform... it's like rain on demand.™



760 and 860 SERIES

Part Circle: Midrange/Close-in Nozzle Set

Part #	Nozzle Color: midrange/close-in
T760-GY	Gray / Yellow
T860-GY	Gray / Yellow



830, 834S, DT SERIES

Full Circle: Midrange/Close-in Nozzle Set

Part #	Nozzle Color: midrange / close-in	Toro Series
T830-GY	Gray / Yellow	830
T834-GY	Gray / Yellow	834S
TDT100-GY	Gray / Yellow	DT 34/35



835S SERIES

Full Circle: Midrange/Close-in Nozzle Set

Part #	Nozzle Color: midrange / close-in
T835S-WP	White / Plug

630 SERIES

CALL FOR AVAILABILITY



670 SERIES

Full Circle: Rear Nozzles

Part #	Nozzle Color: midrange / close-in
T670-BY	Black / Yellow



690 SERIES

Full Circle: Rear Nozzle

Part #	Nozzle Color: spreader
T690-G	Gray



750 SERIES

Full Circle: Front/Rear Nozzle Set

Part #	Nozzle Color #range / spreader	Toro Nozzle #s
T750-5617	Red 56 / Lavender 17	56
T750-5717	Gray 57 / Lavender 17	57



780, 854S, DT SERIES

Midrange/Close-in Nozzle Set

Part Circle (780), Full Circle (854S), Part/Full Circle (DT 54/55)	Part #	Nozzle Color: midrange / close-in	Toro Series
	T780-BY	Black / Yellow	780
	T854-BY	Black / Yellow	854S
	TDT150-BY	Black / Yellow	DT 54/55



855S SERIES

Full Circle: Midrange/Close-in Nozzle Set

Part #	Nozzle Color: midrange / close-in
T855S-PP	Pink / Plug

650 SERIES

CALL FOR AVAILABILITY



Profile nozzles for Rain Bird®

EAGLE 700 SERIES

Full Circle: Midrange/Close-in Nozzles

Part #	Nozzle Color midrange / close-in	Rain Bird Nozzle #s
R70028-RG	Blue / Gray	28
R70032-RG	Red / Gray	32
R7003640-GG	Blue / Gray	36/40 and larger



Look familiar? Poor performing Eagle 700 sprinklers are often the result of clogged and worn nozzles. Profile nozzles' solid metal construction and nozzle shape were scientifically designed to solve this exact problem. They simply don't wear out. And they don't clog. Upgrade your old golf sprinklers to better than OEM with Profile!



900 EAGLE SERIES

Full Circle: Close-in Nozzle

Part #	Nozzle Color
R900-M	Maroon



91 SERIES BRASS IMPACTS

Full Circle: Close-in Nozzle

Part #	Nozzle Color
R91-G	Gray



51 SERIES BRASS IMPACTS

Full Circle: Front/Rear Nozzles

Part #	Nozzle Color # range / spreader	Rain Bird Nozzle #s
R51-1411.5	White 14 / Gray 11.5	14 / 11.5
R51-1611.5	Blue 16 / Gray 11.5	16 / 11.5
R51-1811.5	Yellow 18 / Gray 11.5	18 / 11.5
R51-2011.5	Red 20 / Gray 11.5	20 / 11.5
R51-2213	Green 22 / Black 13	22 / 13
R51-2413	Black 24 / Black 13	24 / 13



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LOW VOLUME PORTABLE SPRINKLER KIT

SpotShot™ is an expandable sprinkler system kit ideal for turf areas requiring low volume watering for extended periods. Connect the Starter Kit to a quick coupler (or golf sprinkler with the HoseTap™ on page 9) and connect Add-On Kits for larger area needs.



ideal for

- Leaching salts on greens
- Targeting hot spots on fairways, roughs, etc.
- Mound watering
- New seed grown in
- Other low volume watering



Starter Kit includes 20' of ½" flexible PVC tubing with connection fittings, pressure regulator, sprinkler base and low volume rotating sprinkler (20 ft. radius / 0.65 GPM - 0.16 in./hr.)



Add-On Kit includes 20' of ½" flexible PVC tubing with connection fittings, sprinkler base and low volume rotating sprinkler (20 ft. radius / 0.65 GPM - 0.16 in./hr.)



Micro-Sprinkler Options

- 20 ft. radius / 0.65 GPM (0.16 in./hr.)
- 20 ft. radius / 1.2 GPM - (0.26 in./hr.)



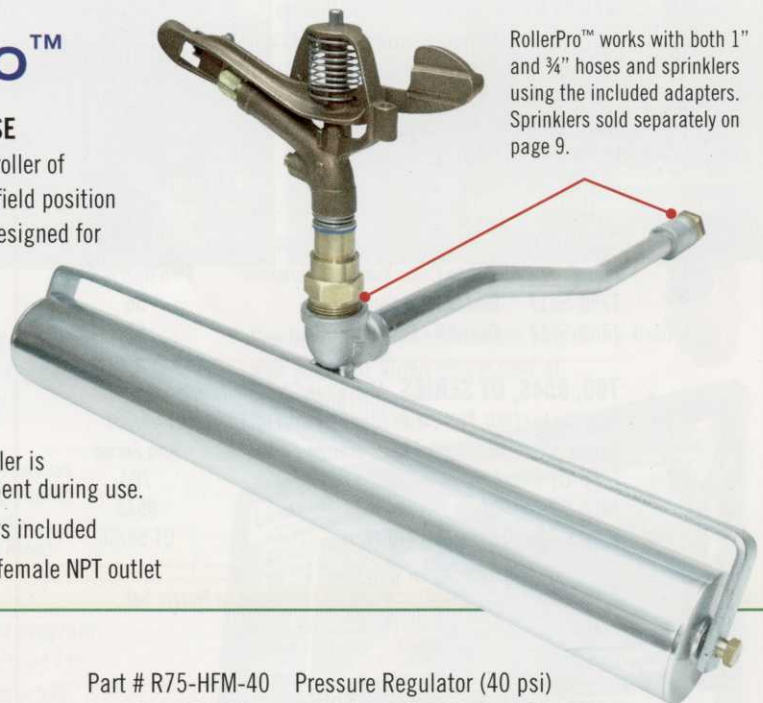
RollerPro™

PORTABLE SPRINKLER BASE

The 22" wide stainless steel roller of RollerPro™ provides a stable field position for supplemental watering. Designed for years of hard use, it is ideal for watering dry spots and newly seeded areas.

features

- 22" wide stainless steel roller is weighted to prevent movement during use.
- ¾" inlet and outlet adapters included
- Standard 1" FHT inlet x 1" female NPT outlet



RollerPro™ works with both 1" and ¾" hoses and sprinklers using the included adapters. Sprinklers sold separately on page 9.

ordering

Part # A-RP221	RollerPro™
Part # SS-SK	SpotShot™ Starter Kit (20 ft. rad, 0.65 GPM)
Part # SS-AOK	SpotShot™ Add-on Kit (20 ft. rad, 0.65 GPM)
Part # SS-SK26	SpotShot™ Starter Kit (20 ft. rad, 1.2 GPM)
Part # SS-AOK26	SpotShot™ Add-on Kit (20 ft. rad, 1.2 GPM)
Part # SS-SB	SpotShot™ Sprinkler Base

Part # R75-HFM-40	Pressure Regulator (40 psi)
Part # TP-050-20	20' Coil of ½" PVC, SuperFlex Pipe
Part # S40-050-HFS	¾" Hose Thread Female x Male, Slip Fitting
Part # S40-050-HMS	¾" Hose Thread Male x Female, Slip Fitting
Part # SS-S16	Micro-sprinkler (20 ft. rad, 0.65 GPM - 0.16 in/hr)
Part # SS-S26	Micro-sprinkler (20 ft. rad, 1.2 GPM - 0.26 in/hr)

Tracker™

PORTABLE IRRIGATION MACHINE

The Tracker™ offers an economical solution for supplementing seasonal watering needs of ¼ acre to 2 acre areas. It's also ideal for irrigating athletic fields, cemeteries, golf course roughs, or other large areas where an underground system is impractical. Built to last with precision German engineering and high quality materials, this portable powerhouse can irrigate an entire football field in just two passes.

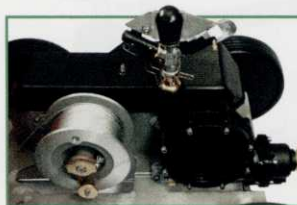
Tracker™ requires minimal labor to operate. Powered by water, it pulls itself along a nylon cable, dragging up to 360 ft. of 1" reinforced heavy-duty hose (sold separately). Each pass irrigates about 2/3 acre per 8 hours of operations.

specifications

- Weight: 58 lbs.
- Size: Length 33", Width 22", Height 22"
- Materials: Aluminum, Brass, ABS
- Minimum Water Pressure: 50 psi
- Hose Required: 1"

features

- Adjustable Speed Control: 20-70 ft./hr.
- Standard full or part circle sprinkler (8-15 GPM)
- 360 ft. nylon cable provides irrigated length of 400 ft.
- 70-85 ft. pass width
- Automatic shut-off at end of pass
- Water turbine drive and gear box
- Galvanized anchor stake
- Includes 1" brass quick-connect adapter



Precision German engineering, high quality components built to last!



DeepDrip™

TREE WATERING STAKES

Water and fertilize your trees at the roots, encouraging deeper roots and healthier trees with DeepDrip™ stakes. Water gets underground fast, so you can irrigate for shorter periods and save water.

They also help aerate the soil, and you can add fertilizer into the shaft to direct nutrients to the root zone.

Three Lengths For All Tree Sizes: Use the 14.5" stake for shallow root trees and shrubs, like rose bushes and ornamental trees (or boxed trees). The 24.5" stake is best for most other tree varieties except for palms and similarly deeper rooted trees, which will benefit from the longer 36" stakes.

Built Smart - And Easy To Use: The DeepDrip's reinforced tip and cap are made from ABS and the upper shaft is made from Schedule 40 PVC. Multiple holes in the bottom half of the spike, internally covered by a mesh filter, allow water to flow out but keep dirt from getting in and clogging the tube. The UV-protected cap acts as a reinforced cover when pounding the stake into the ground, keeps debris from entering the shaft and holds a 1/4" drip line/emitter securely in place. By inserting a screwdriver through the two holes at the top of the upper shaft, stakes can be easily pulled up to remove/reposition, or rotated to deter root invasion.

ADD TO EXISTING TREES! Install DeepDrip™ stakes during or after tree planting for instant access to the root system for fertilizer delivery or to set up deep automatic drip watering.



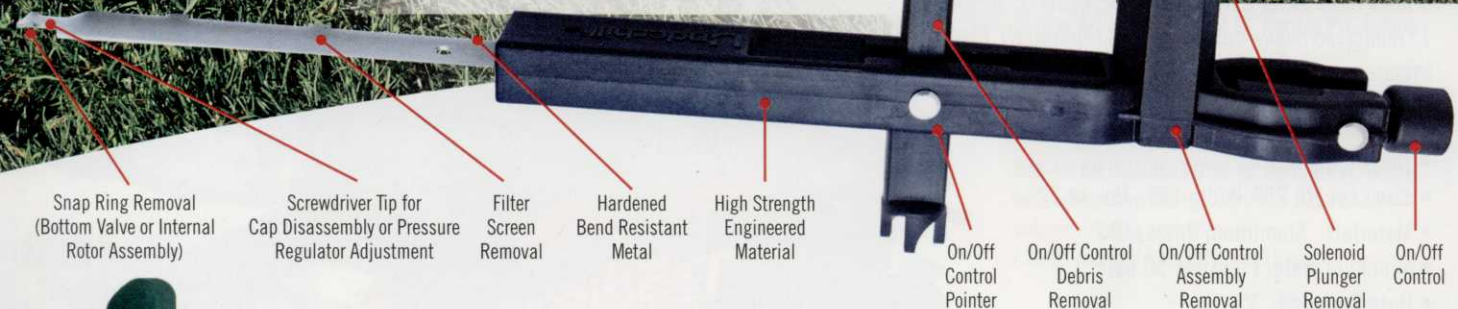
ordering

Part # T-400	Tracker™ Portable Irrigation Machine
Part # A-DD14	DeepDrip™ 14.5" watering stake
Part # A-DD24	DeepDrip™ 24.5" watering stake
Part # A-DD36	DeepDrip™ 36" watering stake

NEW! SuperKey XL™

MULTI-PURPOSE TOOL FOR TORO, RAINBIRD GOLF SPRINKLERS

The ultimate **all-in-one** tool for your golf sprinklers...think of it as a Swiss army knife, a must have companion. Made of stainless steel and composite material, it effortlessly turns electric valve-in-heads on and off, removes internal snap rings and performs many other sprinkler maintenance chores. Great for John Deere®/Signature® sprinklers, too!



EasyReach™ Key

EXTRA-LONG SHAFT ON/OFF KEY

Extra long and extra heavy duty metal key designed for easy on/off operation for **TORO**, **Rain Bird** and John Deere/Signature electric valve-in-head golf sprinklers. Made of high grade metal, EasyReach offers years of effortless on/off operation.



VersaLid™

VALVE BOX UNIVERSAL REPLACEMENT LID

VersaLid™ is the easy solution for broken or missing valve box lids. No need to guess what brand a buried box is or even worse - dig it up to find out - VersaLid's locking system fits all 6"-7" round valve boxes.

features

- Fits all 6"-7" round boxes • Universal fit
- Greater top-load strength and more UV-resistant than structural foam lids
- Purple Lid available for non-potable/reclaimed water

STRONGER! BETTER FIT!
than original equipment lids



Splice Kit

3M DIRECT BURY SPLICE KIT

Each kit includes one wire connector which accommodates wire sizes from 18-10 gauge and a waterproof gel case. Excellent for golf, commercial and residential applications.

ordering

Part # A-SKTRB	SuperKey™ XL for Toro ®, Rain Bird ® and John Deere® golf sprinklers
Part # A-ERT	EasyReach™ for Toro ® and John Deere®/Signature golf sprinklers
Part # A-ERR	EasyReach™ for Rain Bird ® golf sprinklers
Part # VL-6	Green VersaLid™ 6"-7" valve box lid
Part # VL-6P	Purple VersaLid™ 6"-7" valve box lid
Part # DBRY-4	Direct Bury Splice Kit - 4 Pack
Part # DBRY	Direct Bury Splice Kit - single unit

Gulp™ UltraMAX

SUPER HIGH-CAPACITY WATER REMOVAL SUCTION PUMPS

Whether you need to remove water from sprinklers and valve boxes or other areas or devices, UltraMax Series Pumps are the ideal tools for the job...huge capacities and the smoothest pumps you will ever use as well.

special features

- Super Smooth Pumping Action
- High Volume Capacity
- Strong Aluminum Pump Shaft
- Contour Grip Handle
- No Leak Seals
- Self Priming

GULP SYRINGE ULTRA

- 12 oz./stroke
- 12" pump chamber

BIG GULP ULTRA MAX

- 35 oz./stroke!
- 36" pump chamber
- 72" or 36" outlet hose

GULP ULTRA MAX

- 18 oz./stroke!
- 14" clear pump chamber
- 18" outlet hose

also great for



Easy, push-button cleaning system



Gulp UltraMAX and BigGulp UltraMAX include debris filter attachment for very dirty water.

ordering

Part # A-G12-C	Gulp™ UltraMax
Part # A-G3636CK	BigGulp™ UltraMax w/ 36" outlet hose
Part # A-G3672CK	BigGulp™ UltraMax w/ 72" outlet hose
Part # A-G12S-C	Gulp™ Syringe Ultra
Part # A-GTUB-C	100 ft. outlet hose

AuditMaster™

EXPERT SPRINKLER PERFORMANCE TESTING KITS

Increasing watering times to compensate for poorly performing sprinklers wastes a lot of water. Accurately measuring sprinkler application rates with Underhill® AuditMaster™ helps maximize water savings.



4"x 5" Marking flags
on 21" wire (50-pack)
are available in 6 colors.



AuditMaster Combo ST/LT Kit (pictured), includes large CatchCanPro cups (blue) and CatchCanPro Mini cups (30 each).

AuditMaster ST Kit excludes the large CatchCanPro cups. This kit is ideal for **SMALL TURF** audits.

AuditMaster LT Kit excludes the CatchCanPro Mini cups. This kit is optimized for golf courses, sports fields and other **LARGE TURF** audits.



CatchCan Pro™

features

- Self standing - easily anchors into turf, even on slopes
- Measures sprinkler application in inches or centimeters
- Unique design allows for shorter duration test
- Made of durable polypropylene engineered plastic
- Can be stacked for easy storage
- Each 10 pack kit comes with instructions



CatchCan Pro (CCPK-10) for **LARGE TURF** audits. Measures ml, cm, inches.

CatchCan Pro Mini (CCPMK-10) for **SMALL TURF** audits. Measures inches.

ordering

Part # AUD-ST	AuditMaster ST Kit
Part # AUD-LT	AuditMaster LT Kit
Part # AUD-STLT	AuditMaster Combo ST/LT Kit
Part # SALESPRO4	AuditMaster Wheeled Carry Case
Part # A-STW	Stop Watch
Part # A-WIND	Anemometer (Wind Gauge)
Part # CCPK-10	CatchCan Pro (Blue) - 10 Pack
Part # CCPMK-10	CatchCan Pro Mini - 10 Pack

Part # MT-100	Fiberglass Measuring Tape: 100'
Part # A-FLAG	Marking Flags: Yellow - 50 Pack
Part # A-FLAG-B	Marking Flags: Blue - 50 Pack
Part # A-FLAG-O	Marking Flags: Orange - 50 Pack
Part # A-FLAG-P	Marking Flags: Pink - 50 Pack
Part # A-FLAG-R	Marking Flags: Red - 50 Pack
Part # A-FLAG-W	Marking Flags: White - 50 Pack

MADE IN USA

TurfSpy™

EARLY STRESS DETECTION GLASSES

Disease, drought and weed invasion are plant and turf killers. But by the time you see them it can be too late. TurfSpy™ glasses, with stress detection technology developed by NASA, lets you “see into the future” to identify problems 2-10 days before they are visible to your naked eye. Keep your turf and vegetation healthy BEFORE serious problems arise.



fusarium patch

pythium blight

yellow patch
(rhizoctonia)

brown patch

anthracnose

get a jump on **broken**
or **poor-performing**
sprinklers

highly efficient **spot**
watering saves time
and labor costs

superior **weed location**
and spraying saves
time and money

features

- Shatterproof/polycarbonate stress detection lens (ANSI approved safety lens)
- Wrap-around lens limits ambient light for optimal detection
- Sports frame with adjustable ear piece
- Lightweight case included

HOW IT WORKS

Dying vegetation absorbs and reflects sunlight differently than when it's healthy. The earliest signals occur at the outer limits of the human visual spectrum, and are rendered invisible compared to the predominant middle wavelengths. TurfSpy™ filters the light in the center so that fringe spectra, which show early plant stress, become visible.



ordering

Part # NG655-01 TurfSpy™ Glasses and Deluxe Case

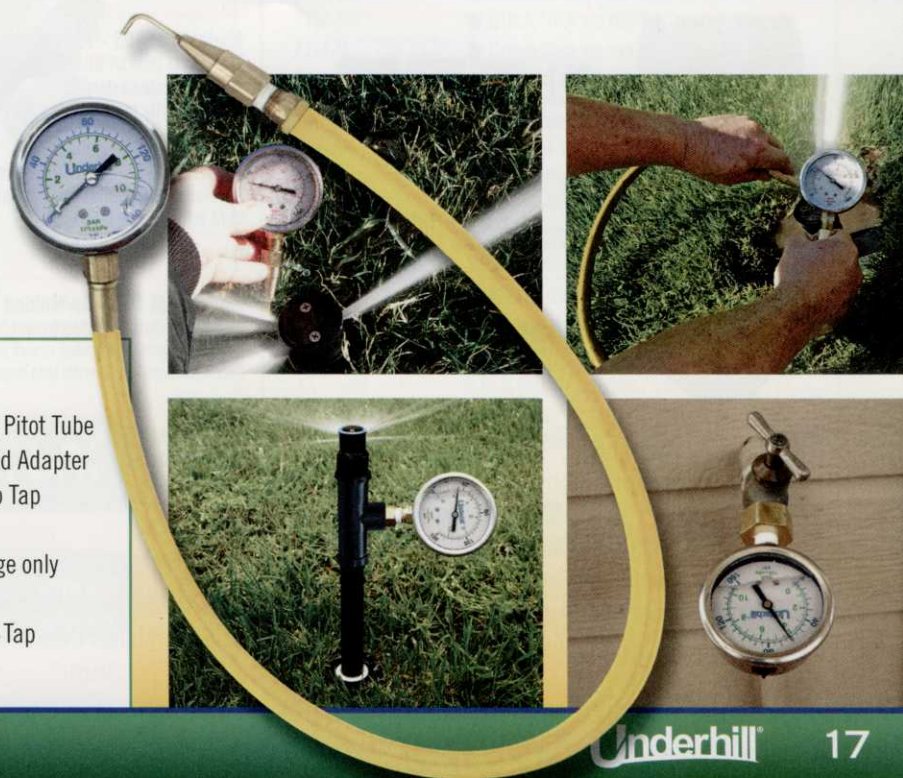
HeadChecker™

NOZZLE DISCHARGE PRESSURE GAUGE

Use this liquid-filled 160 psi gauge with 30" flex hose and solid brass Pitot tube, hose bib, or spray head adapter to measure water pressure at discharge points.

ordering

Part # A-PHG-160K	HeadChecker™ gauge, 30" Flex Hose, Pitot Tube
Part # A-SHG-160K	HeadChecker™ gauge with Spray Head Adapter
Part # A-HBG-160K	HeadChecker™ with ¾" POC Hose Bib Tap
Part # A-HCGPK	HeadChecker™ gauge and Pitot tube
Part # A-PG160L	HeadChecker™ 160 psi pressure gauge only
Part # A-HCP	Pitot tube only
Part # A-HBT	¾" Hose Thread x ¼" Brass Hose Bib Tap
Part # A-SHA	Spray Head Adapter





GRUND GUIDE by Underhill® Marking Systems



SPEED AND QUALITY OF PLAY...GOLF AS IT SHOULD BE.

You know Grund Guide for making premier yardage marking solutions. Now backed with the strength of Underhill® distribution and product development, you can have the highest quality and most complete yardage marking systems available today and into the future. We offer durable and high-visibility customized markers for all popular golf sprinklers along with unique fairway, tee box, and driving range markers. Speed up and improve the quality of play with Grund Guide Marking Systems.

Sprinkler Head Yardage Markers

	Model SPM 106 - TORO Engraved Caps: Perfect-fit caps engraved and color filled for high visibility. Multiple number locations vary for lids with holes.	FITS: Toro 730, 750, 760, 780, 830/850S, 834S, 835S, DT34/35S, 854S, DT54/55, 860S, 880S COLORS: Caps - ●/○/●/●/●/●/● Numbers: - ○/●/●/●/●/●/●
	Model SPM 107 - Rain Bird Engraved Caps: Perfect fit caps engraved and color filled for high visibility number identification.	FITS: Rain Bird E900, E950, E700, E750, E500, E550, 700, 751, 51DR COLORS: Caps - ●/○/●/●/●/●/● Numbers: - ○/●/●/●/●/●/●
	Model SPM 110 - Hunter Engraved Caps/Covers: Perfect-fit flange covers (G800, G900) and caps (G90), engraved and color filled for high visibility.	FITS: Hunter G800, G900, G90 COLORS: Flange cover / caps - ● Numbers: - ○/●/●/●/●/●/●
	Model SPM 101 - Fit Over Discs: Anodized aluminum (no paint!), these markers are engraved and custom fit to each sprinkler. Multiple number locations vary for lids with holes.	FITS: Toro 630, 650, 660, 670, 680, 690, 830/850S, 834S, 835S, DT34/35, 854S, 855S, DT54/55, 860S, 880S, Rain Bird 47/51 DR, 71/91/95, E900, E950, E700, E750, E500, E550, 1100, Hunter G-70/75, G-90/95, G-990, G-995, John Deere/Signature – Call COLORS: Discs - ●/●/●, Numbers - ●
	Model SPM 105 - Universal Tags: Anodized aluminum (no paint!), these markers are engraved and designed for most universal fit applications. Tags are installed using 1/8" rivets.	FITS: Universal - Options: Crescent 2-7/8"W x 1"H, Round Edge 3"W x 1"H, Square Edge 2"W x 3/4"H COLORS: Tags - ●/●/● Numbers: - ●
	Model SPM 103 - TORO Snap-In Markers: OEM UPGRADE to high quality polycarbonate custom fit. One complete, high-visibility marker snaps into OEM plug.	FITS: Toro 730, 750, 760, 780, 830/850S, 834S, DT34/35, 854S, DT54/55, 860S, 880S COLORS: Snap in - ○/●/●, Numbers - ○/● (Reclaimed water option - ● no number - available)
	Model SPM 108 - TORO & Hunter: Special engraved plastic material designed to fit into OEM lid recess	FITS: Toro 730, 750, 760, 780, 834S, DT34/35, 854S, DT54/55, 860S, 880S and Hunter G800, G70/75B, G870, G875, G880, G885, G990, G995 COLORS: Markers - ○/●, Numbers - ●
	Model SPM 104 - Lid/Molded Recess Markers: Durable replacement lid, with reverse engraved number insert process. Excellent number ID with this model	FITS: Rain Bird 47, 51 COLORS: Lid - ●/○/● Insert - ○/●/● Numbers - ○/●
	Model SPM 102 - Rain Bird Yardage Highlighter Snap-Ring: Replaces OEM snap ring with perfect fit bright yardage and reclaimed color identification.	FITS: Rain Bird E900, E950, E700, E750, E500, E550, 700, 751 COLORS: ○/●/● (Reclaimed Water)

ordering example

View/download complete ordering guide at www.underhill.us

Marker Model	Sprinkler Mfg	Series	Marker Color	# Color	Qty. of #s on Marker	Total QM on Order
SPM-106	Toro	730	Black	Yellow	1	76

Fairway / Tee / Range Disc Markers

Large 7 1/2" cap with big bold 3 1/2" standard yardage numbers. Ideal for fairway, tee and driving range marking. Optional 8" mounting pipe attachment available for secure installation.

FAIRWAY STANDARD DISC SYSTEM

Color-coded markers with bold 3 1/2" yardage number.

Several system options available.



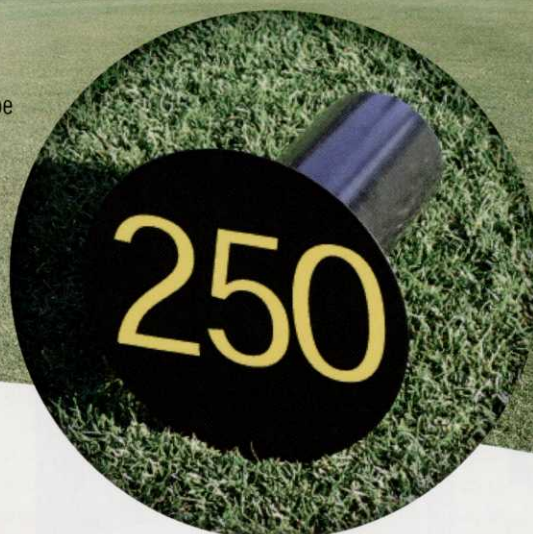
FAIRWAY CUSTOM OPTIONS

Markers can be customized to display specific yardage numbers, include logos, or custom design.



TEE BOX / DRIVING RANGE CUSTOM OPTIONS

Markers can be customized to display specific multiple numbers, include logos, or custom design.

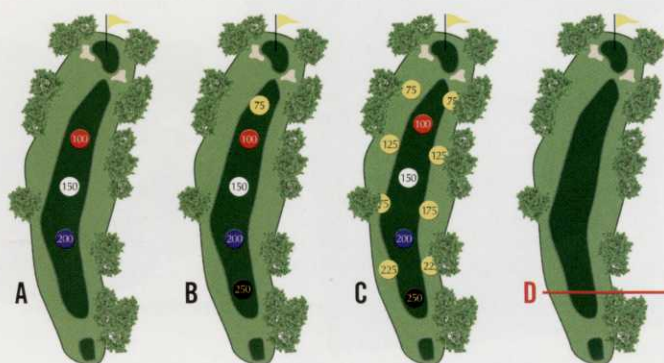


250

Disc Marker pictured with optional 8" mounting pipe (installs easily with standard cup cutter)

SYSTEM EXAMPLES

- A: 3 markers placed down the center of the fairway at 50 yard intervals
- B: 5 markers placed down the center of the fairway for greater coverage
- C: Markers placed on sides and center ("diamond" layout) for highest visibility
- D: Create a custom system with your choice of color and numbers/markings



Valve Box / Universal Markers

These engraved, anodized aluminum (no paint!) markers are ideal for isolation or control valves, satellites or other applications.



VB-31 SAT

VB-31 SAT

ordering

Standard Disks with Markings

- | | |
|--------------|-----------------------------------|
| FTM-Y-75 | Yellow Disk with 75 |
| FTM-R-100 | Red Disk with 100 |
| FTM-W-150 | White Disk with 150 |
| FTM-BL-200 | Blue Disk with 200 |
| FTM-BK-250 | Black Disk with 250 |
| FTM-RWB-KIT | 3 Disks with Yardages (●/○/●) |
| FTM-YRWB-KIT | 5 Disks with Yardages (●/●/○/●/●) |

Custom Disks for Fairway, Tee Box and Driving Range

- | | |
|--------|---------------------------|
| FTM-Y | Yellow Disk no markings |
| FTM-O | Orange Disk no markings |
| FTM-R | Red Disk no markings |
| FTM-W | White Disk no markings |
| FTM-BL | Blue Disk no markings |
| FTM-BK | Black Disk no markings |
| FTM-G | Green Disk no markings |
| FTM-L | Lavender Disk no markings |

Tee Box / Fairway / Driving Range Custom Markings

To order, add to end of custom disk part numbers above.

Example: FTM-Y-#1 (Yellow Disk with One custom number)

- | | |
|-----------|------------------------------------|
| XXXX-#1 | One custom number to disk |
| XXXX-#2 | Two custom numbers to disk |
| XXXX-#3 | Three custom numbers to disk |
| XXXX-CUST | Custom Design; Script |
| XXXX-LOGO | Logo added to disk |
| XXXX-#4 | up to 4 flags / targets / yardages |
| XXXX-#8 | 5 to 8 flags / targets / yardages |
| XXXX-#12 | 9 to 12 flags / targets / yardages |

Accessories

- | | |
|--------|--------------------------------|
| FTM-PL | 8" Mounting Pipe for all disks |
|--------|--------------------------------|

Valve Box / Universal Markers

- | | |
|-----------|------------------------|
| SPM-105-B | Black anodized marker |
| SPM-105-M | Maroon anodized marker |

For detailed ordering information of custom markers, visit www.underhill.us



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1-866-863-3744 • www.underhill.us

An industry leader in innovative watering products all over the world, Underhill® brings 34 years of know-how in developing our inventory of "Products that work...smart.™"



For even more products that work smart, like our super long throw **Mirage™** sprinklers (up to 174 ft. radius!), the **Sapien™** 2-wire controller, **Novo™** 2-wire converters and 2WIRE decoders, visit www.underhill.us



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Form No. UIWP-B13

Products that work...smart.™



WATER-STARVED COURSE

There are many predictions about the look of future courses when increased water rationing kicks in. Many remind me of the nightly news, which often presumes we have memories shorter than a fruit fly's lifespan. Despite the recent and recurring gnashing of teeth and wringing of hands, we don't have to look past the droughts in California or recently in Georgia to see the future of golf courses, but more importantly, to know most of them will survive in some form we'll recognize.

The reality since the start of course building in America 120 years ago is that most would have never been built had they waited for adequate water resources to irrigate to "full ET loss" that many courses view as necessary today. The baby boomers can recall the variations of turf quality

have reduced water availability can learn from those who never did.

An example I'm familiar with is one of my designs – Colbert Hills in Manhattan, Kan. Built at the height of the building boom, it has the length of a college championship course and the environmental sensitivity to be Audubon Certified. But, according to ET charts, those 150 acres of turf require about 72-million gallons an average year, and more in recent droughts.

Manhattan, Kan., has no ground water and insufficient rain harvesting capability to sustain a golf course, so Colbert Hills relies on city water for most of its irrigation. Favorable rates in its early years changed with the city's water rate policy, increasing its irrigation water costs to about \$3,000 per million gallons. In 2010, they used only 27-million gallons, equating to

three occasions. They lost some play to better-irrigated courses. Ironically, many players, including the Web.com mini tour players, preferred the greater challenge of their fast fairways.

After having gone to the precipice last year, they have doubled their water budget, but it is still far less than full ET, with much better results. They are still extremely water conscious. Superintendent Matt Gourlay tweets his followers about every rain event.

They have also implemented other common sense, necessity-is-the-mother-of-invention type water-reduction techniques. They use a moisture sensor to supplement Matt's "old school" gut feel. They maxed out water reduction through their sophisticated irrigation system, which features a weather station, smaller sprinklers and tight spacing, and part to part circles between greens to surrounds, and fairways to rough. They turned off 500 sprinklers to reduce irrigated turf by about 40 acres. They converted to drought tolerant rough varieties. Fortunately, in a prairie setting, the browning and natives look right at home, which might not be the case at all courses.

I am not under the impression that water reduction will be easy, and without consequences to golf's business model. But, I am under the impression that golf will find a way to adapt, much as it has adapted from the original Scottish game to locales all over the world. Water reduction is hard work, and perhaps the hardest part is mentally adjusting to the conditions before realistically attacking the problem. We may be short of water in many places at some point in the future, but my guess is superintendents will have no shortage of good, old-fashioned "Yankee ingenuity" which will go a long way to mitigating any problems they face. **GCI**

I am not under the impression that water reduction will be easy, and without consequences to golf's business model. But, I am under the impression that **golf will find a way to adapt**, much as it has adapted from the original Scottish game to locales all over the world.

from greens to fairways to rough that occurred every summer, although it seems a distant memory for most. But again, even in today's modern irrigation climate, the "nightly news" (golf division) still seems to focus on those top-level courses. Across America, the vast majority of courses have never had enough irrigation.

Even as irrigation systems got better, most courses still experience times when water is short, and superintendents must accept some tinges of brown, sometimes far more than they would like. Those who have irrigation systems everywhere but now

about 25 percent ET replacement of the dry year demand, which textbooks tell us is the critical minimum water amount for most turf before dormancy or death. Their plan was actually to irrigate at 25 percent, and when that critical level resulted due to lack of rain, then water a few minutes a night to keep moisture in plant tissues. It helped reduce irrigation (and disease) that the course had never irrigated greens more than once every four days since opening a dozen years ago.

The self-imposed water restrictions showed on many days, with zozyia fairways going dormant last year on

SEEKING TURF'S HOLY GRAIL

by Helen M. Stone

A look at some of the available turf types that offer playability, heat resistance and reduced water use.

Water conservation is nothing new in the golf course industry. Although golf course superintendents have been struggling with the mistaken public perception as water spenders, water savers is a more accurate label.

New technology saves millions of gallons (and dollars) worth of water as irrigation systems are fine-tuned, weather data incorporated and soil science extracts the most from every drop applied. Maximum water conservation is a medley of several elements, each of which play a part in stretching this precious resource.

"We try to develop bents that tolerate heat and need less total water," says Leah Brilman, Ph.D., director of research and technical services at Seed Research of Oregon in Corvallis, Ore. "But you need good soil and efficient irrigation, since you end up irrigating to the driest point on the course. It's always got to be a combination of turfgrass breeding, management and irrigation

systems to maximize water savings."

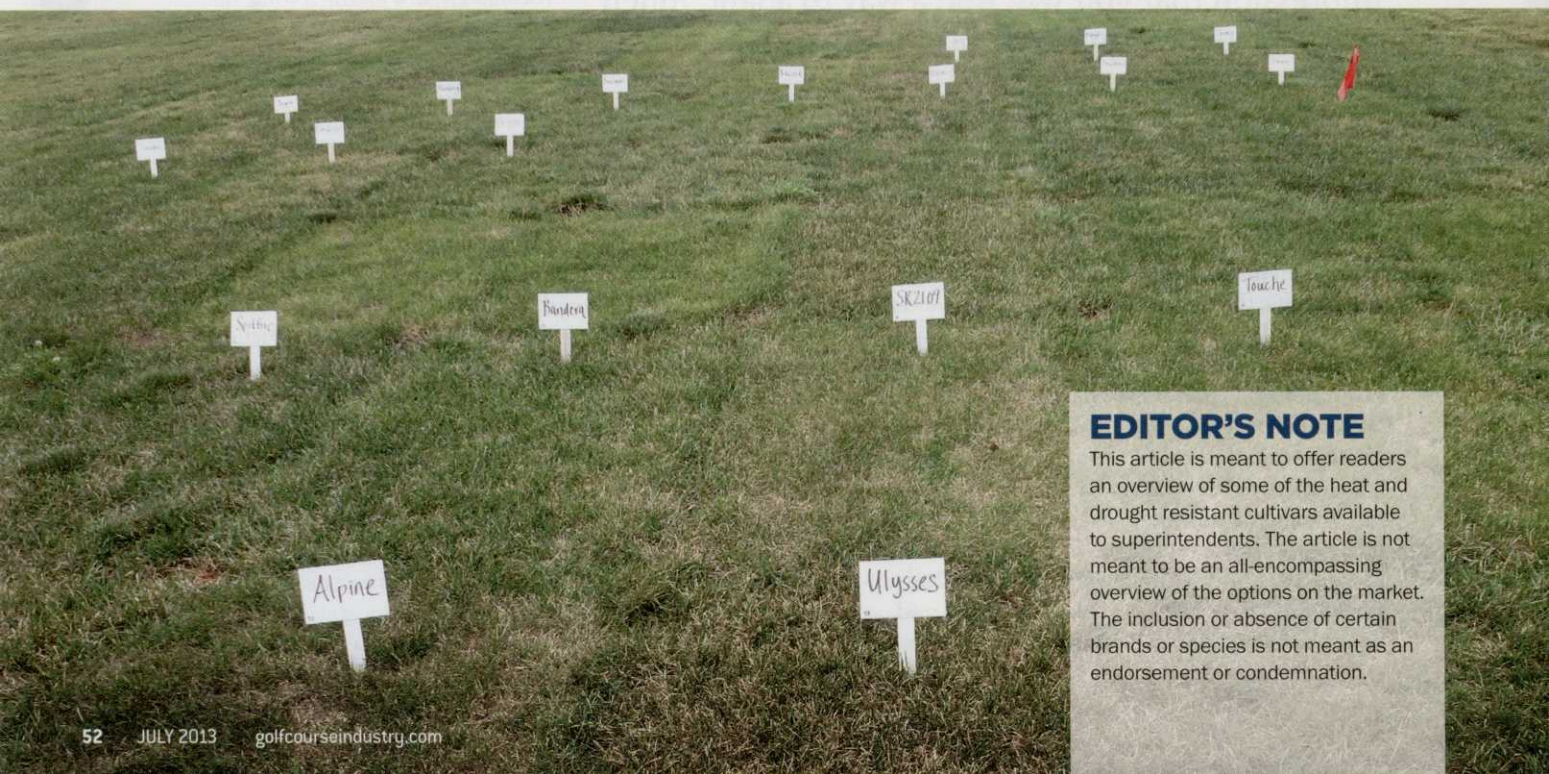
Brilman notes grasses that show good heat tolerance can also be water savers. "Some of our newer creeping bentgrasses, especially 007, Tyee and MacKenzie (yes, it's named after golf course architect Alister MacKenzie) have done really well under heat and drought stress."

Developed with germplasm from Rutgers University, the new "super bents" show better overall performance on golf courses. In addition to water conservation, they tolerate heat and are less attractive to typical turf insects while resisting turf diseases as well.

Penncross bentgrass, released in 1955, was developed at Penn State and is a long-time favorite. Its progeny includes a line of "Penn" bentgrass cultivars. Two of the newest are Pure Distinction and Crystal BlueLinks from Tee-2-Green. "Pure Distinction is a brand-new bentgrass," says Lew Sharp agronomist and golf course consultant for the company in

KEY POINTS

- In addition to turfgrass breeding and management, efficient irrigation systems are required to maximize water savings.
- Grasses that show solid heat tolerance traits can also be effective water savers.
- New "super bents" exhibit solid performance on golf courses and offer water conservation, heat tolerance, as well as disease and pest resistance.
- A number of water-saving turf varieties, including tall fescue, are available for fairways, roughs and out-of-play areas.
- Only recently have turf researchers realized how some varieties of Kentucky bluegrass exhibit drought tolerance.
- Conducting your due diligence with regard to water-saving turfgrass is critical when selecting the right turfgrass variety for your course.



EDITOR'S NOTE

This article is meant to offer readers an overview of some of the heat and drought resistant cultivars available to superintendents. The article is not meant to be an all-encompassing overview of the options on the market. The inclusion or absence of certain brands or species is not meant as an endorsement or condemnation.



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“You’ll likely be living with the turfgrass variety you choose for years. Research and choose the best varieties available.”

– Murray Wingate, Lebanon Turf Products

Hubbard, Ore. “It has four times the root mass of other grasses in the market. It actually likes drier conditions, so it requires less water and fewer inputs than other varieties. It will really save time and money.”

Crystal BlueLinks can also take the heat with ease. “Crystal BlueLinks requires less fertilizer, water, and fungicides to stay healthy,” Sharp says. “It establishes very quickly with very deep roots, and great lateral growth.”

Most “high density” bentgrasses require a bit more management to control thatch. Top dressing and verticutting are usually recommended. However, the water savings, plus lower inputs of pesticides and fertilizers, more than make it worth the slight extra effort.

To adapt to the drier, hotter conditions of the South and West, Bermudagrass is often used. Its biggest drawback is its brown color during winter dormancy. While some courses accept that “brown is the new green,” although most still overseed with perennial ryegrass.

There is a dizzying selection of perennial ryegrass on the market, and while quick establishment and a smooth spring transition are probably the two biggest concerns, saving water

is also a huge issue in regions where Bermudagrass thrives.

“Pennington’s APR 2015 is qualified as a ‘Water Star’ and is showing great drought tolerance for a ryegrass,” says Russ Nicholson, chief agronomist for Pennington in Madison, Ga. It will be available this fall.

Nicholson is active in the Turfgrass Water Conservation Alliance (TWCA), a non-profit organization working to establish a scientific method to distinguish water-saving turf varieties. Grasses are established under optimum conditions, then subjected to drought stress.

Integra II was bred for wear tolerance and disease resistance, but was tested and certified as a Water Star; the same goes for Applaud II. Both boast solid color and quick establishment.

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For fairways, roughs and out-of-play areas, there are many turfgrass choices that can make every last drop count. Tall fescues are a popular choice for landscapes, but double as a good choice for roughs. It's tall mowing height allows it to grow massive roots so that irrigation schedules can be stretched to the limit.

Monet or Van Gogh are recommended if you are renovating, says Murray Wingate, turfgrass marketing and sales manager at Lebanon Turf Products. Monet received consistent high rankings in NTEP (National Turfgrass Evaluation Program) trails for overall quality, traffic stress and fall density. Van Gogh was singled out for its outstanding drought tolerance amid a field of low-water-use tall fescues, and was high in overall quality as well.

Hard fescues can be allowed to go without mowing for weeks, notes Nicholson. "A new one released this fall is Survivor. It's good for out-of-play areas; kind of an ecology mix meadow setting," he says. "If you don't fertilize heavily you only need to mow once a month or not at all. It's shorter than your knee, and you can still go out and find a ball in it. A lot of guys will add wildflowers so you have some color there, too."

Kentucky bluegrass has fallen in and out of favor for fairways, but with improved varieties over the past five years, is now once again recommended. "Mallard, Monte Carlo and Ridgeline all have disease resistance and tolerate wear very well," says Nicholson. "But it's only in the past couple years that we found out how drought tolerant they are. It gave them a new lease on life and we are pumping out a lot of seed now."

Choosing the right Kentucky bluegrass can make a noticeable difference in a water budget. "Kansas State University ran drought trials with bluegrasses," Dr. Brilman explains. "Over the course of four months, some only needed eight inches of water; others needed 22 inches."

Whatever your need, there is a water-saving turfgrass to fill it. Do your homework to find out which cultivars do the best in your region. Use the research by universities and NTEP. "You'll likely be living with the turfgrass variety you choose for years," says Wingate. "Research and choose the best varieties available." **GCI**

Helen M. Stone is a West Coast freelance writer and a frequent GCI contributor.



Desert Mountain in Scottsdale, Ariz., The Cochise Course.



FOR MORE

For more information about the National Turfgrass Evaluation Program (NTEP) enter www.ntep.org into your web browser to check out the website. Enter bit.ly/16dShA7 into your web browser to read the Green section Record article, Report Card for Turfgrasses. You can also check out the July 2011 Green Section Record article, Searching For the Right Stuff: Tolerating Hot and Dry, by entering bit.ly/16EsS3y into your web browser.

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Bill Brown, CGCS, is CEO of Turf Republic and founder of iTurf Apps. Bill has spent 20 years on golf courses, including the last 5 years at Hartefeld National Golf Club. He's served as an officer and board of director for the Philadelphia Association of Golf Course Superintendents, as well as served on national committees. Contact him at billbrown@turfpublic.com.

NODE TO NODE TO TODAY

As I embark on my first social media column with Golf Course Industry, it is a bit ironic that it is the magazine's annual water issue. I am going to a place I reference often, so please bear with me. In my announcement assuming the role of CEO of the new startup Turf Republic, I referenced Steve Jobs' commencement address. In it, Steve talks about connecting the dots:

"... you can't connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will somehow connect in your future. You have to trust in something – your gut, destiny, life, karma, whatever." This really couldn't be more true and I would be willing to guarantee if you all took a moment to look back, your dots would connect too."

So what does connecting the dots have to do with me, water, GCI, Turf Republic and social media? Some of you may think I'm already stretching the column – long internodes between the nodes, to put it in turf terms – but I'm not.

I have always been a tech guy. I like to reside on technology's cutting edge and I like to stand at the front of the line when the "next big thing" comes out. When social media hit the scene, it was innovative and cool and I, of course, jumped on.

Back then it was about Brittney Spears shaving

Who could forget #whosgotmyhose and the #LSOT awards? Both of these hashtags served a very good purpose; one for learning and the other for release.

her head and what Starbucks Ashton Kutcher was going to order a latte. Social media in our industry took root in 2009. Many of us turned to social media, a much larger diverse network, to solve our problems. I tell this story often in my social media seminars. The first time social media had an impact on me professionally was on a Friday in July of 2009. A fellow superintendent was looking for help, his pump station had gone down. He tweeted some photos and symptoms of the issue. Colleagues began chiming in and sharing their thoughts and experiences with this particular type of pump station. By day's end, social media and the intuitive-

ness of interconnected superintendents combined to fix the pump station.

The summer we all wish to forget came next, the summer of 2010. Social media flexed its muscle power that summer. Who could forget #whosgotmyhose and the #LSOT awards? Both of these hashtags served an integral purpose; one for learning and the other for release. Water was a big topic of conversation in 2010. I wrote a few columns that summer focused on utilizing soil moisture meters, and remote access via iPhone and iPad to control irrigation cycles.

The summer of 2010 an idea was born – Turf Republic. Some think this was a whim, something thrown together to bring a more social approach to turf. However, those who know me and understand how I operate, know what Turf Republic is built on and the type of impact it will make. The vision, philosophies and assets of Turf Republic come from an understanding of where we are and where we need to be in the future.

While Turf Republic is young, I could not be more excited about the direction it's going.

So how do we connect these dots, nodes to internodes?

Well, I have trusted my instinct my entire career and life, for that matter. I have had ideas, some good some bad, but have always gone with them. Even the bad ideas have their dots connected. So you may wonder how we go from me in 2009 to today writing a column for Golf Course Industry's water issue? Well my love for technology and passion for the industry paved the way for my use of social media and the genesis of my iTurf Apps platform in 2009. The first time social media made an impact for me was in 2009 when several of us assisted breathing life back into an irrigation pump station for a fellow superintendent. In 2010, social media helped an entire industry endure one of the toughest summers on record. It also educated us in many areas on water and turf management. That same year an idea called Turf Republic was born, and early this year a phone call that had the words "So what's this Turf Republic?" brings me to where I am today.

I look forward to this new journey with you all and look forward to the future and connecting more dots. **GCI**



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by Katie Tuttle

It's not easy being GREEN

So your pond is overrun with algae. Don't fret. Here are three diverse treatments to bring your water back into shape.

When people think of golf courses, the first thing that probably comes to mind is the idea of lush, green, well-manicured greens. However, ponds, reservoirs and hazards on your course are just as important to keep looking good and healthy.

If you are looking for a product to help keep algae off your ponds and water hazards, Colleen Clifford, marketing manager at Aquatrols, suggests using their product Radiance, which is different from most algaecides.

"You have to spray [other products] across the surface," she says. "As it falls through the water column, it kills the algae on the way down. And then it [lands]

on the bottom of the pond, or the water area, and sits there. After years of treating the water area, you end up getting copper landing and building up on the bottom, which really you don't want there."

Radiance, however, is different. "Instead of having to spray it across the top, you swish it up in a bucket of water and chuck it out into the water on top of the surface, and it will automatically disperse itself. It disperses vertically and horizontally, so it's everywhere in the water column," Clifford says. "As the copper attaches to the algae and kills it, all the free copper that's left then spreads out further until all of it is used up. It works a little better

from a long term maintenance standpoint because you don't have that recurring bloom."

Although Clifford suggests using Radiance over other copper products when controlling algae long term, she doesn't suggest it for a large infestation of algae. Instead, she recommends a standard-based copper product.

"It works better maintaining against low levels and continuous, it's not a knock-down product," she says.

No matter what you choose to do to help maintain your water, it's best to always start as early in the season as possible. This is because there will be less algae to kill, so you're more likely to kill a majority of it. Any algae not

killed will rebloom and continue the problem.

Another reason to kill it early in the season is that the lower the algae count is at the initial kill, the less likely it is to damage the pond life around it. As the algae dies and decays, it causes a crash in the oxygen level, and a large enough crash could kill the fish in the pond.

If you're in the process of creating or renovating the ponds on your course, there are ways to proactively prevent algae from taking over the water. Kyle Kanny, superintendent at River Ridge Golf Course in Oxnard, Calif., says a lot of their algae control is managed by the pond structure.

"Our first course has eight acres of lakes but they are only six feet deep at the deepest point," says Kanny. "This allows the water to heat up and water temperature is a key component of algae development." Because of this, algae was able to grow and spread across the pond.

On the second course, the lakes were built at a minimum of 15 feet, which allows the temperatures to stay cooler. However, the water can't be allowed to just stay still.



A golf course pond before and after treatment with Aqua-T



Before treatment, this lake at River Ridge Golf Course was wall-to-wall algae.

"It's important to mix the water so there isn't a layering of temps," says Kanny. "This can be accomplished with fountains and aeration bubblers."

Another tip Kanny has is to avoid as much fertilizer runoff as possible.

"Avoiding fertilizer runoff into lakes is critical, as dissolved nutrients that stimulate aquatic plant growth can result in the depletion of dissolved oxygen, or eutrophication," he says. A downside to the ponds on the first course, on top of being shallow, was that the course was located near an operating landfill. Because of this, they were inundated with seagulls.

"[They] provided a layer of guano that provided the nutrients necessary to grow an algae layer that, when we killed it with chemicals would sink and add to that 'organic' layer," Kanny says. It became a vicious cycle.

When this happened, Kanny realized they had to remove the organic layer at the bottom of the lake, which they did by having US AquaVac vacuum the lake bed and collect the sediment into a geotextile bag.

"This process reestablished our depth and removed the nutrient source."

"Our first course has eight acres of lakes but they are only six feet deep at the deepest point. This allows the water to heat up and **water temperature is a key component** of algae development."

— Kyle Kanny, River Ridge Golf Course

US AquaVac doesn't just specialize in algae. They advertise their services to provide "muck, sludge, silt, and sediment removal services to re-establish your pond's bottom and greatly reduce the amount of bacteria, toxic gases, ammonias, bad odors, and algae that accumulate over time."

If you are looking for an eco-friendly way to keep your pond maintained, you might want to try Aqua-T, a product by Ecologel Solutions. Unlike most algaecides, Aqua-T is completely biological. According to Jim Spindler, agronomist for Ecologel Solutions, the product is made up of thousands of naturally occurring bacteria, which are already found in ponds. When put in the water, the bacteria eat the nutrients that cause algae bloom.

"It takes the organic material that's in the water solution and starts digesting it," says Spindler.

If you deny the algae the nutrients it needs, you will prevent it

from having the ability to bloom.

"By denying a food source, you not only will kill off existing blooms, you also help prevent future blooms from occurring," says Sarah Spatola, marketing coordinator for Ecologel. "[However] you're not going to see a knock out right away. It's going to take some time."

Since Aqua-T is not meant to be a curative, it can be put down at any time, although spring (when the water temperatures start to rise) is best. It's also important for people to note that it will not give immediate results. Instead it should be used as more of a preventative and a program product.

"Some people will use it in conjunction with another algaecide," says Spindler. "They kill algae and then start an Aqua-T program to start taking away the nutrients that the algae would normally use. It's a program where you've got to regularly apply the bacteria. We keep

the population numbers of the bacteria up so we recommend to go out with an initial dose that gets the numbers high, and then every two weeks add some more bacteria to keep the numbers high and continually working on those nutrients in that water."

Spindler says others have used a dye to keep sunlight from reaching the algae.

"The algae is a simple plant that needs sunlight as well as nutrients, so using a dye with Aqua-T will also help. If it doesn't have sunlight and it doesn't have food, it's not going to go very far." **GCI**

Katie Tuttle is GCI's assistant editor.

For some interesting insight into how superintendents dealt with pond algae nearly 75 years ago, check out Blast From The Past in the iPad or iPhone app version of this story.



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

TURF'S MOST IMPORTANT CHALLENGE

In a recent visit with my 4-year-old granddaughter, Ella, she introduced me to her new neighbor and playmate, Lucy.

"This is my grandpa," Ella said, adding, "He makes a lot of funny noises!"

Clearly, Ella thinks I am firmly settled in geezer land!

She might be right. After all, I've been involved in the golf turf industry for nearly 50 years. What changes I have seen in those five decades.

Today's equipment barely resembles those used in the 60s. A strong argument could be made that turf irrigation has experienced more change and progress than anything else a superintendent manages.

My first working experience on a golf course was at a very nice private club. It was in the middle 60s and the fairways were not irrigated, except for a few areas we tried to water with a Rain Train traveling sprinkler. The course was bordered on three sides by the University of Wisconsin Arboretum, and during dry periods we worried about a grass fire that could move into the wooded arboretum. We kept the John Bean sprayer filled with water and ready to go.

The club decided to make a major improvement and invest in an automatic irrigation system with electro-mechanical controllers, the first in our state. We had green fairways! The installation was so impressive that we hosted a WGCSPA meeting and the afternoon was spent with demonstrations and education about this watering system marvel.

I interned at a nice club that had center row quick couplers valves for fairway irrigation. The valves were about 80 feet apart – too close and the result was chronic wet areas in the middle of fairways. Greens and tees were watered from a sod cup in the center of each. It was quite a sight to

see a John Deere 310 backhoe parked on the 18th green one day, digging up a leaky steel pipe in the middle of the green! Obviously, uneven distribution was a problem with all systems like this one, and the use of Cushmans and a night employee created issues, too.

I was hired to manage a private course that had the first irrigated fairways in Wisconsin. The system I inherited was installed by the famed irrigation engineer Scott Stewart in '38 and we were still using it in '73.

When I look back to watching my grandfather use a forked stick to dowse for spring water on his farm, to contemporary golf course irrigation considerations, I really do feel my age.

Greens and tees were still watered with hose and roller base sprinklers. We quickly updated to provide perimeter irrigation, but we still had to wrestle with finding and training someone to do the watering at night. The fairway valves were 100 feet apart and we did a lot of hand watering to even out distribution.

We got caught up in '88 with a Toro Network 8000 system. A good investment, yet long before I retired it was becoming outdated. Since then, the club has replaced controllers and heads, working toward every superintendent's goal of uniform coverage.

And so it has been all across golf. For me, at least sourcing water wasn't an overwhelming problem; after all, we get 34.5 inches of precipitation per year and the course is on the shores of a lake. We have riparian rights and although we have to filter the water, it is reliable and the cost is basically the cost of electricity to pump it up and onto the course. Not so in other parts of the country. Water shortages have forced new technologies, acceptance

of recycled water and changes in areas irrigated. The limits of water sources have initiated breeding programs in search for drought tolerant grasses suitable for golf.

Pump stations have undergone substantial engineering improvements. I started with a small building, a huge pressure tank and water probe, and left a top-notch poured concrete building with variable frequency controls. It was reliable and efficient.

I have witnessed huge improve-

ments in turf cultivation equipment and the positive effects those machines have had on turf rooting and the resultant decrease in water requirements. Also, superintendents have taken advantage of the wide range of surfactant products available, which have made our use of water more efficient. They aid with infiltration and retention and are key components of many water management programs on golf courses.

Our golf course was built in 1920, and I have always marveled at the careful grading that was done to move surface water around the course. Today we see civil engineers designing grading projects for golf courses to divert and capture storm water and urban runoff for use in irrigation.

Let's not forget how much weather forecasting has improved in recent years. Every superintendent now has access to forecasting not even imagined a few years ago. Those forecasts

(MILLER continues on page 79)

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THE LEADER. SINCE 1961.

Due to DEW

Summer means overnight humidity, dew and disease pressure. Here are ways to prevent that morning moisture from destroying your turf. By Katie Tuttle

As the summer weather starts to heat up, superintendents across the country are turning some of their focus to the turf diseases that come with the change in temperature and weather conditions; diseases such as dollar spot (*Sclerotinia homoeocarpa*) and brown patch (*Rhizoctonia solani*), which can be detrimental to the turf.

"All pathogenic fungi can facilitate themselves very well in moist conditions," says Carmen Magro, Chief Agronomist at Agronomy Management Solutions. "Anytime there's free moisture on the leaves, infections can take place as soon as there's an opportunity for that infection to get in that plant."

Because of this, it's suggested that course superintendents

initiate a regular dew removal routine. There is plenty of research out there to support the idea that dew removal directly links to a potential decrease of diseases, such as dollar spot and brown patch. Because of this, it might be beneficial for superintendents to consider adding a dew removal program to their summer maintenance if they don't already implement one.

There are multiple ways courses can remove dew from both the fairway and putting greens. The first is to use a surfactant. Another way is by syringing, or using a backpack sprayer with tap water to simulate irrigation. However, this may not be your best option.

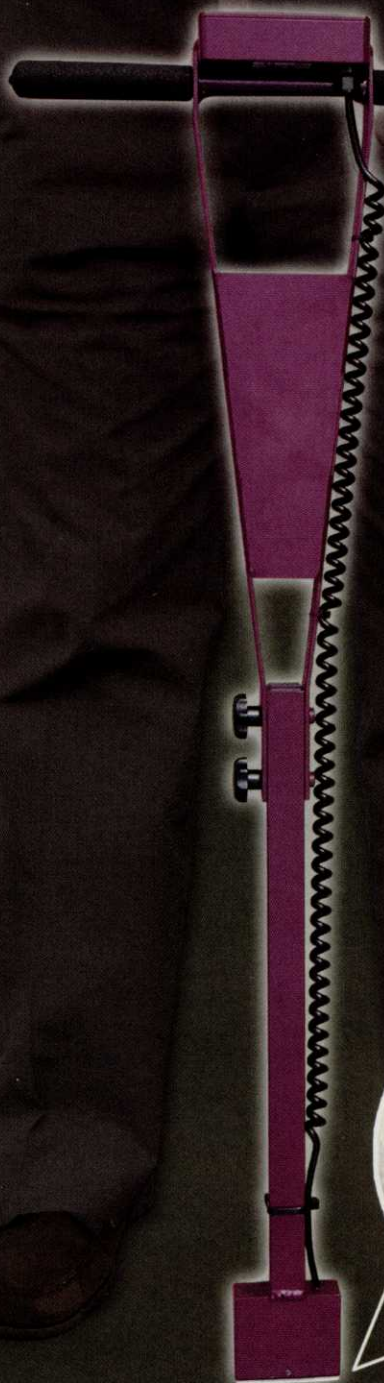
"It seems kind of odd that you would remove water with water," says Magro. "It's not exactly environmentally the right





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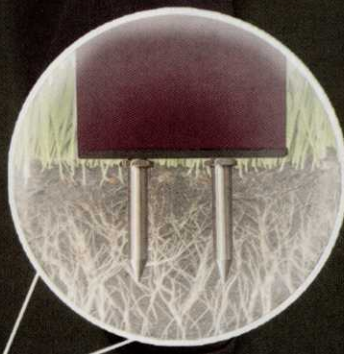
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This image illustrates a dew layer on a putting green. Notice how the dew encapsulates the entire leaf blade in many parts. This layer allows a medium for pathogenic fungi to move around, reproduce and lead to increased disease pressure on the underlying turfgrass.

“On warm nights, when we have cooler weather and dryer weather, we see less disease pressure because diseases mainly thrive in warm or hot weather with moist conditions,”

— says Carmen Magro, Agronomy Management Solutions.

thing to do.”

A third technique courses can use to remove dew is by dragging rubber hoses across the fairway and putting greens.

While some courses also mow, and it's actually recommended as a technique, Magro says this might not be a good idea either. His reason is that the blades of grass grow a waxy layer used to seal off wounds and protect the plant from diseases.

“When we mow it, we cut into that layer and we open up a channel to get into the vascular system of the plant,” he says. “If there's a lot of moisture on the leaves, and if there are pathogens floating around, it's an entry point for that pathogen.”

These four techniques were all tested in a 1993 study out of the University of Kentucky. The testing was to determine which technique had the least amount of moisture remaining after treatment, and which technique resulted in a reduction of dollar spot on the turf. Another technique used in the study was to roll large, sponge-covered rollers over the grass, similar to the rollers used to remove water from tennis courts. The assumption was that they would be just as effective in dew removal.

The almost two month study found that rolling and mowing were the most effective at removing the dew from the turf. Despite what Magro said about mowing, the study

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also found that mowing the dew reduced dollar spot by 78 percent on the fairway and 43 percent on the putting green. On the putting green, the clippings were collected, whereas the clippings were returned on the fairway. The other four techniques tried also reduced dollar spot on the fairway, but not as significantly. On the putting green, the research didn't see a significant reduction in dollar spot from the other four techniques.

Of course, dollar spot as a result of dew also depends on the location of your golf course. A disease has to have an environment to thrive in, so if your course's envi-

ronment isn't ideal, you may not see this problem at all.

"On warm nights, when we have cooler weather and dryer weather, we see less disease pressure because diseases mainly thrive in warm or hot weather with moist conditions," says Magro. "[A course in Phoenix] could be growing the same creeping bentgrass that a course in New York is growing, but the same grasses will contract diseases in the eastern states that they'll never see out in Phoenix. It's not to say that you can't see them out there, it's just not as prevalent because the conditions aren't there for that



MANAGING DEW: Key techniques

As mentioned in the article, there are many different ways that courses can remove dew from fairways and putting greens. Below is a list comprised of techniques mentioned by Carmen Magro, the study by the University of Kentucky, and the study by Delvalle, Landschoot, and Kaminski.

- Wetting agent – a nonionic surfactant was applied once per week during the experiments."
- Syringing – A backpack sprayer with tap water was used to simulate irrigation on these small plots."
- Dragging with hoses – Both the putting green and the fairway were dragged with a 3/8-inch-diameter rubber hose."
- Mowing – Clippings were collected on the putting green test but returned on the fairway test."
- Rolling – The plots were rolled with a sponge-covered roller to absorb leaf surface moisture. The roller drum was 24 inches in diameter and was covered with a 3/4 -inch-thick sponge, which was compressed at the top of the drum by a smaller solid roller to deposit the moisture into a catch pan in the interior of the drum."
- Dew was removed...by driving a Toro ReelMaster 5400-D across the dew removal treatment plots prior to mowing, with mowing units lowered and resting on the turf but reels disengaged."
- Going out and whipping off the dew with dew poles."

According to the University of Kentucky study, it might also be in your best interests to do a combination of these treatments on your course, such as dragging fairways with hoses or syringing early in the morning on the days that your staff doesn't mow.

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disease to grow."

It's not just dew that causes a problem. In fact, the largest problem is caused by guttation water, moisture which comes directly from the plant. Guttation water is the result of photosynthesis and contains a lot of sugars, which contains compounds that pathogens may use as nitrogen and carbon sources, causing bacteria and fungi to thrive. That's why it's beneficial to remove the dew before you mow, because it's not just plain, clean water.

"During [a plant's restoration period], the plant will exude, or release moisture through the leaves, through little pores in the leaves, and that water builds up on the leaf surface," says Magro.

For more information...

Looking for more information about managing dew on your course? Enter the following address into your Web browser to access these articles.

DEW THE RIGHT THING

Superintendents Often Remove Dew From Fairway Turf During The Early Morning As A Courtesy To Golfers, But Are There More Benefits To This Practice Than Golfer Satisfaction?

bit.ly/14GpuoE

DEW IT THIS WAY

Preparing fairway turf doesn't have to be a drag.

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"The combination of that and dew adds a lot of moisture for diseases to facilitate themselves and these pathogens can reproduce and grow."

A 2010 study done by Tanner Delvalle, Peter Landschoot, Ph.D. and John Kaminski, Ph.D found that not only can dew removal decrease diseases, but it can also result in an improvement of your fungicide program. This information may make it more tempting for superintendents to take the time and money to increase dew removal on their course, especially if the improvement in your fungicide program could result in money saved.

According to the study, "results showed that daily dew removal and increasing mowing frequency from 2 to 6 days per week in late summer resulted in a reduction of dollar spot and improvement in the performance of chlorothalonil, propiconazole, and iprodione fungicides." However, it also stated that "Daily dew removal in late summer reduced dollar spot regardless of mowing frequency or fungicide products."

"From a disease management perspective, removing dew appears to be more cost effective than increasing mowing frequency," the study says.

Something for superintendents to consider is that dew removal doesn't just affect disease control.

"It's likely most superinten-

Watch it

In this short video, the maintenance crew at Sun Valley's Trail Creek golf course, Sun Valley, Idaho, remove the dew from fairway No. 1 in preparation for a golf tournament. Using a specially prepared hose connected to the two vehicles the grounds workers drag each fairway to remove the thick dew.

Enter the youtu.be/4eMmKFjgpAM into your Web browser to watch the video now.

dents use this practice more for improving playing conditions (reduction in surface wetness) and dispersal of grass clippings and earthworm castings, than for disease suppression."

Another benefit could be an overall savings to the cost of your disease prevention programs, although the study states that it cannot guarantee that.


"Although results of this study do not provide enough information to establish a definite

economic benefit from dew removal practices, they do suggest that dollar spot severity can be reduced when daily dew removal is practiced on fungicide-treated turf...There is no guarantee this practice will pay for itself through a reduction in fungicide use, but it's likely you will have less dollar spot and improved playing conditions." GCI

Katie Tuttle is GCI's associate editor.



It's beneficial to remove the dew before you mow.



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

4 WAYS TO CONTROL WATER COSTS

There's an ancient Arab proverb that says, "It is wise to bring some water when one goes out to look for water."

The maxim holds true today as well as it did in ancient times, especially for managers and superintendents of golf courses. The search for water – at least the readily available and affordable type – can be a laborious and expensive process, so you better come prepared.

CONSIDER THE FOLLOWING:

- The cost of water per golf round – if one assumes an average of 30,000 rounds per year – ranges from \$8 to \$50 per round.
- Since 1970, the total annual cost of irrigating a golf course in the arid regions of the U.S. has increased from roughly \$12,000 to more than \$250,000.

Accessing adequate supplies of water and effectively managing its use is one of golf's biggest challenges. The scarcity of water, the difficulty accessing it and the uncertainty over its future availability and price leave

against three characteristics: 1) price per unit (gallon or acre foot), 2) total units consumed, and 3) cost per source. Then evaluate other supply alternatives. Water professionals follow a calculated process when conducting an audit. They review the current source and cost, compare costs with comparable benchmarks, identify and evaluate the cost of potential alternative sources and, finally, assess the financial and legal feasibility of making a change.

TRANSITION TO A CHEAPER SOURCE.

This is assuming that doing so is legal and permissible. Matt Payne, a water resource expert at WestWater Research, the Boise, Idaho-based water rights advisory firm, says: "Gaining water independence can improve supply reliability and eliminate exposure to the risk of increasing water rates. Most water users do not understand how to or even that they may shop water sources." Many golf courses receive water from a local utility or from the source most convenient when the original needed to secure an



law and regulations. Herrema and others with similar expertise advise their clients that possession of a secure and affordable water source is – in many cases – even more valuable than land. To confirm that your access to water is secure for the long term, you may want to employ the services of an expert. The team with the best players usually wins at this game too.

OPTIMIZE WATER ASSET MANAGEMENT

TACTICS. According to Clay Landry, the managing director at WestWater, which works with the U.S. Department of Interior and the Internal Revenue Service among others, observes: "Some courses hold large water rights that are not fully utilized. These rights represent potentially valuable assets." He advises clients to monetize water rights and excess capacity, noting that a course may own rights to excess capacity that can be very attractive on the open market.

Golf businesses are struggling with the high costs and restrictions for acquiring and using water. In many cases, the solutions are readily available but have not been fully explored. It's time for golf course owners, operators and superintendent to evaluate new solutions and options to manage their use of water. **GCI**

Golf businesses are struggling with the **high costs and restrictions** for acquiring and using water. In many cases, the solutions are readily available but have not been fully explored.

many courses in a virtual desert.

Many golf managers and superintendents understand full well the challenges water presents, but lack knowledge of how best to manage this critical element of their operation and budget. Here are four ways that courses can control or reduce water supply costs.

CONDUCT A WATER AUDIT. Compare your water bill to competing courses

irrigation source. That source may no longer be the best solution. Shopping the market may uncover new options, including buying a water right.

WORK WITH EXPERTS. The widespread issues surrounding water rights, availability and use have spawned a specialized category of experts. Attorneys such as Brad Herrema at Denver-based Brownstein Hyatt Farber Schreck specialize in water-use

PRESERVING HISTORY... AND WATER

Meadow Club's David Sexton details his high standards for water conservation. by Helen M. Stone

Tucked away in the mountains by the San Francisco Bay, the Meadow Club is a pristine hideaway near one of California's most developed areas. In 1927, Dr. Alister MacKenzie designed his first golf course in the United States in Fairfax, taking advantage of the wide-open native grasslands and breathtaking vistas. The British golf course architect, whose designs were considered among the finest in the world, had already designed courses on three other continents.

The course rapidly became a Bay Area institution, but the original design was gradually compromised as more and more trees were planted. Director of Grounds Management David Sexton, CGCS, ruefully admits to contributing to the overgrowth more than 30 years ago when he came aboard. "If I had it to do over, I wouldn't have planted as many trees back in the '80s because we're taking them out now," he says. "The Meadow Club was called that for a reason."

In 1998, under the direction

of golf course architect Mike DeVries, the club began a six-year restoration to MacKenzie's original vision. The slow renovation place allowed for members to keep playing the course and gradually become accustomed to the newly-opened landscape and unique bunkers. The current superintendent, Sean Tully, was hired as an assistant shortly before the renovation, and took the course helm when Sexton "semi-retired" in 2010.

During and after the restoration, water conservation was always in the forefront of Sexton's consciousness. "The irrigation system was upgraded, but it wasn't replaced," he says, noting the present irrigation system was installed in 1984. "We've kept very close records from year to year; now going on over 20 years. We've had the SitePro(R) and weather station and we've created a pretty good site-specific model."

Sexton takes full advantage of irrigation technology. "We probably have 80 or 90 various irrigation programs that we run and we have five TDR 300 moisture meters that we use all over the course."

Sexton sets high standards for his water conservation efforts. "I take the ETs I get from my weather station and compare that to the water we pump and purchase; I keep track from year to year and I come up with a value of how much I'm pumping in relation to the amount of ET that the course needs,"



"We've kept very close [water use] records from year to year; now going on over 20 years."

— David Sexton, Meadow Club

he explains. "So I have a true weather-adjusted value that I can compare year to year, with the goal to improve it every year. We managed to improve for eight years... last year was the first year that we didn't."

Sexton took that as a call to action. "That tells me I need to get in there and take a good look at all the sprinklers. So this year we're going in and doing a complete top-to-bottom cleaning and replacing parts," he says.

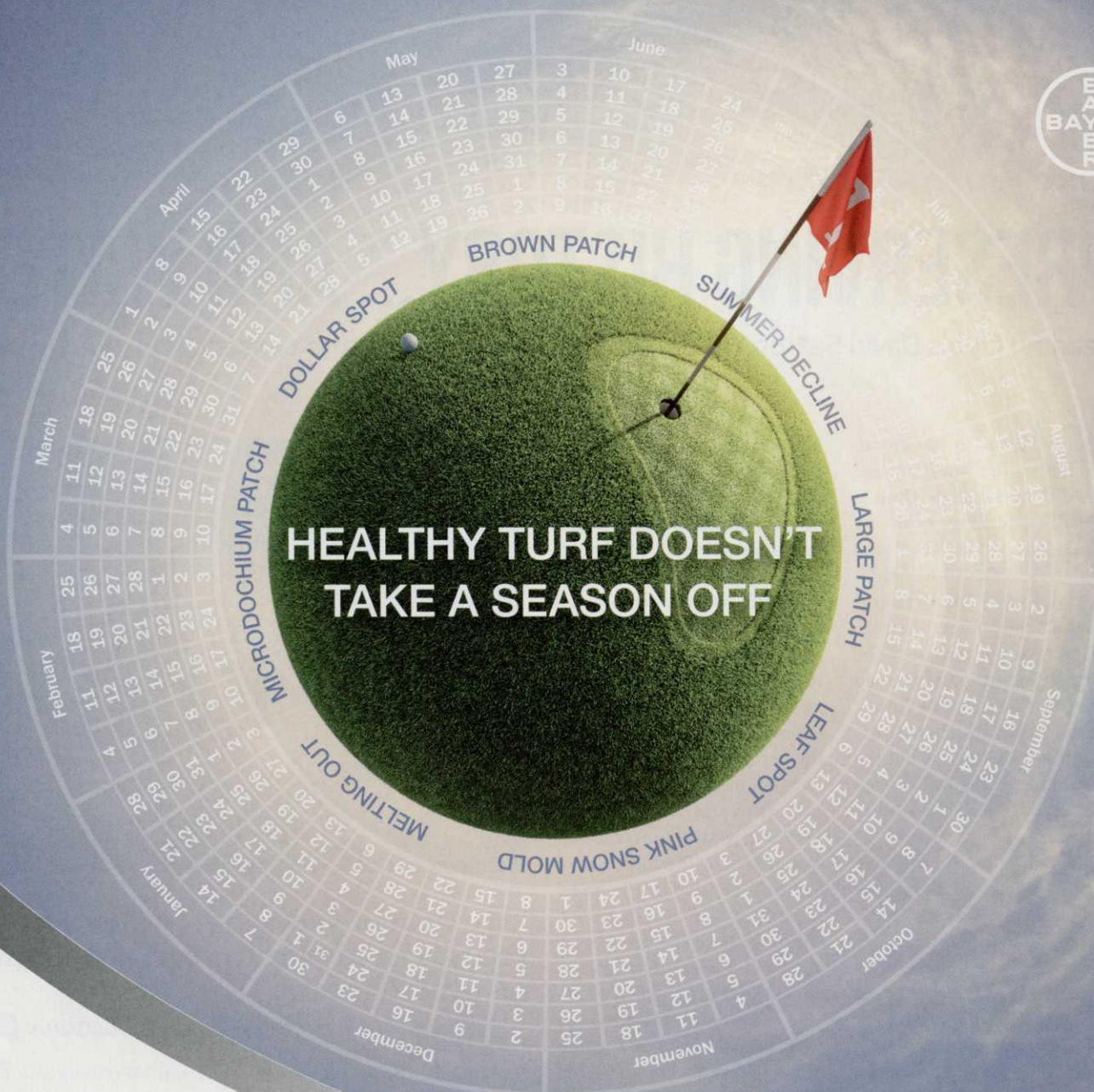
The pump controllers are slated for an upgrade, as well. "We're also changing the pumps to a variable frequency drive. It's about a \$55,000 job, but it should give me a smoother system with less water hammer

and run everything at a lower pressure," he explains. "I think it will be a very positive improvement and keep the replacement of the irrigation system in the far future. And we can get back on track and improve our water savings every year."

In addition to technology, intensively managed turf has been replaced with native species. "We've probably knocked off 15 acres of turf," Sexton notes. "We lead an annual nature walk on the course. We're in tune with the natural world and the members support that." GCI

Helen M. Stone is a freelance writer on the West Coast and a frequent GCI contributor.





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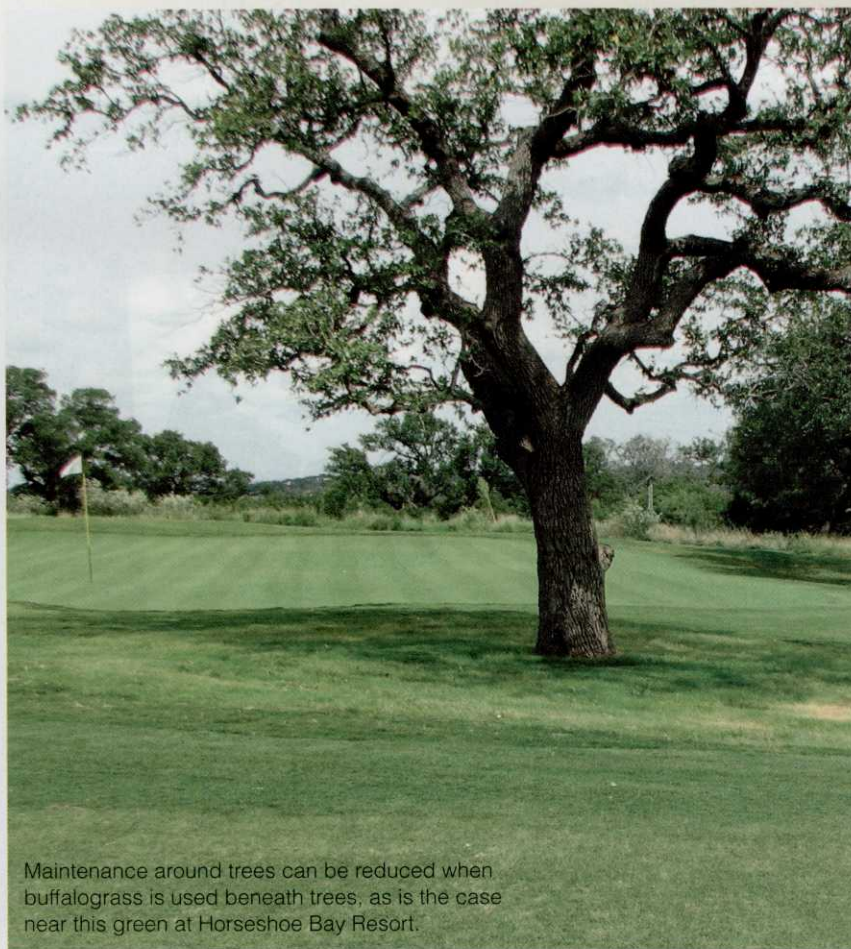


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BY TY MCCLELLAN AND BUD WHITE

Buffalograss on the Golf Course

Two Case Studies at Golf Facilities in Drought-Stricken Texas Highlight Buffalograss' Value as a Low-Maintenance Turf Requiring Less Water



Maintenance around trees can be reduced when buffalograss is used beneath trees, as is the case near this green at Horseshoe Bay Resort.

Let's face it; buffalograss (*Buchloe dactyloides*) is rarely given serious consideration for use on golf courses. It has never been in vogue, but this should change for several regions in the U.S. Before writing off buffalograss as an option for your golf facility, this article features two case studies combined with new information that may be of interest to you.

Most turf managers know that buffalograss is a low-maintenance, warm-season turfgrass with a slow growth rate and excellent drought resistance. It uses less water and requires less mowing and fertilizer than other turfgrasses common to golf. What you may not know is that significant research and turfgrass breeding efforts have been in place for buffalograss in recent decades. Much of this research was funded by the USGA and much of it done at the University of Nebraska-Lincoln (Buffalograss: Tough Native Turfgrass provides a great overview of the history and accomplishments of the buffalograss breeding program at UNL). As a result, there are newer, improved buffalograss varieties now available that possess better density, darker color, finer texture, improved winter hardiness and faster establishment from sod or seed. Newer varieties offer much better quality and playability than previous generations of



Buffalograss works well as a low-maintenance rough, in this case around a zoysiagrass fairway at Briggs Ranch Golf Club near San Antonio, Texas.

buffalograss and are better suited for use on golf courses. If you haven't observed firsthand recent releases of buffalograss varieties, then you almost certainly have a misconception (and likely bias)

against this turfgrass species for golf course use.

At two Texas golf facilities, the availability of improved buffalograss varieties that use less water and resources while providing

playable golf course roughs met the challenges faced during drought conditions in 2011 and 2012. The following two case studies provide details of how buffalograss is well suited to handle heat stress and limited water.

CASE STUDY 1. Briggs Ranch Golf Club, San Antonio, Texas

— Briggs Ranch Golf Club, located in the beautiful and rugged hills west of San Antonio, is a Tom Fazio design that opened in 2001. Its architectural design and features fit perfectly into the surrounding native landscape and terrain. Buffalograss and naturalized areas were included in the layout to reduce maintenance and water use as well as blend the course into its natural

surroundings.

The varieties 'Density,' '609' and 'Eco' were used in the primary and secondary roughs and established with sod. The buffalograss roughs not only require little maintenance, but their bluish hue adds beautiful contrast to the zoysiagrass tees, fairways and intermediate rough. Mowing height is about five inches and the roughs mowed as needed, or about once a month. The density of buffalograss is thick enough to help naturally fend off weed competition and minimize invasion, but not so thick that players have any difficulty finding and playing their golf balls. This is important to point out because the five-inch height of cut does not slow play.

The buffalograss has been virtually pest free, which is an

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Buffalograss provides nice visual definition surrounding bermudagrass tees and goes well with naturalized areas at Horseshoe Bay Resort in Texas. Water use for tee complexes is reduced because buffalograss surrounds are not irrigated; only the bermudagrass teeing surfaces are included in the automatic irrigation design.

other benefit of this species, and it thrives in this dry and difficult environment. As evident during the lack of rainfall in recent years, buffalograss has impressive drought resistance and can maintain its color well into a drought. And if it eventually does go into drought-induced dormancy and turns off-color, it resumes its color and growth quickly after receiving small amounts of rainfall or irrigation.

Fertility is provided by granular pre-emergent herbicide applications on a fertilizer carrier, but little to no fertility is required after establishment. Superintendent Chandler Masters has only been at



Briggs Ranch since July 2012, but he notes that buffalograss is more sensitive than bermudagrass to post-emergent herbicides. However, with the higher height of cut and density of buffalograss, herbicide applications are needed infrequently.

Many consider low-maintenance turfs like buffalograss as only being suited to low-budget facilities or limited to courses not

highly regarded in the golfing community. Not so! The USGA was proud to award the 2012 Women's Mid-Amateur Championship to Briggs Ranch Golf Club. This, one of the USGA's 10 national amateur championships, took place in October 2012, while still in the midst of an extreme drought. Briggs Ranch Golf Club was up to the challenge, in part because of the buffalograss roughs. Not surprising, a majority of the players in this USGA national championship had never experienced buffalograss on a golf course, so naturally there was interest and even a bit of concern about its playability. Rest assured, and after just a few practice rounds, players and USGA officials were impressed with playing conditions...or as pleased as players could be playing from the primary and secondary roughs.



At higher mowing heights, the distinctive buffalograss seedhead will be visible, but it has little, if any, impact on playability.

...or as pleased as players could be playing from the primary and secondary roughs.

CASE STUDY 2. Horseshoe Bay Resort, Horseshoe Bay, Texas - Summit Rock Golf Course, one of four golf facilities at Horseshoe Bay Resort, just opened in 2011 and is a Jack Nicklaus design. The design includes significant thought and planning for turf selection, incorporation of naturalized areas, and the use of low-maintenance turf. Buffalograss is one of the foundation turfs to meet all the criteria of reduced water, low inputs and limited maintenance.

About the authors

Ty McClellan is manager of the USGA Green Section's Education Program and Bud White is director of the Mid-Continent Region. Both agronomists share in their belief that buffalograss should see expanded use on golf facilities in years to come, especially where water is limited and low-maintenance roughs are desired.



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While buffalograss does best in full sun, it is performing well in shaded areas of the deep rough at Briggs Ranch Golf Club.

Ken Gorzycki, CGCS, is director of agronomy at Horseshoe Bay Resort and an active member of the USGA Green Section Committee. He oversaw the grassing details and establishment of this facility. Ken selected buffalograss varieties '609' and 'Density' for the roughs and around teeing surfaces. All buffalograsses were established from sod, and it was slightly more expensive than bermudagrass sod. It was also slightly more difficult to install because it had less sod strength than bermudagrass, but it established nicely, according to Gorzycki. Manual weed removal was used during establishment.

The use of buffalograss in tee surrounds is especially interesting because they are not irrigated; only the bermudagrass teeing surfaces are included in the automatic irrigation design. This greatly reduces water use, and the total irrigated area is less compared to most tee complexes.

Ken reports that the buffalograss roughs and surrounds require very little mowing. It is maintained at 5.5 to 6 inches, and only mowed as needed, usually less than once per month. Gorzycki says the higher the height, the better the density and the less need for mowing, often as little as three times per year. The thin, wispy growth habit does not create a dense turf, and golfers can easily find and play their ball without problems. Weed control is largely accomplished using pre-emergent herbicides and then augmented as needed with post-emergent applications or manual weeding. After establishment, and once the buffalograss reaches maturity, weed pressure is relatively small because of the higher cutting height, low irrigation regime and competitiveness of the buffalograss. Fertility requirements are met predominately from the fertilizer carriers used in granular pre-emerge herbicide applications, as fertility needs are little to none after maturity.

Buffalograss has shown relatively good shade tolerance at Summit Rock, but its weakness is traffic tolerance, both foot and cart. This should be a consideration when identifying areas for establishment.

HELPFUL LINKS AND RESOURCES. This is not the first time buffalograss has been written about in the USGA Green Sec-



Buffalograss possesses good tolerance to traffic, including carts, but damage can still occur where carts do not remain on paths.

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The take-home material has been a big help. I found that simple changes to how I approach certain situations can go a long way in improving our communication and productivity.



Brian White
Wichita Country Club
Wichita, Kan.



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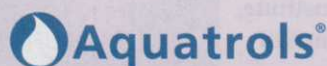
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Real Science

tion Record as a practical turf for use in golf, though it has been a long time. Going back to 1982, an excellent article – Buffalograss – A “New” Turfgrass for Golf Courses? – contains valuable background information, including management and establishment tips for buffalograss. It is suggested reading and it is interesting to note that the justification for buffalograss use then remains the same today: cut costs, reduce maintenance and save water. Further suggested reading and useful information can be found in Low Maintenance Troubles, published in 1998, and Buffalograss Management Research, published in 2002.

With minimal use so far, there remains plenty to be learned regarding establishment and management of buffalograss. Additional resources that may be of interest include the following for buffalograss lawns, albeit they are still useful for golf course roughs. (Editor's Note: See the sidebar “Links” for additional information on how to access the following resources.)

Management of Buffalograss Turf in Nebraska

Buffalograss Management Calendar for Nebraska

Establishing Buffalograss Turf in Nebraska

Buffalograss Establishment and Management Guide from Native Turf Group

‘Cody’ Buffalograss Brochure – Newest Release from Native Turf Group

As with all turfgrass species, buffalograss is not well suited to every golf course or situation. It is a warm-season turfgrass that performs well on most soils, except sand based, and it can be used in many regions of the U.S., but it is best adapted to the Southern Plains, Southwest, and lower Transition Zone where rainfall is less than 30 inches per year with periods of heat and drought during the summer months. Please visit NTEP 2002 National Buffalograss Test or NTEP 2003-2006 Buffalograss Quality Ratings to determine which buffalograss varieties perform best in your region.

CONCLUSION. Given the existing economic climate combined with environmental concerns facing the industry, namely water use and its availability, it is no secret that we need turfgrasses that require less water and fewer inputs. Or, when drought conditions occur, we need turf that can still maintain playability and meet golfer expectations. It is key for almost every golf facility to reach greater economic and environmental sustainability going forward. Fortunately, this aligns nicely with the genetic makeup of buffalograss, the only turfgrass species native to North America.

It is hoped that the information provided in this article provides a fresh perspective on a turfgrass that clearly has potential for use on golf courses but has been rarely utilized. Suffice it to say the potential for buffalograss has never been fully realized. Or perhaps just not until now. An economic downturn that began in 2008 coupled with drought conditions in 2011 and 2012 have exposed weaknesses and needs in the industry, and without such extremes we may have missed the value and practical application of buffalograss. If your golf facility needs a new stand of turf in the roughs, if less maintenance is desired, or if the existing turf is poorly equipped to meet the challenges of limited water availability, then buffalograss may be your answer. **GCI**

Links

Throughout this Real Science article, the authors mentioned a number of resources for additional information on this topic. To access each of these resources, enter the following into your Web browser, respectively. – The Editors.

- Buffalograss: Tough Native Turfgrass – bit.ly/11KLr7
- Buffalograss – A “New” Turfgrass for Golf Courses? – bit.ly/12Ewp2F
- Low Maintenance Troubles – bit.ly/11jOI10
- Buffalograss Management Research – bit.ly/11Uttgt
- NTEP 2002 National Buffalograss Test – bit.ly/1am0aqE
- NTEP 2003-2006 Buffalograss Quality Ratings – bit.ly/1am0aqE
- Management of Buffalograss Turf in Nebraska – bit.ly/18Srvn3
- Buffalograss Management Calendar for Nebraska – bit.ly/1aIZFgb
- Establishing Buffalograss Turf in Nebraska – bit.ly/19K1m8v
- Buffalograss Establishment and Management Guide from Native Turf Group – bit.ly/1aIZWzV
- ‘Cody’ Buffalograss Brochure – Newest Release from Native Turf Group – bit.ly/12QZNUl

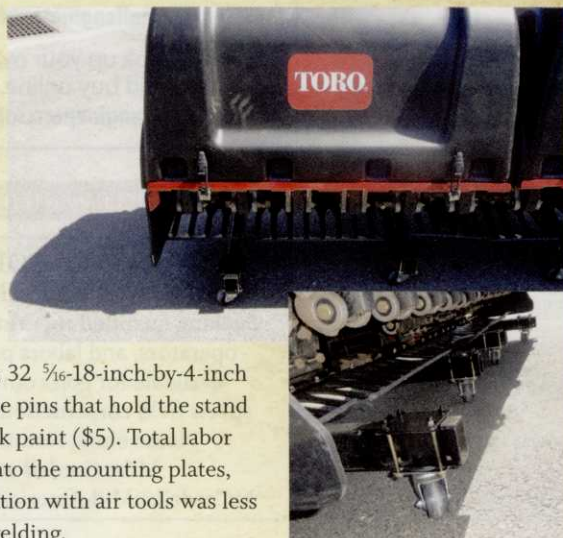


Travels With Terry

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

FAIRWAY AERIFIER PORTABILITY

This Toro ProCore 1298 Fairway Aerifier comes equipped with a 3-inch-by-2-inch tubular-steel stand mounted horizontally underneath the main frame that is used for storing it when not in use. To make the aerifier more versatile for re-mounting it to a tractor, or for simply moving it around the maintenance area, caster wheels were added by David Zollinger, equipment manager, and Les Miller, equipment technician at The Ridgewood Country Club in Paramus, N.J. Eight caster wheels (model # 16D120) were acquired (\$80) from Graingers, which were mounted to the tubular frame using eight 4-inch-by-4-inch by 1/8-inch thick flat-steel stock mounting plates (\$10); 32 5/16-18-inch-by-4-inch bolts and 32 flanged nuts (\$15); Eight 3/4-10 nuts to replace the pins that hold the stand on machine, two per stand (\$8); and a can of spray gloss black paint (\$5). Total labor time was a little more than an hour after holes were drilled into the mounting plates, which were pre-cut at a local fabricating shop. Actual installation with air tools was less than half an hour, as everything was bolted-on without any welding.



PROPER STEERING MECHANICALS:

Standard steering mechanicals and basic steering alignment is being done properly on this Cushman Turf-Truckster by Jacobsen. The tires were wearing unevenly on the inside and the handling was suspect where the vehicle was "wandering" and hard to hold in a straight line due to a negative camber condition and from improper tire pressure.

Jacobsen offers a shim (part #841737 for about \$3.50 each) that can be added between the upper control arm and the frame to push the top edge of the wheel geometry out and correct this condition. Each shim moves the wheel one half of a degree. A digital level from Sears (\$40), which has a magnetic base that attaches to a used bed knife cut to length, is used to measure the camber. To install the shim, the two upper control arm bolts are loosened, the shim is slid into place and the bolts are then re-tightened. To make the camber more negative, the bolts are loosened and one shim per 1/2 degree is removed. The number of shims added or removed depends on the camber measurement and how many degrees the alignment is out. The process takes less than 15 minutes.

Mark Yarick, is the customer service specialist for North Florida and North Central Florida for Golf

Ventures, Inc. and he is the former professor and program coordinator for turf equipment management at Florida Gateway College. Yarick also offered these tips: Regularly check the tie-rod ends, ball joints, spindles and wheel bearings for excessive play. Jack-up the steering axle off the ground and wiggle the tire from top to bottom and in and out to check for play. Grab the tie-rod ends and move up and down and in and out to check for play. With the steering axle on the ground, start the engine and have a helper move the steering wheel right and left while watching the tie-rods and spindles for "slop." Any steering wheel movement that does not result in tire movement is an indication of excessive steering component wear.



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GOLF COURSE INDUSTRY

(MORAGHAN continued from page 10)

To understand the sort of issues we'll be dealing with, check out this study of subsidence in California's Coachella Valley (Enter on.doi.gov/145fYKX into your browser to read this study). The end result was a \$50 million pipeline that brings additional surface water from the Colorado River to Coachella Valley, the region that includes Palm Springs. The water comes into a reclamation plant where it's blended with recycled water to meet the summer demands of up to 50 golf courses that draw on the aquifer.

Another term splashed about at water conferences is "direct potable reuse." The availability of recycled water for irrigation may decline as new methods of treatment allow for more recycled water to go safely back into the water system for drinking. Here's an example from Texas (Enter nyti.ms/WTx8IF into your browser) and a demonstration project in San Diego (Enter bit.ly/bHkurf into your browser).

A leading irrigation consultant told me that such projects are, "a double-edged sword because yes, they increase supply, but advanced treatment means higher water rates for the membrane (reverse osmosis) operation and brine disposal infrastructure and operating costs. This process is just starting to gain traction in the industry."

All of which means that while you also might not like water, you need to know about it. Down to the last drop. Okay. So what do I like about water?

I like that it comes in three forms: frozen, liquid, or gas.

That three-quarters of the earth's surface is covered in water, and that we are trying to find safe ways to harness its power.

In frozen form, it's ideal for skating, a key element of my second favorite sport – hockey, and the perfect complement to my post-round Grey Goose and tonic.

I like showering after a long day on the golf course, and especially at great clubs like Riviera, Merion, and Pine Valley where the showerheads are big and fully pressured.

One more thing to like about water: It keeps us healthy. Remember to stay hydrated, and to make sure your staff drinks enough water, too. Unlike golf courses, for us there is almost no such thing as too much water. **GCI**

(KAMINSKI continued from page 22)

sand topdressing, and the unorthodox use of the fairway rollers as a squeegee allowed the native soil golf course to bounce back from several inches of rain in just a day or two. It's important to point out these results didn't happen overnight. Many years of modified cultural practices were used in advance of the championship to ensure the course was playable if and when a major storm hit.

The bottom line? Many things can impact the playability and health of your golf course, and irrigation/moisture management is high on that list. While some of these practices can have a quick impact on moisture management, others require long-term planning and implementation before the practices pay off.

While we continue to increase our use of scientific instruments to help determine irrigation inputs, the overall process will continue to remain more of an art than an exact science. The turfgrass managers that fine tune irrigation and moisture management are usually the ones that make it through the most difficult of conditions. The superintendents who figure out how to combine the art with the science will likely continue to have the most success. **GCI**

(VINCHESI continued from page 16)

At the same time, irrigation and water management issues were taking 80 percent of Eric's time. With the new system, irrigation materials and labor repair costs dropped to \$2,500 annually and hand-watering hours dipped to 500 hours (50 percent less). The greens are now hand watered, which they were not previously, and accounts for the majority of the hand watering. This decrease in labor has allowed the staff to concentrate on other course improvements.

The new irrigation system has greatly improved the consistency of the course playability, not only on a hole-to-hole basis, but from a month-to-month basis throughout the golf season. It has also been a major factor in the aesthetics of this link-style course allowing it to be dry where and when it is supposed to be, which has brought out the original design intent. **GCI**

(MILLER continued from page 60)

have a tremendous influence on irrigation decisions – we water smarter.

We tend to focus on applying water to golf courses to even out precipitation. But in a year like this, drainage systems can be important to good golf turf. During this year's Memorial Tournament, Jack Nicklaus was discussing a drainage project and concluded with, "Drier golf courses are more fun to play." He's right.

Water is obviously the most important factor in manag-

ing a golf course. Turf cannot live with either too little or too much. And water has become a national concern in the most recent decades. When I look back to watching my grandfather use a forked stick to dowse for spring water on his farm, to contemporary golf course irrigation considerations, I really do feel my age. That perspective, however, leads me to have a lot of confidence that our golf turf industry will continue the innovation needed to carefully use this precious national resource. **GCI**



Pat Jones is editorial director and publisher of Golf Course Industry.

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MY NEW BROMANCE

Last month in this space, I wrote a love letter that described my bromance with Matt Shaffer. Here's the sequel...

Given the run-up to the Open and Matt's stature, I fully expected better-than-average coverage of the grounds staff and how they were instrumental in making the USGA's vision of a short-but-nasty Merion become a reality. After all, this major was meant to be a referendum on distance and a return to traditional set-up values, so the guy in charge of presenting the course would naturally be more of a focus than usual, right?

But I never saw Time magazine coming. I certainly didn't anticipate multiple packages about Matt, Aaron McCurdy and the crew on ESPN and NBC. I lost count of the times they mentioned them on Golf Channel. The social media coverage was off the hook (leading a few grumps to whine about overkill) and about a zillion photos of men and women pushing squeegees, pumping bunkers and rolling greens were published.

For a week, Matt was everywhere and the coverage was positive. Never has a super been given this sort of prominence at a golf event. Never.

When I say "given" prominence, I mean it. It was very clear that both the leadership at both USGA and Merion wanted Matt out front. I think they realized Matt's sincerity, his love for the course and the passion he had for the mission he'd been given ("give it teeth but keep it fair") would shine through in the media. And it did.

So what's it all mean to the average superintendent? Well, let me put it this way: For the past three decades, whenever a turfhead met some schmuck at a party and introduced himself as a golf course superinten-

dent, the schmuck would say, "Oh, like Carl Spackler!" Now they're more likely to say, "Wow, like Matt Shaffer?"

It didn't even matter that Mike Davis went out of his way to say that the superintendent is "the person that is most important to the success of a U.S. Open." For once, it was readily apparent to everyone watching that Matt was the man.

At Pinehurst, playability will be the primary focus but the issue of appearance will be a close second.

Lots of host supers and their teams have incrementally raised the "respect" bar in the past. Now, that bar has "Property of Matt Shaffer" on it.

Which makes it even more interesting to watch the next stop in the USGA's "Changing Perceptions" Tour in 2014. If Matt's job was to send a message that great golf isn't just a bomb-and-gouge distance contest, Pinehurst's Bob Farren and Kevin Robinson are merely tasked with changing the paradigm of how players see courses.

The redesign and rebranding of the #2 course is well documented and you'll be hearing much more about it in the next 11 months so I'll spare you a rehash here. (I'm on record as saying that the notion of reinventing a great course by turning back the clock is a brilliant idea.) But, from a playability standpoint, it will be the polar opposite of Merion starting with the fact that they'll only be two heights of cut on the whole property: greens and everything else. So, newly naturalized

bunkers and Donald Ross's buried elephants will provide the defense instead of the six inches of clumpy rough at Merion.

At Pinehurst, playability will be the primary focus but the issue of appearance will be a close second. The question is how much the TV cameras will like the naturalized look of #2 in comparison to the pristine Augusta-like version they saw the last two times the Open came to the Sand Hills.

Bob and Kevin will be out front of that conversation as the people who executed the transformation plan that took the course from 2011 back to 1943. Fortunately, they'll have a little help talking with the media and the golfing public from a guy named Ben Crenshaw and his pal Bill Coore.

This will be a very different dynamic than what we saw a few weeks ago in Philly. The intensity of Merion will be replaced with Pinehurst's quiet, down-home approach. And we're likely to see far more of Ben Crenshaw than Bob Farren on TV (which I'm sure is just fine with Bob). But you couldn't ask for a better group of people to lead a discussion about how good golf should look.

This isn't going to be another "brown is beautiful" fumble. Pinehurst, with their world-class business approach and amazing agronomic team, will do things the right way to tell this story (and sell the hell out of their brand). In the same way I couldn't imagine a better spokesman for old-skool conditions than Matt, I couldn't dream up a better team than Bob, Kevin, Bill and Ben to tell the story of the naturalized look.

So, thanks again Matt, for all you just did for everyone in the profession. And good luck Bob and Kevin...let the new bromance begin! **GCI**

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