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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 Truttmann, 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 Truttmann 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 Truttmann, 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.

Truttman: 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].

Truttman: 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.

Truttman: 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.

Truttman: 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.

Truttman: 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?

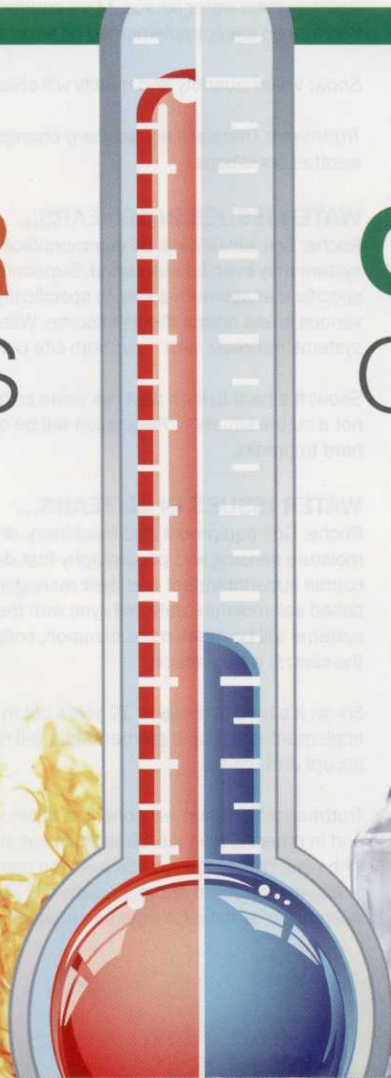
Snow: Contractors have not

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

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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

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-

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-

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



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)

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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.

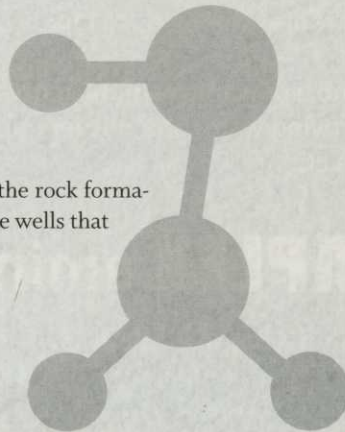
"Let's say you're in a coastal environment and on the fringe of the saltwater/freshwater interface and you're not monitoring the groundwater table," Bowman says. "You could get to the point where you're transitioning from fresh to brackish water. It's not common, but it could happen."

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.