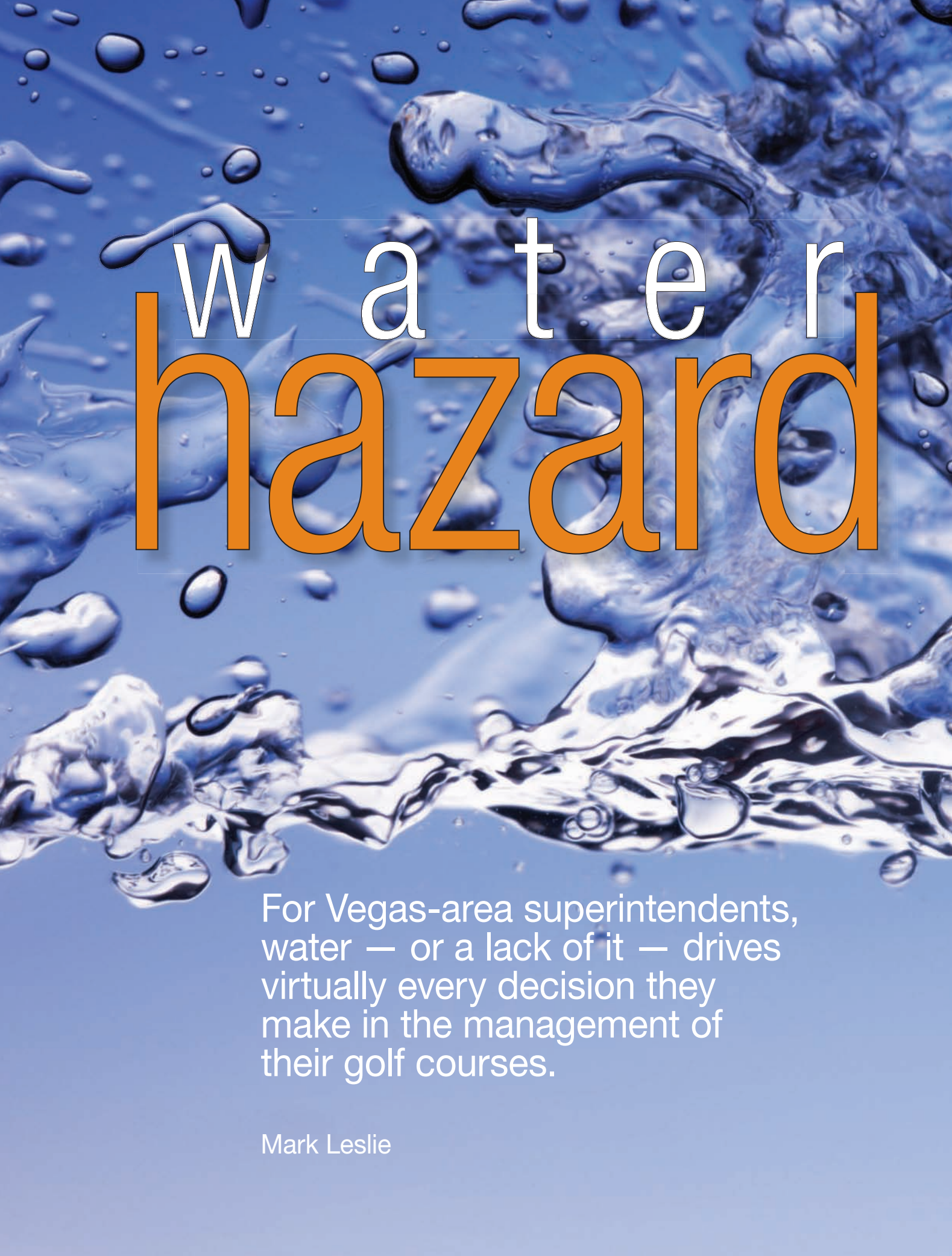


water hazard

For Vegas-area superintendents, water — or a lack of it — drives virtually every decision they make in the management of their golf courses.

Mark Leslie

The "bathtub ring" around Lake Mead, which provides most of Las Vegas' water, shows clear evidence of the water shortage issues facing the region, although levels did rise more than 35 feet in 2011.

In the 1990s, industry legend James Watson, Ph.D., then serving as the director of research for The Toro Co., predicted, "Water will be the oil of the 21st century."

Watson's prophecy has proven correct, especially so in southern Nevada, which is suffering through the eighth consecutive year of a prolonged drought. It's a situation golf course management professionals from around the world will witness firsthand next month when the GCSAA Education Conference and Golf Industry Show comes to Las Vegas for the first time since 1997.

"Last year we had a little over an inch of rain for the whole year," says Patrick Watson, a former superintendent and current conservation services administrator for the Southern Nevada Water Authority.

The situation is so bad that water police roam neighborhoods.

"If you get caught watering your lawn on the wrong day or the wrong hours of the day, or if you have a broken sprinkler, the water police can come over and ticket you," says Bill Rohret, CGCS, superintendent at Legacy Golf Club in Henderson.

"I think the turf superintendents in the Desert Southwest are the most judicious users of water in the country," says Brian S. Whitlark, agronomist with the USGA Green Section's Southwest Region. "They have to be. The evapotranspiration rate in the Las Vegas area is probably the highest in the entire country. As such, they have to be very judicious in their use of water. It costs so much.

"It's not uncommon in Vegas for golf courses to pay over $1 million a year just for water."

"Next to labor, water's the most expensive item in a course's maintenance budget," confirms Watson.

A change in mindset

A five-year-old ban on golf course construction in the southwest valley counties near Vegas is evidence of how seriously residents take the issue of water shortages. And because of the cost, many creative minds have devised ways to make the best use of the limited supply. But it all began, according to Rohret, with a turnaround in the mindset of Nevadans.

Recently awarded the Water Hero Award from the Water Conservation Coalition, a group of area businessmen who have conservation in mind, Rohret says he himself was one of the most intransigent when water conservation loomed as a necessity.

"Twenty years ago, the golf boom started, and the town was exploding. Water and land were inexpensive," recalls Rohret, a 36-year member of GCSAA. His town of Green Valley grew from only a handful of residents to more than 22,000.

It didn't matter much that water was being pulled from the Colorado River. The federal government's Bureau of Reclamation allocated water from Lake Powell, the Colorado River's Upper Basin storage lake, to the states of Colorado, Utah, Wyoming and New Mexico; and from Lake Mead, the storage lake for the Lower Colorado River Basin, to California, Nevada, Arizona and the country of Mexico.

"When they built golf courses," Rohret says, "the only question was how much dynamite and how big a bulldozer you had. Like golf courses in California or the East Coast, they flattened out the

Bill Rohret, CGCS, stands in one of the many areas that he converted from turfgrass to desert landscape at Legacy GC in Henderson, Nev. **Photo courtesy of Bill Rohret**

land, seeded it with grass and installed irrigation. A lot of areas on the golf courses were nonessential to the game of golf; it's just that people were used to seeing grass wall-to-wall."

Lake Mead was full. It rained more often and, Rohret says, "We were living the good life."

Then the drought hit and, for the Desert Southwest — and golf course superintendents — the world went topsy-turvy.

"The Rockies didn't get as much snow. The lake started dropping, dropping, dropping," Rohret says. "The critical point was going to be last summer but, thankfully, they had a good snow melt."

Patrick Watson says Lake Mead, which provides 90 percent of the Las Vegas water — the other 10 percent being groundwater — dropped 130 feet from 2003 to 2010, then rose 35 feet last year. It is expected to go up another 15 feet this year.

Superintendents lead the way

While that recovers part of the water lost, the region is still in drought mode, Watson says, and superintendents have become some of the best conservers of water.

In 2003 the Southern Nevada Water Authority (SNWA) and its member agencies created a drought plan and asked that golf courses stick to an annual water budget of 6.3 acre feet of water per acre. Since then, golf courses and their supporting industries have met the challenge. Sometimes stiff fines await them if they don't.

The Green Section's Whitlark, who travels Nevada, Arizona and Southern California, listed several ways superintendents have reduced water use:

- Raising and leveling irrigation heads at even grade with the surface, which "can increase water efficiency by about 20 percent — a huge factor," he says.
- Installing upgraded nozzles, including full coverage irrigation (FCI) nozzles, which a Center for Irrigation Technology study found creates a water savings of 6 percent. "Some have saved 25 to 30 percent by upgrading to these high-efficiency, longer-lasting nozzles," Whitlark says.
- Performing an irrigation audit and implementing the correct nozzling for their particular environment, considering wind, topography, head spacing, the type of irrigation heads, system pressure, and other factors.
- Installing half-heads along the desert edges and ins-and-outs around putting greens independently of the green surrounds.
- Putting in on-site weather stations so that irrigation is based on localized evapotranspiration data.
- Modifying irrigation schedules to accommodate the extremely low infiltration rate of native soils, which is a cycle-soak type of program. "They may only be able to apply five to 10 minutes of water at a time and space those irrigation cycles a half an hour, or even an hour apart," Whitlark says. "It expands their water window, but is absolutely necessary to avoid runoff."
- Lining lakes with polyvinyl or ESS 13, a liquid polymer emulsion, and edging them with rock, significantly reducing leakage.
- Injecting wetting agents to break down surface tension and improve infiltration.
- Using core and solid-tine aeration strategies on fairways and roughs every four to six weeks throughout the year. "That substantially reduces the potential for runoff, so the soils can hold a lot more water than they would otherwise," Whitlark says.

Besides these, he suggests superintendents in Nevada and Arizona stop overseeding roughs. "Overseeding will have to continue on tees and fairways, but do not overseed roughs," he says. "That may be as much as 30 to 50 acres of a golf course and more in some cases. It represents a huge savings of water because you don't have to put down the ryegrass and irrigate to germinate it. Plus bermuda uses a lot less water than ryegrass."

Rohret adds, "Everybody has a modern central-controlled irrigation system, and most have their own weather station tied to their irrigation computer. Also, 25 years ago pump stations were very inefficient. Now they're all VFD (variable frequency drive), where the pumps only run at the speed to meet demand in

the field. Before, you spent a lot more on electricity and there was a lot more wear and tear on the system."

Golf courses are also using effluent water, which is returned into the water supply after use.

"It's high-quality reused water, but it's still reused," says Watson. "It still has the salts and other things superintendents have to deal with."

Land grab for a good cause

While all of these moves have greatly reduced water use, the most effective effort has resulted from the SNWA's Water Smart Landscaping Program. The program rebates $1.50 per square foot for the first 5,000 square feet of land converted from turf to desert landscaping and $1.00 per square foot thereafter, not to exceed $300,000 per fiscal year.

Under this program 898 acres of turfgrass — the equivalent of almost nine golf courses — have been removed from play on southern Nevada's 52 golf courses and replaced with "xeriscaping." That area is equal to 17.3 percent of golf course property in the area.

"Arizona has been on the water budgets for quite some time," says Watson. "Their model for golf courses is about 100 acres. That is what the golf courses in Nevada have evolved to."

The resulting savings each year amounts to about 2 billion gallons of water each year, he says, adding, "That's pretty impressive. And from just one group, the golf courses."

Rohret alone has removed 126 acres — 76 from Angel Park Golf Course in Las Vegas when he worked there and 50 from The Legacy.

"We've saved 100 million gallons a year by reducing turf acreage," Rohret says, adding that the two facilities are using 350 million fewer gallons a year of water than they were before various conservation moves were made.

"At The Legacy, with 18 holes, our water bills are $450,000 a year," he says.

"One thing about turf conversion that nobody talked about," Rohret adds, "is that we overseed with cool-season ryegrass. So when you reduce acreage you don't overseed as much and you save on seed, water, fertilizer, and diesel because you're mowing the rough or prepping it for overseeding. That all makes a big difference."

The Southern Nevada Water Association's Water Smart Landscaping Program offers rebates to golf operations that convert turfgrass with desert-style "xeriscaping." Installing upgraded nozzles is another way Nevada courses are trimming the water bill. **Photo courtesy of Rain Bird**

Scott Sutton, GCSAA Class A superintendent at the municipal Wildhorse Golf Club in Las Vegas and a Certified Golf Irrigation Auditor, gets raves from his colleagues, including Southern Nevada GCSA President Brian Bagwell, director of golf course maintenance at Sun City Summerlin.

"Scott has done a lot of converting; has poor, briney water quality; and has had a lot of challenges but has turned the course around," Bagwell says. "It's a municipal golf course but it's always in great shape and fun to play."

Since 2004, Sutton, who is a 21-year member of GCSAA, has converted 52 acres of his 132 acres of turfgrass into desert landscaping, he says.

The result?

"Twenty-seven percent savings by the time we irrigated all the plants we put in," Sutton says. "We're saving 67 million gallons of water per year," which translates into $70,000 to $80,000 a year savings, including $56,000 in water and $14,000 in electricity."

The conversion

Vegas-area superintendents converting turf to desert landscape are installing heat-tolerant plants such as acacia, mesquite, Texas Rangers, bird of paradise and vitex bushes; grasses like fountain grass; and trees like palo verde, stone pine, Mondale pine, aleppo pine and various ashes.

Choices are limited because, as Rohret says, "It's pretty ugly desert. It doesn't even grow cactus out here, it's too cold and dry and rocky."

Because the converted areas have been maintained as turfgrass for so many years, Sutton says his biggest challenge has been weed control.

Removing turfgrass exposes very fertile soil, the ideal growth medium for weeds. On his limited budget, Sutton couldn't afford pre-emergence herbicide, but discovered another solution: a workforce of individuals working off community-service hours for the district court.

They've saved Wildhorse "countless dollars," Sutton says.

Indeed, the cost of plant materials and installing drip irrigation is substantial and, according to Rohret, too expensive if not for the Water Smart Program's reimbursement.

"We couldn't do it ourselves financially," he says. "It was a slow death either way. If we didn't convert, the water rates would have risen exponentially and we couldn't pay for our water any more and we'd go under. Or if we tried to convert all our turf over, it was too much of a capital expense, so we'd go under that way. Without the incentives from the Water Smart Program, we'd go under."

Sutton says that over the past six years of conversion, the course's costs were just over $2 million. The SNWA reimbursed $2,160,437. He invested the $160,000 excess into irrigation upgrades: new satellites and sprinklers throughout the course.

Some facilities, though, are so caught up in the economic dilemma they can't afford to carry out modifications that would help them in the end. "With the downturn in the economy, some courses have antiquated systems operating at reduced efficiencies that should be upgraded, but these high-capital expense projects have been deferred. That's a significant issue," says Whitlark.

Proof is in the product

In the midst of southern Nevada's world of water conscientiousness, area superintendents noted two other advancements besides FCI nozzles that can mean major savings in water use — Aquatain, a silicone-based product from Australia being distributed in the West by Simplot Partners, which promises a reduction in surface-water evaporation in ponds; and the TDR 300 soil moisture probe, developed by Spectrum Technologies and since bought by Envco, an environmental equipment manufacturer.

David Kopec, Ph.D., a turf specialist at the University of Arizona, does warn that "there have always been a million gadgets and claims from fertilizers to polyacrylamide products to save water, many of which did not measure up to claims."

But you can count Sandy Clark, CGCS, superintendent at Barona Creek Golf Course in Lakeside, Calif., as one who swears by Aquatain, as do the PGA Tour's TPC superintendents about the TDR 300.

Scott Sutton's turf reduction efforts at Wildhorse Golf Club in Las Vegas have resulted in nearly $80,000 in annual savings. **Photo courtesy of Scott Sutton**

"With the cost of water and our sporadic rainfall, if you can save 50 or 60 percent, or even 30 or 40 percent, to me that's huge and worth a serious look," Clark says.

And that's just what he experienced in a test. Clark set up two 100-gallon aluminum troughs — the kind normally used to feed horses — and treated one and not the other with Aquatain. They were set side-by-side and elevated so no animals could get into them.

"After two weeks we found a unique thing," Clark says. "The treated trough had lost only 4 to 4½ gallons of water. The non-treated had lost 14 gallons. We were amazed to find that much difference, and that was in mid to late April, not during the heat of the summer."

Clark, who this year used the product from May through September, says weekly application rates decrease substantially and are well worth the cost.

A measure of success

Meanwhile, Dale Hahn, director of golf course maintenance operations at TPC Summerlin in Las Vegas, praised the TDR 300, which he has been using since PGA Tour director of agronomy Cal Roth introduced it to his troops in 2008.

"I can't believe every superintendent in the country's not using it," Hahn says. "It's been two years since we've even had a hot spot on a green."

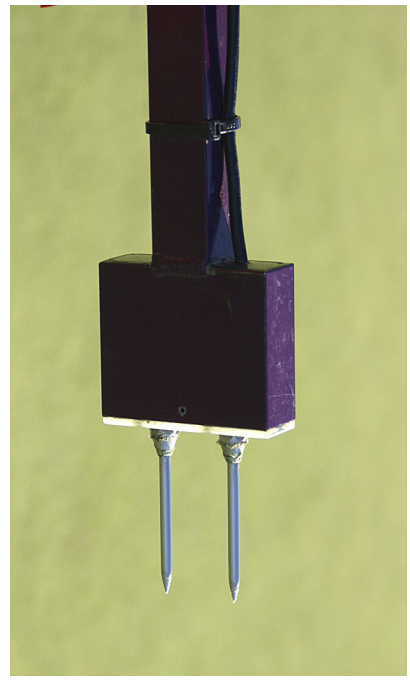
TDR 300 measures moisture instantly and, with 1.8-inch probes, "the next time you mow the greens the holes are gone," he says, "whereas with old tensiometers you had to wait for them to balance out and they left a big hole. Hand-waterers used to use half-inch soil probes where they would pull a plug out of the green.

"Superintendents normally wait to the end of the day and send out hand-waterers to look for hot spots. That plant is already wilting by then and they're in a curative mode instead of a preventive mode," Hahn adds.

Hahn sends out one or two hand-waterers early in the day. They check 30 or 40 spots on each green, mentally mapping the green as they walk, then get the hose and water the green. The TDR 300 "has a readout so you don't even have to bend over to read it," he says.

Hahn knows that if there is less than 6 percent moisture in the top 3 inches, his bentgrass will wilt. So depending on the time of year, he knows exactly how much soil moisture he wants.

"Hand-waterers love it. They come in at lunch time and are done for the day and they're watering a lot less," he says. "Superintendents love it because we don't stay at the golf course any more walking greens at 5 o'clock, checking for wilt. I know it's in good shape."



TPC Summerlin's Dale Hahn, CGCS, champions the TDR 300 soil moisture sensing device in his water management program. Pictured is Dustin Peterson, assistant superintendent at TPC Deere Run in Silvis, Ill., taking a reading at TPC Summerlin during a 2011 PGA Tour event. **Photo by Dale Hahn**

> "We're winning the battle. We've created an ethic of, 'We live in a desert and we can't just run water willy-nilly.'"
>
> — Patrick Watson, SNWA

Turfgrasses differ

Because of the extreme temperatures — 115 F in the summer and as cold as 15 F in the winter — and the fact they are using effluent, superintendents around the Desert Southwest are exploring turfgrasses that are the best fit for their property and that are salt- and drought-tolerant.

With 25 years of experience under his belt, Kopec says the best turfgrass for any property depends on how it is irrigated.

"You can't say one grass is better than the other because it will have limitations," he says. "When salinity becomes worse and there's no drainage, courses will switch over to seashore paspalum.

"The problem with paspalum is, if you practice short-term deficit irrigation (less than it needs normally to avoid drought) it does well, but it can't withstand long-term deficit irrigation. Also, overseeding is an issue. It doesn't like to be scalped and often is slow to grow back from aggressive vertical mowing events. If you miss a mowing or cut off too much, it can take a month off to think about it.

"A few tried bentgrass on fairways, but they went belly-up. It's just too hot, too long at night. You can use bentgrass on greens, though. It depends on elevation and night temperature.

"There has been more of a switchover to bermudagrass greens in the last 15 years, and especially in the last 10, since ultradwarf bermudagrasses came out," Kopec adds. "People who have struggled with bent have switched to ultradwarf bermuda."

Victorious fight

"We're winning the battle," says SNWA's Watson. "We've created a community ethic of, 'We live in a desert and we can't just run water willy-nilly.' When you play golf, you see that ethic. You see the courses are on water budgets, the resorts manage water very well. Everyone throughout the community has responded well to this drought.

"Our member agencies made all our water ordinances permanent a few years ago, and nobody has squawked."

Indeed, Nevadans are living within their (water-resource) means while exploring new water sources. The future may see a desalination deal with Mexico as well as imported groundwater from Nevada's northern counties, which get a lot more precipitation.

Never stand pat, they say.

GCM

Mark Leslie is a free-lance writer based in Monmouth, Maine, and a frequent contributor to *GCM*.