

BY JOHN WALSH

Making the switch

Arizona superintendent deals with consequences of effluent water use

Get ready because it's coming. Reclaimed water, that is. Well, at least for some. And it won't necessarily be cheaper than irrigating turfgrass with potable water.

With the increasing concern about fresh water supply, water use on golf courses is being scrutinized now more than ever. The results of this scrutiny can be categorized into two groups: those who use less potable water via restrictions and those who switch to reclaimed water. Many more golf courses will be joining the second group in the near future. Although, for some, the timing depends on where they're located. One state where it's happening sooner than later is Arizona.

When it comes to irrigating turfgrass with reclaimed water, golf course superintendents – in Arizona and elsewhere – can learn from Mike Kropf, golf course superintendent at the

private, 18-hole Golf Club at Sun City Vistoso in Tucson. Kropf, who's been at Sun City Vistoso for a little more than a year, is dealing with the consequences of switching from potable water to reclaimed, or effluent, water.

But such a decision to switch wasn't made by club management – it was made by the town.

"There was no decision-making process to switch from potable water to effluent because the town told the golf courses in the area they would be using reclaimed water by a certain date," Kropf says. "The decision to switch wasn't by choice. Oro Valley law states that if there's reclaimed water available, golf courses will use it."

The town gave Sun City Vistoso about a year's notice.

There are five courses in the vicinity of Sun City Vistoso that use reclaimed water for ir-



Mike Kropf had experience managing turfgrass irrigated by effluent water before coming to the Golf Club at Sun City Vistoso. Photos: Jacob Chinn.

rigation, and two more that will open during the next couple years also will use reclaimed water, Kropf says.

The switch from potable to effluent water happened just before Kropf started working at Sun City Vistoso. One of the reasons Kropf was hired at Sun City Vistoso is his previous work with reclaimed water. Kropf was an assistant golf course superintendent at Heritage Highlands Golf and Country Club eight miles away. The previous superintendent at Sun City Vistoso, Greg Hrycyk, left to take a job in California.

Sun City Vistoso, which opened in 1986, generates between 33,000 and 35,000 rounds annually and has about 300 annual members. The fairways and rough consist of 419 Bermudagrass, the tees are 328 Bermudagrass, and the greens are Tifdwarf Bermudagrass. The turf on the fairways, rough and greens existed before the water switch was made, but the turf on the



As a result of using reclaimed water, ciliated protozoa grow in the irrigation lines and can clog nozzles. Photo: Jacob Chinn

tees was replaced when the course switched to using reclaimed water, so it's about a year and a half old.

GO WITH BERMUDA

When irrigating with reclaimed water, it's better to have Bermudagrass greens rather than bentgrass greens, Kropf says. Other courses in the Tucson area currently have or had bentgrass greens, including Heritage, but some have switched to Bermudagrass because it's easier to manage when using reclaimed water. Reclaimed water has high levels of nitrates, and because of that and hot temperatures, bentgrass becomes "puffy," Kropf says.

"It grows faster than you can cut it, and you scalp the grass," he says. "You need to adjust for it. You get a huge surge of growth and disease pressures, especially in July and August during monsoon season. You can't mow the greens

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“Oro Valley law states that if there’s reclaimed water available, golf courses will use it.” - MIKE KROPF

fast enough. If you’re at a high-dollar course and can afford large amounts of fungicides and maintenance inputs you can manage it. It’s very high maintenance. If not, you succumb to it. It’s like thatch but different.

“The bentgrass greens slowed down a bit at my last course, so management just bit the bullet and took out the bentgrass and replaced it with Bermudagrass,” Kropf adds. “I’m a big fan of Bermudagrass greens. I don’t have the manpower or the money to deal with bentgrass. But if you have bentgrass greens, then you also have Bermudagrass that encroaches on the bentgrass greens.”

When overseeding Bermudagrass greens, they eventually will roll similar to bentgrass greens, Kropf says.

“I overseed the last week of September, and by Thanksgiving, you’re really dropping the mowing heights,” he says. “I was cutting them at 0.125 by January. I had them down to 0.115 by March and then down to 0.110 in April because of the tournaments we host. When I scalped for overseeding preparation, I had the mower down to .100. Tifdwarf Bermudagrass can tolerate that. MiniVerde, a new dwarf-type Bermudagrass, can handle it even more.”

Last month, the ryegrass and *Poa trivialis* were kicking out of the greens, and Bermudagrass was coming through. Kropf says it takes a month to six weeks to get through the transition.

WATER DELIVERY

One would think using reclaimed water to irrigate a golf course would be cheaper than using potable water because the quality isn’t as good. But that’s not the case at Sun City Vistoso. Kropf pays \$830 per acre-foot. Compare that to \$5 an acre-foot other area courses pay for well water because they were grandfathered in using that water, to which they have rights.

To deliver the reclaimed water to Sun City Vistoso and other area courses, the city had to route a pipe, which is T-ed off at a nearby main road. Heritage Highlands pays less for reclaimed water than Sun City Vistoso because it already had a reclaimed water line routed

directly to it.

“My water is routed through the local municipality,” Kropf says. “I have to call Oro Valley (the nearest community supplier) every morning and tell them what I watered and what I need. Once it gets all orders, it calls Tucson Water and has it sent. I pay \$2.55 for 1,000 gallons. At Heritage Highlands, they pay about \$2.05 because they don’t have to go through the local municipality. They get their reclaimed water directly from Tucson Water.”

The golf courses using reclaimed water didn’t have to pay for the pipe that was installed – the municipality paid for it up front.

“When all is said and done, I pay more for reclaimed water than potable water,” he says. “Technically, you’re not supposed to pay more for reclaimed water, but it’s not a savings because I have to overwater to leach out the salts and increase the application of soil buffers and calcium applications to compensate for the high salts in the reclaimed water. I haven’t seen a larger increase in the budget for water, I’m just adjusting my program.”

A NEW SYSTEM

Sun City Vistoso’s new irrigation system came on line November 2005. Hrycyk was involved with the irrigation renovation, so the system was new to Kropf when he arrived. However, he learned much about water management during the six years he spent at Heritage Highlands when he was the irrigation manager.

“Everything was new except for the pump station, which I’m repairing now,” Kropf says.

The pump station was replaced in 1999, and club management didn’t replace it when the irrigation system was renovated because the system was costly (\$2.5 million) and management wanted to get the full life out of it, Kropf says.

“I’m running on one pump now,” he says. “The reclaimed water ate away at the rubber bushings and seals on the pump shafts causing the pumps to seize.”

The two pumps and the installation will cost about \$40,000, Kropf says.

The new irrigation system has four or five



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heads on each lateral line, and Kropf has individual control on each head.

"It's nice because the soils aren't great," he says. "The course was built on rock. I think I'm overwatering. I water every day. I can't go

every three days like others because the soils don't have a good profile and dry out quickly. If I don't keep water on the turf, you can see the salts coming up, especially in the rough. The sodium levels are so high that water is being

pulled out of the plant by the sodium in the soil instead of the plant pulling the water out of the soil. The grass turns gray. Once you see the gray and wilted look of the grass, it takes a while to get the green color back."

Kropf's maintenance budget is \$1.2 million, and \$390,000 is budgeted for water. As of April, Kropf was \$60,000 underbudget for water. He didn't use as much water as planned because there was a good monsoon season. Kropf believes the new irrigation system is highly efficient.

"I'm not watering as much as they did before with the old irrigation system, but the reclaimed water cost is more than if I had potable water," he says.

The reclaimed irrigation water arrives at the course and sits in two holding ponds that are next to the clubhouse. Algae grows in the ponds, and it smells at times.

"I've tried different algacides and nothing worked, so we had to get guys out there and skim the algae off the pond," Kropf says.

Another problem with reclaimed water is

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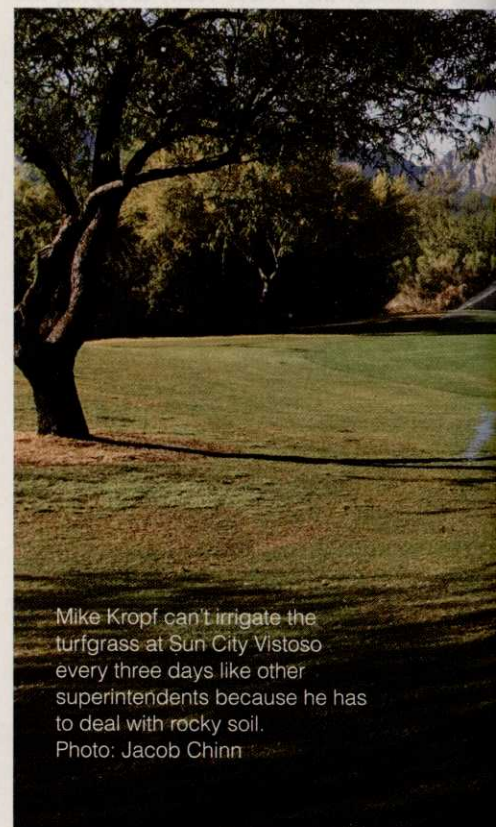
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Mike Kropf can't irrigate the turfgrass at Sun City Vistoso every three days like other superintendents because he has to deal with rocky soil.
Photo: Jacob Chinn

ciliated protozoa, which grow in the irrigation lines. Protozoa grow once they get in the irrigation lines because they don't like oxygen or light. Filters don't work because the organisms grow on the filters, Kropf says.

"It's a snot-like material that clogs the nozzles to the point where it looks like silly string when the heads turn on," he says. "So I'm adding a citric acid and other chemicals to clean them out. You need to stay on top of that or else the sprinklers won't work because they're so clogged."

Irrigating with reclaimed water tends to wear equipment out more quickly. Kropf says the crew at Heritage Highlands replaced nozzles more often because the plastic wore out.

"Metal parts also corrode badly," he says.

CULTURAL PRACTICE CHANGES

Irrigating with reclaimed water doesn't just affect one's watering practices. It impacts cultural practices as well. In many cases, being more aggressive is necessary. Because of reclaimed water use, Kropf is aerifying the rough more often.

"Members who have been here for 20 years

asked what I'm doing, and they say no one has done that before," he says.

Kropf slices the fairways during the winter and aerifies with solid tines (not pulling cores) on the greens because he can't core aerify as often as he would like. He also has been dethatching because of buildup.

Kropf also backs off on his fertility program. He tests the soil three times a year and the water once a month.

"I base my fertilizer programs off of that," he says. "I'm using high levels of potassium because Bermudagrass responds to it in a lateral growth pattern. I'm also going to more organic slow-release fertilizers instead of the synthetics because I don't need salt. I feed as I go and try to time it with the overseeding. I want the turf to peak in March and April because of tournaments we host."

According to the soil tests, the sodium level is now three times higher than optimum range because of the high levels of sodium in the reclaimed water. The turfgrass doesn't always look gray because of overwatering keeps the salts



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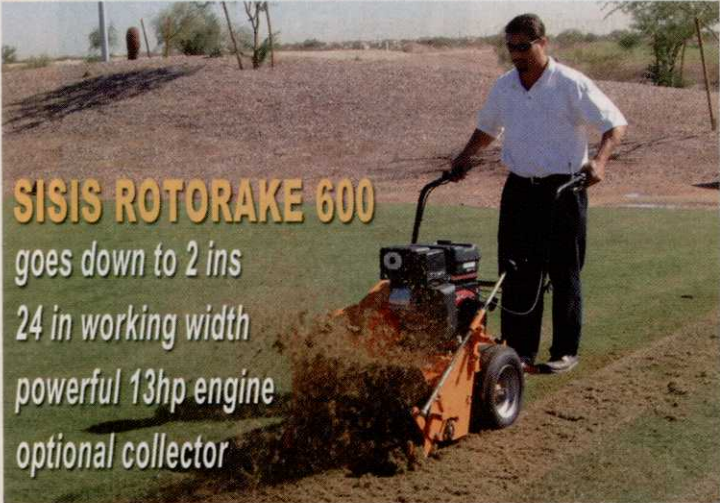
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below the roots, the nonstop aerifying and slicing, and the application of calcium and humic acid products.

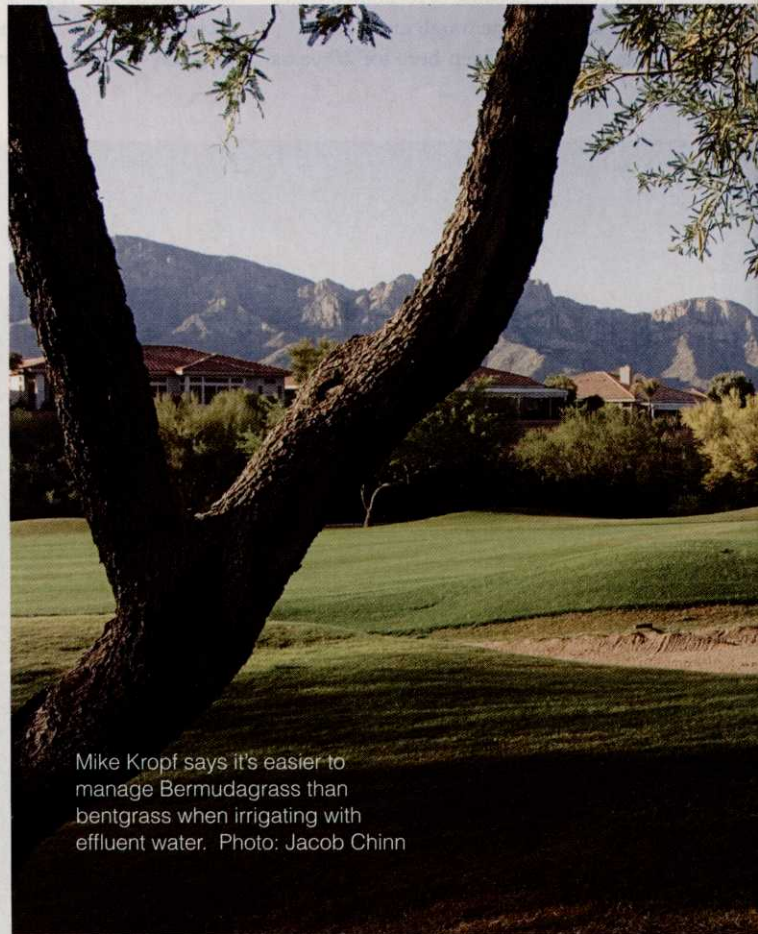
The biggest change is the pH level in the water, which was 9.1 on Kropf's last water test, and that correlates with the higher pH of the soil tests. Tees had pH levels at 8.3 and 8.4. Greens had better pH levels at 7.8 and 7.9. The high soil pH locks up micronutrients, so Kropf has been adding micronutrients and a lot of calcium, which displaces sodium in the soil and moves the sodium down past the roots with the flushing process of applying excess water.

When Kropf arrived at Sun City Vistoso and started mowing the push-up greens, the buckets were juicy - full of water - so he didn't put a lick of fertilizer on them for a month until he got them down to more manageable conditions. He wanted to make them stronger and less susceptible to disease or insect problems.

Kropf also is putting down higher levels of Primo than he normally would because of the reclaimed water use. During July, August and September, he says he can't mow the roughs fast enough.

Despite the changes in his fertility program, Kropf's fertility budget hasn't changed drastically.

One area that Kropf doesn't worry much about is turf disease, mainly



Mike Kropf says it's easier to manage Bermudagrass than bentgrass when irrigating with effluent water. Photo: Jacob Chinn

because of the characteristics of Bermudagrass and the arid climate. In April, it's so dry salts will increase from the heavy use of reclaimed water causing plant stress and increased disease pressures. Kropf applies a fungicide for fairy ring, which is really the only disease the turf gets, unlike with bentgrass.

"Bermudagrass has more tolerance to salt than bentgrass," he says.

RECLAIMED WATER'S IMPACT

In the future, it's inevitable more golf courses will switch from potable water to reclaimed water.

"It's less likely in places such as Washington state where the water tables are so high," Kropf says. "I doubt you'll see this there, but you'll see it anywhere Mother Nature doesn't produce enough water. And environmentalists like it because the grass is a natural filter for waste water."

Even with reclaimed water, there are different quality levels, and Kropf says he's supposed to be getting the minimum standard of "A" quality effluent; however, there are no national standards for reclaimed water.

Whether the switch to reclaimed water is made this year or in five, superintendents in areas that are likely to switch can prepare by realizing they'll need to implement more cultural practices, such as aerifying and slicing, applying more soil amendments, and constantly analyzing incoming water because reclaimed always seems to be changing.

"The biggest thing is – as far out as you can get – to start planning where you're going to adjust fertility programs," Kropf says. "Down the road here, guys are struggling because they didn't adjust enough for what was coming in the water. If you're going to get reclaimed water, plan on getting a lot of nitrogen and sodium." **GCI**



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aeration options

SUPERINTENDENTS IMPLEMENT VARIOUS PRACTICES TO MEET TURF NEEDS

BY STEVE AND SUZ
TRUSTY

To golfers, aeration is a paradox – they don't like it done, but they like the results eventually. It's a good thing aeration options have opened the door for golf course superintendents to mix and match methods to develop the most effective strategy for the needs of the courses they manage. While typical core and spike aerification remain part of turfgrass management programs, other procedures are used, too, as the following four examples depict.

In the spring, superintendent Mark Krick and his crew aerate wall to wall, using five-eighths-inch coring tines on the greens and three-quarter-inch coring tines everywhere else. Photo: The Homestead Golf Course





A 'PLAIN JANE' PROGRAM

Frank Pizzuto, Jr. is owner and superintendent of two 18-hole courses in New York: The Elms Golf Club in Sandy Creek and The Pines in Pulaski. The Elms has been a family-owned course since it opened in 1960, and The Pines was purchased in 1983. Both are in small towns near Lake Ontario and attract golfers who are tourists and army personnel stationed at Fort Drum in nearby Watertown. Budgets are tight and have been affected by a decline of play because of troop deployment.

Both courses have sandy soil – The Pines location was sand dunes before the course was developed – and feature Pennncross bentgrass greens. Traditionally, the season runs from Memorial Day to Labor Day.

For the past 15 years, Pizzuto has aerated the greens and tees in the spring and fall with five-eighths-inch hollow tines at about a 2-inch spacing to a 4-inch depth.

“The soil is so sandy our winds quickly dry the cores,” he says. “Then we drag mat them back in. The remaining debris is just small tufts of grass that we sweep off. The core material generally fills the holes pretty well. If necessary, we’ll topdress lightly with sand matching our profile.”

The spring aeration is planned for the first week in May and the fall aeration for the last week in August, but weather is the deciding factor. Though aerating later in the fall would affect play less, it’s more important for

long-term course conditions that holes heal before the onset of winter. Because aeration equipment is shared between the two courses, Pizzuto alternates the timing based on location convenience. The last to be aerated in the fall is the first to be aerated in the spring.

Fairways, which are aerated in the fall only, are perennial ryegrass and *Poa annua* with some bluegrass mixed in. Pizzuto uses a tow-behind Ryan aerator with open-spoon tines.

“We won’t start on the fairways until after we’ve finished the greens and tees,” he says. “We can change out our tines for solid-core aerification. Typically, we’ll do that with our Toro unit and hit the greens and tees as needed for stress relief and better water penetration. With our native sandy soils, compaction is less of an issue so this ‘plain Jane’ program has worked very well for us.”

WELL WORTH IT

The Homestead Golf Club in Lakewood, Colo., is an 18-hole public course that opened in 2002. The links-style course has heavy-clay native soil. The greens are 90 percent USGA spec sand and 10 percent Dakota peat topped with bentgrass. Originally, the tees and fairways were seeded with a mix of low-grow Kentucky bluegrasses and 10 percent perennial ryegrass. Since then, the tees have been overseeded with ryegrass.

“Heavy clay soils and excessive traffic/compaction are

One trend Bob Vavrek of the USGA Green Section sees is close-space aeration, as superintendents try to pull out twice as many cores for twice as much benefit.
Photo: Steve Trusty



Superintendent Judd Pittler at Hannastown Golf Club uses one-quarter-inch quad tines on the bentgrass greens in the spring and fall. He also has added an 8- to 10-inch-deep, solid-tine aeration in the fall. Photo: Barry Reeger

the overriding factors in our aeration program," says Mark Krick, CGCS. "In the spring, we aerate wall to wall. We use five-eighths-inch coring tines on greens and three-quarter-inch coring tines everywhere else. We tackle nine holes at a time, closing down that half of the course for a day. We collect the cores using a standard Cushman core harvester on all greens and most tees. Manual harvesting is required for those tees with extreme contours."

Krick works in conjunction with Bruce Nelson, CGCS, of Fox Hollow at Lakewood to supply their cores to a local composting company, which combines them with sand and humus to produce a ground compost material suitable for topdressing. It's provided to the two courses at a discounted price.

After harvesting, Krick uses a triplex unit with the Thatch-Away Supa System Verti-Cutter head, which can get down to one-sixteenth of an inch on a verticut reel to clean up any remaining debris.

"We'll topdress the greens with the 90:10 mix of sand to peat that matches the soil profile," he says. "The tees are topdressed with a sand and compost mix. Occasionally, we have topdressed our shorter stretches of fairway, but the results didn't justify the cost and time involved. We follow up with an application of fertilizer and soil amendments – usually gypsum – on the entire course. Amendments and respective rates are

based on soil test results."

Krick aerates the greens, tees and roughs in the fall, generally starting near the end of September and depending on current weather conditions and long-range predictions.

"If we wait too late in the season, we'll have too little healing to avoid desiccation around the hole entry," he says.

Krick augmented his coring program with vertidrainage, in which solid tines are used. He's followed the reports about using needle tines, but sees them as a better fit for those with sandy soils.

"The coring process is very labor intensive, but going into our fifth year, the results have proved to me that it's worth it," he says.

SANDY SOIL'S BENEFITS

Wild Horse Golf Club, a 9-year-old, 18-hole public course in Gothenburg, Neb., has native soil that's primarily a fine sand with little silt or clay. The greens are bentgrass; the green surrounds are a fine fescue with some creeping bentgrass mixed in; and the tees and fairways are a bluegrass/perennial ryegrass mix.

Josh Mahar, CGCS, generally aerifies the fairways, greens surrounds and tees in April and then again starting in late August and going into September, depending on the weather. He uses a Toro ProCore 880 with one-half or five-eighths-inch, side-eject hollow tines. Usually, he uses the five-eighths-inch tines.

"We allow the cores to dry down and then drag them with the metal keystone drag," he says. "After that, we'll go over the area using our deck mower set as low as it can go. By then, the area is pretty clean. Our sand breaks apart so easily that by a couple mowings it's hard to tell we've core aerated. Our golfers might notice it while we're in the process of aerating, but surface disruption is minimal, and it doesn't have much effect on play."

Mahar times fertilization shortly after aeration, basing the formula and application rate on soil test results. But he takes a different approach with the native-soil greens.

"For the past eight years, we've been managing them primarily with consistent topdressing, pulling matching material from one of the hillsides," he says. "We use a light application, ranging from one-sixteenth to one-eighth of an inch, every two weeks. We topdress, brush in the material with a cocoa mat drag and mow again

to clean up anything that's been pulled to the surface by the drag."

Mahar started using needle tines on the greens about four years ago. Before that, he used only the five-eighths- and one-half-inch tines.

"We install the needle tines on our Ryan Greensaire 24 and use them once or twice a year, but only as needed on the dry spots, not the entire green," he says. "It increases water penetration, and there's virtually no surface disruption."

APPRECIATIVE MEMBERS

Judd Pittler became superintendent of Hannastown Golf Club in Greensburg, Pa., in February of 2006. The original nine-hole course has 10 push-up *Poa annua* greens (one practice). The tees are predominantly *Poa*. A second nine holes were added about 10 years ago and include USGA greens that are primarily bentgrass with some *Poa* encroachment and modified-soil bentgrass tees. All fairways are clay-loam native soil with a mix of *Poa* and bentgrass. There's more *Poa* on the original course and more bentgrass on the new nine.

"For some reason, the new greens weren't aerified during the first three or four years, so there's a large organic matter buildup in the top 2 inches," Pittler says. "The two previous superintendents attacked that aggressively with aeration and used verticutting to reduce the thatch. I've adopted similar strategies, using one-quarter-inch quad tines in the spring and fall. We collect the cores using a core harvester attachment on a Cushman. The actual mix for the new greens used a sand particle size that's a little large. To avoid choking them off with too much finer sand, our topdressing is straight silica sand with an 80:20 ratio of large to small particles."

Pittler is incorporating sand into the older soil greens to bring the two nines closer agronomically. Along with the spring and fall quad-tine aerification and topdressing, he has used sand injection with the DryJect at least once the past two years.

"We've also added an eight- to 10-inch-deep, solid-tine aeration in the fall," he says. "We've used needle tines on all the greens in July to alleviate compaction and increase oxygen and gas exchange in the root zone."

During Pittler's first season, the greens showed some disease activity when they emerged from winter.

Comparing tools for customized cultivation

> During his golf course visits, Robert C. Vavrek, Jr., senior agronomist for the USGA Green Section north-central region, sees many maintenance trends. One of them is more customized cultivation for a particular problem or goal. There are many new options available with tine types, penetration depths and spacing, and other cultivation methods that superintendents can consider.

"While superintendents generally use hollow tines for organic matter management, they might attack compaction with water or sand injection, or deep-tine treatment," Vavrek says. "With the new options, one of the trends is more close-space aeration, trying to pull out twice as many cores for twice as much benefit without spending more time on the operation."

One factor that always seems to affect aeration is golfers' rising expectation levels.

"They're less willing to accept playing surface disruption, especially on the greens," Vavrek says. "In response, we see superintendents substituting one type of cultivation for another, seeking less disruption, but increasing the number of cultivations within a season hoping for the same results."

With so many variables throughout the regions of the country in weather issues, seasons of play, and soil and turf types, it becomes increasingly important for superintendents to analyze cultivation options to determine what each can realistically accomplish in terms of their courses' specific needs, Vavrek says.

Editor's note: As well as direct consultation with the USGA Green Section staff, resources addressing cultivation issues can be found in the archives of the Green Section Record including: "Customized Cultivation," by Bob Vavrek, September/October 2006; "Aeration and Topdressing for the 21st Century," by Pat O'Brien and Chris Hartwiger, March/April 2003; and "Core Aeration by the Numbers," by Chris Hartwiger and Pat O'Brien, July/August 2001.

"We wanted to reduce abrasion on the tender turf, so instead of using brushes or brooms following topdressing, we used a push blower to blow the sand down into the holes," he says. "We didn't get any bruising, and it cleaned up well. It only took two people, rather than the eight to 10 for the other methods – a great advantage with our limited budget and crew size. Obviously, we've continued that procedure."

Pittler is using standard half-inch coring tines on the tees along with aggressive verticutting and slicing on the newer nine for thatch removal. Cores are collected on both sides.

"Our season usually runs from March to early November," he says. "Last year, mild weather extended play into January, so we weren't able to topdress the tees as planned."

Fairways are an issue at Hannastown, however, because they haven't been core aerified for more than 10 years.

"Fairway work has alternated between the Aerivator at a 4- to 5-inch depth and the AerWay slicer," he says. "We'd need to contract out for core aerification, but we're trying to work it into the budget."

Pittler found the multiple options for aeration are a great asset to his turfgrass management program.

"With the quad tines, we're getting coring benefits, but with less surface disruption and faster healing," he says. "With the deeper needle tines, there's essentially no surface disruption. These tools allow us to aerate more frequently and accomplish our goals with minimal inconvenience for the golfers. Our members really appreciate that." **GCI**

Steve and Suz Trusty are freelance writers based in Council Bluffs, Iowa. They can be reached at suz@trusty.bz.



Rx FOR HEALTHIER TURF

GROOMING PROMOTES VERTICAL GROWTH

STORY AND PHOTOS
BY DAVID WOLFF

Simply put, turf grooming is a means of managing turf's growth habit to provide a quality, healthy plant. The process uses narrow vertical blades (thin kerf) to clip the advancing growing point of turfgrass periodically.

Grooming is the easiest, most stress-free way to promote vertical growth in golf course turf, says M.C. Engelke, Ph.D., a professor and faculty fellow at the Texas Agricultural Experiment Station in Dallas, which is an agency of the Texas A&M University System. Groomer use helps eliminate grain, smooths irregularities and makes individual blades stand erect for consistency and better play. Regular groomer use will foster thicker plants and healthier, more robust turf.

"It's important to distinguish grooming from vertical mowing," says Engelke, who's also a consultant to Jacobsen specializing in the identification, production and maintenance of turfgrass. "Both processes

use vertical blades, but from a biological standpoint, this is where the similarities end. Verticutters use rotating vertical blades, which penetrate deep into the crown area of the plant, and possibly below, severing stolons and stems. This generally provides an effective means of reducing or removing thatch.”

Groomers are lightweight versions of verticutters, and they help reduce grain and lift turf for a cleaner cut. This is accomplished by setting the blades at or slightly above the height of cut (bedknife setting).

“From a biological standpoint, however, adjusting the blades to just below the height of cut (initially not to exceed 10 percent below the bedknife) provides stimulus to the plant to initiate new growing points,” Engelke says. “The rotating vertical blades sever the expanding culm (stem), remove the plant apex (growing point) and force the crown to generate a new bud.”

LIGHT SCALPING

Turf grooming can be compared to light scalping but on a much-reduced scale. Using one-half-inch spacing between vertical blades that are one-eighth-inch thick results in about 3 to 5 percent of the culms being clipped during each mowing. Each grooming “scalps” a fraction of the turf, which is staged in a timed recovery response.

“By repeatedly using groomers, the entire turf community is eventually forced to be in a rejuvenated state with new growth from the crown of the plant,” Engelke says.

Grain occurs when the culm or stem is allowed to elongate and lean a particular direction with the growing point at the cut end of the stem. If the stem is removed periodically and new growth is initiated from the base of the plant (crown), the subsequent growth is forced to be more vertical and less prone to developing a grain and less prone to scalping.



At Red Hill Country Club, superintendent Craig Kimmel uses turf groomers on his walk mowers for greens and collars, and on three fairway mowers.



At Palos Verdes Golf Club, Pat Gradoville, CGCS, cuts kikuyugrass fairways three to four times a week and uses turf groomers every other mowing.

Besides altering the way the plant grows, the position of the growing point is changed also.

“With the extending stem being severed (scalped), the plant will initiate new growing points at the crown,” Engelke says. “Repeated mowing with turf groomers encourages and conditions the plant and turf to grow tighter to the soil, making for a firmer, more open canopy. This open canopy aids in escape of excess moisture and provides a healthier, more resilient turf.”

OVERSEEDING REQUIRES GROOMING

Turf grooming can be critical especially prior to overseeding. When ambient air and soil temper-

atures decline during the fall, the plant begins to store carbohydrates in the roots, rhizomes and stolons. This helps with winter survival and spring green-up and transition.

With the acceptance of overseeding warm-season grasses with a cool-season grass such as *Poa trivialis* or perennial ryegrass, it has been a standard practice to verticut heavily and even scalp the turf. Scalping is accomplished via a verticutter, flail mower or reel mower set low enough to remove excess plant material.

“Not only is this a laborious task, but it also disrupts the course, creates considerable debris that must be removed and, more importantly, reduces the plant’s ability to store additional carbohydrates for winter survival,” Engelke says. “In many cases, it also will force the plant to use much of its stored carbohydrates just to finish out the fall growing season.”

A three-year grooming study conducted by Engelke resulted in improved turf health, fall color retention and spring green-up. The need for extensive fall preparation for overseeding was reduced, providing a superior turf during the fall and spring transition with improved winter survival.

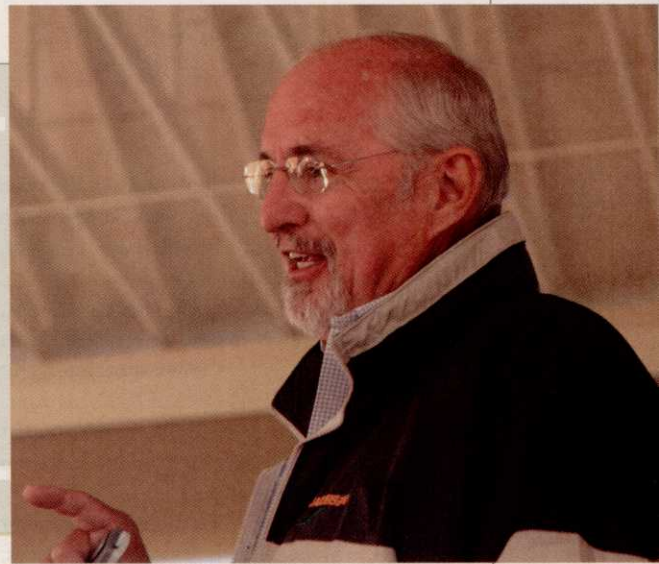
“Grooming is a proactive cultural practice that supports maximum turf health and performance throughout the year when done routinely,” he says. “All stoloniferous and rhizomatous turfs have been demonstrated to benefit from routine grooming regardless of the height of cut.”

TAMING KIKUYUGRASS

Several golf course superintendents have had success since they started grooming their turf. Pat Gradoville, CGCS, grows kikuyugrass in the fairways at Palos Verdes Golf Club in California and says the species is a good thatch builder.

“It’s important to distinguish grooming from vertical mowing. Both processes use vertical blades, but from a biological standpoint, this is where the similarities end.”

-MILT ENGELKE, Ph.D.



“If we don’t stay on top of kikuyugrass, it can get out of hand real quickly,” he says. “When I came here, I was afraid to fertilize.”

Gradoville cuts fairways three to four times a week and uses turf groomers every other mowing.

“The groomers eat into the thatch and take out some of the puffiness,” he says. “We’ve actually increased the percentage of kikuyugrass in the fairways by feeding it more and using a growth regulator. The growth regulator reduces clippings and makes the plant more compact.

We have the benefit of adding nutrients without getting a flush of growth.”

However, grooming isn’t a substitute for verticutting for Gradoville. Grooming can be aggressive and will thin turf if the blades are set too deep, or if groomers are used too much. Healthy turf producing thatch will tolerate much more grooming than hungry turf with no thatch.

“We use it more like a hard tickle,” he says. “With this practice, we’ve reduced the need to verticut as frequently. The kikuyugrass seems to thrive with turf grooming, but you need to

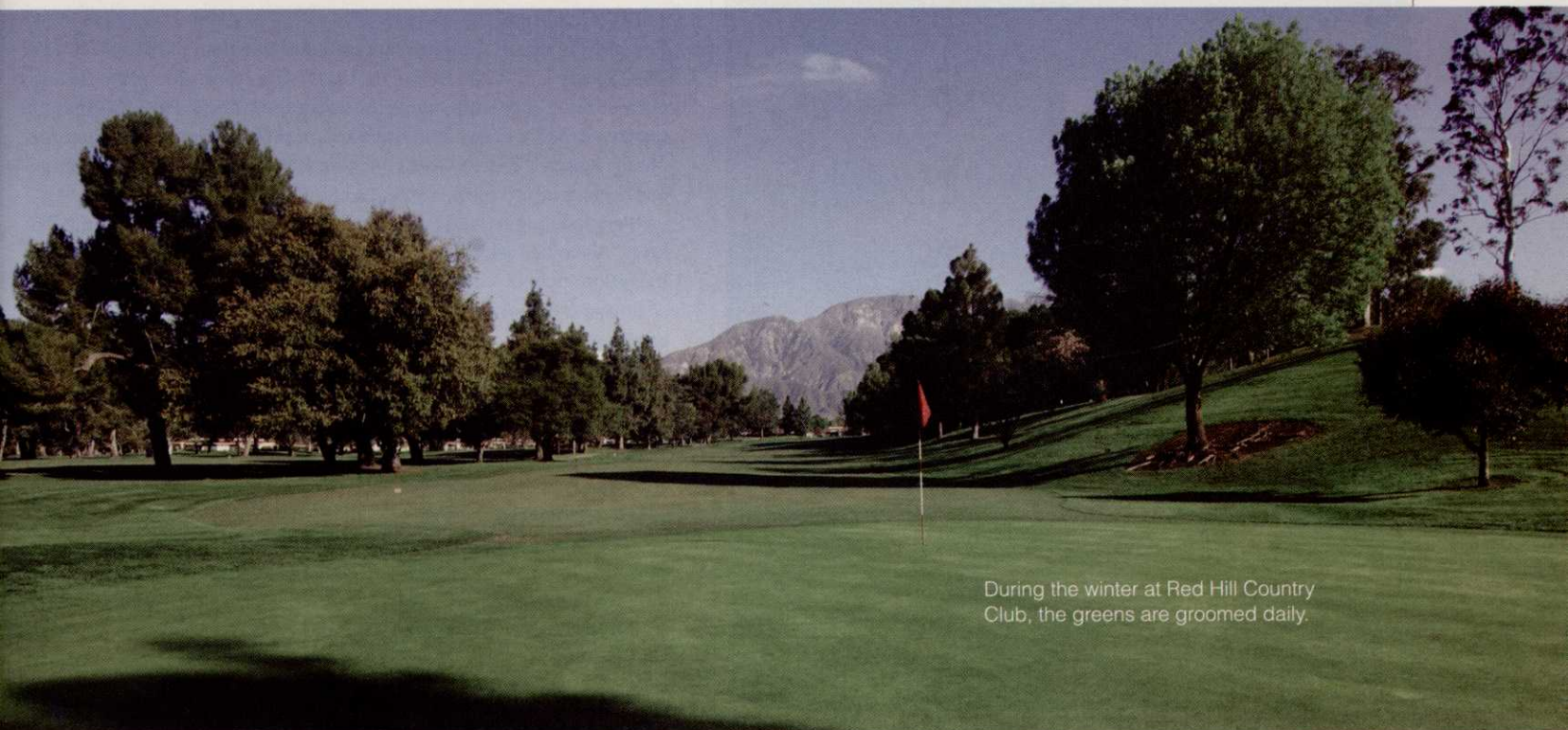
watch you don’t overdo it.”

The *Poa annua* greens at Palos Verdes are groomed twice a week, while the bentgrass tees are groomed every other week.

“The golf course continues to improve, as the members tell me how much better playing conditions are today,” Gradoville says. “I attribute part of that to technology.”

FAIRWAY RENOVATION

Red Hill Country Club in Rancho Cucamonga, Calif., has a reputation for being one of the hid-



During the winter at Red Hill Country Club, the greens are groomed daily.

den gems of the Inland Empire. Built in 1921 and measuring 6,611 yards from the championship tees, the course sits on a bed of heavy, clay soil, and has small, push-up greens.

However, in today's golfing environment, players and members expect current standards of course conditioning. So, when superintendent Craig Kimmel arrived in March of 2000, his direction was simple: bring the course up to date. His first challenge was the fairways, which had been overseeded for many years.

"This created a lot of problems in summer with the *Poa annua* and ryegrass," Kimmel says. "They just died out in the heat. In 2002, we renovated two fairways as a test plot with hybrid bermudagrass, and it has stood the test of time. Now we've changed all the fairways to Tifway II, and they perform excellent in the summer. We aerify a couple times a year and sand topdress; we don't overseed. We want a drier, more consistent golf course with better ball roll during the



Superintendent Craig Kimmel and his staff try to stand up the grass for a better quality cut and more consistent surfaces.

summer and winter. When the turf is semidormant, we don't have to water. Then during the summer, we don't have to put as much water on hybrid bermudagrass as we would with a cool-season grass. The quality of the fairways has risen exponentially."

The maintenance staff verticuts a lot from the spring to the beginning of summer to knock down *Poa annua* seed heads and take care of thatch. Then they light topdress for a smooth ball roll.

Kimmel uses turf groomers on his walk mowers for greens and collars and on the club's three fairway mowers.

"During the winter, greens are groomed every day," Kimmel says. "From March through November, fairways are groomed whenever they're cut, five to six days a week.

Turf grooming isn't verticutting. We're trying to stand up the grass for a better quality of cut and more consistent surfaces. Groomers were something I asked for in our last equipment package. From demonstrations, I liked what I saw and am pleased with the results. We're reaping the benefits of turf grooming."

A SPECIAL SETTING

Few golfing experiences are more memorable than playing a round at The Quarry Golf Club in San Antonio. The front nine plays through native rolling grasslands, while the back nine is nestled in a 100-year-old quarry pit. More than 1.5 million yards of topsoil were brought in to create the course's 8-inch base. Golf course superintendent Bruce Burger has been involved in the project from nearly the beginning in 1993.

"People living around the quarry's rim used to look into a dump," he says. "Now they see a beautiful golf course. When we first fired up the irrigation, people were on their patios clapping."

Burger cuts putting greens with triplex mowers equipped with turf groomers.

"When we started using groomers, we cut the greens at one-eighth of an inch (0.125) with the triplexes and groomers, and I got rave reviews," he says. "Everyone remarks about their consistency."

With the Tifdwarf bermudagrass, Burger is able to maintain the greens at that height without any undue stress on the turf.

"The groomers help reduce the number of times we need to verticut," he says. "The leaf blades stand straight up, and the bedknife and reel come behind and clip them vertically instead of just rolling over the top. We don't have much thatch buildup because the groomers stand up the leaf blades to give us a better cut." **GCI**

David Wolff is a freelance writer based in Watertown, Wis. He can be reached at dgwolff@charter.net.

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BY BOB SELIGMAN

getting started

THE ENVIRONMENT, SOIL, FERTILITY AND PRODUCTS IMPACT THE ESTABLISHMENT OF TURFGRASS MANAGEMENT PROGRAMS



Setting up a comprehensive turfgrass management program at a new golf course might seem simple at first glance, at least to the uninitiated eye.

Put down soil, toss grass seed on top, let a good sprinkler system do its thing, and voila! Instant fairways, rough and putting greens.

If only it were that easy. Putting together a turfgrass management program requires a list full of requirements. It's comprehensive.

One deals with the desires of golf course owners and architects; issues involving soil, fertilizer, water, mowing and aeration; not to mention budgets. Superintendents must prepare for environmental conditions and variations, as well as determining what kinds of grasses are best suited for the course during play and the off-season.

And that's just the beginning. Once a program is in place, superintendents have to be able to plan for and make short-term and long-term adjustments.

"You cannot grow grass on cement like many people think they can," says Joe Voss, owner and president of Marco Island, Fla.-based Joe Voss Consulting and Design. "You need to get your soils up to meet the specifications and to grow the grass you're trying to grow."



FERTILIZATION'S IMPORTANCE

But before the first blade ever rises out of the soil, one has to consider the important issue of initiating a turfgrass management program during the design phase of building a new course or during grow-in – but there doesn't seem to be a clear consensus about when to start.

"You usually do it during the design period because you want input from the architect and the owner about what they want for grass," says Voss, the former golf course manager for Liberty National Golf Club in Jersey City, N.J. "There's so many different varieties of bentgrass. First, you have to find out what they want and what their budget is going to be, which is key. How much will they spend on construction? How much drainage you have? What's your water quality? That determines

your turf program from the actual construction and the preplant through the grow-in and the maintenance."

Fertilization is key for a grow-in to start well, Voss says.

"You might have limited water or limited quality water, but you need to be up to speed on what you're going to use for your preplan and your grow-in," he says.

ENVIRONMENTAL CONSIDERATIONS

Mike Etchemendy, director of facilities operations at 3 Creek Ranch in Jackson Hole, Wyo., also started his program during the design phase. The emphasis was on the environment, which includes the nearby Teton Range and a private fly-fishing area within the adjacent private housing community. Etchemendy started out with an

At 3 Creek Ranch (above), the turfgrass management program is influenced by the Teton Range, a nearby fly-fishing area and a housing community. Photo: Dan Tolson

At The Club at Flying Horse (opposite page), superintendent Dan Hawkins found out what products were and weren't needed during the grow-in. Photo: The Club at Flying Horse



When establishing the turfgrass management program at 3 Creek Ranch, director of facilities operations Mike Etchemendy used an environmental consultant who developed a natural resource management plan, which models fertilizer and pesticide use after weather conditions. Photo: Dan Tolson

environmental consultant who developed a natural resource management plan.

"It basically models fertilizer use, chemical use and pesticide use with weather conditions in this area," he says. "We have three spring creeks where the runoff water could enter during a storm. We modeled all chemicals that could be used here against thunderstorms and rain events that have happened here during the past 30 years. This model told us what kind of potential pollutants we could have entering our spring creeks from the golf course and the residential community. We eliminated anything that could potentially harm or pollute the spring creeks. That told us what kind of fertilizers we could use, what nitrogen sources could pollute the spring creeks and any fungicides that could enter the spring creeks. We worked backwards from there."

TESTING THE SOIL

But not everyone favors putting the pieces of the puzzle of a comprehensive turfgrass management program together during the design phase.

At The Club at Flying Horse in Colorado Springs, Colo., golf course superintendent Dan Hawkins says by testing the soil during the grow-in, he knew what additional amendments were needed such as gypsum and potassium. As a result, management was able to move the money set aside for preplant fertilization and use a portion of it for additional amendments such as gypsum and potassium. This was done before the grow-in, during the construction time frame.

"Those products would have been amended by the construction company on the golf course prior to seeding," Hawkins says. "Once we take over the hole from the construction company, then we begin growing in whatever hole it is."

During grow-in, Hawkins found what products were and weren't needed, which also saved money.

"At the time, we were doing this particular job, and I hadn't decided what we were going to use for our greens program," Hawkins says. "The fertigation system allowed us to get some nitrogen out during the watering of the greens, as well as the rest of the golf course, so we were

getting a nitrogen component that allowed us to see what kind of growth we were getting. We could dial back on our foliar program rather than saying ahead of time that we knew exactly how the bentgrass was going to grow. We could see what the grass was looking like on the greens, and instead of using one product, we were going ahead with a different product because we were getting better growth than we thought.”

MAKING ADJUSTMENTS

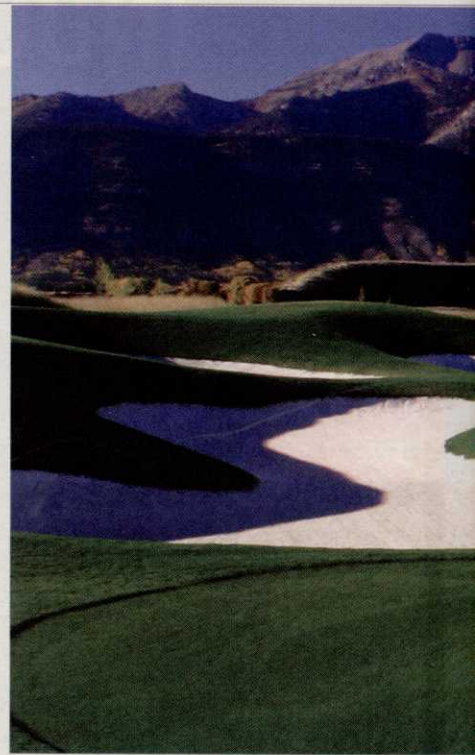
Being flexible is part of developing a successful turfgrass management program. As Hawkins admits, there’s much adjusting on the fly depending on what’s happening. At Liberty National, for example, capping material had an extremely high salt index, so an intensive program was needed to regulate the pH level and add nutrients while eliminating the salts. The importing

of high salt soil was halted eventually.

Even with making adjustments, not every aspect of a successful program is initiated at the beginning. Some take place several years later. One potential change is with products. New ones are made better and cheaper than their predecessors. As a result, Hawkins says he’ll probably use his fertigation system more extensively because there are more better-blended products available.

“The golf industry – the turf side of it – is a changing science,” Voss says. “Things get bigger, better, faster, stronger. That’s inevitable. We’ve gotten into all this new gene research. You might change what you’re doing halfway through the construction.” **GCI**

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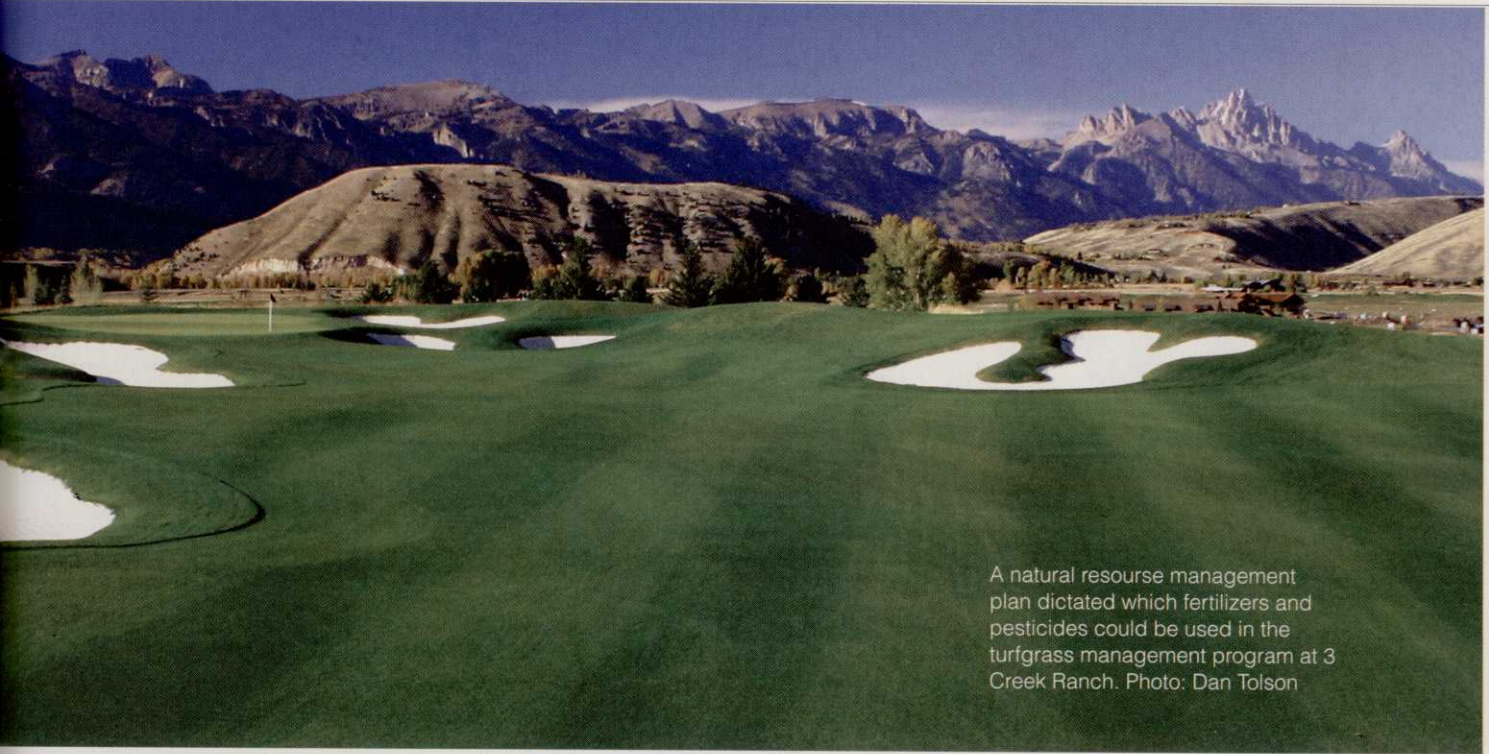
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A natural resource management plan dictated which fertilizers and pesticides could be used in the turfgrass management program at 3 Creek Ranch. Photo: Dan Tolson



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