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.

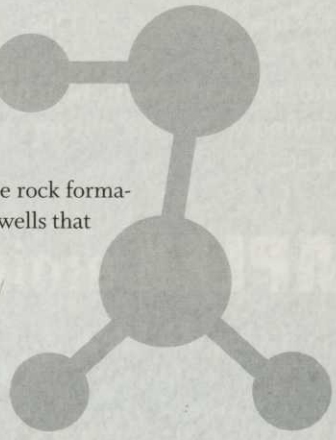
"Let's say you're in a coastal environment and on the fringe of the saltwater/freshwater interface and you're not monitoring the groundwater table," Bowman says. "You could get to the point where you're transitioning from fresh to brackish water. It's not common, but it could happen."

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."



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 contribute 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.

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>
> *– 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**

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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.