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Results

The average soil moisture on a green before treatment ranged from 10.7% to 33.8% with an overall average of 20.2%. The average soil moisture on a green after treatment ranged from 11.4% to 35.9% with an overall average of 23.6%. Tricure™, Revolution®, Immerse GT, Magnus™ and Performa Gold showed increased soil moisture on most greens after the wetting agent was applied (Figure 3). The average increase in moisture for these products was 4.36%, with Magnus™ and Tricure™ exhibiting the greatest increases (Figure 5). Dispatch® decreased the soil moisture on all greens after it was applied. That decrease averaged 4.67%. APSA-80®, Tournament Ready®, and H3O™ each demonstrated an increase in some greens and a decrease in others.

The average soil moisture uniformity on a green before treatment ranged from 52.6% to 90.2% with an overall average of 76.1%. The average soil moisture uniformity on a green after treatment ranged from 57.0% to 90.0% with an overall average of 79.2%. Tricure™, Magnus™ and Revolution® exhibited increased soil moisture uniformity in 34 of 46 greens after the wetting agent was applied (Figure 4). The average increase in moisture uniformity for these products was 6.51% (Figure 5). Dispatch® and Tournament Ready® decreased the soil moisture uniformity on all greens after the wetting agent was applied. That decrease averaged 4.52%. APSA-80®, Immerse GT, Performa Gold, and H3O™ each caused an increase in some greens and a decrease in others.

Figure 3: *Count of the number of greens that increased or decreased soil moisture after a wetting agent application.*

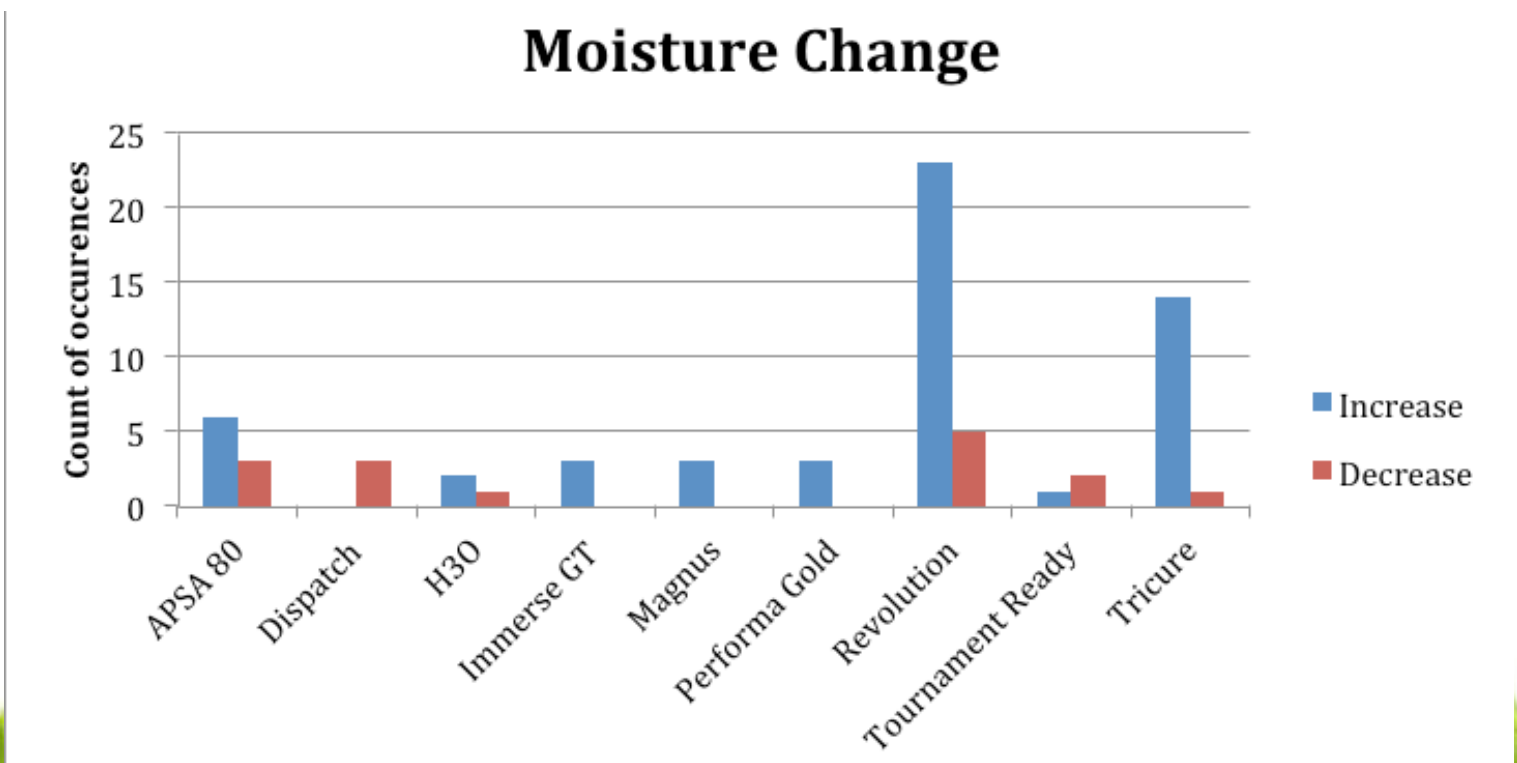


Figure 4: *Count of the number of greens that increased or decreased soil moisture uniformity after a wetting agent application.*

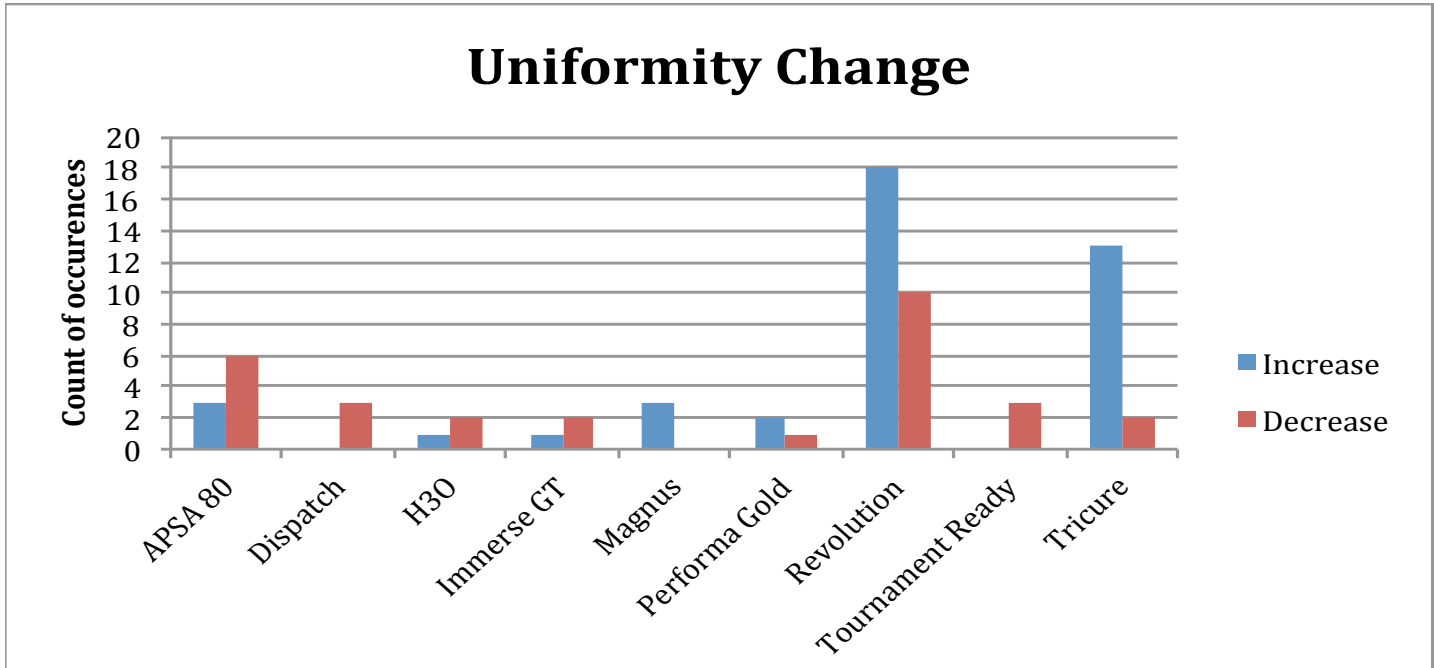
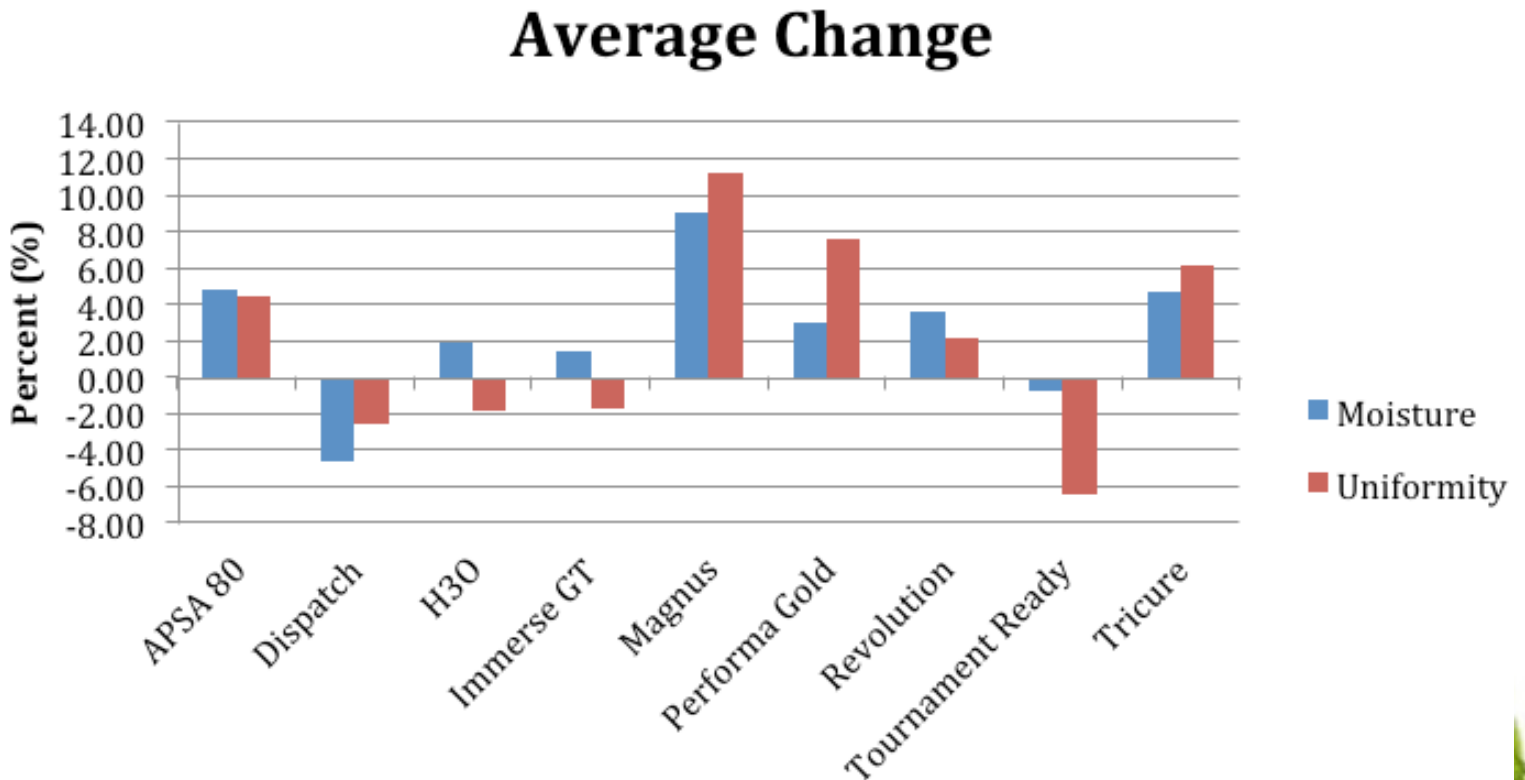


Figure 5: *The average percent change in soil moisture and soil moisture uniformity after a wetting agent application.*



Discussion

A few interesting comparisons can be looked at with this data, such as wetting agent interaction with precipitation, what happens when a course switches wetting agents, and most importantly what can we expect from a wetting agent. It could be suggested that the soil moisture and uniformity differences demonstrated are due to water input changes. Given the minimum span of two days between data collection, this is entirely possible. Total rainfall between ratings ranged from 0 to 4.33 inches, with an average of 0.73 inches. Irrigation systems ran one to four times between ratings, with an average of two runs. Across both years, when minimal water was added (only enough to water in the wetting agent) we saw soil moisture increase in 10 greens and decrease in 8 greens. Further, the same wetting agent caused both increases and decreases. When excess water was added between ratings, soil moisture increased in 45 greens and decreased in 7 greens. This shows that increased water inputs generally lead to increased soil moisture, but it is not the principal reason for the soil moisture and uniformity responses.

In 2011, three courses switched to a different wetting agent from the one they used in 2010. One course switched from Tournament Ready® to Revolution®. In 2010, Tournament Ready® decreased the soil moisture uniformity and had a marginal effect on the soil moisture levels. The Revolution® decreased the soil moisture and uniformity on 2 of 3 greens at the course in 2011. This course saw a similar response even though they switched wetting agents. Another course switched from Revolution® to Performa Gold. Both wetting agents caused a similar response in soil moisture uniformity, but the Performa Gold caused a slightly greater soil moisture increase. The final course switched from Immerse GT to Tricure™. During 2010, the Immerse GT had very little effect on the soil moisture and uniformity. In 2011, Tricure™ greatly increased moisture and uniformity in the greens.

General conclusions about the action of the wetting agents tested can be drawn from the data. APSA-80® is a non-ionic surfactant, which means it spreads water. APSA-80® does not contain agents that attach to soil like other wetting agents. This means an APSA-80® application is more responsive to precipitation levels. In 2010 the courses that applied APSA-80® saw less than 0.25 inches of precipitation between ratings and saw soil moisture loss and uniformity decreases. In 2011, these same courses had 0.75 inches of precipitation and the soil moisture and uniformity

greatly increased. Soldat (2010) studied APSA-80® and found that APSA-80® had no effect on water droplet penetration. Dispatch® caused decreased soil moisture and uniformity and therefore is a penetrant wetting agent. H3O™ is not truly a wetting agent. A component in H3O™ strongly attracts water, but does not attach to soils or spread water like traditional wetting agents. Therefore, it is expected that water will be attracted to where the chemical is in greatest concentrations. On greens that received H3O™ we saw a net increase in soil moisture, but a decrease in soil moisture uniformity, which suggests the water moved to where the chemical was located. Magnus™, Revolution®, and Tricure™ all caused increased moisture and uniformity. Therefore, those are all considered retaining wetting agents. Immerse GT, Performa Gold, and Tournament Ready® generally exhibited retaining capabilities, but did cause some decreases in soil moisture uniformity.

Conclusion

This study demonstrates a distinct soil moisture and soil moisture uniformity response to wetting agent applications. Wetting agents with similar active ingredients responded similarly across a golf course and between golf courses. It should be noted that data was collected in the top 3-in of the soil and these wetting agents may demonstrate different characteristics at shallower and deeper soil depths. Whether

References

- Karcher, D., M. Richardson, A. Patton, and J. Summerford. 2010. Wetting agent effects on rootzone moisture distribution under various irrigation regimes – year 2 summary. Arkansas Turfgrass Report 2009, Ark. Ag. Exp. Stn. Res. Ser. 579:50-56.
- Karnok, K.J., K. Xia, and K.A. Tucker. 2004. Wetting agents: What are they, and how do they work? Golf Course Management Magazine. June: 84-86.
- Kostka, S.J. 2005. ACA1820 – A novel chemistry for rootzone water management in turfgrass systems. Non-peer-reviewed Paper at the 10th International Turfgrass Society Research Conference.
- Leinauer, B., P.E. Rieke, D. VanLeeuwen, R. Sallenave, J. Makk, and E. Johnson. 2001. Effects of soil surfactants on water retention in turfgrass rootzones. International Turfgrass Society Research Journal. 9:542-547.
- Soldat, D. 2010. Comparison of three commercially available wetting agents. The Grass Roots. March/April: 30-32.

On Board: BOD Member E. Paul Eckholm CGCS Shares

Powers Of Observation

E. Paul Eckholm CGCS, Superintendent at Heritage Links Golf Club



Through the years I have had a numerous young people work for me, many have gone on to be in the green industry and many are in fact more successful than I. One of the first things we do when I hire a new employee is go out to a spot on the course and ask them to tell me what they see. We discuss the things they need to look at and the things I see and compare it to the things they see. This teaches them a number of lessons in observation and gets them thinking in terms of

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many types of measurements you can and should take on your course.

I began as a Horticulture Science major at the U of M focusing on a career in the greenhouse. When I took my career outside and began to focus on turf and soil science I brought my floriculture background with me. That industry is very focused on soils and inputs, water, nutrients etc. Many of the decisions made are based on scientific measurements and known plant needs. Very few of the successful growers go strictly off the observed look of the plant.

On my current course I have moisture sensors in the ground and monitor those readings daily. By working with the golf professional, we have developed a program which gives us a more consistent playing surface based on moisture levels. I know what the lower and upper limits of moisture are for the surface the players prefer. The added benefits of this process are a major reduction of how often I irrigate and a reduction in the amount of pesticides used to control pests.

Those of us in the golf course industry have for years thought of our field as more art than science. I am here to tell you that scientific measurements have a place in your program and may in fact help you to have a better playing surface and reduce your costs at the same time. Do you measure your nutrient levels in your soils? How often do you take soil samples? Do you measure the moisture levels in the soil? How often? Have you ever taken light readings? Have you ever measured the actual amount of precipitation that falls on your turfgrass during an irrigation event? These are just a few of the

Soil samples have been taken on a yearly basis and are the basis for nutrient program development. Again, this has increased playing condition consistency, reduced direct nutrient costs as well as the labor to apply those nutrients.

An irrigation audit of one of our golf holes identified problem areas and was used to justify increased irrigation coverage to the ownership. Although time consuming, the knowledge gained has more than paid for itself with the adjustment of irrigation times and adjustment of coverage.

Light audits are something that many of us are not familiar with. Many have problems with shade, but it is only through observation that we are able to provide anecdotal evidence as to the damage to the playing surface. The purchase of an inexpensive light meter and a few days spent taking readings will give you scientific proof of how those trees are affecting the turfgrass. Owners, managers and operators are much more likely to listen if you have proof rather than just listening to you complain that it is the tree that is causing the poor condition on the course.

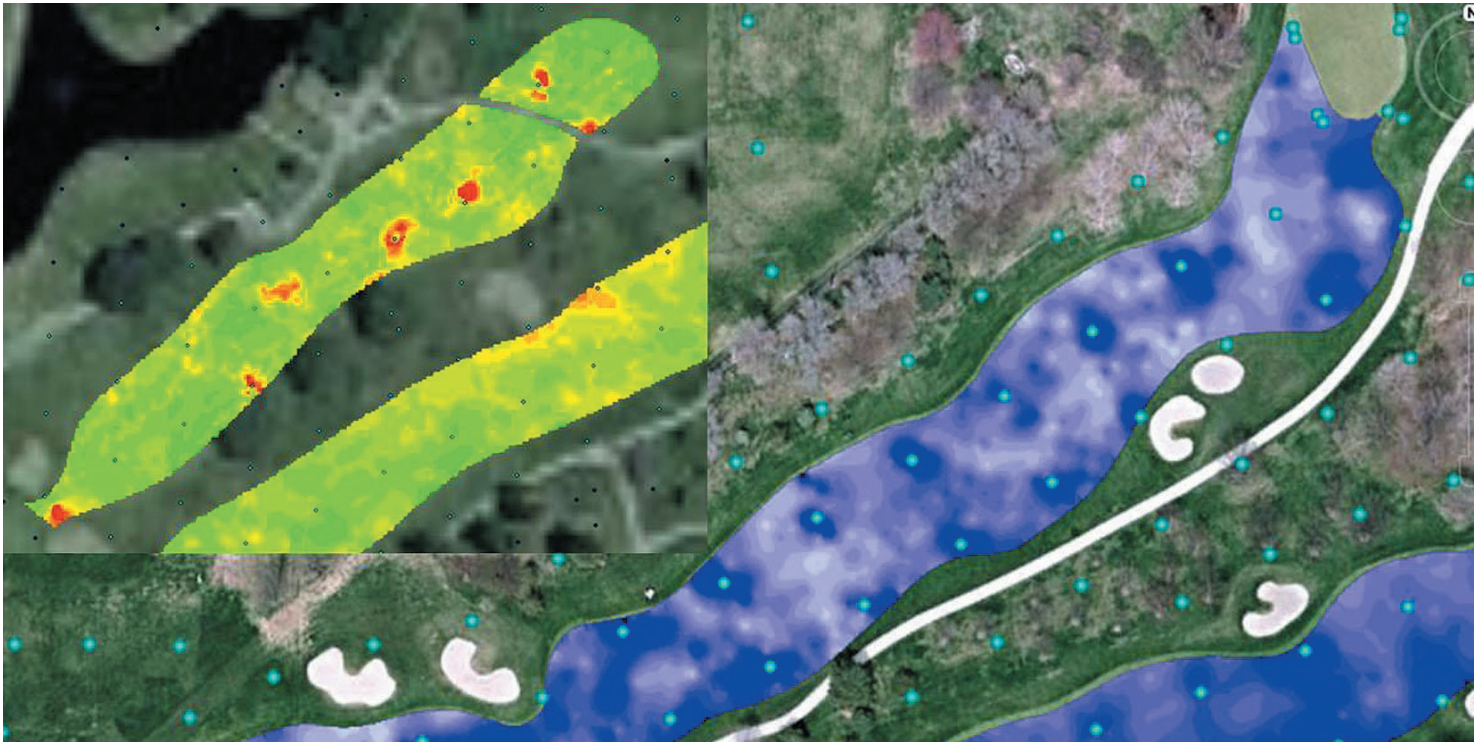
Granted, we could spend our entire day taking readings of one kind or

another but that is not the suggestion I am making.

Start with one type of measurement and begin to generate a database of the information. Then start to make some observation as to when the turf looks best and match it to the base information. This will, over time, help you to maintain more consistent turfgrass environment. I have been working with soil moisture measurement reading for over ten years and the more I use it the narrower the range becomes that I maintain. All of the measurements are just tools that help us to get closer to the science of turfgrass management.

In the photograph below you can see what appears to be very good distribution uniformity. However without the audit cups in place will you ever really know? Photograph courtesy of Troy Carson, Toro Company.





There are tools today for measuring soil moisture and compaction. Both pieces of information can be critical in your management program. Photograph provided by Troy Carson, Toro Company.



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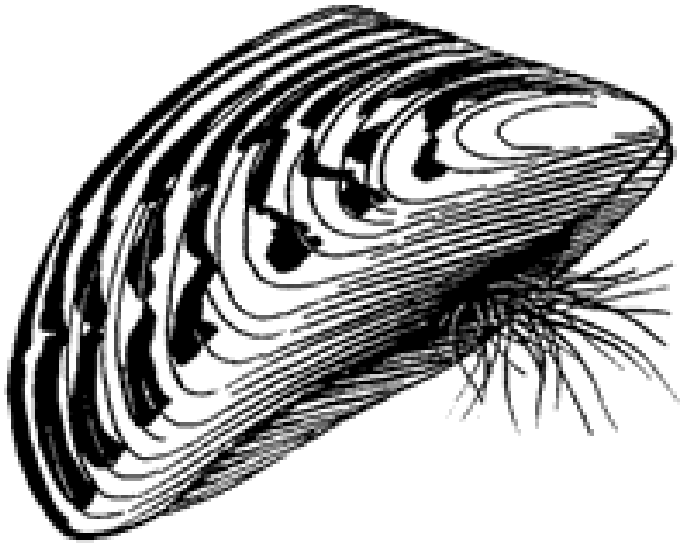


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Menacing Mollusks: The Concern over Zebra Mussels and the Brav

By Daniel Johnson



For Minnesota golf course superintendents, there's one aquatic creature more terrifying than the Loch Ness Monster or the Creature from the Black Lagoon. This species of shellfish is known as the Zebra Mussel and although the invader's infestation of the U.S. Great Lakes appears to be permanent, there is hope. The efforts of a small company operating out of Long Lake combined with the continued diligence and swift action from superintendents may be enough to tame this beast.

The company is Waterfront Restoration. It specializes in chemical free lake weed control and now because of the demand, it provides Zebra Mussel control services. Tom Suerth founded the company in 2003 and has since been assisting private homes, fire departments, and now golf courses, with

their Zebra Mussel pest problem.

"Waterfront Restoration, LLC is committed to restoring residents' enjoyment of their lakefront with guaranteed effective, ecologically conscious aquatic nuisance control services," said Suerth.

Indigenous to Southern Russia and Caspian Sea, the Zebra Mussel is spreading like an infectious disease across U.S. waterways. By attaching onto boat hulls, these mollusks hitch a ride to infest new waters and continue to overrun native mussels by reproducing and maturing faster. At first glance, these small freshwater mussels and their beautiful striped shells may seem harmless, but with great numbers they inflict damage by clumping together against the inside of irrigation piping, clogging waterways like a carotid artery.

North Oaks Golf Club knows about the headaches that go along with having a Zebra Mussel infestation first-hand, as it suspected clogging of its intake pipes in the fall of 2010. That's when they called Waterfront Restoration.

"When entering the holding tank, we discovered the intakes were more than eighty percent clogged. . It took a long focused effort to free the intake screens of the buildup," said Suerth.

Although, the problem isn't new to the area, the massive spread of the