



43rd Annual Golf Turf Symposium

By David Brandenburg, Golf Course Manager, Rolling Meadows Golf Course

With the recent passage of the Great Lakes Compact and recent major droughts around the country this year's symposium topic; "All Water is Not Created Equal" was very appropriate. The Symposium is unique in the way it takes one topic and looks at it from many viewpoints.

No review is complete without a full and hearty thank you to Shelly Biro and Milorganite! Your symposium committee meets and picks a topic and works on securing speakers but Shelly and her staff do all the coordination and arrangements to get the speakers signed on and to the American Club. Milorganite pays for the speaker expenses to allow the WGCSA to offer you an educational session with benefits way beyond the cost. Thanks again Shelly and Milorganite for your continued dedication and support of our education.

Keynote Speaker Tom Crawford used his experience as Staff Attorney for Milwaukee Metropolitan Sewerage District to entertain and educate the audience on the history of the rights and rules regarding water use in the state and nation. His talk "Who Owns The Water" gave insight into how water rights are protected and shared at the same time.

"English Rule" provides for absolute ownership of water, while "Yankee Rule" provides for reasonable use. Texas is the only state to use absolute ownership of groundwater, allowing landowners to sell their ground water rights to others.

The Northwest Ordinance proclaimed the use of water to be "Forever Free" and provided for the right of navigation. Tom

explained that the logging industry molded many of our water rights and laws. The "saw log test" led to today's term of navigable waterway. If an area was able to float logs once a year during high water from spring storms or snow melt it is considered a navigable water way and must be made available for all to use even if it is only "navigable" once per year.

Mr. Crawford discussed the water problems in the west in states like Texas and Arizona where large populations are making water a valuable commodity. In 1990 Agriculture used 90% of Arizona's water, by 2040 that number by regulation has to be down to 66%. That is quite a change.

Water rights involve many different factors depending on where you are. First in time, first in right, Dessert Law, reasonable use, unreasonable use and do no harm are all used at some place in the United States. With these competing thoughts water rights can be difficult to understand and often be the subject of lawsuits.

The very western part of Wisconsin is over the Lake Michigan basin and ground water tends to run towards Lake Michigan. Any water drawn from that area must be returned to that area. The unique factor of the Lake Michigan Basin is that shallow wells draw from one aquifer while deep wells draw from another aquifer. This is due to the layer of primarily impermeable shale that separates the shallow and deep levels of groundwater.

The rest of the state is in the Mississippi Basin and does not have this separation from deep and shallow wells. In this case the



Keynote Speaker Tom Crawford



Dr. Clark Throssell, Director of Research for GCSAA

cone of depression from large deep wells may spread out over 2 miles from the well site and reduce water levels in shallow wells and other deep wells.

Tom feels we are fortunate in the Badger State to have an ample amount of groundwater and very few regulations to its use at this time. He believes golf is covered by the right to farm rules and pro-

tected from local control of wells by state preemption. Deep well reporting is just starting and can be considered as the DNR's first steps to more regulation.

Changing gears brought Dr. Clark Throssell, Director of Research for GCSAA to the podium to discuss water quality. Clark's talk was titled "Salts, Sodium and Bicarbonates, Should I be Worried?"

Dr. Throssell expressed the importance of performing water tests at the same time every year. Once at system startup and again during the dry summer irrigation period. Spring can bring contaminants into surface waters and heavy watering can highlight problems with our water supply. Water should be tested for salinity, sodium hazards, residual sodium carbonate, PH and any ions in toxic levels.

Again we were told we are lucky in Wisconsin to have a great water supply so PH and toxic levels of ions are rarely a problem. The only things we should keep an eye on are Boron >2ppm and Chlorine >350ppm.

Salt accumulations in the soil, attracts water in the soil binding it up and making it unavailable to plants. A fertilizer burn would be an extreme case of high salts in the soil. Water is still there, it is just tied up by the salt ions. Minor salt accumulations are made

worse by summer temperatures and daily watering. Evapoconcentration of salts is caused by evaporating water leaving salt deposits behind.

Salts are flushed from normal soils by the regular rainfalls we have in Wisconsin. So even borderline irrigation water quality does not cause a problem here because the salts are leached through the soil profile by flushing with excess water from rain or irrigation. Of course this does not work in areas of poor drainage because the salts accumulate and do not flush. If your water tests show salinity problems, the purchase of a soil salinity meter would be a good investment for your turf monitoring tool-kit.

Two negative ions that can cause trouble for turf are Carbonate (CO_3) and Bicarbonate (HCO_3). We are fortunate in Wisconsin that our water typically contains Calcium and Magnesium to neutralize the CO_3 and HCO_3 .

A water test that shows a high number of any of salt, carbonate or bicarbonate by itself does not indicate an automatic detrimental problem with your water. We need to look at the way the different ions neutralize each other before concluding poor we have a problem. When submitting samples to the lab ask for the Residual Sodium Carbonate (RSC) numbers to

Elements of Successful Turf Management



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best determine water quality and how it affects turf. 1.25 to 2.5 meq/l is considered medium. This number is not parts per million (ppm) but milliequivalent per liter (meq/l) and is based on the total number of charges combined in the ions.

So far our speakers expressed how lucky we are to have ample rainfall and water in Wisconsin and Dr. Kelly Koop, Associate Professor at Utah State University was no different in her talk titled "Golf Course Water Use, Surprising Results from Utah." Utah is the second driest state and second in amount of water used per person behind only Nevada. With the population of water consumers increasing in Utah, water is becoming difficult to find. With rainfall at only 3-6 inches a year in some areas, irrigation is a necessity for healthy crops of any kind.

Golf course water use was brought to light when individual citizens starting complaining of why they could not water lawns and landscapes but golf courses could water turf. Golf courses are highly visible users of water especially during the day so we need to be proactive in our water use plans.

In response the Utah Golf Course Superintendents Association took action to survey golf courses and determine actual water use in comparison to water needs. Water audits were done to track the use of potable and non-potable water on golf courses. Turf crop coefficients were established to allow for accurate use of deficit irrigation to reduce water use but keep turf quality at an acceptable level.

The survey of the Utah golf courses showed the golf courses on average used water 80% efficiently in 2000 and 2001 and the work done increased that to 86% efficiency in 2002 and 2003. This in comparison to homeowners who show an average of 50% efficiency in water use. The courses were able to reduce water use while maintaining quality through this program. The public is better informed and complaints about water use for golf in Utah have been reduced.

Tuesday's session finished with Dr. Doug Soldat's talk titled, "Understanding Irrigation Strategies, ET, Soil Moisture and Surfactants". That is a lot of topic and Doug provided the audience with a lot of information to go along with it.

The 4 common ways to water are deep and infrequent, light and frequent, deficit irrigation and pray for rain. In any golf season most turf managers use all of these methods depending on the season.

Deep and infrequent provides for deeper roots, less shoots with less succulent leaves. Improved turf quality is possible on good soils and turf but considering *Poa annua* has little root system in the summer makes this method impossible without massive turf-loss.

Light and frequent decreases dry spots and nutrient run-off but causes plants to be succulent with shallow roots.

Deficit irrigation is watering to less than evapotranspiration rates (ET) to keep turf from getting succulent and allow for root growth and water savings. Dry spots are common if wetting agents are not used and again, *Poa annua* the predominate species on many Midwest golf courses will die without frequent watering due to its shallow rooting.

Research is showing that a combination of light and frequent and deficit irrigation provides for the greatest turf health when used in combination with wetting agents.

ET is most influenced by solar radiation and to a lesser degree, wind, temperature, humidity and height of cut (HOC). To properly use deficit irrigation principles we as turf managers need to track ET rates, and use a good soil moisture probe to determine moisture levels in the top 1.5" to 2" of soil. Dr. Soldat expressed 15% was a suitable moisture level while 9% usually was the point of wilt. Surfactants are vital to a successful watering program in order to rewet the soil after dry-down and avoid dry spots.

Wednesday started with Dr. Clint Waltz, Extension Turfgrass Specialist at the University of Georgia. Clint spoke on the "Best Management Practices (BMP) for Golf Course Water Conservation" and the challenges golf courses in Georgia have had with varying levels of water restrictions. In Georgia, water conservation is the most important issue of the turfgrass industry.

The efforts of the Dr. Waltz and the Georgia Golf Course Superintendents Association have improved the states opinion of golf course turf managers. In the 5 years since the work started 95% of the association's member clubs have complete BMP's to guide their irrigation programs. This represents 60% of Georgia's 400 courses.



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Dr. Clint Waltz, Extension Turfgrass Specialist at the University of Georgia



Carol Colein, Irrigations Specialist

Conservation Implementation Plan are to collect reliable data, use Best Management Practices approach and philosophy to develop any plan. The plan must transcend golf as we need to make other turf industries better or fear being dragged down to the level of the worst users of water. And finally communication is key and the state DNR must help us science and proven facts to dispel false claims from special interest groups.

Carol Colein, Irrigations Specialist with Jerry Matthews Natural Course Design located in Michigan continued on the topic of water conservation with her talk titled "Irrigation Systems and Optimizing Water Use Efficiency." Although Michigan has ample water with a climate similar to ours Carol expressed regulations and reporting requirements are more stringent in Michigan and the golf industry is taking proactive steps to reduce its water use.

Carol started with "water is finite" and "irrigation is a net consumptive use and is not recoverable". Carol expressed if the golf industry is not serious about water conservation regulators will make us serious.

There are many factors reducing water use besides saving water. The National Golf Course Owners Association is starting to embrace the cost savings having the playing surfaces a little less green can bring while many architects are trying to provide for drier and less lush turf to allow for more ball roll and more options in course design. Even Golf Digest is reducing the value of green lush turf in its definition of best maintained golf courses.

The big things we can do to reduce water use and waste is to improve our delivery systems by upgrading nozzles or sprinkler drive systems or when finances allow installing new irrigation systems designed to better standards.

Greens encompass a small part

of the golf course and with better nozzles and sprinkler heads distribution uniformity (DU) is near perfect. Fairways on the other hand offer the greatest opportunity for energy and water savings from increased DU.

By using scheduling coefficient (SC) figures, Carol showed how we compensate for the driest areas in a section of turf by over-watering the other areas. The old center row fairway system at best offers a DU of 60% causing the centers of fairways to be watered up to 3 times the amount of the edges of the course. This excessively wet turf is a common complaint leveled towards turf managers. Without a new design the end result of the center row system is dead turf, wet centers or the labor intensive hand watering of the fairway edges.

The shift to double row fairway systems produced a 25 to 40% reduction in water and energy however double row systems are only designed to water the fairway, nothing else. 10 feet off the fairway the turf will be dry any time the irrigation system is not supplemented by rain.

The best and most common current designs offer a three row fairway system to provide 110 to 130 feet of near perfect coverage. Currently a three row system costs \$225,000 more at the beginning but you provide your club with a system that will never be outdated in design. This three row system will save another 20% in water and energy over the two row system because the water can be applied with a SC of 1.1 leaving little room for improvement. The double row system offers a SC of 1.4 to 1.6 for the fairway itself and the single row is an inefficient 1.9 to 2.

Carol offered some simple tips to keep current systems working as efficient as possible. First heads need to be leveled as often as needed. An un-level head distorts

Clint pointed out irrigation is a lot more than just watering. Irrigation audits show how and where water is being applied while proper cultural agronomics and improved root-zones allow for the reduced use of water. Using Evapotranspiration (ET) figures and soil moisture meters allow for watering only when needed.

Communication with community and government regulators was key and through the efforts of the association, Dr. Waltz and Mark Esoda the key spokesman for the GCCSA golf have been given a voice in water use negotiations when other industries have not.

The keys to a successful Water

the throw pattern with even the best of nozzles. If a new irrigation system design is not in the cards a computerized control system will allow for water conservation with even the old single row system. Having a simple way to adjust run times for sprinklers throughout the property will allow you to implement your own water conservation plan until you have the ability to upgrade your system design.

One last suggestion was to be careful when adding a computer control system to old pipes. A short water window is great but be sure to allow for old undersized pipes when writing your programs as to not tax the system you have.

The topic switched directions with a humorous and information talk by James Held, Aquaculture Outreach Specialist, University of Wisconsin Madison about pond management. Although James normally works with fish farms he understands the golf course pond ecosystem and was quick to say "ponds are a pain".

James reviewed the different types of pond plants and algae, how they are affected by light, nutrients and dissolved oxygen. All plants need light to grow so reductions in light by deepening the water, using dyes or cover plants will reduce algae and weed problems.

Fountains help with controlling the level of dissolved oxygen (DO) to allow beneficial bacteria to thrive. DO should be measured at 4 or 5 am to reduce the effect of photosynthesis from the daytime. The bottom of healthy ponds should be 2-3ppm while to support bluegill and perch 4ppm is needed.

In fish management fertilizer is actually added to the water to produce better fish and needed plants. In golf course management we strive to keep fertilizer runoff out of ponds. However many of our challenges come from tree leaves, turf shoots and run-off beyond our



Pete Wood, Stormwater Engineer, Wisconsin Department of Natural Resources

borders. Nitrogen and phosphorus effect water quality the most and interact with each other to enhance different algae or plants.

Despite his hatred for cattails and willow trees James gave the audience a days worth of valuable information and provided great resources to continue our education in pond management.

The morning wrapped up with Pete Wood, Stormwater Engineer, Wisconsin Department of Natural Resources discussing the Legal Aspects and Permitting of ponds. Many golf course ponds are covered under NR216 or Chapter 30 because they feed or are within 500 feet of a navigable water way. As a reminder from earlier in the symposium just about any ditch, swale or stream is considered a navigable water way if once a year you can float a canoe down it.

For the most part the rules are easy to work within as long as the proper permits are obtained and erosion control rules are followed during construction.

Wetlands are a different story and permits are needed any time to fill wetlands or to work with equipment inside the wetland boundaries. Wildlife scrapes are permitted on a regular basis in wetlands however the dredging of

deep ponds within a wetland is difficult to receive permitting for.

With the new technology wetlands are often marked on official maps from aerial or satellite photos without agents ever going to the site. This has lead to many stormwater retention ponds to be listed as wetlands on official maps. However in most cases these are not treated as wetlands and our ability to re-dredge and maintain these areas is not limited by wetland regulations.

Pete reminded us that permits are needed to apply dyes or chemicals to waters of the state along with permits to drain a pond and discharge the flow into a water of the state or a area that leads to a navigable water way.

Pete also talked about well permits and the different permits needed for low and high capacity wells. Any well or series of wells over 70 gpm is considered a high capacity well and subject to permitting and reporting regulations.

After lunch the panel discussion offered a variety of irrigation system examples with the title, How Do You Manage What You Have? Pat Sisk, CGCS of Milwaukee Country Club started with a review of installing the new system at his club and the planning that went into providing the membership a smooth installation.

The key to success was the pre-planning Pat, his staff, club and their consultant did before ground was broke and communication during the process. In the end the smallest of details leads to the greatest customer satisfaction.

The new system has over 1600 heads but through efficient use has reduced overall water use and labor hours in hand watering.

The discussion continued with John Mastenbrook, Golf Course Superintendent at Petoskey Bay View Country Club in Petoskey MI. John is at a resort area private course in North Michigan with a

short summer season.

John is the first in our area to put in a decoder control system and he discussed the benefits and challenges of that. The big benefit is a cost savings of \$30,000 over a satellite system along with no satellites on the golf course. Petoskey Bay View choose a Rainbird system with the Nimbus II Central.

Surge protection and wire tracking capabilities are important for a decoder system but as a benefit the wires are only with the pipe so pipes are easy to track. Each heads decoder has a number that is entered into the central to control it. The decoders are reprogrammable if replaced and additional heads can be added at any time by just digging a hole and tying into the pipe and wire, without the hassle of pulling a new wire.

John went with 5 different wire paths from the central to allow for isolation if problems occur. The two wire casing runs from head to head and a signal is sent to operate the head you need. So far there are no regrets and with any new system John has reduced water use and hand watering.

Wrapping up the panel was Brian Zimmerman, Director of Operations for the County Milwaukee Golf Courses. Brian and his staff oversee 15 courses spread throughout the county.

The courses which had over 389,000 golf rounds in 2007 have over 55 different types of sprinkler heads on the different courses. The systems range from new computerized control to center row quick couplers, new PVC with complete pump-stations to old galvanized pipe run off of city water.

Brian discussed the challenges of keeping up with the variety of systems they have and the importance of communication and patience in getting approval for the upgrading of the systems.

The closing act was USGA

Green Section Agronomist Bob Vavrek giving his roundup and take home messages from the different speakers. Bob reiterated the common theme of doing an irrigation audit to find the efficiency of your system followed by documentation of what you are doing.

Using the accurate ET rates and the newer soil moisture probes will allow us to maximize our irrigation programs. With proper recording and using deficit light irrigation both quality turf and water use reduction is possible. Our turn at drought and regulation will come so it is important to be proactive.

I could go on for many more pages, as this as all symposiums was a great opportunity for superintendents to delve into a very important subject for a day and half. Please contact a symposium committee



USGA Green Section Agronomist Bob Vavrek

member if you have any suggestions for future topics. Thanks again to Milorganite for their sponsorship of this great event. 🌱

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