

# The GRASS ROOTS

AN OFFICIAL PUBLICATION OF THE WISCONSIN GOLF COURSE SUPERINTENDENTS ASSOCIATION

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Country Club





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### What A Season

By Jon Canavan, Golf & Recreation Turf Manager, Milwaukee County Department of Parks, Recreation & Culture

I don't remember a season that has had more up and downs'. April was one of the coldest and snowiest months we have had on record. I was looking through my old twitter feeds and saw a post that the Green Bay area had over 20 inches of snow! Then the rain hit for May and most of June. July has given us hot and humid weather followed low humidity and no rain.

In the Milwaukee area our pump stations have been running nonstop. Even with the irrigation system at full capacity. It is just enough water to keep the playable areas green. I have to remind people that our irrigation systems in the Midwest are only supplemental watering. We need a few rain showers here and there to fill the voids.

It's this time of year that I wonder why I do this as a profession. It is hard to explain to people how quickly things can go wrong at the golf course. I remember once my farther-in-law saying to me "it's only grass what could go wrong?" I started to explain to him, but he gave me the 100 mile stare so I just gave up.

**It is hard to explain to people how quickly things can go wrong at the golf course. I remember once my farther-in-law saying to me "it's only grass what could go wrong?" I started to explain to him, but he gave me the 100 mile stare so I just gave up.**

During this tough stretch of our season. It is important to take a step back

and breath. A few options that I like to do are. Spend the morning with my kids doing something fun. Take a morning to have a cup of coffee somewhere else than the golf course. I find that this helps me get my mind straight.

We have some exciting events coming up yet this year. For the first time the WGCSA is renting a bus to take people to the joint NGLGCSA August 13th event at Horseshoe Bay, September 17th The Wee One Fundraiser at Pine Hills CC, October 1st WTA at Kenosha CC, November 3rd Couples outing in Green Bay, November 28th-29th Annual Turf-grass Symposium.

Best of luck the rest of season. Before we know it the Packers will be playing football! 🍀



#### WGCSA MISSION STATEMENT

The Wisconsin Golf Course Superintendents Association is committed to serve each member by promoting the profession and enhancing the growth of the game of golf through education, communication and research.

#### WGCSA VISION STATEMENT

The Wisconsin Golf Course Superintendents Association is dedicated to increase the value provided to its members and to the profession by:

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- Growing and recognizing the benefits of a diverse membership throughout Wisconsin.
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## University Of Wisconsin Snow Mold Update

By Paul Koch, Ph.D. Department of Plant Pathology, University of Wisconsin – Madison

*Author's note: This article was originally published in the August 2018 issue of Golfdom Magazine. It is republished here with their permission.*

Snow mold is one of the primary diseases of golf course turf in Wisconsin, as it is for much of the northern U.S. Depending on your location, however, snow mold can be a disease that costs tens of thousands of dollars to control with the potential to shut a course down for weeks in the spring without proper protection. Or it might be a disease that you spray for because you don't want THAT winter to be the one your course receives record snowfall, even though most years not much snow mold is seen. The line between severe snow mold and no snow mold seems to be getting thinner, and the winter of 2017-2018 showed just how sharp the cutoff can be from intense snow mold pressure to almost non-existent pressure. Knowledge of this cutoff and how it impacts your risk for snow mold development has important implications for all turfgrass managers in temperate climates.

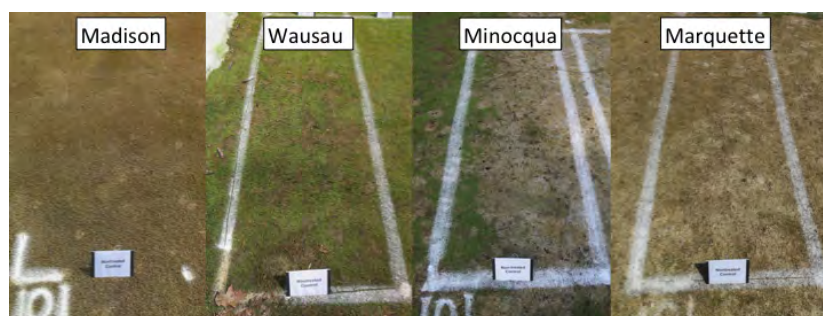
### Wisconsin 2017-2018 Snow Mold Results

At Wisconsin we have various types of snow mold research that includes product testing research and also applied research investigating application strategies and snow mold fungicide persistence. We typically test at sites across Wisconsin and the U.P. of Michigan to provide a broad swath of snow mold pressures, from relatively low pressure in southern Wisconsin to moderate in central Wisconsin and high in northern Wisconsin and the U.P. In 2017-2018 we conducted snow mold research at Cherokee CC in Madison, WI; Wausau CC in Wausau, WI; Timber Ridge GC in Minocqua, WI; and Marquette CC in Marquette, MI (**Figure 1**). Madison, Wausau, and Marquette were product-testing sites while Minocqua hosted a GCSAA-funded study on optimal snow mold fungicide timing.

In a typical winter, pressure in the non-treated controls would be approximately 25% in Madison, 75% in Wausau, and 90% in Minocqua/Marquette. However, recent winters have produced sharper cutoffs and 2017-2018 was an extreme case: Madison had 0% disease in the non-treated areas, Wausau had 11% disease, Minocqua had 88% disease, and Marquette had 99% disease (**Figure 2**). There are only 68 miles between Minocqua and Wausau, an easy 1-hour drive up Highway 51...but it made all the difference last winter between intense snow mold and barely any snow mold.



**Figure 1: Map showing the four University of Wisconsin snow mold research sites in 2017-2018.**



**Figure 2: Snow mold present following snow melt in 2018 in the non-treated control plots at Cherokee CC in Madison, WI; Wausau CC in Wausau, WI; Timber Ridge GC in Minocqua, WI; and Marquette CC in Marquette, MI.**



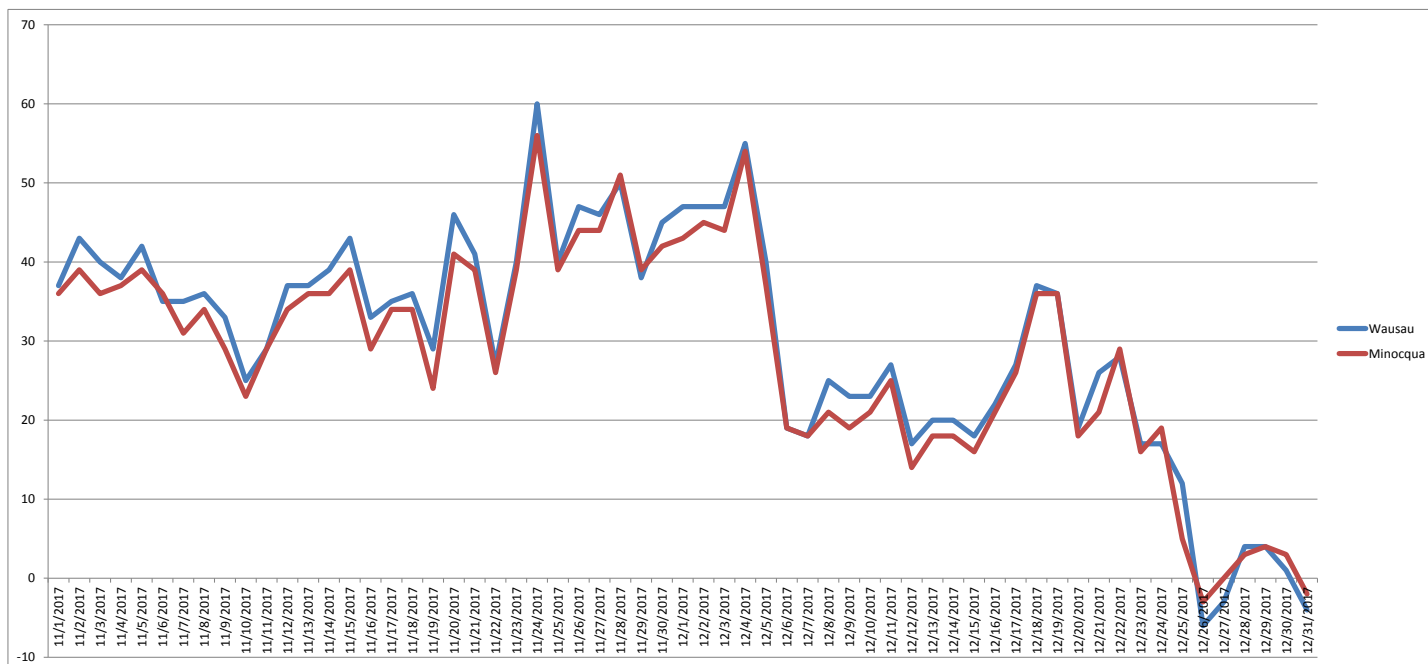


# WISCONSIN PATHOLOGY REPORT

The weather is the major driver in snow mold development, but how did such an intense difference in disease develop over such a narrow area? Both Wausau and Minocqua had snow cover on the ground from approximately mid December through mid to late April, and both sites had similar air temperatures throughout November and December when snow mold fungal growth is in its early (and crucial) phase (**Figure 3**). However, Minocqua had 8 to 12 inches

of snow on the ground during a deep freeze in late December while Wausau only had 2 to 4 inches according to the National Oceanic and Atmospheric Administration (NOAA) Snow Depth Report from December 20th of 2017. The deeper snow depth at Minocqua insulated the turf (and the snow mold fungi) below during the cold snap and allowed it to continue growing early in the season. Wausau's snow depth didn't provide the same level of insulation and

the upper soil froze, inhibiting fungal growth the same way a fungicide application would. Though lots more snow fell throughout the winter in Wausau, this early setback was enough to limit snow mold development throughout the entire winter. In general, what happens early in the winter is more important regarding snow mold development than later in the winter because of the time required for these slow growing fungi to grow and infect turf.



**Figure 3: Air temperature during November and December of 2017 at Wausau, WI and Minocqua, WI**

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# WISCONSIN PATHOLOGY REPORT

## Controlling snow mold under heavy disease pressure

The research trial at Marquette provided an excellent test of the 83 treatments under extreme snow mold conditions. In fact, the snow mold pressure observed at Marquette was probably the highest pressure I had observed in the 12 years I have been conducting snow mold research at Wisconsin (Figure 4). Not only were the non-treated controls obliterated, treatments with only 1 or 2 active ingredients often had similar levels of disease to the non-treated areas. Despite the intense pressure, a surprising 22 out of 83 treatments provided 90% disease control or better (Figure 5 page 11). An additional 10 treatments provided 80% disease control or better, which under the intense pressure observed is probably enough snow mold protection for 90% of golf courses in temperate climates.

Nearly all of the successful treatments in this trial had certain characteristics in common. They all contained at least 3 active ingredients from different chemical classes, which I believe is important in providing greater knockback of the snow mold fungi in the days and weeks following the application. In addition, nearly all the successful treatments also contained a demethylation inhibitor (DMI) fungicide as one of the active ingredients.

DMI fungicides are highly effective against gray and speckled snow mold, so those locations that experience extended snowfall where these snow molds are common should contain a DMI in their mixture. Lastly, most successful treatments also included a contact fungicide (PCNB, Daconil, Medallion, Secure). It's not entirely clear why the contact fungicides are important for snow mold control in heavy pressure, but possible explanations could be broad-based fungal suppression or increased persistence in winter environments relative to other modes of action.

The full Marquette report, including pictures of each treatment, can be accessed at our Turfgrass Diagnostic Lab website (<https://tdl.wisc.edu/results>) in the 'Snow Mold Fungicide Trials' section.

## Controlling snow mold under lighter disease pressure

The decision to control snow mold and what products to use are relatively straightforward when you know you're going to experience significant snow mold pressure. However, winters for many locations have become so variable in both temperature and snow cover that many superintendents in the southern Great Lakes, southern Midwest, and much of the Northeast that spray snow mold either don't need to spray at all or can spray fewer products.



**Figure 4: Intense snow mold pressure at Marquette CC provided a strong test of the treatments.**



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# WISCONSIN PATHOLOGY REPORT

In fact, we have only observed snow mold in the non-treated controls of our southern Wisconsin snow mold locations TWICE in the last nine years...and in both cases disease was 20% or less.

One thing I have learned after 13 years in snow mold research is that superintendents hate to tinker with their snow mold program. This is understandable since snow mold (unlike many other turf diseases) only gives you one shot to get it right and it's a large investment for most clubs. However, most superintendents will agree (and climate data supports) that snow depth and duration of cover has become more variable in the past 15 years, and this variability disrupts the growth of snow mold fungi and decreases snow mold severity. Simply put, I believe most courses outside of the snowiest areas (ie lake effect snow areas, far northern U.S., Rocky Mountain west) experience less snow mold pressure today than they did 20 years ago. Could a superintendent still spray 4 active ingredients on 30 acres of

fairways even though they haven't seen snow mold in 20 years? Sure they could, but they might be able to achieve significant savings without sacrificing disease control by exploring other options.

What other options are available is dependent on what kind of pressure exists on the course over a multiple year period. To do this, leave an unsprayed area or put down a piece of wood prior to spraying to serve as a check plot that will allow you to assess disease pressure. A check plot should be conducted in multiple winters in approximately the same area to assess differences in snow mold pressure between years. It's unlikely your course experiences high pressure if you observe disease symptoms taking up less than 10 to 15% of the non-treated area the following spring, meaning changes to your snow mold program may save you money without a decrease in control.

Options for savings include spraying fewer active ingredients and spraying fewer areas of the golf course. In general I don't recommend drastically decreasing protection for golf course putting greens since they are the highest value areas of the course and they typically only take up 2 to 3 acres. Much larger savings can be found on fairways, and reducing the number of active ingredients being applied from 3 to 2 or 2 to 1 on fairways can result in significant savings when multiplied over 30 acres. In addition, reserving the highest level of protection (3 or more active ingredients) for only areas of the course that tend to see the longest snow cover can also result in significant savings. This might include low swales where snow collects, heavily wooded areas, or areas of poor drainage.

In the end the decision lies with the superintendent since any disease that does develop will be his or her responsibility. However, superintendents looking (or needing) to reduce the amount of money spent controlling snow mold have some potential options based on their location and disease pressure. Take note that all options should be tested onsite in a small area of the course prior to widespread implementation to ensure proper disease control will be achieved.

## Acknowledgements

We're lucky to have great industry support in our snow mold research, which is not easy since our trials are so large they require us to take up almost an entire fairway. Huge thanks to Craig Moore at Marquette CC, Jay Pritzl at Timber Ridge GC in Minocqua, Randy Slavik at Wausau CC, and Eric Leonard at Cherokee CC in Madison for hosting snow mold trials in 2017-2018.

In addition, thanks to the Golf Course Superintendents Association of America and the Wisconsin Golf Course Superintendents Association for funding the snow mold work investigating proper application timing at Timber Ridge GC. Lastly, thanks to The Andersons, AMVAC, BASF, Bayer, Intelligro, Nufarm, PBI Gordon, Quali Pro/Adama, SipcamRotam, and Syngenta for testing products in the trials in Madison, Wausau, and Marquette. Our research wouldn't be possible without their support!

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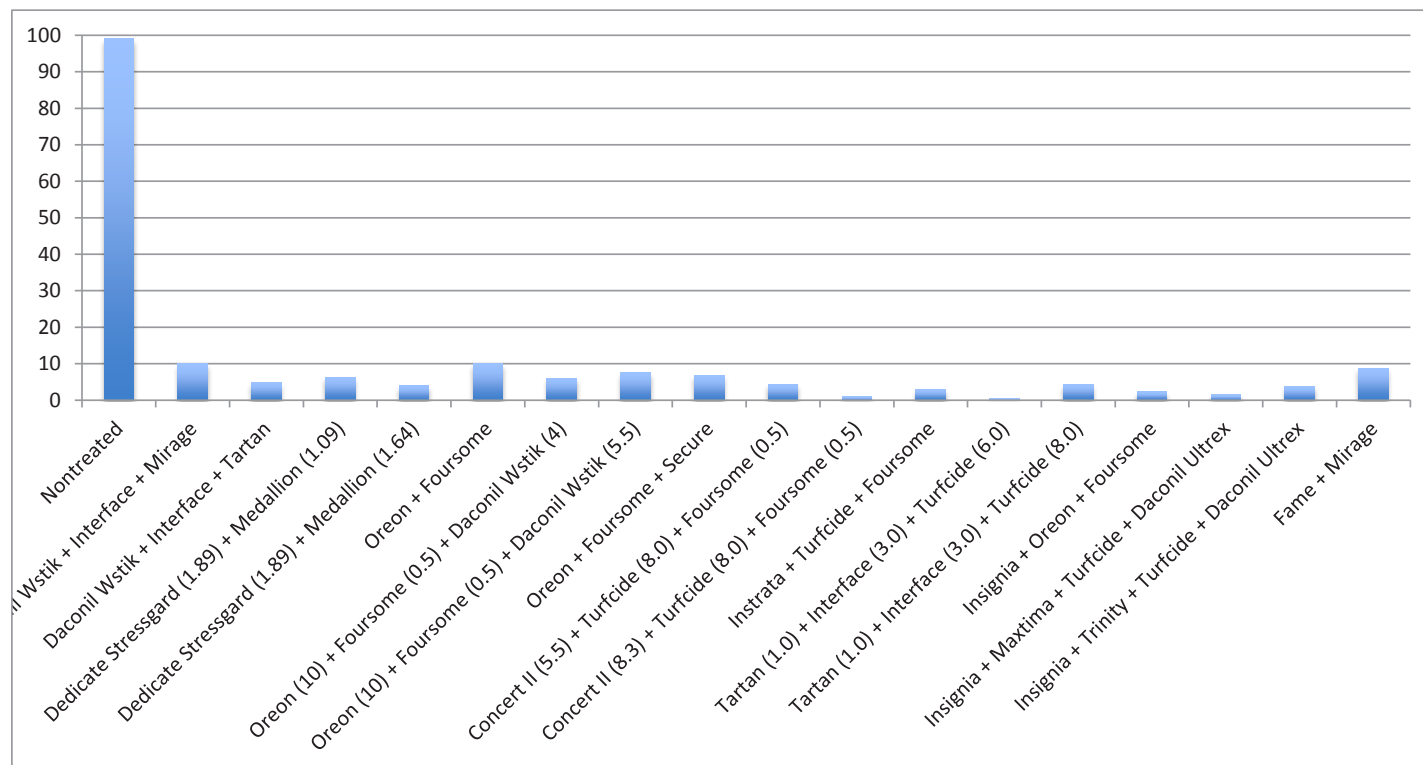


Figure 5: Treatments that provided greater than 90% snow mold control (ie less than 10% disease) under intense snow mold pressure at Marquette CC during the winter of 2017-2018. Experimental compounds were excluded from this list but can be observed, along with the full report, at <https://tdl.wisc.edu/results>.

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## WTA Field Day Wrap-up

By Bruce Schweiger, Manager, O.J. Noer Turfgrass Research and Education Facility

The WTA Summer Field Day 2018 was another success. Many heard of the road construction on County Highway M and those that have visited the O.J. Noer Facility have complained. There was a fear that attendance would suffer due to the difficulty in traveling here. I have always marveled at the support the WTA and the University of Wisconsin Madison turf program receive from industry, this year was no exception. Attendance was good at 251 attendees. The weather was terrific, the educational sessions well received and timely. Gaylord Catering provided another tasty breakfast and lunch. The support from our vendors in the trade show continues to be strong and getting stronger.

The day began with some spirited conversation (an extensive topic was the weather) topped with donuts and coffee. The opening session featured the dedication of the new storage building. After welcoming remarks from Dr. Soldat, he moved to the dedication of the new building. This building was funded by the WGCSA and the WTA. Station superintendent Bruce Schweiger thanked the WGCSA and WTA for all of their support. Dean Dick Straub from the College of Agricultural and Life Sciences thanked the group for all their hard work in funding this project. He was followed by WTA president Paul Huggett who welcomed everyone and acknowledged their continued support of the WTA. This support allows the WTA to continue to promote the turf-

grass program at the University of Wisconsin – Madison. Mike Peters, Director of the Agricultural Research Stations expressed the need for industry support to make projects like this building possible. With all the pleasantries taken care of, attendees divided themselves into five groups and the education began. The topics for the morning tours were:

- Diseases of Over-Watered Lawns
- Calibration of a Stand-on Sprayer
- Wildlife Damage Management
- Effect of Pesticide Residue Within Turfgrass Guttation Fluid on Pollinators
- Kentucky Bluegrass Cultivar Evaluation and Organic Weed Control
- Post-Emergent Control of Crabgrass

There was something for everyone during the morning session. Audrey Simard, Masters student in Entomology, discussed her project where she is harvesting guttation water from a bluegrass plot and a bentgrass putting green plot. Each plot has various plant protectants applied to them. After applications, she takes samples to see if and how long she can detect each plant protectant. This work will allow entomologists and turfgrass managers the insight into what if any plant protectants are found in turfgrass guttation fluid after applications.



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## NOTES FROM THE NOER

Dr. Dave Drake, University of Wisconsin – Madison, Wildlife Management, discussed wildlife we encounter every day and ways to deal with them. He was quick to point out that elimination or eradication are not always good options for a wide variety of reasons. The populations you see and those that you actually have are very different. As Dr. Drake says, everything can live in moderation and harmony but we need to understand all the players.

The Kerns-Smith Dollar spot model has everyone talking. Who has used it? How is it working? Is it useful? Implementing the Kerns-Smith with the Pesticide Database Dr. Koch released this summer.

Many people have been discussing the use of Iron Sulfate for dollar spot control. Dr. Koch showed the work his lab is conducting this year. It is too early for too much fanfare but some applications are showing some potential. Many of the lawn care and landscape applicators enjoyed the Z-spray calibration tune-up given by Kurt Hockemeyer from the Turfgrass Diagnostic Lab. A few of the applicators mentioned they only drive them as instructed. After this brief summary, operators had a better understanding of how the way they operated the Z-sprayer could impact applications.

We know “turfgrass grows by the inch but dies by the foot” (U.S. Parks Department). Research on traffic can be duplicated with specialized machinery but there exists no

such equipment for bentgrass greens. Dr. Soldat and his lab discussed his newest project where plots receive various application rates of nitrogen while being trafficked. The goal; can the level of nitrogen be more closely tied to the amount of play on a putting green? Can the level of nitrogen be established based on rounds played to assist in using our fertilizer applications in the most efficient way possible?

As I mentioned there is no machine to create the traffic that Dr. Soldat is studying. How does Dr. Soldat mimic the rounds played? He has a dedicated staff that dons their golf shoes and walk plots in a prescribed pattern of step with a metronome, equaling everyone's speed. I promised not to divulge this picture but watching them traffic this project speaks volumes as the dedication to their research, especially in the “dog days of summer” Well done!

If you missed this year's event, you missed another great day. Summer Field Day is a chance for you to see the research being conducted but the Winter Turf Conference, January 8, 2019, at the Pyle Center in Madison, is where the some of the results are shared and discussed.

As the season heads for the close don't forget the WTA Fall Golf Outing, Monday, October 1st at Kenosha Country Club. The event is filling so if you plan to play get your registration in soon. Go to [www.wisconsinturfgrassassociation.org](http://www.wisconsinturfgrassassociation.org) for more information. ✓



**Ribbon Cutting for the new shed featured Mike Peters (Director of Agricultural Research Stations), Paul Hugget (WTA President), Dr. Richard Straub (Associate Dean of CALS), Bruce Schweiger (Superintendent, Noer Center) Brett Grams (WGCSA Executive Director)**



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## Water Quality of Golf Courses: What Does The Data Say?

By Michael Bekken, Graduate Student, Department of Soil Science, University of Wisconsin – Madison

*Editors Note: Michael Bekken is a Graduate Student pursuing a PhD in soil science under Dr. Doug Soldat. This student article is eligible for the Monroe S. Miller Literary Scholarship.*

Show me a stream flowing through a golf course and I'll show you an argument about the impact of golf course management on water quality. Having witnessed these highly emotional, sometimes heated, and commonly speculative discussions firsthand, I've relished the opportunity to delve into the facts from the scientific literature that examine the connections between water quality and golf course management practices. In this report, I review what we know and don't know about the quality of water in and around golf courses and describe the findings of studies designed to assess how management practices affect local water quality.

The impact of golf course management practices on water quality varies widely from course to course and is management dependent. Scientists have studied the connections between golf course management practices and water quality in essentially three different ways.

The first approach, taken by five studies reviewed in this article, is to monitor the water quality at a single golf facility. This approach has the advantage of allowing researchers to conduct in-depth and longer-term water quality monitoring. However, because only one site is considered, researchers are not able to look for systematic relationships between the adoption of management practices and water quality. As such, the ability to make general conclusions from this type of study is limited. A second approach, taken by 4 studies included in this article, takes management practices into account when comparing water quality results from various golf courses, which gives researchers the ability to look for trends between the adoption of certain practices and their potential influence on water quality.

**I've relished the opportunity to delve into the facts from the scientific literature that examine the connections between water quality and golf course management practices.**

Using correlation, this approach has the advantage of being able to determine which management practices may be more effective on water quality than others. However, correlation does not always indicate causation, which is a potential disadvantage of the approach. A third approach, taken by two studies in this article, involves researchers working directly with superintendents to implement best management practices (BMPs) to evaluate their impact on water quality. This type of research approach allows researchers to directly test the effectiveness of a BMP program. However, a drawback of this type of study is that BMPs are often implemented in unison, meaning that it is hard to understand the relative effectiveness of each BMP. A possible fourth approach, would involve researchers working with superintendents to systematically implement BMPs one by one every year. This would allow researchers

to gauge the relative effectiveness of each BMP in the field. However, I have not been able to locate any such studies in the current scientific literature. As a result, this article reports on the insight and information gathered from first three types of research design.

In 1999, a group of researchers funded by the Environmental Institute for Golf and led by Stuart Cohen published one of the first reviews of water quality research in and around golf courses. In this study, the researchers solicited reports from all fifty state environmental water quality regulatory agencies and from regional EPA offices that had tracked local water quality around golf courses. Response rates were 37 percent from state agencies and 100 percent from EPA regional offices for data collected between 1990 to 1997. The researchers synthesized results from 17 studies of 36 golf courses, primarily located on the east and west coasts. Taken together, these 17 studies included 16,587 water quality data points in which some number of 136 pesticides, metabolites, and solvents had been analyzed. The authors found that, based on limits set by the EPA for 1999, Maximum Contaminant Levels (MCLs) and Health Advisory Levels (HALs) for the analyzed chemicals were rarely exceeded. Fewer than half a percent of all groundwater and surface water samples exceeded the EPA MCLs or HALs, whereas the percentages of monitoring sites that had at least one MCL/HAL exceedance were slightly higher: 7 percent for groundwater and 6 percent for surface water. This apparent discrepancy derives from the practice of labeling a site as "in exceedance" if any of the samples collected at that site exceed EPA limits during a given study. Importantly, the nitrate MCL of 10 mg/L was not exceeded at any surface water monitoring site but was exceeded in 3.6 percent of groundwater sites. Even though the geographical reach of the study was limited, this preliminary study indicates that golf courses do not commonly exceed the EPA's 1999 water quality contaminant levels.



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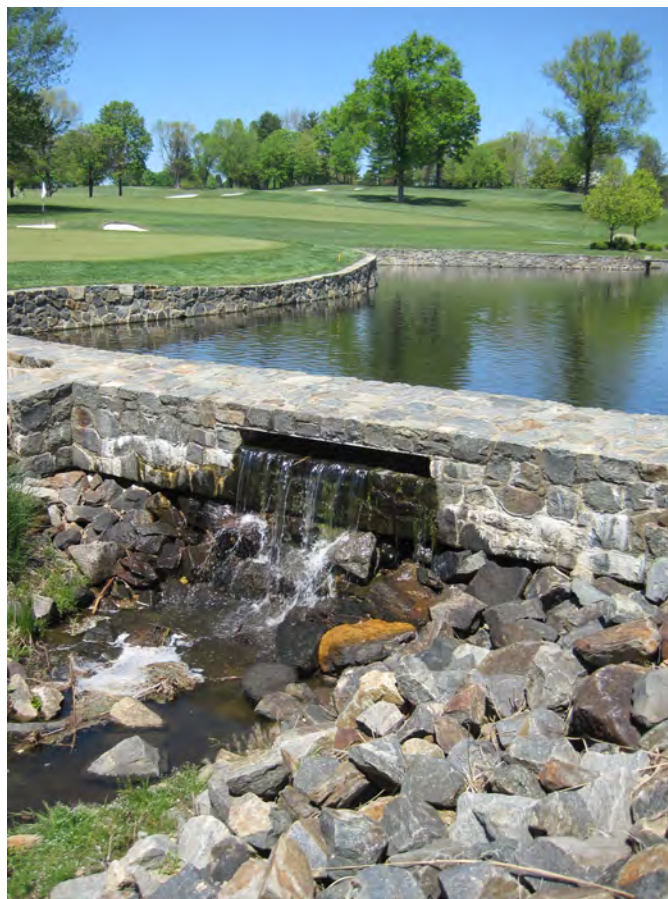


Following the 1999 publication of Cohen and colleagues' review, the research literature has been dominated by smaller scale studies in which a group of scientists measure water quality at ten or fewer golf courses in the same geographic region, e.g., the coastal southeastern US, the Precambrian Shield crystalline rocks of Ontario, Canada, and a smattering of sites across the central US. (Unfortunately, I did not locate any scientifically peer-reviewed golf course water quality studies from Wisconsin.) In these studies, water quality researchers generally define water quality using chemical and biological indicators. The most frequently measured and ecologically important chemical indicators include nutrient concentrations and pesticide residues, while biological indicators include chlorophyll concentrations, fecal coliform bacteria, heavy metal and pesticide residues in biota, and the structure of macroinvertebrate communities are also monitored in select studies.

Many of the regional studies investigated surface water quality by collecting water samples where a stream enters a golf course (inflow) and again where that same stream exits the golf course (outflow). With this experimental setup, researchers conclude with a fairly high level of confidence that the change in water quality from inflow to outflow can be attributed to golf course runoff. Measuring water quality in streams during non-storm events, referred to as base flow, provides an indication of day-to-day ecological conditions in the water. Additionally, if a researcher wants to understand the total amount of a given contaminant leaving a golf course via the stream, samples also must be taken during storm events, because not only do the largest volumes of water exit the golf course during storm events but with their increased erosive capacity, these events can carry a higher concentration of contaminants than during base flow. In fact, contaminant concentrations have been measured up to an order of magnitude higher in storm runoff waters than in base flow.

Nutrient concentrations in outflow water from golf courses varies significantly among studies and among golf courses. An inflow/outflow study of base flow nitrate concentrations by Michael Mallin and Tracey Wheeler on five golf courses in the coastal region of North Carolina found that concentrations of nitrate increased in outflow waters from three golf courses, did not differ significantly in one, and decreased in one (Table 1). Nitrate concentrations of outflow water from the five golf courses ranged from 0.055 mg/L to 1.46 mg/L. For context, the EPA limit for drinking water is 1 mg/L. Even though the average increase in nitrate was quite low, laboratory experiments by the authors found that increases in nitrate concentration as little as 0.05mg/L could significantly increase eutrophication of surface waters. Small increases in nitrate concentrations do have ecological consequences.

Similarly, phosphate concentrations in surface waters were elevated at two of the five golf courses studied, but the other three were unchanged. The authors did not draw any systematic conclusions as to whether or how best management practices might have influenced the range in concentration of nutrients exiting the golf courses. However, the authors observed that presence of vegetated buffer zones and wetlands designed to treat golf course runoff/effluent seemed to correlate with either stabilized or decreased nutrient concentrations in outflow waters.



**Figure 1. Outflow from a golf course retention pond during base flow conditions.**

A separate study in Austin, Texas by Kevin King measured contaminant levels in storm runoff water from one golf course over five years and 115 storm events using an automatic water sampling device. Mean nitrate inflow concentrations were 0.30 mg/L, while mean outflow concentrations were 0.44 mg/L, an increase of 0.09mg/L (Table 1). Phosphate concentrations from inflow to outflow increased but did not reach statistical significance (Table 2). Because the authors measured surface water nutrient concentrations during storm events, they could estimate the total amount of nitrate and phosphate leaving the golf course each year from storm activity, which turned out to be 1.02 kg/ha/yr and 0.51 kg/ha/yr respectively. During the five years of the study the authors did not track best management practices nor how they relate to the observed water quality.

Kevin King, who led the Texas nutrient runoff study, used a similar five-year longitudinal approach to studying pesticide runoff from a golf course in Duluth, Minnesota. King published the Duluth study in 2010, which tracked chlorothalonil and 2,4-D runoff during storm events. Median inflow concentrations of chlorothalonil were below detection while the median outflow concentration was 0.58 µg/L (µg=micrograms, 1,000,000ug = 1 gram). Toxicity levels for trout, in excess of 7.6 µg/L, were occasionally exceeded after application of the pesticide. To place this number in context, the US Health Advisory acute exposure level (HAL) for chlorothalonil is 200 µg/L, and the Canadian guideline for concentrations in natural freshwater is 0.18 µg/L.



# WISCONSIN SOILS REPORT

Golf course	Mean Inflow Nitrate (mg/L)	Mean Outflow Nitrate (mg/L)	Number of samples	Storm/Non-storm	Statistical Significance
Golf course A: Mallin and Wheeler (2000)	1.08	0.32	12	Non-storm	Significant decrease
Golf course B: Mallin and Wheeler (2000)	0.07	0.32	12	Non-storm	Significant increase
Golf course C: Mallin and Wheeler (2000)	0.005	1.46	18	Non-storm	Significant increase
Golf course D: Mallin and Wheeler (2000)	0.02	0.06	12	Non-storm	Significant increase
Golf course E: Mallin and Wheeler (2000)	Not detectable	0.1	12	Non-storm	Non-significant increase
Golf course A: King et al. (2007)	0.30	0.35	115	Storm	Significant increase
Golf course A: Kohler et al. (2004)	1.38	0.67	6	Storm	Significant decrease

**Table 1. Nitrate concentrations in inflow and outflow water from Mallin and Wheeler (2000), King et al. (2007), and Kohler et al. (2004).**

Golf course	Mean Inflow Phosphate (mg/L)	Mean Outflow Phosphate (mg/L)	Number of samples	Storm/Non-storm	Statistical Significance
Golf course A: Mallin and Wheeler (2000)	0.028	0.019	12	Non-storm	Non-significant decrease
Golf course B: Mallin and Wheeler (2000)	0.003	0.008	12	Non-storm	Significant increase
Golf course C: Mallin and Wheeler (2000)	0.003	0.005	18	Non-storm	Significant increase
Golf course D: Mallin and Wheeler (2000)	0.038	0.056	12	Non-storm	Non-significant increase
Golf course E: Mallin and Wheeler (2000)	Not detectable	0.004	12	Non-storm	Non-significant increase
Golf course A: King et al. (2007)	0.7	1.4	115	Storm	Non-significant increase
Golf course A: Kohler et al. (2004)	0.31	0.45	6	Storm	Significant increase

**Table 2. Phosphate concentrations in inflow and outflow water from Mallin and Wheeler (2000), King et al. (2007), and Kohler et al. (2004).**



## WISCONSIN SOILS REPORT

The median inflow concentration of 2,4-D was 0.31 µg/L while the median outflow concentration was 0.85 µg/L. The maximum outflow concentration of 2,4-D over the period of the study was 67.1 µg/L, which approached the EPA's Maximum Contaminant Load (MCL) of 70 µg/L. King showed that transport of 2,4-D from the golf course into the water system correlated positively with streamflow discharge volume, timing of application relative to rainfall events, and pesticide physicochemical properties. He recommended four BMPs to reduce pesticide concentrations in stream outflow including: 1) applying pesticide in less soluble forms (e.g., granular or wettable powder), 2) ensuring no precipitation events are in the near forecast prior to pesticide application, 3) increasing the size and quality of buffer zones around all aquatic bodies, and 4) using spot treatments. However, these best management practices were not tested for their efficacy on the golf course during the study.

A 2007 study conducted by Tracy Metcalfe and colleagues in Ontario tested the toxicity to fish of pesticide runoff. Scientists placed semi-permeable membrane

devices at the outflow points of two golf courses throughout the golf season. The devices trapped pesticide residues flowing through the water. These membranes were collected monthly and brought back to the lab to test for contaminant toxicity on developing fish embryos by varying the concentrations of toxins caught in the membranes. Based on these experiments, the authors found that the presence of pentachloronitrobenzene (PCNB) in the spring and fall, a byproduct of the turfgrass fungicide quitozene, corresponded with peaks in toxicity to developing fish. The researchers concluded that the application of this fungicide to a golf course had the potential to cause toxic impacts to aquatic organisms in the watershed. The authors did not assess the BMPs undertaken by the golf course managers, but did note that buffer zones were narrow or lacking in several places where fairways were mown within 1 meter of the sampled stream that drained the majority of the course.

Two studies published by Michael Lewis and others published in 2002 and 2004 were conducted at a large golf complex on Pensacola Bay, Florida, with the goal of determining whether the flora and fauna

living in the estuary had been adversely affected by pesticides originating from the golf courses. The authors sampled wide-area grasses (common to estuaries), blue crabs, and oysters in the estuary adjacent to the golf courses for contaminants. They also sampled outflow water from the golf course and from local reference sites in natural areas. Analyses of biota revealed concentrations of 19 different pesticides and 18 polychlorinated biphenyls (PCBs) were largely below detection from all locations. The authors also tested biota for trace metals and found elevated levels both at the golf course and at a local reference site. Chemical analysis of water samples revealed slightly elevated levels of mercury, lead, arsenic, and atrazine near the golf courses, however these elevated levels were only detectable in water samples taken immediately adjacent to the golf course and were not present further into the estuary. The researchers concluded that the golf courses were not a significant source of bioavailable contaminants in the estuary; however, they did not track best management practice implementation at the golf complex to understand how BMPs affect water quality.

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In 2002, Jennifer Winter and colleagues published a study of benthic macroinvertebrate communities (i.e. small invertebrate animals found in and around aquatic bodies at some point in their lives) near six golf courses in Ontario and compared the structure of the macroinvertebrate community to that in six nearby forested reference sites in Ontario, Canada. Statistical analysis revealed that the macroinvertebrate communities were significantly impacted at three of the golf course sites, but the other three sites were not statistically distinguishable from the reference sites. In this study, the authors looked for systematic connections between the health of macroinvertebrate communities and the best management practices utilized by the managers of each golf course. Of all of the BMP's included in the analysis, the authors found that fertilizer application rate inversely correlated with macroinvertebrate community health, with lower application rates associated with a healthier community structure.

In a separate 2005 study in Ontario, Jennifer Winter and Peter Dillon investigated the role of riparian quality and its effect on golf course water quality. The researchers monitored chemical water quality on seven golf courses, five of which were operational and two of which were under construction. The researchers simultaneously calculated River Bank Quality Indices (RBQI) for each golf course. The RBQI score accounts for the type of vegetation that surrounds a stream by assigning a number to the vegetation according to its ability to stabilize banks, reduce soil evapotranspiration, regulate stream temperature, and protect against erosion. Using regression analysis, the authors found that higher RBQI scores correlated with lower levels of nitrogen and phosphorus in outflow water. Further, the authors noted lower nitrogen and phosphorus concentrations when the abundance of unmaintained vegetation in riparian areas increased, which effectively act as buffer zones. As in the Ontario study, the authors found that lower fertilizer application rates correlate with lower nutrient levels in outflow streams.

Given the tendency for water quality researchers to suggest the adoption of various best management practices, it is surprising that only two studies have worked with golf course managers to test the ef-

fectiveness of these BMPs. In 2001, Nate Davis and Michael Lydy conducted a study in association with the superintendent at a golf course in Wichita, Kansas to evaluate the effectiveness of surface water quality BMPs. The researchers sampled surface water bodies on the course after storm events over a three-year period. In year one, background data were collected and indicated elevated levels of nutrients (nitrates and phosphates) in both ponds and soil. The pesticides simazine and 2,4-D were detected in ponds across the golf course as well as high levels of copper in pond sediment from the use of copper sulfate to control algal growth. An initial benthic macroinvertebrate assessment was conducted which revealed a limited community of only highly contaminant tolerant species. BMP recommendations for year 2 included eliminating the use of copper sulfate, the temporary elimi-

nation of phosphorus fertilizer, and the use of a slow release nitrogen fertilizer to reduce nutrient losses. The implemented BMPs worked almost immediately; the average nitrate and phosphate concentrations in the golf course ponds dropped by an average of 46 percent and 41 percent, respectively. During the third year, 30 to 45 ft. wide buffer zones were established around all aquatic bodies in which grass grew to 6 inches with no chemical inputs. Drainage tiles were also rerouted to filtration areas instead of draining directly into ponds. Aquatic vegetation was introduced to the ponds and one pond was dredged to increase depth. At the end of the three years, nitrate concentration in golf course ponds was reduced by 80 percent, phosphate concentration dropped by approximately 50 percent, and the frequency of pesticide detection in ponds also declined.



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Macroinvertebrate communities increased in richness and diversity and sensitive taxa indicative of good water quality returned. Because many of the BMPs were implemented simultaneously, the authors were unable to attribute which BMPs were most effective in improving water quality on the golf course. While the implemented BMPs were effective during base flow conditions, they were largely ineffective at reducing pesticide and nutrient release from the golf course during large storm events.

In 2004, E. Kohler and colleagues studied the potential of a series of constructed wetlands on the Purdue University golf course to improve both contaminated urban and golf course runoff water quality. Both an urban stream and tile drainage from the golf course flowed into the wetland system. A total of 83 chemicals were measured at both inflow and outflow sites during storm and non-storm events over a four-year period. During storm events, seventeen contaminants were detected in the inflow water, and eleven of these chemicals were significantly reduced in the outflow water after having passed through the wetland system. Concentrations of aluminum, iron, sodium, and sulfate were occasionally elevated within the wetland system during non-storm events, however during non-storm events there was no discharge of water from the wetland system. As such, the authors determined that the golf course was a non-significant source of contaminants and instead served to improve water quality in the watershed. The authors noted, however, that in order for this type of system to be effective at improving water quality, wetlands must be sized appropriately to maximize water holding capacity during both storm and non-storm events. It is possible that limited water holding capacity of golf course ponds explains why Davis and Lydy in their 2001 BMP study found limited success in reducing offsite transport of pesticides and fertilizers during storm events.

Scientific investigations of golf course water quality indicate that outflow water from golf courses generally contains higher levels of contaminants than in inflow water, but contaminant outflow concentrations only rarely exceed maximum contaminant levels as set by the EPA. However, golf courses have the potential to improve urban and suburban water quality, and some golf courses are already capitalizing on this potential through the implementation of various water quality BMPs. Current studies suggest that the BMPs most effective in improving water quality include: 1) incorporation of chemical free buffer zones with deeply rooted vegetation that shield direct access of runoff to aquatic bodies, 2) reduction in volume of fertilizer and pesticide applied, and 3) structural improvement of onsite drainage and wetland filtration systems. Future scientific studies of golf course water quality will have the greatest impact if scientists work directly with superintendents to implement and test new BMPs while simultaneously monitoring water quality. Ideally these water quality BMPs would be implemented one at a time such that the effectiveness of each BMP can be more precisely determined. And finally, effective water quality BMPs should be tested repeatedly in a wider variety of golf environments. 

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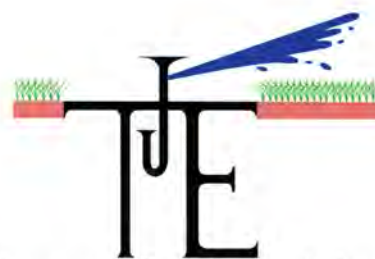
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## Eight and Four

By Shane Conroy, GCSAA Field Staff - Great Lakes Regional Representative

**E**ight and four. That's how many certificates are available for equipment managers and assistant superintendents respectively between the Turf Equipment Technician Certificate Program (TETCP), and the Assistant Superintendent Certificate Series. The certificate series were developed to give equipment managers and assistants the platform to continue their education, and show proficiency in key areas of the industry.

The Turf Equipment Technician Certificate Program - Level 1 is a series of exams designed to demonstrate proficiency in key competency areas related to turf equipment. This certificate program is available to any and all turf equipment technicians. The program is made up of eight exams covering the key competency areas of:

- cutting units
- drivetrain systems
- electrical systems
- engine technology
- hydraulic systems
- metalworking and fabrication
- spray systems
- fundamentals of turfgrass operations

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tions and study guides and webinars are available to help you prepare. The Turf Equipment Technician Certificate Program - Level 2, and certification for equipment managers is currently in the works and will be available soon.


The Assistant Superintendent Certificate Series is composed of certificates covering the key competency areas of:

- Principles of Golf Course Agronomy
- Principles of Golf Course Business
- Leadership and Communication
- Environmental Management/Best Management Practices

Unlike the Turf Equipment Technician Certificate Program, the Assistant Superintendent Certificate Series is an open book exam and does not require a proctor; however, like the TETCP, the exams are taken online. Both the Principles of Golf Course Agronomy and Principles of Golf Course Business certificates are earned by completing a two-part exam. Candidates will have three hours to take the exam, with a five-minute break offered between parts one and two. The Leadership and Communication certificate, along with the Environmental Management/Best Management Practices certificate are still in development through the task group and will be available in late 2018.

I encourage each equipment manager and assistant superintendent to complete the certificates. I would also like to recognize and thank the committees and task groups who have worked tirelessly to create and continually improve the certificate series.

I would also like to encourage each of you to take advantage of the Member-Get-A-Member program. This program allows any GCSAA member to recruit a peer in the industry who is not a GCSAA member, and for their recruitment efforts, earn \$50.00 in GCSAA gift certificates. The gift certificates can be used on dues, merchandise, etc. online, or at the Golf Industry Show. The program allows the recruitment of any membership classification, so please take advantage of this program when bringing a peer, your assistant or equipment manager into the GCSAA family.

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**Top:** GCSAA Director and Westfield Group Golf Course Superintendent Mark Jordan (center) with two of his team members who have completed all 8 certificates for equipment managers.

**Center:** Attendees at the WGCSA Equipment Managers Seminar at Sentry World Golf Course earlier this year.

**Bottom:** Tri State GCSA also hosted a equipment managers session. This one was focused on grinding.





## PGA Junior League - A No Brainer!

By Jeremiah W Hoffmann, Head PGA Golf Professional, Rolling Meadows Golf Course

I'm sure by now most of you have at the very least heard about the PGA Junior League. Maybe your course or club is involved already. If they aren't, figure out how to get them to see its value! At first I was skeptical. Now, as our second season is wrapping up, I'm sold! We have to find a way to engage the next generation of golfers and the PGA JR League is a great start!

Still not convinced? Consider this, not only is it creating new younger golfers, it's bringing in new women players and getting those core male golfers to play more. PGA JR League makes it a family affair. Check out the pictures with this article. Every group at our course on this day had 8-20 adults following it. Golf is starting to be cool again and it's becoming a valuable family activity. Still unsure? Let me tell you about my son, Tyler. He's almost 12. Last spring, we decided to have a team and I needed players to fill my roster, so guess who got signed up. At that time, he liked golf ok, but wasn't going ask to go to the course. He would come if I asked him, but never was overly excited. Two practices into the season he was calling my dad (a school teacher) and begging him to bring him to the course to play 9 holes. Golf went from barely on the radar to a close second favorite sport! Basketball still holds that spot but golf is closing in, which I'm ok with because I coach that too, but I digress.

Tyler is a perfect example of what making golf a team sport does for young players. Now he can play with his friends. There's less pressure since it's a scramble, but it's still competitive enough. We went from 12 players last year to 21 this year. I'm considering



adding a third team in 2019. Other kids see it and want in! As leaders in the golf community I feel strongly that we need to advocate for things that grow the game. PGA JR League does!

If your club doesn't offer a junior league check it out at [www.pgajrleague.com](http://www.pgajrleague.com) and have your PGA Professional contact Erika Pirkel in the Wisconsin PGA Section Office for more info. Or have them call me. I'll sell the program to them! ✓



The two teams representing Rolling Meadows Golf Course show the wide range of ages participating in the league.



# THE GOLF SHOP



Above and Left: Competition on the course. The league plays our back PGA Junior Tees at approximately 2060 yards.



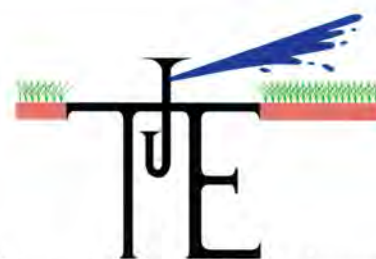
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## Can You Spare Some Change?

By Jake Schneider, Self Proclaimed Bum, Hanging Out at His Parents House

As you can see, the byline has changed significantly since my last article, and although it's a bit of hyperbole, it's factually accurate as of mid-July. A few years ago, following my divorce and job change from golf to landscaping, I wrote about how life wasn't exactly going as I had envisioned as a young, naive man, and thankfully, nothing has changed since then. As a person who generally enjoys a tremendous amount of structure, the previous sentence should fill me with terror, but the exact opposite has happened.

Yes, it's true that you could currently classify me as an unemployed bum shacking up with his parents, but who doesn't dream about living this life as a 35 year old? It's all exactly as I had imagined when I was writing scholarship essays about career ambitions. Or not. As you (hopefully) have figured out, there's more to the story which is a good thing for all parties involved.

Following my divorce, I dove deep into the wonderful, horrible world of online dating, and at one point, 'first dates' were my second biggest budgetary line item right behind 'rent'. And, while it was an occasionally frustrating three-year process, I was fortunate enough to have met many great girls who helped me realize what I was and wasn't looking for in my future partner, and on February 15, 2017, I met her at Rockhound Brewing Company in Madison. Melissa's the reason why I'm homeless, unemployed, and happier than ever.

After a year of dating, we became aware of a potential opportunity to move to Trondheim, Norway through a pending sale with her employer. Coincidentally, years before this was a possibility, she visited Trondheim while on vacation and thought to herself 'I'd like to live here', but never thought that dream would come to

fruition. So, she asked if I'd be interested in moving there should they get the contract, and without hesitation, I said yes in a temporary moment of insanity. Fast forward a couple of months, and Melissa called me while I was at work to ask if I wanted to get married and move to Norway. Again, I was out of my mind and said yes.

We'd had many discussions about both life-changing events in the prior months and had very easily come to the conclusion that we couldn't turn down the opportunity even though our Madison existence was hard to beat. My youngest niece still doesn't quite understand how there can be no formal marriage proposal and how two people can mutually decide that they want to get married. But, we did and are after a fantastically small, family-only ceremony on the Capitol grounds on the sultry Memorial Day weekend.

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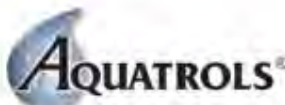
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## WANDERING MUSINGS

Since The Bruce Co has yet to expand to Norway, a major personal career change was also in the cards, but quite frankly, I was ready for a change in direction regardless of the outcome that would be made possible by the emotional and financial support of my much better half. Upon finding out that we were, in fact, going to be moving across the pond, I submitted my resignation as I knew that managing 60 people was going to be an unnecessary additional stressor given that we already had to sell a condo, prepare for a move, make a Midwestern tour for Melissa's friend's weddings, and train for a recently-completed half Iron-man triathlon (more about that in a future article). After little to no persuading, Chad Grimm allowed me to up my employment status at Blackhawk CC from occasionally helping on weekends to essentially working every day but the weekends from mid-April through mid-July. It was a great decision that turned into the most enjoyable and worst paying three months of work that I had in years.

As I sit on my parents' porch in the greater Hilbert metropolitan area on July 19, the condo has been sold, I've been unemployed for a week, my new wife is in Scandinavia, and my legs are sore from last weekend's triathlon. Life's damn good. After a trip to the Boundary Waters followed by a mountain hike and two weddings in Colorado, I'll be heading to Norway just prior to Labor Day, and our transatlantic adventure is supposed to last until December 2020. We're looking forward to learning the Norwegian culture and language and to exploring Europe as plane tickets will now be our second largest budgetary item.

I'm still not sure what the future holds for me, but as it turns out, I never really was. Given my status as someone who has a hard time sitting still, I'm going to need to stay busy through work or volunteering, and by the time that we return to the states, I hope to have figured out a new career path. It's both terrifying and liberating to be floating somewhat aimlessly for the foreseeable months, but above all, I feel fortunate to be in this position of unemployment and homelessness. What a short, strange trip it has been.

P.S. If you need to get in touch with me over the next few years or have a hot, Norwegian job lead, feel free to shoot me an email at [jlschneider@uwalumni.com](mailto:jlschneider@uwalumni.com). Takk! 🌱



**Jake Scheider with his new bride Melissa Hunter. By the time you receive this issue Jake will have moved from his parents couch to the couples new digs in Trondheim Norway.**

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## Minocqua Country Club Hosts 117th Wisconsin State Amateur

By David A. Brandenburg, Editor, The Grass Roots

The 117th Wisconsin State Amateur Championship was held at Minocqua Country Club July 23rd to 26th.

Located on an incredible "northwoods" property on the south side of Minocqua Lake the original golf course was designed by CC Clark and Hubert Howard and opened in 1916.

In July of 1988 the shareholders of the club approved the construction of an entirely new golf course which opened in July of 2001.

The new layout designed by Ron Garl offers a terrific layout for the members and a true challenge for the State Amateur players.

The course offers a great mix of open holes with incredible views and holes cut out of forest.

The Amateur starts with 156 players with a cut to low 70 and ties after 36 holes. College golfers Harrison Ott of Brookfield and Thomas Longbella from Chippewa Falls were tied at 9 under after the 72 holes and then went on a marathon 8 hole sudden death playoff with Ott taking the title.

The team Yule Cup Championship was



won by the Legend Clubs by one shot with a score of 430. Brown Deer Park took second. The Yule Cup competition is open to any club with 3 players in the State Amateur starting field and is played over the first 36 holes.

The ground staff at Minocqua is led by Sterling Solberg who took over in March when former superintendent Bill Stein left to re-join the family seed business.

Sterling is familiar with the property after serving over 6 years as Assistant Superintendent. Sterling grew up in New Glarus, graduated the University

of Wisconsin Platteville in 2012 with degrees in Ornamental Horticulture with Small Business Management.

In 2013 Solberg volunteered at the PGA Tour Waste Management Phoenix Open and served as an intern at Geneva National Golf Club and the Fenway Golf Club.

Looking for a summer job to pay for a golf membership Sterling got his start in the business at Edelweiss Chalet and Country Club in New Glarus which provided not only a job but free golf.

Minocqua Country Club covers 186 acres on mainly sandy soils so water and nutrient management is key to quality conditions. The irrigation system is expansive with near wall to wall sprinklers.

I had played the original course and enjoyed it but the new layout is amazing and I was very surprised by the size (186 acres) of the golf course and the expanse of many of the fairways and green complexes.

Congratulations to Sterling and his staff and the club for providing a worthy venue for the 117th Wisconsin State Amateur Championship. ✓

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**Greensmowing and blowing off the dew on fairways on the 14th hole which was cut out of the forest.**



# WISCONSIN STATE GOLF ASSOCIATION



## 2018 WSGA State Amateur Championship Qualifying Sites

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Meadowbrook CC, Racine  
Washington County GC, Hartford  
Timber Ridge GC, Minoqua  
The Oaks GC, Cottage Grove  
Janesville Riverside GC, Janesville  
Watertown CC, Watertown  
Fox Valley GC, Kaukauna  
La Crosse CC, Onalaska

Attention to detail cup changing on the 15th.

Rolling on the 15th Green.

Tee mowers blowing off any remnants. The seasonal employee in the red sweatshirt turned out to be from Fond du Lac and knew many of our players and employees from his career in the railroad, and from playing baseball and golf. He had previously worked at Mascoutin Golf Club and explained no detail is missed at Minocqua Country Club.





# WISCONSIN STATE GOLF ASSOCIATION

## Member 9 With Sterling Solberg

1. What was your first vehicle? *1991 Jeep Cherokee.*
2. Favorite piece of golf course equipment? *Not sure if it is truly equipment but irrigation, in all shapes and forms.*
3. 18 hole Handicap? *12.*
4. What is your current vehicle? *Toyota Tundra*
5. Favorite TV shows? *Anything I can binge watch late night or in the winter.*
6. Favorite professional sports team? *Green Bay Packers.*
7. Favorite main course meal? *Any cut of steak but I prefer the porterhouse.*
8. Pets? *Not at the moment.*
9. Favorite thing about working in the golf industry? *Despite what might seem like a repetitive over all routine. I have always enjoyed the variety of things I get to do and learn throughout a season.*



Sterling Solberg (left) and the maintenance staff at Minocqua Country Club with the Sinnissippi cup in front of the scoreboard. (Photo courtesy of WSGA). The State Amateur trophy is named after the Sinnissippi Golf Club in Janesville. The club was a founding member of the WSGA and host of the first Amateur.



# WISCONSIN STATE GOLF ASSOCIATION



**Top Left: Last minute detail blowing on 13 tee.**

**Top Right: A fish feeding station for the members on hole 14.**

**Middle: Greensmowing on Hole 15**

**Below: A Bochee Ball court between the 9th green, putting green and clubhouse provides for a fun activity. The WSGA Interns beat the WSGA Staff in a match the night before.**





## Pythium Diseases Are Not All The Same

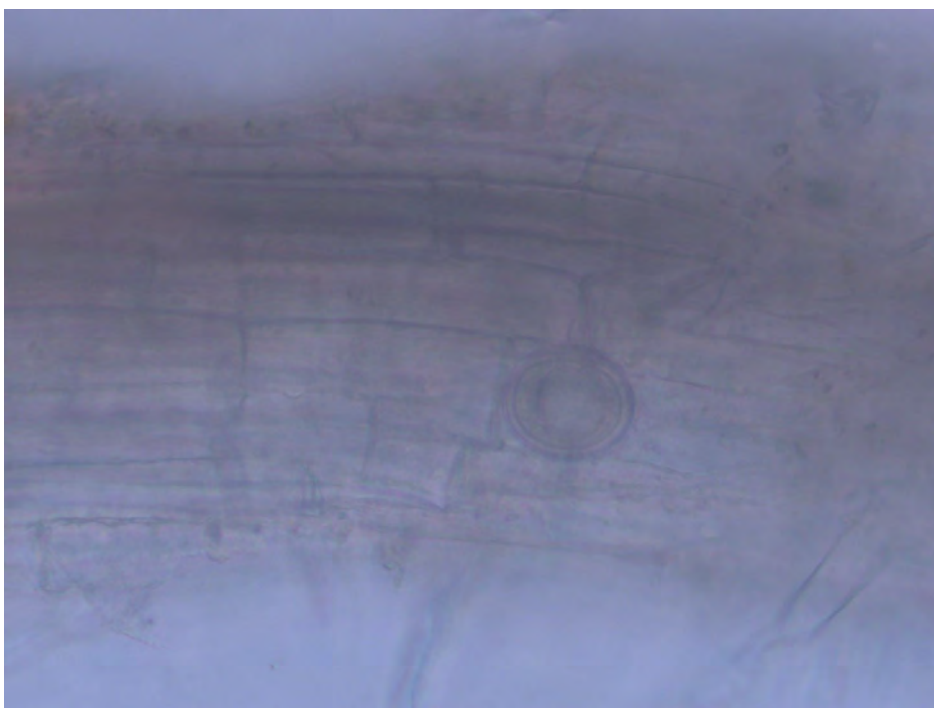
By Kurt Hockemeyer, Turfgrass Diagnostic Lab Manager, O.J. Noer Turfgrass Research and Education Facility

There has been a great deal of chatter this spring and summer about Pythium diseases in the Midwest, particularly Pythium root rot. As part of this chatter I think there has been some confusion as to what the differences and similarities are among these very different diseases. I would like to highlight some of the differences between these diseases here in this article to help everyone understand these differences a little bit better. In particular, I am going to focus on Pythium root rot and Pythium root dysfunction and why these two diseases are different than Pythium foliar blight and different from each other.

Pythium species are not technically fungi, and are often referred to as fungal-like organisms. A more technical name for this group of fungi is oomycetes (OH-oh-my-seats), and this class contains many other genera of fungal-like organisms. This is why many conventional fungicides have little to no effect against Pythium diseases. True fungi differ from oomycetes in many ways including morphology, physiology, genetics, ecology, epidemiology, and chemical composition of cell walls.

**Pythium root rot infection is governed by the extended presence of free water in the rootzone, not heat and humidity**

Pythium root rot is caused by a variety of Pythium species, and has been observed on nearly every turfgrass species cultivated for golf course use. Unlike Pythium root dysfunction, Pythium root rot does not have a defined optimal temperature range. Rather, Pythium root rot infection is governed by the extended presence of free water in the rootzone, not heat and humidity. Hence, Pythium root rot can cause damage over a wide range of temperatures as long as the ground is saturated with water due to recent heavy rains and/or poor surface or subsurface drainage. Pythium root rot symptoms usually are smaller (< 1 foot in diameter)



**Figure 1. Round double walled oospores can be seen embedded all over affected roots. These are survival structures that the Pythium organism leaves behind.**

and more irregular than Pythium root dysfunction, though this is not always the case. Microscopically, the infected roots will appear black and rotted and incapable of transporting water and nutrients to the upper portions of the plant. Oospores can be seen in many roots (Figure 1).

Pythium root dysfunction is caused primarily by Pythium volutum. Pythium root dysfunction has to date only been observed on creeping bentgrass putting surfaces and is usually most severe on more recent creeping bentgrass constructions. The pathogen infects when soil tempera-

tures are between 50-75°F, but like take-all patch the symptoms do not appear until hot and dry conditions lead to rapid root dieback and wilting plants. Typically, plants wilt in roughly circular patches that can be up to 2 feet in diameter, and if left unchecked the symptoms will progress to eventual plant death. Microscopically, infected roots usually appear relatively healthy at first glance until closer inspection reveals the widespread presence of the pathogen (Figure 2). Sometimes root dysfunction affected plants have very little root hairs.



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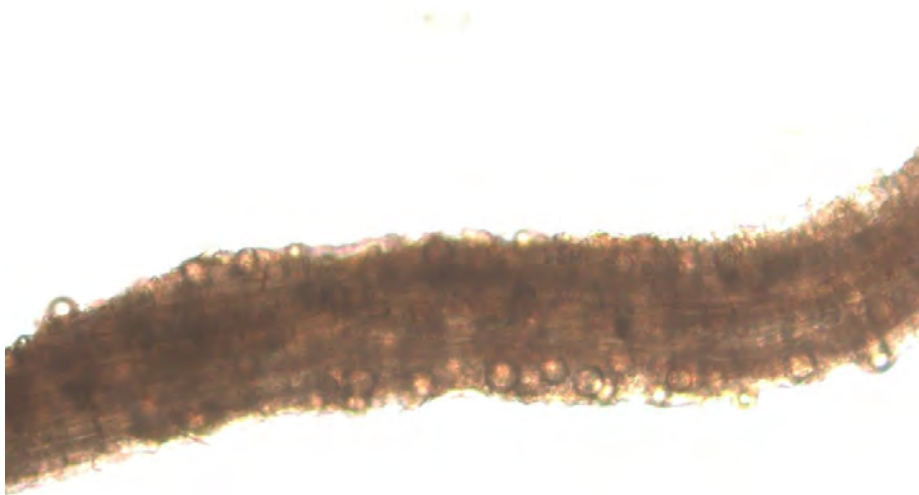
Distinguishing between these two diseases by looking through the microscope is basically impossible. Therefore, differentiation is going to be made by looking at field symptoms, age of the turf, and general color and structure of the root system. Pythium root dysfunction is one of the most over-diagnosed diseases in turf. It only occurs under a very narrow set of conditions.

One of the points of confusion I've heard this year has been assuming what we know about Pythium foliar blight also applies to these Pythium root diseases. Pythium foliar blight can rapidly kill large areas of turf very quickly under hot and humid conditions. One of the more frustrating things I've heard this year has been fungicide applications following a Pythium root rot diagnosis because hot weather is approaching. Hot weather may make symptoms appear due to a compromised root system, but infection is only going to occur in excessively saturated soils. So fungicide applications should be timed before 3 straight days of rain, not necessarily a period of heat and humidity. Efforts should be made to reduce excessive soil moisture if possible and encourage more rooting.

**Root rot can be a devastating disease, but foliar blight is in a class all by itself in how fast turf areas can be completely wiped out.**

Another sentiment I heard this year was turf managers dreading that all of their grass could be dead by the next morning after a diagnosis of Pythium root rot. Root rot can be a devastating disease, but foliar blight is in a class all by itself in how fast turf areas can be completely wiped out. As mentioned, cultural practices that help reduce disease severity should be implemented, and then if environmental conditions are going to be conducive for disease development, then a Pythium-specific fungicide can be used to protect plants against an infection. Also, fungicide applications are not going to eradicate Pythium from your roots. They will only protect roots from new infections.

Hopefully this article helped to differentiate some of the finer points between a few of the Pythium diseases. North Carolina State University has done much more diagnostic and research work with the Pythium root diseases than we have. Their extension publications on these diseases contain more specific information on these diseases and can be found at the following website: <https://www.turfgrass.ncsu.edu/diseases-in-turf/>.



**Figure 2. A much more severe infection by the Pythium organism. Many oospores are embedded in this root.**

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# Horseshoe Bay Golf Club Hosts Joint August Meeting

By David A. Brandenburg, Editor, The Grass Roots

Horseshoe Bay in Egg Harbor provided a welcoming venue for our August joint meeting coupling our Wisconsin Golf Course Superintendent Association members with the Northern Great Lakes Golf Course Superintendents Association members.

It was good to network with some old faces, new faces and be able to get away for education and golf.

Association leaders tried a new concept and chartered a bus to pick up attendees in Madison, Milwaukee and Green Bay due to the long drive up the door peninsula.

A few people took it but most choose the independence of their own vehicle for the trip.

Brian Lussier, was our presenter with a talk titled "Conversation on Master Planning."

Brian was partnered with Rick Robbins to build Horseshoe Bay but has recently completed a master plan for the club to succeed for years to come.

Lussier covered who should be involved

when developing a master plan, the reasons to have a plan and the life cycle of golf course features.

It comes down to times change, players change and a golf course's needs change.

Brian explained "not every club needs a master plan but every club should have a plan for the future."

Although grades and other measurements have to be taken layouts from Google Earth Pro of shots from a drone have made mapping much easier for professionals and amateurs.

In addition to golf course design features master plans should include irrigation, drainage and bunker work.

Future sustainability of features and the property have to be considered before the architect starts designing desired features for the club.

At Horseshoe Bay after a number of trees succumb to Imprellum it was time to take action. Lussier went hole by hole completing a problem sheet and a solution sheet for the property.

Golf Course Superintendent Brian Ferrie added to the talk with a discussion on the club's capital expenditure plan. All departments work on the plan that doesn't just include golf course improvements but building improvements/maintenance and equipment.

It was a very informative talk on an important topic, thank you Brian and Brian.

After a taco & burrito bar for lunch it was time to inspect the golf course as we headed out for a shotgun start. The course was a joy to play with challenging greens and picturesque views of not only Green Bay but also the surrounding landscapes.

After golf we enjoyed more networking and tray served Hors D' Oeuvres while the results were tallied.

Our host for the day Brian Ferrie has been with the Door County Club since 1998 and has seen changes in ownership and club leadership during his tenure.

We thank Brian and the entire staff at Horseshoe Bay Golf Club for their hospitality. ✓



**Our hosts for the day, Superintendent Brian Ferrie and Assistant Superintendent Aaron Slaby.**





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## 2 Man Best Ball at Horseshoe Bay

1st Gross - Steve Frese & Matt Lindgren 67  
 2nd Gross - Scott Anthes & Tim Bressers 71  
 3rd Gross - Aaron Slaby & Andrew Morel 71

1st Net - Jon Canavan & Jim VanHerwynen 59  
 2nd Net - Mike Upthegrove & Ben LaBarre 60  
 3rd Net - Larry Lennert & Gregg Kallenberg 63

## Hole Event Winners

Closest to the Pin - Dan Wubbels, Paul Bastron,  
 Aaron Slaby, Aaron Becker

Long Drive - Matt Lindgren, Brian Busha

Long Putt - Peter Meyer, Bob Lohmann



**Top: Mr. Brian Lussier, Architect for Horseshoe Bay and our lunchtime speaker.**

**Left: The Par 3, 15th hole features a large green with a deep depression in the back. The pin was in this feature when we played but none of us were lucky enough to have our balls find this area.**

**Bottom: McCormick Deering Seeder along hole 11.**







**TOP:** Hole 18 plays 604 yards from the back tees and features a rock outcropping along the right landing area. The approach shots are downhill and provide a awesome view of Green Bay behind the green.

**MIDDLE:** Hole 14 plays 449 yards from the back tee and features a contoured green.

**Bottom:** Hole 5 is a challenging par 3 playing 207 yards and features a 3 tiered green.



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## It's A Gullywasher

By David A. Brandenburg, Editor, The Grass Roots

Last month I opened my column by saying the weather has been weird, and it was. I am not sure what to call this but I will go with weird and wet. Luckily it has not been hot but many courses have been blessed with rain until their "cups runneth over." Or in this case bunker, fairway, buildings runneth over with water.

Madison and especially the south side has been pounded all summer. From following Neil Radatz at Hawks Landing on Twitter he has been in downpour central since mid-June.

The worst was August 20 when the area had 8.6" of rain and the shop flooded. Madison, Baraboo and other parts of the state are still dealing with street flooding. As the summer progressed record rain-falls were seen across the state and the weeks of humidity produced beautiful dollar spot in untreated areas of the course including the roughs.

Fortunately the days were not real hot, just warm but the nights did not cool down for weeks at a time. Paul and Kurt have had many samples into the Turfgrass Diagnostic Lab at the Noer Center including bipolaris leaf spot, gray leaf spot, basal anthracnose and pythium root rot to name a few. A interesting recap of the summer will be coming in a future issue of *The Grass Roots*.

Our area in Fond du Lac was actually dry from the end of June until mid July when the rains returned. We watched storm after storm go by us, around us or just die out at the county line.

We fared okay the past 2 weeks with way too much rain but no permanent damage. Word is Jim at South Hills lost 17 trees due to winds and Pat at Camelot lost over 100 in the storms that whipped through on August 28th.

Hopefully this is all behind us and we are on our way to a pleasant fall season.

\*\*\*\*\*


On pages 44 to 49 are some pictures I was able to take at the LPGA, Senior PGA and USGA Women's Senior Open this summer. I enjoy walking these great layouts and watching how different properties are taken care of. Each property requires different techniques and each event demands different levels of tournament conditions.

For Phil at University Ridge and Steve at Thornberry Creek they are providing high level tournament conditions out of normal maintenance buildings and with very few volunteers and little extra equipment.

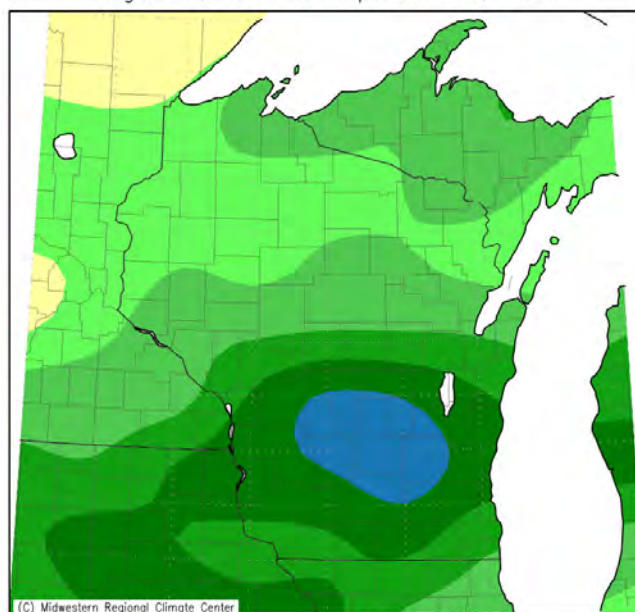
It was my first time at the Chicago Golf Club and I was very impressed with the historic Seth Raynor designed property. The square features, elevated greens and tan fescue grasses blowing in the wind provided for a visual stimulating walk.

My apologies to Tim Wegner at Brown Deer Park Golf Course as I was not able to make it out for the LPGA Symetra Tour event they hosted. Some weeks just do not have enough hours in them.

\*\*\*\*\*

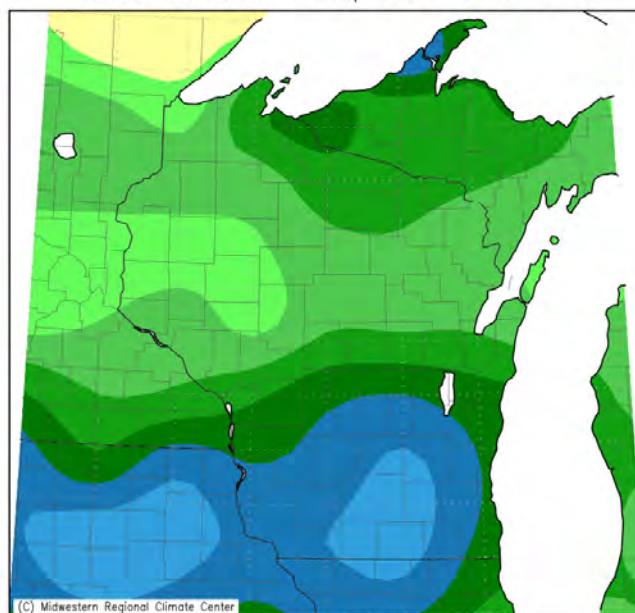
As summer moves into fall I hope your courses and staffs enjoy the shorter days and cooler temperatures. In Fond du Lac we are looking forward to fall maintenance and before we know it winterization. Football is starting, baseball is finishing and basketball and hockey will be here soon. Something for everyone! 

Accumulated Precipitation (in): Departure from Mean  
August 9, 2018 to September 7, 2018



Mean period is 1981-2010.  
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June 10, 2018 to September 7, 2018

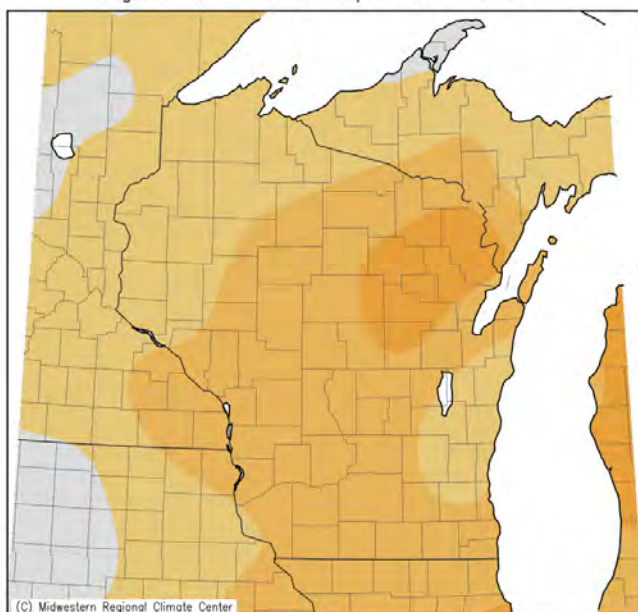


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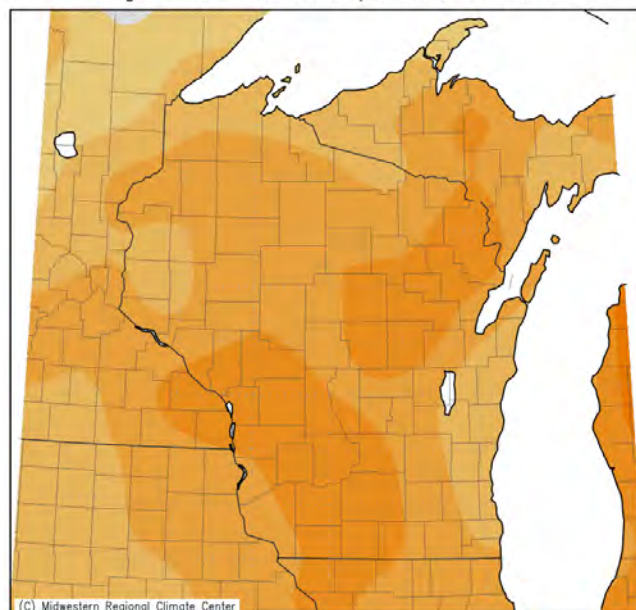
## EDITOR'S NOTEBOOK

Average Temperature (°F): Departure from Mean  
August 9, 2018 to September 7, 2018



Wisconsin State Climatology Office [www.aos.wisc.edu/~sco](http://www.aos.wisc.edu/~sco)  
University of Wisconsin-Madison [stclim@aos.wisc.edu](mailto:stclim@aos.wisc.edu)

Average Minimum Temp. (°F): Departure from Mean  
August 9, 2018 to September 7, 2018



Wisconsin State Climatology Office [www.aos.wisc.edu/~sco](http://www.aos.wisc.edu/~sco)  
University of Wisconsin-Madison [stclim@aos.wisc.edu](mailto:stclim@aos.wisc.edu)

From the Wisconsin State Climatology Office 30 and 90 day maps it has clearly been warm and wet the past 90 days. The maps on this page show above average temps the past month but even warmer nights.

From our Friend Gene Haas, Retired Executive Director of the WSGA and WGCSA Distinguished Service Award Winner.

Dave, I was extremely shocked to hear of the passing of Dr. James Beard. He was certainly a legend in the turfgrass industry. Many years ago I shared a speakers session with him at the Golf Turf Symposium at the Pfister Hotel.

We both spoke about the golfer versus the golf course but with a different viewpoint. I am not sure how effective I was but Dr. Beard certainly was interesting.

Regards, Gene Haas





## EDITOR'S NOTEBOOK



If you see this man, shake his hand and say thank you for your time and talent!

Arnold Walker, long time Wisconsin rules official visited our course in July to run a Player Ability Test and again for the WSGA Junior Boys Tournament. I have known Arnold for over 20 years and have enjoyed many conversations over that time.

At 95 years old Mr. Walker still drives himself to the course and administers PAT's by himself.

As a member of the Wisconsin Golf Hall of Fame and a honorary member of the Wisconsin PGA Section Arnold is the definition of volunteer.

He enjoyed the game, but was never a scratch golfer and never broke 80 that he can remember, but he loved the game and helping out for over 40 years. He was long time president of the Milwaukee County Public Links Association and the association hosts the annual Arnold Walker County Championship.

With the recent changes to the rules of golf Arnold may hang up his stopwatch and clipboard this year rather than sit through another rules seminar and test as well as the expense of travel to Indianapolis.

Thank you Mr. Walker!

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## EDITOR'S NOTEBOOK



From Ben Labarre, Golf Course Superintendent, The Legend of Bristlecone

I am deeply saddened to report the unexpected passing of James Whelan on May 10th, 2018. James "Jimmy or Whales" Whelan was beloved

father, co-worker and friend.

Jimmy was a seasoned veteran in the golf course maintenance industry with over 25 years experience working at multiple facilities throughout Waukesha County (Oconomowoc CC, Lac LaBelle/Rolling Meadows, Iron Wood GC, Erin Hills GC).

Jim began working at The Legend at Bristlecone in 2011 as seasonal assistant superintendent. Jimmy loved being at the golf course and freely dedicated himself to helping whenever called upon. Jimmy was the ultimate 'utility' player in our operation with the ability to manage any job thrown his way.

Most importantly, Jimmy was a great person. Jimmy loved to see people smile and laugh. His one liners, although used often and repeatedly, always lightened the mood of the room.

Personally, Jimmy meant the world to me. We spent many mornings opening up the shop, making coffee and talking baseball. He was my steady rock through the good and bad days of my first year as Superintendent. I miss him every day.

A true friend and co-worker, Jimmy Whelan will be missed by many.

RIP JIMMY



From Mike Werth, Advanced Turf

Thought I would share this photos with you. This is Reedsburg CC's unofficial mascot "Hank" the redtail hawk. Last week he very proudly dropped his squirrel kill on my trailer. Todd Cramblit/Superintendent says he has been showing off his kills like this for over 7 years now. He thinks of the groundscrew as his unofficial family. Pretty cool!

## Event Schedule!

September 17th (Monday) Wee One Fundraiser - Pine Hills Country Club

October 1st (Monday) WTA Golf Fundraiser - Kenosha Country Club (REVISED DATE!)

November 3 (Saturday) Couples Evening - Green Bay

Nov 28th - 29th - 53rd Golf Turf Symposium - American Club, Kohler

January 8, 2019 - Winter Turf Conference - Pyle Center, Madison

February 2-7, 2019 - Golf Industry Show and GCSAA Conference, San Diego Convention Center

Visit our website at [www.WGCSA.com](http://www.WGCSA.com) for the most up to date calendar and registration forms.

## Tournament Time

By David A. Brandenburg, Editor, The Grass Roots



### THORNBERRY CREEK CLASSIC - Thornberry Creek Golf Club, July 3-8

Top Left: mowing and rolling hole 14.

Middle Left: Looking back on the 10th hole.

Middle Right: Hand watering on hole 9.

Bottom Left: Greensmowing on hole 5.

Bottom Right: Hand watering on hole 5.





## MISCELLANY



**Left: Host Superintendent Steve Archibald has been at Thornber-ry for over 20 years and was part of the construction team.**

**Right: Tee Mowing on hole 15.**

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## MISCELLANY

**Previous Page**

**Top: Tee mowing on hole 13.**

**Top Middle: Part of the divot crew.**

**Bottom Middle: Davis Love III practicing his putting after round 2.**

**Bottom: Hole 9 and more of the divot crew.**

**This Page**

**Top: Dr. Doug Soldat and Host Superintendent Phil Davidson inspecting the 10th green.**

**Bottom: A lot of activity on Hole 10.**





## MISCELLANY



### US WOMEN'S SENIOR OPEN Chicago Golf Club, Wheaton, IL July 12-15

**Top:** The 7th Hole is well known as 'redan hole" and plays to 207 yards with a deep drop off left, behind and right as shown in the top right picture.

**Middle Left:** The clubhouse from right of 15 green.

**Bottom Left:** The 320 yard 5th hole.

**Bottom:** Assistant Superintendent Brian Chasensky on the 1st green has been at the historic club since 2015.





## MISCELLANY

**Top Right:** USGA Agronomist from the Northeast region has family in the Chicago area and had his family supervising green firmness on hole 13.

**Middle Right:** The square corner on the 5th green.

**Left Side:** Detail bunker work with push mowers on the edges, a one wing rotary outside of that. A light blowing to remove clippings and hand raking finishes the job.



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