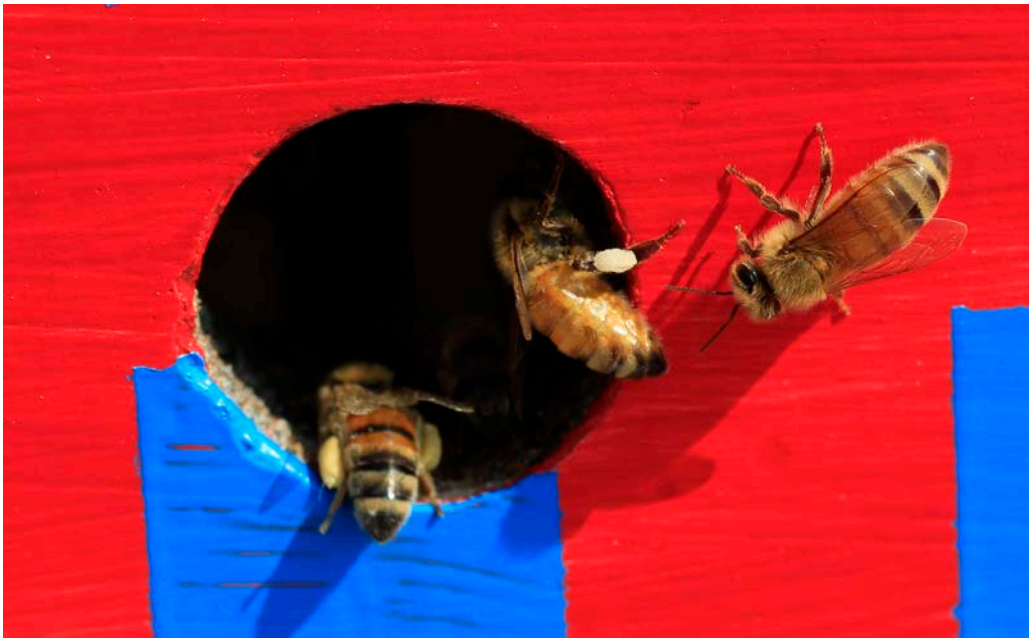
and zinnias in Town & Country Club's many gardens.

Recently, the Town & Country Club's beehives have gone through a transformation. Although many of us are used to seeing stacks of white-painted boxes clustered in fields or orchards, Town & Country's rooftop bees have begun sporting a more urban aesthetic. General Manager Vincent Tracy's wife and daughter have been working hard to paint new bee boxes with gorgeous blue elephants, tulips, checkers, Buddha's, and spaceships.

In order to switch out the white boxes for the new, more glamorous ones, a bunch of Bee Squad members took the cherry picker, chauffeured by Assistant Turfgrass Supervisor Ryan Browning, up to the roof. Each white box was opened, and its frames (there are ten in each box) were moved carefully to a colorful equivalent. The frames, Bee Sqaudders were happy to note, were healthy: thick with honey, brood and bees.

After the transition to new boxes was completed, the Bee Squad was transported back to earth once

Blow. The Bee Squad gives the T&CC hives a property face lift.



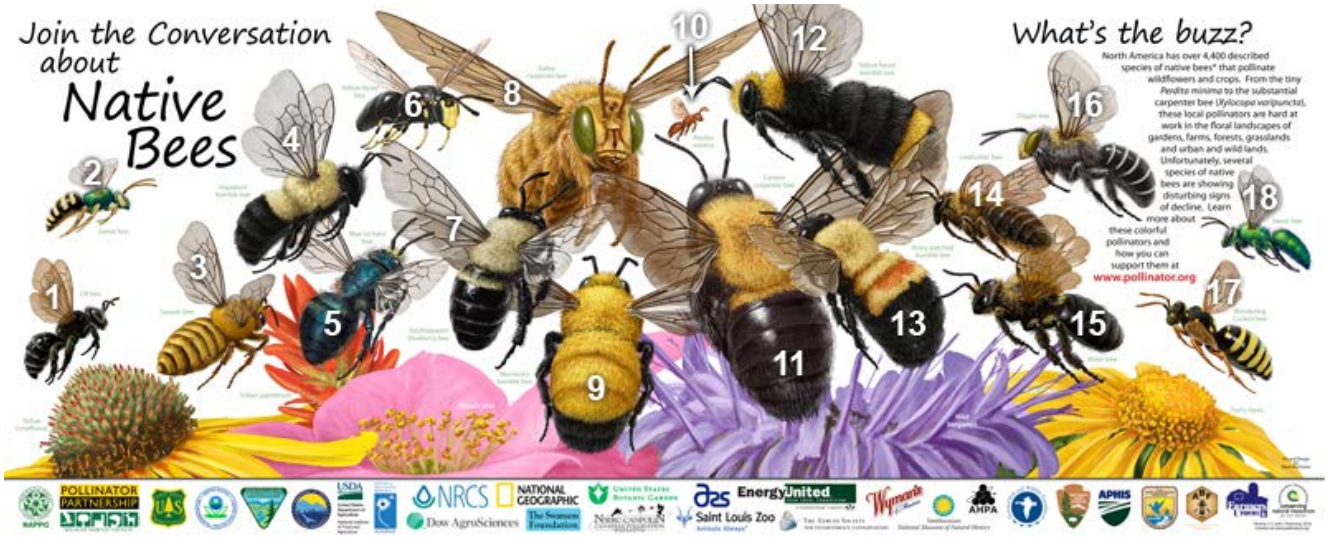
orful hives, the bees orient themselves using the sun and the earth's electromagnetic fields; they don't actually need hive paintings. However, it is important that beehives are painted with light colors, as the bees are affected by temperature, and would have to work extra hard to ventilate and cool a black or dark-colored hive. For more information about the UMN Bee Squad, visit us at www.beesquad.umn.edu.

Checking out the new "digs"

again, began to remove their bee hats and veils, and pack up the van with now-sticky hive tools and extra boxes. An employee stopped by to ask an important question: will the bees recognize their hives now? Or will they get lost in the face of all the new colors and patterns? As long as the new boxes are positioned exactly like the old ones, with their entrances facing the same direction, the bees will successfully navigate their way home. Although we enjoy the col-

Honey bee on new wax comb

Identifying the bees on the poster "Join the Conversation about Native Bees"
Written by Stephen Buchmann, Ph.D., Interim NAPPC Coordinator, Pollinator Partnership



1. ***Macropis nuda***. There's oil in some flowers. Flowers including Spotted Loosestrife (*Lysimachia* spp.) produce energy rich and nutritious floral oils which some female bees (*Macropis nuda*) collect using modified leg hairs like "oil squeegees" to enrich their brood provisions. This happens in some tropical bees (especially the genus *Centris*) but in the northeastern USA, only in these interesting little *Macropis* oil bees.

2. ***Agapostemon texanus***. US sweat bee (a male *Agapostemon texanus*) is especially colorful. Males of this species have a shiny green/brassy head and thorax but a wildly contrasting black and yellow-banded abdomen. Look for these bees on sunflowers and other common plants in the late spring and summer.

3. ***Peponapis pruinosa***. Squash and gourd bees (like our *Peponapis pruinosa*) are common bees across much of the United States. They are specialist pollinators preferring the pollen and nectar of squashes, gourds and pumpkin flowers. The genus *Peponapis* is a colorful bee about the size of a honey bee. They are solitary; each female constructs her own nest with no help from kin, and nest a foot or more underground, usually in or near patches of their favorite cucurbits.

4. ***Bombus impatiens***. The Impatient Bumble Bee (*Bombus impatiens*) is the preferred bumble bee of commerce. Since it can buzz pollinate, while honey bees never do, it is reared in large numbers and its colonies flown to distance localities, greenhouses needing pollinators. Since it does not naturally occur west of the Mississippi, efforts are underway to only allow it to be used in the eastern states as a managed pollinator. Its colors are muted, the yellow hair bands are often more white than a bright yellow. Compare with Morrison's bumble bee of the western states.

5. ***Osmia lignaria***. The Blue Orchard Bee (*Osmia lignaria*) is a member of the leafcutter and mason bee family (Megachilidae). Its distribution includes the Pacific Northwest USA where it is a common visitor to fruit trees in gardens and yards. This bee is often first noticed as females searching for just the right size beetle or nail hole in which to nest and raise their brood. Blue orchard bees are specialists on trees in the rose family and superb pollinator of sweet cherries and other orchard crops. They are currently being tested as pollinators of almonds in California. This bee can be very easily provided for by drilling 7-8 mm diameter holes 5 inches deep into scrap lumber. These "bee condos" can be attached to a garden shed, fence or tree. Nesting females will take up residence and you will be rewarded with bountiful fruit harvests.

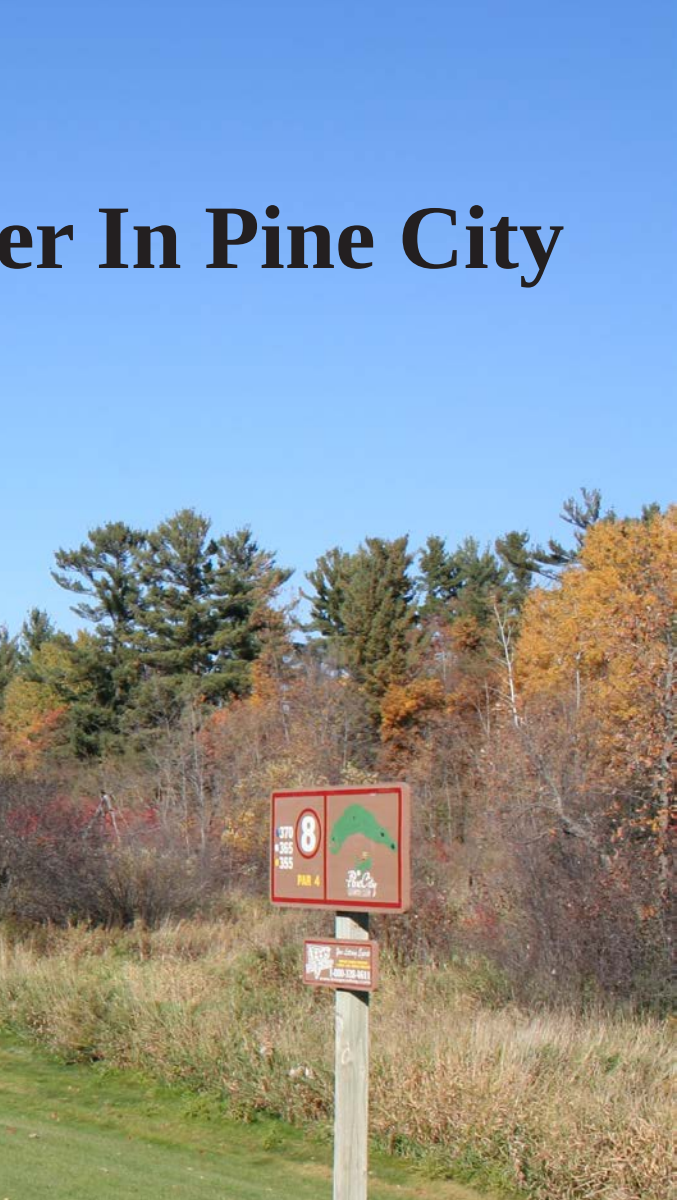
Arrowhead Area Superintendents Gath

By Geoff Jordan, Superintendent, Pine City Country Club

Sunny and dry conditions greeted a gathering for members of the Arrowhead Turf Managers Association for golf and dinner at Pine City Country Club, hosted by Superintendent Geoff Jordan. The golf course was in great condition and the greens were rolling fast for the enjoyment of the sixteen participants.

On course events included a skins game and proxies. Three skins were awarded, two to Josh Gamst from Moose Lake Golf Club with birdies on holes 5 and 6. One skin went to Jake Brytowski from Pine City Country Club after chipping-in for birdie on the second hole. Proximity awards were given to Dale Spetz from Big Lake Golf Club near Cloquet for closest to the pin on hole 3. Long putt on the ninth hole awarded to Ken from 29 Pines Golf Course in Mahtowa. Josh Gamst from Moose Lake Golf Club stuck it close on number 7 to win the proxy, but missed the birdie putt. Prizes were donated by Steve Young with Plaist

er In Pine City



eds / Peat Inc. and Wolf Weber with Tessman Companies Inc. Thank You for your donations!

Roger Stewart, CGCS from TPC Twin Cities, and President of the MGCSA, along with Executive Director of the MGCSA, Jack Mackenzie, were invited to speak to the gathered turf managers. Roger spoke on the importance of organizations such MGCSA and the Arrowhead Turf Managers Association, more specifically, the importance of face-to-face interactions versus the use of social media, and how it relates to attendance at meetings and golf outings. Mr. Stewart and Mr. MacKenzie spoke on the benefits of membership with the MGCSA, focusing mainly on research, and the importance of research funding. Many in the audience were interested in the University of Minnesota's Les Bolstad project and how said project will assist and influence the changing face of golf course maintenance.

The Arrowhead Turf Managers Association is a group of superintendents, owners, managers of a golf facility in Northeast Minnesota and Northwest Wisconsin. Monthly gatherings allow participants to discuss and share problems and/or solutions to aspects affecting golf maintenance. Meetings are held May through September on the third Monday of each month. Upcoming meetings include, July 21 at Big Lake Golf Course. The August meeting will held at Springbrook Golf Course in Mora, on the 18th of that month. Twenty-nine Pines Golf Course will host the outing on the 15th of September.
For more information on the Arrowhead Turf Managers Association, please feel free to contact Geoff Jordan at gjordanenger@gmail.com

In Passing

Mark A. Stennes, age 63, of New Brighton, died July 22 after complications from liver cancer. Born in Bemidji to Oscar & Anna Stennes. He graduated from Bemidji High School and went onto Bemidji State University where he met his future wife Diane Dougherty. They married on August 24, 1974. Mark went onto the University of Minnesota to complete his degree in forestry and masters in plant pathology. They decided to raise their family in New Brighton. Mark was passionate about his career and family and always a friend of the MGCSA.

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A New Way of Looking at an Old Problem

Dr. Doug Soldat

Article courtesy of the Wisconsin GCSA publication *Grassroots*

Some of you may recall sitting in those wonderful wooden chairs (ingeniously designed to keep you awake) in the Soil Science building and learning about the specifics of nitrogen leaching from Dr. J.R. Love, Dr. Wayne Kussow, Dr. Jerry Tyler, or maybe Dr. Nick Balster (who currently teaches Soil Science 301 at UW-Madison). We learned that fertilizer is normally applied in the ammonium form which is quickly converted to nitrate by microbes. Nitrate has a negative charge, and because soils also have a net negative charge, there is no mechanism for nitrate to be retained like there is for the positively charged nutrients like ammonium, potassium, calcium, and others.

Therefore, nitrate is highly susceptible to leaching losses and the recipe for disaster includes: 1) a large application of soluble nitrogen fertilizer, 2) bare soil, or a field with plants too small to absorb most of the nitrogen, and 3) excessive rainfall to transport the nitrate to the groundwater. These three conditions are not uncommon in agricultural settings where soluble fertilizer is the only economically viable choice and logistics usually prevent fertilization when the crop is actively growing. Of course we never quite know what Mother Nature has in store for us in the spring when these applications are typically made.

As we know, turf management is very different from traditional agriculture and for the past three decades studies about nitrogen leaching

from turfgrass have found that nitrogen leaching losses from turf fertilization are minor. Perhaps this finding is not surprising because turfgrass fertilization often involves spoon feeding and slow release fertilizers. We also apply our fertilizer to actively growing, nitrogen deficient turf. That means that we are missing conditions #1 and #2 from this list above. There simply isn't much nitrogen hanging around in a turfgrass soil at any given point in time. As a Master's student under Dr. Kussow, I recall applying soluble urea to my sand-based research green and watering it in with irrigation water that contained about 10 ppm of nitrate. When we collected the drainage water, it was almost always less than 2 ppm nitrate. The turf roots absorbed the nitrogen out of the irrigation water as it passed through. My conclusion from that work was that nitrogen leaching is not a major avenue for when typical fertilization programs for putting greens are used. There are dozens of studies that have reached a similar conclusion.

But recently our ideas about nitrogen leaching from turf have begun to change based on some work from Michigan State and Colorado State Universities. In Michigan, Dr. Kevin Frank has observed substantial amounts of nitrogen leaching from a mature fertilized lawn (Figure 1). By mature, I mean it had been fertilized normally for a period of 20 years. There were two interesting aspects to his findings. First, the fact that high levels of nitrate were found at all was surprising given decades of prior work that found the opposite – in fact in the early 1990s scientists at Michigan State studied these same plots and found minimal nitrogen leaching (Miltner et al, 1996). What happened between 1991 and 2001? Why did the nitrogen start to leach?

To answer that, we need to start with the nitrogen cycle. Keep in mind that I am attempting to distill a highly complex situation into a few generalized sentences. When you apply fertilizer to corn and track where it ends

up, you often find that about half of the application makes it into the corn plant.

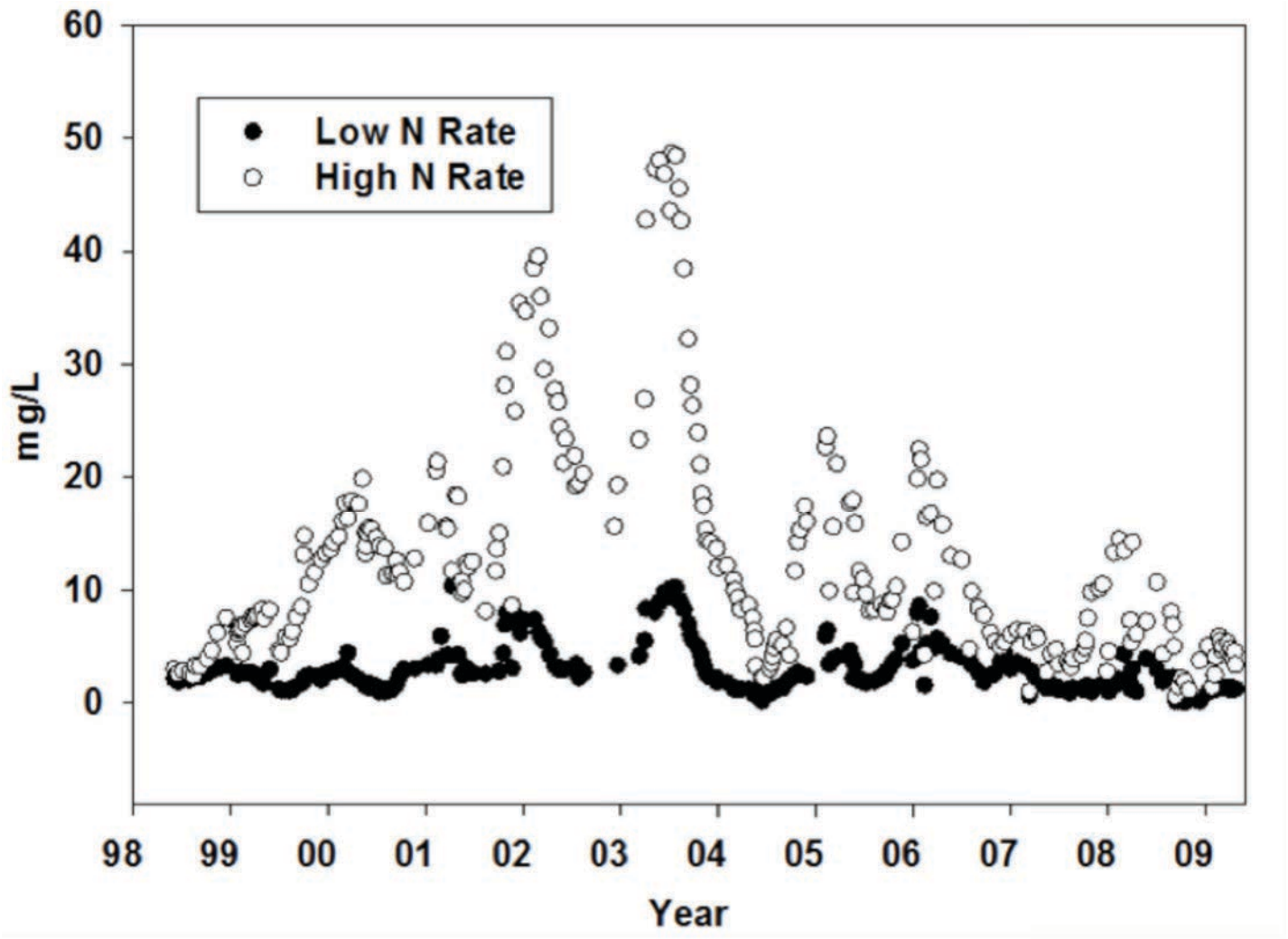

Figure 1. Concentration of nitrate in the drainage water from two mature lawns, one fertilized yearly with approximately 2 lbs N/M (low rate), and the other at about 5 lbs N/M (high rate). The leaching follows a distinct pattern, with high concentrations of nitrogen in the drainage through the late fall, winter, and early spring, with the lowest concentrations found during times of active turf growth. Normally, in conventional agriculture spikes in leaching will coincide with timing of fertilizer application and rain events, that pattern is not evident at all in the turf setting shown above, indicating a different mechanism of leaching is responsible. Graph courtesy of Dr. Kevin Frank, Michigan State University.