

# Minnesota Irrigator

PUBLICATION OF THE IRRIGATORS ASSOCIATION OF MINNESOTA WINTER 2022



## Comments by the IAM President

Jake Wildman

Greetings IAM Members,

I hope everybody had a Merry Christmas and a Happy New Year. From myself and the entire IAM board, I want to say thank you for your support in 2021 and we will continue to advocating for you as irrigators in 2022.

I want to first off remind everybody to mark your calendars for IAM's annual meeting/convention coming up here in about a month. The event will take place on the 17th of February at the Freeport Community Center starting at 9am. We are looking forward to the event being back in-person this year and I think we have a great set of speakers lined up for the day. You can find the agenda and list of speakers here in the newsletter. I feel IAM has a lot of exciting things happening right now and this day can be a great opportunity for you to get an update on everything that is going on. With that being said, I hope many of you are able to attend and I look forward to seeing everybody on the 17th.

On the legislative side of things, IAM is looking forward to the start of the 2022 legislative session on

PRESIDENT continued on page 2

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## 47th Anniversary Convention Program Agenda



Thursday Feb. 17th, 2022  
Freeport Community Center  
Freeport, MN



(\$30 at the Door (\$25 pre-registration) – includes noon lunch

-- 8:30 a.m. Doors open for visiting Exhibitors and refreshments --

### 9 a.m. Welcome & Introductions

Jake Wildman, IAM president

### Annual Business Meeting

Meet IAM's new Lobbyist

Commissioner Thom Petersen, MDA

10:00-10:15 - Break to Visit Exhibitors

---- 10:15 a.m. Program ----

### RCCP Implementing Innovative Irrigation Practices to Protect

#### Groundwater Quality and Quantity

Jeppie Kjaersgaard, MN Department of Agriculture

### 10:45 - Irrigation Research Update

Dr. Vasu Sharmn-UMN Irrigation Specialist

### 11:15 - Drought and Well Interference

Jason Moeckel & Carmelita Nelson- MN DNR

### 11:45 - Alan Peterson Scholarship Recipients

Noon Buffet & Visit Exhibitors

Announcement of Service Award

---- 1:00 PM Program ----

### Variable Rate Irrigation and other Emerging Technologies

Steve McCoon - Neslon Irrigation

### 1:30 - FERTILIZER MARKET UPDATE

JOSH LINVILLE, STONEX FINANCIAL INC.

≈ 3:00 p.m. ≈

Cash Drawings: \$250 & \$100 at End of Meeting

"Must be present to Win"

Socializing with Neighbors and Exhibitors

## MN Irrigation Partnerships to Protect Groundwater

Cost share for Minnesota irrigation system upgrades will be available starting early 2022 for irrigation systems located within Becker, Benton, Cass, Dakota, Douglas, East Otter Tail, Grant, Hubbard, Kandiyohi, Meeker, Morrison, Pope, Sherburne, Stearns, Stevens, Swift, Todd, Wadena, Washington and West Otter Tail Soil and Water Conservation Districts (SWCD).



The program provides financial and technical support to irrigators looking to adopt and integrate proven precision irrigation technology and nitrogen management practices to help optimize irrigation system operation. This will help address groundwater quality and quantity issues under irrigated cropland.

GROUNDWATER continued on page 11

## Renew Membership or Register for the Convention on the IAM WEBPAGE

<https://mnirrigators.org/>

See page 13 for more website information

## Zoom Access to the 2022 IAM Convention Program Presentations

If you desire to have access to the Convention program presentations,

PLEASE visit the IAM Webpage <https://mnirrigators.org/>

or share your email address with IAM Secretary, Jerry Wright at [jerrywright1970@gmail.com](mailto:jerrywright1970@gmail.com)



## Welcome to the MN Irrigator's Winter Newsletter

Jerry Wright, IAM Membership Secretary

This newsletter comes to you thanks to the support of advertisers, current IAM members, Industry Sponsors and Extra Mile Member Supporters listed on page 9.

Your Directors on the IAM Board welcome and strongly encourage you to become a member if you have not already joined. Last year we ended up with only 467 members

Everyone benefits from each other's ideas, experiences, and

partnership in IAM activities this year including keeping a watchful eye on MN Irrigators Water Rights; telling personal stories about benefits of irrigation with Legislators as well as representing the interests of irrigation practices across the state.

To become a member, simply return the sign-up form included on the last page of this newsletter. As a member, you can also be placed on the IAM email alert list if you submit your email address.

January 31st. IAM, along with our lobbyist, have been fairly active during the “off-season” to prepare for this session. Earlier this fall, a few of us had an opportunity to testify in front of the Subcommittee on Minnesota Water Policy. Along with that, we have held multiple meetings with the DNR to discuss a few different topics, as well as the language in IAM’s bill. I know I have said it before, but it so important that we continue to build on these relationships with key legislators and have discussions with the DNR and I feel IAM has made that a priority.

IAM is in the process of figuring out the most effective direction to take during the 2022 session. A couple different factors affecting our decision are that it is a shorter session and as of right now the Senate will be in- person and the House of Representatives will be virtual. We would like to do a day on hill again this year, but we are trying to get a better idea on the lay of the land before we make a final decision. IAM’s lobbyist’s will be at our annual meeting to give a more in-depth update, so stay tuned for more information.

Last thing I will mention is that the board has organized a committee to come up with different ideas on ways to promote IAM and educate the general public and non-farming community about irrigation in the state of Minnesota. The committee has come up with some great ideas so far and has made a few of those ideas a reality. We look forward to sharing some of the completed projects at the annual meeting. With that being said, if any of you have an idea or thought that could be an effective way to promote irrigation; I encourage you to share it with the IAM board. It

can be a challenge to determine what will bring the most value and we are always open for ideas.

I just want to say thank you again for all of your support of IAM. We saw membership grow in 2021 from 2020 and we hope to see that number increase again in 2022. We are getting so close to that 500 membership mark and I think 2022 would be a good year to get that number, what do you say?

Jake Wildman  
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If you are not interested in receiving future newsletters from Irrigators Association of Minnesota (IAM), please send a note to [wrightsj@charter.net](mailto:wrightsj@charter.net) or IAM, 24 S. Edquist St., Appleton, MN 56208

If you have a topic that you would like to see discussed in a future issue, drop a note to IAM president, Jake Wildman at [jakewildman@outlook.com](mailto:jakewildman@outlook.com). Articles for the newsletter are solicited and gathered by the IAM officers and Membership Secretary, Jerry Wright whom can be contacted at [jerrywright1970@gmail.com](mailto:jerrywright1970@gmail.com). Crow River Media in Hutchinson manages the advertiser space and edits, prints and mails the newsletter.

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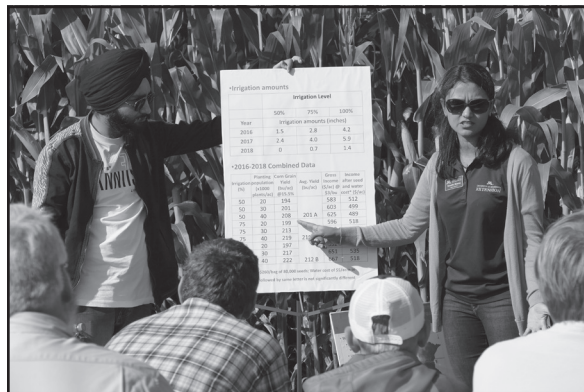
# Corn Growers Support Farms Under Irrigation

Minnesota Corn Growers Association - By: Nate Gotlieb, Public Relations Manager, 952.233.0333 [ngotlieb@mncorn.org](mailto:ngotlieb@mncorn.org)

Like the Irrigators Association of Minnesota (IAM), the Minnesota Corn Growers Association (MCGA) supports science-based research aimed at improving on-farm practices. That includes research aimed at boosting corn farmers who irrigate their crop.

Since 2019, Minnesota Corn has funded research by Dr. Vasudha Sharma of the University of Minnesota that compares four irrigation-scheduling tools. Those are: the checkbook method, the Irrigation Management Assistant (IMA), soil moisture sensors and the Environmental Policy Integrated Climate model.

Sharma and her team conducted their research during the 2019, 2020 and 2021 growing seasons at the University's Sand Plain Research Farm in Becker. Preliminary results, across the first two projects years, show no significant difference in corn yields among the different tools, though water usage and nitrate leaching was low-



The Minnesota Corn Growers Association proudly supports research efforts aimed at boosting corn farmers who irrigate their crop, including a project by Dr. Vasudha Sharma (pictured right).

est on IMA fields and higher on checkbook method fields. MCGA is eager to receive the final report, including data from extremely dry 2021 season, on the research and will post it online at [mncorn.org/research](http://mncorn.org/research).

Meanwhile, Minnesota Corn has also supported research into whether potassium and/or sulfur should be split applied on irrigated corn and into whether an in-ground drip-irrigation system leads to more efficient nitrogen and water usage. The results from

those projects are also online at [mncorn.org/research](http://mncorn.org/research).

More broadly, Minnesota Corn supports educational programming and activities aimed at engaging the non-farming public and ensuring a strong future for rural communities and all Minnesotans. In 2021, that included investing more than \$1 million in University of Minnesota research and 4-H agriculture programming and sponsorship of FFA and Waseca-based FarmAmerica, among other organizations. Additionally, Minnesota Corn continued its longtime support of Minnesota Agriculture in the Classroom (MAITC), which provides free curriculum, educational resources, grants and professional development to students and teachers across the state.

Like IAM, Minnesota Corn's strength lies in its grassroots membership. The organization is grateful for the volunteer and advocacy efforts of its many grower-leaders, both at the county and state level, and always welcomes

new members. By joining MCGA, you're helping support year-round advocacy efforts at the state Capitol and in Washington, D.C., projects aimed at ensuring on-farm profitability and initiatives to inspire future generations of farmers.

To learn more about MCGA or to join, visit [mncorn.org/join](http://mncorn.org/join). Corn farmers can invest in a membership using their corn check-off dollars.

MCGA is grateful for the support of IAM and other agriculture organizations and wishes all farmers a happy, health and prosperous 2022.

This article was submitted by the Minnesota Corn Growers Association, a grassroots organization with nearly 6,500 members. To learn more about MCGA, visit [mncorn.org](http://mncorn.org).



University of Minnesota Researcher, Dr. Vasudha Sharma sharing her research results at the Rosholt Water Quality Research Farm near Westport, MN

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Managing for Variability
By: Michael Dunn, CCA; SSP Precision Agronomist, Anez Consulting, LLC. 320 630 0859

Changes in soils can be sudden and extreme in many parts of the upper Midwest. This natural (and sometimes man-made) variability makes it difficult for farmers to maximize profitability with only one static rate of crop inputs (irrigation water, seed, fertilizer, etc).
GPS-enabled variable rate technology is one tool that can allow for management of these kinds of variability, but this technology is dependent on accurate maps of the type of variability being managed. Some options for mapping field variability include:

Grid Sampling

2.5 acre grids have been a standard resolution for collecting soil samples in most regions. Lab results are interpolated using GIS software to render nutrient maps and variable rate fertilizer recommendations. Unfortunately, the resolution of standard grids fails to depict soil moisture variability, so grids are not recommended for variable rate seeding or irrigation. In some regions, sample resolution may need to be less than half an acre to accurately reflect soil variability.

Zone Management

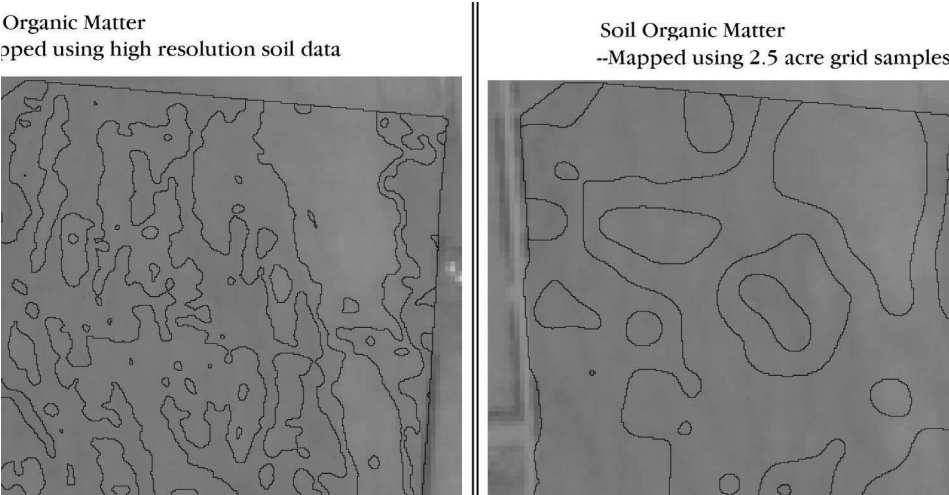
Under zone management, several layers of data are compiled to create a zone map that reflects the natural and man-made yield limiting factors within a field. There is no industry standard to creating zones, and agronomic philosophies usually dictate which data sources get used and how they get put together to make zones. Some data layers include:

Yield Maps and NDVI

Properly timed NDVI (plant health maps) can accurately reflect yield variability, so we will treat yield and NDVI the same for all immediate concerns. If properly selected data is used, these can be good layers to help fine-tune management zone maps. Unfortunately, there are countless fleeting variables (fertilizer misapplication, hybrid changes, disease, insects, etc) that impact plant health/yield that are not always the result of the types of variability that we seek to manage (soil fertility, topography, moisture, etc).

Soil Apparent Electrical Conductivity Mapping

EC has been used successfully to delineate and classify areas of soil variability for decades. It is an especially great tool for areas that are affected by saline soils and where



Pictured: two maps reflecting changes in soil organic matter (black lines), overlaid on a bare soil satellite image. The OM map on the left shows patterns that clearly delineate conspicuous changes in soil brightness, which implies changes in soil organic matter. The map on the right is derived from 2.5 acre grid soil samples, which fails to match up with how quickly soil organic matter actually changes in this field.

deep rooted or perennial crops dominate the rotation. It can be an expensive and time-consuming endeavor to get the mapping accomplished, but it only needs to be done once for the life of the field.

Bare Soil Imagery

Freshly tilled soil gives up a lot of its secrets just by looking at it. Recent advances in imagery analysis allow agronomists to map changes in soil color (hue) and brightness (chroma). They can then make inferences about changes in soil organic matter, soil moisture, soil parent material, erosion, deposition and more. These maps are the highest resolution soil variability maps available and can be obtained at a fraction of the cost of EC mapping. However, it takes a lot of training and experience to properly interpret these maps and regions with perennial crop cover may not have proper imagery to analyze in the first place.

Strategic Farming: Let's Talk 2022 Crops! Register Now!

By: Liz Stahl, Extension educator - crops, and Phyllis Bongard, Content development and communications specialist

If you haven't done so yet, take a moment and register for the U of MN Extension "Strategic Farming: Let's Talk Crops" webinar series! This live, online program will provide up-to-date, research-based information to help optimize crop manage-

ment strategies for 2022. Sessions will be held over Zoom, which can be accessed via your computer, phone, or other mobile device, from 9:00 to 10:00 am Wednesdays, January 5 through March 30, 2022. Sessions will be very informal and

open to all interested. Each session will start with a brief presentation by the topic leaders for the day, followed by discussion framed around farmer/participant questions on the topic.

TOPICS AND SPEAKERS

Speakers include researchers and educators from the University of MN and North Central region.

- January 5: 2022 Crop fertility adjustments
Dan Kaiser, Extension nutrient management specialist, and Brad Carlson, Extension educator - water resources
January 12: 2021-The year when past indiscretions were revealed (think compaction)
Aaron Daigh, North Dakota State University, and Jodi DeJong-Hughes, Extension educator - water quality
January 19: Compare and contrast: Management of corn for grain and silage



- Joe Lauer, UW-Madison corn agronomist, and Luiz Ferrraretto, UW-Madison ruminant nutritionist
January 26: New findings with sulfur fertility
Dan Kaiser, Extension nutrient management specialist, and Jeff Vetsch, Soil scientist
February 2: Strategies for effective weed management in 2022
Debalin Sarangi, Extension weed scientist
February 9: Cover crops: Termination timing and planting green
Axel Garcia y Garcia, Sustainable cropping systems specialist, and Anna Cates, State soil health specialist

STRATEGIC FARMING continued on page 8

Advertisement for Farm Irrigation Systems From Well to Discharge. It features a large image of water splashing and the text 'WE KNOW WATER' and 'TRAUT COMPANIES .COM'. It also includes contact information for their new address effective early 2022.



## Looking Back at the 2021 Drought

By: Dan Miller, Water Use Specialist, DNR Ecological and Water Resources Division

The summer of 2021 was hot and dry for much of Minnesota. Stream flows and lake levels in many areas of the state dropped throughout the summer, until rains arrived in late August and early September. The northeastern part of the state, known as the Arrowhead region, is still very dry, with stream flows and lake levels continuing to be very low.

### Stream flows and water levels

The DNR water monitoring and surveys unit has staff who maintain thousands of stream flow gages, lake level gages and groundwater observation wells throughout the state. This information helps the DNR, farmers, businesses and public water suppliers understand water availability, minimum thresholds for appropriation, and protection flows and water levels for particular streams, rivers, wetlands, lakes and aquifers.

For example, along with the United States Geological Survey, the DNR maintains a stream gage on the Sauk River near St. Cloud. At the time of snowmelt in mid-April 2021, average daily flows peaked at 1,280 cubic feet

per second. During the drought this summer, flows dropped to 1.72 cubic feet per second. Since then, as many people who live in the area are aware, precipitation increased in this part of central Minnesota. In mid-November, before ice started forming, the flows at this location on the Sauk River increased to an average daily flow of about 600 cubic feet per second. This is above the median for that time of year and good news as we transition into winter.

Many streams and rivers across the state provided similar data throughout the summer and into the fall -- a drop in flows throughout the summer months until about mid to late August. Some, not all, streams recovered sufficiently to reinstate suspended surface water appropriation permits.

### Surface water appropriation permit suspensions

If water levels decline to a critical level, the DNR must suspend surface water appropriations from that lake, stream or river. This is because state laws are in place to allow for reasonable use by humans while also pro-

tecting fish and wildlife habitat and to maintain water availability for other users downstream. Some permit holders will temporarily use an alternative water source, such as a well, while their surface water appropriation is suspended. Many other permit holders do not have an alternative water source available. The DNR has developed procedures for surface water permit suspensions during low flows throughout watersheds across the state. You can review these procedures from the DNR webpage: [https://files.dnr.state.mn.us/natural\\_resources/climate/drought/drought\\_permit\\_suspension.pdf](https://files.dnr.state.mn.us/natural_resources/climate/drought/drought_permit_suspension.pdf).

In one instance this summer, a surface water appropriator contacted the DNR hydrologist after they received notice of a pending permit suspension. The farmer and the DNR hydrologist discussed options for the farmer to provide water to one of their fields. The farmer and the DNR were able to come to a solution to get water to the field by testing a well while the surface water appropriation permit was suspended. The well and piping was

in good working order and the DNR hydrologist authorized the use of the well as a contingency source of water during the surface water permit suspension. This communication between a permit holder and DNR staff was critical to resolving the issue, given the urgent nature of the situation.

This summer, due to the low water levels, the DNR suspended 247 surface water appropriation permits, out of a total of 1,550 permits. The permit suspensions included uses for agricultural crop irrigation, golf course irrigation, landscape and athletic field irrigation, wild rice irrigation, sod farm irrigation, cemetery irrigation, construction-related activities, pipeline and tank testing, dust control, mine processing, and sand and gravel washing.

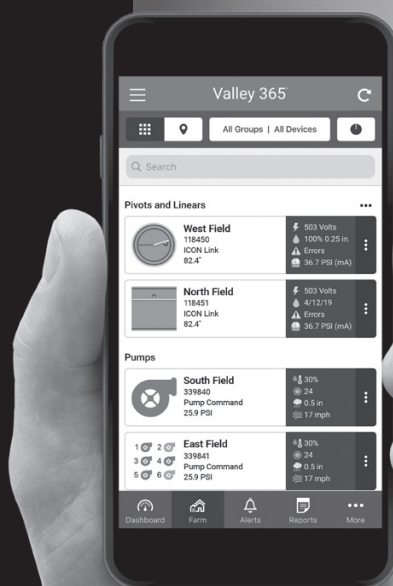
Some surface water appropriation permits continue to be suspended across the state, because water levels and flows did not recover enough to reinstate the permits before ice-in this winter. The DNR will continue to monitor water levels and flows across the state and keep you informed of any potential

*DROUGHT RECAP continued on page 11*

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2021 Record Year for Well Interference Complaints
By: Carmelita Nelson, DNR Water Conservation Consultant and Ellen Considine, DNR Hydrologist Supervisor

Parts of Minnesota experienced extreme drought and a few areas saw exceptional drought during the summer of 2021. Because it was so dry during the critical growing season, many irrigators were pumping heavily this summer. In the driest part of the state, observation wells showed that high-capacity pumping caused nearly 25 feet of drawdown in the aquifer used by many domestic wells. Conversely, the lack of rainfall caused groundwater levels in the shallow aquifer there to drop by about one foot.

In 2021, 24 well interference complaint forms were submitted to the DNR. The DNR also received verbal notification from about 34 additional out-of-water concerns, but no forms were submitted for those. The DNR only investigates complaints after a well interference complaint form has been submitted, which requires that a licensed well driller has inspected the well.

In general, the complaints were from parts of the state where drought was most severe:

- Grant County had five complaints;
• The area along the Red Lake County and Polk County border had 11 complaints;
• The area near Warren, Minnesota had two complaints;
• The Bonanza Valley area had four complaints;
• The Twin Cities area had one complaint; and
• Todd County had one complaint.

Results of 2021 well interference investigations

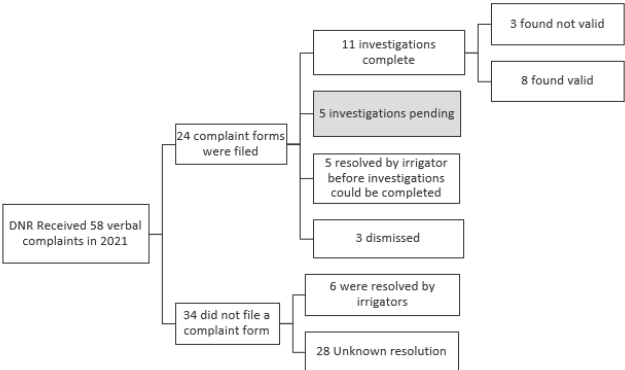
When the DNR investigates a well interference complaint, we evaluate what caused an out-of-water complaint. Out of water situations can be caused by a drought, by the well’s condition, by nearby high-capacity pumping, or a combination of those factors. For a well interference to be found “Valid,” nearby high-capacity pumping must be the primary cause of the out-of-water. If the out-of-water was caused by drought or the well’s condition, the well interference will be found “Not Valid.”

Of the complaints received, 19 have been resolved and five are still being investigated by the DNR. The complaints were resolved in different ways.

- Three complaints were dismissed because the homeowner dropped the complaint, or they could not be investigated or because a mechanical problem caused the out-of-water.
• In five cases, the irrigators helped their neighbors restore their water supply before the DNR investigated. In two other cases, irrigators complied with permit conditions which required them to restore a water supply.
• The DNR has so far completed 11 investigations; five investigations are pending.

Of the complaints that were found valid, high-capacity appropriators (who have been mostly irrigators this year) paid between \$600 to over \$9,000 to restore water to impacted domestic homeowners. In some investigations, multiple irrigation wells were found to have contributed to the interference.

The breakout for 2021 well interference complaints is as follows:



Why do appropriators have to pay?

In Minnesota, the legislature decided that domestic (household) use is the highest priority for water use. Every DNR appropriations permit states that permittees have responsibilities if they are found responsible for a well interference. The well interference process benefits the homeowner and permittee by saving time and money. In other states, both parties must hire consultants and lawyers and go through the lawsuit process.

After a complaint is investigated, and if it is found valid, most well interference complaints are resolved through a settlement process. This may involve paying the cost of lowering the pump in the well or replacing the pump, or in other situations it may be the cost of drilling a new well. Each settlement is unique.

COMPLAINTS continued on pg 7

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Although very few well interference complaints go to hearing, it is an option for both parties. The irrigator also has the option to request a restriction to their permit to the point that it no longer adversely affects the domestic well.

### How is a settlement reached?

Ideally, the homeowner and irrigator negotiate an agreement on a settlement amount. Either party may notify the DNR that they cannot reach agreement, in which case the DNR is required to determine if the offer was reasonable. Once the DNR makes a determination, the ir-

rigator must then pay the amount deemed reasonable. Failure to pay the domestic well owner means the irrigator would not be meeting the requirements of the law. If this were to occur, DNR would inform the irrigator that their water appropriation permit will be suspended unless or until the homeowner confirms they have received full payment.

Minnesota Rule 6115.0730 Subp. 4 A. (1) states that "if an existing well provides an adequate domestic water supply which meets state health standards, and such well no longer serves as an adequate

supply because of permitted appropriation in the vicinity, the permittees shall be responsible for all costs necessary to provide an adequate supply with the same quality and quantity as existed prior to the interference."

### How does the DNR investigate well interference complaints?

There are many steps in the investigation process including field work and monitoring, collection and evaluation of water use data, hydrogeologic analysis and, sometimes, modeling. Our investigations take time, because we need to

ensure that we handle well interference complaints across the state consistently, that our conclusions are supported by science and data, and that we follow statute and rule.

The procedures for resolving well interferences are outlined in Minnesota law. The DNR website describes the resolution process at: [http://www.dnr.state.mn.us/waters/watermgmt\\_section/appropriations/interference.html](http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/interference.html). You can also contact your DNR area hydrologist, or call the statewide well interference coordinator at 651-259-5034.



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### MN Agriculture UPCOMING EVENTS

- ✓ **Jan 19-20th - MN Ag Expo**  
8 am - 5:30 pm  
Mayo Civic Event Center  
1 Civic Center Plaza, Mankato  
Program registration  
<https://mnagexpo.com/>
- ✓ **Jan 21st - Northharvest Bean Day**  
8:30 am - 3:30 pm  
Holiday Inn, Fargo, ND  
<https://northharvestbean.org/growers/bean-day/>
- ✓ **Jan 27th - Central Minnesota Irrigators Annual Meeting**  
8:30 am  
City Ballroom, New York Mills, MN  
program/registration <https://centralmnirrigators.org/>
- ✓ **Feb 8th - Nutrient Management Conference -**  
UM Extension & MAWRC  
Mayo Clinic Health Systems Event Center, Mankato - 8 am  
<https://extension.umn.edu/courses-and-events/nutrient-management-conference>
- ✓ **Feb 15th - Nitrogen Management Conference -**  
UM Extension & MAWRC  
Holiday Inn, St. Cloud MN  
8 am - 3:40 pm  
<https://extension.umn.edu/event/2022-nitrogen-conference>
- ✓ **March 16th Corn Trade School**  
10 am - 4 pm  
Arrowood Resort & Conference Center, Alexandria, Mn  
<https://www.northern-crops.com/events-calendar/corn-trade-school-031622>

• **February 16: Tar spot of corn: Status and options for this rising issue**

Dean Malvick, Extension plant pathologist, and Nathan Kleczewski, plant pathologist, GROWMARK Inc.

• **February 23: Small grains management update**

Jochum Wiersma, Extension small grains specialist

• **March 2: Soybean gall midge: Knowns and unknowns**

Bruce Potter, Extension IPM specialist, Bob Koch, Extension soybean entomologist and Gloria Melotto, graduate research assistant

• **March 9: Getting ready for corn insects in 2022**

Bruce Potter, Extension IPM specialist

• **March 16: Can we store C in a production ag system (and to what benefit)?**

Anna Cates, State soil health specialist, and Jodi DeJong-Hughes, Extension educator - water quality

• **March 23: Biocontrol strategies to manage pests**

George Heimpel, U of MN entomologist

• **March 30: Taming your fertility and soil amendment input costs**

U of MN Extension Nutrient management specialists and researchers

*For more details on each session, go to <https://z.umn.edu/strategic-farming>.*

## REGISTRATION

You need only register once for the program series. At registration, please take a moment to let us know what questions you would like highlighted during the discussions. There is no charge to participate, thanks to generous sponsorship from the Minnesota Soybean Research and Promotion Council. Not able to attend a day? No problem. Sessions will be recorded and posted for viewing later at your convenience.

## REGISTER ONLINE

If you are not familiar with Zoom, details will be included at registration on how to access the sessions on your computer (all you need is the link) or mobile device.

We hope you will take this opportunity to join with U of MN Extension in discussing crop topics at our "Strategic Farming: Let's Talk Crops!" program in 2022!

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**If involved with a domestic-DNR Well Interference "Complaint"**  
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# Drought and Center Pivot Sprinkler Packages

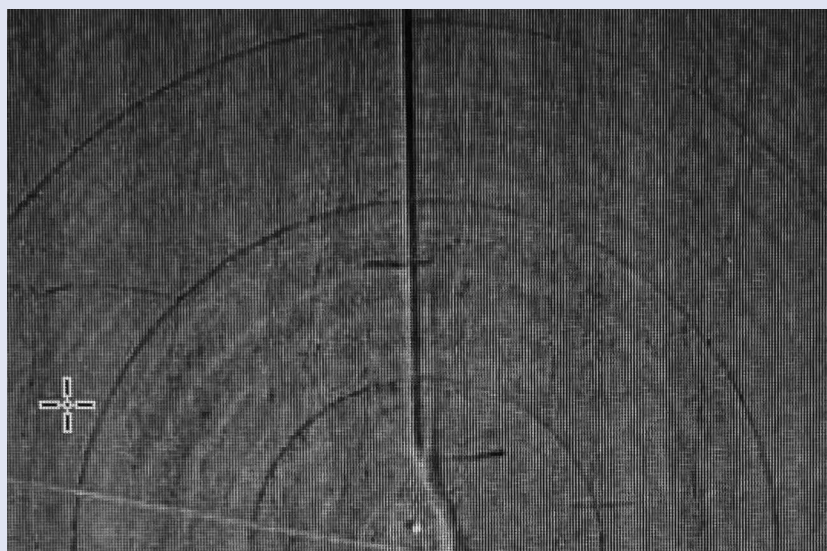
Article taken from the NDSU "Water Spouts" newsletter No. 319 September 2021  
[www.ag.ndsu.edu/extension-aben/irrigation/water-spouts](http://www.ag.ndsu.edu/extension-aben/irrigation/water-spouts)

This year we have been experiencing a drought in many parts of the state. During a drought, the irrigation system is used more often, and the crops are more reliant on irrigation water than rain. During growing seasons with normal or excess rain, many sprinkler problems are "covered up," and effects of poor water placement in the field are not readily apparent. However, during droughts, sprinkler application problems become quite noticeable, especially on a center pivot.

Some of the more common mechanical problems associated with non-uniform water application under sprinkler systems are a change in the nozzle diameter due to wear, plugged or partially plugged nozzles, sprinklers not rotating properly, pump wear causing a reduction in pressure or flow rate or both, and leaks in the piping.

Often, poor water uniformity can be seen in aerial pictures as different colored circles in the field, or lower yields are noticed on combines with yield monitors. Sprinkler irrigation systems throw water through the air, which makes them susceptible to the vagaries of wind and weather. Ideally, a sprinkler system should apply the same amount of water to every square foot of field surface. However, this does not happen because of the wind, topography, and weather, and because of mechanical problems.

We can't do much about the weather, but we can make sure mechanical problems are not affecting the application uniformity of the sprin-



**Aerial image of a center pivot showing streaks where the sprinklers are partially plugged near the pivot point. (Drone operated photo by Paolo Flores, ABEN Precision Ag)**

kler system. The average application amount of a sprinkler system can be calculated if you know the area of coverage, the duration of water application, the application efficiency, and the flow rate.

For example,

**Table 1** shows the average depth of application in inches for a pivot with different times of rotation and flow rates. The calculations were made using an application efficiency of 85% and 128 acres of irrigated coverage. The application efficiency is the ratio of the volume of water that actually gets into the soil for plant use to the volume of water that is pumped. An application efficiency of 85% was selected based on research showing that this was a representative value for most irrigation events.

However, weather conditions during the day can affect this value significantly. At night and into the morning, when the wind speed is very low, the application efficiency might be more than 90% for a pivot. But by mid-afternoon, when the air temperature is high, the relative humidity is low and the wind is greater than 15 miles per hour, the application efficiency might drop to below 50%.

Therefore, the average application amount is the ideal amount that we want applied to every square foot of the surface of the field, assuming that the mechanical aspects of the sprinkler system are not creating any problems. The easiest way to identify malfunctioning sprinklers or find leaks is to walk the length of the center pivot and observe each sprinkler head and tower. Most of the time, the worst mechanical problems are easy to see.

If you want to see the actual uniformity of water application under a center pivot sprinkler system, do a "can test" (see the next article about a video showing a can test). The test involves putting containers (cans), which are identical and have an opening diameter greater than three inches, under the sprinkler system in a set pattern. While the system is running,

the flow rate, pressure and area of coverage of the center pivot are measured. For moving systems, such as travelling big guns and pivots, the cans are put out in one or more lines that are perpendicular to the direction of movement of the system. Along the lines, the cans are equally spaced, typically

10 feet to match the sprinkler spacing on new pivots. After the center pivot system passes over the cans, the catch in each can is measured and recorded. Then they are totaled, and the average catch amount is determined

The individual can amount is then compared with the calculated average depth. Catch amounts with a large variation from the average will often identify sprinkler application problems. If you are chemigating through a pivot, the uniformity of application can have a significant effect on how much benefit is derived from the chemical as well as the water.

Frequently, irrigators judge application depth based on a single rain gauge either near the end of the pivot or near the pivot point. Neither of these locations is desirable. A mini can test may be performed by using 14 to 18 identical containers. Plastic cups available in grocery stores make good "cans." For a typical eight- to 10-tower pivot, two catch cans should be located under each span starting with the second span from the pivot point. The cans should be located at random places between the towers, but not too close to the tower. Stay at least 10 feet from the tower. To continually monitor the application amounts of the pivot, the cans could be left in place throughout the growing season.

If your sprinkler package is more than five years old, and you have noticed problems in variable yield or seen rings on aerial pictures of the field, this winter would be a good time to visit an irrigation dealer to look at updating the sprinkler package. It will pay big dividends if the drought continues into next year.

Tom Scherer, NDSU Extension  
Agricultural Engineer

Thomas.Scherer@ndsu.edu 701-231-7239

Table 1. Average application amounts in inches for a						
128 acre pivot with an application efficiency of 85%						
Hours	Flow Rate (gallons per minute)					
per 1	500	600	700	800	900	1000
Rotation	Applied amount in inches					
10	0.07	0.09	0.1	0.12	0.13	0.15
15	0.11	0.13	0.15	0.18	0.2	0.22
20	0.15	0.18	0.21	0.23	0.26	0.29
25	0.18	0.22	0.26	0.29	0.33	0.37
30	0.22	0.26	0.31	0.35	0.4	0.44
35	0.26	0.31	0.36	0.41	0.46	0.51
40	0.29	0.35	0.41	0.47	0.53	0.59
45	0.33	0.4	0.46	0.53	0.59	0.66
50	0.37	0.44	0.51	0.59	0.66	0.73
55	0.4	0.48	0.56	0.65	0.73	0.81
60	0.44	0.53	0.62	0.7	0.79	0.88
65	0.48	0.57	0.67	0.76	0.86	0.95
70	0.51	0.62	0.72	0.82	0.92	1.03
75	0.55	0.66	0.77	0.88	0.99	1.1
80	0.59	0.7	0.82	0.94	1.06	1.17
85	0.62	0.75	0.87	1	1.12	1.25
90	0.66	0.79	0.92	1.06	1.19	1.32
95	0.7	0.84	0.98	1.12	1.25	1.39
100	0.73	0.88	1.03	1.17	1.32	1.47



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**GROUNDWATER** *continued from pg 1*

The program utilizes a flexible, tiered approach where irrigators can participate at the level that is relevant for their operation and attitude towards technology adoption and risk:

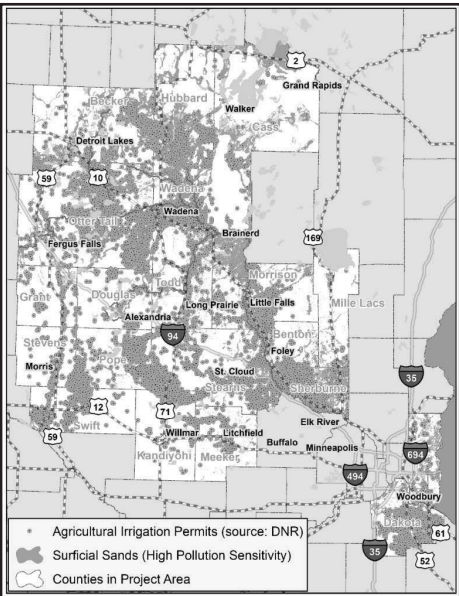
- The first tier includes installing advanced soil moisture sensors in irrigated fields used for irrigation scheduling.
- The second tier includes installing precision irrigation packages, including updates to panel, nozzles, and variable frequency drive pumps.
- The third tier includes an advanced irrigation package along with the newest technology for irrigation water and nutrient management. This will include recent, proven systems using remote operation technology, crop status sensors and variable rate fertilization systems.

The cost share is available through a \$3.5 million agreement with the USDA-Natural Resource Conservation Service (NRCS). The Minnesota Department of Agriculture (MDA), NRCS, the SWCDs listed above, Central Lakes College, Ag-Centric, University of Minnesota, Mille Lacs Band of Ojibwe, state agencies, irrigator’s associations, and businesses have partnered to offer this program.



In addition to providing cost share, a limited number of irrigators will receive a stipend to participate in the AgCentric Farm Business Management Program to provide an annual financial analysis of their operation.

The program will also help build irrigation-related technical expertise and information sharing among SWCD, NRCS and irrigation industry staff, and organize education events, field days, and irrigation technology demonstration event.



More information is available through the program website at <https://agcentric.org/rcpp-precision-irrigation/>. On that website you can sign up to receive notifications about the program, including when applications for cost share is accepted.

Contact your local SWCD for more information about the program and how to apply.

By Jeppe Kjaersgaard, Research Scientist, Minnesota Department of Agriculture. Ph.: 651-201-6149 Email: [jeppe.kjaersgaard@state.mn.us](mailto:jeppe.kjaersgaard@state.mn.us)

A Memorandum of Understanding for the irrigation partnership program was signed on December 13, 2021 during the Minnesota Association of SWCDs Annual Convention (photo below).

The agreement was signed by (L to R)

Keith Olander, Dean of Agricultural Studies at Central Lakes College and AgCentric,

Troy Daniel, Minnesota NRCS State Conservationist,

Darren Newville, District Manager for East Otter Tail and Wadena SWCDs,

Thom Petersen, Minnesota Commissioner of Agriculture, and

John Jaschke, Executive Director at the Board of Soil and Water Resources (not pictured).





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**DROUGHT RECAP** *continued from pg 5*

changes to surface water appropriation permits. If you have questions about a surface water appropriation permit, please contact your local DNR area hydrologist. A list of staff and the areas they cover is available at [https://files.dnr.state.mn.us/waters/area\\_hydros.pdf](https://files.dnr.state.mn.us/waters/area_hydros.pdf).

**Additional considerations and conversations**

The drought this summer also demanded a lot from the State Climatology Office, who provided weekly updates for the state drought map. This is a map that shows the extent and severity of the drought throughout the state. At the peak of the drought this summer, on August 10, 2021:

- 95% of the state was experiencing moderate drought or worse;
- 78% of the state was experiencing severe drought or worse;
- 42% of the state was experiencing extreme drought or worse; and
- 7% of the state was experiencing exceptional drought.

Again, rains in mid to late August started to ease the drought in many parts of the state. The State Climatology Office continues to update the drought map and monitor conditions throughout the state.

For the first time since 2012, the DNR convened the State Drought Task Force. This group of professionals made up of state, local and federal agencies and associations provided coordination and communication between agencies and institutions affected by the drought. It also provided a forum for discussion about drought management plans and policies and was a source of information for the news media. This group started meeting in mid July 2021 and concluded their last meeting of the year in late October.

**Prepare for the next drought**

Many water appropriation permit holders have taken action to increase their water use efficiency. We encourage those who have not already done so to prepare for the next drought. Install water-conserving nozzles and other hardware, talk with someone who is using efficient irrigation water management practices, use soil moisture meters or contact your crop advisor or a University of Minnesota Extension Irrigation Specialist (<https://extension.umn.edu/soil-and-water/irrigation>) to learn more. Planning for and implementing some new strategies to conserve water is good for business, agriculture, our water resources and all Minnesotans.



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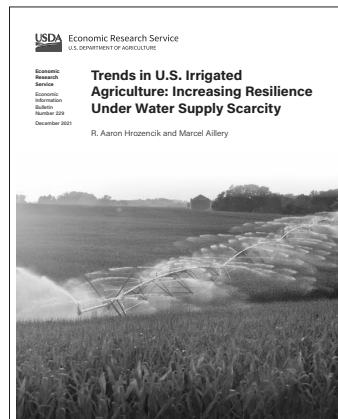


# Trends in U.S. Irrigated Agriculture: Increasing Resilience Under Water Supply Scarcity

R. Aaron Hrozencik and Marcel Aillery

## What Is the Issue?

Growing urban populations and economic development intensify competition for the Nation's water resources. With surface water supplies largely allocated in most river basins of the Western United States and some river basins in the Eastern United States, emerging water demands from non-agricultural sectors must be met in many cases through a reallocation of water initially allocated to agriculture. Meanwhile, changing climate regimes—through increased evaporative losses, seasonal shifts in precipitation patterns, reduced snowpack and snowmelt runoff, and higher frequency and severity of droughts—have reduced water supplies during the crop growing season. At the same time, groundwater pumping in excess of natural recharge has substantially diminished aquifer resources critical to agriculture in regions where, and when, surface water is less abundant. Increasing competition for water, coupled with increasingly constrained water supply trends, have important implications for the viability and resiliency of the irrigated agricultural sector. How the sector adapts to these trends will shape the future of irrigated agriculture and the value it creates for the greater agricultural economy.



## What Did the Study Find?

Irrigated agriculture—a critically important component of the U.S. farm economy—expanded significantly over the last century, as public reclamation policy initiatives and technological innovations opened new lands to irrigated production.

- Irrigated agriculture generates substantial value for the broader U.S. agricultural economy. In 2017, irrigated farms accounted for more than 54 percent of the total value of U.S. crop sales, while irrigated cropland constituted less than 17 percent of total harvested cropland.
- Irrigated acreage has expanded rapidly since the onset of the Federal reclamation era, which began with the passage of the Reclamation Act (P.L. 57-161) in 1902. Nationwide, irrigated acreage grew from less than 3 million acres in 1890 to more than 58 million acres in 2017.
- Between 1949 and 2017, the share of U.S. irrigated cropland located within the Mountain and Pacific regions decreased from 77 percent to 44 percent, while the share of irrigated cropland in the Mississippi Delta and Northern Plains regions increased from 8 percent to 34 percent.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.



To read this article in its entirety please scan the QR code to visit **[www.ers.usda.gov](http://www.ers.usda.gov)**



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## Renew Membership or Register for the Convention on the IAM WEBPAGE

If you have not visited the NEW IAM website **<https://mnirrigators.org/>** and Facebook page recently it's time you do so! At IAM, our mission is to "support new science-based research on irrigation management and provide advocacy at the state and local level for the right of farmers to irrigate." This website highlights our work in this area, and we'll provide updates and events via our Facebook page.



"The impact of irrigation on Minnesota's economy not just to the farmer, but also the rural communities where irrigation takes place in Minnesota is significant. IAM wants to spread the message that farmers who irrigate are working hard to be good stewards of our natural resources."  
- ALAN PETERSON, FORMER IAM PRESIDENT



The website also allows you to join/renew your membership online with credit card as well as register for the 2022 Convention and make other donations to IAM projects.

There is also a place for farmers to find irrigation resources from research farms across the state and access the latest copy of IAM's Minnesota Irrigator newsletter.

CHECK OUT THE IAM FACEBOOK PAGE and BECOME A FOLLOWER!!!



Thanks to IAM Board member Anna Bregier and technical staff at Central Lakes College for upgrading and organizing the website layout and creating a Facebook page.





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Agriculture isn't just a market we serve. It's what we're founded on. It's who we are. Our mission goes far beyond farm loans and insurance offerings. We are passionate about the hopes and dreams of rural America and are always evolving to meet the needs of the communities we serve to build for the future. Let's get started today.

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## "Friends of Alan Peterson" Offer Matching Dollars for any NEW DONATIONS to the **ALAN PETERSON AG SCHOLARSHIP FUND**

Five friends of the late Alan Peterson came together, donating \$12,500 the first of April. These funds are to be used to match any new donations made over the next year. Hence any new gifts including your donation to the scholarship fund will be doubled thanks to this group of generous donors. This offer of a match to the Alan Peterson Scholarship fund goes until March 1st, 2022.

As Qualifying Donations are received by IAM for the Scholarship Fund an equal amount will be withdrawn from the Friends of Alan Peterson Fund by the IAM Treasurer and deposited into the Alan Peterson Scholarship Fund. If the Friends of the Alan Peterson Fund is not depleted by March 1, 2022, their remaining deposit will be returned to the depositors in equal shares.

Since last fall, we have raised over \$48,000 in donations honoring our former president Alan Peterson, who lost his battle with cancer in 2020. A committee of the board was formed to develop criteria for this scholarship and recently announced two recipients to receive the scholarships once they have enrolled in college this fall.

Applications for this year 2022 award can be found on our website  
[www.mnirrigators.org/resources](http://www.mnirrigators.org/resources).

Donation checks can be made payable to the  
"Alan Peterson Agricultural Scholarship Fund" and mailed to:

**Irrigators Association of Minnesota**  
**Fletcher Syltie, Treasurer**  
24 S. Edquist St.  
Appleton, MN 56208

## 8th Annual Nitrogen: Minnesota's Grand Challenge & Compelling Opportunity Conference

**HOLIDAY INN, ST. CLOUD** • 75 South 37th Avenue, Saint Cloud, MN

The 8th annual Nitrogen Conference will take place on February 15, 2022, in St. Cloud and online via Zoom. This conference is organized by UofM Extension and the Minnesota Agricultural Water Resource Center (MAWRC). In-person attendance will be limited to 100 people, with a fee of \$20 payable at the time of registration. Lunch is provided for in-person attendees. Virtual attendance is unlimited and free, but registration is required. This conference offers continuing education credits (CEUs) in soil and water and nutrient management for Certified Crop Advisors (CCAs).

### PRESENTATIONS

- Combining 4R nutrient stewardship with intensive agronomics to improve corn systems - Dr. Jeff Coulter, UofM
- Integration of irrigation and nitrogen management for optimum corn production and reduced nitrate leaching in Minnesota - Vasu Sharma, UofM
- Nitrogen management under different soil drainage conditions - Fabian Fernandez, UofM
- On-Farm Nitrogen trial results from 2018-2020 AFREC funded research - Matt Wiebers, CropCentric
- The MRTN database and university nitrogen rate guidelines - Dan Kaiser, UofM
- Balancing the MRTN approach with environmental outcomes - Newell Kitchen, USDA-ARS/U of Missouri
- Reducing nitrous oxide from corn and soy systems with designed microbial communities - Alexander Frie, UofM
- Vegetative buffers of intercropped kura clover - John Baker, USDA-ARS/UofM ring of nitrate from tiled fields - Tim Radatz, Discovery Farms

- Current status, opportunities and challenges of cropping system diversification - Jeff Strock, UofM
- Cost: \$20 for in-person event (lunch included); free for virtual conference

### REGISTRATION

Register for the in-person event (limited to 100 people) or register for the online version (unlimited) Registration Required. Attend in person or via Zoom! In-person attendance will be limited to 100, with a fee of \$20 payable at time of registration. Virtual attendance is free, but requires registration. To register for in-person attendance, go to <https://www.eventbrite.com/e/211131348547> To register to participate via Zoom, go to <https://tinyurl.com/kxvww35f>.

For more information please contact Fabian Fernandez (fabiangf@umn.edu; 612-625-7460) Extension nutrient management specialist or Warren Formo, Executive director, MAWRC, (warren@mawrc.org; 952-237-9822).





**Renew Membership or Register for the Convention on the IAM WEBPAGE**  
**<https://mnirrigators.org/>**  
**See page 13 for more website information**

**Zoom Access to the 2022 IAM Convention Program Presentations**

**If you desire to have access to the Convention program presentations, PLEASE visit the IAM Webpage <https://mnirrigators.org/> or share your email address with IAM Secretary, Jerry Wright at [jerrywright1970@gmail.com](mailto:jerrywright1970@gmail.com)**

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**IAM 2022 CONVENTION & MEMBERSHIP – WE NEED YOUR SUPPORT!**

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Please mail this form and a check payable to "IAM" to:

**Irrigators Association of Minnesota**

Attn: Fletcher J. Syltie, IAM Treasurer, 24 S Edquist St, Appleton, MN 56208

Address \_\_\_\_\_

City, State & Zip \_\_\_\_\_

Email Address \_\_\_\_\_

**IAM 2022 MEMBERSHIP DUES & CONVENTION SIGN UP**

Pre-Convention Registration — \$25 per person . . . . . \$ \_\_\_\_\_

Individual Annual Dues — \$100 or \$275 for 3 Years . . . . . \$ \_\_\_\_\_

Platinum Circle Membership — \$1,000 or more . . . . . \$ \_\_\_\_\_

Presidential Membership — \$500 or more . . . . . \$ \_\_\_\_\_

GOLD Membership — \$300 . . . . . \$ \_\_\_\_\_

Silver Membership — \$200 . . . . . \$ \_\_\_\_\_

Bronze Membership — \$150 . . . . . \$ \_\_\_\_\_

**TOTAL ENCLOSED** . . . . . \$ \_\_\_\_\_