



# 11<sup>th</sup> | International Drainage Symposium

**AUGUST 30 – SEPTEMBER 2, 2022**

**Marriott Des Moines Downtown  
700 Grand Avenue  
Des Moines, IA 50309**

**FINAL PROGRAM**

**Partners:**





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- **Connect** with members of your local chapter



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## Co-Chair Message

As co-chairs, it is our great pleasure to welcome you to Des Moines, Iowa, for the 11th International Drainage Symposium. The symposium continues a tradition of convening professionals and students every five to six years to address challenges and opportunities for managing poorly drained land. As with previous symposia, we trust the ideas presented and discussed here will continue to advance the science and practice of agricultural drainage.

Highlights from the general sessions include an opening session panel discussion on advancing drainage to meet the changing physical, political, and socioeconomic climates featuring perspectives from a climatologist, researcher, design engineer, and a contractor organization. Rob Burtonshaw will discuss his experiences studying drainage design and installation around the world at the Wednesday luncheon. The Thursday luncheon presentation will feature Dr. Charlotte Kjaergaard presenting her work on drainage water quality practices as part of Denmark's national strategy. In the closing session, Dr. Chandra Madramootoo will share his thoughts on the progression and future of international drainage.

The 11th International Drainage Symposium also features the following:

- 86 oral presentations and 18 poster presentations
- Exhibitors on display throughout the conference on Wednesday and Thursday
- Field tours highlighting research and implementation projects addressing the concurrent demands for agricultural production, profitability, and downstream water quality
- A workshop on DRAINMOD for modeling drainage hydrology, crop yield, and nutrient dynamics
- Opportunities for networking with other attendees at the Tuesday evening welcome reception, Wednesday evening early career mixer, and the Wednesday and Thursday lunches
- An awards banquet to celebrate the 2021-2022 inductees into the Drainage Hall of Fame

The symposium venue is in the heart of Downtown Des Moines—the fastest growing metro area in the Midwest. We are located near the confluence of the Des Moines and Raccoon Rivers, which have been the source of discussions about drainage for more than 100 years. Downtown Des Moines has a variety of restaurants, shops, and arts and cultural attractions to explore, so we hope you will take some time to enjoy the area during your stay.

Finally, we want to thank all the attendees, presenters, sponsors, exhibitors, volunteers, and organizers for making the symposium possible. After multiple years of virtual conferences, we look forward to the opportunity for in-person interaction again with our global drainage colleagues. It has been an honor to serve as co-chairs, and we hope you have a productive and enjoyable symposium.



**Matthew Helmers**  
*Symposium Co-Chair,  
Iowa State University*



**Christopher Hay**  
*Symposium Co-Chair,  
Iowa Soybean Association*



# Planning Committee

## SYMPOSIUM CO-CHAIRS

**Matthew Helmers**, Symposium Co-Chair,  
*Iowa State University*

**Christopher Hay**, Symposium Co-Chair,  
*Iowa Soybean Association*

**Bethany Brittenham**, Program Co-Chair,  
*ISG*

**John McMaine**, Program Co-Chair,  
*South Dakota State University*

**Mohamed Youssef**, Publication Co-Chair,  
*North Carolina State University*

**Zhiming Qi**, Publication Co-Chair,  
*McGill University*

## PLANNING COMMITTEE

**Courtney Allen**, *Soil and Water Conservation Society*

**Renee Bouldin**, *Soil and Water Conservation Society*

**Bethany Brittenham**, *ISG*

**Laura Christianson**, *University of Illinois Urbana-Champaign*

**Jane Frankenberger**, *Purdue University*

**Ehsan Ghane**, *Michigan State University*

**Jeppe Kjaersgaard**, *Minnesota Department of Agriculture*

**Ainis Lagzdins**, *Latvia University of Life Sciences and Technologies*

**John McMaine**, *South Dakota State University*

**Zhiming Qi**, *McGill University*

**Malcolm Robertson**, *Iowa State University*

**Gary Sands**, *University of Minnesota*

**Vinayak Shedekar**, *The Ohio State University*

**Ranvir Singh**, *Massey University*

**Mohamed Youssef**, *North Carolina State University*

## FIELD TOUR PLANNING COMMITTEE


**Bethany Brittenham**, *ISG*

**Christopher Hay**, *Iowa Soybean Association*

**Matthew Helmers**, *Iowa State University*


**Keegan Kult**, *Agricultural Drainage Management Coalition*

**Malcolm Robertson**, *Iowa State University*



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# Symposium Registration and Facility Information

*The IDS registration desk is located in the foyer on the 3rd Floor. Staff will be on site to assist you.*

## REGISTRATION HOURS

**Tuesday** 7:00 AM – 5:00 PM

**Wednesday** 7:30 AM – 5:00 PM

**Thursday** 8:00 AM – 5:00 PM

**Friday** 7:00 AM – 8:00 AM

## SYMPOSIUM ADMISSION

The symposium registration fee covers one participant. All registered attendees will receive a registration packet, which contains a formal name badge and tickets for purchased events.

Your name badge acts as your admission ticket to educational sessions, including the luncheon and speaker sessions, exhibits, posters, and special events. Please be sure your name badge is worn at all times. For your safety, it is recommended that you do not wear your name badge outside the facility. Please note that tickets may be collected for ticketed events.

Formal name badges are not provided for guests. Additional tickets for guests to attend the special events may be purchased at the registration desk and are subject to availability.

Please Note: No refunds will be given for symposium registrations, workshops, tours, meal functions, or activities. Registration personnel will not exchange tickets. IDS reserves the right to cancel events/activities without prior notice.

## COVID-19 POLICY

Please note any interaction with the general public poses a risk of being exposed to COVID-19, and we cannot guarantee that you will not be exposed while in attendance at the event. To help promote the health and safety of others, attendees will be required to complete a self-assessed proof of health screening within 24 hours prior to attending the event. A “pass” result is required in order to receive access to the event. Information will be emailed to attendees on Monday, August 29 with information on completing the health screening.

The event will follow the Des Moines public health guidelines. As of now, no public health orders are currently in effect in Des Moines. Face coverings

are still highly recommended for those who are immunocompromised and those who are unvaccinated or not fully vaccinated or boosted. Face coverings provide an added layer of protection for those who are fully vaccinated and boosted. We will inform attendees if any changes occur prior to the event. By attending the symposium, you knowingly and freely accept the risks associated with COVID-19.

Masks and hand sanitizer will be provided to attendees at the proof of screening checkpoint, and hand sanitizing wipes will be provided throughout the meeting rooms.

## INTERNET

Select the “**Marriott-Bonvoy-Conference**” network, enter “**IDS@2022!**” as the password when prompted, and complete the required steps to connect to the free internet connection.

## LOST AND FOUND

Check with the front desk of the Marriott or at the registration desk.

## NAME BADGE RECYCLING

If you wish to recycle your name badge, please return it to the registration desk at the end of the event.

## PHOTO RELEASE

Registration and attendance at, or participation in, IDS events constitutes an agreement by the attendee for IDS to use the attendee’s likeness (all photos, videos, or digital media) in any format without payment or other consideration. IDS may use the images for nonprofit educational, informational, or promotional purposes. IDS will not sell the rights to the images or likeness to any other entity.

## CEUs

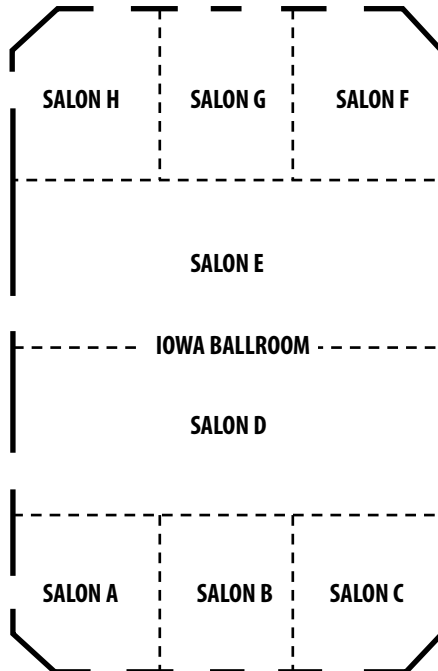
IDS has worked to secure continuing education credits (CEUs) from various certifying organizations. The room moderators in each session will have a sheet for you to sign in and out with your name and certification number.

**JOIN THE CONVERSATION ONLINE!**

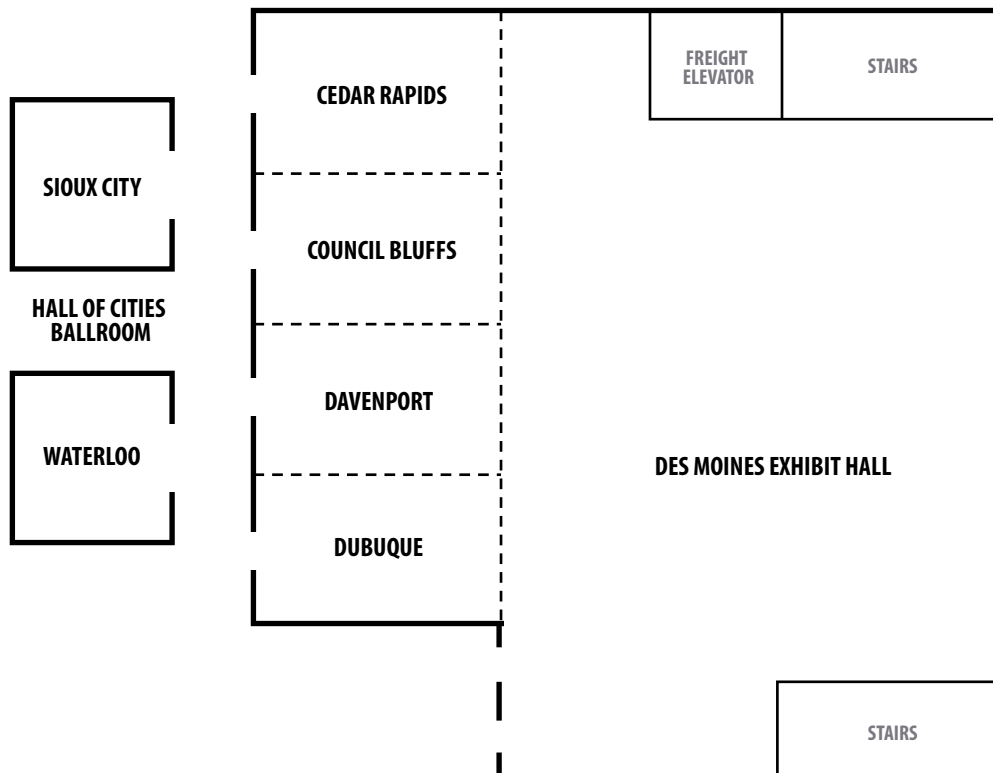
**#IDS22**

# Meeting Space Map

## SECOND FLOOR



## THIRD FLOOR



# Symposium Schedule in Brief

*All sessions are included with symposium registration, unless otherwise indicated.*

## TUESDAY, AUGUST 30, 2022

<b>7:00 AM – 5:00 PM</b>	Registration and Health Screening Desks Open
<b>8:00 AM – 5:00 PM</b>	*DRAINMOD 7.0 Workshop: Modeling Hydrology, Crop Yield, Nitrogen and Phosphorus Dynamics in Drained Lands
<b>5:00 PM – 7:00 PM</b>	Welcome Reception

## WEDNESDAY, AUGUST 31, 2022

<b>7:30 AM – 5:00 PM</b>	Registration and Health Screening Desks Open
<b>7:30 AM – 8:30 AM</b>	Morning Coffee and Light Breakfast: Exhibit Hall and Poster Presentations Open
<b>8:30 AM – 10:00 AM</b>	Opening General Session and Panel Discussion
<b>10:00 AM – 10:30 AM</b>	Morning Break: Exhibit Hall and Poster Presentations Open
<b>10:30 AM – 12:00 PM</b>	Concurrent Sessions
<b>12:00 PM – 1:30 PM</b>	Luncheon and Speaker
<b>1:30 PM – 3:00 PM</b>	Concurrent Sessions
<b>3:00 PM – 3:30 PM</b>	Afternoon Break: Exhibit Hall and Poster Presentations Open
<b>3:30 PM – 5:00 PM</b>	Concurrent Sessions
<b>5:00 PM – 6:00 PM</b>	Early Career Mixer
<b>6:00 PM – 8:00 PM</b>	*Drainage Hall of Fame Awards Banquet

## THURSDAY, SEPTEMBER 1, 2022

<b>8:00 AM – 5:00 PM</b>	Registration and Health Screening Desks Open
<b>8:00 AM – 8:30 AM</b>	Morning Coffee and Light Breakfast
<b>8:30 AM – 10:00 AM</b>	Concurrent Sessions
<b>10:00 AM – 10:30 AM</b>	Morning Break: Exhibit Hall and Poster Presentations Open
<b>10:30 AM – 12:00 PM</b>	Concurrent Sessions
<b>12:00 PM – 1:30 PM</b>	Luncheon and Speaker
<b>1:30 PM – 3:00 PM</b>	Concurrent Sessions
<b>3:00 PM – 3:30 PM</b>	Afternoon Break: Exhibit Hall and Poster Presentations Open
<b>3:30 PM – 5:00 PM</b>	Closing General Session

## FRIDAY, SEPTEMBER 2, 2022

<b>7:00 AM – 8:00 AM</b>	Registration and Health Screening Desks Open
<b>8:00 AM – 4:00 PM</b>	*Tour 1: Field to Stream: Researching Conservation Drainage Performance
<b>8:00 AM – 4:00 PM</b>	*Tour 2: Farm to City: Scaling Up Implementation of Nutrient Reduction Practices (Full-Day Tour)
<b>8:00 AM – 12:00 PM</b>	*Tour 3: Farm to City: Scaling Up Implementation of Nutrient Reduction Practices (Half-Day Tour)

*\*Not included in symposium registration. Additional cost required to attend.*



# Symposium Sponsors

*Thank you to our 11th International Drainage Symposium Sponsors!*

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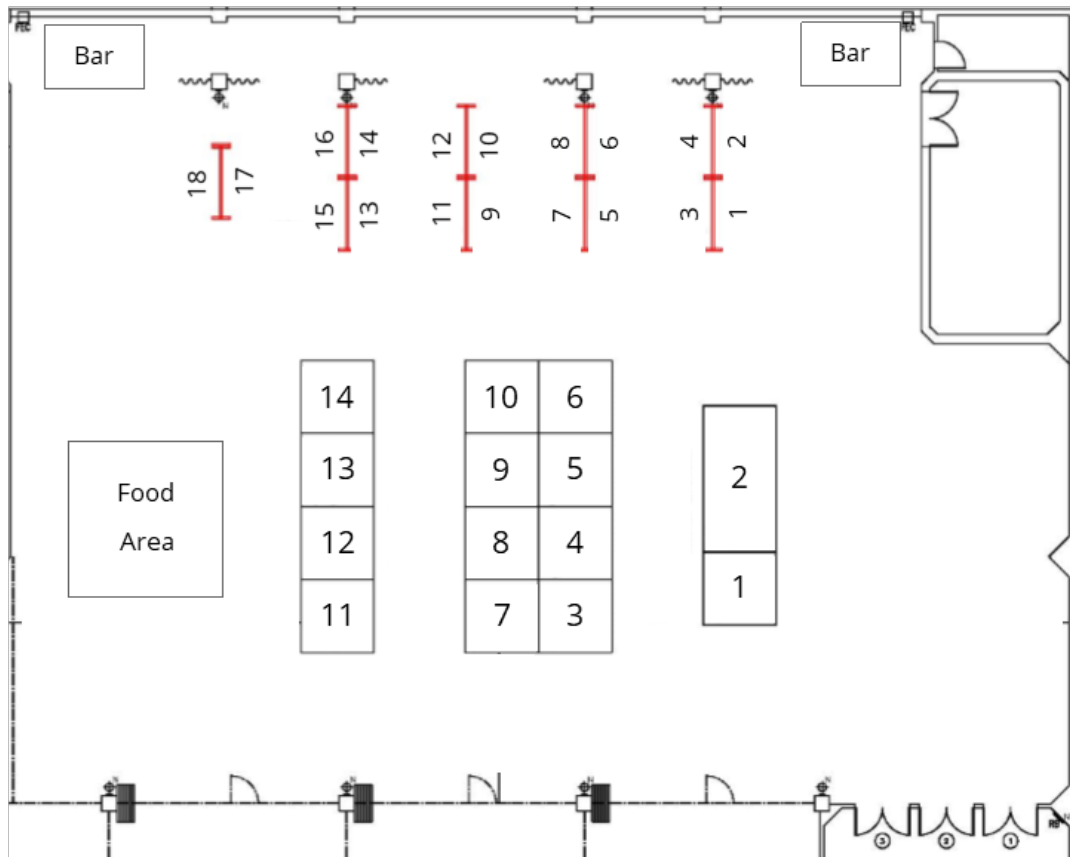


## FUNDING SUPPORT



*Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the US Department of Agriculture.*

## Exhibit Hall



Booth #	Exhibitor
1	Agricultural Drainage Management Coalition
2	Agri Drain Corporation/Ecosystem Services Exchange
3	Advanced Drainage Systems, Inc.
4	Iowa Nutrient Research Center
5	Iowa Agricultural Mitigation
6	Bolton & Menk
7	ISG
8	Xylem, Inc.
9	Data Harbor
10	Carriff Corporation Inc.
11	USDA-ARS
12	Soil and Water Conservation Society
13	The Ohio State University
14	Prinsco

# Poster Presentations

## Climate Resilience and Drainage

1. Quantifying the Relationship between Tile Drainage and Carbon Storage in Grass Seed Cropping Systems

## Drainage System Design, Installation, and/or Performance

2. Impact of Tile Drain Depth and Spacing on Nutrient Losses and Crop Production
3. Investigating the Suitability of Geotextile Envelopes as an Alternative to Stone Aggregate in Clay Textured Soils in Ireland

## Drainage Tools and Modeling

4. Mapping Depth-Specific Soil Water Content via Electromagnetic Induction Method
5. Optimum N-Rates for Corn in Iowa and Illinois over the Last Two Decades

## Edge-Of-Field and Other Conservation Drainage Practices for Water Quality

6. Comparison of Nitrogen Export Before and After Implementing a Constructed Wetland at the Catchment Outlet
7. Quantifying the Effectiveness of a Saturated Buffer to Reduce Tile NO<sub>3</sub>-N Concentrations in Eastern Iowa
8. The Internet of Bioreactors: Real-Time Nitrate Sensors at Denitrifying Bioreactors
9. Vegetated Agricultural Drainage Ditches (Vadds) for Agricultural Runoff Mitigation: Two Decades of USDA-ARS Research

## Water Quality and Drainage

10. Antibiotic Resistance in Agricultural Drainage: Five Years of Monitoring
11. Assessment of Phosphorus Loads from Tile Drainage in the Jewett Brook Watershed of St. Albans Bay, Vermont
12. Examining the Effects of Controlled Drainage on Nutrient Load in the Western Lake Erie Basin
13. Impacts of Controlled Drainage on Hydrology and Water Quality across Varying Tile Drain Depths and Spacings
14. Land Management for Improved Yields, Environmental Resilience, and Sustainability
15. Nitrate Leaching and Nitrous Oxide and Ammonia Emissions in Southwestern Minnesota Corn Fields during a Drought
16. Reducing Phosphorus Export through Farmed Pothole Surface Inlets with Phosphorus Filters and Blind Inlets
17. Seepage-Corrected Nitrogen Loss Reduction Assessment for the Practice of Controlled Drainage in Illinois
18. Water Storage, Mixing, and Fluxes in Tile-Drained Agricultural Fields Inferred from Stable Water Isotopes

### IMPROVE WATER QUALITY

Increase Yields | Conserve Water | Reduce Nutrient Loss

Agri Drain has teamed with Ecosystem Services Exchange to offer planning, design, management, and products for conservation practices such as:

- ✓ Drainage Water Management
- ✓ Woodchip Bioreactors
- ✓ Sub-Irrigation
- ✓ Saturated Buffers



**Sample Conservation Activity**  
USDA financial assistance may be available.

**Automated Water Level Control Structure and Components**

US Patent No. 6,715,508 B2  
US Patent No. 6,786,234 B2  
Canadian Patent No. 2,403,456  
Canadian Patent No. 2,466,976

Call ESE for technical assistance & FREE site review (A \$396 VALUE)!  
Then, call Agri Drain for the products you need to get the job done!



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**Agri Drain**  
CORPORATION

Lisa Newby | newby@agridrain.com  
Ph: 800-232-4742 | www.agridrain.com

# Tuesday, August 30

## SCHEDULE AND EVENTS

### SCHEDULE

<b>7:00 AM – 5:00 PM</b> <i>Foyer on the 3rd Floor</i>	Registration and Health Screening Desks Open
<b>8:00 AM – 5:00 PM</b> <i>Dubuque on the 3rd Floor</i>	*DRAINMOD 7.0 Workshop: Modeling Hydrology, Crop Yield, Nitrogen and Phosphorus Dynamics in Drained Lands
<b>5:00 PM – 7:00 PM</b> <i>Des Moines Exhibit Hall on the 3rd Floor</i>	Welcome Reception

*\*Not included in standard registrations. Additional cost and ticket(s) required to attend.*

### EVENTS

#### **DRAINMOD 7.0 Workshop: Modeling Hydrology, Crop Yield, Nitrogen and Phosphorus Dynamics in Drained Lands**

**8:00 AM – 5:00 PM, Dubuque on the 3rd Floor**

Instructors: Dr. R. Wayne Skaggs, NC State University; Dr. Mohamed Youssef, NC State University; Dr. Brian Phillips, Phillips Research and Consulting, LLC; Dr. Manal Askar, USDA-Agricultural Research Service

This workshop will feature the new version of DRAINMOD (v. 7), which has an enhanced user interface and adds phosphorus modeling. In the workshop, participants will practice using the model to simulate the effect of drainage system design and management on field hydrology and losses of nitrogen and phosphorus from drained fields to downstream receiving surface water. Topics, including model parameterization, calibration, and use, will also be discussed.

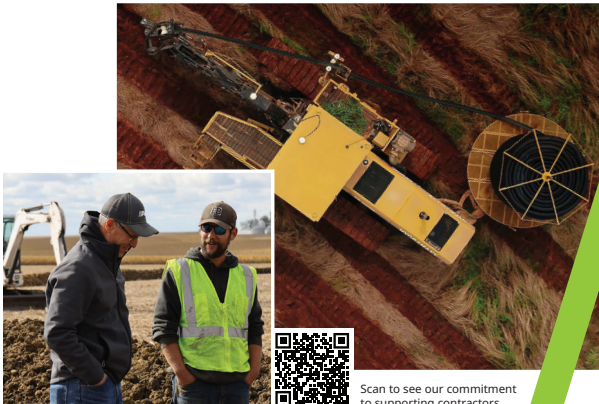
*A ticket for this event was required to be purchased online in advance.*

#### **Welcome Reception**

**5:00 PM – 7:00 PM, Des Moines Exhibit Hall on the 3rd Floor**

This reception offers a prime opportunity to visit with exhibitors showcasing their newest technology, programs, products, and services. Attendees will have the opportunity to view posters and hear from the authors. This is also a great time to connect with potential business associates and reconnect with colleagues. A selection of appetizers will be served, along with a cash bar.

*This event is included with full symposium registration. Additional tickets may be purchased online in advance for guests or at the registration table if available.*



## We keep business flowing.

With historically high prices for corn and soybeans, there has never been a better time to reinvest in land. Together with drainage contractors across the United States, ADS products and solutions help farmers improve yields, increase farmable acres and create sustainable water management solutions to ensure the long-term success of their operation.

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# Wednesday, August 31

## SCHEDULE AND EVENTS

### SCHEDULE

<b>7:30 AM – 5:00 PM</b> <i>Foyer on the 3rd Floor</i>	Registration and Health Screening Desks Open
<b>7:30 AM – 8:30 AM</b> <i>Des Moines Exhibit Hall on the 3rd Floor</i>	Morning Coffee and Light Breakfast: Exhibit Hall and Poster Presentations Open
<b>8:30 AM – 10:00 AM</b> <i>Iowa Ballroom on the 2nd Floor</i>	Opening General Session and Panel Discussion
<b>10:00 AM – 10:30 AM</b> <i>Des Moines Exhibit Hall on the 3rd Floor</i>	Morning Break: Exhibit Hall and Poster Presentations Open
<b>10:30 AM – 12:00 PM</b> <i>See pages 14-15</i>	Concurrent Sessions
<b>12:00 PM – 1:30 PM</b> <i>Iowa Ballroom on the 2nd Floor</i>	Luncheon and Speaker
<b>1:30 PM – 3:00 PM</b> <i>See pages 14-15</i>	Concurrent Sessions
<b>3:00 PM – 3:30 PM</b> <i>Des Moines Exhibit Hall on the 3rd Floor</i>	Afternoon Break: Exhibit Hall and Poster Presentations Open
<b>3:30 PM – 5:00 PM</b> <i>See pages 14-15</i>	Concurrent Sessions
<b>5:00 PM – 6:00 PM</b> <i>Windows on 7th on the Lobby Level</i>	Early Career Mixer
<b>6:00 PM – 8:00 PM</b> <i>Iowa Ballroom on the 2nd Floor</i>	*Drainage Hall of Fame Awards Banquet

*\*Not included in standard registrations. Additional cost and ticket(s) required to attend.*

### EVENTS

#### Opening General Session and Panel Discussion

**8:30 AM – 10:00 AM, Iowa Ballroom on the 2nd Floor**

This year's symposium will be opened by Chris Hay, symposium co-chair, Iowa Soybean Association. This year's keynote panel will discuss advancing drainage to meet a changing climate and will include Richard Cooke, University of Illinois; Dennis Today, USDA Midwest Climate Hub; Chuck Brandel, ISG; and Melisa Luymes, Land Improvement Contractors of Ontario.



**Richard Cooke** is a professor in the Department of Agricultural and Biological Engineering at the University of Illinois. He has broad research experiences in subsurface drainage design including increasing the efficiency of drainage-related best management practices and

developing protocols for their design.



**Dennis Today** is the director for the USDA Midwest Climate Hub, outreach/research on Midwest/Plains ag-climate issues across time scales from seasonal to future climates. He is the former state climatologist for South Dakota.

Dennis' background is in ag climatology/meteorology.



**Chuck Brandel** is a vice president with ISG. Chuck's significant experience in watershed management is widely recognized, making him a frequently requested authority and designer on projects throughout the region. He understands the value of bringing

landowning partners into the conversation early and often to build trust and consensus. Drawing from their knowledge, he works to identify solutions that address the ecological challenges facing water resources while growing our region's most integral agricultural industry.





**Melisa Luymes** is the executive director of the Land Improvement Contractors of Ontario (LICO) and has coordinated the partners of the Huronview drainage project since 2018. As a freelancer, communicator, and project manager, Melisa works to improve the environmental outcomes and social license of agriculture and drainage.

### Luncheon and Speaker

**12:00 PM – 1:30 PM, Iowa Ballroom on the 2nd Floor**

The Wednesday luncheon speaker is Rob Burtonshaw with Farm Services Ltd., who will be discussing experiences and observations on drainage design and implementation around the world.



**Rob Burtonshaw** is director of Farm Services Ltd., land drainage contractors based in Warwickshire, England. He is the third generation of his family to manage the company, which operates both drainage plows and chain trenchers thought the United Kingdom.

In 2012, Rob was awarded a Nuffield Scholarship providing a truly unique opportunity to study land drainage across the globe; his study title was “Land drainage and its role in farming’s future.” During his 18-month scholarship, Rob visited some of the best drainage professionals in the world, both fellow contractors and academics, to gain an unmatched wealth of experience.

Since completing his Nuffield studies, Rob has promoted land drainage, giving hundreds of talks to farming groups and others, appearing in the press, and collaborating with numerous organizations, including government, trade bodies, and private companies, to advance land drainage and good drainage practice.

*This event is included with full symposium registration. Additional tickets may be purchased online in advance for guests or at the registration table if available.*

### Early Career Mixer

**5:00 PM – 6:00 PM, Windows on 7th on the Lobby Level**

The Early Career Mixer is a time for professionals early in their careers to mix and mingle with each other as well as with those “more seasoned” within our field. We hope you are able to join us! The Early Career Mixer is graciously sponsored by ISG.



*This event is included with full symposium registration, although registration in advance is recommended.*

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## Drainage Hall of Fame Awards Banquet

**6:00 PM – 8:00 PM**, Iowa Ballroom on the 2nd Floor

The “Drainage Hall of Fame” is the most prestigious award in the agricultural drainage profession and is given to an outstanding person who has made significant contributions to the development and use of drainage in agricultural production through their career-long work. These are individuals who have provided extensive service to the science, art, engineering, and/or practice of agricultural drainage and water management through teaching, extension education, research, technology development, consulting, contractor training, or leadership in

the agricultural drainage industry. Join the awards banquet to participate and celebrate the induction of the 2021–2022 nominees into the Drainage Hall of Fame. For full details on the International Drainage Hall of Fame, visit <https://u.osu.edu/hshw/drainage/drainage-hall-of-fame/>.



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*A ticket for this event is required. Tickets may be purchased online in advance or at the registration table if available.*

**CFAES**

# International Program for Water Management in Agriculture

**at The Ohio State University**

**Home of the International Drainage Hall of Fame**  
*2021 – 2022 induction ceremony to be held on Wednesday, August 31 in conjunction with the International Drainage Symposium*



Learn more: [u.osu.edu/hshw](https://u.osu.edu/hshw)



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AND ENVIRONMENTAL SCIENCES

**FABE**

DEPARTMENT of  
**FOOD, AGRICULTURAL and  
BIOLOGICAL ENGINEERING**

## Wednesday, August 31, 2022

Wednesday, August 31, 2022					
7:30 AM - 5:00 PM	Registration and Health Screening Desks Open				3rd Floor Foyer
7:30 AM - 8:30 AM	Morning Coffee and Light Breakfast: Exhibit Hall and Poster Presentations Open				3rd Floor Des Moines Exhibit Hall
8:30 AM - 10:00 AM	Opening General Session and Panel Discussion - Richard Cooke, University of Illinois; Dennis Today, USDA Midwest Climate Hub; Chuck Brandel, ISG; Melisa Luymes, Land Improvement Contractors of Ontario				2nd Floor Iowa Ballroom
10:00 AM - 10:30 AM	Morning Break: Exhibit Hall and Poster Presentations Open				3rd Floor Des Moines Exhibit Hall
10:30 AM - 12:00 PM	Concurrent Sessions				
3rd Floor Cedar Rapids Management of Drainage Systems	10:30 AM	10:53 AM	11:16 AM	11:39 AM	
	History of Subsurface Drainage Systems and Drainage Research in Iowa - Rameshwar Kanwar, Iowa State University	Supporting Drainage Authorities and Maintaining Drainage Systems by Applying Multi-Disciplinary Resources - Ivan Droessler and Spencer Pech, ISG	Water Dynamics of Managed and Unmanaged Agricultural Drainage Ditches in a Cold Climate - Jeff Strock, University of Minnesota	Design and Construction of a Large Drainage Ditch Pumping Station - Jacob Rischmiller, ISG	
3rd Floor Council Bluffs Water Quality and Drainage - Saturated Buffers and Hybrid Projects	Assessing the Design Criteria of Saturated Buffers - Yousef AbdalAal, Michigan State University	Performance of Saturated Riparian Buffers in Iowa Across Eighteen Site-Years - Gabriel Johnson, Iowa State University	Integrating Drainage Improvements and Wetland Restoration in Iowa: Environmental Impacts of Improved Drainage and Targeted Wetland Restoration - William G. Crumpton, Iowa State University	Hybrid Drainage Practices to Improve Water Quality - Spencer Pech and Bethany Brittenham, ISG	
	Achieving Multipurpose Water Management Goals by Balancing Tried and True Practices with New Techniques - Mark Origer, ISG	Incorporating a Hybrid Drainage and Wetland Design Project System into Engineering Teaching - Xinhua Jia, North Dakota State University	The Impact of Drainage Water Recycling on Reduction of Nitrogen, Phosphorous, and Sediment Losses from a Drained Agricultural Field in Eastern North Carolina - Hossam Moursi, North Carolina State University	Learning Curve: Collaboration on Drainage Innovation at Huronview Demo Farm, Clinton Ontario - Melisa Luymes, Land Improvement Contractors of Ontario	
3rd Floor Davenport Edge-of-Field and Other Conservation Drainage Practices for Water Quality - Innovation	Design and Construction of Corrugated HDPE and PP Pipe Agricultural Mains with Shaped Trench Bottoms - Joseph A. Babcanec, Advanced Drainage Systems	Choice of Pipe Material Affects Drainage System Performance and Cost - Ehsan Ghane, Michigan State University	DRAINMOD Simulations in a Field with Asymmetrical Drainage System - Shiv Prashee, McGill University	Shallow Drainage Furrow and Tile Water Management System Effects on Soil Water Conditions and Crop Yield in Eastern North Carolina - Mitchell Watkins, North Carolina State University	
3rd Floor Dubuque Drainage System Design, Installation, and/or Performance - Pipe Materials and Installation	Luncheon and Speaker - Rob Burtonshaw, Farm Services, Ltd.			2nd Floor Iowa Ballroom	



Concurrent Sessions				
1:30 PM - 3:00 PM	1:30 PM	1:53 PM	2:16 PM	2:39 PM
3rd Floor Cedar Rapids Drainage Policy and Administration	C.G. Elliott and the Rise of Specialized Drainage Knowledge in the Federal Government, 1902-1914 - Anthony Carlson, School of Advanced Military Studies	The History of Lake Drainage in Iowa - Joe Otto, Soil and Water Conservation Society	From Practice to Policy: Advancing Edge of Field Conservation Practices - Clare Lindahl, Soil and Water Conservation Society	Streamlining the Flood of Paperwork after a Flood - Drainage Repairs in Redwood County, Minnesota - Tom Berry, Stantec
3rd Floor Council Bluffs Edge-of-Field and Other Conservation Drainage Practices for Water Quality - Bioreactor Woodchips	Can Woodchip Bioreactors Exceed Water Quality Goals by Denitrifier Enhancement or Carbon Dosing? - Gary Feyereisen, USDA ARS	The Effect of Three Types of Amendments on Nutrient Removal from Tile Drainage Water Using Denitrifying Woodchip Bioreactors - Anydas Povilaitis, Vytautas Magnus University	Particle Characterization of a Failed Denitrifying Woodchip Bioreactor - Shelby Duncan and John McMaine, South Dakota State University	Digging in to Denitrifying Bioreactor in Situ Bulk Density - Laura Christianson, University of Illinois
3rd Floor Davenport Drainage Tools and Modeling - Phosphorus Models	Predicting Hydrology and Phosphorus Transport from a Subsurface Drained Field Using RZWQM2-P - Md Sami Bin Shokrana, Michigan State University	Modeling Phosphorus Losses from Tile-Drained Cropland Using RZWQM2-Phosphorus - Zhiming Qi, McGill University	An Introduction to P-Trap Software for Designing and Evaluating Phosphorus Removal Structures - Chad Penn, USDA ARS	Accuracy of WaSim and DRAINMOD Models for Subsurface Drainage Design and Analysis in a Data-Scarce Environment - Tafadzwa Mabhaudhi, University of KwaZulu-Natal and International Water Management Institute
3rd Floor Dubuque Drainage Data Acquisition and Management	Putting GIS to Work for You: The Three-Fold Benefit of Drainage Data Acquisition and Management - Chuck Brandel, ISG	Prioritizing Maintenance Work in Agricultural Drainage Ditches: A Procedure - Daniel Bernardo Aviles Ribera, San Simon University	Evaluating Sampling Strategies and Phosphorus Transport Dynamics Using High-Frequency Monitoring of Drainage Discharge - Babak Dialameh, Michigan State University	Global Significance of Filling Materials for Nitrate Removal in Denitrifying Bioreactors Revealed by Meta-Analysis - Yuchuan Fan, University of Florida
3:00 PM - 3:30 PM	Afternoon Break: Exhibit Hall and Poster Presentations Open			
3:30 PM - 5:00 PM	Concurrent Sessions			
3rd Floor Cedar Rapids Drainage Tools and Modeling - Decision Tools	3:30 PM Drainage Design Tools: Creating Topologically-Sound Subsurface Drainage Networks - Falasy Anamalechi, University of Illinois at Urbana-Champaign	3:53 PM Designing Better Drainage Systems Through Advanced Technologies - Jacob Rischmiller, ISG	4:16 PM Nutrient Tracking Tool (NTT): Evaluation of Conservation Practices of Tile Drainage Systems - Ali Saleh, Tarleton State University	4:39 PM A Decision-Support Tool to Quantify the Nitrate Load Reduction of Shallow Drains in Subsurface Drainage Design - Ehsan Ghane, Michigan State University
3rd Floor Council Bluffs Edge-of-Field and Other Conservation Drainage Practices for Water Quality - Bioreactor Modifications	Denitrification Bioreactors as a Structural Water Quality Measure at Catchment Scale: Performance and Lessons Learned - Gary Feyereisen, USDA ARS	The Magic of Bioreactors Arrives in Spain for Denitrification of Saline Drainage under Semi-Arid Conditions - Carolina Diaz-Garcia, University of Illinois	Modification and Monitoring of a Dual-Chamber Denitrification Bioreactor with a Surface Water Pumping System - Lindsey Hartfield, Iowa State University	Long-Term Nitrate Removal Performance of Four Denitrifying Woodchip Bioreactors in Eastern South Dakota - John McMaine, South Dakota State University
3rd Floor Davenport Water Quality and Drainage - Nutrient Transport	Source and Transport Controls on Nutrient Delivery to Tile Drains - Mark Williams, USDA ARS	Phosphorus Desorption Kinetics under Flowing Conditions: How Physical and Chemical Processes Interact to Control Concentrations and Load - Chad Penn, USDA ARS	Source Contributions to Subsurface Drain Dissolved Phosphorus Losses in Ohio - Will Osterholz, USDA ARS	Effects of Re-Drainage on Nutrient Leaching and Crop Yield - Ingrid Weststrom and Abraham Joel, Swedish University of Agricultural Sciences
5:00 PM - 6:00 PM	Early Career Mixer			
6:00 PM - 8:00 PM	Drainage Hall of Fame Awards Banquet (Ticket Required, Additional Fees Apply)			
				Lobby Level Windows on 7th
				2nd Floor Iowa Ballroom

# Thursday, September 1

## SCHEDULE AND EVENTS

### SCHEDULE

<b>8:00 AM – 5:00 PM</b> <i>Foyer on the 3rd Floor</i>	Registration and Health Screening Desks Open
<b>8:00 AM – 8:30 AM</b> <i>Foyer on the 3rd Floor</i>	Morning Coffee and Light Breakfast
<b>8:30 AM – 10:00 AM</b> <i>See pages 17-18</i>	Concurrent Sessions
<b>10:00 AM – 10:30 AM</b> <i>Des Moines Exhibit Hall on the 3rd Floor</i>	Morning Break: Exhibit Hall and Poster Presentations Open
<b>10:30 AM – 12:00 PM</b> <i>See pages 17-18</i>	Concurrent Sessions
<b>12:00 PM – 1:30 PM</b> <i>Iowa Ballroom on the 2nd Floor</i>	Luncheon and Speaker
<b>1:30 PM – 3:00 PM</b> <i>See pages 17-18</i>	Concurrent Sessions
<b>3:00 PM – 3:30 PM</b> <i>Des Moines Exhibit Hall on the 3rd Floor</i>	Afternoon Break: Exhibit Hall and Poster Presentations Open
<b>3:30 PM – 5:00 PM</b> <i>Iowa Ballroom on the 2nd Floor</i>	Closing General Session

Denmark developing novel agricultural drainage filter technologies for nitrogen loss reduction.

Prior to this, Charlotte worked three years as a chief scientist at SEGES Innovation with innovation and implementation of drainage filter/edge-of-field technologies, and 15 years as a senior scientist at Aarhus University (former Danish Institute of Agricultural Research) with research focused on nutrient (nitrogen, phosphorus) losses and targeted mitigation strategies at both field and catchment scale. She was responsible for initiating Danish research on drainage filter/edge-of-field technologies. Further as expert advisor for the Danish Ministry, Charlotte was responsible for developing the national strategy for approval and implementation of drainage filter/edge-of-field practices. This included developing tools to determine where to implement which practices, and site-specific evaluation of mitigation measure efficiency.

*This event is included with full symposium registration. Additional tickets may be purchased online in advance for guests or at the registration table if available.*

### Closing General Session

**3:30 PM – 5:00 PM**, Iowa Ballroom on the 2nd Floor

This year's symposium will close with Chandra Madramootoo with McGill University sharing his perspectives on the advancement of international drainage development.



**Chandra Madramootoo** is a Distinguished James McGill Professor of Bioresource Engineering at McGill University. His research and teaching are in the areas of drainage, water table management, and environmental considerations in drainage water quality. Chandra is a fellow of

ASABE and the Canadian Academy of Engineering. He is a member of the Overholt Drainage Hall of Fame, and recipient of the World Irrigation and Drainage Prize of the International Commission on Irrigation and Drainage.

### EVENTS

#### Luncheon and Speaker

**12:00 PM – 1:30 PM**, Iowa Ballroom on the 2nd Floor

The Thursday luncheon speaker is Charlotte Kjaergaard with NovaDraiN ApS, who will be discussing experiences, results, and future perspectives on drainage filter solutions in the context of Denmark's national strategy.



**Charlotte Kjaergaard** is the chief scientist of environmental engineering at NovaDraiN (since January of 2021). NovaDraiN ApS is a private startup company in



## Thursday, September 1, 2022

8:00 AM - 5:00 PM	Registration and Health Screening Desks Open				3rd Floor Foyer
8:00 AM - 8:30 AM	Morning Coffee and Light Breakfast				3rd Floor Foyer
8:30 AM - 10:00 AM	Concurrent Sessions				
		8:30 AM	8:53 AM	9:16 AM	9:39 AM
<b>3rd Floor Cedar Rapids</b> Modeling and Measuring the Water Balance	Simulating Historical Changes of Water Table Depth in the US Corn Belt - <i>Sotirios Archontoulis, Iowa State University</i>	Impacts of Subsurface Drainage on Water Yield and Opportunities for Controlled Drainage in Eastern South Dakota - <i>John McMaine, South Dakota State University</i>	Investigation of the Contribution of Snowmelt to Subsurface Drainage and Surface Runoff in a Quebec Cropland - <i>Ziwei Li and Zhiming Qi, McGill University</i>	Development of a New Macropore Flow Model for DRAINMOD - <i>Shiv Prasher, McGill University</i>	
<b>3rd Floor Council Bluffs</b> Site Specific - Edge-of-Field and Other Conservation Drainage Practices for Water Quality - Controlled Damage	Reduction of Nitrate Leaching and Threats to Surface Water under Conservation Tillage in an Edge of Field Monitoring at the Micro-Catchment Scales - <i>Zouheir Massri, Michigan State University</i>	Impact of Controlled Drainage on Crop Yield Including Within-Field Variability - <i>Jane Frankenberger, Purdue University</i>	Drainage Water Management in Ohio – Lessons Learned and Future Direction - <i>Vinayak Shedeekar, The Ohio State University</i>	Agricultural Water Management with Controlled Drainage and Subirrigation: Results from a Nordic Field in Level Terrain - <i>Minna Mäkelä, Finnish Field Drainage Association</i>	
<b>3rd Floor Davenport</b> Soils - Barriers to Edge-of-Field and Other Conservation Drainage Practice Implementation	Threading the Needle: Getting Conservation Practices in Place - <i>Bethany Brittenham, ISG</i>	Implementation of Edge-of-Field Practices in the Southfork Watershed in Central Iowa: Perspectives from a Farmer - <i>Jacob Bolson, Beaver Creek Food &amp; Fibre</i>	Batch and Build: A Case Study in Alternative Practice Delivery to Address Barriers and Increase Adoption - <i>Keegan Kuit, Agricultural Drainage Management Coalition</i>	Expanding Opportunities for Targeted Water Quality Wetlands in Iowa - <i>Matt Lechtenberg and Shane Wulff, Iowa Department of Agriculture and Land Stewardship</i>	
<b>3rd Floor Dubuque</b> Watersheds - Edge-of-Field and Other Conservation Drainage Practices for Water Quality	Assessment of Stacked Conservation Practices on Edge-of-Field Subsurface Nitrogen and Phosphorus Loss at a Field in Ohio - <i>Manal Askar, USDA ARS</i>	Eating the Metaphorical Elephant: Meeting Nitrogen Reduction Goals in Upper Mississippi River Basin States - <i>Christopher Hay, Iowa Soybean Association</i>	Water Quality Monitoring for Targeted Implementation of Water and Nutrient Retention Measures in Latvia: An Example of the LIFE GOODWATER IP Project - <i>Ainis Logzdins, Latvia University of Life Sciences and Technologies</i>	Building Trust While Understanding Complexity: Process Models for Edge-of-Field Practices - <i>Catherine DeLong, Iowa State University Extension and Outreach</i>	
10:00 AM - 10:30 AM	Morning Break: Exhibit Hall and Poster Presentations Open				3rd Floor Des Moines Exhibit Hall

Concurrent Sessions				
10:30 AM - 12:00 PM	10:30 AM	10:53 AM	11:16 AM	11:39 AM
<b>3rd Floor Cedar Rapids</b> Climate Resilience and Drainage	Climate Change, Agricultural Drainage and Water Storage in Minnesota - <i>Joe Wagner, University of Minnesota</i>	The Frontier of Drainage Water Recycling - <i>Christopher Hay, Iowa Soybean Association</i>	The Effect of Drainage Water Recycling on Corn and Soybean Yields and Water Conservation for a Drained Field in Eastern North Carolina - <i>Hossain Mousi, North Carolina State University</i>	
<b>3rd Floor Council Bluffs</b> Site Specific - Edge-of-Field and Other Conservation Drainage Practices for Water Quality - Ditches	Effect of Vegetative Filter Strips on Sediment Deposition in Drainage Ditches in Littoral Zone of Lake Sainte-Pierre in Quebec, Canada - <i>Zhiming Qi, McGill University</i>	Seasonal and Annual Nutrient Removal from Agricultural Drainage Ditches Using Low-Grade Weirs - <i>Andry Z Ranivosoa, University of Minnesota</i>	Oxbows and Drainageways as New Tile Drainage Edge-of-Field Practice Opportunities - <i>Keith Schilling, Iowa Geological Survey and Matthew Sreeter, University of Iowa</i>	Seepage Considerations in Drainage Canal Design for Groundwater Quality - <i>R Coleb Bruhn, University of Illinois Urbana-Champaign</i>
<b>3rd Floor Davenport</b> Soils - Water Quality and Drainage - Soil Interaction	Consistent Fertilizer Application Increased Corn Yields Without Change in Nitrate Export - <i>Chelsea Clifford, Iowa State University</i>	Improving Ecological Simulations by Incorporating Accurate Tile Drainage and Fertilizer Application Rate Data: A Case Study of Central Iowa - <i>Tassia Brighenti and Philip Gossman, Iowa State University</i>	Characterization and Identification of Microbial Communities in Agricultural Drainage Ditches - <i>Hao Wang, University of Minnesota</i>	
<b>3rd Floor Dubuque</b> Water Quality and Drainage	Management of Drainage Water in the Holland Marsh of Ontario for Environmental and Agronomic Benefits - <i>Chandra Madramootoo, McGill University</i>	Coordinated Site Network for Studying the Impacts of 4R Nutrient Management on Crop Production and Nutrient Loss - <i>Matt Helmers, Iowa State University</i>	The Long-Term Results of the Agricultural Runoff Monitoring Programme in Latvia - <i>Ainis Lagzdins, Latvia University of Life Sciences and Technologies</i>	
<b>12:00 PM - 1:30 PM</b>	<b>Luncheon and Speaker</b> - <i>Charlotte Kjaergaard, NovaDrain ApS</i>			
<b>2nd Floor Iowa Ballroom</b>				

Concurrent Sessions				
1:30 PM - 3:00 PM	1:30 PM	1:53 PM	2:16 PM	2:39 PM
<b>3rd Floor Cedar Rapids</b> Site Specific - Edge-of-Field and Other Conservation Drainage Practices for Water Quality - Field Scale	Soil Health and Drainage Water and Nutrient Losses - <i>Vinayak Shedekar, The Ohio State University</i>	Do Newly Drained Fields Need Revised Fertility Recommendations? - <i>Lindsay Pease, University of Minnesota</i>	Long-Term Benefits of Controlled Drainage - <i>Chandra Madramootoo, McGill University</i>	There is No Such Thing as a Quick Fix: Travel Times to Subsurface Drains - <i>Eileen Kladyko, Purdue University</i>
<b>3rd Floor Council Bluffs</b> Soils - Drainage Tools and Modeling - Water Quality	Modeling Drained Pothole Ponding Durations with SPAW Software - <i>Donald D Eter, Bolton &amp; Menk, Inc.</i>	XP-SWMM and ICM Modeling: Leveraging Support for Water Quality Projects - <i>Bailey Griffin, ISG</i>	Assessment of the Macropore Component of RZWQM2 in Simulating Hourly Subsurface Drainage and Peaks - <i>Zhiming Qi, McGill University</i>	Performance of Endrain in Modeling Agricultural Subsurface Drainage Systems in KwaZulu-Natal, South Africa - <i>Aidan Senzanje, University of KwaZulu-Natal</i>
<b>3rd Floor Davenport</b> Revisiting Drainage Ditch Systems - Challenges and Emerging Solutions for Managing Water Volume and Protecting Water Quality	History, Science and Benefits of Two-Stage and Self-Forming Ditches - <i>Jonathan Witter, Ohio State University Agricultural Technical Institute</i>	Implementing and Maintaining Two-Stage Ditches, A County Engineer's Perspective - <i>Mike Priewski, County Engineer Lucas County, Ohio</i>	Promoting Adoption of Ditch Conservation Practices: Lessons Learned from Outreach Efforts and H2Ohio State Funding in Ohio - <i>Jessica D'Ambrosio, The Nature Conservancy</i>	Panel Discussion on Revisiting Drainage Ditch Systems with Session Speakers
<b>3:00 PM - 3:30 PM</b>	<b>Afternoon Break: Exhibit Hall and Poster Presentations Open</b>			
<b>3:30 PM - 5:00 PM</b>	<b>Closing General Session</b> - <i>Chandra Madramootoo, McGill University</i>			
	<b>3rd Floor Des Moines Exhibit Hall</b>			
	<b>2nd Floor Iowa Ballroom</b>			

## Friday, September 2

### SCHEDULE AND EVENTS

#### SCHEDULE

<b>7:00 AM – 8:00 AM</b> <i>Foyer on the 3rd Floor</i>	Registration and Health Screening Desks Open
<b>8:00 AM – 4:00 PM</b> <i>Meet in the Hotel Lobby</i>	*Tour 1: Field to Stream: Researching Conservation Drainage Performance
<b>8:00 AM – 4:00 PM</b> <i>Meet in the Hotel Lobby</i>	*Tour 2: Farm to City: Scaling Up Implementation of Nutrient Reduction Practices (Full-Day Tour)
<b>8:00 AM – 12:00 PM</b> <i>Meet in the Hotel Lobby</i>	*Tour 3: Farm to City: Scaling Up Implementation of Nutrient Reduction Practices (Half-Day Tour)

*\*Not included in standard registrations. Additional cost and ticket(s) required to attend.*

#### EVENTS

##### Field Tours

All participants of tours should meet at the hotel lobby at least 20 minutes prior to the departure times listed.

Tours will leave on time. Roll call will be taken prior to departure, and IDS staff and volunteers will make every effort to ensure all participants are on the bus. However, due to transportation scheduling, buses will not be held for those arriving late, and refunds will not be issued for missing the bus.

##### Tour 1: Field to Stream: Researching Conservation Drainage Performance

###### 8:00 AM – 4:00 PM

This tour will head north from Des Moines to the outskirts of the City of Ames. Ames is the home of Iowa's land grant university, Iowa State University. On this tour, attendees will hear from researchers about buffers, wetlands, and drainage water recycling projects in the central Iowa district. Lead investigators will share research progress, challenges, and questions.

The morning part of the tour will take place south of Ames at Uthe Farm. As part of Iowa State University, the farm is intended to be an educational resource for students and the community. There will be three stops. The first stop will be at the "Comparison of Biofuel Cropping Systems (COBS)" long-term research plots. Established in 2008, this project seeks to identify and develop cropping systems that produce large quantities of biofuel feedstocks while protecting soil and water resources and increasing biodiversity on the Iowa landscape. From here, there will be a short drive to the second and third stops, where attendees will hear about two edge-of-field drainage research projects: restored oxbows and bioreactors.

Concluding the morning session, the tour will head into Ames for lunch at Reiman Gardens. Reiman Gardens is a 17 acre (6.9 hectare) university-owned public garden that consists of a dozen distinct garden areas, an indoor conservatory, and an indoor butterfly "wing."



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The afternoon part of the tour will take place north of Ames and will have three stops. During this session, attendees will learn about wetlands, drainage recycling, and saturated buffers.

View the Tour 1 agenda at [www.swcs.org/22IDSTours](http://www.swcs.org/22IDSTours).

## **Tour 2: Farm to City: Scaling Up Implementation of Nutrient Reduction Practices (Full-Day Tour)**

**8:00 AM – 4:00 PM**

This tour will look at local challenges in Iowa of upstream nutrient loss from drained agricultural land and approaches to scale up the implementation of nutrient reduction practices. Attendees will hear from a variety of stakeholders working on practice implementation.

Des Moines Water Works (DMWW) is the state's largest drinking water provider serving over 600,000 customers in the Des Moines metro area and central Iowa. In 1991, DMWW completed one of the largest nitrate removal facilities (operating capacity of 10 million gallons per day) to remove nitrate from their Raccoon River and Des Moines River source waters. Attendees will tour the DMWW Fleur Drive Water Treatment Plant and learn about the utility's water quality challenges and efforts to improve upstream water quality.

Attendees will then travel to a farm in northern Polk County that has implemented several nutrient removal and other conservation practices. Practices at the site include no-till, cover crops, prairie strips, saturated riparian buffers, and a denitrifying bioreactor. The most recent of these practices were installed using a "batch and build" concept that greatly increased the pace of practice implementation within the project area. Attendees will be able to see the different practices, learn more about the project, and hear from the various stakeholders (landowner; contractor; technical assistance providers; and county, state, and federal government staff) that were instrumental in its success.

After the morning session, the tour will head into Ames for lunch at Reiman Gardens. Reiman Gardens is a 17 acre (6.9 hectare) university-owned public garden that consists of a dozen distinct garden areas, an indoor conservatory, and an indoor butterfly "wing."

The afternoon portion of the tour will explore market-based approaches to scaling up the implementation of practices to reduce both greenhouse gas emissions and nutrient losses. Attendees will hear from a city exploring using market-based approaches to achieve water quality outcomes, state regulators that provide the framework for this approach, and the Soil and Water Outcomes Fund that provides financial incentives to farmers for implementing practices that provide climate and water quality outcomes by selling those outcomes to public and private beneficiaries. Attendees will then visit a farm that participates in the Soil and Water Outcomes Fund and has adopted other water quality and climate adaptation practices.

View the Tour 2 agenda at [www.swcs.org/22IDSTours](http://www.swcs.org/22IDSTours).

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### Tour 3: Farm to City: Scaling Up Implementation of Nutrient Reduction Practices (Half-Day Tour)

**8:00 AM – 12:00 PM**

This tour will look at local challenges in Iowa of upstream nutrient loss from drained agricultural land and approaches to scale up the implementation of nutrient reduction practices. Attendees will hear from a variety of stakeholders working on practice implementation.

Des Moines Water Works (DMWW) is the state's largest drinking water provider serving over 600,000 customers in the Des Moines metro area and central Iowa. In 1991, DMWW completed one of the largest nitrate removal facilities (operating capacity of 10 million gallons per day) to remove nitrate from their Raccoon River and Des Moines River source waters. Attendees will tour the DMWW Fleur Drive Water Treatment Plant and learn about the utility's water quality challenges and efforts to improve upstream water quality.

Attendees will then travel to a farm in northern Polk County that has implemented several nutrient removal and other conservation practices. Practices at the site include no-till, cover crops, prairie strips, saturated riparian buffers, and a denitrifying bioreactor. The most recent of these practices were installed using a "batch and build" concept that greatly increased the pace of practice implementation within the project area. Attendees will be able to see the different practices, learn more about the project, and hear from the various stakeholders (landowner; contractor; technical assistance providers; and county, state, and federal government staff) that were instrumental in its success.

Attendees will return to the Marriott Des Moines Downtown for lunch on their own.

View the Tour 3 agenda at [www.swcs.org/22IDS Tours](http://www.swcs.org/22IDS Tours).



The Iowa Nutrient Research Center addresses the critical need for continued research and innovation to improve Iowa's water quality.

INRC has supported research in four areas: nutrient management, land management, edge-of-field, and multi-objective.

For more information, visit our website at [www.cals.iastate.edu/inrc/](http://www.cals.iastate.edu/inrc/)

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