NEXT WISE STEPS
FOR

ENGAGING PEOPLE

IN SOUTHEAST MINNESOTA
WATERSHED RESTORATION & PROTECTION

An assessment completed by NewGround for

Winona County & Minnesota Pollution Control Agency

September 2019

Contents

➤ Acknowledgements

Thank you to landowners, local government staff and elected officials, and agriculture and resource professionals who took time to share their experiences, expertise, perspectives, and projects for this study. Thank you to Winona County and especially Sheila Harmes, Winona County Water Planner, for project support. Kevin Kuehner, Pesticide and Fertilizer Management, Minnesota Department of Agriculture (MDA) and lead, Root River Field To Stream Partnership, also generously consulted during this project and identified openings for meaningful work.

Joel Johanningmeier, agriculture technology specialist, Winfield Solutions, and Paul Trcka, Certified Crop Adviser, CHS Rochester, drew on decades of work in agriculture and deep personal awareness of water issues in southeast Minnesota to advise on how to connect agriculture retail and conservation communities in the region.

Minnesota Crop Production Retail Association director Bill Bond opened the way for southeast Minnesota agriculture retailers to participate in a pilot project investigating MDA's Agriculture Water Quality Certification program software as a tool to support crop advisors in increasing nutrient efficiency on farms. The pilot connected people, revealed needs and opportunities, and led to statewide distribution of the story series featured in this report and resulting dialogue.

This project was funded by Clean Water Funds made possible by Minnesota's Clean Water, Land, and Legacy Act. The funds were administered by Winona County and Minnesota Pollution Control Agency. The report is solely the responsibility of the author and does not necessarily represent the views of Winona County or Minnesota Pollution Control Agency.

➤ Credits

Report prepared for Winona County and the Minnesota Pollution Control Agency
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September 2019
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➤ Introduction

In 2013, 2014 and 2015, while hosting meetings for the Mississippi River-Winona Watershed Restoration and Protection Strategies (WRAPS) process, I noticed agriculture retail partners were rarely, if ever, at the table. We knew large numbers of farmers worked primarily with retail crop advisors to make agronomic decisions, so I started asking, "Why aren't they involved in this process?"

This led to conversations with senior area crop advisors who understand southeast Minnesota's water dynamics, as well as ag retail suppliers who are closely tied to details of products and application, but typically not connected to conservation staff in the area or involved in water quality conversations.

I saw all swam in a sea of complexity—called upon by growers to help manage risk and economic return, called upon by employers to sell products that benefit crops but move in water invisibly, and asked by the public to ensure crop nutrients do not enter drinking water.

I shared what I saw with colleagues at Minnesota Pollution Control Agency, who recognized the need to build connection between sectors in the region and create a climate in which sharing diverse experiences, knowledge, and work is natural and normal. We asked questions like: How are citizens in this area invited to see water and supported in establishing habits to protect it? What do local leaders need to successfully invite and engage people? How do we cultivate the cultural shift needed to establish and sustain norms that protect water and people?

As a result, NewGround was asked to do three things:

1) *Interview southeast Minnesota citizens who are already thinking about agriculture, community choices, and water quality, to identify opportunities and needs;*
2) *Investigate public outreach, education, and engagement goals in watershed plans and the realities of implementing them in major watersheds of southeast Minnesota, to identify what is needed to reach targets;*
3) *Connect agriculture retail suppliers, crop advisors and conservation staff and resources in the area, to lay groundwork for more collaboration and shared work.*

This report documents what was learned from these tasks and recommends next wise steps to a new, more robust and collaborative phase of water protection in the region.

—Nancy North
Project Lead and Principal, NewGround, Inc.

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EXECUTIVE SUMMARY

In this three-part project, water restoration and protection thought leaders in southeast Minnesota were interviewed; outreach, education and engagement in 53 water plans in 11 major watersheds identified; people responsible to meet targets in those plans were interviewed; and connections were cultivated between southeast Minnesota agriculture retail and conservation staff and growers. The purpose: To identify outreach, education and engagement strategies that are working, and what is needed now to meet targets and support success.

Key Findings

- Minnesota's water management framework is forging a higher level of collaboration, engagement, and strategic work in the region, but more clarity and coordination among state agencies are needed, as well as locally-delivered education for elected officials, so they can support it.
- Outreach and engagement targets are fewer and less articulated in plans than conservation targets, despite the fact that barriers to success are primarily social.
- Plans updated during this project show outreach goals becoming more specific, particularly in leadership, coalition building, peer-to-peer networks, one-on-one contact in priority areas, collaborative planning with landowners, investment in localized test plots, communication tools and social media, but how expanded activities would be funded was unclear.
- Local government staff want thoughtful, sustained outreach and cross-sector engagement, but staff size vs scale of work, unpredictable opportunity and funding cycles, and lack of professional communications/ engagement staff and/or training make it difficult to achieve.
- Agricultural watersheds are trending to farmer led, peer-to-peer, and systematic one-on-one work in small watersheds, but the trend is in infancy and restricted by short staffing, old habits, program limitations, funding limitations, and need for training in collaborative leadership.
- Collaborations among agriculture retailers, crop advisors, suppliers and conservation groups are opening doors in many locations and increasing dialogue and adoption of practices.

Conclusions & Next Wise Steps

To successfully achieve watershed restoration and protection targets, attention, status, professional staff, systemic support, and funding for outreach, education and engagement must match their importance relative to achieving a challenge that is primarily social. Current conservation staffing and delivery systems do not support the quantity and quality of engagement work needed, and need attention. This report includes itemized lists of what is working, and what leaders responsible to meet targets need to succeed.

ASSESSMENT COMPLETED BY NEWGROUND FOR
WINONA COUNTY & MINNESOTA POLLUTION CONTROL AGENCY | September 2019
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➤ Methods & Objectives

PART 1 | Stakeholder Interviews

In late 2016 and 2018 NewGround conducted interviews with local officials and water protection thought leaders in southeast Minnesota, with primary focus on residents of the Mississippi River-La Crescent, Mississippi River-Reno, and Upper Iowa watersheds.

3 purposes drove the work:

- *Identify what is working now to engage people in water protection;*
- *Learn what local leaders need to meet goals;*
- *Inform and pave the way for Watershed Restoration and Protection Strategies (WRAPS) development in three of Minnesota's major watersheds.*

25 interviews were conducted with water stakeholders including 4 group conversations and 21 individual interviews of 30-60 minutes. Group interviews were conducted in person, and individual interviews by phone.

➤ Findings

PART 1 | Stakeholder Interviews

Do elected officials in your area understand Minnesota's water management framework? Is education needed? If so, how should it be provided?

"No, they do not understand. Township boards don't understand much at all. County supervisors have so many other responsibilities that are huge budget, time, and policy drivers. Counties work through committees, and often there isn't anyone on the board who wants water assignments." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"I think [elected officials] are aware, but I would be surprised if they know much about the state water management system and policy." — AGRICULTURE STAKEHOLDER

"We need more education of public officials. When the DNR rolled out the unfunded mandate to prepare a wellhead protection plan, it was difficult to get our Council to spend $15,000 for the plan. They don't understand the highly technical document and evaluation. The City will pay for any training they want. Most all go to League of Minnesota Cities council member training, but that's it. It always involves travel, which is a barrier. We are open to trainings at local meetings. It would be best for our Council to receive something in print first, then see a face at a regular meeting saying, "Here's what it is. Here's what it takes, etc." — LOCAL GOVERNMENT LEADER

"As mayor and, later, county supervisor, I haven't seen an overview of Minnesota's water management framework. It would be helpful to learn about it at regular meetings, with visuals." — LOCAL GOVERNMENT LEADER

"A lot was done by staff on Root River One Watershed, One Plan, not policy makers. Staff need to communicate with elected officials. The best way is to provide meeting agendas and information updates enough ahead so officials can read and understand. It's best to get smaller information pieces more often. We don't want to feel like a rubber stamp." — LOCAL GOVERNMENT LEADER

"Yes, we would benefit from more knowledge." — LOCAL GOVERNMENT LEADER

"Yes, more education would be helpful, possibly at Minnesota Association of Townships meetings." — LOCAL GOVERNMENT LEADER

"I go to annual township regional meetings to talk about water issues." — CONSERVATION STAFF

"A few elected officials know a lot, and many know nothing—collectively we might be four on a scale of one to ten. Some go to Minnesota Association of Townships meetings, but the best place to deliver more information is regular existing local meetings. We need a champion. There is a huge danger in doing nothing." — LOCAL GOVERNMENT LEADER

What motivates people in your area to adopt practices that improve water quality and streams?

"We can be at the elevator or waiting in line somewhere and get talking about yields. It kind of gets out there, what you're doing." — AGRICULTURE STAKEHOLDER

"I have a couple of neighbors no-tilling now who I never would have thought would no-till. They watched what I was doing and gained confidence." — AGRICULTURE STAKEHOLDER

"I share yields with my neighbors so they see the value of no-till." — AGRICULTURE STAKEHOLDER

"We need more conservation projects in places where people can see them. A lot of work on farms can't be seen, and that's a shame. Projects need to be visible to help educate. That's our job!" — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"We make it a habit and a practice to build experience and longevity in our staff. It makes a big difference for landowners. We place a big focus on interns, bringing in young people who want to be in and stay in the area, giving them real life experience. We used to run as many students through here as possible. Now we keep fewer interns deeply engaged. We give them full responsibility for all aspects of projects including testing, reporting, sharing, mapping. They are totally in charge, interacting with farmers, signing off on meetings and requirements, working with engineers. They feel accomplished, and we put them in the limelight. It sets up an obvious choice to hire. It's an investment in the future. They stay. They buy houses. They ensure the success of future projects, because we have experienced, trusted individuals on staff. Farmers like this. They trust us." — CONSERVATION STAFF

"As a farmer and landowner, I'm hoping other landowners will step up and tell their tenants what needs to be done." — AGRICULTURE STAKEHOLDER

"At a recent event I met a retired surveyor with a model showing how water moves soil and sand. At Whitewater State Park they made a lego model of our watershed. People like these kinds of things. It's right now! Immediate! — LOCAL GOVERNMENT LEADER

"The greatest way to get things done is peer to peer. " — CONSERVATION STAFF

"We need someone on the farm saying, "This could use attention, then doing it at a reasonable cost." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"Ron Meiners' farm walkovers work. This low-key approach with individual landowners gives an opportunity to talk about what can be done differently without meetings or pressure from the government. That approach will get a lot of respect." — LANDOWNER & LOCAL GOVERNMENT LEADER

"Let people know where we are now, what the factors are that contribute to good water quality, and what we can do. What are benchmarks for progress?" — LOCAL GOVERNMENT LEADER

What barriers keep you and your neighbors from making changes to protect water?

"We need more precision nutrient application that takes into account credits from farmers' crops. This requires more testing. It also requires fertilizer people with some skin in the game." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"When it comes to nutrient management, we need to clearly answer the question: What do you really want us to do? Farmers are hearing direction from all sides and often don't know what to believe." — AGRICULTURE STAKEHOLDER

"When activists get involved in a project and are mostly against rather than for something, it doesn't help. We need people to stay involved when one issue is resolved, to keep learning and serving on local committees." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"Allamakee County [Iowa] has worked with Minnesota, but our computer systems don't interface, which slows and stops collaboration. This is a barrier. There has been a watershed project here since the 1990s and we have high hopes of working more across state and county boundaries. It is the wave of the future." — CONSERVATION STAFF

"It comes down to dollars for projects—cost share. We need to address this question: How do we promote doing the right things without making the landowner pay for it all?" — LANDOWNER & LOCAL GOVERNMENT LEADER

"Speed up the process of permitting and planning. The cultural resources process [finding potential impacts to historic properties or artifacts] can take a long time and discourages landowners." — CONSERVATION STAFF

"Within specific projects, project coordination is the biggest challenge. We need to get people from all agencies and contractors in the same room, on the same page, before work begins." — CONSERVATION STAFF

"Farmers need some financial support to make changes at scale." — AGRICULTURE STAKEHOLDER

"It's hard to get people excited about surface water so high in the watershed. New work being done in [Iowa's part of] the Upper Iowa watershed could help." — CONSERVATION STAFF

"Easements with crop history required don't go over well." — CONSERVATION STAFF

"For SWCD staff, lack of time and resources is a barrier. All of our dollars are tied to 17 programs. What I would really like is for the State to say, "Here's $500,000. Run your program." — CONSERVATION STAFF

"Our board made a resolution this week to simplify paperwork for projects." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"City of La Crescent doesn't do much to communicate with La Crescent Township. By nature, the Township doesn't have a person who can pick up the phone during the day. The only formal communication is when annexation is proposed." — LOCAL GOVERNMENT LEADER

"I got on the SWCD board because too much money goes to paper work, and not enough to dirt work. When I ran for this board, my neighbor was working on waterways and a pond with an NRCS price tag of $18,000. He thought it was too expensive, so he did it all on his own for $3,000. It's hard to talk people into projects that are too expensive. Many projects are overboard and it scares farmers away. " — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

As a landowner, what motivates you to say yes when conservation staff offer assistance? What turns you off?

"I recently took offense when SWCD staff told me what to do without knowing my operation. They have 'pets' who are featured over and over at meetings. I'm not looking for praise, but I've no-tilled since 1984. A lot of people are doing a good job but others don't know it. " — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"I am concerned about administration [of government programs]. It bugs me when land is in a program contract, then rented or sold and all the practices come out without compliance or continuance according to contract. They should have to pay back those dollars." — AGRICULTURE STAKEHOLDER

"Field days are not as effective as they used to be, because there are so many." — AGRICULTURE STAKEHOLDER

"Root River Field To Stream Partnership is a good project. There's real buy-in." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"Give landowners a chance to tell their story. Landowners are proud of their land. There are things we want to do better, and a one-on-one conversation at home is more open and respectful than preaching at a meeting." — LANDOWNER & LOCAL GOVERNMENT LEADER

"SWCDs are responsible not only to wear the white hat, but to start wearing a black hat—not just sending letters about buffer compliance, but getting out there to work directly with people." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"Farmers want agencies to work together." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

Is education needed for our communities? If so, what kind? How should it be provided?

"Ninety percent of the people in the room at ag workshops are already doing the practices. We need new ways to get others involved." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"It helps to see a quantifiable benefit whenever possible, so it's important to continue funding on-farm nitrogen trial plots." — AGRICULTURE STAFF

"Peoples' perception of the best farmers in the area are dairies with a lot of hay ground. But often they way over-apply nutrients on hay, then instead of doing one to two years of corn without adding nutrients, apply anyway." — AGRICULTURE STAKEHOLDER

"Sometimes the simplest things have the most impact. The lego model of our watershed has been a great hit at the fair!" — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"Are crop advisors educated enough to advise farmers about nutrient application?" — CONSERVATION STAFF

"Farmers look at something brief and to the point." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

"Lack of landowner interest is a roadblock. Participants in the Field To Stream Partnership in Bridge Creek have been positive and we think they, in particular, will be a catalyst." — CONSERVATION STAFF

"I don't see a lot of interest in water management here. There is interest in the Green Steps team, but challenges exist. An intern managed the program, so there was turnover. I am pushing the City to do more to build interest, but most people don't even know our projects happen." — LOCAL LEADER

"We need to support farmer-led councils in the area." — AGRICULTURE STAFF

"I am focused on expanding native cover. More materials for work with schools would help, and I would like to do a column in the newspaper to teach and find out what people need" — CONSERVATION STAFF

"Urban and rural residents need to connect on [water]. Communication is core, and we need to get citizens involved as partners." — AGRICULTURE STAKEHOLDER

"It's important for each level of government to provide what it can do best. Local government units (LGUs) can't afford to educate in all the ways that are necessary. The State can educate at mass scale, and create more impact. Buffer rule compliance, for example, went well because the State educated and showed up to inform landowners." — AGRICULTURE STAKEHOLDER

"It is worthwhile to connect with township directors." — CONSERVATION STAFF

"In an Upper Iowa Watershed landowner survey by Northeast Iowa RC&D, 60% of respondents wanted to learn more and gave contact information to make that possible." — CONSERVATION STAFF

Do you see possible collaborations, situations that can be catalysts, or individuals who might serve on an advisory committee, demonstrate a practice, fund a project, organize a collaboration, or build awareness in some other way?

"Everyone's got to be coming to the table. This is really important. Ag suppliers are not necessarily aware of watershed or big picture realities, even if they are using or recommending nitrogen best management practices. We need to reach this group of suppliers. Nutrient management and big picture realities need to be part of retail training in big companies. Many want to tie crop protection with seed sales for profitability. It's part of how the system works now. We need to see territory-level training." — AGRICULTURE STAKEHOLDER & RURAL LEADER

"Southeast League of Minnesota Cities holds regional meetings in different locations. Mayors, council members, city staff attend. They may have information channels and opportunities to educate." — LOCAL GOVERNMENT LEADER

"City of La Crescent started in MPCA's Green Step program two years ago, which includes 25 stormwater management best management practices. An active Green Step committee meets every other month. [Its leaderss] are active members who have energy and a great deal of knowledge." — LOCAL GOVERNMENT LEADER

"There are signs of improvement in La Crescent's stormwater infrastructure. While it's not a policy, we narrow streets when they are reconstructed, so there is less hard surface, less cost, and more room for sidewalks and bigger boulevards. We ask every engineer to prepare 3-4 designs, then pick the best.

"With construction of our new events center and hotel, water will make its way to Veterans Park and enter a kind of second stormwater system. No educational signage is planned for that area at this time.

"Working with the Minnesota Land Trust, we put conservation easements on sensitive land, which led to a grant from the DNR. We are mowing large detention ponds in residential hillside neighborhoods and looking at how to make them more appealing, functional, and natural.

"There is much room to do better at publicizing our success, but we're proud of what we have done, and what private businesses like Gundersen Health System and Kwik Trip have done to manage stormwater above and beyond minimum requirements. MNDOT's landscape partnership program's technical people and funds make it possible for us to add new plantings every year." — LOCAL GOVERNMENT LEADER

"Local connections are important. I am lucky! I have worked at this for 17 years in my home county. I have local knowledge and familiarity. We pay attention to collaboration at every level. We work in three year cycles, gathering information to apply to big programs, working hard to implement, then getting extensions and more collaborative dollars. We are creative with use of positions and funding. Pheasants Forever is one partner—they'll gladly kick in $25,000 because they know work will get done on the ground." — CONSERVATION STAFF

"One billion dollars of damage from the flood of 2007 captured attention. But have we done anything different?" — RURAL LEADER

"Farm Bureau is actively inviting farmers to work with water in mind in Winona County." — LOCAL GOVERNMENT LEADER

"Often people want to move to the city because their septic system is failing. Annexation is also a big issue. Our township has had a hard time getting along with La Crescent over the years, taking away our tax base. We are trying to develop a plan and schedule for annexation, so folks understand how they can plan for septic management and replacement, and not invest big dollars in septic before an area becomes annexed. — LOCAL GOVERNMENT LEADER

"Pheasants Forever and Trout Unlimited are doing good projects in our county." — CONSERVATION STAFF

"The owners of Niagara Cave are taking water samples in the cave, keeping baseline data, and thinking about using some of their land to educate about sinkholes. This could be a catalyst project." — CONSERVATION STAFF

"Interest on the Minnesota side of Bee Creek could drive action on the Iowa side. Or we could work together." — CONSERVATION STAFF

"People own land on both sides of the Iowa/Minnesota border. This can be a positive factor for scaling up practices." — CONSERVATION STAFF

"When we put projects where state and federal staff and others can see them, they may see our good work and provide more dollars." — AGRICULTURE STAKEHOLDER & LOCAL GOVERNMENT LEADER

➤ Methods & Objectives

PART 2 | Watershed Plan Review & Follow-up Interviews

Communications, education and engagement commitments in 53 plans for 11 major southeast Minnesota watersheds were reviewed, charted, and verified in personal interviews with plan managers in 2018 and early 2019.

5 purposes drove the work:

- *Identify communications, education and engagement commitments across the region;*
- *Assess clarity of outreach targets and their status relative to other tasks;*
- *Identify alignments in plans;*
- *Identify what is working, so successful strategies can be repeated;*
- *Identify what is needed to achieve goals, to inform funding and actions.*

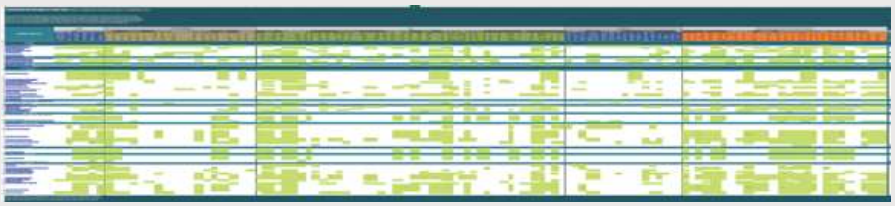
Managers responsible for executing watershed plans were asked in follow-up interviews:

- *What strategies and activities are working?*
- *What roadblocks and opportunities have arisen since plans were made?*
- *What communications, education and engagement support do you need to succeed?*

Major watersheds included in the assessment are:

Lower Mississippi River Basin
Cannon River
Mississippi River-La Crescent
Mississippi River-Lake Pepin
Mississippi River-Reno
Mississippi River-Winona
Root River
Upper Iowa River
Zumbro River

Cedar River Basin
Cedar River
Shell Rock River
Winnebago River



A list of watershed plans reviewed, links to actual plans, and findings can be seen on a spreadsheet in the companion file entitled "Chart_SE MN Watershed Outreach Targets.2019.xlsx."

***Note!** The chart identifies **targets** named in watershed plans. Current **activities** may differ, reflecting new decisions, new circumstances or updated plans.*

➤ Findings

PART 2 | Watershed Plan Review & Follow-up Interviews

➤ Context

The scale of work identified in major watershed plans is outsized. In southeast Minnesota, the task of achieving targets requires large scale, voluntary action by farmers who face dynamic risks while directing work on vast spans of agricultural land. Rural and urban communities face unique challenges and only partially understand each others' realities. Citizens work in sectors of interest across a diverse landscape, often without knowledge of others' actions. And going deep —literally—huge areas of southeast Minnesota are undergirded by limestone karst bedrock that is full of holes and channels, connecting surface and ground water as one system.

So, challenges are significant and the situation is complex.

In Minnesota, this complexity is approached with watershed planning that follows a multi-year Watershed Restoration and Protection Strategies (WRAPS) process including data collection, data assessment, surface water conditions report, community engagement, and collaborative strategy development. State and local agencies, some non-government organizations (NGOs), and contractors support WRAPS work, then locally led planning defines specific actions for priority locations, who completes each task, and a budget and timeline.

This review of 53 plans and conversations with the people who lead their fulfillment revealed this fact: ***Challenges to meeting targets in plans are not primarily technical, but social.*** Technologies can be advanced and better applied, but the urgent question is: How will we engage people in new habits and embed those actions in a culture of shared values, so new practices persist? ***A rich pool of creative, communications, education, and engagement skill exists in this state. When will we seriously apply those skills to protect our waters?***

➤ Outreach Concentrations Across 53 Southeast Minnesota Watershed Plans:

- **Strategic work required by Minnesota's watershed restoration and protection framework is showing up in plans and cultivating a pattern of thoughtful, shared work.** Citizens are involved in planning, landowner surveys are completed, interagency and cross-sector working relationships are building, and groups are committing to outreach beyond the traditional.
- Fueled by requirements, **most plans commit to communicating baseline water and services information, and to interfacing with government staff and officials to inform decisions.** Some aim to cultivate deeper understanding and broader, longer-term collaborations.
- **Connections related to wellhead protection programs, subsurface treatment systems (SSTS), and other mandated work to provide basic utilities to small communities dominate,** in part because needs are urgent; mandates, roles, and goals are clear; and regional staff support has been available as a driver.
- **Agriculture is a priority.** Outreach is often embedded in programs. Priorities vary by landscape and social capacity of staff, with focus on ag BMPs, soil health, local priorities such as retention ponds, tours and field demonstrations, and one-on-one work with landowners.

➤ Are outreach targets clear and appropriate to reach watershed restoration and protection goals?

Most watershed plans are not written in plain language for easy understanding. Offices or teams with outreach specialists who have training and time to write clearly and define clear targets and actions do better. Where outreach activities are clearly spelled out, action is more purposeful.

> *An experienced staff in one major watershed successfully advanced an upland water storage initiative identified in the watershed plan by clearly mapping locations where rainfall storage would benefit streams, and acting on a variety of well-articulated strategies to connect and people and invite action. "We made personal invitations, published clear articles in local newspapers, shared maps at two watershed picnics, drew attention with a compelling story by a Board of Water and Soil Resources (BWSR) writer, and focused on downstream and recreational benefits," explained a team member. "People were enthused, and now take this approach, the need, and these connections for granted!"*

Staff work with long term change in mind, overall, but plans are low on activities that embed new practices in community norms.

> *One lead said, "Most organizations we work with aren't interested in deep, lasting work when they can check the box with a brochure."*

This attitude prevails where work loads are large and dictated by seasonal cycles, weather and program deadlines, or where busy biologists are asked to do the work of outreach specialists.

> *"We need to build relationships across sectors," said another conservation lead. "Our interaction with local co-ops has been nonexistent, and a lot of folks we help are getting information from retailers. Half-time dedicated staff for work like this would take the burden off three other people who scurry to do it all."*

Despite the fact that barriers to reaching watershed health are primarily social, well-considered **engagement and outreach targets are proportionately fewer in plans than other targets.**

What is Working Now?

Professionals responsible for reaching targets in plans shared these examples of activities that are moving people to action now in their watersheds:

Collaborative Strategic Planning

- *WRAPS and the One Watershed One Plan processes are credited by most with improving connections, engagement, and targeted action, including: strong and meaningful alliances between government and NGOs, strategic focus on specific needs, new kinds of collaboration in which agencies learn from each other, support for farmer leaders, new citizen-led initiatives supporting public targets, less duplication, and sharpened roles.*
- *Citizen dialogue and leadership training in WRAPS led to well-attended community dialogues hosted throughout a watershed, with training participants establishing and staying engaged through an active river friends group.*
- *Where appropriate NGOs are included as paid leadership partners in WRAPS and One Watershed One Plan processes, a broader diversity of people and practices are brought to the table and future work.*

Peer-to-Peer and One-on-One Learning and Influence

- *Work in agricultural areas is slowly trending to systematic, one-on-one work with landowners and operators in smaller targeted watersheds, so results are concentrated and can be seen faster, supporting culture change.*
- *In areas where some landowners adopt new practices, neighbors watch results and may adopt the same practices over time, especially where yield data from test plots, cover cropped acres, and no-till acres is shared neighbor to neighbor.*
- *A skilled program leader who doubles down on developing relationships with individual farmers and landowners—including those she may not know—is seeing practices on the ground as a result.*
- *Farmer-led councils bring intentionality and sustained focus to peer-to-peer connection, sharing, and influence.*

- *A soil health team started by staff is now sustained and led by citizens, with peers are influencing culture and farming practices.*
- *Farmers and staff in many places are asking agronomists to share information and nutrient and land management success stories with their customers.*
- *Neighbor-to-neighbor invitations to events have drawn larger attendance than when staff invite.*

Community Collaboration and Shared Work

- *A full-time position funded by Pheasants Forever co-located in SWCD office increases staff time, adds expertise, and expands program implementation.*
- *Collaboration between SWCDs and municipalities is desired and being cultivated.*
- *Growers, agronomists, ag suppliers, conservation staff and others are collaborating to collect data and expand the conversation for nutrient efficiency and farm sustainability.*

Connecting People Across Sectors

- *Efforts are being made to connect people in urban and rural areas of watersheds, to build understanding.*
- *A rural and urban public learning series called "Resilience in the Landscape" is being well received.*

Connecting People to Water

- *In collaboration with a local business, free canoe and kayak use is offered on local waters.*
- *Streams are identified on roadways..*
- *New water access points are built to encourage use of local waters, with promotion to let people know they are there..*
- *The"We Are Water" exhibit by Minnesota Humanities Commission has focused attention on water and connected people for to collaborate on water education and awareness in several watersheds.*
- *Nature did this one—a flood crisis led to awareness and preventive action.*

Focus on Issues

- *Nitrate testing clinics place focus on safe drinking water.*
- *Work for a state-level policy change around a local issue galvanized and motivated citizens.*
- *A strategic campaign to increase upland water storage has methodically drawn attention and facilitated progress. Actions include a color coded survey map*

identifying places where basins are needed; personal contacts with landowners; two watershed picnics, regular newspaper stories; news story, photos and story placements by BWSR; focus on recreation; and downstream benefits.

Financial Incentives

- *Awareness is growing and the number of voluntary stormwater projects are increasing where small financial incentives are offered.*
- *Financial incentives make agricultural projects accessible, and trying something new easier.*

Clear and Compelling Information

- *Branded watershed communications and websites that are easy to navigate, easy to update, and long-lasting are seen as essential tools, owned by some and desired by all.*
- *A professional, citizen-friendly storm water management video was developed and is now used county-wide.*
- *An adopt-a-storm drain program with web-based site selection has increased participation.*
- *An annual tabloid insert in local newspapers is effective for building local conversation and reaching some target audiences.*
- *Social media is quickly building awareness and engagement in areas where designated staff are investing time to produce content and post it regularly, as part of their jobs.*
- *Where an experienced staff writer with public relations expertise is applying skills to local conservation work, stories and invitations are regularly sent to and used by media, media relationships and partnerships are cultivated, and the number of people involved is growing.*

Youth

- *Consistent work in schools is building awareness.*
- *A paddling film festival was developed and hosted.*
- *At last count, a youth fishing club organized in collaboration with a local organization has 67 kids participating*

Commitment to building connection and collaboration, energetic and innovative staff, prescribed time, funding for staff time, and disciplined professional communications work are driving these successes.

➤ Who does the outreach to achieve targets in watershed plans?

Local professional staff charged with achieving restoration and protection targets in watershed plans approach the work, overall, with love for place and care for people. If employed by government, their work is dominated by regulated programs, contracts, and funding streams made unpredictable by politics. If employed by an NGO, those factors are present but more freedom to pursue creative strategies may exist.

> *Said one conservation professional in the midst of plan-making, "[The lead NGO] in this watershed will probably get work geared toward socioeconomics."*
>
> *And in another watershed, "When [the watershed group associated with this river] disbanded recently, it left a big hole. Their drive to engage people would have been a tremendous benefit if the group could have lasted two more years."*

Dedicated local staff are typically trained in sciences as biologists, hydrologists, agronomists and the like, and may not be prepared to direct communications, host community dialogues, build a website, or approach people who do not request services. Some staff seize specialized training opportunities; many do not have time.

In some instances a government conservation staff member's job includes regular, designated time for communications and outreach, typically website

maintenance, social media, news releases, or events. Program fulfillment drives most other outreach, which is done on demand.

> *"We try to make one social media post a day," stated one leader. "We show farmers trying to do the right thing, and share information about events."*

The world in which these local professionals work is shaped by messages, decisions, policies and trends emerging from a complex network of municipal, township, county, state, federal, nonprofit and commercial groups. **The extent to which people within those groups in the larger system listen, understand, act from wisdom and conviction, and cultivate healthy collaborative relationships and systems can influence how long local partners stay in their jobs, and how effectively targets in watershed plans are met.**

➤ Are resources available to reach targets?

Professional managers who are responsible for achieving targets in watershed plans are generally working as hard as they can to use what they know and what they have to achieve goals.

They do not have adequate staff capacity to readily meet targets, and very few have staff with professional communications, outreach and strategic engagement expertise. Most staff with those skills and time for outreach also have other responsibilities that vie for attention. Those staff members are valued by peers for their abilities, networks, and successful partnership building.

> *Said one lead,"We need people who know how to deliver messages. One person who does know how to do that was a HUGE asset in the One Watershed, One Plan process. Because that person has designated time, they can also successfully build partnerships, and be consistent."*

Organizations that have benefitted in practical ways from engagement opportunities in the WRAPS process see the influence those activities have had and continue to have on their progress, and ask for more.

> *"We hosted successful citizen summits as part of WRAPS and people still ask for more. They were a safe place to come and understand, and strong citizen*

initiatives came out of them. It was powerful and helpful to get farmers and others in the same room, to listen."

Other activities mentioned include: learning new skills; training citizens in dialogue practices; supporting citizen-led initiatives; providing citizens with a platform to speak; launching professional websites, branding programs and initiatives; hosting dialogues; and the like.

Leaders in locations where Board of Water and Resources staff writers have documented projects with stories, photos, and distribution see the effects of that support, and ask for more.

"Seeing a BWSR public relations professional do a story differently than our usual SWCD way was cool. It was done well and published broadly. We don't know how to do that. We want to showcase more projects, and help from the outside would be good."

All local staff ask for professional outreach and engagement support from people who understand watershed restoration and protection. In southeast Minnesota, formal and informal support networks exist, and leaders look for more practical ways to work collaboratively and share resources.

"A regional hub could provide GIS, education, outreach, and grant management services to all major watersheds in the area. It's a possible solution to fill the gap we live with, but the possibility—so far—has waxed and waned based on political leaders."

➤ Specific needs and requests from people responsible to meet targets in watershed plans

- Requests were made for systems that encourage participating organizations to collaborate, share, and not be territorial.

  "Clarifying roles might be helpful."

  "We must be sure our actions match what's in our One Watershed, One Plan, to stay on our best paths."

  "It is a loss when all groups aren't equal partners."

  "Siloing is going on. Everyone must be willing to share what they know, rather than keep it close as a power grab."

  "Inclusive planning processes involve diverse groups and can be complicated. We need expert help developing powerful questions and engaging in conversations with a deep center."

  "We will only succeed if state agencies and county organizations working with water and natural resources work more closely together. It would be helpful for BWSR to sit down with Minnesota Association of Counties and Minnesota Counties Intergovernmental Trust, to get clear on issues that affect water."

- A majority of interviewed staff see citizen initiatives, partnerships, and collaboration as a natural way to facilitate lasting action. **They ask for professional support to lead dialogues, funding that allows for the unpredictable nature of partnership building, shared regional resources, and staff time to cultivate what is rising**.

  "Agronomists are trusted advisors to farmers, and we talk all the time about their ability to influence. A staff member who farms engaged 12 agronomists in a 60-acre project. That farm is creating conversations with retail advisors, who disseminate what we learn to producers. Now we need to connect at a

much deeper level, and we need professional support and focused time to do a good job."

"This is a cultural shift," says one SWCD team of the soil health movement. "Farmers are gathering of their own accord, meeting over lunch to plan and share. This is working, and we want to be part of it. The more we reach out to people now, with farmers who deliver the message, the faster it will grow. [An NGO partner in the watershed] is doing a good job of disseminating information. But it is time to move conversations from church, school, and basketball games to a more focused opportunity to connect, peer-to-peer, on the topic. We need staff, time, good communications, and help leading dialogues to make the most of what is happening, and establish more local, farmer-led groups."

"The county and city are tightening collaboration for urban stormwater outreach through our MS4 work, and urban agriculture is the elephant in the room. It's time to bring produce production into the city in partnership with school districts and neighborhoods. But we need staff to do this."

"We need staff time and training to develop public/private partnerships."

"We need more support for groups tying to do work aligned with watershed plans."

"We need time to find farmer champions, and human skills to build collaboration and navigate the competitive farming environment."

"We are disappointed the Department of Agriculture stepped away from prioritizing farmer-led councils and Township Testing advisory committees. We saw this systemic support for local, collaborative decision making as a helpful, powerful move forward."

"More regional sharing would allow us to do more. For example, many counties or a region could support a person to coordinate several farmer-led councils."

"A thoughtfully created regional engagement plan could be helpful. Together we could educate about karst, its impacts, drinking water, and farming on this landscape."

- **Training and resources were requested:**

  "Staff time and a good, current listing of regional funding options (with focus, dollar range, and details) would help us add to baseline funding."

  "We need more staff, even more than we need money for projects. Political resistance to this is a big barrier. It takes time to reach people who are on the fence, who would do more with a little push."

  "We need flexible funding and time to find more funding options."

  "We need staff."

  "We need more people to do the work."

  "We need staff with communications skills.They could serve regionally."

  "All of us could use sustained training in public speaking, and how to present ourselves."

"We want to learn how to use social media to full advantage. We need training, money to pay for training, and staff to do the work."

"What kind of messaging is helpful with farmers? We need training."

"We need help communicating the recreational value of local waters, and increasing access."

"Truth is, I don't even know what to ask for related to communications. We are so busy holding what is, and we know nothing about those things we need very much."

- **Dynamic communication tools and stories are needed by all:**

"We need a website that is more interesting and easier to understand. Right now we are just using what we have because there is no other realistic option."

"We now have no access to branding, design, website services. We need guidance and support in this area, because we need a clear, accessible home base online."

"We need templated tools to share."

"Templates for watershed websites would be helpful, and a source for communications resources, information, and services."

"We want to put two- to three-minute videos featuring local work and issues in classrooms, and onon our YouTube channel and website. We need technical and production help and a good microphone. These could be regionally provided."

"BWSR helped us communicate about a subwatershed project, and that was super helpful—news story, video, photos, media distribution, social media. But that staff person serves state-wide. We need more stories, timely stories."

"We are focusing on hot topic programs and projects, communicating using social media, events, and conversation. But it is a lot of work and we need expert staff and more time to do this well."

"We need clear messages to open doors."

"Word is getting out about what was learned in the Root River Field To Stream Partnership project. I think it will be a catalyst, and we need to keep telling those stories."

- Much of southeast Minnesota is rural, and while most landowners feel social pressure to use conservation practices, social expectations for civic or collective action are generally low. **Requests were made for fresh ways to connect people around water, and processes that don't discourage partners or landowners, once they engage.**

  "For construction projects, the cultural resources process can be a deterrent, because it takes a long time."

  "The watershed planning process has caused a lot of angst. We need money for projects, staff, and fewer plans.

- **Staff also ask for realistic expectations.**

  Said one, "We have a long way to go, and we need people who identify time targets and the success of clean water work to know that this is a seismic social shift, and change at this scale takes time. We are working steadily to use every hour and every resource to make progress."

  "We are weaving a fabric of connection, with social support for desired practices. This takes time."

➤ Methods & Objectives

PART 3 Connecting Agriculture Retail & Conservation Sectors

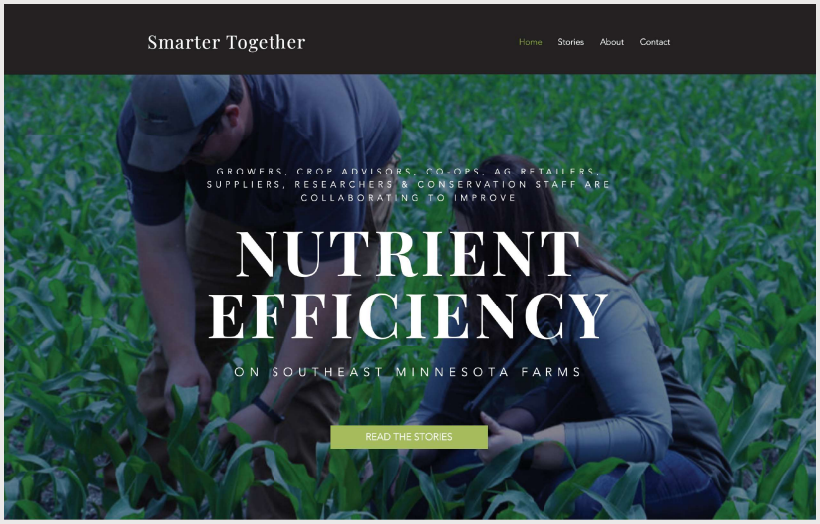
Over 30 months (January 2017 to June 2019) NewGround worked to connect agriculture retailers, crop advisors and conservation staff to build shared work across sectors for nutrient efficiency on southeast Minnesota farms.

Work took place in three phases:

- ***Phase 1 —*** *NewGround worked with Minnesota Crop Production Retail Association and Minnesota Department of Agriculture for12 months to bring a pilot project to southeast Minnesota. The pilot, entitled "Industry-led Pilot Project to Enhance MDA's MAWQCP Software and Evaluate the Feasibility of Introducing into the Agricultural Marketplace", engaged retailers in finding out if Minnesota's Agriculture Water Quality Certification program software could become a tool for confident conversations between retail advisors and clients about nutrient efficiency, increase familiarity with Minnesota's nitrogen best management recommendations, and cultivate connections with conservation staff and resources. The pilot did not lead to full application, but perspectives and relationships became a foundation for more work. The official report is in the appendix of this document.*

- ***Phase 2 —*** *NewGround met with senior area crop advisors to define a path to shared work in the region. They recommended showcasing existing collaborations among growers, retail suppliers, crop advisors, third party researchers, and conservation technical staff.*

- ***Phase 3 —*** *Diverse local collaborations were identified, participants interviewed, and their work featured in six stories, now posted at SmarterTogether.info, a website designed to showcase these collaborations and promote dialogue, solutions, and fresh ideas. Featured retailers, suppliers, Minnesota agriculture organizations, publications, and other partners were contacted and invited to publish, share, and distribute the stories. These include: Ag Partners, CFS, CHS Rochester, Farmers Win Co-op, Northern Country Co-op, Nutrien Ag Solutions, Bluff Country News, Austin Daily Herald, Albert Lea Tribune, MediaCom, KTTC TV, KAAL TV, KIMT, TV KSMQ TV, Steel County Times, Rochester Post Bulletin, KAUL FM, Winona Post, Winona Daily News, Farm Bureau, Minnesota Corn Growers Association, Minnesota Crop Production Retail Association, Agriculture Fertilizer and Research Education Council, and all local governments and Minnesota agencies associated with this project.*



In addition to publication at SmarterTogether.info, stories are included in this report on pages 37 to 62.

➤ 6 Stories, 6 Southeast Minnesota Collaborations

People featured in these stories have stepped out of the norm to ask questions, quantify benefits of various practices, and work with collaborators for greater nutrient efficiency on farms. Every collaboration is different, and all are motivating new thinking in the region and beyond.

Wayne DeWall (center), Kevin Kuehner, MDA agronomist and researcher (left) and Root River Field To Stream Partnership technician Ron Meiners (right) pause at the edge-of-field monitoring station in DeWall's field. Data collected at this station over many years is now informing on-farm management decisions throughout the region.

Research Starts at Home For for Wayne DeWall

On-farm research has been a way of life for Grand Meadow area farmer Wayne DeWall. His dad did his own comparisons, and Wayne has carried on the tradition for nearly 40 years. In recent years his interest in on-farm research has expanded and intensified with the help of CHS agronomists and a Minnesota Department of Agriculture (MDA) researcher.

"I've compared liquid fertilizer versus dry and various application rates, as well as comparing split applications to 100 percent preplant to find the best rate and application timing," says DeWall. "CHS Rochester does soil sampling on a three-acre grid, and my agronomist Emily Drinkall makes recommendations on how much phosphorus (P) and potash (K) to apply. They then make variable rate applications accordingly."

About nine years ago, DeWall added another resource to his research efforts when he joined the Root River Field to Stream Partnership. Funded by a variety of agencies and organizations, and led by the MDA, the partnership carries out farm-based research and monitoring of water quality and edge-of-field runoff of water and sediment, as well as nitrogen and phosphorus, in several watersheds feeding into the Root River.

When Kevin Kuehner with the MDA knocked on his door, DeWall agreed to take part in the project that included a runoff monitoring station. "We had a perfect location for it, and we also had a drain tile nearby," says DeWall. "The drain tile emptied into a ditch where they could monitor subsurface nitrogen loss, as well as how often and when the tile line ran. Kuehner explained that anytime the water was flowing, we could be losing nitrogen, even in the winter."

DeWall also began working with Kuehner, the University of Minnesota and CHS on in-field plots looking at various nitrogen rates and timing practices. Plots looked at seven preplant rates and three timing treatments. Applications ranged from 0 to 180 pounds of nitrogen (N) per acre applied in 30 lb N/ac increments and each are replicated four times.
"Kevin lays out the plots each year, and we work with them," says Drinkall. "He gives me the locations, and when we do our applications, I ensure rates correspond in the plots."

Landowner Wayne DeWall (left) and Kevin Kuehner, MDA agronomist and Root River Field To Stream Partnership lead (right) take stock at the edge-of-field runoff station on DeWall's land. The station measures how much water, sediment, nitrogen and phosphorus leave the field.

Drinkall notes that like DeWall, most of the CHS patrons she works with utilize grid sampling and variable rate applications of P & K. Many also use nitrogen stabilizers on their urea, UAN and anhydrous to reduce leaching and volatilization, keeping it in the soil for the crop to use.

"They realize that with our wet springs and heavy rains, applied nitrogen is at risk," says Drinkall. "Every acre needs to be treated individually, but we try to encourage split N application where possible. We find that combined with variable rate phosphorus, lime and potassium application, it provides the most agronomic benefit."

Drinkall emphasizes the need for as much information as possible, thus the grid sampling. DeWall's involvement in the Root River Field to Stream Partnership is giving him even more data and is impacting how he farms.

"We are able to see how much sediment and nitrogen we are losing and when it occurs. The monitoring shows our biggest runoff happens when the ground is still frozen," says DeWall. However, this is not when we see the most amount of sediment and nutrient loss. About 60% of the sediment, phosphorus and nitrogen loss measured occurred in May and June."

Baseline monitoring was conducted on DeWall's 's field from 2011-2016. Starting in 2017 DeWall began to make changes accordingly. He reduced fall tillage to the use of a ripper, eliminated fall nitrogen applications and put in targeted pollinator habitat/filter strips alongside his private drainage ditch side inlets and the fence line where the monitoring station is installed.

"We had a good catch last year with the pollinator habitat/filter strip," says DeWall. "It's about 60 feet wide and not quite half a mile long. We expect it to be fully established in about three years."

He also put in a new waterway and revamped some older ones. It didn't take long to begin seeing the effects. "Sediment runoff has been cut down, and nitrogen losses have been reduced," says DeWall. "For nitrogen, we've gone to split applications with a lower preplant rate and sidedressing at V4 when the plant needs and will take up more nitrogen. Our data shows it is agronomically more feasible. Putting everything on preplant was overspending."

Kuehner points to potential savings demonstrated by DeWall's plot in 2018 when average corn yields following soybeans, peaked at 218 bushels per acre. "The economic return to fertilizer N (when using average 2018 fertilizer and corn prices) was greatest when about 160 lb N/ac was applied just before planting. This rate includes all sources of nitrogen including starter and credits from MAP and AMS. However, when nitrogen was split applied, the 120 lb N/acre split rate treatment provided the greatest return on investment. When compared to a 180 lb/ac preplant rate, which is a common rate when corn follows soybeans, profits could have been improved by $16/acre, even when factoring in the extra cost of the in-season nitrogen application. Rainfall was 50-80% above normal in May and June last year and was a major reason why the split nitrogen rate performed so well."

"We need additional years of data, but these experiments are signaling that slightly reduced N rates when split applied are more profitable on Wayne's farm and result in less loss from the sub-surface drain tile system," says Kuehner. "Preliminary water quality monitoring results indicate that the six-year baseline nitrate load of 36 lb N/ac measured from the sub-surface drain tile has been reduced by 19%."

After three years of similar data, DeWall dialed back his rates and started split applying. However, he has continued with the plots, and new data reinforces his move. "On our test plots last year, we saw our best yield of 220 bushels (at

After baseline monitoring was conducted on DeWall's field from 2011-2016, he made changes. In addition to reducing fall tillage to the use of a ripper and eliminating fall nitrogen applications, he put in targeted pollinator habitat/filter strips along private drainage ditch side inlets and the fence line where the monitoring station is installed.

17.6% moisture) on a test plot with only 120 lbs. N applied in a 30/90 split," says DeWall. "When factoring in the nitrogen and drying cost, our net return on that plot was $623 per acre."

DeWall sees more changes ahead. "First we want to see if the practices continue to reduce N loss and sediment runoff," he says. "Possibly we will go to even less tillage, and we may try cover crops. We need to do what we can. We use the water resource, whether for swimming, fishing or drinking. We need to protect it."

Landowner Jon East works closely with Nutrien Ag Solutions agronomist Scott Barnes to improve yields and efficiently use nutrients. Barnes has been a catalyst for bringing East and other area growers into on-farm plot research funded by Minnesota's AFREC, led by Matt Wiebers.

Nitrogen Utilization Effort Based on Trust

Jon East has made a few changes in his farming program since taking over the farm in 2003. Most of these changes have occurred in the past six to seven years, thanks to a trust relationship with his Nutrien Ag Solutions' agronomist, Scott Barnes, Harmony, Minnesota.

"My dad farmed his whole life and had made some changes along the way but not to the extent of how things are done now. " says East. "When he passed away, I started off doing things the same way he did initially but after a few years I began looking around, trying to find ways to do better, with different hybrids and varieties and a fertilizer plan that would produce better yields."

Those efforts went into high gear when Barnes, operating in Harmony, stopped by East's farm about nine miles west. The timing was right, with East less than satisfied with his then current yields. "He didn't have to twist my arm very hard to give him a try," recalls East.

Living in Rochester and commuting to the farm for fieldwork, East needed an advisor he could depend on. "He's out at the farm scouting the crops and

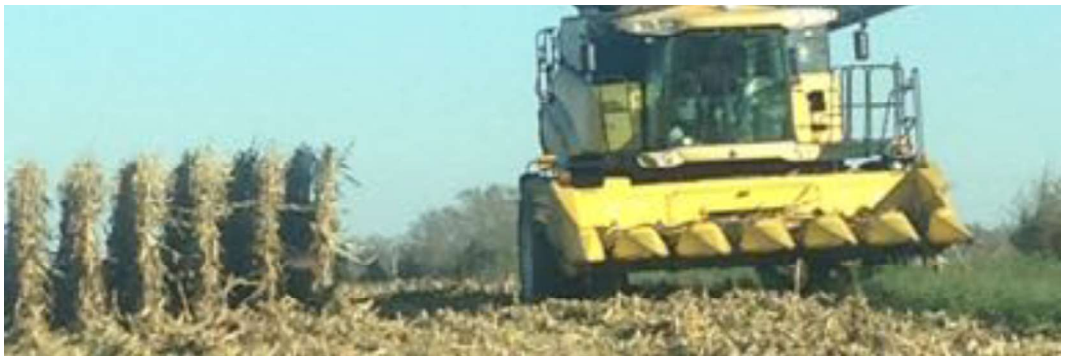
checking multiple things from weeds to plant health to disease," says East. "He gives me a better report than I could do if I was there."
Understanding that East was open to new ideas, Barnes suggested using encapsulated nitrogen (N) and the following year trying split applications of N. East gives the new practices credit for a significant boost in yield.

"I had been putting all my fertilizer on preplant," says East. "Since making the changes, I've been getting exceptional yields from my corn the past few years, and the return on investment has really paid off."

Other practices to improve economic and environmental outcomes were also explored, as well as on-farm corn hybrid variety comparisons. "We do a corn plot one year and soybean plot the next," says East. "We'll do up to 16 different hybrids in the plot. It includes both Scott's recommendations and some I get from another seed dealer to use as checks."

Two years ago, Barnes introduced a program funded by farmers through the Agricultural Fertilizer Research and Education Council (AFREC). Established in 2008, AFREC is funded by a 40 cent per ton fee paid by Minnesota farmers on all fertilizer sold in the state. The lion's share of the $1.2 million disbursed each year goes to the University of Minnesota. However, three years ago a small portion was dedicated to on-farm plot research under the direction of Matt Wiebers, an independent crop consultant.

"The grant sought to demonstrate that replicated research trials could be done on farms across the state and that the data collected would show that



Jon East harvests part of the AFREC trial in 2018. The combine is equipped with a yield monitor to record yield in specific areas where the trial is located.

farmers were capable of producing good quality research results and a public database of nitrogen utilization for corn," says Wiebers.

He notes that while retailers like Barnes may have dozens of trials with growers, the raw data collected from them is usually not publicly available or shared for analysis. AFREC data will be shared with the cooperating farmer and later (with the location information removed) an overall report on the entire project will be publicly available. Barnes was sold on the concept when Wiebers introduced it.

"In the first year we did 48 full-field plots across the state, and Nutrien Ag Solutions in Harmony helped find locations for 11 of them," says Wiebers. “This demonstrates that local retailers can scale up an approach such as this with minimal impact to their operations and efficiency.”

One of those plots was on the field belonging to East. "When I presented the program, Jon was all over it," says Barnes. "Like the others, he provided data from his planter and yield monitor, and I provided the rest. We could have signed up even more. All of our growers are interested in anything they can do to save money and help the environment."

“Scott and Matt set up the plots on different blocks in the field with the University of Minnesota's recommended nitrogen rate compared to rates 30 units above and 30 units below the recommended rate," says East.
At the end of the year, Wiebers met with the growers to review the data collected. While they didn't know what farms the data came from, they could

This piece of equipment top-dressed nitrogen on the AFREC plots. Its technology adjusts application rate on the go, to make these trials possible.

review practices. As a result, they all stayed with the practices from the study and some cut back their N application a bit as a result of what they saw. They saw they could cut back 10 to 15 units and still get pretty good yields with a sidedress back-up plan."

The project is now in its third year and has expanded to include potassium and sulfur in addition to nitrogen. Barnes has three growers signed up for nitrogen trials this year, East and one other from the first year and a third grower taking part for the first time. Barnes expects to see more valuable information as this year they are evaluating a wider spread of rates.

"In Jon's case, we applied 147 total units of nitrogen as his standard practice and deviated by 50 units above and below the recommended rate," says Barnes. "All plots received 73 units of N up front, including 9 units of N in his 6/24/6 starter in-furrow, plus 64 units as a mixture of DAP, urea and AMS, broadcast and then incorporated. The 50-under plot was topdressed with 24 units of stabilized N, while the standard rate plot was topdressed with 74 units of N and the 50-over plot received 124 units of stabilized N."

These aren't the first N utilization trials that Barnes and his growers have been involved in. While smaller in scope, they include plots in the Root River Field to Stream Partnership set up by Kevin Kuehner and Nutrient Management Initiative plots designed by Dawn Bernau. Both Kuehner and Bernau are with the Minnesota Department of Agriculture. Like Wiebers full-field plot, their plots provide Barnes and his growers with valuable information.

"We've used data from all of these plots with other growers," says Barnes. "They like these trials because the data is local."

East echoes Barnes on the value of local data, but even more, on data from his fields. "I went to school at the University of Minnesota, Waseca," he says. "They have research plots there, but they aren't as valuable as local data. We have different soils here, and mine are different from those in fields even two or three miles away."

Dawn Bernau, Minnesota Department of Agriculture's Nutrient Management Initiative lead for southeast Minnesota (left) works with Fillmore SWCD technician Sara West (center) and Farmers Win Co-op agronomist Erik Dahl (unpictured) to support landowners Glen and Melinda Groth in their effort to increase nitrogen use efficiency on their farm. Here, Bernau takes soil plant (chlorophyll) analysis development (SPAD) readings and shares results related to nitrogen deficiency with Glen Groth (right).

Partnering for Profit and the Environment

When Glen Groth started his farming career 13 years ago, he knew he wanted to utilize the knowledge of local agronomists to give his business an advantage. He found the partners he was looking for at Farmers Elevator (now Farmers Win). He credits his co-op and its agronomists for teaching him how to use fertilizer and crop protection inputs. Now he is repaying the co-op with in-field data on nitrogen utilization test plots they can pass on to other customers, helping them increase yields while reducing N loss and helping protect the environment.

Groth, who farms with his wife Melinda near Ridgeway, Minn., says, "They earned my business, and I've stuck with them. I use their grain drying and storage services, fertilizer application, seed sales and more."

"We get involved in pretty much all of Glen's work," says Erik Dahl, agronomist, Farmers Win. "The work we do with him can be transferred to other growers we work with, as well as shared with other Farmers Win agronomists at our winter meetings."

That work includes a wide variety of product, rate and application timing studies. This year Groth is continuing some split applications, evaluating the

benefits of nitrogen stabilizers and doing replicated trials at different rates. Dahl and Rushford, Minn., location manager Justin Brown get involved to some extent in all of the above, both at application and at harvest, when they provide weigh wagons for accurate data gathering.
Many of his fields are considered highly erodible land (HEL), and Groth has enrolled 300 acres in the state's Conservation Stewardship program for a second year. As part of it, he is working with no-till and cover crop practices on some of his fields.

"If it were dry every year, I would be no-till on all my fields," says Groth. "However, my fields are spread out with lots of wet spots, and I still have to do tillage to get crops in early, but I don't do any more tillage than I have to. I believe in no-till and do it on a third to half my acres."

Groth's experience with cover cropping has been positive, but he is still evaluating its place in his program.

"Last year I planted soybeans green in six-foot tall rye, and it produced some of our best beans," he says. "However, last fall the soil froze up too soon to get any cover crops planted. I think they do increase organic matter and nutrients, but they are an added investment, and you need a return."

While he seeks high yields, he is also concerned about the impact his practices have on ground water and the Root River, Mississippi and Pine Creek watersheds his fields drain into.

Bernau uses a hand-held soil plant analysis development (SPAD) meter to quickly, accurately measure leaf chlorophyll concentrations in southeast Minnesota fields. The readings help Ridgeway, Minn. area farmer Glen Groth and others understand how much fertilizer is enough, and how and when to best apply it.

Groth appreciates the co-op's variable rate application (VRT) services. He gathers some of his own soil samples, but relies on Farmers Win to do most of his grid sampling. They sample on 2 1/2-acre grids on his larger fields and composite samples on smaller fields. While still unsure if the variable rate fertilizer is providing savings or yield increases, he intends to continue.

"It is too early to see results yet," he says. "However, I do think it is good to invest in fertilizer where it is needed, and the people we rent from like to see that we are maintaining fertility."

Groth does a variety of test plots every year on his own, including split applications. This year he has a third partner in his on-farm research. He is working closely with Dawn Bernau, pesticide and fertilizer management, Minnesota Department of Agriculture. She manages the Nutrient Management Initiative (NMI) research plots in southeast Minnesota and its second stage initiative, The Southeast Minnesota Nitrogen BMP Outreach Program. Overall goals are to reduce nitrate groundwater contamination by increasing N use efficiency.

Bernau lays out replicated in-field plots that Farmers Win applies. They include his normal corn following corn rate of 165 lbs. N per acre, as well as rates plus and minus 30 lbs. and a high rate of 200 lbs. "We marked out the strips, and I rode with the applicator to make sure the rates were applied

Justin Brown, Farmers Win Co-op location manager, Rushford, Minn., customer Glen Groth (center), and Erik Dahl, Farmers Win agronomist finish a quick analysis of Groth's 2019 harvest. Corn kernels and rows on a number of ears suggest potential yield of 220 bu. per acre, assuming no frost until October 1.

properly," notes Dahl. "Dawn then marked them with GPS so they can be evaluated throughout the season."

The program includes intensive nitrogen sampling of soil and tissue at the plots, which will be carried out by Bernau and Fillmore Soil and Water Conservation District staffer, Sara West. This is Groth's first year in NMI and the SEMN N BMP Outreach Program; however, Famers Win has been participating in the NMI/SE BMP program since 2015 with other growers. They also did similar nitrate testing on Groth's fields in 2018. These were done at four different sites, including fields with corn following soybeans and corn-on-corn with manure and without. The results surprised Groth and Brown.

"We did soil nitrate testing at V5 and R1 (silking) stages, tissue sampling at black layer and end of season stalk nitrate testing," says Groth. "We want to be sure we are applying enough N, but we also want to do right by our water."

"Manured fields had plenty of N early, but not late, while fields that had not been manured stayed high throughout the year," says Brown. "The results go against what we expected. As a result, we are sidedressing manured fields this year."

"The results suggest we were underapplying, but it could have been a function of the wet year," says Groth. "We'll be doing more nitrate testing this year in hopes of benchmarking N rates."

Groth's research data is shared with Farmers Win and other farmers. "At the end of the season, we bring participating farmers together to go over their reports and discuss them," says Bernau. "We also hold field days in the summer that are open to the public."

"Through the test plots we are doing with Glen and Dawn, as well as others, we are learning and trying to apply that knowledge to make better decisions as we move forward," says Brown. "Nitrogen utilization is an ongoing, learning process. With so many variables, you have to look at data and results over the years to truly know if you are going the right way."

Nitrogen utilization rate trials conducted with University of Minnesota Extension help the Haag family run a profitable farm business with minimal environmental impacts. In this photo, Extension educator Jake Overgaard and Glen Haag share what they're learning with visitors at a 2018 field day. (Photo: Cory Ryan for University of Minnesota Extension)

Looking for Answers Is Part of the Job

Glen Haag has more questions than answers when it comes to nitrogen (N) utilization, but that hasn't stopped him from looking. He and his farming partner and father-in-law Dave Ruprecht work with plant tissue tests, soil nitrate and end-of-season stalk nitrate tests, split application of N, cover crops and no-till. This year the Lewiston area farmer began working with his Ag Partners agronomist Justice Keefauver on a new program to tie fertility and organic matter together. For the past five years Haag has worked with University of Minnesota Extension Educator Jake Overgaard on nitrogen rate trials. His search for data on nitrogen utilization is both personal and professional.

"I'm an outdoorsman, and like a lot of farmers who are, I want to protect water quality," says Haag.

A member of the Whitewater Watershed Farmer-Led Council, Haag's varied efforts have brought impressive results. "Glen is on the leading edge of our precision platform in regard to nitrogen efficiency," says Keefauver. "In 2018 his corn utilized on average 0.72 pounds of total applied nitrogen per bushel of yield, but he is still trying to better understand what his soils can do and how he can maximize yield while protecting the environment from nitrate movement."

Ag Partners is working with him in that effort. It is Haag's first full year with the cooperative. "We learned what he has been doing, his concerns for the environment, his goals for production and getting there without the overuse of fertilizers," says Keefauver. "Based on that, we made some recommendations, including urea coated with ESN, a flexible polymer, and some N stabilizers to see if he can reduce the total pounds of N per bushel even more."

The ESN coating reacts to soil temperature to release N in solution to meet the crop's growing demands, while the stabilizers keep the N in the profile where roots can absorb it rather than it moving down into groundwater. Haag likes the idea of the blend of standard urea for early pop-up and ESN for slower release. As part of the evaluation, Keefauver is running a series of soil nitrate tests for Haag. Samples were pulled at 0-12 and 12-24-inch depths preseason and again at the V4 growth stage to determine the location of available Nitrogen.

One of the challenges Haag faces is matching N rates to his use of manure. With 450 Holstein steers on feed, he has a lot of manure to spread. Nitrogen rate trials conducted with Jake Overgaard, now in their fifth year, are a valuable source of data for Haag. Overgaard lays out replicated plots of zero added N as checks, what Haag would normally apply, rates 30 lbs. above and

Ag Partners agronomist Justice Keefauver (left) works with Glen Haag to meet production goals while respecting his desire not to overuse fertilizers. His recommendations have included using urea coated with ESN and some N stabilizers to help reduce total pounds of N per bushel.

below the normal rate and a high rate. This year the tests will include the ESN urea blend.

Overgaard also runs soil nitrate tests preseason, at V4 and post season, as well as stalk nitrate tests on the plots. He appreciates being able to partner with Haag on the plots for more than just data gathering.

"Glen really wants to improve his N management for the environmental benefits, but with a strong eye on economics and managing to the best of his ability," says Overgaard. "I know the findings we get will factor into what he does and help him make changes."

What Haag typically does is apply up to 180 lbs. of N per acre on corn-on-corn fields and 150 on corn following soybeans, depending on how much manure was applied. "Some years the results have been mind boggling," says Haag. "The optimum rate is usually between 150 and 180 lbs."

Managing nitrogen with a manure application is challenging when samples are variable, notes Haag. The number of years a field has been manured, the application method and timing, and the results from the manure samples help play a role in decision-making.

Managing nitrogen with a manure application is challenging. Says Haag, "Organic matter makes a huge difference in how much N it gives back," says Haag. "We have had plots with the right temperatures, the right rain and the right organic matter where zero added N was the optimal rate."

"Organic matter makes a huge difference in how much N it gives back," says Haag. "We have had plots with the right temperatures, the right rain and the right organic matter where zero added N was the optimal rate."

This may not be one of those years. On manure applied fields, the early soil nitrate tests showed 200 lbs. available N in the top two feet. Whether it sticks around during the growing season depends on the weather.

"Last year we saw a big drop between preseason tests and V4," says Keefauver. "Based on weather patterns this spring, I expect we lost quite a bit."

While it doesn't account for potential N release from organic matter, Haag is looking forward to evaluating the soil nitrate test data and comparing it to other sampling he has tried. He has seen mixed results in some cases or too much variability in others; however, he continues with trials.

Whether or not he has found the answers he is looking for, Haag is confident in the value of the search. "I think the biggest thing is to get involved in available programs and experiment on your own farm," he says. "Everyone's place is different, which is why we do all these trials on our own ground. We can see what's going on, analyze and adjust."

Blooming Prairie farmer Justin Krell (left) credits a strong working partnership with CFS agronomist Ashley Schmeling (right) and the CFS Central Advantage program for helping him greatly improve nutrient efficiency on his land over the past decade.

More Yield Without More Nitrogen

Justin Krell is getting the best of both worlds - higher yields without buying more nitrogen while being a good steward of soil and water. The Blooming Prairie area farmer and LG Seeds technical team agronomist is a strong advocate of programs that have helped him do better in all three areas. He gives a lot of credit for his progress to his local CFS retailer and its agronomist Ashley Schmeling.

"I'm now in my 10th year with the CFS Central Advantage program," says Krell. "It is what really got me started improving my nutrient utilization. It introduced me to variable rate fertilizer applications and later to prescription seeding at variable rates."

Krell is not alone with his appreciation for CFS Central Advantage. Schmeling reports that the program, in its 17th year, has enrolled 210 growers, improving nutrient utilization efficiency on more than 240,000 acres in the co-op's territory. Unlike many retailer offered programs, co-op members are not required to buy product to qualify.

"Our co-op made a major investment in the program, with an 11-person precision ag staff," says Schmeling. "All of us work directly with growers like

Justin. CFS wouldn't have the history it does with this program if we didn't believe it helps growers do the right thing."

Schmeling describes Central Advantage as a toolbox of precision agriculture technologies. "Justin is into just about every tool," she says. "Land O'Lakes Sustain's TrueTerra Insights Engine is an element of Central Advantage. It measures how sustainable a piece of ground is and guides the farmer in being more sustainable. It helped Justin and his father Rodney qualify for the Minnesota Agricultural Water Quality Certification Program (MAWQCP). "

MAWQCP is a voluntary opportunity offered by the Minnesota Department of Agriculture for farmers and agricultural landowners to take the lead in implementing conservation practices that protect water. Those who implement and maintain approved farm management practices and are certified obtain regulatory certainty for a period of ten years.

"I know our generation of farmers is under the microscope for how we farm, and I want to do the best I can," says Krell. "We have to be able to make money, but we also have to be environmentally responsible."

Krell knows that the Central Advantage tools track everything he does on his farm and provides a report card he can show anyone questioning his impact

Schmeling helps Krell interpret information produced by Central Advantage tools, which track everything he does on his farm. The tools also provide a report card he can show people who want to learn about his impact on local watersheds.

on local watersheds. With fields draining into three different watersheds, including the Cedar River watershed, he is especially concerned about nitrogen (N) utilization. Thus, it is not surprising Central Advantage's Nitrate Now is a favorite tool.

"Nitrate Now has been a game-changer for saving us money while reducing nitrate loss without sacrificing yields," says Krell.

Under the program, CFS lines up sampling on Krell's cornfields at V3 to take 6-inch deep soil cores on 4.4-acre grids. This is in addition to grid sampling for other nutrients once every four years. CFS reports nitrate levels in parts per million. Fields are broken into A, B and C zones with A being highest productivity and C lowest A variable rate prescription is developed for a sidedress application. This is in addition to 2 by 2 starter placement at planting and liquid N added to Krell's pre-emerge herbicide pass. The three passes—in furrow, pre-emerge and sidedress—spoon-feed his crop and allow him to adjust to the year. If needed, he can also inject N into the center pivots on lighter soil on 400 acres of the operation. Section controls allow him some rate variability with them as well.

"When we started with Nitrate Now, we were at 0.9 pounds of N per bushel of corn yield," says Krell. "Since then our lowest rate was 0.6 pounds.

Central Advantage Nitrate Now tool includes soil and nutrient grid sampling and precision nutrient application. Krell has also begun using cover crops.

Normally we are around 0.75. This year we will likely be at 0.8 or a little higher."

While CFS offers variable rate application services, Krell and his father do their own applications on their respective 800-acre operations. "We share equipment and management ideas, but farm separately," says Krell. "I'm 100 percent strip till, so I put my phosphorous and potash plus sulfur down in the fall using 50 to 60 percent what I would broadcasting."

Krell doesn't limit his sustainability efforts to nutrient applications. Center pivot use is determined with the help of in-ground sensors. Over the past two years he has also begun adding cover crops to his canning crops, winter wheat, corn and soybean rotation. This has allowed him to try planting corn and soybeans green, something he admits was a struggle this past spring due to the frequent rains and late planting.

Nitrate testing, variable rate nutrient applications and other elements of the Central Advantage program, as well as cover crops and moisture sensing, are all part of Krell's overall objective. "Raising corn and soybeans the same way it has always been done, we had run out of ideas on how to be more profitable and better manage inputs," says Krell. "With Central Advantage tools like Nitrate Now and TrueTerra Insights Engine, we can use data produced on our farms to learn and improve our ROI. At the same time, we are more responsible with our inputs."

This project was initiated by (L to R) Jeff Irvin (Northern Country Coop staff), Tom Cotter (Northern Country Co-op board member and farmer cooperator), and Nathan Augustine (Northern Country Coop staff). Al Slowinski (R) is farming The Sustainable Answer Acre and surrounding land.

Learning on The Sustainable Answer Acre

A lot of people have big hopes for a plot of land at Lansing, Minn. Northern Country Co-op regional manager Jeff Irvin hopes it will help end the finger-pointing between urban and rural members of the community about agriculture's impact on water quality in the Cedar River watershed.

Area farmer Jim Kellogg hopes it will help identify agricultural practices that he and other farmers can adopt that will protect water quality while maintaining productivity. Nathan Augustine, project agronomist and certified crop consultant, Northern Country Co-op, hopes it will provide his member/customers with practices that provide environmental and economic benefits.

How can one piece of ground be expected to do so much? As the realtor says: location, location, location. It is in the right place, and this is the right time to put it to work examining the relationship between nitrogen application, water quality and a farmer's return on investment.

"The area north of Austin has been designated a nitrogen groundwater bullseye by the Minnesota Pollution Control Agency," says Augustine.

"Northern Country would rather take a proactive stand that defends grower productivity while reducing nitrogen losses."

Actually seven acres of land, the Sustainable Answer Acre (SAA) sits in the bullseye, close to the Upper and Middle Forks of the Cedar River on 80 acres of land owned by Northern Country Co-op. While plans are for the co-op to eventually build new facilities on the site, an area farmer currently crops it.

In fact, it was area farmers who first encouraged a research initiative. Northern Country board member Tom Cotter has been working with cover crops for a number of years and suggested the co-op develop expertise in this area. Kellogg, a member of both Northern Country and the Mower County Soil and Water Conservation District boards of directors, was an active proponent of developing a research approach to the water quality issue.

"Northern Country owns land in a very sensitive area as far as water quality is concerned," says Kellogg. "Water percolates very quickly through the sandy soil, and there is an adjacent population. My thought was to show what ag practices we can adopt to protect and improve water quality using factual information that no one will question."

"In addition to our board members, we heard there was interest in setting up plots to study the nitrate and groundwater issue," says Irvin. "Dan Hoffman at Riverland Community College was looking for a site where students could do hands-on research into the issue, and Steve Lawler, Mower County Soil and Water Conservation District, wanted to do research on the issue as well. With our proximity to the Cedar River and having the land, it all fit together."

Lawler helped secure funding through an Innovation Grant from the Minnesota Corn Growers. The University of Minnesota (U of M) became involved, assisting with set-up and design and assigning a graduate student to track results with the goal of publishing a paper on the project. SWCD staff also provided technical assistance as needed. Environmental concerns contributed to Northern Country's involvement, as did a need for local agronomic data on efficient nitrogen utilization. In recent years the co-op has experienced a shift in its members' preference for nitrogen applications.

"We used to do 80 percent of our nitrogen applications in the fall, but that is ending," says Irvin. "We now have to compress that into a few short weeks in the spring. We've been gearing up with equipment to apply urea and 32 percent, but we needed some good solid research on options we could offer our members. These plots will help provide unbiased, independently verified (U of M) data for our members to consider."

Kellogg is one of the area farmers who has made the change in nitrogen application. "We use a nitrification inhibitor in the spring," he says. "It pays. We can cut back on the amount we use, and in a wet year like this one, it pays big dividends. While we still put it on all at once, I can side dress if I want. "

The SAA is examining the effect of three replications of three different application methodologies carried out on conventionally tilled, reduced-till and strip-till cover crop systems. The latter plots were planted to cereal rye in the fall of 2018. Environmental impacts will also be measured. A total of 32 groundwater-monitoring wells have been placed in the plots to compare nitrate movement from the various methodologies. Those included applying the full, recommended rate of 130 lbs. of nitrogen pre-plant. A second methodology applied 80 lbs. pre and 50 lbs. side dressed at V6-V8. A third methodology applied 80 lbs. pre-plant, but utilized nitrate sampling, UAV (drone) imagery and nitrogen modeling to determine an optimum side dress rate. Northern Country staff utilized plant tissue testing and bi-weekly

Local farmer and collaborator Rod Moe provides strip till application into cover crop at The Sustainable Answer Acre during spring 2019.

scouting to further evaluate crop health and the impact of the various practices.

"The heavy rains we had this spring and early summer had an impact on available N," says Augustine. "As a result, the technology recommendation called for a nitrogen side dress rate of 87.4 lbs."

In addition to the plots, buffer strips of native prairie are being established to either side of the plots. They provide easy access to the plots, buffer them from the conventionally farmed surrounding acres and serve as zero-rate checks for nitrate in the groundwater while also measuring nitrification naturally taking place in the prairie strips.

"The challenging weather delayed installation of the wells and initial sampling to July 31," explains Augustine. "In the future, the monitoring wells will give us a better understanding of actual losses. Likewise, interseeding of cover crops which had been planned for V5 or V6 stage corn has been delayed to late August due to the weather and potential herbicide interaction. In many ways, this year is a set-up year as we get the plots established and work out the kinks. It will provide a data baseline for future plots."

Northern Country Co-op's board of directors and staff are making The Sustainable Answer Acre a local learning resource for growers with the support of Mower County Soil and Water Conservation District, Natural Resource Conservation Service, and the University of Minnesota. Here, technical staff install lysimeters to measure evapotranspiration of plants.

A weather station located on site provides accurate tracking of rainfall and its impact on N movement. The data gathered from soil and tissue tests and scouting, as well as wells and weather stations, is vital from several standpoints, suggests Irvin.

"If we don't address concerns over nitrogen applications and water quality in some shape or form, the state will do it for us, and we'll have to follow their guidelines," says Irvin. "At the same time, making better use of nutrients is the right thing to do."

Another key feature of the plots is the cover crops. Like the move of N application from fall to spring, Irvin notes increased interest by his members in the use of cover crops. Popular in other areas for their impact on soil health, they have seen limited use in the local area. However, they have worked for Cotter, and he is actively involved in the SAA plots. Irvin hopes to leverage what Cotter has learned and share the results with area farmers.

"We have to find what's going to work best in this area and how it can be economical," says Irvin. "Sustainability starts with profitability. If a farmer can't adopt a practice and be profitable, he can't do it."

Kellogg agrees, adding, "We have to be open to new ideas. I'm in a totally different soil type, but that doesn't mean the practices being looked at, such as cover crops, can't be adopted. I don't think they are a passing fad. I think they will be around for the long term."

➤Summary Findings

Key takeaways and recommendations identified on the following pages of this report are informed by stakeholder interviews, watershed plan review, interviews with primary staff responsible for attaining targets in plans, and work with agriculture retail and conservation sectors that are part of this project. Information in a landowner survey completed concurrently by University of Minnesota Center for Changing Landscapes, "Water, Community and You: A survey of landowners in La Crescent and Reno Watersheds" was also considered.

Current Social Capacity:

- A majority of interviewed leaders said Minnesota's water management framework is forging a higher level of collaboration, engagement, and strategic work, but nearly all cited need for more clarity and coordination among state agencies and county groups, and enough funds for staff time to accomplish the work of meeting identified targets.
- At time of this review, no watershed had a strategic engagement plan outside the watershed plan (though one was working on it), actions were most often tied to mandates or funder-bounded projects, and a pull to passive engagement vs active, strategic new patterns was evident.
- Plans updated during this project's work period show outreach goals becoming more specific, particularly in areas of leadership, coalition building, one-on-one contact in priority areas, collaborative planning with landowners, investment in localized test plots with partners, and communication tools (website; videos) and social media (time, expertise)., though how those activities would be funded or supported with staff time was unclear.
- Fewer outreach and engagement targets are clearly identified in plans than conservation action targets, despite the fact that barriers to success are primarily social.
- Across the board, the quantity and quality of outreach, education, and engagement goals in plans are not adequate to achieve goals.

Challenges & Opportunities

- Agricultural watersheds are trending to farmer led, peer-to-peer, and systematic one-on-one work in small watersheds to engage all landowners and establish new norms, but the trend is in infancy and restricted by short staffing, old habits, program limitations, funding limitations, and need for training in collaborative leadership.
- Local government staff want thoughtful, sustained outreach and cross-sector engagement, but it is the exception rather than the rule due to staff size vs scale of work, unpredictable opportunity and funding cycles, and lack of professional communications/engagement staff and/or training.
- Social media is used increasingly and becoming a valuable asset for building awareness and participation where it is used regularly and well.
- The ambiguous nature of retail crop advisor as both salesperson and nutrient management consultant is known, but in most cases reward systems do not motivate consultants to educate growers about nutrient efficiency.
- Collaborations with agriculture retailers, advisors, suppliers and conservation groups are opening doors in many locations and increasing dialogue and adoption of practices.
- For the most part, local conservation staff do not have training, skills, or time to produce educational materials and tools. They want them, and ask for professional help or support finding a trusted advisor.
- Volunteer monitoring programs are desired but appear to be under promoted and underutilized.
- The value of visible demonstration practices and plots was mentioned in a majority of interviews, yet beyond ag field days this has been pursued in only a limited way.
- Karst is mentioned in almost every watershed plan where it exists, but leaders indicate understanding of impacts is limited.
- In urban areas staff need training and support to develop regulation, education, and enforcement muscle regarding construction and development., and to carry out collaborative initiatives of all kinds.
- Overall, leaders see progress and long-term value in partnerships and collaboration, but need staff time dedicated to cultivating the relationships.

➤ Conclusions

To successfully achieve watershed restoration and protection targets, more attention, status, professional staff, systemic support, and funding for outreach, education and engagement are needed.

Next Wise Steps for Systems Development

- Fund communications, education, and engagement at a scale equal to their importance and the scale of the task.
- Identify which communication, education and engagement tasks are best done by local, regional, and state governments, NGOs, and business, and develop delivery and training systems to support high quality work. Consider regional resource and service hubs as an option.
- Identify outreach assets needed by all major watersheds, such as a high quality video or awareness campaign, and produce for use by all.
- Template essential tools, such as a website with localization options, and provide technical support to make them available to all major watersheds.
- Design delivery systems to promote deeper, longer-lasting program collaborations and staff tenure, to shift culture and sustain benefits.
- Within the watershed management process, ensure all organizations with major leadership and delivery responsibilities are funded to participate in the process, including NGOs, and continue adjusting systems to support open sharing and to discourage power grabs.
- Teach, model, require, and support collaborative leadership and processes, including peer-to-peer learning to expand what is working.

Next Wise Steps for Increasing Involvement & Conservation Action in Southeast Minnesota

- *Be clear. What exactly do we want people to do? Support with local evidence and progress stories of all kinds including many people—not just stars.*
- *Take time. Thoughtfully assess values, needs, realities, and activity patterns of people we want to engage, then plan outreach that fits locally.*
- *Put visible examples of desired practices where people will see them—physically, digitally, and in print. Identify people who can apply the examples, then promote to them with partners.*
- *Quantify benefits of conservation where possible, and communicate them.*
- *Design citizen events to engage people, and host at times of day when attendance is likely highest.*
- *Focus work in agriculture on peer-to-peer learning and systematic one-on-one conversation and support within targeted programs, with small financial incentives to ease the risk of trying something new.*
- *When local collaborations emerge, such as farmer-led initiatives, support them with staff to coordinate work they are ready to lead, to make it happen.*
- *Educate local government elected officials and staff about Minnesota's water management framework.*
- *Build community and social connection around water.*

Appendices

Appendix A

Final Report for "Industry-led Pilot Project to Enhance MDA's MAWQCP Software and Evaluate the Feasibility of Introducing into the Agricultural Marketplace "

Executive Summary
Final Report

Industry-led Pilot Project to Enhance MDA's MAWQCP Software and Evaluate the Feasibility of Introducing into the Agricultural Marketplace

This feasibility study had four distinct components. Component 1 was the enhancement of the existing Minnesota Agricultural Water Quality Certification Program (MAWQCP) fertilizer/nutrient module assessment tool to provide more integration of the process into the precision agricultural practices to make the software modifications and enhancements utilizing a technical advisory team to provide guidance to the MDA software vendor. Component 2 was developing and training a small number of agricultural dealers scattered across Minnesota's BMP Areas to apply the Environmental Risk Assessment Tool (ERAT) to 5000-7000 acres on five farms in each BMP region. After introducing the concept of the ERAT into the Fertilizer Market Place Component 3 evaluated the likelihood that the ERAT could fit into the market place for fertilizer retailers and other ag professionals. Component 4 was the evaluation/assessment process and the recommendations/findings.

The outcome of Component 1 was successful in introducing modifications on the MDA ERAT that enabled the ag nutrient service providers in the study to test and utilize it in conjunction with their precision ag process and digital records. The final ERAT modification was reviewed and approved by the MDA Staff and the MAWQCP Committee. However, the 4 R components recommendations in the ERAT were not approved by the MDA.

Component 2 was accomplished by developing the training program and integration of the ERAT into the Precision Ag process generally utilized by ag retailers according to the input and recommendations of the MCPR Technical Advisory Committee, the Houston Engineering, Inc. (HEI) firm developed the software modifications and based upon a wire frame analysis, and alpha tested by a subset of the committee members. Precision Ag staff from ag retailers in each of the MDA BMP regions were trained and agreed to provide the ERAT process to five farmer customers totaling 5-7000 acres after the December 20 training session. This beta test was to run throughout the month of January ending optimally by January 31, 2018. HEI developed the online survey research component to gather data from the ag retailer nutrient service providers and growers who participated.

Component 3 was modified when it was apparent that few of the participating retailers were completing the ERAT with their growers. The principle investigator reached out to complete the web-based survey by interviewing the retailer staff not completing the ERAT during February 2018. The conclusion demonstrated by the disappointing participation level was that it is not feasible to integrate the ERAT with the precision ag providers in the market place on a wide geographic, industry wide basis. Further, local government officials and participating environmental advocates determined they were not qualified and did not complete the ERAT with their growers with whom they had developed relationships through outreach endeavors. Some evidence was gathered that growers did appreciate the ERAT analysis provided by ag retailers, but the input size was too low to be conclusive. The survey report section in this report

provides interesting observations which might be tested. One suggestion was the development of a payment system for ag retailers and growers which would provide a marketplace incentive to provide increase ERAT participation and reporting. However, the cost and scope of this makes the feasibility of this idea suspect. The other suggestion of some merit was the development of ERAT interns utilizing agronomy students who would be trained and work within the ag retailer locations with their customer growers. This idea was evaluated as a possibility for success because of the acceptance of interns by retailers and their growers. However, MCPR decided that the low utilization of the ERAT in the feasibility study would yield a similar outcome utilizing interns.

MCPR is indebted to the many volunteer hours provided by the MCPR members participating in this feasibility study. HEI and the MDA staff were also very supportive and helpful. The MDA grant made this feasibility study possible and for which MCPR is grateful. Details and additional insight can be gained by reading the entire report.

Bill Bond, Principle Investigator.

Final Report
June 30, 2018

Industry-led Pilot Project to Enhance MDA's MAWQCP Software and Evaluate the Feasibility of Introducing into the Agricultural Marketplace

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Dates:
March 15, 2017 - June 30, 2018

Background:

In response to the continually growing concerns regarding agricultural nutrient inputs affecting water resources, the Minnesota Department of Agriculture (MDA) has developed several programs to help promote and assess Best Management Practices. The Minnesota Ag Water Quality Certification Program (MAWQCP) is one of the programs with tools to conduct field assessments. The MDA_Environmental Risk Assessment tool (herein referred to as "ERAT") was developed and promoted to provide numeric environmental value to various conservation practices and has significantly increased the ability to make sound management decisions.

MCPR assisted MDA in the following related endeavors:

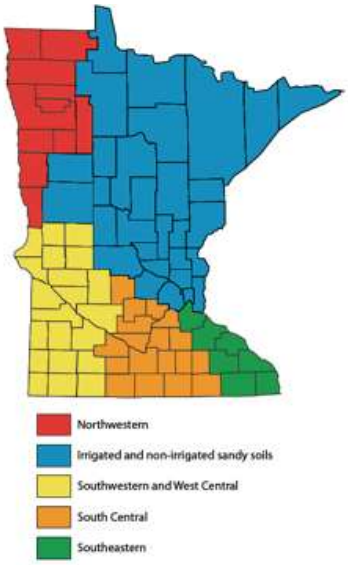
- Refining the ERAT module with increased attention to fertilizer inputs, associated management practices, and environmental risks with emphasis on complex precision ag applications;
- Providing technical guidance to the software developers and MDA to synchronize with existing fertilizer software already being used by the industry;
- Placing the enhanced ERAT process into the hands of the fertilizer dealerships and crop consultants. It is a highly accepted fact that dealerships and consultants are the key information providers when it comes to fertilizer management decisions;
- Using ERAT to capture a wide array of metrics related to advanced fertilizer management. MCPR envisions significant value in this type of information in summarized forms when corresponding with the public with water quality and other environmental issues;

- By using the MAWQCP or the enhanced ERAT, crop production retailers could potentially be in an ideal gateway position to encourage producers to take the next step into the actual MAWQCP program;
- During the business transaction of the fertilizer sales, the incorporation of the ERAT process could be an extremely valuable "teachable moment" between the retailer and the producer. This process could potentially place crop production retailers as key information providers which would be extremely valuable in the general position of BMPs.

This feasibility study had four distinct components. Component 1 was the enhancement of the existing MAWQCP fertilizer/nutrient module. Part of this process was MCPR coordinating with Houston Engineering, Inc. (HEI) which MDA in a separate contract identified as the vendor to make the software modification. In addition, MCPR convened a technical advisory team which included MDA staff, to provide guidance to the software vendor. Component 2 was developing and training a small number of dealers scattered across the state. Component 3 was introducing the concept of the ERAT into the Fertilizer Market Place by evaluating the likelihood that the ERAT could fit into the market place for fertilizer retailers and other ag professionals. Component 4 was the evaluation/assessment process and the recommendations/findings.

Project Area:

The state of Minnesota is divided into five (5) Best Management Regions based on University of Minnesota field research and upon practical consideration. Management guidelines have been developed to assist farmers manage their nitrogen in ways that optimize profitability, reduce risk, and minimize losses of nitrate into surface and ground water. Best Management Practices (BMPs) are voluntary practices that can minimize nutrient contamination of surface and ground water while optimizing production.



MCPR designed and implemented this pilot training program for at least one dealership in each of the five Nitrogen Fertilizer BMP Regions identified in the attached map. Each dealership was recruited with the understanding that they would recruit five farmers and use the ERAT on their fields that will receive nitrogen fertilizer applications during the crop rotation. Fields could include precision agricultural practices, manure applications, and legume crediting. It is anticipated that the enhanced ERAT module will be tested on 5,000 to 8,000 acres in each of the five BMP regions.

Goals and Outcomes:

The enhanced MAWQCP environmental risk assessment tool in the hands of fertilizer retailers may increase the following: 1) Environmental services to the producer; 2) Capture fertilizer metrics; 3) Dialog and promotion of BMPs/4-Rs; and 4) Assist producers interested in eventually getting into the MAWQCP.
MCPR's pilot project develop training for the each of the pilot sites to enable MCPR to report on the feasibility of utilizing the ERAT during the retailer-farmer exchange as part of the "point of sale" discussion, which could provide an extremely important teachable moment. This pilot project would determine feasibility of the crop consultant utilizing this ideal time to evaluate alterations in management practices to improve efficiencies and reduce environmental risks. In cases like these, the retailers become technical support providers while suggesting alternative management practices for environmentally sensitive areas.

Potential Outcomes:

- A methodology for establishing fertilizer management benchmarks which could be used for designing/implementing future educational programs, determining BMP adoption rates as required in the Nitrogen Fertilizer Management Plan, and providing solid metrics
- Ag Fertilizer Retailers becoming a highly creditable environmental services provider;
- Retailers introducing the MAWQCP and taking the preliminary steps with the ERAT may increase the number of producers that desire certification;
- Retailers actively promoting BMPs---increased BMP adoption

Project Activities:

Component 1) Enhancement of the Current MAWQCP's ERAT

- Form a MCPR lead advisory team (with MDA representation) to improve the current MAWQCP ERAT module for capturing complex nitrogen and phosphorus fertilizer management scenarios;
- The advisory team will work closely with MDA's selected software consultant as they refine and complete the revised ERAT software;
- MCPR will work with a small number of retailers which have existing fertilizer management records to test the functionality of the revised tool;
- Once completed, use the enhanced ERAT module for future activities during the life of this feasibility project.

Component 2) Pilot Training and Testing of the Enhanced ERAT Module for the 2017-2018 Cropping Seasons

- Design and Implement a pilot training program that would provide 'one-on-one' training to a small group of participating crop retailers using the enhanced ERAT software;
- Target and deliver training to selected dealership(s) and/or crop advisors/consultants in the five Nitrogen (N) Fertilizer BMP Regions;
- Include complex N management situations such as those using precision agricultural practices;

- MCPR will develop an assessment form for quantifying elements in Component 3. This form would be filled out by the participating retailers;
- Use the enhanced ERAT module with the goal of capturing between 5,000 to 8,000 acres in each of the five BMP regions.

Component 3) Introducing the Concept of ERATs into the Fertilizer Market Place

- Evaluate the likelihood that the ERAT process could fit into the marketplace for fertilizer retailers and other Ag professionals;
- Examine the effectiveness during the ERAT process for creating dialog and action steps for making potential improvements as associated management practices;
- Preliminary assessment of the ERAT process for engaging farmers and implementing behavioral changes;
- Preliminary assessment on the feasibility of increasing the likelihood for participating farmers to enroll into the MAWQCP program;
- Preliminary assessment of producing meaningful metrics characterizing fertilizer management in a format digestible for public consumption.

Component 4) Provide Formal Report to MDA

- Submit quarterly summary reports that include completed tasks/objectives, successes and challenges to MDA.Accounts-Payable@state.mn.us
- Submit quarterly invoices MDA.Accounts-Payable@state.mn.us

Performance measures:

Quarterly reports progress reports are required as part of the invoicing process.

- Report on completion of training materials.
- Report completion of training sessions the pilot program.
- Final report on the project successes and challenges.

Quarterly Reports

First Quarter

Item 1: The lead advisory team was comprised of two consultants retained by MCPR– Bob Schoper and Dean Fairchild. MCPR recruited volunteer technical advisory team members from MCPR cooperating ag retailers' precision ag specialists. Utilizing the review and advice of the technical advisory team the MCPR consultants continued to engage MDA staff to review and improve the ERAT N and P nutrient modules and refining the entire software to make it more useful for ag retail staff in the field and useful for growers considering the MAWQCP. Additional meetings and telephone contact and emails were exchanged. Prior to finalizing the software changes MCPR expressed concern to the MDA that their review process had eliminated the 4 R categories in the ERAT. HEI suggested a possible fix to this dilemma was to color code each of the 4 R categories to achieve the distinction. The 4 R categories were becoming significant in that the MN Agri Growth Council had engaged with The Mosaic Company to

strongly promote the 4 R Certification program developed in Ohio as a program that could report significant acres conforming to 4R Input practices for documenting environmental impact as an industry initiative as compared to a governmental/public sector mandate or voluntary initiative. While MCPR leadership sees the MAWQP as more comprehensive and farm field focused, being able to report in the 4 R practice framework might provide useful if several states adopt the 4 R Certification Program and Minnesota growers concur. However, MCPR still believes the ERAT has more merit than the 4 Certification Program.

Item 2: MCPR Staff and consultants meet with the MDA software consultant to refine and complete the ERAT software. MDA Staff Peter Gillitzer reported the consultation from MCPR to MDA and HEI had resulted in an updated ERAT which was available publicly on MDA's web site for use. The ERAT updates had been reviewed and approved by the MDA AWQCP Advisory Board to complete the process and consultation.

Item 3: The MPCR consultant team and staff met to select and plan training meeting materials, dates and locations for three training meetings. Additionally, a SE MN MDA Watershed project was selected for engagement in the pilot program and an MDA staff, an environmental consultant, and a crop consultant were contacted to be the lead for the pilot project in SE Minnesota. The MPCR consultant team and staff subsequently conducted two training meetings at the MCPR training facility in Maple Grove, MN on June 19 with Ag Partners Coop and on June 23 with CFS Coop and CentraSota Coop agronomy /precision ag staff. More conversations led to a meeting with the SE MN MDA Watershed project which includes an MDA staff, an environmental consultant as the invited lead for the pilot project in SE MN.

2.) ACTIVITIES PERFORMED AND OUTCOMES

Item 1: A strategy meeting was held to develop the most effective and efficient manner of securing ag retailer management "buy-in" to the pilot project in a meeting held with Dean Fairchild, Jessi Brunelle, and Bob Schoper. The meeting was successful in developing the preliminary primary work items to be accomplished and assign duties for the MAWQP ERAT grant. The work sheet submitted envisioned three distinct sets of meetings which immediately were modified based upon Consultants Fairchild and Schoper's recommendation. While the program designer Bill Bond envisioned training materials with three ring binders and extensive handouts, to maximize the impact for the intended audience Consultant Schoper submitted a draft Power Point and described a meeting which would achieve the purposes necessary to accomplish the goals and objectives. Also, a better approach than contacting the target ag retailer General Manager (GM) to set a single meeting for each retailers' GM and management staff, upon Bob Schoper's advice the group modified the plan to a more realistic approach of contacting each participating ag retailer's agronomy manager with budget and staff authority and getting their recommendation and buy in.

MCPR staff were assigned the task of contacting the appropriate agronomy management leader for CFS, Ag Partners, and CentraSota Coops to get their agronomy staff leader recommendations for the first management level meeting. The plan was to meet with all three organizations together by selecting a compatible date for the consultants and MCPR's Executive Director in June and July. Another meeting would engage the agronomy management in a similar fashion for Harvest Land, New Vision, and Central Ag Coops. Finally, the SE Minnesota BMP area would be engaged through a combination of an MDA staff, an Environmental Consultant, and a CCA/CPAg professional and or Ag Partners and CFS Coops covering in the SE MN location and would likely involve a unique meeting with both agronomy/precision ag staff and environmental and local government staff who seemed sympathetic with the agriculturally sensitive approach to the ERAT pilot project. The meeting opened the opportunity for the agronomists, activists, and local government staff to consider utilizing the ERAT with the growers with whom they had develop a relationship in South East Minnesota. However, the outcome was that only the agronomy staff were self-determined to be capable of using the ERAT with the growers. None of the activists or local government staff were able to follow through on the ERAT pilot project by introducing the ERAT directly to growers.

The modified the plan to meet with the agronomy leader with budget and staff authority and getting their recommendation and buy in on the management level contact along with their selected agronomy staff in these first stage of meetings was determined to be the correct adjusted strategy. In the June 2017 meetings each of the agronomy leaders either promised or signaled agreement to authorize their agronomy department to participate in the pilot project. In fact, one manager appeared to be attempting to integrate the pilot project training material into his staff marketing/planning meetings. Subsequently, Bob Schoper and Bill Bond was invited and did present the ERAT training proposal to the Ag Partners agronomy precision ag staff of 30.

The strategy meeting also accomplished the task of developing the calendar which generated the following:

> Stage 1 MCPR staff contacted the Ag retailers and the SE MN consortium in anticipation of setting up the three first stage 1 training meetings which were partially competed in June and with plans set to hold the other two meetings in July 2017.
>
> Stage 2: Completing of the Stage One management meetings in June had the intended consequence of generating support from three of the Coop agronomy departments. Subsequently the appropriate agronomy staff were recruited by their managers to enable the 2nd stage training meetings to proceed from August 15 to September 2017. These are the meetings in which MCPR anticipated the beta

version of the software would be available to access and utilize as part of the Stage 2 training and implementation phase. The SE Minnesota consortium Stage 2 process and beta testing was determined during the Stage 1 training as stated above in that only the Coop agronomists continued the process for training to utilize the ERAT with growers. The beta testing was planned for the September to December 2017 period which will allow MCPR and the consultants to evaluate the experience and the survey results to determine together with the MDA software consultant Houston Engineering what the beta test indicates so that the software could continue to be edited to meet the needs of the marketplace.

Stage 3: During the December 2017 to April 2018 time frame remaining the plans were made to engage the participating Ag retailers and the SE MN Ag Consortium in launching the recruitment phase to cover 5000 to 8000 acres per BMP district as the ERAT is utilized. MCPR staff planned and ultimately engaged HEI to plan the final survey process and reporting results. During the June 2017 training meetings, each Coop participating agreed to supply the 5000-8000 acres envisioned in the grant description.

Item 2: Dean Fairchild and Bill Bond contacted Houston Engineering staff to update them on the revised project plans, calendar, and deliverables. Dean consulted on several occasions with Peter Gillitzer and Bruce Montgomery (MDA) to improve and refine the ERAT software alpha version. Dean and Bill determined that the Houston Engineering contract allowed for an update to the beta version with additional coding and meeting with the ag retailers and the SE MN Consortium. If resources had not been available through the MDA grant to Houston Engineering MCPR planned to reserve budget allocation to enable the software update prior to the Stage 3 implementation.

3.) CHALLENGES ENCOUNTERED, AND LESSONS LEARNED

The concern was identified that the state of Minnesota could become a challenging grantor if the executive and legislative branches of state government could not pass a FY 2018-2029 budget to continue the funding of this grant. MCPR staff followed this development closely but, in the end, did not have to suggest contingences because the State of MN budget was approved by July 1, 2017. Also, the value of retaining a consultant with experience and credibility with ag retailer agronomy and precision ag staff and a working knowledge of the actual decision-making hierarchy in ag retailer organizations was essential in this type of pilot project. Overcoming the oversight of the MDA in the minds of ag retailers and growers would prove to be challenging and could only be overcome because MCPR was engaged and Fairchild and Schoper are developing and leading the training power point and meetings. We learned that the culture of agriculture adult learners resisted the typical professional trainer who would show up at a meeting with large three ring binder training materials and administer long meetings

which could prove to be ineffective. Rather, the agronomy adult learners we were attempting to engage in adopting the ERAT software into their marketing sales program required finesse and wise credible trainers. The result was that during the meetings the agronomy adult learners were engaged and seemed to respond without reservation to the request that they participate in the MCPR pilot project and in adopting the ERAT software into their marketing sales programs. This change in training approach was determined to be a cost-effective decision.

Second Quarter

1.) GOALS AND OBJECTIVES OBTAINED

Item 1: Additional meetings and telephone contact and emails were exchanged as the MDA staff reported that the final ERAT software design did meet MDA's needs and subsequently approved the final draft design. HEI staff were consulted additional times to assist HEI staff in comprehending the crop consultant point of view related to utilizing the ERAT.

Item 2: This component was complete when HEI announced the final version of the ERAT software would be tested with select crop advisors. Significant time was invested which tended to stall the project progress in waiting for MDA to approve approval of the final changes and ERAT reports. Also, the SE MN consortium was discussed as the need to integrate an ag retailer(s) into the ERAT training was determined. The consortium was consulted to determine ag retailer prospects which were determined to total two facilities – CPS Harmony, MN and CHS Grand Meadow, MN. Bill Bond contacted each and determined to include in both facilities in training on September 14 without any additional ERAT engagement directly with growers by the other SE Consortium participants.

Item 3: The MPCR consultant team and staff conducted one training meeting at the MCPR training facility in Maple Grove, MN on July 20 morning with New Vision Coop, Harvestland Coop, and West Central Ag agronomy /precision ag staff. Unfortunately, New Vision staff were unable to attend. Subsequently Bill Bond contacted the New Vision Coop agronomy manager and was able to reschedule New Vision training August 21 at the New Vision Main office in Brewster, MN. On July 20 afternoon MCPR consultant Bob Schoper and Bill Bond met with the SE MN MDA Watershed project which includes an MDA staff, an environmental consultant as the invited lead for the pilot project in SE MN. The pilot project was thoroughly reviewed and determined that the next training meeting would be in SE MN and involve the MDA staff, the environmental consultant, and both SE Ag Retailers identified based on Bill Bond's recommendation. After consultation, the next phase of the training in which the beta software version is provided on the MDA web with each agronomy staff engaged in the

program attended a mid-November training session operated primarily by HEI to all the staff at the MCPR Maple Grove facility. Rather than the individualized training at each Coop site, everyone involved determined the single training session after fall harvest and crop input activities and prior to the year end was preferred. On September 14, Bob Schoper and Bill Bond attended a training meeting at the Ag Partners Coop headquarters in Goodhue, MN in which 30 agronomists attended. Bob and Bill were able orient the entire agronomy/precision ag staff on the MCPR ERAT pilot project and the opportunity to engage in digitally documented Sustainability through the ERAT. In addition, discussing the MDA BMP regions, it was interesting to note that not everyone seemed to be familiar with all the BMPs for the region. In the September 14 meeting in Rochester Chad Phillips and another agronomist attended from CPS Coop in Harmony and Paul Trcka of CHS Grand Meadow attended. In addition, Kevin Kuehner of MDA attended, and Sheila Harmes**,** Winona County Water Planner, and Nancy Woods attended and set up the meeting room at the Rochester Public Library. While CHS Coop is not participating in as a corporation in the MCPR ERAT pilot project, the potential participation of Paul Trcka of Grand Meadow CHS was determined to be very helpful in connecting with the Executives at CHS Coop.

Upon follow through with New Vision, the Agronomy manager related that he had decided NOT to participate in the ERAT pilot project. A follow through contact was made to learn what went into their decision and to determine what incentives would attract participation in the future. The New Vision staff reported that the ERAT was not a strategic objective of their organization and that agronomy staff determined that the grower customers were not interested in the project. A payment system might be an avenue their organization would consider but the system would have to provide financial incentives to both the Coop and the grower and assure data confidentiality. Bill Bond also followed through with Sheila of Winona County to suggest that we are interested to learn if her relationship with farmers in the watershed project she has been working on could translate into recruiting a farmer or group of farmers to participate in the ERAT pilot project. To date, only the ag retailers have agreed to utilize the ERAT software and none of the consortium Rochester area folks not employed as agronomy/precision ag practitioners have communicated a way forward in which they directly engage and complete the software with the growers they bring into the project. One might surmise that environmental and local government water quality advocates will be on the sidelines when the actual data collection efforts begin.

Third Quarter

1.) GOALS AND OBJECTIVES OBTAINED

Item 1: The MCPR technical advisory team reviewed and improved the ERAT N and P nutrient modules and refining the entire software to make it more useful for ag retail staff

in the field and useful for growers considering the MAWQCP. Subsequently MDA reported the final ERAT software design meets MDA's needs and approved the final draft design.

Item 2: MCPR contracted with HEI to design an online survey using the Monkey Survey web-based program. Two surveys were developed: 1) is to be completed once by each staff from the participating ag retailers to state their opinions about the effectiveness and acceptability of the ERAT process and 2) the other survey is to be completed by the crop advisor in the presence of each grower during the meeting between the crop advisor and the grower recording the grower reaction to each meeting. The survey results were designed to be submitted online and tabulated by HEI. HEI was to report to MCPR retailer and grower reaction to the ERAT.

Item 3: Two training sessions were held on December 20 with faculty including Bill Bond, Brian Fischer, Peter Gillitzer, Bob Schoper, Dean Fairchild, and Brad Redlin of MDA. The programs were three hours in length and lunch was shared by all participants in the morning and afternoon training. Competitor concerns were addressed by insuring sensitive relations were isolated by alternating training to morning and afternoon. The content of the training sessions and attendees are in Addendum A.

3.) CHALLENGES ENCOUNTERED, AND LESSONS LEARNED

Anecdotally, one participant suggested the training session was too elementary for some of the advanced precision staff attending and, but another expressed the concern that the content might prove very challenging for others who were not as proficient on the precision ag software. Live training is perceived as mandatory to enable questions and answers. Ultimately, the conclusion was that the training was very effective and appropriate for the attendees.

Fourth Quarter

1.) GOALS AND OBJECTIVES OBTAINED

Item 1: Enhancement of the Current MAWQCP's ERAT

- A notable change in the metrics of the MAWQCP score reflected the alternative mission and intentions of the ERAT pilot project. The decision process engaged Peter Gillitzer, MDA, and HEI to adjust the ERAT score downward so that an assessment score for a grower performing the current U of MN B.M.P.'s would achieve a score of approximately 5.5 out of 10 rather in contrast to the MAWQCP score of a farm using the same practices to approximately 7 out of 10. The goal was to motivate retailers and their growers to consider additional advanced agronomic practices which were feasible for their farm. This decision may have had some impact on the ultimate low participation of

the retailers and their growers applying the ERAT. The principal investigator reviewed this idea with the advisory team and reported conclusions in the final report.

- The resulting enhancements for the ERAT were reviewed by the MDA staff and MDA MAWQCP Advisory Board and approved. The updated ERAT was modified by HEI and placed on the MDA MAWQCP web site for public use. The modified ERAT metric for the MCPR Pilot project was accessed by the pilot project participants. A substantial development in the MDA BMP standard was the "adaptive management" option which was well received by the ag retailer participants. The MDA agreed that a departure from the MDA adopted B.M.P.s should be available to growers who developed field trials over three years to document and justify higher rates of N application. The MDA accommodation addressed agriculture concerns that University of Minnesota BMPs were not realistic in high production grower systems and the precision ag systems operating field trials could demonstrate and justify through metrics N rates higher than the current BMPs.

Item 2: **Pilot Training and Testing of the Enhanced ERAT Module for the 2017-2018 Cropping Sessions**

- Having previously reported on the development and performing the ERAT training sessions held on December 20, the informal feedback combined with the survey research on the training effectiveness leads us to conclude that generally the training was very effective, and all questions and concerns were answered. In addition, the project design that participating retailers and agronomists apply the enhanced ERAT module with the goal of capturing between 5000-8000 acres from 5 growers to include the five BMP regions in Minnesota was clearly articulated and seemed acceptable to all participants.

- Follow up calls to participants confirmed that any concerns of overly simplistic detailed explanations of the ERAT mentioned in the previous report was not shared by most participants.

- HEI did report some issues with field boundaries in applying the ERAT in the pilot project.

- Given the low participation, some might ponder if the original training plan to train the participants at their facility would have been more effective than the training session centralized to two meeting of 3 hours each at the MCPR offices. However, the consultants are concluding that a training session at one of the facilities for all the agronomy staff did not appear to change the ultimate engagement of that facility. Furthermore, the consultants offered upon request to perform specific training sessions in each of the participating facilities immediately after the MCPR office training sessions and yet not one facility requested the additional facility training.

- HEI was engaged to develop a web-based survey assessment which was reviewed, edited, and finalized by the project consultants and principle investigator. The instrument utilization was clearly explained and documented in the training material and in the training session to ensure all participants were comfortable with the survey instrument. The final design was a HEI operated web-based survey which each participating nutrient service provider was to complete online once the ERAT had been utilized with their participating growers. The other evaluation process engaged the nutrient service providers to administer and complete the online survey with the grower after the completion of the ERAT during the consultation with the grower. This was also clearly explained, and any questions were answered during the training session. Additionally, HEI offered to answer and address any issues or questions that might occur during the project implementation with their growers through follow up phone contact. See Addendum B for the Survey questions and results.

- The participants were charged with completing the ERAT and survey assessment process by January 31, 2018 which seemed also acceptable to all involved during the training sessions.

- The primary investigator was disappointed and surprised that very few of the participants completed the project as described above. Ultimately, the principle investigator after several email requests in February and March gave up on participants completing the project and contacted each of the participants to attempt to learn and report the reasons behind the low participation.

- During the phone survey, the principle investigator completed the web survey during the interview process, thus utilizing the web-based survey format for final calculations and reports to assist in making conclusions about this outcome. However, few growers' surveys were completed by participants.

- Consultants have concluded that the training was not a factor in the lack of follow through by the ag retailers/nutrient service providers.

- The consultants also concluded that lack of understanding of the MDA BMP's was NOT evident before, during, or after the training. The nutrient service providers understand the BMP's. Knowledge and lack of interest were not the limiting factors in the outcome of the project.

- Concern about evaluations and where the data will go and who will review it seemed to be a factor with some growers and ag service providers.

Component 3) Introducing the Concept of ERATs into the Fertilizer Market Place

- The preliminary conclusion is that the likelihood is low that the ERAT process could fit into the marketplace for fertilizer retailers and other Ag professionals given the process utilized in this pilot project based upon survey results.

- Anecdotal comments and reported intentions provided some evidence that the ERAT process was effective for creating dialog and action steps for making potential improvements on advanced management practices and was well accepted by some of the growers as an indicator of their farm's general comparison to the BMP standards.

- Frankly, one participant reported that the honest application of the ERAT yielded farm field scores around 4 of 10 score which was discouraging yet enlightening to the participant and their growers. This raises questions about further exploring and research should be considered to determine if the current MDA BMPs are appropriate for some areas of Minnesota farmland, particularly the Red River Valley.

- Anecdotal comments gave rise to the hope that the ERAT process was useful for engaging farmers related to their environmental impact and could assist in implementing behavioral changes in farming practices and environmental sensitivity.

- Some comments lead to the idea that a few growers might consider the feasibility of enrolling into the MAWQCP program but too few growers were engaged to make this conclusive.

- Another preliminary conclusion of the ERAT producing meaningful metrics characterizing fertilizer management in a format digestible for public consumption is that the ERAT could be useful if it was utilized, however, low participation makes any conclusions speculative.

- Conclusions about the likely changes necessary to create an incentive to integrate the ERAT process into the ag retailer precision ag culture and market were evaluated. Among the possible considerations are an infusion of public dollars to enhance retailer ROI on the ERAT process, and the integration of agronomy student interns into selected participating retailer organization to implement the ERAT as a pilot project which could be scalable.

- One positive was the pilot project created an avenue of communication and understanding between the MDA and participating ag retailers.

Survey Results

BACKGROUND AND PURPOSE

MCPR contracted with Houston Engineering, Inc. (HEI) to compile a survey for use in evaluating the performance of the pilot program, and to analyze and report on the results of the survey. This project was conducted to report on the results of the pilot program through retailer and farmer customer surveys. The specific objectives of this survey were to:

1. To complete an electronic survey of each retailer staff who was trained and used MDA's Environmental Risk Assessment Tool (ERAT) web-based software to learn their options about ease of use, suggested changes, their perception of the adaptability of this for their future grower interaction and marketing, their comfort with use of the U of MN MDA BMP's as part of the ERAT presentation, their opinion about the grower's attitude about the ERAT.

2. Through the assistance of crop retailors, determine if growers see a benefit to the ERAT scoring, and how many of these growers would consider participating in the Minnesota Agricultural Water Quality Certification Program.

To achieve these objectives, training was provided by the MCPR to Crop Retailor ERAT Program participants to ensure they had the training needed to operate the ERAT and conduct the survey. They survey questions have been provided in **Appendix A**. The results of the survey and conclusions and recommendations based upon the survey responses are as follows:

SURVEY RESULTS

The survey results have been summarized within the body of this technical memorandum. The full results have been provided in **Appendix B** and **Appendix C** for the Crop Retailor Survey and Farmer Survey, respectively. In general, MCPR and HEI had hoped for a higher number of survey responses. There were only three surveys completed, independently, by crop retailers and six surveys for farmers. The MCPR conducted four phone interviews to increase the number of survey responses from Crop Retailors. Therefore, the results are described for all Crop Retailor Survey responses, independently completed Crop Retailor responses (i.e., three surveys), Crop Retailor responses completed through a phone interview with MCPR (i.e., four surveys), and Farmer Survey Responses.

CROP RETAILER SURVEY

Survey feedback was gathered from North Western, Western, South Eastern, Central, Southern, and South Eastern Minnesota, providing a good representation of the agricultural areas of Minnesota. The average acres within the service area of respondents was about 660,000 acres with an average of 117,500 of those acres utilizing precision agricultural services. Those Crop Retailers that completed the survey independently (i.e., without a phone interview from MCPR) averaged 6,450 acres participating in the pilot ERAT program. Those Crop Retailers who filled out the survey through an interview with MCPR had zero acres participating in the pilot ERAT program. Based upon feedback received during the phone interview process, it was apparent that completing the pilot program with farmers would consume enough time and resources that Crop Retailers would need additional support to make a program like ERAT part of their business operations.

The Crop Retailor survey also revealed that the majority of Crop Retailors do not agree with the University of Minnesota (UMN) Nutrient best management practices (BMP) for their region. The reasons included lack of longer term economic consideration, not a large enough range of BMPs, lack of soil grid sampling, and lack of sufficient BMPs for P and K. While UMN BMP recommendations were not widely used, all the Crop Retailer Survey respondents indicated that their customers were already using the BMPs described in the ERAT pilot program, and that their clients were aware of fertilizer source credits for BMPs on corn and soybeans. Across all respondents, this included an average of 80% of Crop Retail customers using nutrient rate BMPs and 70% using nutrient timing BMPs.

All but one of the Crop Retailor respondents indicated that their customers either reacted positively or had a neutral reaction to the ERAT pilot program. The same general response, positive or neutral, was given to the value added to Crop Retail Business from the ERAT pilot program. The Crop Retailors written responses seemed to indicate that the biggest obstacle wasn't the program itself, but rather the time needed to complete the ERAT program paired with a lack of direct business incentive for completing the assessment. This would suggest that if a business-based value proposition was available to Crop Retailors for participating in the ERAT program, that farmers would be open to having their Crop Retailor fill the role of delivering this information. This conclusion was supported by responses indicating that, in general, the ERAT was easy to use and easy to understand but did require a fair amount of time to prepare for and complete.

Very few scores were reported from the ERAT pilot program. However, respondents did comment that in some instances the information provided may encourage farmers to reconsider their current practices for more advanced BMPs. In addition, respondents all agreed that training sessions were helpful in demonstrating how to use the tool and that, in general, using the ERAT tool made it more likely that Crop Retailors would encourage their agronomy staff to participate in the Minnesota Ag Water Quality Certification Program (MAWQCP). Most respondents also indicated that their agronomy staff may utilize the ERAT program in the future with their farmer clients. At the end of the day, Crop Retailors indicated that the farmers bottom line was the biggest driving factor in decisions around implementing recommendations around conservation.

FARMER SURVEY

Six farmers surveys were completed as part of the ERAT pilot program, including responses from North Western, Western, and South Eastern Minnesota. On average, the respondents farmed 2,164 acres and all had familiarity with and follow the Minnesota BMPs within their area. Most of the farmers participating in the survey either agreed or had a neutral response on the usability of the ERAT program and all respondents were either neutral or disagreed with being likely to participate in the MAWQCP. However, over 30% of respondents indicated that the information from the ERAT program led them to considering alternative nutrient management practices.

SURVEY CONCLUSIONS AND RECOMMENDATIONS

While there where challenges in getting Crop Retailors to complete the surveys, the responses received provided a few key conclusions:

- There is public value in having the Crop Retailor network engage in conservation conversations with their farmer clients as the survey results suggested this often led to considering more advanced BMP alternatives
- There needs to be a monetary value proposition for the Crop Retailors business to support the time and energy needed for Crop Retailors to engage in programs like ERAT or MAWQCP
- Harmonizing programs, like ERAT, with existing private tools already utilized by Crop Retailors will provide a more streamlined approach to empowering Minnesota Crop Retailors to engage in conservation conversations with their farmer clients

Final Grant Project Conclusion and Recommendations

The participation of the members of the Minnesota Crop Production Retailers (MCPR) in the process of developing and training the agronomy service providers (ASP) through the 12 months traveling at their own expense to meetings primarily in the Maple Grove MCPR offices demonstrated a commitment and determination to the process. Two retailer organizations dropped out of the study primarily related to staff turnover or marginal interest reported by the growers' customers/or agronomy /fertilizer staff.

The survey report above details the actual response of the ag retail participants who completed the ERAT training and committed to the implementation challenge of applying the ERAT to five farm customers and covering 5-8000 acres farmed.

One must understand that the retailers were preselected as those who demonstrated an interest in the environmental impact of agronomy services. Furthermore, each retailer participant worked in an agronomy department with a history of providing advanced precision ag services on thousands of acres for as many as 10 years and more. These retailers represent the more advanced agronomy practitioners in commercial retail ag in Minnesota.

The growers selected to utilize the ERAT these participating retail staff were also selected based upon the growers past interest and demonstrated commitment to good agronomic practices for several years.

These retailers and growers represent the top tier of agribusiness and grower practices in Minnesota. The principle researcher must conclude that the knowledge, commitment, and skills were not an issue in the result of the pilot project. Furthermore, the knowledge of and utilization of the University of Minnesota BMPs for N and P nutrient application and utilization was demonstrated throughout the meetings and training for the ERAT.

The primary reason for the low actual follow through was a surprise and disappointment. Apparently, the crush of several competing agronomy and precision ag programs combined with increased economic vitality pressures due to low commodity prices were factors in the lack of follow though. In addition, mergers and acquisitions and staff turn over in a highly volatile and competitive agronomy staffing environment created an inability for highly trained and committed staff to do what they intended and committed to complete.

Evidence emerged of the anticipated ag retailer influence on the grower N and P application and the consideration of using advanced agronomy practices. Further evidence emerged that growers did respond positively to the retailer advice about metrics of the grower environmental impact and suggested advanced agronomic practices were well received and considered.

However, most retailers in the pilot project simply did not complete the ERAT on 5 farms and 5-8000 acres. These retailers provided a strong message on their utilization of the ERAT fits in in their competitive market place. In a word, it did not fit. Questions about what would have made the ERAT a more desirable program with the participating retailers remain unanswered, except for those who did complete the ERAT assignment and survey.

Two final recommendations emerged from the pilot project.

- Any further efforts to integrate the ERAT process into the ag retailer precision ag culture and market place should consider the infusion of public dollars and/or non-governmental agency dollars into a pilot project in a well thought out and tested payment system which will provide a fair and equitable payment for services which will appropriately enhance retailer ROI on the ERAT process for the ag retailer and the grower. Absent this payment system which should be tried and tested, only one other suggestion is advanced as follows:

- The suggestion from one of the ag retailers who wanted to participate in the ERAT implementation with their growers but was unable was the development and integration of agronomy student interns into selected participating retailer organizations which may be a way to integrate the implement of the ERAT as a pilot project which if successful, could be scalable. After evaluation, the notion that agronomy interns who are well accepted individuals by both ag retailers and growers is a strategy which could prove successful and should be attempted as another method to integrate the ERAT into their market place. A significant number of two-year agribusiness agronomy and precision ag programs exist in Minnesota and a significant market and competition for qualified ag interns has developed. Training these interns on ERAT and moving them into the ag retailers to interact and use the ERAT with growers may prove to be a very successful method of addressing ag retailer organizational and/or grower reticence and resistance. However, upon consideration of pursuing the agronomy internship strategy, the MCPR decided the participation results of this pilot project indicate the internship program will be unlikely to succeed.

Appendix B

Pre-Training Session Survey for Participating Managers

Pre Training Session Survey Mgrs

1. How familiar are you with the MN Nutrient Best Management Practices (BMPs) for your service area?

   Not at all 1 2 3 4 5 Very

2. Estimate how often your organization agronomy staff utilize the MN Nutrient Best Management Practices (BMPs) in advising grower customers about N and P application?

   Not at all 1 2 3 4 5 Always

3. How familiar are your agronomy staff familiar with the Nutrient 4 R's (Right Source, Right Rate, Right Time, Right Place)?

   Not at all 1 2 3 4 5 Very

4. Does your organization agronomy staff utilize the 4 R's in advising grower customers about N and P application?

   Never 1 2 3 4 5 Always

5. How familiar are you with the MN Department of Ag (MDA) MN Ag Water Quality Certification Program (MAWQCP)?

   Not at all 1 2 3 4 5 Very

6. How much does your organization routinely encourage your customers to participate in the MAWQCP?

   Never 1 2 3 4 5 Always

7. Are you aware of the number of your grower customers who are MAWQCP certified?

   Yes No If yes, how many?

8. Does your organization participate in any other sustainability or environmental stewardship programs such as Field to Market FieldPrint projects? If yes, please list the projects you are in:

9. Does your organization provide Variable Rate Technology (VRT) Application of Crop Nutrients?
   Yes No Comments

Appendix C

Agendas for MCPR Environmental Risk Assessment Tool Training

MCPR Environmental Risk Assessment Tool Training

Agenda

9 AM-12 noon

(includes lunch at noon with afternoon training particpants)

December 19, 2017

9 AM **Introduction** – Bill Bond, MCPR Executive Director

9:10AM (everyone online) **Introduction to Software** – Brian Fischer, Houston Engineering, Inc.

9:45 AM **Software Demo** – Peter Gillitzer, MDA

10:45 AM **Process with Grower** – Dean Fairchild, Bob Schoper, Brian Fischer

- Preparation for Grower Meeting
- N and P
- Multiple Entry-what ifs – the score?

11:30 AM **Survey Management** – Houston Engineering with Bob and Dean assist

- Agronomists/Crop Advisors
- Growers

Ag Water Quality Certification - MDA

Q & A

12 noon **Adjourn - Lunch**

MCPR Environmental Risk Assessment Tool Training

Agenda

12 PM lunch

1 PM– 4 PM Training

(includes lunch at noon with morning session participants)

December 19, 2017

12 Noon **Lunch Provided**

1 PM **Introduction** – Bill Bond, MCPR Executive Director

1:10 PM (everyone online) **Introduction to Software** – Brian Fischer, Houston Engineering, Inc.

1:45 PM **Software Demo** – Peter Gillitzer, MDA

2:45 PM **Process with Grower** – Dean Fairchild, Bob Schoper, Brian Fischer

- Preparation for Grower Meeting
- N and P
- Multiple Entry-what ifs – the score?

3:30 PM **Survey Management** – Houston Engineering with Bob and Dean assist

- Agronomists/Crop Advisors
- Growers

Ag Water Quality Certification - MDA

Q & A

4 PM **Adjourn**