



STAR ANNUAL REPORT

IMPROVING CONSERVATION ONE FIELD AT A TIME

CROP YEAR 2021



A letter from the STAR Steering Committee Chairman

It's a GREAT time to be a Conservationist!

I have used this tagline many times, but the demand for what we do as conservationists continues to grow. Upcoming generations are growing eager to support transparent and honest companies about their environmental impact, with clear plans to improve. Government leaders also understand the grave importance of safeguarding natural resources.

Agriculture is not immune to this wave sweeping the country. Even here in my home of Central Illinois, with our wonderful resource of flat lands and black soils, local lakes and marinas struggle to keep heavy siltation at bay. Further downstream, the Gulf of Mexico's "Dead Zone" is 5,364 square miles this year...on par with the 5-year average, although the goal is to shrink the dead zone by 45%.

Is there a bridge between our current reality and (at times) daunting goals? The STAR initiative is uniquely positioned to highlight pragmatic solutions to local natural resource concerns. STAR invites producers to take stock of their current practices in relation to locally identified resource concerns, and then track their continuous improvement. Because of this unique approach, interest in the STAR initiative continues to grow nationally.

On behalf of the STAR steering committee, I am honored to bring you the STAR 2021 Crop Year annual report.

Contents

Letter from the Chairman.....	2
STAR Program Overview.....	3
STAR Year in Review.....	4
STAR Web App.....	4
STAR Collaboration.....	5
STAR Affiliates.....	6
STAR Activities.....	8
Message.....	8
STAR Results.....	9
IL STAR Results.....	10
Practices.....	11
Outcomes.....	12
2021 STAR Awards.....	13
Meet the STAR Team.....	14
Appendix	15
2021 Field Form and FAQ.....	15
Methodology.....	21
STAR Structure.....	24



Steve Stierwalt

STAR Steering Committee Chairman
Champaign County SWCD Board Chairman
Champaign County Farmer
NACD Executive Board North Central Region Representative
Sadorus, Illinois

STAR Office Contact Information:

info@starfreetool.com | (217)352-3536 ext. 3 | www.starfreetool.com



STAR Program Overview

In 2016, the Soil and Water Conservation District (SWCD) in Champaign County began to explore ways to encourage farmers in Champaign County, IL to adopt conservation practices identified in research to reduce nutrient losses into waterways in support of the Illinois Nutrient Loss Reduction Strategy (NLRs).

This led to the development of STAR, an initiative that educates and encourages farmers, ranchers, and landowners to employ conservation management practices that improve water quality and soil health. STAR evaluates an individual field for a given crop year that includes practices such as cover crops, nutrient management, and tillage.

STAR is also a tool for industry to demonstrate the progress and status of how farmers are delivering sustainable solutions. Field-level STAR Ratings clearly communicate sustainability information and progress and can be aggregated at county, regional or state levels for various audiences. When implemented alongside other programs, a STAR Rating provides an easily understood 'scorecard' that serves as a transferable metric.

The expertise of the Science Advisory Committee, including university researchers and other experts, ensures that STAR accurately captures nutrient loss reductions and impacts on agriculture resources. Fields are then ranked on the 5-STAR scale, and participants can receive a sign for their fields to identify their STAR designation. Roughly 10% of fields undergo a verification process to validate their field evaluation.

The initiative has been recognized nationally and adopted by SWCDs in Illinois, Iowa, Colorado, Missouri, and Indiana. STAR is organized into committees of governmental, non-governmental, and nonprofit partner organizations and farmers to implement and expand the initiative. These conservation-minded partners make up the following committees to ensure STAR is efficient and effective in its goals to improve water quality in the state:

- Steering Committee
- Science Advisory Committee
- Outcomes and Alignment Subcommittee of the Science Advisory Committee
- Communications Committee
- Market Development Committee
- Training and Education Committee
- Evaluation and Verification Committee

We'd like to thank the following partners who serve on committees for their support and work developing, promoting, and implementing STAR:

- American Farmland Trust
- Archer Daniels Midland Company
- Association of Illinois SWCDs
- Certified Crop Advisers
- Centrec Consulting Group
- Champaign Co. SWCD
- Champaign Co. Farmers
- CHS, Inc
- Coles Co. SWCD
- DC Analysis, LLC
- DIGS Associates
- Illinois Corn Growers Association
- Illinois Department of Agriculture
- Illinois Fertilizer and Chemical Association
- Illinois Nutrient Research and Education Council
- Illinois Soybean Association
- Kankakee Co. SWCD Director
- McHenry Co. SWCD
- Natural Resources Conservation Service Illinois
- Piatt Co. SWCD
- Precision Conservation Management
- The Nature Conservancy
- University of Illinois
- University of Illinois Extension
- Wabash Valley FS

Year in Review (CY21)

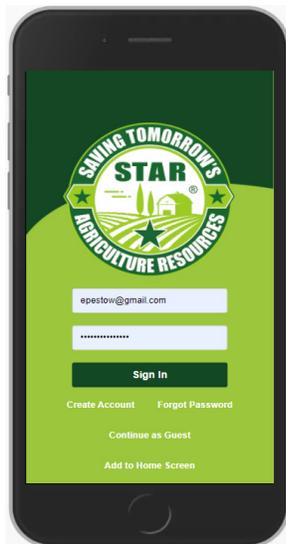
STAR Web App

In July 2021, STAR (Saving Tomorrow's Agricultural Resources) launched the STAR Web App, offering farmers and landowners an intuitive and simple way to document STAR Ratings for their fields. The STAR Web App is a progressive web application with smart, accessible navigation, has the ability to work on both large and small screen devices, and be downloaded as an App icon.

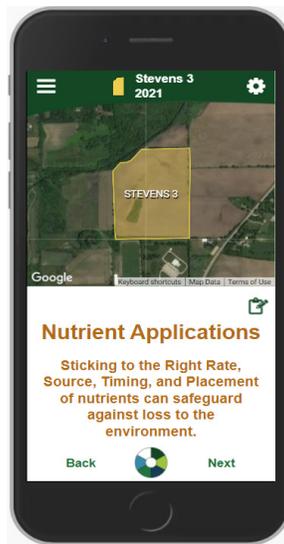
Once farmers or land owners enter their STAR field form information, the STAR Web App provides the users with clear, concise evaluations of their field management. Additionally, it automatically identifies practices to increase a field's STAR Rating, providing a clear path to improved STAR Ratings with resources and local technical assistance.

The STAR Web App connects farmers and land owners to local conservation district staff who equip them with knowledge of conservation management practices. Local STAR Licensees have access to their territory's STAR data to identify farmers for financial programs and track yearly improvement.

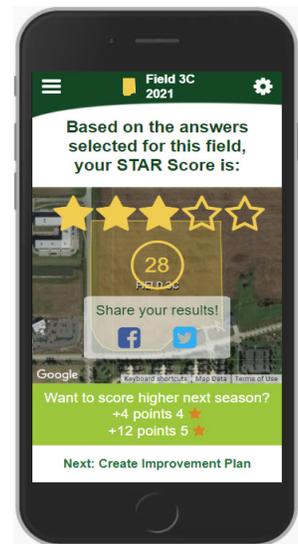
Over the course of Crop Year 2021, STAR collected feedback from STAR Participants and STAR Licensees to learn how to best continue enhancements and develop new Web App features. We look forward to launching into Crop Year 2022 with new tools in the Web App for farmers and licensees.



Sign In Page



Nutrient Management Guidance



STAR Score and Improvement Plan

STAR Collaboration

Over the course of Crop Year 2021, STAR partnered with organizations and projects to inform and advance the adoption of conservation practices.

Soil Health Policy: Developing Community-Driven State Soil Health Policy and Programs, Yale Center for Business and the Environment's Regenerative Agriculture Initiative

In 2021, STAR staff members, Erin Gundy and Bruce Henrikson, were invited to speak with now authors of "Soil Health Policy: Developing Community-Driven State Soil Health Policy and Programs" to inform them of soil health program structures, conservation adoption progression and barriers, and to learn more about STAR's programmatic structure. The discussion provided additional direction to their guidebook creation, which hosts recommendations for creating soil health policy across the U.S. and lists programs, including STAR, that currently promote conservation, soil health, water quality, etc.



<https://bit.ly/3mxBRli>

Soil Health Incentive Program (SHIP)

Led by The Conservation Fund and Delta Institute, the CCSWCD delivered a pilot Soil Health Incentive Program (SHIP) in Champaign County to provide payments to producers for capturing greenhouse gases (GHGs). The project's goal was to develop a set of recommendations for how a state-level organization could deliver a successful climate payment program across Illinois. Partners analyzed soil health programs in other states to develop the pilot structure. Farmer and landowner applicants were required to complete STAR for each field enrolled. An aggregated summary of practices was given to the project team to help compile the recommendations report that rounded out the project.



<https://bit.ly/39jZqL6>

Pay-for-Performance Pilot Program

In partnership with companies up and down the supply chain involved in the Midwest Row Crop Collaborative, STAR developed a method for merchandisers and grain buyers to incentivize conservation through the use of STAR, by rewarding farmers that improve and/or maintain a high STAR Rating. Throughout the first year of the pilot, STAR developed the Consumer-Packaged Goods (CPG) Engagement Guide that details this process, providing a road map to companies that want to encourage conservation through the purchase of their raw ingredients.



<https://bit.ly/3Qeoynj>

Partners for Conservation Program

The Illinois Department of Agriculture also sees the value of STAR as a means to better track the practices and outcomes of their Partners for Conservation (PFC) program, requiring 2020-2021 PFC cost-share contract holders to fill out a STAR evaluation. Participants filled out 373 STAR evaluations through the PFC program, which is administered through Soil and Water Conservation Districts throughout the state.

STAR Affiliates

Statewide organizations with values and goals to provide outreach, education, and capacity for conservation programs can qualify to become a STAR Affiliate and administer STAR on a state level. Upon executing a Memorandum of Understanding with STAR, the STAR Affiliate develops a Steering Committee and a Science Committee to pinpoint their local resource concern(s), develop their state's STAR evaluation, and create a structural plan to administer STAR via local technical staff throughout their state or region.

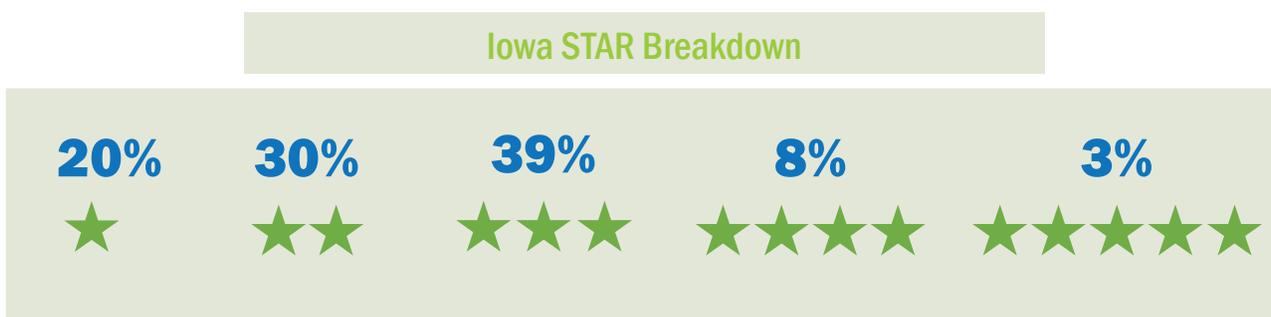
The Illinois Steering Committee guides STAR Affiliates in the development of their state's STAR initiative. It is critical, however, that local experts and farmers play a lead role in advising STAR Affiliates to adapt STAR to their unique eco-regions.

Colorado STAR and Iowa STAR both implemented Crop Year 2021 and have shared updates below. Moving forward, STAR will provide more detailed STAR Affiliate results in future STAR Annual Reports as the number of STAR Affiliates grows.

Iowa STAR

The Iowa STAR initiative was launched for the 2021 sign-up year through the Conservation Districts of Iowa (CDI). The pilot territory covered 25 conservation districts and collected a total of 94 STAR field submissions, covering 10,421 acres.

Each district that administered STAR received an email outlining the program, a sample fillable press release for local media, and an explanation of the reward system that CDI proposed for each participating district. The reward system offered \$100 for each field form the local district helped enroll in the program. CDI expended a total of \$7,300 in reward funds to the participating districts.



Colorado STAR

The last two years have seen the STAR program come to Colorado through a stakeholder process and the development of a state soil health program based on STAR. The Colorado Collaborative for Healthy Soils was a process that involved more than 250 stakeholders and resulted in passage of HB21-1181 and SB21-235, which authorized and funded the launch of a state soil health program based around STAR. Colorado Department of Agriculture (CDA) then wrote several grant applications to launch STAR for Colorado and now administers the program.

Any farmer or rancher in Colorado may now go on the CDA website to fill out a Field Form and receive a STAR Rating. STAR Field Forms have been developed for 11 types of production and free soil health tests are available for the first 100 participants. CDA is now scoring field forms and will conduct the verification process for the first time this winter.



State stimulus funding and additional grant funding have also enabled the launch of the STAR Plus program. As part of STAR Plus, CDA is partnering with 20 conservation districts and eligible entities to provide financial and technical assistance to producers as they implement new practices on one field over three years and consider adopting them across their operation.

Participants gain familiarity and expertise with new practices and an increased understanding of the environmental and economic outcomes associated with them. STAR Plus also provides significant capacity support, equipment grants, training and other support to conservation districts and eligible entities so that they can provide technical assistance to landowners where and when they need it in a new way. These partners provide the trusted local support and knowledge to ensure producer success.



Colorado STAR team installing soil moisture probe

Colorado is excited about STAR becoming the framework for our state soil health program. The strong partnership between Illinois and Colorado has enabled a successful launch of the Colorado STAR program in the first year. Conservation districts, farmers and ranchers, and others are curious and enthusiastic about STAR. There are 131 participants in STAR Plus, and an additional 100 farmers and ranchers are expected to receive a STAR Rating this year.

STAR Activities

Education and outreach are vital components of STAR. Just as important as the promotion of STAR was the number of presentations focused on soil health management systems. Education on the practices known to provide effective nutrient loss reductions while also increasing on farm resiliency is requisite to the long-term benefit of STAR.

Date	STAR Presentations and Displays	Location	Attendees
2/3/2021	Virtual Shop Talk	Webinar	80
2/3/2021	STAR Brunch 'n Learn Series	Webinar	32
2/4/2021	STAR interview - WHOW	Radio	
2/11/2021	STAR interview - Yale School for the Environment's Soil Health Guidebook	Virtual	5
3/3/2021	STAR Brunch 'n Learn Series	Webinar	44
5/12/2021	Land Use Council Region 11 Meeting	Albion, IL	20
7/7/2021	STAR Brunch 'n Learn Series	Webinar	35
7/14/2021	AISWCD Summer Conference	Springfield, IL	100
7/25-7/27/2021	NACD Annual Meeting	Chicago, IL	300
8/4/2021	STAR Brunch 'n Learn Series	Webinar	35
8/26/2021	PCM Soil Health Field Day	Gifford, IL	30
8/31/2021	The Pasture Project Field Day	Elkart, IL	40
9/1/2021	STAR Interview - Dana Cronin, Illinois Public Radio	Podcast	
8/31-9/2/2021	Farm Progress Show	Decatur, IL	500
9/8/2021	Regenerative Grazing Field Day	Gays, IL	30
9/10/2021	Big Ditch Watershed Meeting	Rantoul, IL	12
9/21/2021	STAR Annual Report interview - Jared White, RandyRadio	Radio	
9/21/2021	IFCA Annual Meeting	Pontiac, IL	100
9/27/2021	ISAP Cover Crop Specialist Call	Webinar	20
12/5-12/6/2021	AISWCD Winter Training	Springfield, IL	100
1/26-1/27/2022	Midwest Ag Expo	Gifford, IL	500

Total Reach 1,983

Message From IL STAR Coordinator

Hello, readers! 2021 has been quite the challenge both in the field and in life in general. But as we're halfway into 2022, things are finally getting back to normal and we can now look forward to the future.

Since the beginning of this year, we've laid very important groundwork in expanding STAR's outreach and improving existing features. As a recent February hire, I am excited to represent STAR's interests in its home state and fine-tune the aspects that make the program highly accredited by participants!



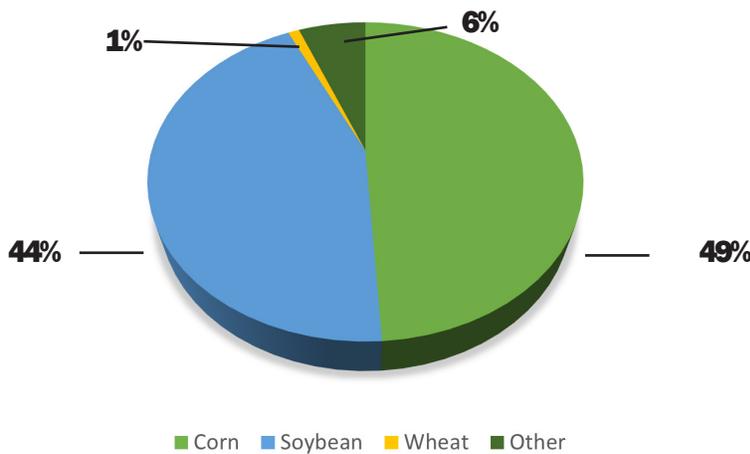
David Nguyen
STAR Coordinator

Results

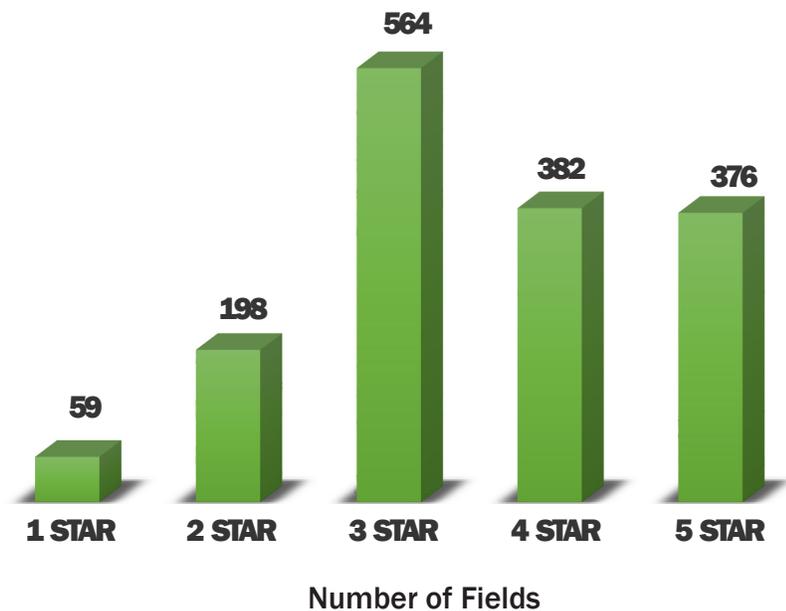
2021 Program Totals

For the 2021 Crop Year, 472 participants utilized the STAR tool on 89,579 acres over 1,579 fields. Compared to the trending growth in the last three crop years, this is a decrease in participation. Previously, STAR has been required for participants of several programs but prides itself on being a voluntary initiative. We look forward to continuing to grow our network of partners and farmers to increase voluntary conservation efforts in the future.

2021 STAR Fields by Row Crop



Distribution of 2021 STAR Ratings



What Does a Top-Rated Field Look Like?

Most Common 5 STAR Practices



82%

Applied P at or below removal rates



85%

Planted a winter hardy cover crop



90%

Under no-till or strip-till management



68%

Corn fields did not apply fall N

Illinois STAR Results

2021 STAR Participation and Results

STAR was created in Champaign County, Illinois. Since its inception, STAR has grown to cover 70% of Illinois counties. Although farmers can utilize the program anywhere in a state, entities within a particular county can sign up to be a STAR Licensee to administer the program locally and provide technical assistance to the growers in their county.

PARTICIPANTS

460

NUMBER OF FIELDS

1,442

ACRES

83,616

COUNTY LICENSEES

69

2021 FIELDS BY CROP TYPE

Corn - 50%

Soybeans - 43%

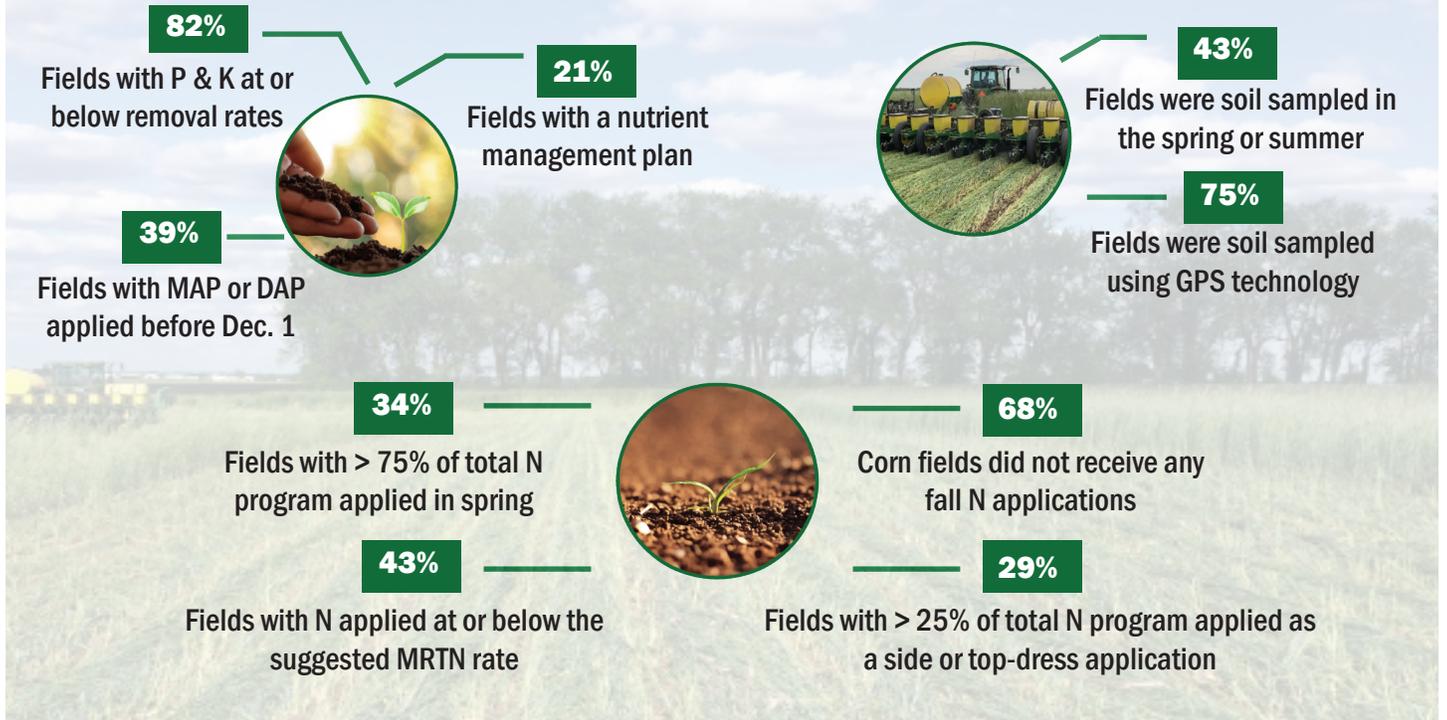
Wheat/Forage/Other - 7%



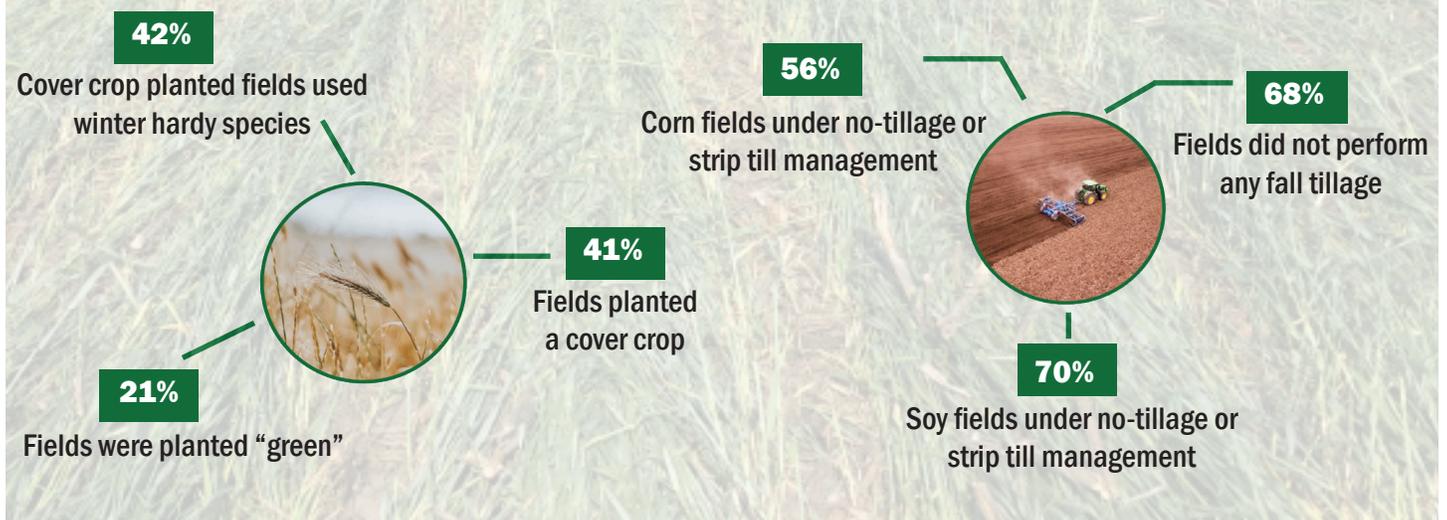
Results - Practices

The following statistics provide a breakdown of a majority of the 2021 Crop Year practices included in the STAR evaluation. Results of the adoptions of the practices listed below are full program participation, including farmers located in Illinois, Indiana, Missouri and West Virginia. Any farmer can complete an Illinois field evaluation to measure their conservation progress.

Soil Sampling & Nutrient Management



Cover Crops & No-Till



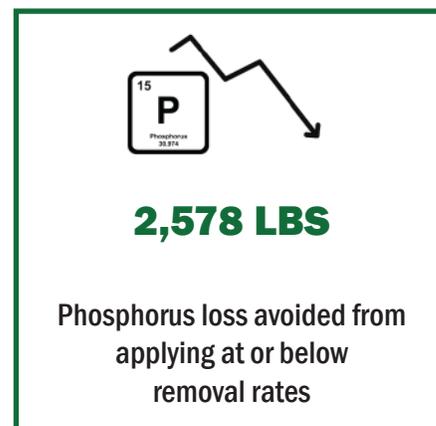
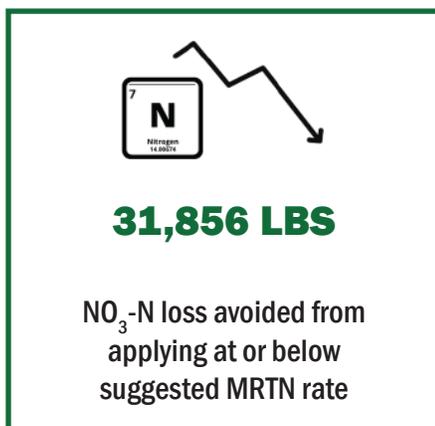
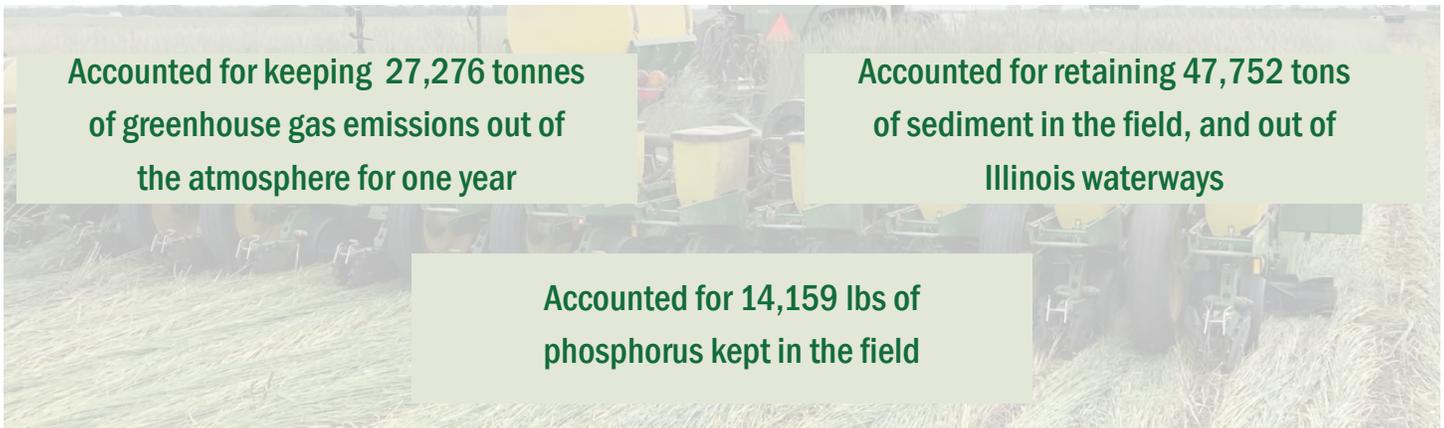
Results - Estimated Environmental Outcomes

Reported metrics have been calculated on a per practice basis and are meant to provide an estimate of practice-level performance. The values presented are not additive. All methods employed to quantify environmental outcomes, including equations and Illinois data sources, can be found in the appendix. Estimated environmental outcomes of STAR-enrolled acres exclude outcomes from acres of farmers participating in the Precision Conservation Management Program and the pilot Pay-for-Performance program. Partnering entities report the environmental outcomes of acres enrolled in those programs.

The Use of Cover Crops by STAR Farmers...



The Use of No-Till & Strip Till by STAR Farmers...



2021 STAR Awards

Award Winners

Numerous players in the agricultural community assist growers daily with their conservation goals. The STAR Steering Committee was happy to recognize three stakeholders that went above and beyond to promote STAR in 2021 to their peers, customers, and larger community.



Partner of the Year:
Emily Bruner, Ph.D.

Emily Bruner was an important STAR collaborator in her previous role. Her contributions to STAR's Steering and Science Advisory Committees ensured the program's relevance and scientific credibility respectively, and her leadership in the STAR Web App's functionalities earned her a spot as STAR's Partner of the Year.



Farmer of the Year:
Randy Leka, Grigsby Grain

Randy Leka is a long-time STAR farmer operating in Cass and Menard counties. In CY21, his farm enrolled nearly 100 fields that totaled almost 9,000 acres. 90% of those fields were also rated 3-STARs or above, an exemplary feat for a large quantity of enrolled acreage.



Licensee of the Year:
Iroquois County SWCD

Iroquois County SWCD demonstrated the importance of local staff working with their farmers to deliver conservation services and assistance. Their support made STAR a huge success in Iroquois County, enrolling nearly two dozen producers and 3,000 acres in 2021. Photo: Rich Reynolds (left) and Thad Eshleman (right)

Connect with STAR



STAR: Saving Tomorrow's Agriculture Resources

www.facebook.com/STARfreetool



STAR
@STARfreetool

www.twitter.com/STARfreetool



Check Latest News on the STAR Website

www.starfreetool.com

Meet the STAR Team

Erin Gundy, CCSWCD Resource Conservationist – Champaign, IL

Erin Gundy is the Resource Conservationist for the Champaign County Soil & Water Conservation District in Champaign, Illinois, where she provides technical assistance to farmers, develops and executes educational programs for youth, community members, and farmers, and works to uphold the District's mission of clean water, healthy soils. Erin leads programmatic coordination of STAR, serves as point of contact for STAR affiliates, and manages STAR grants. She received her Master of Science in Agronomy with a focus on soil science from Kansas State University and her Bachelor of Science in Agronomy with a minor in Natural Resource and Environmental Science from Kansas State University.

David Nguyen, AISWCD Illinois STAR Coordinator – Champaign, IL

David Nguyen is the IL STAR Coordinator, directly employed by the Association of Illinois Soil and Water Conservation Districts. David leads Illinois STAR support, conducts annual report data analysis, grant reviews, progress reports, and event engagements. His prior work history includes technical lab projects regarding aquatic invasive species, inclusive conservation among underserved communities, and sustainable GMO crops, providing a multi-disciplinary skillset for contemporary environmental issues. He is a Champaign local, having received his Bachelor of Science in Natural Resources and Environmental Sciences (NRES), with a minor in Spatial and Quantitative Methods in NRES at the University of Illinois at Urbana-Champaign.

Morgan Cauble, CCSWCD Conservation Coordinator – Champaign, IL

Morgan Cauble is the Conservation Coordinator for the Champaign County Soil and Water Conservation District. She assists with educational events, manages administrative duties, and supports District programs, including STAR. Previously, she assisted with research through the University of Illinois Department of Natural Resources and Environmental Sciences, and she worked in youth education at the Montgomery County Extension. She grew up on a farm in Fayette County, IL and graduated from the University of Illinois Urbana-Champaign with a bachelor's degree in Agricultural and Consumer Economics and a concentration in Finance in Agribusiness.

Bruce Henrikson, STAR Assistant Coordinator – Mahomet, IL

Bruce was raised on a small grain and livestock farm near Springfield and has been married to his wife Deb for 46 years. He finished a Masters in Vocational Education at University of Illinois in 1974 and became an Agriculture Instructor at Parkland College in 1975, primarily teaching marketing and agribusiness management. In 1985 Bruce resigned from Parkland to become a farm marketing consultant but he missed teaching; he was rehired at Parkland in 1989. He became the Chair of the Business & Agri-Industries Department at Parkland in 2003 and retired in June of 2016. Bruce began working part-time for the CCSWCD in March of 2017. He has continued to serve many roles with STAR including giving presentations and representing STAR at various conferences and meetings, serving on several committees, helping with various communication efforts with Illinois licensees and other states, and continues to help procuring and distributing STAR field signs.

Appendix

2021 Crop Year Field Form

IL STAR – 2021 Field Form

For office use:

Points: _____

STARs: _____



"If you can't measure it, you can't improve it." - Peter Drucker

Farmer/Owner Information:

1. Name: _____ Email: _____
 Phone: (____) _____ - _____ Street/City/Zip: _____
 2. Field name: _____ 3. 2021 Crop: _____ 4. Acres: _____
 5. County: _____ 6. Sec/Township/Range: _____
 7. Owner: _____ 8. Is this field tile-drained? Yes No

I understand this field may be randomly selected for verification. To the best of my knowledge, this information is correct. I also agree to the Terms of Use and Privacy Policy, as posted on the www.starfreetool.com website.

Signature: _____ Date: _____

IMPORTANT - Before proceeding, please review these instructions. Accurate responses will help ensure your field is awarded the correct point total and STAR Rating.

- This form documents field activities beginning immediately after harvest in 2020 and concluding with 2021 harvest.
- Read every item under each category. More than one selection is possible, but sometimes no items will be selected.
Example of multiple selections from the Cover Crops section- You planted a cover crop mix of cereal rye and tillage radish. You would select "Winter hardy- single species" and "Winter kill- single species."
- Completely read each statement. Several have more than one qualifier that needs to be met.
Example from the Spring Tillage section- "Any full width operation, limited to a single pass, where no fall tillage was performed."

First, tell us a little bit about the field you have selected.

9. Conservation and Management Practices- (check all that apply on this individual field):

- | | |
|---|--|
| <input type="checkbox"/> Saturated Buffer | <input type="checkbox"/> Conservation Plan that reduces sheet/rill erosion to "T" |
| <input type="checkbox"/> Bioreactor | <input type="checkbox"/> Nitrogen rate study conducted |
| <input type="checkbox"/> Constructed Wetland | <input type="checkbox"/> You attended a soil health or nutrient management meeting or field day within the last year |
| <input type="checkbox"/> Terraces/Contours/WASCOBs | <input type="checkbox"/> Nutrient management plan and/or field is under CCA advisement |
| <input type="checkbox"/> Grass Filter Strip/Riparian Buffer | <input type="checkbox"/> Enrolled in Federal/State/Local Conservation Program |
| <input type="checkbox"/> Grass Waterway | <input type="checkbox"/> Completed the 2020 STAR form for this field |
| <input type="checkbox"/> Pollinator Planting (a ½ acre minimum) | |
| <input type="checkbox"/> Windbreak | |

Now let's establish a crop history for this field.

10. Crop Rotation- use an "X" to indicate the 5-year crop history on this field.

Crop	2021	2020	2019	2018	2017
Corn					
Soybean					
Small Grain: _____					
Hay/Forage: _____					
Other: _____					

Example: A field has been in corn/soybean rotation for over a decade. In 2021 it was planted to corn. Place an "X" adjacent to corn for the years 2021, 2019, 2017. Soybean would have an "X" for 2020, 2018. If your crop is not listed, i.e. Grain Sorghum, write your crop on the line and mark "X" in the year(s) planted. Do not record cover crops here.

11. Cover Crops (Summer 2020-Spring 2021)- Established with NRCS guidelines (must have some growth):

- Winter hardy- single species
- Winter hardy- 2 or more species
- Winter kill- single species
- Winter kill- 2 or more species
- Cover crop was terminated AFTER spring 2021 cash crop planting

Discussion: Time period varies slightly here. Any cover crops established in 2020 either prior to harvest or after a summer crop was harvested count. Examples: aerial application into standing corn or drilling after wheat harvest. Wheat is not considered to be a cover crop.

Continue to Page 2

Appendix

2021 Crop Year Field Form Cont.

12. Soil Sampling- Use the previous 4-year field history:

- Not sampled in the last 4 years
- Sampled every 4 years or less
- Spring or Summer sampled
- Fall sampled
- GPS sampled (by grid or zone)

Discussion: Here is a great example of why you should read every item in each category. If a respondent simply marked "Sampled every 4 years or less" they may have missed points if they didn't indicate when the field was sampled or if GPS was used.

Almost done. The next category is tillage practices broken down into Fall 2020 and Spring 2021 categories.

13. Fall Tillage- Starting after harvest of the 2020 crop:

- No tillage or low disturbance fertilizer toolbar
- Strip tillage on field classified as non-HEL
- Shank type fertilizer bar and no other tillage performed
- Any full width operation not exceeding a 3" depth
- Any full width operation exceeding a 3" depth
- Any full width operation on soybean stubble

Discussion: With numerous possibilities for soil preparation, we elected to keep the options fairly simple. No tillage and strip tillage are easily definable. Full-width tillage can be tricky. In the fall, focus on the depth of machine operation and also note if soybean residue was tilled. In the spring, how many passes were made and was fall tillage performed?

14. Spring Tillage- 2021 field operations:

- No tillage or low disturbance fertilizer toolbar
- Strip tillage or Strip freshener on non-HEL field, or shank type fertilizer bar, and no other Spring tillage
- Any full width operation, limited to a single pass, where no fall tillage was performed
- Any full width operation, two or more passes, where no fall tillage was performed
- Any full width operation, one or more passes, where fall tillage was performed

Finally, your nutrient management strategies are a large component of your overall score. Like tillage, we've broken these into two sections defined by specific time periods. A third section reviews activities that may have occurred at any time during the crop year being reviewed.

15. Nutrient Management (Fall 2020 – February 2021):

- No Nitrogen was applied in this time frame other than MAP or DAP
- Wheat topdress
- MAP or DAP was applied before December 1st
- NH₃ was applied when the soil temperature was below 50 degrees, and amounted to no more than 50% of the total Nitrogen program, and included an inhibitor
- Manure/Biosolid injected or applied and incorporated when soil temperature was below 50 degrees.
- Manure applied, not incorporated

16. Nutrient Management (March 1st - Summer 2021):

- No Nitrogen was applied in this time frame AND no prior Fall 2020-February 2021 Nitrogen other than MAP or DAP
- Spring/Summer nitrogen application(s) amounted to 50% - 74% of the total N Program (from all sources)
- Spring/Summer nitrogen application(s) amounted to at least 75% of the total N Program (from all sources)
- In-season N application (top or sidedress) was at least 25% of the total N Program (from all sources)
- Manure/Biosolid injected or applied and incorporated
- Manure applied, not incorporated

17. Additional Nutrient Activities:

- Total Nitrogen applied on corn that followed a different crop was 181 to 200 lbs./acre,
OR corn-on-corn was 201 to 220 lbs./acre
- Total Nitrogen applied on corn that followed a different crop was 180 lbs. or LESS/acre,
OR corn-on-corn was 200 lbs. or LESS/acre
- Phosphorus and/or Potassium application based on removal rates and/or soil samples (may mean zero applied)
- At least 50% of total applied phosphorus was banded subsurface
- Used Triple Super Phosphate (0-45-0)
- Used Variable Rate Technology application
- Any fertilizer source containing Nitrogen or Phosphorous was broadcast on *frozen* or *snow-covered* ground

Appendix

2021 Crop Year FAQ

General STAR

1. *What is the definition of STAR's Crop Year?*

STAR is focused on improving in-field management and sets our Crop Year to capture all field preparation activities starting after harvest and including any pre-plant and in-season activities up to harvest. The STAR program year runs from July 1st, 2021 when the new field form is released through February 1st, 2022.

2. *Why is my contact information needed?*

Once your field is rated, you may be selected for verification. Also, we will contact you with your results and offer a field sign to display your rating.

3. *How do I order a field sign?*

Contact your local STAR Rep using the "Contact" page on our website or email info@starfreetool.com. You can also request a field sign through the STAR Web App. A post is not provided with the STAR sign.

4. *Who will know my STAR rating(s)?*

While we strongly encourage participants to post field signs to display STAR ratings, your ratings are confidential and will not be shared with anyone but you. Field-level practice data will be aggregated for use in tracking STAR participation and program outcomes on a state/county basis once personal identifiable and specific location data have been removed. Please see our Terms of Use and Privacy Policy on our website for more information.

5. *How will my answers be verified?*

The STAR Coordinator will use random sampling to identify up to 10% of the fields submitted. A set of "Verifiers" will contact the randomly selected participant(s) to confirm the use of the practices identified on their Field Form. The verification process will occur in Feb-March 2022. Potential items and information that may be requested from participants are on our website.

STAR Web App:

6. *How do I log in?*

Go to www.starfreetool.com and navigate to the STAR Web App link to launch the app in your browser. If you don't have an account, click "Create Account." If you do have an account, log in using your email and password.

7. *What happens if I forget my password?*

Utilize the "forgot password" button on the log in page to walk through the steps to reset your password.

8. *I need to change my email/contact information, what do I do?*

Contact info@starfreetool.com. In your message, please let us know all details of your request.

9. *Who do I contact for assistance?*

For STAR Web App support, contact info@starfreetool.com. If you'd like local conservation assistance, check our website's contact page for a list of STAR County Contact and send them an email or give them a call! If your county is not a licensed STAR County, contact info@starfreetool.com.

10. *Why should I create an account instead of filling out a PDF field evaluation form?*

Creating an account in the STAR Web App is a fast, simple way to enter your information. It will save in your account for proceeding years, so you can copy answers to other fields each year you participate. The STAR Web App provides instant STAR Rating results, walks you through steps to increase your STAR Rating, provides resources for improvement, and allows you to share results on social media!

Appendix

2021 Crop Year FAQ Cont.

Fillable PDF/Hard Copy Field Evaluation Form

11. Should I mark something on each section of the field evaluation form?

Yes, it is very important to mark all applicable activities in each section. Separate forms should be completed for each field you would like rated.

12. Why am I asked to sign and date the Field Form?

Your signature acknowledges that you have completed the form as accurately as possible and that you understand your field may be randomly selected for verification.

13. Field Evaluation Form Questions:

Section 9 – Conservation and Management Practices: This section includes several recommended practices to reduce nutrient and soil loss in addition to the in-field management practices that STAR prioritizes. Items should be checked only if applicable to the individual field being evaluated. The first eight items on the list should only be checked if they are still functioning as intended.

- Having a “Conservation Plan” is good, but checking this item assumes it is being implemented in such a way that reduces sheet and rill erosion to “T.” The soil loss tolerance rate (T) is the maximum rate of annual soil loss that will permit crop productivity to be sustained economically and indefinitely on a given soil. Erosion is considered greater than T if either water (sheet and rill) erosion or wind erosion rate exceeds the T.
- “Attended soil or nutrient management meeting/field day” may have been any meeting that includes some discussion or recommendations related to soil, nutrient use, tillage, or cover crops, including field days, no matter the length of time. It should have been within the past year at the time of completing the form and counts for every field evaluated.
- “A written nutrient management plan” is often completed with the help of a retailer or private consultant and does not have to be an NRCS 590 plan. STAR recognizes it is best if the person helping with any advice is a Certified Crop Advisor.
- “Enrolled in a Federal, State, or Local Conservation Program” includes NRCS programs such as CSP and EQIP, state programs such as PFC, and local programs such as Precision Conservation Management (PCM).
- “Completed 2020 STAR Form” is to be checked only if it was completed for this specific field.

Section 10 – Crop Rotation: Rotating crops helps to improve above-ground and below-ground diversity. Ideally, a field would never have more than two continuous years of a crop (one exception would be continuous forage or hay). Incorporation of a winter hardy crop, such as wheat, or perennial crop into a corn/soy rotation offers several benefits including, but not limited to, improved soil structure, increased organic matter, greater diversity of soil biology, and reduced nutrient loss. The “Other” crop could be milo, sunflowers, canola, etc.

Section 11 – Cover Crops: A cover crop credited for the 2021 Crop Year must have been planted and established in the late summer or fall of 2020, which means it must have had some growth before spring planting. According to NRCS Practice Standard Code 340, “established” means the cover crop was planted “in a timely matter and when there is adequate moisture to establish a good stand.” Planting dates for the likelihood of “adequate establishment” will vary by the species and geographic location. It is best to use winter hardy species, including annual ryegrass, cereal rye, etc., as these species provide more soil protection and nutrient capture over the winter months and into early spring than winter kill species.

Cover Crop Resources: www.mccc.msu.edu/statesprovince/illinois

Appendix

2021 Crop Year FAQ Cont.

Section 11 – Cover Crops: How do I record my cover crop species? Check the category that applies to your cover crops. If you planted cereal rye, mark “Winter hardy single species.” If you planted cereal rye and clover, mark “Winter hardy – 2 or more species.” If you planted cereal rye and radish, mark “Winter hardy – single species” and “winter kill single species.” It should be noted that planting more than one species will encourage additional above and below ground biodiversity that may offer distinct soil health benefits when compared to single species.

Section 11 – Cover Crops: The longer a winter hardy species is actively growing, the more environmental benefits it provides, so we encourage termination of a winter hardy cover crop after spring planting (thus the participant “planted green”). It is important to note that termination timing is a very important aspect of successful cover crop management and we recommend utilizing the previously mentioned cover crop resources and/or reaching out to your local SWCD or NRCS office for technical assistance on cover crop mixes, seeding rates, planting guidelines, and termination strategies appropriate for your operation.

Section 12 – Soil Sampling: Soil samples should be collected for each field every four years or less. To reduce the uncertainty associated with in-field soil variability and to inform accurate nutrient management decisions, samples should always be taken from the same locations identified via GPS. We encourage spring or summer sampling to provide ample time to incorporate soil analyses into nutrient recommendations for the upcoming crop year. How do I know if my sampling was done with GPS? If your sampling is done by a soil testing or related service firm, it is likely done using GPS. The grid or zone sizes should be based on the University of IL Agronomy Handbook: extension.cropsciences.illinois.edu/handbook/

Section 13 & 14 – Fall and Spring Tillage: Minimal soil disturbance is recommended. No-till systems keep the soil covered and minimize soil loss due to wind and water erosion. We acknowledge that fertilizer tool bars are likely to be low disturbance (unless it is a shank-type) and we consider these applications (with the shank type exception) equivalent to no tillage. Strip-till systems also limit soil disturbance compared to full-width tillage systems, but should never be used on Highly Erodible Land, as the strips become a pathway for gullies to form. Any full width tillage on soybean stubble should be avoided when possible. If a cover crop is planted or manure is applied in the fall, a shallow tillage operation to incorporate has some benefit, but is still considered one tillage pass. Use of a strip freshener in the spring is considered the same as strip tillage, again with the assumption it is not Highly Erodible Land. Tillage done in small areas of a field, such as rut repair, is not considered part of a routine tillage system and is outside the scope of STAR.

Section 15 – Fall/Winter Nutrient Management: We discourage fall and winter application of fertilizers due to an increased risk of nutrient loss from rainfall on fields without an active crop. If applying MAP (11-52-0) or DAP (18-46-0) in the fall, it should be applied before December 1st. In wheat rotations, a top-dress nitrogen fertilizer application in February or early March with an active crop growing reduces the risk of nitrate loading to local waterways.

Appendix

2021 Crop Year FAQ Cont.

Section 15 – Fall/Winter Nutrient Management: If NH_3 (anhydrous ammonia = 82-0-0) is used during the fall through February time period, it should be applied with an inhibitor and when the 4-inch soil temperature is below 50 degrees Fahrenheit. Though not recommended, if a fall through February NH_3 application is made, it should represent no more than 50% of the total Nitrogen program.

Section 15 – Fall/Winter Nutrient Management: Manure/Biosolids are best applied in the spring when there is less likelihood of leaching or runoff. If Manure/Biosolids are to be applied in the fall through February time period, they should be injected or broadcast when the soil temperature is below 50 degrees Fahrenheit and if broadcast, they should be incorporated. Management of such applications should include soil tests to determine exact amounts of nutrients being added. Research on stabilizers used in conjunction with manure applications is inconclusive and the STAR Science Advisory Committee does not feel that the use of manure stabilizers is warranted at this time.

Section 16 – Spring/Summer Nutrient Management: While some crops require additional nitrogen inputs to sustain yields, limiting nitrogen applications can significantly improve downstream water quality. Nitrogen is best applied in the spring and/or summer, as close as possible to the time the crop will use it, minimizing nutrient losses from the field.

Section 16 – Spring/Summer Nutrient Management: Manure/Biosolids applied during the spring or summer should be incorporated if broadcast.

Section 17 – Additional Nutrient Activities: The “total nitrogen program” for a crop should incorporate residual soil nitrogen, nitrogen made available from organic matter mineralization, and nitrogen applied from all sources in the Crop Year. The maximum levels identified for this section are based on the maintenance needs for optimal corn yield goals in Illinois and should help to offset and/or limit losses due to leaching and denitrification. The continuous corn rotation allows higher nitrogen rates due to the maintenance needs of corn following corn versus corn following soybeans. Optimally, producers would follow the guidelines of the “Corn N-Rate Calculator” that is a part of the NRCS 590 Nutrient Management standards and specifications, found at this link: <http://cnrc.agron.iastate.edu>. The Corn N-Rate Calculator uses current corn and nitrogen prices to calculate the MRTN (Maximum Return to Nitrogen) but is not required for STAR. Participants should also consider using the 4R Principles (Right Source, Right Rate, Right Time, and Right Place) when making nutrient decisions. More details can be found here: www.nutrientstewardship.com/4rs/4r-principles/.

Section 17 – Additional Nutrient Activities: Limiting phosphorus applications will help meet the water quality goals of the Illinois Nutrient Loss Reduction Strategy. If phosphorus is applied, either in the fall or spring, it is best to follow soil test recommendations and apply subsurface. Triple Super Phosphate is better than MAP or DAP as it does not add the complexity of additional nitrogen. As stated earlier, it is best to apply phosphorus and potassium based on soil testing, but it is reasonable to replace those nutrients using estimated removal rates. Additionally, utilizing Variable Rate Technology (VRT) is economical and environmentally friendly and allows for the placement of fertilizer where it's needed.

Section 17 – Additional Nutrient Activities: Any fertilizer containing nitrogen or phosphorus, including manure, that is broadcast on either frozen or snow-covered ground increases the likelihood of loss, particularly via surface run-off, and should be avoided.

Appendix

Methodology

Methodology for Calculating Environmental Outcomes of the STAR Initiative in Illinois

Developed and Written by Emily Bruner, Ph.D., Midwest Science Director, American Farmland Trust

Background

A rough approximation of nutrient, greenhouse gas (GHG) and sediment load reductions from acres enrolled in the Saving Tomorrow's Agriculture Resources (STAR) Initiative are estimated utilizing the data sources, tools and equations listed below. All reported metrics are calculated on a per-practice basis and are meant to provide an estimate of practice-level performance; therefore, such equations are not additive.

Data Sources:

- Acres enrolled in STAR in Illinois
 - Champaign County Soil and Water Conservation District (CCSWCD)
- GHG reductions in Carbon Dioxide Equivalents (CO₂e) from adding a non-legume cover crop to non-irrigated cropland (CPS 340) and switching from intensive till to no-till or strip-till on non-irrigated cropland (CPS 329) as estimated via USDA and Colorado State University's COMET-Planner Tool
<http://comet-planner.com/>
- Nutrient Removal Efficiencies of selected practices - IL Nutrient Loss Reduction Strategy (NLRS)
<https://www2.illinois.gov/epa/Documents/iepa/water-quality/watershed-management/nlrs/nlrs-final-revised-083115.pdf>
- HUC 8 NPS Nutrient Loading – IL NLRS 2019 Science Assessment Update
- HUC 8 and Illinois County Boundaries - Geospatial Data Gateway
<https://datagateway.nrcs.usda.gov/>
- Non-irrigated cropland acres per county (calculated as total cropland acres remaining after subtracting irrigated cropland acres reported per county) - 2017 Census of Agriculture
https://www.nass.usda.gov/Quick_Stats/CDQT/chapter/2/table/1/state/IL/year/2017
- Average annual sediment load per county - 2018 IL Department of Agriculture Tillage Transect
<https://www2.illinois.gov/sites/agr/Resources/LandWater/Pages/Illinois-Soil-Conservation-Transect-Survey-Reports.aspx>

Appendix

Methodology Cont.

Nutrients

Non-point Source (NPS) Nitrate-N (NO₃-N) and Total Phosphorus (TP) Load Reductions

County-level Agricultural NPS NO₃-N and TP Loads are estimated using total non-irrigated cropland acres calculated from acres reported by the 2017 Census of Agriculture and the HUC 8 NPS Loads estimated by the 2019 IL Nutrient Loss Reduction Strategy Science Assessment Update averaged for water years 2012 - 2017. Briefly, a weighted average of county area contained within each HUC 8 was used to allocate estimated NPS HUC 8 loads (NO₃-N and TP) to the county scale using the following equations:

Equation 1: Non-irrigated Cropland Acres in each HUC8 per County = Percentage of Area in each HUC 8 draining the county * 2017 non-irrigated cropland acres for that county

Equation 2: Annual Load from non-irrigated Cropland Acres in each HUC8 per County (lbs/yr) = non-irrigated Cropland Acres in each HUC8 per county * Estimated NPS NO₃-N and TP yield (lbs/ac-yr) associated with each HUC8(a)

Equation 3: Annual County NPS Load (lbs/yr) = Sum of Annual Load from non-irrigated Cropland Acres in each HUC8 per County (lbs.) by county

Equation 4: Average County NPS Loading (lbs/ac-yr) = Annual County NPS Load (lbs/yr) / Non-irrigated Cropland Acres in each county

Equation 5: Annual County NPS Load Reduction (lbs/yr) from Cover Crops = (Average County NPS Loading (lbs/ac-yr)(b) Acres of Cover Crops enrolled in STAR. per County) * NLRS Nutrient Removal Efficiency of Cover Crops

Equation 6: Annual County NPS Load Reduction (lbs/yr) from No-till/Strip-till = (Average County NPS Loading (lbs/ac-yr) * Acres Under No-till S trip-till Management enrolled in STAR per County) * NLRS Nutrient Removal Efficiency of changing conventional tillage to conservation tillage or no-till

Equation 7: Annual County NPS P Load Reduction (lbs/yr) from acres applying P at or below Removal Rates = (Average County NPS P Loading (lbs/ac-yr) * Acres Applying P at or Below P Removal Rates enrolled in STAR. per County) * NLRS Nutrient Removal Efficiency of P application rate reduction

Equation 8: Annual County NPS Load Reduction (lbs/yr) from acres applying N at or below Maximum Return to nitrogen Rates (MRTN) = (Average County NPS Loading: (lbs/ac-yr) * Acres applying at or below MRTN enrolled in STAR per County) * NLRS Nutrient Removal Efficiency of reducing N application rate

Assumptions:

a) Negative values for NPS NO₃-N were not reported in the NLRS and were assumed to be based on mismatches between HUC areas and monitored drainage areas and/or load estimation errors. For the 2019 Update, negative values were reported to facilitate future identification and correction of inappropriate assumptions or errors in calculating point and non-point yields. For the STAR methodology, where negative NPS NO₃-N and TP values were reported in the |2019 Science Update for the 2012 - 2017 period, zeros were substituted. This could lead to a slight overestimate of NPS load from agriculture, but given the magnitude of NPS nutrient loading, any potential overestimate would be considered negligible. HUC8s reporting negative values for NPS NO₃-N and TP include Lower Illinois - Senachwine Lake, Upper Fox, Upper Rock and Chicago. HUC8s reporting negative values for NPS TP only include Lower Illinois - Lake Chautauqua and Lower Illinois.

b) An estimate of 30% was used for both NPS NO₃-N and TP removal efficiencies

Appendix

Methodology Cont.

Sediment

Non-point Source (NPS) Sediment Load Reductions

Equation 9: Annual Sediment Load Reductions from Cover Crops (tons /yr) = (Average sediment load per acre (tons/ac-yr, averaged across corn and soy estimates provided by the 2018 IDOA tillage transect * Acres of Cover Crops enrolled in STAR per County) * Sediment Removal Efficiency of Cover Crops provided by literature (c)

Equation 10: Annual Sediment Load Reductions from No-till/Strip-till (tons/yr) = (Average sediment load per acre (ton/ac-yr, averaged across corn and soy estimates provided by the 2018 IDOA tillage transect) * Acres under No-till / Strip-till Management enrolled in STAR per County) * NLRS Nutrient Removal Efficiency of changing conventional tillage to conservation tillage or no-till^(d)

Assumptions:

While average sediment loads per acre vary depending on if the field is planted to corn or soy, in any given year it is assumed that roughly half a county's commodity acres will be in corn or soy, so averaging these estimated erosion rates was considered reasonable for the purpose of calculations.

Truckloads of sediment reported in annual report used an average number of 14 tons per dump truck.

c) Previous studies have reported sediment removal rates by cover crops ranging from 11 to over 90% for Midwest soils. A bibliography compiled by the Sustainable Agriculture Research and Education Program (SARE) and the University of Missouri reported a range of soil loss reduction of 31% to 100% by non-legume cover crops, including rye species. Given these ranges, a Sediment Removal Efficiency estimate of 40% was used in EQ 9.

d) 50% reduction for P assumed to be primarily due to phosphorus attached to soil particles, thus reduction efficiency for P extended to sediment in EQ 10.

Carbon Sequestration and Greenhouse Gas Emissions

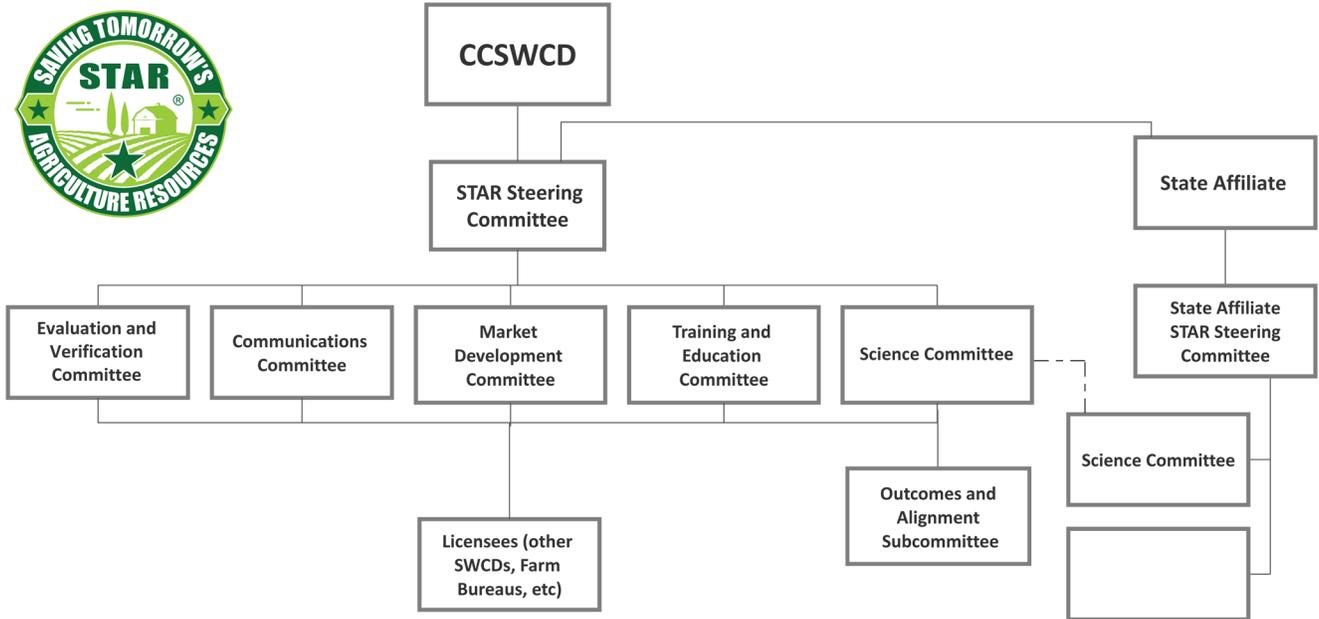
Tonnes of Carbon Dioxide Equivalents (CO₂e) Reduced per Year

Calculated using USDA and Colorado State University's online COMET-Planner Tool by selecting IL and the county of interest in Step 1, Cropland Management in Step 2, Cover Crop (CPS 340) and Add Non-Legume Seasonal Cover Crop to Non-Irrigated Cropland or Residue and Tillage Management OR No-Till (CPS 329) and Intensive Till to No Till or Strip Till on Non-Irrigated Cropland in Step 3, and the number of acres utilizing cover crops or no-till / striptill management enrolled in STAR per county in Step 4. The COMET-Planner Tool provides approximate carbon sequestration and GHG emission reductions in tonnes of CO₂ equivalents (CO₂e) per year. CO₂e estimates were converted to number of passenger vehicles driven for one year using the equations provided by the Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator available here:

<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Appendix

STAR Structure



STAR Office Contact Information:
 info@starfreetool.com | (217)352-3536 ext. 3 | www.starfreetool.com
 Full Report Prepared/Designed by: Chandler Bruns
 Photography Provided by: Aidan Walton, Frank Rademacher

