

A program of the



**Illinois Corn
Growers Association**

**2015–2019
Data
Summary**

The Business Case for Conservation

Cost-Benefit Analysis of Conservation Practices



Precision Conservation Management

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NOTE FOR THE READER: To truly utilize the economic benefit of conservation practices, you must suspend the belief that higher corn yields equal increased profitability. As a farm organization, we believe this quest for higher yields has been “baked” into farmers’ psyche for generations. We’d like to challenge readers to consider that obtaining high yields, and the higher input costs that goal often requires, may not be the best economic or conservation model for Illinois farms and Illinois farm families.



What is Precision Conservation Management (PCM)?

PCM is a farmer service program designed to help farmers understand and manage risks associated with adopting new conservation practices with the objective of helping farmers make sound financial decisions.

The program evaluates conservation practices on both their impact to the environment and their impact to family farmer profitability.

Farmers in five key watersheds in Illinois and Kentucky voluntarily participate in the program. Participating farmers can utilize the one-on-one technical assistance to guide them through conservation decisions and to aid in the evaluation of their farm relative to others in the program.

To date, over 325 farmers have enrolled in PCM, representing more than 300,000 acres.

Farmers in the program also have access to Natural Resources Conservation Service (NRCS) Conservation Stewardship Program funds; Environmental Quality Incentive Program funds (CSP & EQIP); and special offers from industry partners only made available for participating PCM farmers.

Local Farms – Corporate Investment

Illinois farmers are partnering with PepsiCo and other large corporations across their supply chain. PCM and PepsiCo have spent two years in partnership, working with participating farmers to reduce CO2 emissions by 8,155 metric tons, equivalent to taking 1,762 cars off the road. The project is part of PepsiCo's efforts to help build a more sustainable food system.

As a global food and beverage company, agriculture makes up the largest portion of PepsiCo's footprint. The company's climate strategy related to agriculture goes hand in hand with their sustainable sourcing goals. Through PepsiCo's Sustainable Farming Program, they promote and support practices that lead to better

yields, improved soil health, lower deforestation and higher productivity for farmers, which also leads to GHG emission reductions.

PepsiCo understands that investing in farmers and helping farmers understand the financial and environmental benefits to changing farm management practices is the best way to make positive water quality and climate impacts.

PCM has over 30 contributing partners, including projects with NASA Harvest, National Fish and Wildlife Foundation, Ecosystem Services Market Consortium (ESMC), Soil Health Partnership (SHP), Field to Market® and The Nature Conservancy (TNC).

ROI From Relationships



"I agree with the philosophy that sustainability is not a result. It is a continual process. I have learned so much over the years from other farmers who are farther ahead on the learning curve. My hope now is some people can learn something from our practices."

Marty Marr, New Berlin, IL



MARTY MARR reviews his Resource Analysis and Assessment Plan, which reviews Marty's input costs and return per acre per field, as well as aggregated data from his region, so he can see how he's doing compared to others in his area using different management practices.



"The primary goal of a PCM conservation specialist is to form a long-term, trusting relationship with each farmer they work with. Each specialist strives to attend multiple conferences, courses and demonstrations throughout the year to maintain a robust agronomic skill set to ensure we're relaying the most up-to-date and relevant information possible every time we walk into a cooperating farmer's shed."

Shane Sinclair, PCM Specialist

A Note On PCM Data

The PCM program now represents over 6,000 corn and soybean fields in Illinois from 2015-19; this is up from 3,600 fields last year. Providing the most valuable information to PCM farmers and to other farmers interested in conservation practices, we parse PCM data into higher ($SPR > 136$) and lower ($SPR < 136$) soil productivity levels. Detailed information on lower SPRs can be found at www.ilcorn.org/pcm.

Some profitability trends for tillage and nutrient management have changed since last year's summary. The long-term value of PCM data is to provide farmers with accurate, unbiased data that they can rely on to make good financial decisions for their farming operation. We pride ourselves on providing analysis that is transparent, objective and accurate. As we add more data every year, we expect to see new trends, and over time, we know PCM data will begin to more closely reflect the real farm financial impacts of the PCM standard practices (tillage, nutrient management and cover crops).





What Can We Learn From 2019?

Impacts of Unprecedented Spring Weather

Illinois farmers will never forget 2019 – and not in a good way. Significant flooding left farmland and newly planted crops underwater. Farmers waited: for signs of life from seeds in the ground, for farmland to dry enough to plant, for a signal to quit trying. Illinois saw the largest number of prevent plant acres in 2019 since the USDA began reporting such data in 2007.

Illinois Prevent Plant Acres, reported by USDA Farm Service Agency

Corn: 1,145,385 acres

Soybeans: 331,247 acres

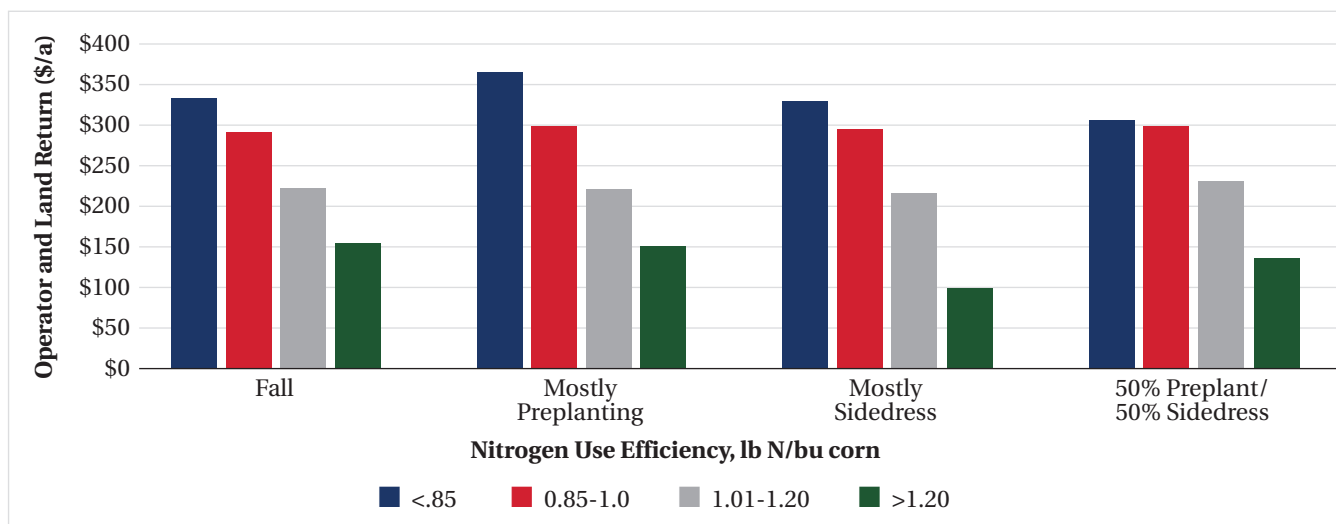
Farmers enrolled in PCM experienced the same unprecedented struggles throughout the growing season, and the data reflects the struggle. However, the 300,000 acres of program data can teach us the factors that could make Illinois farmers most successful.

In assessing the 2019 PCM data, specifically the nutrient (nitrogen) management systems employed across our program, we noticed a trend – the highest rate of return for corn farmers on high SPR soils was realized when the Nitrogen Use Efficiency (NUE) was 1.0 lb N/bu or lower.

Nitrogen is the most limiting nutrient for corn production, and with the wet conditions, one might think this would be more evident where lower N rates were applied.



Figure 1 – Corn, High SPR, Profitability by N Management and NUE 2019



As you can see in the table, regardless of timing, farmers that applied 1 pound of N for every 1 bushel of corn produced (NUE) or less had the greatest return on investment.

Year to year, and field to field, the optimal N rate is going to vary. Rainfall, temperature, moisture and drainage are among a long list of factors that are going to affect your final yields and ROI. Tight profit margins are making decisions on inputs to crops difficult for farmers. Decisions on when and where to use fertilizers can be important to ensure maximum profitability.

AS YOU READ THE REST OF THIS REPORT:

Remember that we've summarized data by high and low SPR soils. Most PCM data comes from high SPR soils, and this report details that data. For more information on both high and low SPR soils in Central Illinois, visit www.ilcorn.org/pcm.

Tillage Data & Recommendations

In our last analysis, strip-till and 1-pass light tillage were the most profitable tillage systems among PCM farmers regardless of soil productivity range. The new 2018 and 2019 data changed these trends. High SPR corn fields that adopted a 2-pass light tillage system had the highest average net return; 1-pass light tillage systems were only a few dollars per acre behind 2-pass light tillage.

Big changes prompt PCM experts to review what could have caused the change, and the weather is certainly one explanation.

Farmers experienced the wettest spring on record in Illinois in 2019. It's possible that ONLY those fields that were the most well-drained and regionally lucky to miss a few rain events would have even allowed for a second

tillage pass in 2019. Those same fields would have likely had the most suitable conditions for early planting and early season growth, all pointing toward higher yields that had very little to do with additional tillage passes.

In Illinois in 2018, we had cool early season conditions that could have encouraged farmers to make an extra tillage pass in the spring.

The analysis this year drops strip-till to fourth place in profitability. Our most profitable strip-till fields use the strip-till bar to apply less total N, eliminate one field pass and yield about 18 bushels/acre greater than farmers that do not use the bar to apply liquid fertilizer. The 2019 weather could have impacted the viability of this practice as well.

Figure 2 – Tillage application data and recommendation

CORN IL, HIGH SPR 2015-19 AVG VALUES	NO-TILL	STRIP-TILL	1-PASS LIGHT	2-PASS LIGHT	2-PASS MODERATE	2+ TILLAGE PASSES
No. Fields	310	296	710	139	302	46
Yield per acre	209	219	220	224	223	216
GROSS REVENUE	\$750	\$787	\$790	\$804	\$801	\$773
TOTAL DIRECT COSTS*	\$388	\$395	\$382	\$384	\$396	\$422
Field work	\$0	\$20	\$10	\$22	\$26	\$38
Other power costs**	\$96	\$93	\$96	\$93	\$92	\$97
TOTAL POWER COSTS	\$96	\$113	\$106	\$115	\$118	\$135
OVERHEAD COSTS	\$37	\$37	\$37	\$37	\$37	\$37
TOTAL NON-LAND COSTS	\$521	\$544	\$524	\$536	\$550	\$594
OPERATOR & LAND RETURN	\$229	\$243	\$266	\$269	\$250	\$180

*Direct costs = fertilizers, pesticides, seed, cover crop seed, drying, storage and crop insurance | **Other power costs = fall fertilizer application, spraying, planting, cover crop planting, spring/in-season fertilizer application, harvesting and grain hauling

No-Till = No tillage; 1-Pass Light = 1 pass w/ low-disturbance tillage; 2-Pass Light = 2 passes w/ low-disturbance tillage; 2-Pass Medium = 2 passes (1 low-disturbance +1 high-disturbance); 2+ Pass = more than 2 tillage passes, any intensity level

Nitrogen Application Data & Recommendations

PCM nitrogen fertilizer management analysis on high SPR soils shows that corn fields receiving more than 40 percent of the total nitrogen application in the fall demonstrated a Nitrogen Use Efficiency (NUE) >1.0, higher nitrogen fertilizer application rates and higher total costs than

most in-season nitrogen fertilizer application systems. This resulted in reduced operator net financial return. The most profitable nitrogen application systems applied less than 40 percent of the total nitrogen in the fall with the balance either in a preplant or sidedress application.

Figure 3 – Economic returns resulting from various nitrogen fertilizer management strategies for corn production in Central Illinois from 2015-19.

CORN IL, 2015-2019 HIGH SPR	>40% FALL	MOSTLY PREPLANT	MOSTLY SIDEDRESS	50% PRE/50 SIDEDRESS	3-WAY SPLIT
AVG NUE (lb N/bu grain)	1.01	0.93	0.92	0.91	0.94
Yield per acre	219	218	220	221	230
No. Fields	732	492	612	228	52
GROSS REVENUE	\$789	\$785	\$791	\$793	\$827
N fertilizer	\$84	\$78	\$76	\$84	\$95
Other direct costs*	\$320	\$286	\$307	\$311	\$338
TOTAL DIRECT COSTS	\$404	\$364	\$383	\$395	\$433
Field work	\$16	\$16	\$16	\$18	\$19
Other power costs**	\$97	\$89	\$94	\$95	\$93
TOTAL POWER COSTS	\$113	\$105	\$110	\$113	\$112
OVERHEAD COSTS	\$37	\$37	\$37	\$37	\$37
TOTAL NON-LAND COSTS	\$554	\$506	\$529	\$545	\$582
OPERATOR & LAND RETURN	\$235	\$279	\$261	\$248	\$246

*Direct costs = fertilizers, pesticides, seed, cover crop seed, drying, storage and crop insurance | **Other power costs = fall fertilizer application, spraying, planting, cover crop planting, spring/in-season fertilizer application, harvesting and grain hauling

Mostly Fall = >40% of total N application rate applied in fall; Mostly Preplant = more than 50% of total N applied at or before planting in spring; Mostly Sidedress = more than 50% of total N applied after planting; 50% Pre/50% Sidedress = total N application is split roughly evenly between Preplant and sidedress; 3-Way Split = <40% total N is fall-applied and balance is roughly evenly applied between preplant/sidedress

Nitrogen Data & Recommendations

Figure 4 – Nitrogen Rates, Yields and Returns. This table demonstrates that the greatest net income is generated from the 151 to 175 lb of total nitrogen per acre rate range when averaged over all years and high SPR soils. For reference, corn following soybean rate recommended from the Maximum Return to Nitrogen rate calculator would be about 180 lb nitrogen per acre.

CORN, HIGH SPR, N RATE LBS PER ACRE	NO.OF FIELDS	SPR	AVG 2015-19						OPERATOR AND LAND RETURN – 2015-19
			2015	2016	2017	2018	2019		
			Bushels per acre						
Less than 150	41	139	154	222	212	216	198	200	\$221
151 to 175	114	140	191	229	212	231	205	213	\$270
176 to 200	382	140	205	226	220	232	207	218	\$264
201 to 225	574	140	207	223	222	234	211	219	\$252
Over 225	336	139	210	233	233	241	217	227	\$242

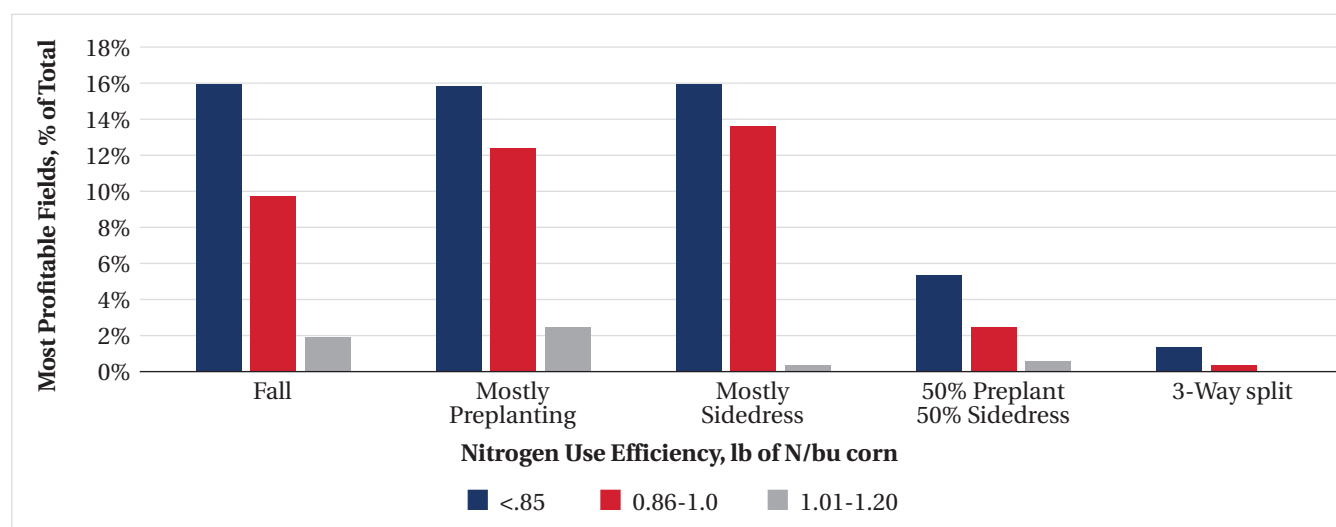
For more information about the economic impacts of nitrogen timing and rates, tillage options, and low SPR soils, visit www.ilcorn.org/PCM.



Most Profitable Strategies

What did the most profitable fields in our dataset have in common?

Figure 5 – Most Profitable Corn, High SPR, N Management and NUE, 2015-19



The most profitable PCM corn fields shared a few common themes: 1-Pass Light tillage and low Nitrogen Use Efficiency values (NUE).

Although there were a range of N application rates among the most profitable high SPR corn fields, it appears that low NUEs are a common strategy among the most profitable fields.

This likely means that the most profitable farmers have a good idea of the yield potential for these fields and apply N fertilizer at moderate rates which, in our analysis, are within the same range as the University of Illinois' Maximum Return to Nitrogen (MRTN) recommendation system.

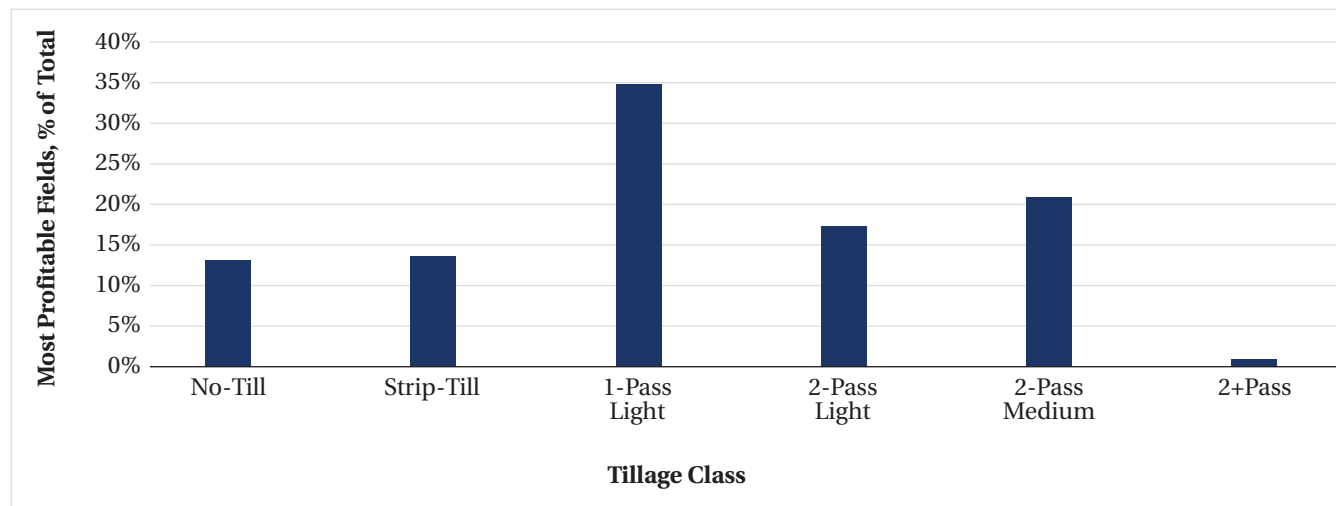
There was one obvious nitrogen strategy among the most profitable low SPR corn fields: mostly preplant with NUE in the range of 0.86-1.0 lb N/bu (data not shown).

In terms of N timing, Mostly Fall, Mostly Preplant and Mostly Sidedress were used in similar proportions among PCM high-profit, high SPR corn fields.

Most Profitable Strategies

What did the most profitable fields in our dataset have in common?

Figure 6 – Most Profitable Corn, High SPR, Tillage, 2015-19



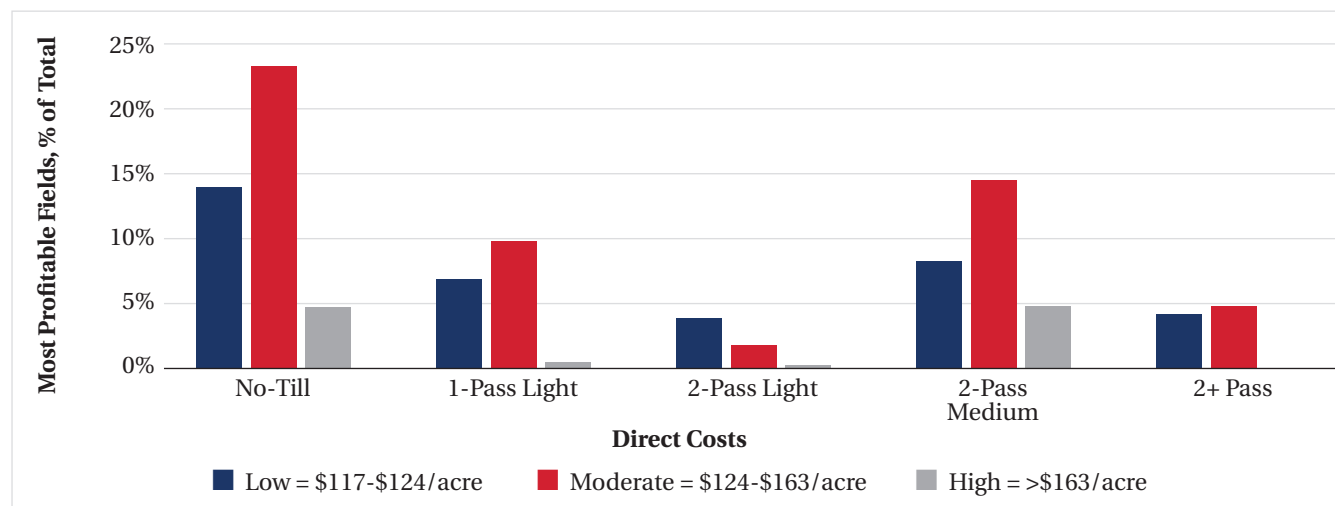
PCM data consistently shows that the most profitable fields focus on reducing total costs to make more money instead of just more bushels.

1-Pass Light tillage was the most common high-profit tillage system for high SPR corn fields, representing 35 percent of the most profitable fields. Continuing the theme, the most common tillage strategy among low SPR corn fields was also 1-Pass Light tillage, representing 36 percent of all fields.

The other low-SPR tillage strategies, in order of prevalence, were: 2-Pass Medium (17%), 2-Pass Light (15%), No-Till and Strip-Till (both at 12%), and 2+ Pass Tillage (8%).



Figure 7 – Most Profitable Soybean, High SPR, Tillage and Direct Cost Classes, 2015-19



Surprisingly, no-till was the most common tillage practice for our highest profit soybean fields, regardless of soil productivity range. No-till has never been one of the more profitable tillage systems for soybean production among our full pool of PCM fields but, considering only the most profitable fields, no-till was the clear tillage winner representing 41 percent and 47 percent of high and low SPR soybean fields, respectively.

It appears that no-till soybeans can be worth learning to do correctly!

Another interesting theme among the most profitable soybean fields is the importance of keeping direct costs in a moderate range. For high SPR soybean fields, “moderate” direct costs were in the range of \$124-\$163/a. For low SPR soybean fields, “moderate” direct costs were in the range of \$117-\$124/a. Over 50 percent of the most profitable soybean fields (for both high and low SPR soils) maintained expenses in this moderate direct cost range.

CONSIDER:

- *Will another tillage pass increase yield enough to pay for itself?*
- *Are more inputs an investment in your crop, or are you throwing money down the drain and nutrients down the river?*
- *Is your best strategy to apply nitrogen in the fall, hoping it will still be available to your crop in the spring?*



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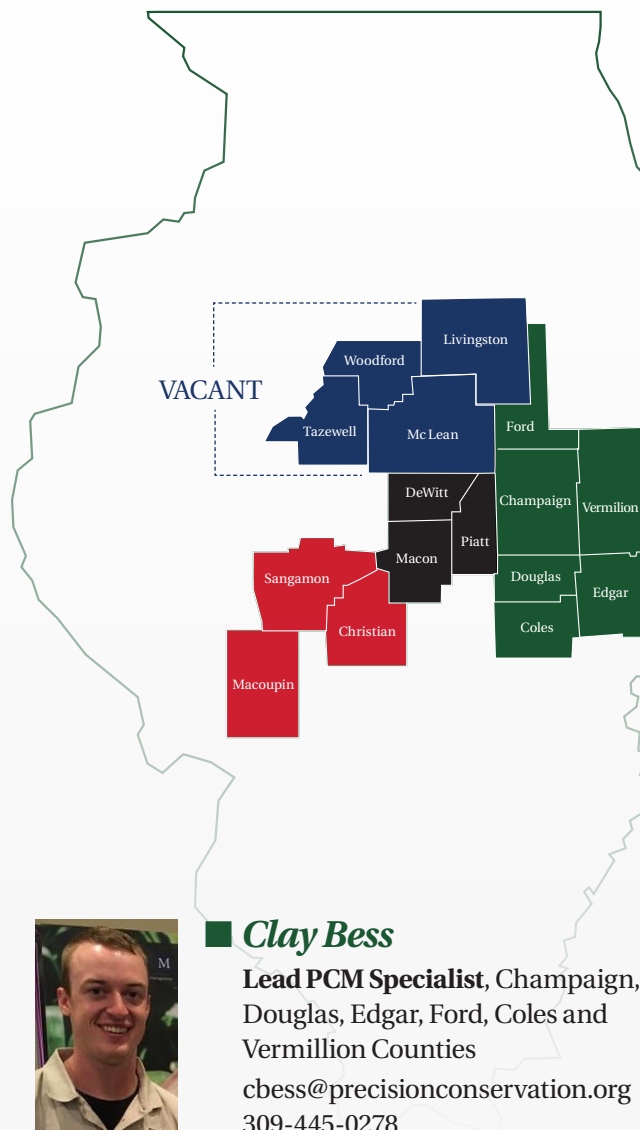
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The PCM program is also active in Kentucky.

PCM Recognized

The National Corn Growers Association and Environmental Defense Fund (EDF) launched the Success in Stewardship Network in 2020 to celebrate and accelerate the use of agricultural conservation practices on U.S. corn farms. IL Corn's Precision Conservation Management Program was recognized in the first year of this network's existence.

"The Success in Stewardship Network will break down the notion that conservation is only for an elite group of farmers," said Callie Eideberg, director of agricultural policy and special projects at EDF. "Practices that protect the land and water and increase climate resilience are more prevalent than many think, and this network will bring farmers and agricultural organizations together to continue making conservation commonplace."

In addition, PCM has been recognized by the following organizations for innovation, efficiency and impactful work since 2018:

- Field to Market
- USDA Natural Resources Conservation Service
- National Fish and Wildlife
- Walton Family Foundation
- Council for Best Management Practices
- The Nature Conservancy



In 2015, PCM was created through the Natural Resources Conservation Service (NRCS) Regional Conservation Partnership Program (RCPP). Later, PCM was the first NRCS RCPP Partner Spotlight recognized for its innovative service to farmers.



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