

2015–2022 DATA SUMMARY

The Business Case for Conservation

*Cost-Benefit Analysis of
Conservation Practices*



Precision Conservation Management

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2022 at a Glance

Many thanks to the 401 farmers enrolled in the Precision Conservation Management (PCM) program in 2022. This report is possible because these farmers voluntarily agree to anonymously share their farm's data for the betterment of Illinois agriculture and the advancement of farm conservation practice analysis today.

TOTAL ACRES*

(not unique acres)

REDUCED
TILLAGE

193,090

NITROGEN
MANAGEMENT

195,402

COVER CROPS

59,119

TOTAL IMPACTS*

(loss reductions)

NITRATE-N
LOSS (NO₃-N)

861,374

PHOSPHOROUS
(LBS/P)

134,806

SEDIMENT (TONS)

196,723

**total acres and total impacts graphics represent 2022 Illinois data only*



INCREASED YIELD ≠ INCREASED PROFITABILITY

We understand that farm management shifts require psychological shifts. It can be difficult to pivot from the drive to maximize crop yields; however, it's time to challenge the assumption that increased yield equals increased profitability. Consider the following pages while also evaluating lower yields and lower input costs for your farm's future.

Using Data to Drive Conservation Decisions

The PCM program was created by farmers, for farmers, to assist in the evaluation of on-farm conservation decisions.

The program began with a Regional Conservation Partnership Program (RCPP) award through the USDA in 2015. Since that time, the program has expanded from four Illinois regions to seven, one in Kentucky, and one in Nebraska.

The objective of PCM is to work one-on-one with farmers to help them

understand the costs and benefits of adopting new conservation practices. By joining PCM, farmers agree to allow PCM to aggregate and anonymize their data in a way that demonstrates how conservation practices affect both environmental outcomes and farm incomes. The advantage of PCM to individual farmers is that they have their own PCM specialist who helps them make decisions about adopting conservation practices in a financially responsible way.





Thanks to PCM, we have more detailed research on cover crops.

We know that cereal rye planted into corn stubble with no-till does not result in soybean yield losses when compared to no-till without a cover crop. More work with the extensive PCM data set will offer more opportunities to learn how to make cover crops profitable.

DR. GARY SCHNITKEY
UNIVERSITY OF ILLINOIS

*PCM relies on our partners Field to Market and
COOL Farm Alliance for estimates of environmental impacts.*



“As a PCM specialist, I am able to provide education, conservation recommendations and financial assistance to cooperators in the PCM program. The goal is to assist growers with sustainability on the farm while maximizing profitability, and there are many ways to do so.

PCM data is unique in the way that it can show growers how their operation compares to both similar and different in-field practices across their county, region and the state. I work with growers who are quite advanced with soil health practices to those who have not as much experience, and there is assistance available

to all. By meeting with a PCM specialist and receiving a customized report for their operation, growers can learn about and tap into all the opportunities available, including those that are specific to PCM cooperators.”

AIDAN WALTON

PCM SPECIALIST
NORTH CENTRAL IL REGION



More Partners, More Funding, _____ 7 More Opportunities than Ever Before

PCM is proud to be a partner in multiple projects funded by the United States Department of Agriculture's (USDA's) Partnerships for Climate-Smart Commodities program.

Funded at \$95 million, the Farmers for Soil Health (FSH) project will incentivize farmers to plant additional acres of cover crops. The FSH collaboration includes Soy Checkoff, Pork Checkoff, National Corn Growers Association and American Soybean Association, resulting in a farmer-led cover crop program that advances the use of soil health practices, meets sustainability goals and improves farmer profitability.

FSH's goal is to encourage farmers to expand their adoption of cover crops to 30 million acres by 2030.

A second climate-smart proposal by Field to Market is funded at \$70 million and includes PCM as a valued partner. PCM will interface with Illinois farmers to

deliver innovative financial incentives to increase conservation adoption.

These initial projects will expand markets for climate-smart commodities, leverage the greenhouse gas benefits of climate-smart commodity production and provide direct, meaningful benefits to production agriculture, including for small and underserved farmers.

The Illinois Corn Growers Association (ICGA) applauds the efforts of the USDA to encourage conservation adoption via voluntary programs through the Partnerships for Climate-Smart Commodities Grant. We believe the approach to develop markets that can support farmers with funding mechanisms to offset the cost and therefore some of the financial risk associated with adopting climate-smart farming practices is a good approach to scale climate-smart practice adoption.



Like last year, our updated results demonstrate that 1-pass light and 2-pass light tillage are most profitable for both high SPR corn and soybean fields enrolled in PCM. Light tillage is defined as tillage that leaves about 80% of the soil surface covered with crop residues and creates very little soil disturbance.

Analyze this tillage data and consider our premise that additional yield does not always equal increased profitability. For both corn and soybeans, the 2-plus-pass tillage class produces high average yields but does not result in correspondingly high net return; the fuel for the additional pass does not produce

enough additional bushels of corn or soybeans to pay for itself. And that doesn't even factor in the value of your time driving back and forth across fields. And how about your topsoil? You can save anywhere from three-quarters to more than one ton of your most valuable topsoil per acre per year by reducing or eliminating tillage passes.

You might also notice the greenhouse gas emissions numbers are much higher with increased tillage passes, resulting not only in lower profitability, but also lower sustainability metrics.

Corn TILLAGE HIGH SPR 2015-22 AVG VALUES	NO-TILL	STRIP-TILL	1-PASS LIGHT	2-PASS LIGHT	2-PASS MODERATE	2+ PASSES
# of fields	578	881	1,496	488	663	76
Yield per acre	215	220	220	226	225	227
GROSS REVENUE	\$909	\$931	\$926	\$953	\$951	\$966
TOTAL DIRECT COSTS*	\$415	\$434	\$406	\$415	\$418	\$437
Field work	\$0	\$21	\$11	\$23	\$27	\$38
Other power costs	\$103	\$97	\$101	\$101	\$98	\$102
TOTAL POWER COSTS**	\$103	\$118	\$112	\$124	\$125	\$140
OVERHEAD COSTS	\$38	\$38	\$38	\$38	\$38	\$38
TOTAL NON-LAND COSTS	\$556	\$590	\$556	\$577	\$581	\$616
OPERATOR & LAND RETURN	\$353	\$341	\$370	\$376	\$370	\$351
Estimated soil loss (tons/a)	0.55	0.50	1.10	1.05	1.02	1.24
GHG emissions (metric tons CO ₂ e/a)	0.11	0.55				1.08

*Direct Costs = fertilizers, pesticides, seed, cover crop seed, drying, storage and crop insurance

**Power Costs = tillage, fall fertilizer application, spraying, planting, cover crop planting, spring/in-season fertilizer application, harvesting and grain hauling

Additionally, consider the heavy winds Illinois saw this spring, resulting in dust storms significant enough to cause damage and even loss of life. Reduced tillage is a great way to manage crop residue effectively to help armor your soil, especially in vulnerable areas.



DAVID WESSEL
CHANDLERVILLE, IL

Soy TILLAGE HIGH SPR 2015-22 AVG VALUES	NO-TILL	STRIP-TILL	1-PASS LIGHT	2-PASS LIGHT	2-PASS MODERATE	2+ PASSES
# of fields	2,284	115	751	237	816	434
Yield per acre	68	72	70	69	71	70
GROSS REVENUE	\$697	\$755	\$718	\$716	\$737	\$719
TOTAL DIRECT COSTS*	\$165	\$210	\$160	\$155	\$167	\$147
Field work	\$0	\$18	\$12	\$25	\$27	\$44
Other power costs	\$77	\$72	\$76	\$70	\$71	\$68
TOTAL POWER COSTS**	\$77	\$90	\$88	\$95	\$98	\$112
OVERHEAD COSTS	\$32	\$32	\$32	\$32	\$32	\$32
TOTAL NON-LAND COSTS	\$273	\$331	\$279	\$281	\$297	\$290
OPERATOR & LAND RETURN	\$424	\$424	\$439	\$436	\$440	\$429
Estimated soil loss (tons/a)	0.80	0.57	1.09	1.37	1.65	2.20
GHG emissions (metric tons CO ₂ e/a)	-0.63	-0.18				0.23

No-Till = no tillage; **Strip-Till** = less than full-width tillage of varying intensity; **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 tillage + 1 high-disturbance tillage); **2+ Pass** = more than 2 tillage passes, any intensity level

SPR = soil productivity rating

Cover crops remain the best conservation practice to improve soil health and productivity, reduce soil and nutrient loss and address climate change. Many farmers have also seen agronomic benefits related to weed control, water infiltration and drought tolerance. Still, there are clear risks to cover crop adoption, like management, labor, time and finances.

Cover crops do present a unique challenge; there are many combinations of planting and termination options and dozens of species and mixes to choose from. The decision fatigue associated with identifying

the right combination for the right soil type, region or management is very real, made more difficult by varying costs.

And yet, we find that PCM farmers who begin using cover crops plant them again. The next time corn and soybeans were grown, 70% of PCM farmers used cover crops again on cornfields and 75% used them again on soybean fields.

While our aggregated data has yet to demonstrate the profitability of cover crops, we're confident that

Corn COVER CROPS HIGH SPR 2015-22 AVG VALUES			
	OVERWINTERING	WINTER TERMINAL	NO COVER CROP
# of fields	369	164	4,502
Yield per acre	215	217	222
Soil Productivity Rating	139	140	140
GROSS REVENUE	\$922	\$918	\$938
COVER CROP SEED	\$14	\$14	\$0
TOTAL DIRECT COSTS*	\$427	\$407	\$417
COVER CROP PLANTING	\$12	\$16	\$0
Other power costs	\$121	\$111	\$114
TOTAL POWER COSTS**	\$133	\$127	\$114
OVERHEAD COSTS	\$38	\$38	\$38
TOTAL NON-LAND COSTS	\$598	\$572	\$570
OPERATOR & LAND RETURN	\$295-\$345	\$321-\$371	\$368
Estimated soil loss (tons/a)	0.64	0.72	0.91
GHG emissions (metric tons CO2e/a)	-0.31		0.59

*Direct Costs = fertilizers, pesticides, seed, cover crop seed, drying, storage and crop insurance

SPR = soil productivity rating

farmers who want to utilize them can do so without a net loss of income under the right circumstances, and PCM is identifying those opportunities. In our cost tables, we include a \$50/acre range for Net Return estimates to reflect the broad range of decisions that impact final profitability.

In general, average corn yield is reduced by 5-7 bu/acre and soybean yield is reduced by 1-2 bu/acre following cover crops. Reduced yields paired with increased costs inevitably result in reduced net profitability unless other financial incentives are factored in.

The values shown in our tables do not reflect any payments farmers receive for their conservation efforts. Typically, those payments make up for the profitability loss farmers incur as a result of growing cover crops.

Soybeans COVER CROPS HIGH SPR 2015-22 AVG VALUES			
	OVERWINTERING	WINTER TERMINAL	NO COVER CROP
# of fields	918	33	3,750
Yield per acre	68	69	70
Soil Productivity Rating	139	139	140
GROSS REVENUE	\$710	\$688	\$717
COVER CROP SEED	\$14	\$13	\$0
TOTAL DIRECT COSTS*	\$176	\$163	\$161
COVER CROP PLANTING	\$10	\$16	\$0
Other power costs	\$93	\$71	\$85
TOTAL POWER COSTS**	\$103	\$87	\$85
OVERHEAD COSTS	\$32	\$32	\$32
TOTAL NON-LAND COSTS	\$311	\$281	\$278
OPERATOR & LAND RETURN	\$369-\$419	\$384-\$434	\$439
Estimated soil loss (tons/a)	0.86	0.71	1.26
GHG emissions (metric tons CO ₂ e/a)	-1.24		-0.08

****Power Costs** = tillage, fall fertilizer application, spraying, planting, cover crop planting, spring/in-season fertilizer application, harvesting and grain hauling

As many of you are painfully aware, the price of fertilizers, especially nitrogen fertilizer, began increasing in late summer/fall 2021 and continued to increase to historically high levels over the next 12 months. Naturally, many of us were wondering if average nitrogen rates would decline in 2022 in response to high nitrogen prices. We now have the answer. Nitrogen application rates on high SPR corn acres remained almost exactly the same (within 1 lb/a) in our Illinois PCM regions in 2022 relative to the previous two years. However, nitrogen fertilizer *costs* expressed as a percentage of total non-land costs for corn on high SPR fields about doubled (from 8% and 9% in 2020 and 2021 to 16% in 2022).

Why did farmers not reduce their nitrogen fertilizer rates in response to higher nitrogen prices? It's tempting to say farmers are stuck in their ways, or that ag retailers were very convincing, or any number of other easy-button responses. But PCM farmers, on average, were more profitable in 2022 than any other year since 2015 as a result of strong corn prices and high yields across the state. So, call it good luck or call it good management, but corn farmers in Illinois in 2022 made more money and grew more corn per acre by maintaining their nitrogen fertilizer application rates at the same level as previous years despite the higher costs of fertilizers.

Corn N-TIMING HIGH SPR 2015-22 AVG VALUES	>40% FALL	MOSTLY PREPLANT	MOSTLY SIDEDRESS	50% PREPLANT/ 50% SIDEDRESS	3-WAY SPLIT
NUE (lb N/bu grain)	0.98	0.92	0.91	0.94	0.92
# of fields	1,876	1,126	1,189	367	477
Yield per acre	222	218	221	220	224
GROSS REVENUE	\$941	\$918	\$933	\$929	\$948
N fertilizer	\$93	\$87	\$86	\$96	\$92
Other direct costs	\$335	\$308	\$321	\$324	\$348
TOTAL DIRECT COSTS*	\$428	\$395	\$407	\$420	\$440
Field work	\$16	\$15	\$16	\$15	\$18
Other power costs	\$102	\$94	\$100	\$100	\$100
TOTAL POWER COSTS**	\$118	\$109	\$116	\$115	\$118
OVERHEAD COSTS	\$38	\$38	\$38	\$38	\$38
TOTAL NON-LAND COSTS	\$585	\$542	\$561	\$573	\$596
OPERATOR & LAND RETURN	\$356	\$376	\$371	\$356	\$352

*Direct Costs = fertilizers, pesticides, seed, cover crop seed, drying, storage and crop insurance

SPR = soil productivity rating

**Power Costs = tillage, fall fertilizer application, spraying, planting, cover crop planting, spring/in-season fertilizer application, harvesting and grain hauling

Looking to 2023 and beyond, the rate at which fertilizer prices decline will be much slower than the rate at which corn prices decline. We might see something very interesting with fertilizer rates in

2023. Stay tuned! And remember that the MRTN has been an excellent predictor of the most profitable nitrogen fertilizer rate for corn EVERY SINGLE YEAR since we began our program in 2015.

OTHER INTERESTING NITROGEN MANAGEMENT OBSERVATIONS:

- **MRTN FOR THE WIN!** Our data indicates that the most profitable nitrogen application rate range in 2022 was 151-175 lbs TOTAL N per acre (including nitrogen contained in MAP, DAP or applied with herbicides). Our results, once again, demonstrate the value of the University of Illinois' Maximum Return to Nitrogen (MRTN) tool for calculating nitrogen fertilizer application rates for corn.
- Once again, *the most profitable nitrogen timing categories were Mostly Preplant and Mostly Sidedress.*

Corn N-RATE HIGH SPR LBS PER ACRE	<150	151-175	176-200	201-225	>225
# of fields	105	443	1,535	1,905	1,047
AVG Corn Yield (bu/a) 2015-22	208	217	219	221	229
OPERATOR & LAND RETURN (2015-22)	\$370	\$379	\$371	\$359	\$358
GHG emissions (metric tons CO2e/a)	0.21	0.38	0.43	0.52	0.71

“Our farm has slowly switched to either spring- or sidedress-applied nitrogen since 2019. We apply MRTN rates with confidence knowing that this is the most effective way of getting our nitrogen needs. **We have seen a 40-bushel advantage in certain instances with sidedress compared to fall anhydrous at the same nitrogen rate.** While this isn’t common, it shows the potential of what applying the right rate at the right time can do for your corn.”

ELLIOTT UPHOFF, SHELBYVILLE, IL



Each year we take a look at the top 25% most profitable fields to see what those farmers are doing and what farmers all over Illinois can learn from them. Our analysis lets us identify the most profitable corn and soybean fields across our entire data set, broken out by higher- and lower-productivity soils and normalized by year, to account for different profitability levels across time.

We had 1,250 cornfields and 1,156 soybean fields in our analysis this year. As expected, the majority of high-profit fields came from 2021 and 2022, which were years with higher commodity crop prices and good yields across most of the state of Illinois.

Regarding tillage, we also saw these trends:

The most frequently observed tillage systems among the most profitable corn and soybean fields with high-productivity soils were 1-pass light tillage for corn (51% of most profitable fields) and no-till for soybean (53% of most profitable fields).

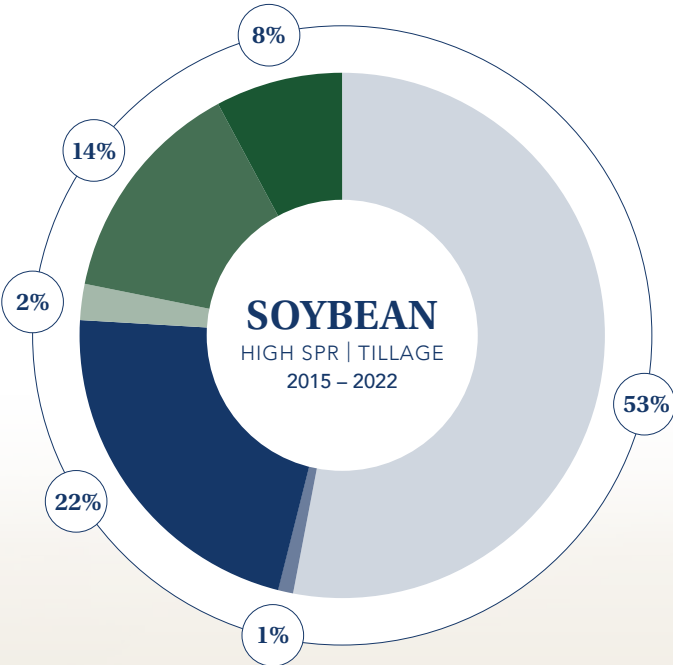
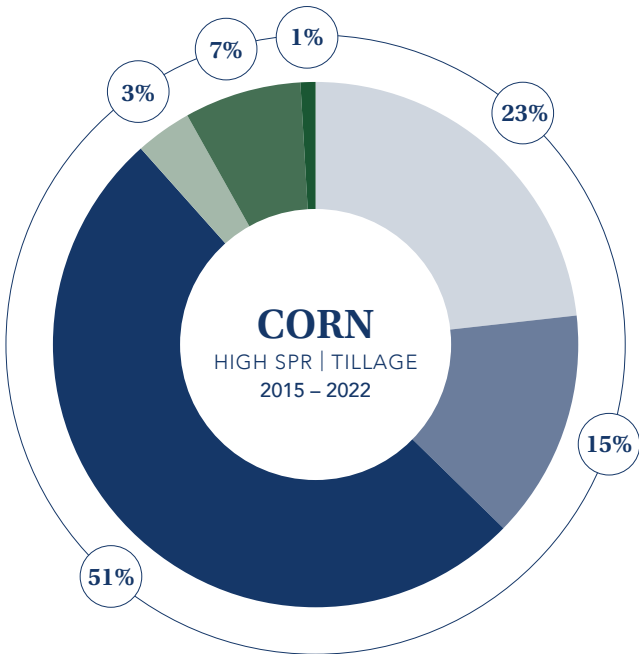
Only 8% of PCM's most profitable soybean fields and less than 1% of the most profitable cornfields are managed with three or more tillage passes.

Strip tillage is being used more frequently – and more profitably – for corn production in recent years. In 2022, 33% of the most profitable PCM cornfields in Illinois were managed with strip-till.

Nitrogen trends are also compelling:

The most profitable high SPR cornfields receive less than 1 pound of nitrogen per bushel.

Seventy percent of the most profitable high SPR cornfields receive most of their nitrogen in the spring, either preplant or sidedress or some of both.

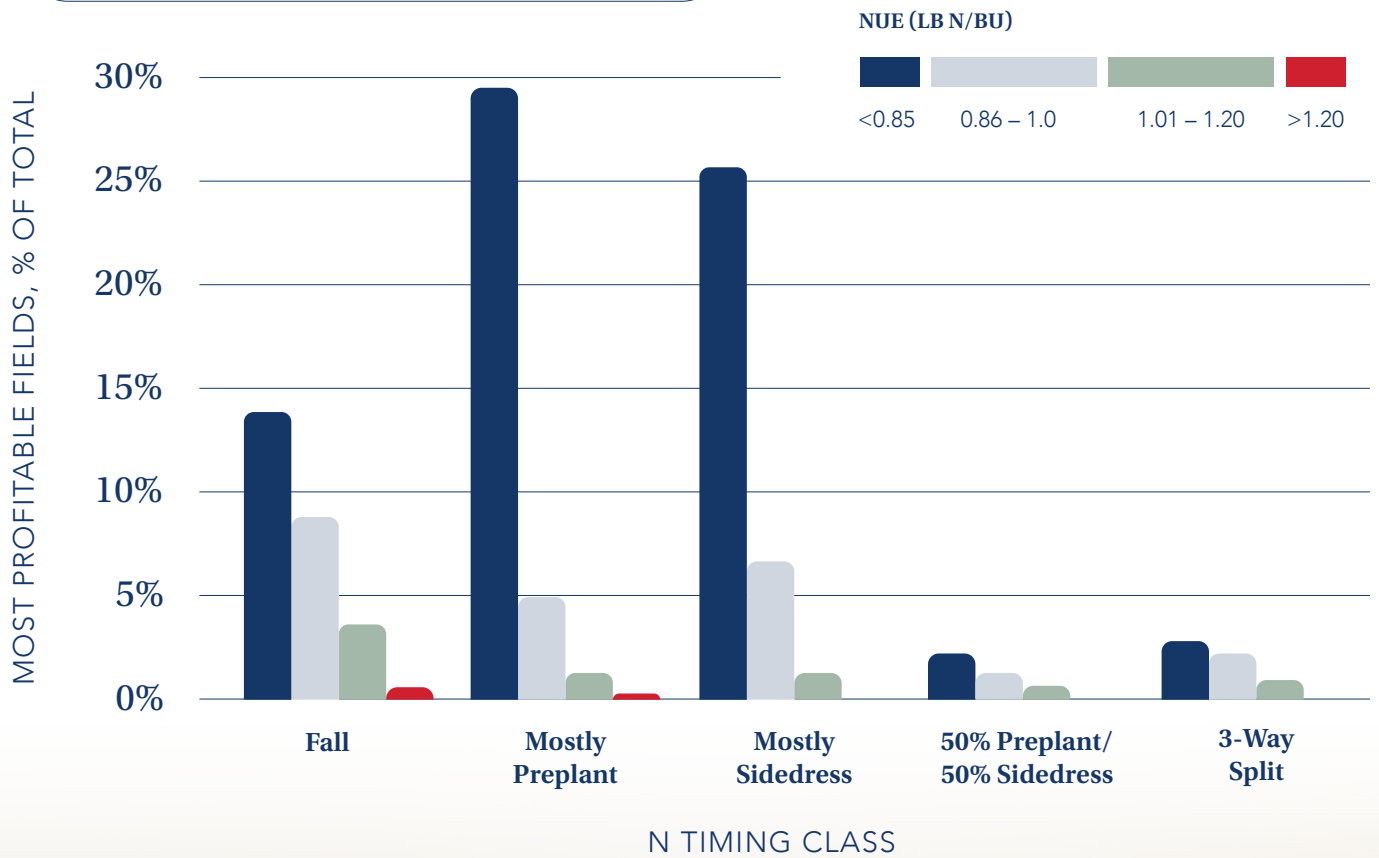


CORN

HIGH SPR

NITROGEN

2015 – 2022





Farmers that apply less fertilizer are making the quickest, easiest change to increase their profitability. Based on eight years of PCM data, **farmers that apply nitrogen over MRTN are less profitable** than those applying at MRTN rates, on average.



Preplant and sidedressed nitrogen applications at MRTN levels are paying off. Consider this as you make decisions regarding your N-timing for this coming year. In-season timing is good for your wallet and the environment.



When it comes to tillage and profitability – less is more. Approximately half of the most profitable Illinois farmers are using no-till ahead of soybeans or a single light tillage pass ahead of corn.



Try cover crops this fall. There have never been more incentive offerings to plant a cover crop than right now. Take advantage of these opportunities and **start building your soil health and farm resiliency with lower risk.** You will not regret it.



Heartland Science and Technology has been our dedicated technology partner from the earliest days of PCM’s conception and every day since. Their team of developers has worked side by side with the PCM administrative team and specialists to bring maximum data value and ensure data security for PCM farmers. Heartland continues to maintain and evolve the PCM Farmer Portal and provide us with the technological expertise to expand into new regions and crops.

Heartland is wholly committed to solving technical challenges of national, local and public interest. They specialize in advancing scientific research and

engineering development, providing and maintaining technology solutions, and facilitating and managing collaborative partnerships. As a trusted partner, Heartland Science and Technology is a 501(c)(3) not-for-profit corporation in Champaign, Illinois, founded by experienced engineers, researchers and business professionals devoted to technical excellence and responsiveness to client needs.



PepsiCo’s Incentive Program provides payments for conservation practices

PepsiCo supports and rewards farmers who are new to conservation practices AND those who have been using these practices for years. Through PCM, PepsiCo offers a higher payment during the first two years that a field is managed with cover crops and reduced tillage. For years three and beyond, PepsiCo continues to offer financial incentives in exchange for the right to claim the carbon assets against their corporate climate commitments.

COVER CROPS – REDUCED TILLAGE: This is a payment for farmers who use no-till and strip-till, without any full-width tillage, during their full rotation (every year).

NITROGEN REDUCTION: This is a payment to farmers for reducing their nitrogen fertilizer applications by at least 10% AND meeting the U of IL MRTN rate range.

Farmers cannot participate in any other carbon/ecosystem service market or claims system for acres in this program. Carbon assets generated from participating in this program are being claimed by PepsiCo.

2023 PAYMENT STRUCTURE

COVER CROPS	NO-TILL/STRIP-TILL	MRTN/10% NITROGEN REDUCTION
\$15, 1st/2nd year	\$10, 1st/2nd year	\$10, 1st year
\$10, 3+ year OLD	\$5, 3+ year OLD	–
\$25, 1st/2nd year NEW \$15, 3+ year OLD		
\$20, 1st/2nd year \$15, 3+ year OLD		–
		\$15, 1st/2nd year





PCM's team of specialists are available to help farmers navigate today's positive land management practices and incentive programs. Reach out directly to your county specialist or any of the PCM professionals if you don't see a county represented and want to learn more.

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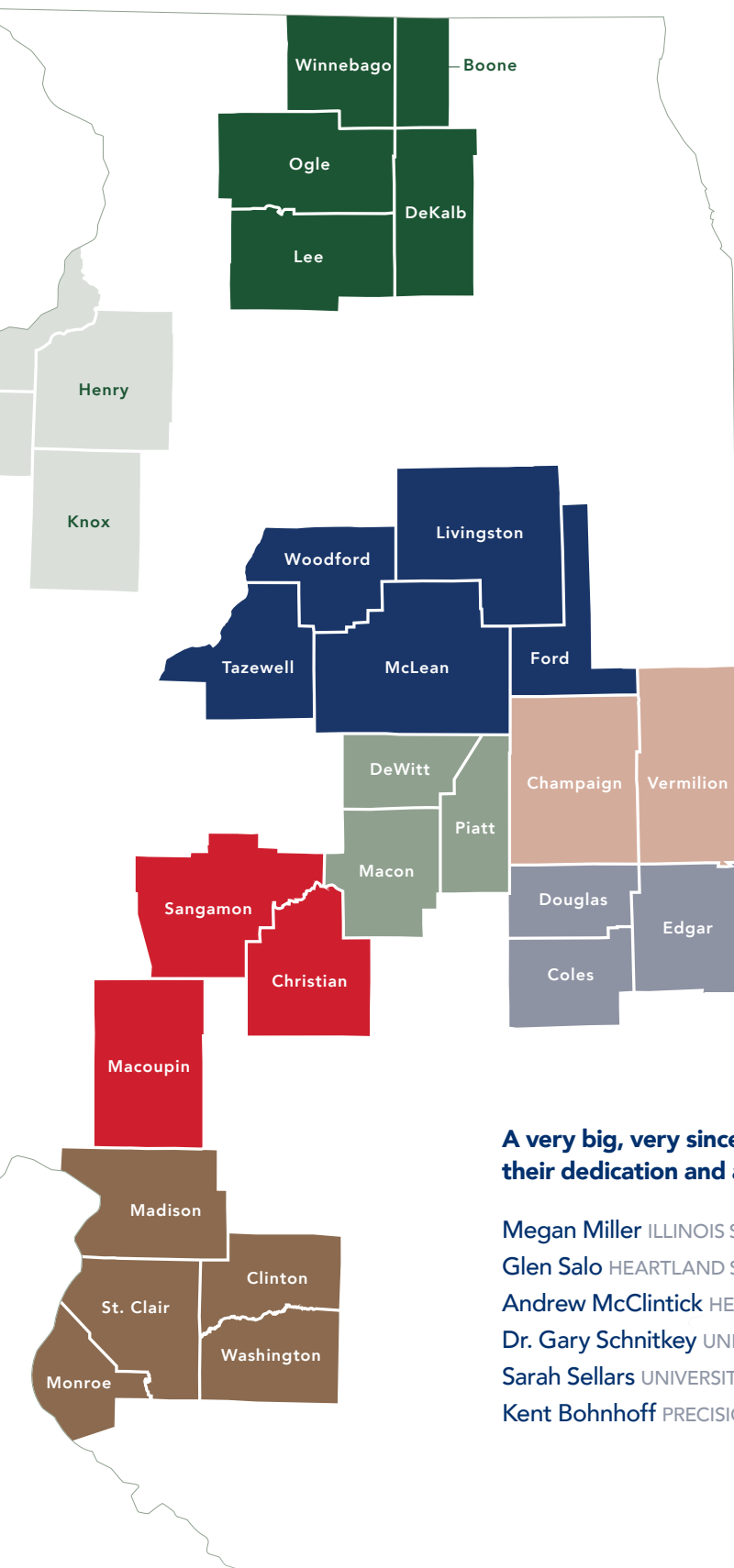
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