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Photo by Dan Myers

CONSERVATION IN ILLINOIS: HOTSPOT ANALYSIS AND IMPLICATIONS FOR PROGRAM DESIGN

JULY 2021

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Understanding conservation behavior is one of the key factors in designing effective programs. Farmers manage their land and make decisions about how they farm based on myriad tangible and intangible considerations. Decisions to implement conservation practices may be affected by bottom line and soil productivity; land tenure and farming experience community and peer norms; cross-generational succession planning; and, beliefs and attitudes about the environment and their actions in it.

Studies have identified numerous attributes that are correlated with conservation practice adoption including demographics, characteristics of the land, and access to resources. Research also suggests that there is a wide range of constraints to adopting conservation including beliefs about the benefits of conservation and the effectiveness of practices; cost and management considerations; and, a lack of access to information on which practices are best for their local conditions[1]. Understanding the drivers and barriers to conservation adoption is key in implementing programs and policies that encourage a transition to conservation-focused land management. Programs that aim to increase conservation adoption need to be designed to consider broader trends and how local factors like attitudes, perceptions and public policy impacts on land management decisions and associated behavior.

Our Approach

To assess conservation adoption in Illinois and identify key factors that lead to higher adoption rates, Delta Institute and Environmental Working Group partnered to identify conservation hotspots, defined as Illinois counties with high uptake of specific conservation programs, and evaluate the impact of relevant factors. We utilized a suite of publicly available data from federal and state programs, satellite data, data from non-governmental organization (NGO) watershed projects, and other supporting datasets to identify where conservation practices are being adopted. Where we had datasets that covered extended time ranges, we also assessed the longevity of conservation behavior. We used cover crops and conservation tillage activities as proxy indicators for broader conservation behavior. Additionally, an interactive map was created to facilitate further exploration of the data.

The results of the analysis suggest that future strategies which seek to more effectively deploy financial and technical support to increase conservation adoption should be modified to focus on local conditions and concerns, avoiding a state-wide or uniform program design that fails to consider local factors.

Findings

The analysis revealed that there are patterns of conservation adoption behavior in different parts of the state. Linking patterns to specific drivers and assessing their longevity requires a deeper investigation of local drivers at the sub-county level. However, there are larger trends that are identified through analysis and provide next steps for further research.

Most cover crop acres are in the southern part of the state, while most of the conservation tillage occurs in the northwestern part of the state. Because these areas are geographically distinct, it suggests these practices are typically not adopted as part of a system or a result of soil health education efforts. Rather, data suggests that adoption may be driven largely by landscape characteristics and social norms[2].

Cost-share programs are most active in the central part of the state, driving conservation adoption in areas where it would not occur otherwise. Conservation programs could be redesigned to increase adoption rates by targeting areas of the state for certain practices and removing barriers to implementation created by local conditions. More research is needed to compare the impact of social and policy motivators for the adoption of certain practices. Data sources and methodology are described in the Analysis section.

Although the data required to assess long-term trends is limited, identifying hotspots of conservation implementation and understanding where and why they occur can inform future policy and program design and enable increased conservation adoption and contribute to environmental and agronomic outcomes. We recommend the following actions be taken to distribute funding for conservation practices to be impemented more effectively and to expand programs to target local market conditions.

1. Promote conservation practices as a system by adopting a graduated cost-share rate that supports multi-practice adoption.

2. Encourage the adoption of a system of soil health practices by communicating benefits, providing subsidized soil testing, collecting additional geographic data, and targeting cost-share programs to hot spot-adjacent areas.

3. Prioritize the distribution of federal cost-share funding for central Illinois, in-field practices, small farms, cover crops in northern Illinois.

4. Concentrate State conservation funding in priority areas, encourage adoption of practices identified in the Illinois Nutrient Loss Reduction Strategy (NLRS), and enhance outreach activities to promote the program.

5. Establish standardized performance tracking and reporting for outreach activities and create an accessible method for governmental agencies and NGOs to monitor that data.

6. Conduct additional analysis of the relevant factors in hotspots including the operations of stakeholder organizations like local Soil and Water Conservation Districts.

Findings from Illinois demonstrate how conservation programs can be strengthened. Specifically, our analysis evaluated conservation adoption trends in Illinois and provides a basis for decision makers to improve existing programs and design new policies and programs that lead to more conservation practices on the landscape. We anticipate conservation behavior trends in other Midwest states also varies as a function of local factors. It is our hope that State and local conservation program administrators, policy advocates and agricultural conservation professionals find this analysis informative in making changes to their program design efforts and enabling more comprehensive consideration of local conditions and realities for farmers in Illinois while avoiding designing programs for a typical farmer without considerations for local social and ecological context.

About Delta Institute

Established in 1998, Delta Institute is a Chicago-based nonprofit organization that collaborates with communities to solve complex environmental challenges across the Midwest. We envision a region in which all communities and landscapes thrive through an integrated approach to environmental, economic, and social challenges.

As a 501c3 nonprofit with a 2021 Platinum Seal of Transparency from GuideStar, Delta serves as a trusted advisor, technical provider, and project implementation expert for partners across the public, private, nonprofit, and community sectors. We rely on both philanthropic and earned revenue, specifically through grants, charitable contributions, and fee-for-service contracts. Our work takes us to cities like Chicago, St. Louis, Gary, and Milwaukee; to Great Lakes coastal towns; and to rural communities with thousands of acres of farmland and waterways.

Visit us online at www.delta-institute.org.

Acknowledgements

This project was produced with generous support for the Walton Family Foundation.

We also acknowledge Environmental Working Group for their contributions to this analysis.

This document and the tools provided aim to be action oriented and to provide the most current, correct, and clear information possible, but some information may have changed since publication. We encourage practitioners to reach out to us at delta@delta-institute.org with questions, corrections, or to discuss implementation challenges.

About the Map

The interactive map[1] was created to complement the analysis and further allows individuals to explore hotspots of conservation activity in Illinois using relevant data to reveal connections between factors including conservation programs, farm size, soil productivity and erodibility, outreach activities, diversity of crop rotations, and others. To use the map:

- Use the sliders on the left side of the map to identify counties that fall above or below the state average in a given category.
- View different base maps by selecting one of the options (above the map in the upper left corner) to see how additional landscape characteristics, such as corn rotation frequency, soil productivity index, highly erodible land or average farm size relate to the identified hotspots.
- Use the scroll-wheel on your mouse or use the "+" or "-" icons in the lower right corner of the map to adjust magnification level.
- Click on specific counties (outlined in black) to view detailed information about the county, conservation hotspots, and conservation incentive programs.

Basemaps show different landscape characteristics that were used in this analysis and correlate with conservation activities or programs. These inividual characteristics are shown as basemaps, in no particular order, on the following pages. Figure 1 shows corn rotation frequency; Figure 2 shows soil productivity; Figure 3 shows highly erobile land; and, Figure 4 shows farm size. Figure 5 displays the watersheds designated as a priority for action by the Illinois NLRS.

[1] https://www.ewg.org/interactive-maps/2021-conservation-hotspots-illinois/map/

Figure 1. Base map showing corn rotation frequency in Illinois
Corn rotation frequency is a proxy for crop rotation diversity showing how many years corn was planted during a twelve year period. It was evaluated as a factor for conservation practice adoption.

Source: USDA National Agricultural Statistics Service (NASS)

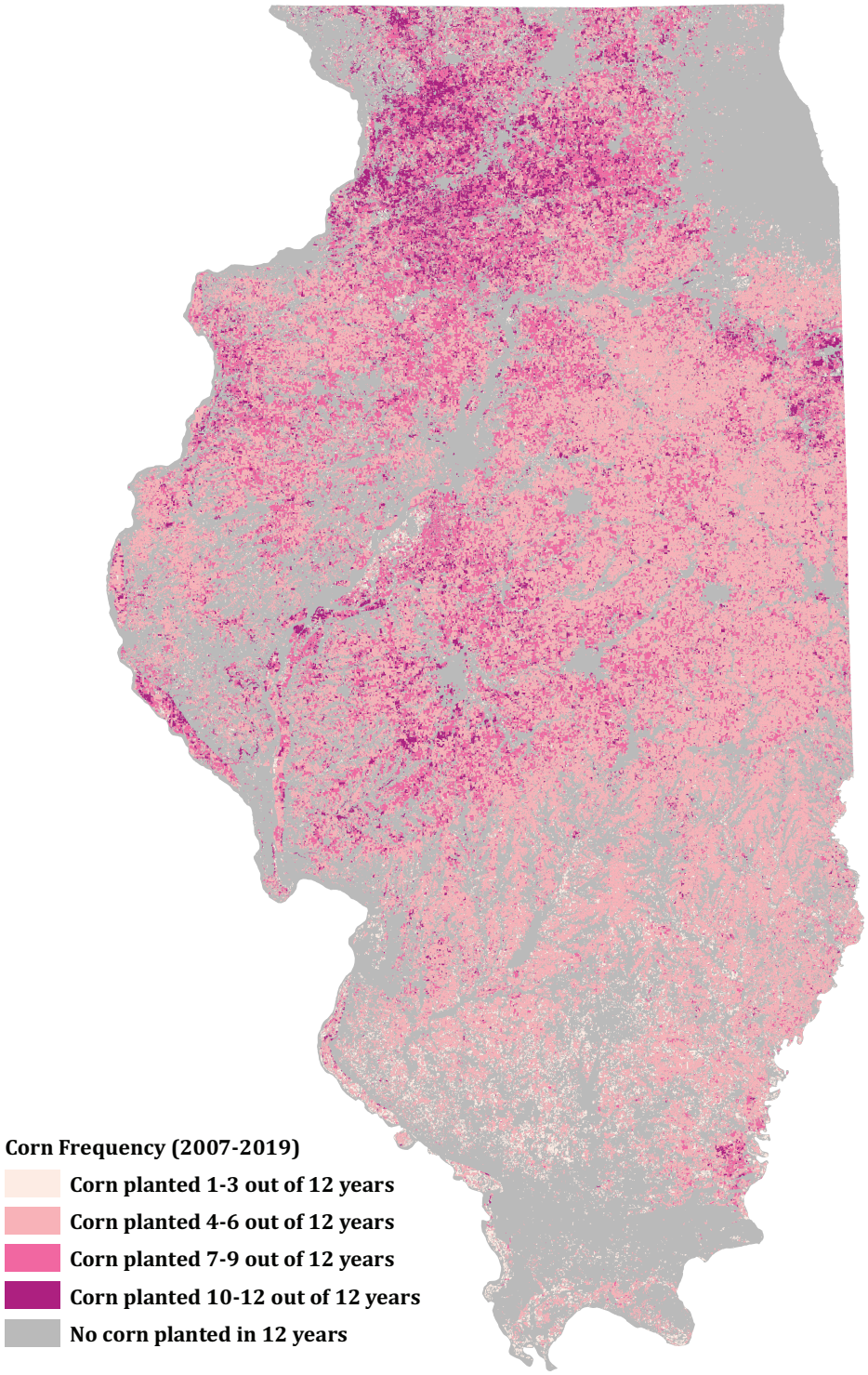


Figure 2. Base map showing average soil productivity in Illinois counties
Soil Productivity Indices indicate areas with more or less productive soils. Soil productivity influences what crops are grown and how land is managed.

Source: USDA

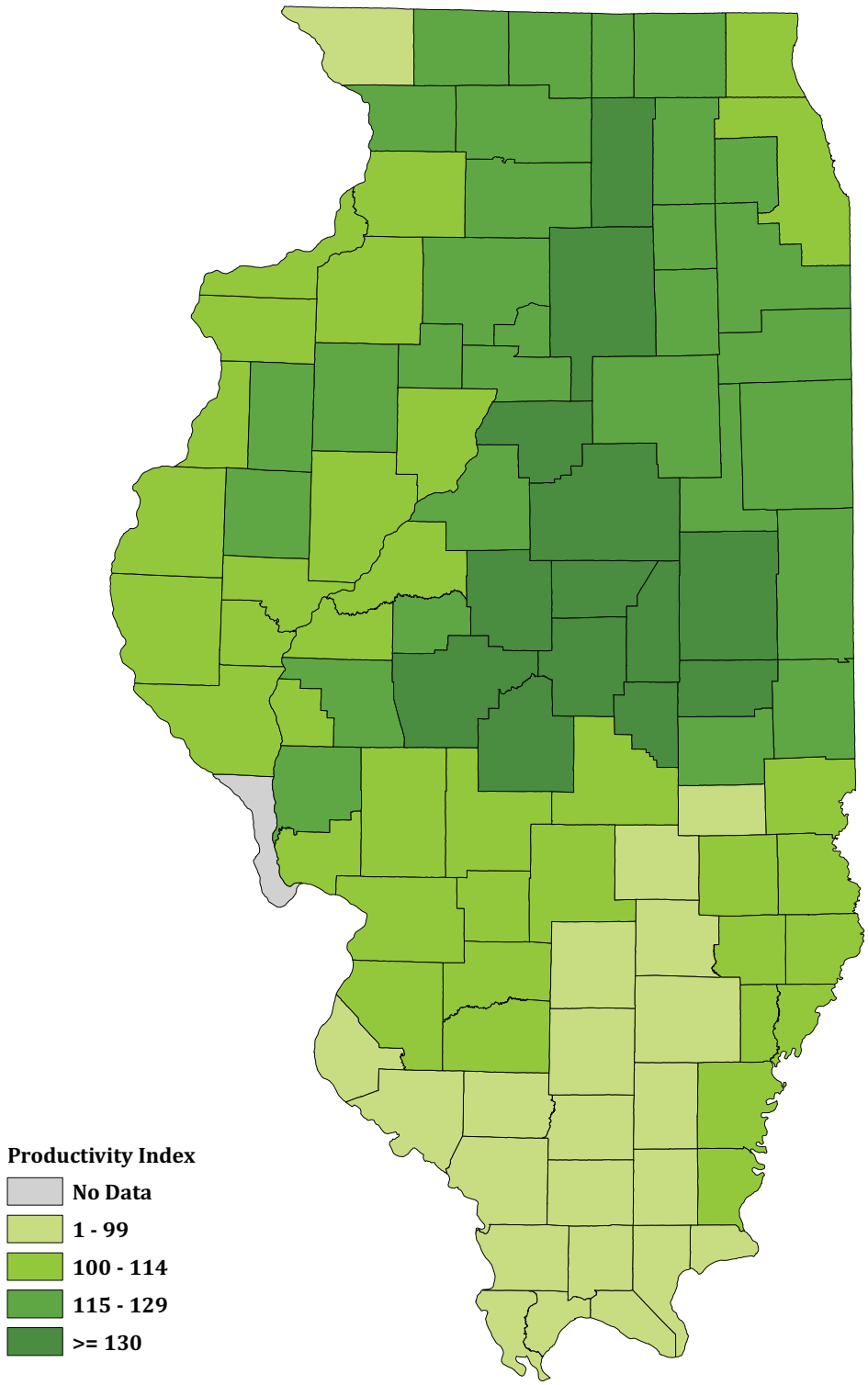


Figure 3. Base map showing proportion of highly erodible land in Illinois counties
Highly erodible land indicates areas where soil may erode at an excessive rate. This data was used to evaluate if conservation behavior is different on lands that are more prone to erosion and if participation in conservation programs is affected by environmental compliance restrictions.

Source: USDA Farm Service Agency (FSA)

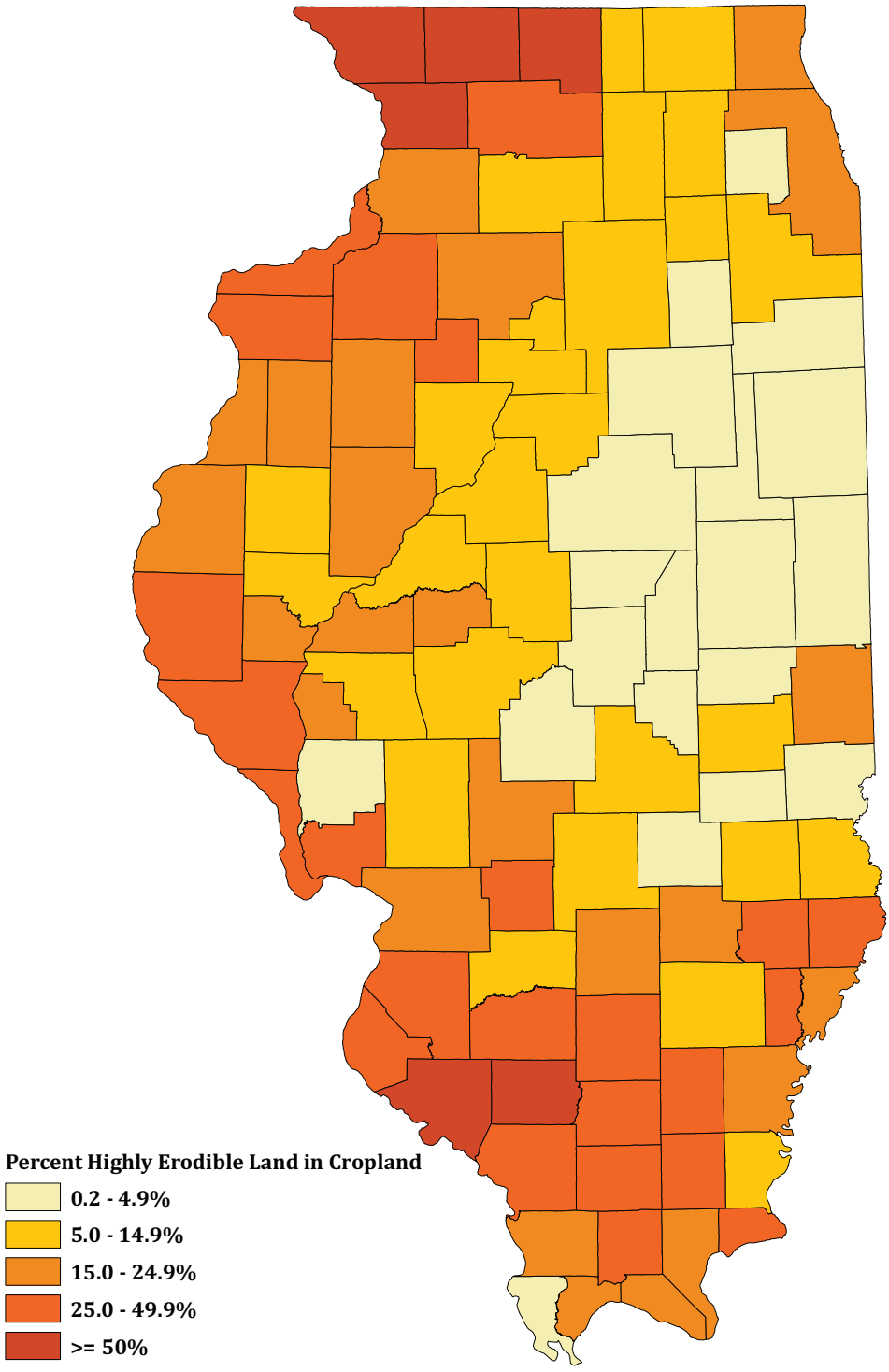


Figure 4. Base map showing average farm size in Illinois counties
Farm size data shows the average acreage of farming operations. It can be used an indicator of operational capacity and scale that provides incentives for conservation practice adoption and/or enrollment in conservation programs.

Source: USDA 2017 Census of Agriculture

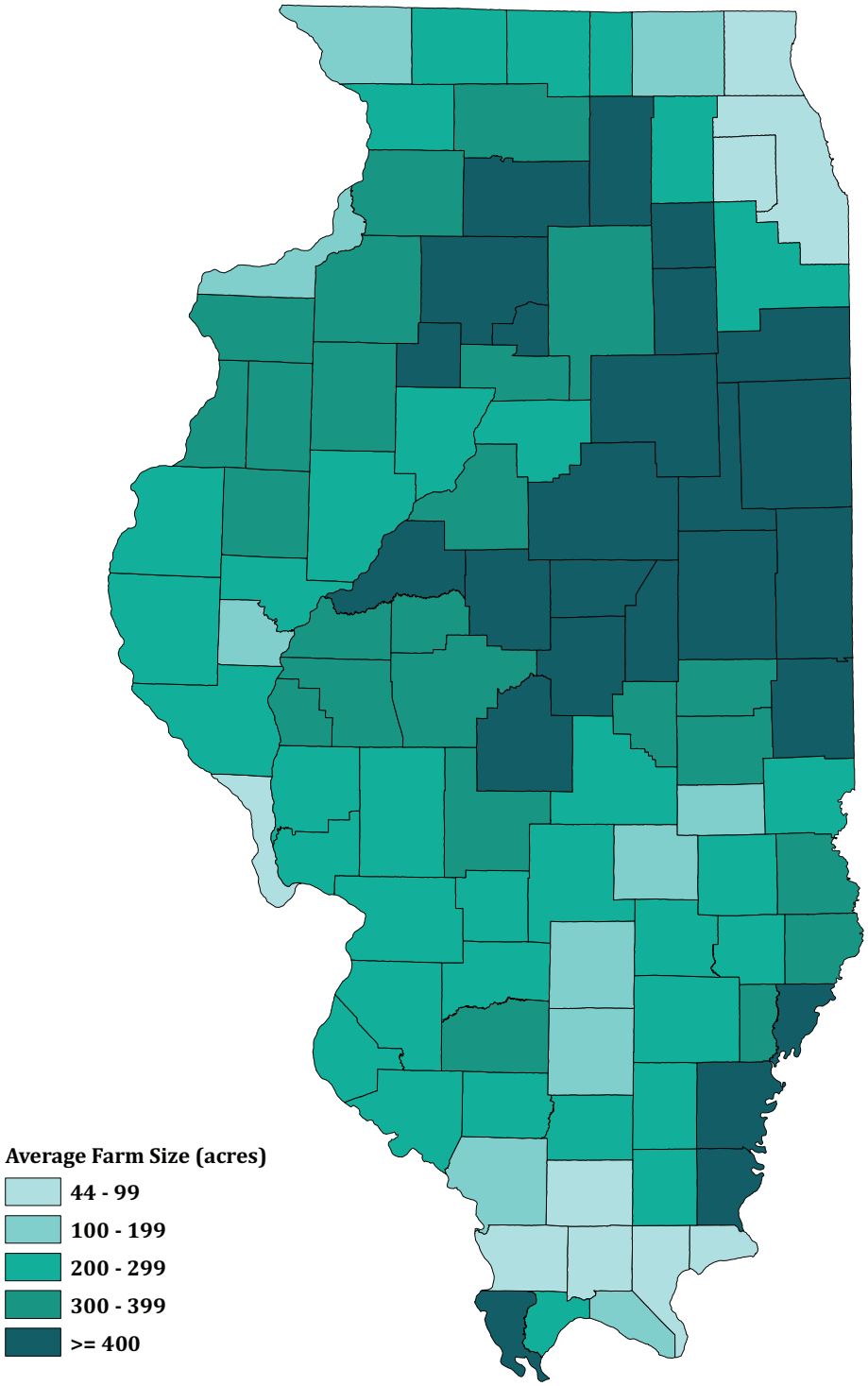
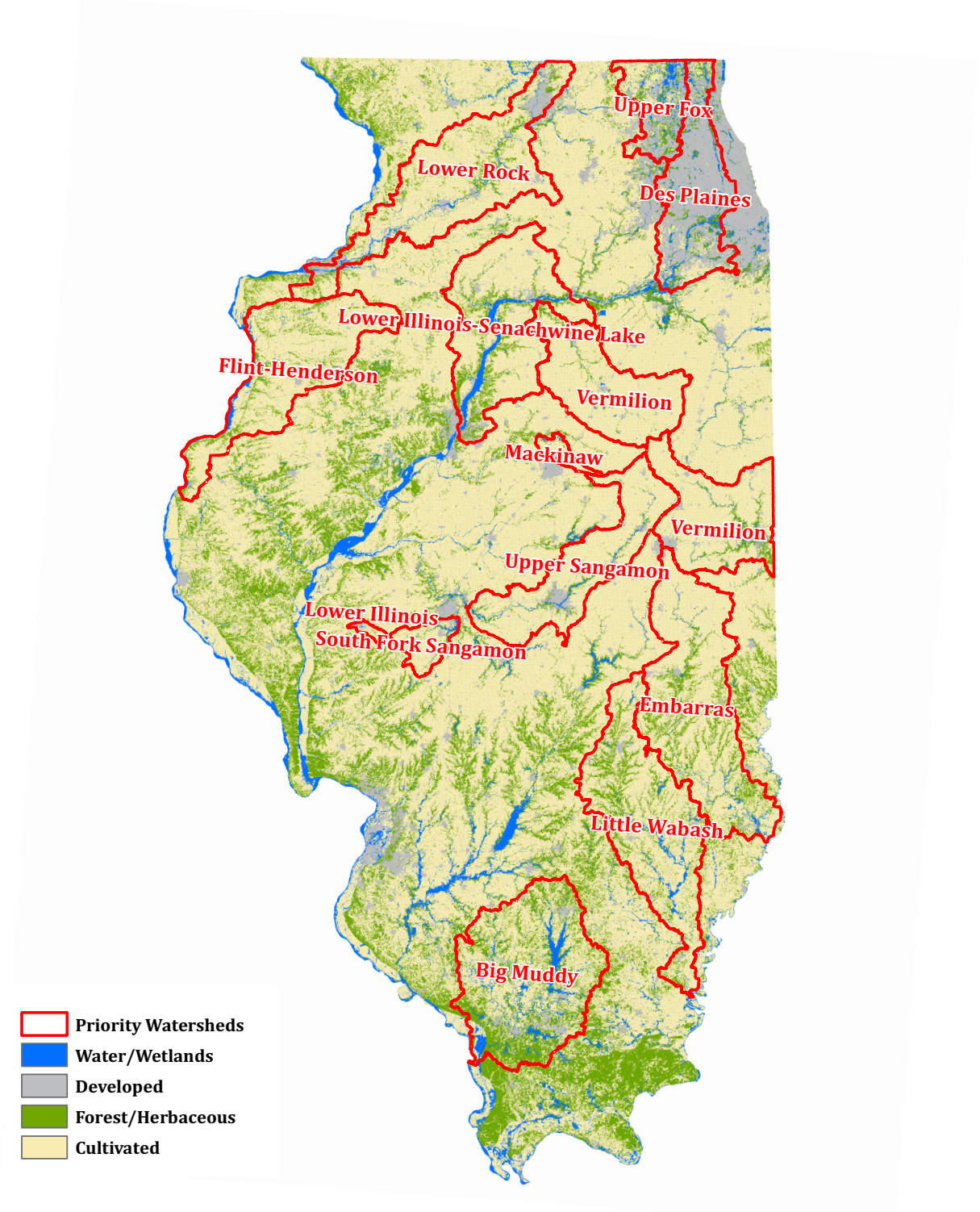


Figure 5. Base map showing Illinois priority watersheds
The priority watersheds shown on the map, as identified in the Illinois NLRS, are designated to address most pressing nutrient losses and associated water quality issues. These designations are intended to guide how State agencies to direct resources to address these issues.

Source: U.S. Geological Survey (USGS) National Land Cover Database (NLCD)



KEY FINDINGS & RECOMMENDATIONS

Finding 1: Different conservation practices are clustered in different parts of the state

The proxy indicators for conservation behavior – adoption of cover crops and conservation tillage – are observed to occur at higher rates in different areas of the state, suggesting a lack of a comprehensive, conservation focused approach.

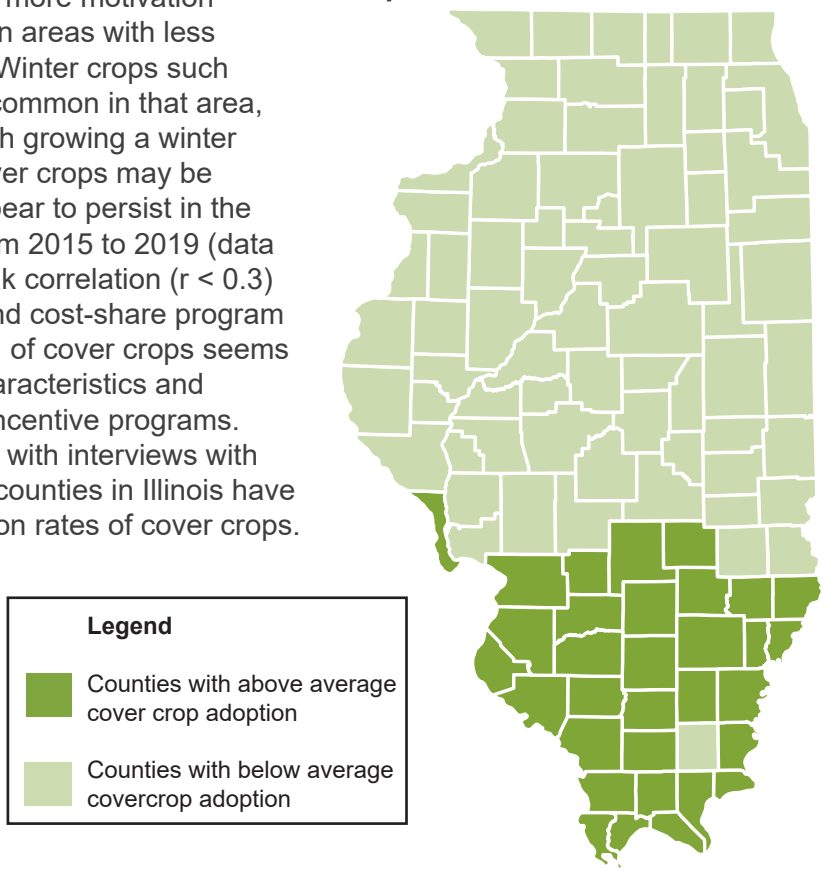
Finding 1a: Cover crop adoption rate hotspots are in the southern part of the state.

(See *Cover Crop Acreage* map filter)

One of the main proxies for conservation behavior considered in this analysis is the adoption of cover crops on farmland in Illinois. The analysis suggests that cover crop adoption rates (acres of cover crops as a percentage of all cropland acres) are highest in the southern part of the state. Cover crop adoption hotspots are those with above Illinois county average adoption rate of 4.7 percent. These areas correspond to areas with lower productivity indices (select Productivity Index base map), less frequent corn rotations (select Corn Frequency base map) and, to a lesser extent, a higher percentage of highly erodible land (HEL) (select Highly Erodible Land base map).

There appears to be less motivation to grow corn because it is less profitable and more motivation to plant more diverse rotations in areas with less productive soils after rotations. Winter crops such as winter wheat are also more common in that area, so farmers are more familiar with growing a winter crop and therefore adopting cover crops may be easier. Cover crop hotspots appear to persist in the southern portion of the state from 2015 to 2019 (data not shown). There is only a weak correlation ($r < 0.3$) between cover crop adoption and cost-share program spending 2014 - 2019. Adoption of cover crops seems to be driven primarily by soil characteristics and climatic conditions rather than incentive programs. This hypothesis could be tested with interviews with farmers. Figure 6 shows which counties in Illinois have recorded above average adoption rates of cover crops.

Figure 6. Cover crop adoption hotspot counties



Finding 1b: Most of the conservation tillage (no-till, reduced-till, and mulch-till) activity occurs in the northwestern part of the state, along the western border, and southeastern border.

(See *Conservation Tillage Acreage* map filter, *Conservation Tillage Frequency* map filter)

Conservation tillage was used to further assess conservation adoption across Illinois. Conservation tillage hotspots (counties with an adoption rate above the state average of 67.7 percent) occur primarily in the northwestern part of the state. This is an area where there are the highest percentages of HEL in the state (select Highly Erodible Land base map) and corresponds to an area where there are highest percentages of continuous corn planting (select Corn Frequency base map). Data suggests that farmers in this area are familiar with conservation tillage and have been doing it consistently over the last decade.This is indicated by higher frequency values, where frequency represents the number of years a county had above average conservation tillage adoption rates. Similar to cover crops, conservation tillage adoption appears to be driven by landscape characteristics rather than incentive programs.

Figure 7 (top right) shows which counties in Illinois have recorded higher than average rates of conservation tillage adoption. Figure 8 (bottom right) shows how frequently, between 2011 and 2018, each county recorded above average adoption rates of conservation tillage.

Figure 7. Conservation tillage hotspot counties

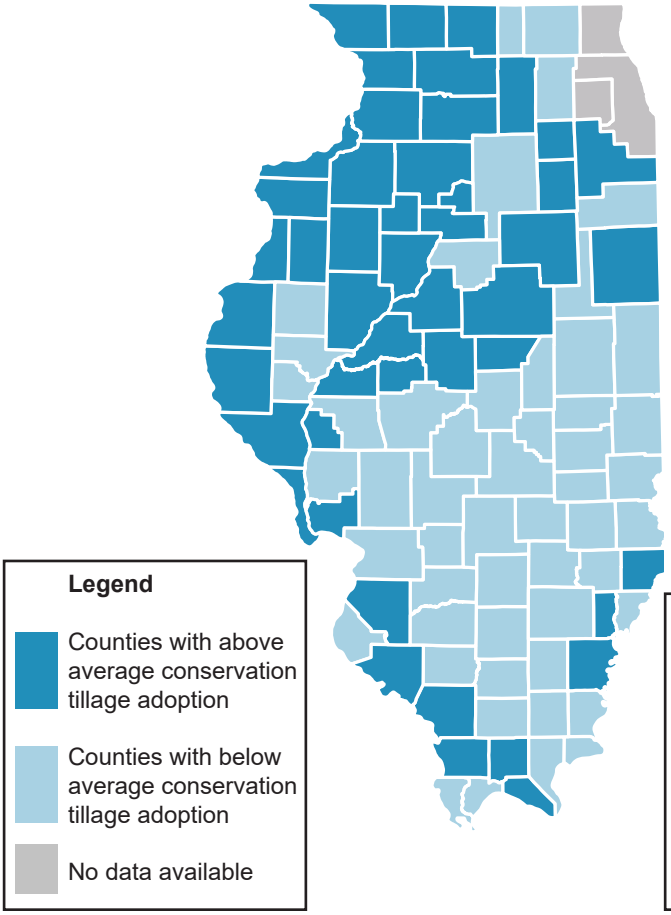
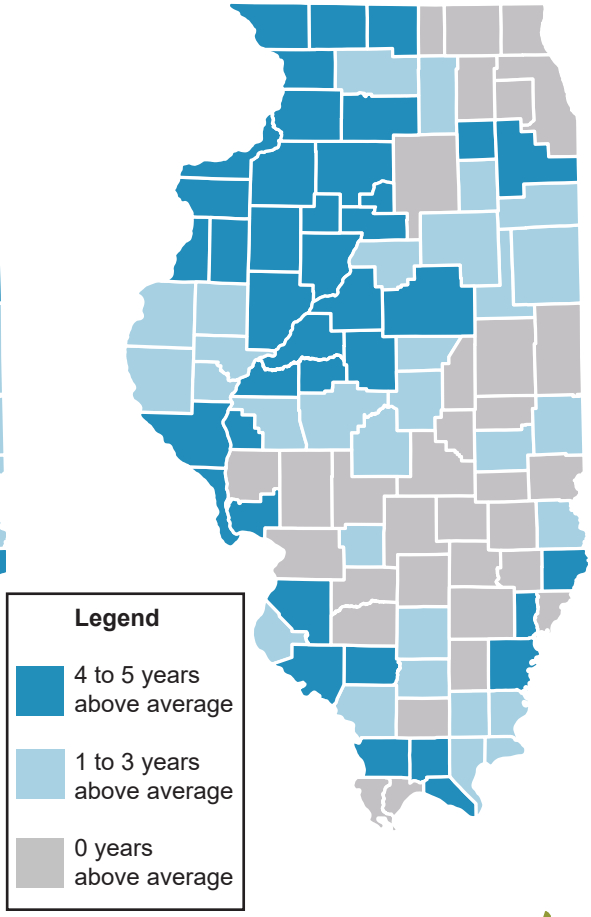


Figure 8. Frequency of conservation hotspot counties



Finding 1c: Conservation tillage hotspots and cover crop hotspots are geographically distinct.

Conservation practices do not appear to be adopted as a part of a conservation cropping "system". Rather, farmers likely adopt one type of practice and continue to implement it. Which practice they adopt may be due to physical characteristics of the land such as productivity or slopes (select Highly Erodible Land/Productivity Index base maps) or climatic conditions.[3]

Recommendations for Findings 1a through 1c:

1. Promote conservation practices together as part of the system by:
2. Adopting a graduated cost-share rate that supports multi-practice adoption; and,
    - Leveraging State soil health strategy to convey benefits of a system of practices for soil health improvements.
    - Exploring subsidized soil health testing to track changes in soil in response to conservation practices.
    - Further investigating why these practices are adopted in these geographies.
    - Targeting cost-share programs and outreach to areas bordering hotspots to facilitate diffusion of adoption to new area.

Photo by Henry Be

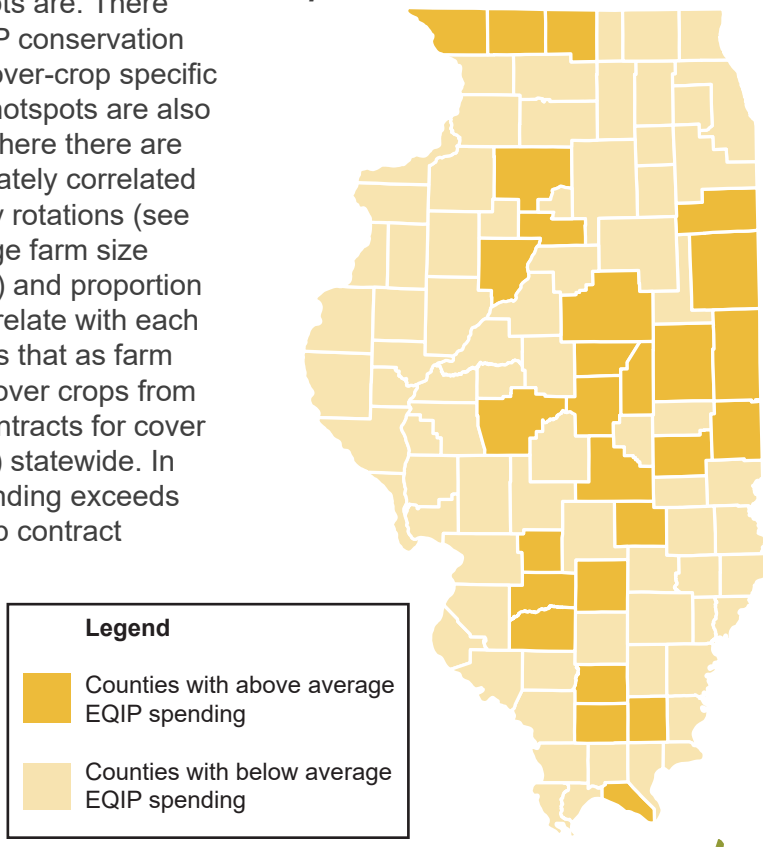
Finding 2: Federal cost-share program hotspots occur in the central, east-central, and southwestern part of the state.

(See *EQIP, CSP, CRP Payments* map filters)

Central and east-central parts of the state are also where the proportion of spending on cover crops and conservation tillage is highest. Counties with above average Environmental Quality Incentive Program (EQIP) and Conservation Stewardship Program (CSP) spending also tend to be the ones that continue to have above average spending between 2014 and 2019 (strong correlation, r = 0.81 EQIP, r = 0.77 CSP) and are likely to be the ones that have higher proportion of spending going toward cover crops (moderate correlation, r = 0.35 EQIP, r = 0.56 CSP).

In the most recent Farm Bill cycle (2014-2019), total spending in Illinois was $69,615,024 for EQIP, $15,547,553 for CSP, and $870,718,641 for CRP. EQIP and CSP hotspots are not aligned. There are differences between EQIP, CSP, and Conservation Reserve Program (CRP) hotspots counties that spend above the state average on conservation practices, $113,750 for EQIP, $50,809 for CSP, and $1,126,648 for CRP, respectively. For EQIP, which supports practices intended to address immediate resource concerns, spending hotspots (Figure 9) occur in several areas across the state. CSP, which is intended to support longer-term, whole farm conservation activities, appears to be more prevalent in the east-central region (Figure 10). CRP hotspots (Figure 11), however, extend from south-eastern to the west-central side of the state, and in the northwest corner and east central counties. There is only weak correlation (r < 0.3) between areas where these three program spending hotspots are. There is moderate correlation between EQIP conservation tillage spending and total CSP and cover-crop specific spending. EQIP conservation tillage hotspots are also weakly correlated (r < 0.3) to areas where there are most productive soils and are moderately correlated to areas with majority 2-year corn-soy rotations (see PI/corn frequency map filters). Average farm size (select Average Farm Size base map) and proportion of EQIP spending on cover crops correlate with each other moderately (r = 0.32). It appears that as farm size goes up, cost-share dollars for cover crops from federal programs increases. EQIP contracts for cover crops average 70 acres (28 hectares) statewide. In counties where EQIP cover crop spending exceeds state average, the average cover crop contract acreage is 73 acres (30 hectares).

Figure 9. Counties with above average EQIP spending on cover crops



There is weak correlation (r < 0.3) between federal cost-share spending from 2014 to 2019 and cover crop adoption. This suggests that these programs are not driving adoption rates. This can be attributed to a possible lag between infusion of cost-share spending and longer-term uptake of practices. Correlation between cover crop adoption and EQIP spending from 2010 to 2013, the previous Farm Bill cycle, is also weak (r < 0.3) however, suggesting that the adoption rate of cover crops in the southern part of the state is driven by factors other than cost-share conservation programs. The sustained EQIP spending in the Upper Macoupin and Vermilion watersheds is directly related to the increased funding made available in these areas from the Mississippi River Basin Initiative and Regional Conservation Partnership Program projects led by American Farmland Trust in coordination with multiple State, local and NGO partners. Given that areas with above average EQIP and CSP spending tend tohave a higher proportion of spending on cover crops, additional capacity and coordination between partners for outreach, practice prioritization, and financial and technical assistance may be critical components of increased cover crop adoption on the landscape.

Figure 10. Counties with above average CSP spending on cover crops

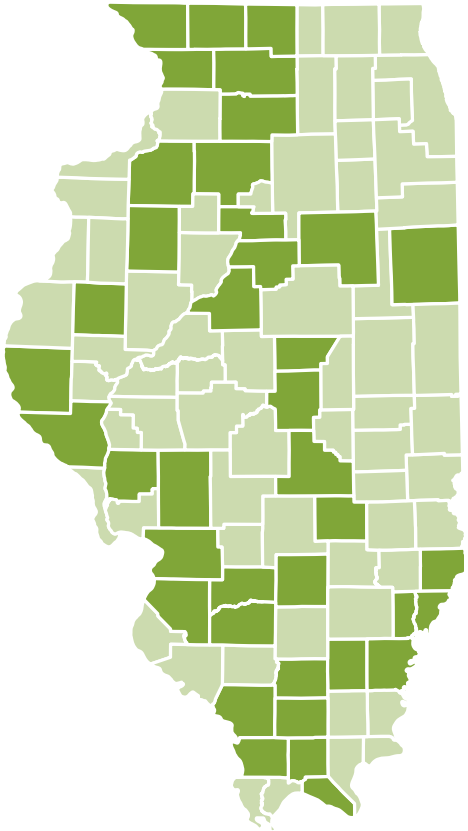
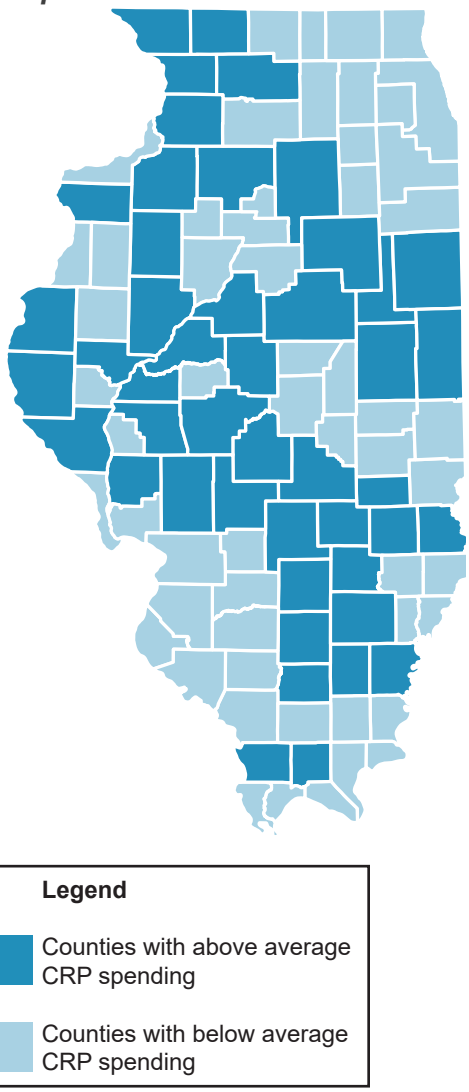


Figure 11. Counties with above average CRP spending on cover crops



Recommendations for Finding 2:

1. Federal cost-share programs should continue to support central Illinois areas as well as direct a larger portion of their spending to in-field practices. This may be more feasible within CSP.
2. Conduct further analysis of the factors that affect how small farms participate in conservation programs.
3. In addition to supporting current hotspots, efforts should also promote cover crops in the northern/northwestern parts of the state, where there are already high levels of conservation tillage and high proportion of sensitive landscapes (e.g., HEL, continuous corn rotations).
4. NGOs play a critical role when partnering with NRCS and Soil & Water Conservation Districts (SWCDs) to deploy cost-share funds, coordinate activities, and enhance outreach. Long term partnerships are critical to ensure there is uptake and wider adoption.

Finding 3: The State cost-share program, Partners for Conservation, shows no hotspots across the state despite higher program spending in the east-central and southern part of the state.

(See *Partners for Conservation Program Payments (2017-2018)* map filter)

The state average financial assistance provided through the Partners for Conservation Program is $9,154 per county. Some counties have not had any program funding allocated to conservation practices. Statewide spending in 2018 totaled $912,035. The percentage of spending on cover crops and conservation tillage is low, with 33 percent and 0.5 percent of spending respectively in 2018. With only two years of data available, it is difficult to assess long-term program spending patterns. Counties that have above average cover crop spending are moderately correlated (r = 0.36) with locations of NLRS priority watersheds shown in Figure 5. Additionally, no correlation was found between federal program spending and NLRS priority watersheds; nor was there correlation established between conservation adoption, outreach, and NLRS priority watersheds.

Recommendations for Finding 3:

The State conservation program should strengthen alignment with current NLRS priority watersheds to concentrate funding in previously identified priority areas, encourage adoption of practices identified in the Strategy, and enhance outreach to promote the program.

Finding 4: There are several hotspots for outreach across the state: in Lake, McHenry, and DuPage counties; in Knox, Stark, Kankakee, and Champaign counties; and, in Bond, Clinton, Jefferson and Jackson counties.

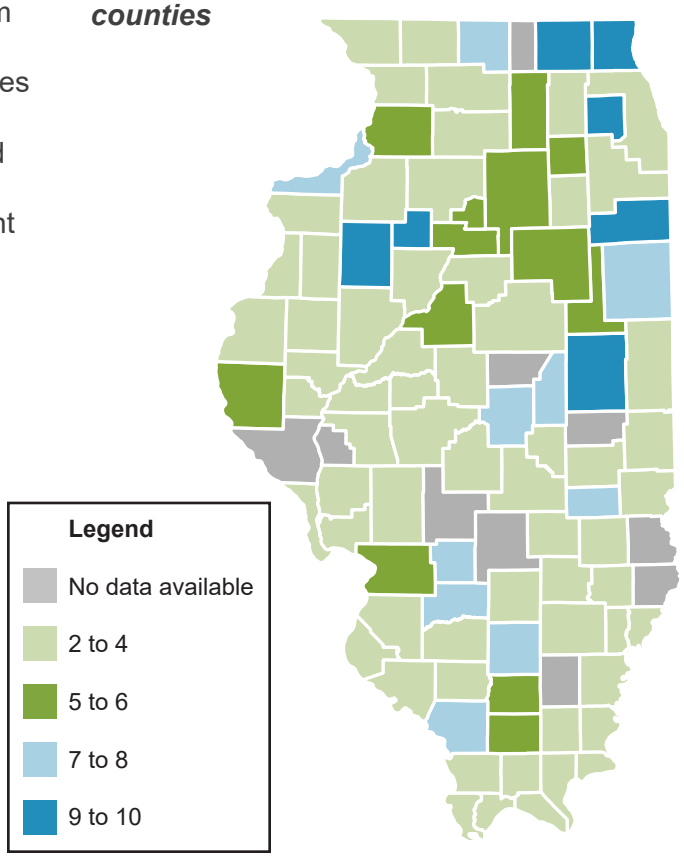
(See *Conservation Outreach Activity Rating* map filter)

Counties reporting above average (greater than 4.2) outreach ratings constitute hotspots. These hotspots are not pronounced and because only one year of data is available, their longevity could not be assessed. There is a weak correlation ($r < 0.3$) between outreach activities and Partners for Conservation program cover crop spending. More long-term data and analysis is needed to evaluate the effectiveness of these activities in driving conservation.

Recommendations for Finding 4:

1. Establishing standards, reporting metrics, clear goals for outreach events would allow program administrators to assess the impact of such events on conservation behavior. Long-term, systematic tracking of outreach and education activities is key in understanding whether and to what extent these activities enable conservation behavior change to design and implement effective programs. While research suggests that producers prefer hands-on learning opportunities such as field days, more information is needed to determine the appropriate content, duration, and frequency of such events for lasting impact.
2. Establish a central system to track such data for use by State and local agencies as well as NGOs The system should be created to facilitate reporting of such data and subsequent analysis.

Figure 12. Outreach scores reported by counties



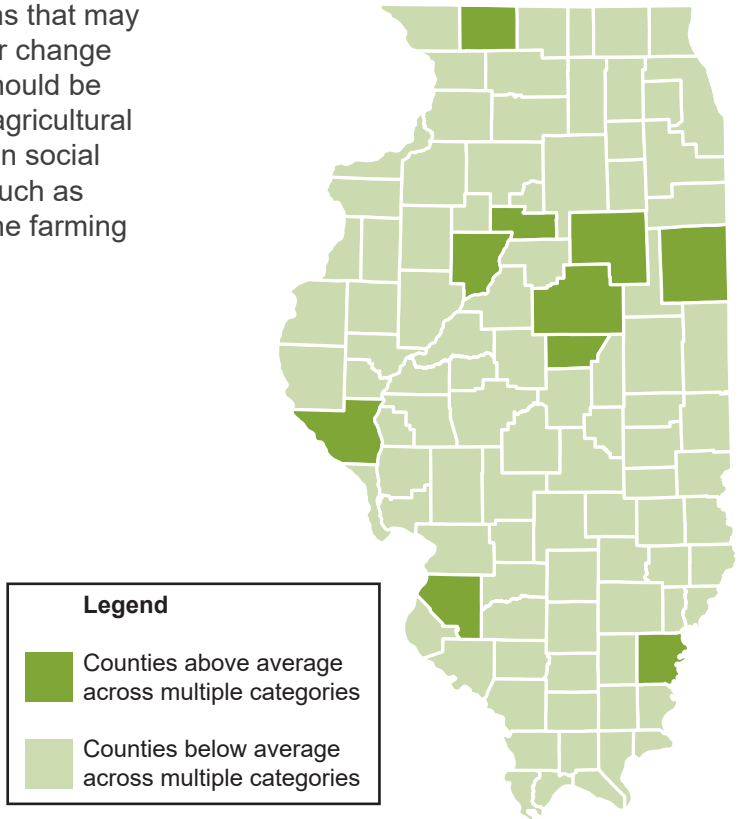
Finding 5: DeWitt, Iroquois, Livingston, Marshall, McLean, St. Clair, Peoria, Pike, Stephenson, and White counties were identified as top conservation activity counties across multiple categories associated with conservation practice adoption.

Results show that some counties exhibit high level of conservation activities including implementation of practices, financial assistance through government programs, as well as outreach. Data used in this calculation include conservation tillage practices and number of years with above average conservation tillage practices; cover crop practices; EQIP, CSP, and PfC spending, including number of years with above average spending and percentage spent on conservation tillage and cover crops when available. Once aggregated, the counties with the ten highest scores were identified. De Witt, Iroquois, Livingston, Marshall, McLean, and Peoria counties are all located in central Illinois and almost contiguous, while the other four counties are more isolated geographically.

Recommendations for Finding 5:

More analysis of the economic and social factors is needed within the hotspot counties, as well as within the operations of organizations such as SWCDs and other stakeholders involved in the those counties. The analysis should include spatial analysis of conservation practice adoption beyond cover crops and conservation tillage and examine temporal trends to the extent possible to link increased conservation behaviors to particular events, funding streams, or other programs. The analysis can also include a review of county master plans or land use plans to identify any local programs that may be in place to which such behavior change may be attributed. The analysis should be supplemented by interviews with agricultural stakeholders to determine the main social drivers of conservation activities such as leadership among staff or within the farming community.

Figure 13. Counties with above average scores across multiple categories



ANALYSIS

Hotspot Determination

The analysis aimed to identify areas in Illinois where program activities/conservation adoption are occurring at higher levels, termed hotspots. Hotspots were determined at a county scale. For each dataset where hotspots were determined, a state county average was computed. Depending on the temporal duration of the dataset, state county average was determined either for each year, sum of the included years, and/or average over the included years. Then, each county was assigned 1 if it was above the state average or 0 if it was below the state average. Counties with above average characteristics constituted hotspots.

Hotspot Longevity

To assess whether hotspots are transient or represent sustained activity over time, frequency analysis was conducted for data sets with at least three years of data available or where appropriate. The frequency of above-average rating for each county was computed to indicate if hotspots remain in an area over a prolonged period.

Conservation Adoption Data

Cover crop adoption hotspots were determined based on 2017 cover crop satellite data. Cover crop acreage per county was controlled for total agricultural land (divide cover crop acres by total cropland acres).

Conservation tillage hotspots were determined based conservation tillage transect data. The percentage of fields that have conservation tillage out of all the fields on which transects have been collected was calculated. For each year, no-till, reduced till, and mulch till transects were summed to represent conservation tillage practices; Temporal trends (hotspot longevity) were assessed by evaluating the frequency of county average exceeding state average during the analysis period.

- Conservation tillage practices for 2017 from USDA as reference (normalized by total acreage)

Cost-Share Data, Federal Programs

Hotspots for EQIP, CSP, and CRP program spending were based on data for 2014-2019 (the most recent Farm Bill), for each year and for the cumulative sum spending. Temporal trends were also assessed using frequency analysis, i.e., the number of years program spending in a county was above average. Further, we determined cover crop and conservation tillage cost-share hotspots by calculating the percentage of spending that goes toward implementing cover crops and conservation tillage practices (including reduced and no-till) of total program spending for EQIP and CSP.

Frequency analysis was conducted by comparing the program spending for a given county to the state average for program spending for each year between 2014 and 2019. Counties received one point for every year where their spending was above the state average, and points were then summed for a final value.

Cost-Share Data, State Programs

Hotspots for the Partners for Conservation program spending were based on data for 2017 and 2018 cumulative sum spending. Further, we determined cover crop and conservation tillage cost-share hotspots by calculating the percentage of spending that goes toward implementing cover crops and conservation tillage practices (including reduced and no-till) of total program spending. Spending levels for these practices individually are too low to show any spatial trends. Preliminary analysis of data for 319 Program indicated that the majority goes to support structural practices, so the dataset was not included in further analysis.

Counties Above Average in Multiple Criteria

Hotspots for federal and State cost-share programs, as well as hotspots for conservation adoption were assigned numeric values and then summed to create a final score to capture the counties that were above average across multiple criteria. Data used in this calculation include conservation tillage practices and number of years with above average conservation tillage practices; cover crop practices; EQIP, CSP, and Partners for Conservation spending, including number of years with above average spending and percentage spent on conservation tillage and cover crops when available. Once summed, the counties with the ten highest scores were identified.

Outreach and Technical Assistance

Hotspots for outreach about conservation were determined using NLRS outreach and communication activity data for 2018. Outreach activities include meetings, workshops, presentations, field days, etc. Communication activities include newsletters, social/print media, website information, radio spots, etc. Rather than using above/below average threshold to determine hotspot thresholds, for each data type, we calculated the number of events and their respective reach. For each county a high, medium and low rankings were assigned if the number of events and reach exceeded the state median, if either the number of events or reach exceeded the state median, and if neither were above the state median, respectively. Rankings for both outreach and communication activities were combined to determine an overall outreach activity ranking ranging from 2 to 10, 2 representing the lowest levels of activities and reach and 10 representing the highest levels of activities and reach.

Contextual Data, Social

To explore whether age is a factor that influences farmer conservation behavior, we determined acreage of cropland, by county, operated by producers under 35 years of age.

To explore whether farm size is a factor that influences farmer conservation behavior, we determined average farm size for each county by taking total cropland acreage divided by the number of operations in the county.

Watershed projects led by conservation organizations direct resources to implement practices and technical assistance. Two watersheds have been targeted through projects led by American Farmland Trust and a variety of partners from 2015 to 2019 - Vermilion and Upper Macoupin. These projects provided targeted cost-share dollars from existing federal programs to leverage their priority watershed status and additional outreach and technical assistance activities. In the Vermilion watershed, Livingston and Ford County SWCDs were involved. In the Upper

Macoupin watershed, Macoupin County SWCD contributed to the project.

Acreage of public agricultural lands was determined based on data provided by agencies and/or Freedom of Information requests. Acreage for each county is the sum of public farmland located in that county and may include farmland owned by multiple agencies. Public working lands programs have the potential to create conservation hotspots due to their more formal leasing requirements, conservation missions, and accountability for the public good. Public land acreage did not correlate with any other data included in the analysis.

Contextual Data, Agro-Ecological

Corn frequency data was used as a proxy to identify areas where more diverse crop rotations occur. For each county, acreage that had a corn crop for three, six, nine, or 12 out of the last 12 years were normalized by total cropland. Crop diversity could be correlated with adoption of conservation practices.

Productivity Index (PI) data is used to identify areas where soils are most productive. Average PI for each county was available from AcreValue. High PI values suggest prime areas for intensive/conventional corn-soy production and could be related to lack of conservation activities and where conservation program priorities should focus.

The Illinois Nutrient Loss Reduction Strategy identified priority watersheds where nutrient loadings were high. As a result, this provided a guide for prioritizing additional resources such as staff capacity, conservation planning and implementation. Increased conservation activities would be expected in those areas.

Fertilizer application data was used as a proxy for high nutrient loading areas. It can be used to identify, confirm, or reestablish priority conservation areas. Fertilizer application is uniform across the state.

Highly Erodible Land (HEL) data was used to identify areas where conservation activities should be prioritized.

Correlations

Correlations were computed for all variables to identify linkages between different attributes. Absolute values between 0-0.3 indicated weak, 0.3-0.7 moderate, and above 0.7, strong linkages. For all correlations, n = 102 (number of Illinois counties) except for data sets where data for a small number of counties was unavailable or not tracked.

Data Sources

Source/Program	Time/Period	Attributes
USDA/EQIP	2014-2019	Spending, practices/acres, by county
USDA/CSP	2017-2019	Spending by county
USDA/CRP	2000-2019	Spending by county
EWG/Cover crops via satellite	2015, 2017	Acreage of cover crops by county
USDA FSA/Highly Erodible Land (HEL)	2008 Common Land Unit	Summarized acreage of HEL fields by county
USDA/Corn frequency	2008-2020	Frequency of corn crop in the last 12 years by county
USDA/Farm size	2017	Average farm size by county
USDA/Farmer age	2017	Proportion of farmers under the age of 35
USDA/Soils data/Productivity Index	-	Average Productivity Index by county Note: PI averages determined from data on AcreValue
USDA - 2017 Census of Agriculture/fertilizer application data	2017	Acres treated with fertilizer by county
USDA - 2017 Census of Agriculture/Harvested Cropland	2017	Acres of harvested cropland by county
IL DOA/Transect data	2011-2018	Number of transects with conventional till, no-till, reduced till and mulch-till
IL DOA Partners for Conservation	2017-2018	Spending on conservation practices by county
IL Nutrient Loss Reduction Strategy/priority watersheds	2015	Watershed boundaries and names
IL Nutrient Loss Reduction Strategy/Outreach activities	2018	Events, publications and their associated reach by county
I DOA/Fall Cover for Spring Savings (FCSS)	2020	Cover crops enrolled in the program by county
IL EPA/319 grants	2000-2019	Spending, practices/acres, estimated nutrient reductions, by county
Delta/Public Farmland inventory	2018	Acreage of farmland managed by public agency
Special watershed projects	2015-2019	Acreage and dollars (USD) spent on conservation practices in the Vermillion and Upper Macoupin Watersheds

*Data for Figures 6 through 13 are from Esri, HERE, Garmin, FAO, USGS, NGA, EPA and NPS.

NEXT STEPS

Through this analysis, Delta Institute examined relationships between conservation activities in Illinois and the programs designed to support them. Analysis revealed that conservation activity hotspots are not linked to locales where conservation programs spending levels are high. Rather, the analysis suggests that conservation practice adoption is driven by other local ecological and social factors such as land productivity, climatic conditions, and the diversity of crop rotations commonly practiced. This analysis highlights the need to better understand the factors that influence conservation practice adoption and how geographic and sociological differences are reflected in land management decisions. Additionally, more analysis needs to be conducted to understand what drives that behavior and how program design can take those factors into account.

The results of this analysis should be used to guide the development and refinement of conservation programs to increase participation and conservation adoption rates. Delta Institute will conduct deeper investigation into the social and ecological factors that contribute to conservation hotspots in Illinois. We will also continue to engage stakeholders and program administrators to evaluate why certain counties exhibit high levels of outreach activity and financial support extended to producers and whether similar strategies can be replicated effectively in other parts of the state. We will also work with policy advocates and decision makers to support policies that fund all conservation programs at higher levels in the long term.

Finally, acknowledging lessons learned from our work in Illinois, we will also investigate and identify conservation hotspots and factors that influence adoption rates to inform local and state conservation program design in other Midwest states where agriculture constitutes a significant portion of the landscape. We will continue to build relationships within farming communities to gain a deep understanding of socioeconomic dynamics including how the status quo, local culture, and decision-making structures impact conservation adoption in the region.

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