



I ILLINOIS
Extension
COLLEGE OF AGRICULTURAL, CONSUMER
& ENVIRONMENTAL SCIENCES



ILLINOIS
NUTRIENT LOSS
REDUCTION STRATEGY

Agriculture Water Quality Partnership Forum

March 16, 2022

Introductions

Type your name and affiliation in the chat box.



Agenda

10:00	Welcome <i>Michael Woods, Illinois Department of Agriculture</i> Introducing <i>Joan Cox Eliana Brown, University of Illinois Extension</i>
10:05	Biennial Report Agriculture Chapter Overview <i>Trevor Sample, Illinois Environmental Protection Agency</i>
10:20	Stream Buffer Mapping Project <i>Ken Copenhaver, CropGrower LLC</i>
10:40	Review of data sources and nutrient reduction by practice <i>Trevor Sample, IEPA</i>
11:00	Climate Smart Initiatives <i>Michael Woods, IDOA</i> <ul style="list-style-type: none">• RCPP update <i>Brian Rennecker and Elliott Lagacy, IDOA</i>• Illinois Climate Smart Ag Workgroup & Illinois Climate Smart Agricultural Partnership <i>Max Webster, American Farmland Trust</i>• US Climate Alliance Technical Assistance Grant <i>Michael Woods, IDOA</i>• Climate Smart Ag and Forestry Partnership Program <i>Kris Reynolds, AFT</i>
11:30	Partner Initiatives <i>Michael Woods, IDOA</i> <ul style="list-style-type: none">• PACE crop insurance product <i>Megan Dwyer, Illinois Corn Growers Association</i>• ISAP NLRS story map <i>Jean Brokish, Illinois Sustainable Ag Partnership</i>• Spring & Summer Field Days Announcement <i>Lauren Lurkins, Illinois Farm Bureau</i>
12:00	Wrap up/Next Steps <i>Michael Woods, IDOA</i> <ul style="list-style-type: none">• Proposed Summer Meeting – doodle poll forthcoming





JOAN COX

NLRS Outreach Associate

Cooperative Extension Service
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REDUCTION STRATEGY

Biennial Report Review

Agriculture Sector Chapter

Trevor Sample



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REDUCTION STRATEGY

Agriculture Chapter

- Agriculture chapter is the longest chapter in the 2021 Biennial Report
- Solicit feedback on streamlining and providing the most pertinent information.
- Potential Examples
 - Reducing the number of years displayed on graphs
 - Display 2011 baseline data and most recent year of data?
 - Move yearly trend data to Adaptive Management chapter?
 - Only display graphs and not accompanying tables?
 - Move all Partner Updates (30 pages) to Appendix
 - Delete Strategy pages update table
 - Only present 2021 data??
- The goal is not to reduce the amount of overall information.
Just more efficient in how we present it.

(Chapter Review)



Identification of In-field Buffers using Satellite Imagery

March 16, 2022

Presented by Ken Copenhaver
CropGrower LLC

Satellite Data

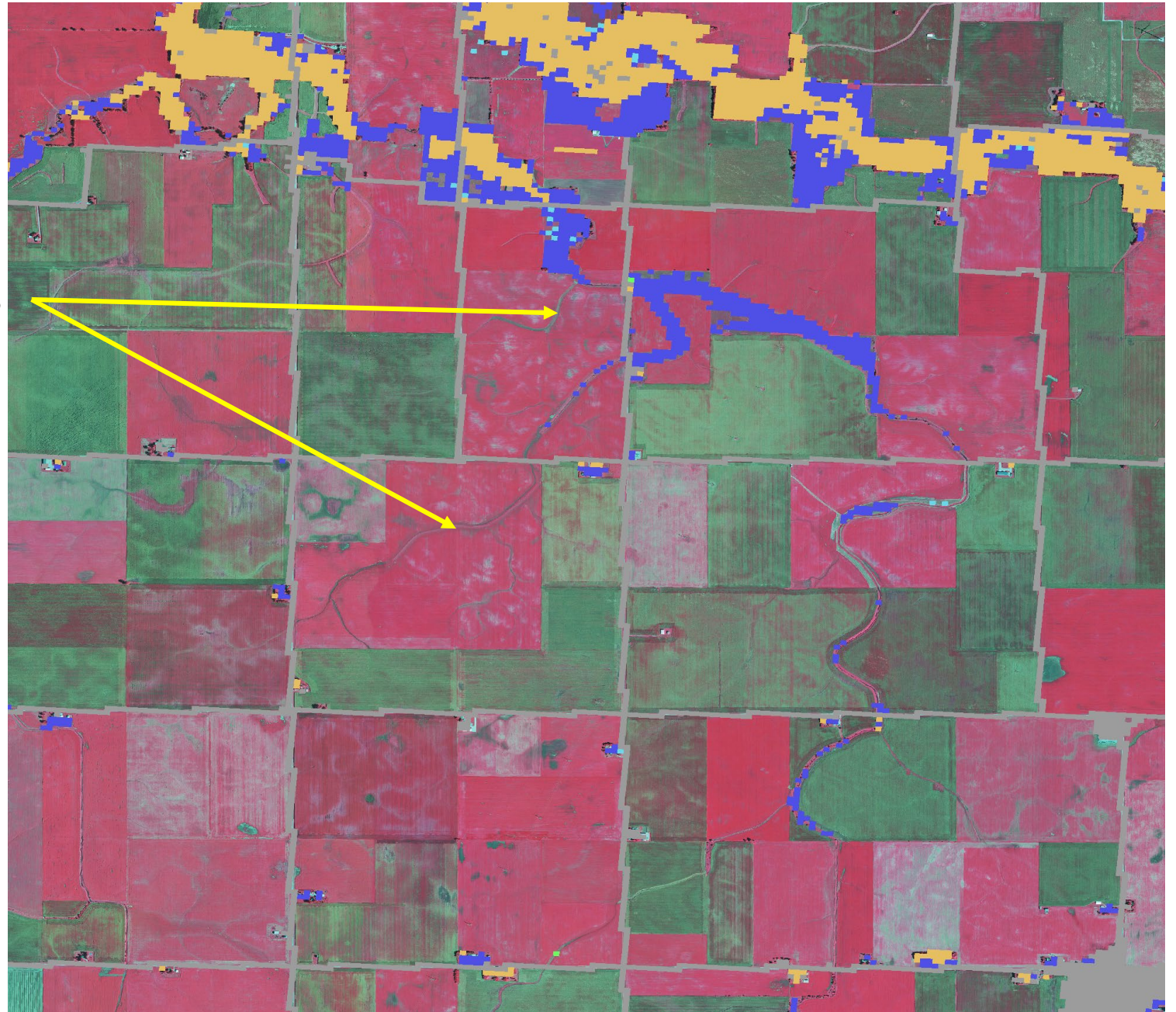
- Sentinel 2a and 2b are a pair of satellites launched and maintained by the European Space Agency
- Free imagery with five-day revisit time and visible, Near-infrared bands at 10 meters
- Easy to view and manipulate in Google Earth Engine or ArcGIS



Sentinel-2 Bands	Central Wavelength (μm)	Resolution (m)
Band 1 - Coastal aerosol	0.443	60
Band 2 - Blue	0.490	10
Band 3 - Green	0.560	10
Band 4 - Red	0.665	10
Band 5 - Vegetation Red Edge	0.705	20
Band 6 - Vegetation Red Edge	0.740	20
Band 7 - Vegetation Red Edge	0.783	20
Band 8 - NIR	0.842	10
Band 8A - Vegetation Red Edge	0.865	20
Band 9 - Water vapour	0.945	60
Band 10 - SWIR - Cirrus	1.375	60
Band 11 - SWIR	1.610	20
Band 12 - SWIR	2.190	20

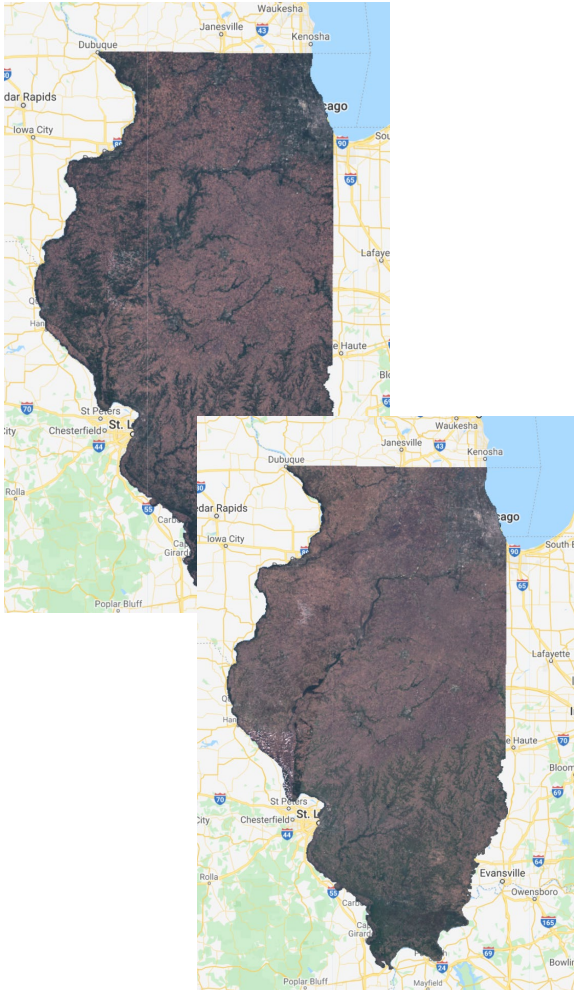
Validation Data

Masking out non-crop areas from the Cropland Data Layer, we identify buffers in agricultural fields and use these points to train and test the accuracy of our delineation methods

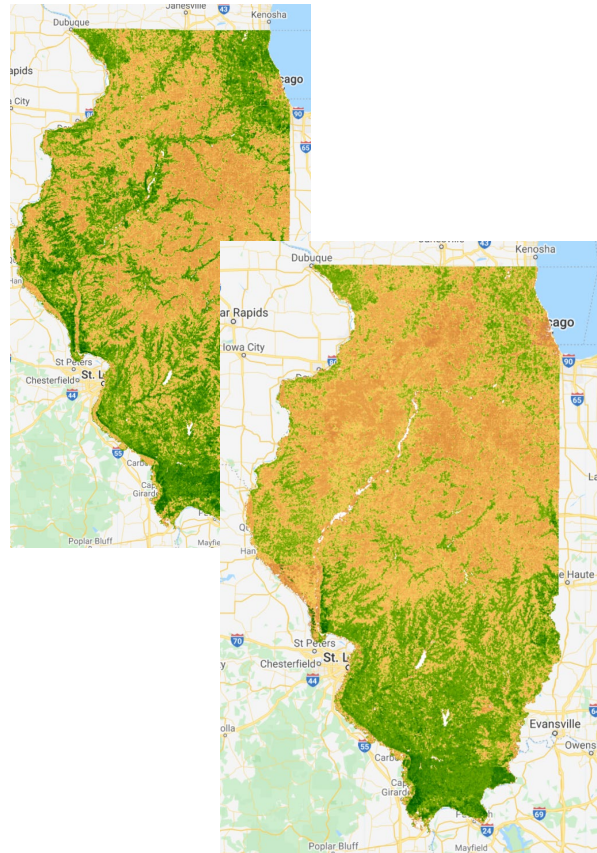


Methodology

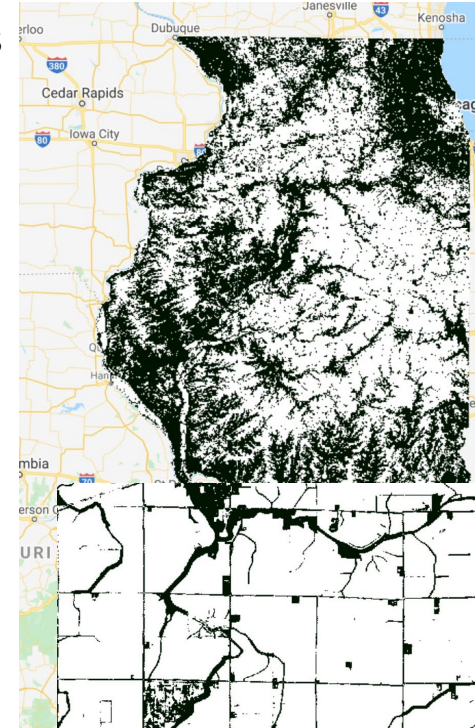
Step one: Composite Sentinel-2 Imagery from previous Autumn (October/November) and in Spring (April/May) of year for buffer ID



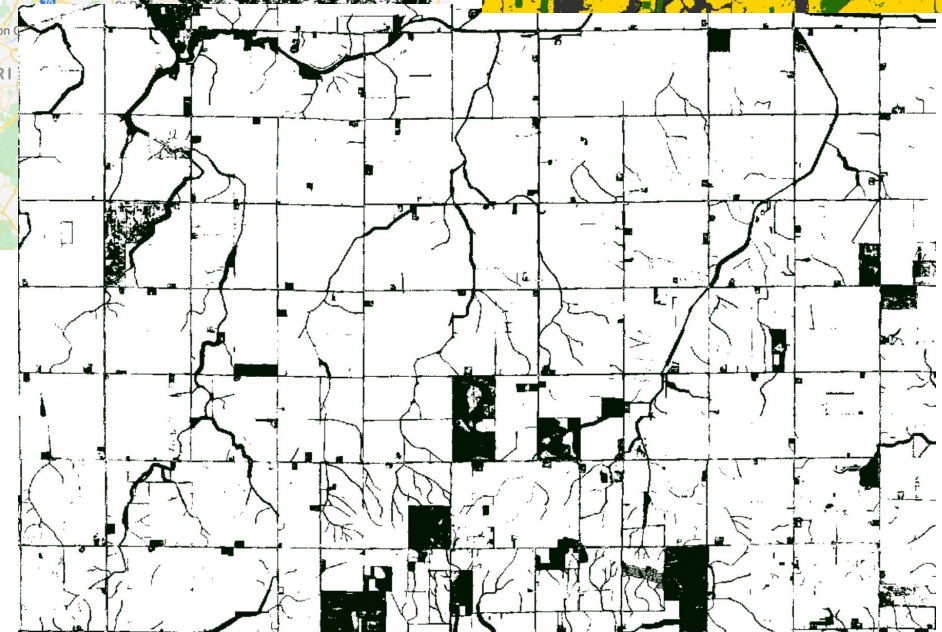
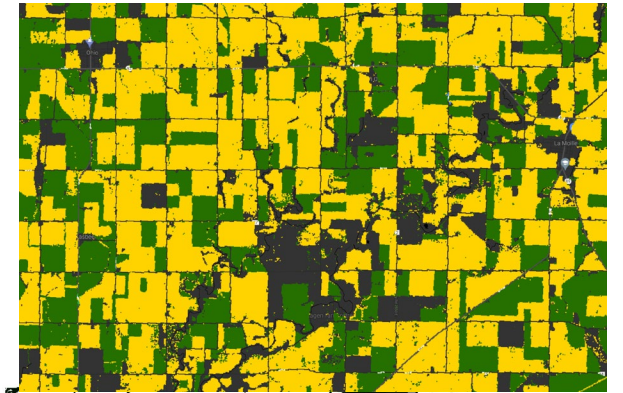
Step two: Create Vegetation Indices (NDVI) for each image composite



Step three: Combine Vegetation Index from each image into one binary image (yes or no to vegetation)

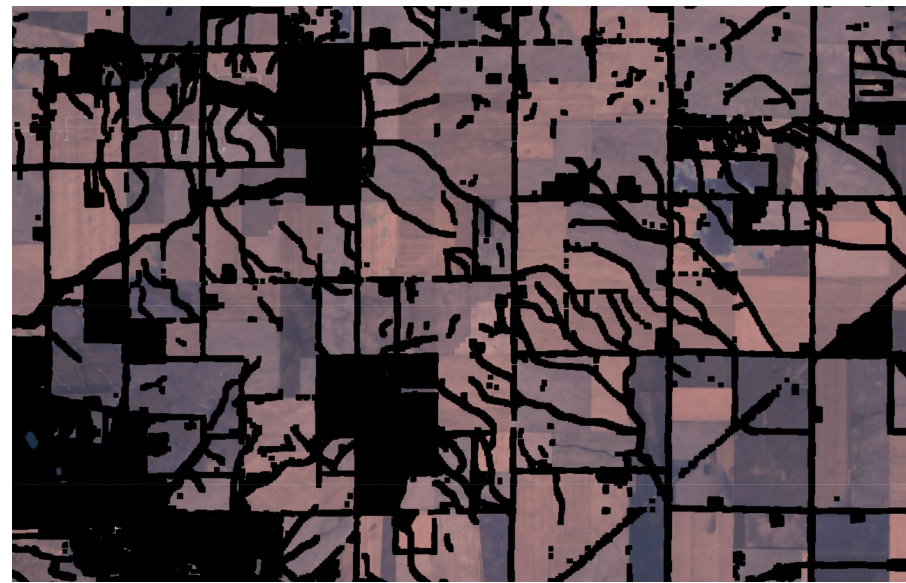


Step four: Using a modification of the Cropland Data Layer, place land cover ID on each pixel (crop, grass, forest)



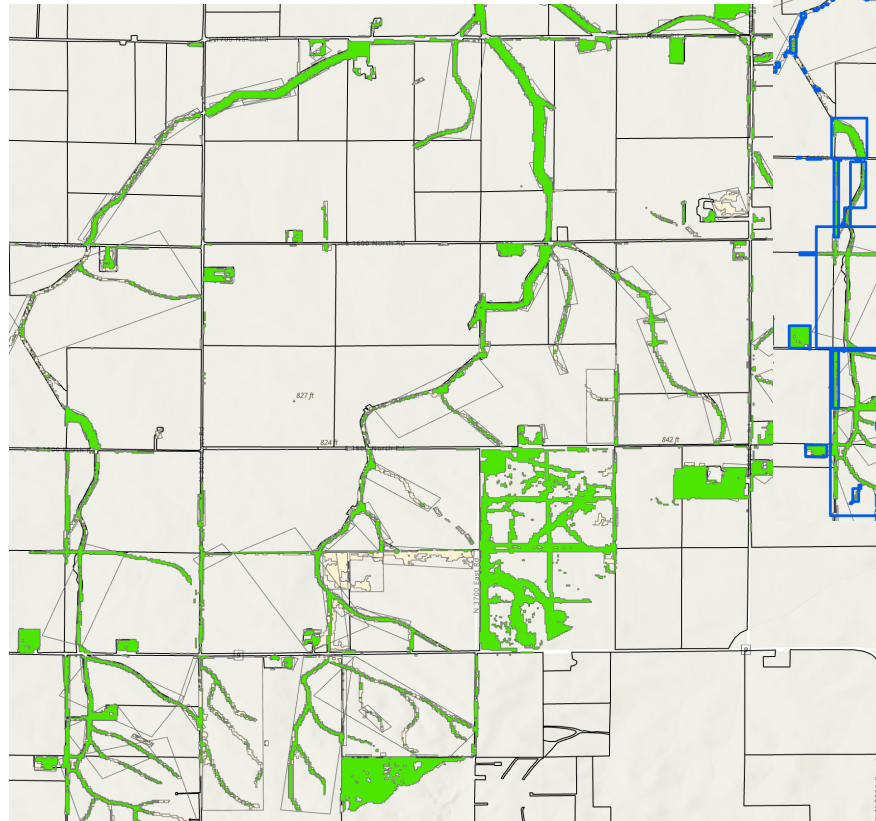
Methodology: Slide 2

Step 5: Neighborhood Mean Filter/
Edge Detection on binary vegetation layer

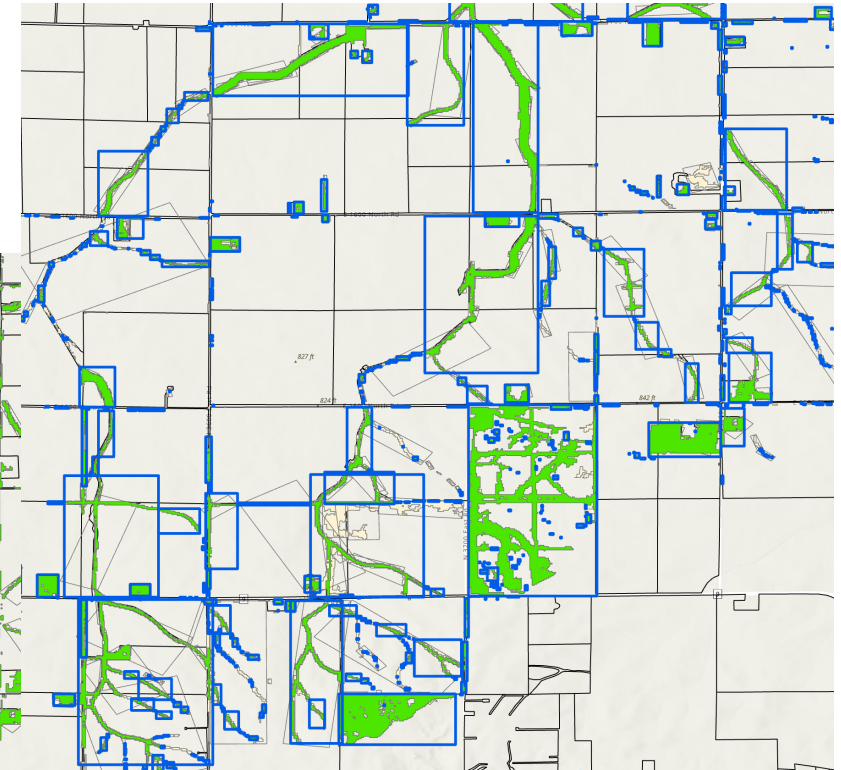


Step 6: Compare to size of vegetation
Parcel to size of field in CDL

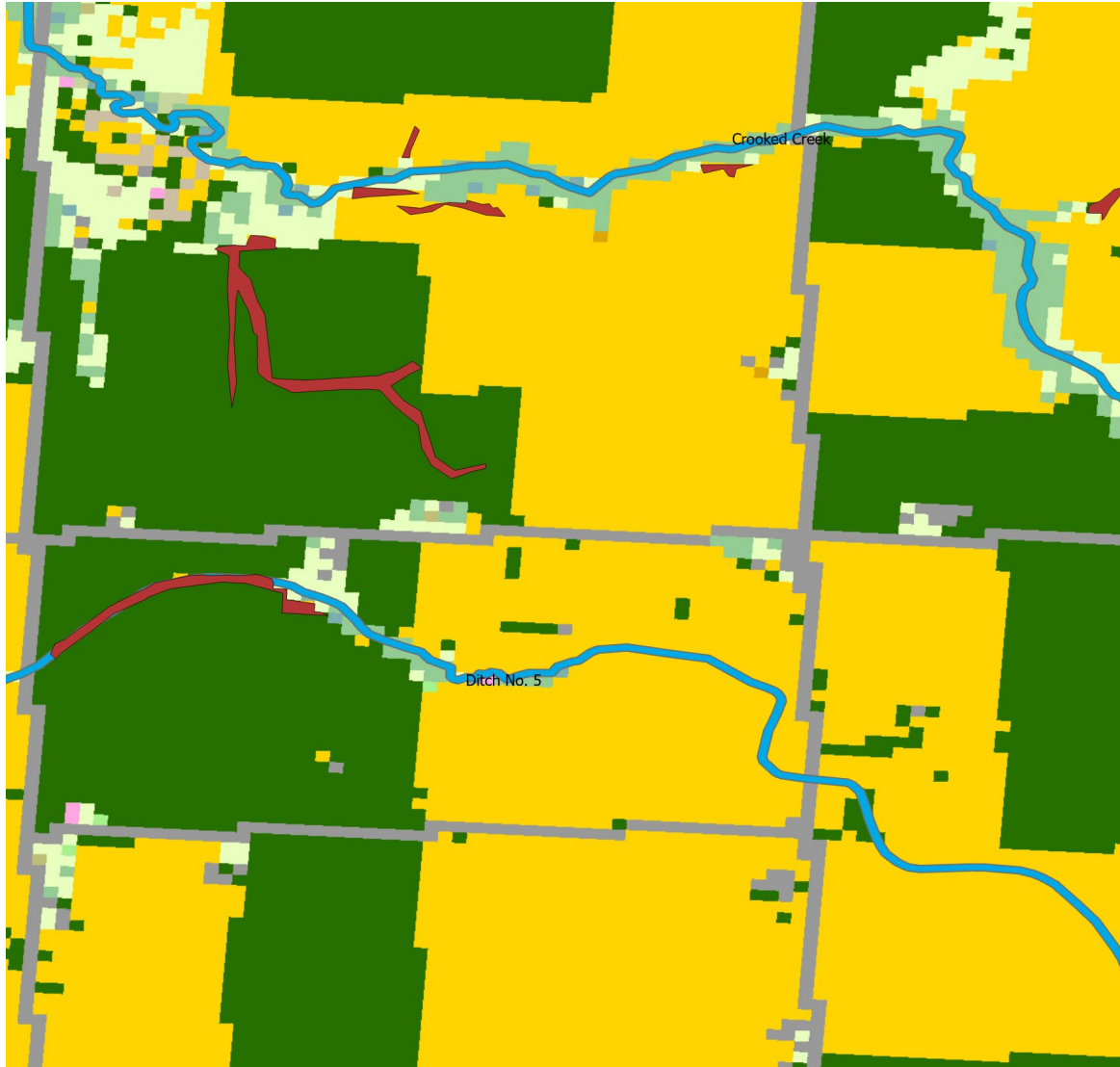
- >30% cover or cereal
- 15% to 30% weeds
- <15% potential buffer



Step 7: Analyze Shape
Buffers are typically long and thin, fields
and farm yards are square. Define a
Minimum bounding box and remove those
With area within 10% of square.

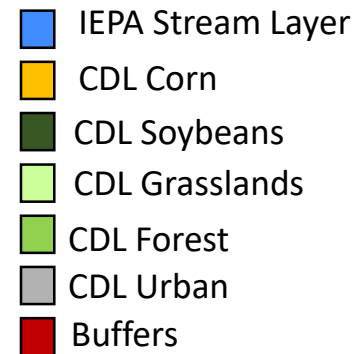


Methodology: Slide 3



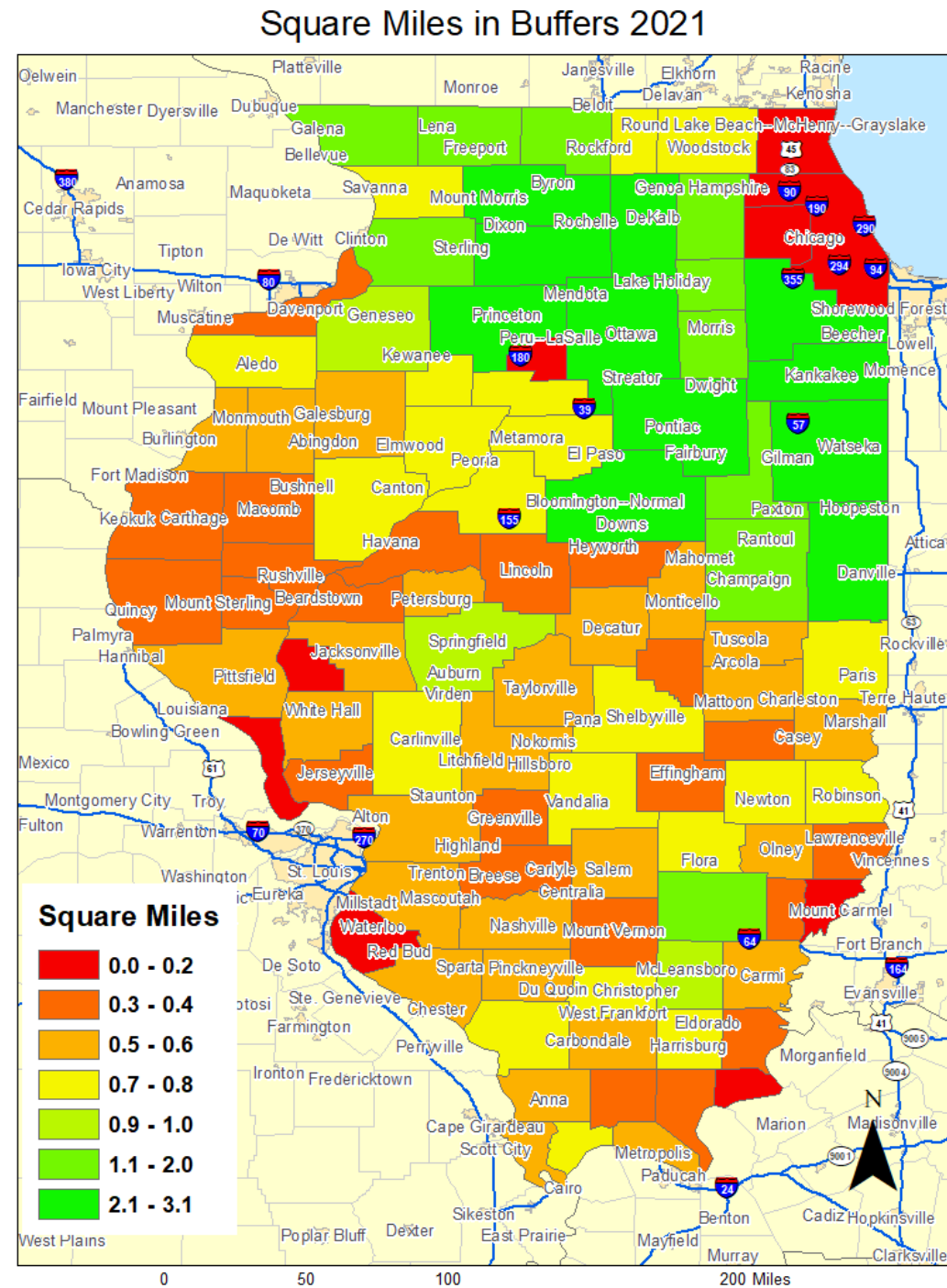
Additional steps for IEPA Analysis:

- 1) Identify potential riparian areas in USDA Cropland Data Layer (forests, grassland, water, wetlands forest or grassland)
- 2) Using IEPA provided streams GIS layer, only include above riparian areas that abut/overlap with streams.
- 3) Using the buffers developed from the previous steps include: only buffers that abut the above riparian areas and are also in an agricultural field.



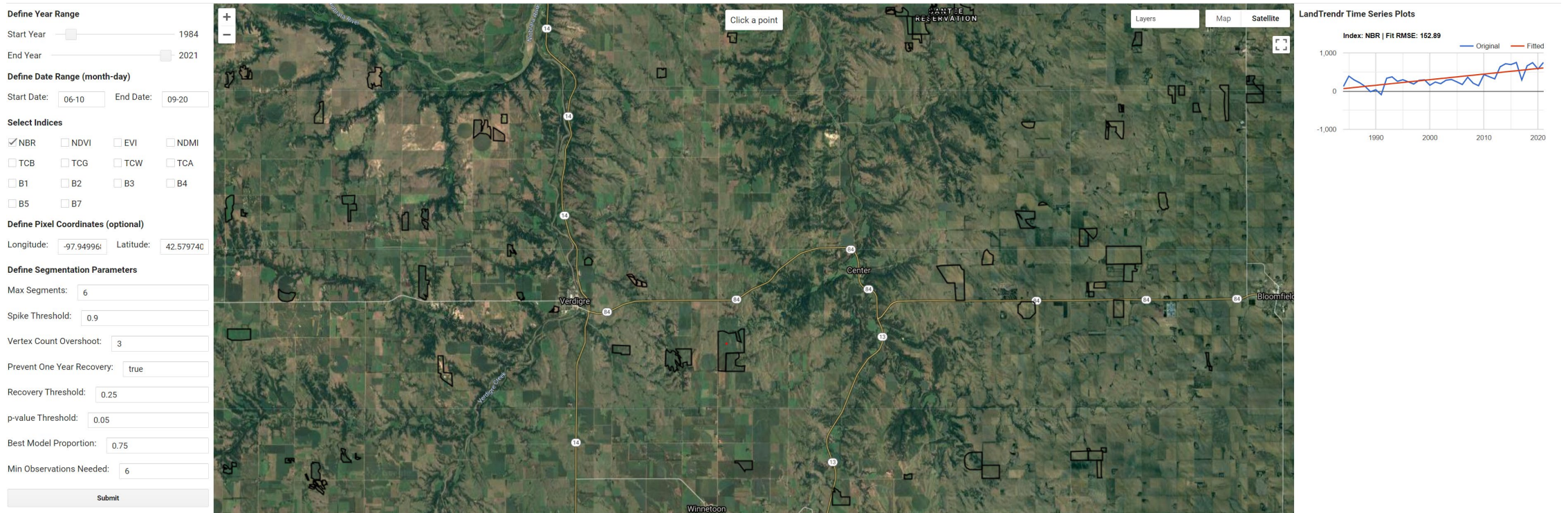
Results

- 77.1 square miles of in-field buffers in Illinois in 2021.
- Accuracy is 84%. This data is, however, considered a Census not a Survey.
- We were very careful to error on side of not identifying buffers rather than incorrectly including weeds etc



Google Earth Engine

- Petabytes of satellite imagery can be rapidly accessed.
- Other GIS layers can also be accessed and analyzed.
- Active developer community contributing algorithms daily
- Easy to develop graphical user interface components



Conclusions

- 10-meter Sentinel-2 satellite data allows for accurate mapping of in-field buffer strips when combined with the USDA Cropland Data Layer.
- Statistical and Edge Detection Tools in Google Earth Engine have greatly improved the ability to delineate these strips.
- The 77 miles of estimated buffer strips in Illinois agricultural fields may be slightly lower than actual to ensure other land covers are not included.
- With the tools in Google Earth Engine this can be performed quickly in the future.

Agriculture Metrics

Data Sources

Trevor Sample



Agriculture Metrics—Data Sources

- Review data sources for each Agriculture BMP practice
- Most sources rely on combination of NASS survey results and cost-share practice program data.
- Need to establish data source for filter strips/grass buffers
 - IL Corn buffer project
- Need to establish data sources for newly adopted practices
 - Saturated Buffers
 - Terraces
- Determine data sources for Adaptive Management chapter
 - NASS Cover Crop data vs FSA data



Adaptive Management Chapter - Scenarios

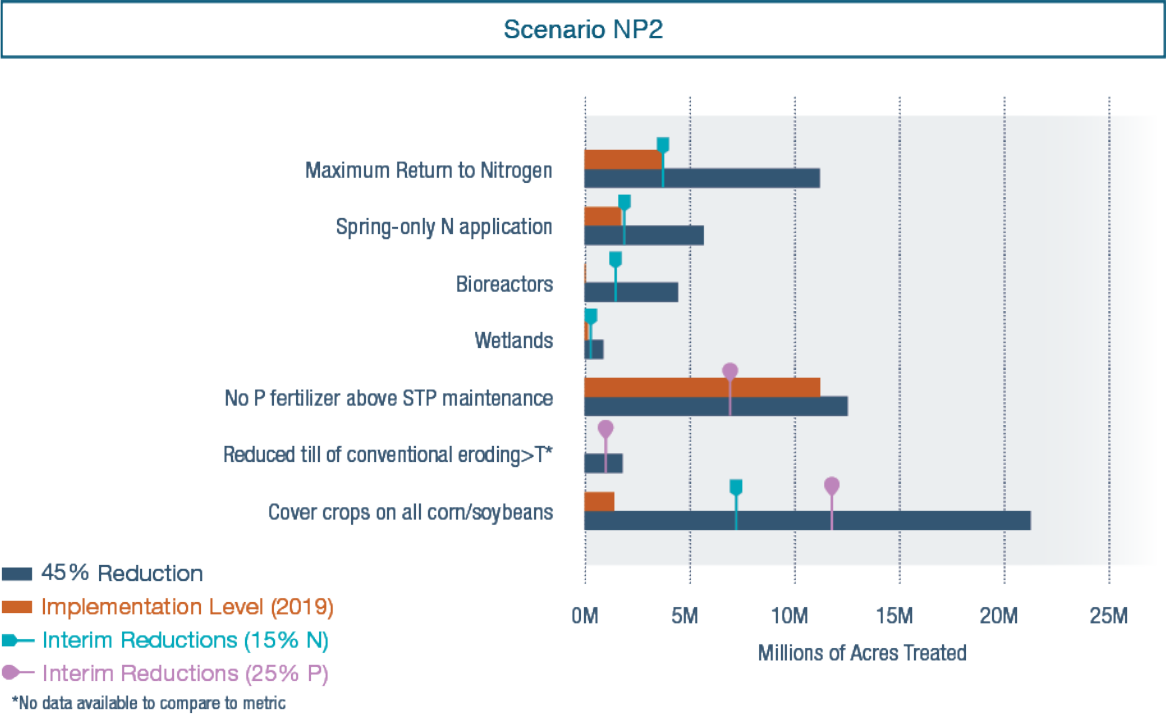


Figure 8.3. Agricultural implementation as compared with scenario NP2

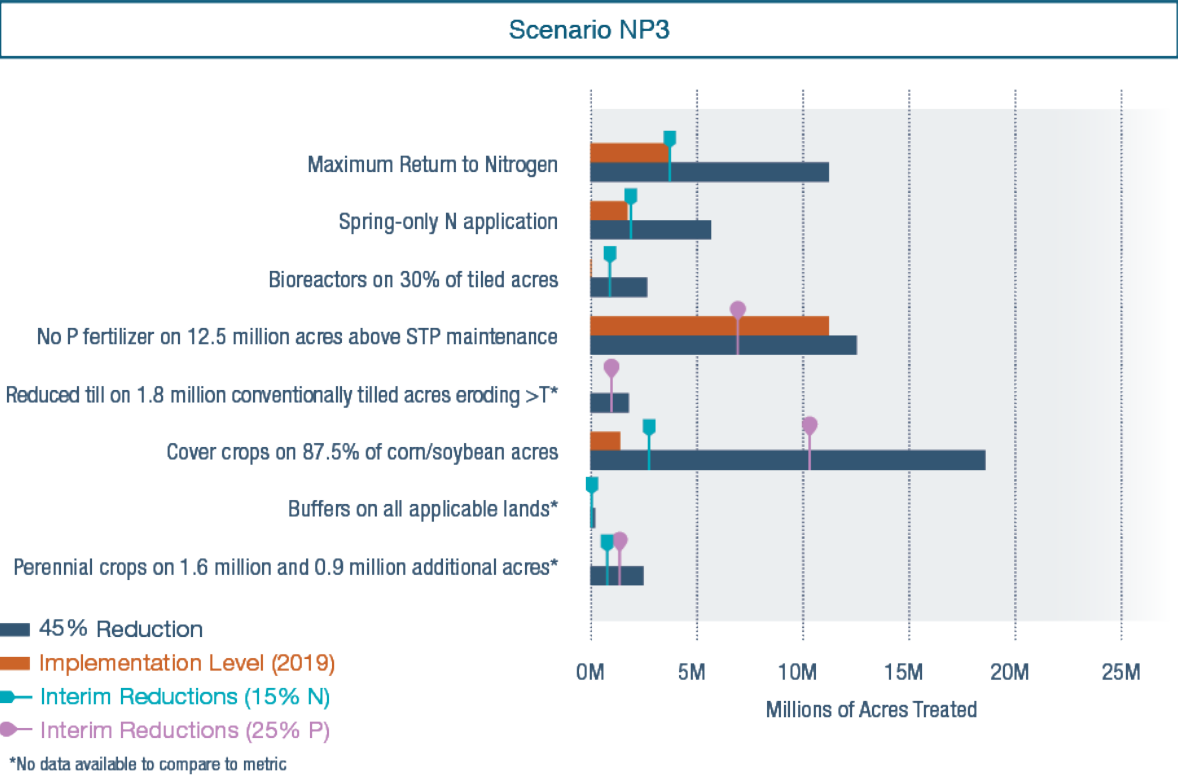


Figure 8.4. Agricultural implementation as compared with scenario NP3



Adaptive Management Chapter - Scenarios

Scenario NP7

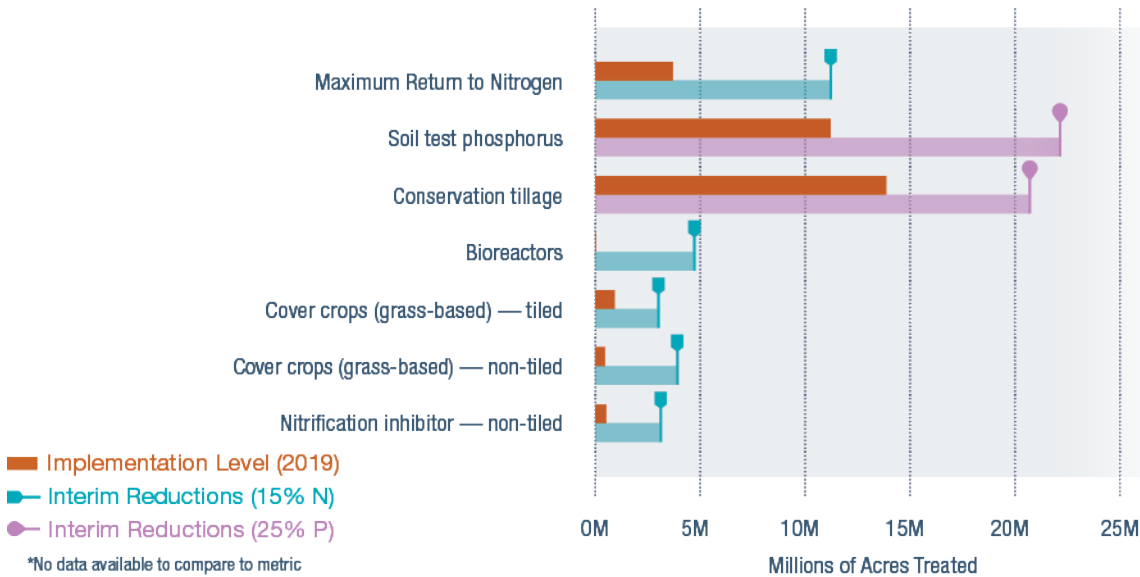


Figure 8.5. Agricultural implementation as compared with scenario NP7 (which reflects interim goals)

Scenario NP8

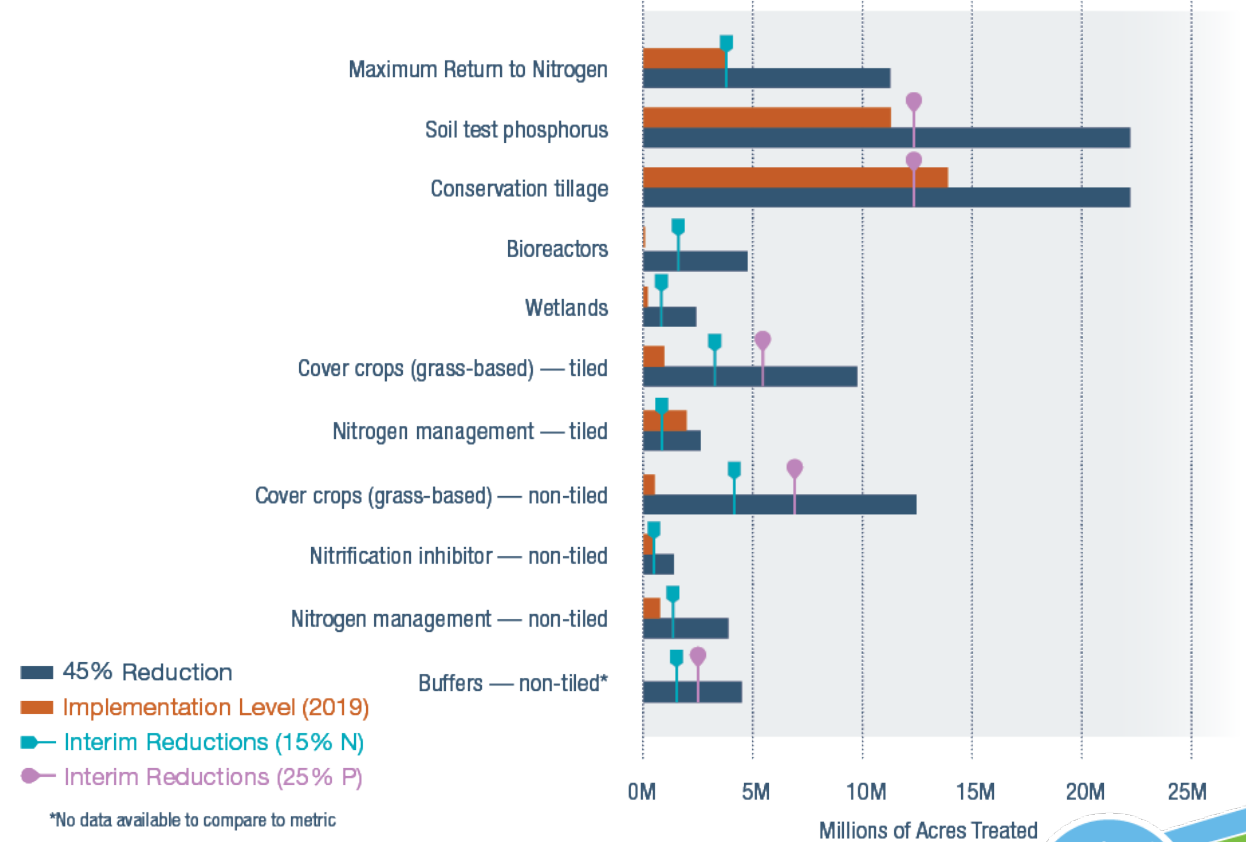


Figure 8.6. Agricultural implementation as compared with scenario NP8



Agriculture Metrics—Data Sources

- **Saturated Buffers (CP 604)**
 - State and Federal cost share data
 - Other??
- **Terraces (CP 600)**
 - State and Federal cost-share data
 - Other??
- **Note:** neither practice included in developed scenarios
- **Wetlands (CP 656):** Included in NP2 and NP8
 - Only use Federal Cost share data
 - Other??

(Review data source spreadsheet)



Practice/scenario	Nitrate-N reduction per acre (percent)	Nitrate-N reduced (million lb)	Nitrate-N reduction from baseline (percent)	Cost (\$/lb removed)
Reducing N rate from background to MRTN on 10 percent of acres	10	2.3	0.6	-4.25
Nitrification inhibitor with all fall-applied fertilizer on tile-drained corn acres	10	4.3	1	2.33
Split application of 50 percent fall and 50 percent spring on tile-drained corn acres	7.5-10	13	3.1	6.22
Spring-only application on tile-drained corn acres	15-20	26	6.4	3.17
Split application of 40 percent fall, 10 percent pre-plant, and 50 percent side dress	15-20	26	6.4	
Cover crops on all corn/soybean tile-drained acres	30	84	20.5	3.21
Cover crops on all corn/soybean non-tiled acres	30	33	7.9	11.02
Bioreactors on 50 percent of tile-drained land	25	35	8.5	2.21
Wetlands on 35 percent of tile-drained land	50	49	11.9	4.05
Buffers on all applicable crop land (reduction only for water that interacts with active area)	90	36	8.7	1.63
Perennial/energy crops equal to pasture/hay acreage from 1987	90	10	2.6	9.34
Perennial/energy crops on 10 percent of tile-drained land	90	25	6.1	3.18
Point source reduction to 10 mg/L		14	3.4	3.3

Nitrate-N data



1	Conservation Practice	Data Source Currently Used	Alternative Sources?
2	NITROGEN		
3	Reducing N rate from background to MRTN on 10 percent of acres	NASS Section 2 Question 1	
4			
5	Nitrification inhibitor with all fall-applied fertilizer on tile-drained corn acres	NASS Section 2 Question 2.b	
6			
7	Split application of 50 percent fall and 50 percent spring on tile-drained corn acres	NASS Section 2 Question 2.c (asks for acres of split application, not 50/50)	
8			
9	Spring-only application on tile-drained corn acres	NASS Section 2 Question 2.d	
10			
11	Split application of 40 percent fall, 10 percent pre-plant, and 50 percent side dress	NASS Section 2 Question 2.e (asks for acres of split application, not 40/10/50)	
12			
13	Cover crops on all corn/soybean tile-drained acres	NASS Section 4 (no longer specific to tile vs non-tiled; relates to crop type)	
14			
15	Cover crops on all corn/soybean non-tiled acres	NASS Section 4 (no longer specific to tile vs non-tiled; relates to crop type)	
16			
17	Bioreactors on 50 percent of tile-drained land	University researches/self reported	
18			
19	Wetlands on 35 percent of tile-drained land	Question no longer asked. May be captured in Section 6 "Other Techniques"	
20			
21	Buffers on all applicable crop land (reduction only for water that interacts with active area)	No information (This is not a saturated buffer practice)	
22			
23	Perennial/energy crops equal to pasture/hay acreage from 1987	FSA (CRP), IDNR (CREP), other	
24			
25	Perennial/energy crops on 10 percent of tile-drained land	FSA (CRP), IDNR (CREP), other	
26	Saturated Buffer	???	

Practice/scenario	Total P reduction per acre (percent)	Total P reduced (million lb)	Total P reduction from baseline (percent)	Cost (\$/lb removed)
1.8 million acres of conventional till eroding >T converted to reduced, mulch, or no-till	50	1.8	5	-16.6
P rate reduction on fields with soil test P above the recommended maintenance level	7	1.9	5	-48.75
Cover crops on all corn/soybean tile-drained acres	30	4.8	12.8	130.4
Cover crops on 1.6 million acres eroding >T currently in reduced, mulch, or no-till	50	1.9	5	24.5
Wetlands on 25 percent of tile-drained land	0	0	0	
Buffers on all applicable crop land	25-50	4.8	12.9	11.97
Perennial/energy crops equal to pasture/hay acreage in 1987	90	0.9	2.5	102.3
Perennial/energy crops on 1.6 million acres >T currently in reduced, mulch, or no-till	90	3.5	9	40.4
Perennial/energy crops on 10 percent of tile-drained land	50	0.3	0.8	250.07
Point source reduction to 1 mg/L (majors only)		8.3	22.1	13.71

Total P data



PHOSPHORUS

1.8 million acres of conventional till eroding >T converted to reduced, mulch, or no-till

Potentially IDOA Soil Transect Survey; 2018 data last year available

P rate reduction on fields with soil test P above the recommended maintenance level

NASS Section 3 Question 1 (question is not specific to maintenance level)

Cover crops on all corn/soybean tile-drained acres

NASS Section 4 (no longer specific to tile vs non-tiled; relates to crop type)

Cover crops on 1.6 million acres eroding >T currently in reduced, mulch, or no-till

NASS Section 4 (no longer specific to tile vs non-tiled; relates to crop type)

Buffers on all applicable crop land

No information. This metric has not been reported beyond cost-share programs

Perennial/energy crops equal to pasture/hay acreage in 1987

FSA (CRP), IDNR (CREP)

Perennial/energy crops on 1.6 million acres >T currently in reduced, mulch, or no-till

FSA (CRP), IDNR (CREP)

Perennial/energy crops on 10 percent of tile-drained land

FSA (CRP), IDNR (CREP)

Terraces

???





United States Department of Agriculture

UPDATE

RCPP

Regional Conservation Partnership Program

Illinois Department of Agriculture
Bureau of Land and Water Resources
Brian Rennecker, Bureau Chief
Elliot Lagacy, Regional
Representative



Partnering for Conservation Solutions

RCPP

Regional Conservation Partnership Program

Illinois Climate-Smart Agricultural Partnership

Goals

Increase the amount of Conservation Cropping Practices installed in Illinois while reducing the amount of Sediment, Nitrogen, Phosphorus loading in Mississippi River Basin and also raising awareness of Carbon capturing or limiting release carbon by introducing Illinois Climate-Smart Agricultural Partnership.

Objectives

1. Expand the use of conservation cropping systems in Illinois by leveraging “Climate-Smart Agricultural Practices” across the state’s diverse watersheds.
2. Formalize the creation of the Illinois Climate-Smart Agricultural Partnership.
3. Establish educational and training opportunities to advance evidence-based climate-smart agricultural practices throughout Illinois.
4. Unite outreach and marketing initiatives to farmers and industry professionals that strengthen implementation of climate-smart agricultural practices

RCPP

Regional Conservation Partnership Program

Illinois Climate-Smart Agricultural Partnership

Partners

- Illinois Department Of Agriculture (Lead)
- American Farmland Trust
- Association of Illinois Soil and Water Conservation Districts
- Illinois Farm Bureau
- Illinois Stewardship Alliance
- Izaak Walton League of America
- Pheasants Forever

RCPP

Regional Conservation Partnership Program

Illinois Climate-Smart Agricultural Partnership

Partners

- Illinois Department Of Agriculture (Lead)
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- Illinois Farm Bureau
- Illinois Stewardship Alliance
- Izaak Walton League of America
- Pheasants Forever

RCPP

Regional Conservation Partnership Program

Illinois Climate-Smart Agricultural Partnership

Partners

- Programmatic Partnership Agreement
 - Alternative Funding Arrangement (AFA) Land Management Activity and
 - Enhancement Technical Assistance Activity Expectations to Illinois USDA NRCS Review
- Illinois Climate Smart Agriculture Working Group: Report and Recommendations
 - Prepared by Max Webster, American Farmland Trust
 - Grant Hammer, Association of Soil and Water Conservation Districts



American Farmland Trust

Illinois Climate Smart Ag Working Group

Max Webster, Midwest Policy Manager, American Farmland Trust

Feedback from Participants

- Five meetings since September, one more scheduled for April
- Advise IDOA and other agencies on opportunities to promote Climate Smart Agriculture and climate resilience on natural and working lands in Illinois
- Review and interpret recommendations provided by working group members and stakeholders
- Assist IDOA in making connections to leaders for climate smart agriculture outside of the working group
- Identify resources, information, reports, datasets that can support program guidance for climate smart agriculture
- Work collaboratively and actively participate in meetings of the working group

Initial Recommendations for Climate-Smart Action in Illinois

- 1) Integrate climate-smart agriculture into state strategies to fight climate change
- 2) Empower the Illinois Department of Agriculture to continue to lead efforts to promote climate-smart agriculture.
- 3) Build on and enhance the state's existing financial assistance programs
- 4) Identify long-term stable sources of funding for climate-smart ag efforts
- 5) Recover lost capacity support and technical assistance provided by Soil and Water Conservation Districts and the University Extension service to facilitate access to resources and programs for farmers and landowners to implement climate-smart practices.
- 6) Strengthen relationships with the private sector and explore innovative partnerships to effectively leverage public and private resources.
- 7) Convene an advisory committee, including subcommittees, to guide efforts going forward.
- 8) Use the advisory committee to address key challenges for expanding climate-smart agricultural opportunities in Illinois.



Where we are:

- IDOA should convene an advisory committee
 - Led by the RCPP project partners
- Should also convene three subcommittees
 - Large-scale cash crop, livestock and commodity producers
 - Rural and urban small and mid-sized mixed production and specialty crop producers
 - Rural landscapes and ecosystem service functions
- Advisory committee should compile a report to improve public communications and to guide actions by policy makers, business leaders, education providers and other stakeholders.



Creating an Outreach Plan



IDENTIFY POTENTIAL
PARTNERS AND
PARTICIPANTS



FIND BEST AVENUES FOR
COMMUNICATIONS



DETERMINE BEST
STRUCTURE(S) FOR
ENGAGEMENT
(MEETINGS, LISTENING
SESSIONS, SURVEYS ETC.)



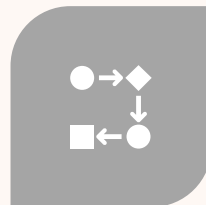
PREPARE
COMMUNICATIONS AND
OUTREACH MATERIALS



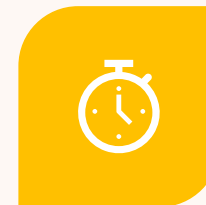
IDENTIFY LEAD PARTNER
SUPPORT



DEVELOP SHARED
UNDERSTANDING OF
GOALS AND PRIORITIES



ESTABLISH PROCESSES FOR
REVIEW, FOLLOW-UP AND
INFORMATION SHARING



AGREE TO A TIMELINE*



UNITED STATES CLIMATE ALLIANCE

STATES UNITED FOR CLIMATE ACTION

UPDATE

Technical Assistance Fund proposal

Resubmitted March 4th

UNITED STATES CLIMATE ALLIANCE

Technical Assistance Fund Proposal

Objectives

The project aims to produce three primary outcomes:

1. a ranked list of barriers from all SWCDs;
2. a framework tool for assessing local opportunities for expanding practice adoption and setting attainable goals; and
3. education materials for state-level staff and policy makers to advance climate-smart ag practices in Illinois.

UNITED STATES CLIMATE ALLIANCE

Technical Assistance Fund Proposal

Partners

- Illinois Department of Agriculture (Lead)
- American Farmland Trust
- Illinois Sustainable Ag Partnership

UNITED STATES CLIMATE ALLIANCE

Technical Assistance Fund Proposal

Proposed Project Activities

Develop Ranked Barriers List (IDOA)

1. Develop barriers survey;
2. Share survey with all 97 SWCDs through the Association of Illinois Soil and Water Conservation Districts;
3. Conduct 10 follow-up interviews with a targeted group of SWCD staff and representatives;
4. Utilize the advisory committee organized under the Illinois Climate Smart Agricultural Partnership to review survey results;
5. Establish internal ranking utilizing an Interpretive Structural Model; and
6. Host workshops with industry experts and SWCD representatives to validate identified barriers and share results.

UNITED STATES CLIMATE ALLIANCE

Technical Assistance Fund Proposal

Proposed Project Activities

Create Framework Tool (Illinois Sustainable Ag Partnership)

1. Assemble statewide datasets downscaled to the county level,
2. Conduct overlay analysis to identify target areas
3. Develop templates/guidebooks for resource prioritization, policy, fundraising, and outreach (Illinois Sustainable Ag Partnership)

UNITED STATES CLIMATE ALLIANCE

Technical Assistance Fund Proposal Budget

Project Initiative	Funds Requested
Research Scholar through the Illini Science Policy Program Partnership (50% of cost covered by partnership with University of Illinois Extension)	\$25,000
Capacity Support for 97 Soil and Water Conservation District's	\$34,000
Technical Assistance Subcontracts (Illinois Sustainable Ag Partnership)	\$20,000
Instrument Development	\$2,000
Survey Outreach	\$2,000
Workshop	\$5,000
Project Dissemination	\$9,000
Data Collection Travel	\$3,000
Total	\$100,000



PACE

**Post
Application
Coverage
Endorsement**



ILCORN
WWW.ILCORN.ORG

Entities Involved with PACE

Developer



Supporting Organizations

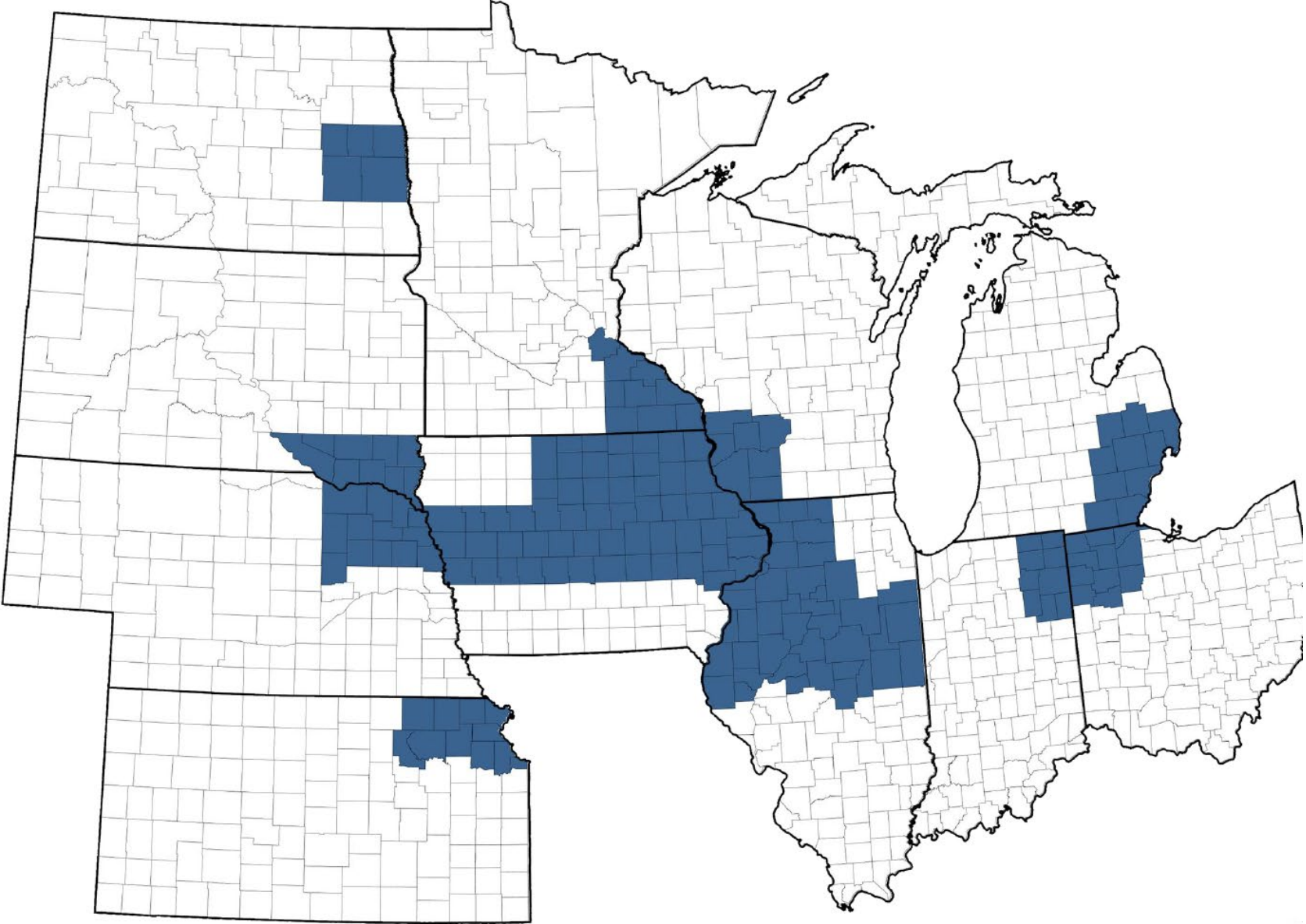


Sponsoring Crop Insurance Companies



• pacecropinsurance.com

2022 PACE Pilot Area



2022 Example

- LaSalle County, Illinois
 - \$5.80 Projected Price
 - 220 bushel/acre yield
- Farmer decides by March 15
 - Total N to be applied for the year
 - **Post-application percent: 40%**
 - Unit (Enterprise, Basic, Optional)
 - **PACE coverage level election: 90%**
- Farmer-paid premium: \$2.82 per acre
- Payments if post application can not be made = \$69 per acre
 - **Can go up if harvest price greater than Projected price, RP**

Post-Application	75% PACE Coverage		90% PACE Coverage	
	Farmer-Paid	PACE Indemnity	Farmer-Paid	PACE Indemnity
25%	\$0.58	\$29	\$1.41	\$34
30%	\$0.77	\$38	\$1.88	\$46
35%	\$0.96	\$48	\$2.35	\$57
40%	\$1.15	\$57	\$2.82	\$69
45%	\$1.34	\$67	\$3.29	\$80
50%	\$1.53	\$77	\$3.76	\$92
55%	\$1.73	\$86	\$4.23	\$103
60%	\$2.11	\$105	\$5.17	\$126
65%	\$2.49	\$124	\$6.11	\$149
70%	\$2.68	\$134	\$6.58	\$161
75%	\$3.07	\$153	\$7.52	\$184
80%	\$3.45	\$172	\$8.36	\$207



ILLINOIS
SUSTAINABLE
AG PARTNERSHIP

Online Story Map

A roadmap to identify and prioritize opportunities to achieve nutrient loss reductions.

ISAP PARTNERS



ISAP's PURPOSE

The Illinois Sustainable Ag Partnership is a coalition of organizations working collaboratively to promote conservation solutions focused on soil health and water management to reduce nutrient losses and meet sustainability goals.



Healthy Soil | Clean Water | Profitable Farms

Theory of Change

Core Strategies

How do we create our desired impact?

Increase farmer recognition in the **ECONOMIC VALUE** of conservation practices

Serve as clearinghouse for **SOIL HEALTH & CONSERVATION DRAINAGE EDUCATION**

Accelerate the **ADOPTION OF CONSERVATION PRACTICES** that improve soil health, carbon cycling & water quality

Enabling Outcomes

What is needed to bring about change?

Farmers and advisors have access to data and view ISAP as a trusted source of information.

All education is action oriented, fosters knowledge transfer, and motivates change on the landscape.

ISAP members and partners are using a consistent message to inform and engage key audiences.

Policies and funding priorities are supporting practices with the biggest water quality and climate impacts.

Desired Impact

What is our “long-term” goal?

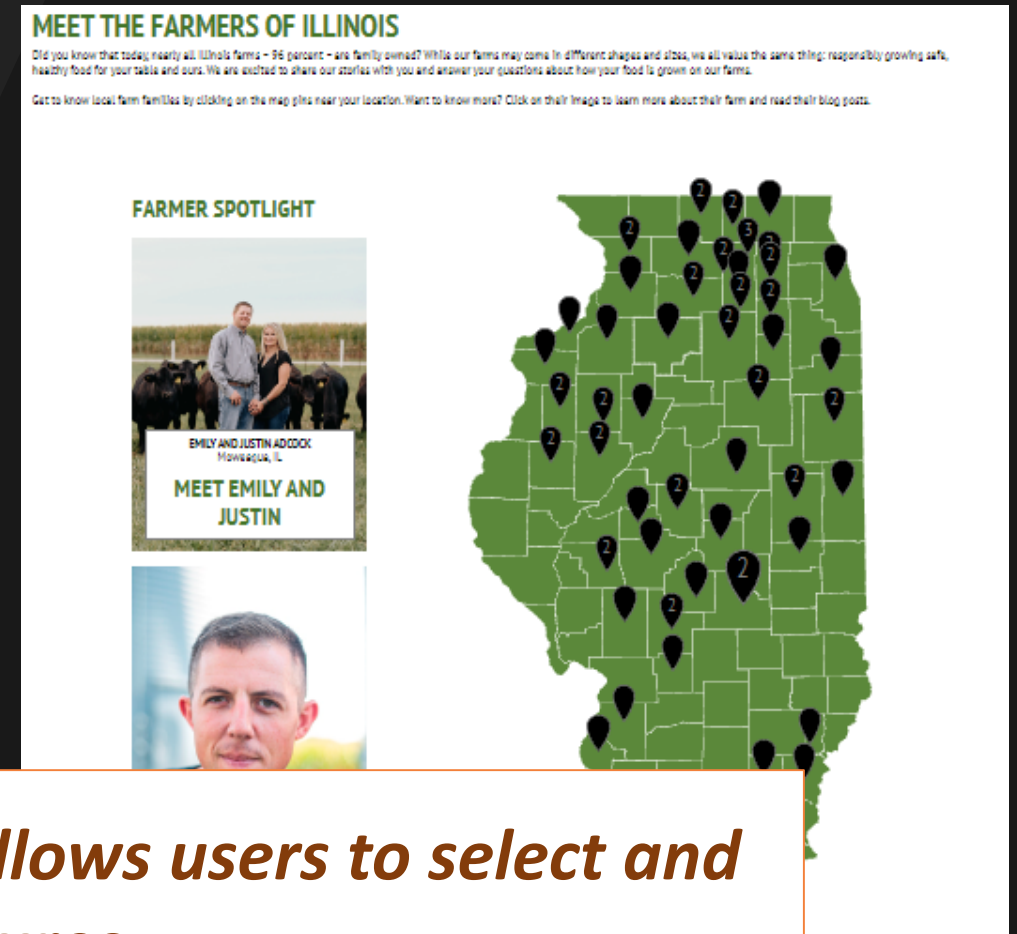


Illinois agriculture voluntarily meets **NLRS** goals and benefits from being part of the climate solution

STORY MAP DEVELOPMENT

image from Illinois Farm Families

- Engage and inform stakeholders on NLRs-related efforts happening in each county of Illinois.
- Serve as a roadmap to identify and prioritize opportunities to achieve water quality and climate goals.



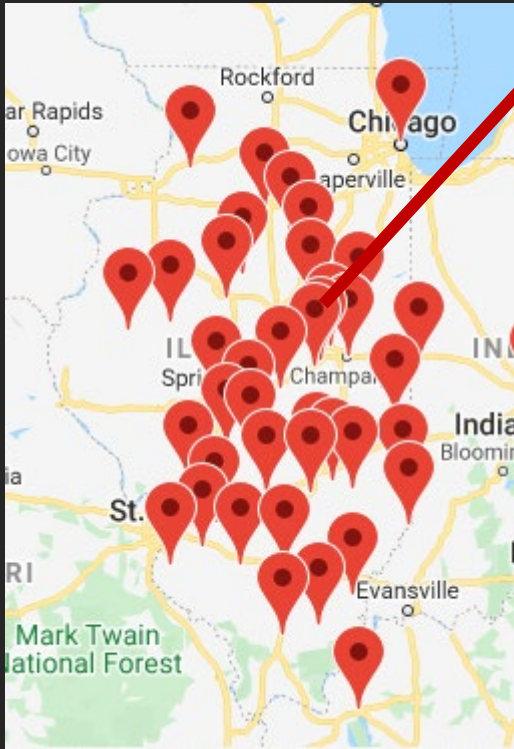
A story map is an interactive map that allows users to select and explore multiple features.

FEATURES AND FUNCTIONS

- Highlight organizations and initiatives at county, watershed, and state levels
- Share results from research and field trials conducted throughout the state
- List education / demonstration sites offering opportunities to learn more about best management practices
- Provide directory of individuals and service providers with soil health and / or conservation drainage expertise
- Profile farmers utilizing conservation cropping systems and edge of field practices



SERVICE PROVIDER DIRECTORY



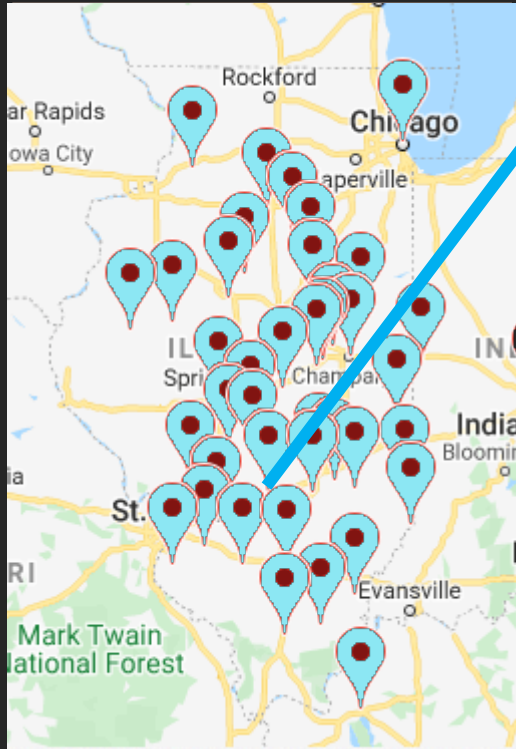
Business Name & Logo
Location (address, counties served)

Services Provided

custom no-till / strip-till
cover crop seeds
consulting services

FMI: url, phone, email

FARMER PROFILE TEMPLATE



Farmer Name
Location (County & watershed)

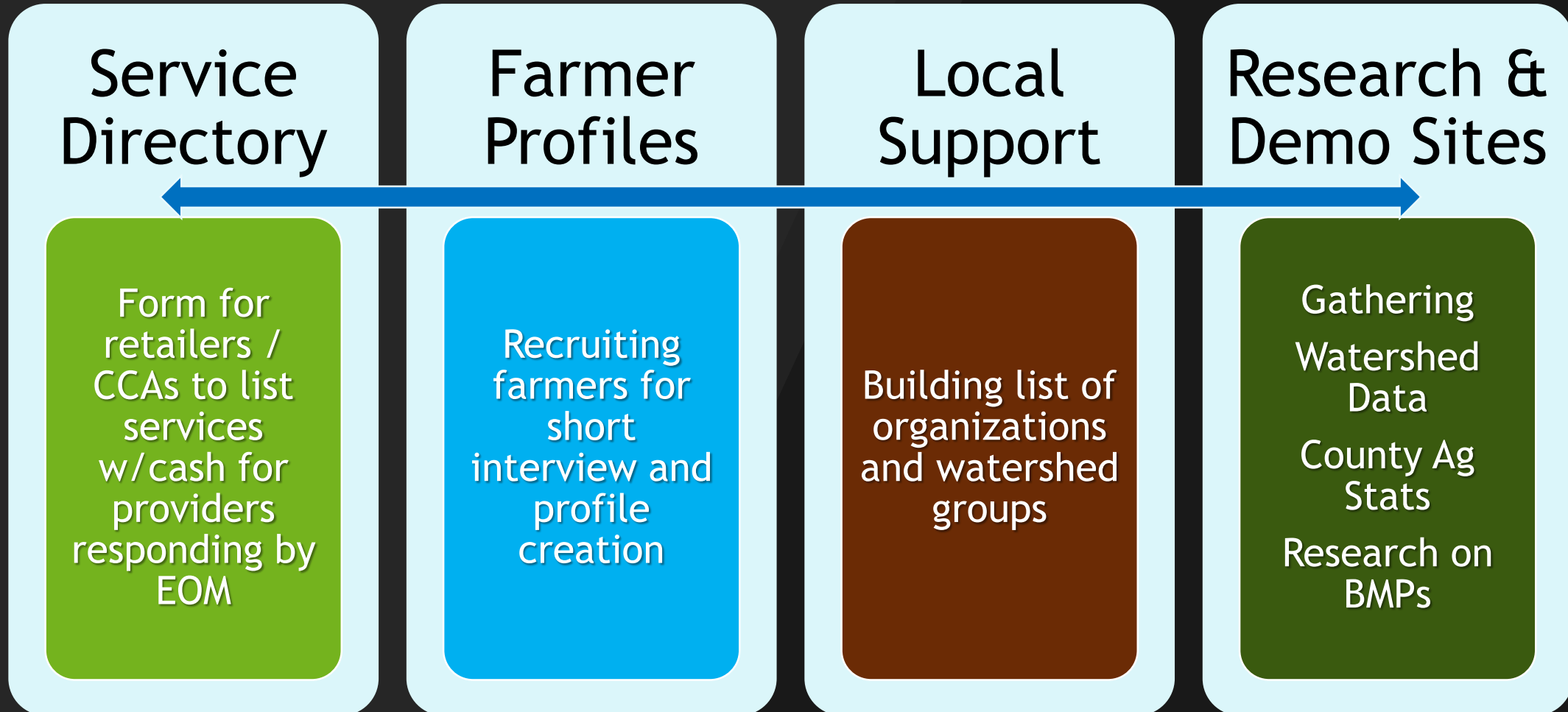
Summary of operation
2 or 3 sentence / bullet list of practices used

“Quote from farmer...”

FMI: url or email (if applicable)

AN INVITATION!

Who needs to be included?



CONNECT!



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