Stakeholder Advisory Committee Meeting

December 8, 2020

THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

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Agenda

- 2:00 to 2:10 – Welcome and introductions
- 2:10 to 2:30 - What is important to ask on the presentation evaluations?
- 2:30 to 3:30 – What global to local drivers and potential policies/programs should we be thinking about for our region?
- 3:30 to 3:50 - What are fair assumptions about land management within ag production?
- 3:50 to 4:00 – Wrap-up

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Introductions

Research Team

- Dr. Robyn Wilson – project director
- Dr. Elena Irwin – land use modeling
- Dr. Aaron Wilson – climate modeling
- Dr. Kaiguang Zhao – services modeling
- Dr. Yongyang Cai – economic modeling
- Greg LaBarge - extension
- Dr. Bryan Mark – state climatologist
- Dr. Alan Randall – economic modeling
- Jason Cervenec – educ & outreach
- Dr. Kristi Lekies - evaluator
- Dr. Mary Doidge – behavioral modeling
- Post-docs/GRAs: Hugh Walpole, Ziqian Gong, Ziyu Guo, Shelby Taber, Mackenzie Jones

Stakeholder Advisory Team

- Kirk Merritt – Ohio Soybean Council
- Dr. Larry Antosch – Ohio Farm Bureau
- Dr. Dennis Todey – USDA Midwest Climate Hub
- Dr. Carl Zulauf – OSU Emeritus Ag Policy
- Steve Emery – Nutrien Ag Solutions
- Mark Apelt – Becks Hybrid
- Nate Andre – Andre Farms
- Luke Crumley – Ohio Corn & Wheat
- Jeff Goetz – The Andersons
- Gail Hesse –National Wildlife Federation
- Kevin Elder – Farmer
- Matthew Adams – Ag Credit

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Overall research question

In the face of climate risks and uncertainties that influence farmer adaptations…

What is the right set of policies and programs to achieve **sustainable and resilient agroecosystem management** that balances agricultural production with critical ecosystem services?

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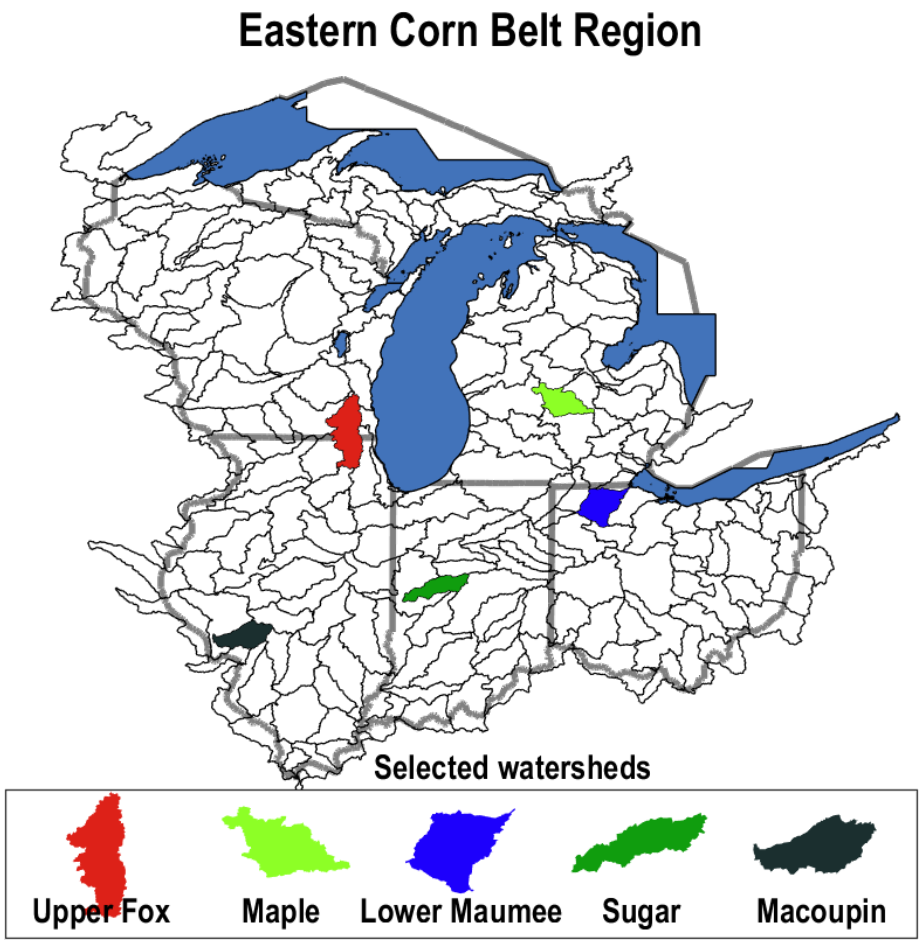
- What is the impact of climate and farmer decision making on ecosystem services?
  - Downscaled climate modeling
  - Farmer adaptation survey
  - Ecosystem services model
- Given this spatially explicit understanding, what are the expected regional economic outcomes?
  - Dynamic, regional economic model
- What policies might best promote sustainability and resilience?
  - Optimal policy assessment



Evaluating Project Presentations

What is important to ask on the presentation evaluations?

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Climate and Agriculture Presentation

We are very interested in your thoughts about the presentation and what you have learned. The survey will take about 5-10 minutes to complete. Please answer honestly. Do not put your name on this form.

Section A: Please indicate your opinion BEFORE and AFTER the presentation. Circle the number that best matches your thoughts about each statement.

Climate Impacts	Back . . . before I attended the presentation					Now . . . after I attended the presentation				
	Circle one number for each statement					Circle one number for each statement				
	Not at all		Somewhat		A great deal	Not at all		Somewhat		A great deal
1. I understand the difference between climate and weather.	1	2	3	4	5	1	2	3	4	5
2. I understand how weather patterns are changing in the Eastern Corn Belt.	1	2	3	4	5	1	2	3	4	5
3. I understand the challenges farmers will face due to changing weather patterns.	1	2	3	4	5	1	2	3	4	5
4. I understand the practices that farmers can use to reduce the negative impacts of changing weather patterns.	1	2	3	4	5	1	2	3	4	5
5. I understand how farmers are adjusting their practices to deal with the impacts of changing weather patterns.	1	2	3	4	5	1	2	3	4	5

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Section B: We are interested in your thoughts about the presentation today. Please answer the following questions.

1. What is something new that you learned today about changing weather patterns and agriculture?

1. Please indicate one or two key ideas you will take away from today's presentation.

1. Was there anything you would have liked to have had covered but was not?

1. Was anything unclear to you?

1. Please indicate any additional questions you have.

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Section C: If you are a farmer, please answer the following questions:

1. What are your main concerns about changing weather patterns and your farm?
2. How will the information from the presentation today help you with your farming practices? Provide one possible idea.
3. Have you already made changes to your farming practices as a result of changing weather patterns? *Check one.* _____ Yes ____ No

   3b. If yes, briefly list. _____

   3c. Why did you make these adaptations? Briefly explain.

   3d. Have you talked to other farmers about your adaptations?

   3e. Do other farmers you know use any of these methods?

   3f. Did anyone help you with your adaptations? (e.g., Extension educator, crop advisor, organizations, other farmers)?

   3g. Is there anything you are particularly proud of concerning the adaptations you have made? Briefly explain.

   3h. Have your adaptations been featured or showcased anywhere? (such as in a newspaper or at another meeting of farmers)?

4. How likely are you to make additional changes as a result of the information you received today? *Circle one.* Very likely Somewhat likely Somewhat unlikely. Very unlikely

   Briefly list. _____

5. How confident are you in your ability to change your farming practices to address changing weather patterns? *Circle one.*

   Very confident Somewhat confident Slightly confident Not at all confident

6. What barriers prevent you from making adaptations?
7. What information would be the most helpful to you in adapting to changing weather patterns?
8. What supports would be most helpful to you in adapting to changing weather patterns?
9. What do you feel are the next steps to help farmers adapt to changing weather patterns?

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Section D: Please respond to the following questions.

1. Are you: _____ Male _____ Female
2. What is your current age? _____
3. What is the highest level of education you have achieved? *Please check one.*

___ Some high school, or High school diploma or equivalent

___ Some college, no degree, or an Associate's degree

___ Bachelor's degree, or Graduate or professional degree

4. How many previous talks on climate and agriculture have you attended? *Please check one.*

___ None ____ 1 or 2 ___ 3 or 4 ___ 5 or more

5. What is your current position? *Check the one that best describes you and answer any related questions.*

___ Farmer: How large is your farm operation (include owned and rented land)? _____ acres

How many years have you been farming? _____ years

Will you pass your farm down to a member of your immediate or extended family? ___yes __ no __unsure

___ Extension Educator or State Specialist

___ Crop Advisor/Agribusiness Consultant

___ Policymaker (elected or appointed official)

___Other (please specify) _____

Thank you! The Ohio State University will this information internally to help inform future extension and outreach programming. If you are also willing for this information to be used for research purposes, please initial below. Your participation is completely voluntary, and if you choose to participate, your responses will be completely confidential and will not be linked in any way to any identifying information about you. *For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251. For research related questions, contact Dr. Robyn Wilson at 614-247-6169 or Wilson.1376@osu.edu* *Initials:* _____

Designing Scenarios

What global to local drivers and potential policies/programs should we be thinking about for our region?

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Scenarios provide the Context for modeling Alternative Policies and Strategies

- Scenarios are representations of
  - The status quo
  - The trends and drivers that will help shape the future
- Our Region is Nested in the Nation and the World
  - This has implications:
    - Scenarios must be multi-part, addressing possible future configurations of the world, the nation, and our region
    - Scenarios must be plausible – why model the absurd?
    - But they should stretch the bounds of plausibility – we can't be complacent about the future
    - Scenarios must be internally consistent – some configurations of our regional future are inconsistent with some national and global futures

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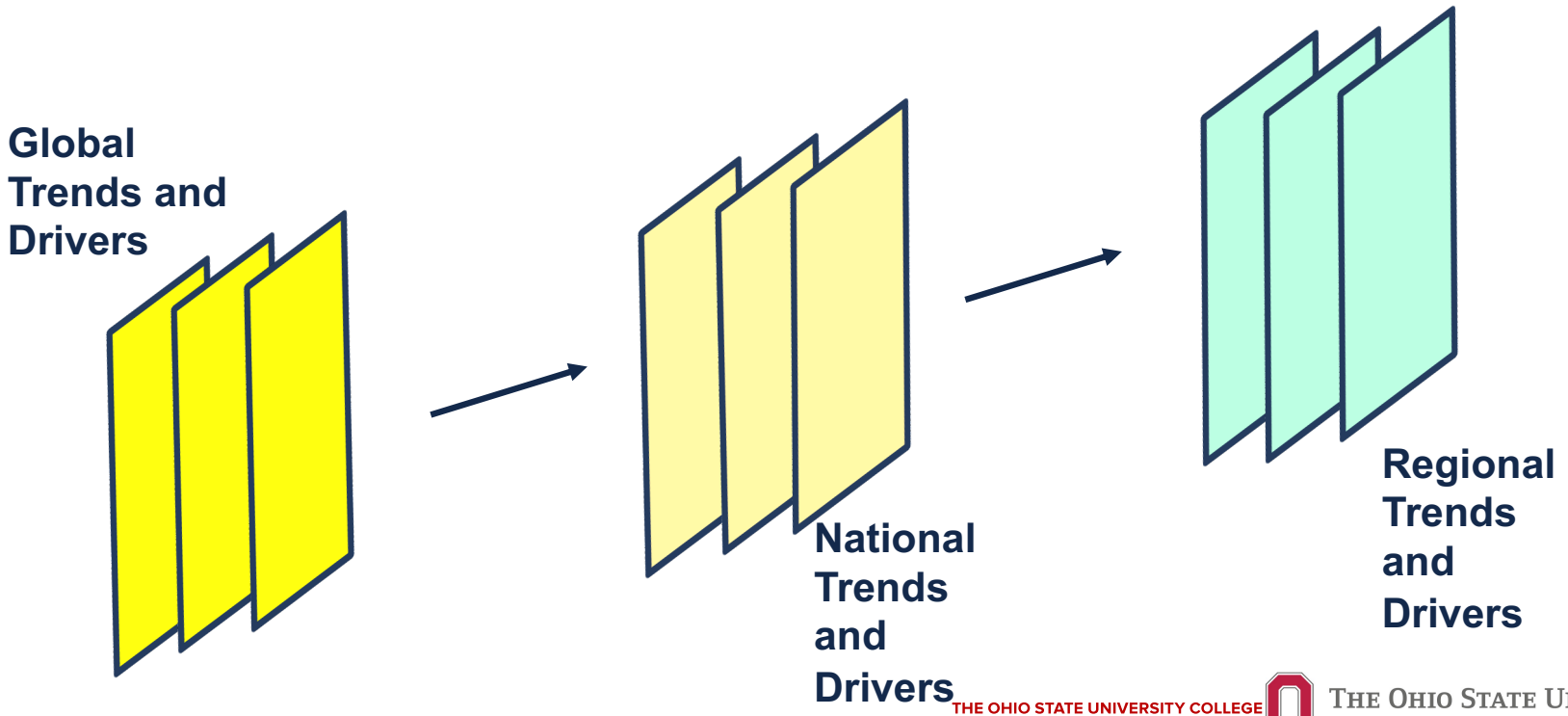
Our scenarios are layered, to reflect this nesting

Looking forward, several different futures are possible for the world, the nation, and our region



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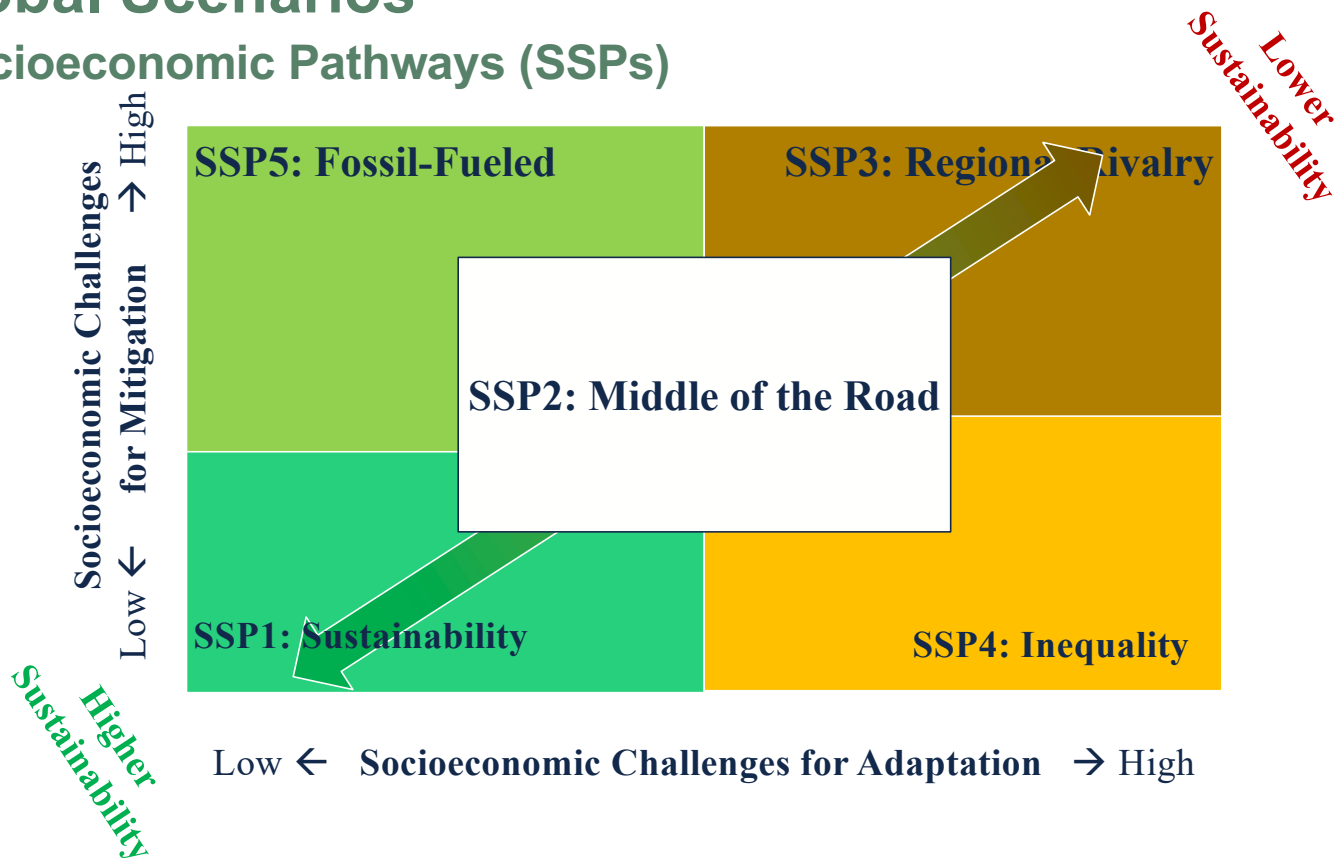
Toward Global Scenarios

Shared Socioeconomic Pathways (SSPs)



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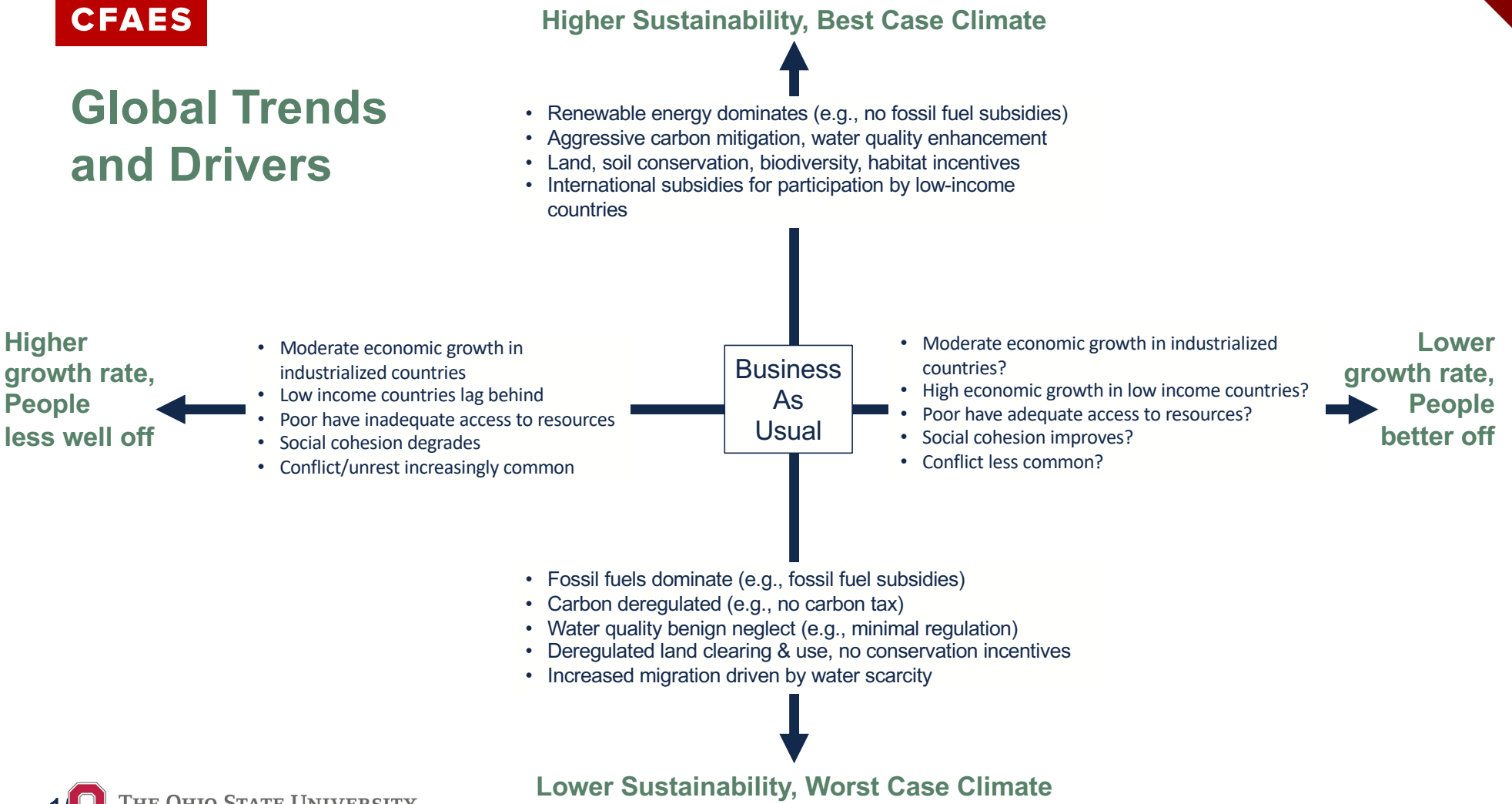
Global Trends and Drivers



Scenarios depict global drivers that affect the region

- E.g., Extreme heat/drought reduces yields
- E.g., Richer increases demand for feed
- E.g., Poorer increases demand for food grain
- E.g., More water decreases water quality

The goal is to ***predict regional response to global conditions*** and ***consider any regional policies or programs to help the region thrive under the given combination of conditions***

Higher Sustainability, Best Case Climate

Renewable energy dominates (e.g., no fossil fuel subsidies)
Aggressive carbon mitigation, water quality enhancement
Land, soil conservation, biodiversity, habitat incentives
International subsidies for participation by low-income countries

Higher growth rate, People less well off

- Moderate economic growth in industrialized countries
- Low income countries lag behind
- Poor have inadequate access to resources
- Social cohesion degrades
- Conflict/unrest increasingly common

Business As Usual

- Moderate economic growth in industrialized countries?
- High economic growth in low income countries?
- Poor have adequate access to resources?
- Social cohesion improves?
- Conflict less common?

Lower growth rate, People better off

- Fossil fuels dominate (e.g., fossil fuel subsidies)
- Carbon deregulated (e.g., no carbon tax)
- Water quality benign neglect (e.g., minimal regulation)
- Deregulated land clearing & use, no conservation incentives
- Increased migration driven by water scarcity

Lower Sustainability, Worst Case Climate

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Today we will Discuss:

1. The plausibility and coherence of our global scenarios. For each:

- Does it make sense?
- Is it coherent, or are some parts inconsistent with others?
- Is it likely that the global future will resemble this scenario? Is it at least possible?
- How would you change it, to make it more plausible?

… because you want to expand the scope of possibilities considered?

… for any other reason?

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2. The plausibility and coherence of our National Scenarios.

- We are not so far along with national scenarios. But we might expect:
- National conditions are driven to some degree by global climate and population.
- But the US might exert some influence on global conditions, through global leadership.
- For many other issues (e.g. trade policy), the US has scope for agency.
- Our region, as a major producer and exporter of agricultural commodities, may have some influence on national agricultural policies.

- What are some of the considerations you would like to see elaborated in national scenarios?

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3. Help us construct regional scenarios:

- What do you expect to drive our regional prospects through the rest of this century?
- Perhaps there are some kinds of policies and projects that can be implemented by regional initiative of improve regional prospects: what might some of these be?

Correlating land use and management

What are fair assumptions about land management within ag production?

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Questions

- What are agricultural land use and crop rotation trends in our study region?
- How much do they vary over space and over time?
- How are they correlated with observable land management practices (based on remotely sensed data)
- What's reasonable for us to assume in our model scenarios in terms of crop-land management correlations?
- How might these correlations change over time?

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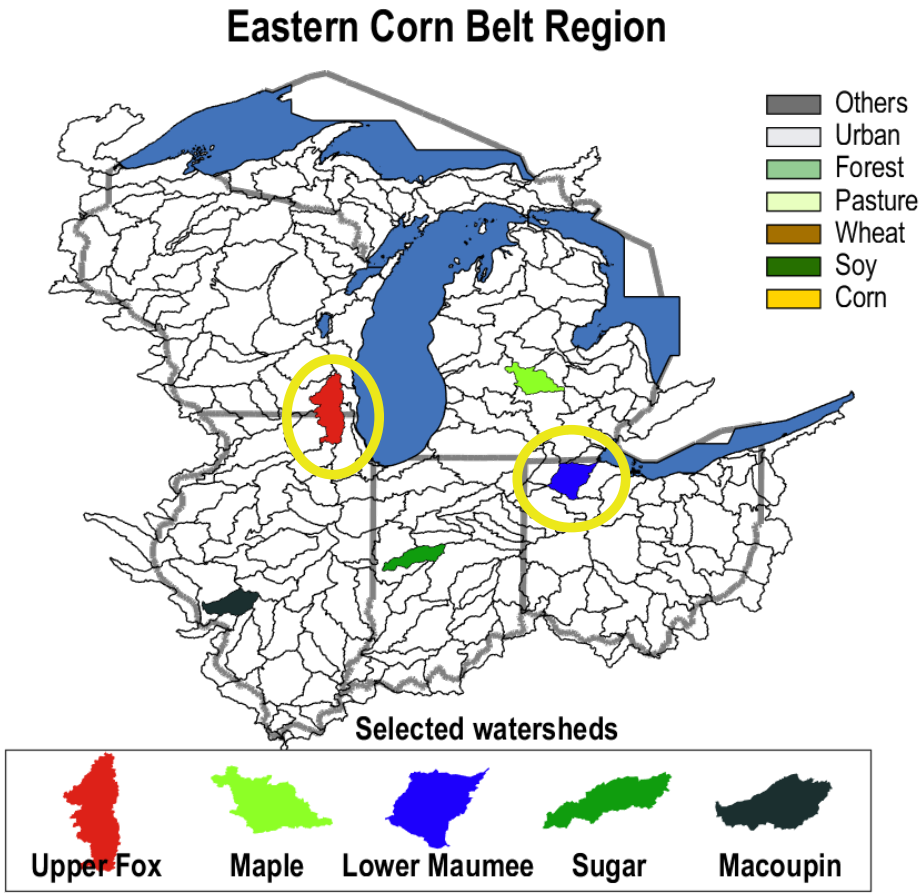
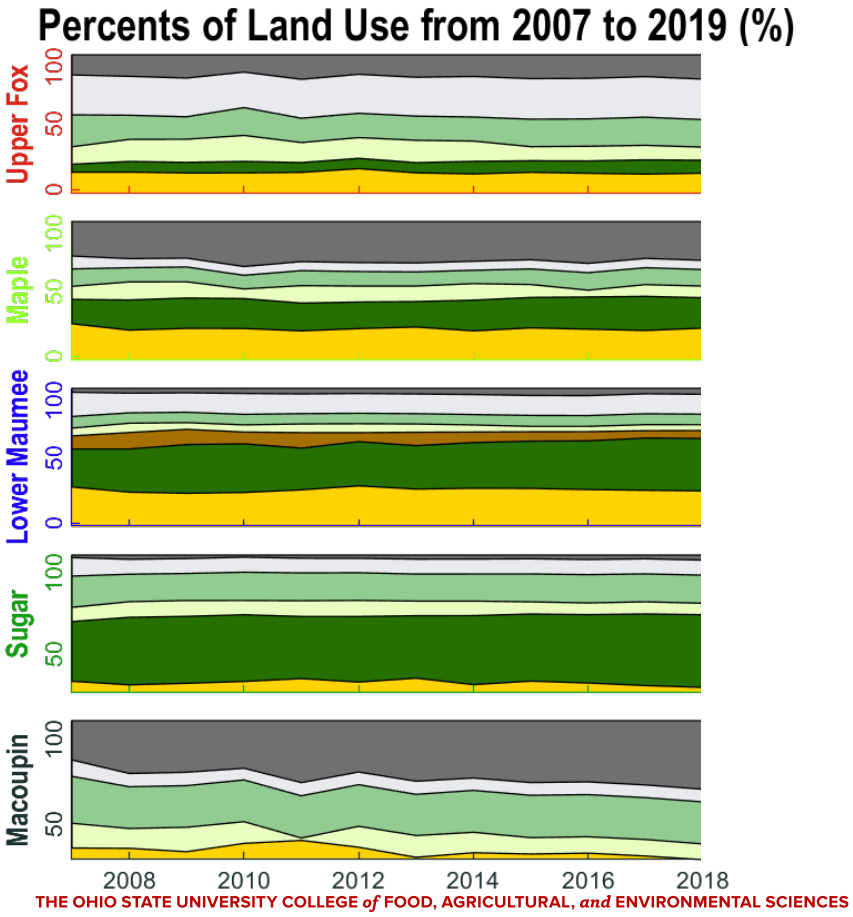
Study region: Eastern Corn Belt region and land use in selected watersheds





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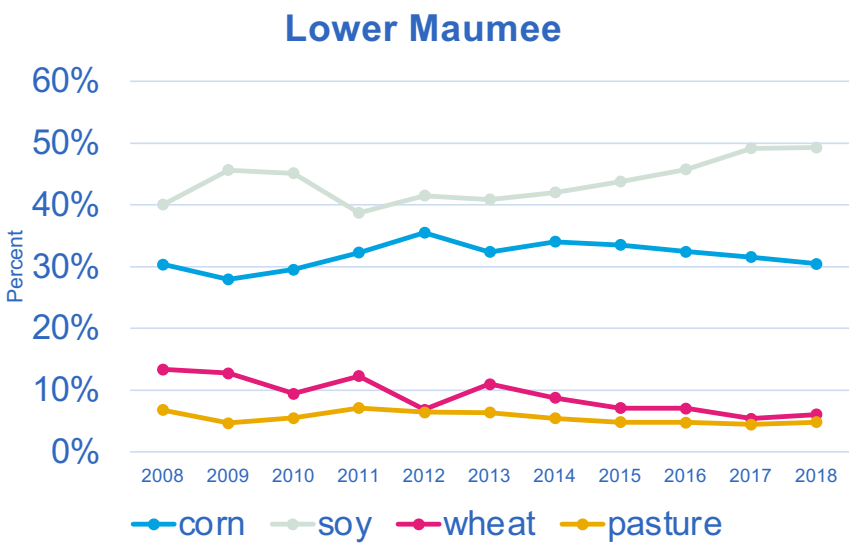
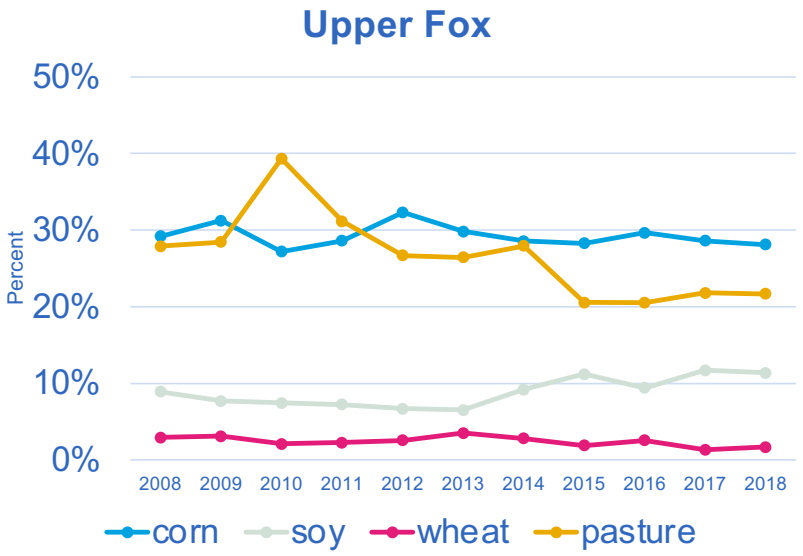
Agricultural Land Use (percent of total land area)





Source: USDA Cropland Data Layer (CDL)
https://www.nass.usda.gov/Research_and_Science/Cropland/Release/

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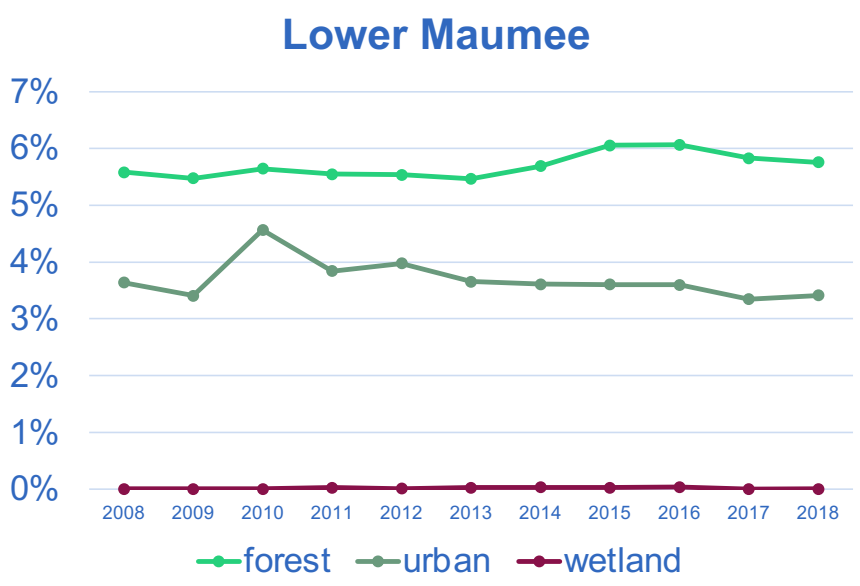
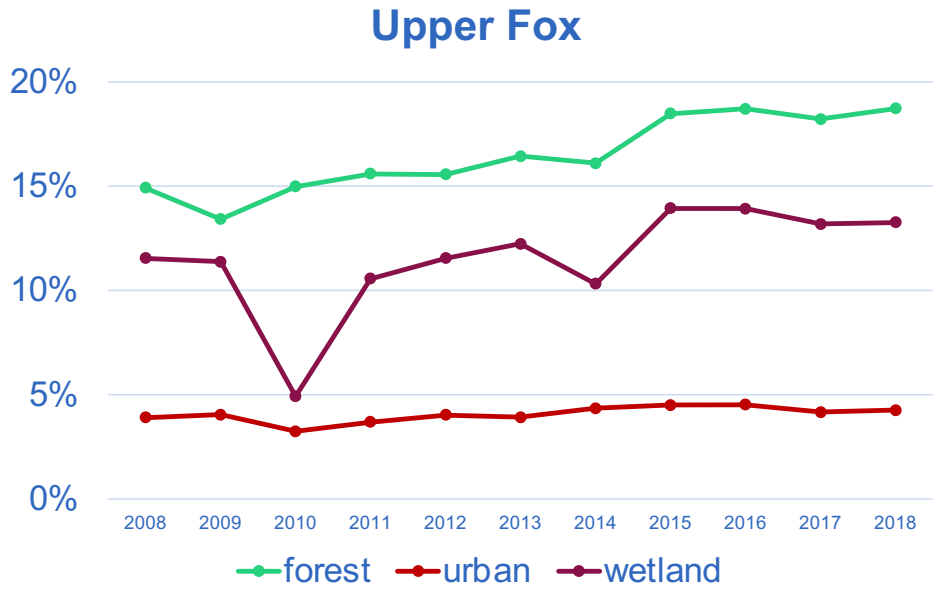
Non-agricultural Land Use (percent of total land area)





Source: USDA Cropland Data Layer (CDL)
https://www.nass.usda.gov/Research_and_Science/Cropland/Release/

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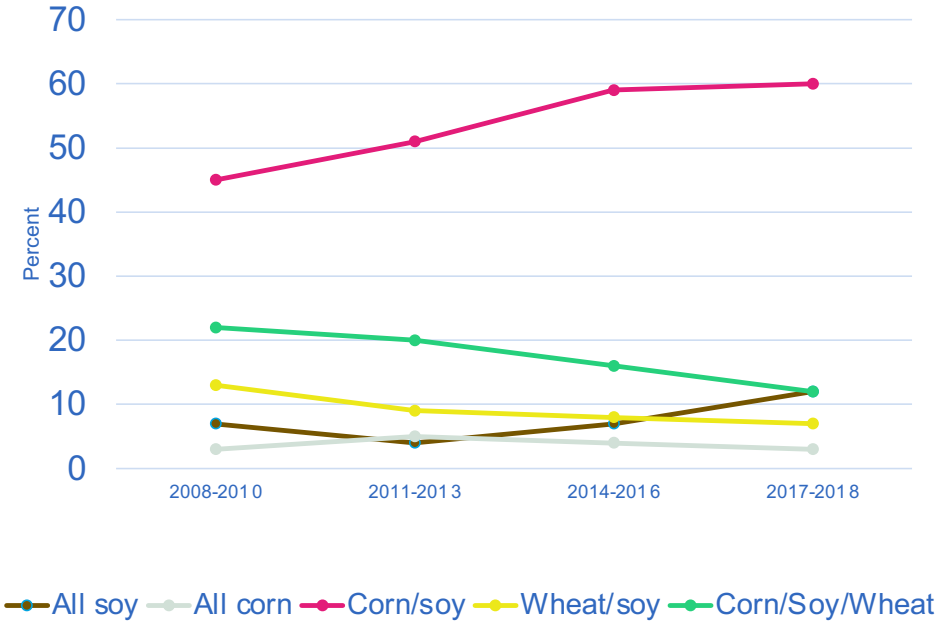
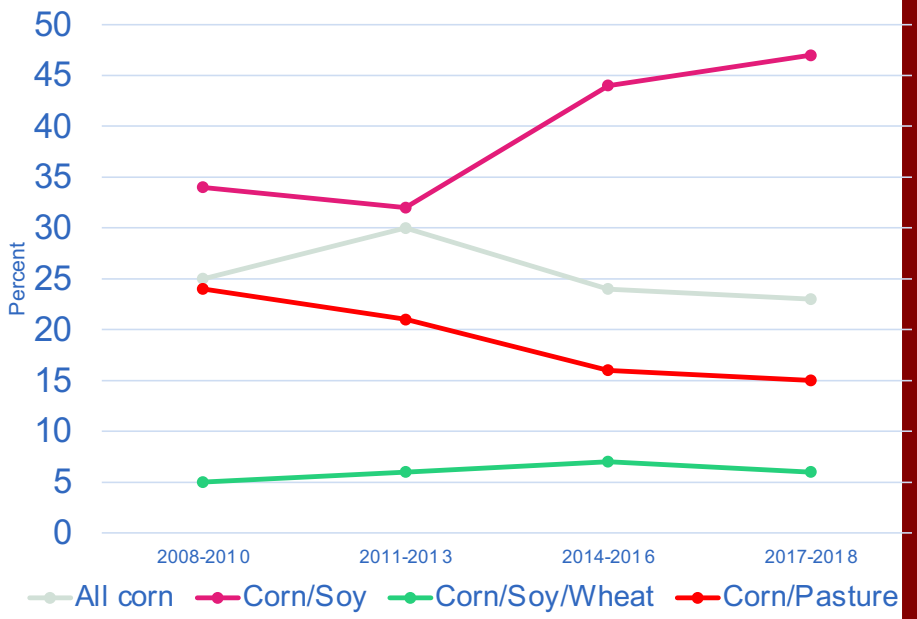
Crop Rotations (percent of total cropland)

- Lower Maumee



- Upper Fox



Source: USDA Cropland Data Layer (CDL) https://www.nass.usda.gov/Research_and_Science/Cropland/Release/ overlaid with historical field boundaries approximations

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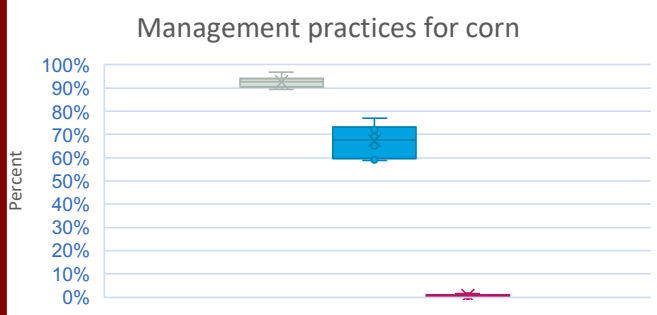
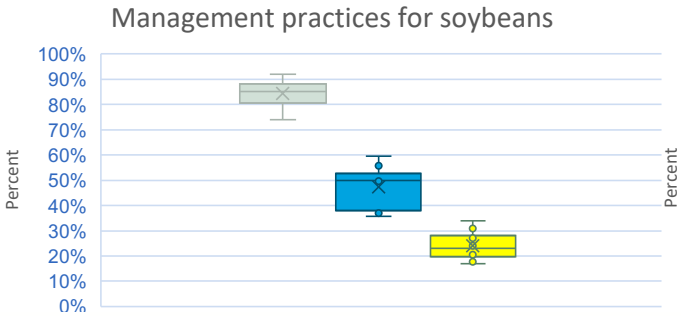
No or reduced till | High or moderate residue | Cover crops

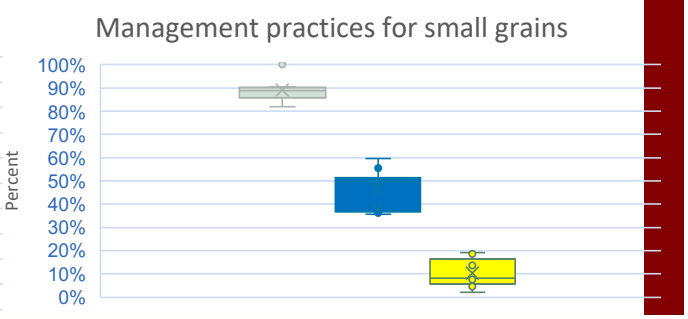
Lower Maumee



Average %land area: 32%

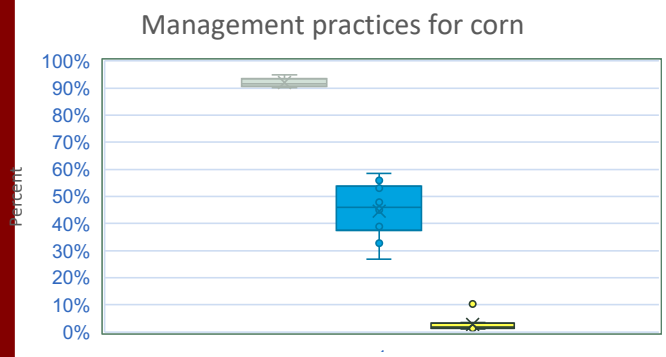


44%

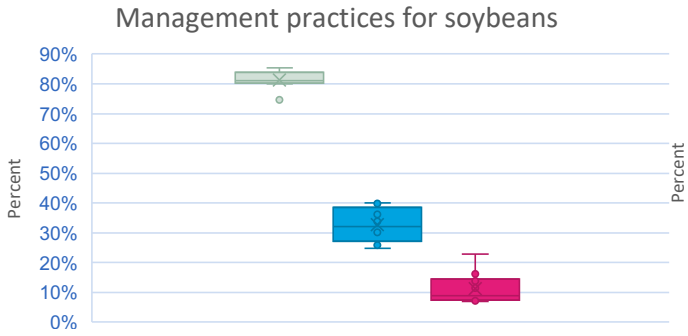


1%

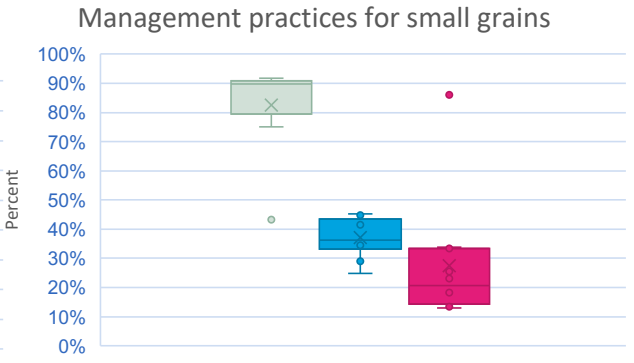
Upper Fox



Average %land area: 29%



9%



2%

Source: Conservation Technology Information Center: https://www.ctic.org/OpTIS_tabular_query (combined OpTIS categories)

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Average tillage by crop (2008-2018)

	No-Till	Reduced Tillage	Conventional Tillage
Corn	21%	71%	7%
Soybeans	46%	38%	16%
Small Grains	36%	59%	12%
Other	65%	22%	13%

Upper Fox

	No-Till	Reduced Tillage	Conventional Tillage
Corn	11%	81%	8%
Soybeans	33%	49%	19%
Small Grains	37%	50%	13%
Other	50%	34%	17%

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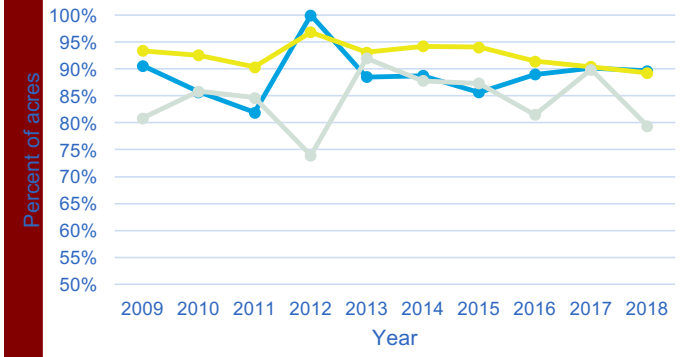
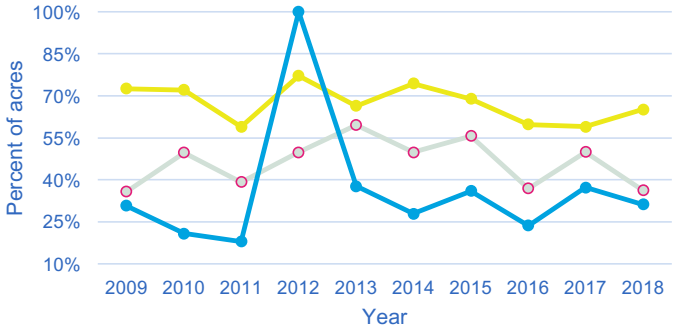
Soybeans Corn Small Grains

Lower Maumee

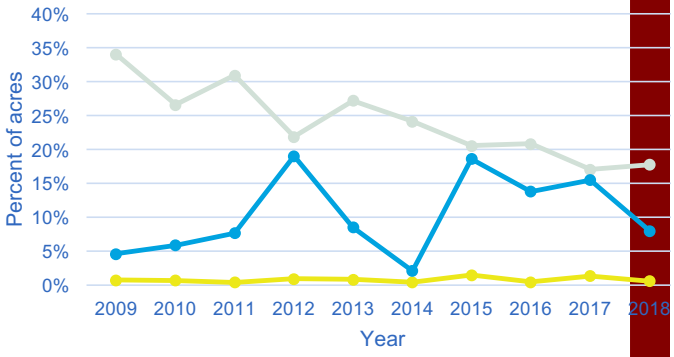
Use of no & reducted till over time



Use of high & moderate residue over time

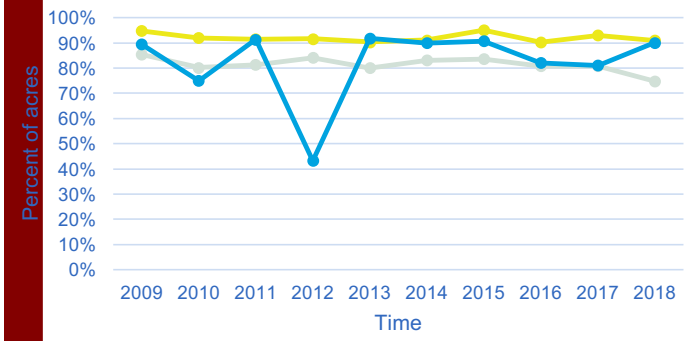


Use of cover crops over time

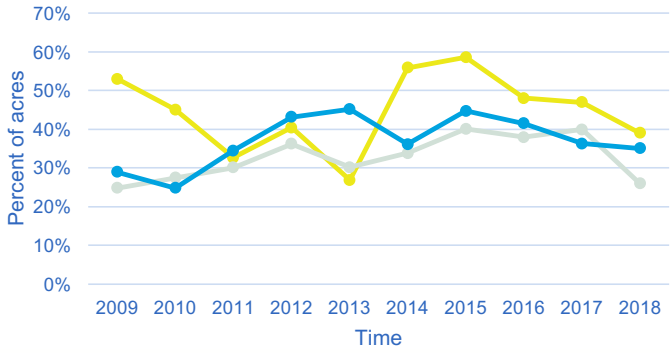


Upper Fox

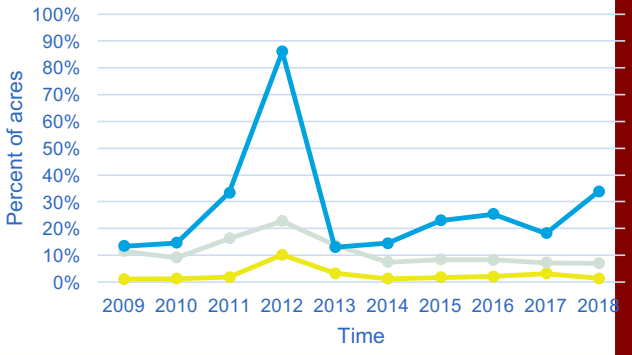
Use of no & reduced till over time



Use of high & moderate residue over time



Use of cover crops over time



 Source: Conservation Technology Information Center: https://www.ctic.org/OpTIS_tabular_query (combined OpTIS categories)

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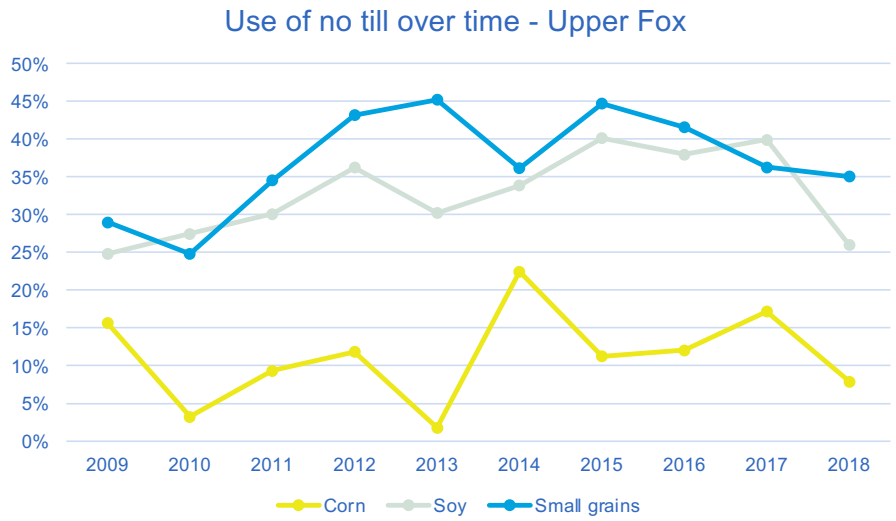
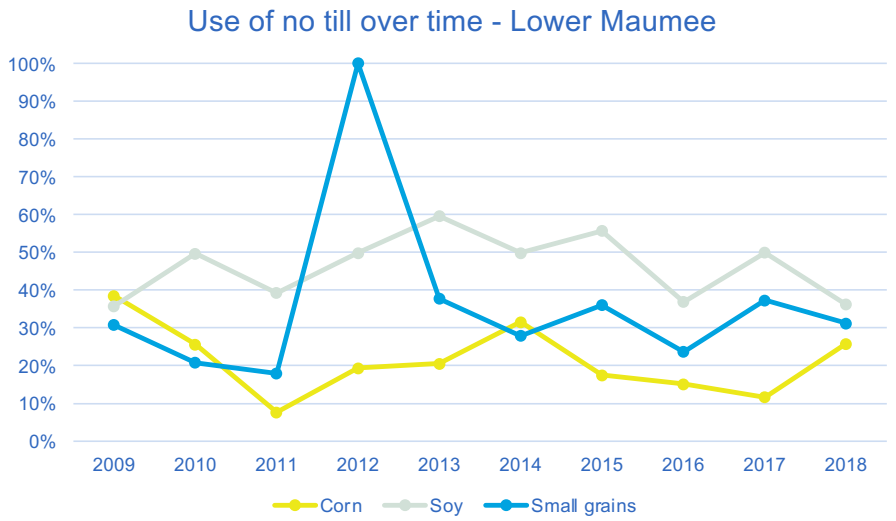

Use of no till over time - Upper Fox
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Corn
Soy
Small grains


Use of no till over time - Lower Maumee
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Corn
Soy
Small grains

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Trends

- Similar adoption rates of each management across crops and watersheds
  - Higher adoption of no till & reduced till
  - Moderate adoption of high & medium residue
  - Low adoption of cover crops
- Dominant rotation is corn/soy
  - increasing corn/soy over time with other rotations decreasing or constant
  - declining cover crops with soy over time in Lower Maumee

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Questions

- What are agricultural land use and crop rotation trends in our study region?
- How much do they vary over space and over time?
- How are they correlated with observable land management practices (based on remotely sensed data)
- **What's reasonable for us to assume in our model scenarios in terms of crop-land management correlations?**
- **How might these correlations change over time?**

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What about other management practices? How might these be correlated with crop type and/or rotation, and change over time?

- Subsurface placement
- Other filtering methods (e.g., filter strips)
- Double cropping
- Added tile drainage or other irrigation management
- Land conservation
- Increased fertilizer or pesticides

Wrap-up

Final questions or thoughts?

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