Farmer BMP Adoption: Possible Futures and the Efficacy Gap

Robyn S. Wilson, Ph.D.

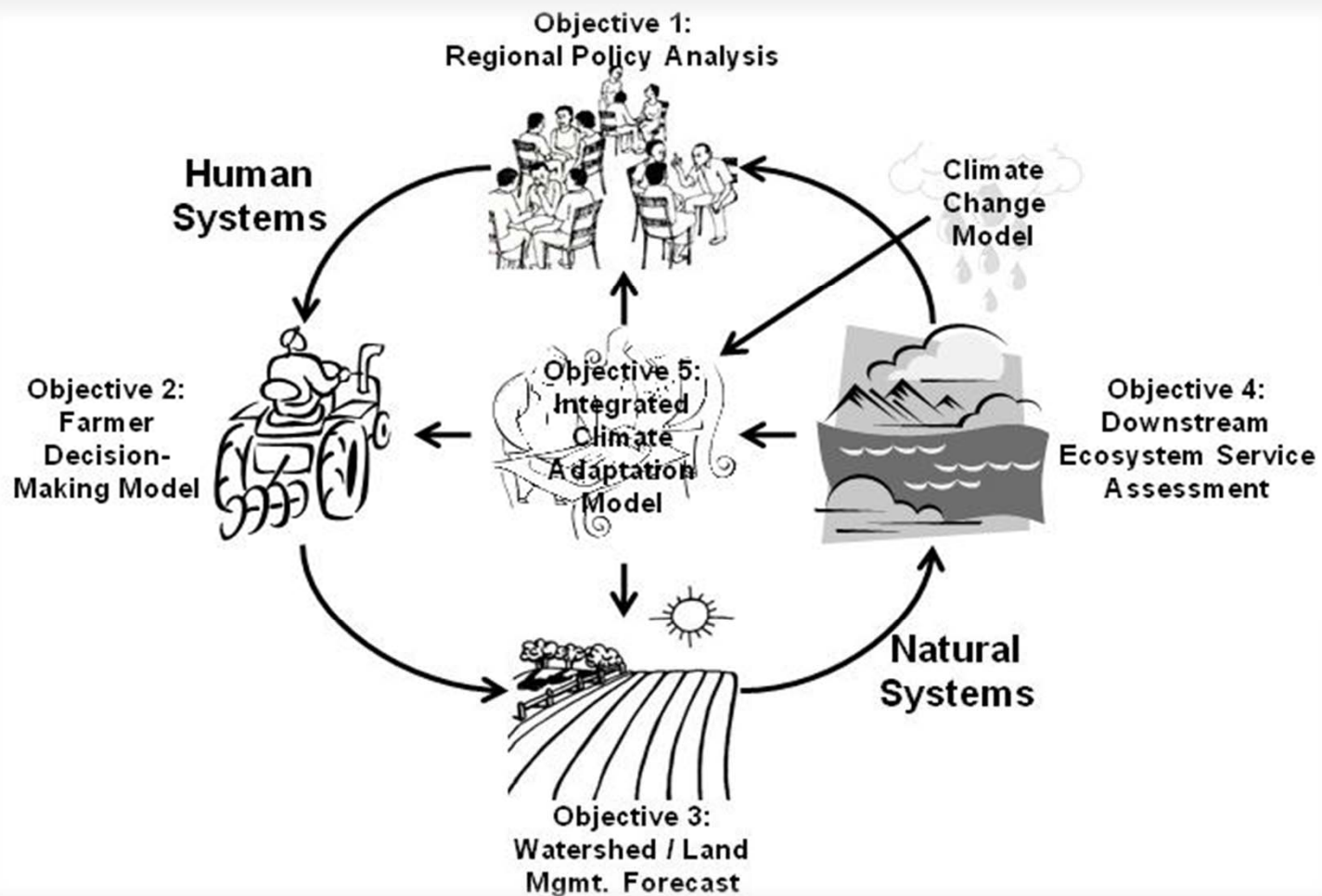The Environmental and Social Sustainability Lab

Understanding HABs: State of Science Conference ~ Toledo, OH ~ September 15, 2016

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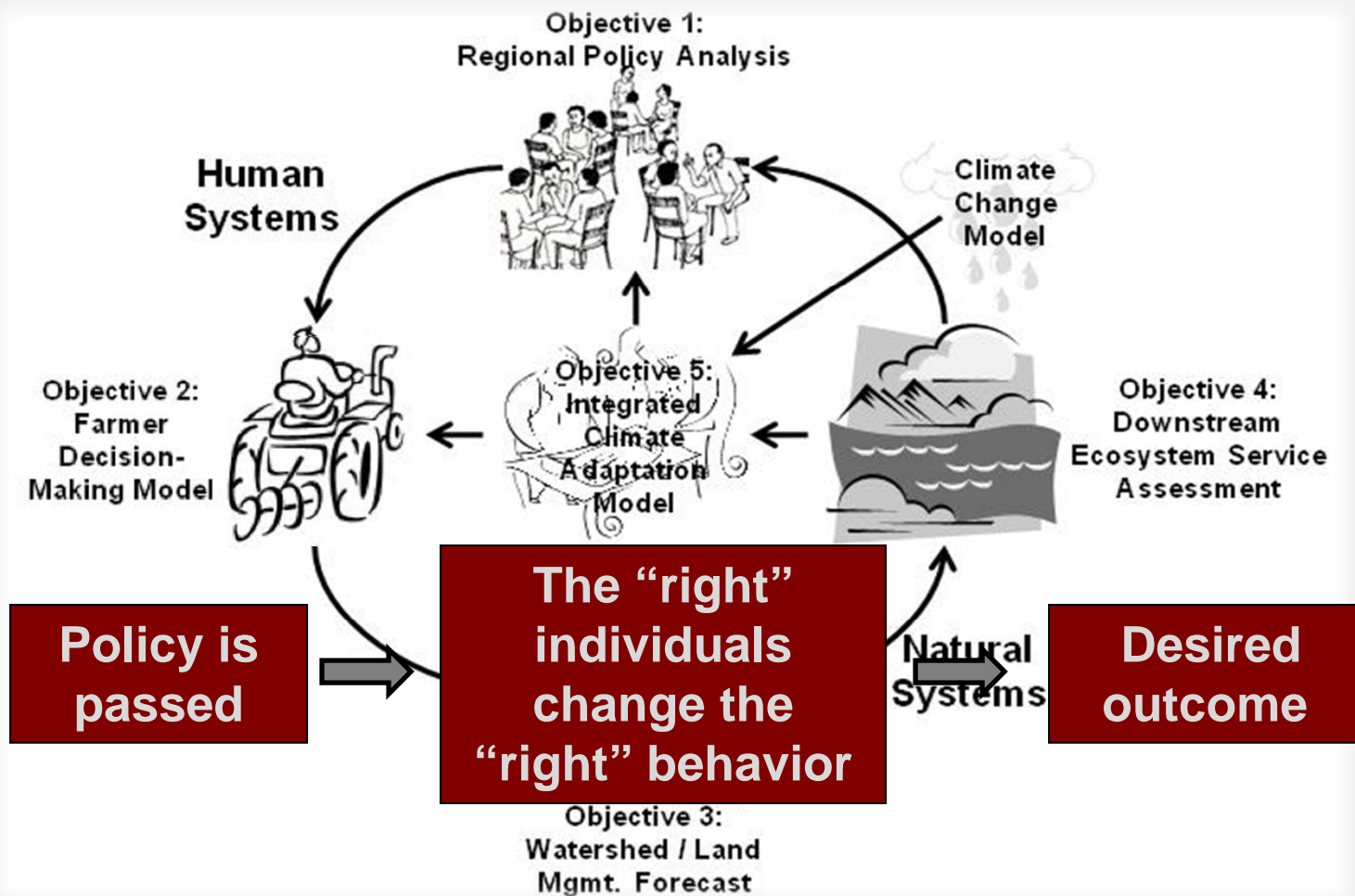
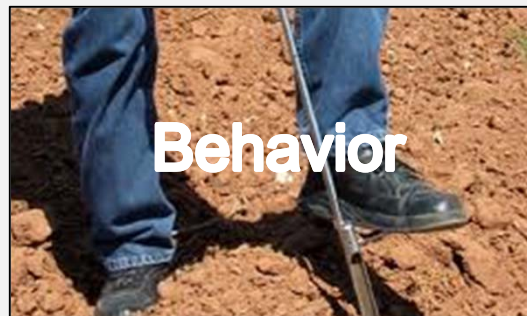THE OHIO STATE UNIVERSITY

Project Overview

Objective 1:
Regional Policy Analysis

Human Systems

Climate Change Model

Objective 2:
Farmer Decision-Making Model

Objective 5:
Integrated Climate Adaptation Model

Objective 4:
Downstream Ecosystem Service Assessment

Natural Systems

Objective 3:
Watershed / Land Mgmt. Forecast

Project website: http://ohioseagrant.osu.edu/maumeebay/

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Case study: Overview

Objective 1:
Regional Policy Analysis

Human Systems

Climate Change Model

Objective 2:
Farmer Decision-Making Model

Objective 5:
Integrated Climate Adaptation Model

Objective 4:
Downstream Ecosystem Service Assessment

Policy is passed

The "right" individuals change the "right" behavior

Natural Systems

Desired outcome

Objective 3:
Watershed / Land Mgmt. Forecast

Project website: http://ohioseagrant.osu.edu/maumeebay/

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Spurring behavior change

Beliefs

Attitudes

Norms

Values

Knowledge

Behavior

- Outcomes

Image: 2009 bloom on Catawba Island, Ohio/NOAA

+ Outcomes

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Achieving desired outcomes

- Technological fix
  - Bypasses the cause (human behavior) of many issues
  - e.g., Improving water treatment facilities

- Structural fix
  - Targets human behavior through changes in the physical, social or political environment
  - e.g., Banning nutrient application on frozen grounds

- Cognitive fix
  - Targets human behavior through information and attitude change
  - E.g., Designing outreach to promote the benefits of a practice

Heberlein, TA. 2012. Navigating Environmental Attitudes

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What did we do?

- Conducted three mail surveys of corn and soybean farmers living in the WLEB
  - 2011 – Maumee (OH counties)
  - 2014 – Maumee (IN, MI, OH counties)
  - 2016 – Maumee and Sandusky (entire WLEB)
- Response rate: ~35-43%
- Goals
  - Identify baseline adoption of recommended practices
  - Model likely future adoption to inform policy and outreach

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What do farmers think?*

- 77% think they have a good understanding of the 4Rs of nutrient stewardship

- 82% agree that they think about nutrient stewardship as it relates to water quality and profitability

- 56% have changed 4R related practices on their farm in the past three years

- 54% are concerned about their farms contributing to HABs in Lake Erie
    - 77% are concerned about the negative impact of nutrient loss to their farm's profitability

*Based on the valid percentage, or those that responded to the question, 2016 survey

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What are farmers doing?*

	2011	2014	2017	Potential Future*	The Need**
Cover crops	8%	17%	22%	60%	58%
Avoiding winter application	25%	49%	56%	85%	--
Delaying broadcasting	--	36%	39%	86%	--
Subsurface placement	--	33%	39%	68%	50%
Rates based on testing	46%	52%	63%	92%	--

*2017 self-reported behavior + those reporting likely adoption
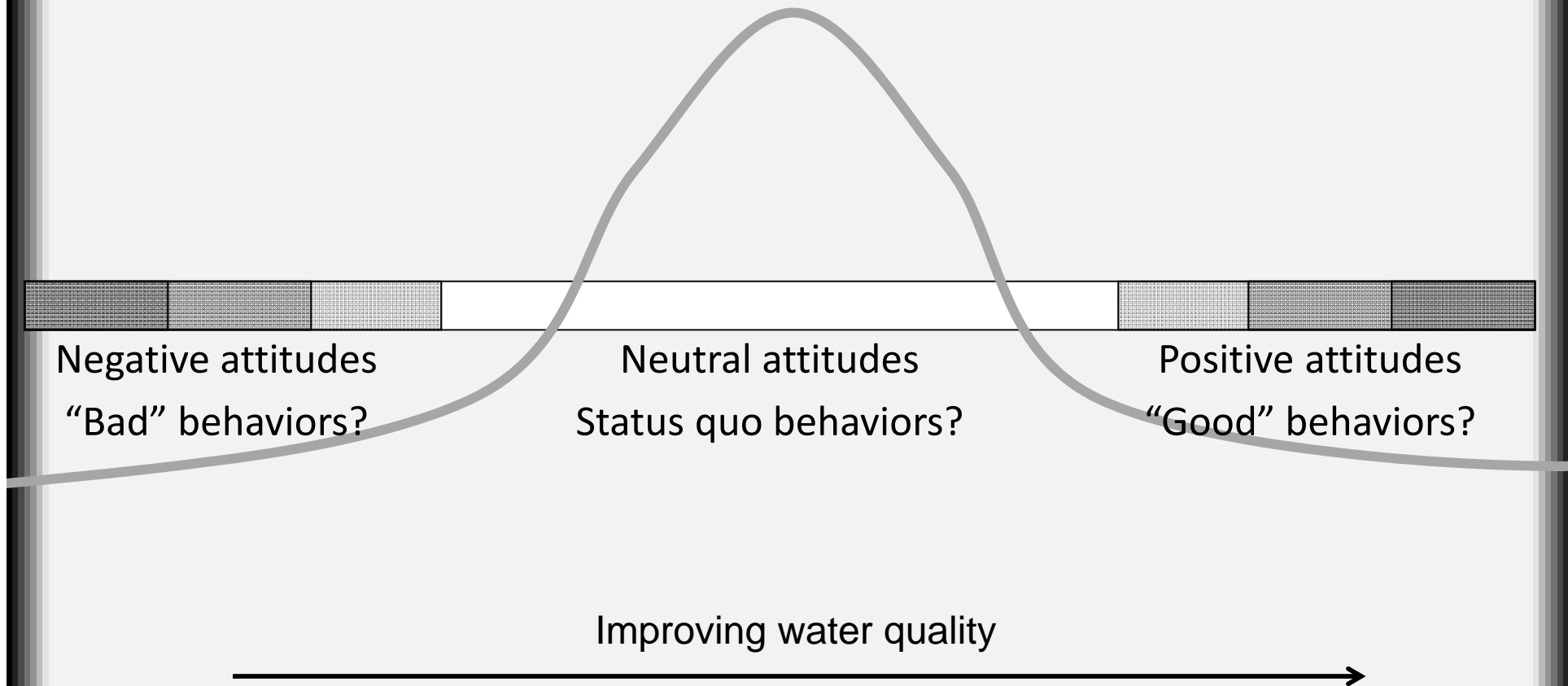**Based on multi-modeling scenarios to achieve a 40% reduction in total P, assuming 78% adoption of filter strips

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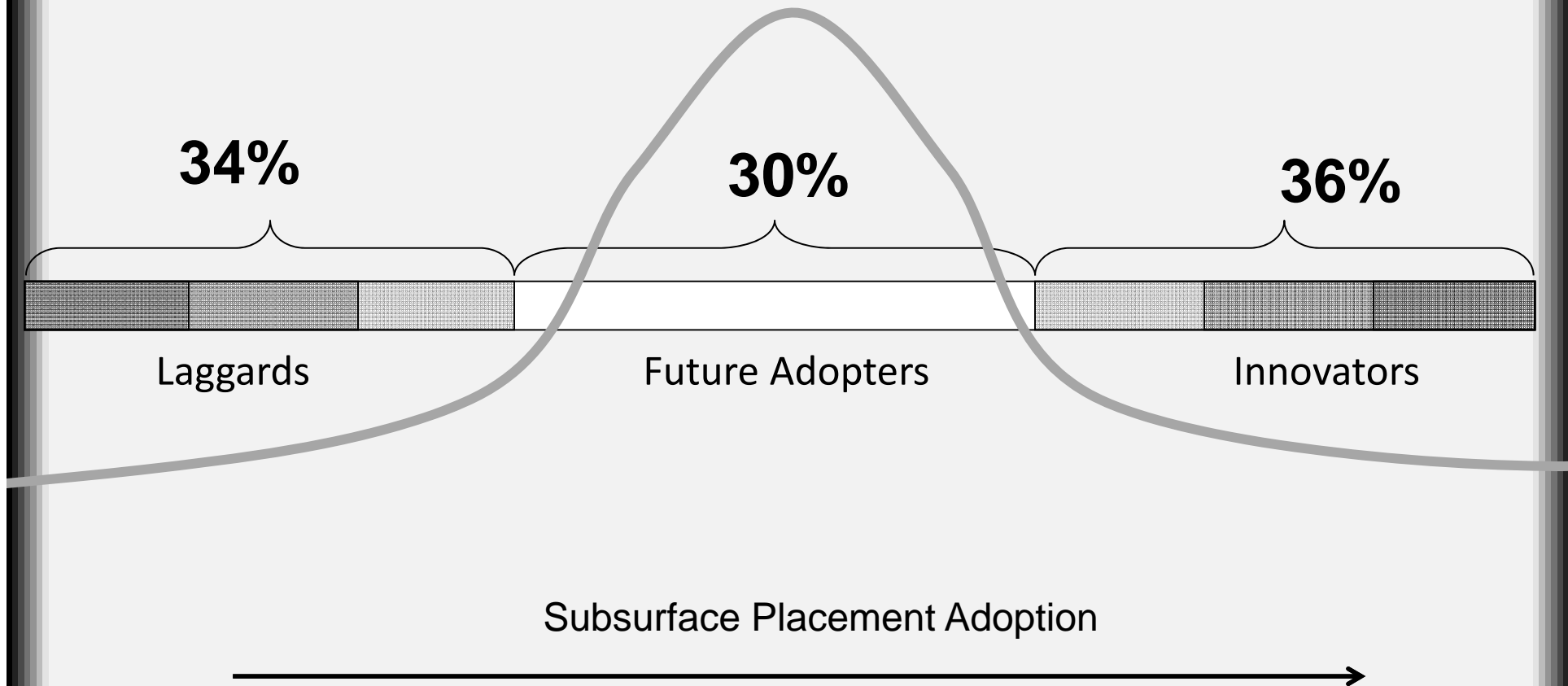
Predictors of BMP Adoption

	Planting Cover Crops		Subsurface Placement	
	Innovators	*Future Adopters*	*Innovators*	*Future Adopters*
Age				
Farm Income				
Education	+		+	
Farming Experience				
Total Owned Acres				
Total Rented Acres	-			
4R Awareness			+	
Nutrient Loss Concern		+		
Perceived Efficacy	+	+	+	+
Perceived Barriers	-	-		

Based on 2016 data, multinomial logistic regression, comparison group: laggards

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Spurring Behavior Change?

Negative attitudes	Neutral attitudes	Positive attitudes
"Bad" behaviors?	Status quo behaviors?	"Good" behaviors?

Improving water quality →

Spurring Behavior Change?

34%　　　　　**30%**　　　　　**36%**

Laggards　　　　　Future Adopters　　　　　Innovators

Subsurface Placement Adoption

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Spurring Behavior Change?

34%	30%	36%
Laggards	Future Adopters	Innovators

The "laggards" have less owned and more rental acreage

- "Structural" solutions for the minority (~34%)
  - e.g. remove barriers (e.g., rental agreements)
- "Cognitive" solutions for the majority (~66%)
  - e.g., promote benefits (e.g., efficacy of the practice)

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Summary & Conclusions

- Farmers in the WLEB are engaged and largely willing to take on additional practices

- There is potential to reach the 40% reduction in total P through changes in farmer behavior
  - 30 to 40% of the population is considering a change
  - The motivations and constraints may vary

- Target outreach and education toward implementing practices effectively and promoting the benefits

Questions?? Wilson.1376@osu.edu

- Website:
  - http://ohioseagrant.osu.edu/maumeebay
- Thanks to WLEB Farmers!!!!
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  - International Plant Nutrition Institute
- Collaborators:
  - Jay Martin, Erik Nisbet, Eric Toman, Elena Irwin, Brian Roe, Stu Ludsin, Seyoum Gebremariam, Noel Aloysius, Greg LaBarge, Kevin King
  - Tara Ritter, Lizzie Burnett, Ajay Singh, Greg Howard, Avishek Konar, Alex Heeren, Wendong Zhang

FARMERS, PHOSPHORUS AND WATER QUALITY: PART II

A DESCRIPTIVE REPORT OF BELIEFS, ATTITUDES AND BEST MANAGEMENT PRACTICES IN THE MAUMEE WATERSHED OF THE WESTERN LAKE ERIE BASIN

Elizabeth A. Burnett, Robyn S. Wilson, Brian Roe, Greg Howard, Elena Irwin, Wendong Zhang, and Jay Martin.

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