

# Applying Behavioral and Experimental Economics to U.S. Agri-Environmental Programs: Benefits, Challenges, and Lessons Learned

Kent D. Messer

*University of Delaware, Co-Director of CBEAR*



REECAP Workshop - Vienna, Austria

26 September, 2018

# Thank you and Outline of Talk

Thank you

- Sophie Thoyer
- Raphael Preget
- Ulrich Morawetz

1. History of CBEAR and applying behavioral and experimental economics to agri-environmental programs in the US
2. Successes
3. Challenges
4. Lessons Learned

# History of CBEAR

and

Applying behavioral and experimental  
economics to agri-environmental  
programs in the US



# Importance of Behavioral Science



In 2014, the White House launched the Social and Behavioral Sciences Team (nudge squad).

In 2014, CBEAR established through a national competition by the USDA Economic Research Service.

In September 2015, President Obama issued the Executive Order entitled “*Using Behavioral Science Insights to Better Serve the American People*”

- “To more fully **realize the benefits of behavioral insights** and **deliver better results at a lower cost** for the American people, the Federal Government should design its policies and programs to reflect our best understanding of how people engage with, participate in, use, and respond to those policies and programs.”

# Motivation of Applying Behavioral Insights

- **Non-political.** Goal is helping programs work better, better serve their customers, and being cost-effective with taxpayer money.
- **Nudges work.** Many of the things related to behavioral science are relatively small adjustments and are within the control of a program administrator.
  - Do not require additional funds or new legislation to be passed.
  - Works well with **voluntary programs**.
- **Testing is embedded** within the programs and market settings.
  - **Strong external validity.**
  - Research permit the telling of simple stories to external audiences.

# White House's Evidence and Innovation Agenda

 EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF MANAGEMENT AND BUDGET  
WASHINGTON, D. C. 20503

THE DIRECTOR July 26, 2013

M-13-17

MEMORANDUM TO THE HEADS OF DEPARTMENTS AND AGENCIES

FROM: Sylvia M. Burwell *SMB*  
Director, Office of Management and Budget

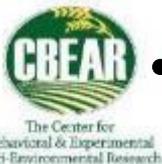
Cecilia Muñoz *C. Muñoz*  
Director, Domestic Policy Council

John Holdren *JH*  
Director, Office of Science and Technology Policy

Alan Krueger *Alan Krueger*  
Chairman, Council of Economic Advisers

SUBJECT: Next Steps in the Evidence and Innovation Agenda

- “... strengthening agencies’ abilities to continually improve program performance by applying existing evidence about what works, generating new knowledge, and using experimentation and innovation to test new approaches to program delivery. ... This is especially important given current fiscal challenges, as our nation recovers from a deep recession and agencies face tough choices about how to meet **increased demand for services in a constrained resource environment.**” (Memorandum to the head of departments and agencies, 2013)



- Similar directives have been released by the Trump administration in 2017 also calling for evidence-based policy.

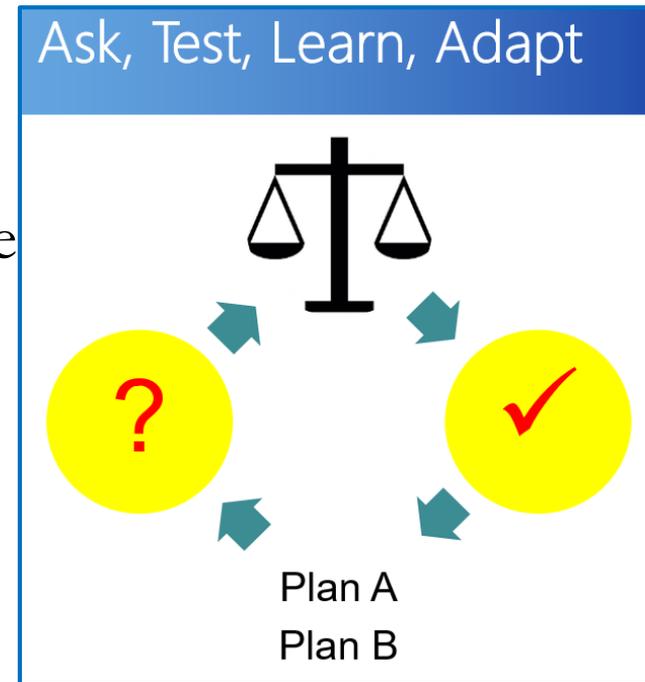
# Bipartisan Support

## **Evidence-Based Policymaking Commission Act**

- Sponsored by Speaker Paul Ryan (R-WI) and Senator Patty Murray (D-WA)
- Signed into law by President Obama on March 30, 2016
- Final Report released on September 6, 2017.

# Why Experiments?

- Agri-environmental problems are primarily behavior problems. Thus changing agri-environmental conditions is fundamentally about changing human behavior.
- Experiments enable us to carefully measure changes in behavior and ultimately in agricultural and environmental conditions.
- Well designed field experiments provide compelling evidence that is attractive to academic journals.
  - Randomized controlled trials (RCTs) often are referred to as the “gold standard” and the cornerstone of evidence-based policy



# CBEAR Goals

Bring insights from the behavioral sciences to agri-environmental programs



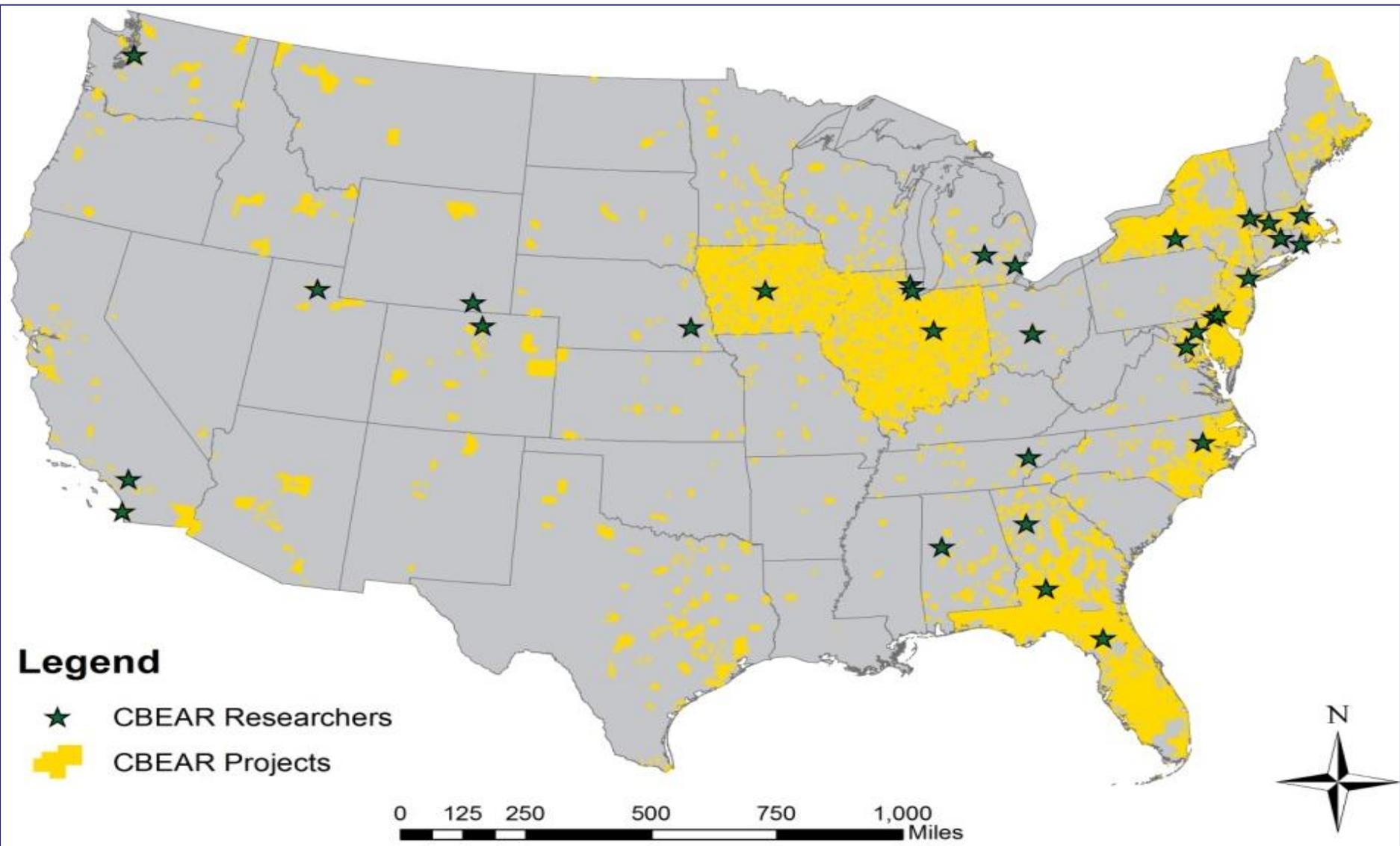
Foster a culture of experimentation & evidence in agri-environmental programs



CBEAR a USDA Center of Excellence in 2016.



# Location of CBEAR projects by county



# Recipients - CBEAR Grant Program

- Risk and ambiguity
- Adaptation to climate change
- Assurance contracts and ecosystem services
- Conservation and agglomeration bonus
- Groundwater management
- Conservation exchanges
- Compliance with agri-environmental regulation
- Groundwater extraction and electricity subsidies
- Red wolf habitat fragmentation
- Reverse auctions and screening for grassland bird conservation
- Nudging empathy in the Conservation Stewardship Program
- Habitat conservation for imperiled species

											
Simanti Banerjee University of Nebraska – Lincoln	Christopher Bastian University of Wyoming	Mark Burbach University of Nebraska – Lincoln	Anwesha Chakrabarti University of Connecticut	Kristiana Hansen University of Wyoming	Jacob Hochard East Carolina University	Aaron Hrozencik Colorado State University	Chian Jones-Ritten University of Wyoming	Leah Palm Forster* University of Delaware	Gregory Parkhurst Weber State University	Aminon Rapoport University of California Riverside	Carson Reeling Western Michigan University
											
Paul Christian Cornell University	Hans Czap University of Michigan – Dearborn	Natalia Czap University of Michigan – Dearborn	Angela de Oliveira University of Massachusetts Amherst	Abdul Kidwai University of Massachusetts Amherst	Yuanhao Li Norwegian School of Economics	Pengfei Liu University of Connecticut	Dale Manning Colorado State University	Cristian Rojas University of Wyoming	Jason Shogren University of Wyoming	Jordan Suter* Colorado State University	Stephen Swallow University of Connecticut
											
Ariel Dinar University of California Riverside	Yasha Felerholtz University of Wyoming	Teevrat Gaig University of California San Diego	Chris Goemans Colorado State University	Nicole Mason Michigan State University	Richard Melstrom Oklahoma State University	Stephen Morgan Michigan State University	Amy Nagler University of Wyoming	Edgar Tellez-Foster University of California Riverside			

# Successes



# Accomplishments (since 2014)



- Engaged in more than 25 research projects that involve adult participants in nearly every state in the country;
- Leveraged ERS's initial investment of \$750,000 into additional grants that contributed more than \$6 million of additional research funds;
- Hosted events such as including workshops, conferences, and lunch-and-learns, to connect academic researchers and program managers;
- Developed the *CBEAR Behavioral Insights Brief* to explain topics and tools in behavioral sciences that can be applied to agri-environmental issues;
- Contracted by USDA Natural Resources Conservation Service's (NRCS) to develop and deliver staff training modules that provide information about useful insights from behavioral economics and how to use experiments to generate evidence to increase the effectiveness of NRCS programs and efforts.



# Success Stories: Process Labeling of Food

- 2015 CAST Paper Issue paper on Process Labeling of Food.
- Understanding consumer behavior and labels.
- Impacted the federal legislation on labeling of GMO-foods.

### Process Labeling of Food: Consumer Behavior, the Agricultural Sector, and Policy Recommendations



Process labels can effectively bridge the informational gap between producers and consumers, but such labeling often has serious unintentional consequences. (Background image from Joshua Rainey Photography/Shutterstock; Foreground image from Matthew Cole/Shutterstock [adapted].)

#### ABSTRACT

The simple phrase “You are what you eat” is commonly taught to children and then repeated throughout one’s life. This phrase speaks to the intimate connection between individuals’ food choices and their health—and even their personal identity. Yet most modern consumers rarely grow their own food, which means that what people “are” is a bit out of their control. Given today’s predominantly global food supply chain, consumers have little ability to observe directly

the production process that created the food they eat.

Consumers are frequently exposed to labels communicating specific processing aspects of food production, such as Certified Organic, Rainforest Alliance Certified, rbST free, Fair Trade, and Free of Genetically Modified Organisms. At the root of this phenomenon are the desires for individual control and a diffuse distrust in the safety and health of the food produced by modern agriculture. These desires are paired with concerns about

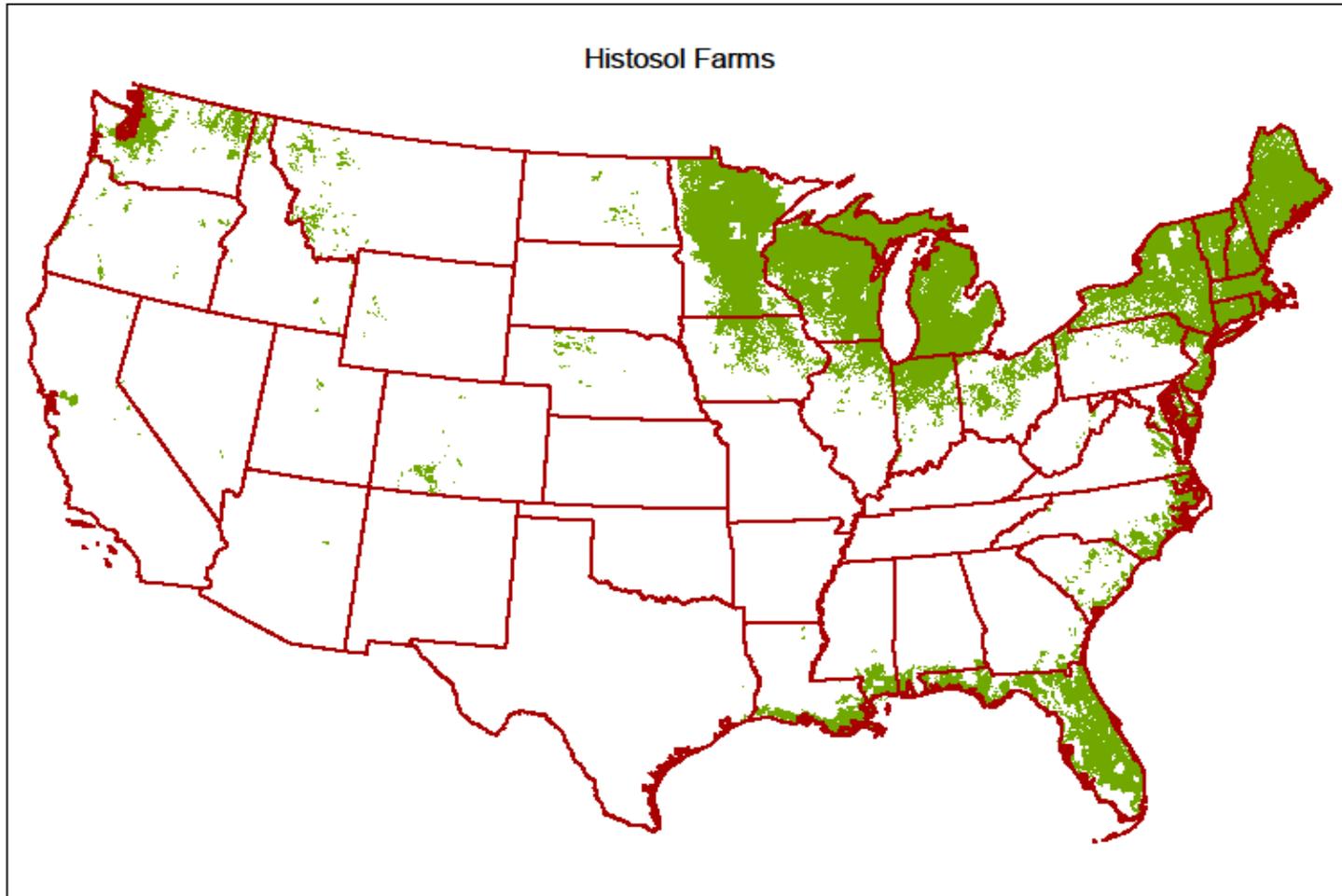
the ethical, social, and environmental consequences of food production. Under appropriate third-party or governmental oversight, these “process labels” can effectively bridge the informational gap between producers and consumers, satisfy consumer demand for broader and more stringent quality assurance criteria, and ultimately create value for both consumers and producers. Despite these potential benefits, process labeling often has serious unintentional consequences. For instance, labeling the benefits of a process for a

# Farmers

(RCT with Administrative Data)



# Histosol Outreach Project



Partnership of CBEAR USDA ERS, FSA, NRCS, and OCE  
P. Ferraro, J. Fooks, N. Higgins, R. Iovanna, M. Kecinski, D.  
Lamm, J. Larson, K. Messer, B. Thomas, and M. Wilson

# USDA wants to persuade farmers to mitigate climate change

Farm Press Staff | Southeast Farm Press

May 12, 2016

EMAIL

SHARE

COMMENTS 0

- Agriculture Secretary Tom Vilsack shared May 12 the first results of USDA's Building Blocks for Climate Smart Agriculture and Forestry, one year after the plan was unveiled at Michigan State University.



Click on a case study to learn more

USDA Building Blocks for Climate Smart Agriculture and Forestry

iowa  
farm and  
rural life  
poll



SUBSCRIBE

SCIENTIFIC  
AMERICAN™

English • Cart • Sign In | Register

THE SCIENCES MIND HEALTH TECH SUSTAINABILITY EDUCATION VIDEO PODCASTS BLOGS STORE Q

ClimateWire

SUSTAINABILITY

## What Do Farmers Think about Climate Change?

Most farmers believe climate change is occurring but do not trust those who clamor for  
action

By Nina Holkinen, ClimateWire on January 28, 2015 13

### **To engage a farmer: Don't mention 'climate change'**

In order to get farmers to use adaptive farming practices like low tillage or crop rotations, Arbuckle recommended that extension workers avoid talking specifically about greenhouse gas mitigation or even use the phrase "climate change" at all.



The Center for  
Behavioral & Experimental  
Agri-Environmental Research

# Histosol Outreach Experiment

- Early internal discussion immediately bogged down:
  - Do not use “G” or “C” words
  - Invite everyone to webinar
  - Mail only vs “personal contact”
- Simple (“light touch”) outreach intervention
  - Mail contact (10,000 landowners)
  - Information: website and webinar
  - Outcomes: website hits and links, webinar attendance, Receipt of Service, NPAD



# Outreach Letters

{Customer Name}  
{Address}  
{City} {State} {Zip}

4 March 2016



*Farming on Organic Soils:  
Best practices to maintain  
soil health and productivity*

Dear {Customer Name}:

## Why am I getting this letter?

**Organic (“muck”) soils** are some of the most productive soils in the world. They have high nutrient content and water holding capacity. But they are **extremely fragile**. As a producer who may have significant organic soil acreage on your farm, you likely are aware of the soil “**subsiding**” after years of cropping. This subsidence indicates that organic matter is being lost, with a resulting **decrease in productivity**.

This occurs because **organic matter in these soils rapidly breaks down** when exposed to air. These soils are also susceptible to wind erosion and compaction. The loss of organic matter makes farming these soils more difficult and expensive.

This soil breakdown also has **negative environmental impacts, like affecting water quality in your county**.

**We encourage you to take action** to learn more about what you can do. The USDA administers a range of **programs that can help you maintain or even enhance your long-term productivity**, while promoting soil health and improving water quality.

For example, the Environmental Quality Incentive Program covers much of the cost of adopting conservation practices like no-till, cover crops, pasture conversion, or installation of wind breaks. Converting to managed or permanently flooded wetlands can stop and possibly reverse subsidence. If you have lands that are unprofitable to cultivate, you can instead **restore their soil functions** using the Conservation Reserve Program or Agricultural Conservation Easement Program, which **compensate you** for forgone agricultural returns, as well as establishment costs.

### Would you like to learn more?

To get more information go to:  
<http://smarter.farm/g>

NRCS and FSA staff at your local service center can also answer your questions. For your local contact, please visit <http://offices.sc.egov.usda.gov/locator/app>

{Customer Name}  
{Address}  
{City} {State} {Zip}

4 March 2016



*Farming on Organic Soils:  
Best practices to maintain  
soil health and productivity*

Dear {Customer Name}:

## Why am I getting this letter?

**Organic (“muck”) soils** are some of the most productive soils in the world. They have high nutrient content and water holding capacity. But they are **extremely fragile**. As a producer who may have significant organic soil acreage on your farm, you likely are aware of the soil “**subsiding**” after years of cropping. This subsidence indicates that organic matter is being lost, with a resulting **decrease in productivity**.

This occurs because **organic matter in these soils rapidly breaks down** when exposed to air. These soils are also susceptible to wind erosion and compaction. The loss of organic matter makes farming these soils more difficult and expensive.

This soil breakdown also has **negative environmental impacts, like releasing greenhouse gases that contribute to climate change**. Compared to other soils in the U.S., **organic soils release the most greenhouse gases per acre** when they are disturbed. Applying lime to reduce their acidity increases their greenhouse gas emissions.

**We encourage you to take action** to learn more about what you can do. The USDA administers a range of **programs that can help you maintain or even enhance your long-term productivity**, while promoting soil health and reducing greenhouse gas emissions.

For example, the Environmental Quality Incentive Program covers much of the cost of adopting practices like no-till, cover crops, pasture conversion, or installation of wind breaks. Converting to managed or permanently flooded wetlands can stop and possibly reverse subsidence. If you have lands that are unprofitable to cultivate, you can instead **restore their soil functions** using the Conservation Reserve Program or Agricultural Conservation Easement Program, which **compensate you** for forgone agricultural returns, as well as establishment costs.

### Would you like to learn more?

To get more information go to:  
<http://smarter.farm/k>

NRCS and FSA staff at your local service center can also answer your questions. For your local contact, please visit <http://offices.sc.egov.usda.gov/locator/app>

# “negative environmental impacts, like releasing greenhouse gases that contribute to climate change... organic soils release the most green gases per acre when disturbed.”

{Customer Name}  
{Address}  
{City} {State} {Zip}

4 March 2016



*Farming on Organic Soils:  
Best practices to maintain  
soil health and productivity*

Dear {Customer Name}:

## Why am I getting this letter?

**Organic (“muck”) soils** are some of the most productive soils in the world. They have high nutrient content and water holding capacity. But they are **extremely fragile**. As a producer who may have significant organic soil acreage on your farm, you likely are aware of the soil “**subsiding**” after years of cropping. This subsidence indicates that organic matter is being lost, with a resulting **decrease in productivity**.

This occurs because **organic matter in these soils rapidly breaks down** when exposed to air. These soils are also susceptible to wind erosion and compaction. The loss of organic matter makes farming these soils more difficult and expensive.

This soil breakdown also has **negative environmental impacts, like affecting water quality in your county.**

**We encourage you to take action** to learn more about what you can do. The USDA administers a range of **programs that can help you maintain or even enhance your long-term productivity**, while promoting soil health and improving water quality.

For example, the Environmental Quality Incentive Program covers much of the cost of adopting conservation practices like no-till, cover crops, pasture conversion, or installation of wind breaks. Converting to managed or permanently flooded wetlands can stop and possibly reverse subsidence. If you have lands that are unprofitable to cultivate, you can instead **restore their soil functions** using the Conservation Reserve Program or Agricultural Conservation Easement Program, which **compensate you** for forgone agricultural returns, as well as establishment costs.

### Would you like to learn more?

To get more information go to:  
<http://smarter.farm/g>

NRCS and FSA staff at your local service center can also answer your questions. For your local contact, please visit <http://offices.sc.egov.usda.gov/locator/app>

{Customer Name}  
{Address}  
{City} {State} {Zip}

4 March 2016



*Farming on Organic Soils:  
Best practices to maintain  
soil health and productivity*

Dear {Customer Name}:

## Why am I getting this letter?

**Organic (“muck”) soils** are some of the most productive soils in the world. They have high nutrient content and water holding capacity. But they are **extremely fragile**. As a producer who may have significant organic soil acreage on your farm, you likely are aware of the soil “**subsiding**” after years of cropping. This subsidence indicates that organic matter is being lost, with a resulting **decrease in productivity**.

This occurs because **organic matter in these soils rapidly breaks down** when exposed to air. These soils are also susceptible to wind erosion and compaction. The loss of organic matter makes farming these soils more difficult and expensive.

This soil breakdown also has **negative environmental impacts, like releasing greenhouse gases that contribute to climate change**. Compared to other soils in the U.S., **organic soils release the most greenhouse gases per acre** when they are disturbed. Applying lime to reduce their acidity increases their greenhouse gas emissions.

**We encourage you to take action** to learn more about what you can do. The USDA administers a range of **programs that can help you maintain or even enhance your long-term productivity**, while promoting soil health and reducing greenhouse gas emissions.

For example, the Environmental Quality Incentive Program covers much of the cost of adopting practices like no-till, cover crops, pasture conversion, or installation of wind breaks. Converting to managed or permanently flooded wetlands can stop and possibly reverse subsidence. If you have lands that are unprofitable to cultivate, you can instead **restore their soil functions** using the Conservation Reserve Program or Agricultural Conservation Easement Program, which **compensate you** for forgone agricultural returns, as well as establishment costs.

### Would you like to learn more?

To get more information go to:  
<http://smarter.farm/k>

NRCS and FSA staff at your local service center can also answer your questions. For your local contact, please visit <http://offices.sc.egov.usda.gov/locator/app>

# Reminder postcards

**Learn more!**

We invite **you** to participate in this USDA outreach initiative



**Would you like to learn more?**

Check out the back of this postcard for where you can go for more information

Histosol Initiative  
1400 Independence Avenue, SW, Room 0078  
Stop 0563  
Washington, DC 20250

We have set up a website to provide you with information about organic soils, environmental impacts, and programs that can help you.

To get more information, go to:  
<http://smarter.farm/g>

**John Doe**

123 Mickey Mouse Lane  
Newark, DE 19717

**Learn more!**

We invite **you** to participate in this USDA outreach initiative



**Would you like to learn more?**

Check out the back of this postcard for where you can go for more information

Histosol Initiative  
1400 Independence Avenue, SW, Room 0078  
Stop 0563  
Washington, DC 20250

**Thursday, March 31, 2-3 PM Eastern Time:** The USDA will host a **webinar** to answer your questions and provide more information about organic soils, environmental impacts, and programs that can help you.

To access the webinar (live or recorded), or just get more information, go to  
<http://smarter.farm/y>

**John Doe**

123 Mickey Mouse Lane  
Newark, DE 19717

“The **USDA** will host a **webinar** to answer your questions and provide more information ...”

**Learn more!**

We invite **you** to participate in this USDA outreach initiative



**Would you like to learn more?**

Check out the back of this postcard for where you can go for more information

Histosol Initiative  
1400 Independence Avenue, SW, Room 0078  
Stop 0563  
Washington, DC 20250

We have set up a website to provide you with information about organic soils, environmental impacts, and programs that can help you.

**John Doe**

123 Mickey Mouse Lane  
Newark, DE 19717

To get more information, go to:

<http://smarter.farm/g>

**Learn more!**

We invite **you** to participate in this USDA outreach initiative



**Would you like to learn more?**

Check out the back of this postcard for where you can go for more information

Histosol Initiative  
1400 Independence Avenue, SW, Room 0078  
Stop 0563  
Washington, DC 20250

**Thursday, March 31, 2-3 PM Eastern Time:** The USDA will host a **webinar** to answer your questions and provide more information about organic soils, environmental impacts, and programs that can help you.

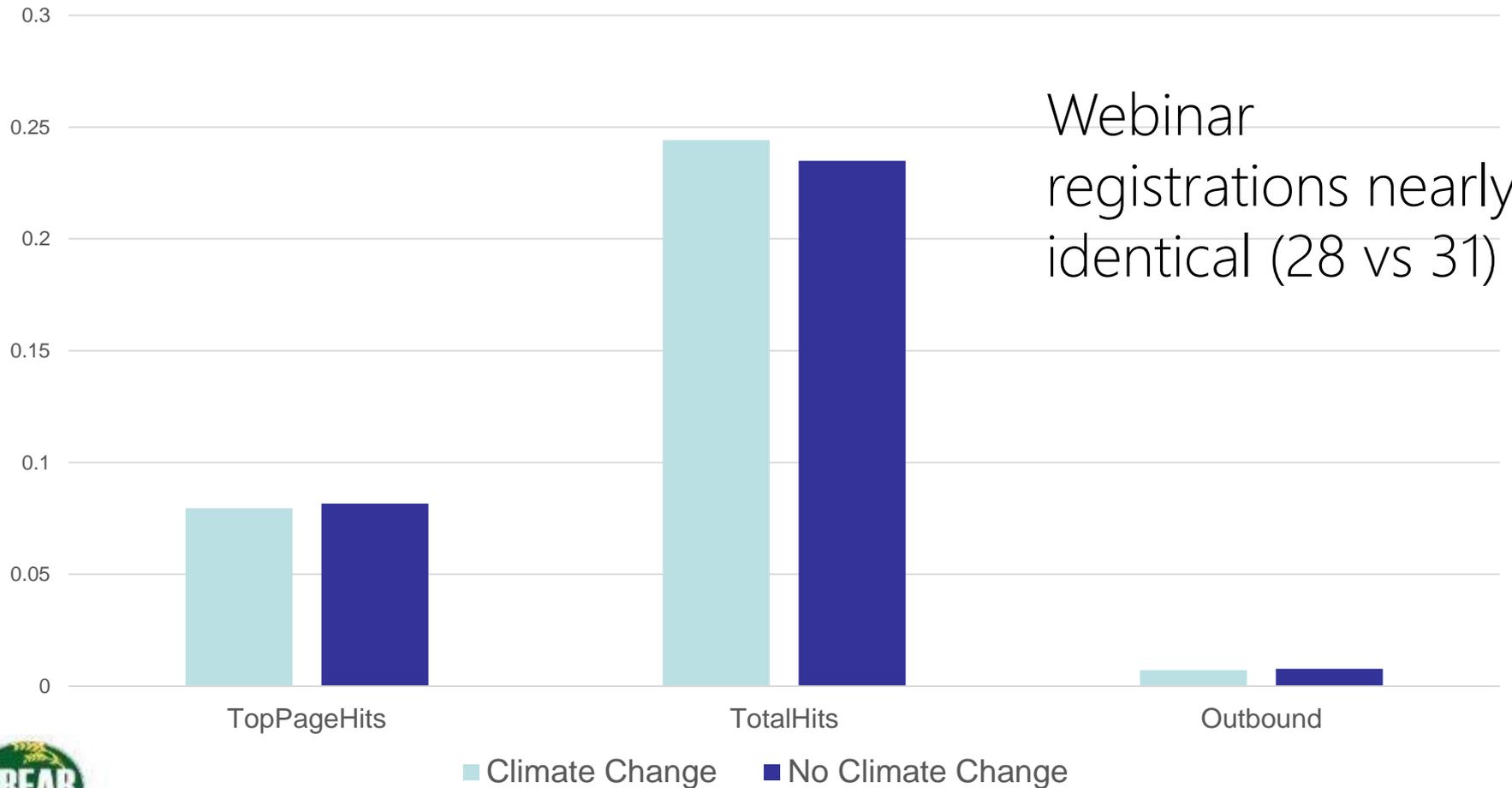
**John Doe**

123 Mickey Mouse Lane  
Newark, DE 19717

To access the webinar (live or recorded), or just get more information, go to  
<http://smarter.farm/y>

# Mentioning Climate Change and Greenhouse Gas Emissions has No Effect on Responses

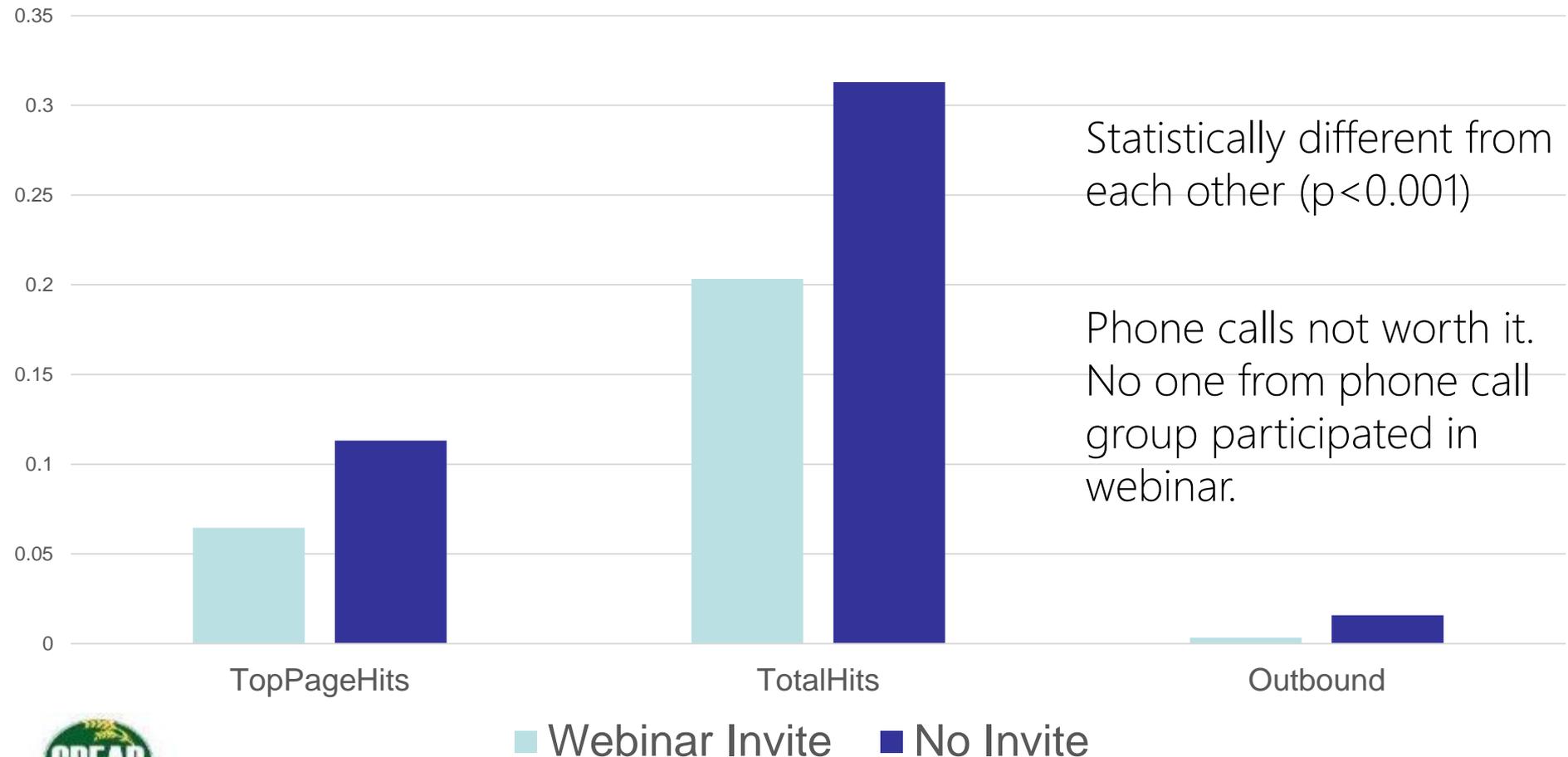
Website Hits Per Invitation



Webinar registrations nearly identical (28 vs 31)

# Inviting Farmer to Webinar Reduced the Website Hits or Outbound Links Per Invitation by Almost Half

Website Hits Per Invitation



# Farmers

## (Framed Field Experiments)



# AgVISE (traps for feral hogs)

## Screening Criteria:

- Typically earn \$1,000 or more in ag revenue annually
- Own or lease land in TX, LA, MS, TN, AL, GA, SC, or FL
- 25+ years of age
- One member per household per auction



From: Weigel, Masters, Ferraro, and Messer

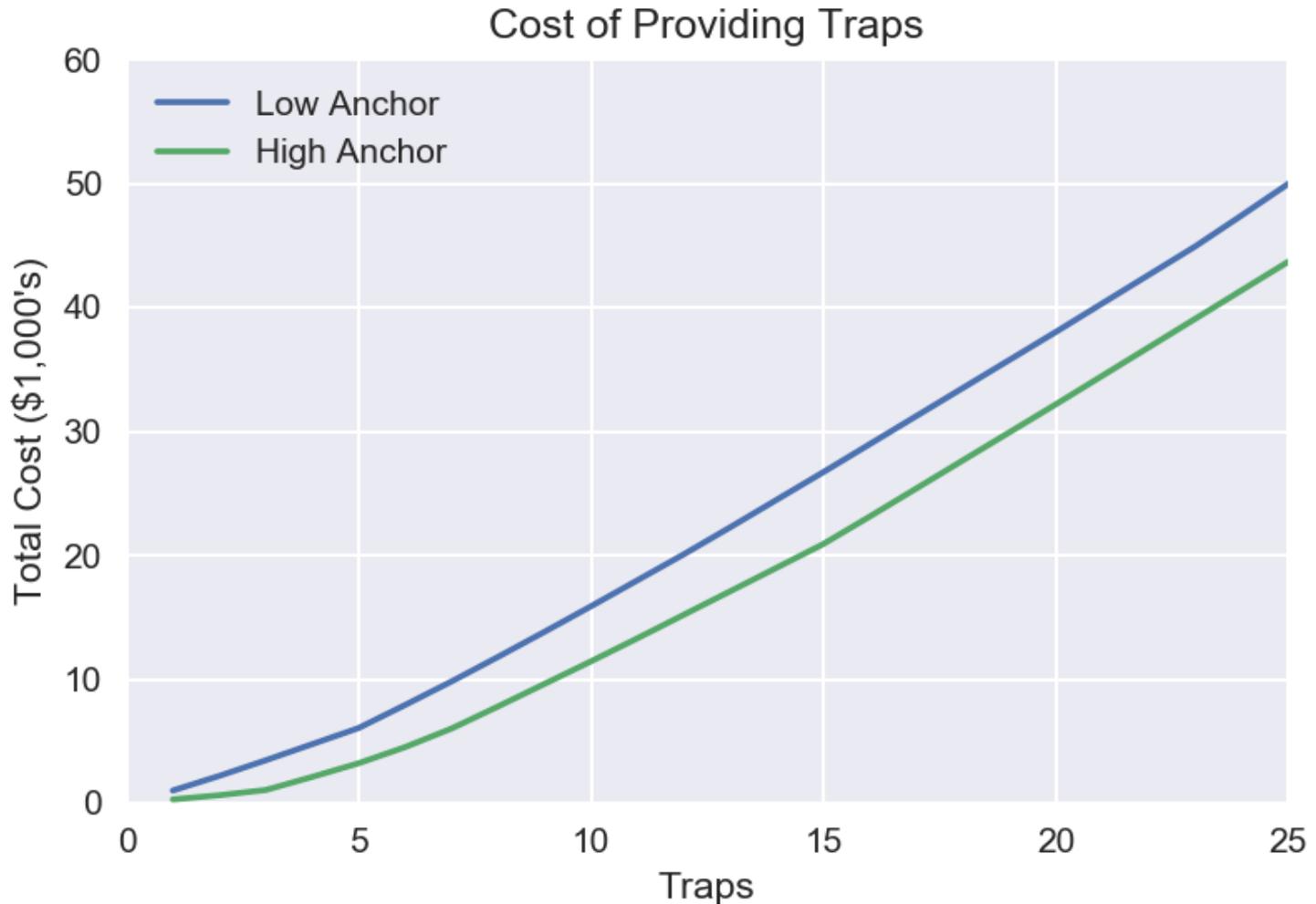
# AgVISE (*Agricultural Value, Innovation, and Stewardship Enhancement*) project



<https://www.youtube.com/watch?v=BJbl1qs75BI>

# Initial Results

## (Cost-effectiveness of Nudges)



# Challenges



# Challenge of Representativeness



- As one moves away from student subjects, this inherently suggests that the composition of the sample matters. Thus, one needs to draw as representative sample as possible.
- New approaches are needed to deal with a public that is increasingly wary of participating in studies.
- Keys of recruitment:
  - Trust
  - Ease of participation



# Challenge of Representativeness

- HomeVISE (Homeowner Value, Innovation, and Stewardships Enhancement) project
  - Source: T. Li, J. Fooks, K. Messer, P. Ferraro (*in development*)
- Spring of 2015, we worked with Infogroup, a company that promised to send invitations to our field experiment.
- We paid \$650 for them to solicit 5000 residents of Delaware.
  - Only 14 people participated (0.28%).
  - None were from Delaware.
- We revised it to be an intercept study to be conducted at Ag Day.
  - In one day, we had 337 adults participate!
  - Subsequent HomeVISE studies had approximately 2000 more adult participants



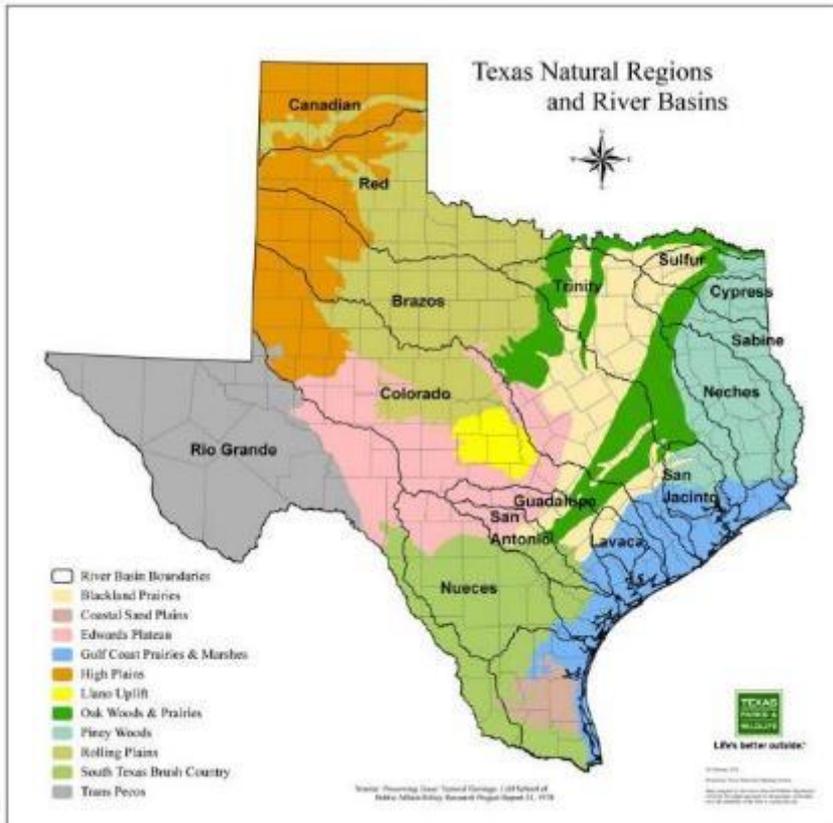


# Partnerships can be Challenging

AgVISE (*Agricultural Value, Innovation, and Stewardship Enhancement*) project



AGENDA 21 IS EVIL

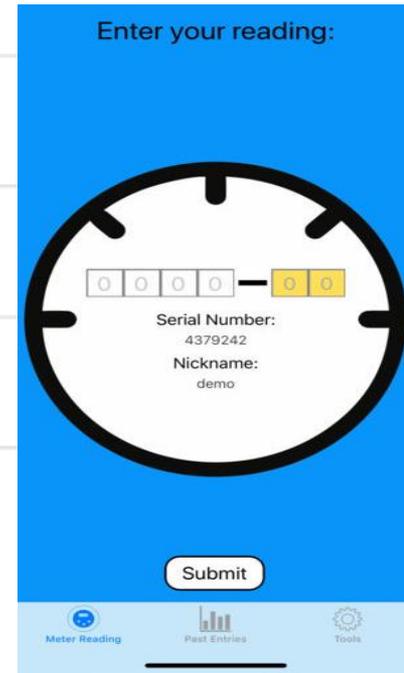
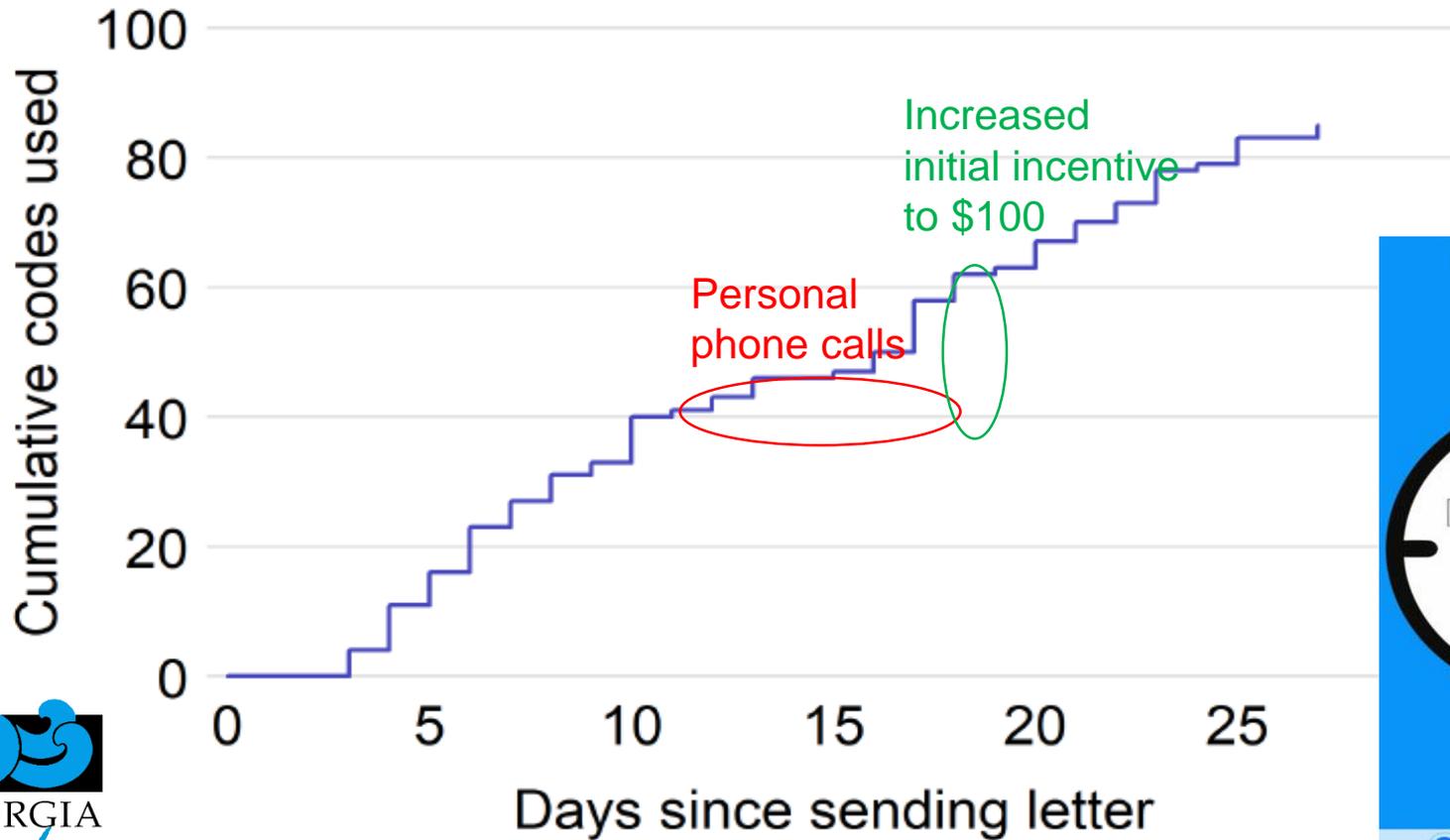


**21 Signs**  
**Agenda**  
  
**21**  
**is in**  
**your**  
**Community**





# AgDRIP recruitment



GEORGIA Water

PLANNING & POLICY CENTER ALBANY STATE UNIVERSITY

Source: Meiselman, Suter, Weigel, Masters, Ferraro, Savchenko, Messer

# Challenge of Shifting Partner Priorities and Staff Turnover



# Challenge of Shifting Partner Priorities



- Example, in 2015, NRCS launched a new internet platform, “Conservation Client Gateway” in the hopes of better serving its customers.
  - Set ambitious goal of enrolling 60,000 landowners in first year
- NRCS started working with CBEAR and ERS on how to improve the roll-out.
  - Rejected all major ideas; only wanting to consider the lightest of interventions.
- Project launch delayed several times and before the actual launch we were called and told that due to concerns about low enrollment that they weren’t going to be working with CBEAR.
  - Irony is this is exactly when trying something new would have been most appropriate.
- How did it turn out?
  - Only 300 farmers enrolled in first year. Enrollment now is reportedly around 6,000 farmers.
  - Sadly, no lessons were learned to help avoid problems in future.

# Lessons learned

1. Develop a coalition or network (aka. *share the wealth*)
2. Need more research on getting a representative sample of farmers/landowners
3. Call for evidence-based policy needs to be build into agri-environmental programs.
  - Connect to administrative data
4. Seek opportunities for collaborative/cooperative research
5. Non-partisan (in the US that means talking about having a “business approach” to policy making)
6. Need to stay active.
7. Timing is key
8. Relationships matter
  - Example of NRCS Conservation Communication Contract.

# Future Vision

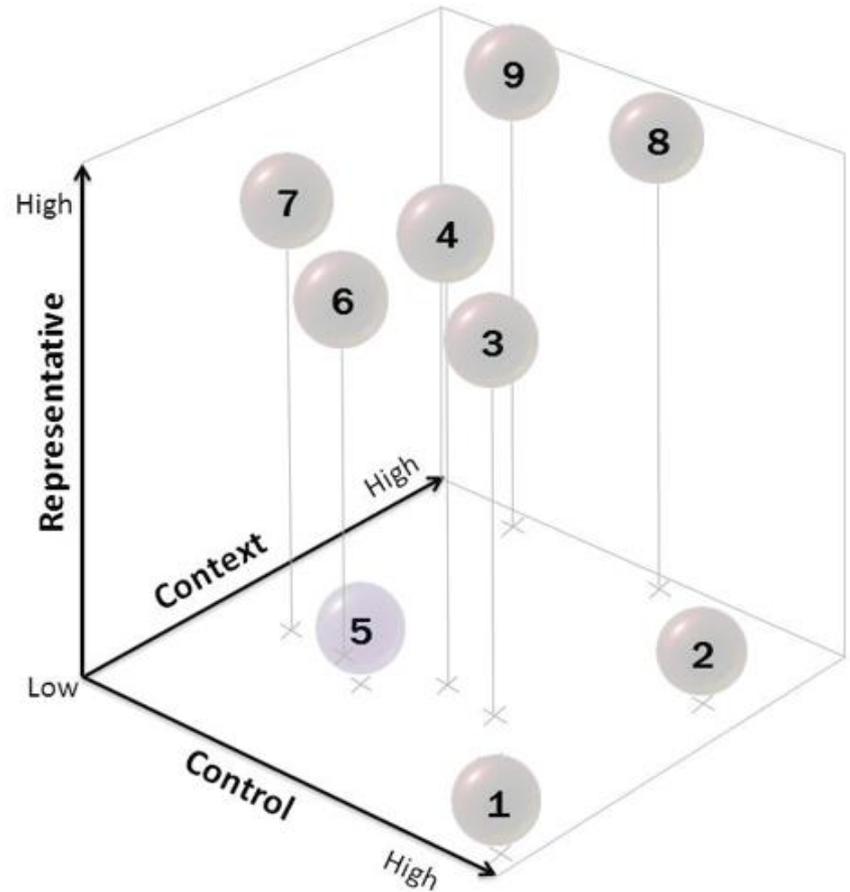
**“Behavioral and experimental economics agri-environmental research: methodological issues, literature gaps, and recommendations”**

L. Palm-Forster, P. Ferraro, N. Janusch,  
C. Vossler, and K. Messer

*Environmental and Resource Economics (Special Issue - Forthcoming)*



# Concerns about Applying Results from Lab Experiments To Policy



Based on: Messer, Duke, Lynch, 2014 39

# The Appeal of Framed Field Experiments for Policy



# Publication Bias

## ADDRESSING PARTICIPANT INATTENTION IN FEDERAL PROGRAMS: A FIELD EXPERIMENT WITH THE CONSERVATION RESERVE PROGRAM

STEVEN WALLANDER, PAUL FERRARO, AND NATHANIEL HIGGINS

N= 46,823 (producers with expiring CRP contracts)

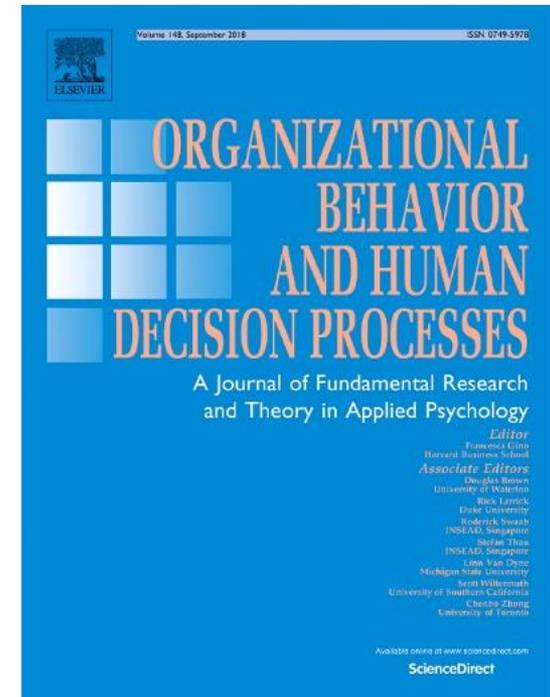
AJAE editor comments

- “Reviewer 3 finds the small/no impacts of the treatment to reduce the contribution of this paper.”
- “Reviewer 1 and 2 would also like to see more exploration of the types of farms and regions where the treatment had a bigger impact.”

# Publication Bias

OBHDP editor comments:

- “It is important to publish these findings since null results are badly underreported. The experiment seems well conducted, however to fit with OBHDP it would need to shed more light on underlying mechanism of why these interventions not have an effect on these organizations.”



# Under-Powered Studies, Replicability, and Pre-registrations

THE  
ECONOMIC  
JOURNAL



*The Economic Journal*, 127 (October), F236–F265. Doi: 10.1111/ecoj.12461 © 2017 Royal Economic Society. Published by John Wiley & Sons, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA.

## THE POWER OF BIAS IN ECONOMICS RESEARCH\*

*John P. A. Ioannidis, T. D. Stanley and Hristos Doucouliagos*

We investigate two critical dimensions of the credibility of empirical economics research: statistical power and bias. We survey 159 empirical economics literatures that draw upon 64,076 estimates of economic parameters reported in more than 6,700 empirical studies. Half of the research areas have nearly 90% of their results under-powered. The median statistical power is 18%, or less. A simple weighted average of those reported results that are adequately powered (power  $\geq 80\%$ ) reveals that nearly 80% of the reported effects in these empirical economics literatures are exaggerated; typically, by a factor of two and with one-third inflated by a factor of four or more.

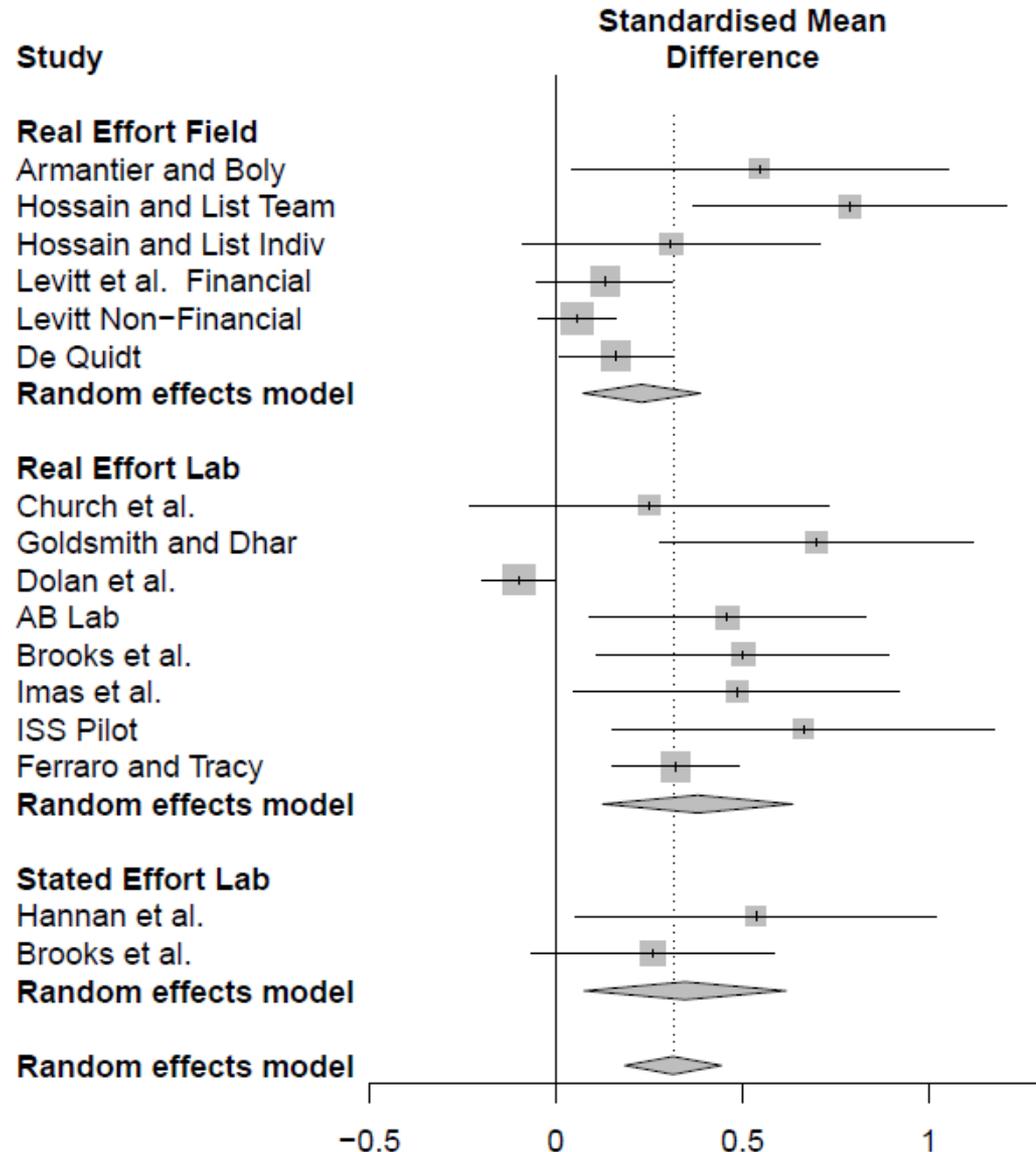


# Example:

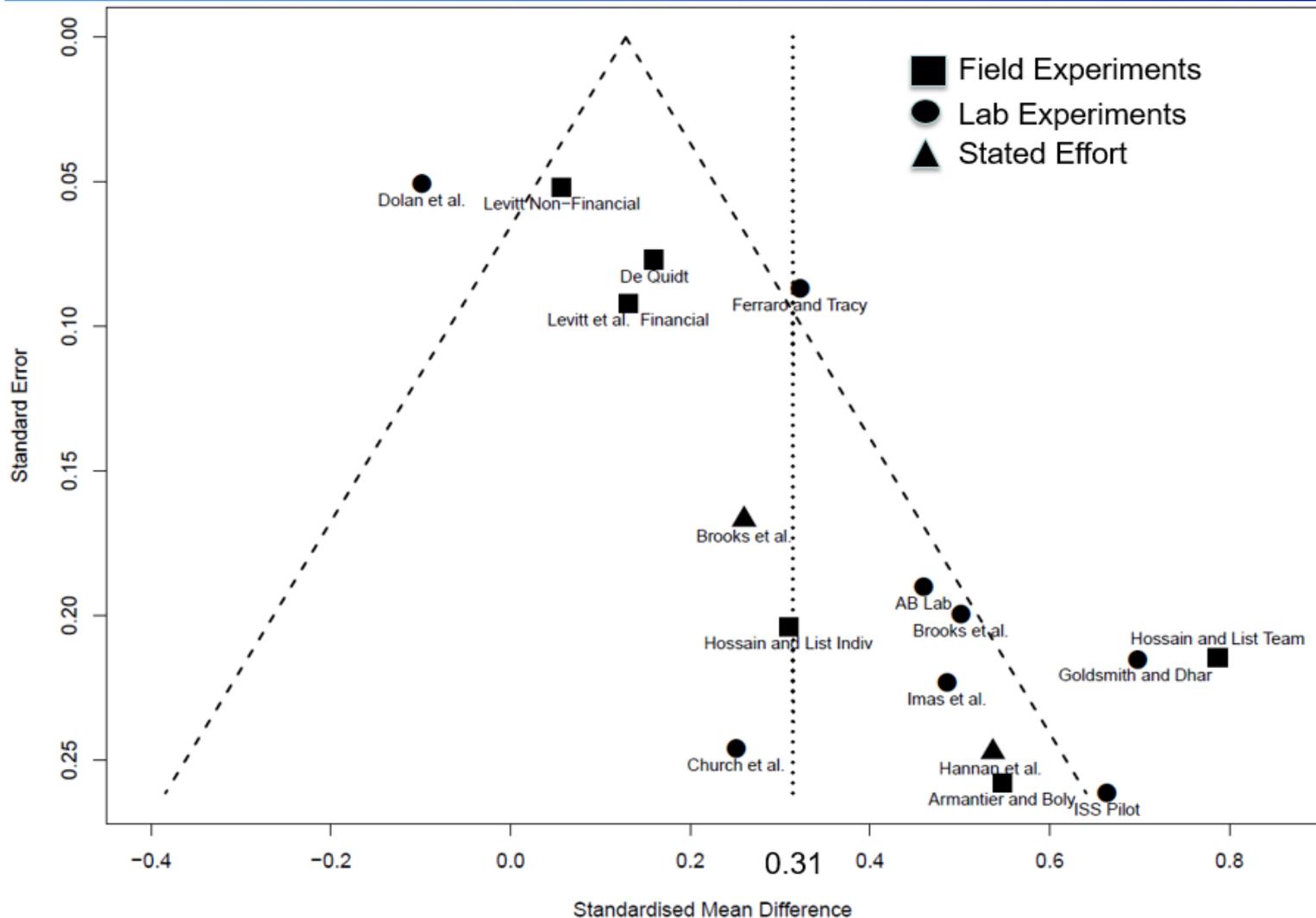
## Loss-framed Incentive Contracts

- 16 published experiments imply that loss-framed contracts, on average, increase effort (success) at the incentivized task
- Meta-analysis yields an overall weighted average effect of 0.31 SD [95%CI 0.18, 0.44]

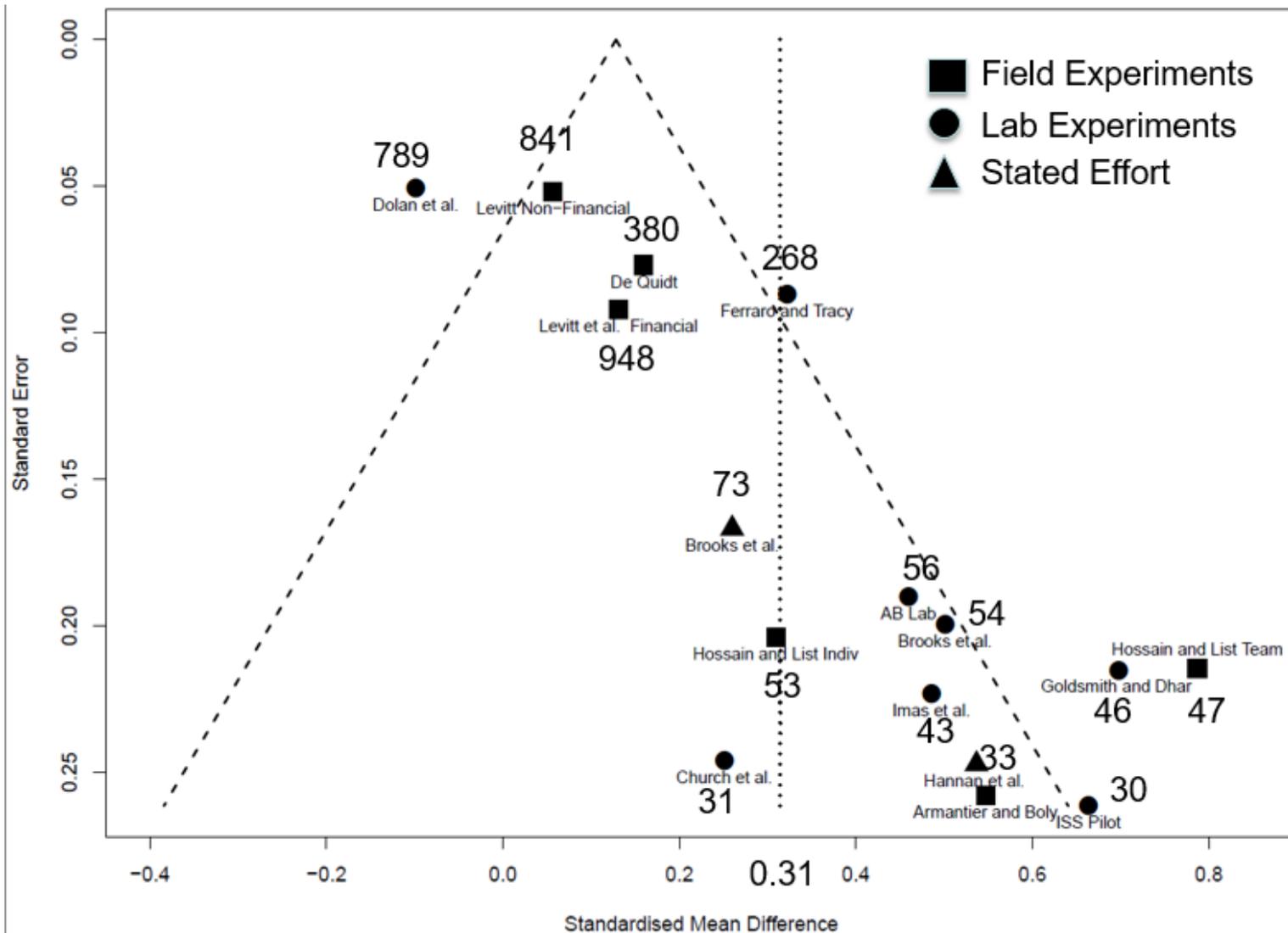
(Source: Ferraro and Tracy, unpublished)



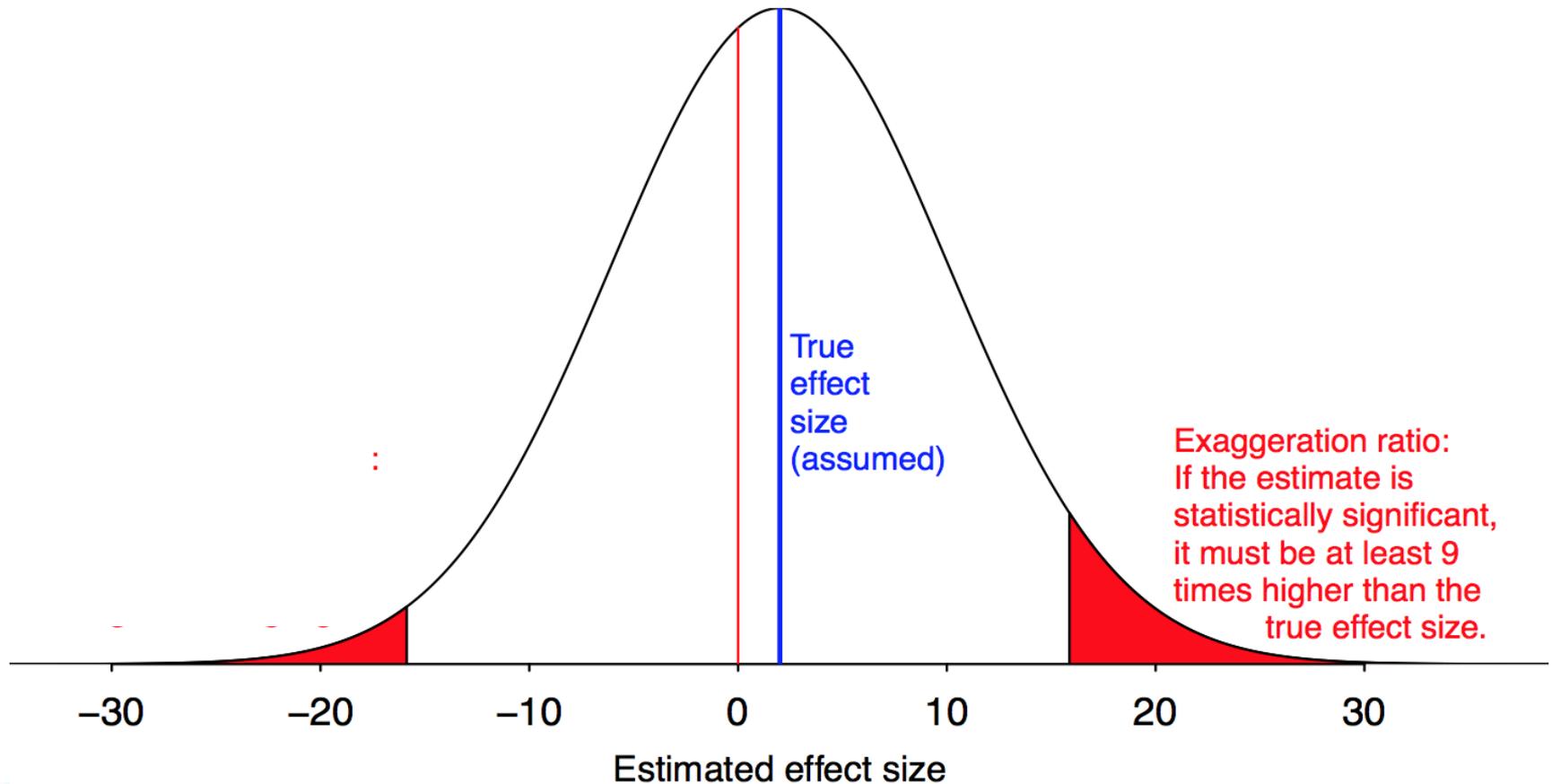
# Loss-framed Incentive Contracts



# Loss-framed Incentive Contracts



# Type M Error (power = 0.06)



# Recall the value of Replicability

- Replicability was supposed to be a fundamental tenant of experimental economics, but it doesn't happen very often.
  - Hard to get funding for this.
- Value in pre-registering experimental designs (<http://www.socialscienceregistry.org/>).

# Literature Review

Most literature relates to three area:

1. Tax and subsidy mechanisms to reduce nonpoint source pollution:
  - Alpízar et al. 2004; Poe et al. 2004; Spraggon 2004, 2013; Cochard et al. 2005; Vossler et al. 2006; Suter et al. 2008; Spraggon and Oxoby 2010; Cason 2010; Cason and Gangadharan 2013; Suter and Vossler 2014; Palm-Forster et al. 2017
  
2. Extraction of ground water for irrigation:
  - Gardner et al. 1997, Li et al., 2014, Liu et al., 2014, Suter et al., *forthcoming*, Suter et al 2012.
  
3. Incentivize land conservation and ecosystem service provision:
  - Parkhurst et al. 2002; Parkhurst and Shogren 2007, 2008; Banerjee et al. 2014, 2015, 2017; Fooks et al. 2016; Banerjee 2018.

## MINDSPACE (modified from Dolan et al. 2010)

<b>Cue</b>	<b>Behavior</b>	<b>Published Papers</b>
<b>Messenger</b>	We are heavily influenced by who communicates information to us	Duquette, Higgins, and Horowitz 2012 <sup>Admin</sup> Li et al. 2014 <sup>Lab</sup>
<b>Incentives</b>	Our responses to incentives are shaped by predictable mental shortcuts such as strongly avoiding losses	Wallander, Ferraro, and Higgins 2017 <sup>Adm</sup> Banerjee et al. 2014 <sup>Lab</sup>
<b>Norms</b>	We are strongly influenced by what others do	
<b>Defaults</b>	We “go with the flow” of pre-set options	Wallander, Ferraro, and Higgins 2017 <sup>Adm</sup> Banerjee et al. 2014 <sup>Lab</sup> Cason et al. 2003 <sup>Lab</sup> Li et al. 2014 <sup>Lab</sup> Higgins et al. 2017 <sup>Adm</sup>
<b>Saliency</b>	Our attention is drawn to what is novel and seems relevant to us	Wallander, Ferraro, and Higgins 2017 <sup>Adm</sup> Banerjee et al. 2015 <sup>Lab</sup> Cason, Gangadharan, and Duke 2003 <sup>Lab</sup> Czap et al. 2013 <sup>Lab</sup> Higgins et al. 2017 <sup>Adm</sup>
<b>Priming</b>	Our acts are often influenced by sub-conscious cues	Messer and Borchers 2015 Framed Czap et al. 2013 <sup>Lab</sup>
<b>Affect</b>	Our emotional associations can powerfully shape our actions	
<b>Commitment</b>	We seek to be consistent with our public promises, and reciprocate acts	
<b>Ego</b>	We act in ways that make us feel better about ourselves	



# Applying Behavioral and Experimental Economics to U.S. Agri-Environmental Programs: Benefits, Challenges, & Lessons Learned

Kent D. Messer

*University of Delaware, Co-Director of CBEAR*



REECAP Workshop - Vienna, Austria

26 September, 2018

