Conservation, HABs, and New Approaches

October 9, 2014

NORTHEAST-MIDWEST INSTITUTE

Speakers

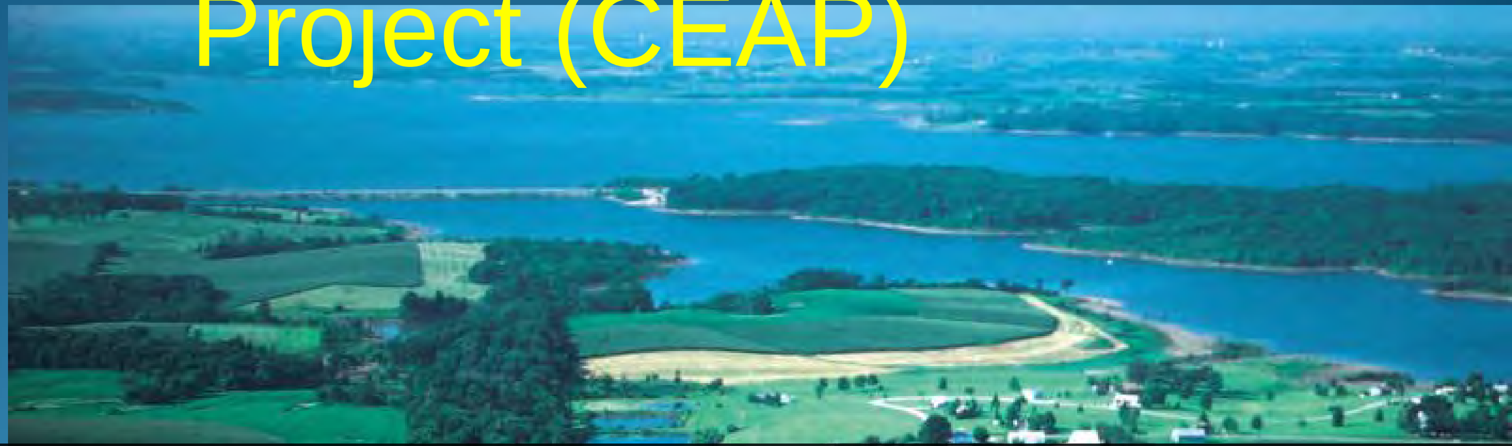
- Deanna Osmond, PhD, Professor, Department of Soil Science, Extension Leader, North Carolina State University
- Elin Betanzo, Senior Policy Analyst, NEMWI
- Patrick Lawrence, PhD, Professor, Department Chair, Department of Geography and Planning, University of Toledo
- David White, Former Chief, Natural Resources Conservation Service
- Alex Echols, Independent Consultant, Principal of Terra Altus
- Danielle Chesky, Director, Great Lakes Washington Program, NEMWI

The Case for a New Approach: Effectiveness of Past Conservation Efforts and Lessons Learned from NIFA-CEAP Watershed Synthesis

Deanna L. Osmond
Department of Soil Science
NC State University

Conservation Practices Work!

The Conservation Effects Assessment Project (CEAP)

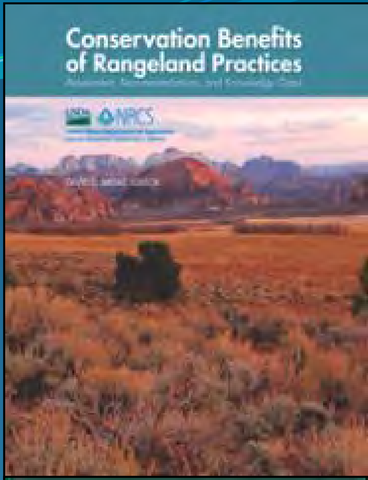


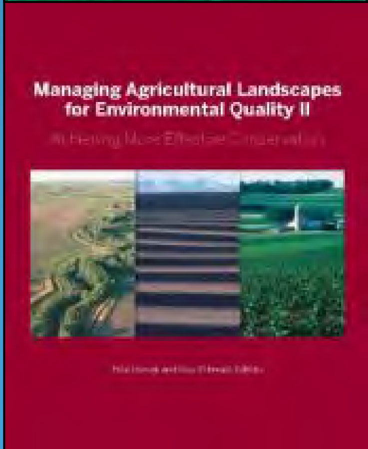
"…This study will …enable USDA to design and implement conservation programs that will not only better meet the needs of farmers and ranchers, but also help ensure that taxpayers' conservation dollars are used as effectively as possible."

- Tom Vilsack, Agriculture Secretary

CEAP Activities

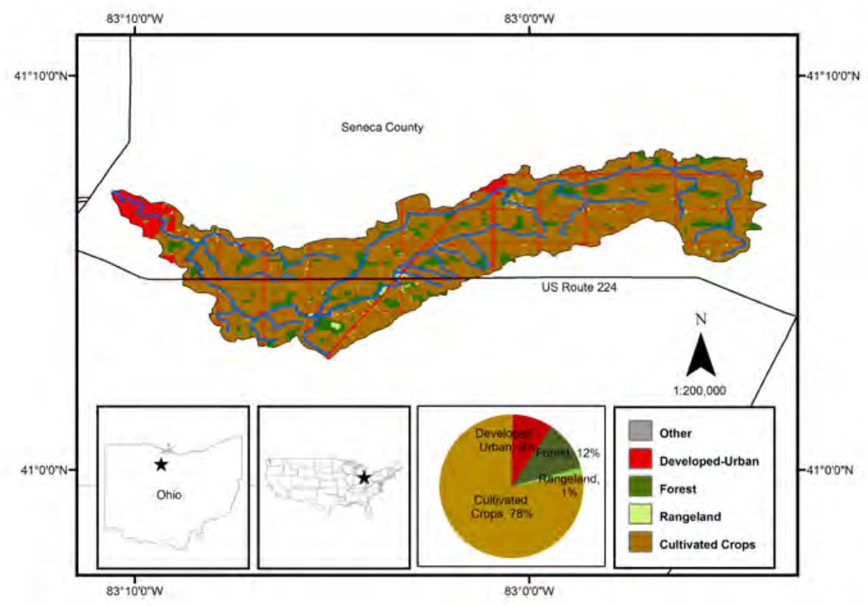
- National / Regional Assessments
  - Cropland (Cultivated)
  - Grazing Lands (Range and Pasture)
  - Wetlands (Depressional and Riverine)
  - Wildlife (Terrestrial and Aquatic)
- Watershed Assessment Studies
  - ARS Benchmark
  - NIFA Competitive watershed projects (including synthesis study)
  - NRCS Special Emphasis
- Bibliographies and Literature Reviews
  - 3 NEW literature syntheses last year
  - Bibliographies- http://www.nal.usda.gov/wqic/ceap/index.shtml





NIFA CEAP Competitive Grant Watershed Studies

- Studies to analyze the effects of prior conservation implementation at the watershed scale
- All studies were required to have at least 5 to 10 years of water quality data and land treatment data
- Watersheds were cropland or pasture



Rock Creek (OH CEAP) Watershed

NIFA CEAP Watershed Locations

Synthesizing and Extending Lessons Learned from the 13 NIFA CEAP Watershed Studies: Objectives

- Summarize and describe the science-based information and lessons learned about conservation practices at the watershed scale from the 13 NIFA CEAP projects.
- Deliver knowledge to decision- and policy-makers within key organizations.

United States Department of Agriculture
National Institute of Food and Agriculture
NRCS

NIFA CEAP: Water Quality Results

Six projects were able to document water quality changes at the watershed scale. All had significant conservation practice implementation and appropriate water quality monitoring.

- Three employed long-term monitoring (ID, NE & OH)
- Three used paired watershed monitoring designs (IA, NY & PA)
    - Two were part of the US Environmental Protection Agency 319 National NPS Monitoring Program (IA & NY)


Cannonsville Reservoir (NY CEAP)


Rock Creek (OH CEAP)


Spring Creek (PA) CEAP

Lessons Learned from NIFA-CEAP: We MUST Incorporate Results

With dwindling resources and mounting environmental degradation, it is essential that many of the lessons from NIFA-CEAP be integrated into policy and agency protocol if water resources are to be protected or improved.

Black Creek Project 1978-1984

The Rural Clean Water Program 1980-1995

Model Implementation Program 1978-1982

Hydrologic Unit Area Projects & Demonstration Projects 1991-1994

USEPA Section 319 National Nonpoint Source Monitoring Program 1991 - present

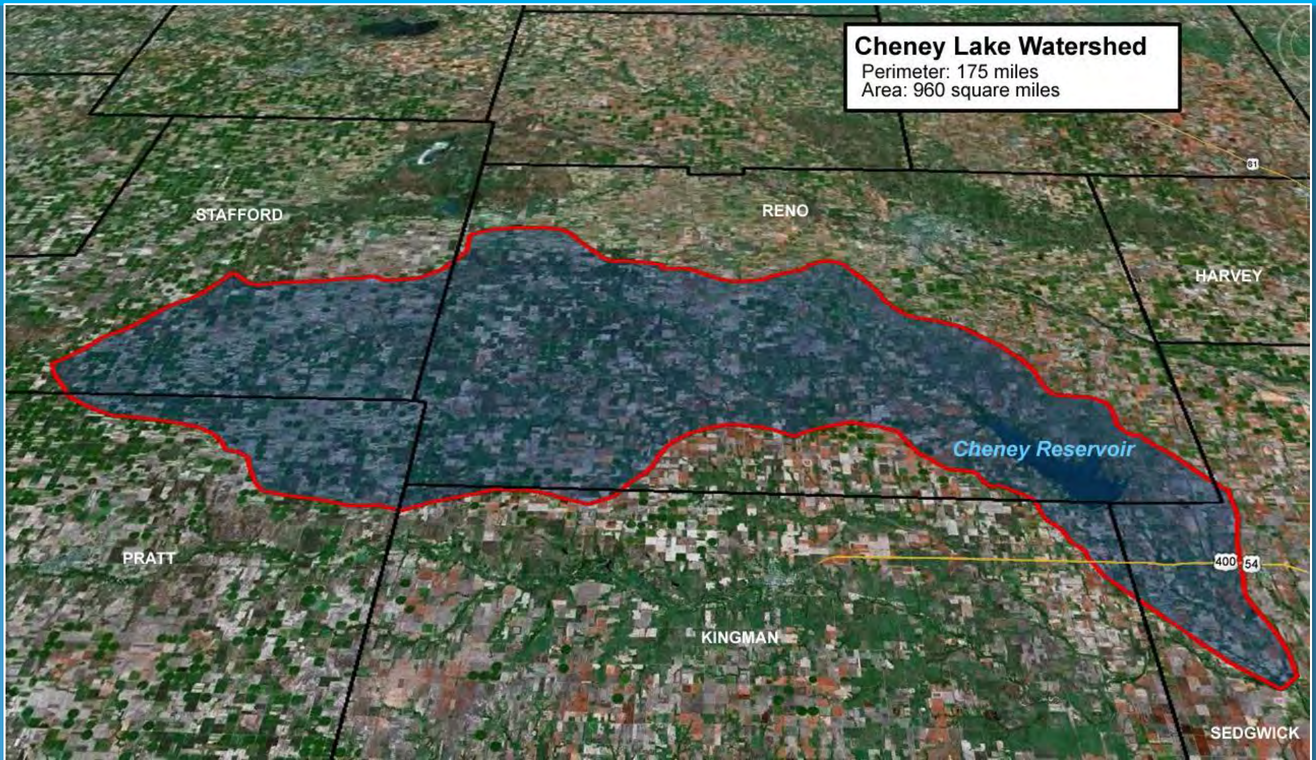
NIFA CEAP 2004-2011

What Would Make Conservation Practice Implementation Better?

Rock Creek (OH NIFA-CEAP)

Lessons Learned from NIFA-CEAP: Intentional Conservation

Before implementing conservation practices, plan at the watershed scale by identify the pollutants of concern, the sources of the pollutants, and the hydrologic transport of the pollutant.



Lessons Learned from NIFA-CEAP: Intentional Conservation

Understand how conservation practices function; there may be tradeoffs.

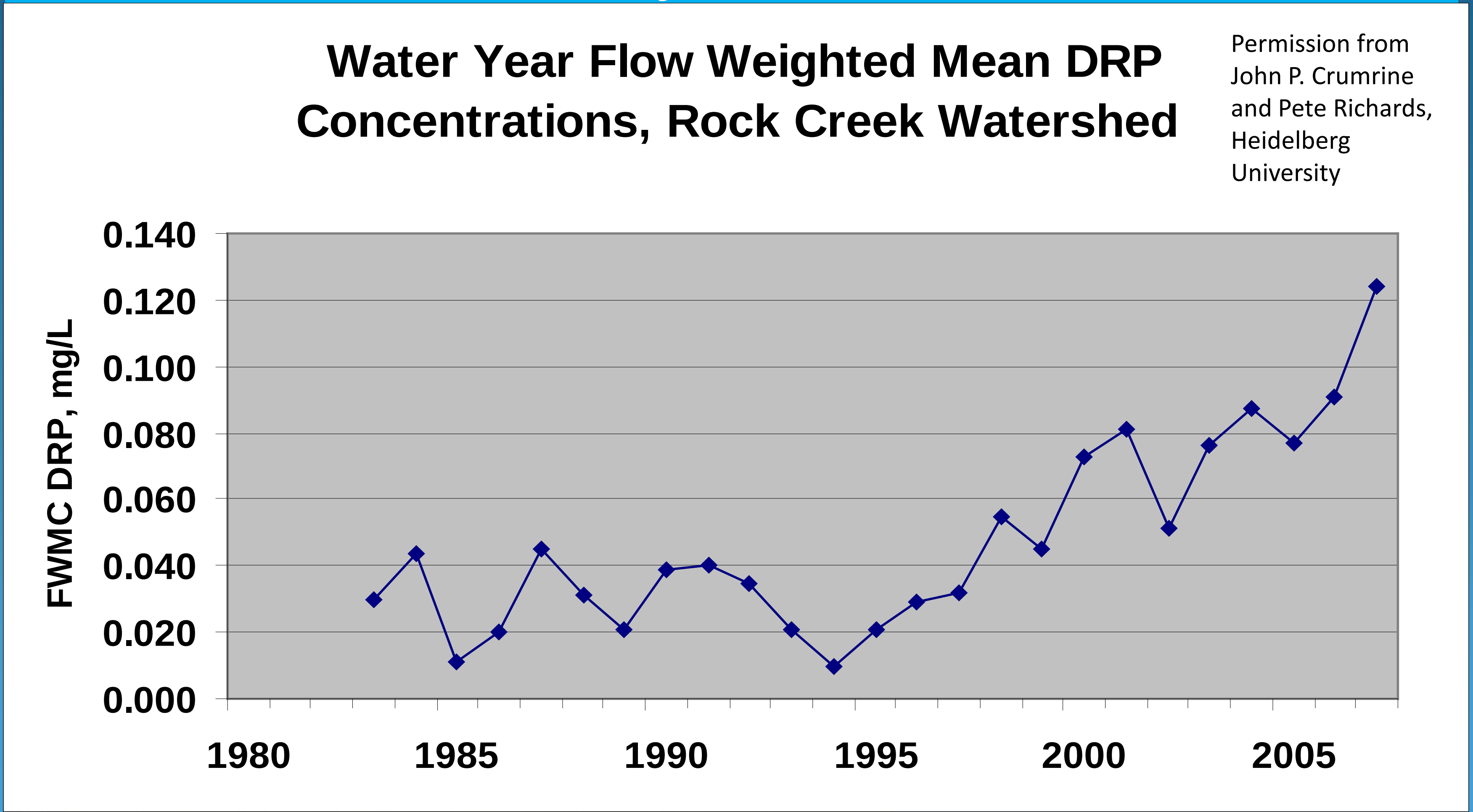
Rock Creek (OH CEAP)

Conservation practices:

- may function differently than expected
- may affect pollutants differentially
- may lead to management changes that affect water quality

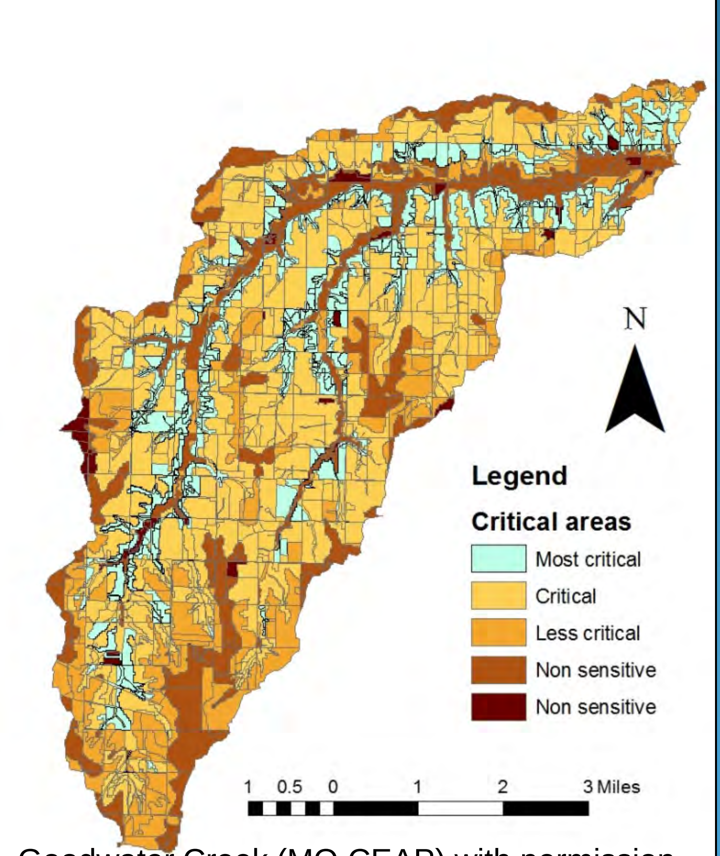
Lessons Learned from NIFA-CEAP: Intentional Conservation

Understand how conservation practices function; there may be tradeoffs.



Lessons Learned from NIFA-CEAP: Intentional Conservation

Identify critical source areas to target conservation practices within the watershed.



Goodwater Creek (MO CEAP) with permission of C. Baffaut

Lessons Learned from NIFA-CEAP: Continued Conservation

Even after conservation practices have been adopted, continue to work with farmers on maintenance and sustained use of the practices.

Little Bear River (UT CEAP)

Land Treatment Sediment: Key Points


Little River (GA CEAP)

Erosion control has increased substantially due to technological advances, price and labor pressures, and conservation programs UNTIL recently. Much of the sediment is coming from streambanks and streambeds, not uplands, although reduction in conservation practice use has increased erosion in certain areas of the country.

Land Treatment Nutrients: Key Points

Controlling nutrient pollution, especially nitrogen, will continue to be a significant challenge:

- **management practices are harder for farmers**
- **greater difficulty implementing practices that control pollutants farmers cannot see**
- **farmers use nutrients to reduce risk**
- **antagonistic outcomes of conservation practices; practices that reduce sediment may increase nutrients**
- **tile drainage is being added much faster than conservation practices can be adopted**
- **marginal land transformation**
- **climate change may change the timing and duration of rainfall that increases nutrient losses**

NIFA CEAP Outreach Information

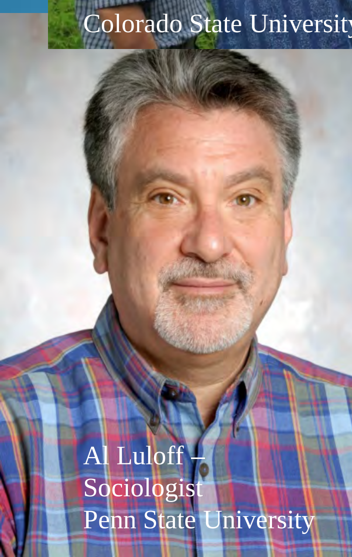
- **USDA NRCS CEAP Website**
  - http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/ws/?&cid=stelprdb1047821
- **Book**: Osmond, D., D. Meals, D. Hoag, and M. Arabi. 2012. How to Build Better Agricultural Conservation Programs to Protect Water Quality: The National Institute of Food and Agriculture Conservation Effects Assessment Project Experience. Soil and Water Conservation Society. Ankeny, IA.
- **Fact Sheets**
- **USDA NIFA National Water Quality Conference Proceedings**
- **USEPA Webinar**

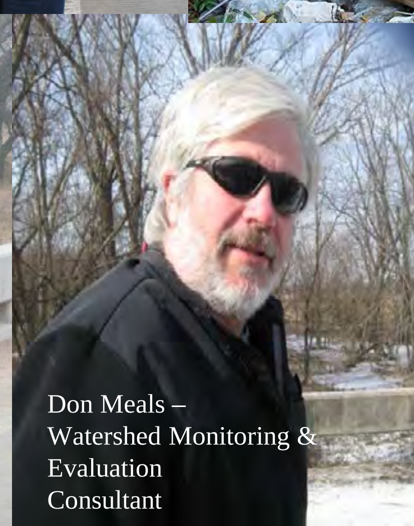
NIFA CEAP Team

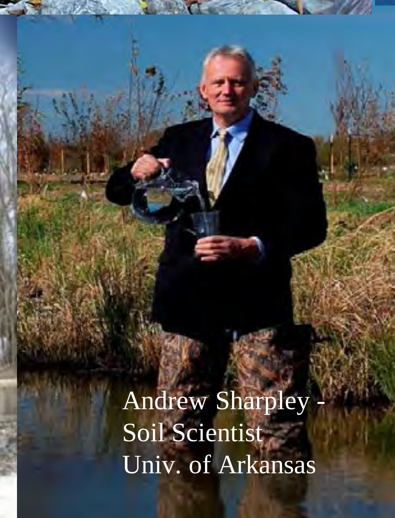
Thanks all the NIFA-CEAP watershed project personnel, key informants, USDA NIFA-CEAP and NRCS-CEAP personnel

Our Sponsors USDA United States Department of Agriculture National Institute of Food and Agriculture | NRCS

Co-Authors







What water quality data are available to evaluate conservation practices for reducing phosphorus inputs to Lake Erie at the watershed scale?

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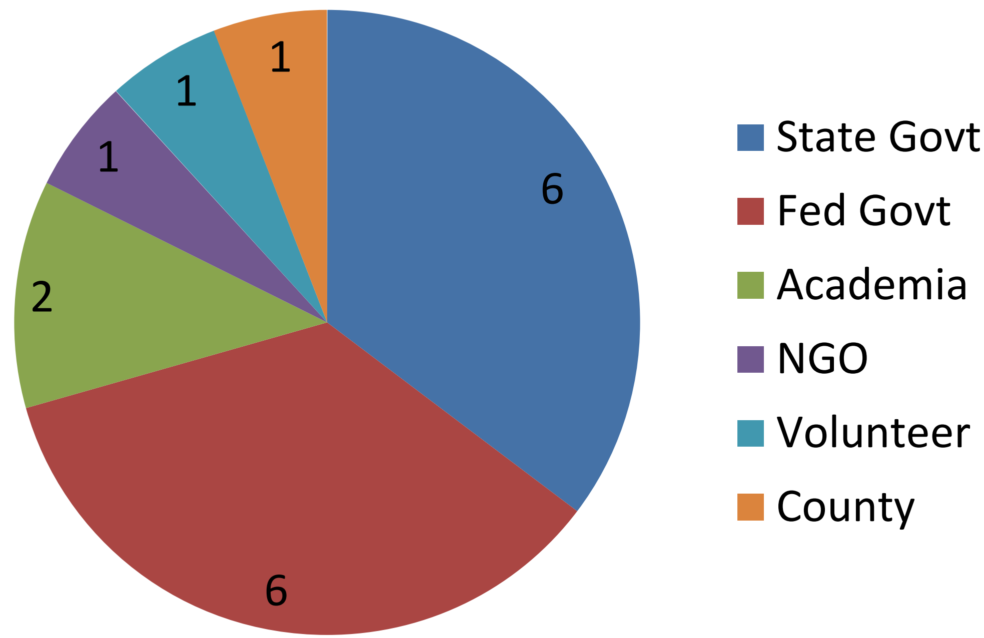
Elin Betanzo

Organizations Collecting Stream Water Quality Data in the Lake Erie Drainage Basin

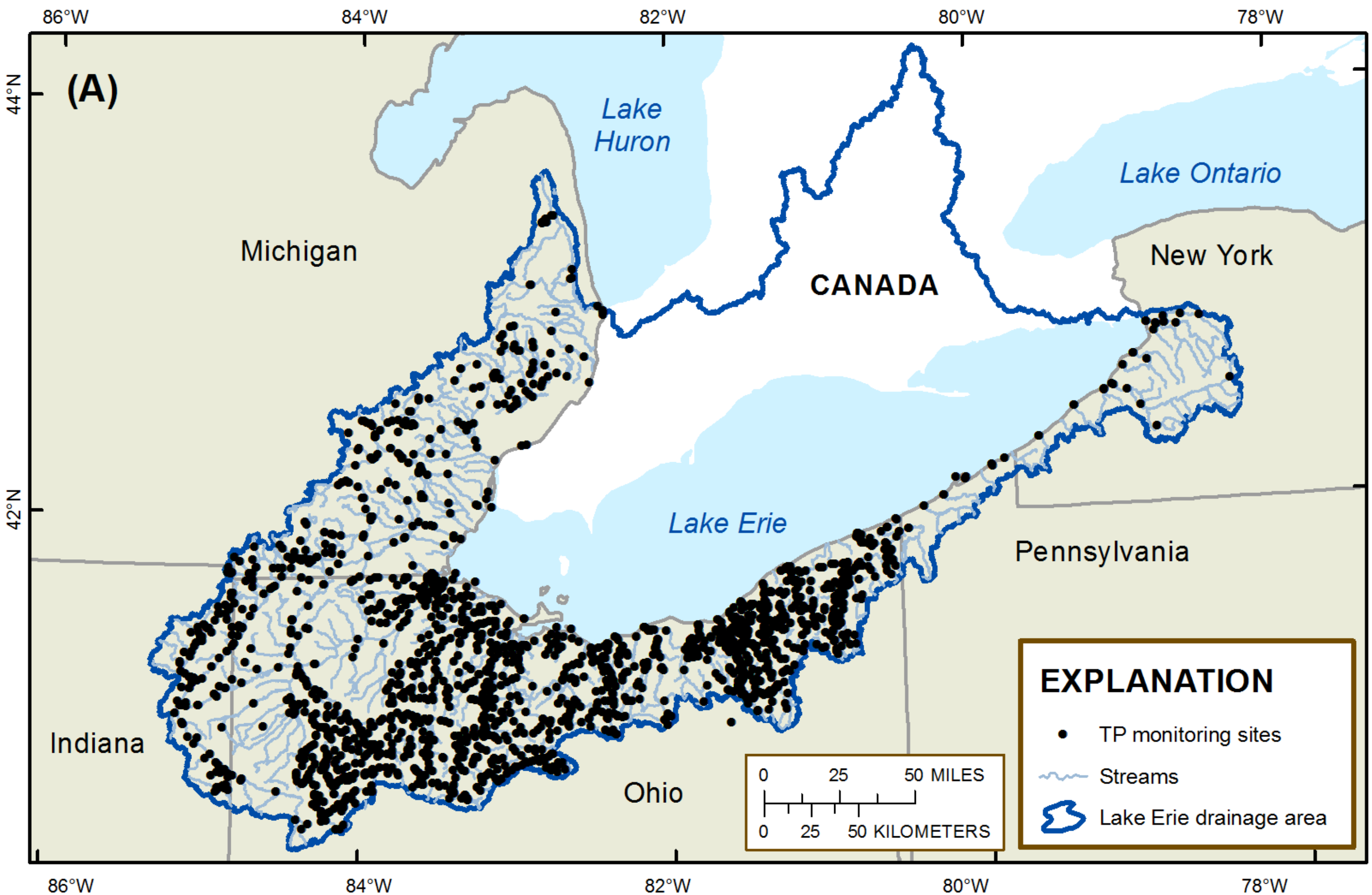
Data from 1943-2010

17 organizations
3,005 monitoring sites
1,190,842 records



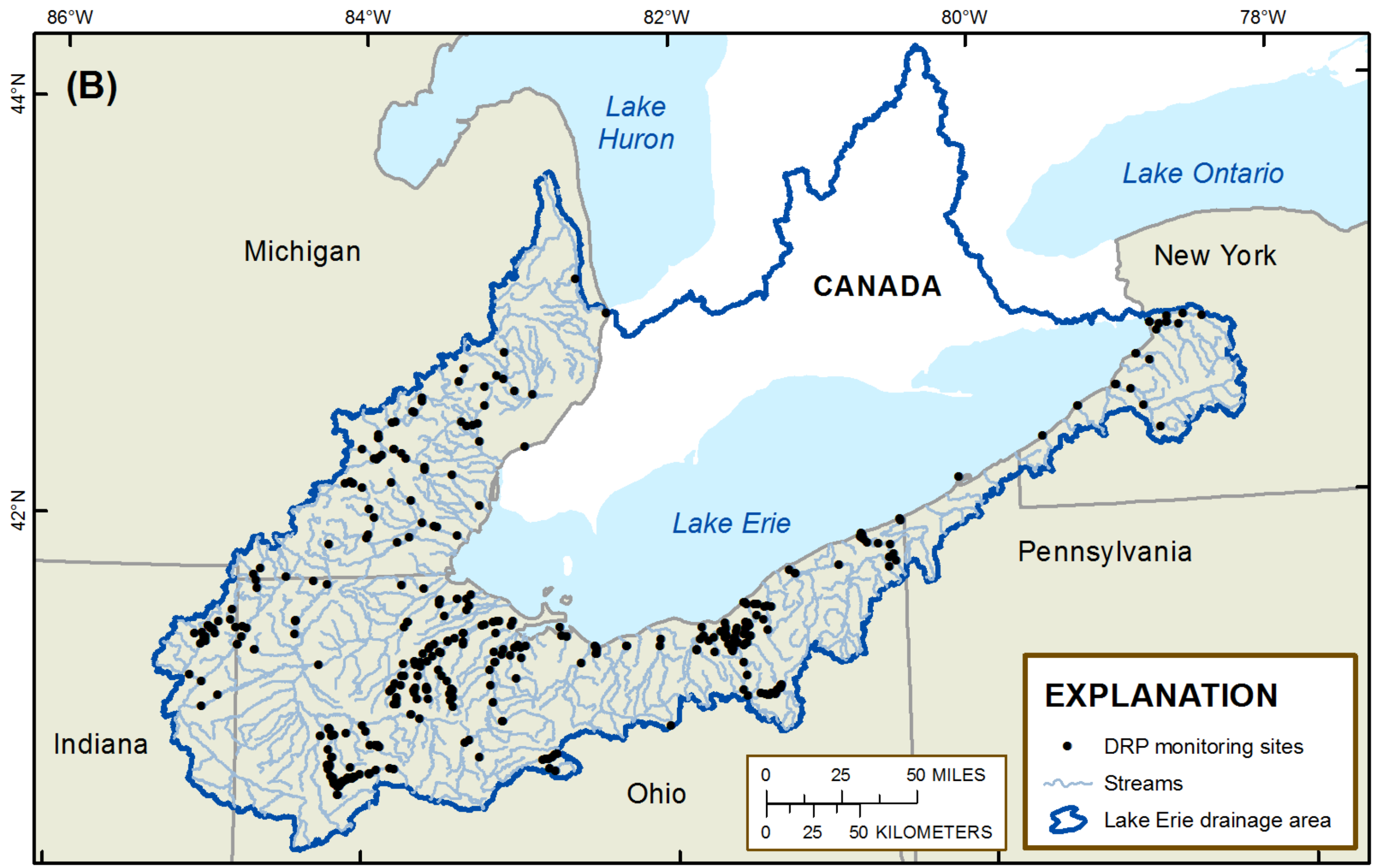
Preliminary Findings - Subject to Change. Monitoring sites active through 2010.

Total Phosphorus Monitoring Sites in the Lake Erie Drainage Basin (n=1,981)



Preliminary Findings - Subject to Change. Monitoring sites active through 2010.

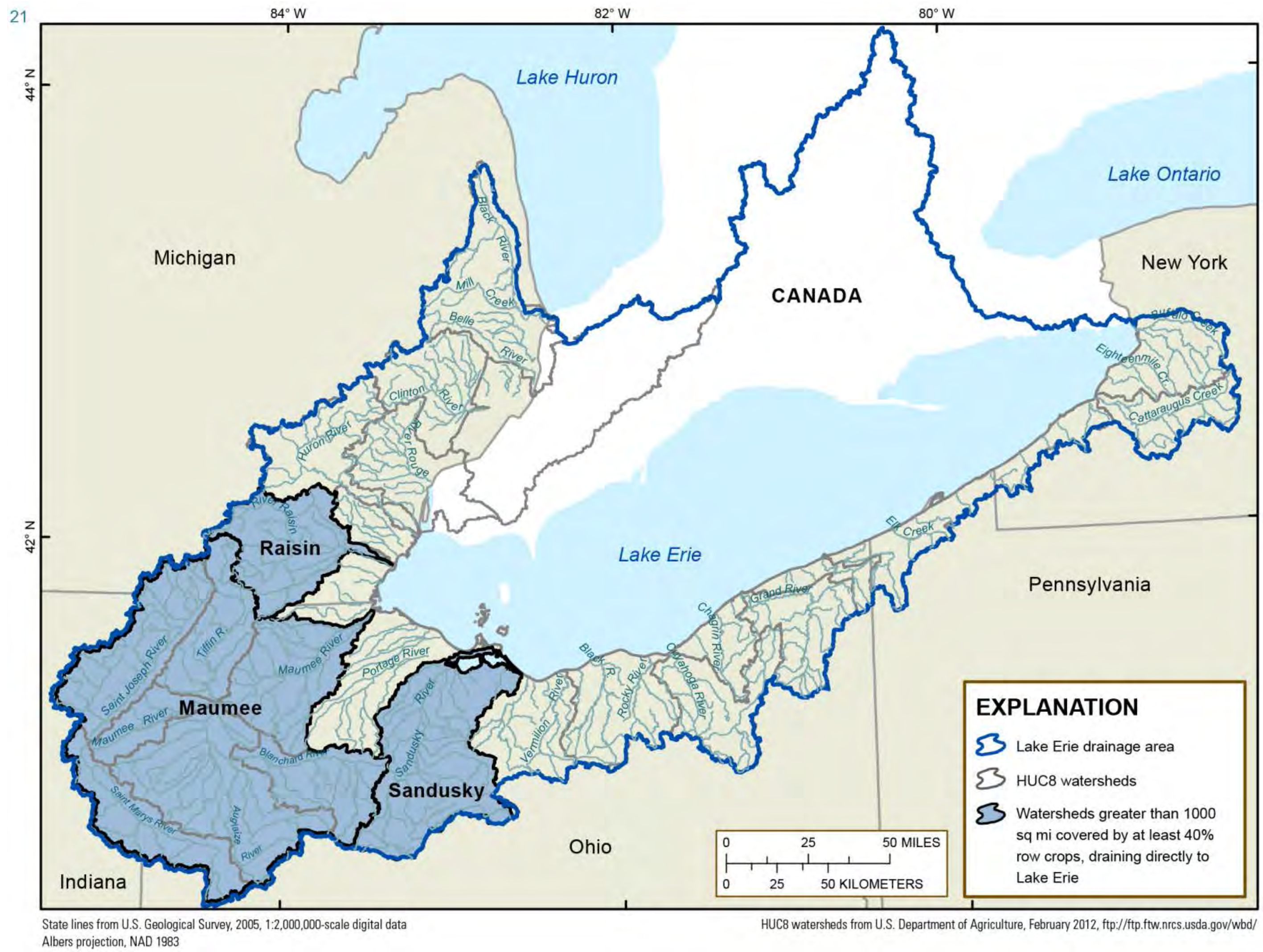
Dissolved Reactive Phosphorus Monitoring Sites (n=370)



State lines from U.S. Geological Survey, 2005, 1:2,000,000-scale digital data
Streams from U.S. Geological Survey, 2012, 1:1,000,000-scale digital data
Albers projection, NAD 1983

Preliminary Findings - Subject to Change. Monitoring sites active through 2010.

Large Agricultural Watersheds Are Collecting Needed Water Quality Data to Evaluate Practice Effectiveness



Preliminary Findings - Subject to Change. Monitoring sites active through 2010.

Few Small Watersheds Are Collecting Water Quality Data Needed to Evaluate Practice Effectiveness

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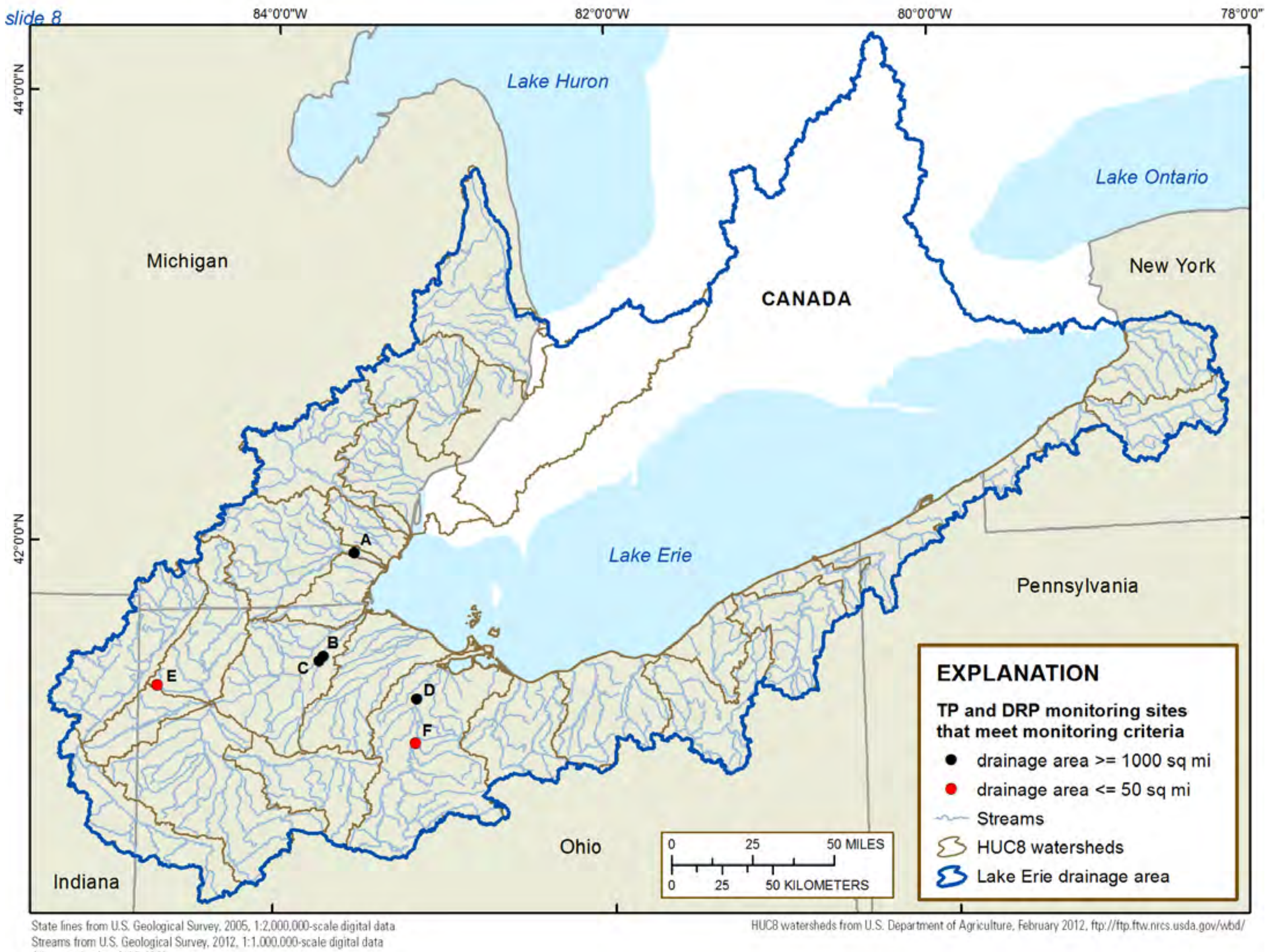

Preliminary Findings - Subject to Change. Monitoring sites active through 2010.

Water Quality Data Needed to Evaluate Conservation Practice Effectiveness

- Limited small watershed data are available in the Lake Erie drainage basin.
  - New small watershed monitoring sites and increased monitoring at existing sites are needed
  - Monitoring should be prioritized in watersheds with potential for very high implementation rates
- Large watersheds are collecting the needed water quality data
  - Monitoring should continue at these sites
- Conservation practice implementation data must be available to water quality researchers for both large and small watersheds.

Northeast-Midwest Institute

Dr. Patrick Lawrence

David White
Former NRCS Chief

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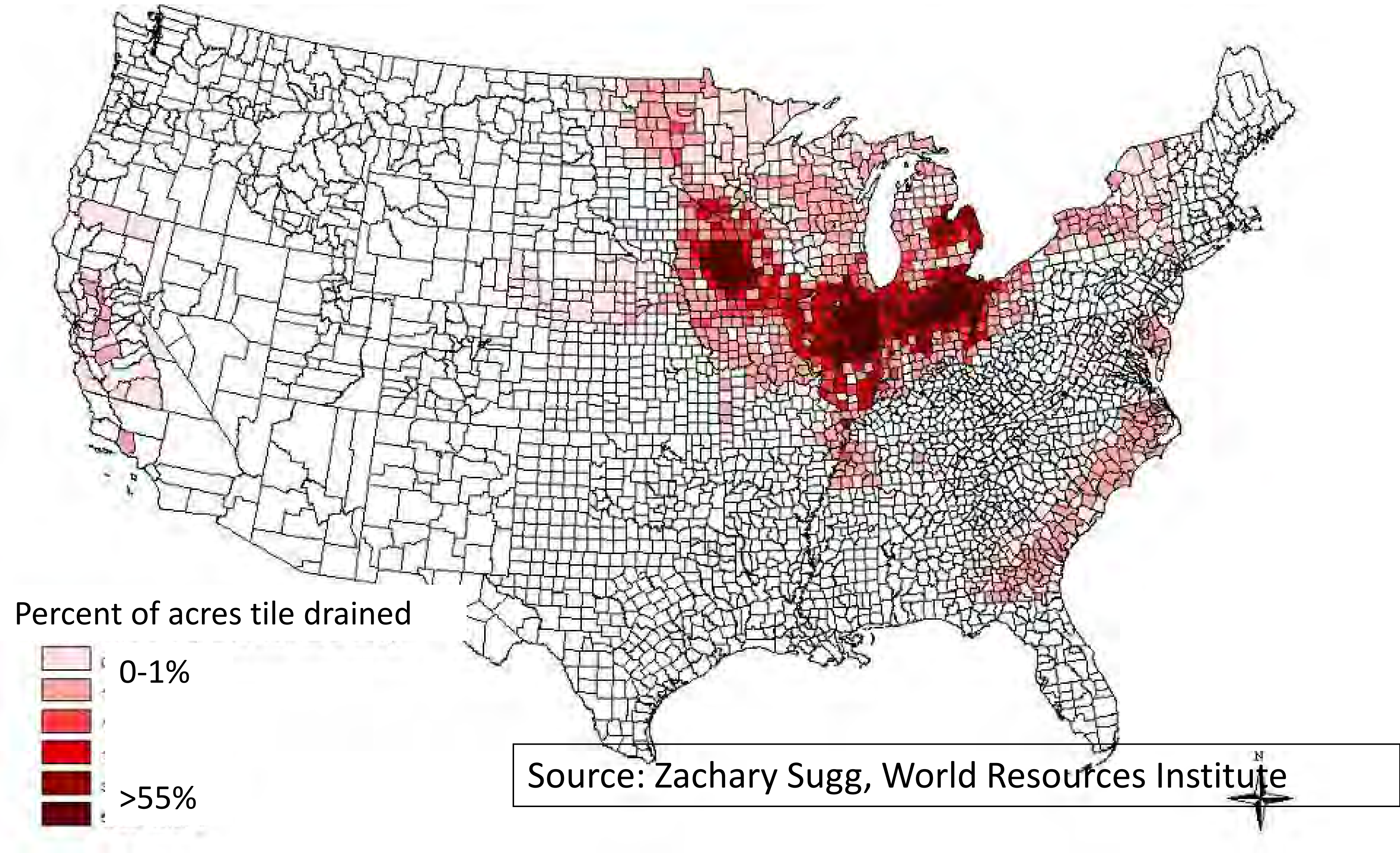
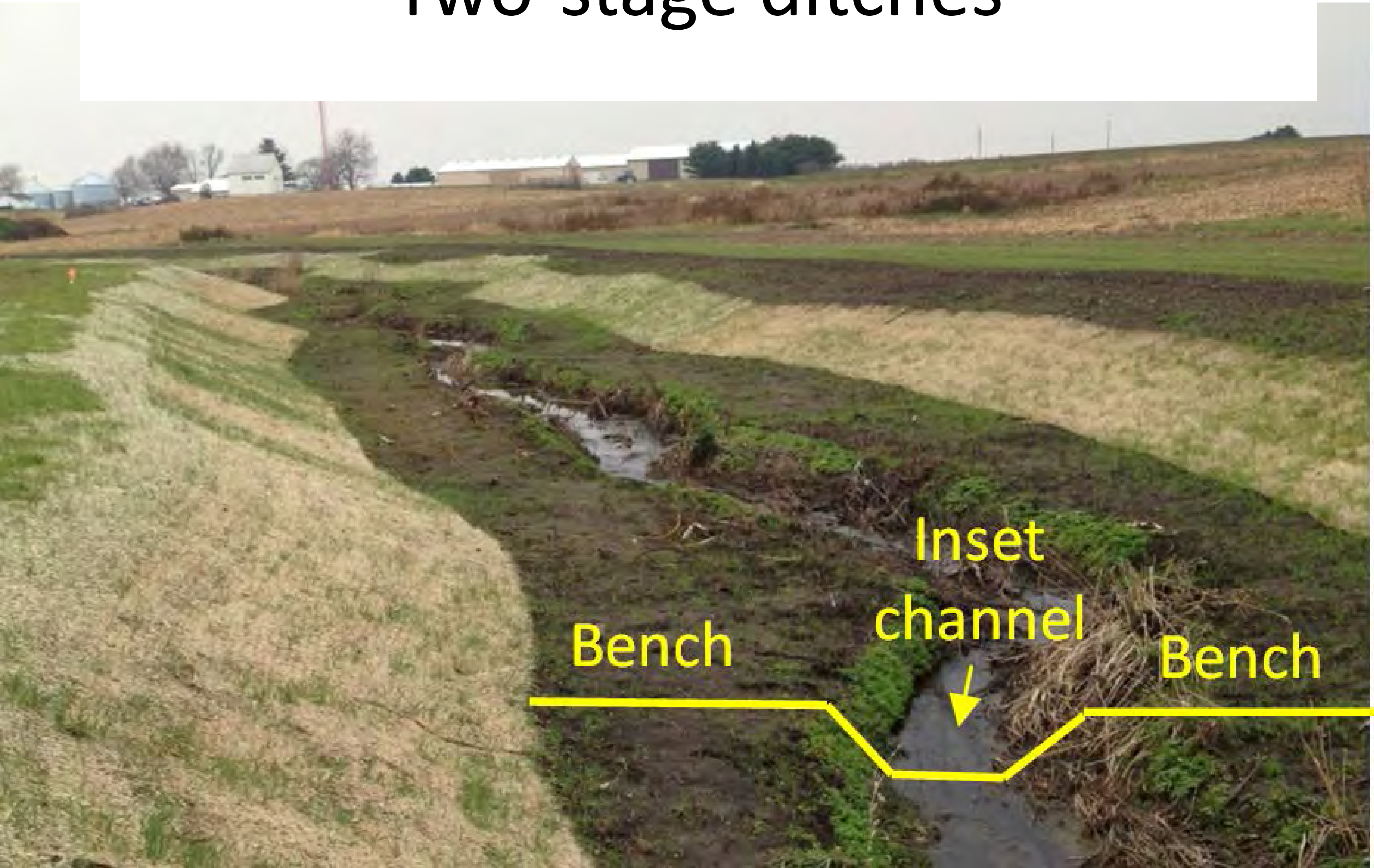
Strategies for Reducing Phosphorous
and Nitrogen Agricultural Lands in the
Great Lakes

Estimated percent of land with subsurface drainage

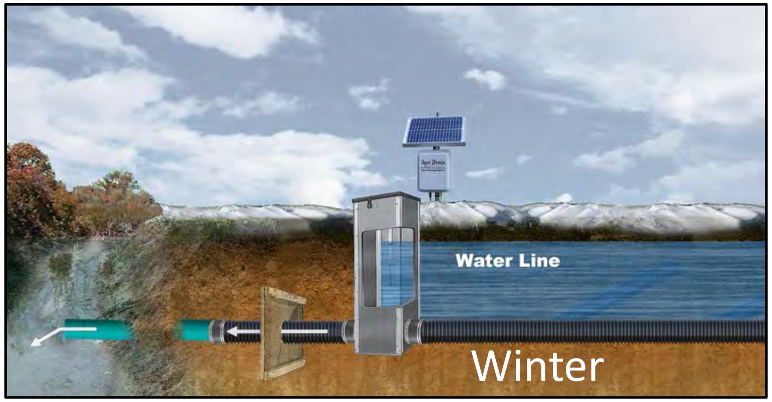


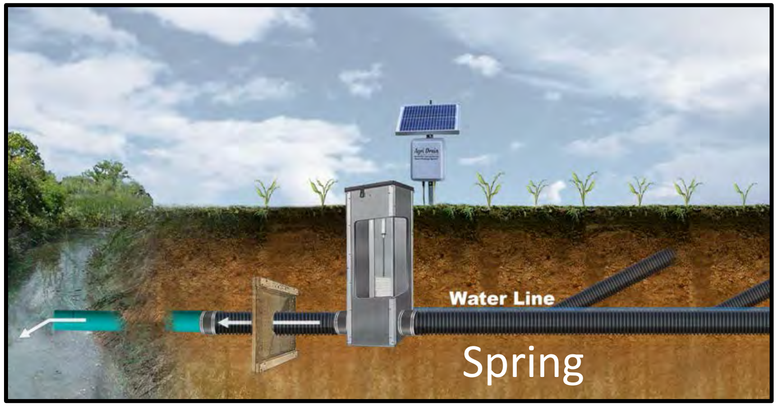
Source: Zachary Sugg, World Resources Institute


Two-stage ditches

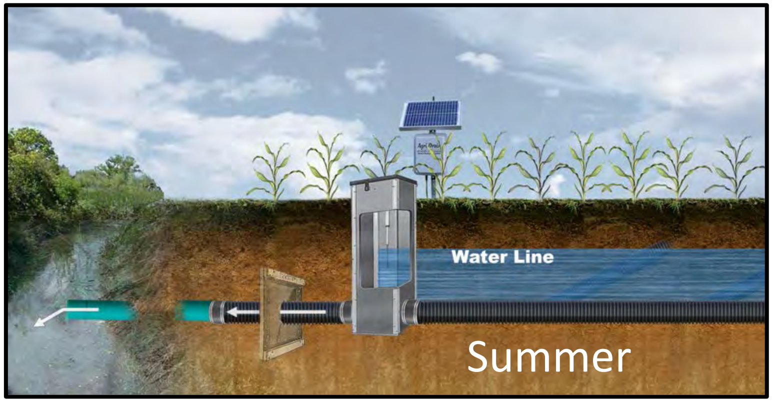


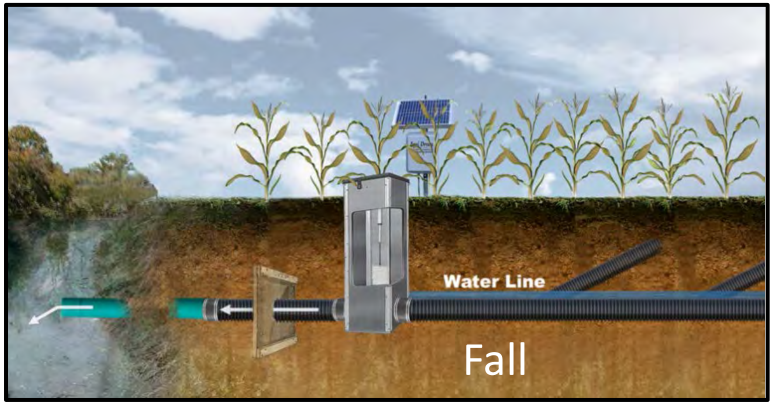
Drainage Water Management



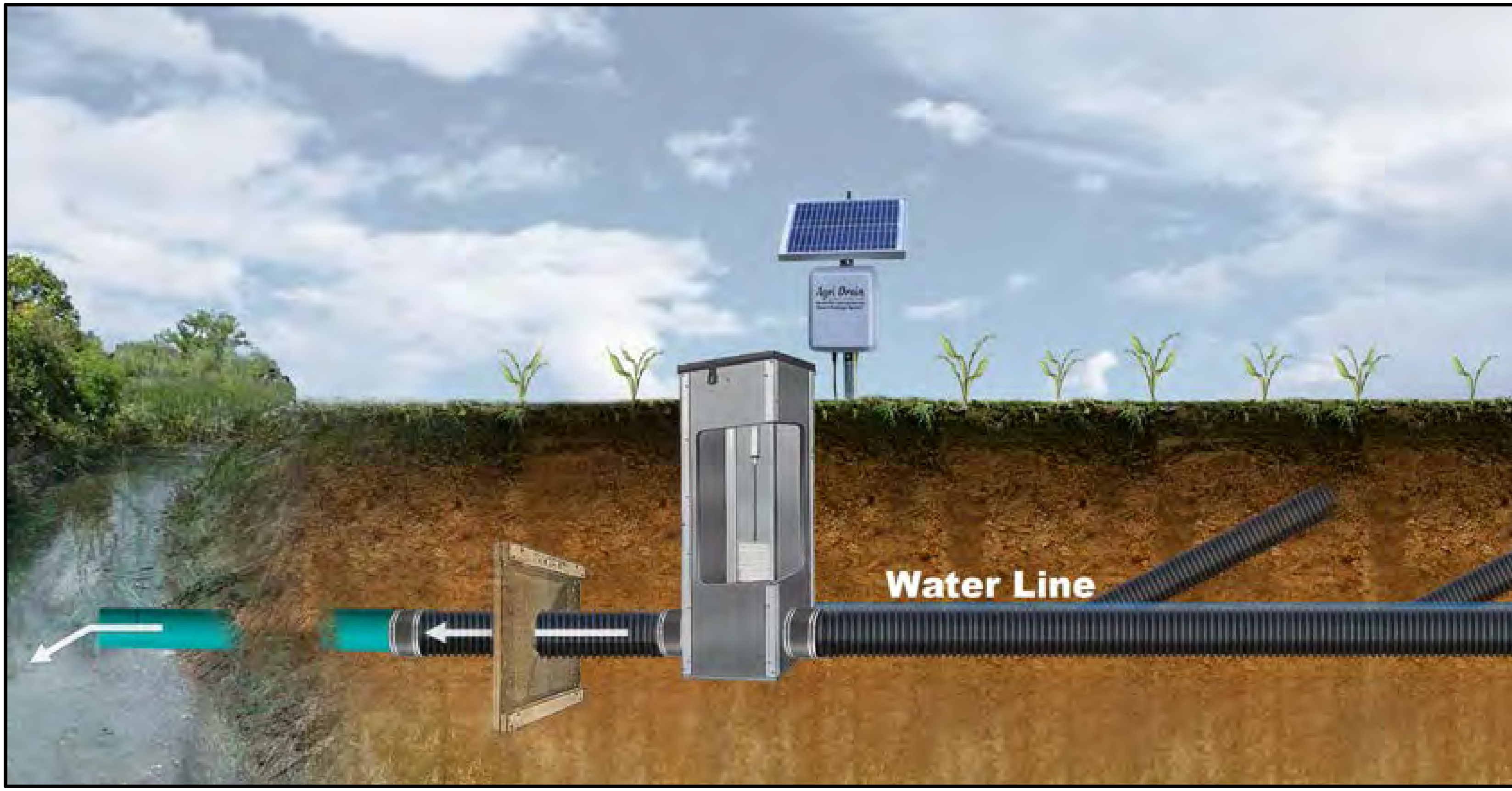


Seasonal Schedule

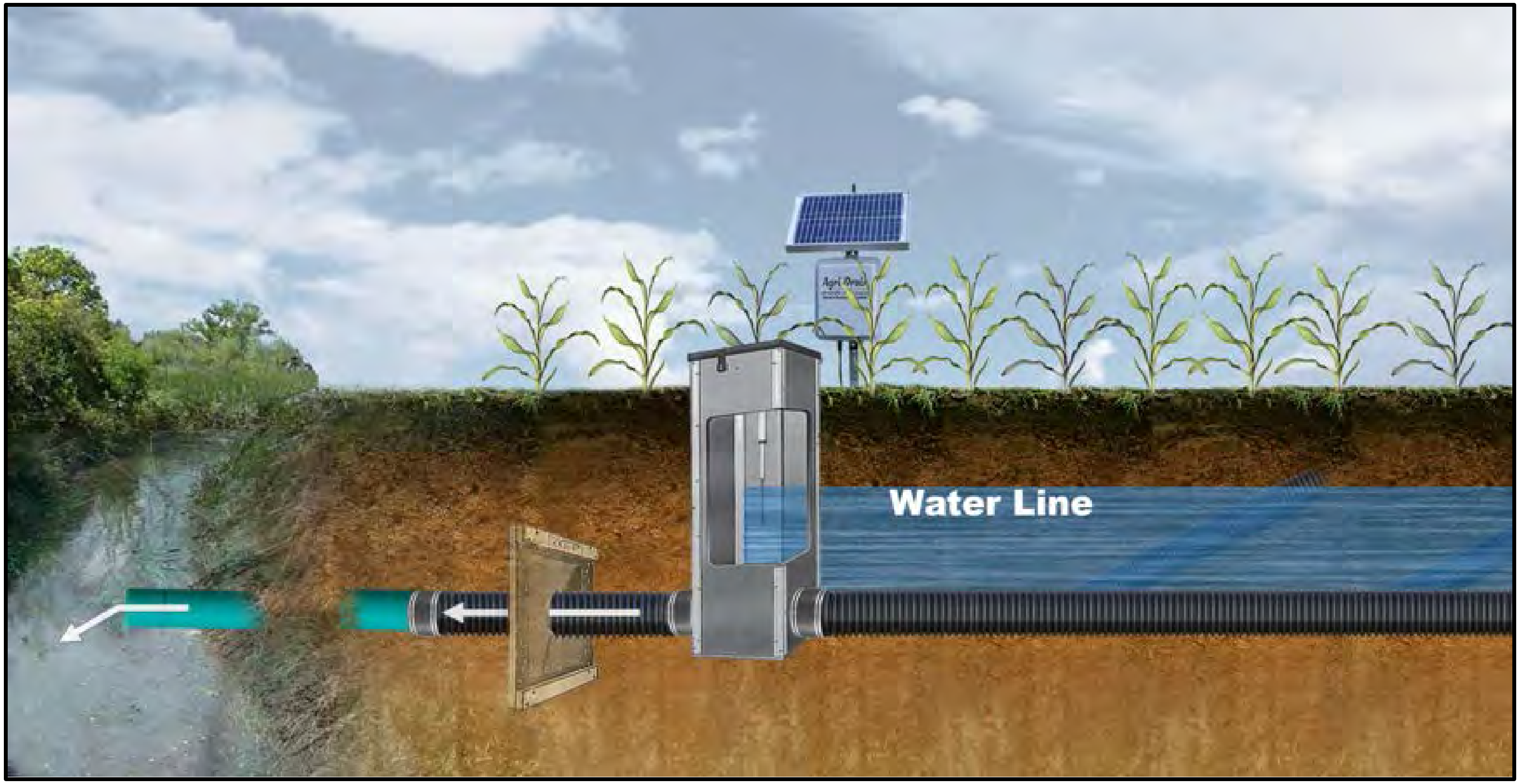




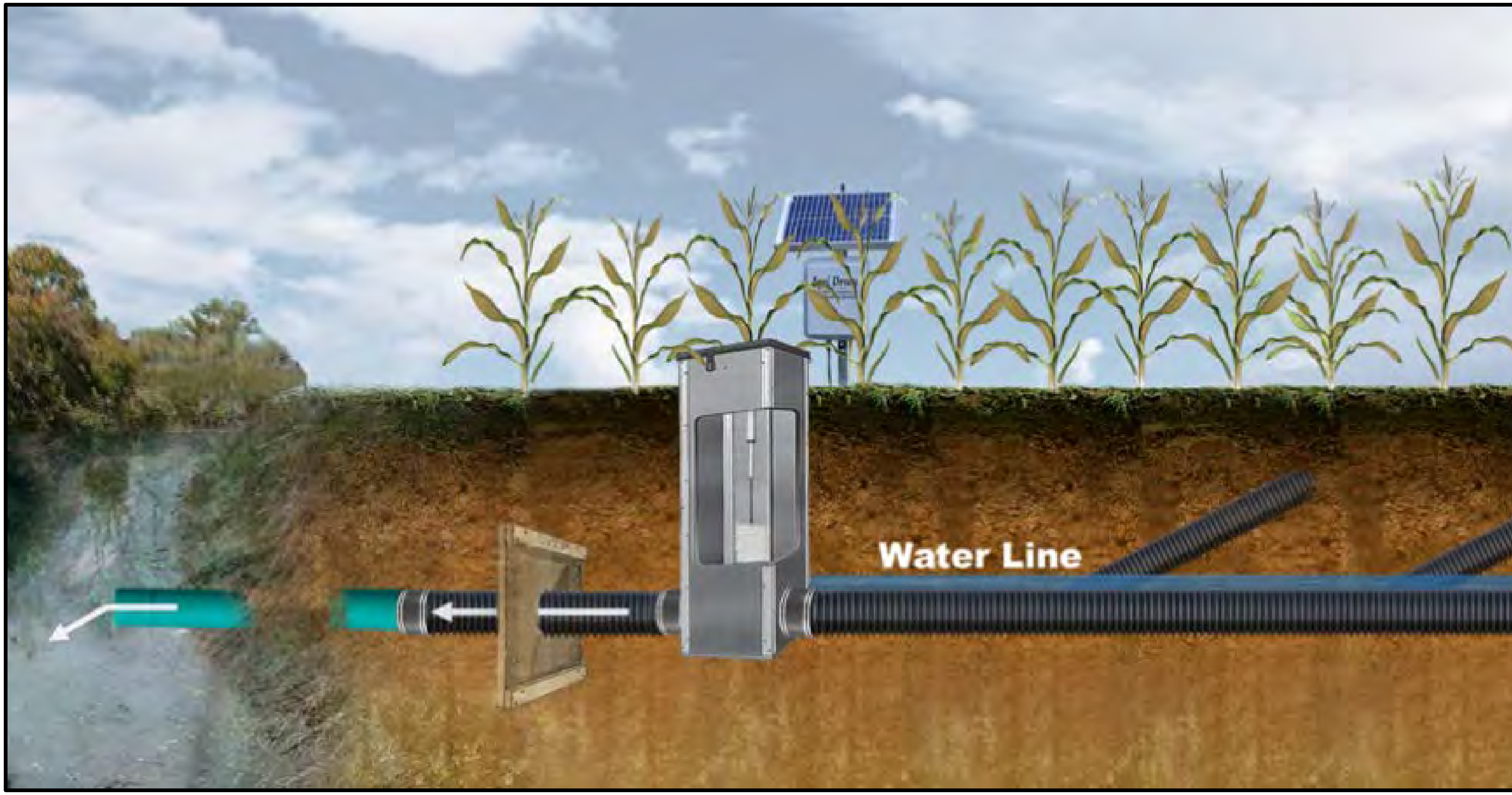
Spring: open gates to let field dry for planting



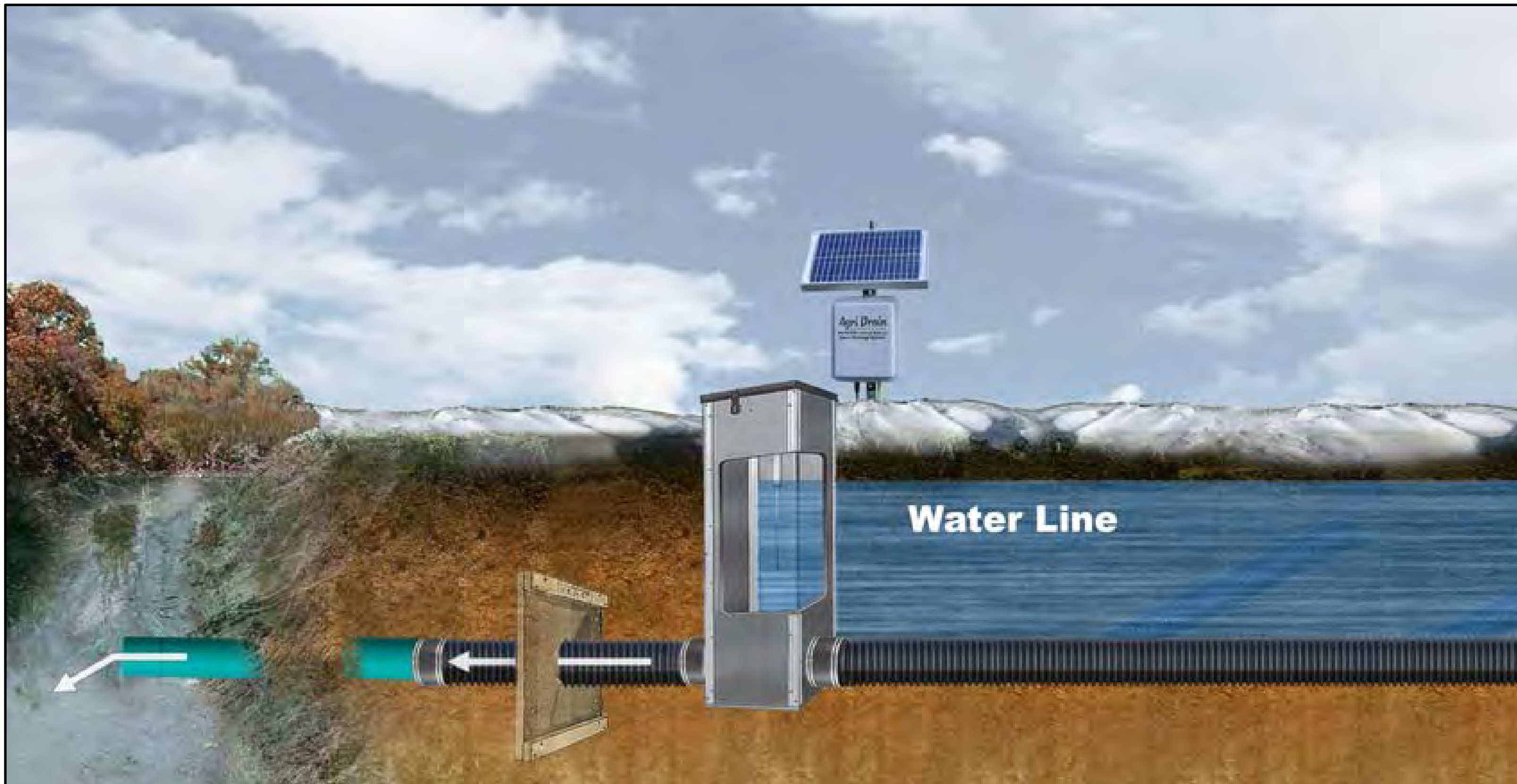
Summer: close and open gates to manage water in field to maximize crop production



Fall: open gates to dry out field for harvest



Winter: close gates to keep water in field



Saturated Buffers

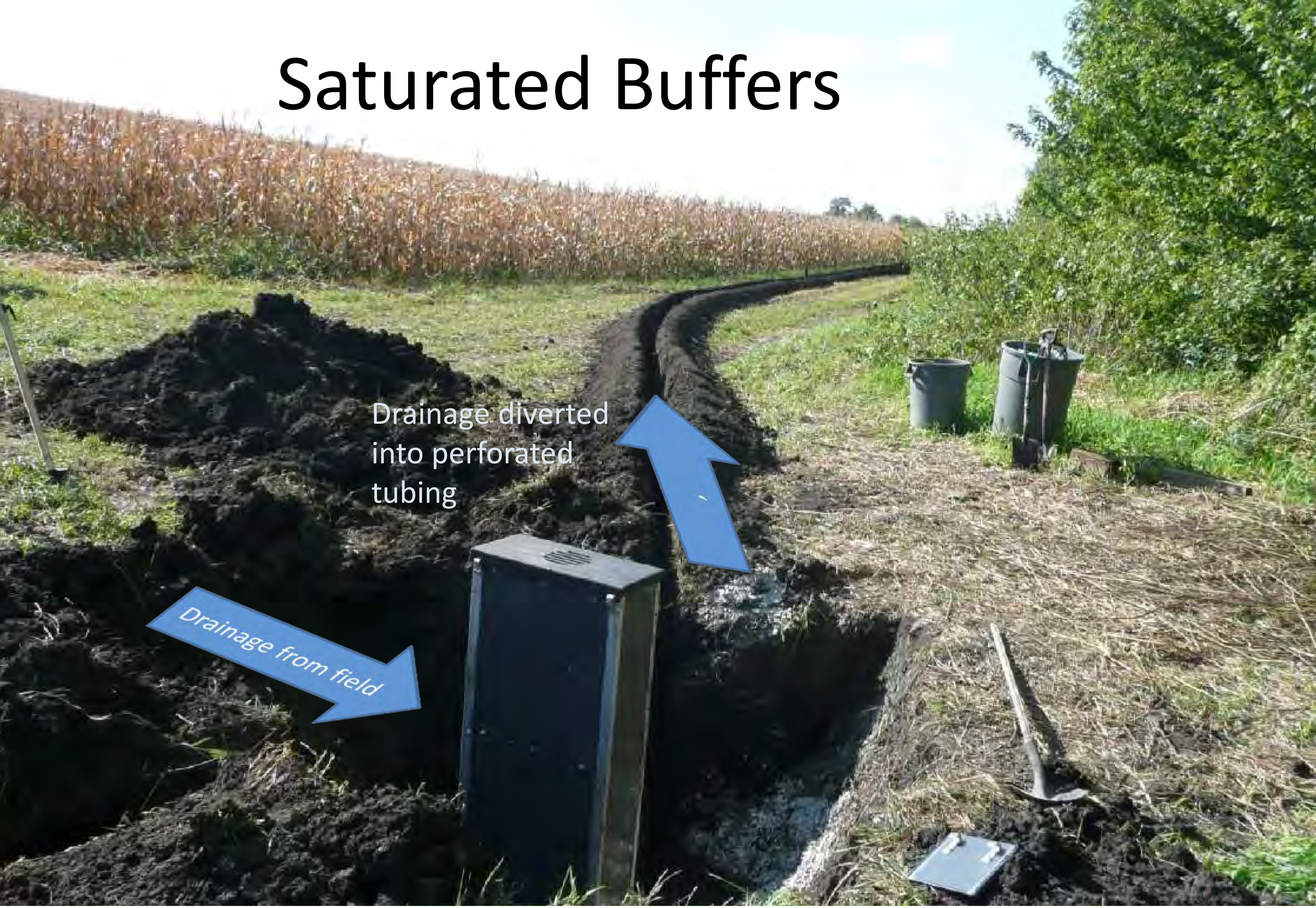
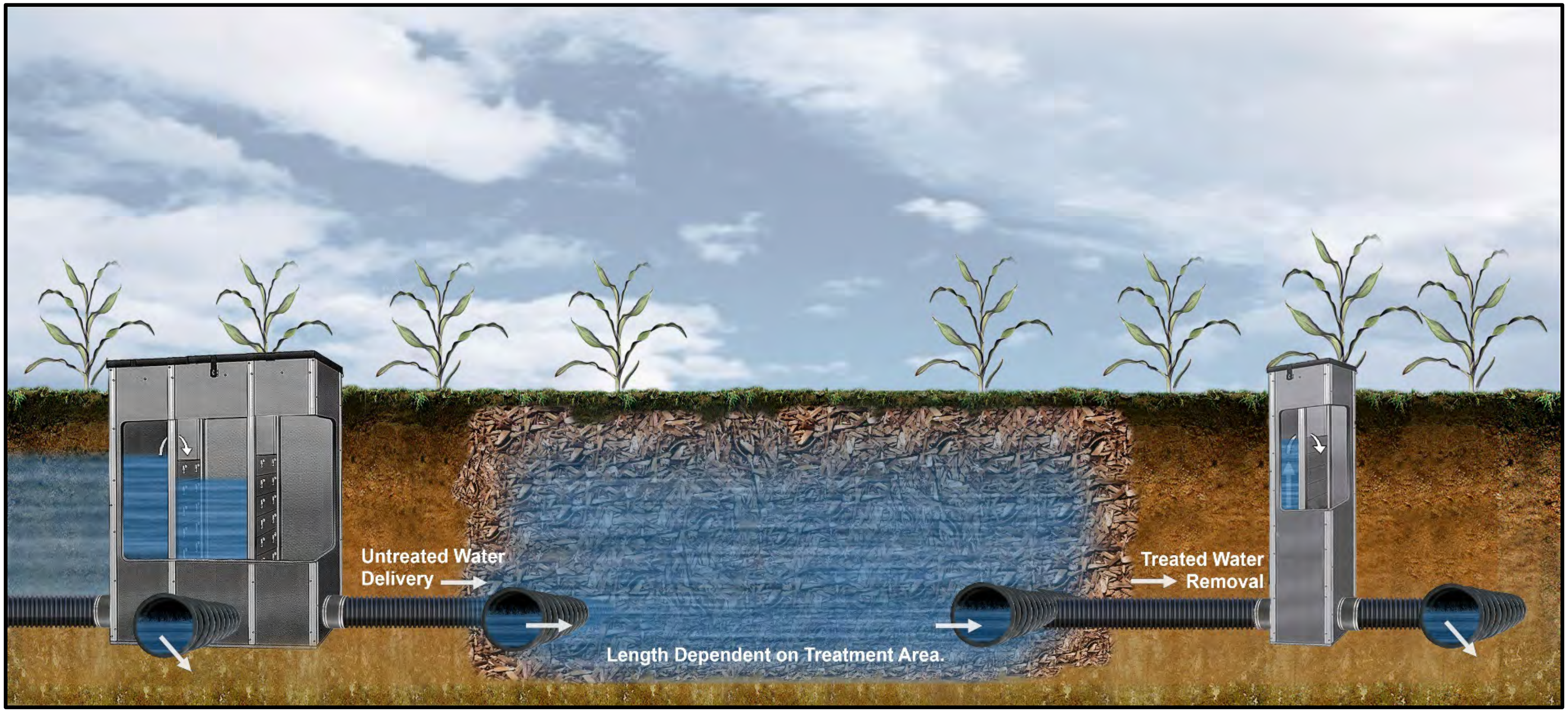


Photo courtesy Dan Jaynes, USDA-ARS)

Bioreactor


Untreated Water
Delivery
Treated Water
Removal
Length Dependent on Treatment Area.

Do not exceed recommended soil test phosphorus levels

Apply all phosphorus below the soil surface

- Applying fertilizer in the soil, not on the soil, substantially reduces phosphorus in surface runoff and also tile drains.

Constructed Wetlands


Cover crops

Alex Echols
Independent Consultant, Principal of Terra Altus

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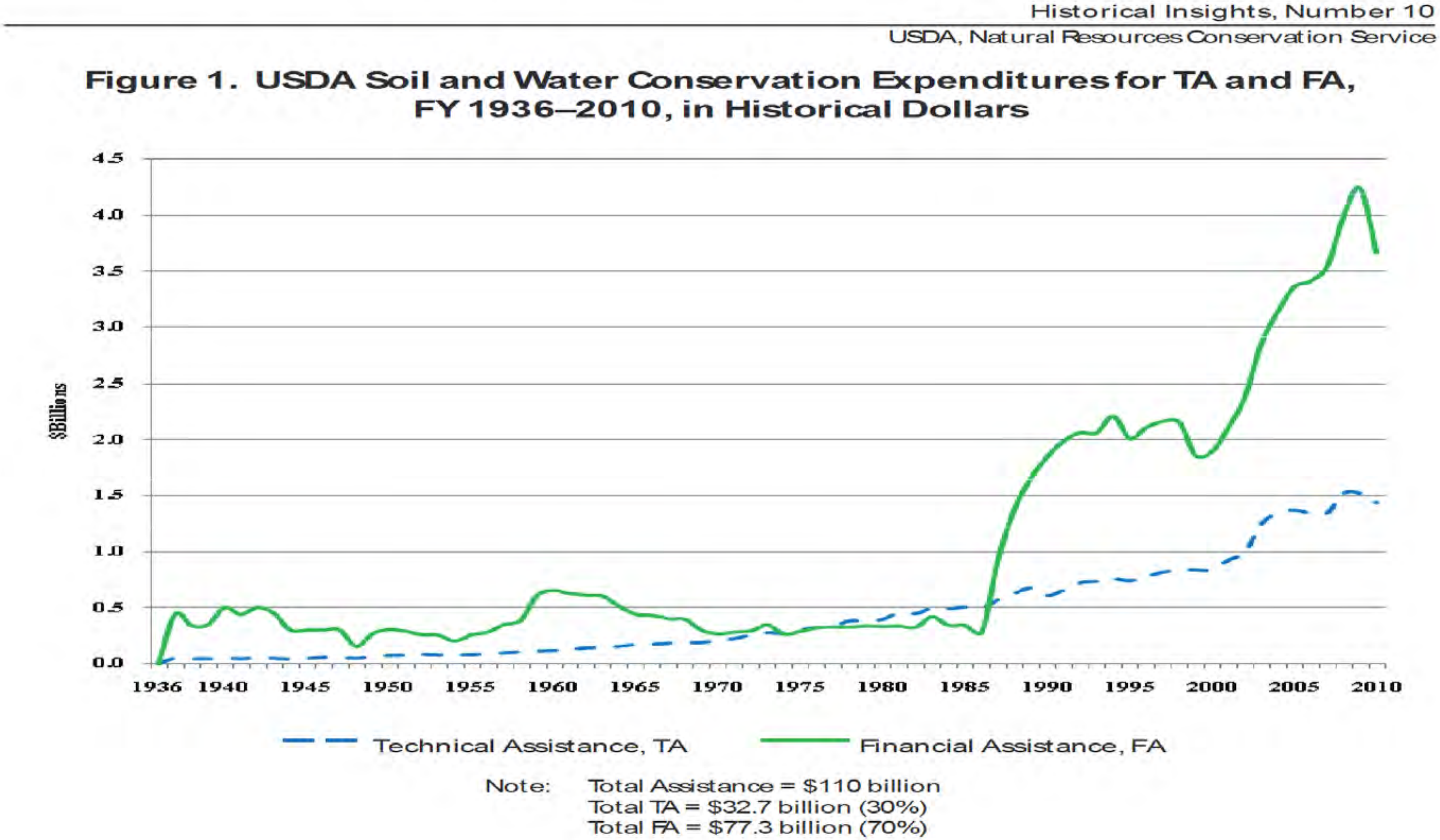
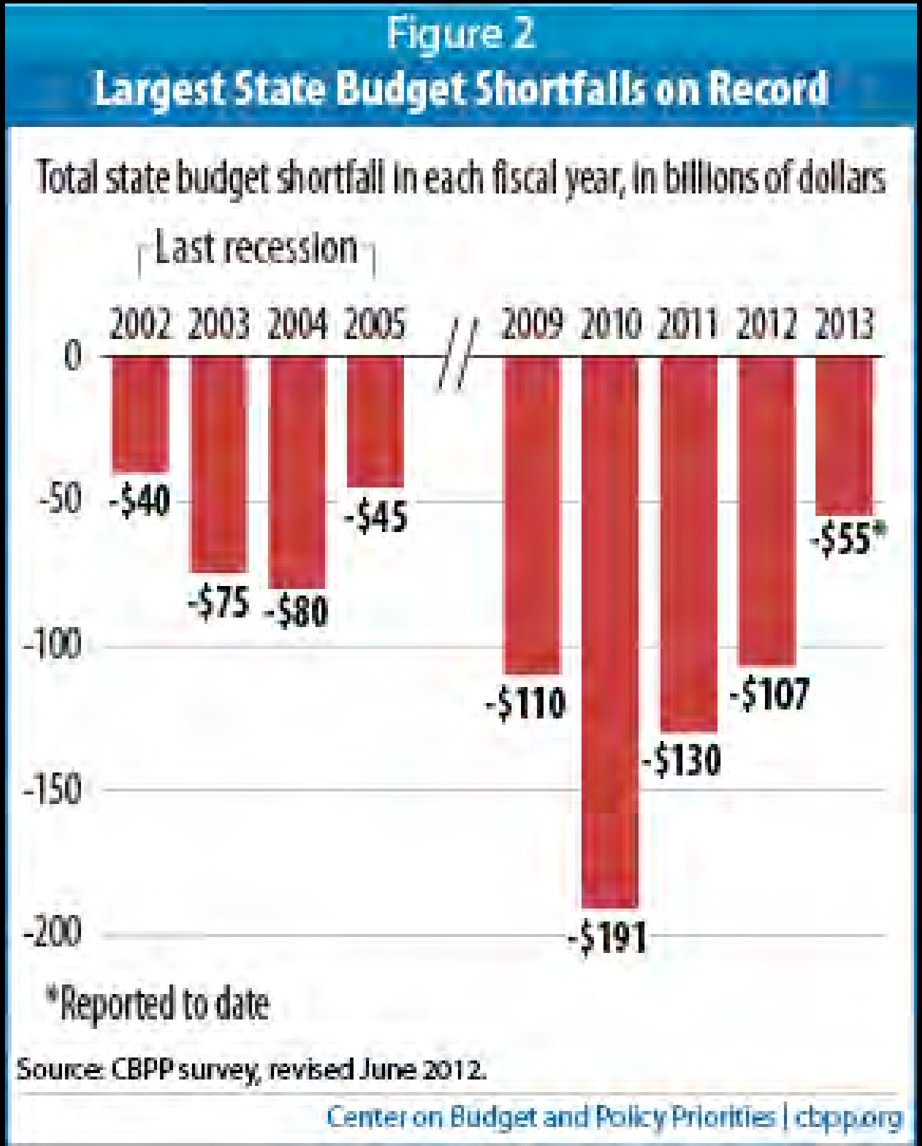
Government Funding for Ag Conservation has Peaked



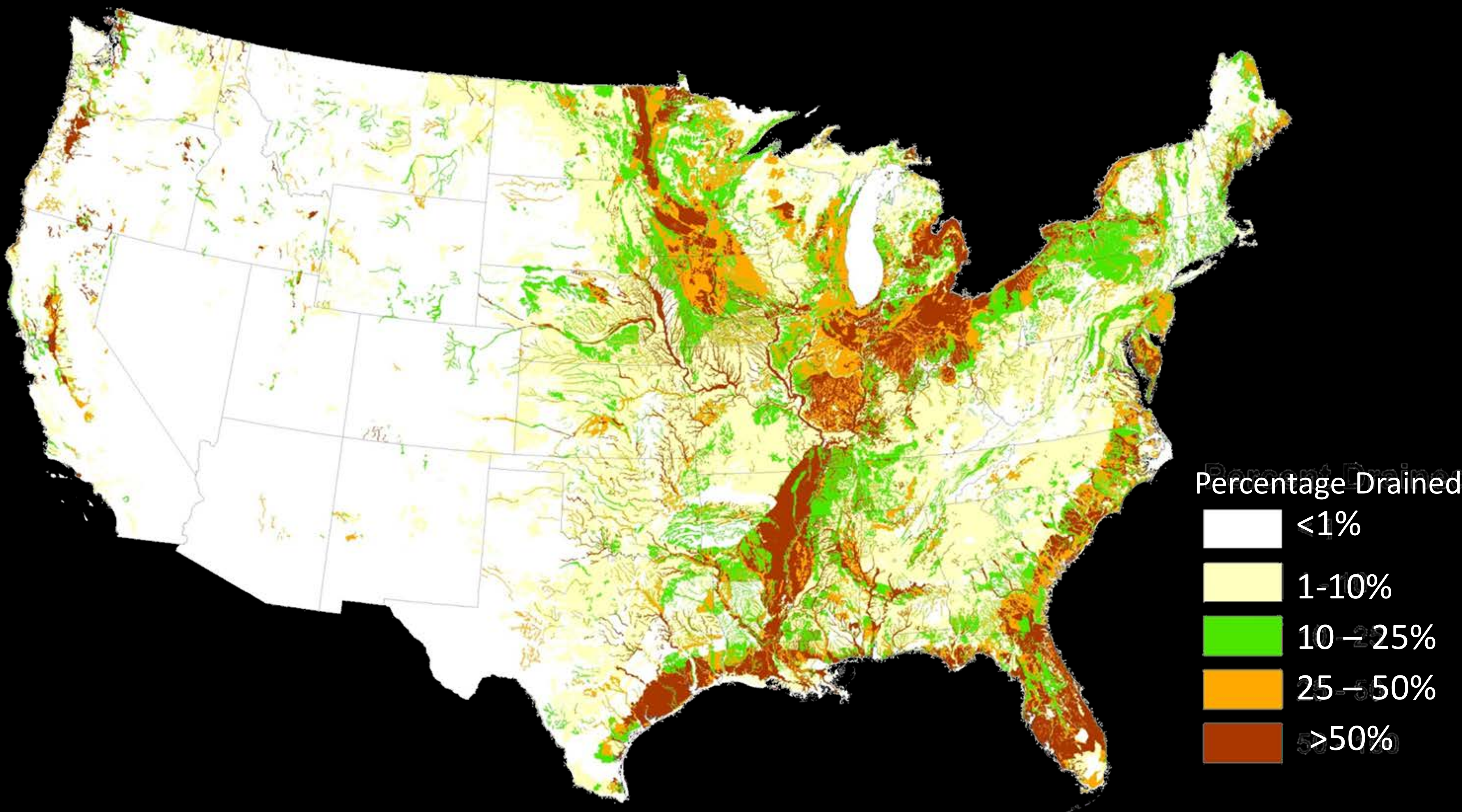
States Are Unable To Make UP Federal Shortfalls



We Need Improved Performance

- We can not just ask for more money
- We need to ask for more from the money
- We need to document what we get for the money
- We need to broaden the basis of support for Ag Conservation
- We need to diversify funding sources

Agricultural Drainage



Jaynes and James 2008)

Example: Opportunity To Expand Funding & Use Market Principles to Support Ag Conservation

Drainage Water Management

- Clear property rights
- Highly tangible
- Easy to quantify changes
- Outstanding performance
- Consistent in metrics with other sources

New Funding Sources Required

- Agriculture can deliver clean water cheaper and more effectively than anyone else
- Just the municipal sector is estimated to face between $300 Billion and $1 Trillion in costs in the next 20 years.
- If even a small percentage of that can be invested with ag producers we can both diversify our funding and build a new base of support

Aligning Incentives

On Farm Benefits	Off Farm Benefits
Increased Production Optimized Inputs ▪ Nutrients ▪ Water ▪ Energy Reduced Risk	Water Quality Greenhouse Gas Reduction Flood Control (possible) But… • Increase cost to producer • Increase management needed • More time from producer

We Need To Get Incentives Right!

If We Get It Right

1. We will get more for our dollar (taxpayer, environmental proponent, and ag producers)

2. Farmers will have new economic opportunity

3. The cost of environmental improvement will be lower because markets reward efficiency

4. We will unleash competition for improving environment which will promote innovation and delivery of benefits