

US EPA ARCHIVE DOCUMENT

# **Soil Health through Conservation Cropping Systems**

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**Shannon Zezula, Indiana State Resource Conservationist**

**Barry Fisher, Indiana State Agronomist**

**Ray Archuleta, Conservation Agronomist, Natl. Soil Health Team**





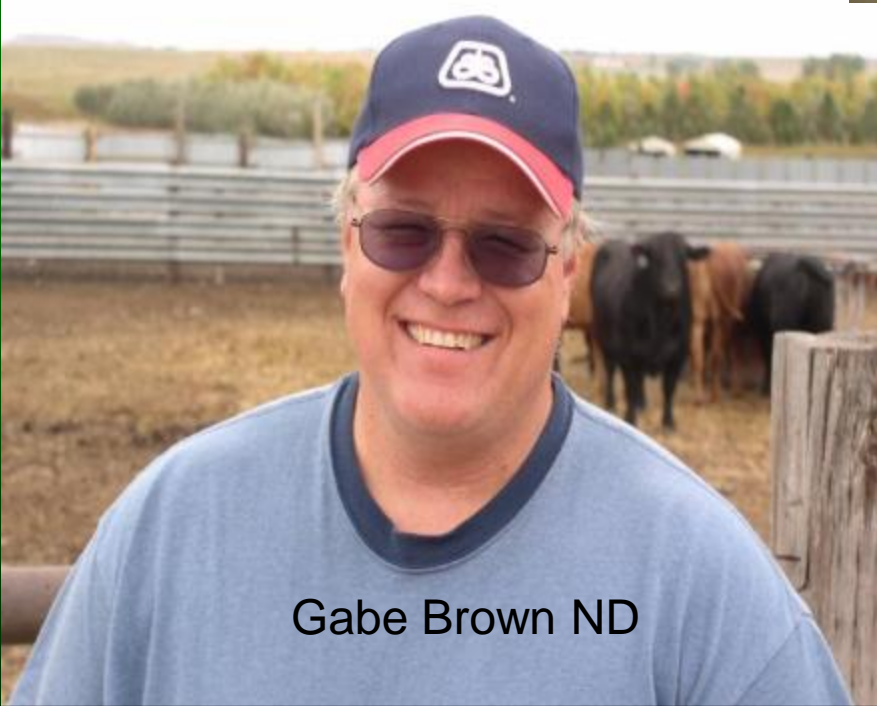
Ray Styer NC



Dave Brandt OH



Steve Groff PA



Gabe Brown ND



Ray McCormick IN



**System      No System**  
**Virginia**

**Stable,  
Sustainable Food  
Supply**



**System      No System**  
**Indiana**



**Un-Managed Pasture**  
**Missouri**

**Pasture System**

**“Insurance” against  
drought, floods,  
markets**

# Synergistic Benefits of the Systems!


## Purdue University

Dr. Eileen Kladvko

- Nutrient management, no-till, crop rotation and cover crops were implemented as a **SYSTEM!**
- Annual Nitrate concentrations in tile water dropped from over 30 mg/l to under 10 mg/l



# BENEFITS OF SOIL HEALTH




Lake Erie = sediment and algae plumes 2011



Worldwide Energy Demand



Lubbock, Texas 2011 = particulate matter

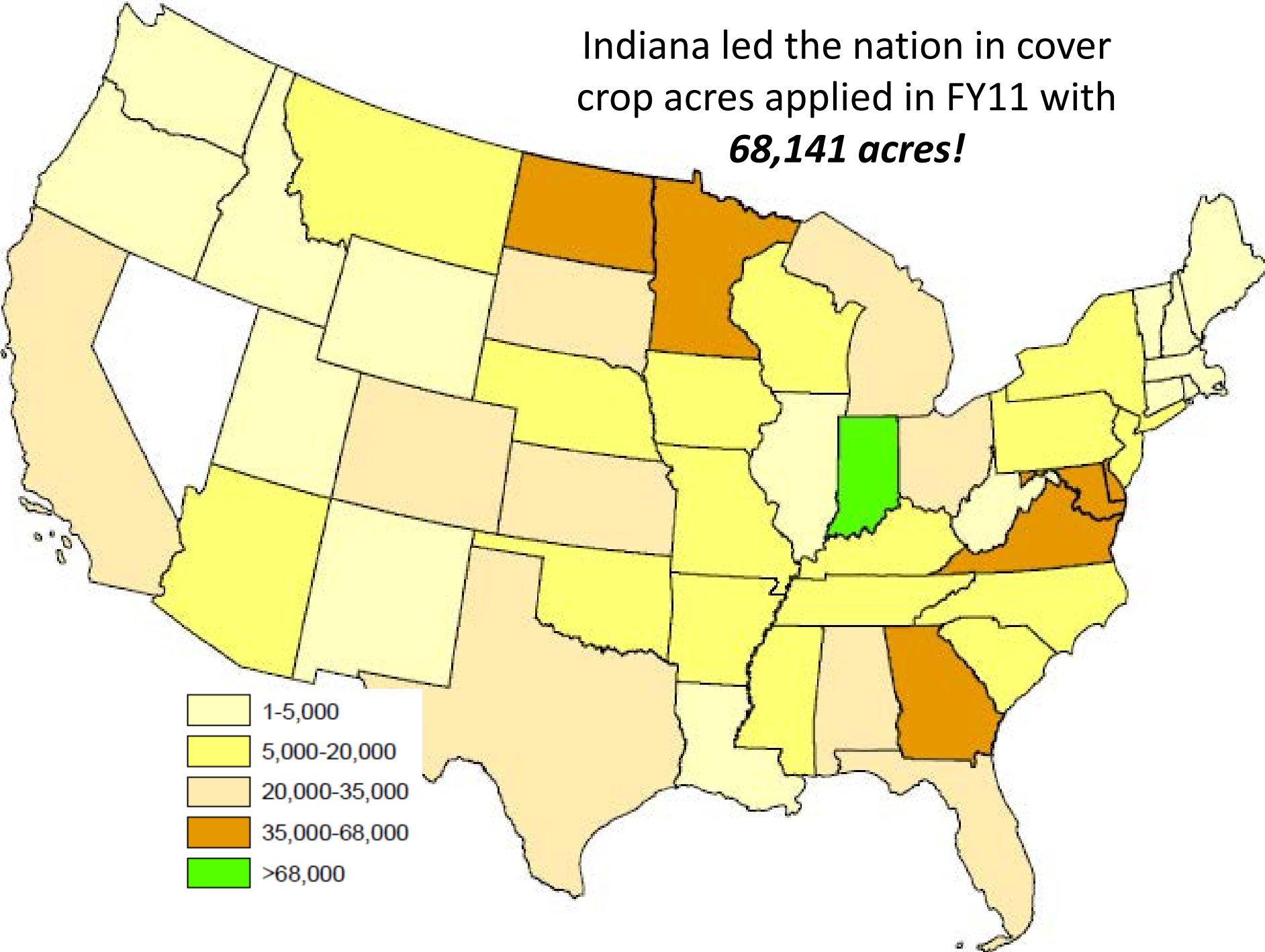


Mississippi River Watershed Flood 2011 = flood damage, sediment and nutrients


# Indiana's **SUCCESS** = Measured by Cover Crops



Indiana led the nation in cover  
crop acres applied in FY11 with  
***68,141 acres!***

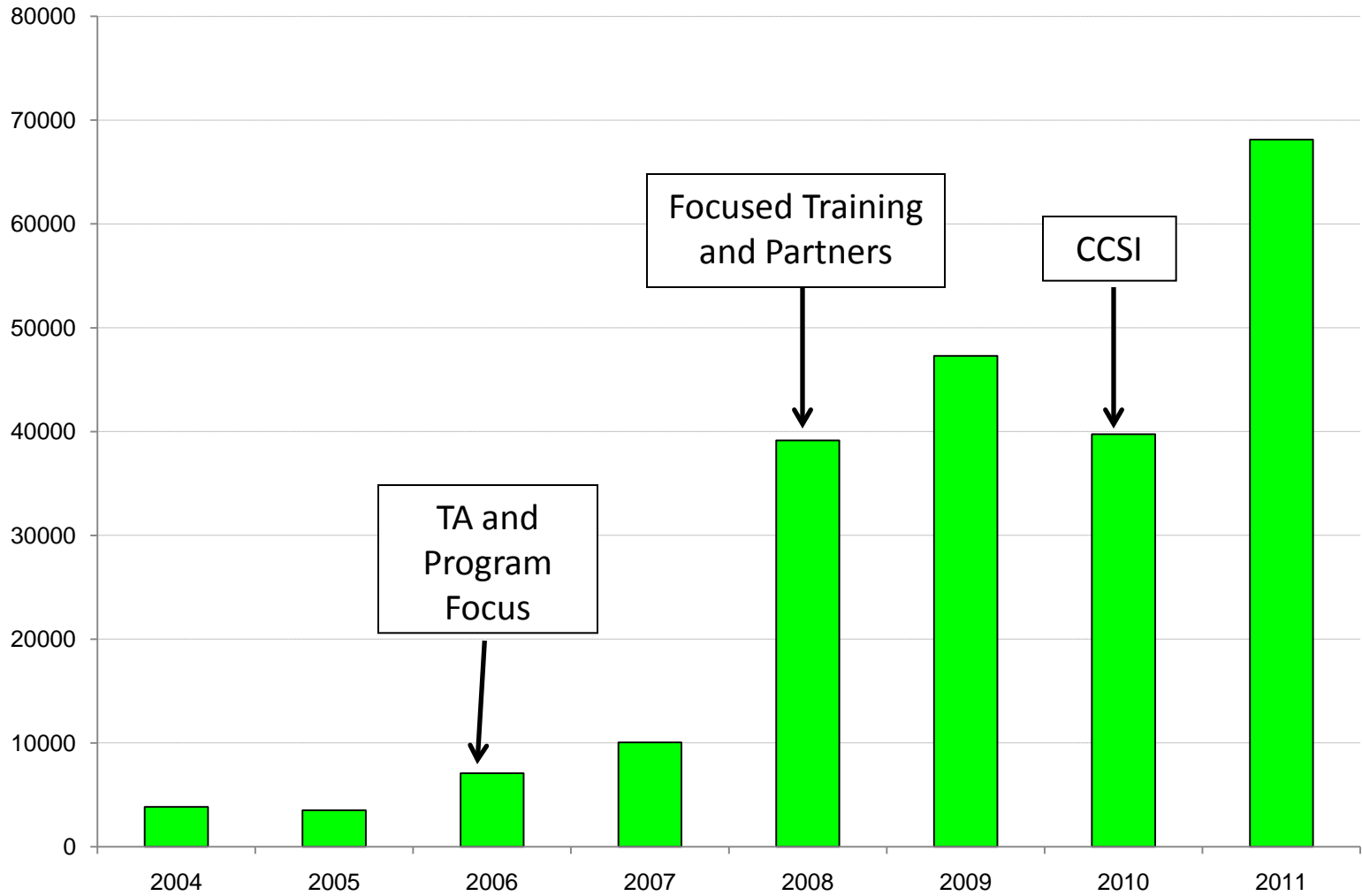




A photograph of a lush green field, likely a cover crop field, with white text overlaid in the center. The text reads: "From Indiana's Tillage Transect, there were an estimated **180,000+** *acres* of cover crops planted for crop year 2011!".

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*acres* of cover crops planted for  
crop year 2011!

# INDIANA APPLIED COVER CROP ACRES



## INDIANA'S ROAD TO SUCCESS:

- **2010 – present** = Conservation Cropping Systems Initiative (CCSI)
  - CCSI = workshops, field days, and technical assistance to producers
    - To Date = over 130 workshops and presentations;  
over 7500 farmers and private providers
    - The Future = expand and engage the ***PRIVATE SECTOR*** and ***MONITOR/MEASURE*** benefits

# Conservation Cropping Systems

## PUBLIC COST SAVINGS



**No System =  
Higher likelihood for  
environmental  
concerns**



**Gully Erosion Repair =  
1 acre treated  
\$16,000 to install  
40+ hours NRCS staff time**



**SOLUTION =  
Conservation Cropping  
Systems**

**60+ acres treated  
\$16,000 over 3 years  
15 hours NRCS staff time  
over 3 years**

# KEY POINTS TO INDIANA'S SUCCESS:

- Soil Health sells conservation to farmers once they understand it
    - Farmers need educated and *High-Quality* technical assistance to successfully overcome the risks
  - Conservation Cropping Systems are time-efficient systems that provide significant results
  - A consistent commitment from all partners and engaging the private sector is essential
- 
- A close-up photograph of a person's hand holding a fishing rod. The hand is wearing a white long-sleeved shirt. The fishing rod is dark blue and black, with a silver reel. The background is a bright green, textured surface, possibly a boat's hull or a fishing net.

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# Conservation Cropping Systems

## WILDLIFE



**No System =  
no cover, minimal  
biology**



**Healthy Soil Biota**

**Solution =  
Conservation  
Cropping Systems**



# Conservation Cropping Systems

## AIR QUALITY



**No System =  
particulate  
matters and  
emissions**



**Lubbock, Texas 2011 =  
particulate matter**

**SOLUTION =  
Conservation  
Cropping Systems**





# Conservation Cropping Systems

## WATER QUANTITY

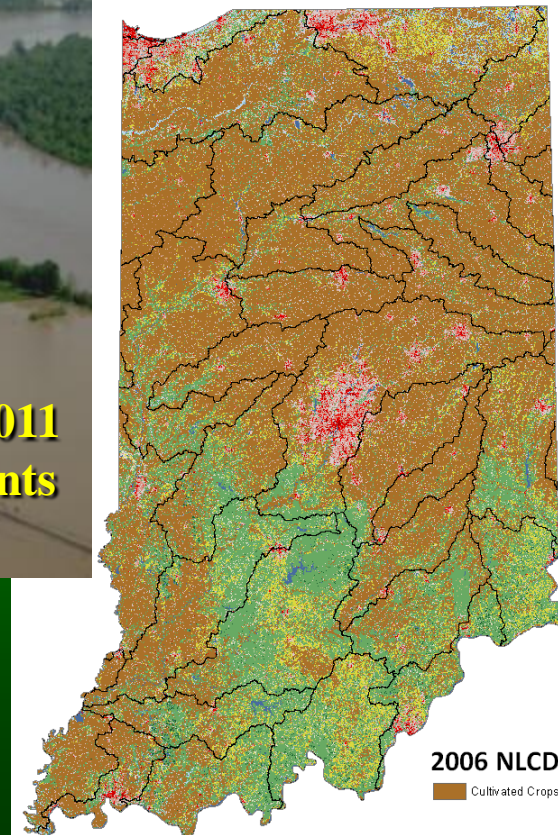
**SOLUTION =  
Conservation Cropping  
Systems on a watershed  
scale**



**No System =  
more runoff &  
less water-  
holding capacity**



**Mississippi River Watershed Flood 2011  
= flood damage, sediment and nutrients**



# Conservation Cropping Systems

## ENERGY



**No System =  
multiple tillage  
passes = fuel**



**Worldwide Oil Demand**

**SOLUTION =  
Conservation  
Cropping Systems**



# CONVENTIONAL Farming

Founded on Tillage :

- Degrades Air, Water, Wildlife...
- Requires multiple trips across the field = more fuel, bigger machinery, repetitive labor
- Excessive runoff, erosion, compaction & nutrient losses
- Releases Carbon and  $\text{NO}_x$
- Disrupts soil biology = Lost soil stability, decreased water-holding capacity & lost nutrient cycling



# CONSERVATION Cropping Systems



Founded on No (Never)-Till / Strip-Till:

- IMPROVES Air, Water, Wildlife...
- Requires only **1** trip across the field = less fuel, less machinery, enables skilled labor
- Limits erosion, compaction & nutrient runoff
- Sequesters Carbon and retains  $\text{NO}_x$
- Improves soil biology = Stable soil + water-holding capacity & functional nutrient cycling



# COVER CROPS in the System



## Year-Round LIVING Cover:

- Improves Water Quality
  - Protects the Soil
  - Traps Nutrients
  - Reduces compaction
  - Increases infiltration
- Promotes Soil Biology
- Builds and Sequesters Carbon



Cover crop – no cover

# NUTRIENT MANAGEMENT and PRECISION TECHNOLOGY

## in the System

- Apply right source and right amount, at the right time, in the right place based on soil function, biology and crop need

The Soil is NOT a chemistry set

- Minimizes soil disturbance, compaction and overlap
- Reduces nutrient losses and improves soil biological function



# STRATEGIC BUFFERS in the System



- Strategic locations =
  - Low-Yielding Areas
  - Filtering Opportunities



- Reduces inputs, filters sediment and nutrients, provides habitat