

## Reaching The Nutrient Reduction Strategy Goals

Matthew Helmers

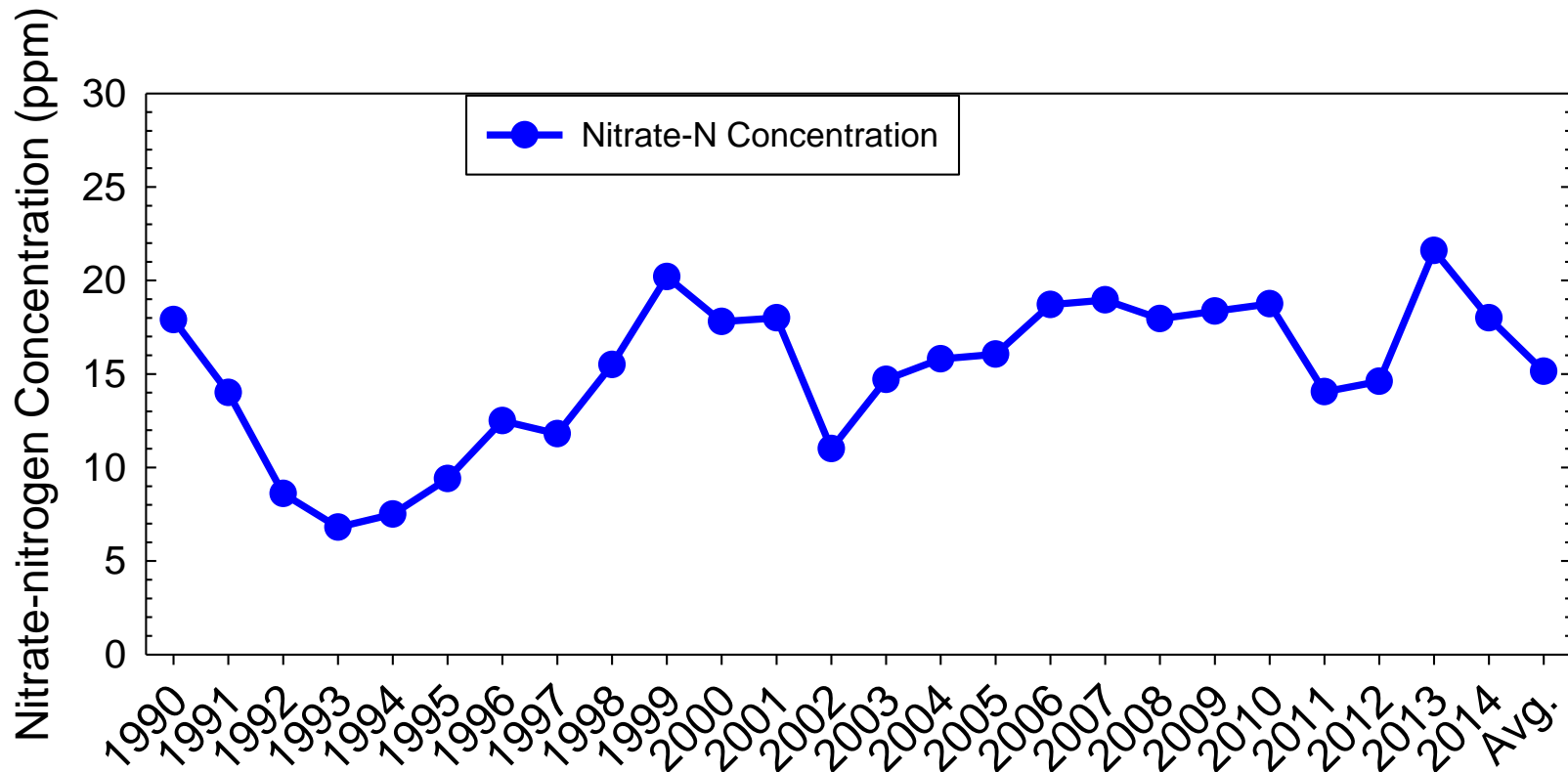
Dean's Professor, College of Ag. & Life Sciences

Professor, Dept. of Ag. and Biosystems Eng.

Iowa State University

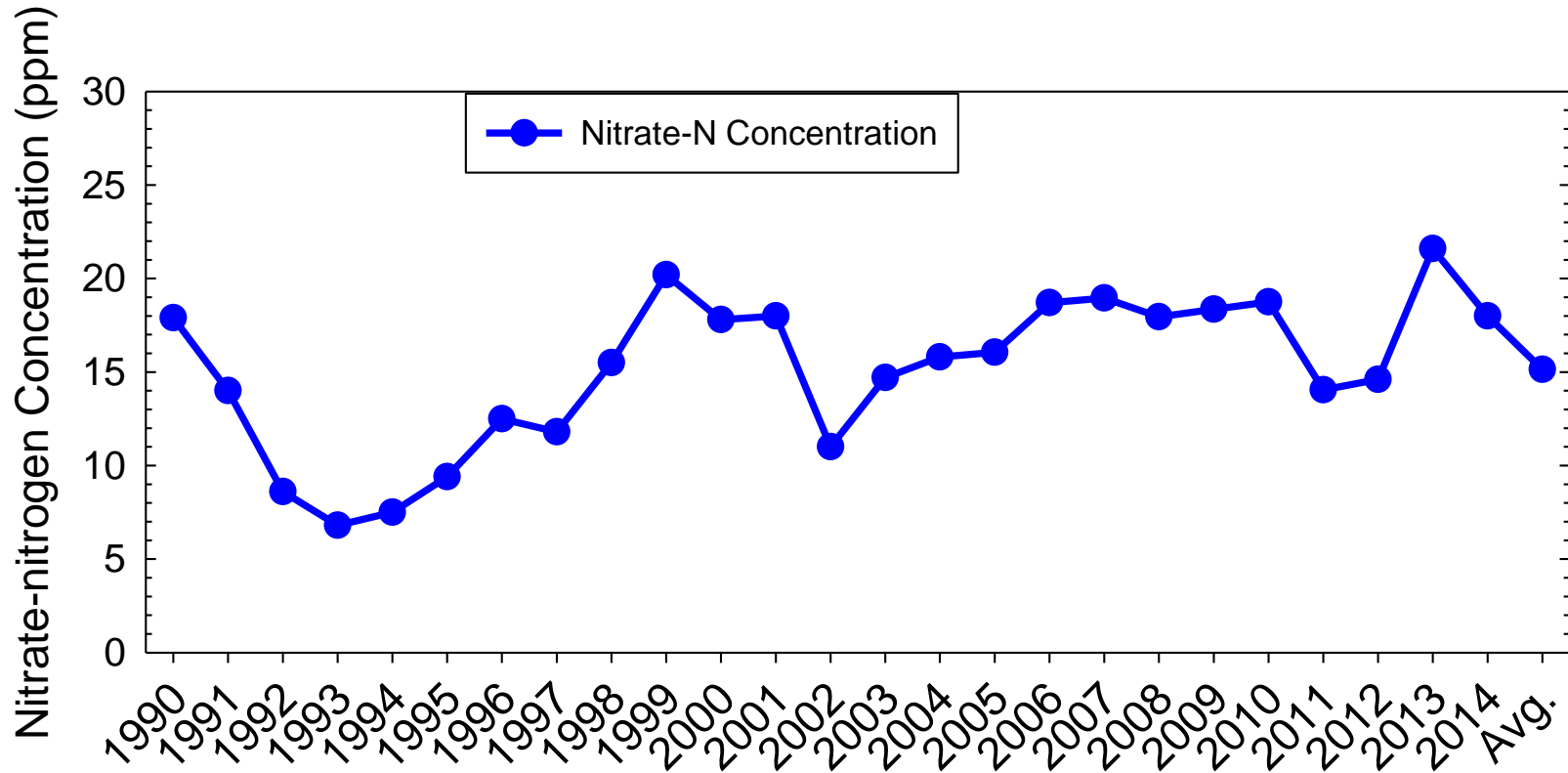
# How Does Nitrate Leaching Vary from Year to Year?

# Twenty-Five Year Summary of Nitrate-N Concentration



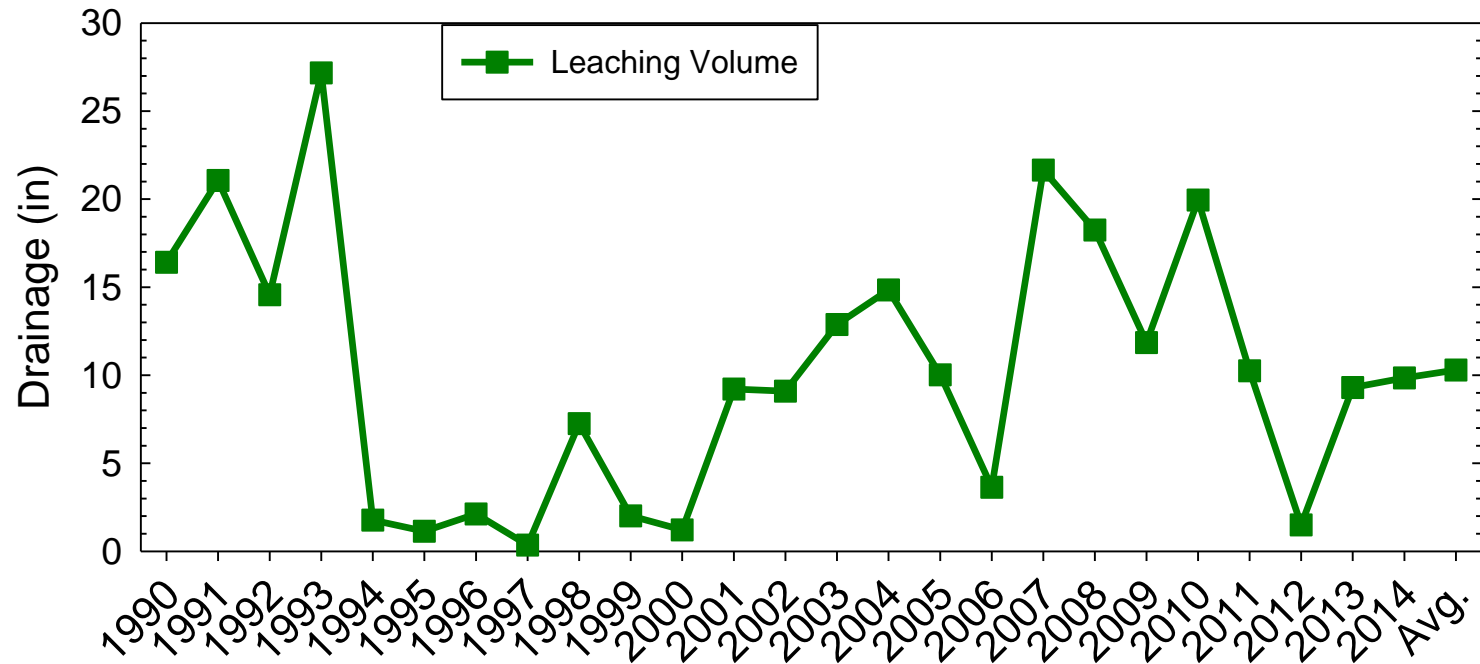
What is Different over this Period?

# Twenty-Five Year Summary of Nitrate-N Concentration



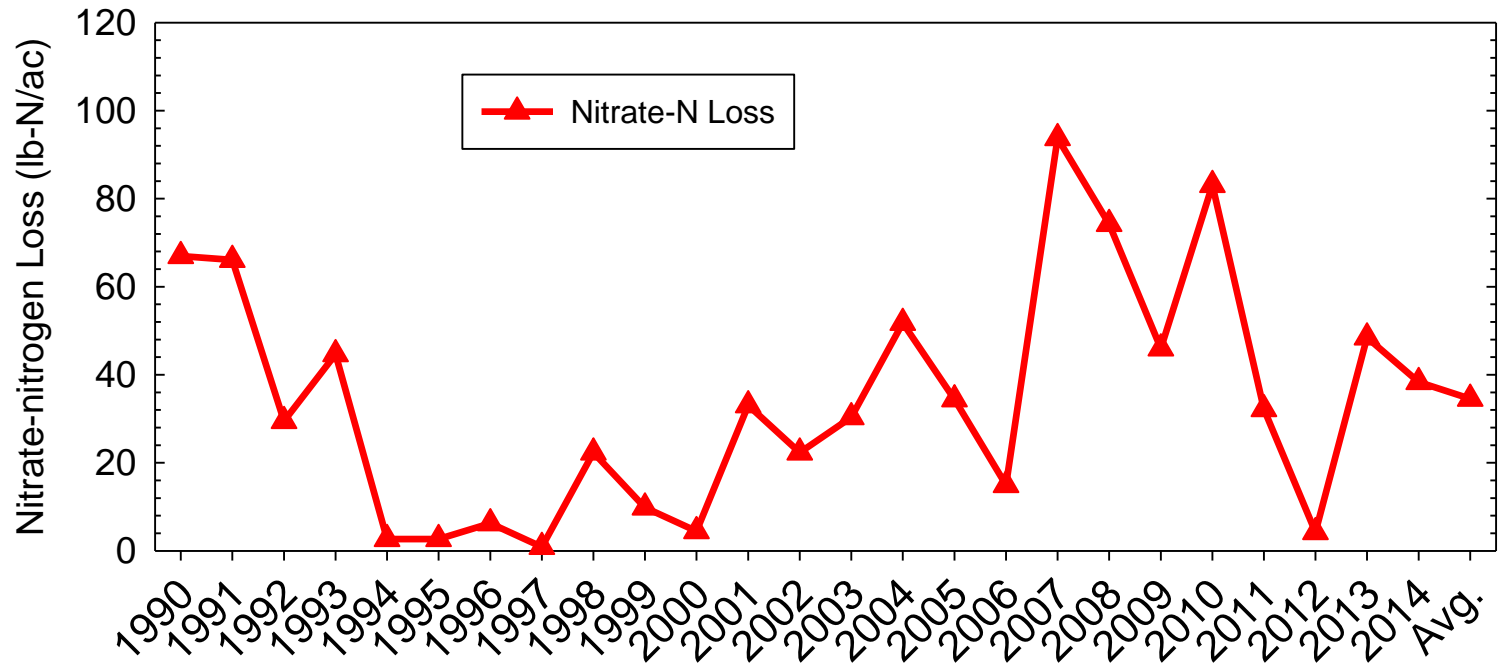
Combined Corn-Soybean System – Same N management  
– Early Spring Sidedress at 150-160 lb-N/acre

# Twenty-Five Year Summary of Leaching Volume



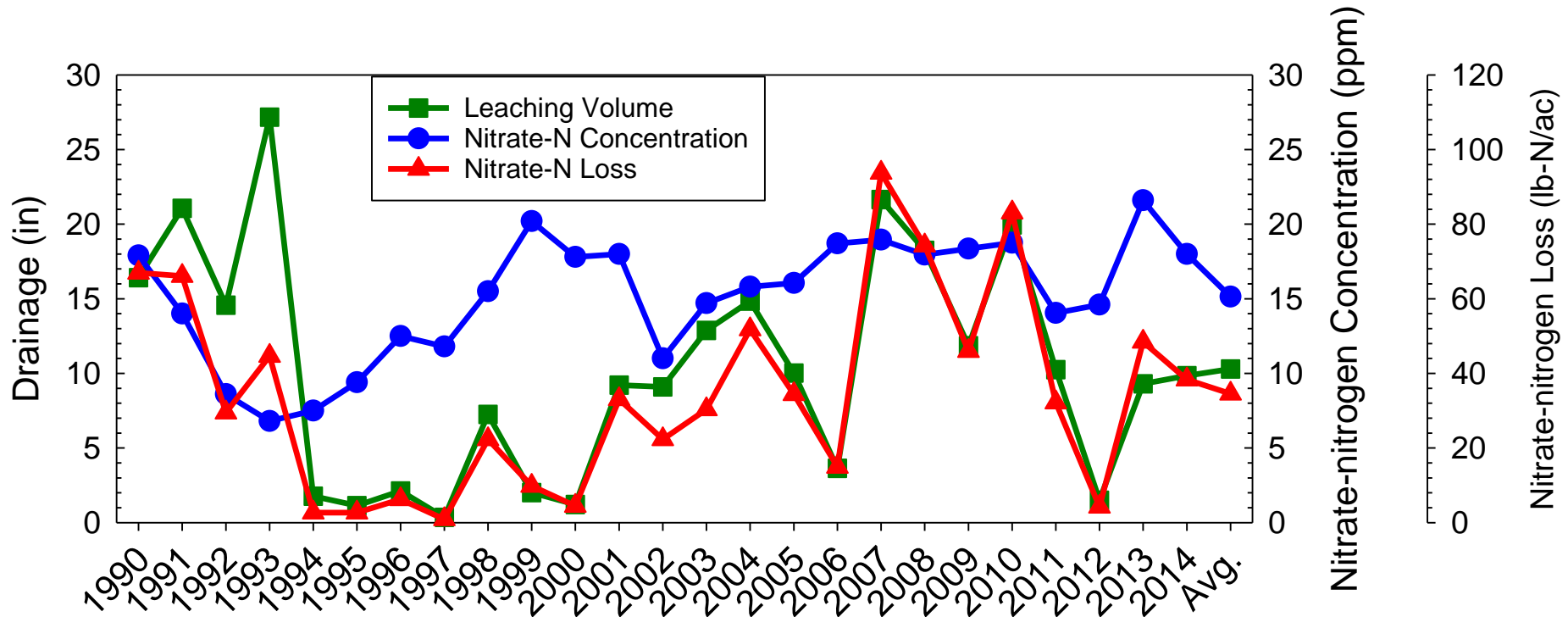
Combined Corn-Soybean System – Same N management  
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# Twenty-Five Year Summary of Nitrate-N Loss



Combined Corn-Soybean System – Same N management  
– Early Spring Sidedress at 150-160 lb-N/acre

# Twenty-Five Year Summary

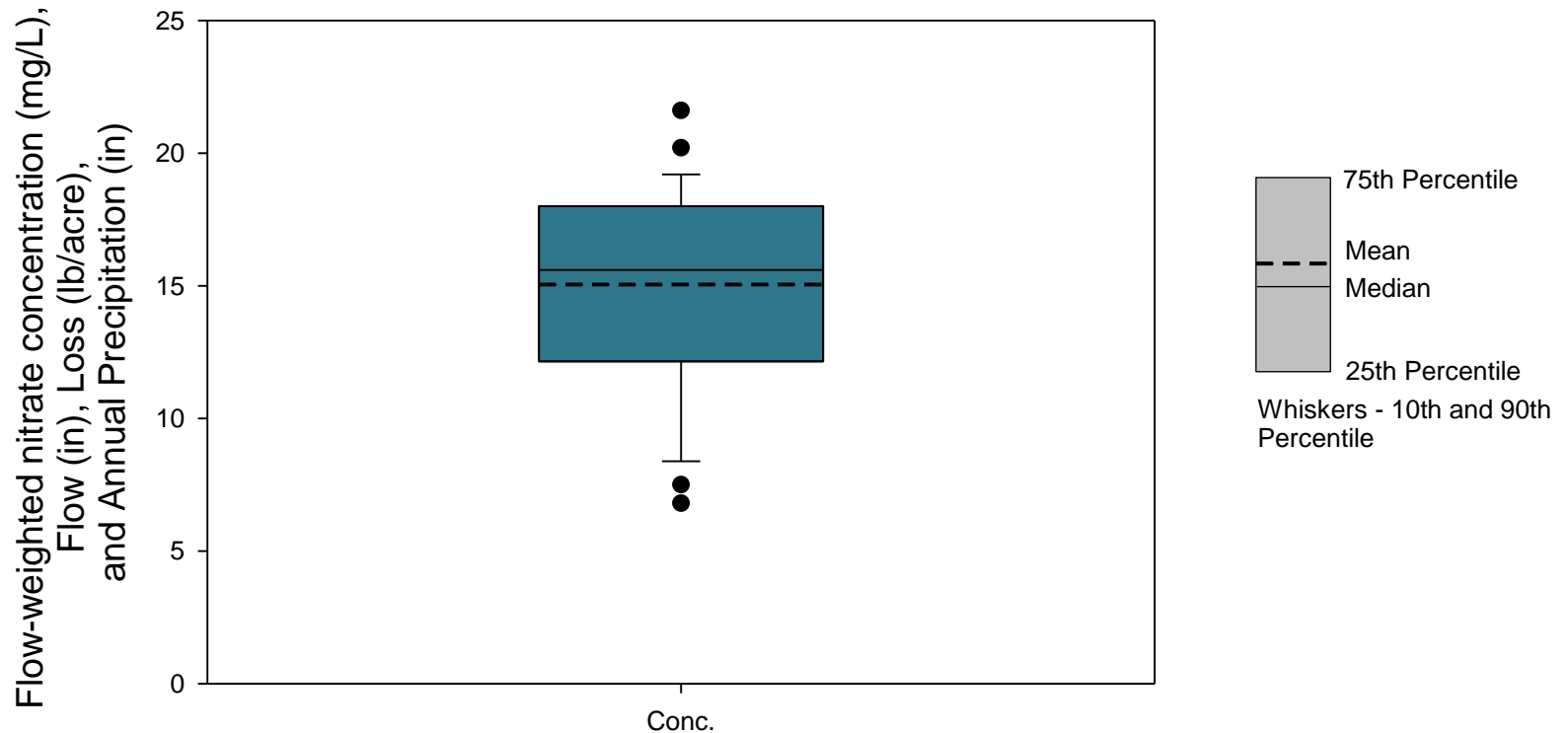


Combined Corn-Soybean System – Same N management  
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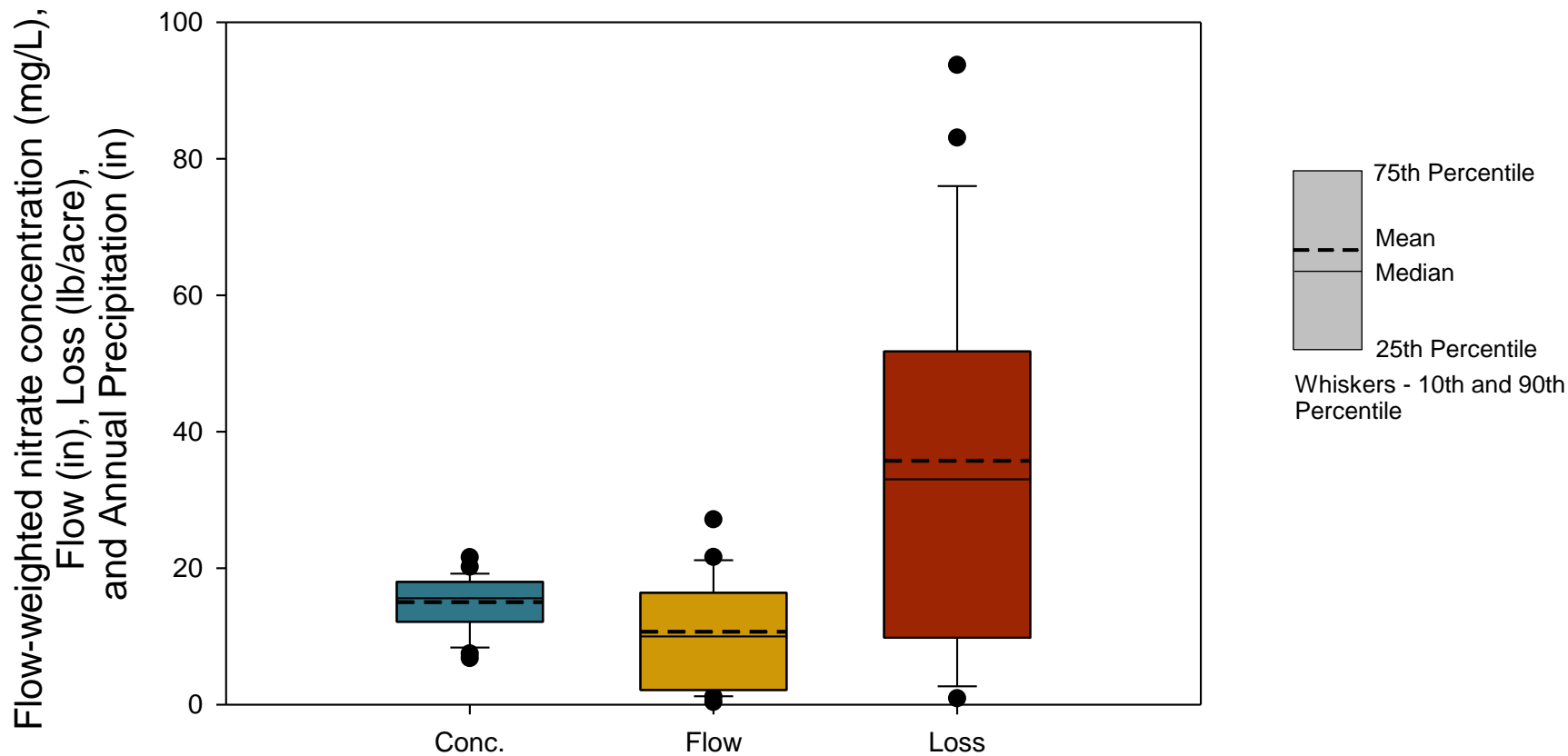
# Nitrate-N Concentration and Load Variability



# Variability in Annual Nitrate-N Concentrations (1990-2016) – Same N Management

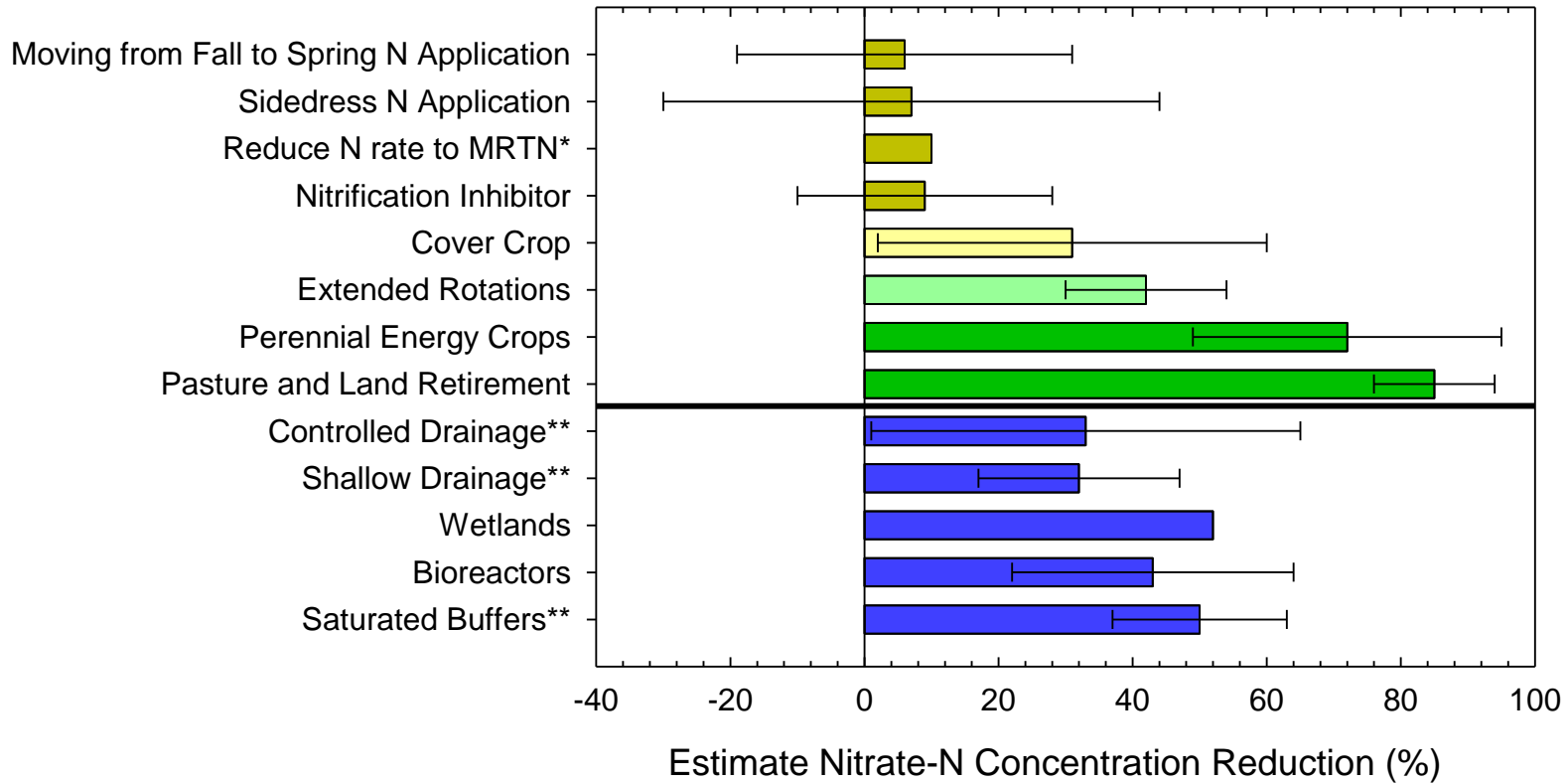


# Variability in Annual Nitrate-N Conc and Loss (1990-2016) – Same N Management



# Nitrate-N Practice Performance

Nitrate-N Reduction Practice



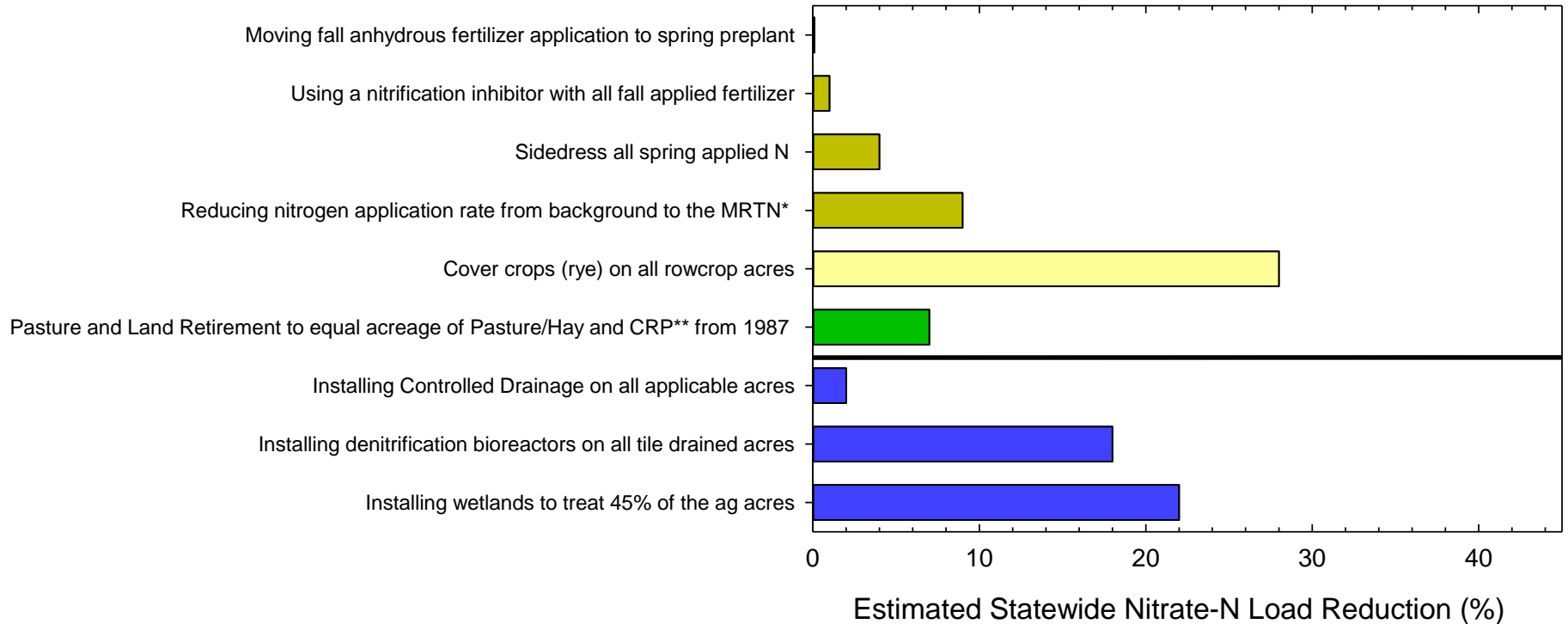
\*MRTN - Maximum Return to Nitrogen Application Rate from Corn Nitrogen Rate Calculator (<http://cnrc.agron.iastate.edu/>)

\*\* Load reduction

Error bars show standard deviation of practice performance

# Nitrate-N Load Reduction

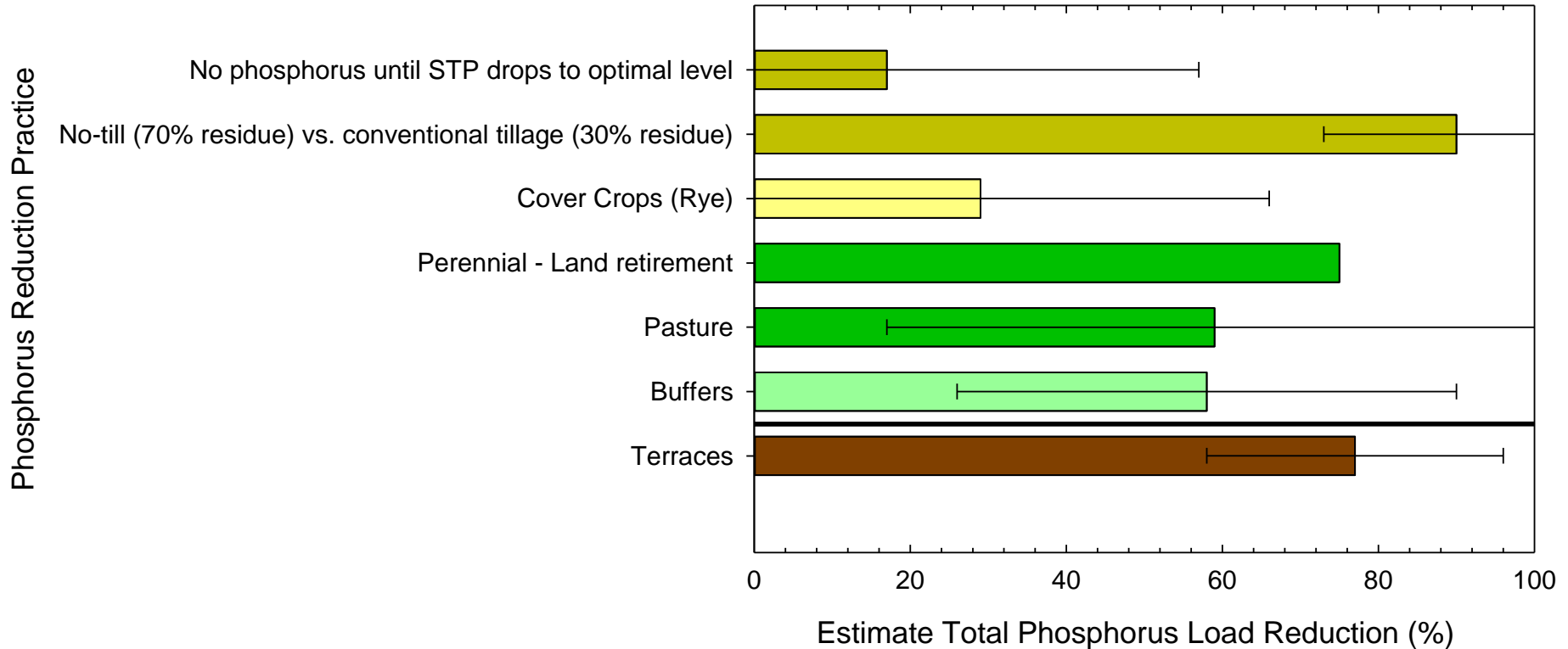
Nitrate-N Reduction Practice



\*MRTN - Maximum Return to Nitrogen Application Rate from Corn Nitrogen Rate Calculator (<http://cnrc.agron.iastate.edu/>)

\*\*CRP - Conservation Reserve Program

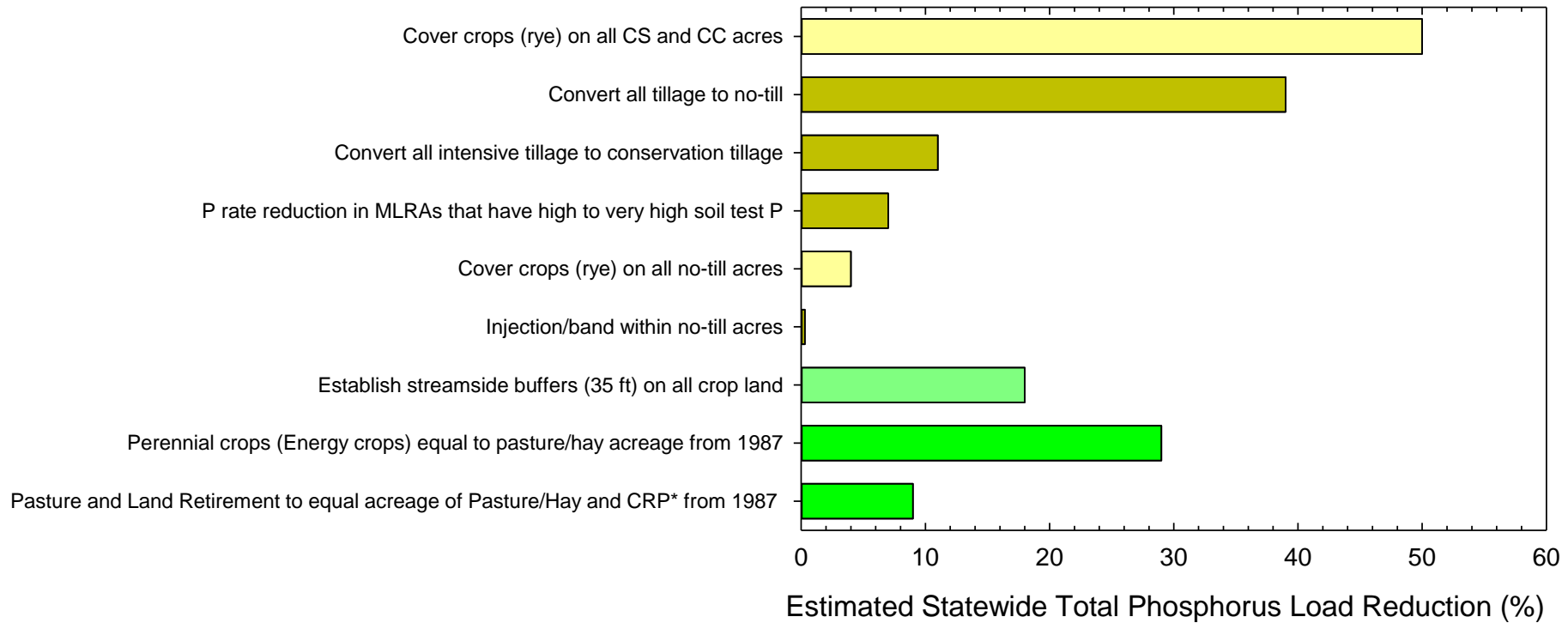
# Phosphorus Practice Performance



Error bars show standard deviation of practice performance

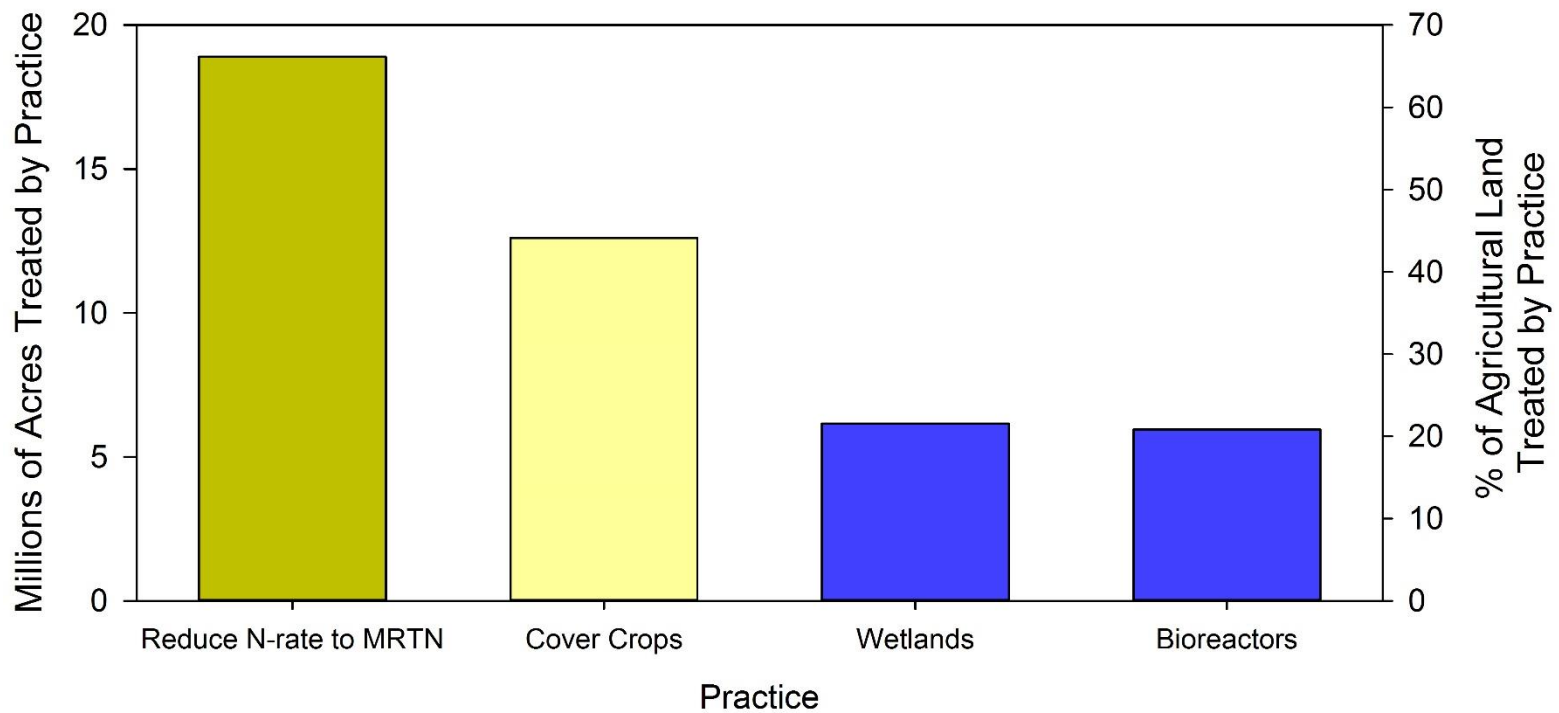
# Phosphorus Load Reduction

Phosphorus Reduction Practice



\*CRP - Conservation Reserve Program

# Level of Implementation Needed for one Nitrate-N Reduction Scenario



# Meeting Summary from Feb- March 2017 Meetings

- Asked questions of participants on conservation related issues
- Participants were:
  - Farmers
  - Landowners
  - Ag. Professionals



# Leading Causes of Water Quality Issues

- Responses
  - Soil erosion
  - City runoff
  - Public perception
  - Climate change
  - *Less discussion of leaky system with annual row crops*

# Practices Most Effective for Improving Water Quality

- Responses:
  - No-till
  - Buffer strips
  - Cover crops
  - 4Rs
  
  - *What is missing?*
    - *Bioreactors, saturated buffers, WETLANDS*

# Practices Most Effective for Improving Soil Health

- Responses:
  - No-till
  - Waterways/Buffer strips
  - Cover crops

# Barriers to Adoption

- Responses:
  - Cost
  - Mindset/Tradition
  - Return on investment
  - Lack of solid scientific data to backup practice performance

# Contact

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