Presented to: Minnesota Corn Research & Promotion Council

Discovery & Development Team

Faribault County Update:

"Demonstrating water quality improvements while maintaining or enhancing profitability of corn production"

~ from the funded MN Corn Innovation Grant submission, 12/30/2019

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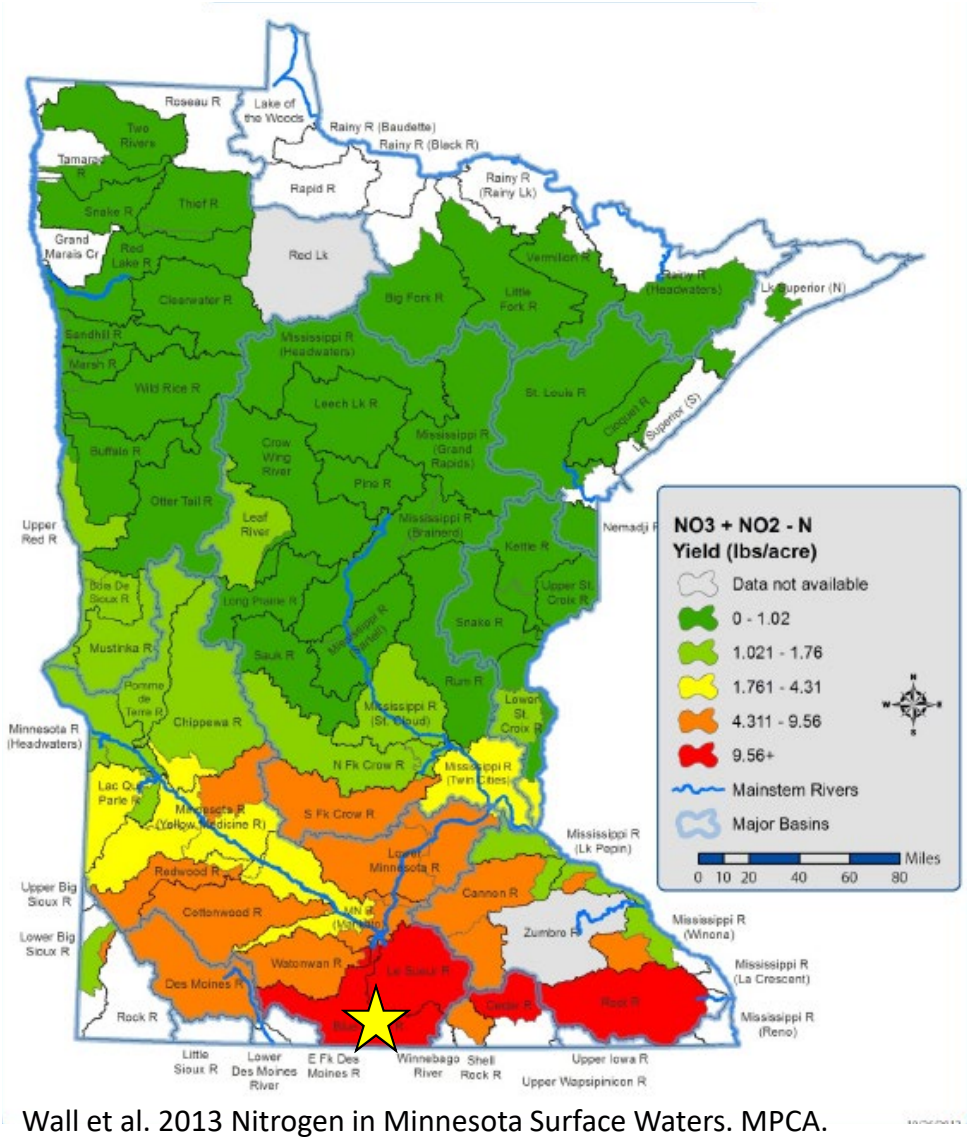
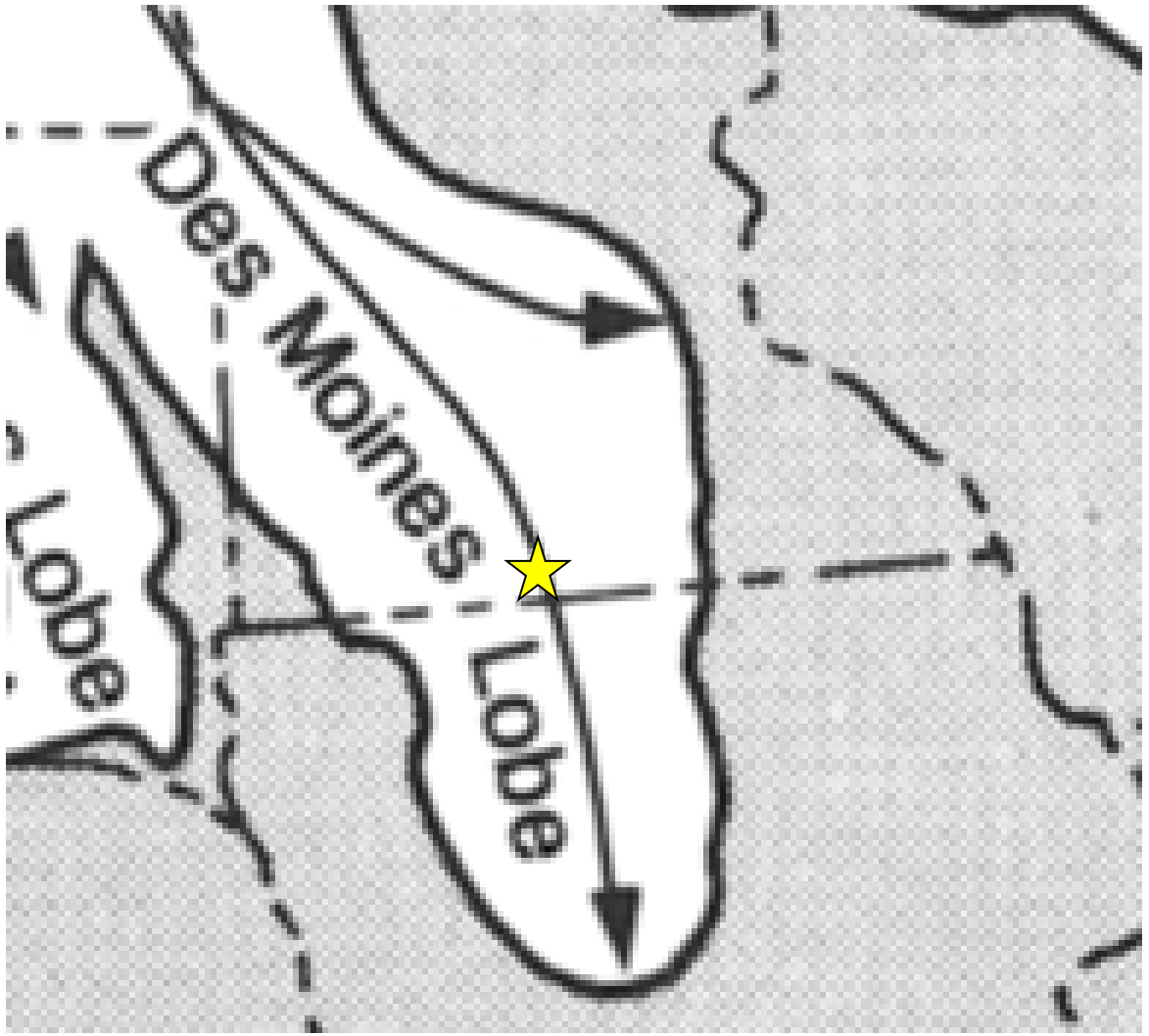
8/15/2024

Blue Earth Site: Critical Location



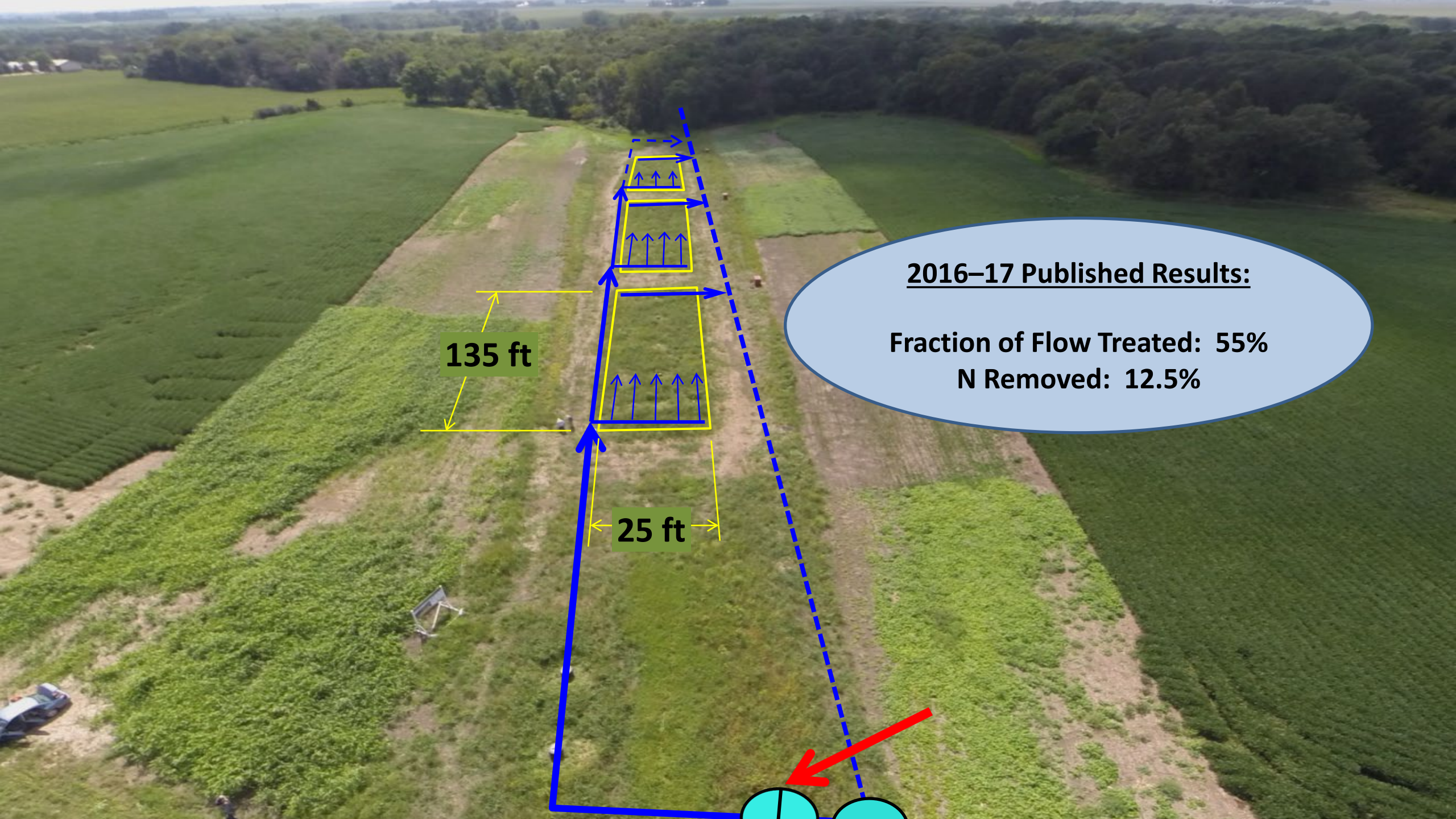
Wall et al. 2013 Nitrogen in Minnesota Surface Waters. MPCA.



From: Paterson, C.J. 1997. Southern Laurentide ice lobes were created by ice streams: Des Moines Lobe in Minnesota, USA. Sed. Geol. 111:249-261.

Bioreactor: Objectives

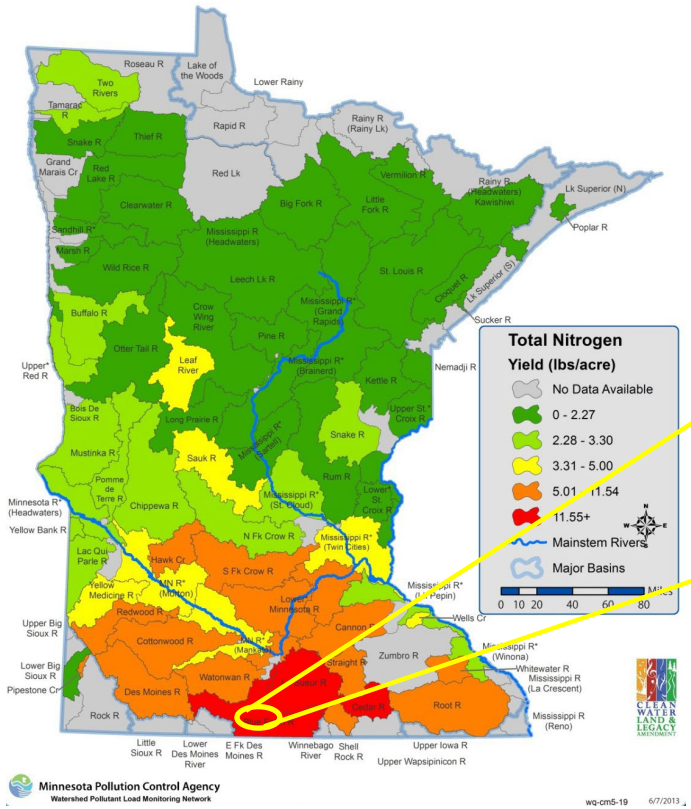
- Investigate % of flow treated
- Confirm nitrate removal performance
- Water Quality
  - Nitrate-N & Total-N
  - Ammonium-N
  - Dissolved & Total Phosphorus
  - Sediment
  - Sulfur


135 ft
25 ft
2016–17 Published Results:
Fraction of Flow Treated: 55%
N Removed: 12.5%

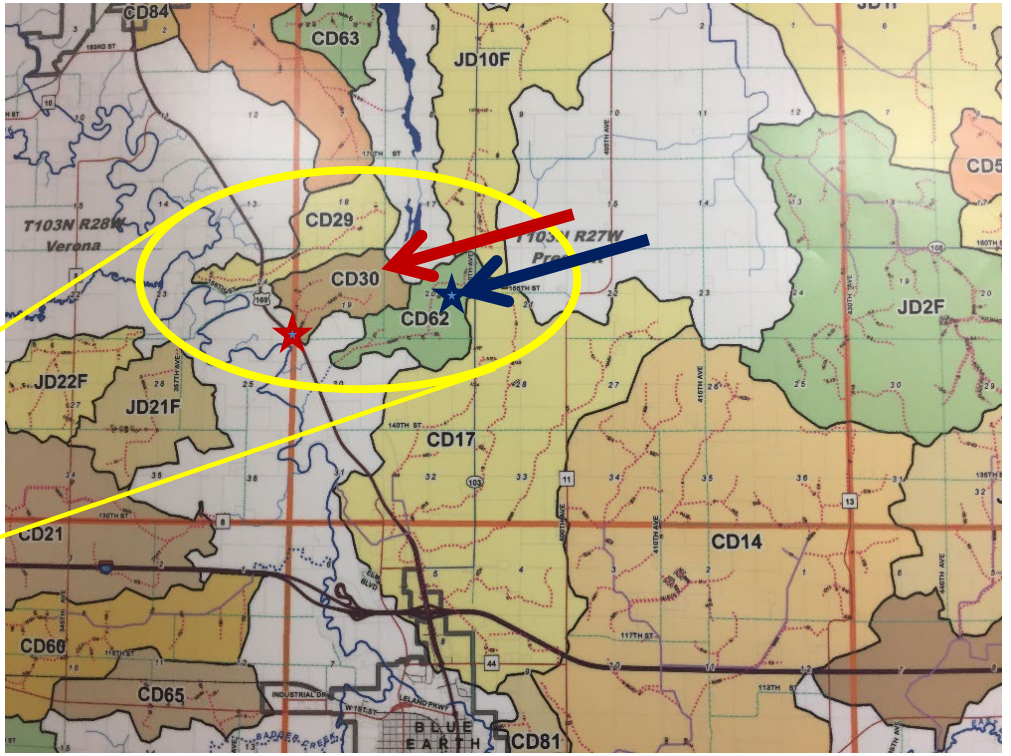
Storms plugged the BRs with sediment

6/25/18 → 3.6”

Use neighboring watershed for comparison



Nitrogen in Minnesota Surface Waters. Wall et al. 2013

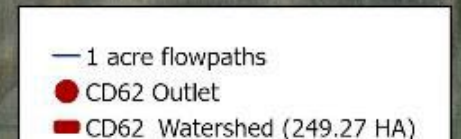


Operating Philosophy

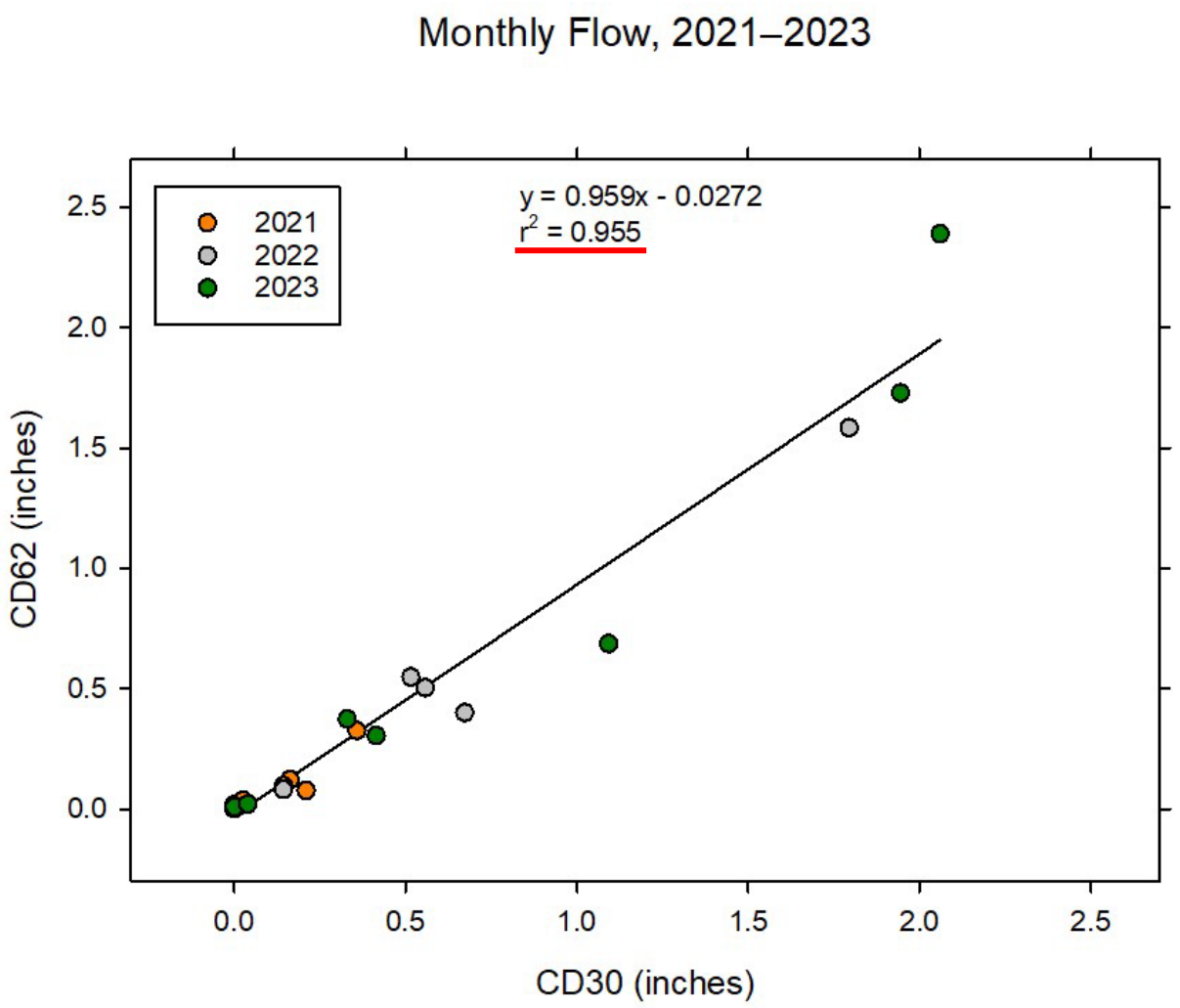
- Stakeholders involved
- Science to serve
- Use neighboring watersheds for comparison

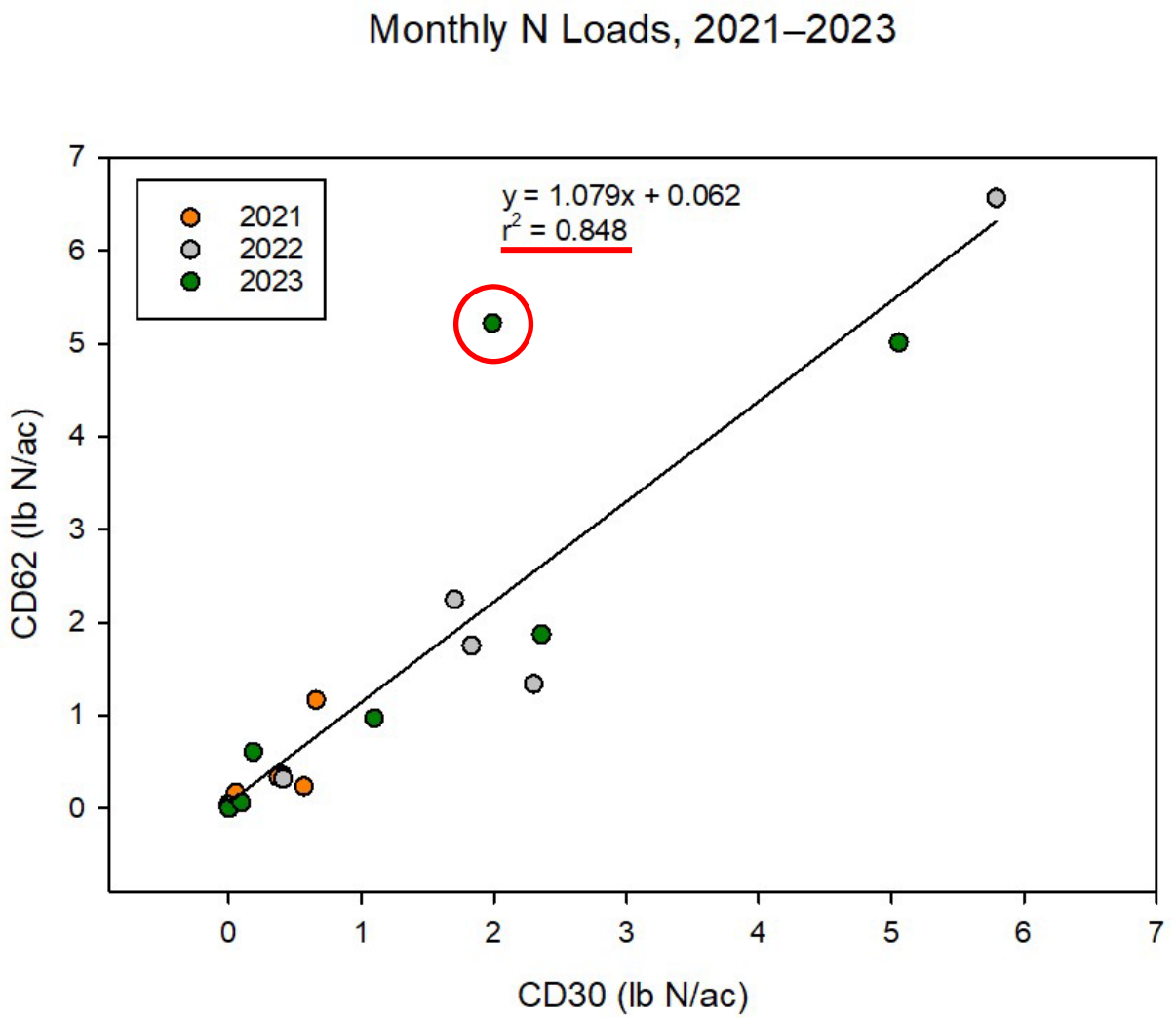
“Establishing a Paired Watershed to Prepare for Conservation Practice Assessment”

Installation: Fall 2020
Monitoring Began: Spring 2021



First 3 years' results: 2021–23





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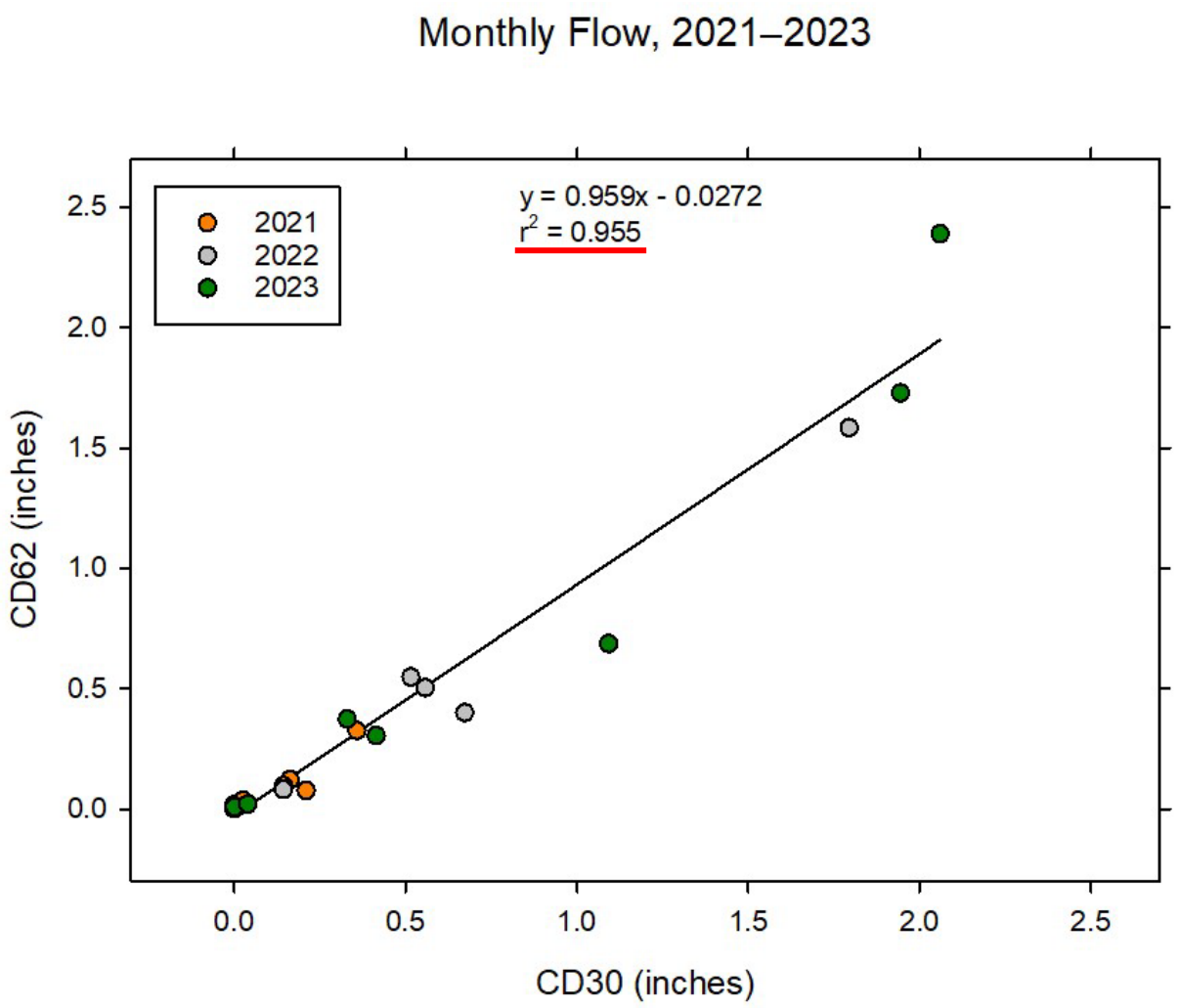
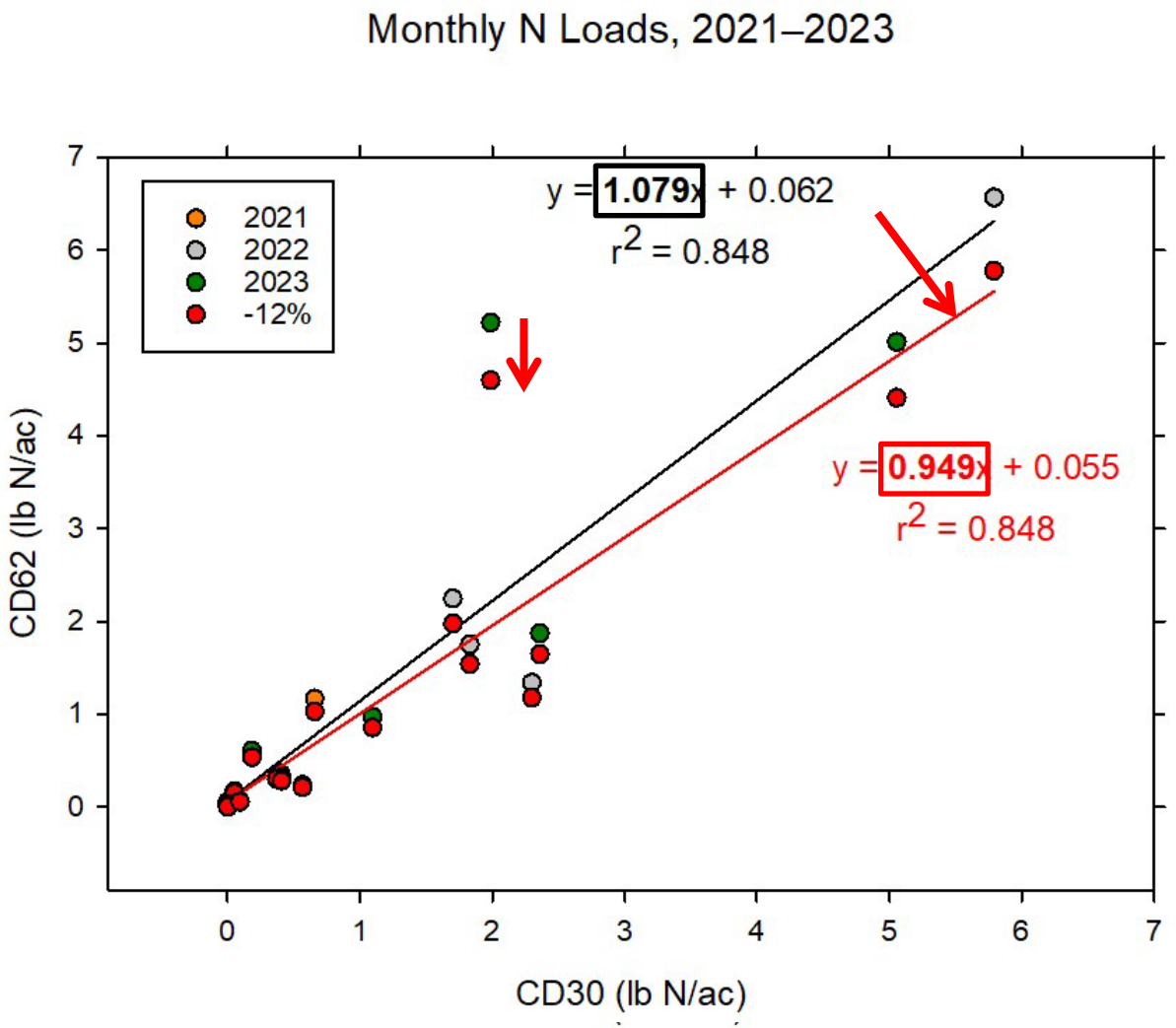
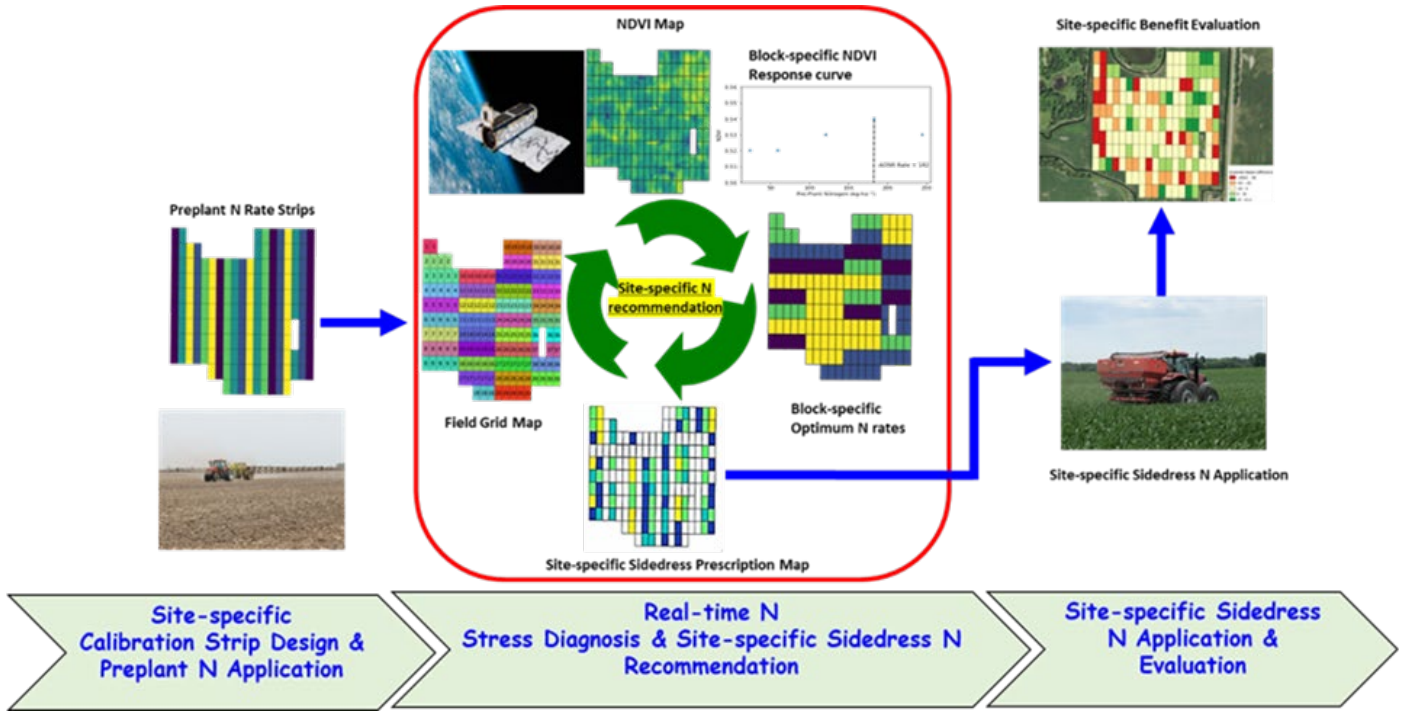


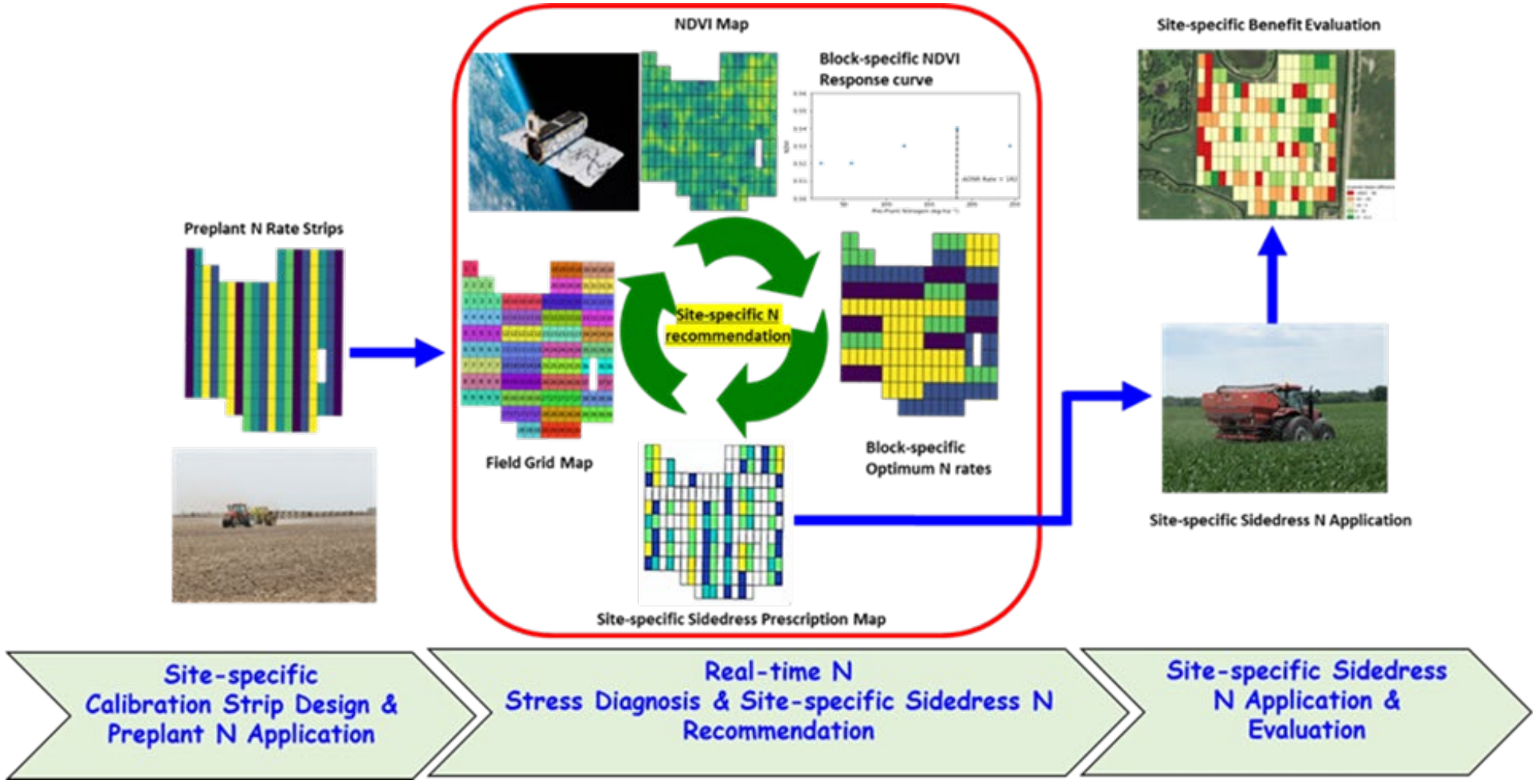


Next Step: Funded NRCS CIG On-Farm Trial Grant

- "Integrated Conservation Strategies to Reduce Tile Drainage Nitrate-N Losses from Row-Crop Production at Watershed Scale"
  - Integrated: **Precision N mgt** + **Cover Cropping** + **Bioreactor**
  - Evaluate benefits
    - Agronomic
    - Economic
    - Environmental
  - Model potential benefits
    - Mgt options
    - Weather impacts



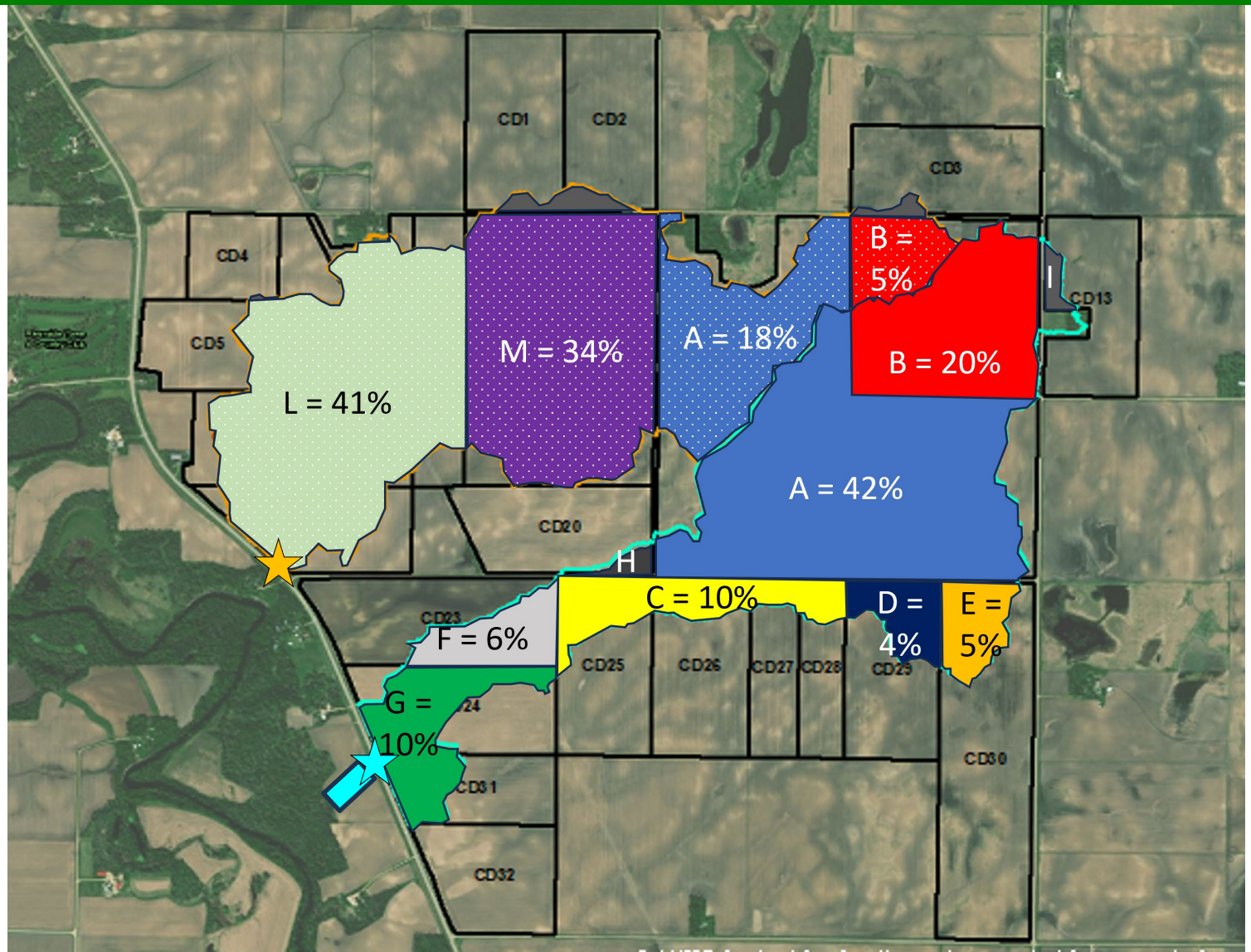
Satellite-based Split Application



Previous Results; Some Facts

- 60+ site-years in MN and IN
- Program works better in wet years
- Yields are compared to each producer's standard practice
- Any yield losses will be fully compensated
- Pre-plant N can be any form
- Split application needs variable rate technology

Program incents producers & advisors on a per field basis



Thank you.

Nutrient Loss Reductions from Subsurface (Tile) Drainage

- Performance of Edge-of-Field Conservation Practices
  - Woodchip Bioreactor @ watershed scale
  - Dual-line Saturated Buffer
- Paired Watershed Comparison of Management Practices
  - Satellite-based precision nutrient management (PNM)
  - “Stacking” of PNM with a bioreactor
- Cross-location Drainage Efforts (Ames, W. Lafayette, Columbus)
  - Subsurface/surface flow separation with stable isotopes
  - Location of tiles using UAV
  - Microplastics tile loads
  - Improve drainage representation in watershed models
- Co-production of conservation and management practices
  - Interaction with producer-cooperators, local conservation professionals, commodity group, consulting engineers