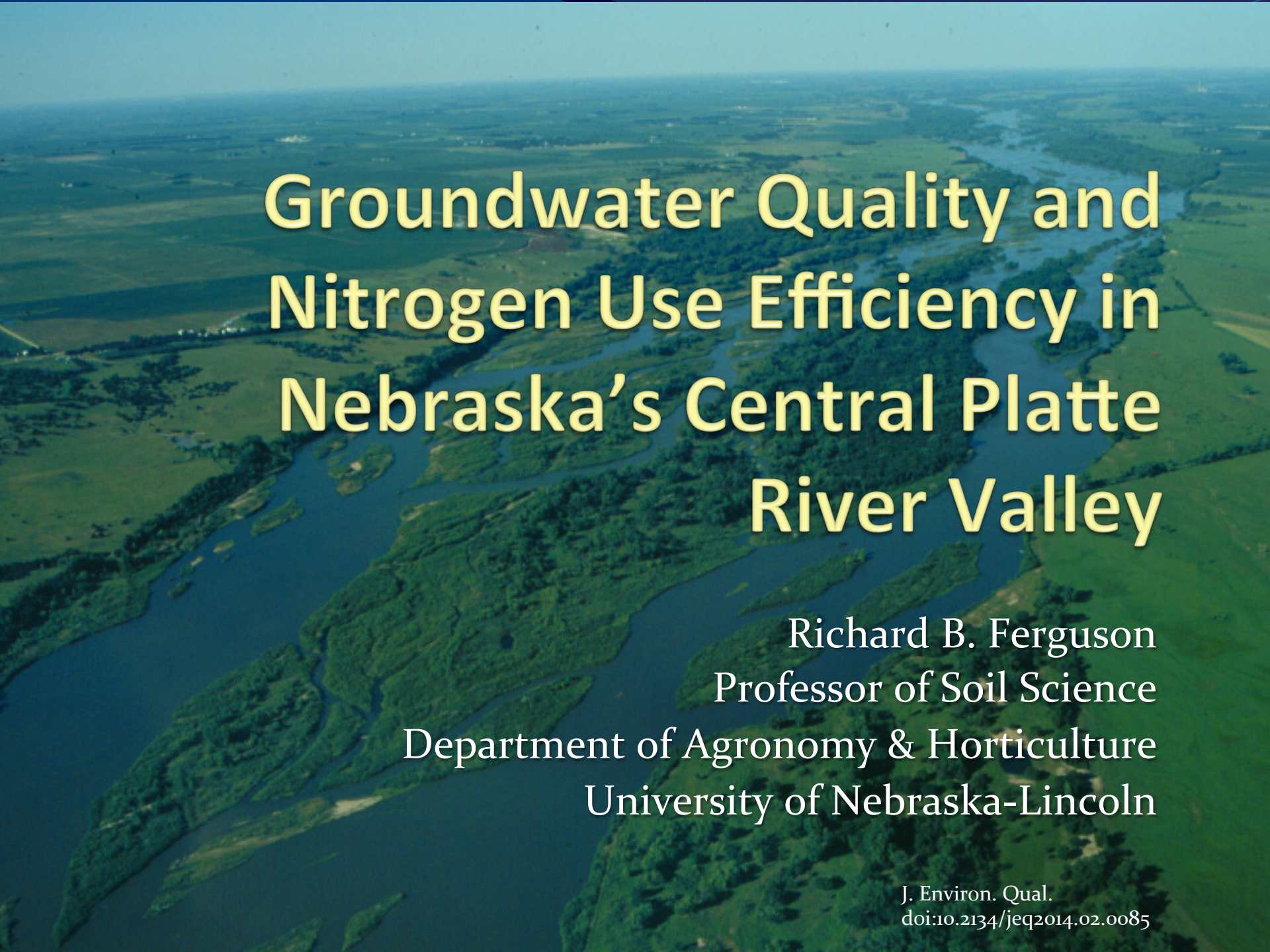

Groundwater Quality and Nitrogen Use Efficiency in Nebraska's Central Platte River Valley

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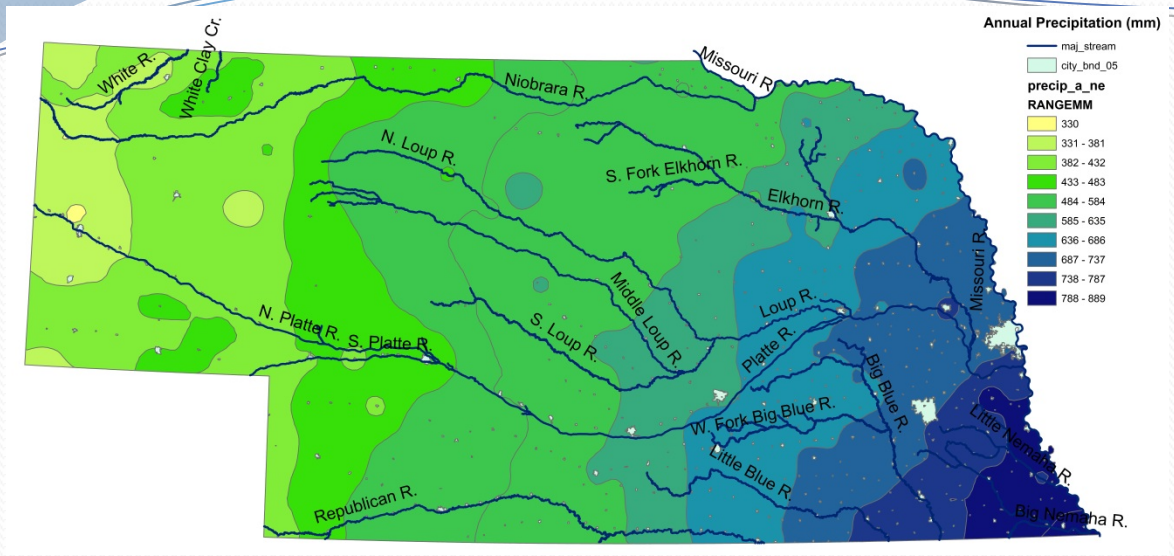
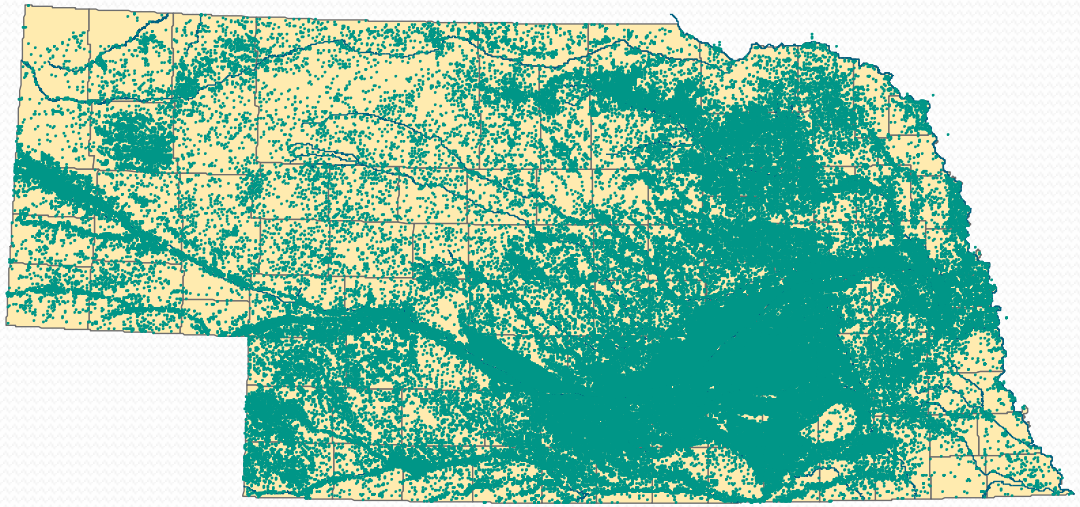


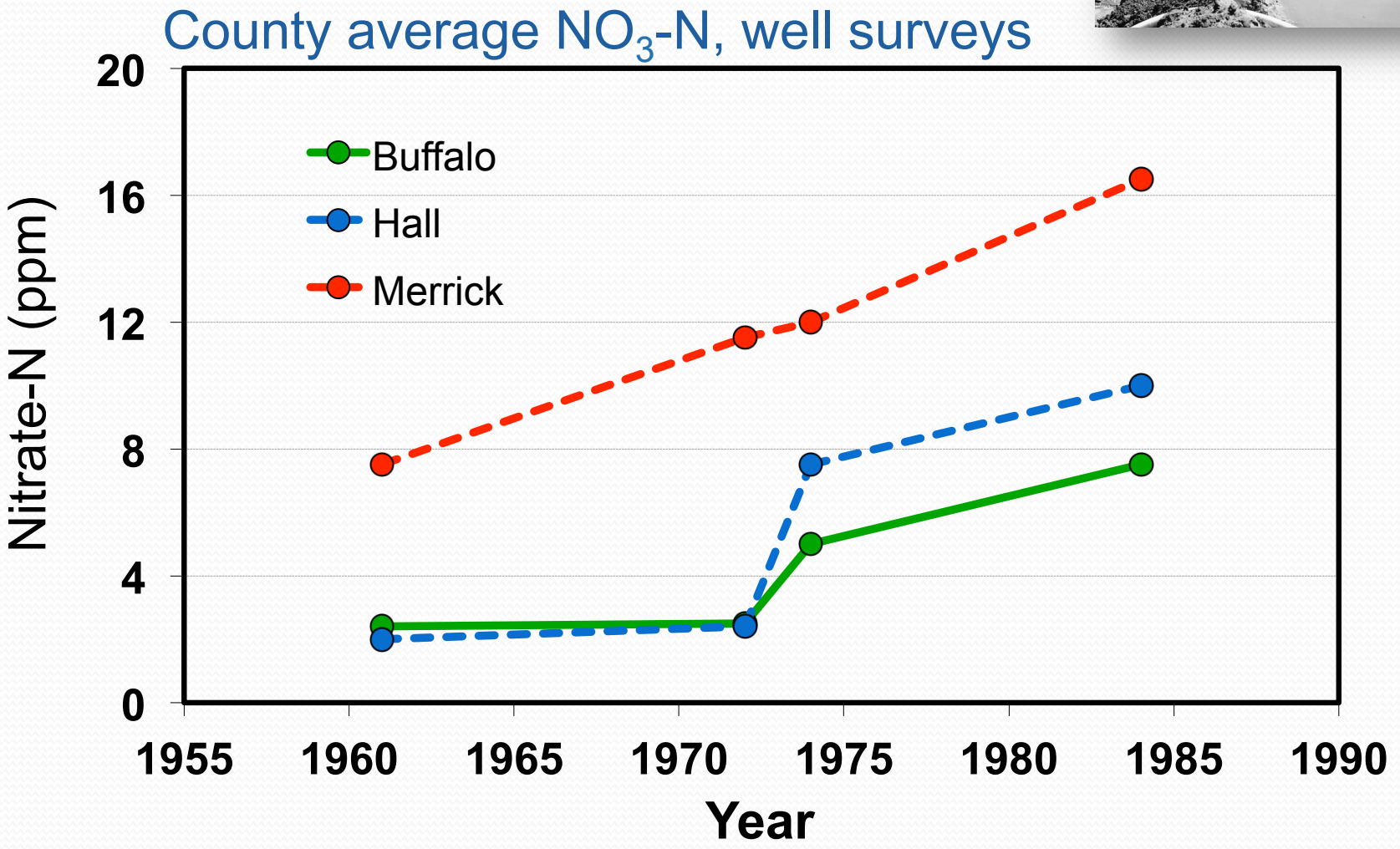
Annual Rainfall and Major Streams of Nebraska

Registered Wells in Nebraska

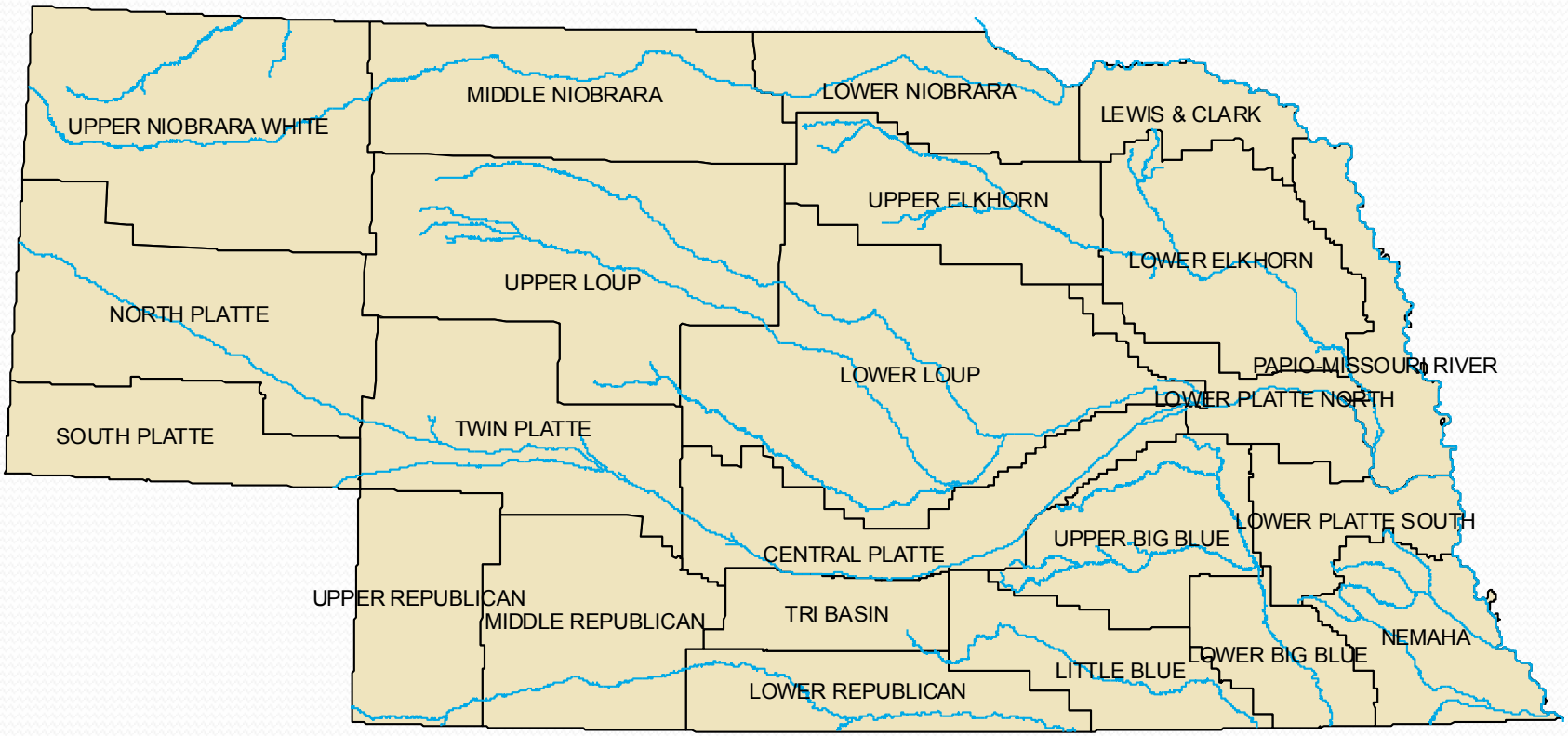


Approximately 8.5 million acres of irrigated cropland in Nebraska – the most of any state in the US.

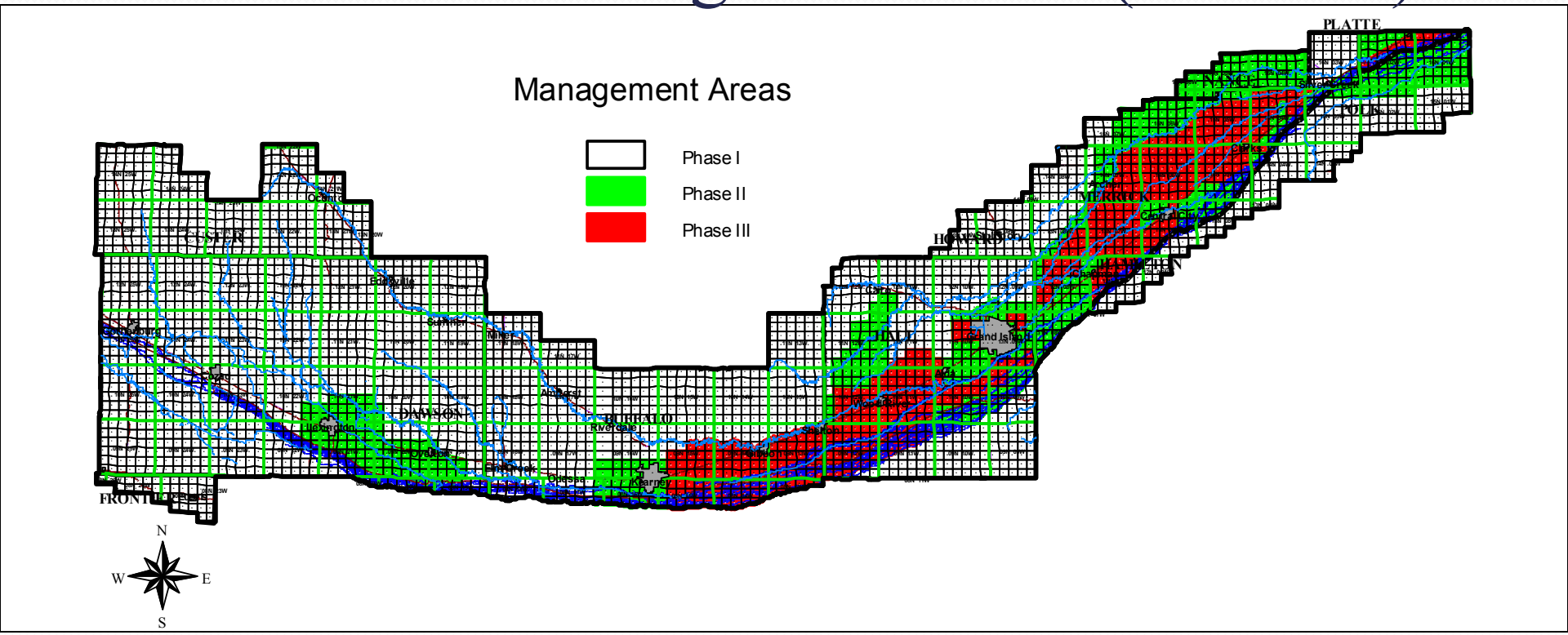
Ground Water Nitrate-N Trends
Central Platte River Valley



Natural Resources Districts in Nebraska



Central Platte Natural Resources District Groundwater Management Area (GWMA)



First GWMA in Nebraska, established in 1988 following passage of enabling legislation.

Central Platte NRD Groundwater Management Area (GWMA)

Initiated 1988

Phase 1 (0-7.5 ppm NO_3-N)

- Fall application banned on sandy soils; allowed after Nov. 1 on heavier soils.

Phase 2 (7.6 – 15 ppm)

- No N application until Mar. 1; soil and water tests required annually; reporting to District of test results, N application, and water applied.

Phase 3 (> 15 ppm)

- Split N application, or use of an approved nitrification inhibitor.

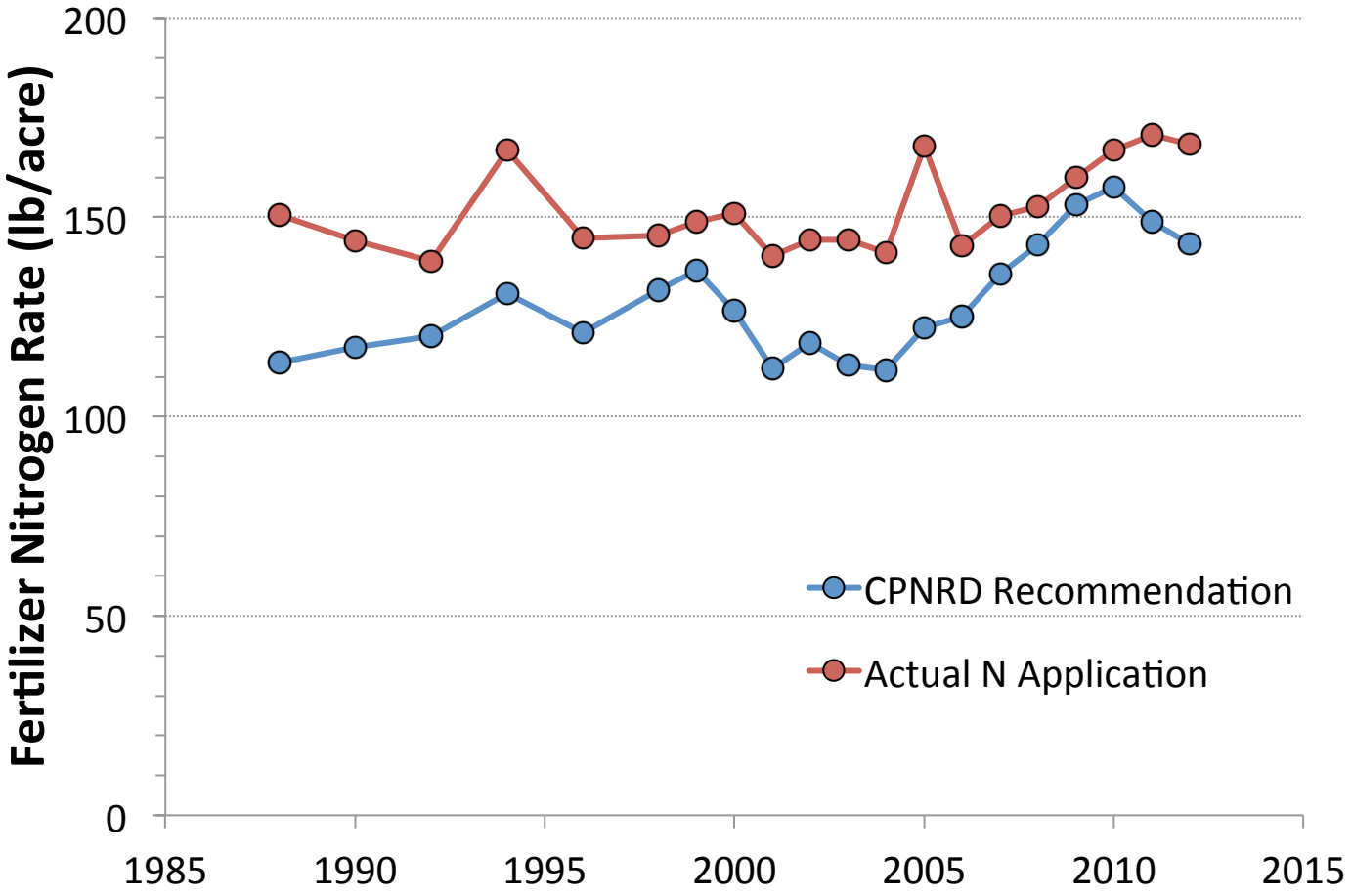
Phase 4 – areas with rising NO_3-N concentrations (not yet implemented).

- District will set expected yield.

Platte Valley Nitrogen and Irrigation Management Demonstration Project

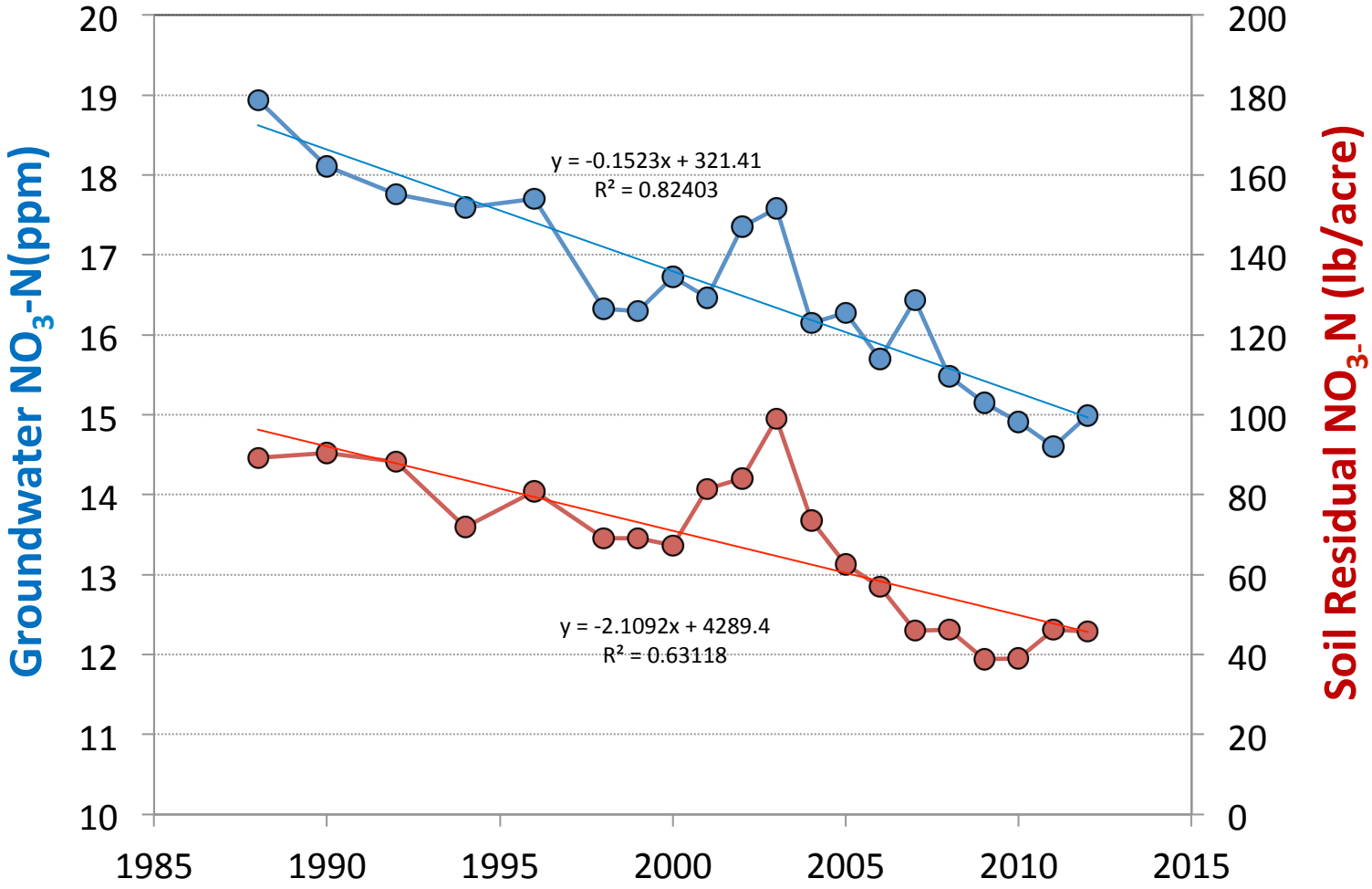
- Joint effort of the University of Nebraska and the Central Platte Natural Resources District.
- Emphasis on the necessity to manage both irrigation water and nitrogen fertilizer to reduce nitrate leaching.
- Conducted continuously since 1984.
- From 1984 through 2005, over 300 field demonstrations on producer fields, with over 240 field days and winter meetings.

Trends In the Central Platte Valley



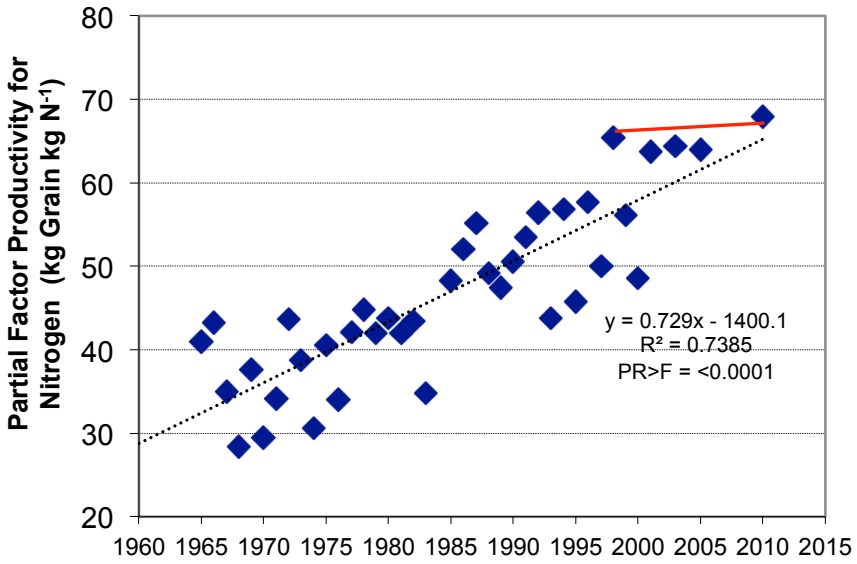
Average of values from producer reports in GWMA, representing ~ 300,000 acres

Trends in the Central Platte Valley

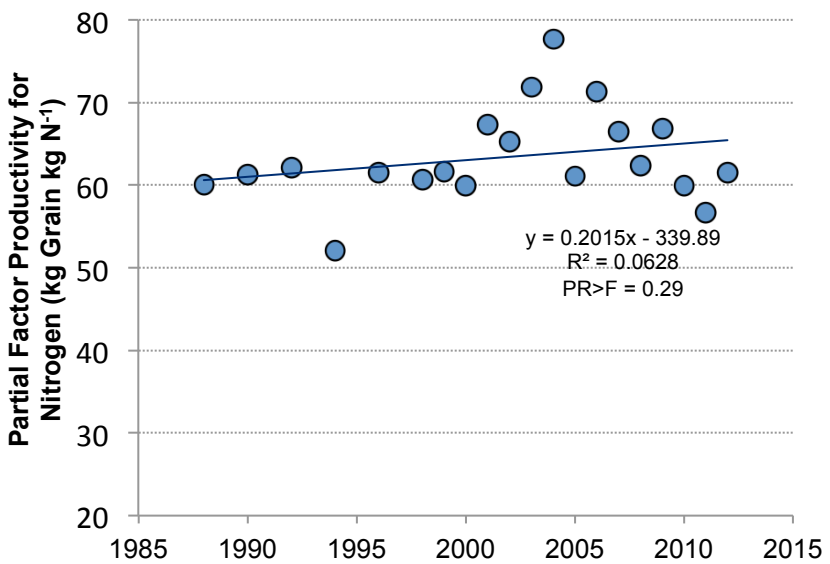


Average of values from producer reports in GWMA, representing ~ 300,000 acres

Nitrogen Use Efficiency



Nebraska statewide, rainfed and irrigated corn.

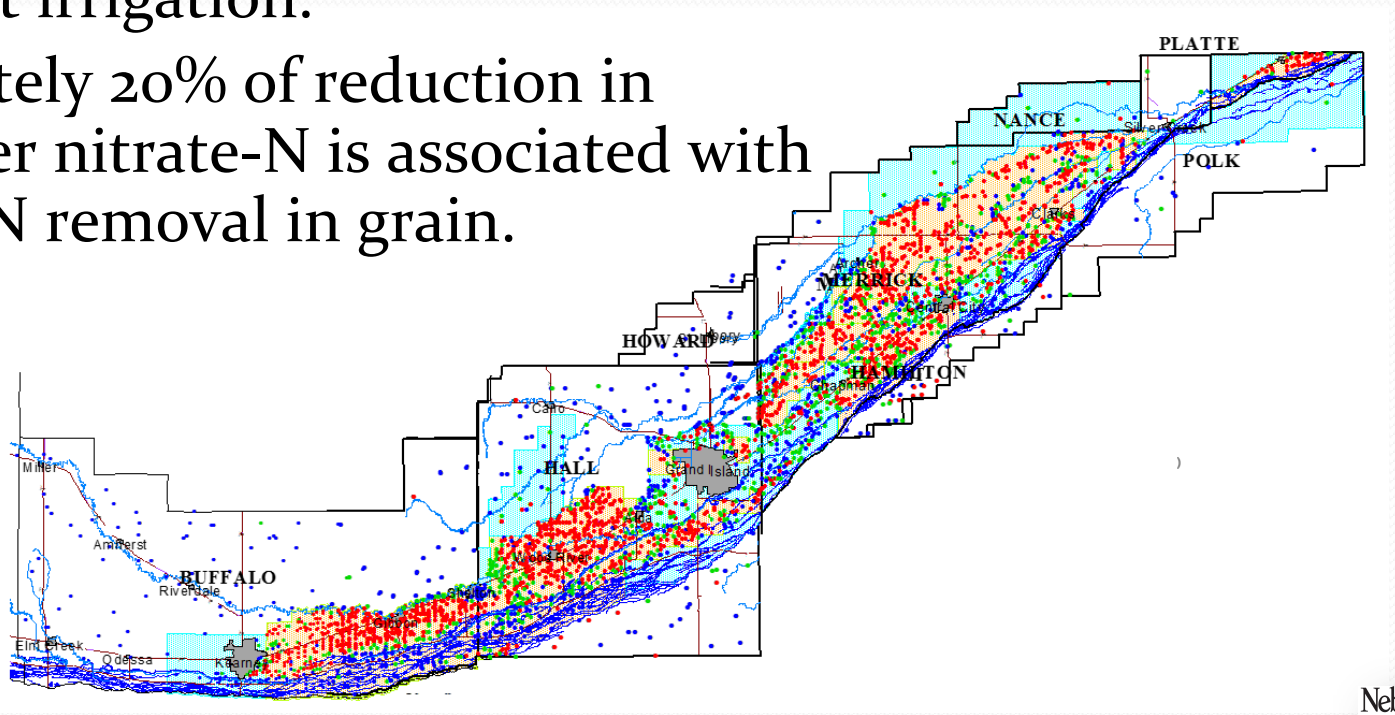


Nebraska's Central Platte River Valley, Groundwater Management Area (GWMA) producers, predominately irrigated corn.

Conservation Effects Assessment Project (CEAP)

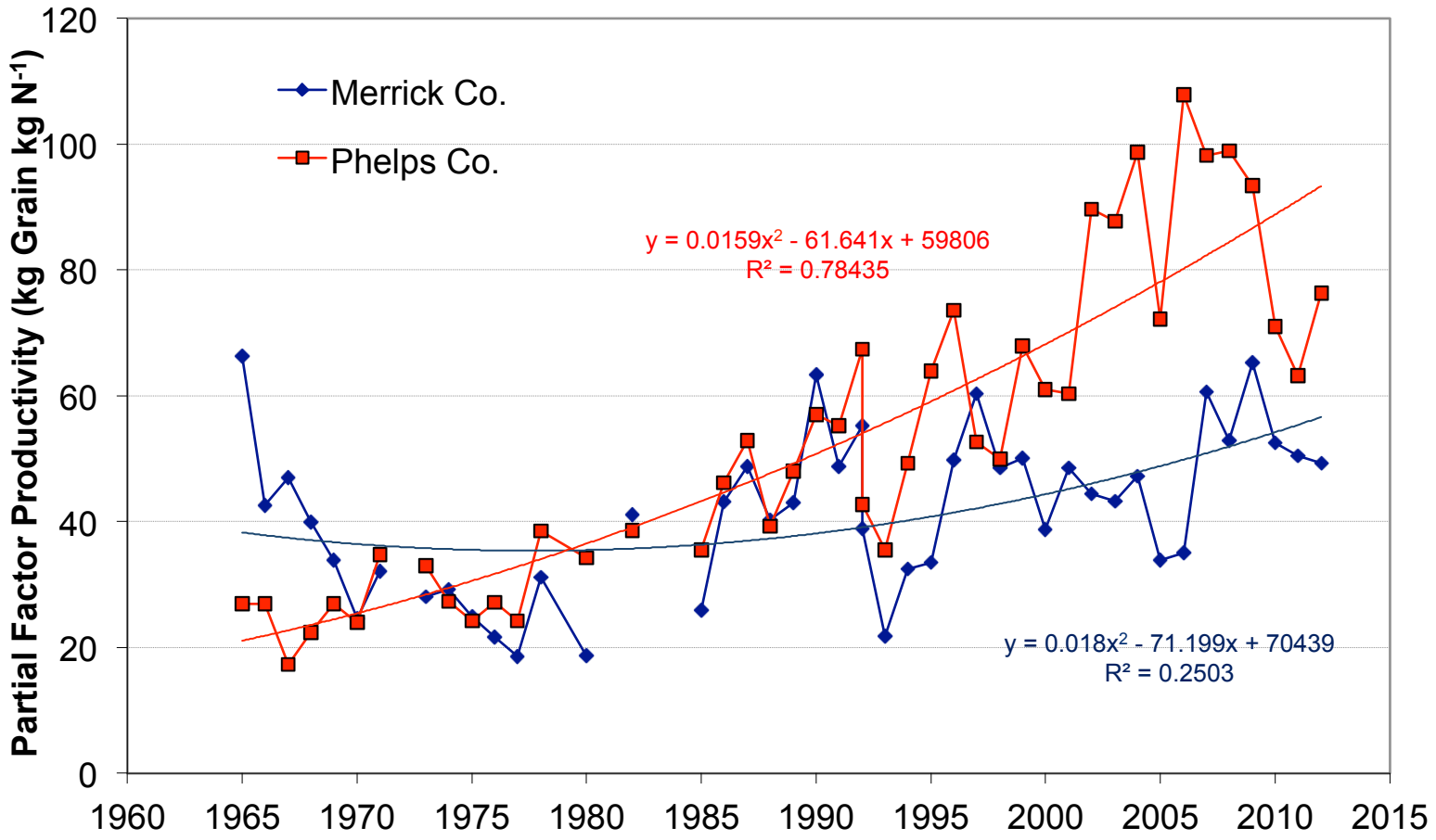
Exner, Perea-Estrada, Spalding 2010

- Approximately 50% of reduction in groundwater nitrate-N concentrations can be attributed to conversion from furrow to center-pivot irrigation.
- Approximately 20% of reduction in groundwater nitrate-N is associated with increasing N removal in grain.

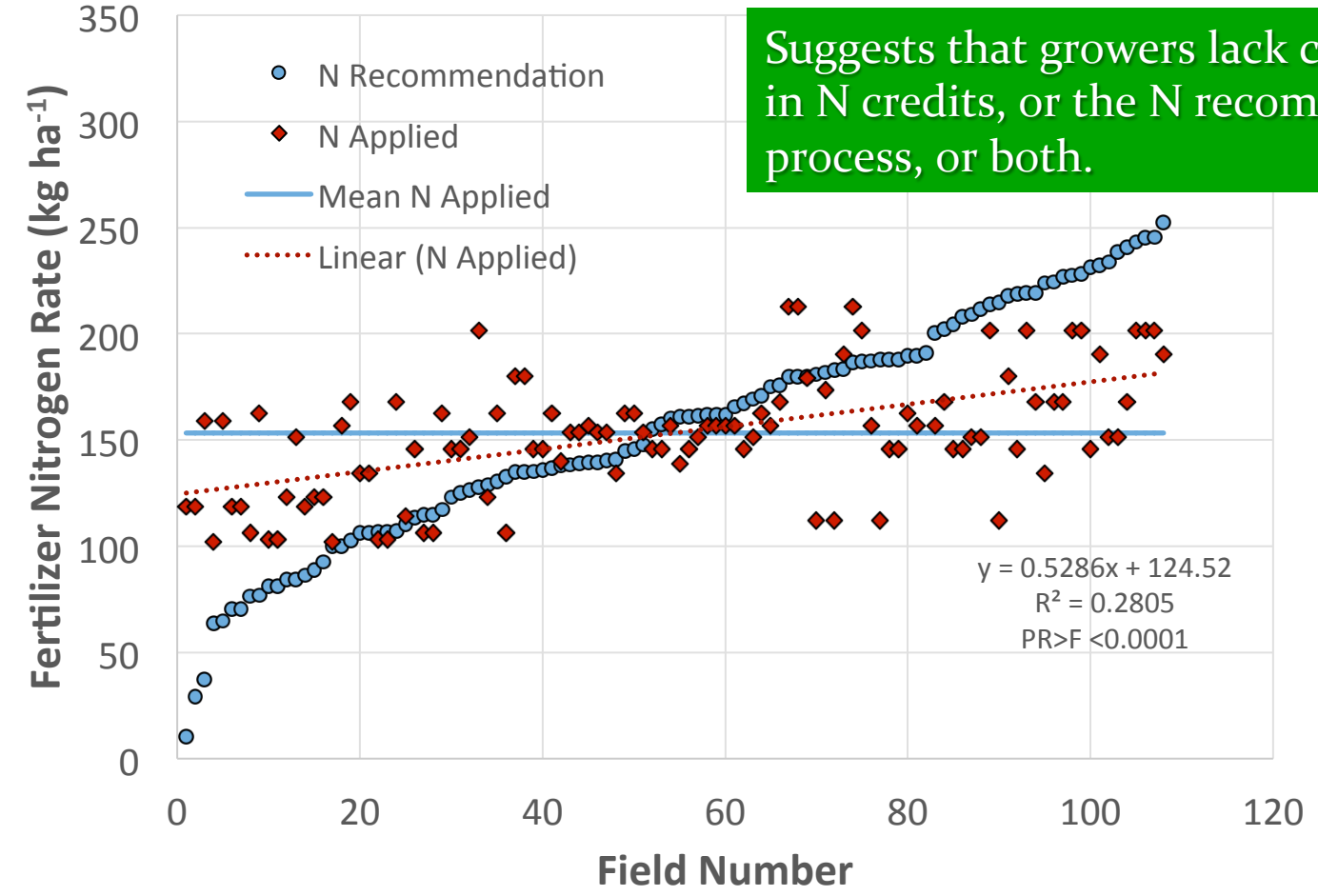


Nitrogen Use Efficiency –

Merrick vs. Phelps Counties



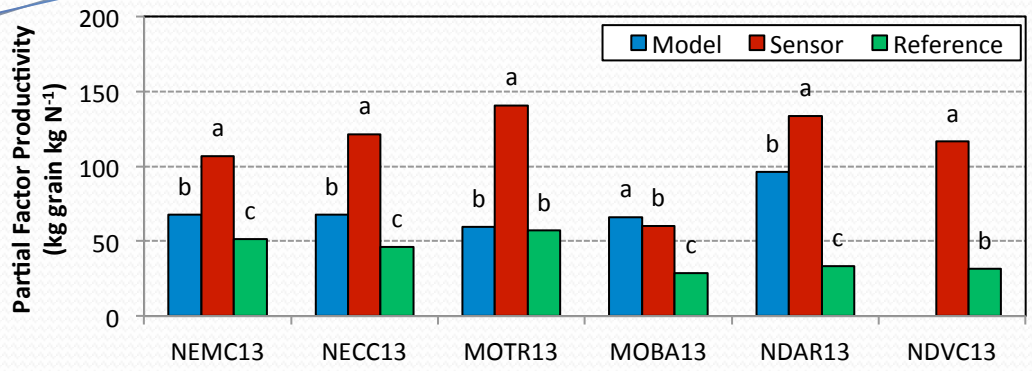
Recommended vs Applied N
Single Township, Merrick Co. 2005

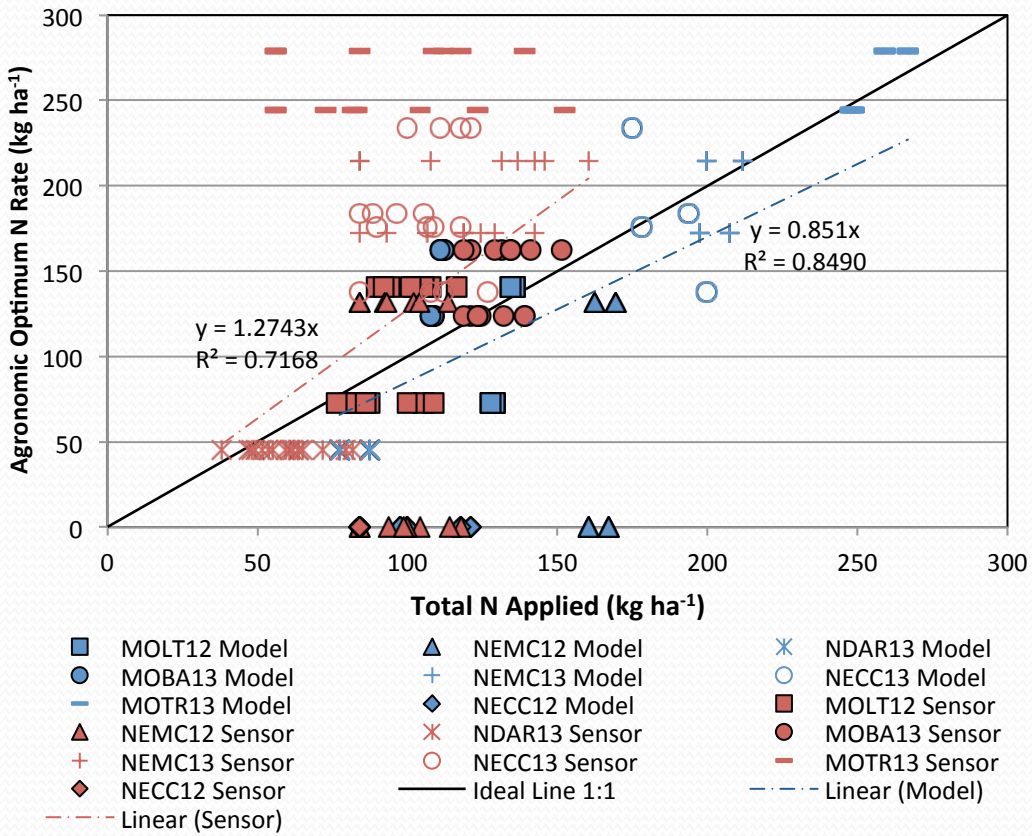


Suggests that growers lack confidence in N credits, or the N recommendation process, or both.

108 fields
Mean recommended N rate: 155 kg N ha^{-1}
Mean applied N rate: 153 kg N ha^{-1}

Regional Study: Nitrogen Use Efficiency and Agronomic Optimum N Rate





Sensor:
Crop Circle RapidScan, Holland/Schepers algorithm

Model:
Maize-N

Summary

- There have been significant improvements in groundwater quality in the Central Platte River Valley due to a combination of education and localized regulation, with resulting adoption of recommended practices.
- Current recommendation systems and widely practiced N management systems may be reaching a limit to further substantial improvements in NUE.
- Reactive, sensor-based N recommendation systems have greater flexibility to adjust to temporal and spatial variation in crop N requirement than predictive N rate approaches.


Questions?