Nitrogen Tracking and Reporting System Task Force

Nebraska: Central Platte Valley Groundwater Management Program

Edward James Hard, CDFA

*Source data & graphics courtesy of Dr. Richard Ferguson, University of Nebraska-Lincoln

Problem

- Non-point source groundwater pollution
- Major corn production region
- High elevated NO_3^- N concentrations
- Heavy fertilizer and irrigation application
- Threats to main source of drinking water
- Coarse sandy, silt, loam soils
- Shallow groundwater levels (10-30 feet)

Solution

- 1984 Education of producers
  - Nitrogen and Irrigation Management Project
- 1986 Nebraska Ground Water Management and Protection Act
- 1987 Central Platte Natural Resources Districts (NRD) develop comprehensive Groundwater Management Areas (GWMA)
- Regulation of producers

NRD GWMA

Purpose

- Reduce nitrate nitrogen concentrations in shallow groundwater aquifers.

Expected Outcome

- Improve water quality in affected aquifers with the targeted application of University approved management practices.

Data Elements

- Phase I (0-7.5 ppm NO_3^- N)
- Phase II (7.6-15 ppm NO_3^- N)
- Phase III (>15 ppm NO_3^- N)
- Phase IV (groundwater NO_3^- N levels not declining at acceptable rate)

Phase I (0-7.5 ppm NO_3^- N)

- Fall and winter N application banned on sandy soils.
- N application allowed on heavier-textured soils after November 1.
- No reporting.

Phase II (7.6-15 ppm NO_3^- N)

- No N fertilizer allowed until after March 1.
- Annual soil and irrigation water tests required.
- Lab analysis and nutrient accounting is required if manure is to be applied.
- Legume credits must be considered.
- Certification by NRD every 4 years.
- Measurement of irrigation water applied to each field.
- Annual reporting of crop grown, N credits, recommended N rate, nitrification inhibitor use, soil & water analyses, N fertilizer and water applied & cr op yield.

Phase III (> 15 ppm NO_3^- N)

- All requirements of Phase II, plus –
- Split N application, or use of a nitrification inhibitor, or sidedress application.

Phase IV

- Groundwater NO_3^- N levels not declining at acceptable rate.
- All requirements of Phase III, plus-
- Expected yield set by NRD.
- Nitrogen application rates must not exceed the District's recommendation.
- NRD staff will work with University staff and producers on best management practices.

Reporting Mechanism

- Paper reporting currently.
- Producers, Independent Crop Consultants, Fertilizer Dealers, and Certified Crop Advisors
- Regulated by NRD for water quality protection and improvement.

Scale

- Field Level, some 6,000 fields
- 300,000 acres for Central Platte

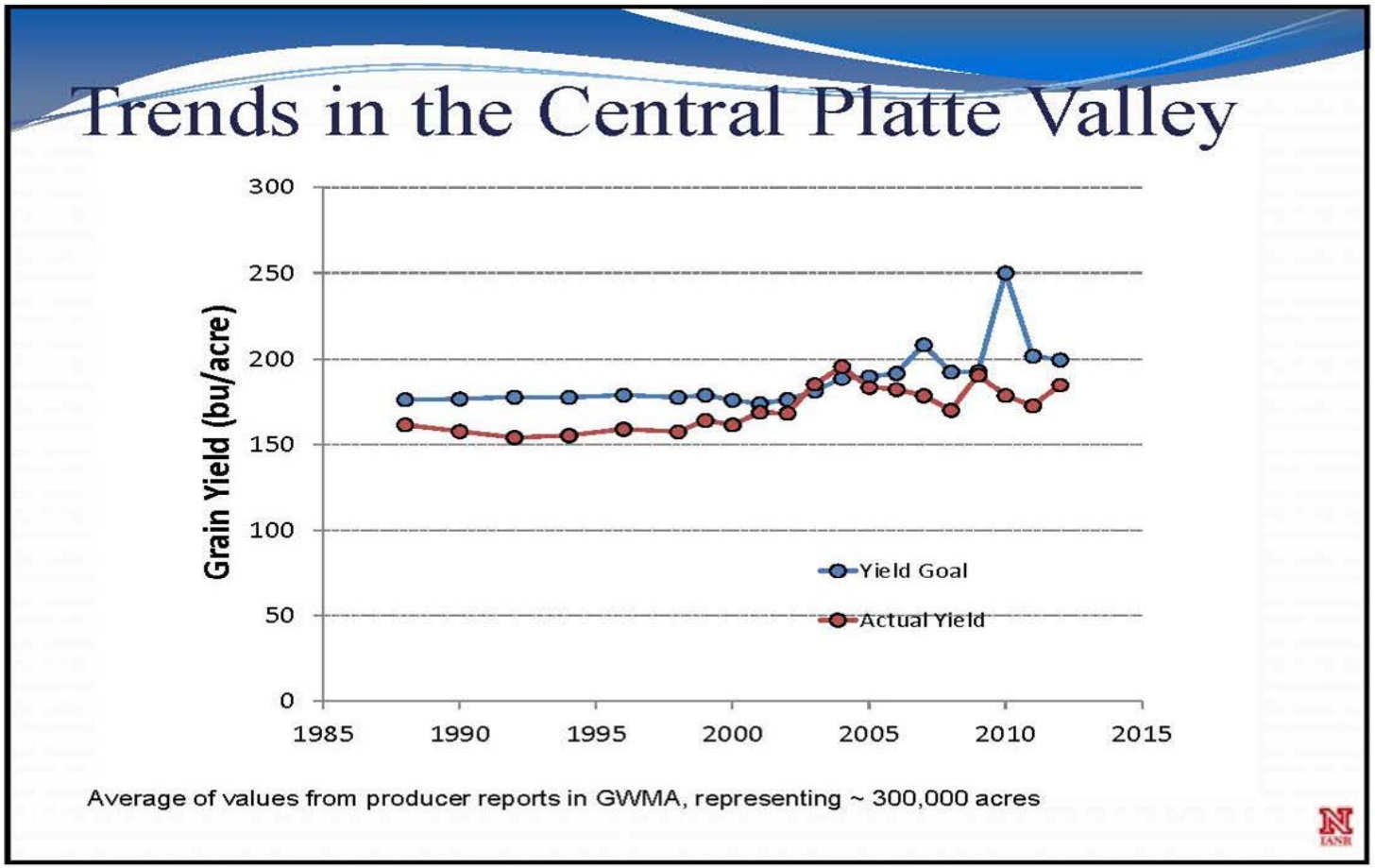
Cooperative Nature

- NRD, University, Growers and Crop Advisors
- Good relationships and attitudes
- Education

Economic Costs & Impact

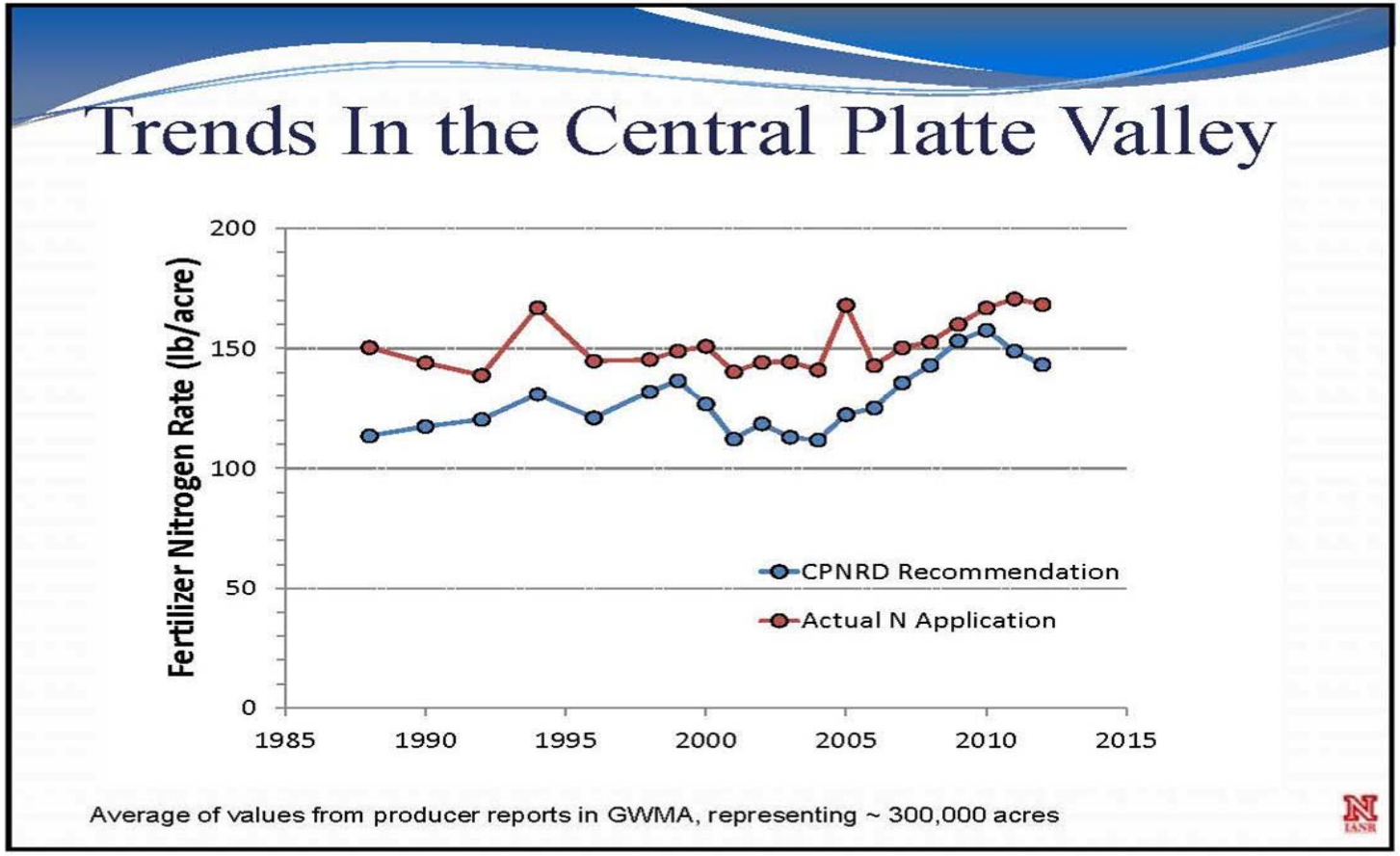
- Producers respond to trends in NO_3^- N concentrations.
- Nitrogen & Irrigation Demonstration Project 1984-2002
  - Expected Yield 176 bu/acre
  - Actual Yield 171 bu/acre
  - Recommended N rate 129 lb/acre
  - Grain Yield -50% N 162 bu/acre
  - Grain Yield +50% N 174 bu/acre
  - Soil N credit 67 lb/acre
  - Irrigation water N credit 28 lb/acre

Measures of Success: Yield



Source: Central Platte Natural Resources District and the University of Nebraska-Lincoln Dr. Richard Ferguson

Measures of Success: N Rate



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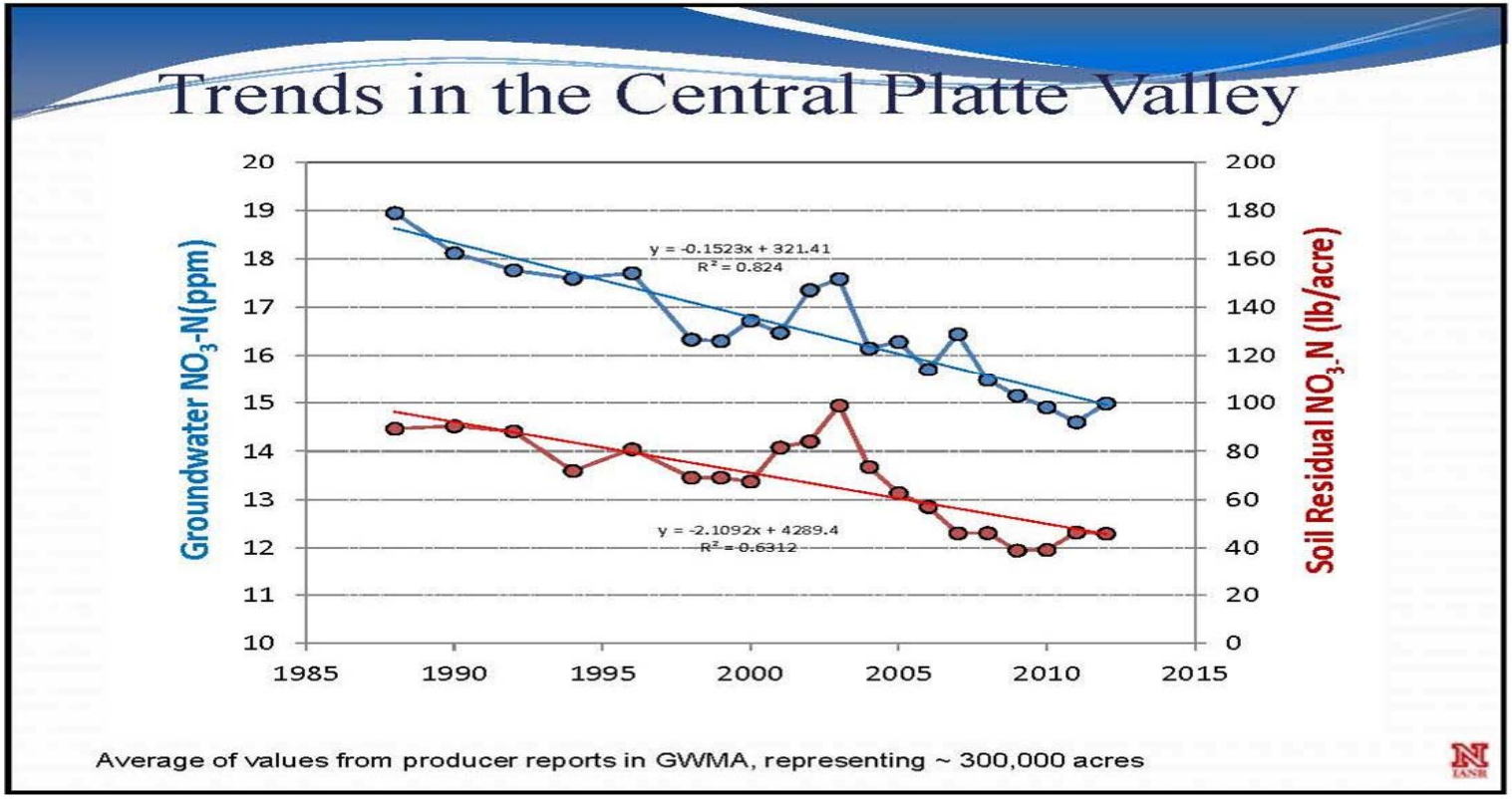
Measures of Success: H_20 Quality



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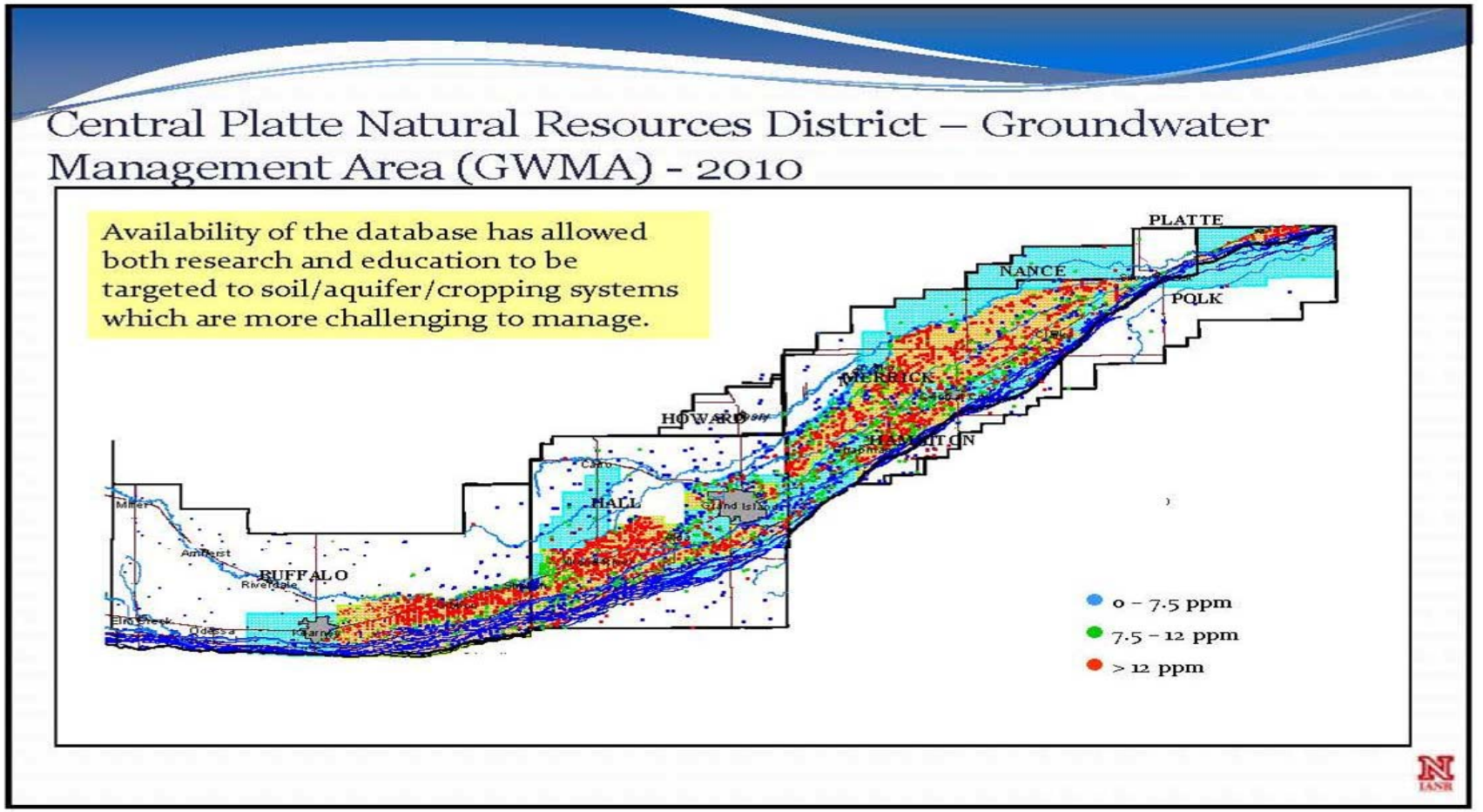
Measures of Success: Data



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Benefits and Challenges

- Nitrogen & Irrigation Demonstration Project 1984-2002
  - Extensive outreach & education on BMP adoption
  - Economic and environmental benefits
- Regulatory Impact of monitoring & data collection
- WUE ↑ + NUE ↑ =
  - Conversion: furrow ⟶ center pivot
  - Soil water sensors ⟶ irrigation scheduling
  - Crop canopy sensors ⟶ inhibitors & CRF
  - Shallow Aquifers NO_3^- N concentrations improving
- Protecting deeper aquifers from NO_3^- N concentrations
- Emerging technologies for NUE and drinking water treatment