Nitrogen Management under CV-Salts and the Irrigated Lands Regulatory Program:

A Water Quality Coalition Perspective

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PLANTIERRA

N management components

- Regulatory process
- Approach to compliance
  - Conceptual model
  - Mine existing data
  - Check system performance
  - Monitor, verify
  - Manage to reasonably minimize excessive
    - N leaching
    - Other N losses

Related Regulatory Processes in Region 5 (Central Valley of CA)

- *CV Salts – A stakeholder-driven Basin Plan Amendment process (nitrate & other salts in groundwater)*
- *Programs affecting irrigated lands (all subject to the Basin Plan & currently in effect)*
  - *Statewide General Permit for Landscape Irrigation Uses of Municipal Recycled Water*
  - *Dairy General Permit (nitrate in groundwater)*
  - *Individual WDRs*
  - ***Long-term Irrigated Lands Regulatory Program (****focused on nitrate in groundwater)*
    - *The focus of this presentation*
    - *Implemented by Water Quality Coalitions*
    - *Main example is the CRC coalition (commodity-specific)*

Regulatory Process Facets & Issues

- Two recent UC studies focus on source control in irrigated croplands
- Each coalition unique, but permits probably functionally consistent
- Water quality regulators have a predominant hydrogeologic focus
  - Desire extensive groundwater monitoring, which has large program cost/benefit implications
  - Unfamiliarity with nutrient management (NMP) concepts and tools
  - NMP requirements uncertain
  - Other media are currently outside scope of discussion
- This context influences WDRs and MRPs

One Coalition's Approach to Compliance

MRP

1. Environmental monitoring
2. Edge-of-field &/or root-zone studies (optional component)

Results – Problem?

yes

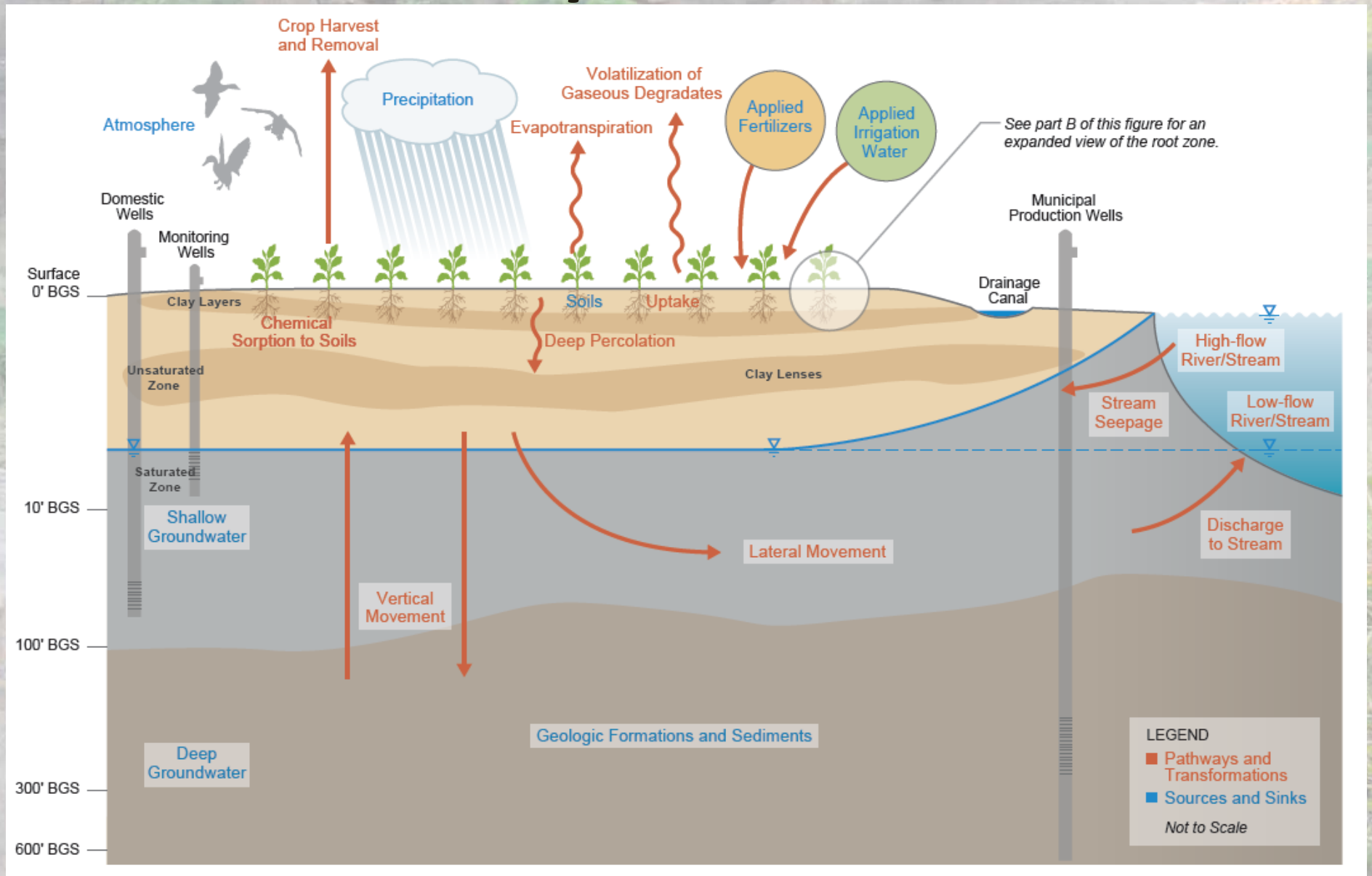
Management Plan

1. Environmental monitoring
2. Edge-of-field &/or root-zone studies (optional component)
3. Management actions

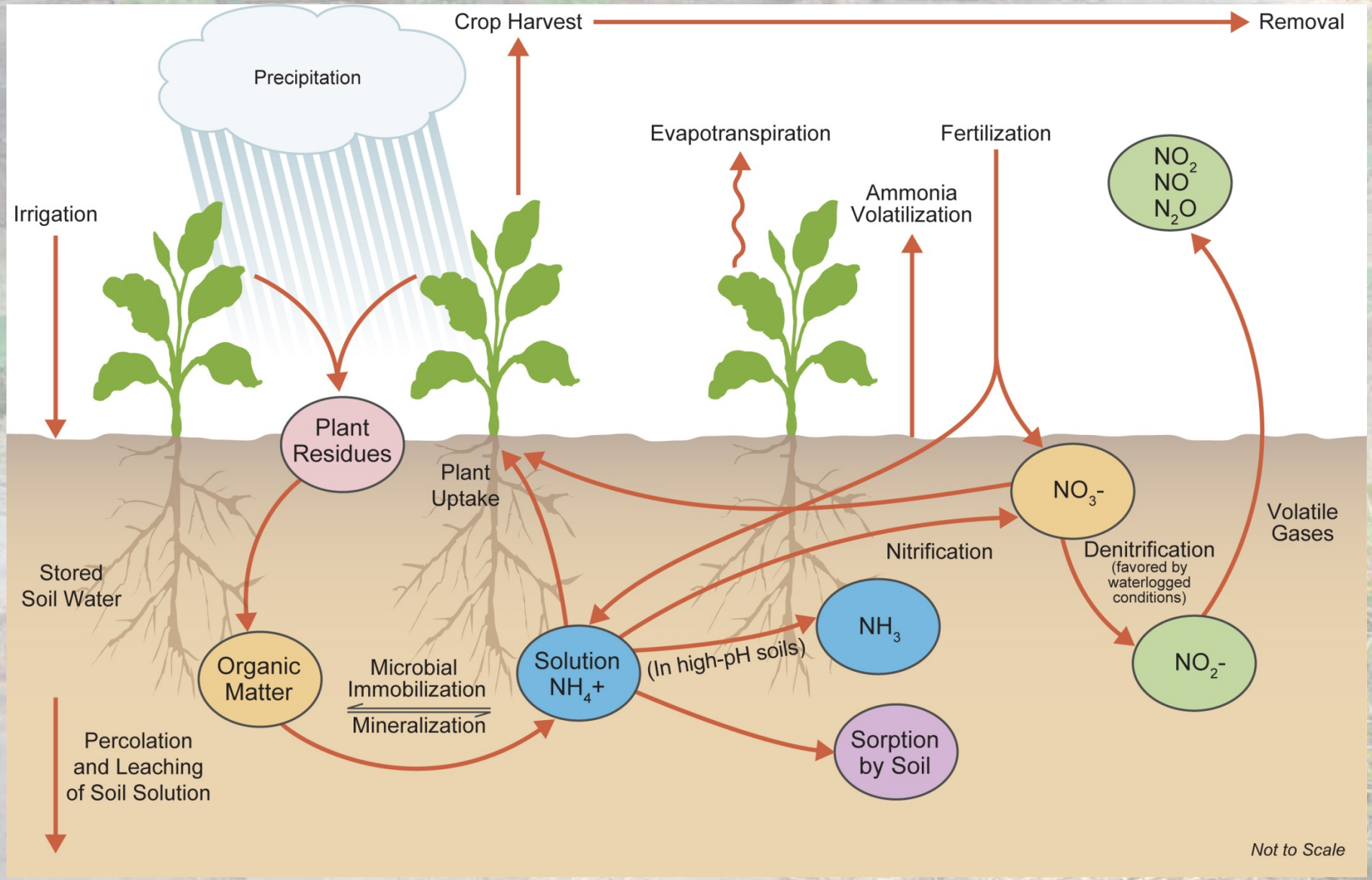
no

Refined MRP

Conceptual Model



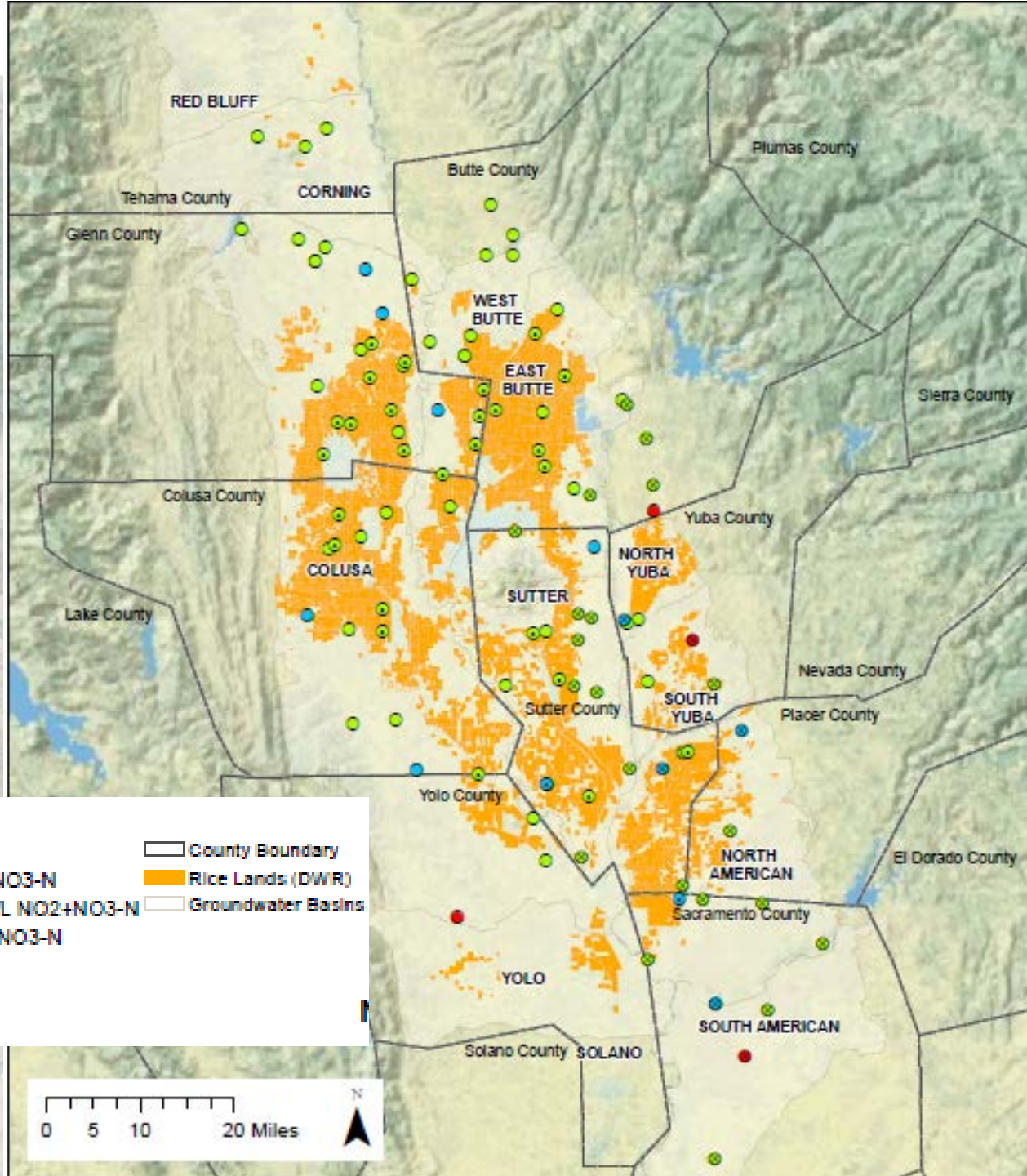
Conceptual Model



Mine existing data

↓

Low shallow groundwater nitrate concentrations



Check system performance:

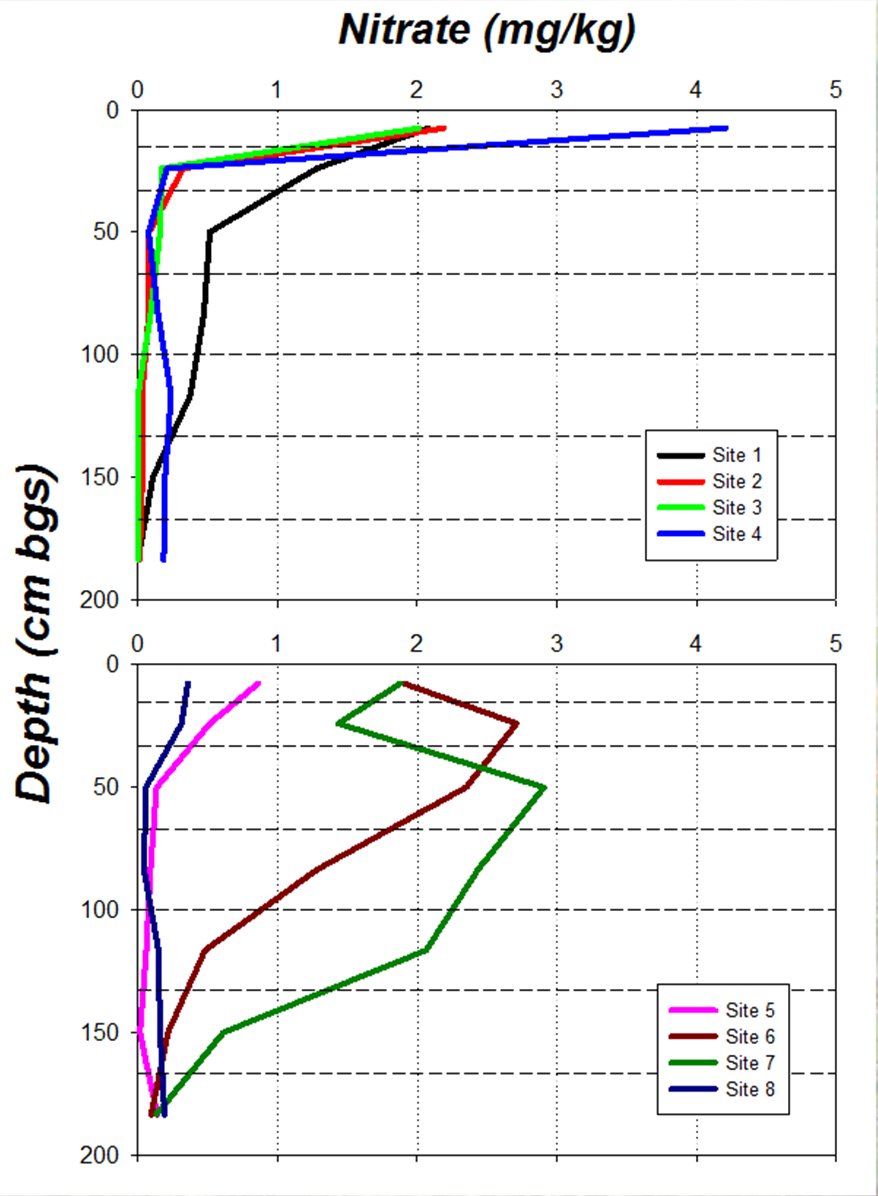
Nitrate transport in rice soils

Site	Soil map unit	Classification
1	Clear Lake clay	Fine, smetic, thermic Xeric Endoaquerts
2	Hillgate clay loam	Fine, smetic, thermic Typic Palexeralfs
3	Willows clay	Fine, thermic Typic Calciaquolls
4	Lofgren-Blavo complex	Very-fine, smetic, thermic Xeric Epiaquerts
5	San Joaquin loam	Fine, mixed, thermic Abruptic Durixeralfs
6	Clear Lake clay	Fine, montmorillonitic, thermic Typic Pelloxererts
7	Columbia fine sandy loam	Coarse-loamy, mixed, thermic Typic Xerofluvents
8	Clear Lake clay	Fine, montmorillonitic, thermic Xeric Epiaquerts

Check system performance:

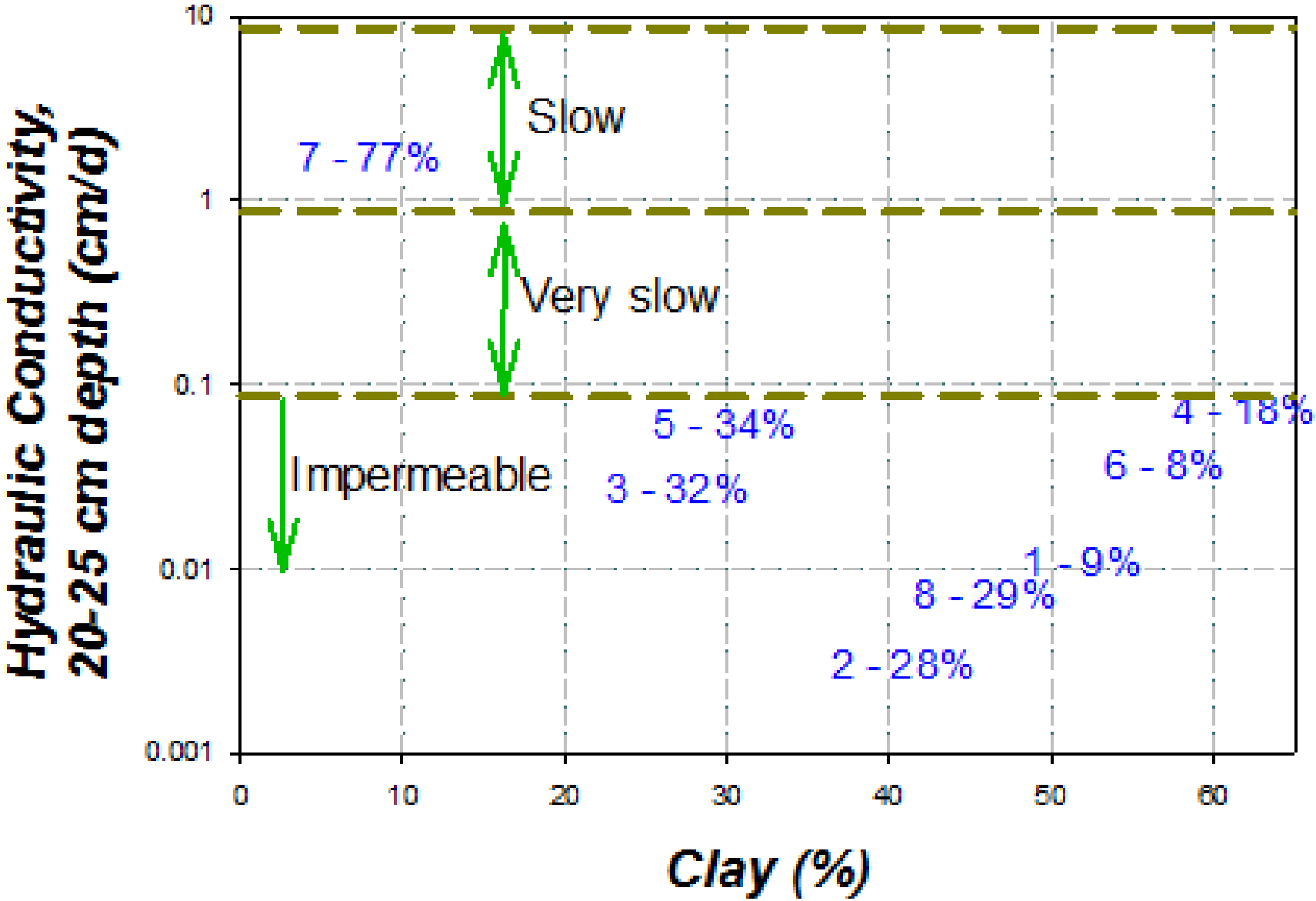
Very low nitrate concentrations in rice soils

- **Pore water concentrations are ~1.2x soil**
- **<MCL throughout**
- **~0 at the base of the profile**



Check system performance:

Very slow vertical hydraulic conductivity



Monitor, verify

Program in Development

- Commodity-specific WDRs and MRPs
- Continue focused surface-water monitoring
- Rice monitoring wells (USGS network plus some)

Manage to reasonably minimize excessive N leaching & other losses: WDR elements

- Sound nutrient management
- Field-level BMP development and effectiveness verification
- Commodity-specific nutrient management plans, as required

Manage to reasonably minimize excessive N leaching & other losses

Field-specific factors affecting NMPs

- Climate
- Annual weather
- Soils
- Surface and groundwater proximity & quality
- Crops and cultivars
- Yield and quality goals
- Degree and type of mechanization
- Tillage
- Planting and seeding
- Fertilizing
- Pressure from and control of weeds, pests, and pathogens
- Irrigation
- Drainage
- Nutrient forms and timing
- Field history
- Farm programs

Technical challenge is adaptation to diverse, site-specific conditions & delivery to large number of users

Summary

- A raft of new and/or re-focused CA regulatory processes pertaining to nitrate pollution
- Recent study conclusions reinforce mandate
- Little connection to non-water media (e.g., greenhouse gas) programs
- Great opportunity to apply existing practical knowledge and research results about nutrient management
- Also need:
  - Expanded BMP menu
  - Site-specific adaptation and broad scope of implementation

Conclusions

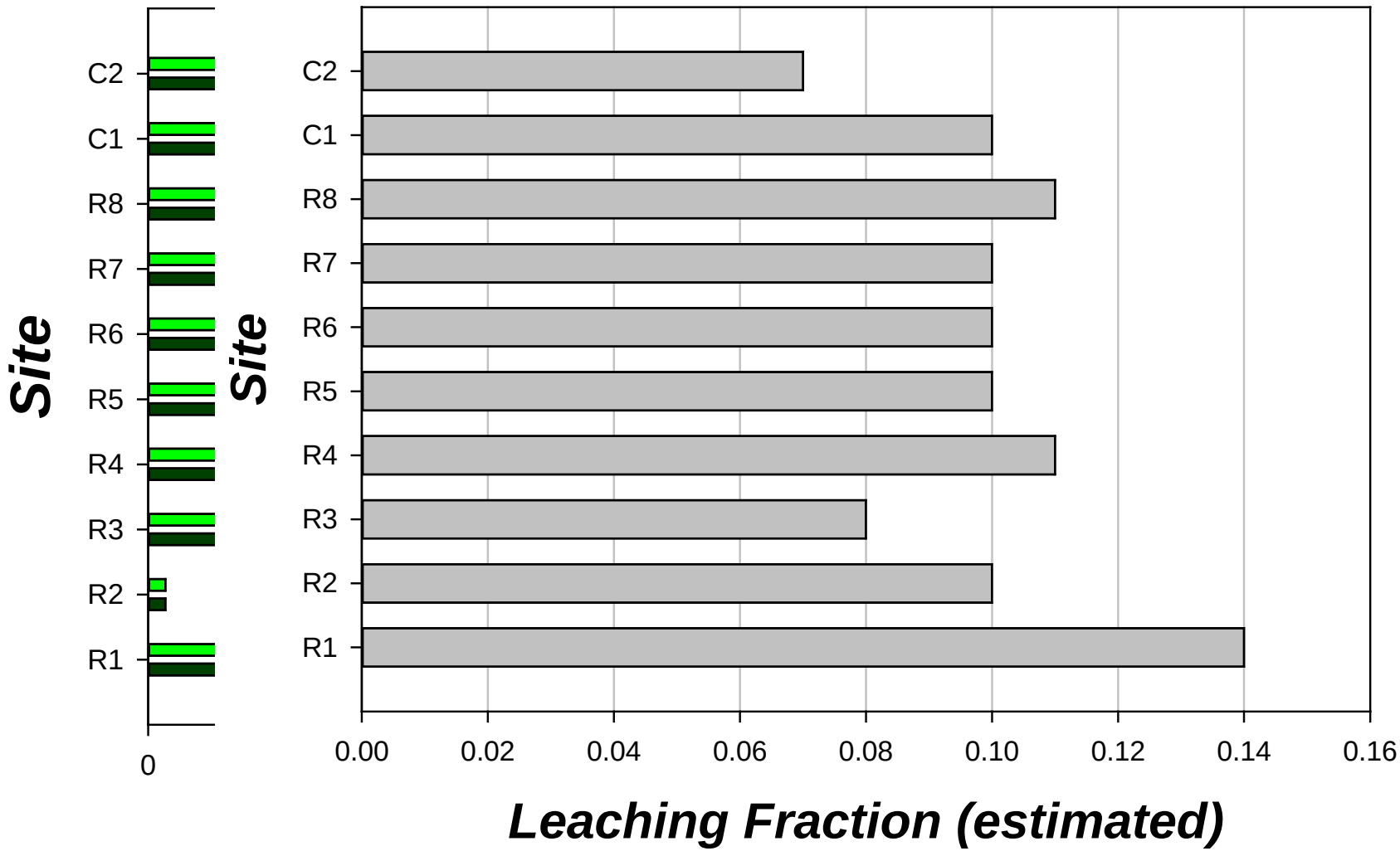
- Potentially helpful actions:
  - Strengthen crop, soils, and irrigation presence at all levels of regulatory process
  - Avoid turning management recommendations into inappropriate regulatory criteria
  - Connect with coalitions to assist with development and implementation of programs
  - Work with farmers to find practical source control strategies consistent with profitable farming

End of main presentation

Existing Nutrient Management Tools and System Performance:

Site Specific Examples

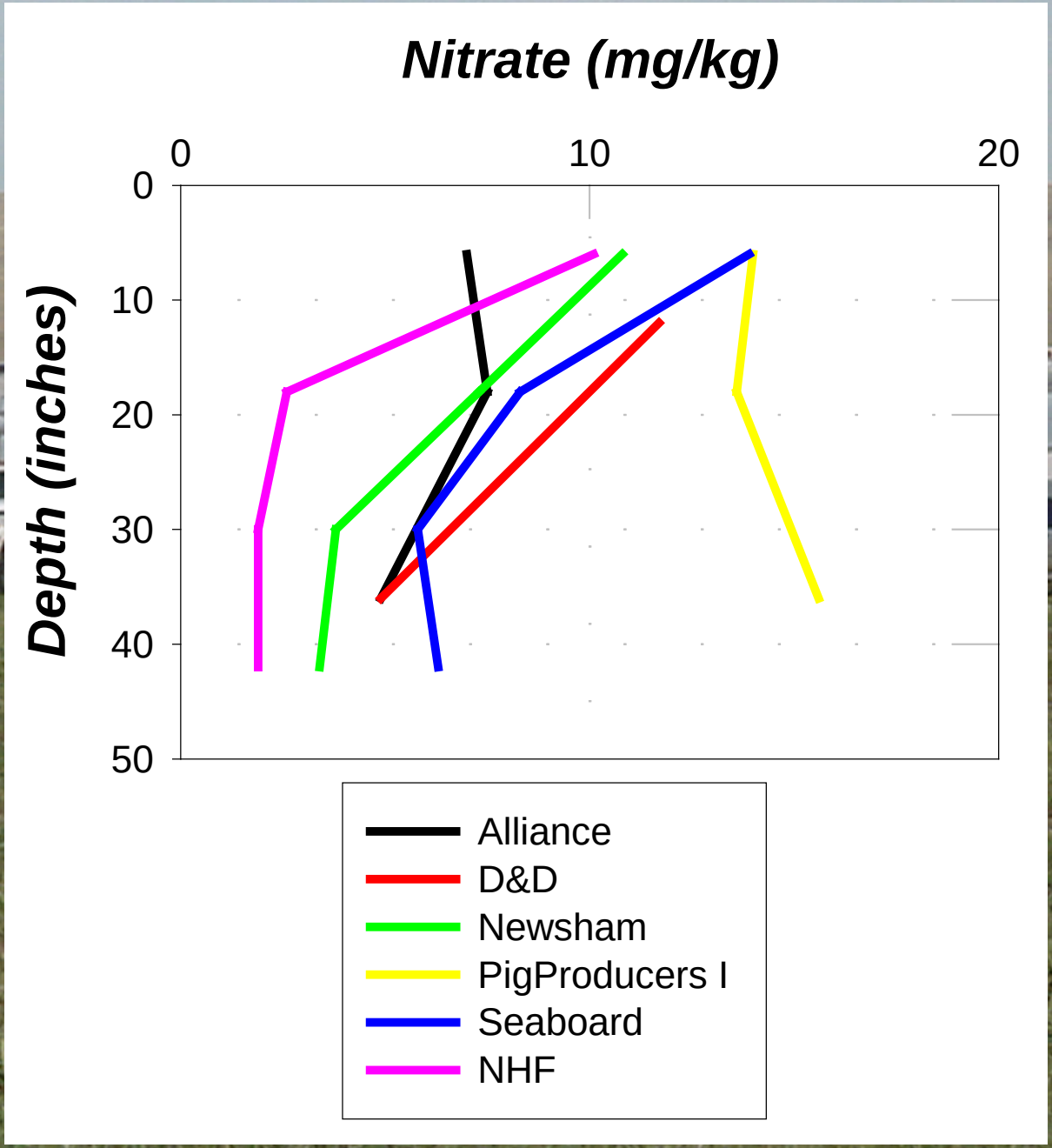
City Park Areas on Capay & Rincon Clays



Hog Farm near Greeley, CO

- 15,500 sows producing 349,000 pigs per year
- Effluent and separated solids
- >900 T N/year in effluent
- Applied to 2,860 acres of intensively farmed, irrigated forage crops on sandy soils overlying South Platte River Aquifer
- In 1998, a state initiative (Amendment 14) and resulting regulations required Swine Waste Management Plans for all facilities
- Facility undertook intensive nutrient management planning and monitoring of performance for about 5 years

Pivots

Soil sampling immediately after triticale harvest

NHF in context: