May 2016

Comments on SWRCB Draft Order to revise WDR *R5-2012-0116*
May 2016

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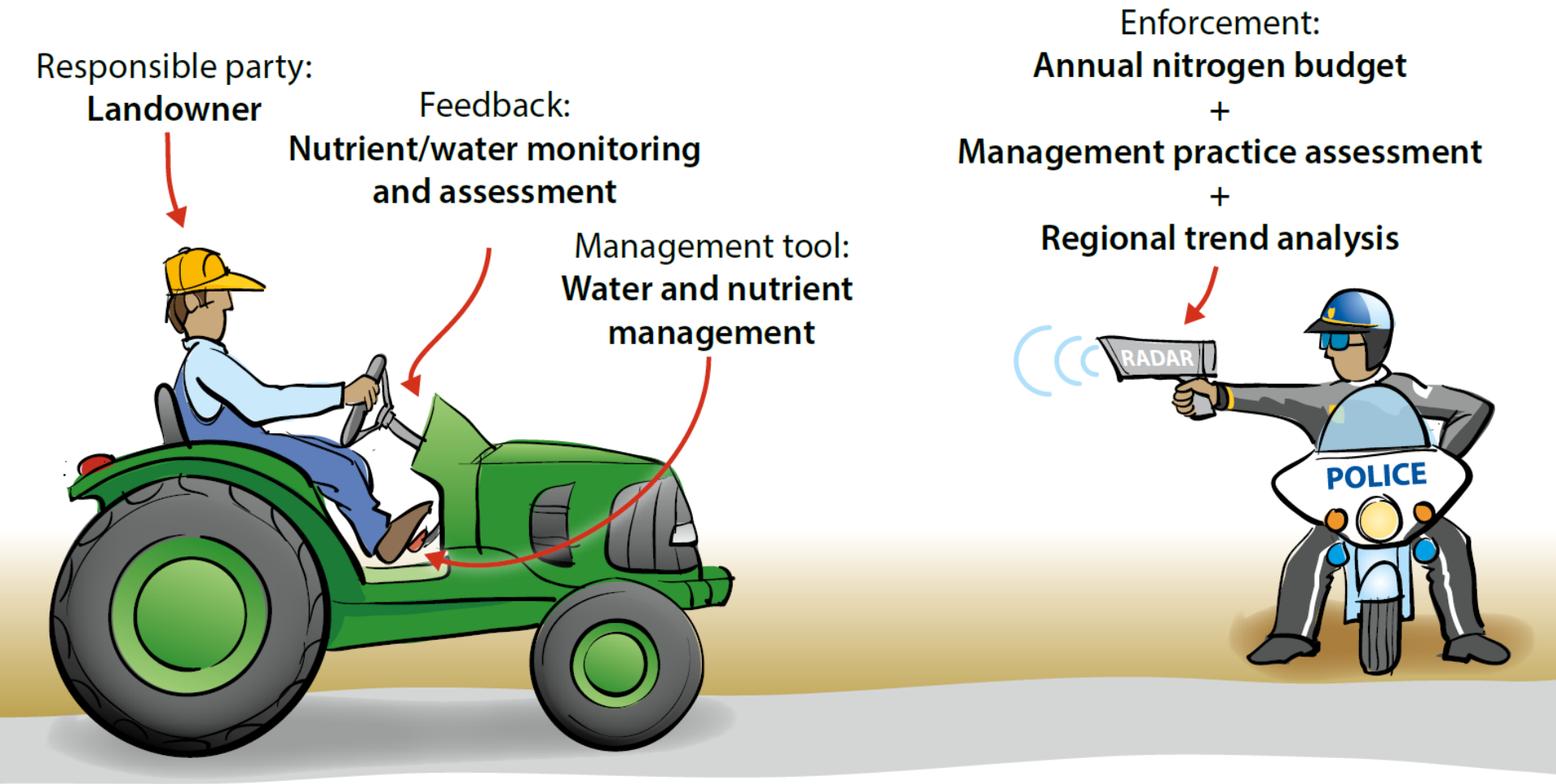
Comment Summary

- A, R, *and* A/R needed

- By township, crop, year
- Coordinated long-term shallow groundwater / domestic well trend monitoring program

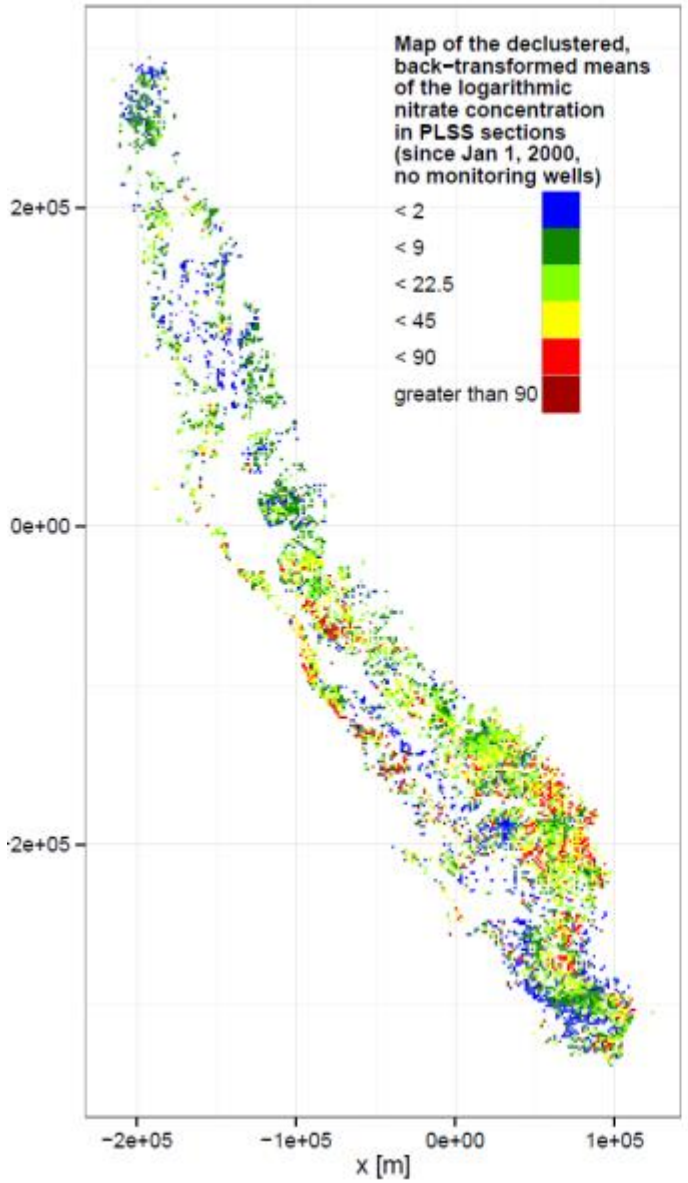
Application to Nonpoint Source Pollution

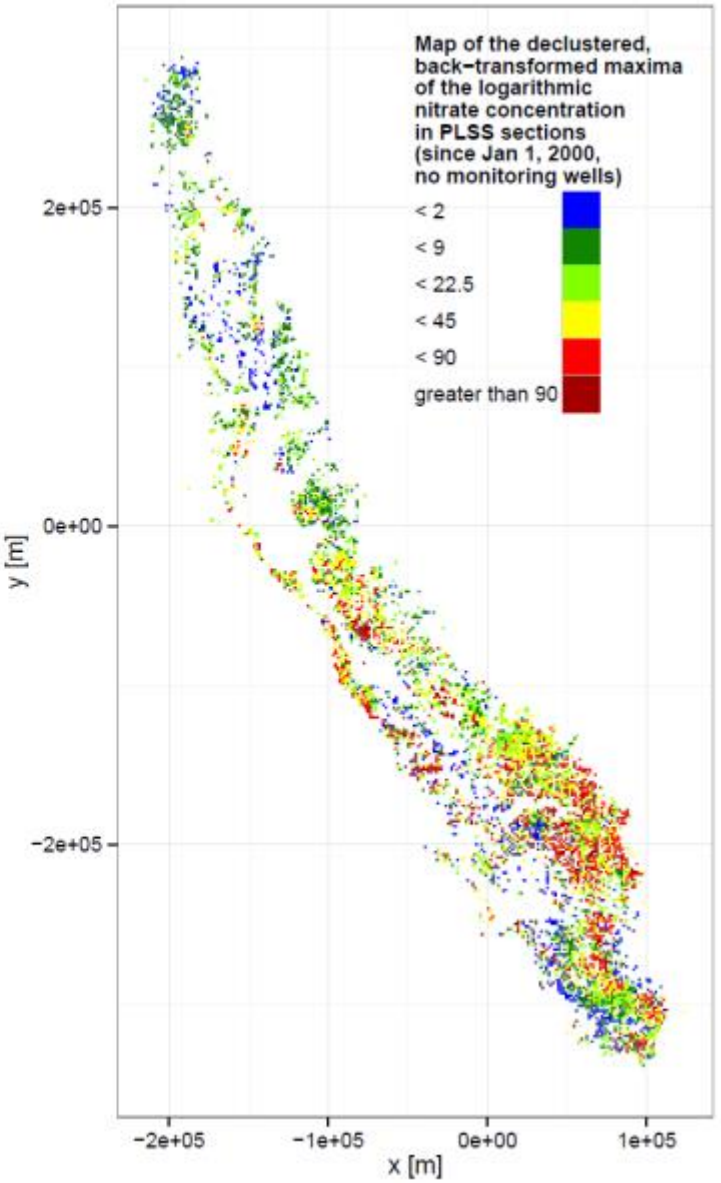
- Identify risks: e.g., Groundwater Assessment Reports (ILRP)
- Identify parties to be regulated, e.g., vulnerability zones (ILRP)



Harter, California Agriculture, 2015

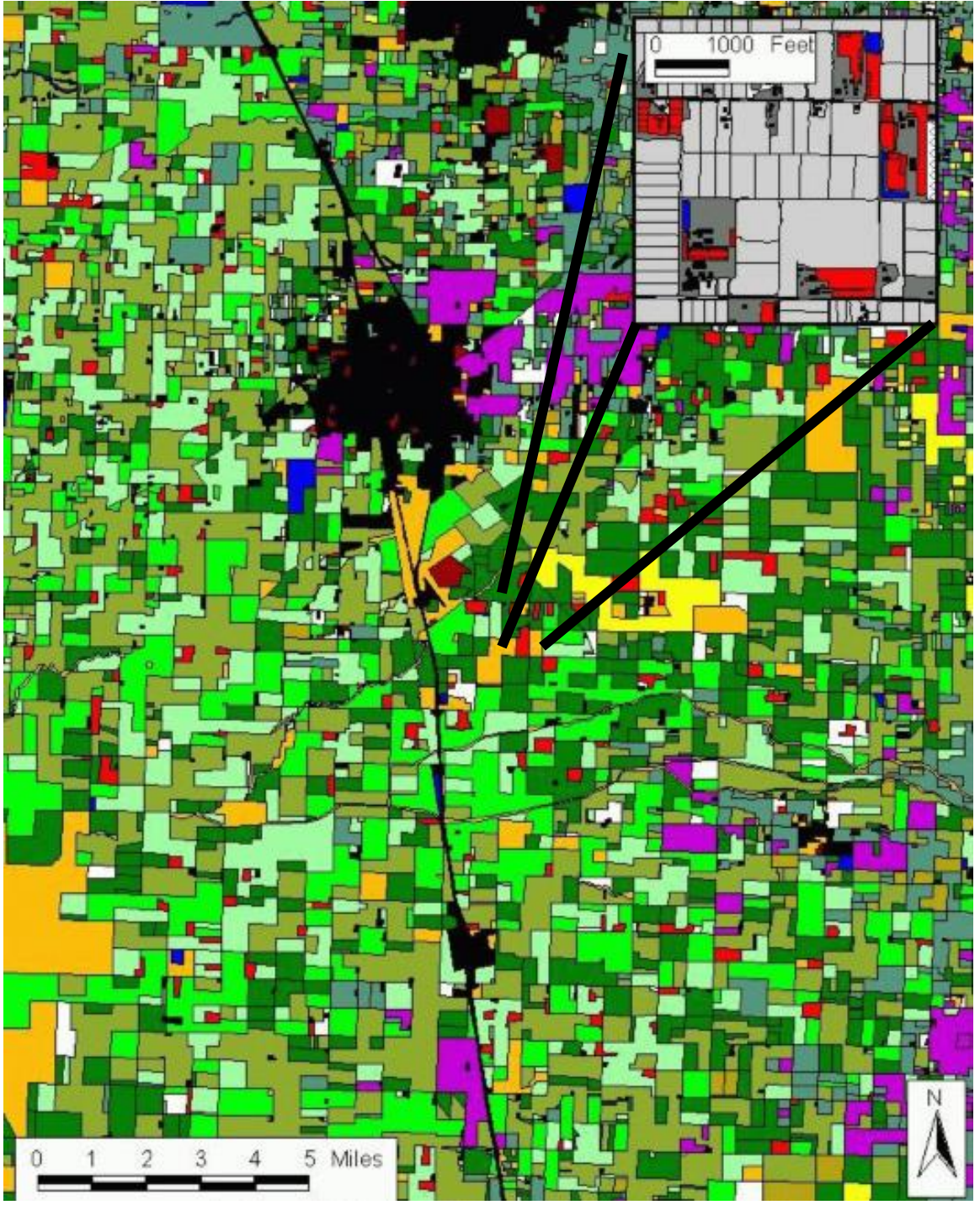
Groundwater Nitrate in the Central Valley: Not a Plume



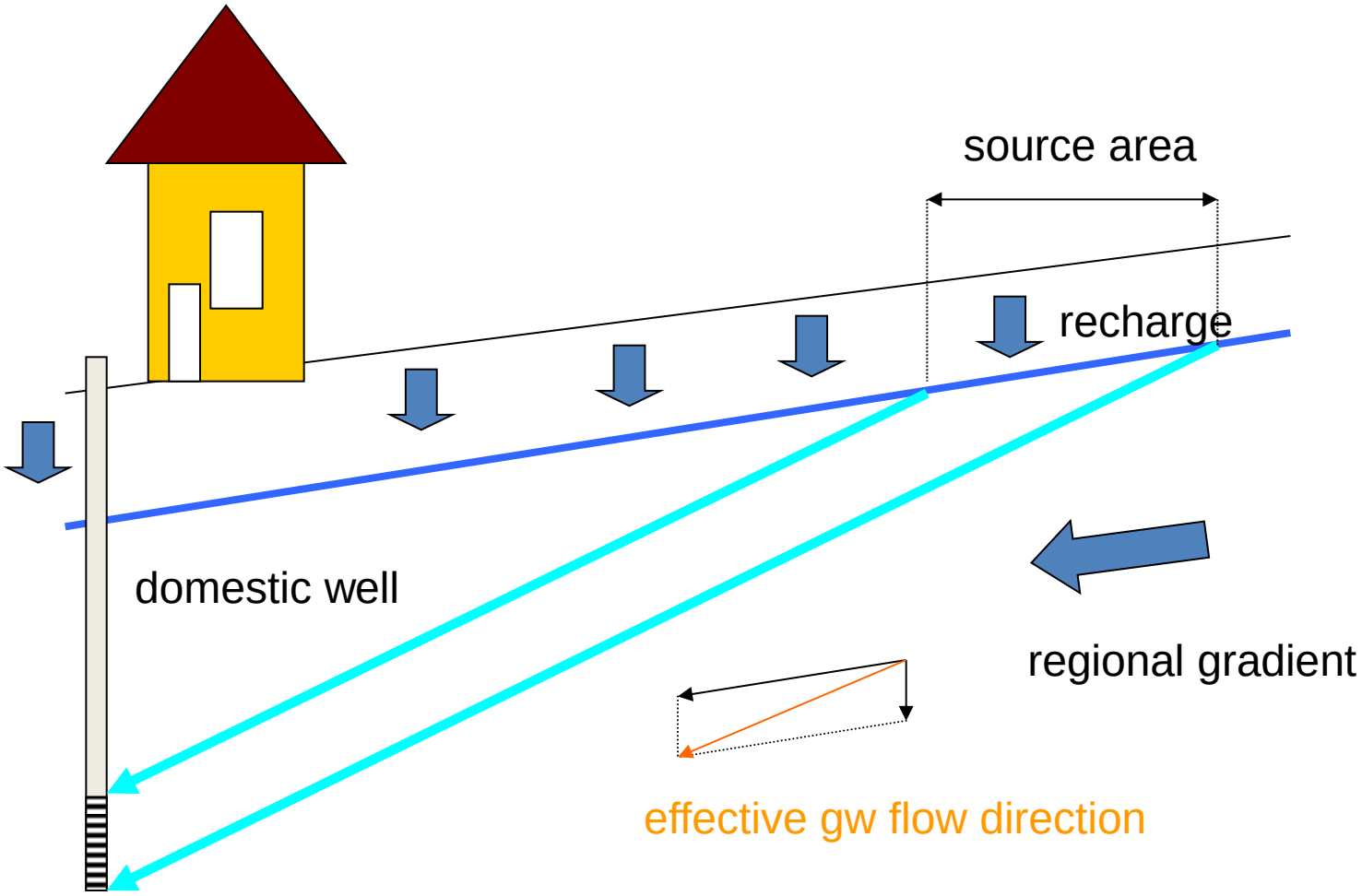


Groundwater Nitrate Sources:

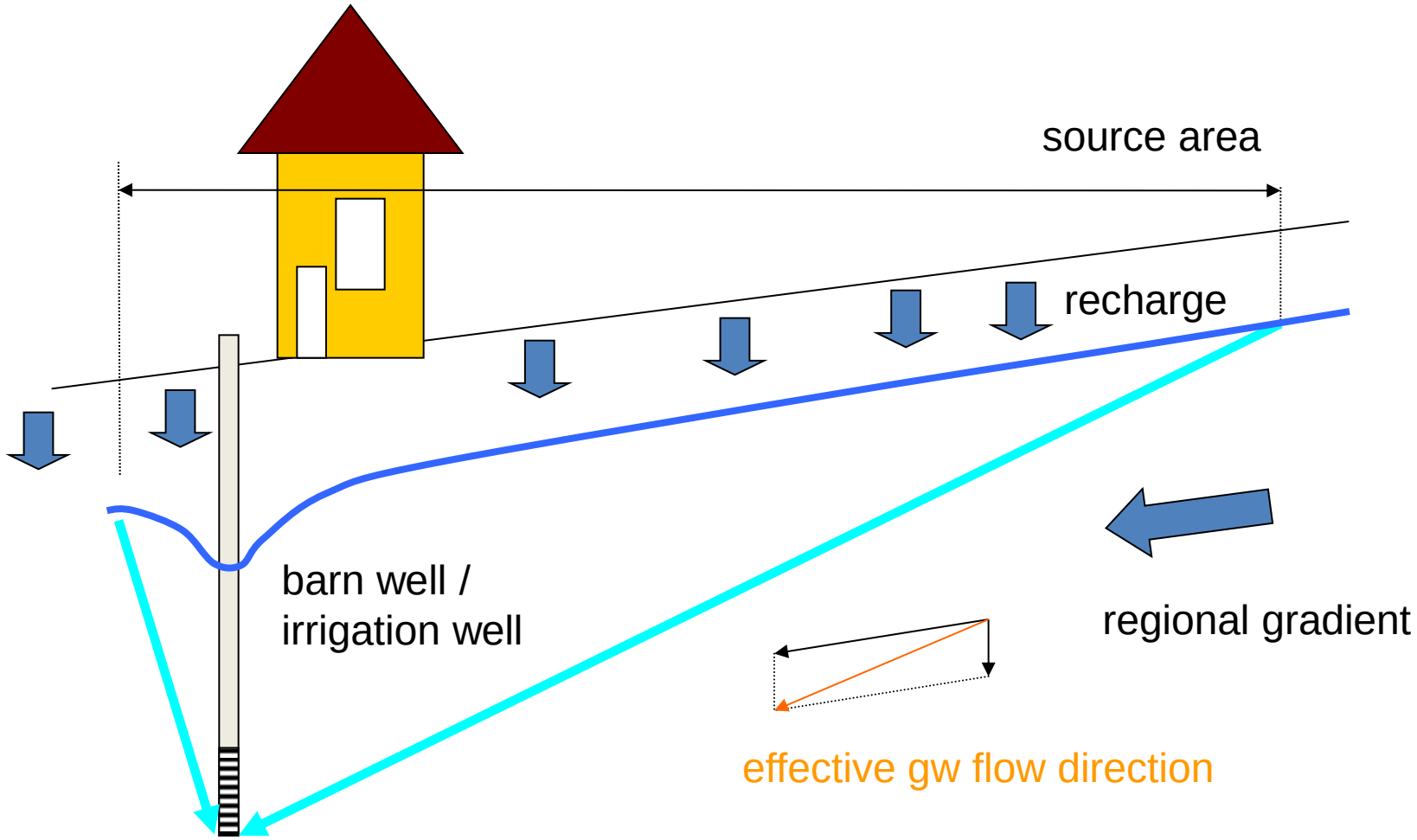
Each source is neighbor to another source, at different loading rates.

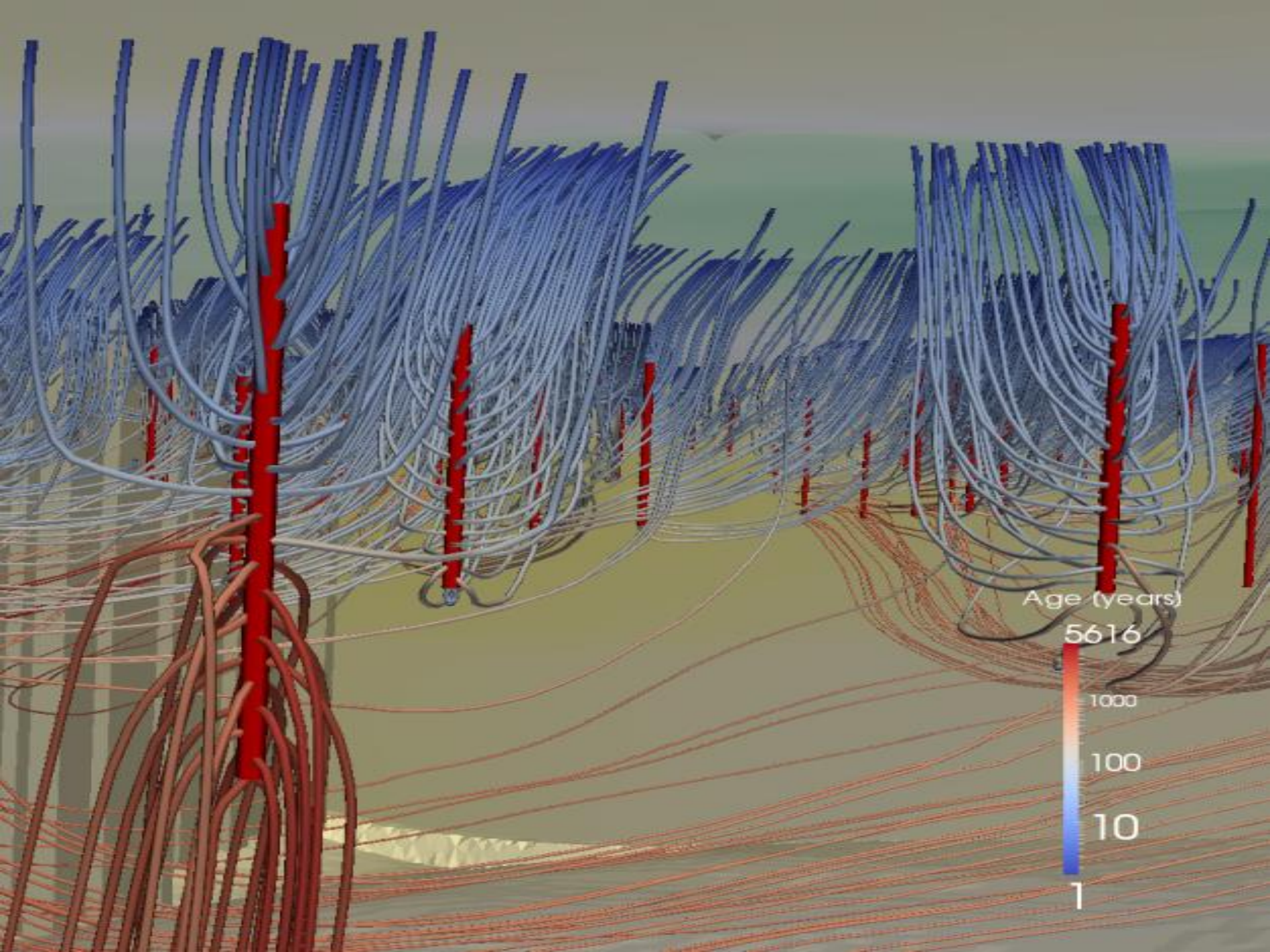


Where is My Well Water Coming From?
- Domestic Well-



Where is My Well Water Coming From?
- Public Supply Well / Irrigation Well / Barn Well -

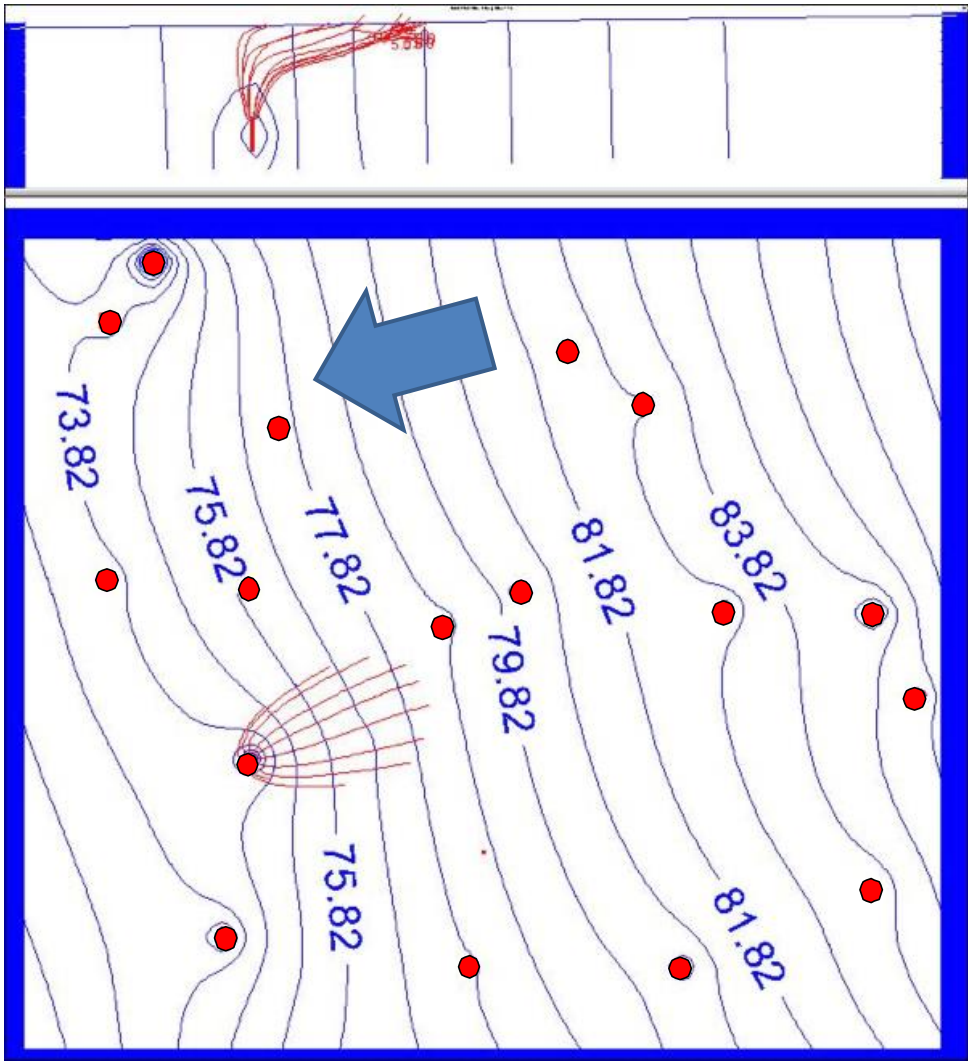



Age (years)
5616
1000
100
10
1

Source Area and Age of Well Water - top of the screen - Simulation of Smaller Public Supply Well -

Aquifer Cross-Section 200’ x 2 miles

Aquifer Map-View 2 mi x 2 mi



- Water flow is horizontal & vertical
- Horizontal travel distances are generally MUCH longer than travel vertical distances
- Different depths of the well screen capture different water!

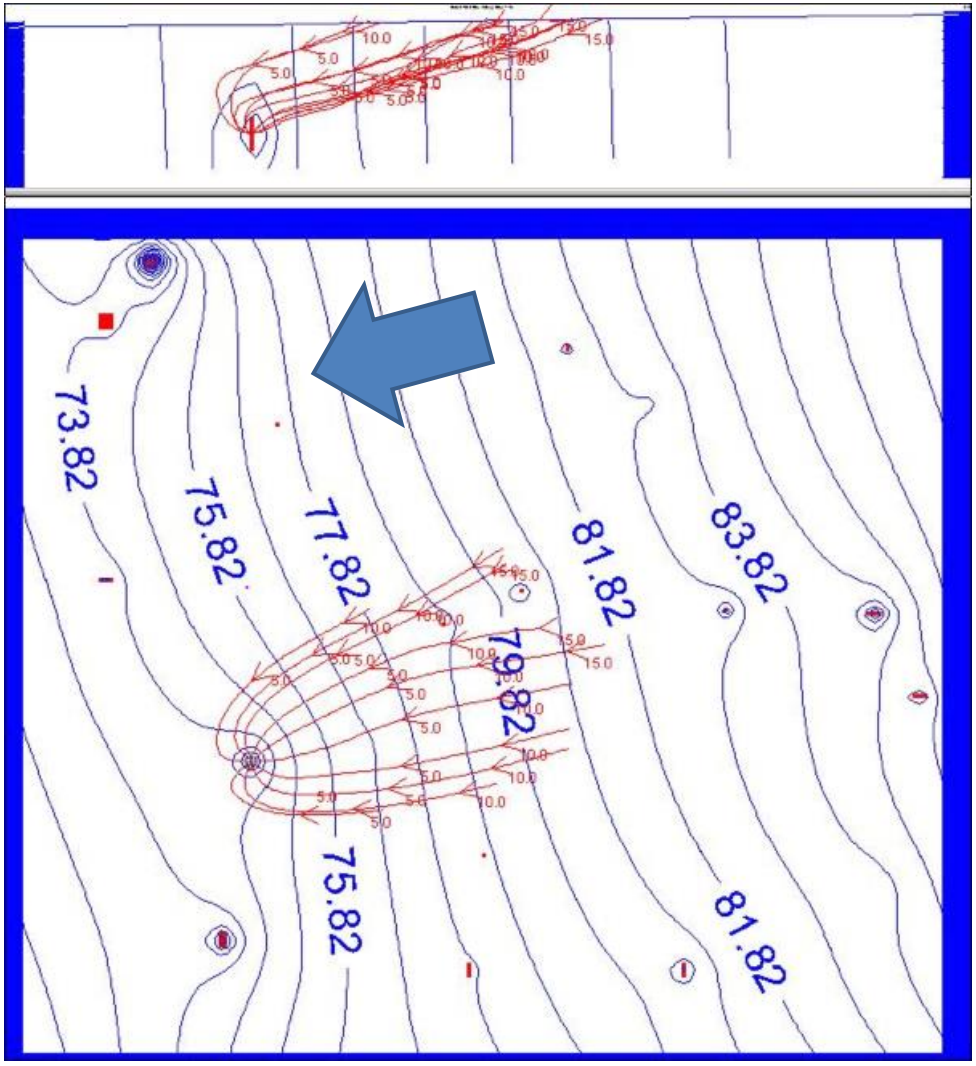
pumping wells

water level contour

Source Area and Age of Well Water - middle of the screen - Simulation of Smaller Public Supply Well -

Aquifer Cross-Section 200’ x 2 miles

Aquifer Map-View 2 mi x 2 mi



- Water flow is horizontal & vertical
- Horizontal travel distances are generally MUCH longer than travel vertical distances
- Different depths of the well screen capture different water!

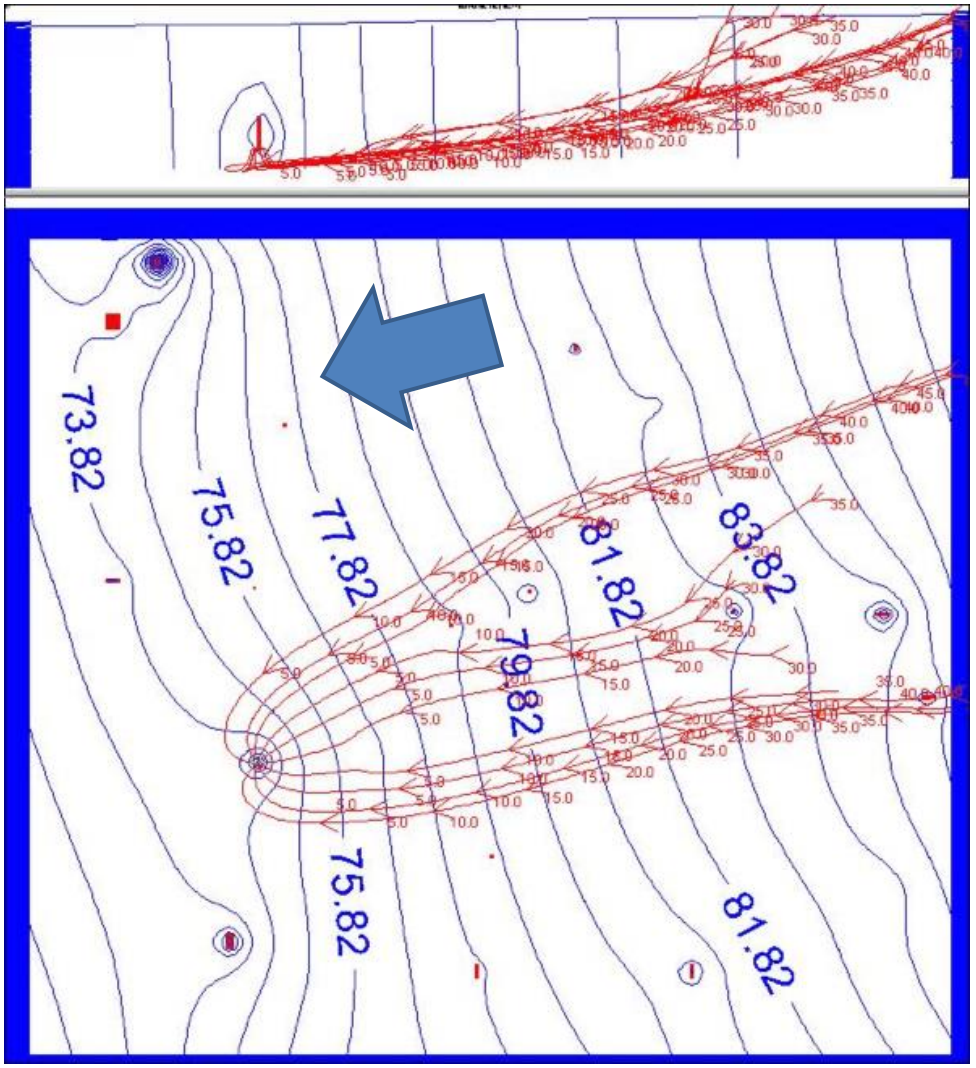
pumping wells

water level contour

Source Area and Age of Well Water - bottom of the screen - Simulation of Smaller Public Supply Well -

Aquifer Cross-Section 200’ x 2 miles

Aquifer Map-View 2 mi x 2 mi



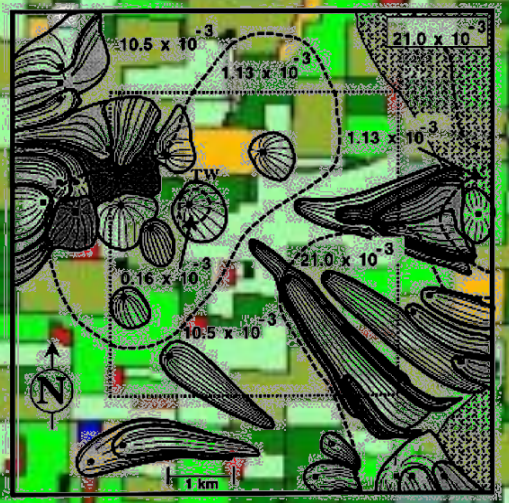
- Water flow is horizontal & vertical
- Horizontal travel distances are generally MUCH longer than travel vertical distances
- Different depths of the well screen capture different water!

pumping wells

water level contour

Where is the water in my well from, at any time?

Many sources of mixed age!



Unconfined Region of Principal Aquifer

0 1 2 3 4 5 Miles

N

Coalitions =>MPEP and Outreach/Education with

- UC Extension
- UC/CSU/CalPoly academics
- NRCS, RCD
- Consultants/advisors

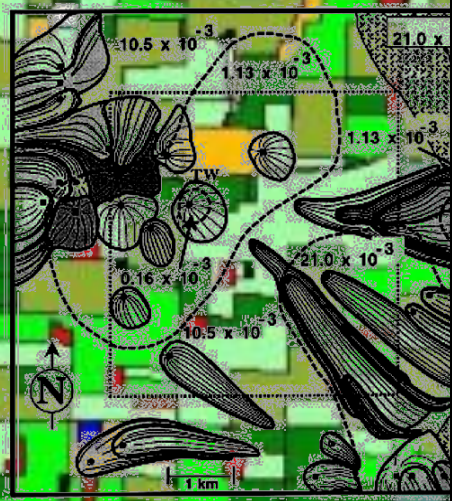
Public Data / data submitted to RWB by year and crop for each township of:

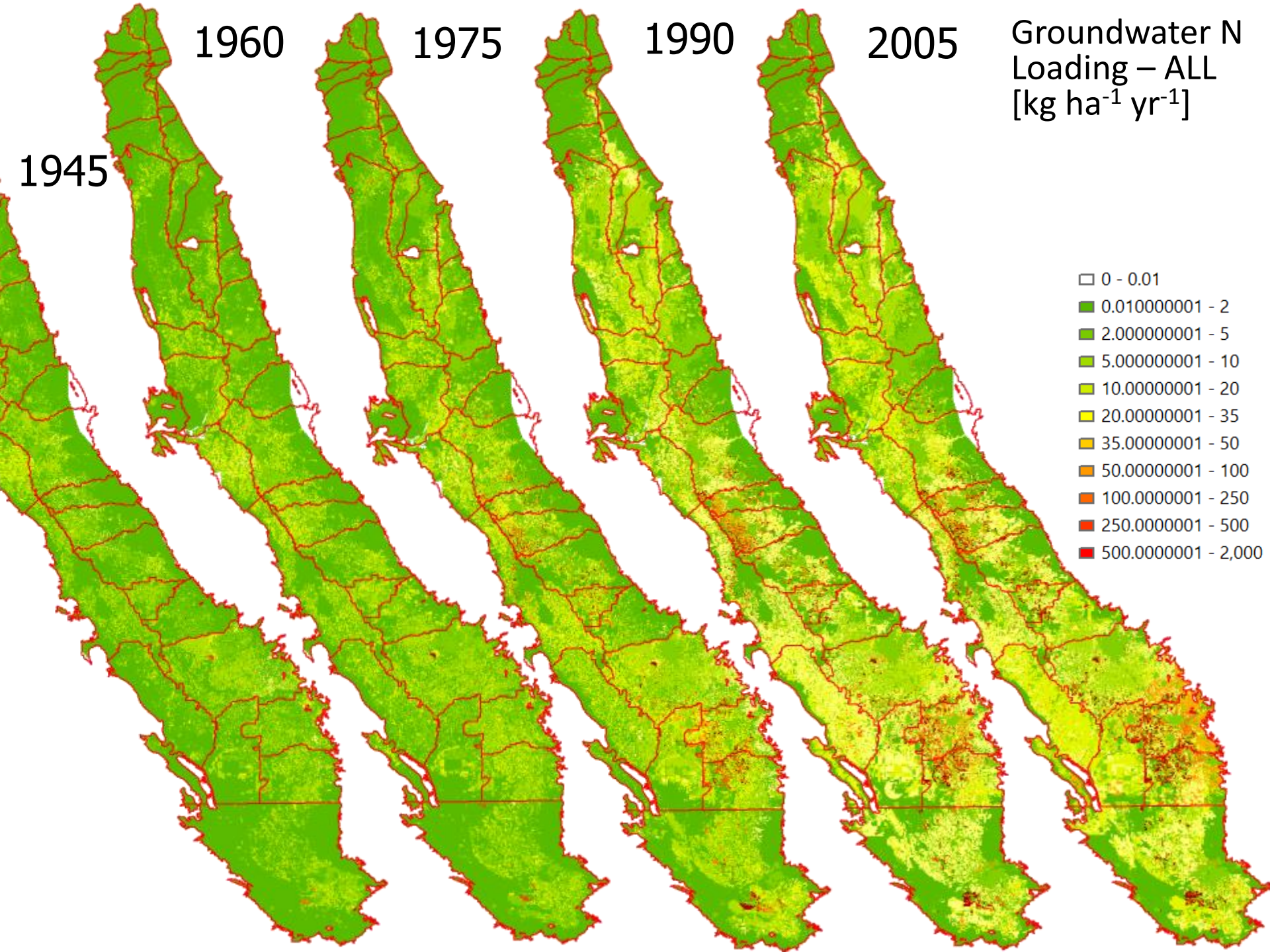
- Sum of A (sum of nitrogen applied)
- Sum of R (sum of nitrogen removed)
- Average A/R (ratio of N applied over N removed)
- Statistics of A, R, A/R (quantiles etc.)

…are scientifically/technically sufficient to:

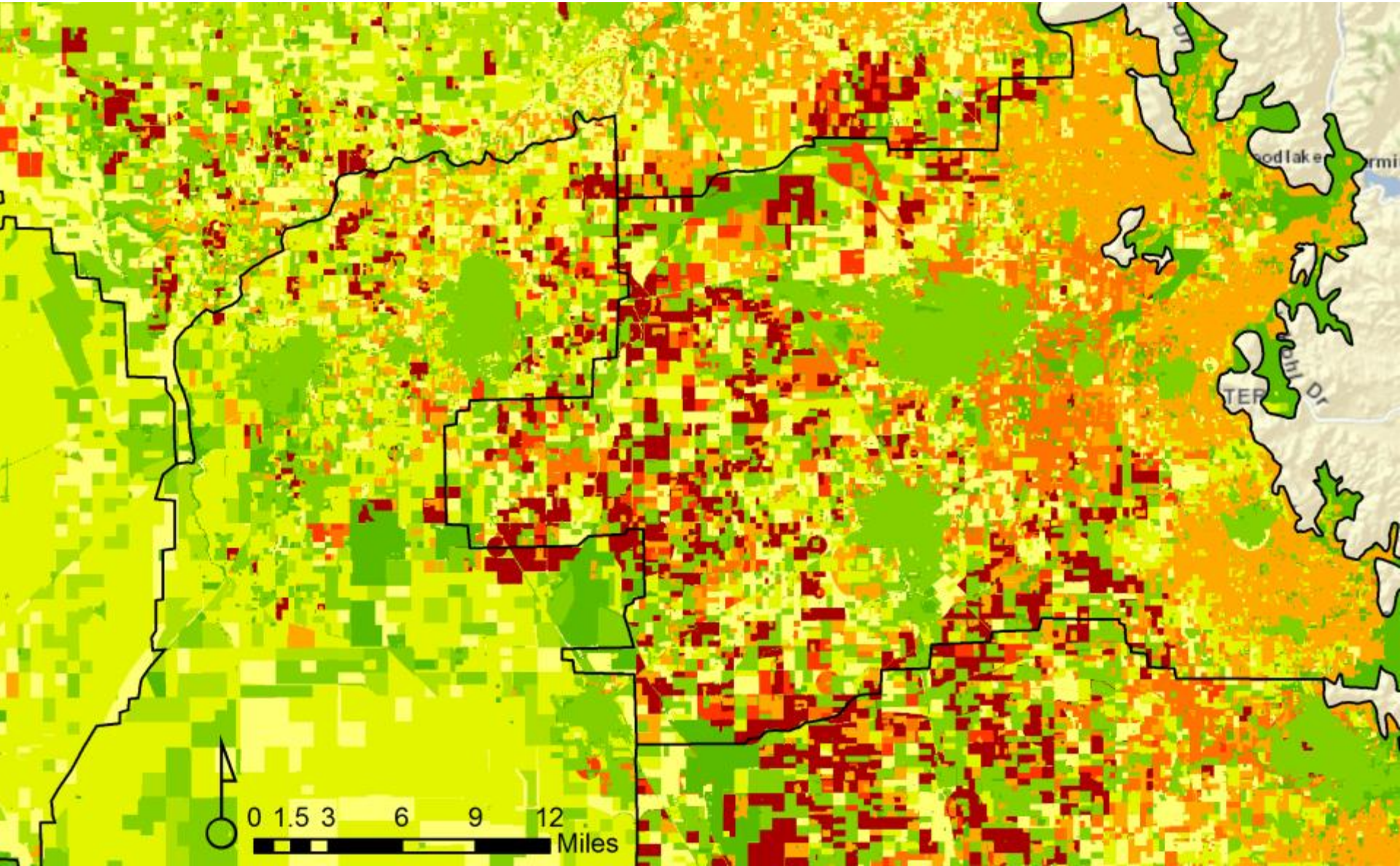
- provide crop-specific feedback on performance to all growers (peer information)
- assess temporal trends
- assess waste discharge
- check compliance by responsible parties

…at a spatial scale that is on the same order as the spatial scale at which well source area can be known

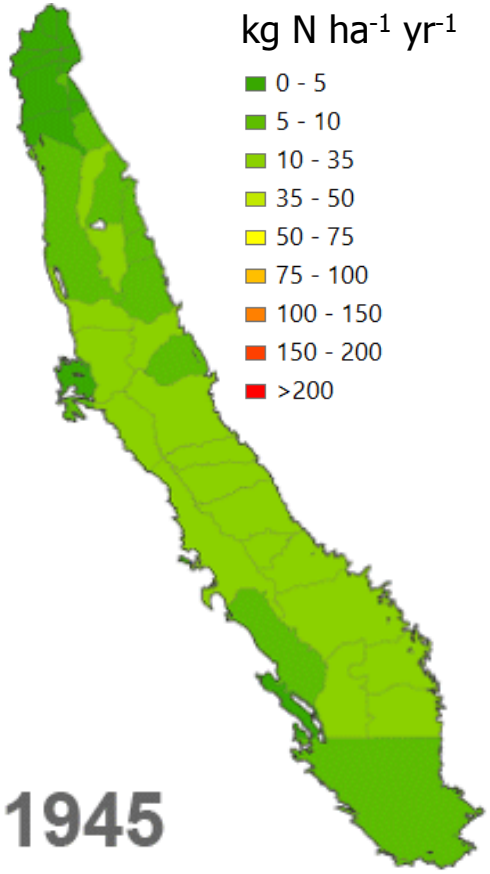


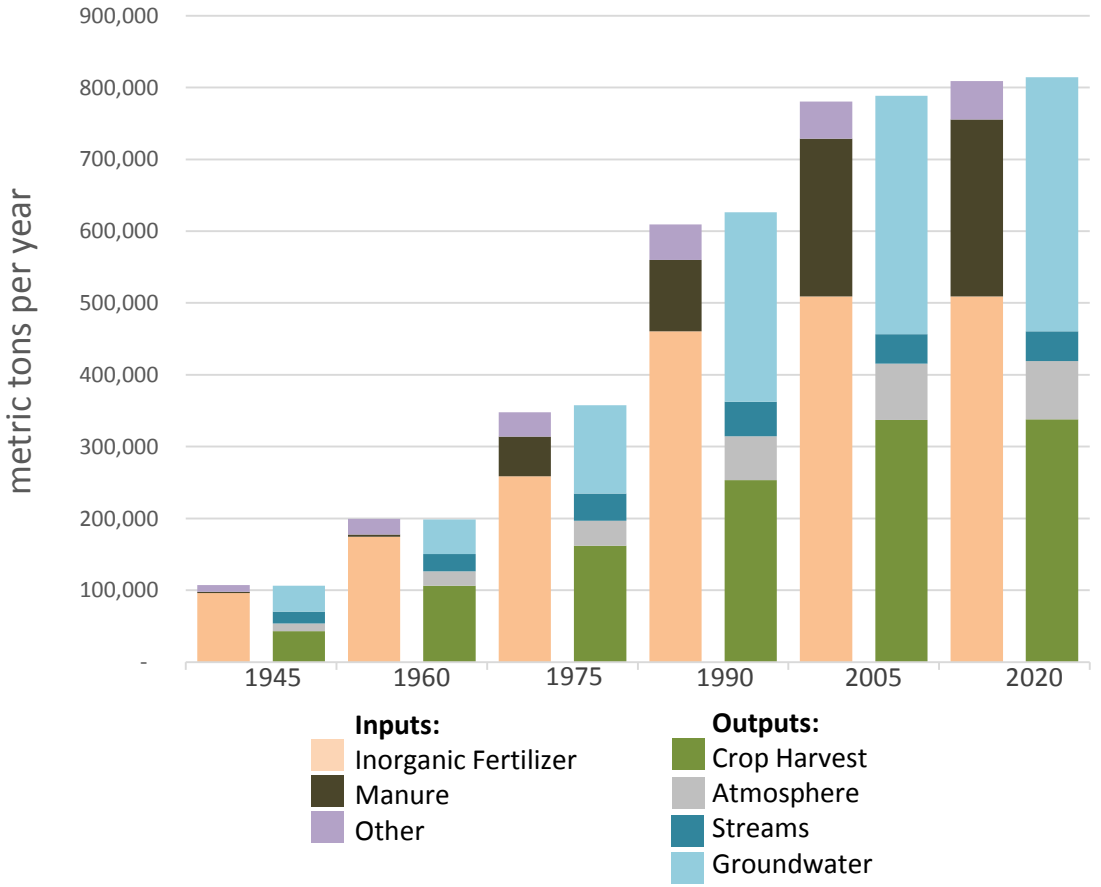

1945
1960
1975
1990
2005
Groundwater N Loading – ALL [kg ha-1 yr-1]
0 - 0.01
0.010000001 - 2
2.000000001 - 5
5.000000001 - 10
10.00000001 - 20
20.00000001 - 35
35.00000001 - 50
50.00000001 - 100
100.0000001 - 250
250.0000001 - 500
500.0000001 - 2,000

Detailed Scene Visalia/Tulare: 2005 N Loading (all sources)



Nitrate Loading: Spatial and Temporal Trends





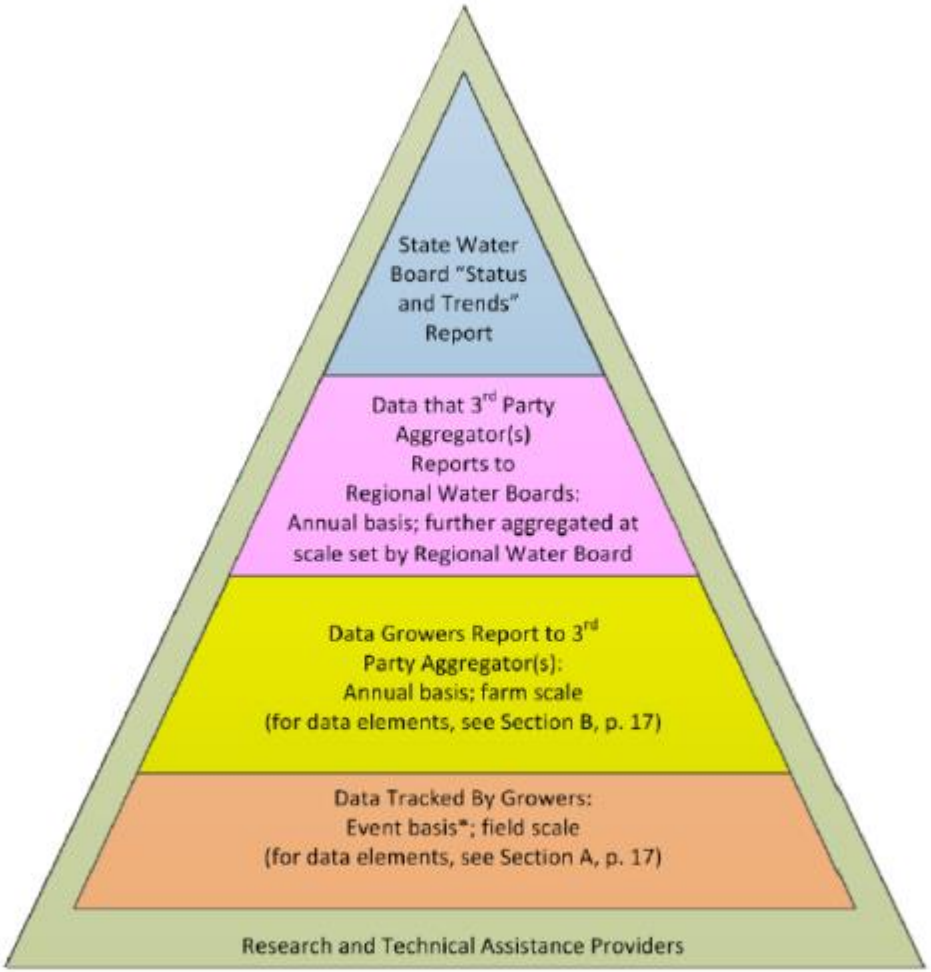
Sources: SBX2-1 report and updates (Harter et al, in prep, 2016)

Nitrogen Tracking and Reporting Task Force Recommendation

Figure 1

CDFA Nitrogen Tracking and Reporting Task Force

Nitrogen Tracking and Reporting System for Nitrate High Risk Areas in California: Structure, Roles, and Data Elements



Notes:

- Bottom of pyramid represents data tracked by grower.
- Moving toward top of pyramid corresponds with process of reporting data up to higher levels of decision makers.
- Research and technical assistance providers support all aspects of tracking and reporting system.

**/ "Event" to be defined by Regional Water Board, in consultation with data aggregator(s); more frequent than annual.*

Ag Expert Panel Recommendation

" […] It was discussed whether a program that requires reporting nitrogen concentration in groundwater might provide a disincentive for farmers to use high-nitrate water. The Panel members believe that **there should be no disincentive to pump high-nitrate water**, and coalitions and Regional Water Boards must be especially careful to finesse guidelines that emphasis this point.

4.5.3 Data Consolidation

The time period for a report should encompass a 12-month period, and should consolidate monthly or short-season values into single reported values. However, it is recommended that this annual data be evaluated on a multi-year basis. It is emphasized that the collected data should be used to examine regional, multiple-year conditions and trends of nitrogen applications. Analysis of these data on too-short time frames (e.g., year-to-year) will introduce random error and potentially misleading results because many confounding variables, such as residual soil nitrogen and nitrogen removal rates, vary by year and by crop rotation. These differences tend to even out over multiple years. **It is also emphasized that the data should not be used for regulatory enforcement because the possibility of regulatory consequences will compromise the accuracy of the data**. […]"

(Ag Expert Panel, Final Report, September 2014, Page 38, *emphasis added here*)

Domestic Well Monitoring

- Currently at least 4 Central Valley Efforts:
  - Dairy WDR (since 2007)
  - ILRP trend monitoring (in development)
  - CV-SALTS (draft network proposed)
  - Central Coast Ag Order
  - SWRCB GAMA shallow groundwater (USGS)

=> consider a combined / well-coordinated effort to achieve program specific and overarching goals

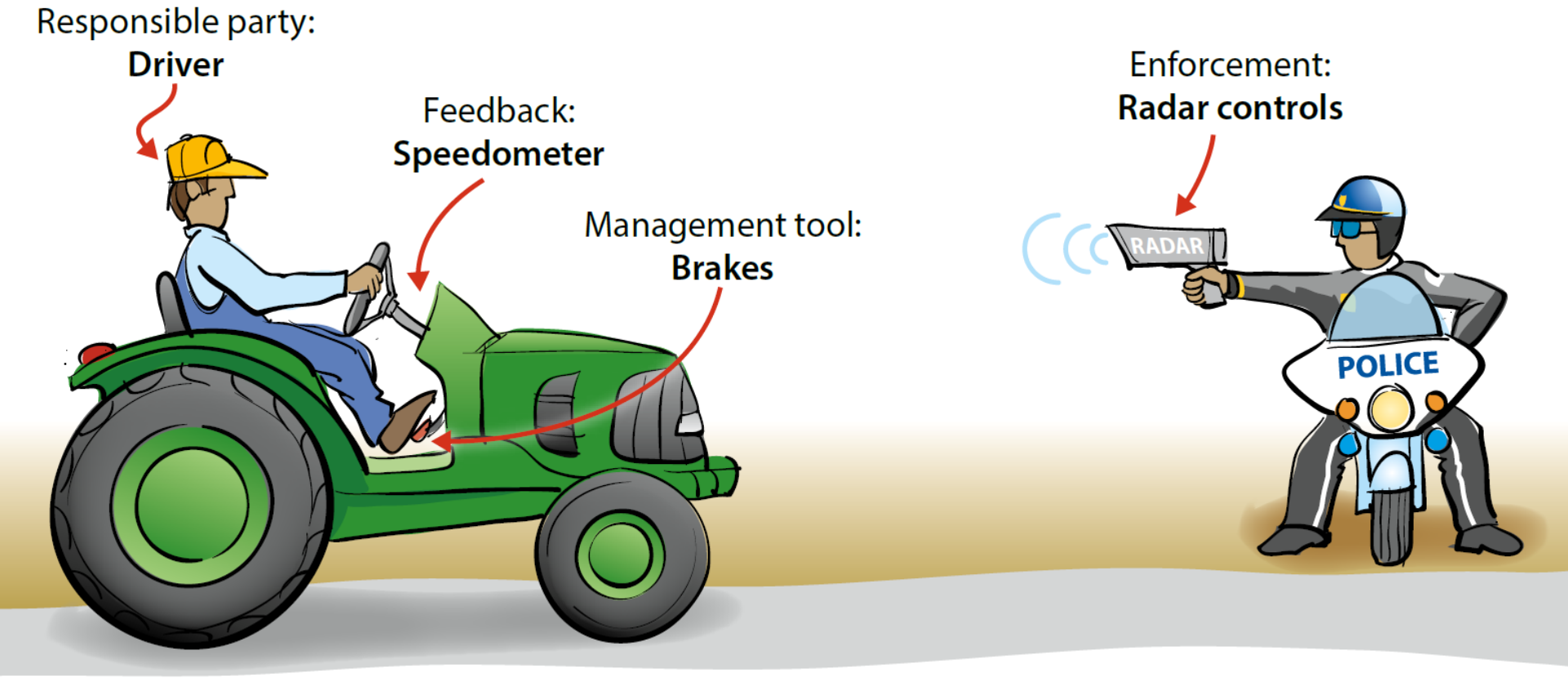
Summary:

- Coalitions in charge of MPEP and outreach and reporting aggregated A, R, and A/R (high data quality)
- Report to RWB by township and by crop is adequate for assessment, trend analysis, and enforcement/compliance
- For efficiency and effectiveness: Strong coordination needed on long-term shallow groundwater / domestic well / trend monitoring programs
  - Dairy Order (Central Valley)
  - Ag Order (Central Coast)
  - ILRP (Central Valley)
  - CV SALTS (Central Valley)
  - SWRCB GAMA Shallow Groundwater Monitoring Program

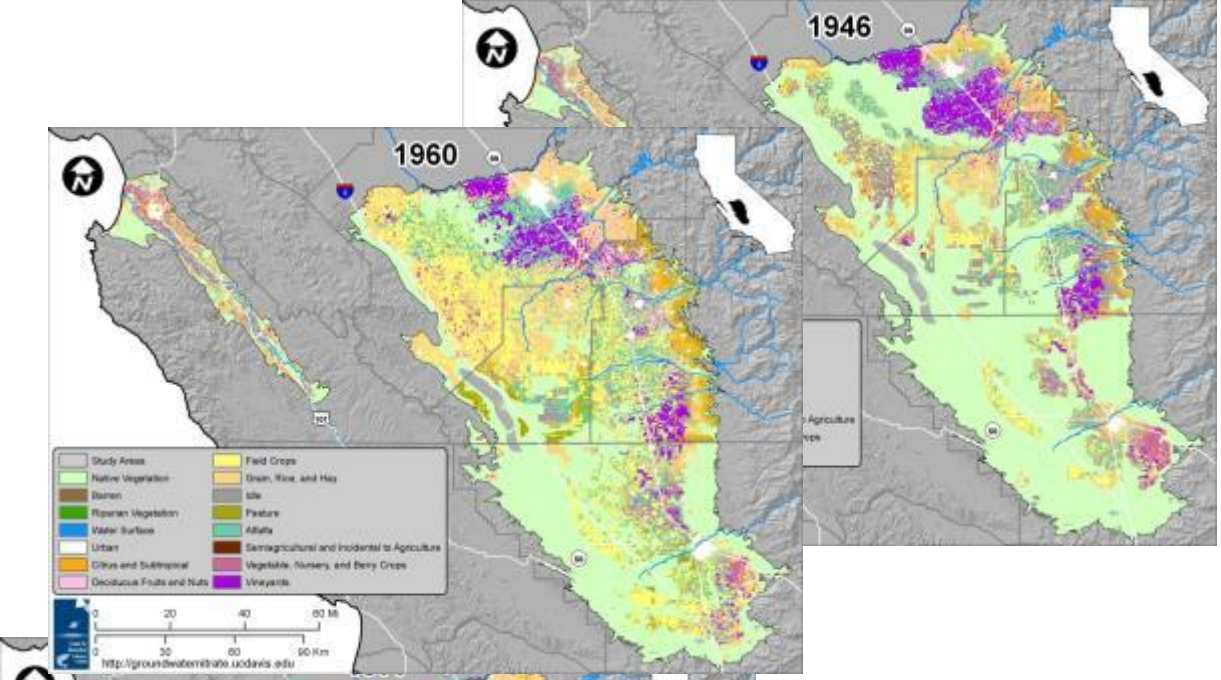
Additional slides for use as needed during Q&A

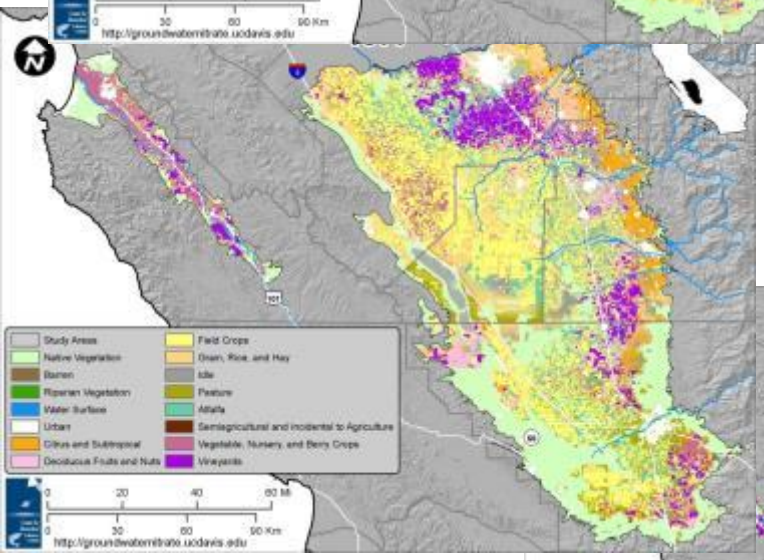
The Basics of Management Policy & Regulation

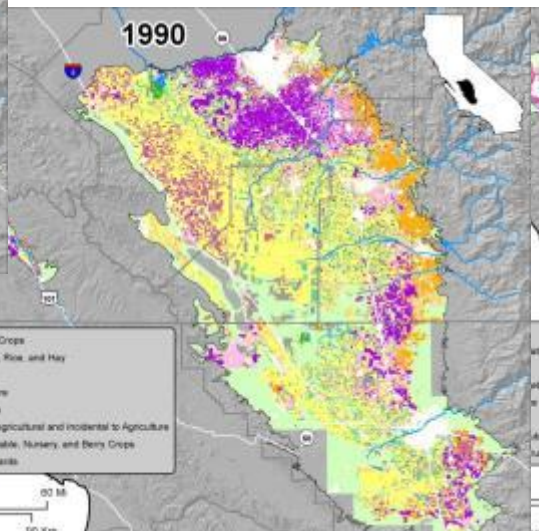
- Identify impacts (human health, environment, economy) and risk drivers
- Identify & prioritize parties to be regulated (universal v structured/categories)

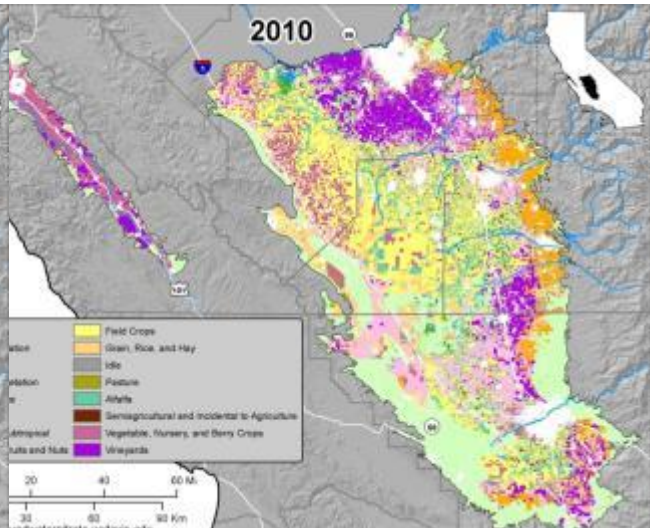


Harter, California Agriculture, 2015





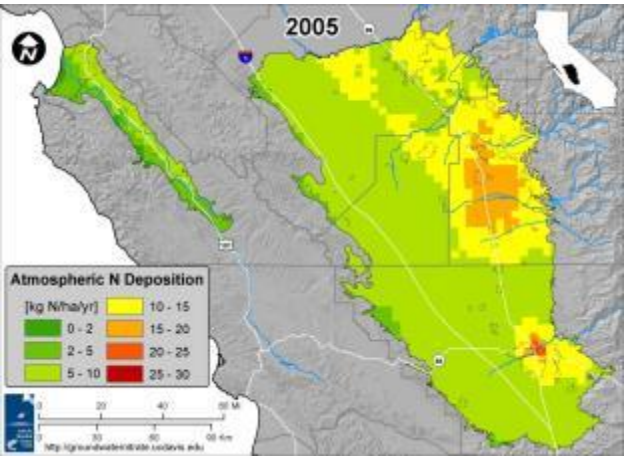


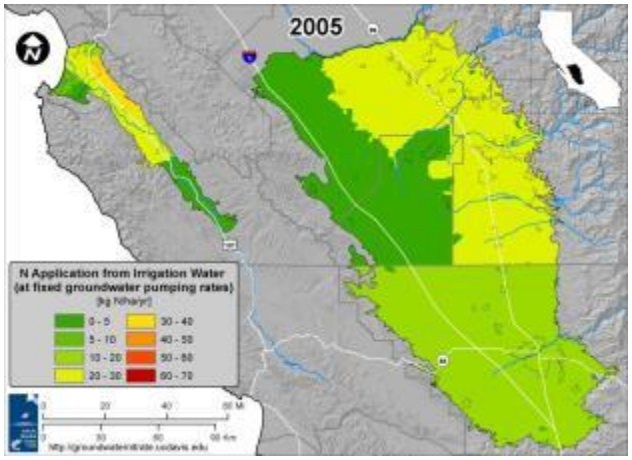


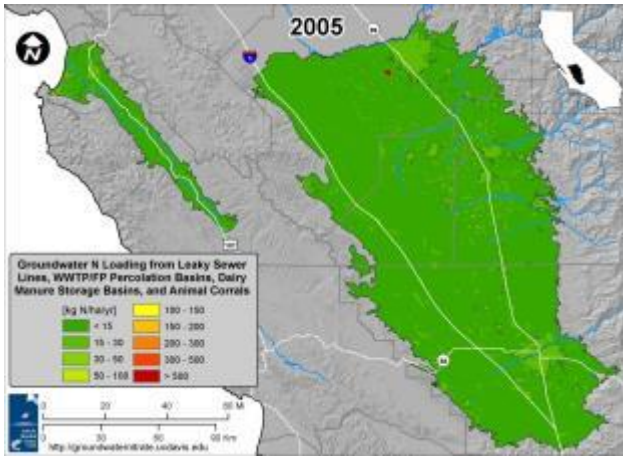
- Central Valley: 52,900 km^2
- 85 % of groundwater recharge is associated with agricultural landuse
- Population: 6 million
- 3.1million ha irrigated lands, more than 200 crops including many specialty crops
- 1.7 million adult dairy cows (milking & dry) plus support cattle in confined animal facilities
- >80% of California's agricultural production, >90% of dairy herd

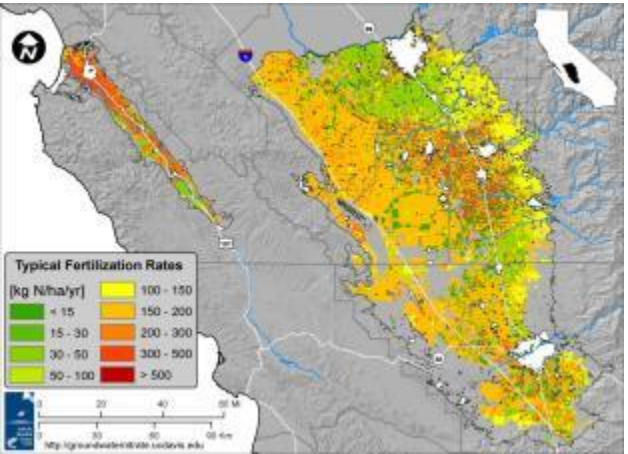
Rosenstock et al., J. Env. Qual. 43(3):895-907, 2015

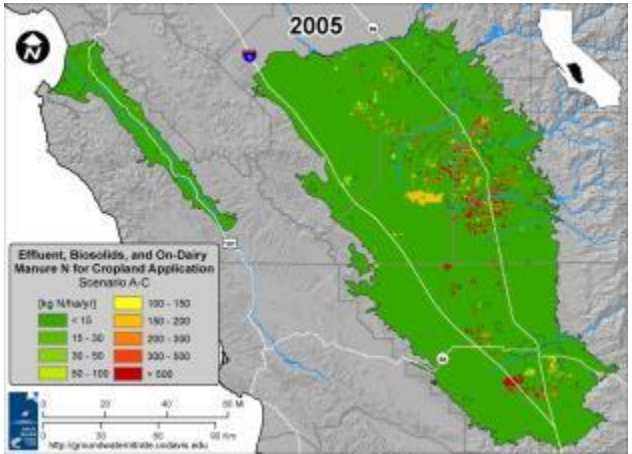
Nitrogen Inputs into the Landscape

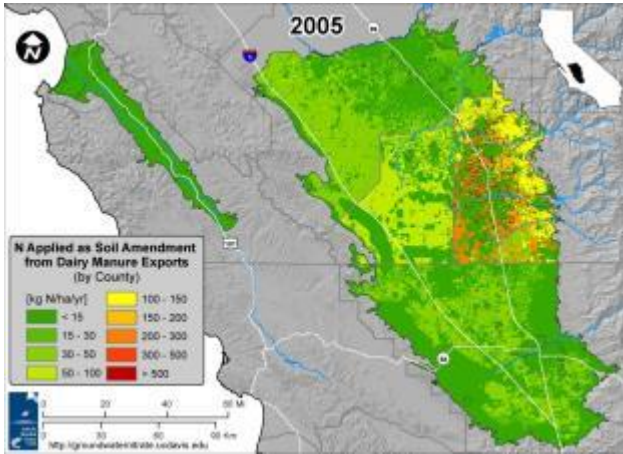




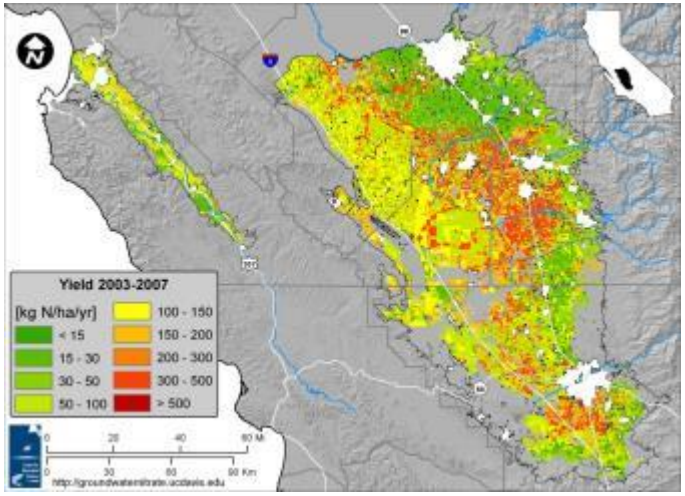


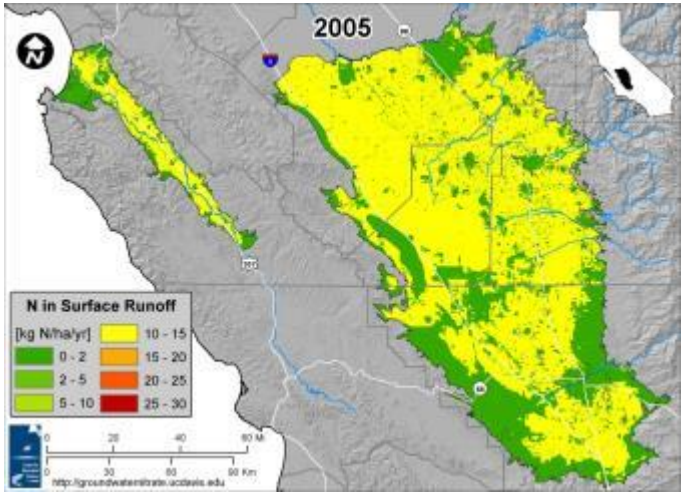


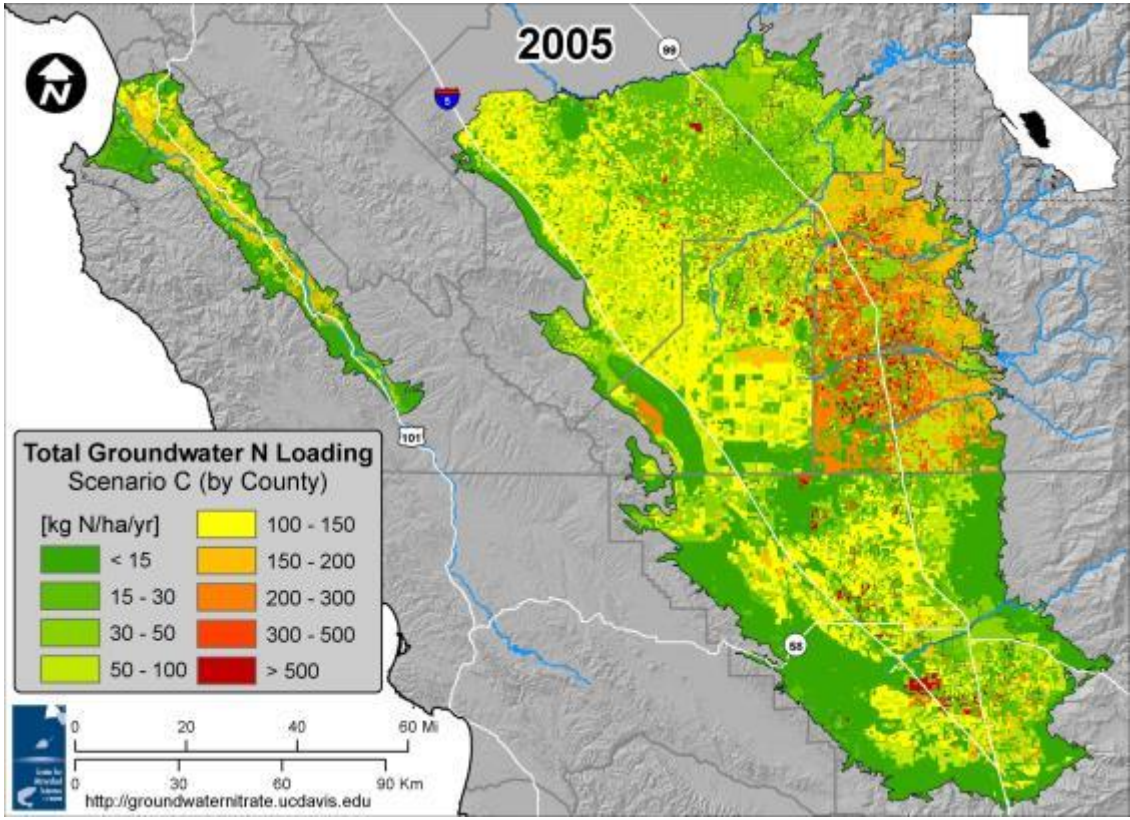




N Outputs to SW and ATM - N Loading to GW

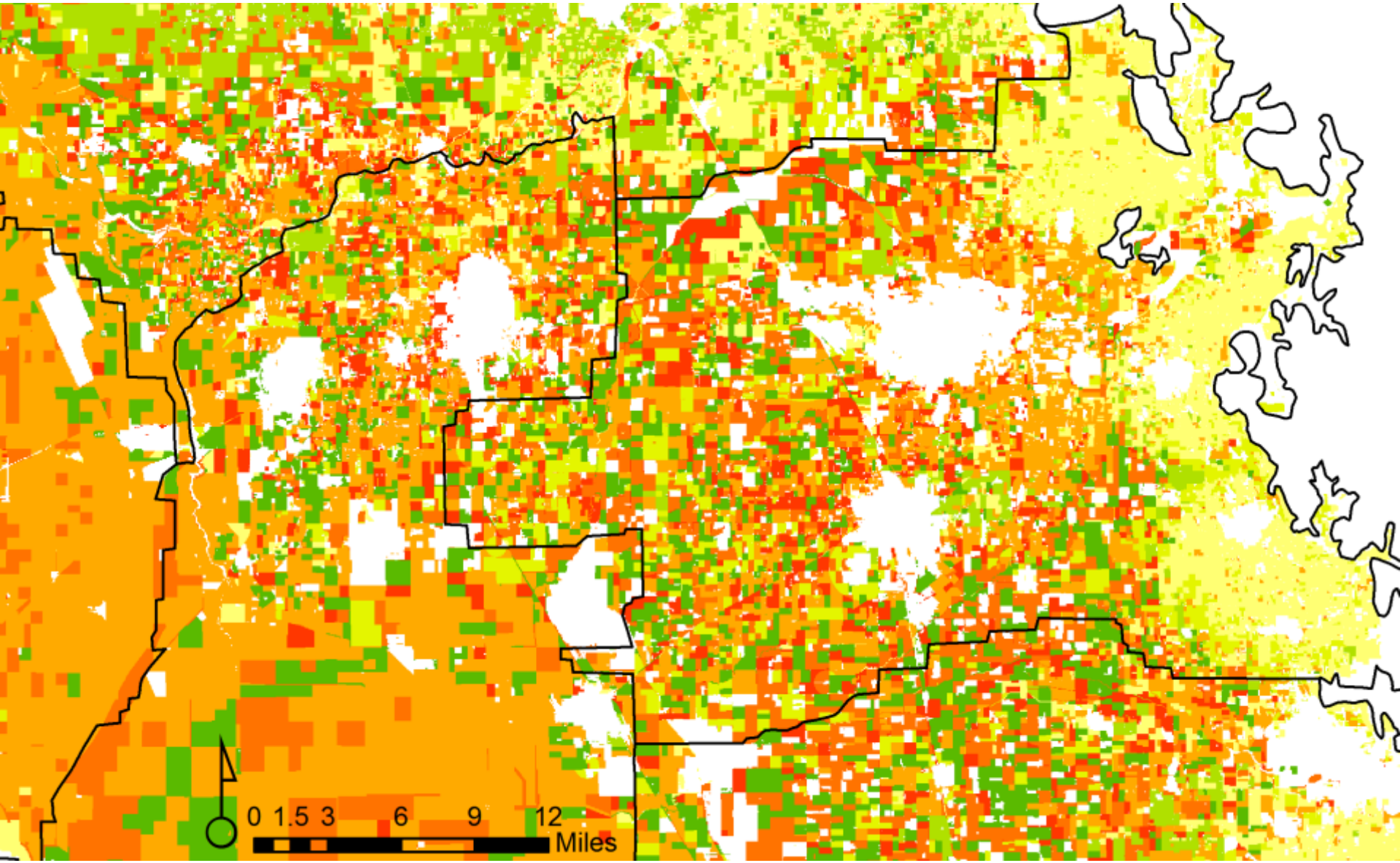




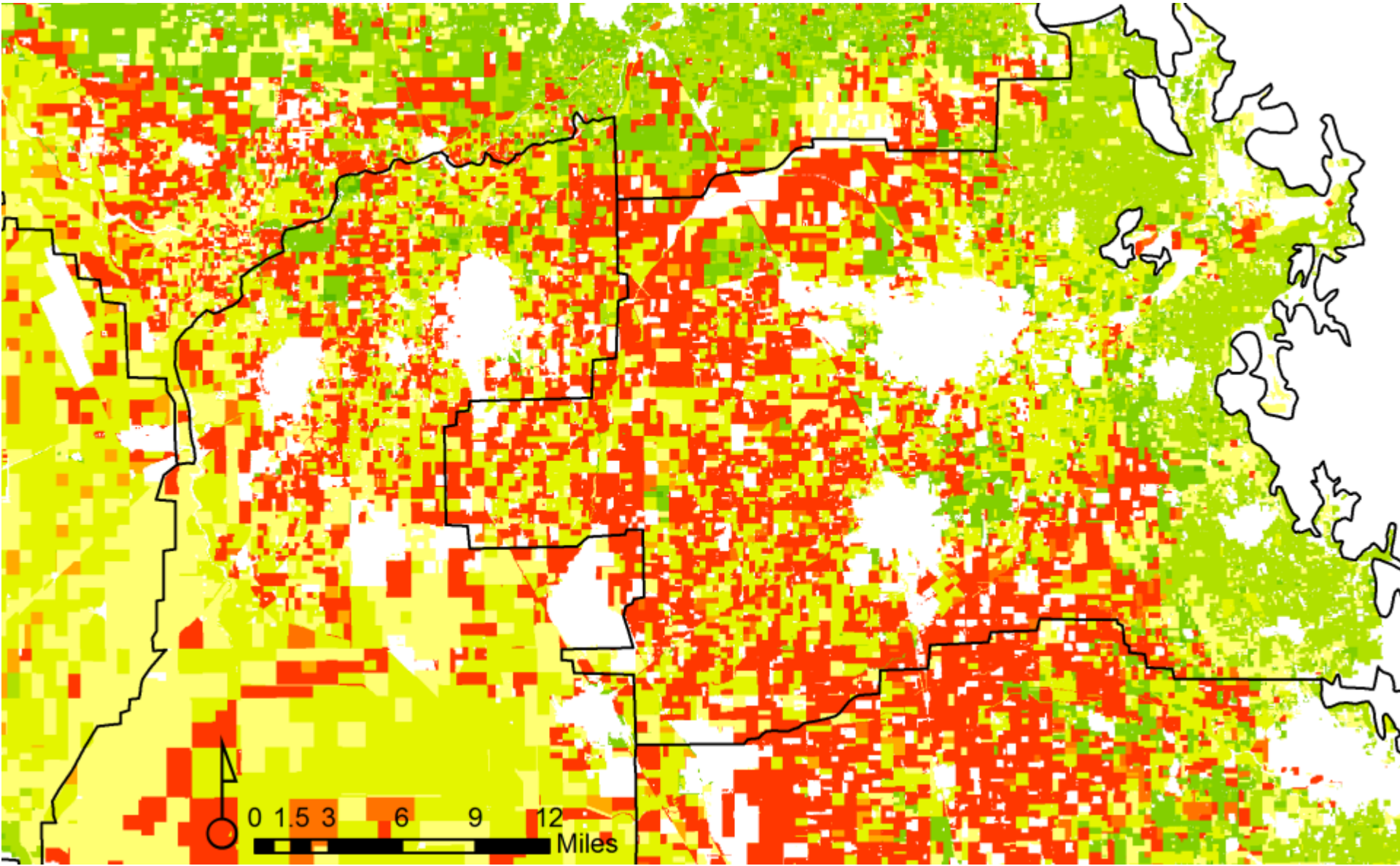


Rosenstock et al., J. Env. Qual. 43(3):895-907, 2015

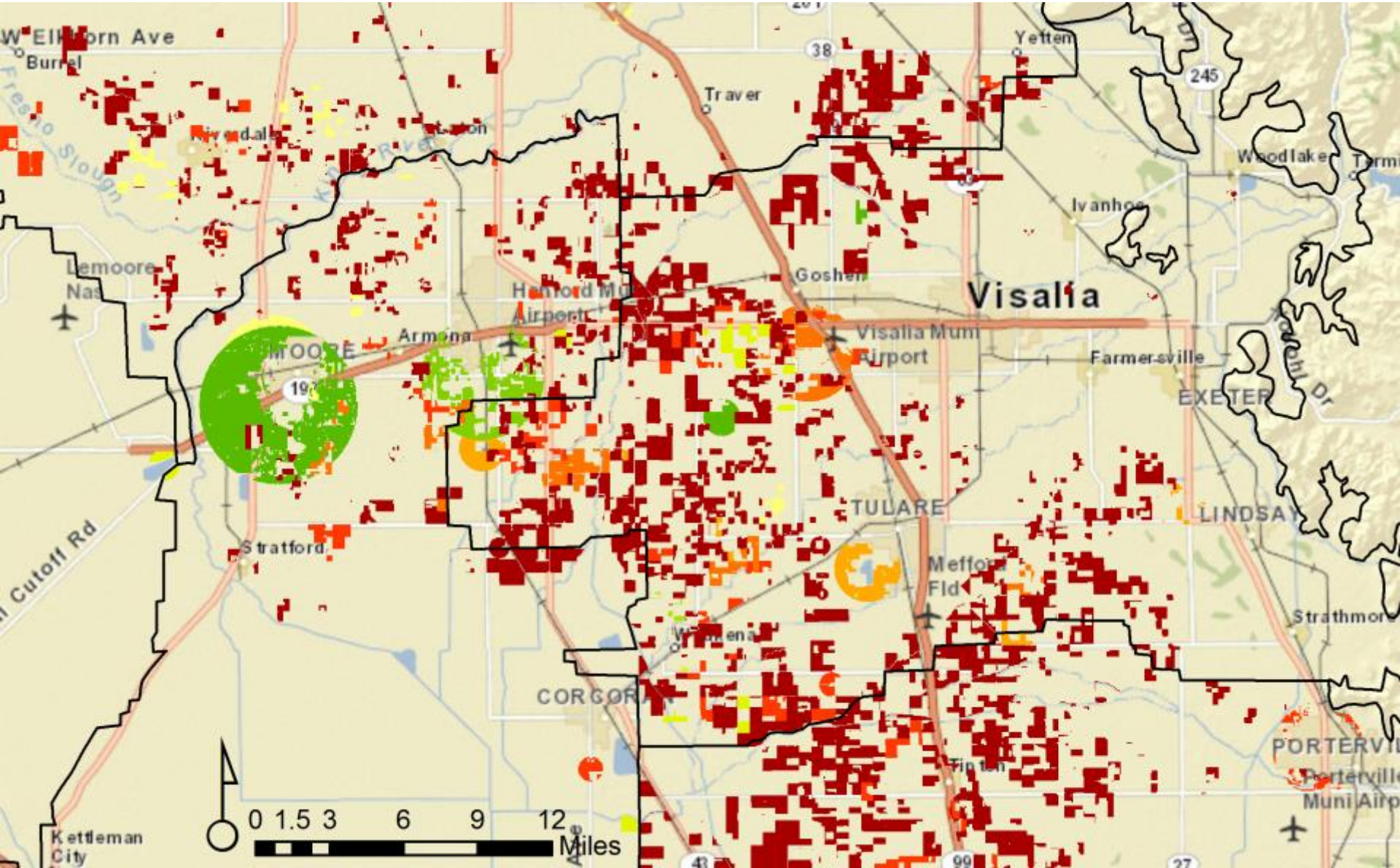
Detailed Scene Visalia/Tulare: 2005 Applied Fertilizer N



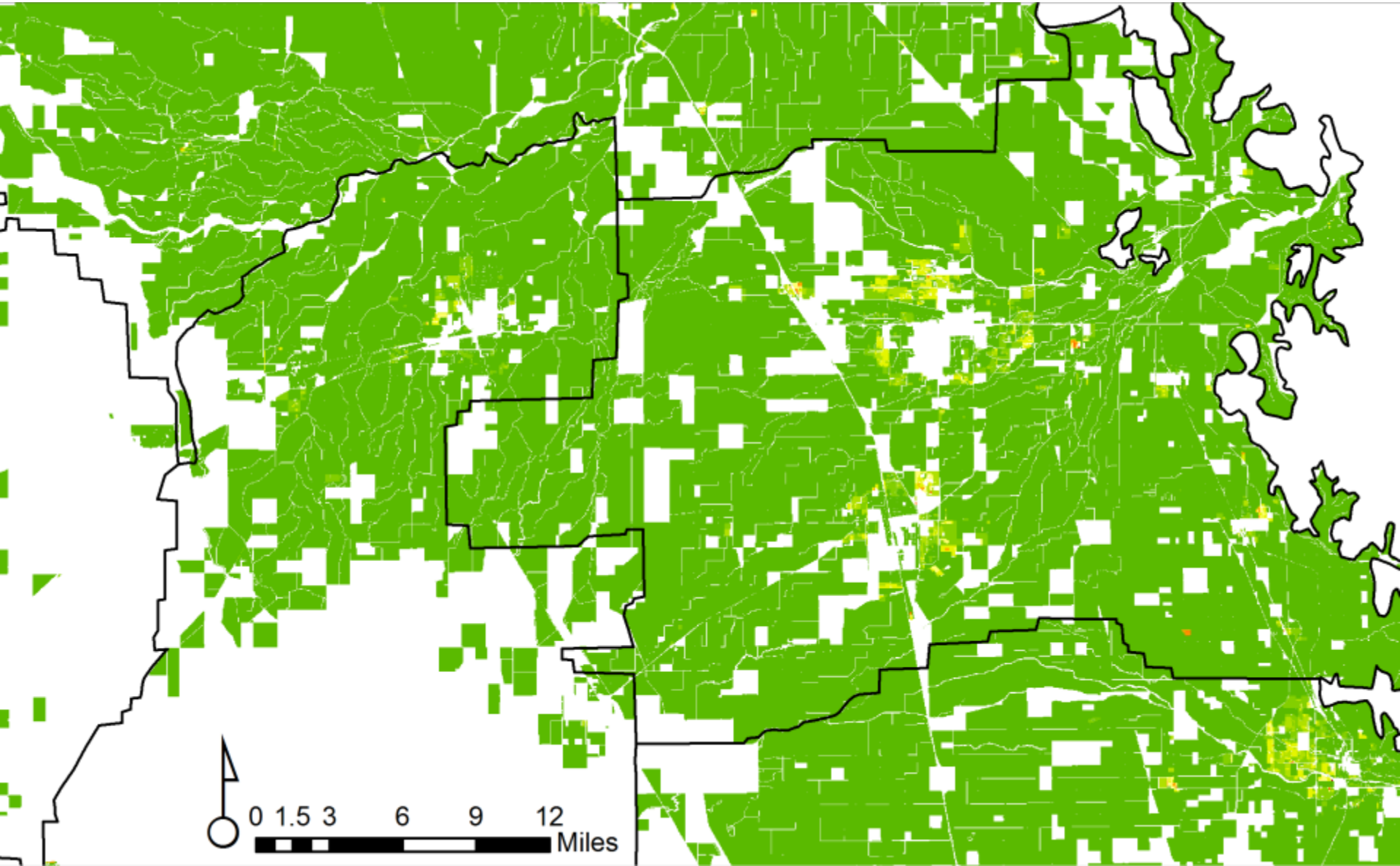
Detailed Scene Visalia/Tulare: 2005 Harvested N



Detailed Scene Visalia/Tulare: 2005 Dairy Manure Applied N



Detailed Scene Visalia/Tulare: 2005 Septic Leachate N



Detailed Scene Visalia/Tulare: 2005 N Loading (All)