Nitrogen Management

Nitrogen Tracking & Reporting System Task Force

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East San Joaquin Water Quality Coalition

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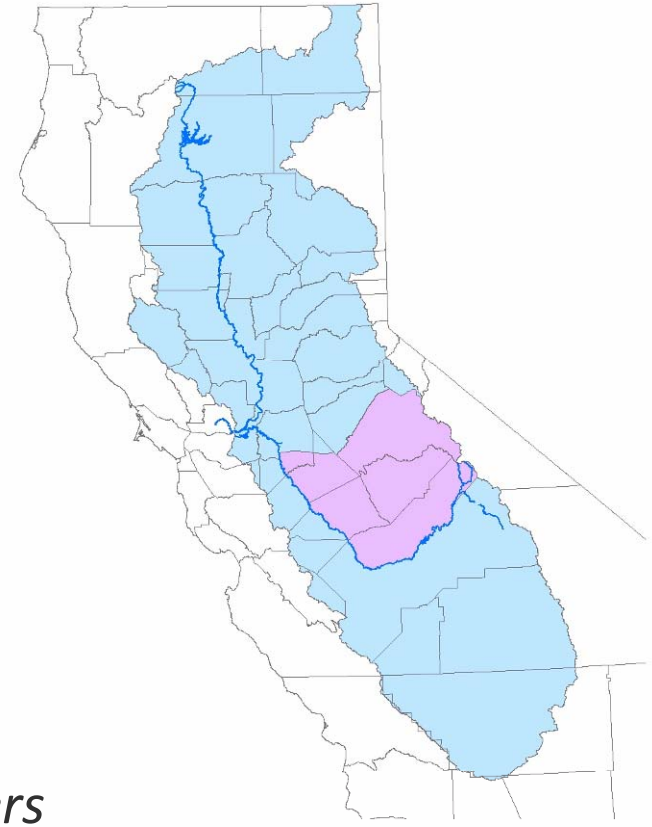
Coalition Overview

East San Joaquin Water Quality Coalition

- In operation since 2003
- **3,950 Landowner / operators**
- **706,336 irrigated acres**
  - Madera, Merced, Stanislaus, Tuolumne, Mariposa counties
- *We manage group permit for our members*

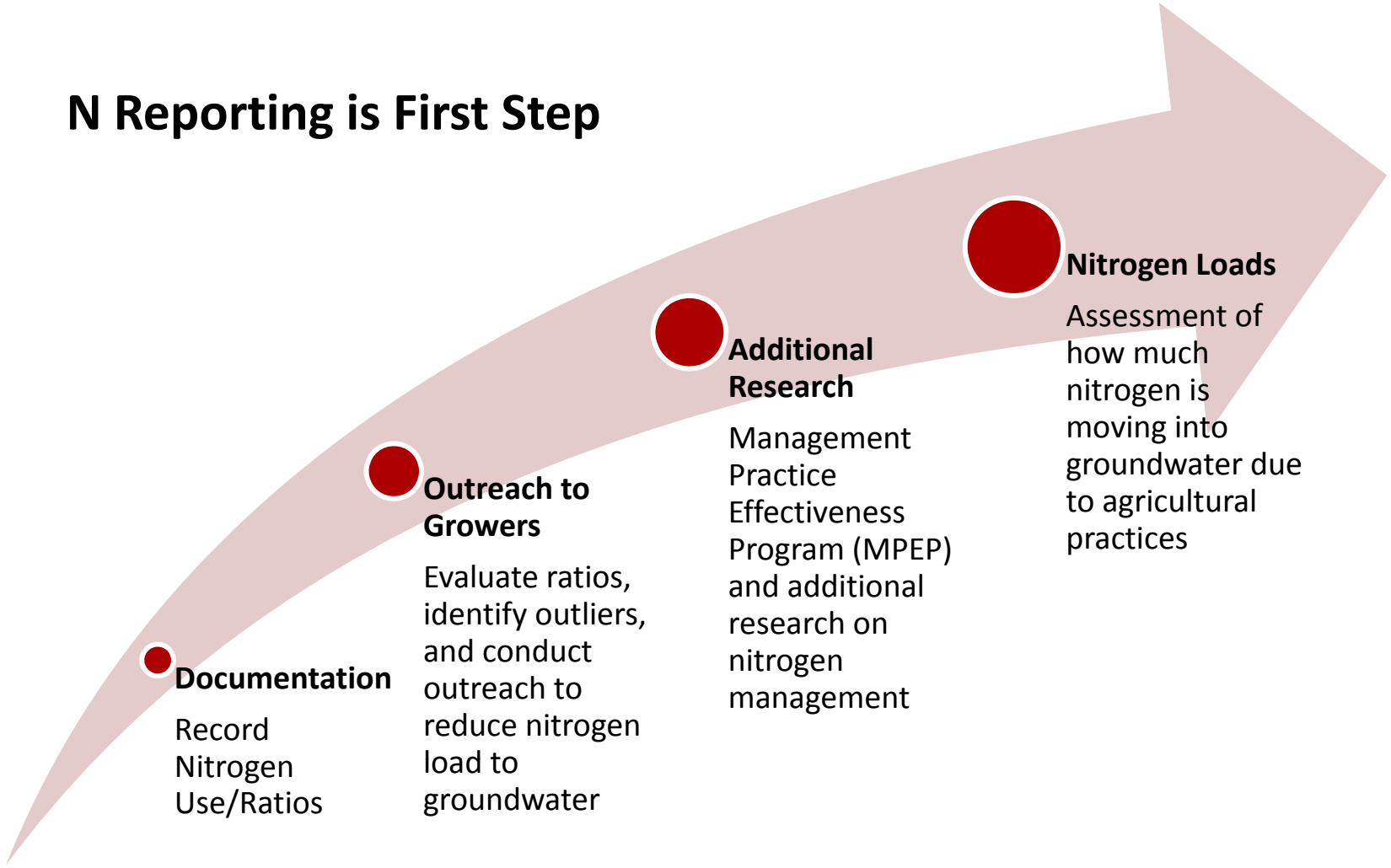


Take Home Message

- Created a reporting approach that is *hopefully* workable
  - Spent two years developing *a proposed* nitrogen use reporting system with cooperation from growers, watershed coalitions and commodity groups
- Compliance with Irrigated Lands Regulatory Program, WDR R5-2012-0116
  - WDR General Order for the Growers Within the Eastern San Joaquin River Watershed that are Members of the Third Party
- Substantial step toward answering questions about nitrogen loading due to irrigated agriculture

Long Term Goal

N Reporting is First Step



Purpose / Expected Outcome

- Purpose is working toward improvements in nitrogen management (when/if needed)
  - Focuses on crop uptake – not total applied
  - Helps growers understand their use in context with like crops
  - Helps to identifies “outliers”

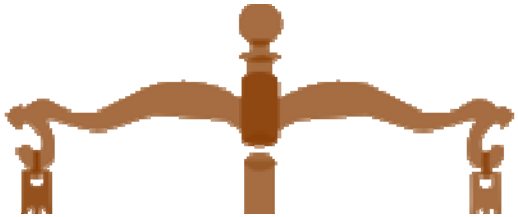
Outcome

  - Better management of nitrogen as information is developed leading to improved groundwater quality

Reporting Process

- Coalition members fill out annual Nitrogen Management Plan Worksheet on a field by field basis
  - Data gathered either electronically or paper reporting
- Coalition records ratio for each field and associates with Assessor Parcel Number (APN)
- Ratio associated with a specific field and crop
- Ratios compared using box and whisker plots on a crop by crop basis; outliers identified
- Coalition reports ratios by Township to Regional Board
  - Order specifies grouping by commodity, similar practices and similar soils
- Outreach focuses on selected members and their practices
  - Not on generating useless information (total applied per acre)

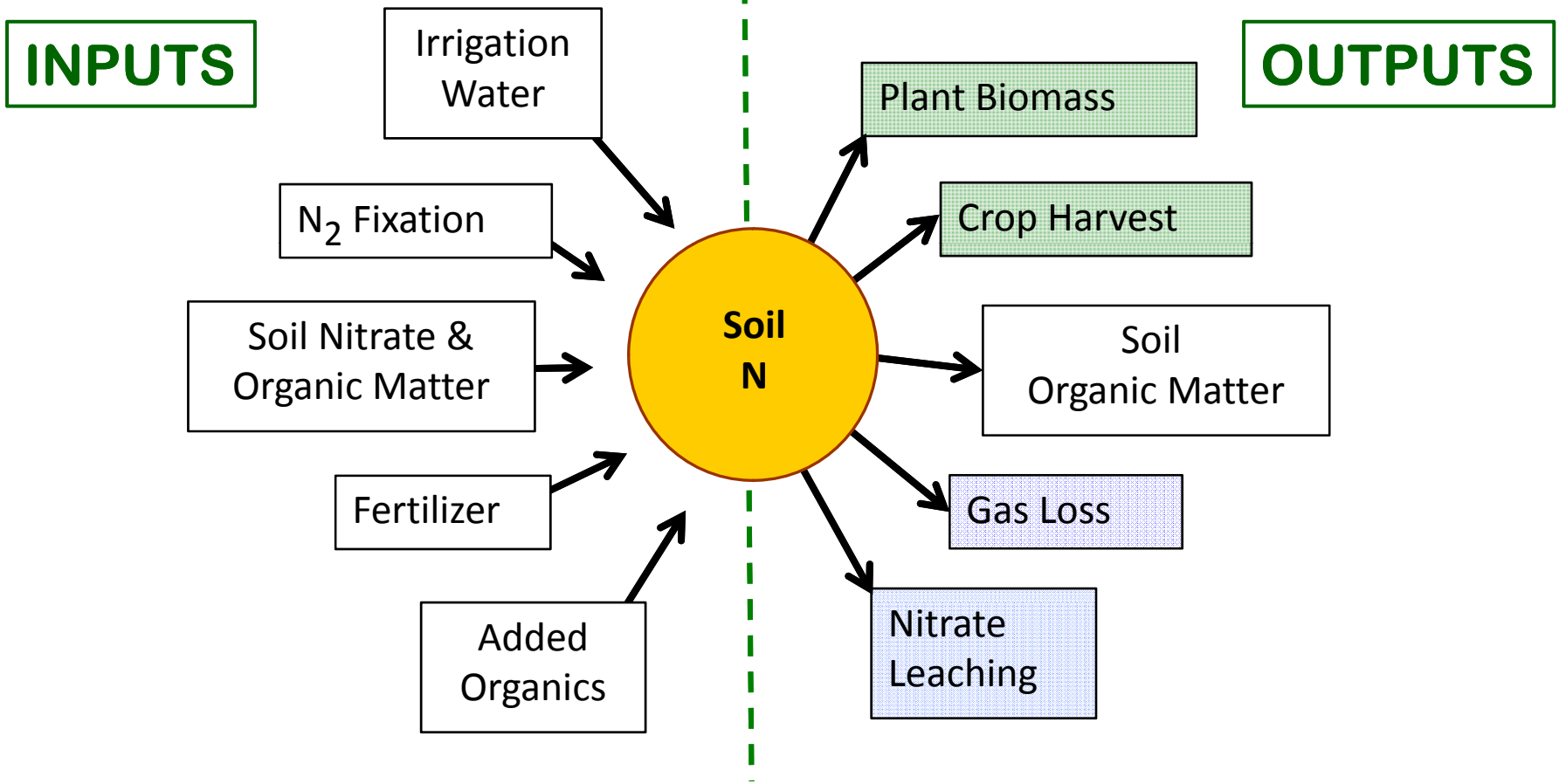
Nitrogen … a simple matter of balance?



Removal

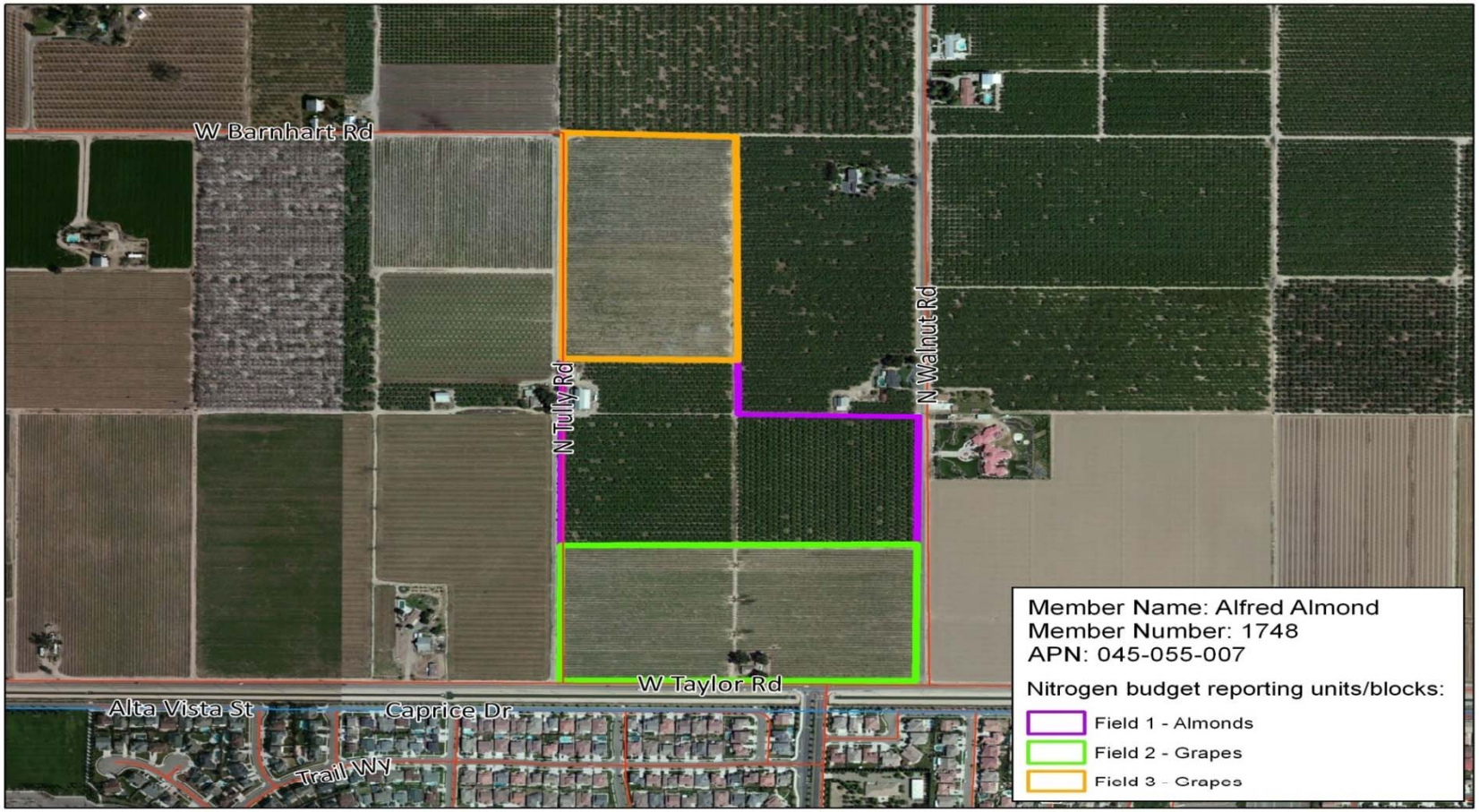
Replacement

Reality: Agricultural Nitrogen Management Challenge



Many processes are variable, uncontrollable or poorly predicted

Scale - Individual Farm Map



Nitrogen Management Plan Worksheet

Crop Year 2012

Member ID# 1234 APN: 111-00-222

Owner/mgr Joe Almond Field # A, B, C

CROP NITROGEN DEMAND Crop Nitrogen Needs / Uptake	NITROGEN APPLICATIONS AND CREDITS			
			Recommended N	Actual N
Crop	**Total N applied to field (lbs/ac)**			
Almonds				
Expected yield (Lbs of production/ acre)	***Nitrogen fertilizers*** (conventional and organic)			
3000 lbs / ac	Dry & Liquid Fertilizers		100	105
Nitrogen Crop Needs to meet expected yield (lbs of Nitrogen per acre)	Foliar N fertilizers		100	90
250	Other N fertilizers		0	0
Total Acres	Organic Material N (manure, compost, etc.)		10	0
178			5	5
	Other N containing materials			
	TOTAL N APPLIED (per acre)		215	200
	Soil Nitrogen Credits	Soil N ppm [3]	Lbs N/acre	Lbs N/acre
	Nitrogen from previous legume crop		0	0
	N residual from manure applications		5	5
	Soil organic matter mineralization		5	5
	Nitrates in irrigation water (annualized)		50	50
	TOTAL N CREDITS (per acre)		60	60
		Total N Credits and Applications:	275	260
		Crop N needs:	250	250
		Balance	**25**	**10**
		Ratio	**1.100**	**1.040**

Reporting Elements

- Nitrogen Worksheet kept on farm
- Summary information submitted to coalition
  - Member ID, APN, field, crop, acres
    - Nitrogen Applied
    - Nitrogen Crop Uptake
    - Ratio:

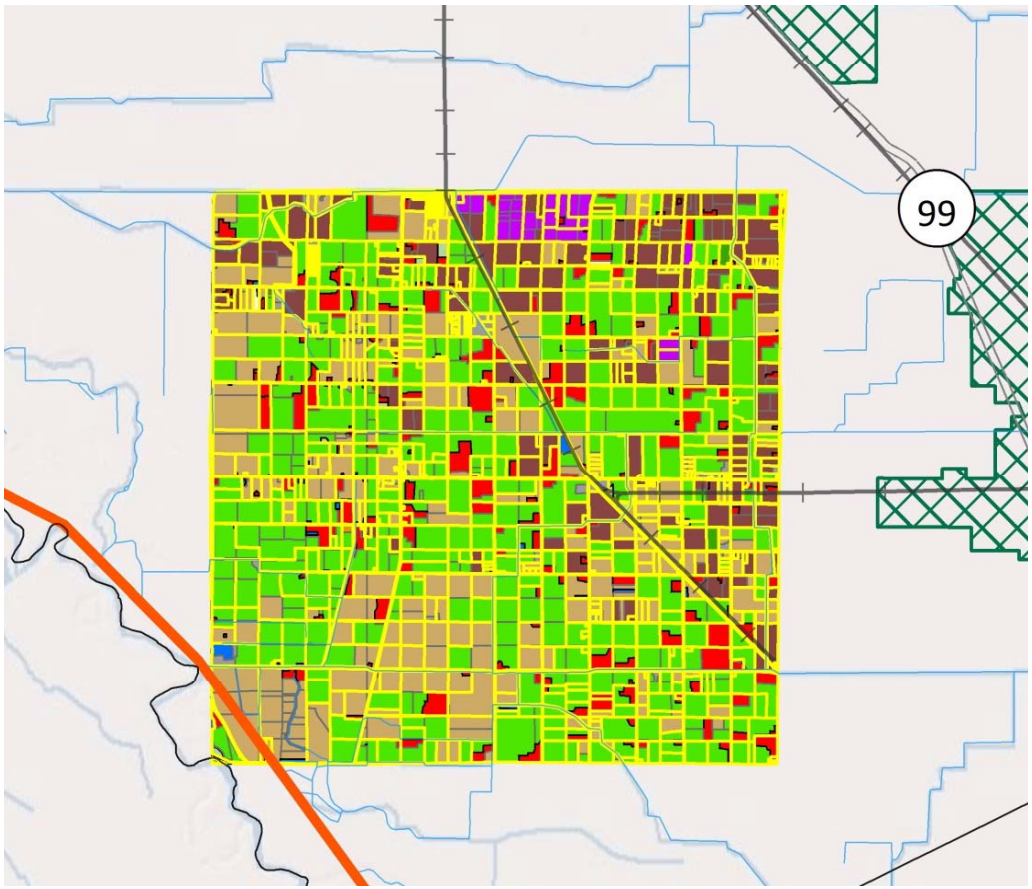
$$\frac{\text{Nitrogen Applied}}{\text{Nitrogen Uptake}}$$

NITROGEN MANAGEMENT PLAN
SUMMARY REPORT

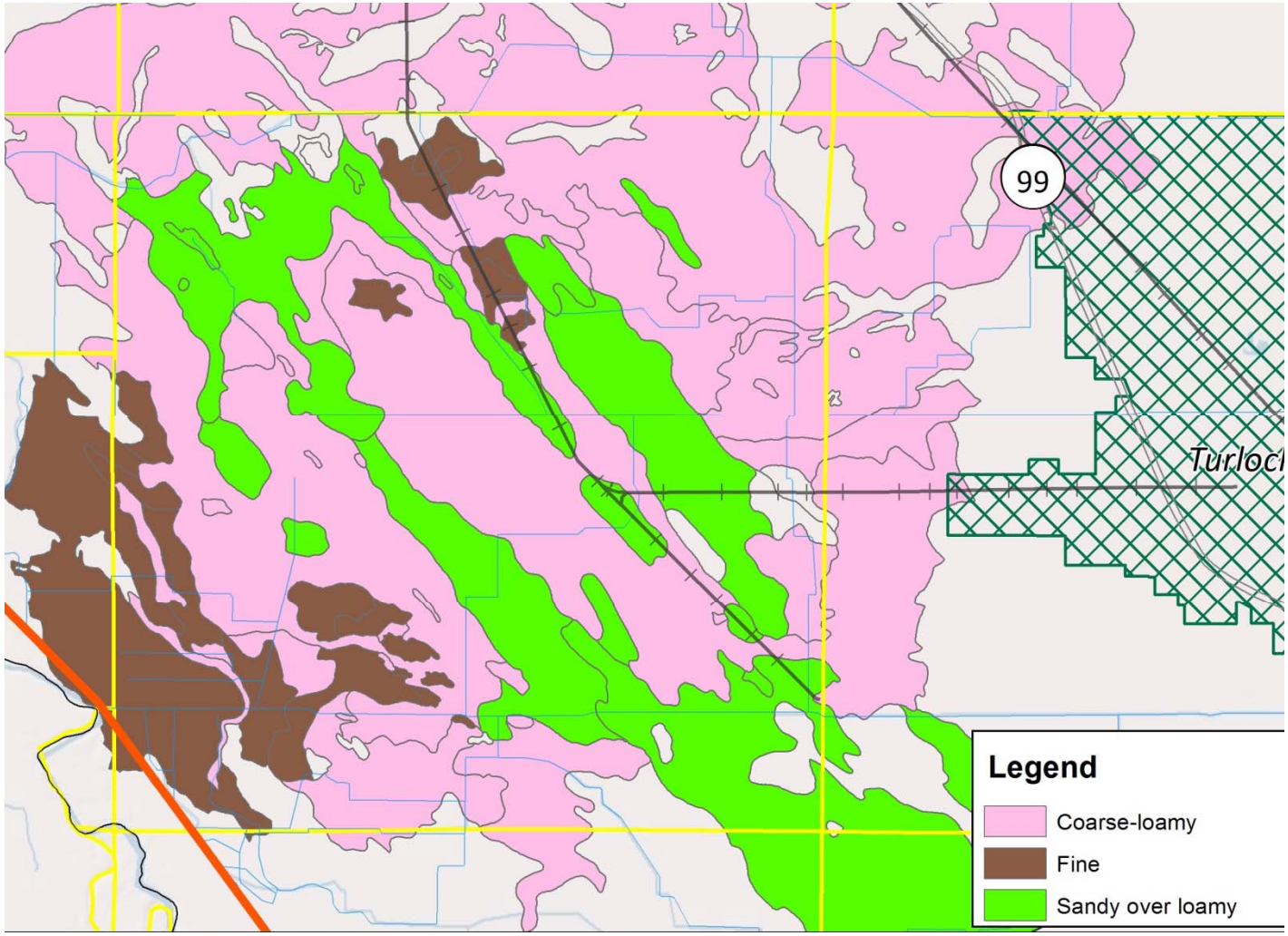
Date	March 15 2015
Name	Joe Member
2 Member ID No.	1234
1 Crop Year	2014

4 APN (1)	5 Field ID (1)	6 Crop (2)	11 Acres (3)	24 Ratio (4)

Township Map
Stanislaus County Example: 23,040 acres



Stanislaus County Example: Soil Profile



Township Data Summary

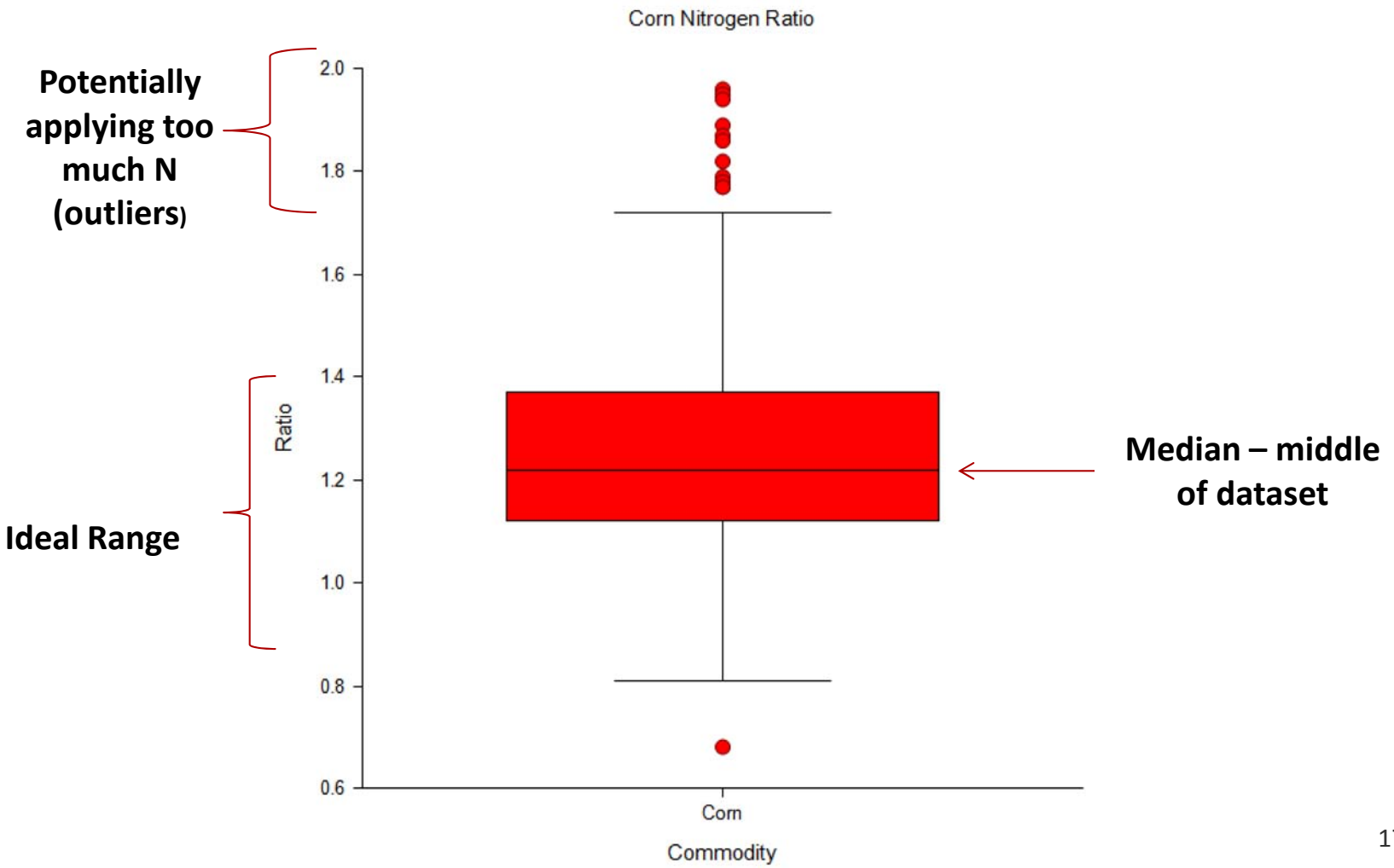
Stanislaus County example

- Total acres: 23,040 acres
  - Irrigated: 20,210
  - Non Irrigated: 2,830
- Number of Members: 137
- Number of APNs: 304
- Number of Fields (Estimated): 286

What the township report should show

- Where most growers are with nitrogen ratios
- The “Outliers”: those who apply too much
- Outliers focus of outreach with commodity specific information/references
- Ratio not meant to be a regulatory end point at this time

Box and Whisker Plot Visual



Benefits and Challenges

Benefits

- Ready for implementation
- Ratio
  - Captures both replacement and removal in one number
- Vetting shows support from multiple groups
  - Fertilizer suppliers, commodity groups, coalitions
  - Believe to be reasonable approach
    - (Resigned acceptance)
  - Not developed as regulatory endpoint

Challenges

- Refining crop consumption number
- Rates don't take into account all variables
  - For example:
    - Soil conditions
    - Weather
    - Irrigation system
    - Applied water
- Reflects mass loading but is not absolute loading

Waste Discharge Requirements
Irrigated Lands Regulatory Program

Management Practice Effectiveness Studies

- **Confirm that management practices implemented to improve groundwater quality are working**
- Are agricultural management practices protective of groundwater?
- Modify practices if needed

Proposing coordinated effort by coalitions/commodity groups to complete

- Share expense across Central Valley
- Coalition to present Water Board with phased approach
- CURES USDA project to be starting point for approach
  - Literature search
  - Interview experts in field

Economic Costs / Impacts

Cost to Coalition

- Development of online tools
  - In house data entry from paper reports
  - Online data submittal software
- Reporting to Regional Board
- Outreach to growers
- Database Management

Cost to Grower

- Increased dues
- Certification by CCAs
  - Growers time to complete certification (if pursued)
- Grower time to complete paperwork
- Possible change of management practices
- Reduction in nitrogen applications (potential)

Reporting approach allows growers to comply with order in a cost effective manner while supplying necessary information to assist with the prioritization of outreach and effectiveness studies necessary to reduce loading of nitrogen to groundwater.