

# Presentation to the Expert Panel

## East San Joaquin Water Quality Coalition

**Parry Klassen**  
**Executive Director**



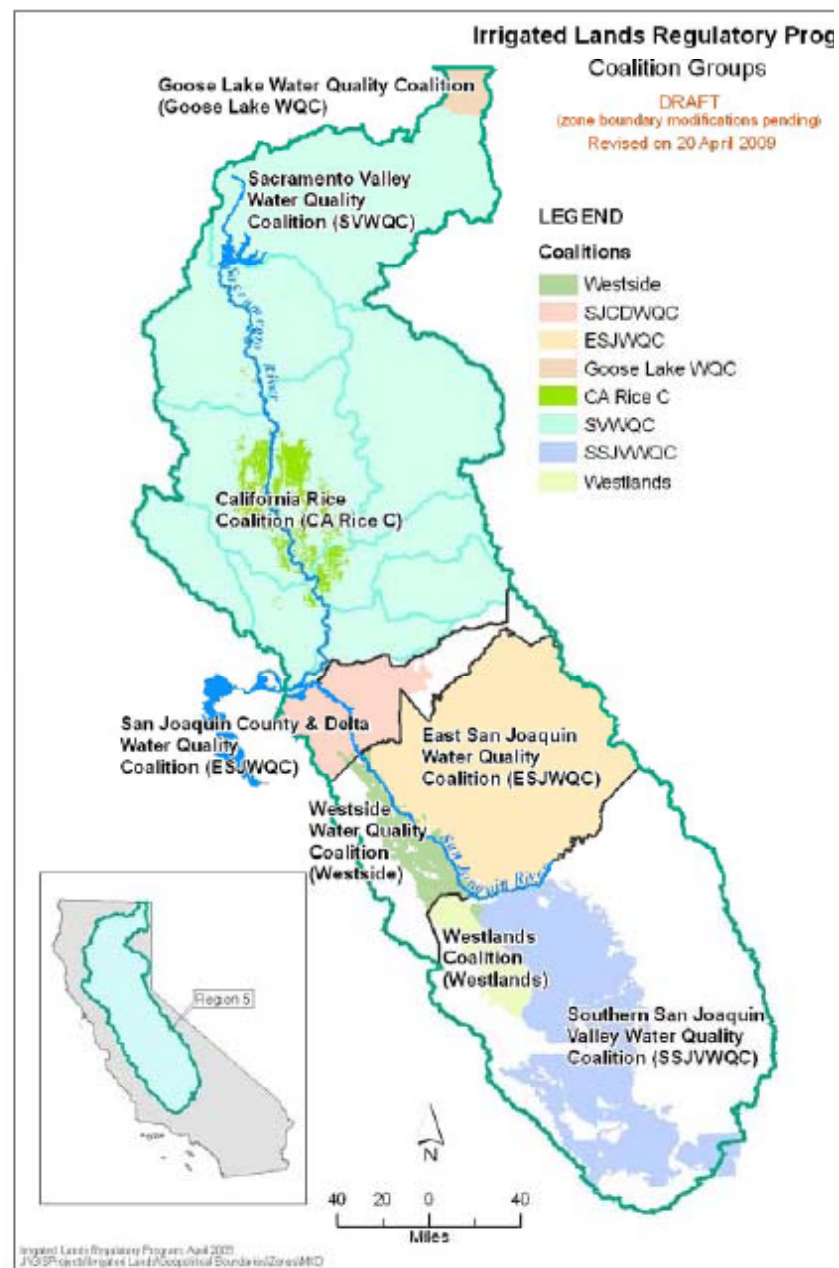






# Central Valley Coalitions

- **Sacramento Valley Water Quality Coalition**
  - Bruce Houdesheldt
- **California Rice Commission**
  - Tim Johnson
- **San Joaquin County & Delta Water Quality Coalition**
  - Michael Wackman
- **Westside San Joaquin River Watershed Coalition**
  - Joseph C. McGahan
  - David Cory
- **East San Joaquin Water Quality Coalition**
  - Parry Klassen
  - Wayne Zipser
- **Southern San Joaquin Valley Water Quality Coalition**
  - David Orth
- **Westlands Coalition**
  - Charlotte Gallock





# Waste Discharge Requirements

## Irrigated Lands Regulatory Program

### **ESJWQC WDR adopted December 7, 2012**

- First of seven “third party” coalitions to get WDR
- Second WDR : South San Joaquin Water Quality Coalition (adopted September 19, 2013)
- Third and Fourth WDRs: Westside San Joaquin River Water Quality Coalition and Westlands Coalition (adopted January 9, 2014)
- Remainder of CV Coalition WDRs adopted in March 2014

# ESJWQC Overview

- **3,993 Landowner / operators**
- **716,051 irrigated acres**
  - Madera, Merced, Stanislaus, Tuolumne, Mariposa counties
- Managed by Board of Directors
- In operation since 2003
- Member dues: \$3.75/ac +\$50
  - *Pay \$.75/ac for State Board fee*
- \$3.1 million 2014 budget
  - Surface and groundwater programs
  - Outreach
  - State fees





# New WDR; Lots of Work Ahead

## Member Responsibilities

- Complete Farm Evaluation (due May 1, 2014)
- Complete Nitrogen Management Plan (due March 1, 2015)
  - In high vulnerability groundwater area; submit to ESJ annually
    - Certified by 3<sup>rd</sup> party or grower trained (if developed)
  - Low vulnerability keep on site; no certification required
- Sediment and Erosion Control Plan
  - In areas identified as high vulnerability for erosion and sediment discharge

## Coalition Responsibilities

- Collect and analyze member information for reporting to Water Board
- Conduct Groundwater Analysis Report
- Develop Groundwater Trend Monitoring Network
- Initiate Management Practice Effectiveness Program



## **Expert Panel: *When Making Recommendations, Consider CA Crop Diversity / Growing Regions***

### **Short Term**

- Encourage phasing in of any new reporting
- Coalitions need time to get member field information organized based on member's Farm Evaluation data
  - *Need consistent "management units" for reporting*
  - *When/if nitrogen use reporting begins, reporting units need to be understood by growers so consistent information is collected*



## Following are my responses and recommendations

*Please note that the responses here do not represent those of the larger agricultural community and reflect only my personal opinion*

- Expert Panel Questions are in blue text
- Focus of response is in red text





# Vulnerability and Risk Assessment

## 2. Evaluate and develop recommendations for the current approaches taken to assessing risk to or vulnerability of groundwater:

- a. Nitrate Hazard Index (as developed by the University of California Center for Water Resources, 1995),
- b. Nitrate Loading Risk Factor (as developed by the Central Coast Regional Water Quality Control Board in Order R3-2012-0011),
- c. Nitrogen Consumption Ratio,
- d. Size of the farming operation,
- e. **High Vulnerability Areas Methodology (as developed by the Central Valley Regional Water Board in a series of Waste Discharge Requirements issued to agricultural coalitions in the ILRP).**



# ***Groundwater Assessment Report***

## ***Draft Report Submitted to Regional Water Board...***

- Hydrogeology for ESJ region
  - Groundwater levels
- Land Use
- Groundwater Quality
- Groundwater Vulnerability Assessment
  - Determine high vulnerability areas
  - Identify wells with nitrate exceedances (> 10 mg/L NO<sub>3</sub>-N)
- Prioritize High Vulnerability Areas for Actions
- Basis for Future GW Trend Monitoring Program
  - Candidate sites identified
- *Work by Lohdorff & Scalmanini, Consulting Engineers*

***Awaiting Response from Water Board***

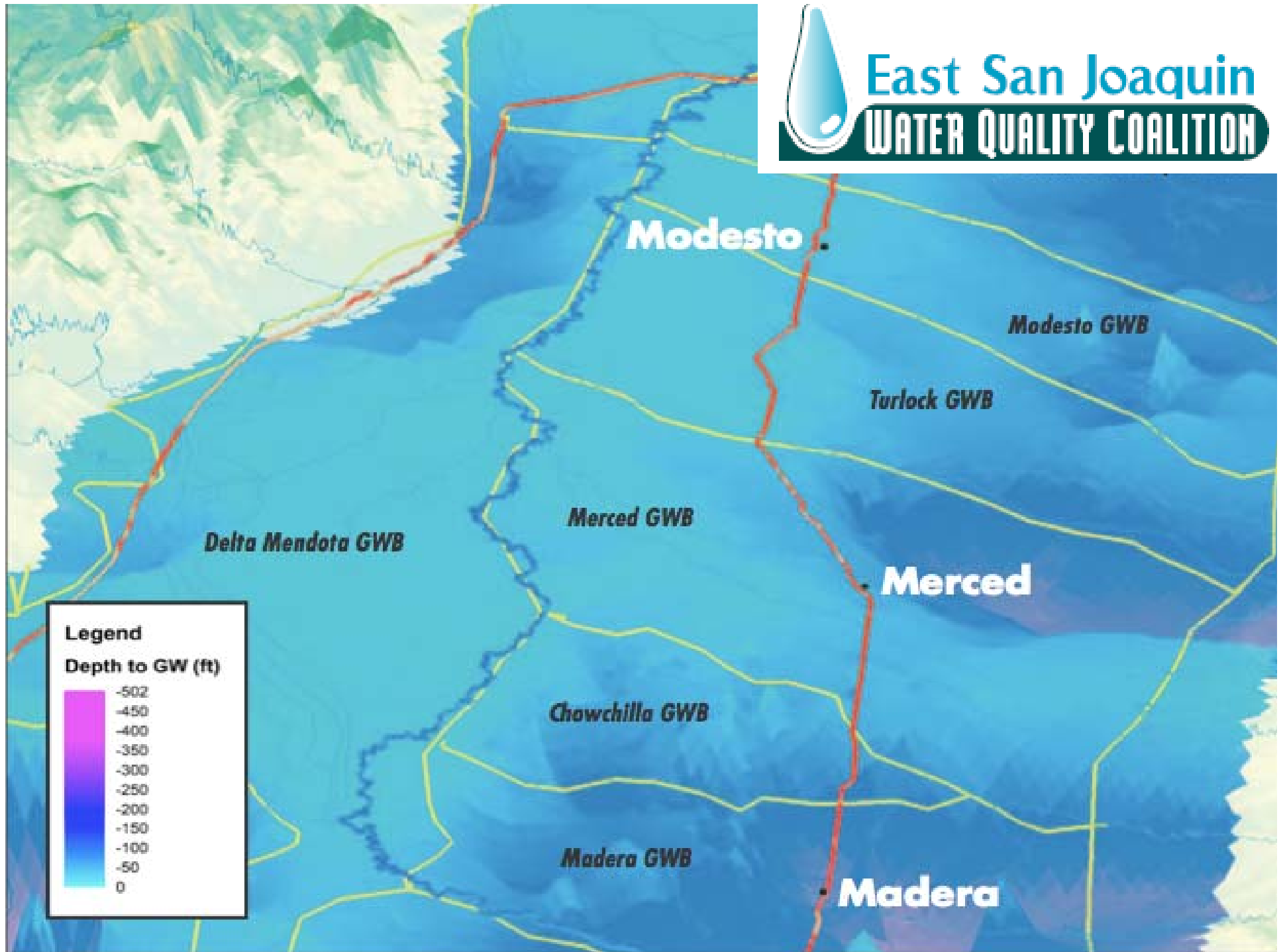


# Groundwater Vulnerability Determination

- ESJWQC GAR Vulnerability Assessment
  - Considers hydrogeologic characteristics
  - Observed groundwater quality
  - Land use
  - Scientific/quantitative approach
- Compared to Other Vulnerability Approaches / Delineations
  - SWRCB
  - Calif. Department of Pesticide Regulation

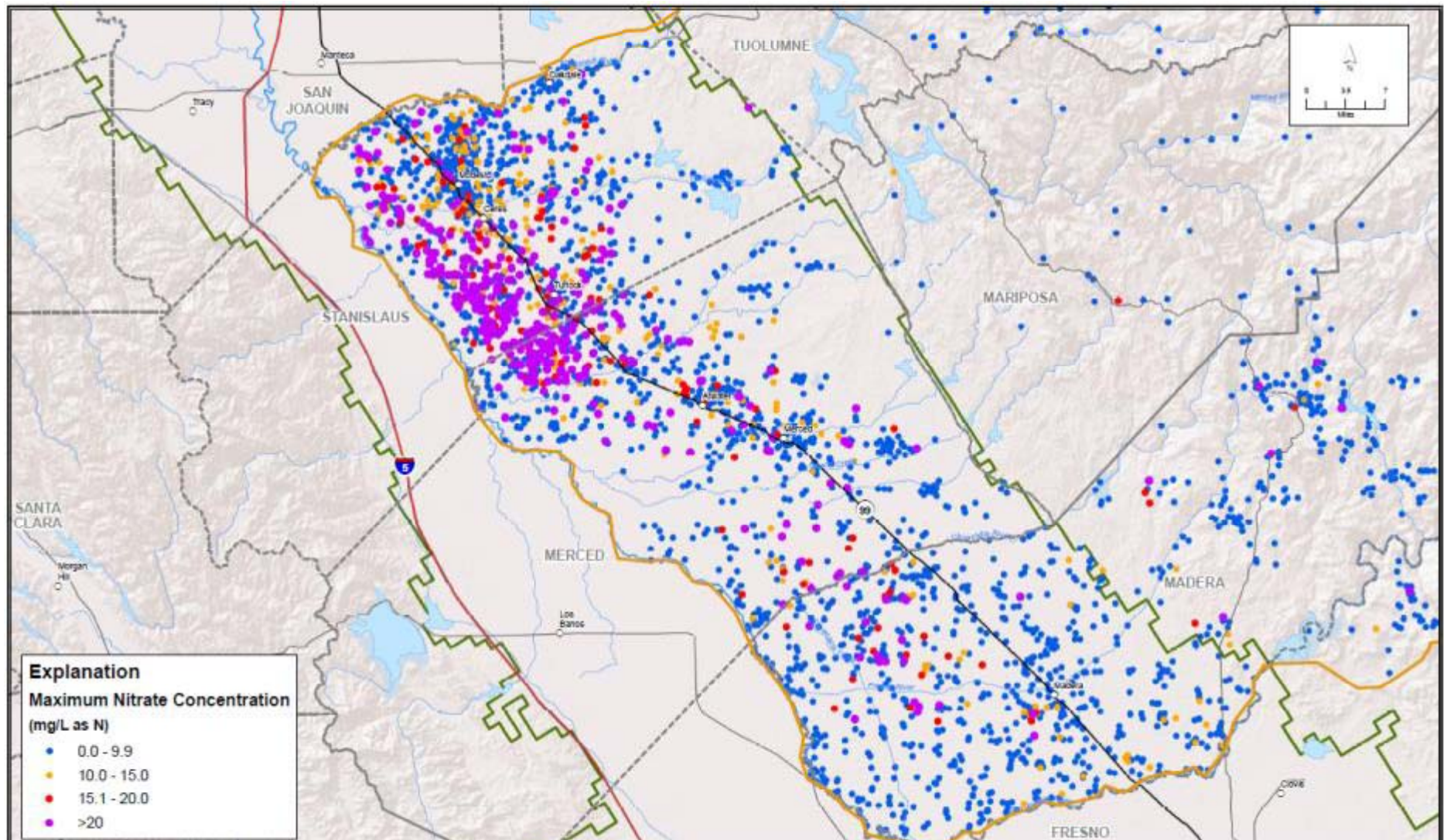


# East San Joaquin WATER QUALITY COALITION





# GW Quality: Nitrate Concentrations





# Proposed High Vulnerability Areas

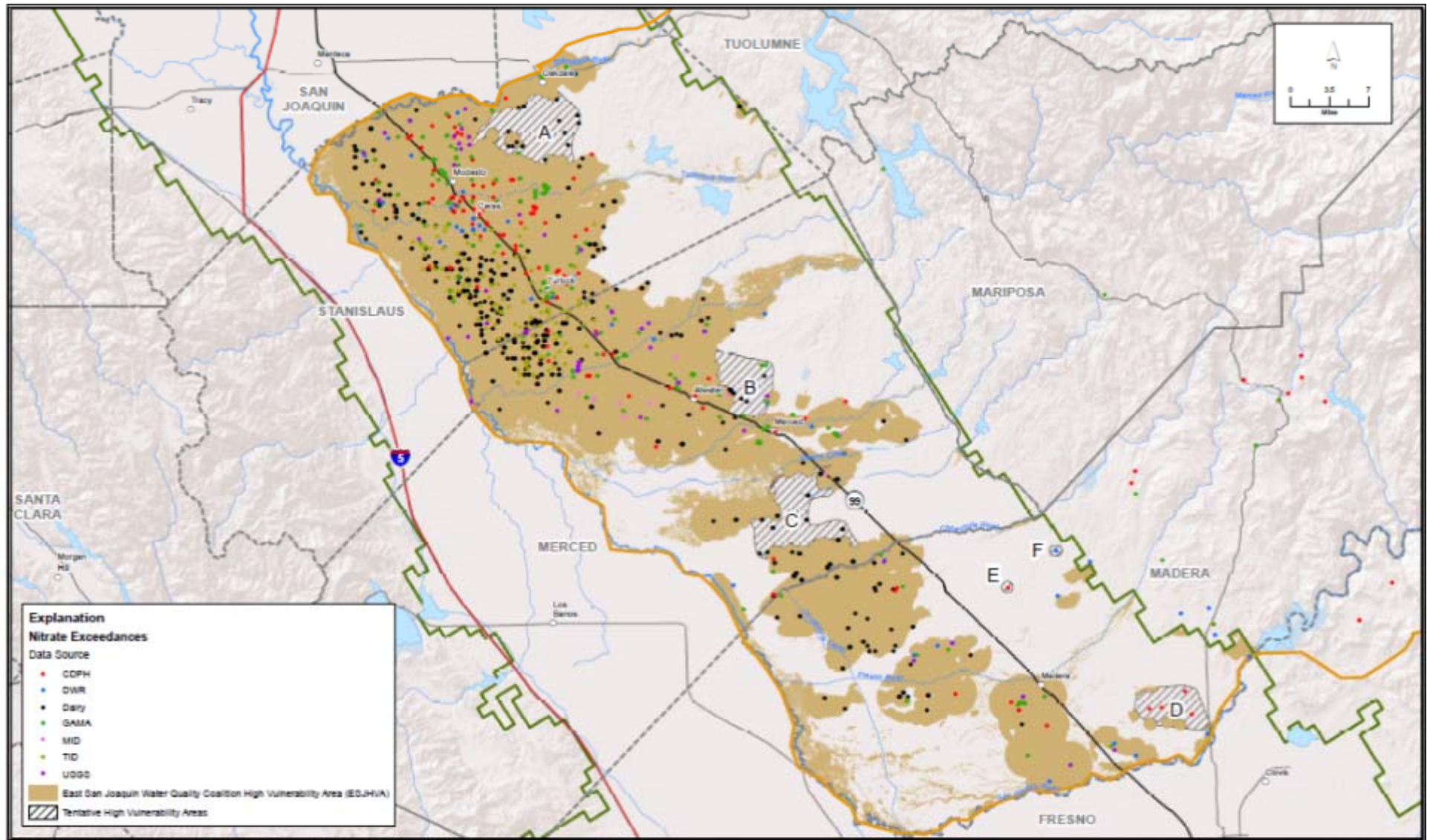


Figure 6-23

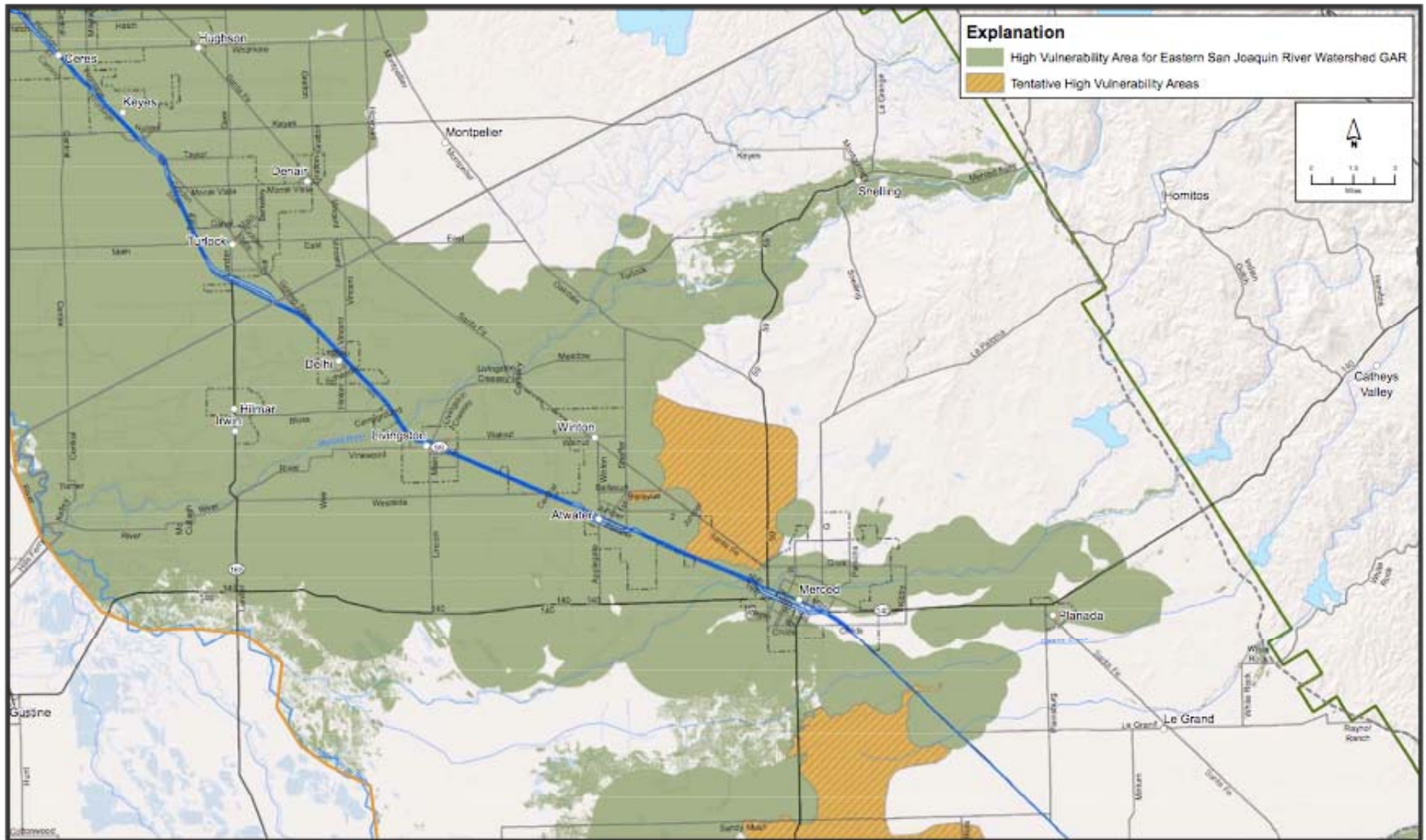




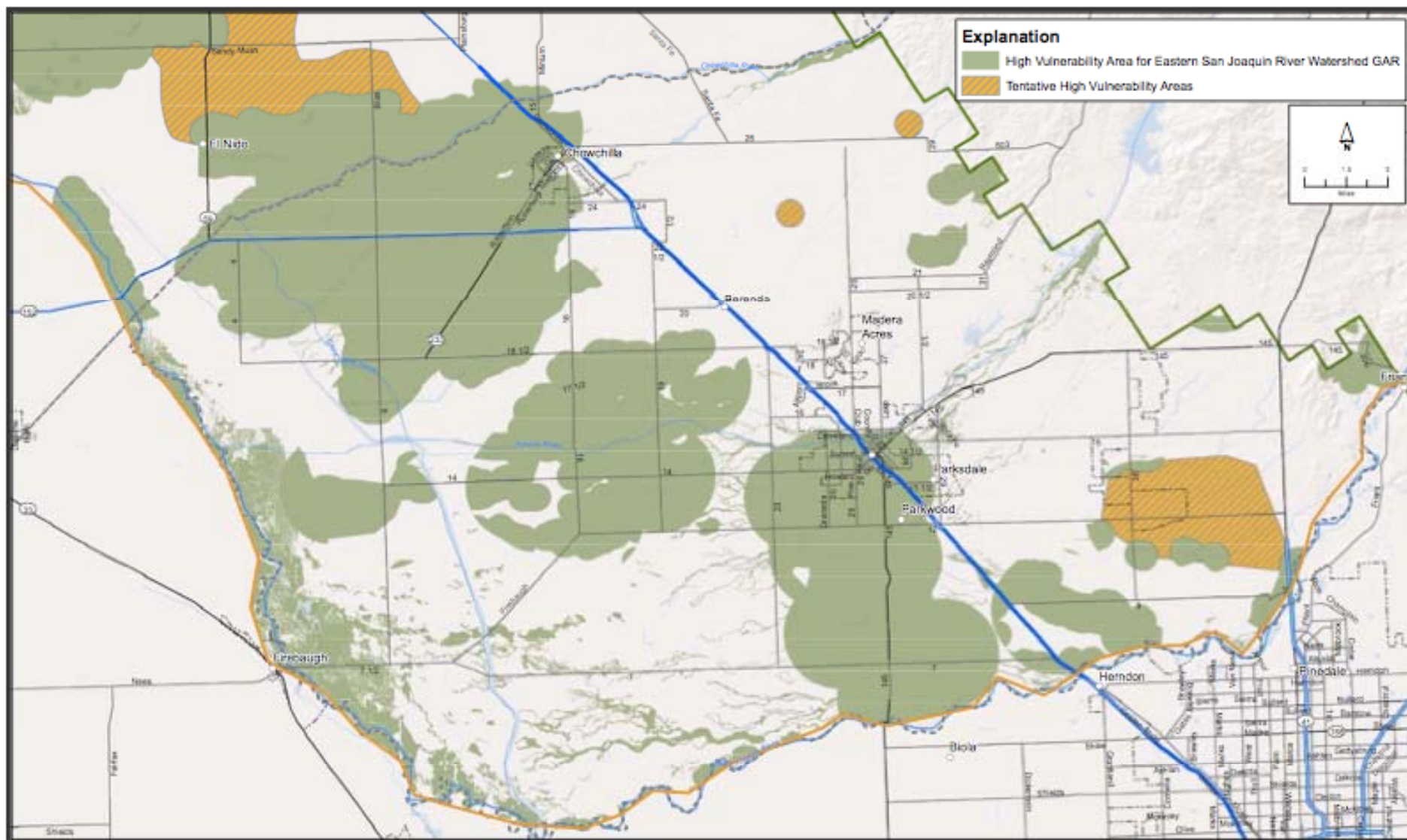
High Vulnerability Area for the East San Joaquin Water Quality Coalition  
With Additional Extensions for Well Nitrate Exceedances

# High Vulnerability Areas

Annual Report - Page 11

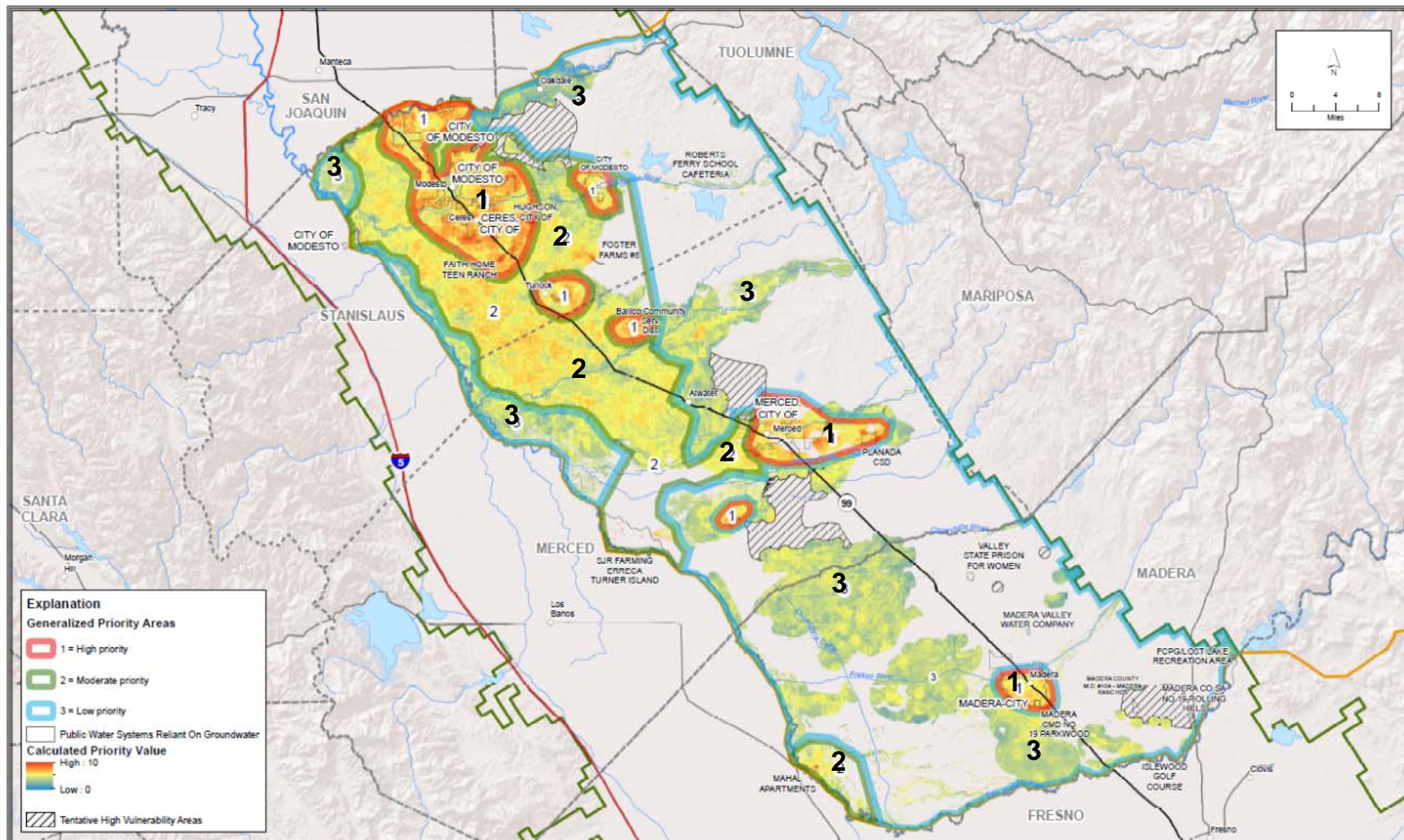








# High Vulnerability Priority Areas





# Application of Management Practices

7. Evaluate and make recommendations regarding the usage of the following **management practices**:
  - a. Nitrogen mass balance calculations and tracking of nitrogen applied to fields.  
This should include consideration of measuring and tracking Nitrogen:
    - i. Applied to crops or fields.
    - ii. In soil.
    - iii. In irrigation water.
    - iv. Removed from field.
    - v. Estimation of losses.
  - b. Templates for determining nitrogen balance.
  - c. **The usage of nitrogen balance ratios.**
  - d. **Nutrient management plans.**



## These are NOT Management Practices

- a. “Nitrogen mass balance calculations and tracking of nitrogen applied to fields...”
- b. “Templates for determining nitrogen balance.”
- c. “The usage of nitrogen balance ratios.”
- d. “Nutrient management plans.”

*These are tracking and reporting methods, not management practices. A practice is something you put in place in a field to manage a certain outcome.*



## Annual Nitrogen Management Plan Summary

Member ID# 1234

APN: 111-00-222

Owner/mgr Joe Almond

Field # A, B, C

This is the template  
proposed to  
CV Regional Water Board  
in 2013

CROP NITROGEN DEMAND	NITROGEN APPLICATIONS AND CREDITS		
		Recommended N	Actual N
<b>Crop</b>	<b>Total N applied to field (lbs/ac)</b>		
<u>Almonds</u>			
<b>Expected yield</b> (Lbs of production/ acre)	<b>Nitrogen fertilizers</b> (conventional and organic)		
<u>3,000 lbs/ac</u>	Dry & Liquid Fertilizers	100	110
	Foliar N fertilizers	100	90
<b>Nitrogen Crop Needs to meet expected yield</b> (lbs of N per acre)	Other N fertilizers	0	0
<u>250 lbs/ac</u>	Organic Material N (manure, compost, etc.)	10	0
		5	5
<b>Total Acres</b>	Other N containing materials		
<u>178</u>			
	TOTAL N APPLIED (per acre)	215	205
<b>Summary Detail</b>	<b>Soil Nitrogen Credits</b>	Soil N ppm <sup>3</sup>	Lbs N/acre
<b>Actual yield</b> (lbs of production/ acre)	Nitrogen from previous legume crop	0	0
<u>2,700 lbs/ac</u>	N residual from manure applications	5	5
	Soil organic matter mineralization	5	5
<b>Total N Applied (lbs)</b>	Current soil test levels		
<u>36,490 lbs</u>	Nitrates in irrigation water (annualized)	50	50
	<b>TOTAL N CREDITS (per acre)</b>	60	60
	<b>Total N Credits and Applications:</b>		
	<b>Crop N needs:</b>	275	265
	<b>Balance</b>	250	250
	<b>Ratio</b>	25	15
		1.100	1.060



## Nitrogen Consumption Ratio

1. **Need more focused crop research before embracing nitrogen consumption ratio**
    1. Programs in place now (almonds, strawberries, walnuts, etc.) where better crop consumption information being developed
  2. In the Central Valley Management Practice Effectiveness Program (MPEP), focus will be on proving practices are protective
    1. Use our best practices in field trails; show they are effective in protecting groundwater (intensive data gathering)
    2. Gain better understanding of crop nitrogen consumption, nitrate movement past the root zone.
    3. Potential Outcomes:
      1. improvements should be made to practices or
      2. validate existing practices are effective
- ***Recommendation: Start with reporting applied nitrogen per field or management unit***
  - ***Maybe work toward a “ratio approach” over next 5-10 years***
    - ***Once better information is developed***
    - ***If it is verified as useful tool***



## Nutrient Management Plans

Use this component of template for nitrogen management planning

Report text in red to coalitions

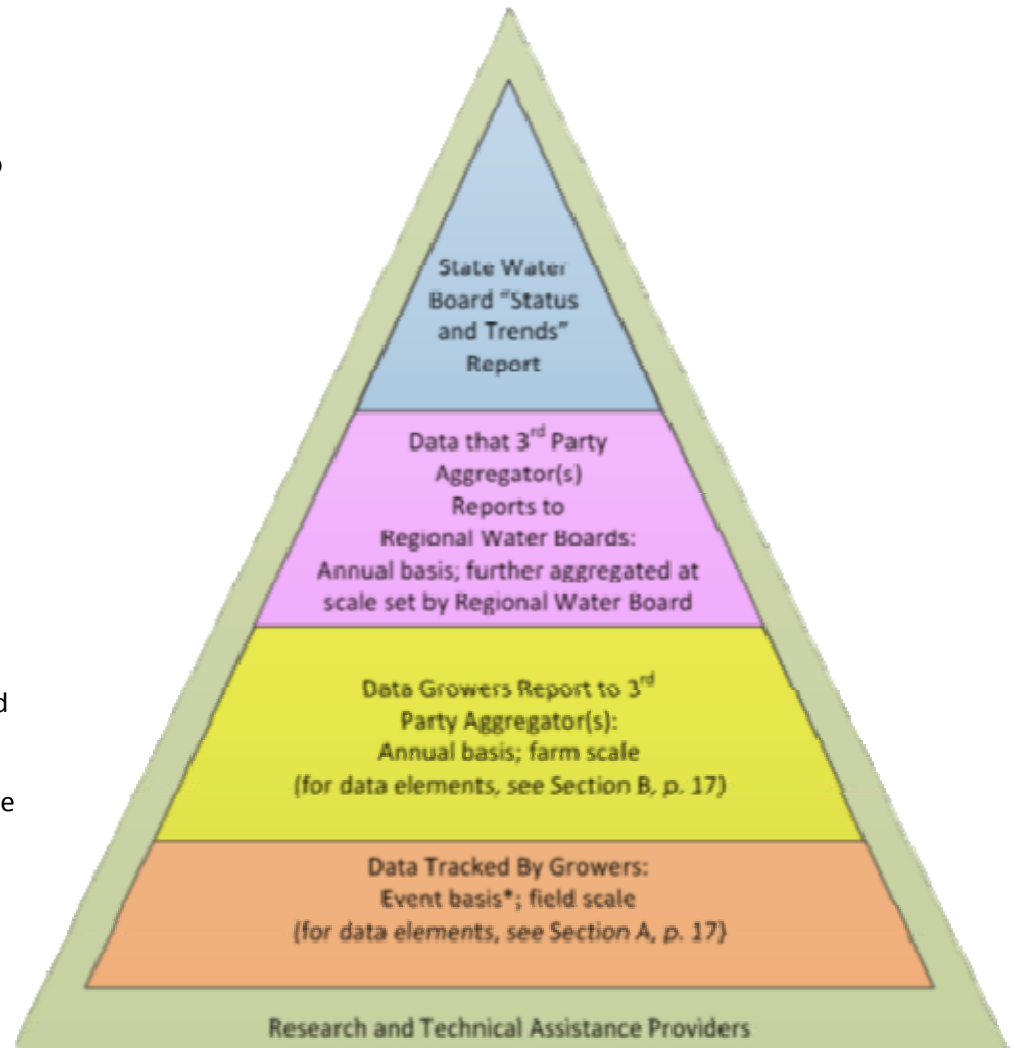
NITROGEN APPLICATIONS AND CREDITS			
	Recommended N		Actual N
Total N applied to field (lbs/ac)			
Nitrogen fertilizers (conventional and organic)			
Dry & Liquid Fertilizers		100	110
Foliar N fertilizers		100	90
Other N fertilizers		0	0
Organic Material N (manure, compost, etc.)		10	0
		5	5
Other N containing materials			
TOTAL N APPLIED (per acre)		215	205
Soil Nitrogen Credits			
	Soil N ppm <sup>3</sup>	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
Current soil test levels			
Nitrates in irrigation water (annualized)		50	50
TOTAL N CREDITS (per acre)		60	60
Total N Credits and Applications:			
		275	265

Total Acres in management unit  
Total lbs N

100 acres  
26,500 lbs

# Tracking and Reporting System Structure

- Growers collect a number of types of crop and field-specific information on an event basis to enable calculation of nitrogen mass balance (the quantity of nitrogen applied minus the quantity of nitrogen removed). The difference represents nitrogen that is not currently accounted for, including but not limited to nitrogen available for leaching to groundwater.
- Much of the tracking data are retained on farm; a subset is compiled by crop and field at the farm scale and annually reported upward to a data aggregator.
- The data aggregator annually compiles and reports data submitted by numerous growers into a single combined report for a larger geographic area as designated by the relevant Regional Water Board.
- The Regional Water Board provides to the State Water Board the information necessary to compile an annual report on “status and trends” with respect to management and the fate of nitrogen applied in irrigated agriculture.
- The narrowing of the pyramid reflects increasing consolidation of information and larger geographic units of analysis as the information moves upward through the system from grower to State Water Board.







# Application of Management Practices

8. Evaluate and make recommendations regarding the most effective methods for **ensuring growers have the knowledge** required for effectively implementing recommended management practices.

Consider the following:

- a. Required training.
- b. Required certifications.
- c. **Workshops sponsored by third parties** such as: CDFA, County Agricultural Commissioners, Farm Bureau, UC Cooperative Extension.
- d. **Usage of paid consultants – e.g., CCAs/PCAs.**
- e. UC Cooperative Extension specialists.



## Application of Management Practices

... *ensuring growers have the knowledge...*

- Coalitions are committed collaborators
- ESJ will be using IPNI 4R's program in member outreach 2014/15
- Seeking Grower Certification Program based on CCA program; CDFA/UC Collaboration



## Application of Management Practices

... **Usage of paid consultants – e.g., CCAs/PCAs. ...**

- Grower outreach on N use/BMPs won't be successful without private industry participation
- Use UC Cooperative whenever possible but not always available (limited UC personnel w/agronomy training)
- Hire CCA's to be part of outreach team, use in trainings in addition to UC personnel



# Application of Management Practices

5. What management practices are expected to be implemented and under what circumstances for the control of nitrogen?

---

- *Encourage grower use of 4R approach when applying nitrogen*

5. 4R Principles apply to all crops
  - *Right time, place, material, amount*
6. Need to customize literature based on California crops
7. Need to refine crop consumption information for many crops





# Verification Measures

**10. Evaluate and make recommendations regarding the usage of the following verification measurements of nitrogen control:**

- a. Sampling first encountered groundwater via shallow monitoring wells.
- b. Direct sampling of groundwater from existing wells, such as an irrigation well or domestic drinking water well, near the field(s) where management practices for nitrogen are being implemented.
- c. **Sampling of the soil profile to determine the extent to which nitrogen applied to a field moved below the root zone.**
- d. Representative sampling of a limited area and applying the results broadly.
- e. Sampling water in surface water containment structures for their potential discharge to groundwater.
- f. Estimating discharge to groundwater based on nitrogen balance model and measured irrigation efficiency.



# Management Practice Effectiveness Studies

*Implemented by CV Coalitions under  
Management Practice Effectiveness Program (MPEP)*

- **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 study expenses among coalitions willing to collaborate
- Coalition to present Water Board with phased approach
- CURES USDA project to be starting point for approach
  - Literature search
  - Interview experts in field
  - Performing field instrument evaluation through CDFA grant



c. Sampling of the soil profile to determine the extent to which nitrogen applied to a field moved below the root zone.

## How do we best determine volume of nitrogen moving past the root zone?

Direct measurement under each field

- Enormous data collection
- Impractical

Mass loading estimates based on field trials

- Must be representative sites in trials
- May need new science to ID approaches

Fate and transport

- New science needed



CURES project  
Funded by USDA/CDFA  
Specialty Crop Block Grant

*Establishing cost efficient methods to measure  
nitrate movement beyond the root zone when  
using nutrient BMPs in California Specialty Crops*

**Project Goal:**

Establish one or more reliable, repeatable scientific methods  
to characterize movement of nitrogen fertilizers beyond the  
plant root zone

Crops: walnuts and broccoli/lettuce (and other specialty crops  
from Central Valley and Central Coast)



# How do we measure nitrates past the root zone?







Soil pore  
water sampler







# Verification Measures

10.

c. Sampling of the soil profile to determine the extent to which nitrogen applied to a field moved below the root zone.

## **Expert Panel Suggestions/Guidance on:**

- How many replicates per crop
- How many replicates per field
- How many soil types need to be tested (sand, loam, clay)
- How many methods of root zone/below root zone analysis
  - Soil pore water
  - Soil coring at various depths
  - Surrogate measurements (i.e. EC or soil moisture)
  - First encountered groundwater

***Studies need to be practical, economical (don't break the bank)***

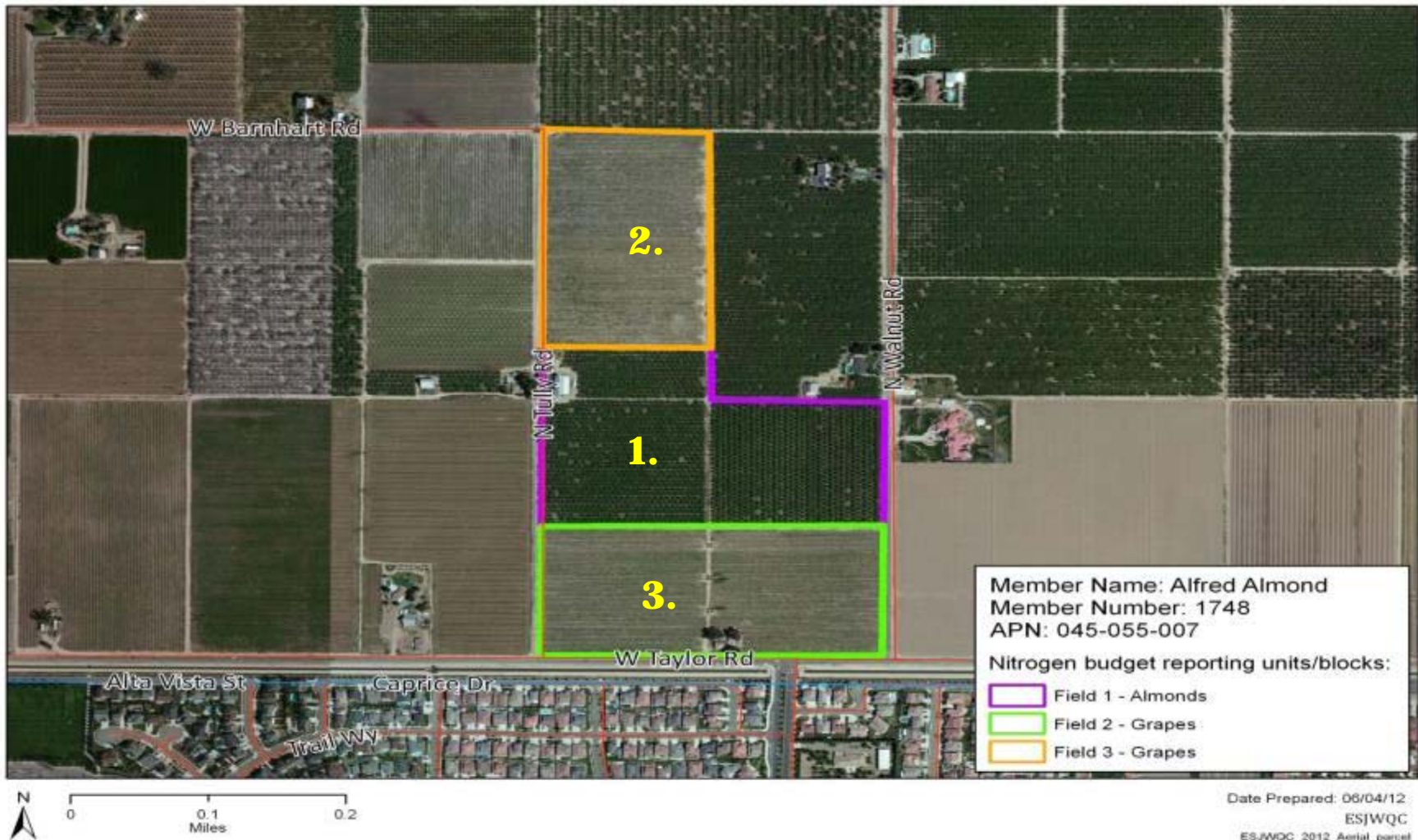


## Reporting

13. Evaluate and make recommendations on the reporting requirements to report budgeting and recording of nitrogen application on a **management block** basis versus reporting aggregated numbers on a nitrate loading risk unit level.  
(Definitions of “management block” and “nitrate loading risk unit” are contained in State Water Board Order WQ 2013-0101.)

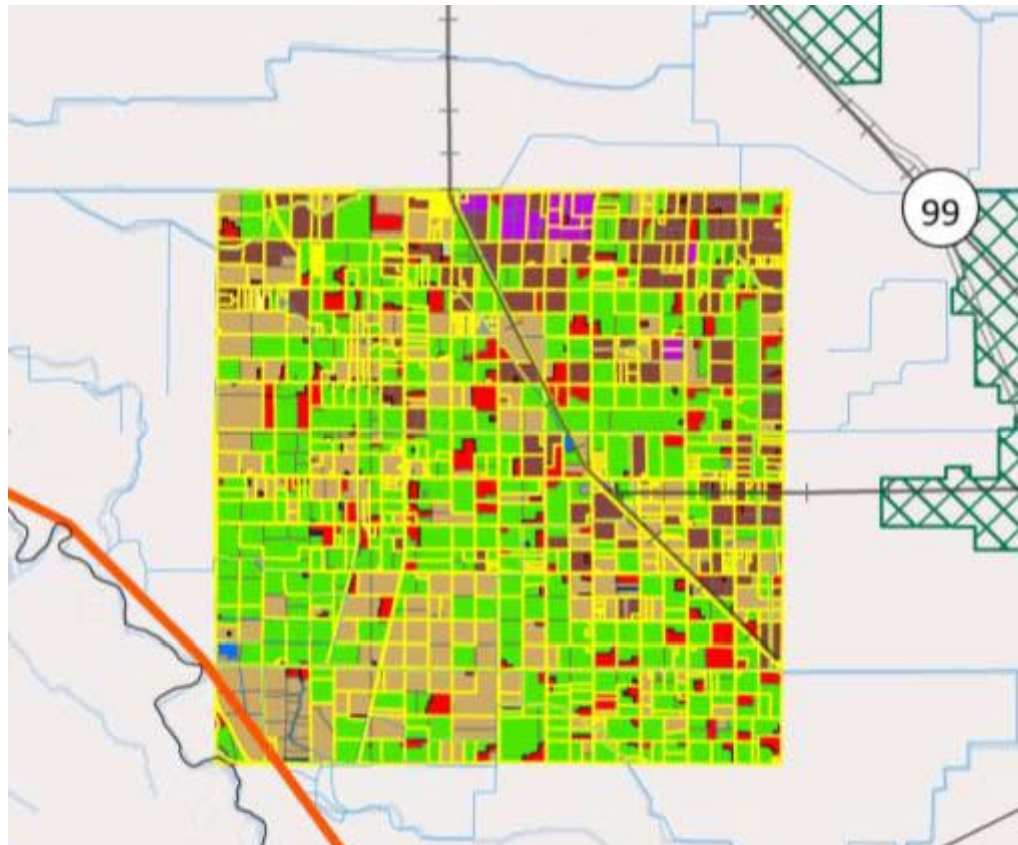


**Field Most Familiar Reporting Unit**  
Or **Management Unit**: 2+ fields managed the same



# Combine Member Results into Township Level for Analysis

*Example below in ag area: 23,040 acres*





## 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





...reporting requirements to report budgeting and recording of nitrogen application...

## **Field Most Familiar Reporting Unit**

### **Or Management Unit: 2+ fields managed the same**

- For nitrogen/fertilizer, reporting unit may not be the same as Pesticide Use Reporting (PUR)
- PUR system (county field ID) will not always equate directly to nitrogen reporting system that is practical for growers
- Coalitions will be refining field ID approach with members

*Another reason to go slow when implementing any nitrogen reporting program!*



**Parry Klassen**  
**559-288-8125**  
**[www.esjcoalition.org](http://www.esjcoalition.org)**