SACRAMENTO VALLEY WATERSHEDS: REGIONAL COLLABORATIVE APPROACHES TO MAINTAINING AND IMPROVING GROUNDWATER QUALITY

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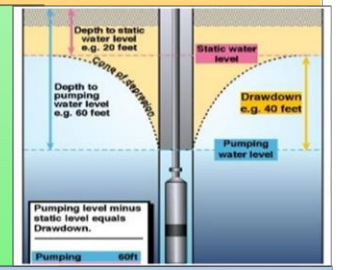
OVERVIEW

- **Nitrate in Groundwater: Occurrence in Sacramento River Watershed**
- **SVWQC Irrigated Lands Regulatory Program: GAR Update and AGLAND Domestic Wells' Results**
- **Central Valley BPA: Nitrate Control Program**
- **Sustainable Groundwater Management Act**

BPA Management Zone (MZ)

SGMA Groundwater Sustainability Plans

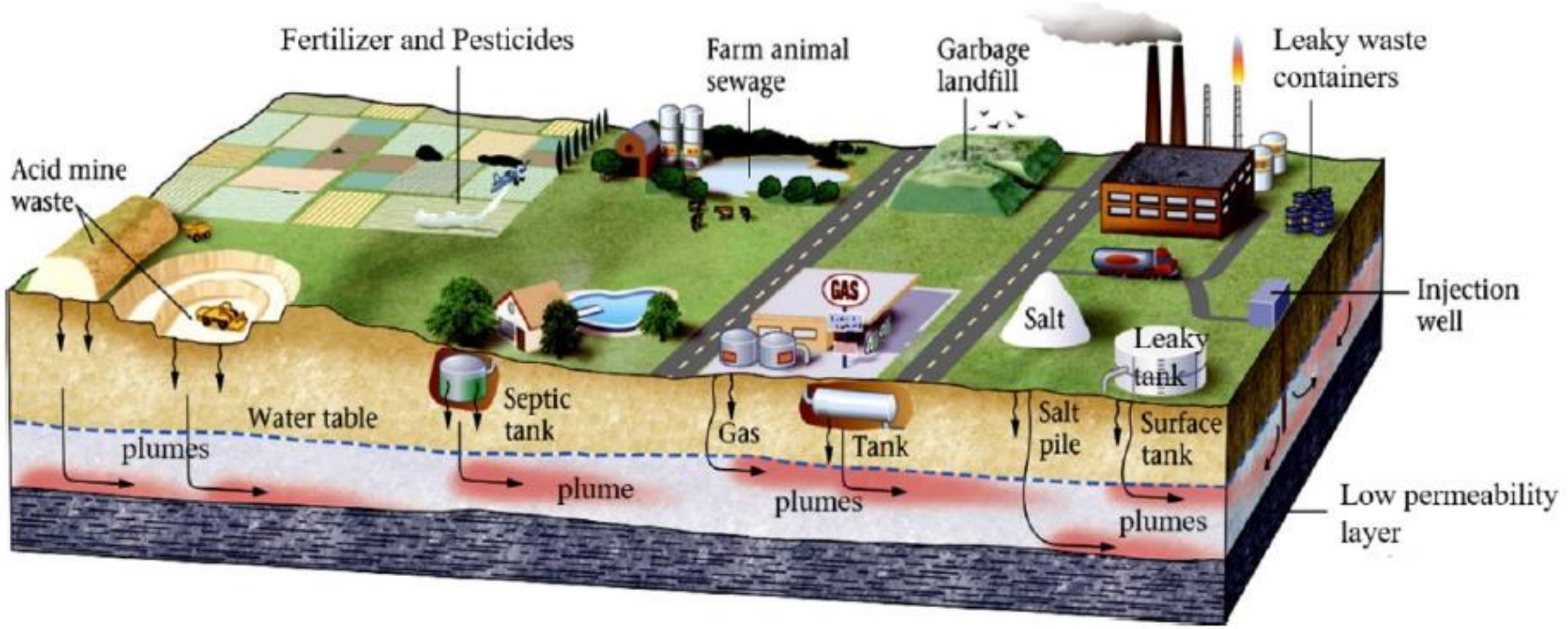


Irrigated Lands Regulatory Program Coalition (GQMP/MPEP)

NITRATE: A VERY COMMON CHEMICAL

- **What is Nitrate?**
  - Contaminant that can make drinking water unsafe for drinking when above a certain level
  - You can not see, smell, or taste Nitrate in water
  - You can not boil Nitrate out of water
  - Chemical found in most fertilizers, manure, and septic tanks
  - Rain or irrigation water can carry Nitrate down through the soil and into groundwater

CHEMICAL CONSTITUENTS (INCLUDING NITRATE): HUMAN LAND USES



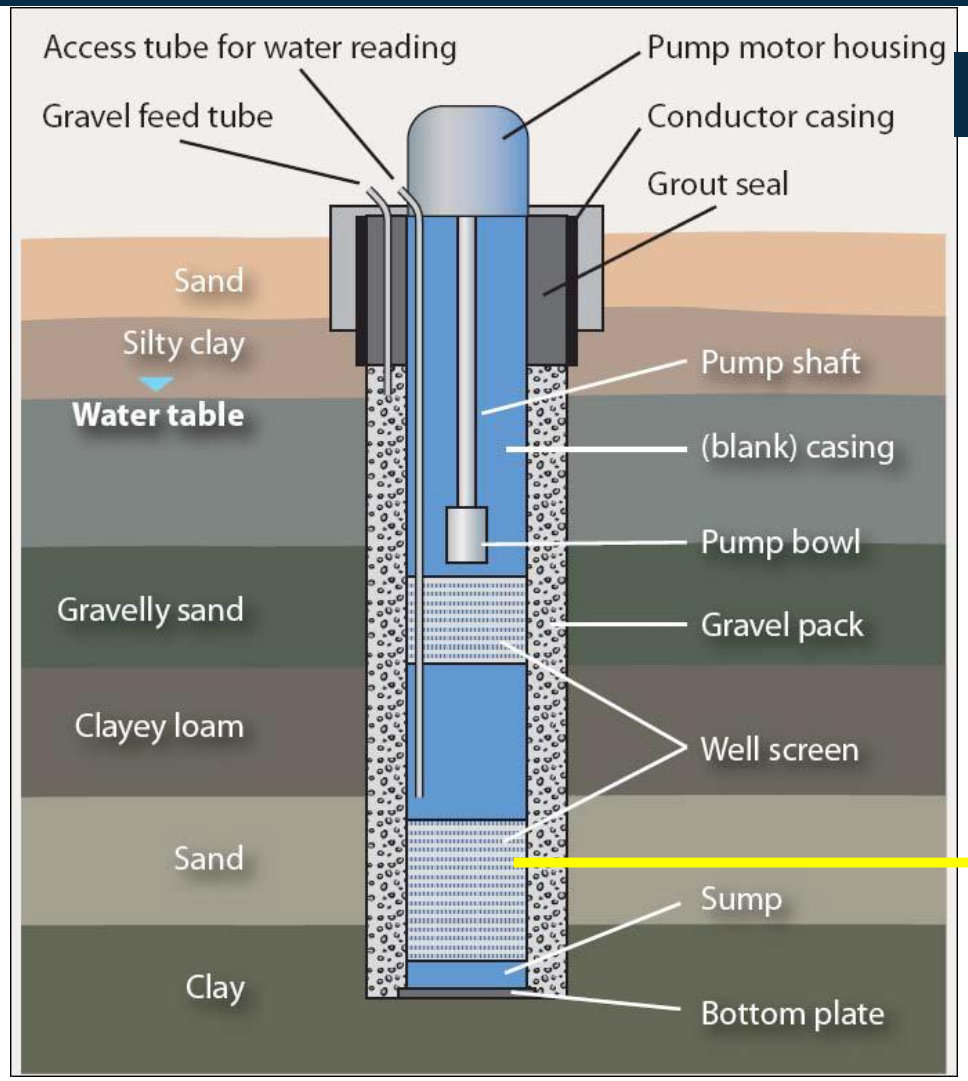
- Adapted from Marshak, 2005 in Poeter, et al., 2020

WHY DO WE CARE ABOUT NITRATE?

- When is Nitrate Unsafe?
  - Government set a legal limit on the amount of Nitrate in water used for drinking
  - Drinking water limit is 10 milligrams per liter Nitrate as nitrogen (US EPA and California state regulatory requirement; Maximum Contaminant Level [MCL])

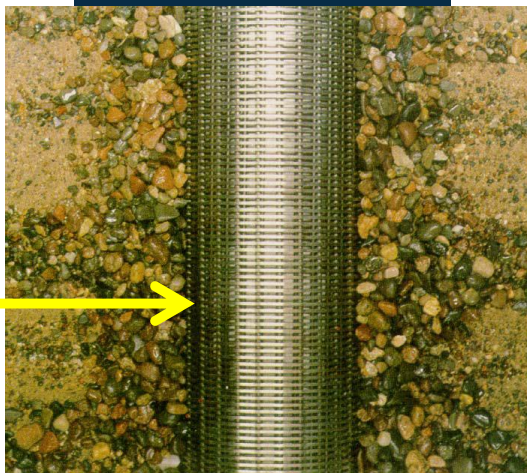
HOW DO NITRATE AND OTHER CHEMICALS GET INTO WELL WATER?

- How does Nitrate get into your well water?
  - Groundwater is produced from water-bearing deposits beneath the land surface
  - All wells need to have good integrity and be protected from land surface activities
  - Proper well construction helps reduce contaminants from being introduced at the land surface



Typical Well Structure

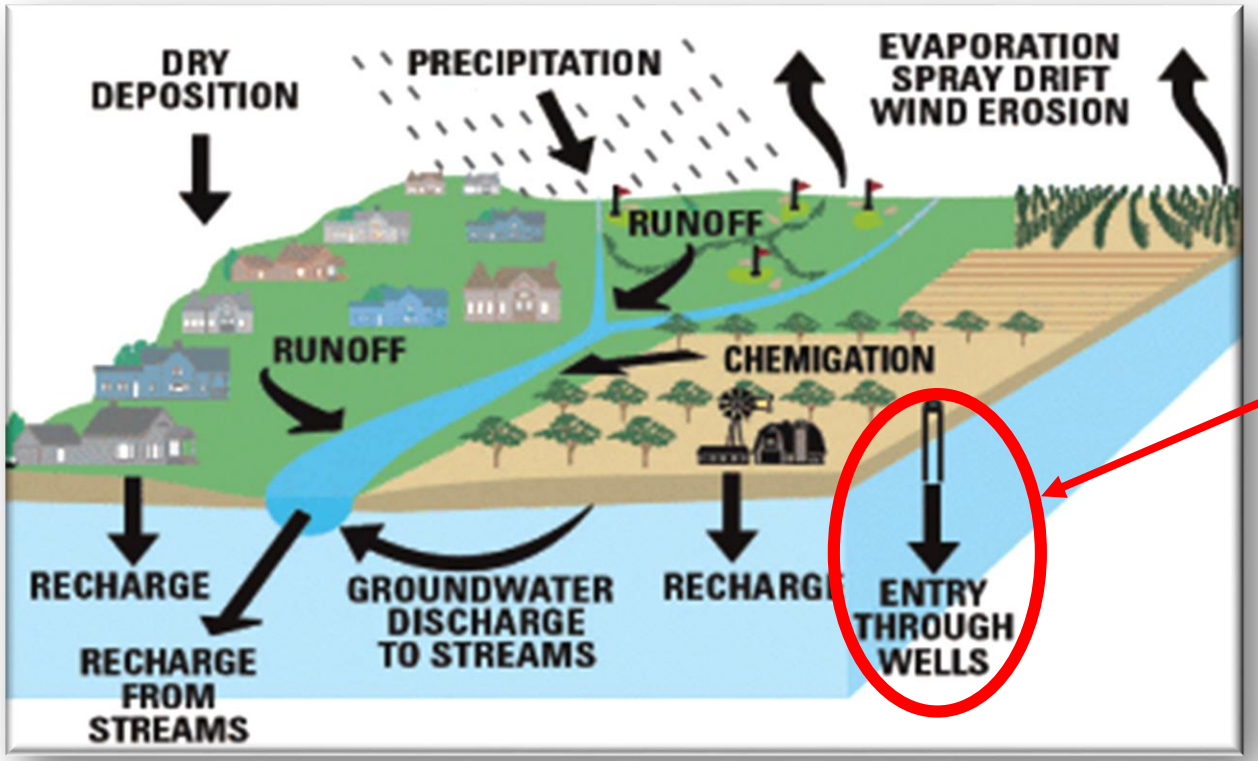
Well Screen



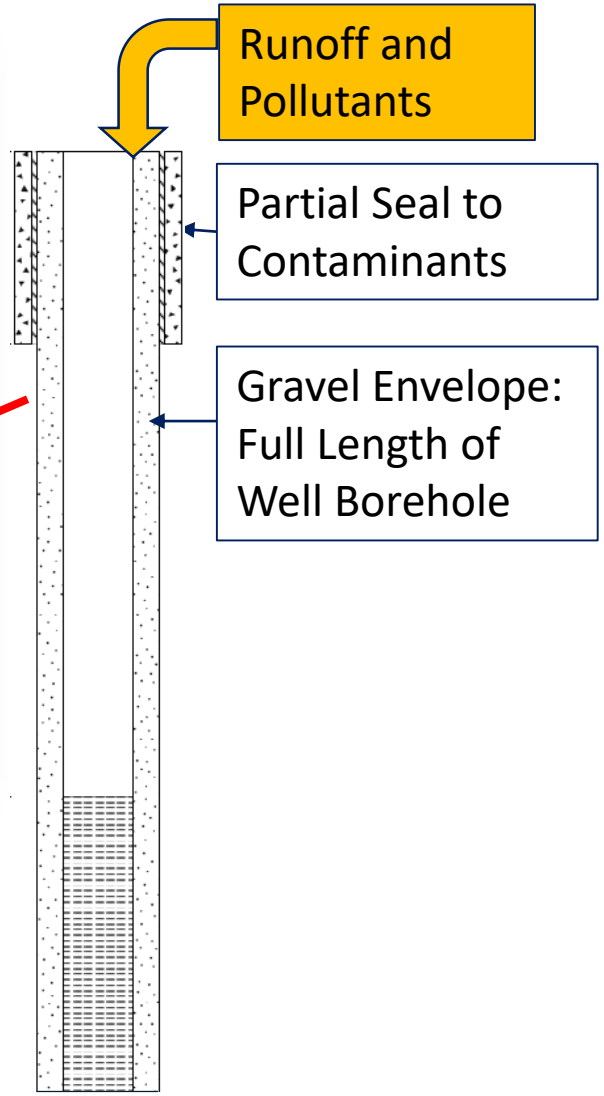
NITRATE AT THE LAND SURFACE MAY AFFECT GROUNDWATER

Sources of Nitrate Near Well:

- Entrance to well near land surface



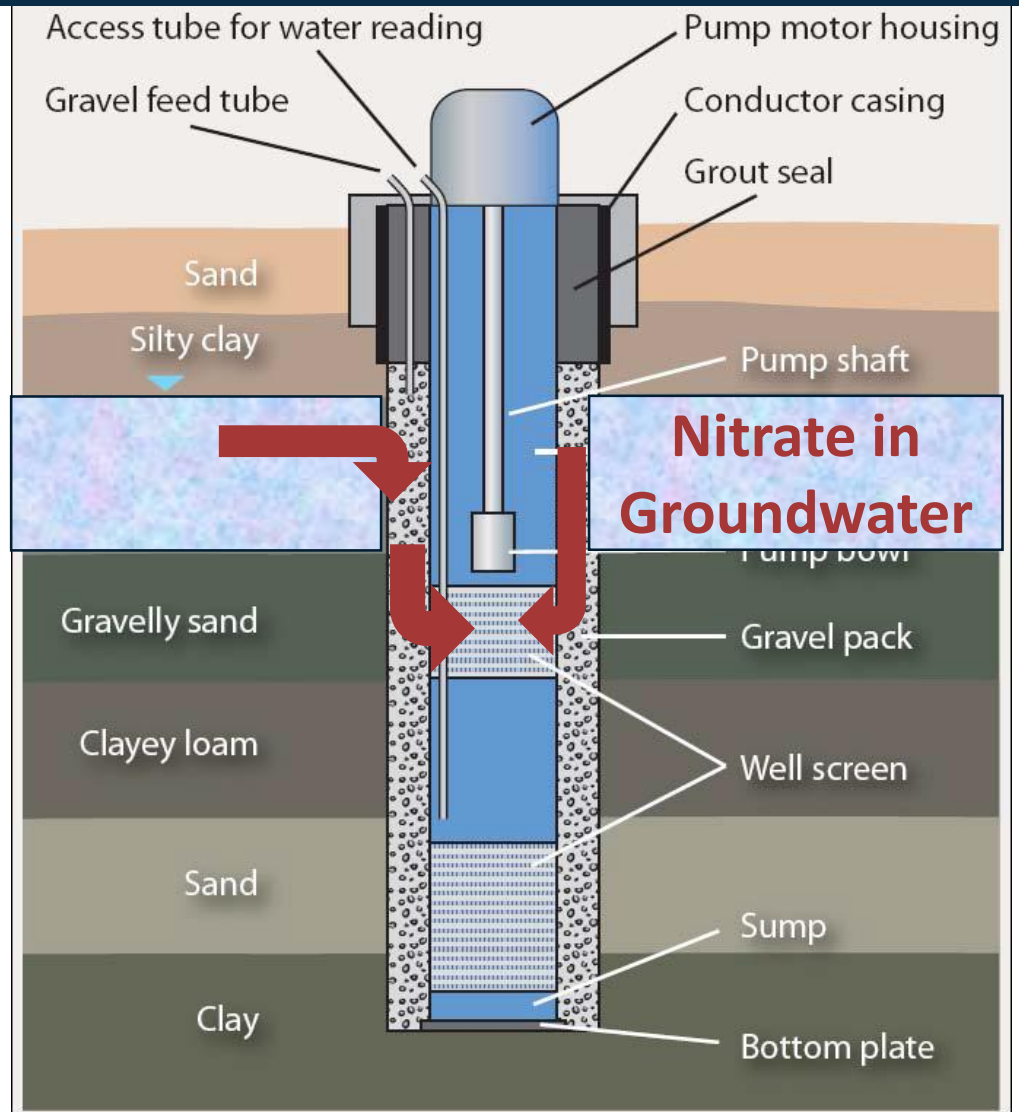
USGS, C.E. Thodal et al.. 2008. Fact Sheet 2009-3093
Modified from Gilliom and others, 2006



NITRATE IN GROUNDWATER MAY ENTER THE WELL

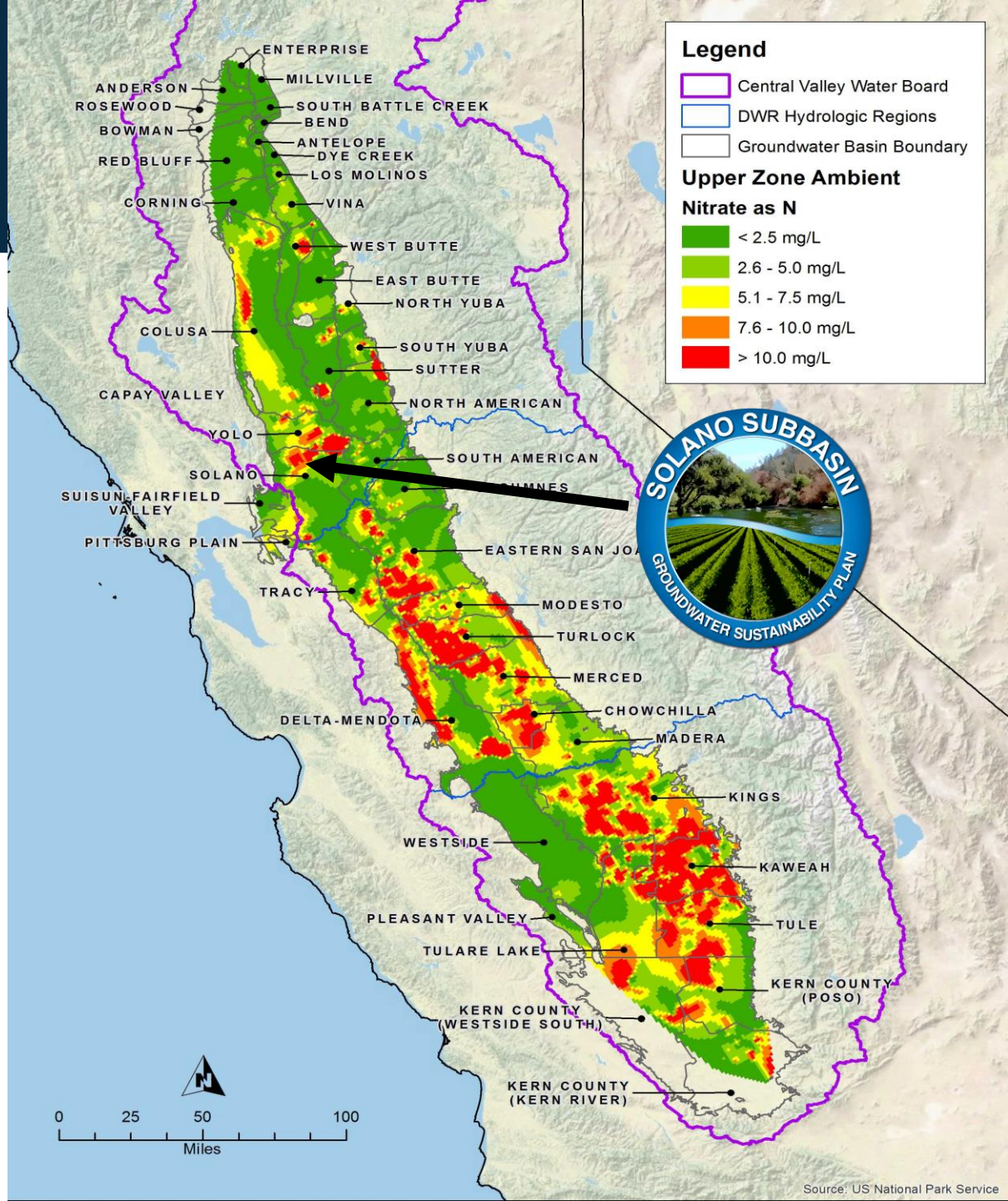
Movement into Well Structure:

- Shallow Groundwater with Nitrate in Vicinity of Well May Move into Well



CENTRAL VALLEY AND NITRATE IN GROUNDWATER

- Legacy and existing conditions
- Direct impacts to drinking water supplies
- Significant economic costs, including treatment or alternate supply
- Diverse sources of nitrate to be managed



WHY DO WE CARE ABOUT NITRATE IN GROUNDWATER?

Drinking water obtained from groundwater that enters our homes through a private domestic well may require action if impacted by Nitrate.

- **Public Supply Wells**
  - Public Supply Wells are tested regularly
  - Public Supply Wells can have treatment to make sure the water is safe for drinking or cooking before it reaches homes

VS.

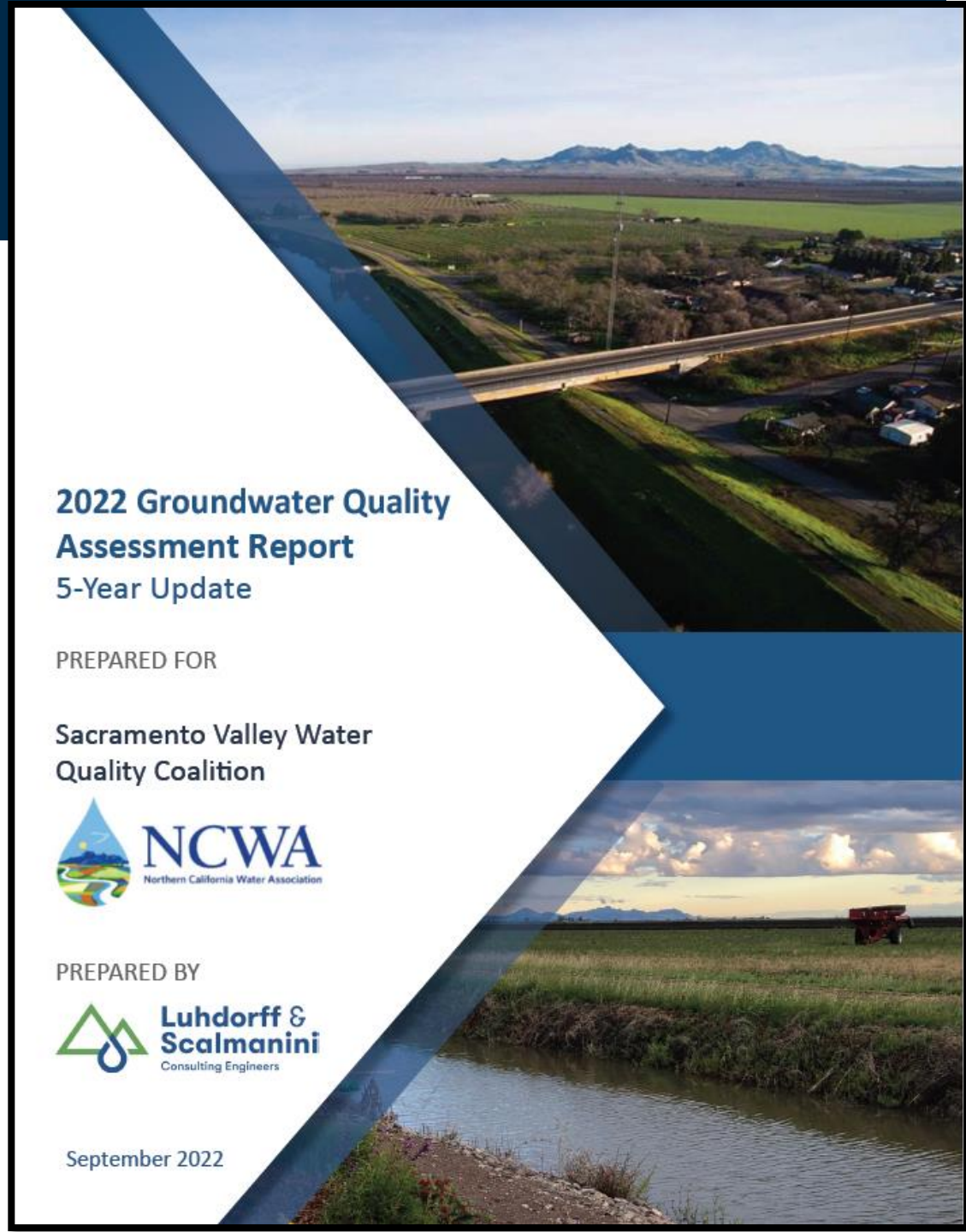
- **Private Domestic Wells**
  - The well owner must test the water to determine if it is impacted by Nitrate
  - If impacted, the well owner should take action to address the Nitrate before water is used for drinking or cooking

SVWQC Irrigated Lands Regulatory Program

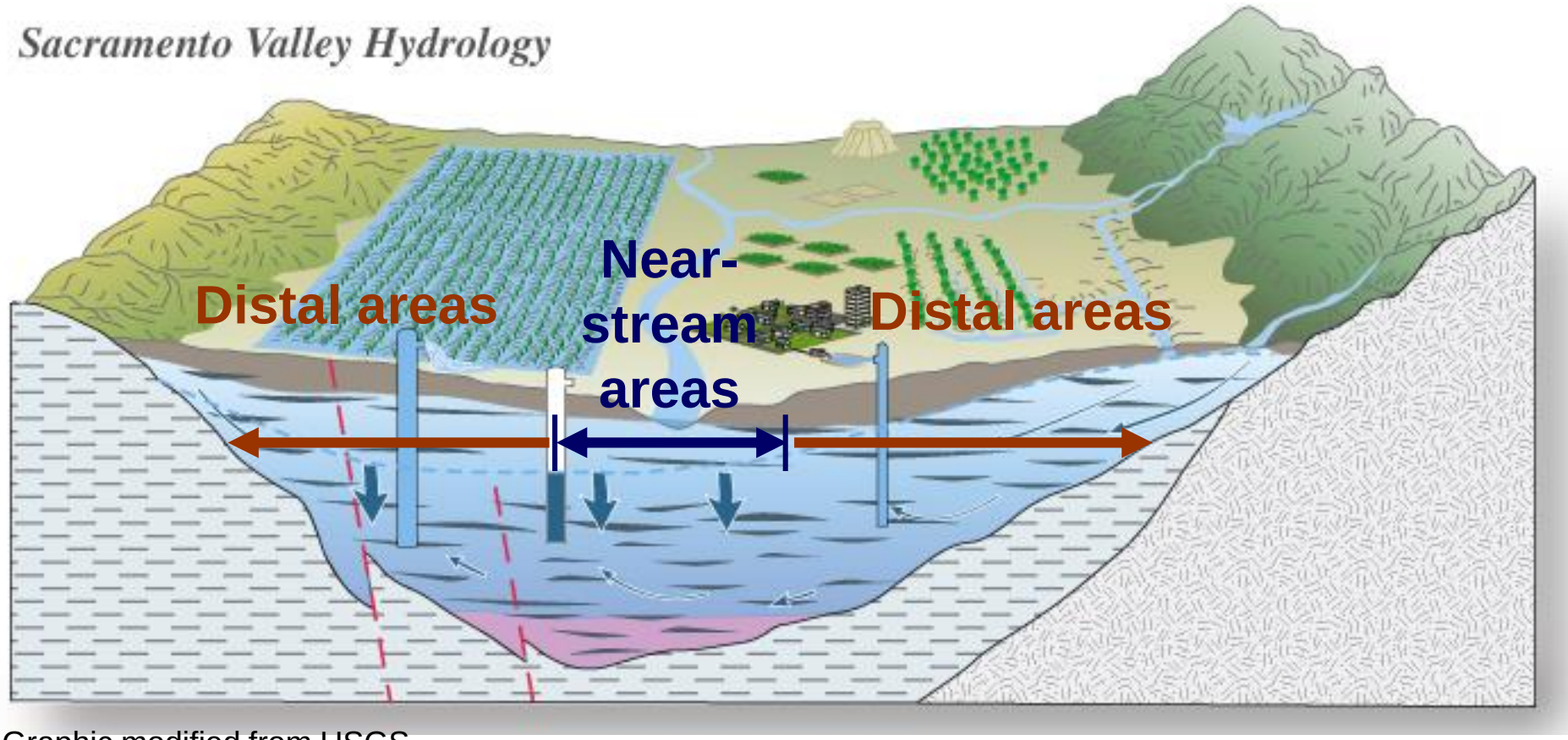
Groundwater Quality

ILRP REQUIREMENTS:
GROUNDWATER QUALITY ASSESSMENT REPORT UPDATE

- One of the key objectives of the GAR:
  - "Provide an assessment of all readily available, applicable and relevant data…. to determine the high and low vulnerability areas where ***discharges from irrigated lands may result in groundwater quality degradation***."
- Additionally, as part of data review and analysis:
  - "Determine where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where ***conditions make groundwater more vulnerable to impacts from irrigated agricultural activities***."



CONCEPTS RELATING TO GROUNDWATER VULNERABILITY



Graphic modified from USGS

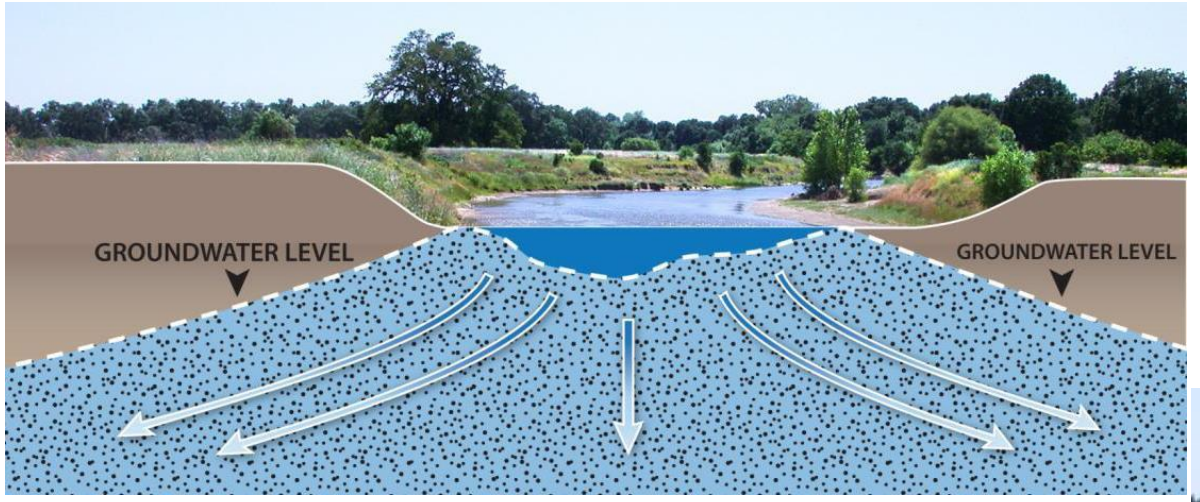
Near-Stream Areas

- Shallow GW
- High SW/GW exchange
- Low NO_3
- Low vulnerability to impairment

Distal Areas

- Deeper GW
- Greater influence by sediment character
- Potential vulnerability to impairment, depending conditions

NEAR-STREAM AREA SW-GW INTERCONNECTIONS

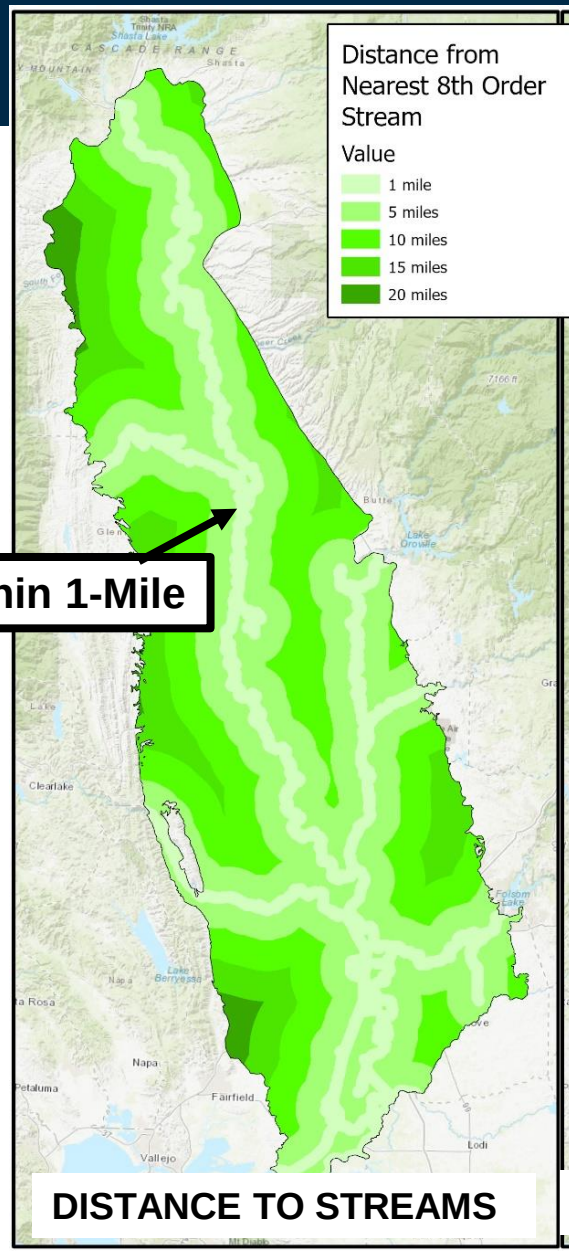


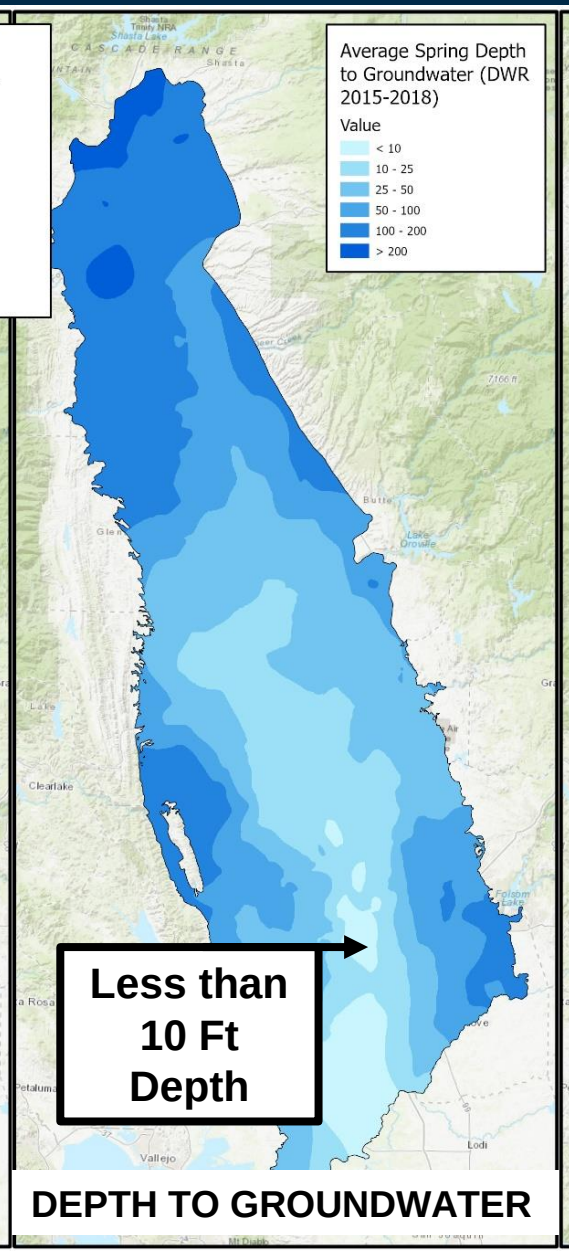
High recharge volume; low NO_3 in GW

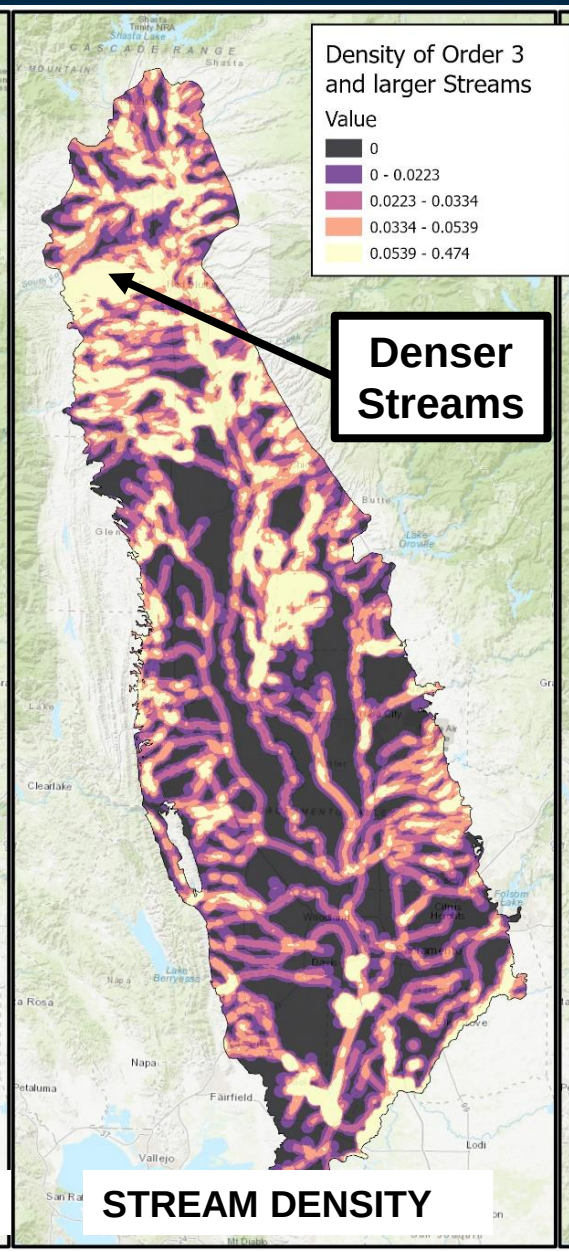
High GW discharge; low NO_3 in GW

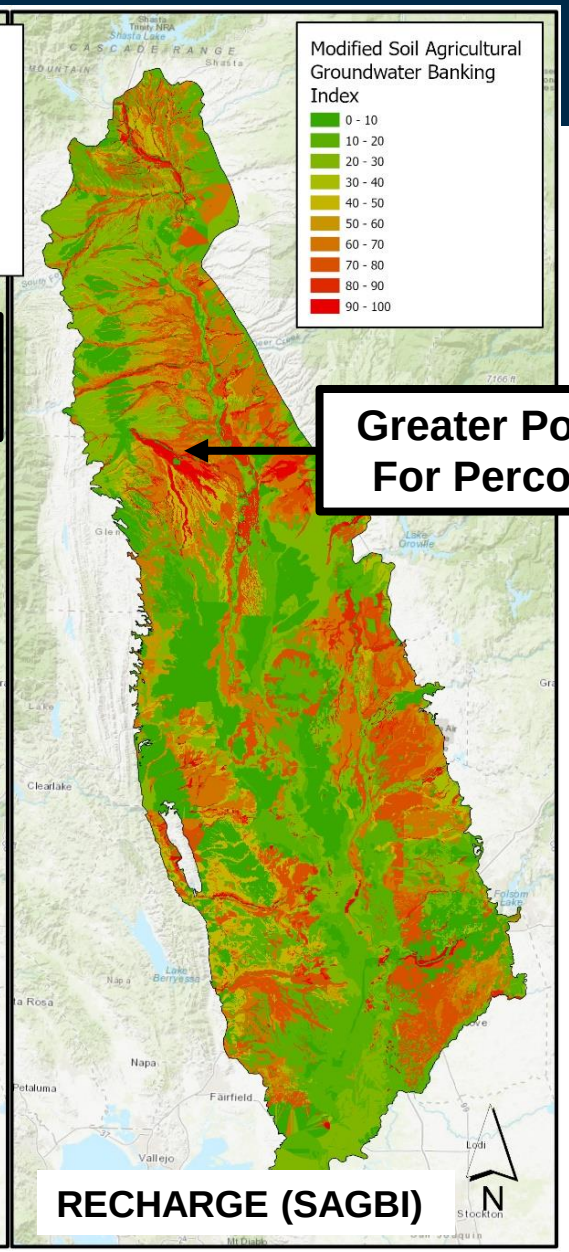
Graphic source: TNC

INPUT VARIABLES TO MAP HYDROGEOLOGIC SENSITIVITY





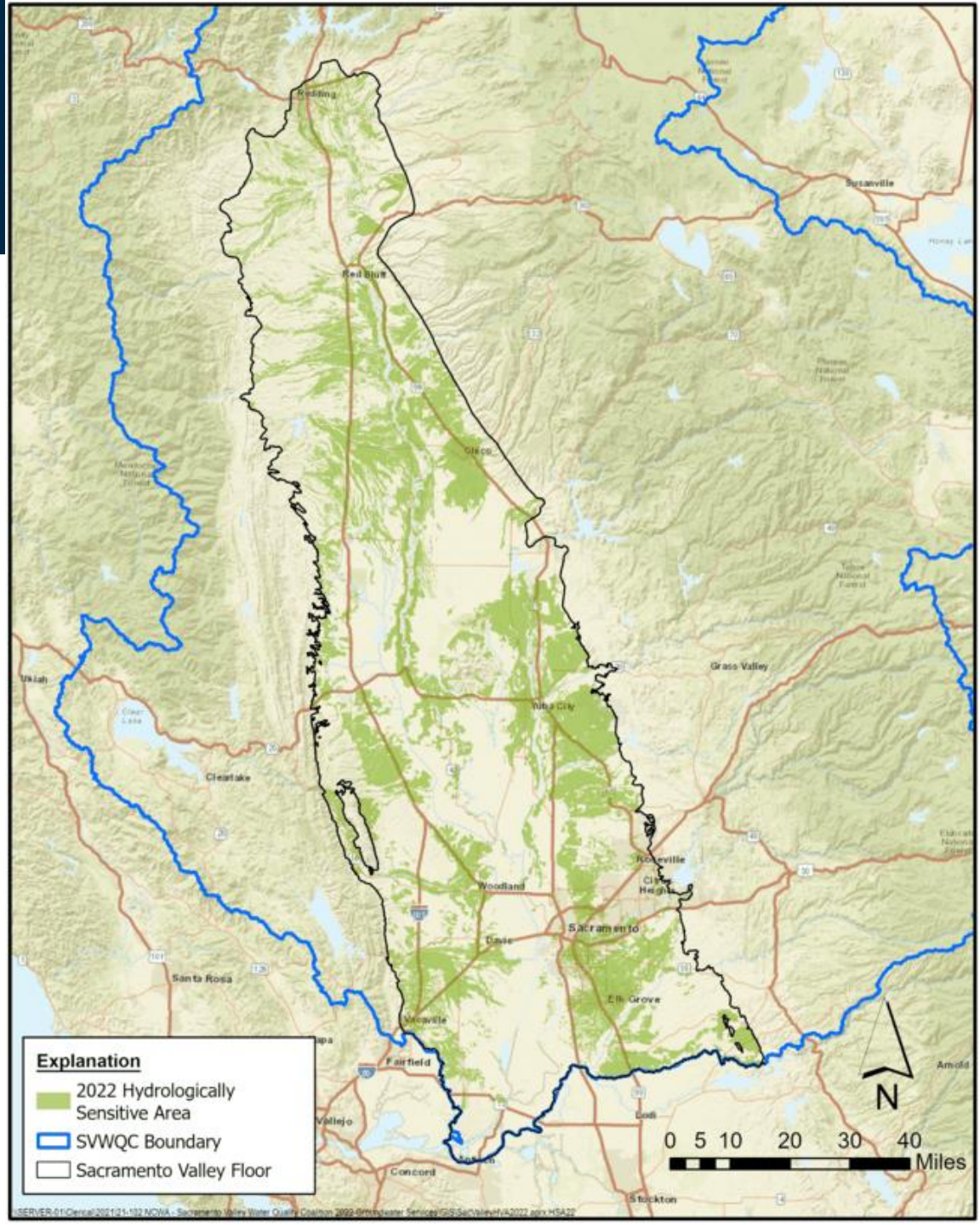




HYDROGEOLOGICALLY SENSITIVE AREAS

Hydrogeologically Sensitive Areas (HSA) defined based on physical characteristics:

- **1,478,472 acres** in the Sacramento Valley
- Not evaluated outside of Sacramento Valley

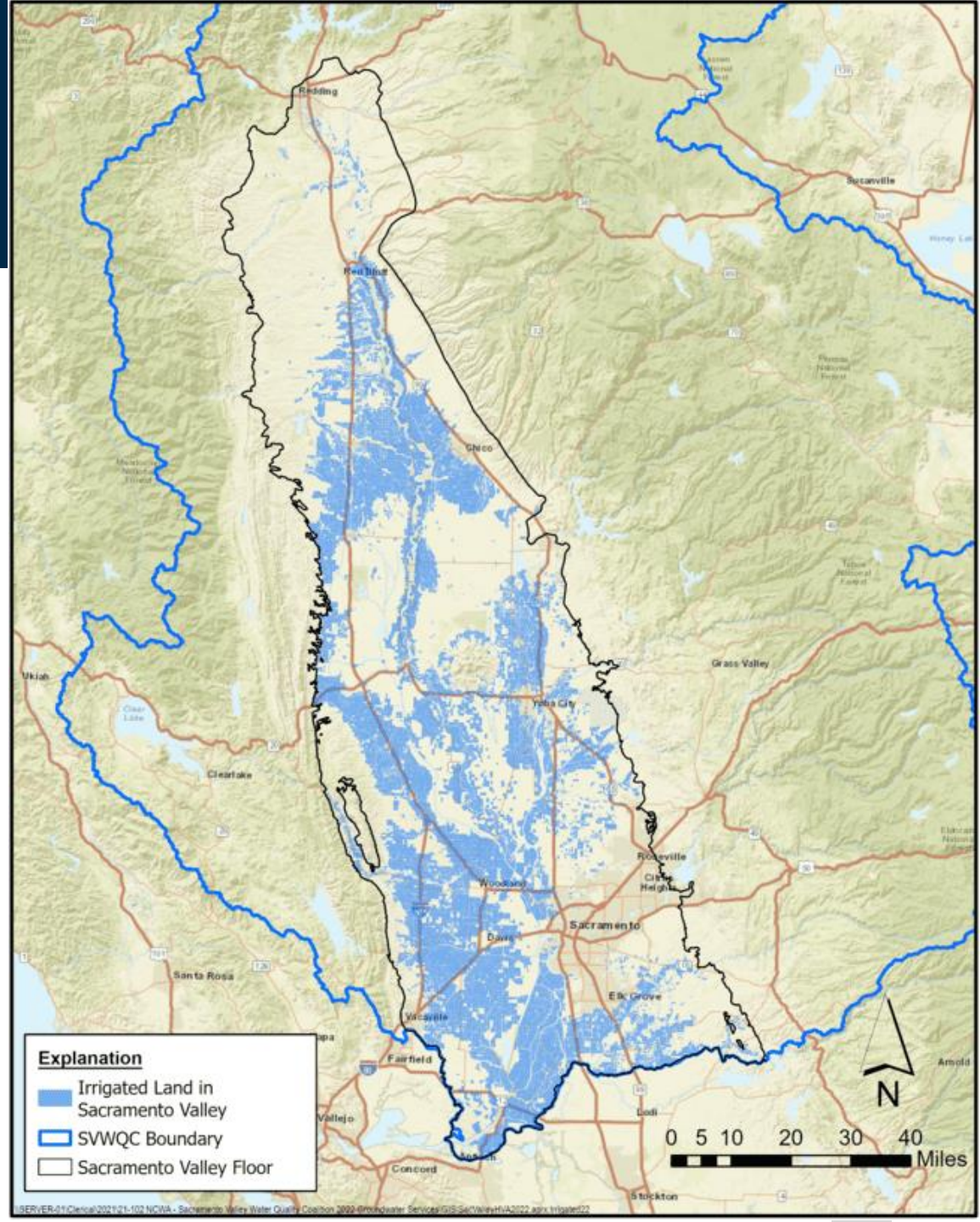


IRRIGATED LANDS

Irrigated Lands as defined by:

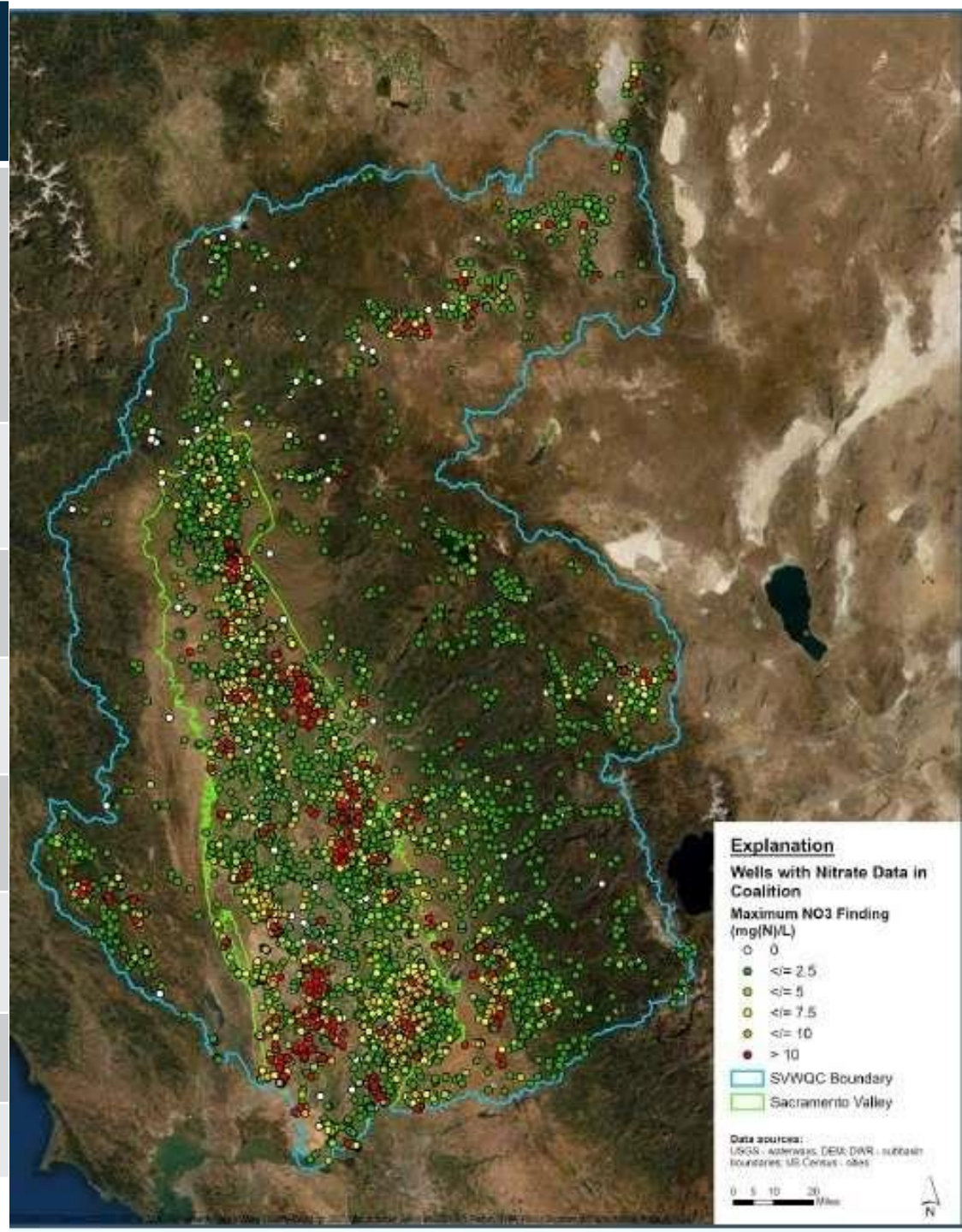
- LandIQ 2018 landuse (DWR)
- CropScape 2020 landuse (NRCS)

Total Irrigated Acres = 1,331,666



Nitrate Data Sources in the Sacramento Valley

Data Source	Count of Wells in Sac Valley	Count of Wells in Sac Valley with Depth Data	Count of Nitrate Samples in Sac Valley	Count of Wells in Coalition	Count of Nitrate Samples in Coalition
State Board-DDW	1,844	606	40,326	3,170	56,855
State Board-GAMA	264	0	488	749	1,378
DWR	1,547	331	5,413	2,229	7,252
USGS	1,600	1,299	3,037	2,107	3,934
Special Studies	62	0	65	62	65
ILRP	22	18	40	30	53
Total	**5,339**	**2,254**	**49,369**	**8,347**	**69,537**

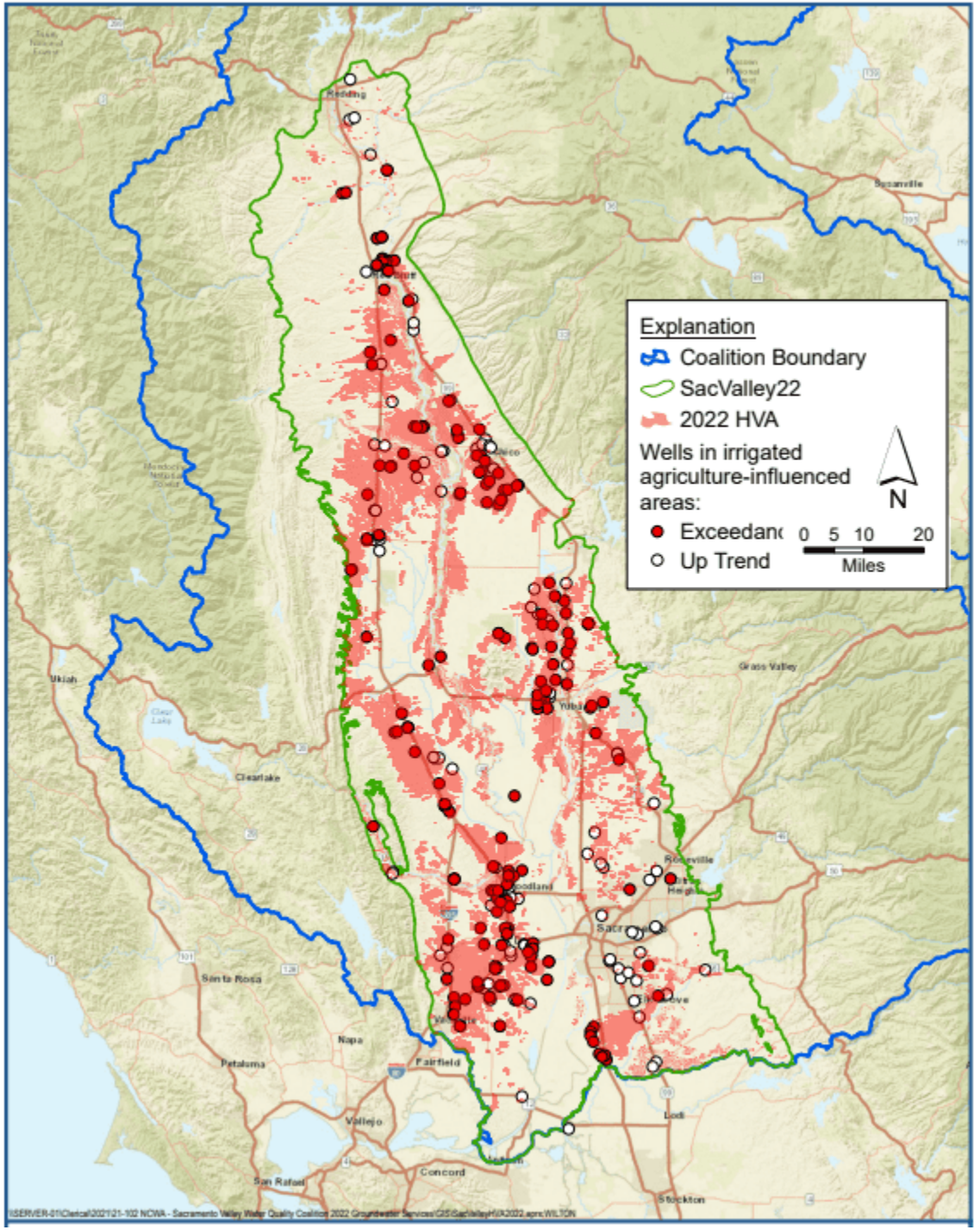


2022 HVA

Hydrogeologic Vulnerability Area (HVA):

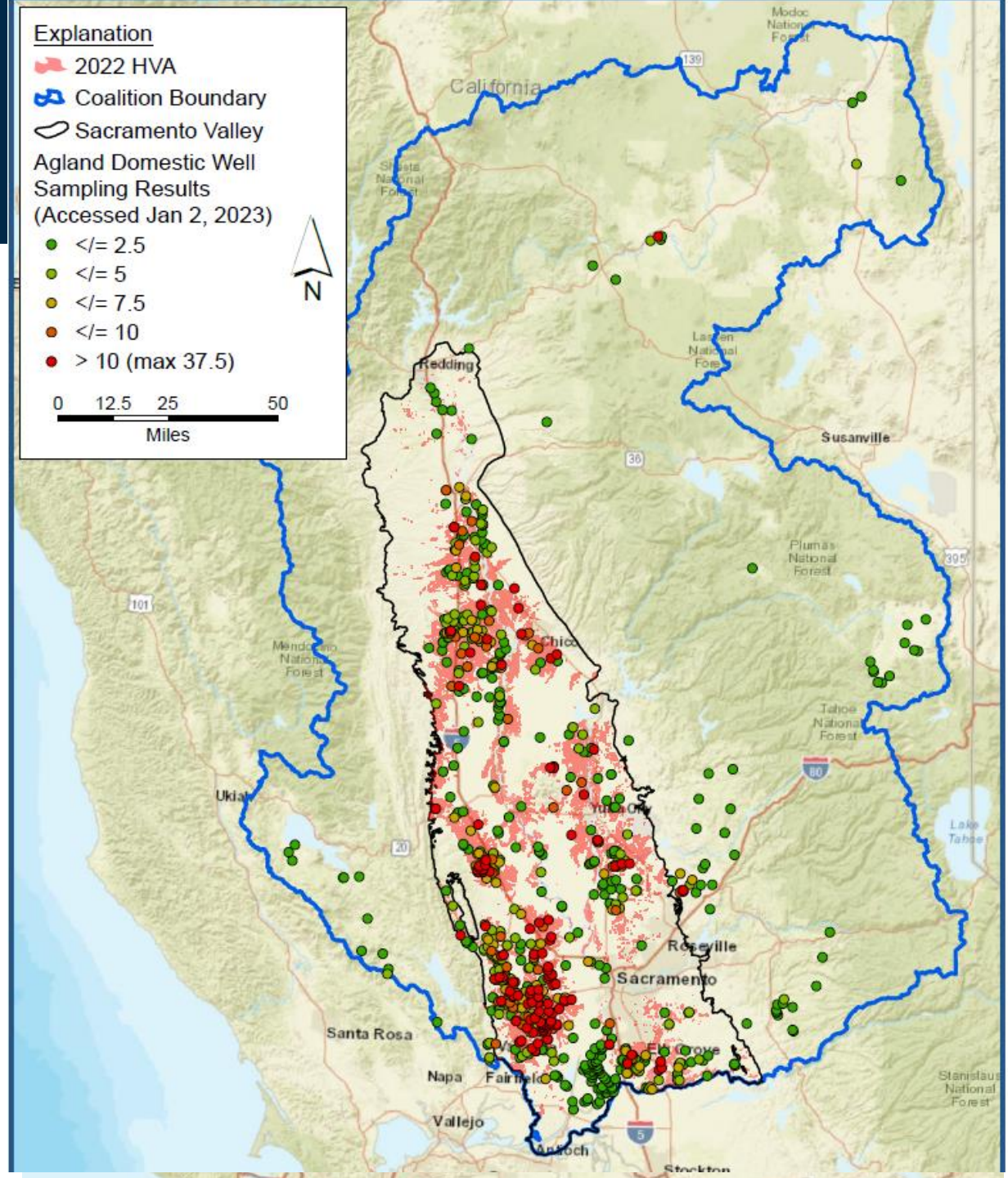
All Irrigated HSA lands in Sacramento Valley that encompass Nitrate exceedances and wells with increasing Nitrate trends.

Land in 2022 HVA	Acres
Irrigated	598,262
Irrigated and Enrolled	*468,342*
Irrigated and Not Enrolled	*129,920*
Enrolled Not Irrigated (buffer area)	2,667
All HVA Acres	**600,929**



2022 DRINKING WATER WELL TESTS (RESULTS AS OF 1/7/23)

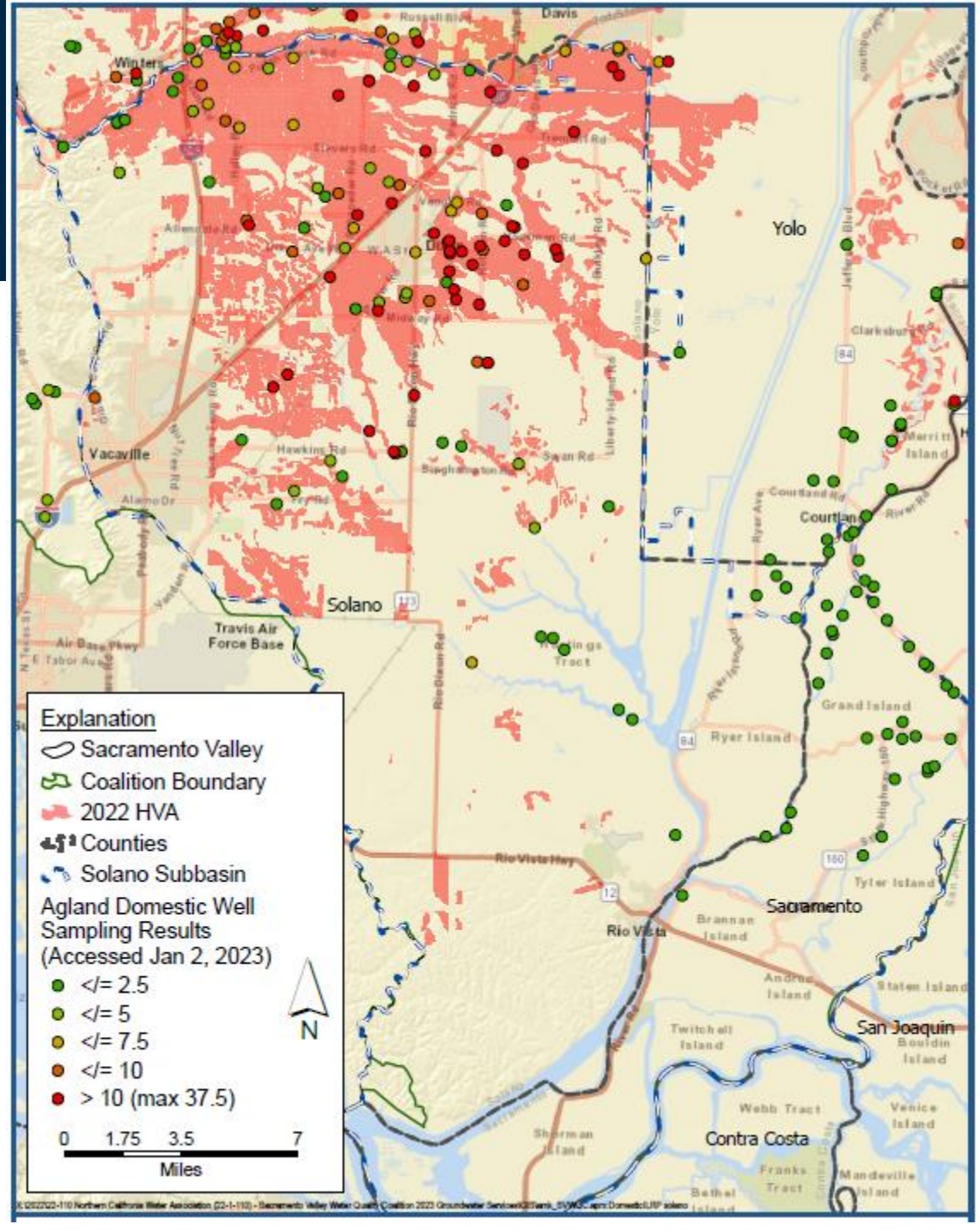
- **ILRP Drinking Water Well Testing Program**
  - Nitrate testing required of individual landowners for domestic wells by end of 2022
- **Total number of drinking water wells tested to date ~817; 738 in Sacto. Valley**
  - 17% of well tests in the Valley exceed NO_3 MCL
- **122 nitrate exceedances to date**
  - 96% of wells with exceedances within 0.5 mile of HVA



SOLANO SUBBASIN NITRATE WELL TESTS

Nitrate Domestic Well Tests in Solano Subbasin as of January 7, 2023

- **147** Domestic Wells tested for Nitrate per ILRP requirement
- **40** Domestic Wells that exceed the Nitrate MCL (27% of tests)
- **39** wells located within 0.5 miles of HVA



Central Valley Basin Plan Amendment

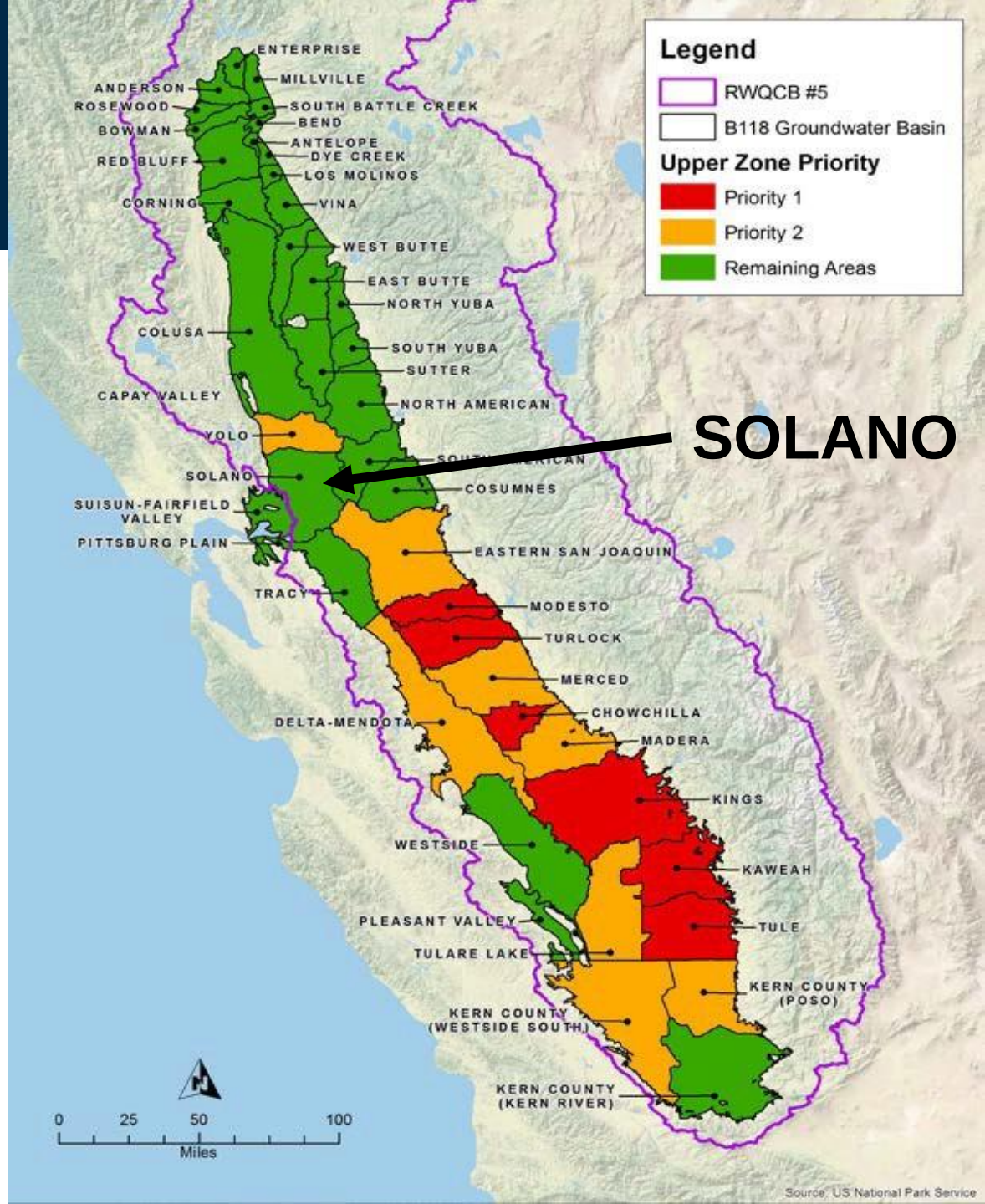
Nitrate Control Program

SNMP/BASIN PLAN AMENDMENT GOALS

1. **Ensure safe drinking water supplies**
   - Short-term and long-term solutions
2. **Reduce salt and nitrate loadings to not cause or contribute to exceedances of water quality objectives**
   - Short-term and long-term solutions
3. **Implement long-term managed aquifer restoration programs**
   - Where reasonable, feasible and practicable

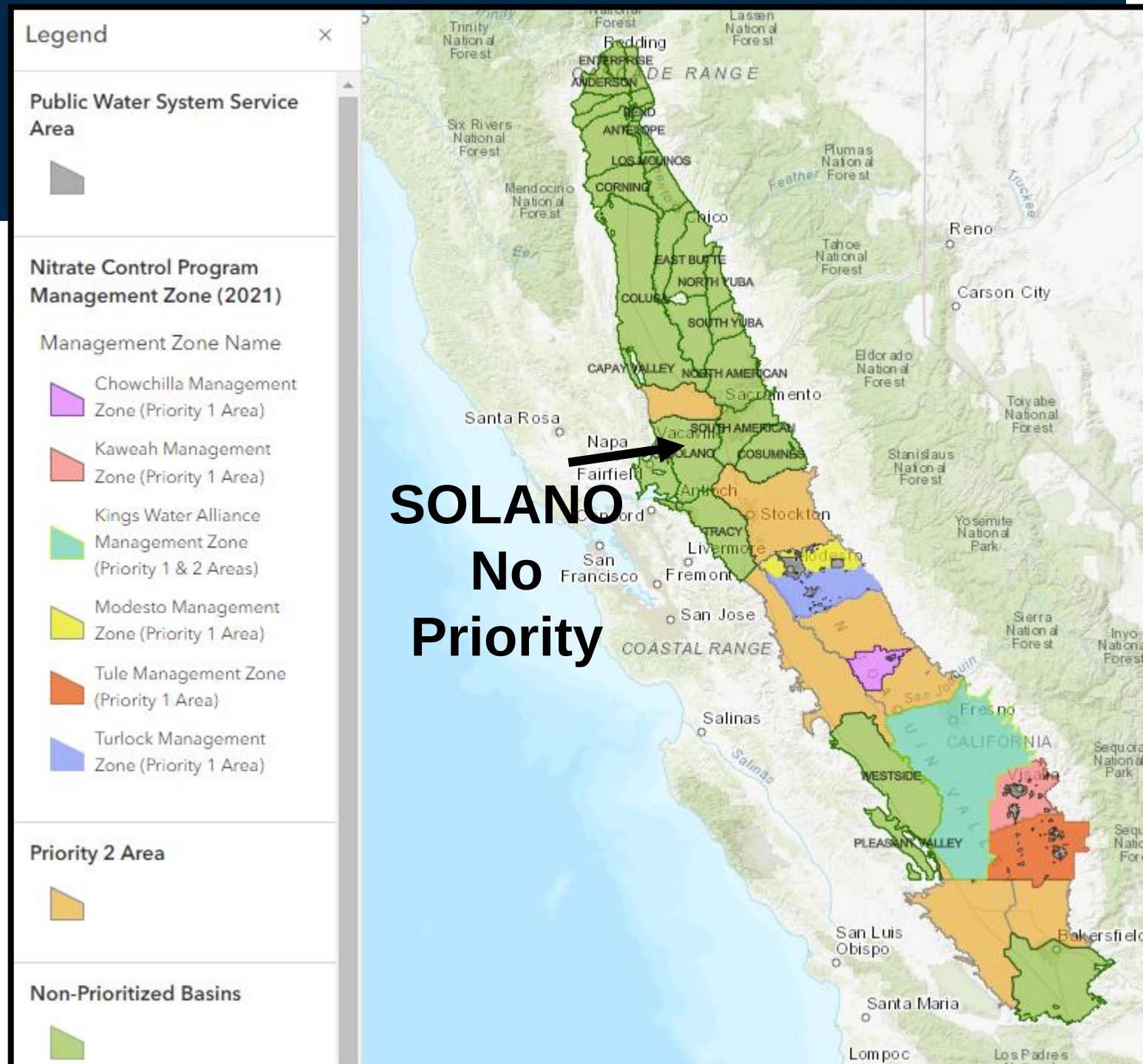
NITRATE CONTROL PROGRAM IMPLEMENTATION

- **Priority 1 Area (Red)**
  - Notice to Comply *within one year of Basin Plan amendments* becoming effective
- **Priority 2 Area (Orange)**
  - Notice to Comply *within 2-4 years of Basin Plan amendments* becoming effective
- **Remaining Areas (Green)**
  - Implementation to be phased in at a later date

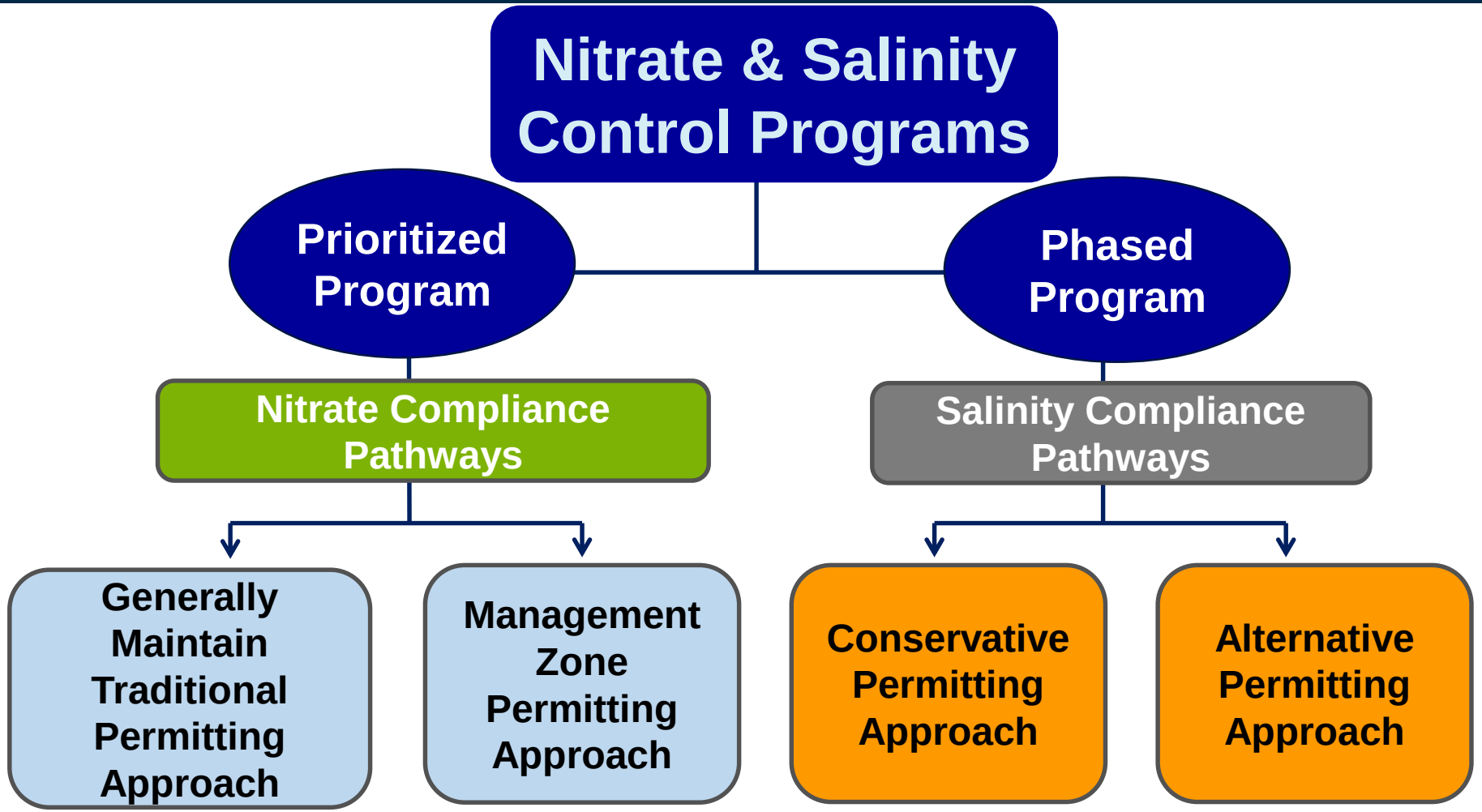


STARTED IN 2020 WITH PRIORITY 1 BASINS

DWR No.	Groundwater Basin
5-22.11	Kaweah
5-22.03	Turlock
5-22.05	Chowchilla
5-22.13	Tule
5-22.02	Modesto
5-22.08	Kings

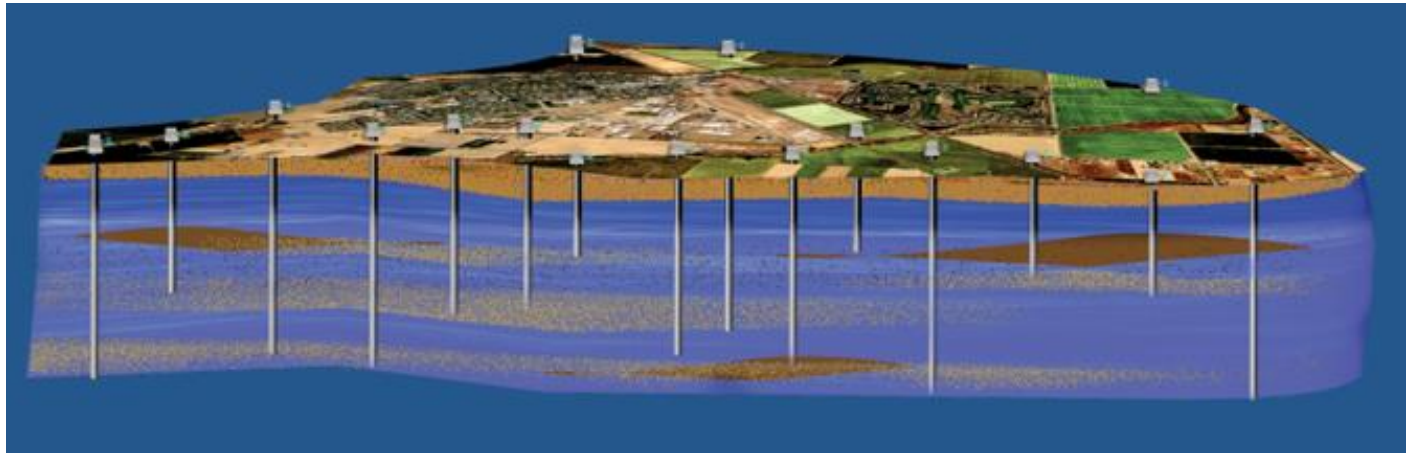


FUTURE CHOICES TO ADDRESS SALT & NITRATE ISSUES



WHAT IS A MANAGEMENT ZONE?

- Regulatory construct in BPA
- Defined area; discrete regulatory compliance unit for nitrates in groundwater (Nitrate Control Program)
- Dischargers in MZ cooperate to implement Early Action Plan to address nitrate in groundwater



- Nearer term – Early Action Plan to address wells with nitrate-impaired groundwater (i.e., interim clean water supplies)
- Longer term – Implement Plan for maintaining/improving GW quality and reducing salt and nitrate impacts, and restoration where practical/feasible

MANAGEMENT ZONE IMPLEMENTATION PLANS (MZIPS)

Nitrate Control Program is unlike anything tackled in California before and currently involves 6 MZs:

- Assessing nitrate in GW across **~2,644,000** acres
- Addressing nitrate contamination in **~9,000** wells and an affected population of **~86,000**
- Working with all sectors of dischargers (ag, dairy, wastewater facilities, food processors, wine industry, poultry, rural residential septic systems, and others)
- Developing nitrate loading estimates
- Developing an understanding of nitrogen reduction efforts
- Determining long-term solutions for clean water for communities and private wells

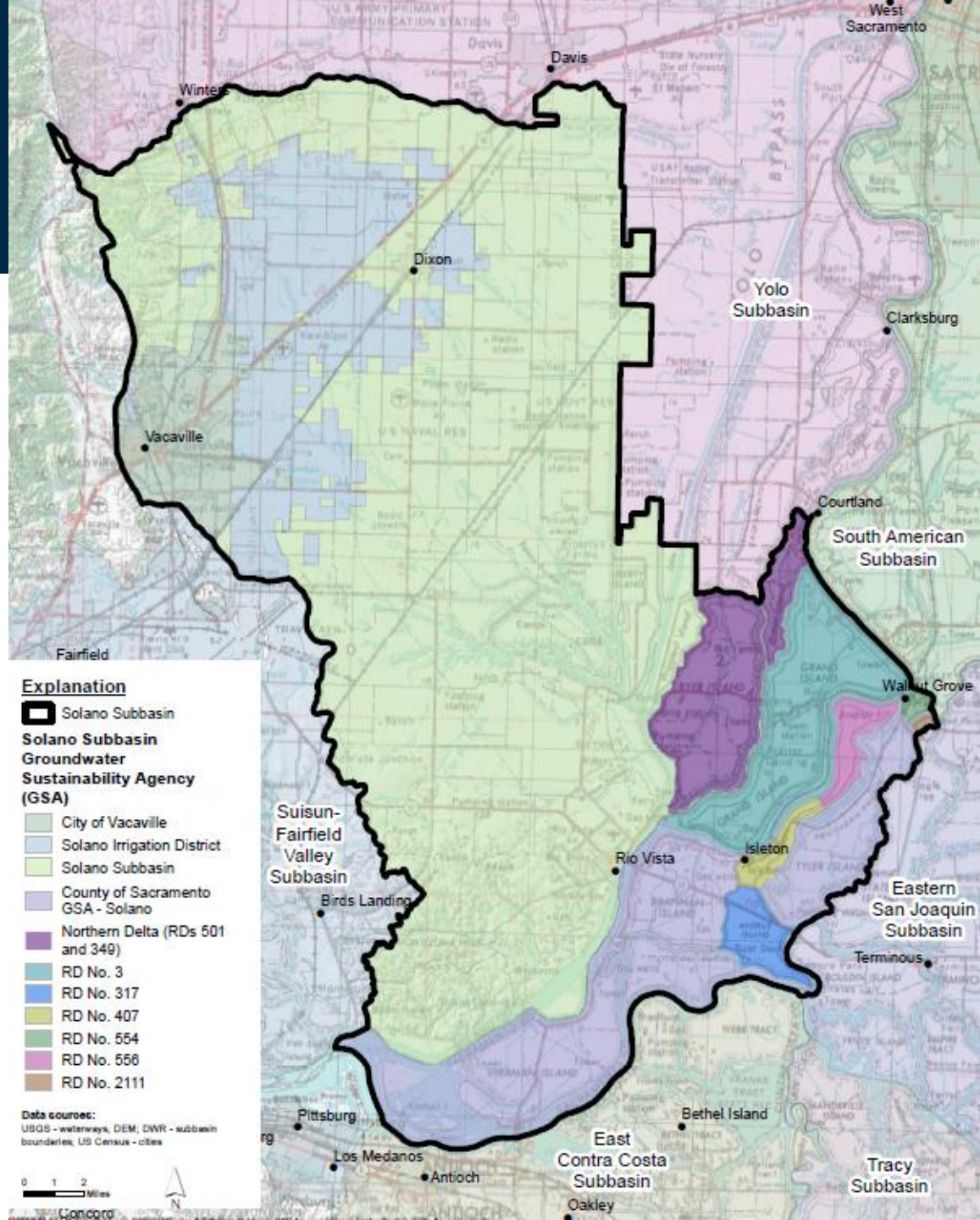
Sustainable Groundwater Management Act

Solano Subbasin

GSP IMPLEMENTATION

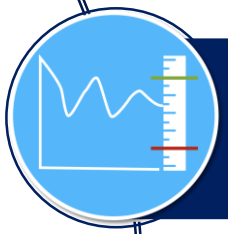
Solano Subbasin

- Groundwater Sustainability Plan (Plan Area)
- GSP Submitted to DWR January 2022
- GSP Implementation
  - Monitoring
  - Annual Report
  - Projects/Management Actions (like Recharge Projects)



SOLANO SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

Describe the Basin Conditions



Define Basin Sustainability

Develop Projects/Management Actions & Implementation Plan

Develop & Adopt GSP

SGMA: GROUNDWATER CONDITIONS – QUALITY

§ 354.16. Groundwater Conditions

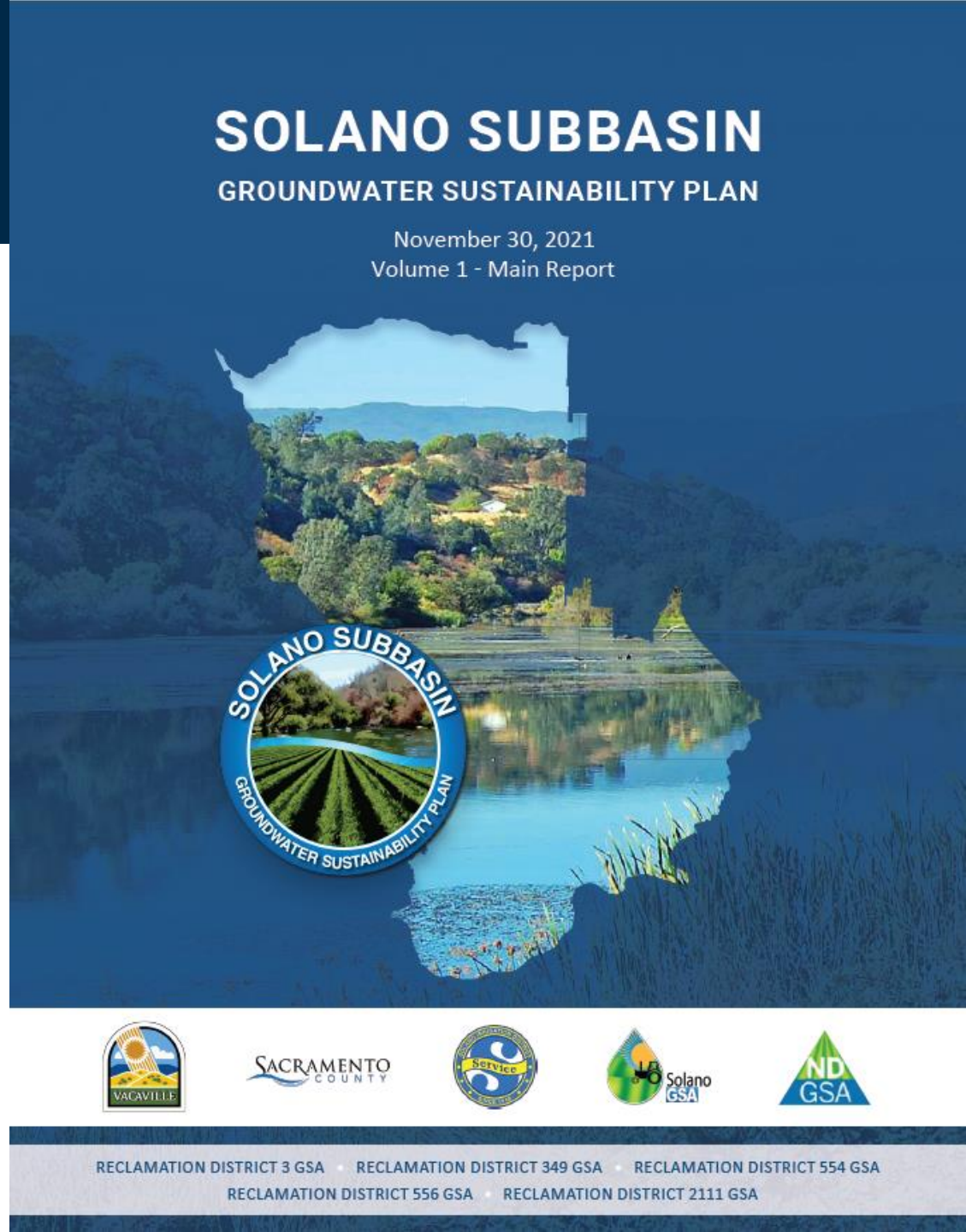
Each Plan shall provide a description of **current and historical groundwater conditions in the basin**, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:

(d) **Groundwater quality issues** that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.

SGMA AND PROTECTING GROUNDWATER QUALITY

Avoid significant and unreasonable degradation of groundwater quality

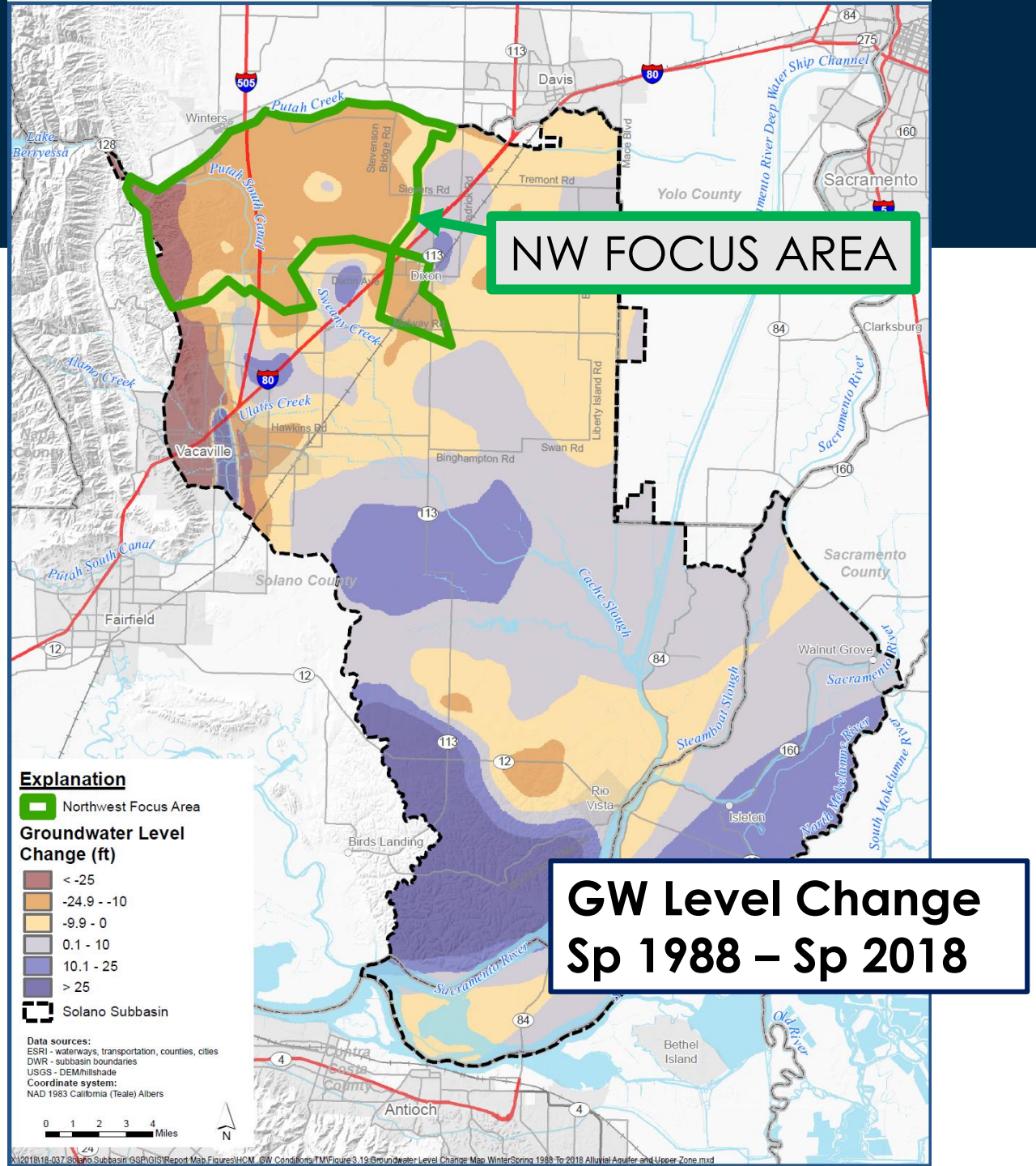
- Consider local, state, and federal water quality standards applicable to the basin
- GSAs not responsible for regulatory programs enforced by other agencies
- GSAs are responsible for groundwater quality conditions affected by sustainability projects



FOCUS AREA FOR PROJECTS

Northwest Focus Area

- Local area with groundwater level declines
- Key Recharge Opportunities:
  - Retain storm runoff to enhance recharge
  - Use flood flows as available from creeks in this area (excluding Putah Creek)



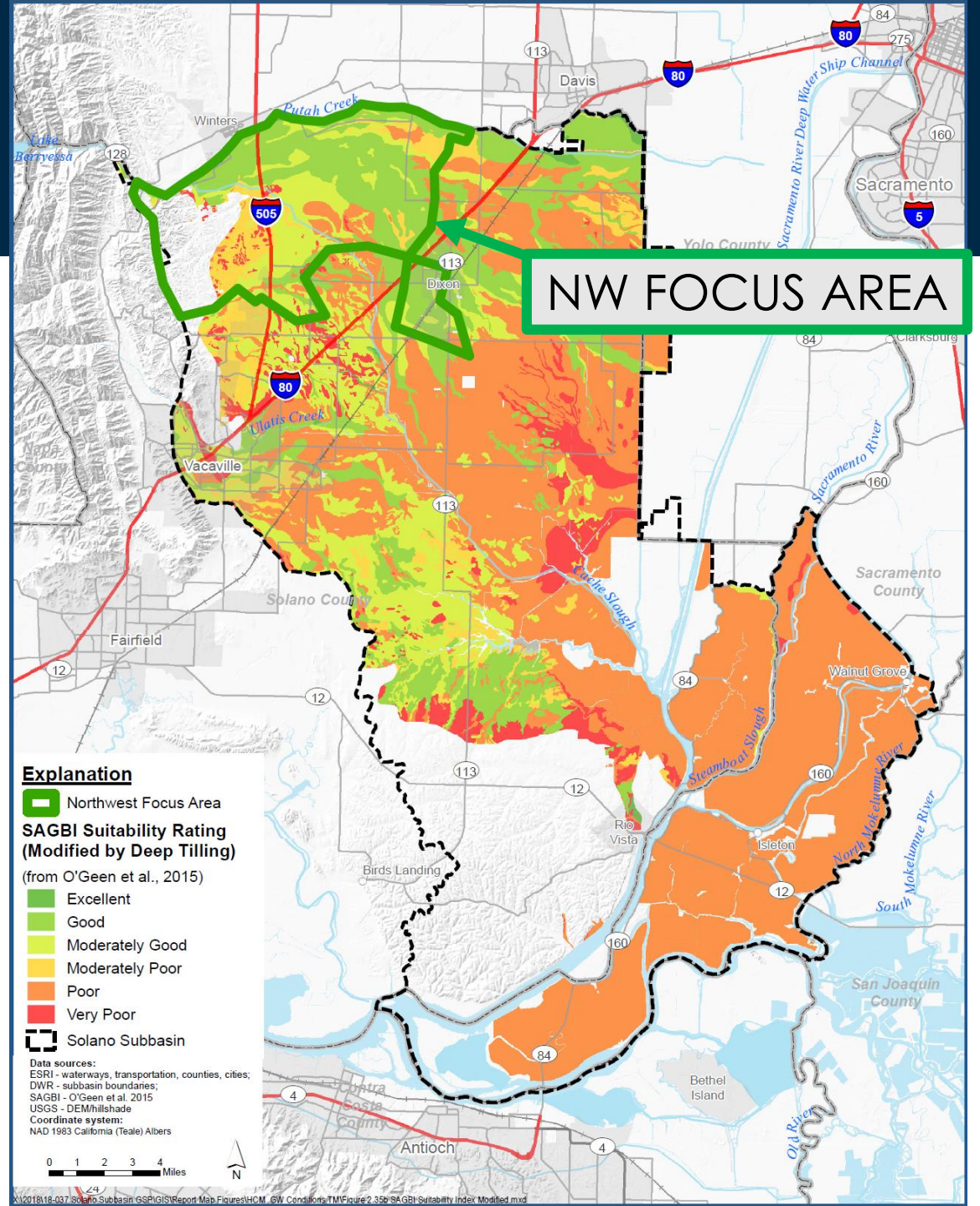
POTENTIAL GROUNDWATER RECHARGE AREAS

Preliminary identification of recharge locations based on:

- Soil properties
- Hydrogeology
- Conveyance
- Areas of interest generally excellent recharge potential

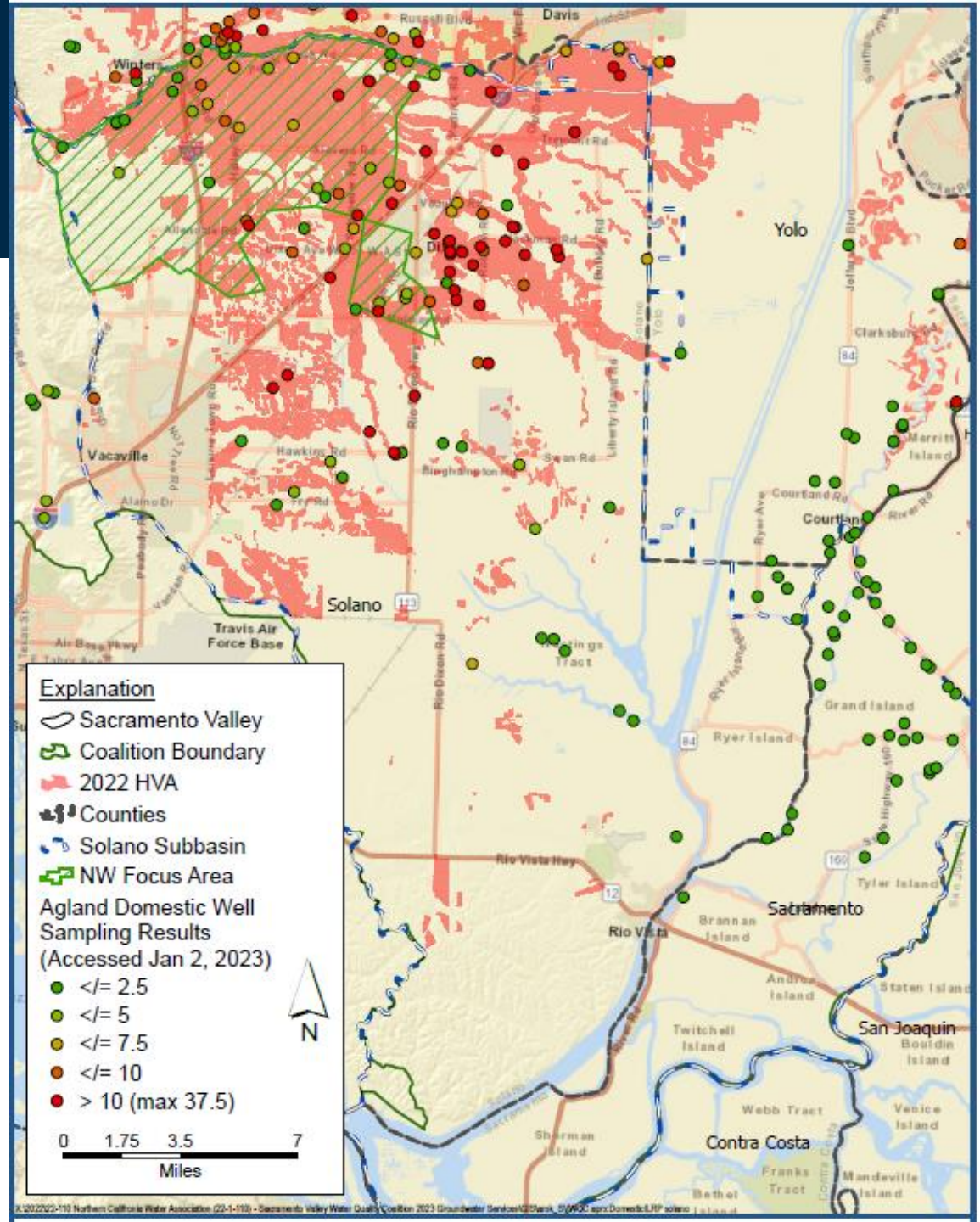
Excellent Potential for Recharge

Very Poor Potential for Recharge



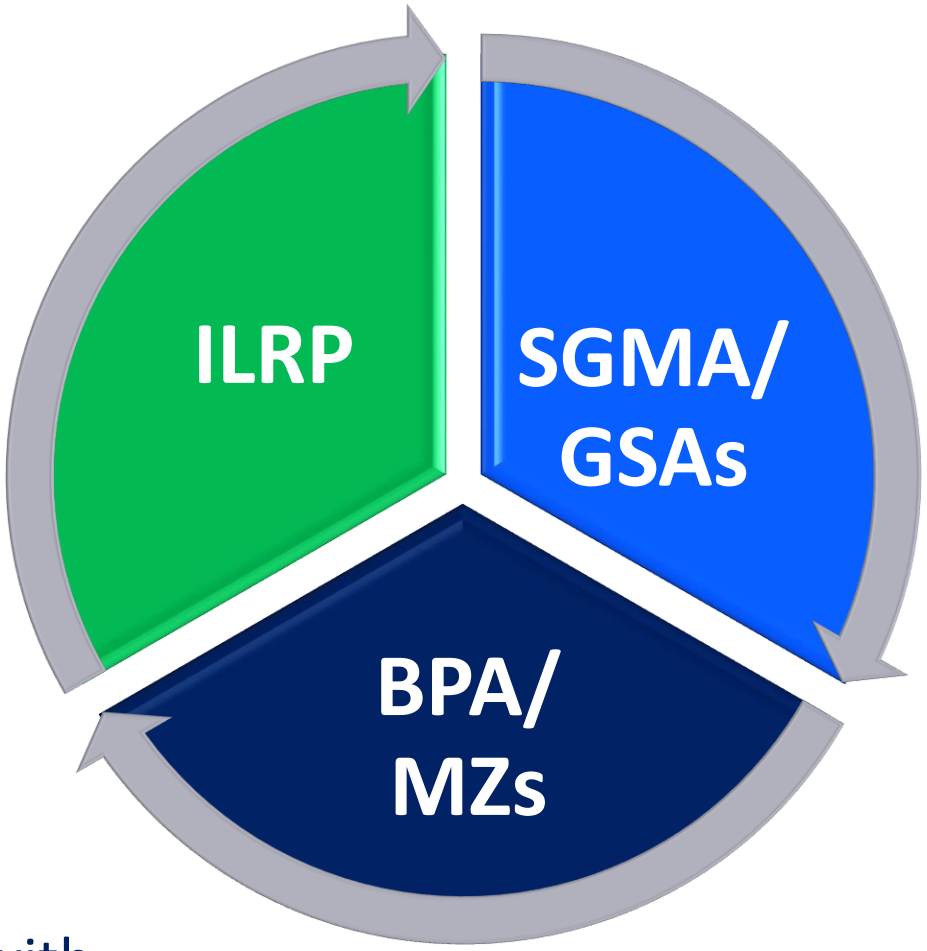
RECHARGE PROJECT CONSIDERATIONS

- Assess effect of recharge on GW quality
- Regional Board recognizes salt and nitrate in vadose zone
  - Potential for short-term WQ degradation near recharge sites
- Enhanced natural recharge and/or intentional recharge may increase nitrate and/or salt concentrations initially
  - Long-term quantity and quality recharge benefits likely outweigh initial effects



GROUNDWATER QUALITY AND PROGRAM SYNERGIES

- GW quality characterization & GW quality trend **monitoring** (ILRP)
- Surveillance and **monitoring** program (BPA/MZs)
- GW conditions/conceptualization (SGMA)
  - Inform management strategies
  - Sustainability indicator (quality and quantity) **monitoring**
- Coordination between Groundwater Sustainability Agencies (GSAs) and MZs
  - Maintain local flexibility
  - Coordinate **monitoring**
  - Coordinate SGMA management actions/projects with salt and nitrate management strategies



THANK YOU