Appendix D

Task Force Workshop Presentations

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Basin Planning Priorities Task 2 Kickoff – Recycled Water Policy Requirements

August 24, 2021

Agenda

- The Regional Board Ask for Addressing Groundwater Monitoring and Ambient Water Quality Methods
- Approach
- Today's Workshop: Recycled Water Policy Overview
  - Recycled Water Policy Background
  - 2019 Recycled Water Policy Amendments
  - Salt and Nutrient Management Plan Requirements
- What's Coming Next

New Basin Plan Requirement (Draft)

- Groundwater Monitoring Program

  No later than August 1, 2022 ... [the Task Force Members] … shall submit to the Regional Board for approval, an updated watershed-wide TDS and nitrogen monitoring program that will provide the data necessary to implement the TDS/nitrogen management plan. Data to be collected and analyzed shall address a minimum

  (1) determination of current ambient quality in groundwater management zones;

  (2) determination of compliance with TDS and nitrate-nitrogen objectives for the management zones;

  (3) evaluation of assimilative capacity findings for groundwater management zones;

  (4) assessment of the effects of recharge of surface water POTW discharges on the quality of affected groundwater management zones; and

  (5) ***any other requirements specified in the State Water Board's Recycled Water Policy*** (Resolution No. 2018-0057)

New Basin Plan Requirement (Draft)

- Ambient Water Quality

  The determination of current ambient quality can be accomplished using the method consistent with that employed by the N/TDS Task Force (20-yr running average) to develop the TDS and nitrogen water quality objectives included in the Basin Plan***, or an alternative method approved by the Executive Officer of the Regional Board***. The determination of current ambient groundwater quality throughout the watershed must be reported by October 1, 2023, and, at a minimum, ***every five years thereafter*** unless the Regional Board revises this schedule.

Purpose of the Ask

- Monitoring program hasn't been updated since 2005
- Past recommendations to revise ambient water quality methods
- 2019 Recycled Water Policy (Policy) Amendments
  - Requires the Regional Board and Task Force to address more than just the monitoring program and ambient water quality methods
  - Monitoring program and ambient water quality are elements program identified as an early target for the RB in complying with the 2019 Policy amendments

Objectives and Approach

Our objective is to develop monitoring and reporting specifications that:

- Create compliance with applicable regulations
  (Basin Plan objectives; Recycled Water Policy)
- Leverage regulations to create flexibility in assessment methods
- Leverage regulations to reduce frequency and cost of future assessments
- Are clear and actionable, with a time-certain schedule to perform compliance actions

Our approach is to start with the end in mind →compliance with 2019 Recycled Water Policy

Workshop Approach

Date	Workshop Topic
August 2021	Overview of Recycled Water Policy – SNMP Monitoring and Analysis Requirements
October 2021	Critical Analysis of SAR SNMP Ambient Water Quality and Alternative Methods to Comply Pt. 1: What Have We Learned in 17 years of Implementation?
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June 2022	Final Work Plan Review

2019 Recycled Water Policy

Recycled Water Policy

- Adopted in 2009 by the State Board
- Not all basin plans include ***adequate implementation procedures*** for achieving or ensuring compliance with the water quality objectives for salts or nutrients
- Regional Board Basin Plans are intended to include the implementation procedures to enable permitting of waste discharges (including recycled water use for irrigation) that:
  - comply with water quality objectives of receiving waters
  - are protective of the beneficial uses

Recycled Water Policy

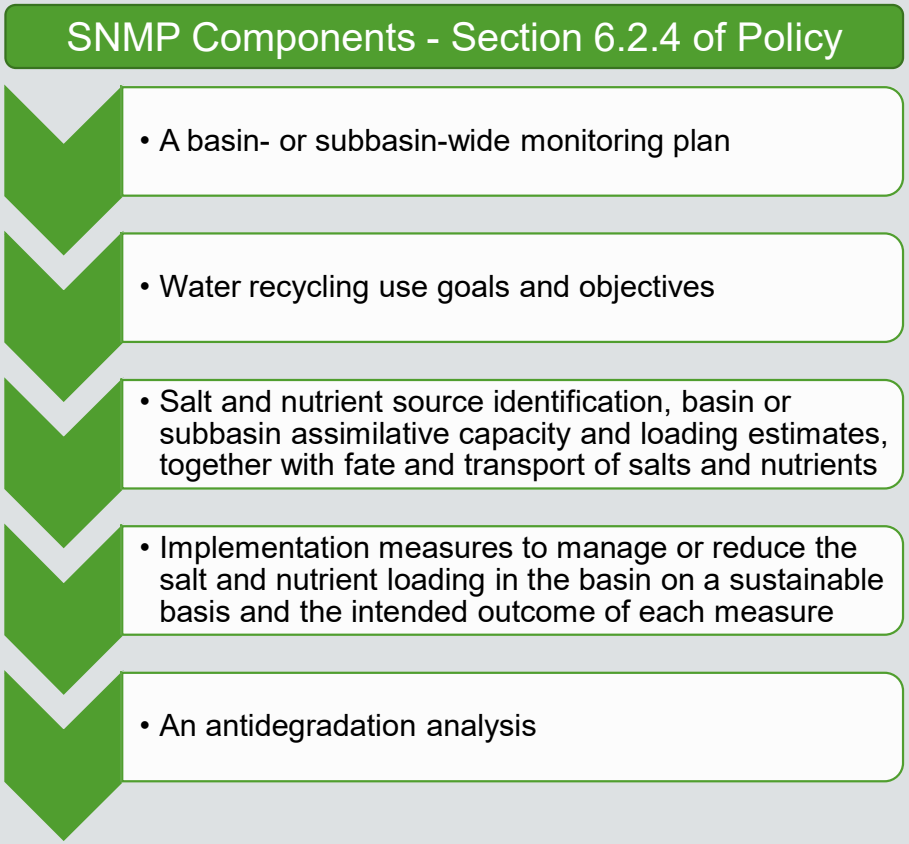
Section 6.1.3 of Policy

- All groundwater basins are different in size, hydrogeologic complexity, and loading factors, which necessitates:
  - Stakeholder engagement to develop appropriate plans
  - allowing variable levels of analysis and management efforts in developing and implementing SNMPs

Recycled Water Policy

What does an adequate implementation plan look like?

- Not explicitly defined in the Policy
- SNMPs as framework for stakeholders to define implementation procedures
- Guidelines for what an SNMP should contain
- Santa Ana Region SNMP as an early model!



Declaration of Conformance – Santa Ana Basin Plan Approach

California Regional Water Quality Control Board
Santa Ana Region

RESOLUTION NO. R8-2010-0012

Declaration of Conformance with the State Recycled Water Policy

To ensure attainment of water quality objectives and protection of beneficial uses, it is the stated intent of the RWP that "salts and nutrients from all sources be managed on a basin-wide or watershed-wide basis"[1]. To that end, the RWP requires all Regional Water Quality Control Boards to take the following actions:

1) Develop and enact a Salt and Nutrient Management Plan through a locally-driven and controlled collaborative process.[2]

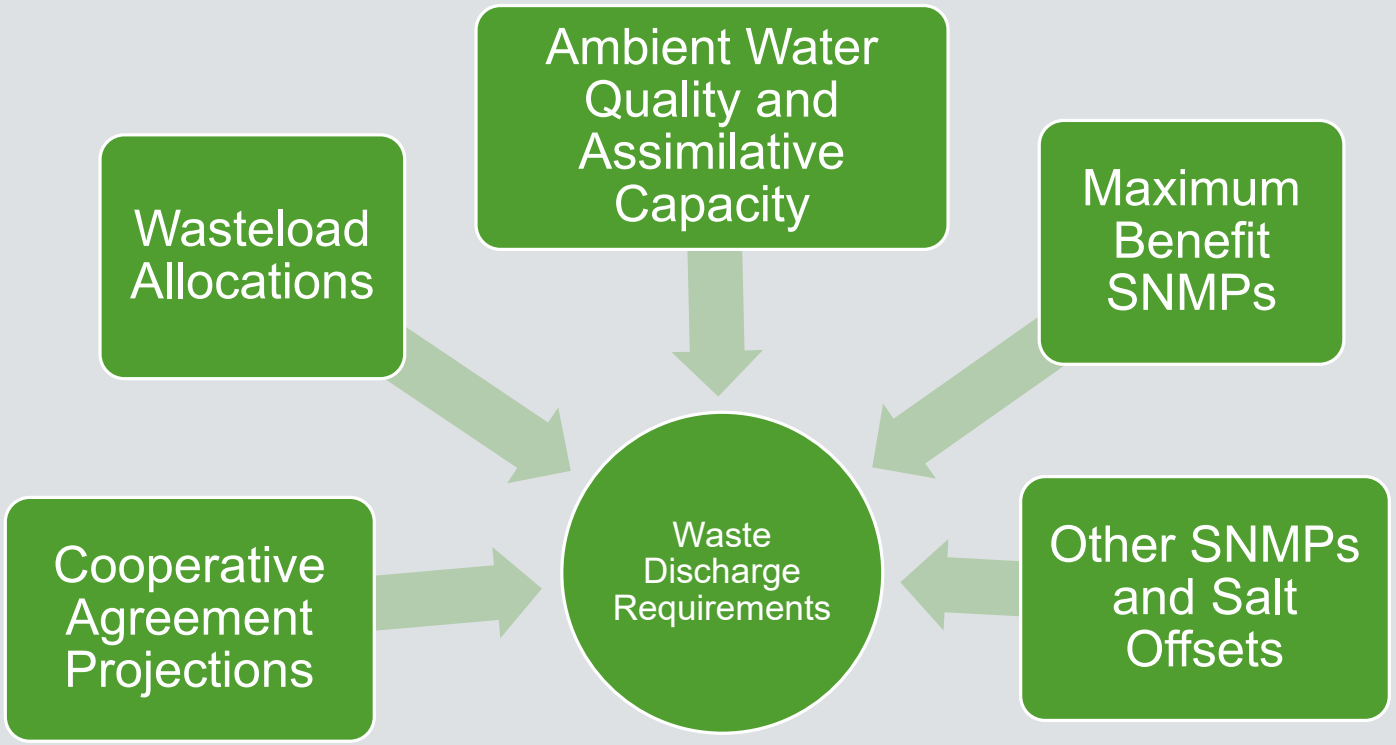
2) Establish an appropriate water quality monitoring program to implement the Salt and Nutrient Management Plan.[3]

3) Streamline the permitting process to facilitate increased use of recycled water wherever possible[4] and especially for landscape irrigation projects.[5]

The Regional Board has adopted plans and programs that fully conform to the requirements set forth in the RWP.

- Defines management areas, beneficial uses and water quality criteria (objectives) required to protect beneficial uses
- Defines the methods and metrics that should be used to assess compliance with the objectives (current AWQ)
- Defines how RW discharge and use will be permitted with specific protocol for WDRs based on AWQ
- Requires periodic assessment of current AWQ (defined frequency) and requires monitoring to support analysis
- Enables basin-specific SNMPs for areas seeking to maximize recycled water use in areas where no assimilative capacity and RW TDS > antidegradation objectives. These plans consider the management actions necessary to manage salt and nutrient loading
- Encourages water quality projections in areas with imported water recharge (Cooperative Agreement)

Santa Ana Basin Plan SNMP



SNMP Development

The following chart gives an update of SNMP progress by region (as of March 21, 2018)

Region	Number of Priority Basins[1]	Number of Priority Basins		Percentage of Priority Basin Area	
		Stakeholder Group	SNMPs Accepted by Region	Stakeholder Group	SNMP Accepted by Region
North Coast	16	1	0	11%	0%
San Francisco Bay	12	5	3	41.54%	30.98%
Central Coast	31	10	0	52.37%	0%
Los Angeles	27	19	12	90.91%	60.85%
Central Valley	41	41	41	100%	100%
Lahontan	18	17	4	98.05%	49.25%
Colorado River	27	26	12	98.81%	18.75%
Santa Ana	13	13	13	100%	100%
San Diego	21	18	0	79.08%	0%

[1]Includes subbasins, if separate SNMPs are in progress.

2019 Recycled Water Policy Amendments to Address Lesson Learned, New Conditions

- Administrative challenges with SNMP Development
  - Tie to recycled water use resulted in limited coverage of plans and stakeholder involvement
  - Agencies that developed SNMPs often lacked the regulatory or administrative authority to implement the management actions listed in the SNMPs
- Technical challenges with SNMP Development
  - Limitations of data used for SNMP analyses: limited data available and data not always representative of the full aquifer system
  - Methods used for SNMP analyses: simplification using mass-balance approaches for current and projected ambient water quality. These methods could over or underestimate basin concentrations of TDS/N & ignore hot spots
  - Inadequate monitoring and reporting plans to support SNMP implementation

New requirements of the 2019 Recycled Water Policy

- Provides direction to Regional Boards on approving plans
- Monitoring program must be representative – designed to address SNMP
- Monitoring data must be submitted every year
- Analyze monitoring data every five years
- The Regional Board must review each SNMP to determine if it should be updated based on five-year assessment results

Five-Year Assessments

Section 6.2.6 of Policy

The regional water boards, in consultation with stakeholders, shall assess and review monitoring data generated from [the SNMP] every five years, unless an alternate timeline has been established in a basin plan amendment. The assessment shall include an evaluation of:

1. Observed trends in groundwater salinity with the predicted trends from the SNMP
2. The ability of the monitoring network to adequately characterize groundwater quality in each GMZ and
3. Potential new data gaps
4. The ability of any relied-upon models to adequately simulate groundwater quality
5. Available assimilative capacity based on observed trends and the most recent water quality data
6. The impact of new projects that are reasonably foreseeable at the time of the assessment

Five-Year Assessments

Section 6.2.1.3 of Policy

Salt and nutrient management plans adopted as a Basin Plan amendment or accepted by the regional water board prior to April 8, 2019 shall be evaluated pursuant to 6.2.6 and 6.2.7 by ***April 8, 2024***

Section 6.2.6 of Policy

1. Observed trends in groundwater salinity with the predicted trends from the SNMP
2. The ability of the monitoring network to adequately characterize groundwater quality in each GMZ and
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6. The impact of new projects that are reasonably foreseeable at the time of the assessment

Five-Year Assessments

Section 6.2.7 of Policy

The regional water boards, in consultation with stakeholders, shall use the results of these periodic assessments to …

determine whether potential updates or revisions to the salt and nutrient management plan may be warranted as a result of the data assessment or to make the plan consistent with the Policy

Section 6.2.6 of Policy

1. Observed trends in groundwater salinity with the predicted trends from the SNMP
2. The ability of the monitoring network to adequately characterize groundwater quality in each GMZ and
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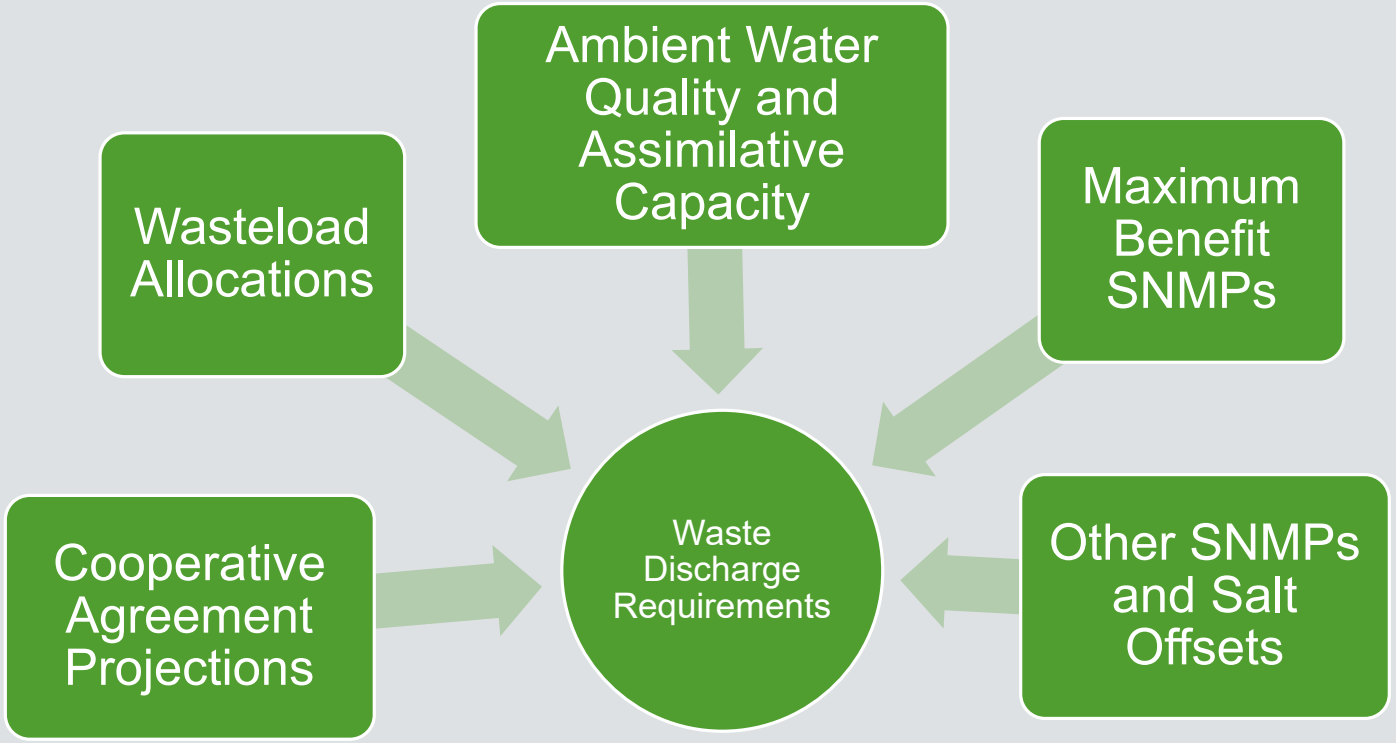
SNMP Requirements: How Does the Basin Plan Measure Up?



SNMP Requirements: How Does the Basin Plan Measure Up?

- Assess current assimilative capacity
- Identify loading sources and estimate loading
- Characterize fate and transport
- Assess future assimilative capacity
- Define implementation measures
- Monitoring program ***tailored*** to SNMP
- Periodic assessment of monitoring data

Triennial AWQ	Maximum Benefit SNMPS	Cooperative Agreement Modeling	WDR Salt Offset Programs
✓	✓		
	✓	✓	*For RW ✓
	✓	✓	
	✓	✓	
	✓		✓
	✓		✓
✓	✓		

SNMP Monitoring Plan Requirements

Section 6.2.4.1 of Policy

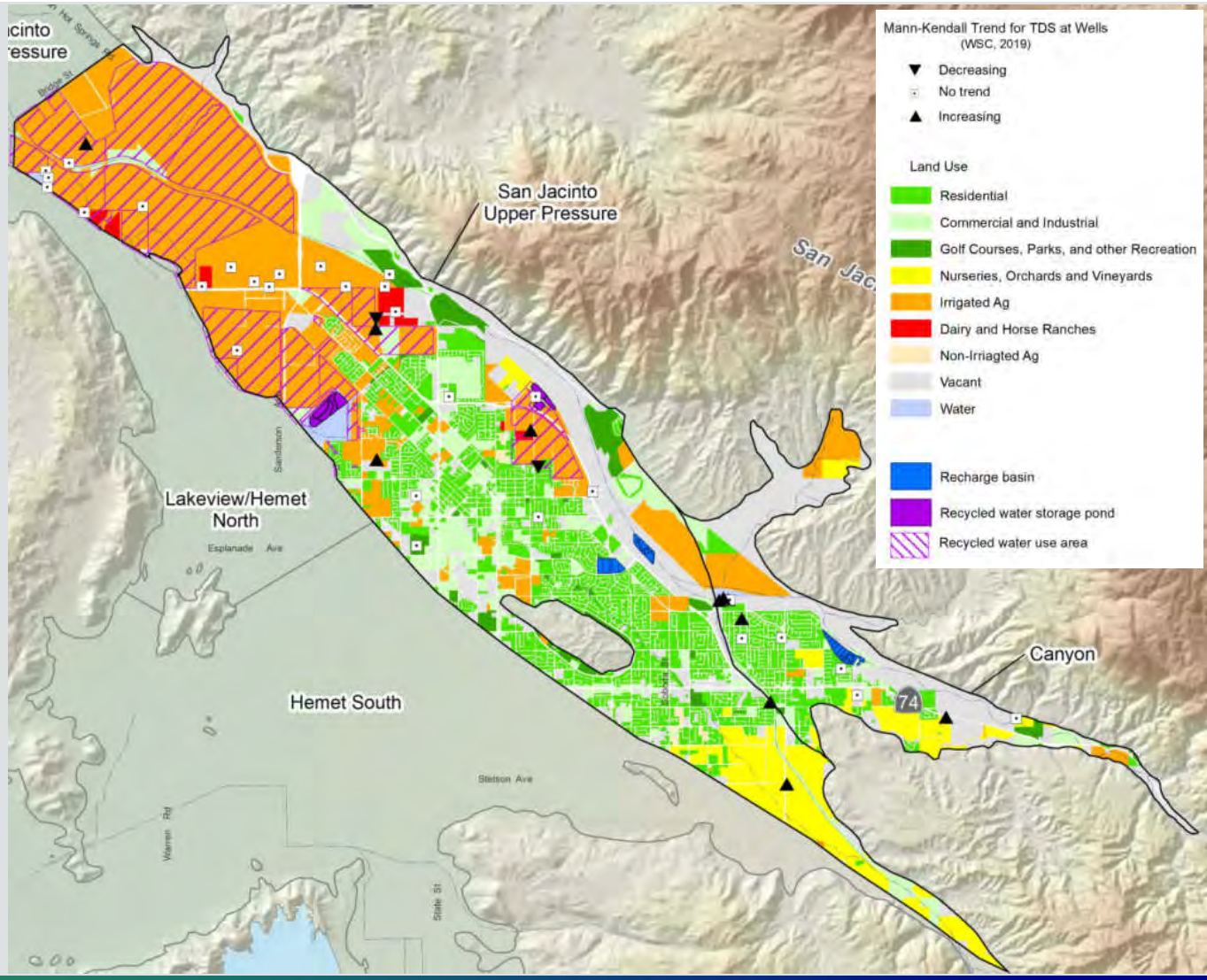
- The monitoring plan must be designed to effectively evaluate water quality in the basin. The monitoring plan must focus on:
  - water supply wells,
  - areas proximate to
    - large water recycling projects, particularly groundwater recharge projects, and
    - other potential sources of salt and nutrients identified in the salt and nutrient management plan.
  - Also, monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with adjacent surface waters.

Five-Year Assessments: Do we have the information and protocols needed?

	Triennial AWQ	Maximum Benefit SNMPS	Cooperative Agreement Modeling	WDR Salt Offset Programs
1 Compare observed trends in groundwater salinity with the ***predicted trends*** from the SNMP		✓	✓	
2 The ability of the monitoring network to adequately characterize groundwater quality in each GMZ	✓			
3 Potential new data gaps	✓			
4 The ability of any relied-upon models to adequately simulate groundwater quality		✓	✓	
5 Available assimilative capacity based on observed trends and the most recent water quality data	✓	✓		
6 The impact of new projects that are reasonably foreseeable at the time of the assessment		✓	✓	

Advancements to Consider

- Mapping of loading factors
- Selection of key wells rather than all wells available
- Applying tiered AWQ analysis approach to focus higher-cost efforts in most critical areas and simplify in other areas
- Five-year reporting



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WE SUPPORT OUR COMMUNITIES

WE ARE WATER FOCUSED

WE TAKE PRIDE IN WHAT WE DO

WE DO WHAT'S RIGHT

WE STRIVE TO BECOME OUR BEST

WE BELIEVE IN QUALITY

WE LISTEN

WE SOLVE HARD PROBLEMS

WE SEE THE BIGGER PICTURE

WE TAKE OWNERSHIP

WE COLLABORATE

WE HAVE FUN

WE ARE WEST YOST

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Basin Planning Priorities Task 2 Workshop – Critical Analysis of Ambient Water Quality and Alternative Methods to Comply Pt. 1:

What Have We Learned in 17 years of SAR SNMP Implementation?

October 28, 2021

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Workshop Approach

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Agenda

- Ambient water quality (AWQ) regulatory framework - Why we do it
- Methods to compute ambient water quality - How we do it
- Findings and adaptations since 2004 - What we have learned
- Questions for Consideration in Ongoing Methods and Data Collection
  - What questions do you have?

AWQ Regulatory Framework

Why are we required to compute ambient water quality?

AWQ Regulatory Framework: Basin Plan Implementation

- The Regional Board's principal means of achieving the water quality objectives and protecting the beneficial uses specified in the Basin Plan is the development, adoption, issuance, and enforcement of waste discharge requirements
- By regulating the quality of wastewaters discharged, and in other ways controlling the discharge of wastes which may impact surface and groundwater quality, the Regional Board works to protect the Region's water resources
- The Regional Board's regulatory tools include:
  - National Pollutant Discharge Elimination System permits
  - Waste Discharge Requirements
  - Water Reclamation Requirements
  - Water Quality Certification
  - Waste Discharge Prohibition

AWQ Regulatory Framework: Salt and Nutrient Management

- TDS and nitrogen management in the Santa Ana Region involves both regulatory actions by the Regional Board and actions by other agencies to control and remediate salt problems
- Regulatory actions include:
  - adoption of appropriate TDS and nitrogen limitations in requirements issued for waste disposal and municipal wastewater recycling
  - adoption of waste discharge prohibitions
- Actions by other agencies include projects to:
  - improve water supply quality
  - construction of groundwater desalters and brine lines to remove highly saline wastes from the watershed

AWQ Regulatory Framework: Salt and Nutrient Management

- The principal TDS and nitrogen regulatory tool employed by the Regional Board is the issuance of appropriate discharge requirements for the discharge, reuse, and recharge of recycled water (and other high-TDS/N discharges, as appropriate)
- Waste discharge requirements must specify limitations that, when met, will assure that Basin Plan water quality objectives will be achieved
- Where the quality of the water receiving the discharge is better than the established objectives (e.g. the receiving water has assimilative capacity for degradation), the Board must assure that the discharge is consistent with the state's antidegradation policy (State Board Order 68-16)

AWQ Regulatory Framework: Assimilative Capacity

- Some waters in the Region have assimilative capacity for addition of TDS and/or nitrogen discharges that exceed AWQ or BPOs:
  - wastewaters with higher TDS/nitrogen concentrations than the receiving waters are diluted sufficiently by natural processes, including rainfall or recharge, such that the TDS and nitrogen objectives of the receiving waters are met.
- The amount of assimilative capacity in a GMZ, if any, varies depending on the individual characteristics and must be reevaluated over time

AWQ Regulatory Framework: Assimilative Capacity

- To compute assimilative capacity in each groundwater management zone (GMZ), current TDS and nitrate water quality (e.g. AWQ) are compared to water quality objectives
- If the ***current AWQ is better than the water quality objectives***, then a GMZ ***has assimilative capacity***. The difference between the objectives and current quality is the amount of assimilative capacity available
- If the ***current AWQ is the same as or poorer than the water quality objectives***, then a GMZ ***does not have assimilative capacity***
- For groundwater management zones, current AWQ and available assimilative capacity must be determined every three years

AWQ Regulatory Framework: Regulatory Actions based on AWQ & AC

- If there is assimilative capacity in the receiving waters:
  - A waste discharge may be of poorer TDS/N quality than the Basin Plan objectives for the receiving waters, if Antidegradation demonstration is prepared by project proponent to show:
    - the discharge does not cause violation of the objectives
    - antidegradation requirements (68-16) are met, such as:
      - Beneficial use protection
      - Economic and socioeconomic considerations
      - Maximum benefit demonstration
  - A waste discharge with a constituent concentration that is at or below (i.e., better than) the current ambient TDS and/or nitrogen water quality, then the discharge will not be expected to result in the lowering of water quality, and no antidegradation analysis is required
    - *Note: Regional Board always retains discretion to request antidegradation analysis in any case*

AWQ Regulatory Framework: Regulatory Actions based on AWQ & AC

- If there is no assimilative capacity in the receiving waters:
  - the numerical limits in discharge requirements cannot exceed the receiving water objectives
- In some cases, compliance with TDS or N objectives for discharges to waters without assimilative capacity may be difficult to achieve (e.g. high TDS source water supplies).
- In such cases dischargers may:
  - participate in TDS offset programs, such as the use of desalters, in lieu of compliance with numerical TDS limits, subject to certain conditions incorporated into WDRs
  - Propose a maximum-benefit based salt and nutrient management plan that includes revised TDS and/or N objectives and long-term commitment to a program of water quality management actions

AWQ Regulatory Framework: Elsinore GMZ Example

Elsinore GMZ

- TDS Objective

  = 480 mgl

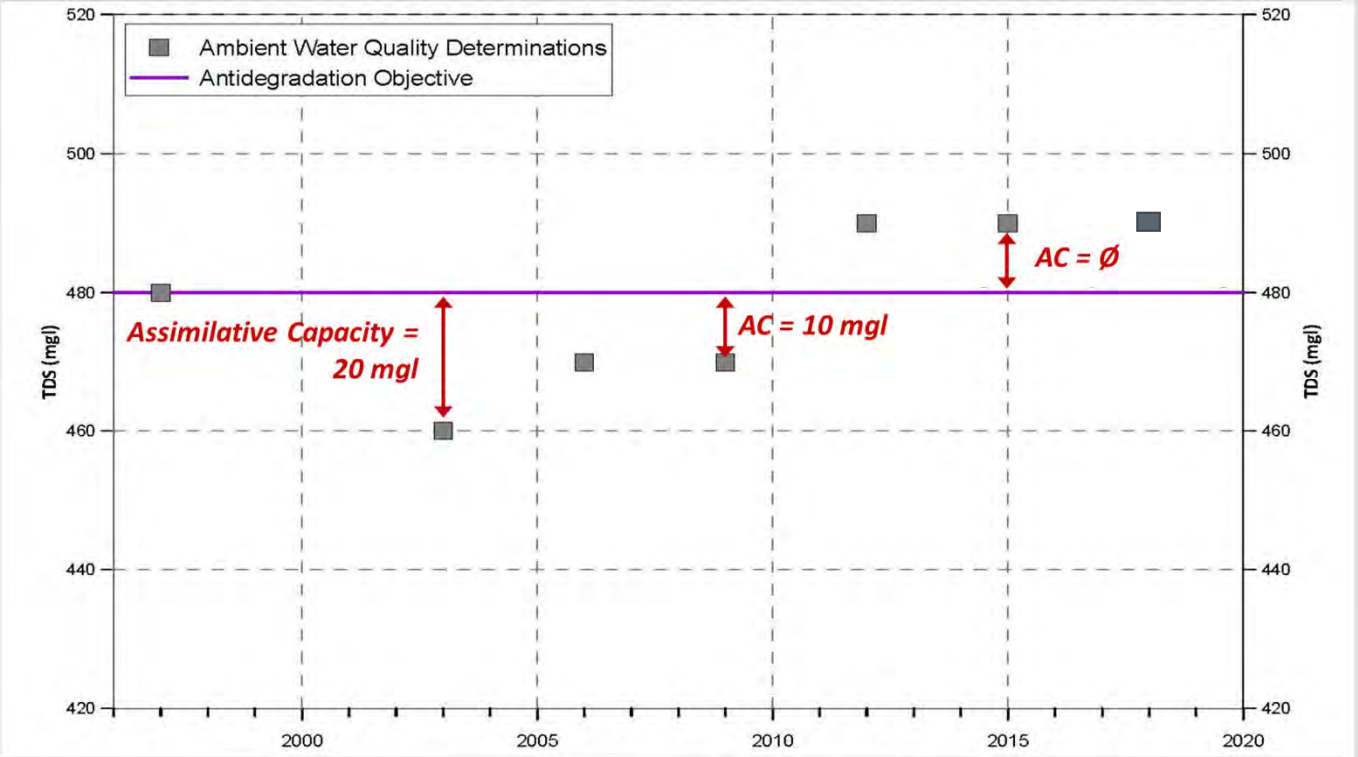
- Waste Discharge Limit

  = 700 mgl

- Solution:

  Maximum Benefit SNMP

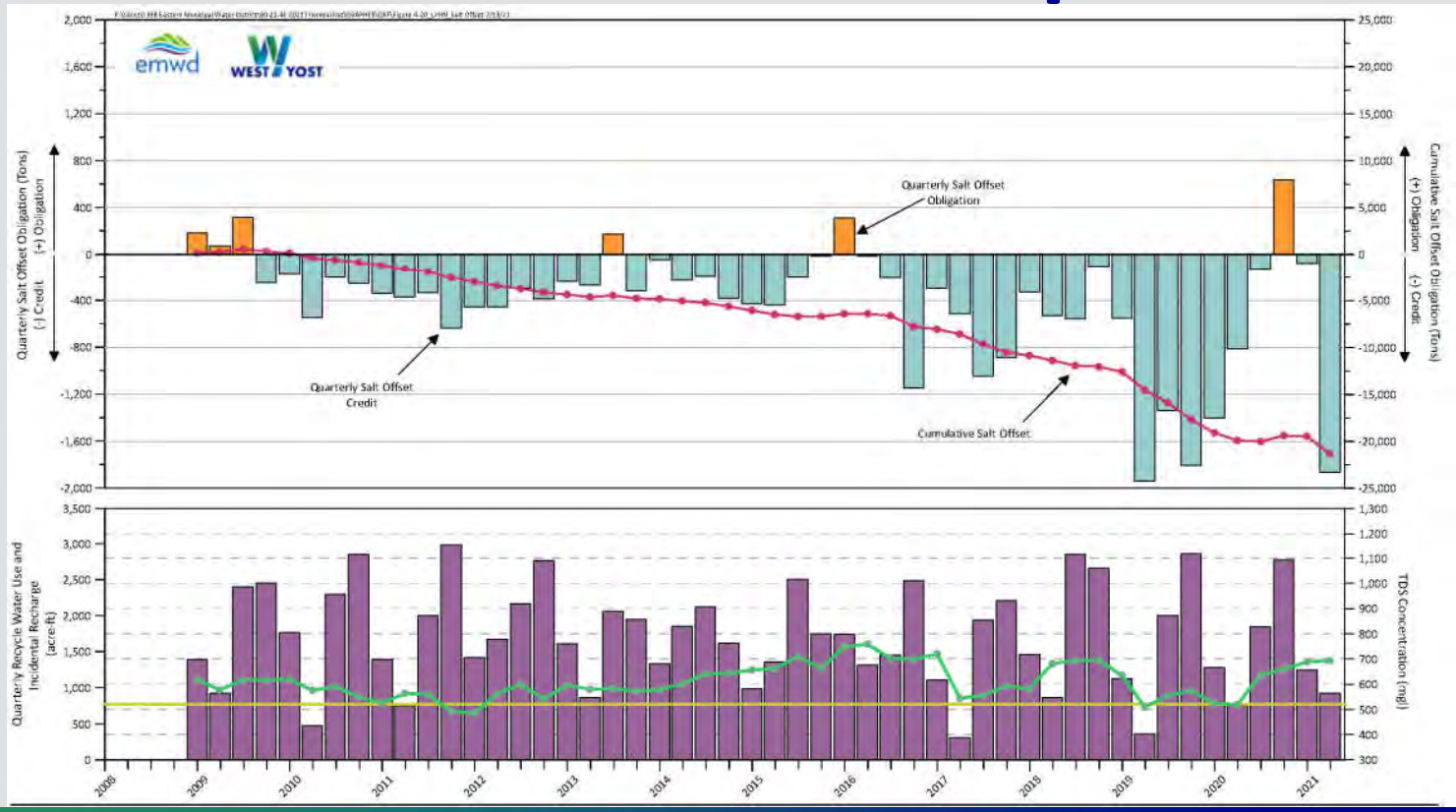
  (pending final approval)



AWQ Regulatory Framework: Lakeview/Hemet-North GMZ Example

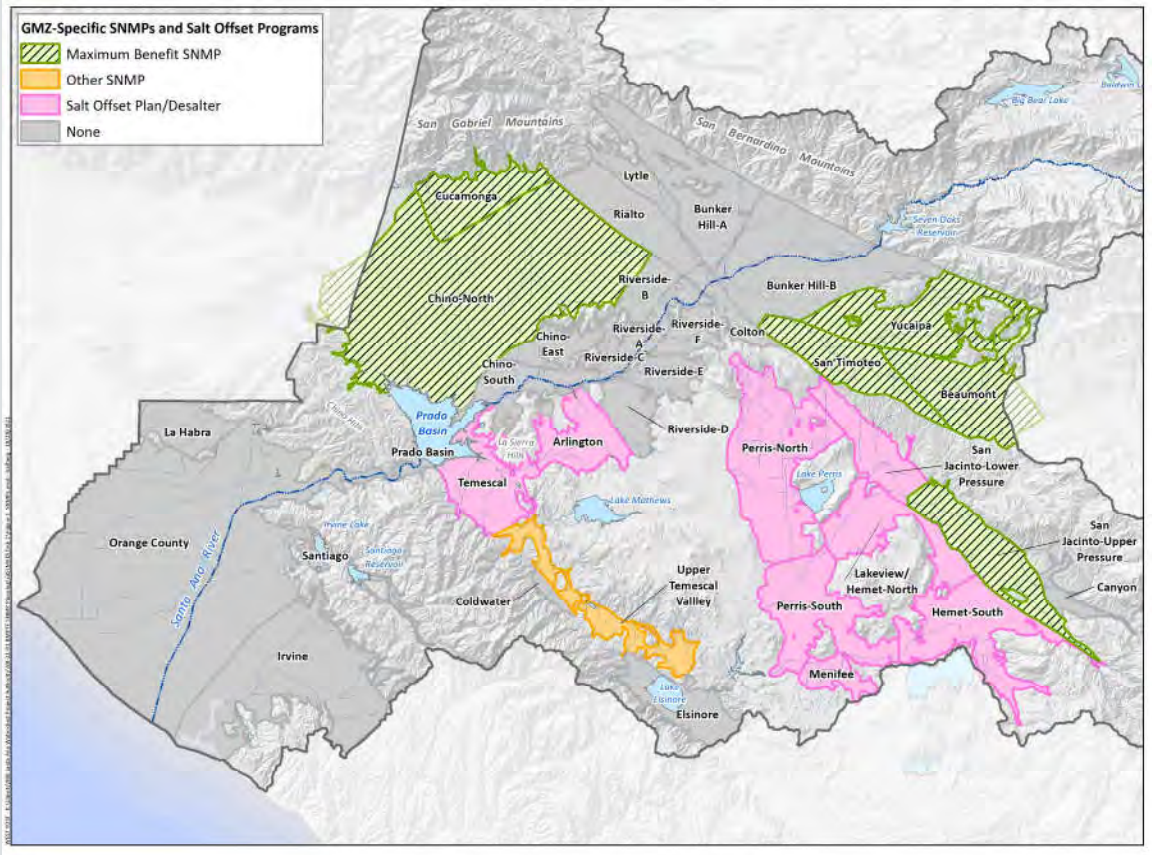
LVHN GMZ

- TDS Objective
  = 520 mgl
- TDS AWQ
  = 850
- Recycled Water TDS
  = 500-800 mgl
- Salt Offset with Perris Desalter



GMZ-Specific SNMPs or Salt Offsets

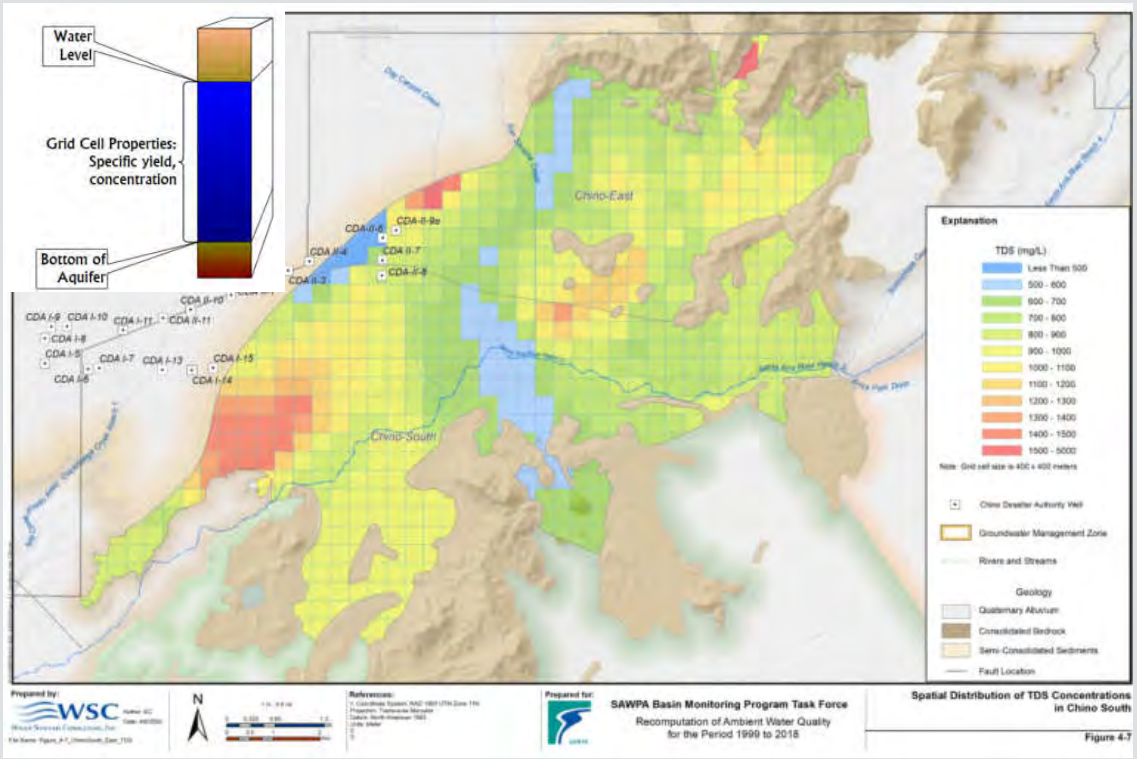
- Six GMZs with Maximum Benefit SNMPs
  - Plus Elsinore GMZ, expected in 2022
- One GMZ with an SNMP to address salt loading
- Eight GMZs with Salt Offset projects as part of WDRs



Ambient Water Quality Methods

How is AWQ calculated?

AWQ Methods:
GMZ volume-weighted concentration



$$V = \sum_{i=1}^{n} A_i \cdot (GWE_i - BOA_i) \cdot SY_i$$

V	= volume of groundwater in the GMZ
A_i	= area of the i^{th} grid cell
GWE_i	= groundwater elevation (feet above mean sea level [feet msl])
BOA_i	= bottom of the aquifer of the i^{th} grid cell (feet msl)
SY	= specific yield of the i^{th} grid cell
n	= number of grid cells

$$C_{avg} = \frac{\sum_{i=1}^{n} C_i \cdot V_i}{\sum_{i=1}^{n} V_i}$$

C_{avg}	= the volume-weighted current ambient concentration in a GMZ
C_i	= the current ambient concentration of groundwater in the ith grid cell
V_i	= the volume of groundwater in the ith grid cell
n	= number of grid cells

AWQ Methods: Development of TDS and N Statistics

- Raw data from wells
- Time history review
- QA/QC checks
- Annualized averages for time period
- Statistical test for normality and rejection of outliers
- Compute AWQ “Statistic” for wells with qualified data
- Compute average and median values for wells where data was disqualified during statistical test

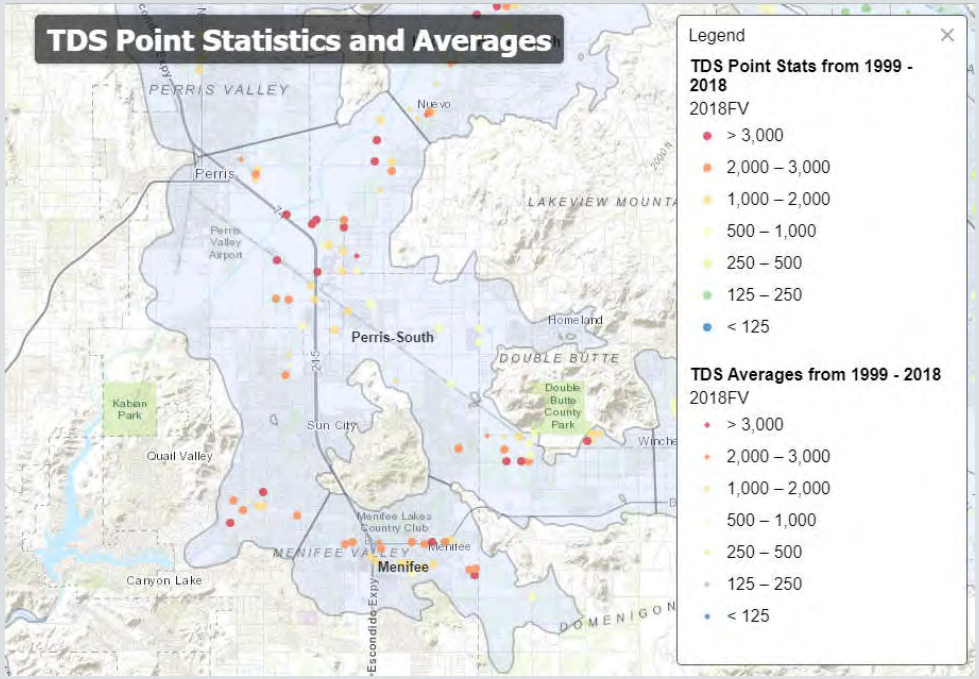


Image Source: WSC ArcGIS Online AWQ Data Explorer

AWQ Methods:
Water Level, TDS/N Contours

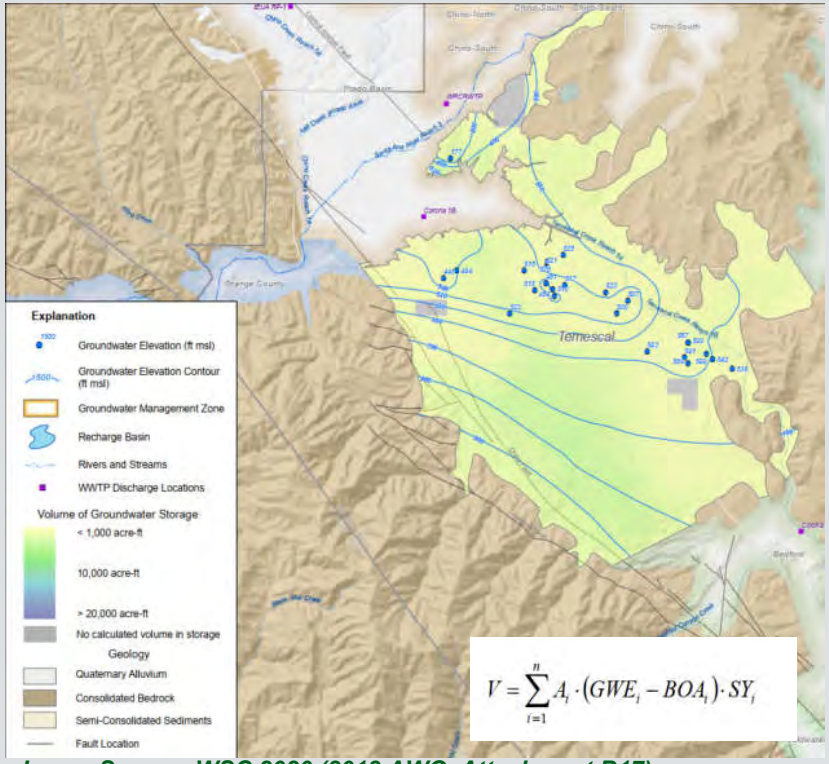


Image Source: WSC 2020 (2018 AWQ, Attachment B17)

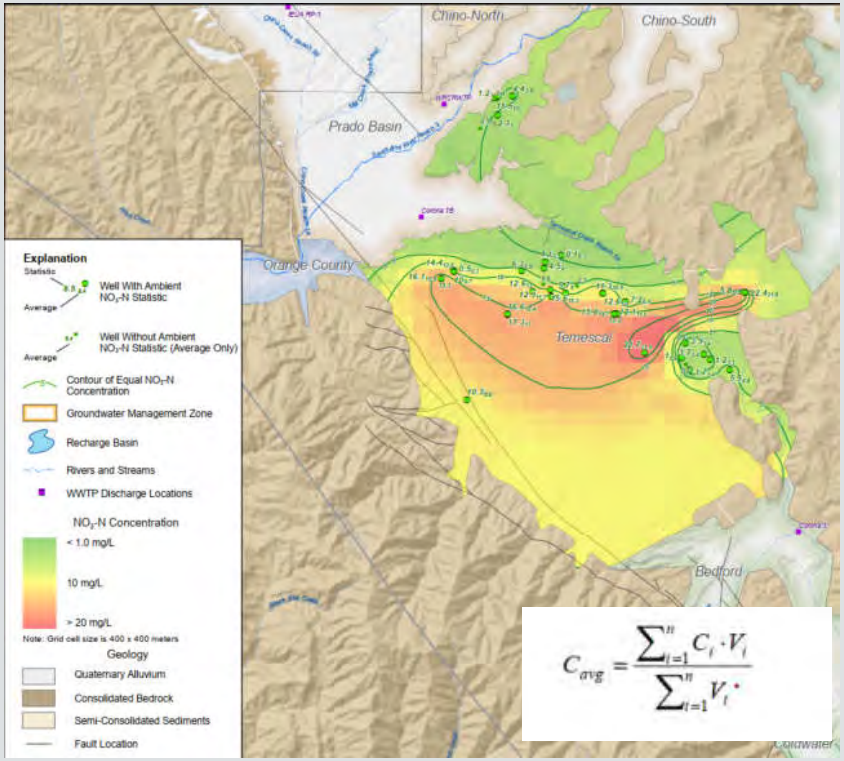
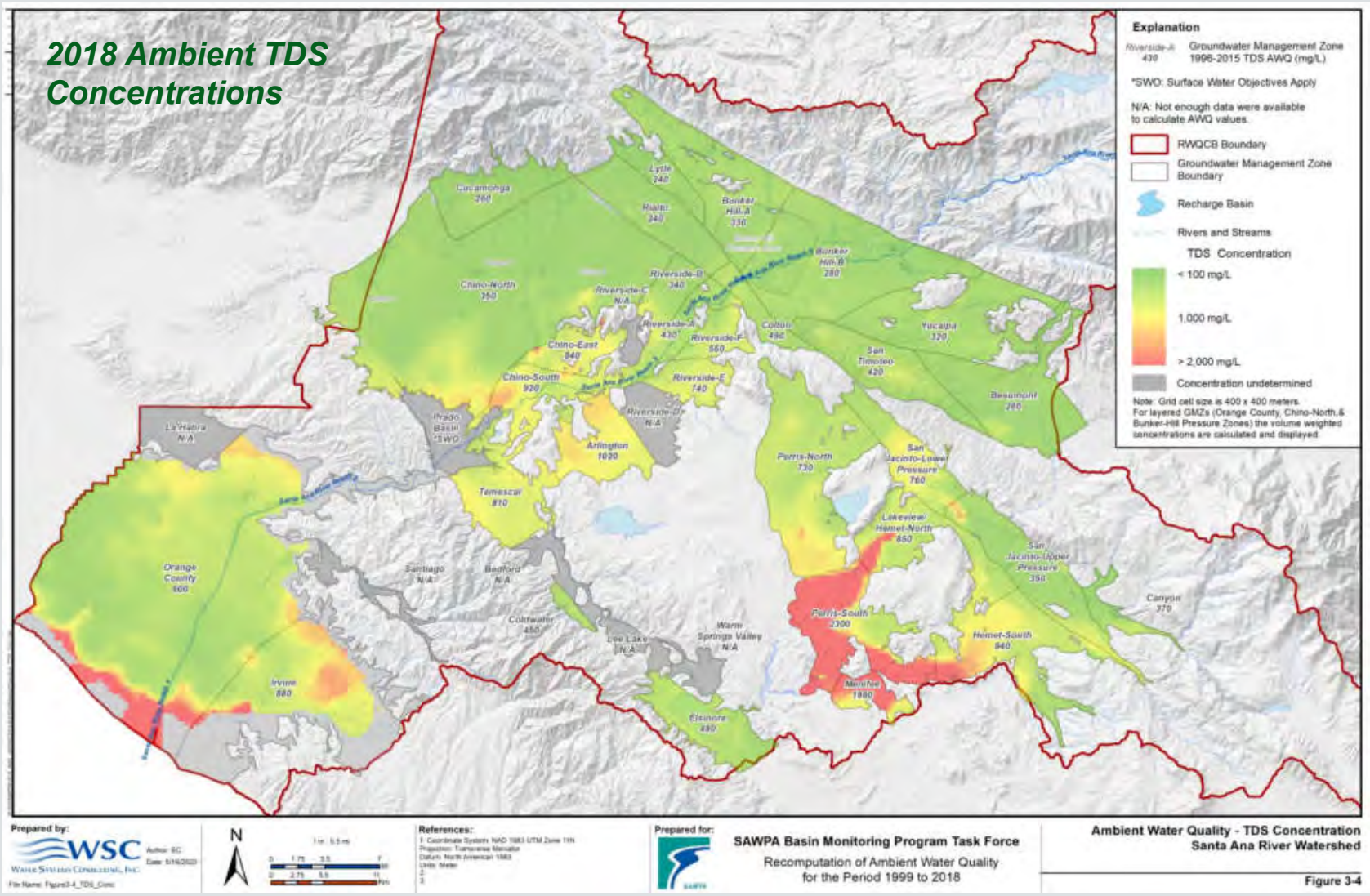
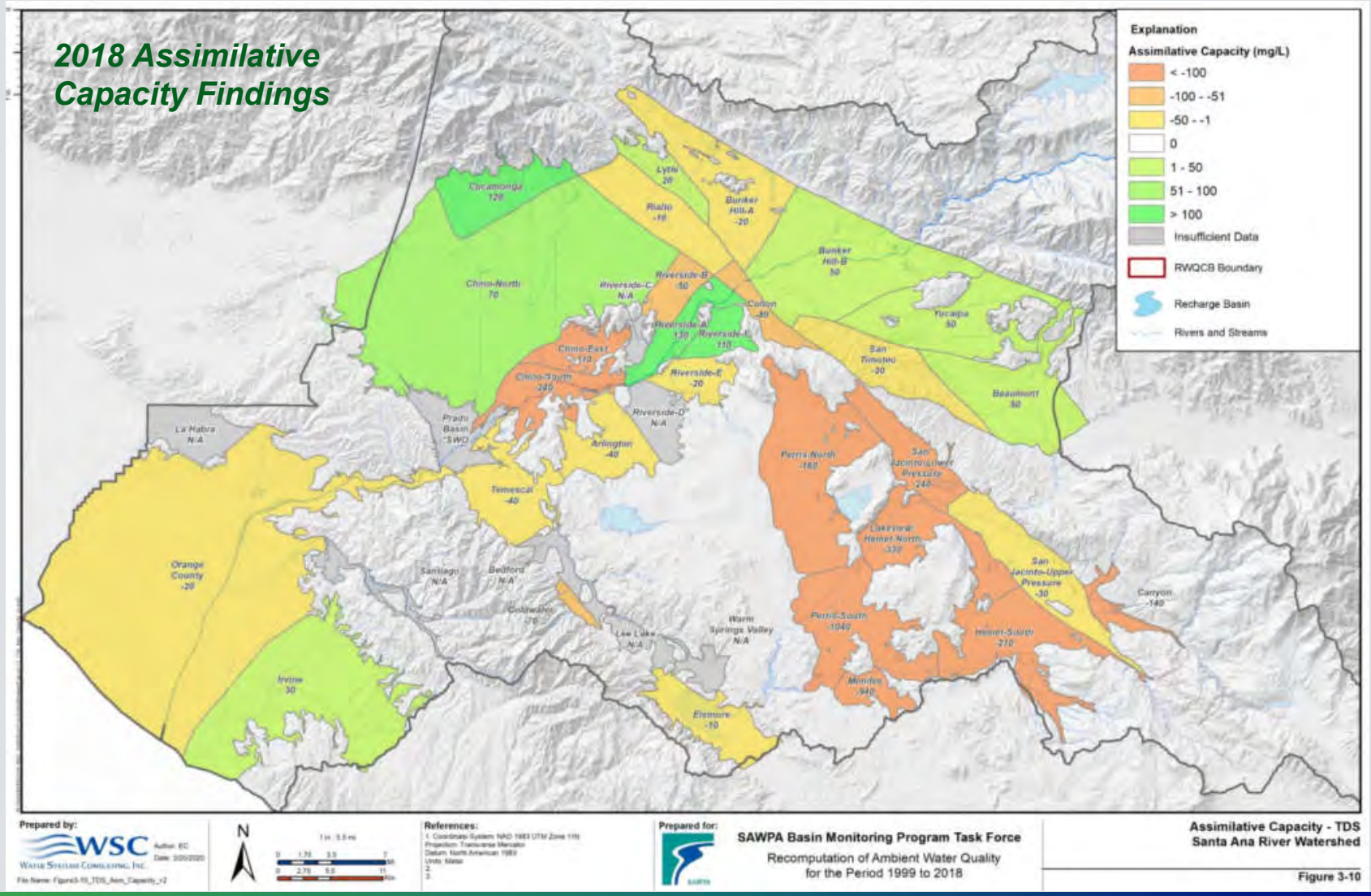


Image Source: WSC 2020 (2018 AWQ, Attachment B17)

2018 Ambient TDS Concentrations



2018 Assimilative Capacity Findings



Key Features of AWQ Methods Defined by TIN/TDS Task Force

- "Current" AWQ: the most recent 20-year historical record used to compute TDS/N statistics
  - 2018 AWQ Period of Record = January 1, 1999 through December 31, 2018
- Minimum of three years of data within the 20-year period is required to qualify for TDS/N statistic generation
- TDS/N statistics favored in contouring, average/median values are primarily for reference
- All statistics equally weighted in contouring, regardless of time period of available data within the 20-year computation period
- In areas with limited or no data, historical interpretations honored

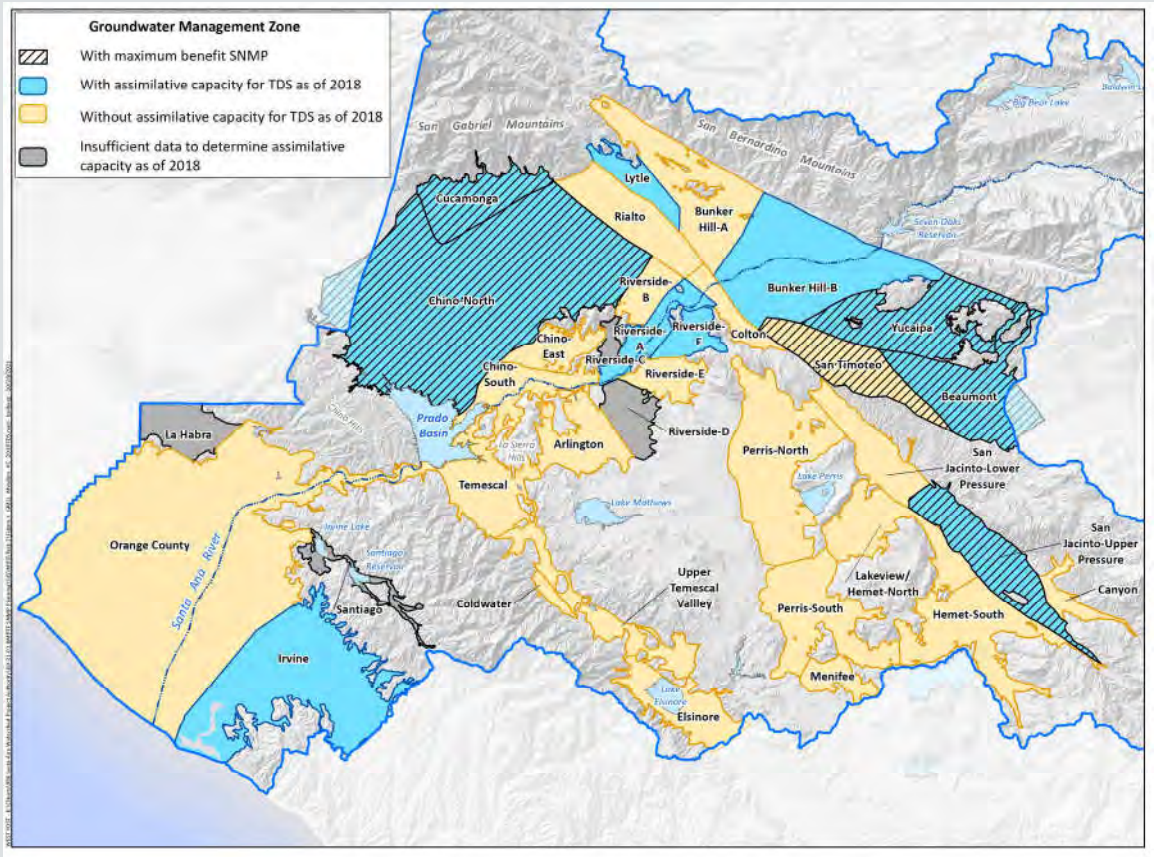
AWQ Findings and Adaptations

What we have learned since 2004?

Assimilative Capacity for TDS As of 2018 AWQ

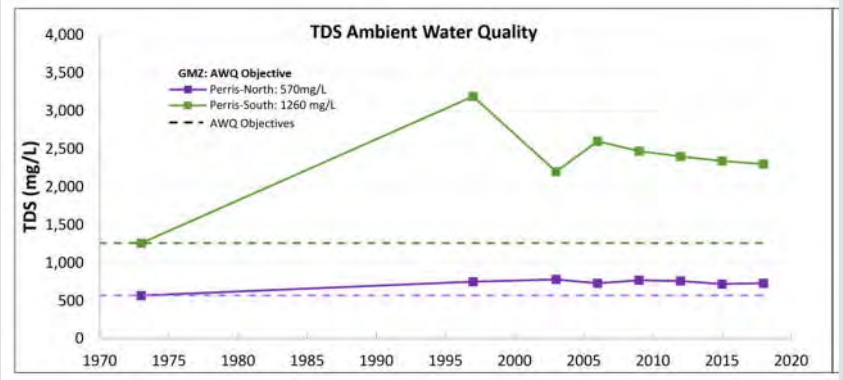
- 35 GMZs Total
- 10 GMZs with Assimilative Capacity
  - 5 are Maximum Benefit GMZs
- 21 with ***NO*** Assimilative Capacity
- 4 with no AWQ findings

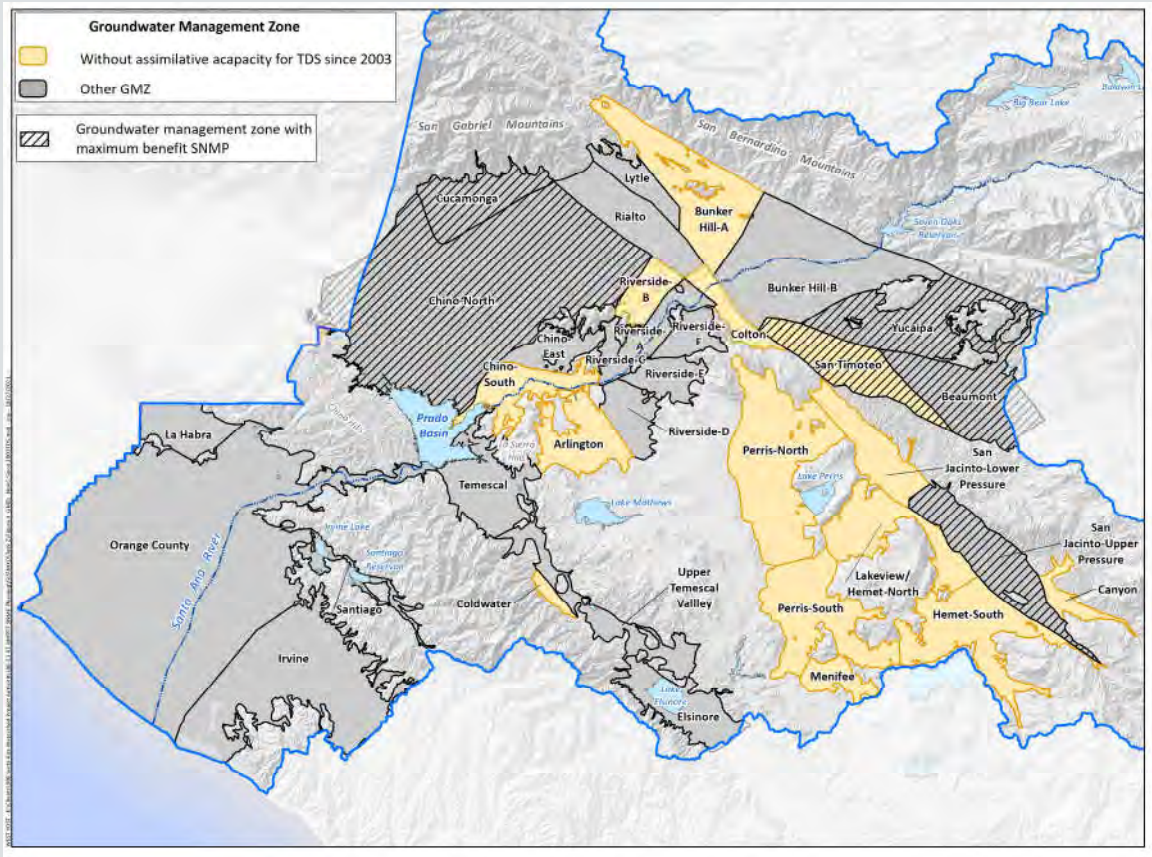
- *Note: AWQ in Upper Temescal Valley GMZ computed in separate process with unique methods per approved GMZ-specific SNMP*



Assimilative Capacity for TDS Since 2004

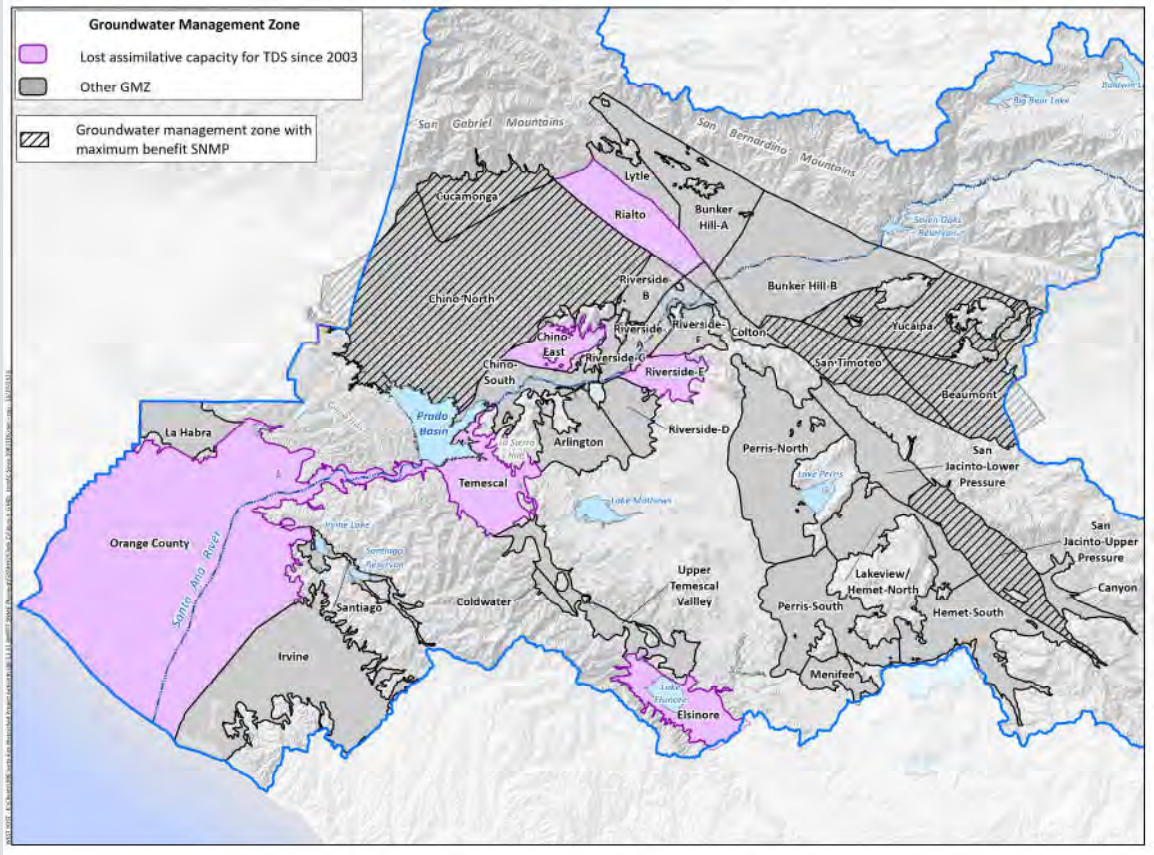
- 14 GMZs have had ***NO*** Assimilative Capacity since 2003 AWQ recomputation





Assimilative Capacity for TDS Since 2004

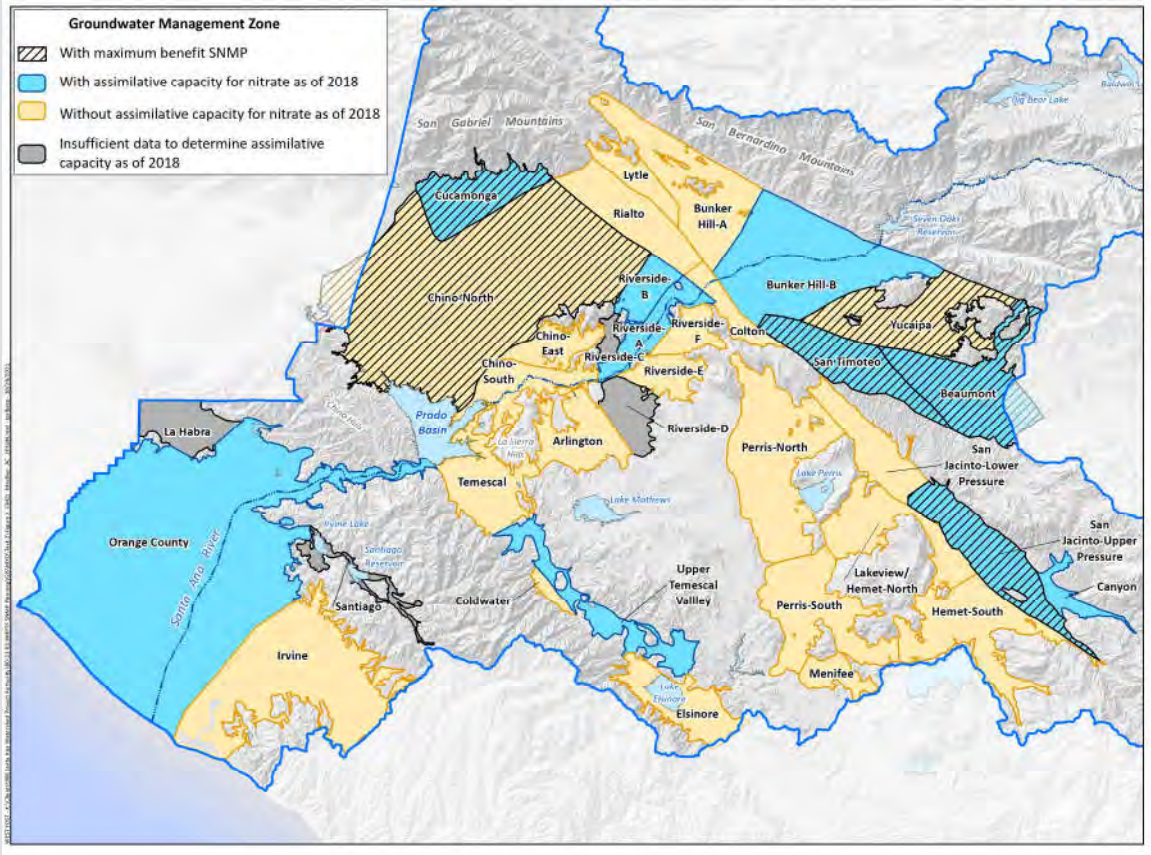
- Six GMZs lost assimilative capacity for TDS since 2003
  - Rialto
  - Riverside-E
  - Chino East
  - Temescal
  - Elsinore
  - Orange County



Assimilative Capacity for Nitrate As of 2018 AWQ

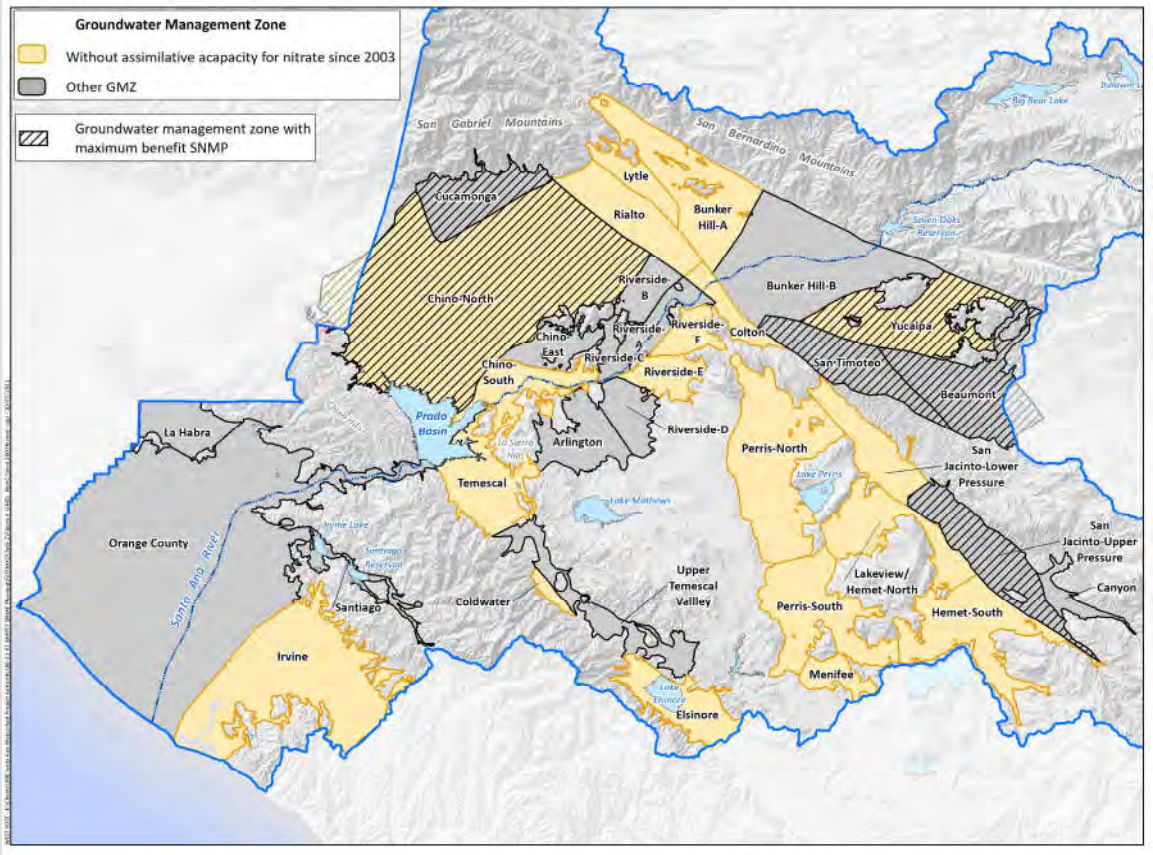
- 35 GMZs Total
- 10 with Assimilative Capacity
  - 4 are Maximum Benefit GMZs
- 21 with ***NO*** Assimilative Capacity
- 4 with no AWQ findings

- *Note: AWQ in Upper Temescal Valley GMZ computed in separate process with unique methods per approved GMZ-specific SNMP*



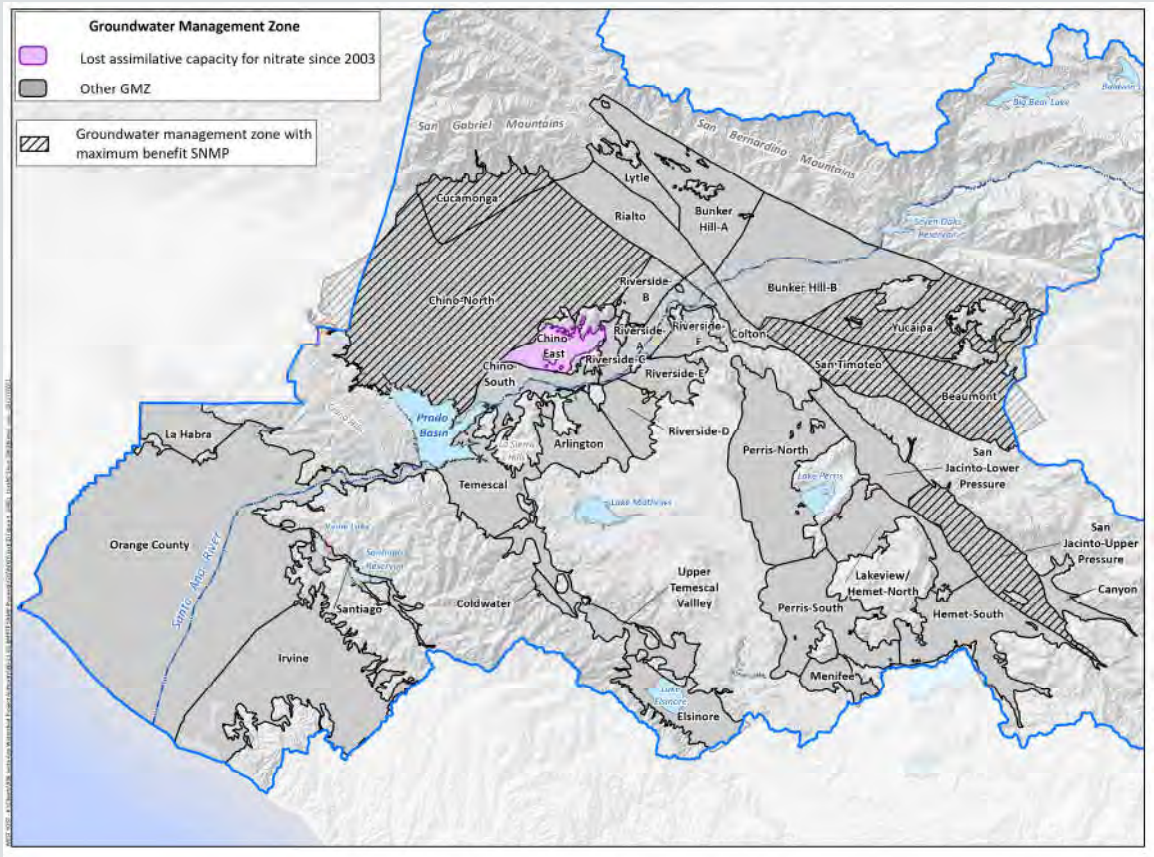
Assimilative Capacity for Nitrate Since 2004

- 19 GMZs have had ***NO*** Assimilative Capacity since 2003 AWQ recomputation



Assimilative Capacity for Nitrate Since 2004

- One GMZ lost assimilative capacity for nitrate since 2003
  - Chino East GMZ
  - Methodological



Overview of Key Findings and Adaptations since 2004

Key Findings

- Changes in AWQ over time are driven by systemic (physical) processes ***and*** analytical methodologies
- Collection, QA/QC, and management of data is time consuming and expensive
- Aquifer properties are outdated in some GMZs
- Many GMZs have very limited data
- The statistics procedure eliminates a lot of data that could/should be used
- Method does not address "hot spots"
- AWQ is not suitable initial condition for forward-projections of TDS/N conc.

Key Adaptations

- Interpretive tools
  - Change maps
  - Key wells and trends
  - Well attrition analysis
- Exploratory tasks to address:
  - how revision of aquifer properties could change AWQ results
  - filling data gaps
- Refined statistical procedures
- Web tools for exploring data
- ***Next Up: AWQ specific monitoring program***

Interpretive Tools
What drives changes in AWQ over time?

Table 4-1. Systemic and Methodological Factors Affecting Groundwater Quality.

Category	Factor
Systemic Change	The movement of solutes from the vadose zone to the saturated zone.
Systemic Change	Changes in water levels that affect groundwater storage in a GMZ
Systemic Change	Revised understanding of hydrogeologic physical models, which may change aquifer geometry and aquifer properties.
Systemic Change	Pumping/recharge stresses and/or groundwater flow within or between GMZs that can add, remove, and/or transport TDS and nitrate constituents in groundwater.
Methodological Change	The addition or loss of wells within GMZs.
Methodological Change	The geographic distribution of added or lost wells within GMZs.
Methodological Change	Differences in the techniques employed to contour and interpolate water quality data.
Methodological Change	The elimination of three years of data from the analysis (1996 to 1998).
Methodological Change	The addition of three years of data to the analysis (2016 to 2018).

Image Source: WSC 2020 (Table 4-1, page 48)

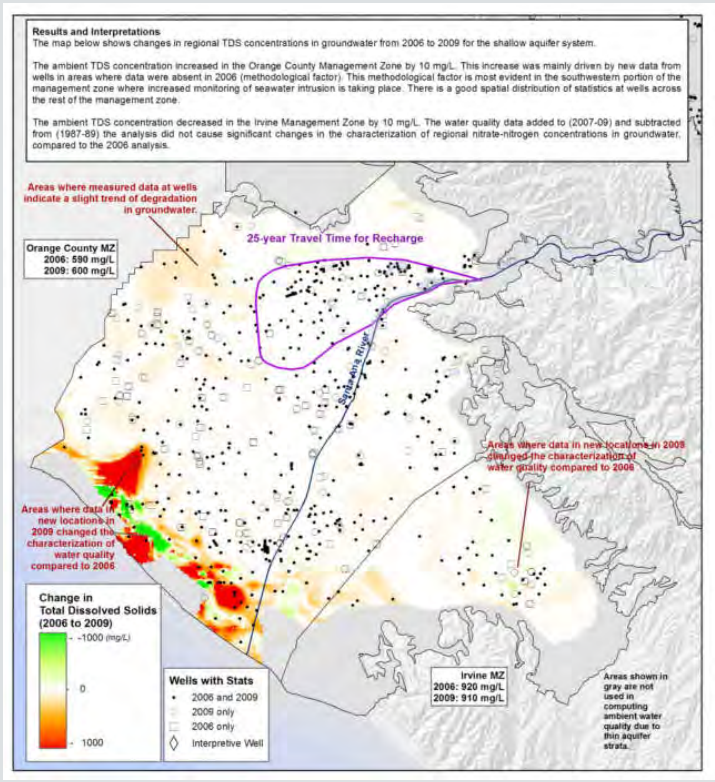


Image Source: WEI, 2011 Figure 4-10

Interpretive Tools
Key Well Trends

- 1st Generation:
  - Selected for 2009 AWQ
  - Selected based on:
    - location
    - groundwater flow paths
    - construction
    - proximity to recharge facilities or SAR recharge
    - representativeness of basin trends
  - Qualitative interpretations of time history charts
- Advancements:
  - Mann Kendall statistical trend analysis
    - Expanded to all wells

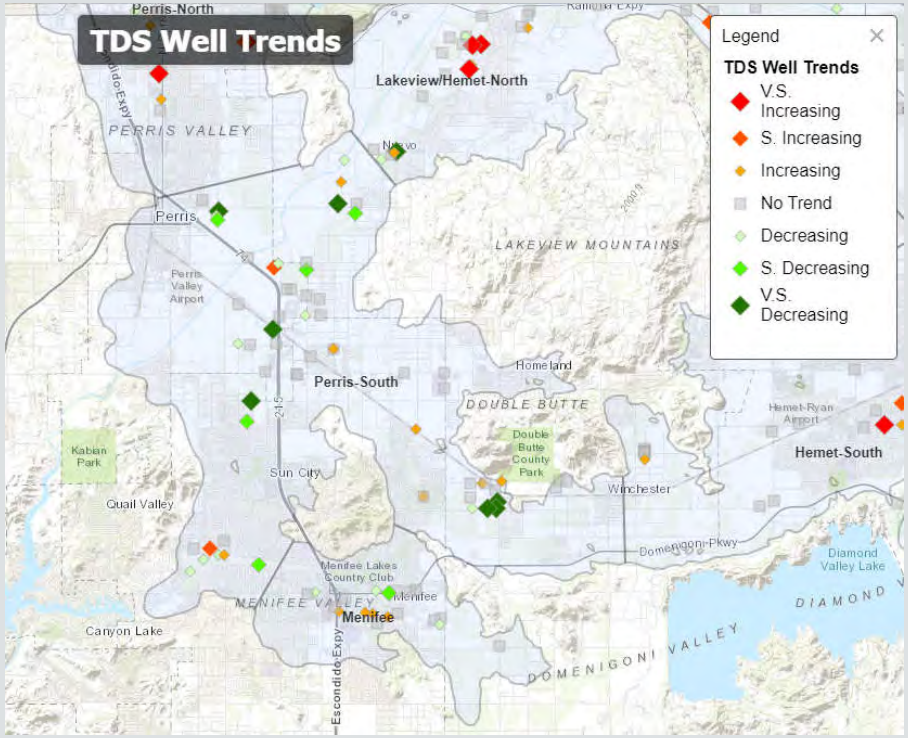


Image Source: WSC ArcGIS Online AWQ Data Explorer

Interpretive Tools
Well Attrition

- If wells are no longer sampled, they fall out of the analysis, and, if not replaced:
  - Can alter interpretation and interpolation of water quality statistics
  - Reduces understanding of how basin is changing
- 1st generation:
  - Identify wells lost if not sampled in next three-year period
- Advancements:
  - Identify wells lost if not sampled in next six-year period
  - Attempts to address data gaps

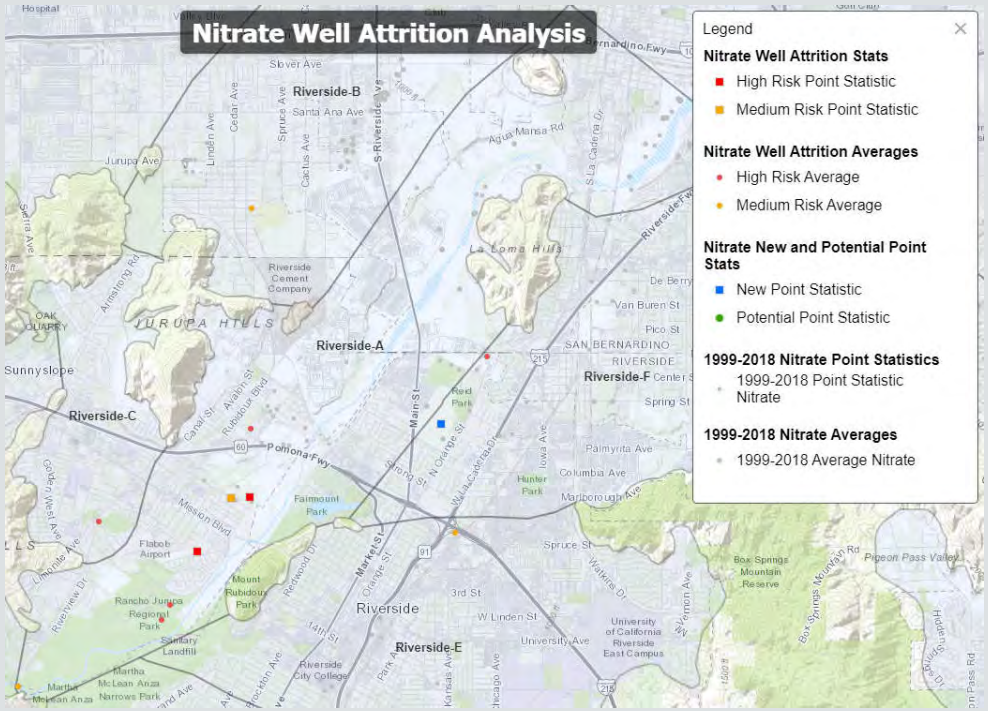
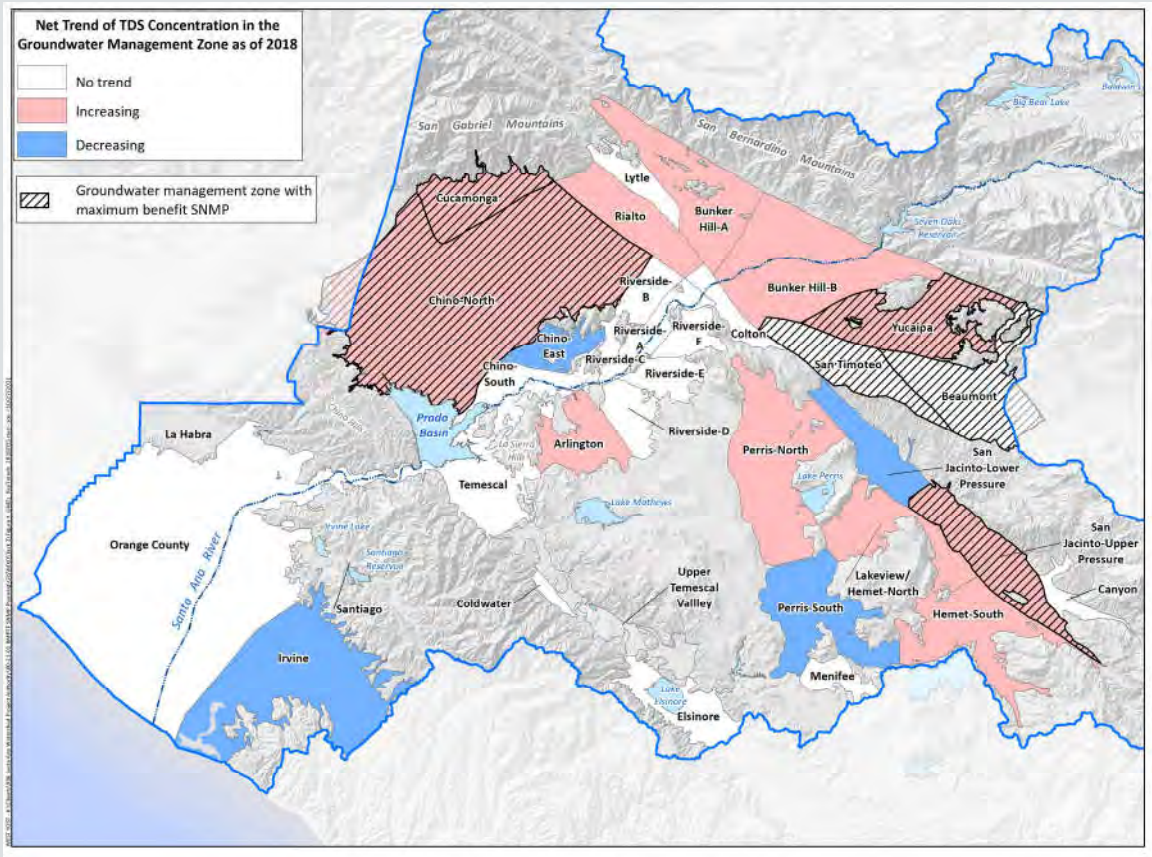


Image Source: WSC ArcGIS Online AWQ Data Explorer

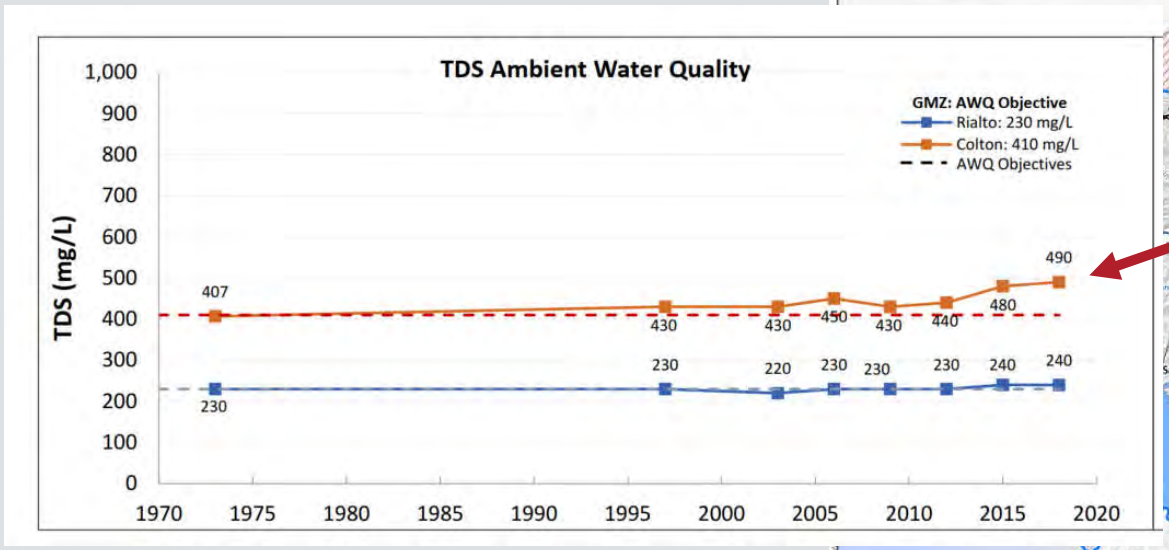
Challenges with Data and Statistics

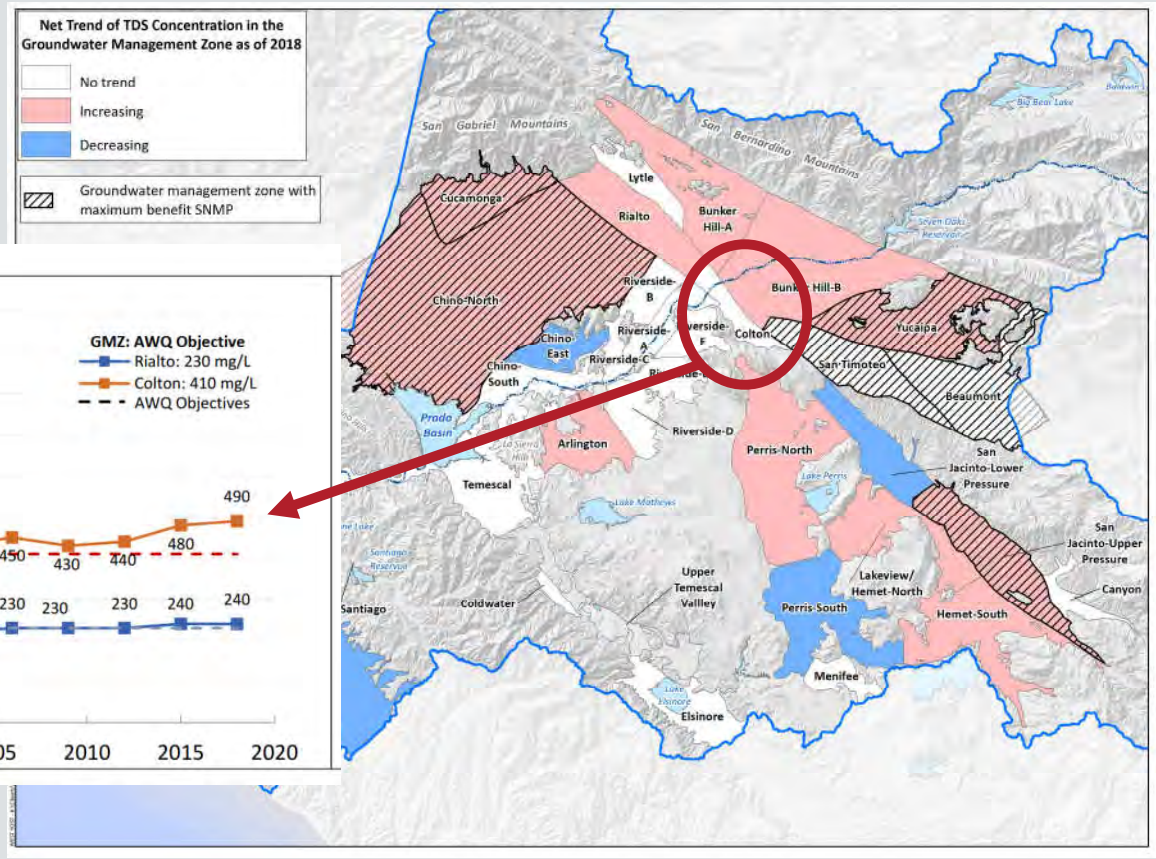
Trend Analysis

- Only considers the 20-year period of analysis, not longer term trends
- When only looking at key wells, sometimes well trend don't match AWQ trends



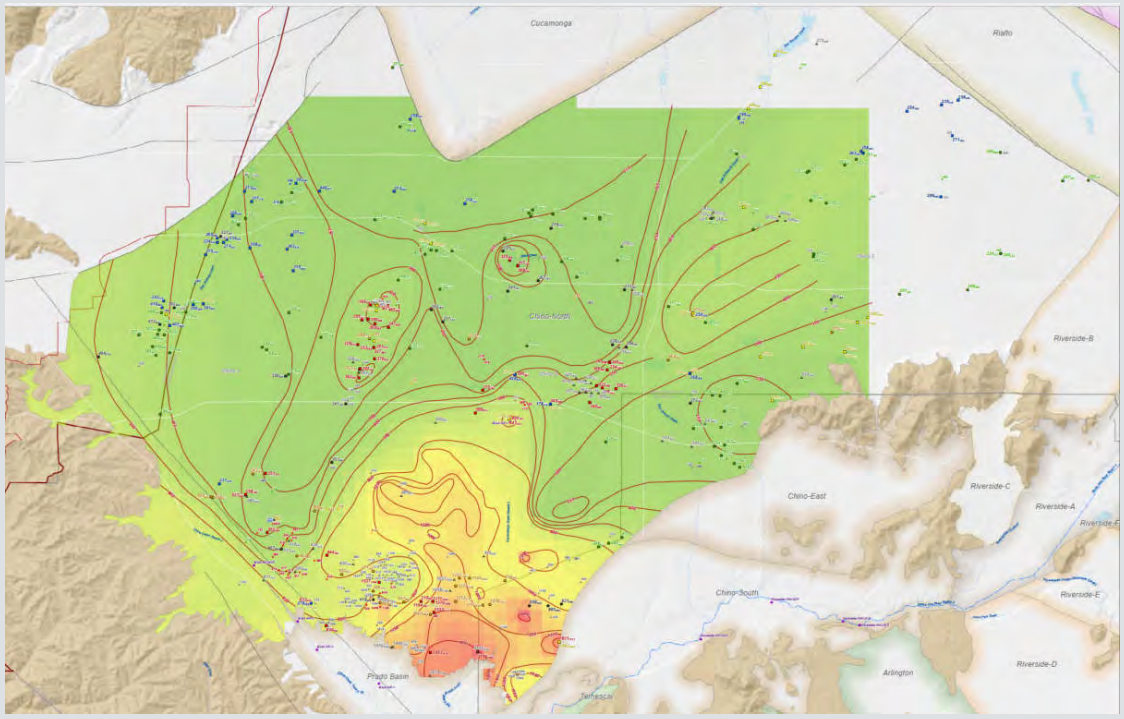
Challenges with Data and Statistics





Challenges with Data and Statistics

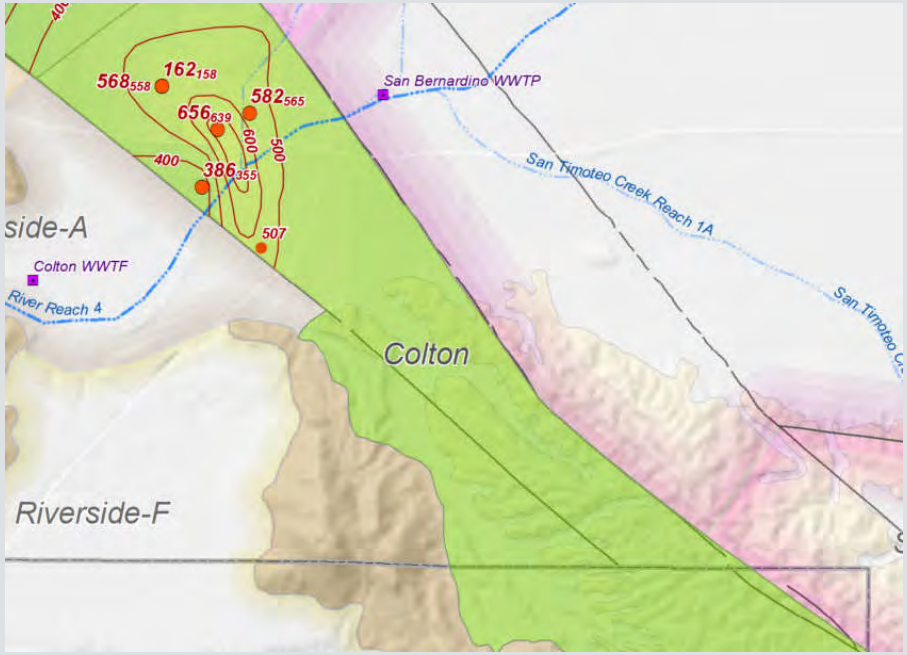
- There is ***a LOT*** of data
  - Difficult to standardize contouring approach
  - No attribution to new vs old data
  - Prioritization of old statistics vs recent data with averages only
  - Default assumption to honor contours in areas where wells lost
  - Mistakes are more likely
    - Examples



Source: WSC, 2020 (Attachment B)

Challenges with Data and Statistics

- In some places there is ***very little*** data, same problems?
  - Difficult to standardize contouring approach
  - No attribution to new vs old data
  - Prioritization of old statistics vs recent data with averages only
  - Default assumption to honor contours in areas where wells lost



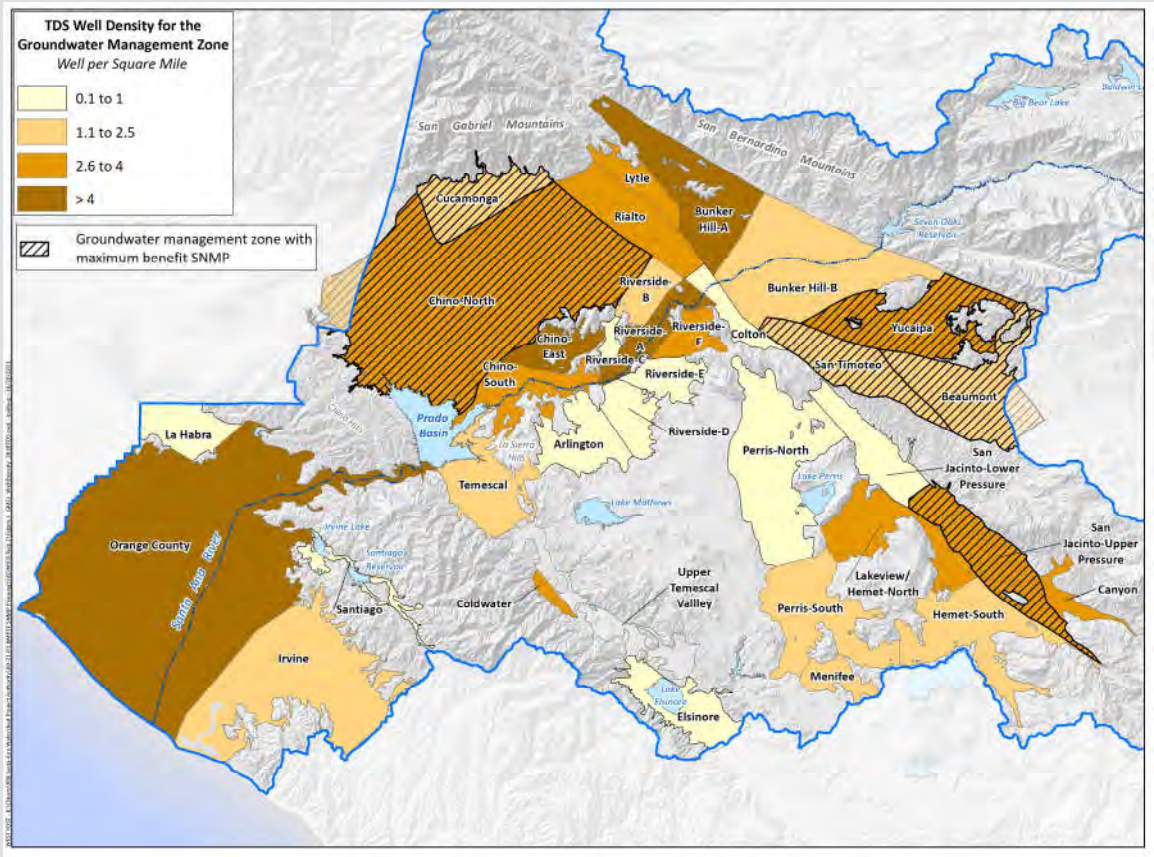
Source: WSC, 2020 (Attachment B)

Challenges with Data and Statistics

- The data we have…

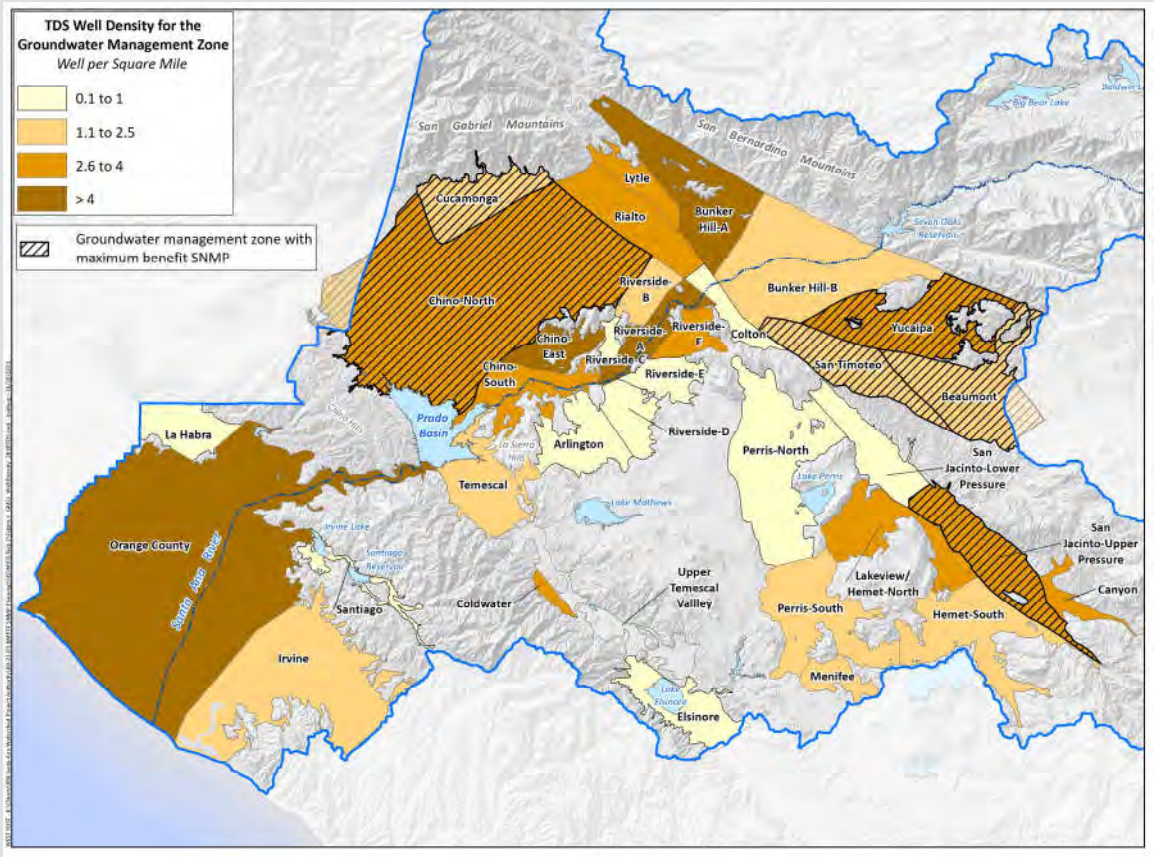
  is what we have

- Well attrition analysis alone has not successfully yielded increase in monitoring needed
- Basin Plan requirement to prepare monitoring program



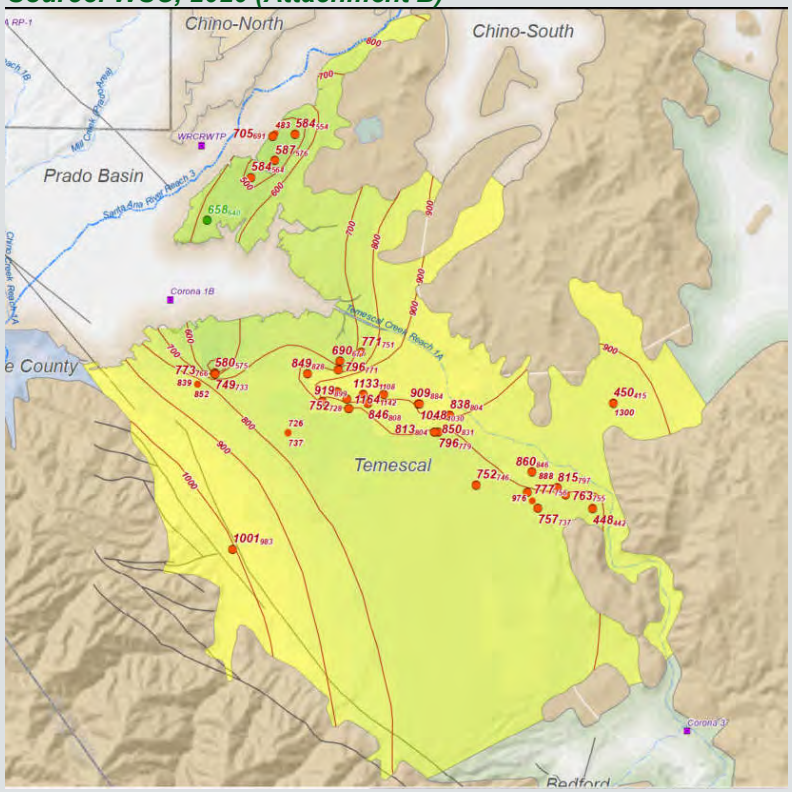
Challenges with Data and Statistics

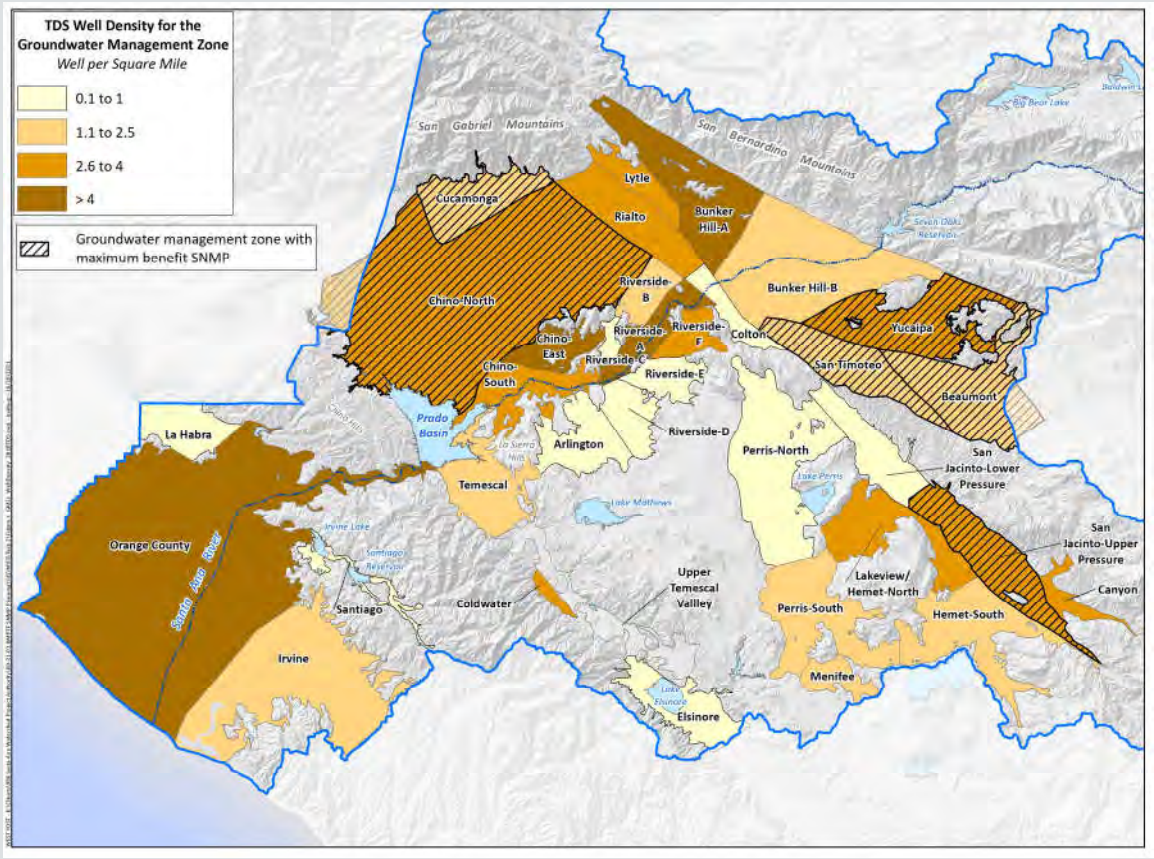
- What is the right density of data?



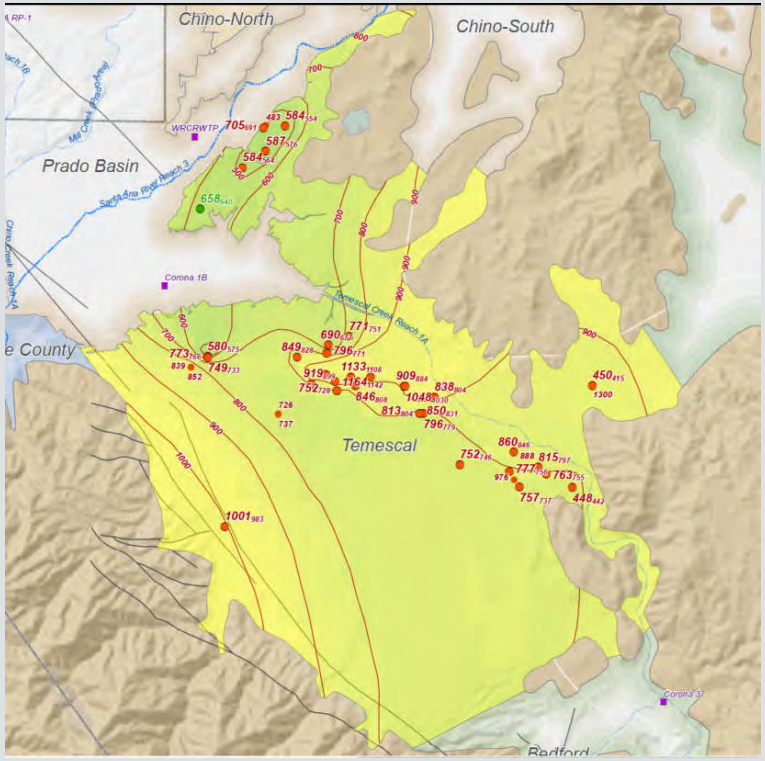
Challenges with Data and Statistics

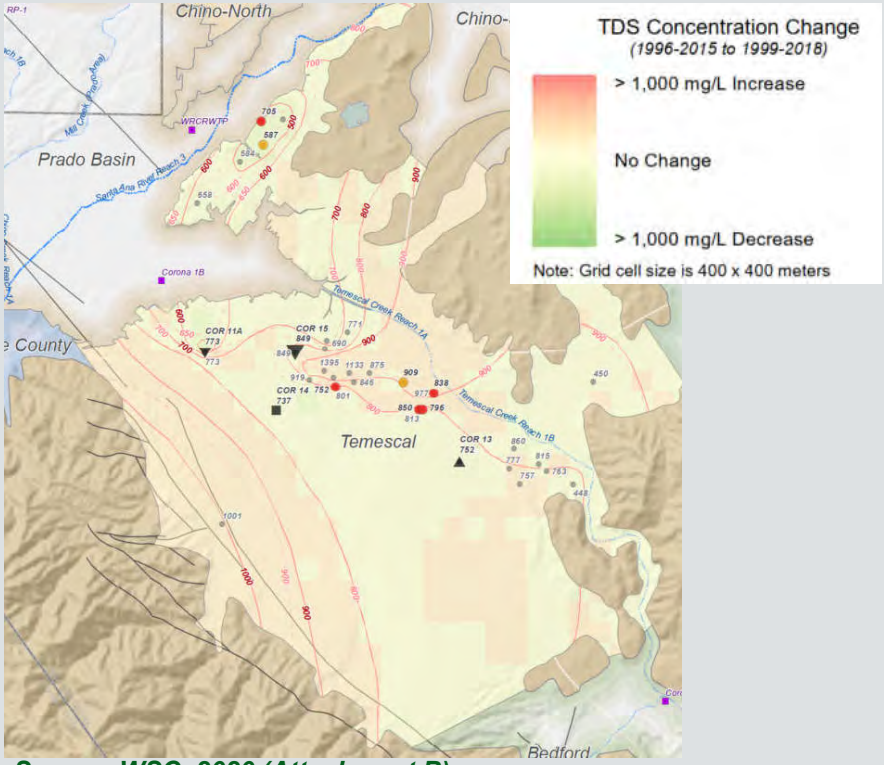
Source: WSC, 2020 (Attachment B)





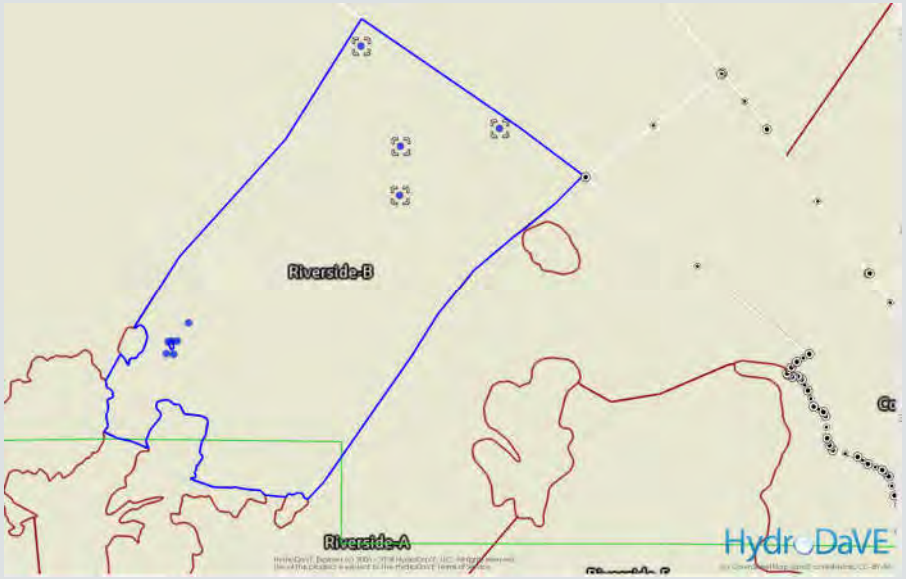
Challenges with Data and Statistics Interpretation in areas with no data





Source: WSC, 2020 (Attachment B)

Challenges with Data and Statistics Interpretation in areas with limited data



- 10 wells with TDS statistics
- But…
  - Six are landfill wells in small cluster
  - 2 may no longer be actively sampled
- How to fill these data gaps?

Questions for Consideration in Ongoing Methods and Data Collection

- Is all data good data?
  - Should we reduce the analysis to a set of key wells that MUST be monitored?
  - Should we include landfill monitoring wells? If so, which ones?
- How do we prioritize addressing data gaps?
- Should the high TDS concentrations along the Pacific Coast of Orange County GMZ be included in the ambient concentration – especially in light of regional groundwater management actions to address seawater intrusion?
- Should we continue to rely on a 20-year period of record? If so, what improvements could be considered:
  - Should we prioritize wells with recent data (over any data within analysis period)

What Questions do you have?

- ???

Next Presentation

Date	Workshop Topic
August 2021	Overview of Recycled Water Policy – SNMP Monitoring and Analysis Requirements
October 2021	Critical Analysis of SAR SNMP Ambient Water Quality and Alternative Methods to Comply Pt. 1: What Have We Learned in 17 years of Implementation?
November or December 2021	**Critical Analysis of SAR SNMP Ambient Water Quality and Alternative Methods to Comply Pt. 2: The Case for Prioritization and Levels of Analysis**
January 2022	Critical Analysis of SAR SNMP Ambient Water Quality and Alternative Methods to Comply Pt. 3: Consideration of Alternative Methods
February 2022	Groundwater Monitoring for SNMP Compliance Pt. 1: Defining Key Wells, Data Gaps, and Responsible Parties
March 2022	Groundwater Monitoring for SNMP Compliance Pt 2: Database Management and Five-year Assessments
April 2022	Draft Work Plan Review
May 2022	Discuss Comments on Draft Work Plan
June 2022	Final Work Plan Review

THANK YOU

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WE DO WHAT'S RIGHT

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WE LISTEN

WE SOLVE HARD PROBLEMS

WE SEE THE BIGGER PICTURE

WE TAKE OWNERSHIP

WE COLLABORATE

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New Basin Plan Requirement (Draft)

- Groundwater Monitoring Program

  No later than August 1, 2022 ... [the Task Force Members] … shall submit to the Regional Board for approval, an updated watershed-wide TDS and nitrogen monitoring program that will provide the data necessary to implement the TDS/nitrogen management plan. Data to be collected and analyzed shall address a minimum

  (1) determination of current ambient quality in groundwater management zones;

  (2) determination of compliance with TDS and nitrate-nitrogen objectives for the management zones;

  (3) evaluation of assimilative capacity findings for groundwater management zones;

  (4) assessment of the effects of recharge of surface water POTW discharges on the quality of affected groundwater management zones; and

  (5) ***any other requirements specified in the State Water Board's Recycled Water Policy*** (Resolution No. 2018-0057)

New Basin Plan Requirement (Draft)

- Ambient Water Quality

  The determination of current ambient quality can be accomplished using the method consistent with that employed by the N/TDS Task Force (20-yr running average) to develop the TDS and nitrogen water quality objectives included in the Basin Plan***, or an alternative method approved by the Executive Officer of the Regional Board***. The determination of current ambient groundwater quality throughout the watershed must be reported by October 1, 2023, and, at a minimum, ***every five years thereafter*** unless the Regional Board revises this schedule.

Purpose of the Ask

- Monitoring program hasn't been updated since 2005
- Past recommendations to revise ambient water quality methods
- 2019 Recycled Water Policy (Policy) Amendments
  - Requires the Regional Board and Task Force to address more than just the monitoring program and ambient water quality methods
  - Monitoring program and ambient water quality are elements program identified as an early target for the RB in complying with the 2019 Policy amendments

Objectives and Approach

Our objective is to develop monitoring and reporting specifications that:

- Create compliance with applicable regulations
  (Basin Plan objectives; Recycled Water Policy)
- Leverage regulations to create flexibility in assessment methods
- Leverage regulations to reduce frequency and cost of future assessments
- Are clear and actionable, with a time-certain schedule to perform compliance actions

Our approach is to start with the end in mind →compliance with 2019 Recycled Water Policy

Five-Year Assessments

Section 6.2.6 of Policy

The regional water boards, in consultation with stakeholders, shall assess and review monitoring data generated from [the SNMP] every five years, unless an alternate timeline has been established in a basin plan amendment. The assessment shall include an evaluation of:

1. Observed trends in groundwater salinity with the predicted trends from the SNMP
2. The ability of the monitoring network to adequately characterize groundwater quality in each GMZ and
3. Potential new data gaps
4. The ability of any relied-upon models to adequately simulate groundwater quality
5. Available assimilative capacity based on observed trends and the most recent water quality data
6. The impact of new projects that are reasonably foreseeable at the time of the assessment

SNMP Monitoring Plan Requirements

Section 6.2.4.1 of Policy

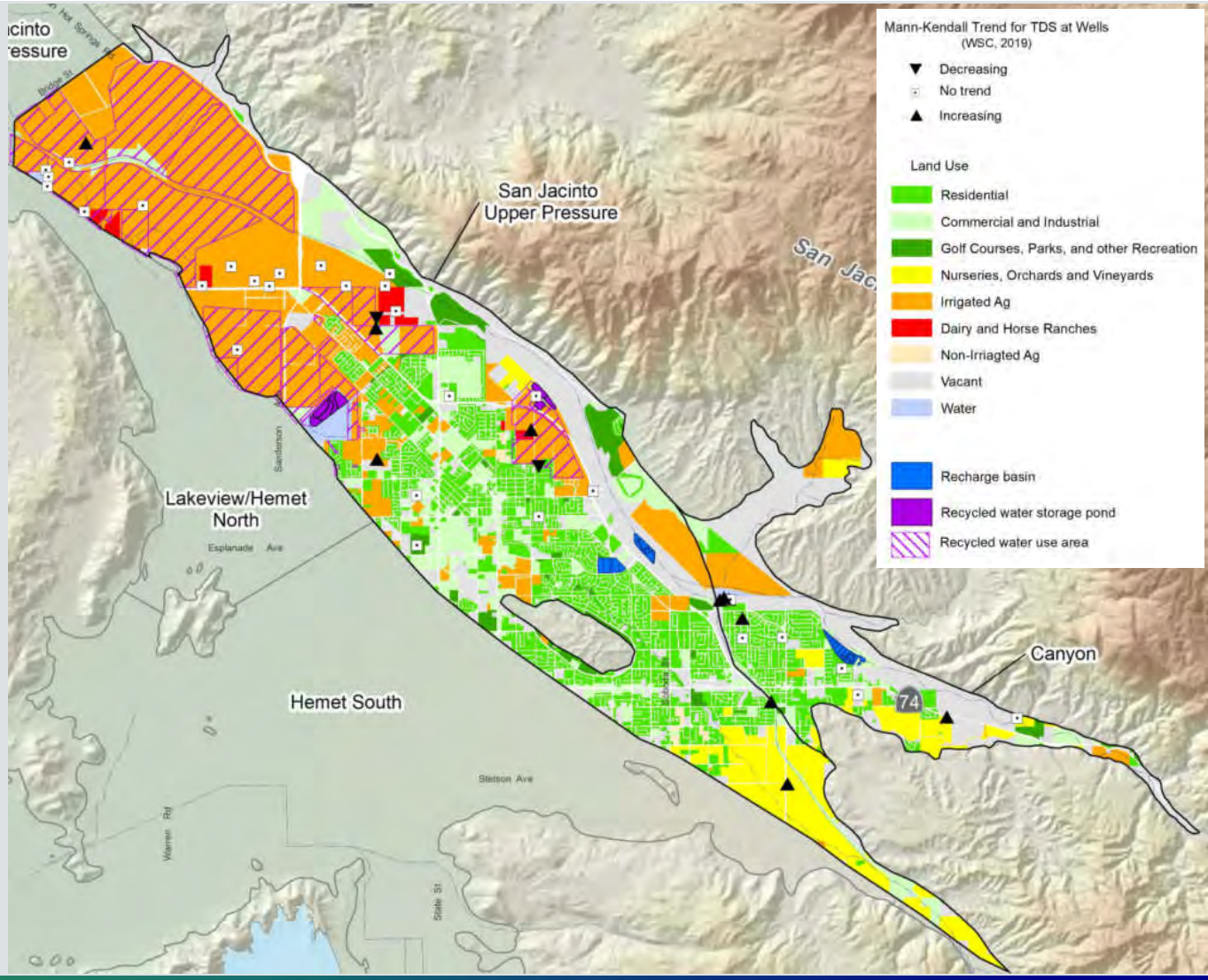
- The monitoring plan must be designed to effectively evaluate water quality in the basin. The monitoring plan must focus on:
  - water supply wells,
  - areas proximate to
    - large water recycling projects, particularly groundwater recharge projects, and
    - other potential sources of salt and nutrients identified in the salt and nutrient management plan.
  - Also, monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with adjacent surface waters.

Five-Year Assessments: Do we have the information and protocols needed?

	Triennial AWQ	Maximum Benefit SNMPS	Cooperative Agreement Modeling	WDR Salt Offset Programs
1 Compare observed trends in groundwater salinity with the ***predicted trends*** from the SNMP		✓	✓	
2 The ability of the monitoring network to adequately characterize groundwater quality in each GMZ	✓			
3 Potential new data gaps	✓			
4 The ability of any relied-upon models to adequately simulate groundwater quality		✓	✓	
5 Available assimilative capacity based on observed trends and the most recent water quality data	✓	✓		
6 The impact of new projects that are reasonably foreseeable at the time of the assessment		✓	✓	

Advancements to Consider

- Mapping of loading factors
- Selection of key wells rather than all wells available
- Applying tiered AWQ analysis approach to focus higher-cost efforts in most critical areas and simplify in other areas
- Five-year reporting



Basin Planning Priorities Task 2 Workshop – Critical Analysis of Ambient Water Quality and Alternative Methods to Comply Pt. 2:

Consideration of Alternative Methods

December 13, 2021

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Agenda

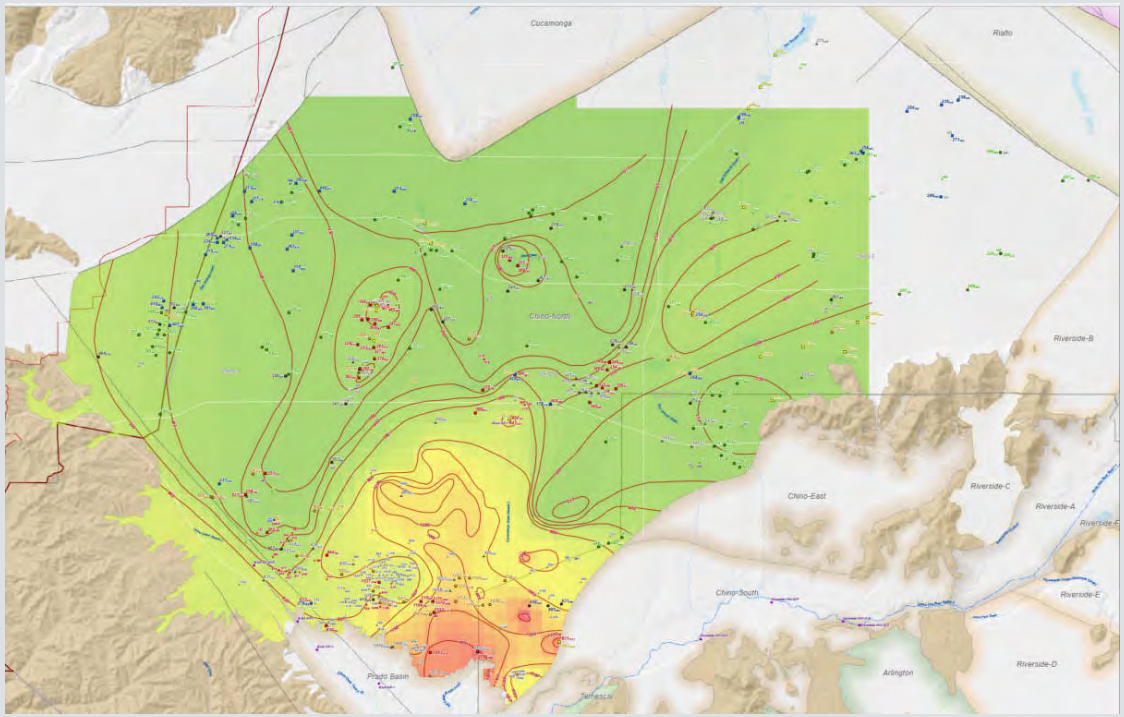
- Overview of questions to discuss in next two meetings
- Open discussion with review of examples:
  - PLEASE PARTICIPATE. There are no wrong answers or wrong opinions – all ideas, questions and concerns are important to hear.
  - Follow-up input will be collected
- Note: We will schedule individual meetings to discuss input with interested Task Force members in January. (1/11, 1/13, 1/14, and 1/18)

Reminder: Key Features of AWQ Methods Defined by TIN/TDS Task Force

- "Current" AWQ: the most recent 20-year historical record used to compute TDS/N statistics
  - 2018 AWQ Period of Record = January 1, 1999 through December 31, 2018
- Minimum of three years of data within the 20-year period is required to qualify for TDS/N statistic generation
- TDS/N statistics favored in contouring, average/median values are primarily for reference
- All statistics equally weighted in contouring, regardless of time period of available data within the 20-year computation period
- In areas with limited or no data, historical interpretations honored

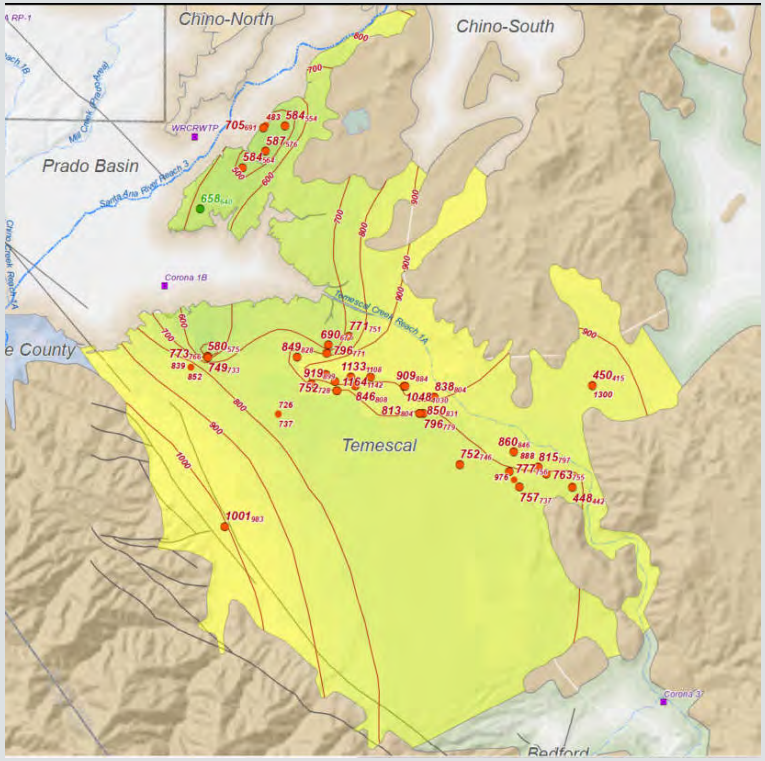
Challenges with Data and Statistics

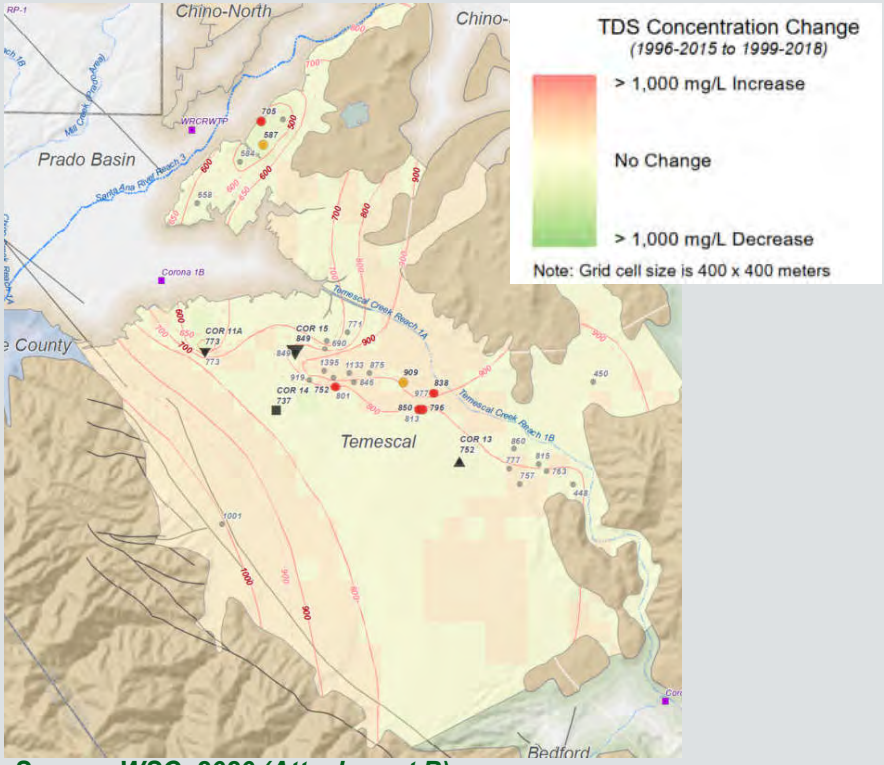
- There is ***a LOT*** of data
  - Difficult to standardize contouring approach
  - No attribution to new vs old data
  - Prioritization of old statistics vs recent data with averages only
  - Default assumption to honor contours in areas where wells lost
  - Mistakes are more likely
    - Examples



Source: WSC, 2020 (Attachment B)

Challenges with Data and Statistics Interpretation in areas with no data





Source: WSC, 2020 (Attachment B)

Overview of Questions for Consideration in Ongoing Methods and Data Collection

- Should we continue to rely on a 20-year period of record?
- Is all data good data? Is all data relevant data? What should we exclude, if any?
- Should we reduce the analysis to a set of key wells that ***must*** be monitored, and replaced if lost?
- Should we limit the area of analysis to exclude areas with no data, limited aquifer volume?
- Should we update the physical model of the groundwater basins if improved hydrogeologic characterizations are available since 2004?
- Who should be responsible to pay for and/or preform technical work to: fill data gaps? implement method improvements that only affect some GMZs?
- How do we prioritize our efforts/timeline to improve methods and data collection?
- Should we continue to perform full ambient water quality recomputation process in all GMZs?
- ***What questions or ideas do you have?***

Questions for Consideration in Ongoing Methods and Data Collection

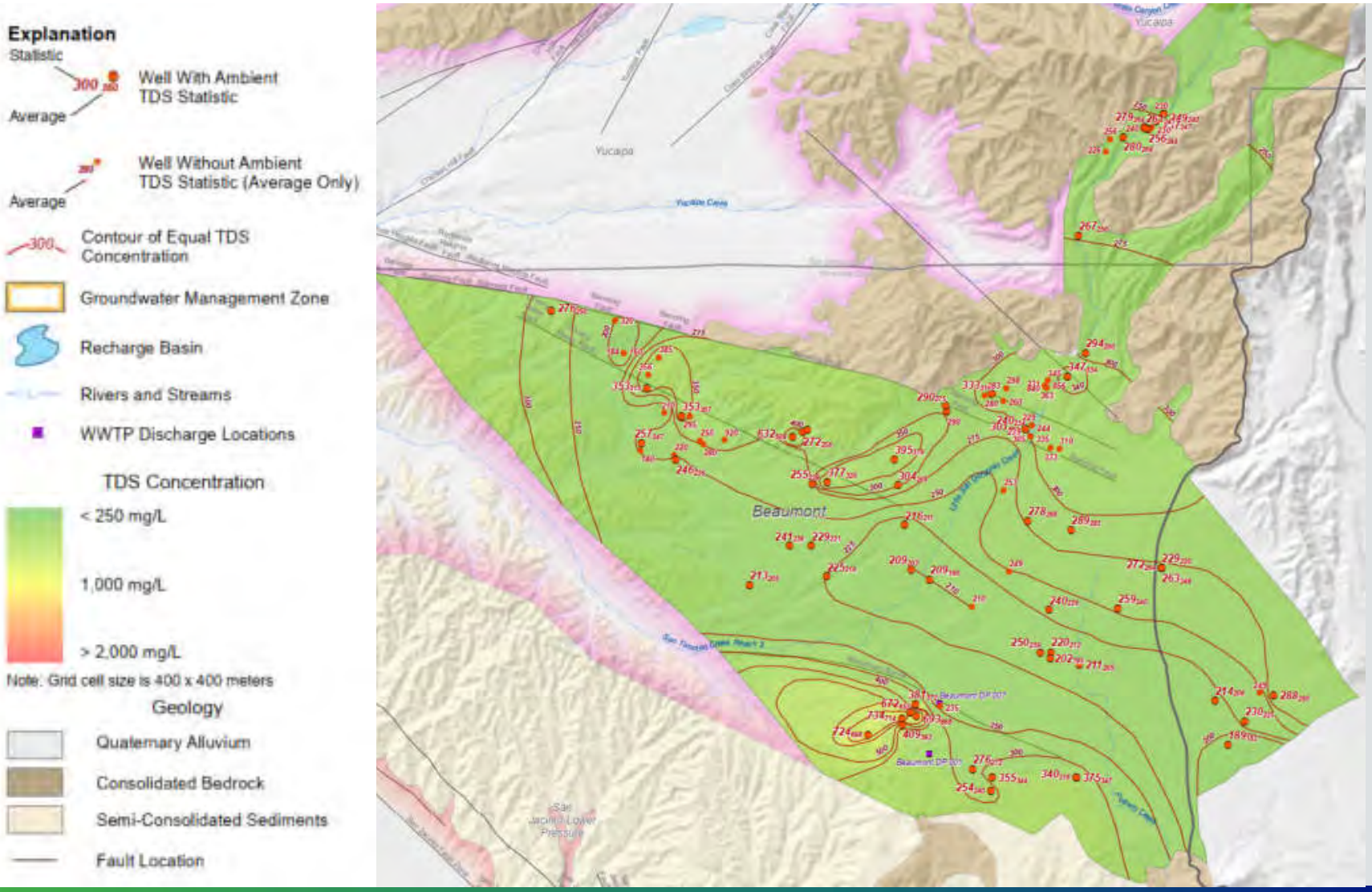
- We'll look at specific examples to support the discussion
- Keep in mind:
  - Each GMZ has its own challenges
  - A one-size fits all answers may be difficult

Discussion

Questions for Consideration in Ongoing Methods and Data Collection

- Should we continue to rely on a 20-year period of record?
  - If so, what improvements could be considered?

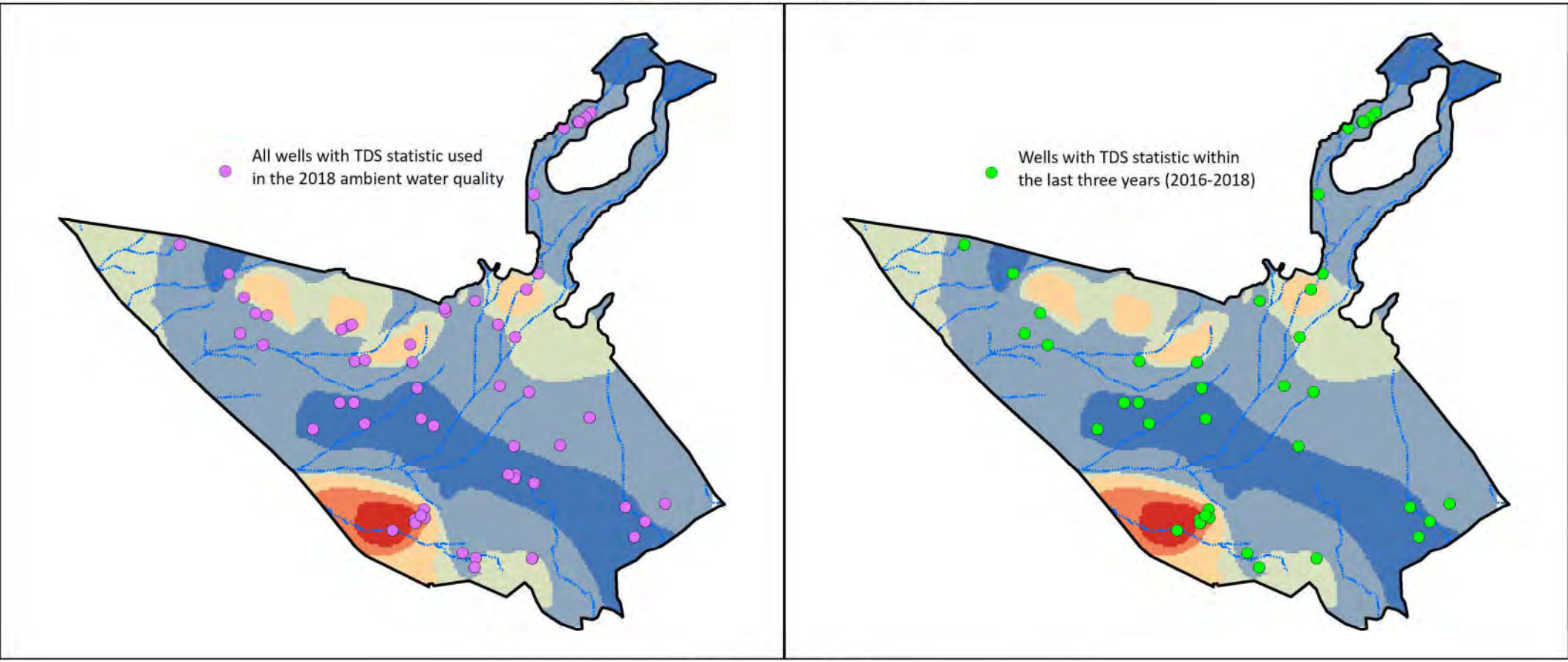
- Let look at what we do now…


Explanation
Statistic
Average
Well With Ambient TDS Statistic
Well Without Ambient TDS Statistic (Average Only)
Contour of Equal TDS Concentration
Groundwater Management Zone
Recharge Basin
Rivers and Streams
WWTP Discharge Locations
TDS Concentration
< 250 mg/L
1,000 mg/L
> 2,000 mg/L
Note: Grid cell size is 400 x 400 meters
Geology
Quaternary Alluvium
Consolidated Bedrock
Semi-Consolidated Sediments
Fault Location
Yucaipa
Beaumont

Questions for Consideration in Ongoing Methods and Data Collection

- Should we continue to rely on a 20-year period of record?
  - If so, what improvements could be considered?
- Should we prioritize wells with recent data only (over any data within analysis period)?
- Example of revised qualifying criteria:
  - Minimum of three years of data in the 20-year period ***AND*** data in the last three-year period

Beaumont Groundwater Management Zone

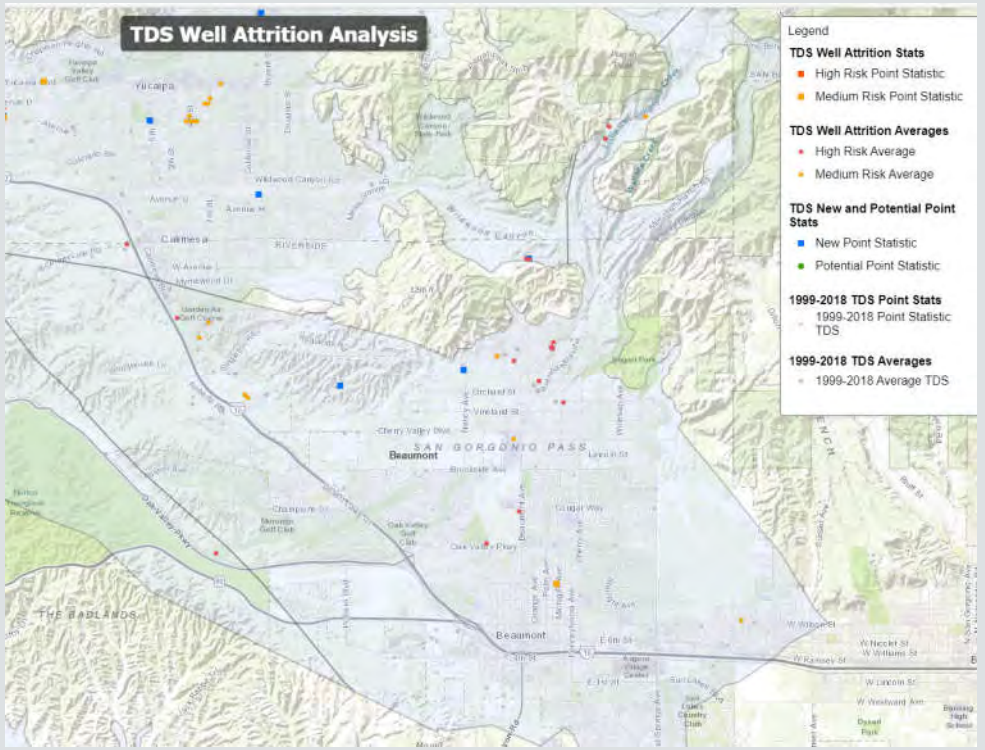


2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 330 mgl, antidegradation objective is 230 mgl)

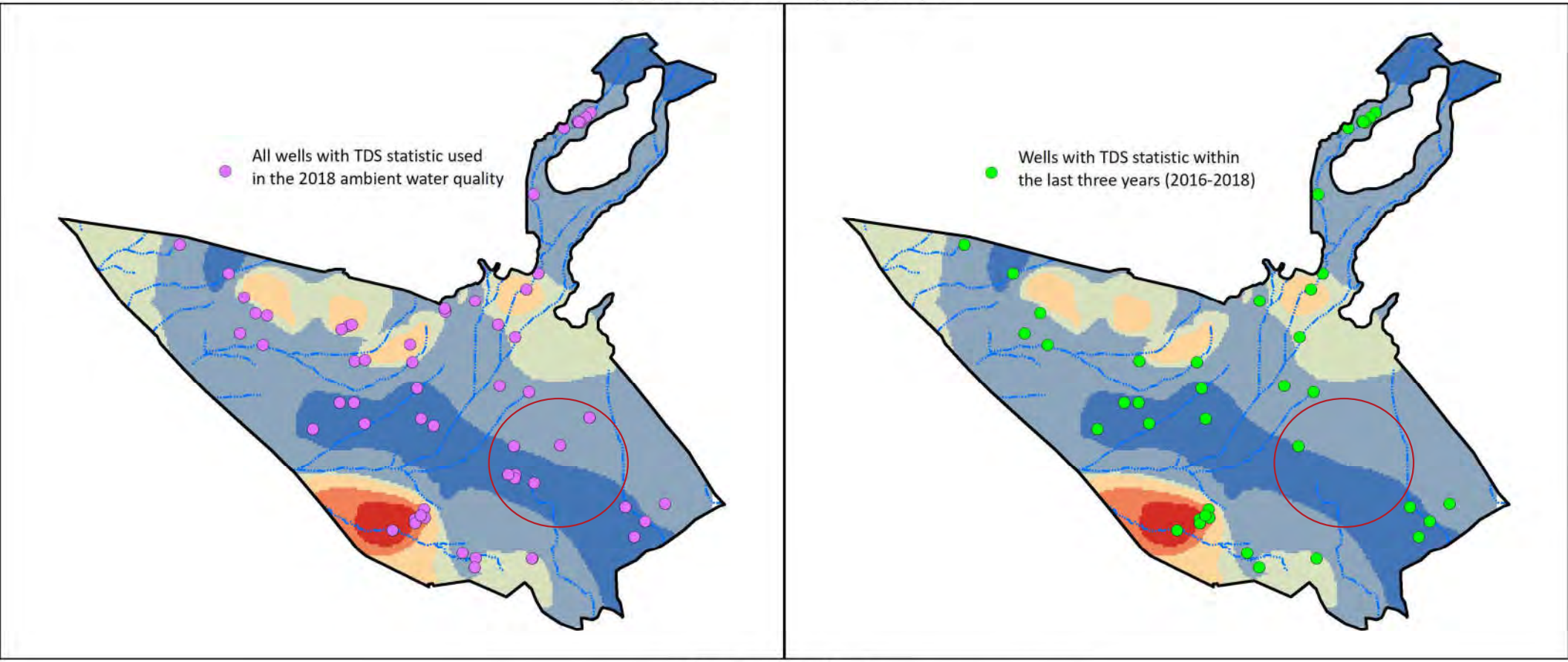
190 - 230	>300 - 330	>430 - 530
>230 - 300	>330 - 430	>530 - 700

Questions for Consideration in Ongoing Methods and Data Collection

- Well Attrition helps us keep track of when we will lose data in the next six years
- Looking only at the loss of wells with no data for the last 14 years
- Recommendation: Focus on building and maintaining 20-year record at wells with recent data

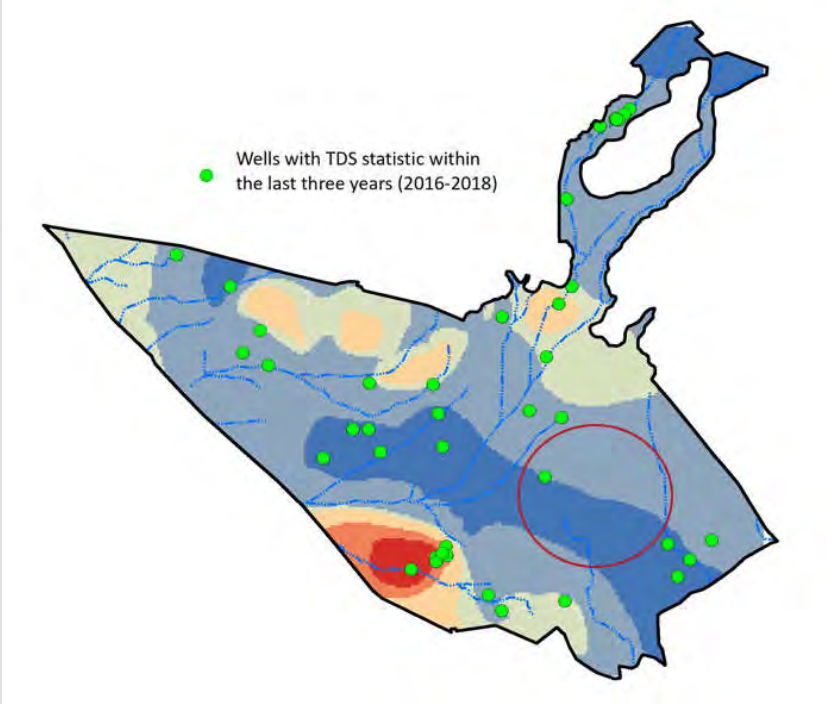


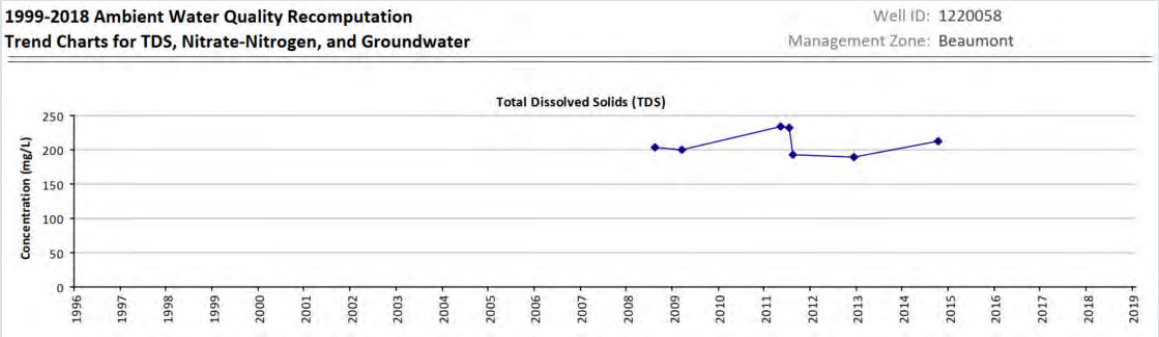
Beaumont Groundwater Management Zone

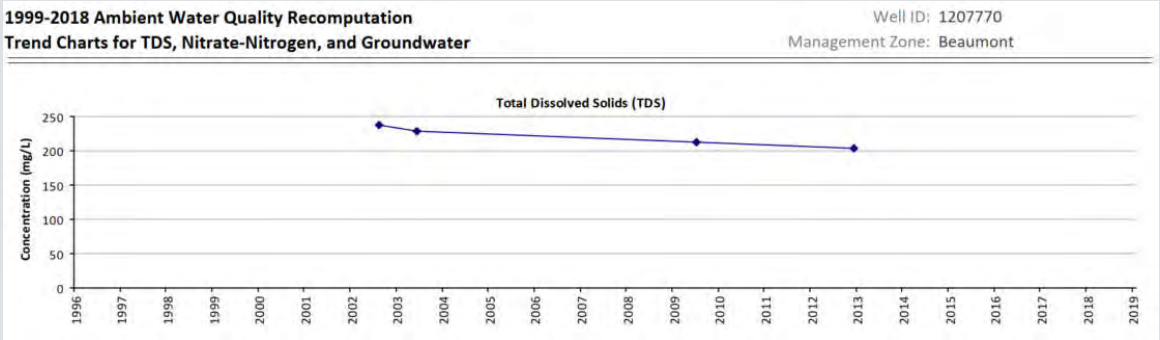


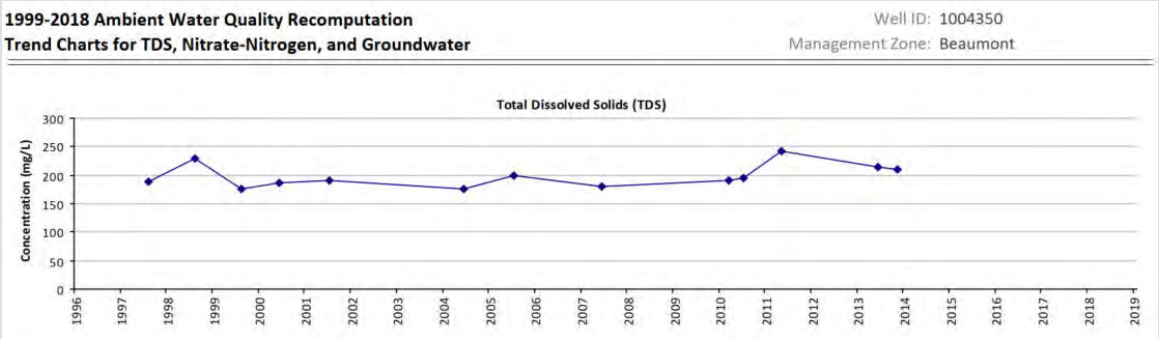
2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 330 mgl, antidegradation objective is 230 mgl)

190 - 230	>300 - 330	>430 - 530
>230 - 300	>330 - 430	>530 - 700

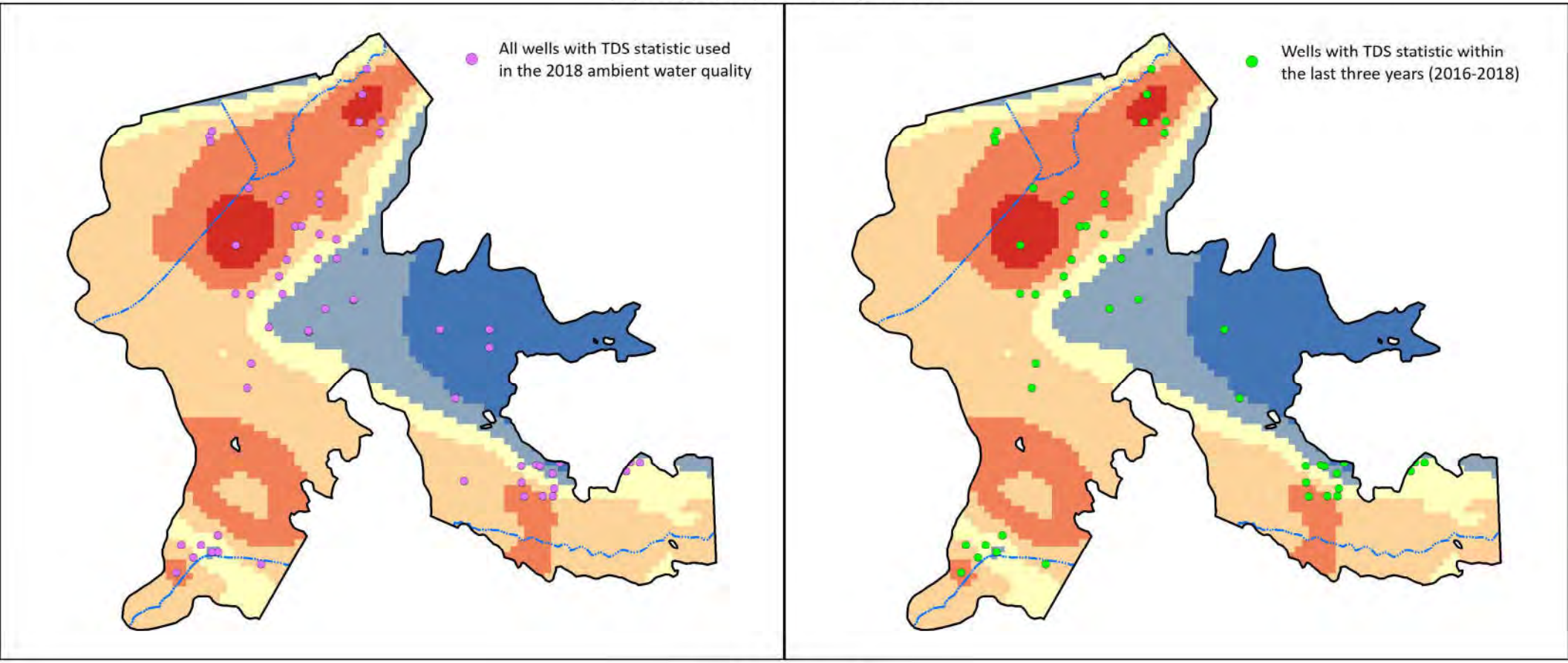

Wells with TDS statistic within
the last three years (2016-2018)


1999-2018 Ambient Water Quality Recomputation
Trend Charts for TDS, Nitrate-Nitrogen, and Groundwater
Well ID: 1220058
Management Zone: Beaumont
Total Dissolved Solids (TDS)
Concentration (mg/L)


1999-2018 Ambient Water Quality Recomputation
Trend Charts for TDS, Nitrate-Nitrogen, and Groundwater
Well ID: 1207770
Management Zone: Beaumont
Total Dissolved Solids (TDS)
Concentration (mg/L)


1999-2018 Ambient Water Quality Recomputation
Trend Charts for TDS, Nitrate-Nitrogen, and Groundwater
Well ID: 1004350
Management Zone: Beaumont
Total Dissolved Solids (TDS)
Concentration (mg/L)

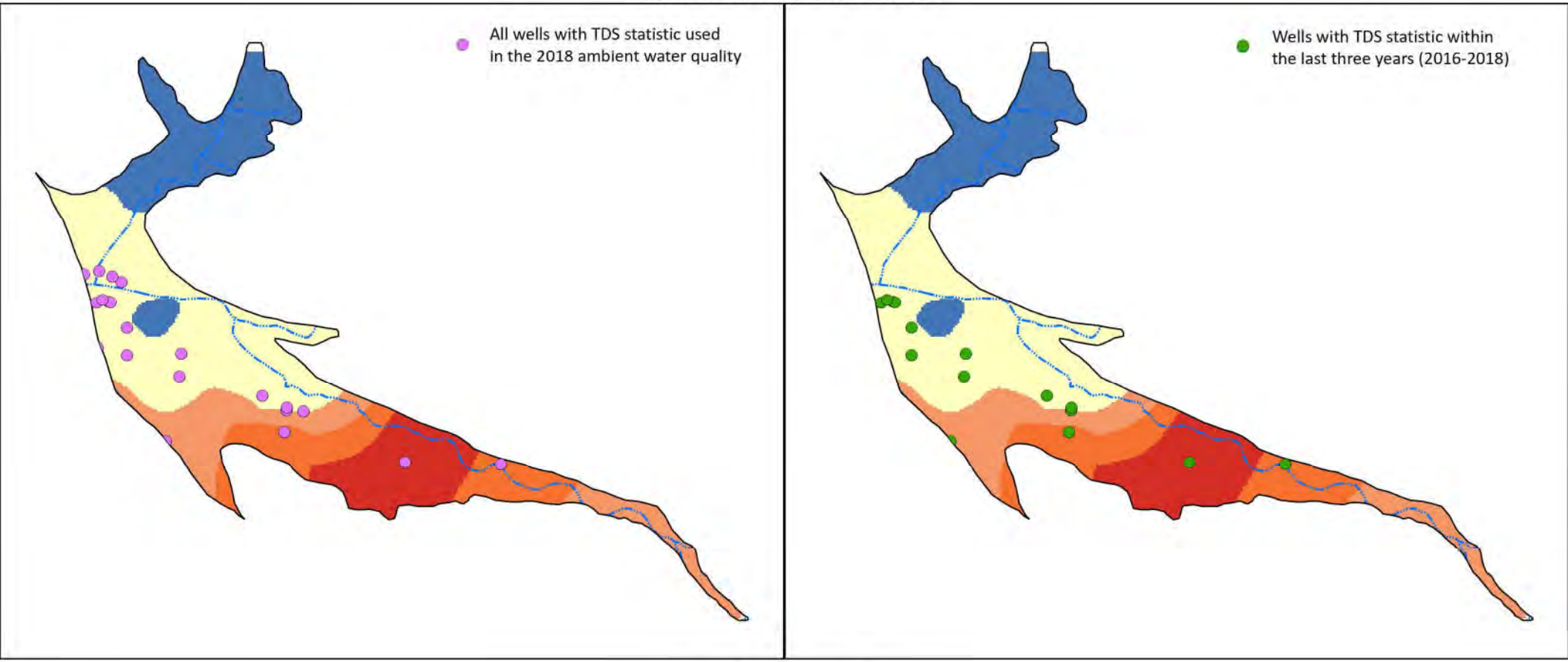
Perris South Groundwater Management Zone



2018 Ambient TDS (mgl)
(TDS objective is 1,260 mgl)

180 - 700	>1,260 - 2,000	>2,800 - 4,400
>700 - 1,260	>2,000 - 2,800	>4,400 - 8,000

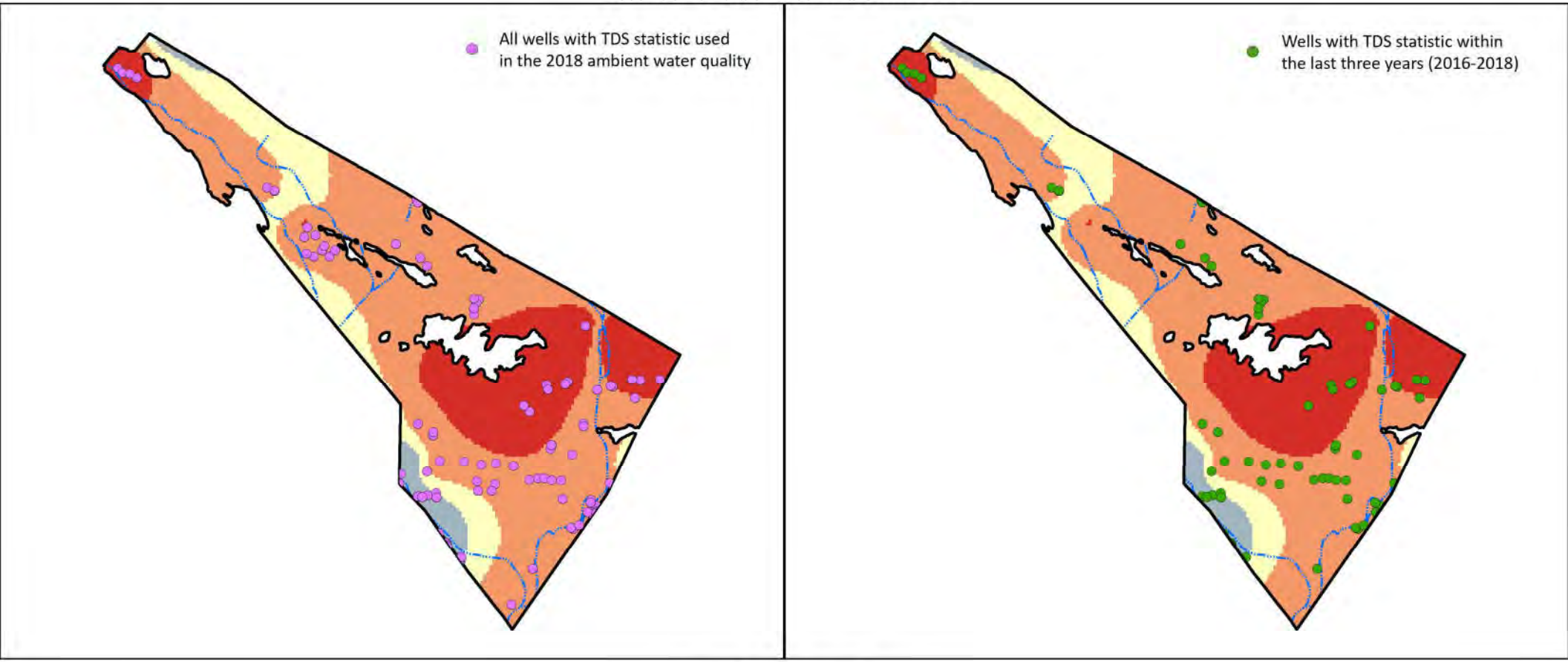
Canyon Groundwater Management Zone



2018 Ambient TDS (mgl)
(TDS objective is 230 mgl)

196 - 230 | 231 - 330 | 331 - 430 | 431 - 530 | 531 - 630

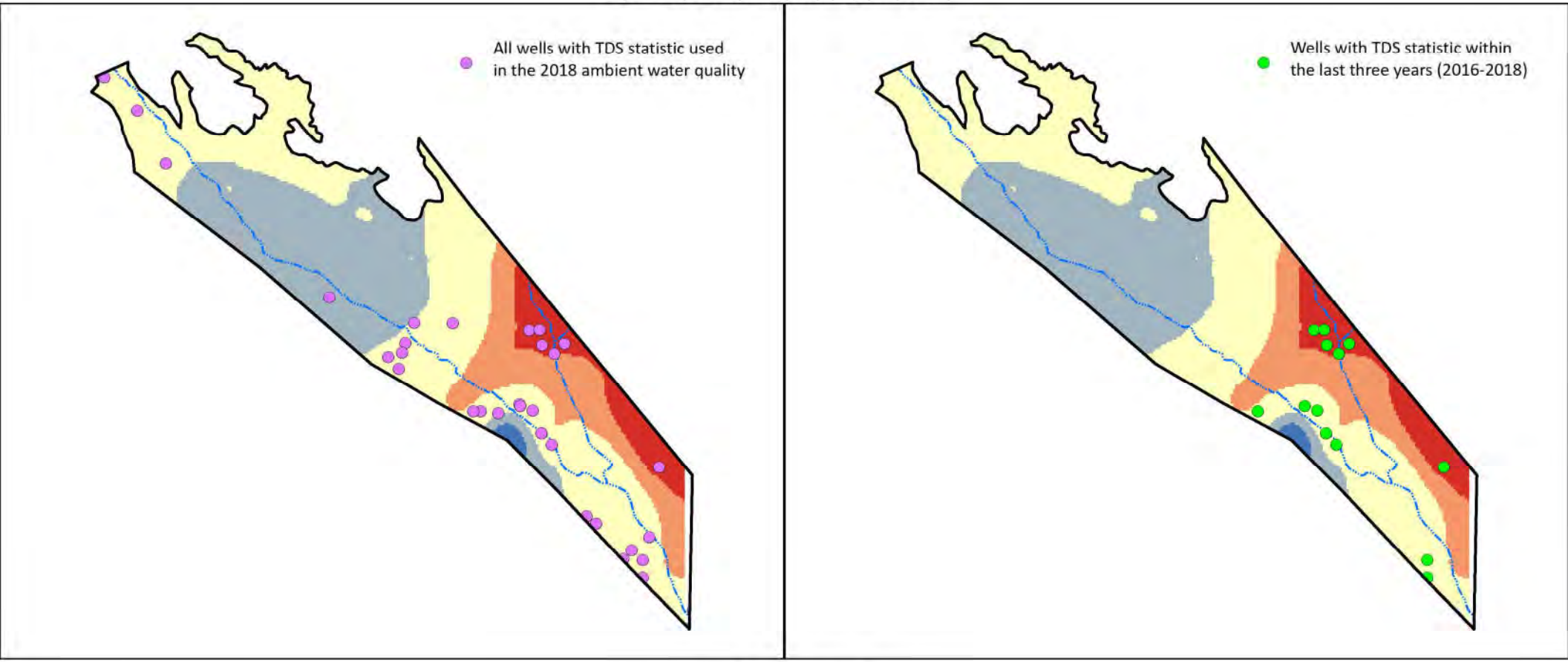
Bunker Hill - A Groundwater Management Zone



2018 Ambient TDS (mgl)
(TDS objective is 310 mgl)

195 - 250 | > 310 - 340
> 250 - 310 | > 340 - 380 | > 380 - 510

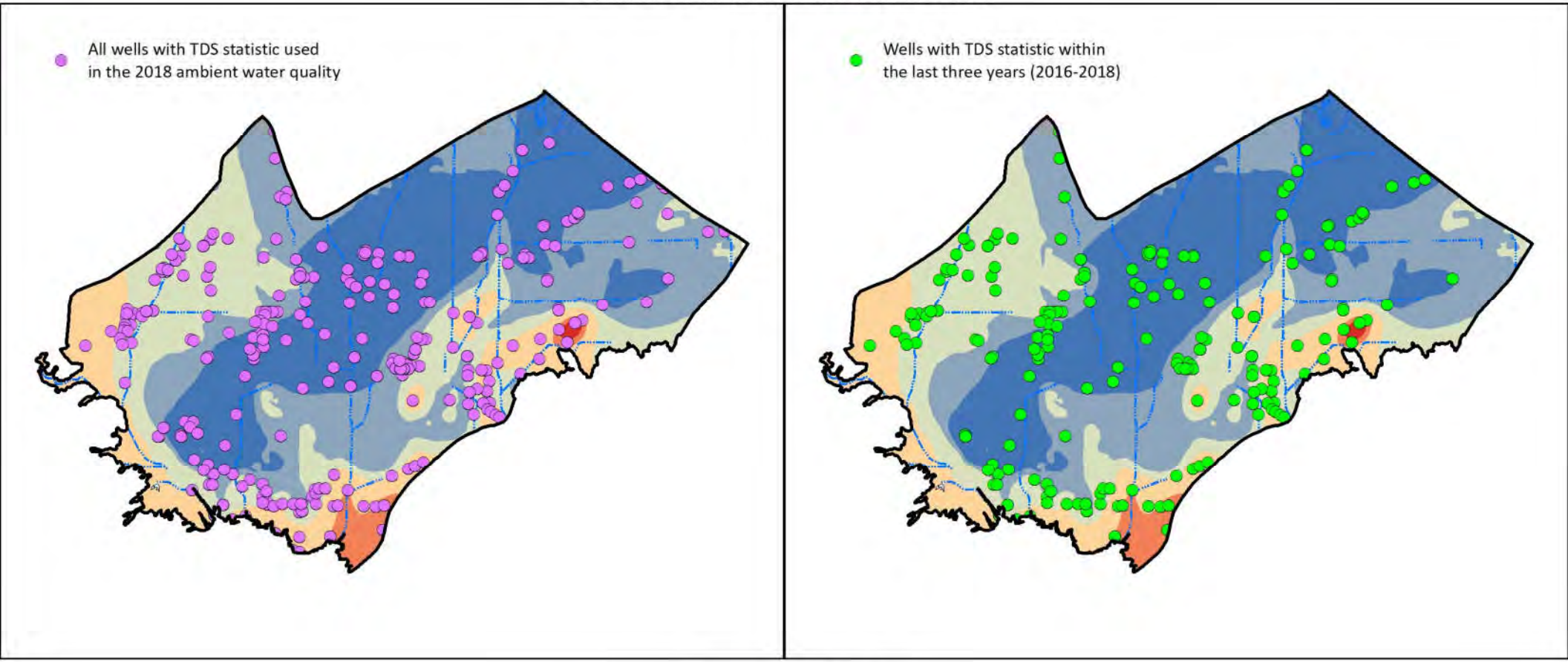
Lytle Creek Groundwater Management Zone



2018 Ambient TDS (mgl)
(TDS objective is 260 mgl)

> 120 - 160	> 190 - 260
> 160 - 190	> 260 - 300
	> 300 - 370

Chino North Groundwater Management Zone - Layer 2



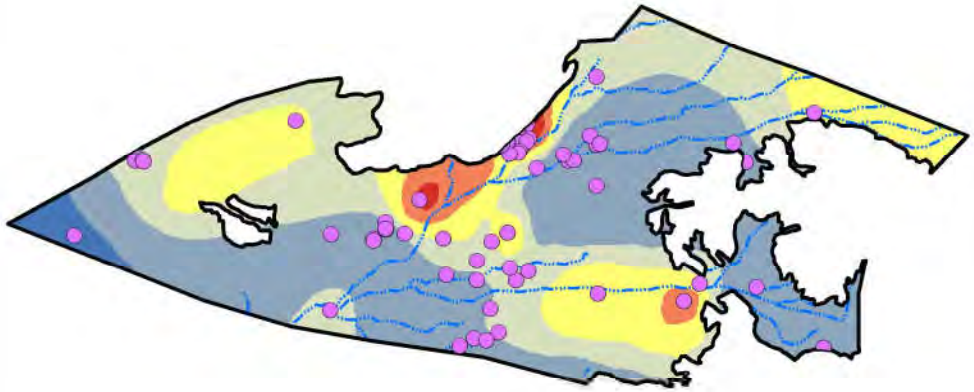
Questions for Consideration in Ongoing Methods and Data Collection

- Is all data good data? Is all data relevant data?
  - Should we include landfill or other clean-up site monitoring wells? If so, all of them or case by case?
  - Should the high TDS concentrations along the Pacific Coast of Orange County GMZ be included in the ambient concentration – especially in light of regional groundwater management actions to address seawater intrusion?
  - Are there other examples of data that is not relevant?

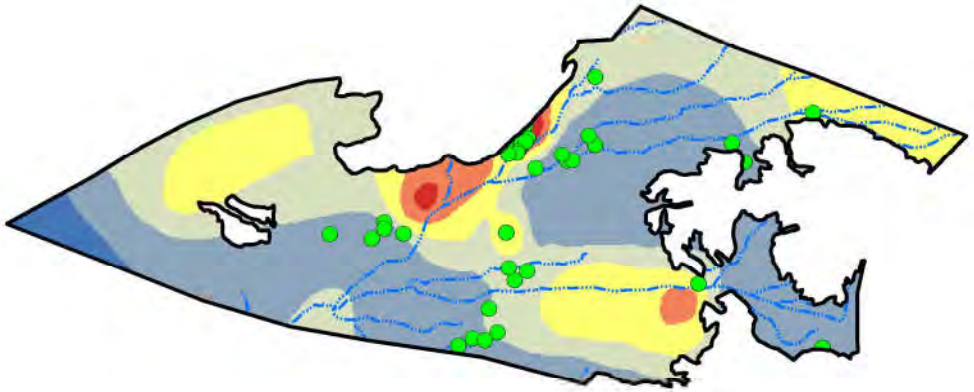
- Should we reduce the analysis to a set of key wells that MUST be monitored?

Yucaipa Groundwater Management Zone

All wells with TDS statistic used in the 2018 ambient water quality



Wells with TDS statistic within the last three years (2016-2018)

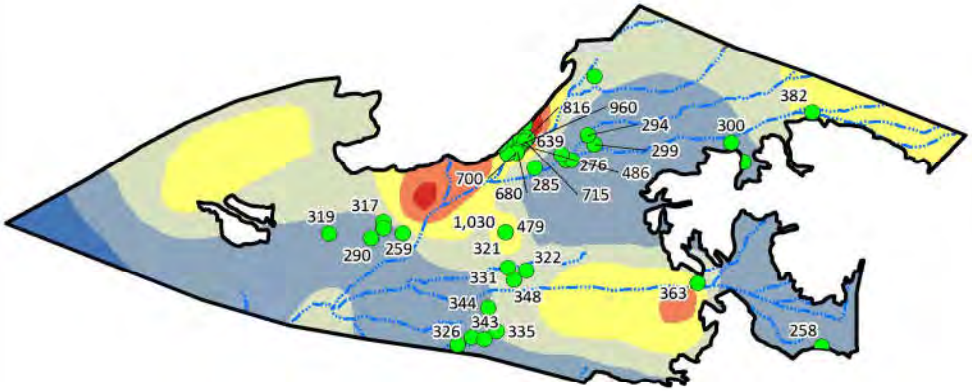


2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 370 mgl, TDS antidegradation objective is 320 mgl)

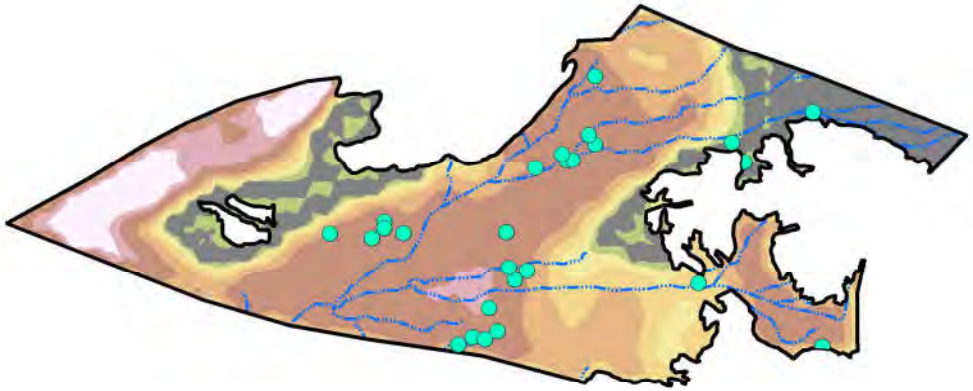
130 - 250	>320 - 370	>450 - 550
>250 - 320	>370 - 450	>550 - 815

Yucaipa Groundwater Management Zone

Wells with TDS statistic within the last three years (2016-2018)



Non-landfill wells with TDS statistic within the last three years (2016-2018)



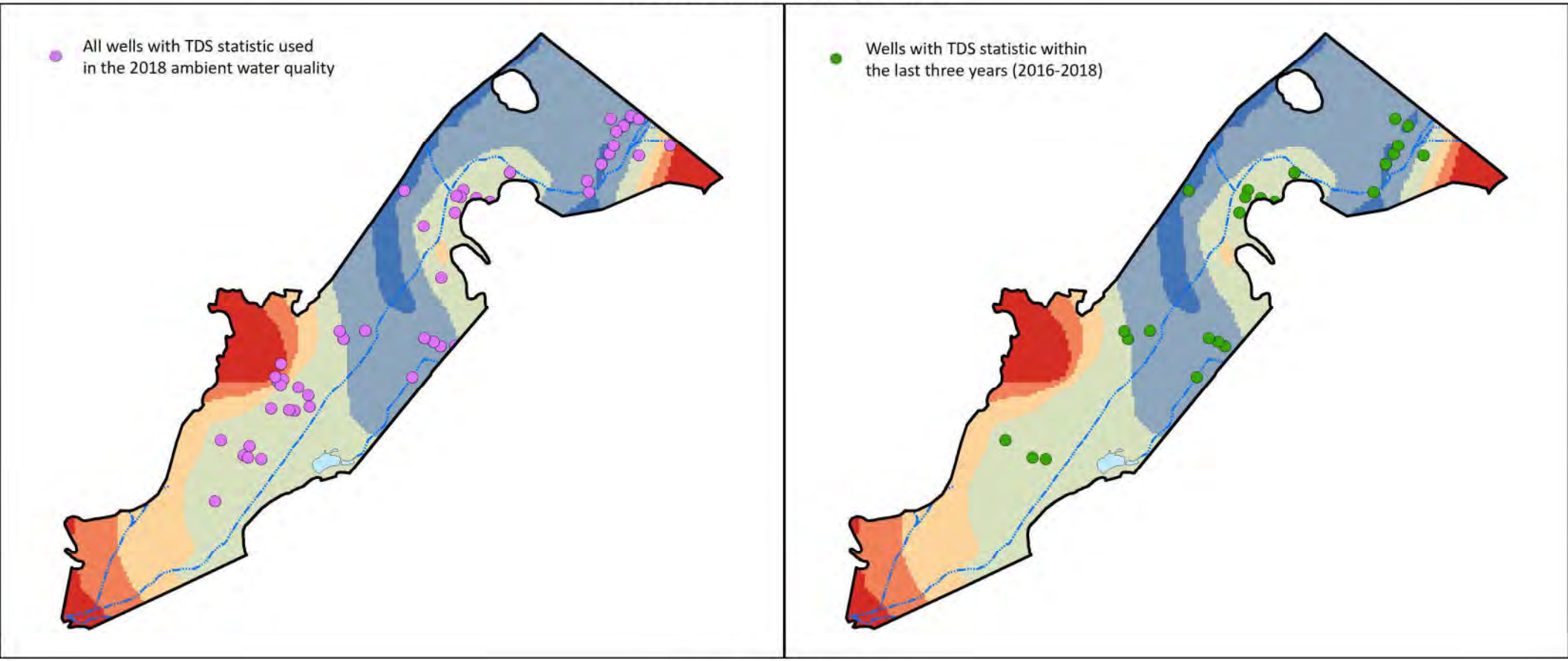
2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 370 mgl, TDS antidegradation objective is 320 mgl)

130 - 250	>320 - 370	>450 - 550
>250 - 320	>370 - 450	>550 - 815

2018 Groundwater Storage (af)

0 - 1	>200 - 500	>2,000 - 2,500
>1 - 50	>500 - 1,000	>2,500 - 4,900
>50 - 200	>1,000 - 2,000	

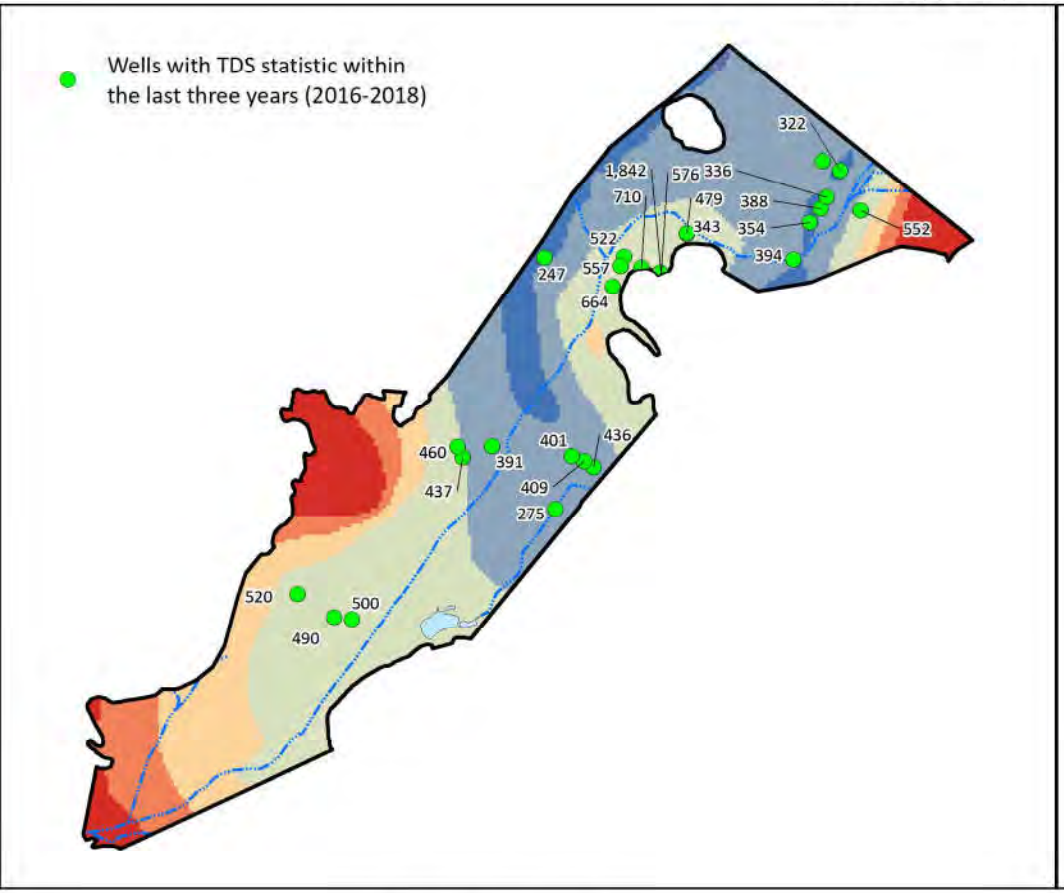
Riverside-A Groundwater Management Zone

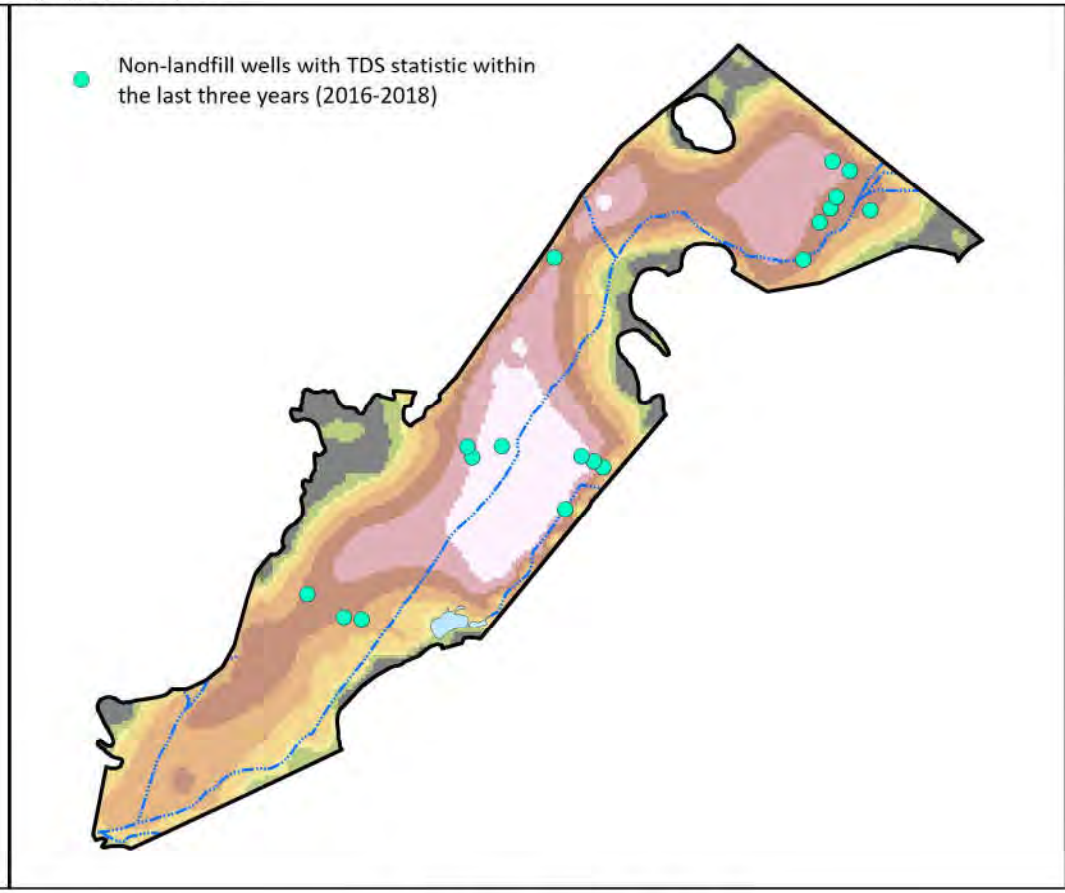


2018 Ambient TDS (mgl)
(TDS objective is 560 mgl)

266 - 300	>450 - 560	>650 - 750
>300 - 450	>560 - 650	>750 - 890

Riverside-A Groundwater Management Zone





2018 Ambient TDS (mgl)
(TDS objective is 560 mgl)

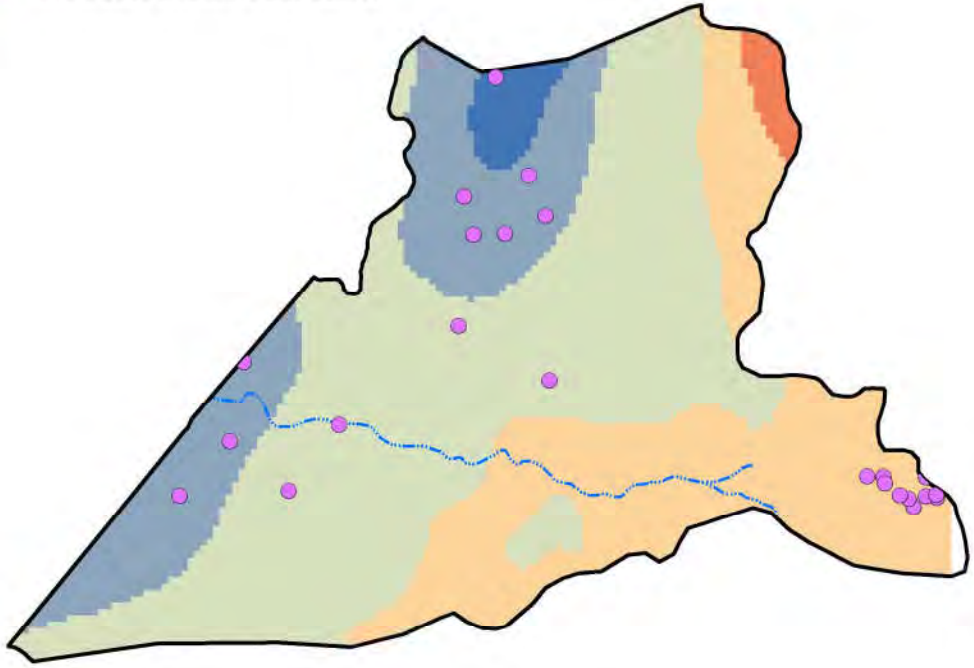
266 - 300	>450 - 560	>650 - 750
>300 - 450	>560 - 650	>750 - 890

2018 Groundwater Storage (af)

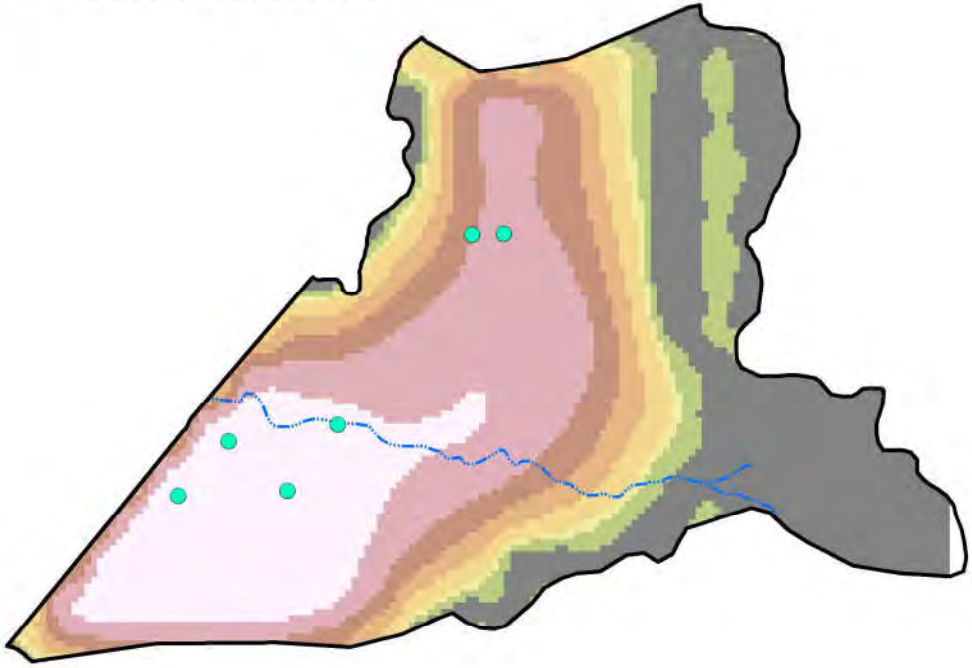
0 - 1	>50 - 100	>300 - 600	>1,000 - 1,500
>1 - 50	>100 - 300	>600 - 1,000	>1,500 - 2,380

Riverside-F Groundwater Management Zone

All wells with TDS statistic used in the 2018 ambient water quality



Non-landfill wells with TDS statistic within the last three years (2016-2018)



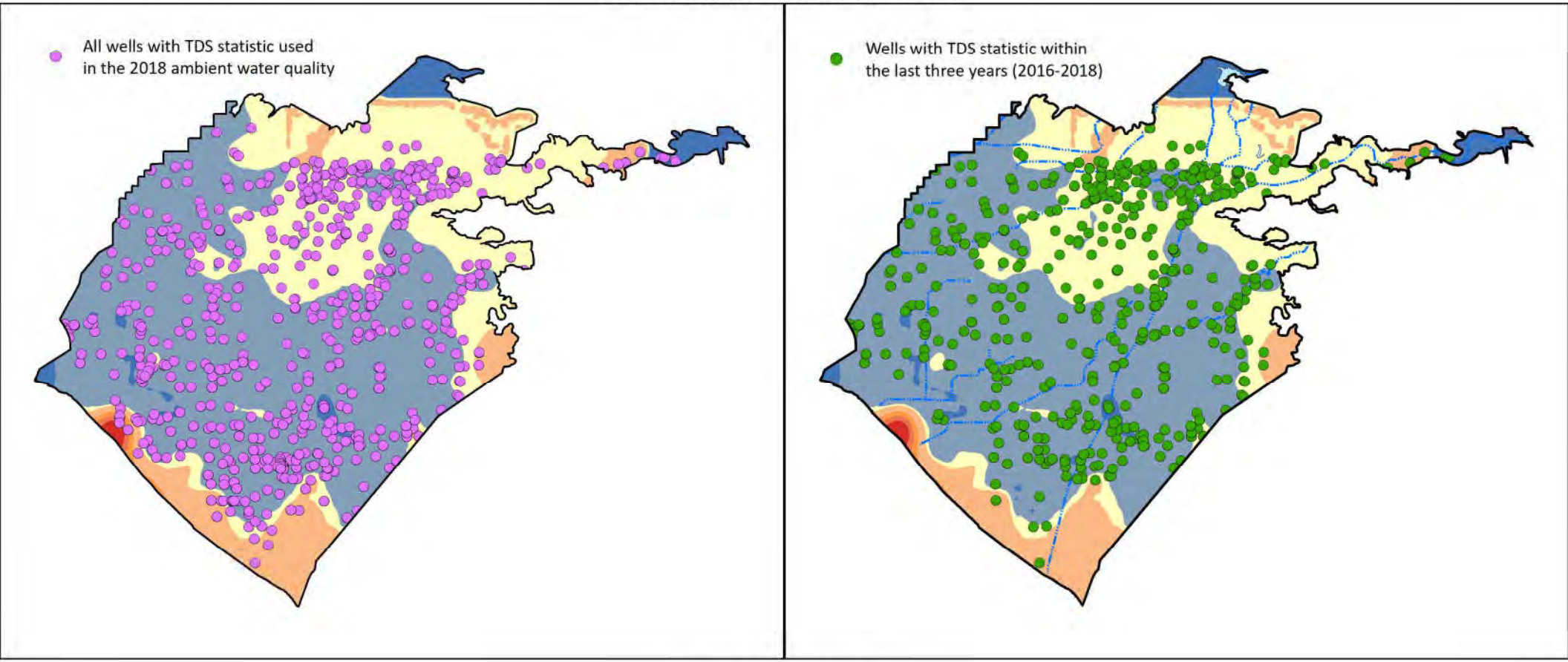
2018 Ambient TDS (mgl)
(TDS objective is 720 mgl)

- 244 - 300
- >300 - 500
- >500 - 720
- >720 - 800
- >800 - 850

2018 Groundwater Storage (af)

- 0 - 1
- >1 - 50
- >50 - 100
- >100 - 300
- >300 - 600
- >600 - 1,000
- >1,000 - 1,500
- >1,500 - 2,390

Orange County Groundwater Management Zone



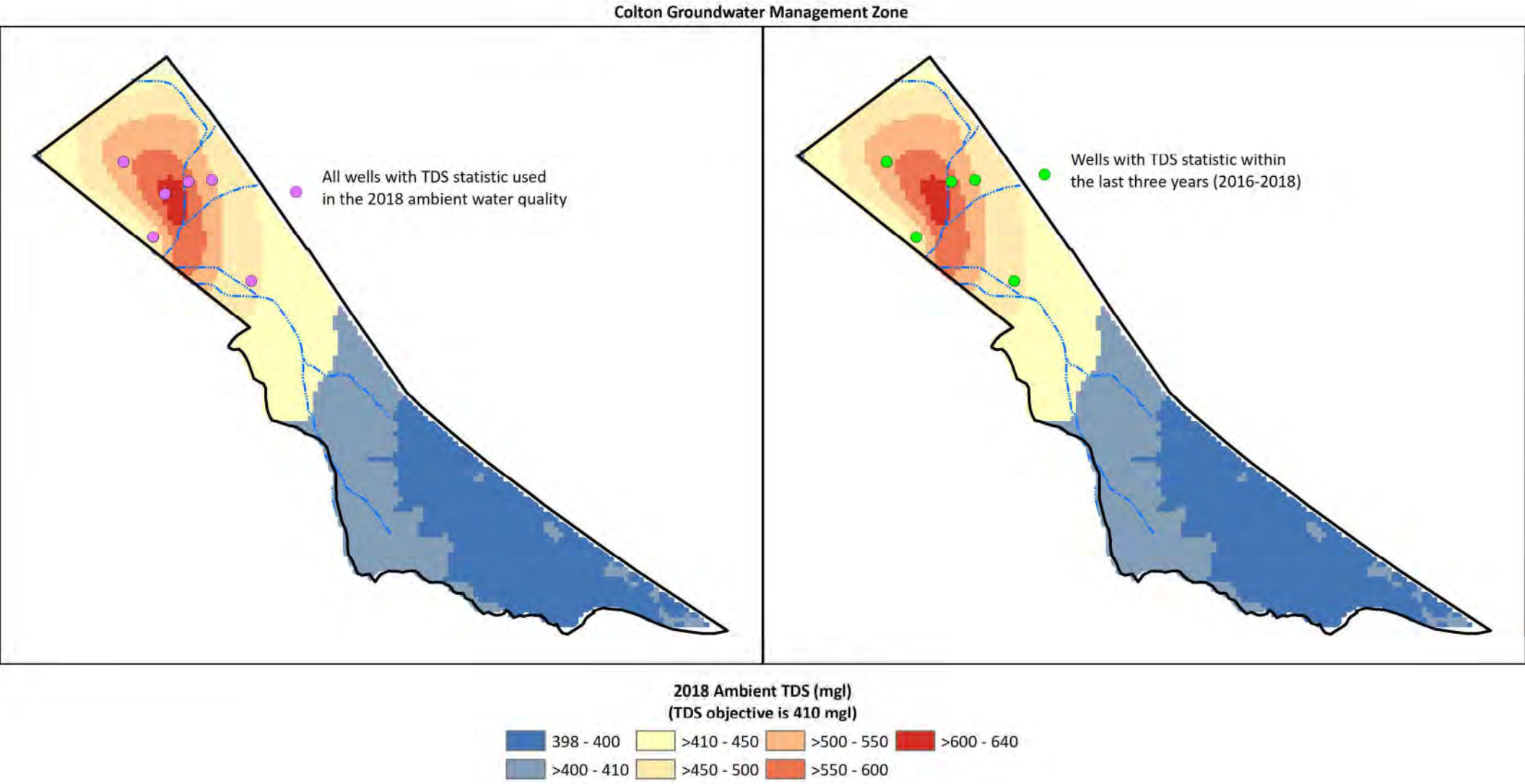
2018 Ambient TDS (mgl)
(TDS objective is 580 mgl)

< 250	> 580 - 1,000	> 5,000 - 10,000	> 16,000 - 26,500
> 250 - 580	> 1,000 - 5,000	> 10,000 - 16,000	

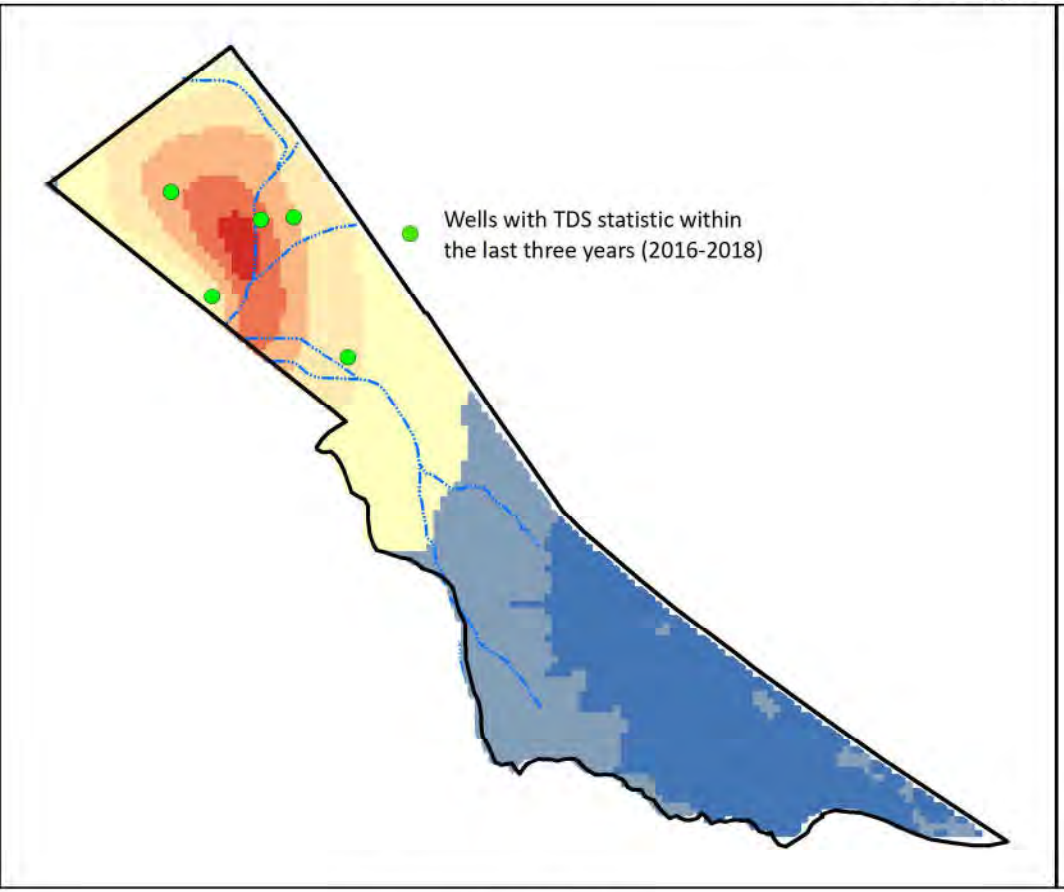
Questions for Consideration in Ongoing Methods and Data Collection

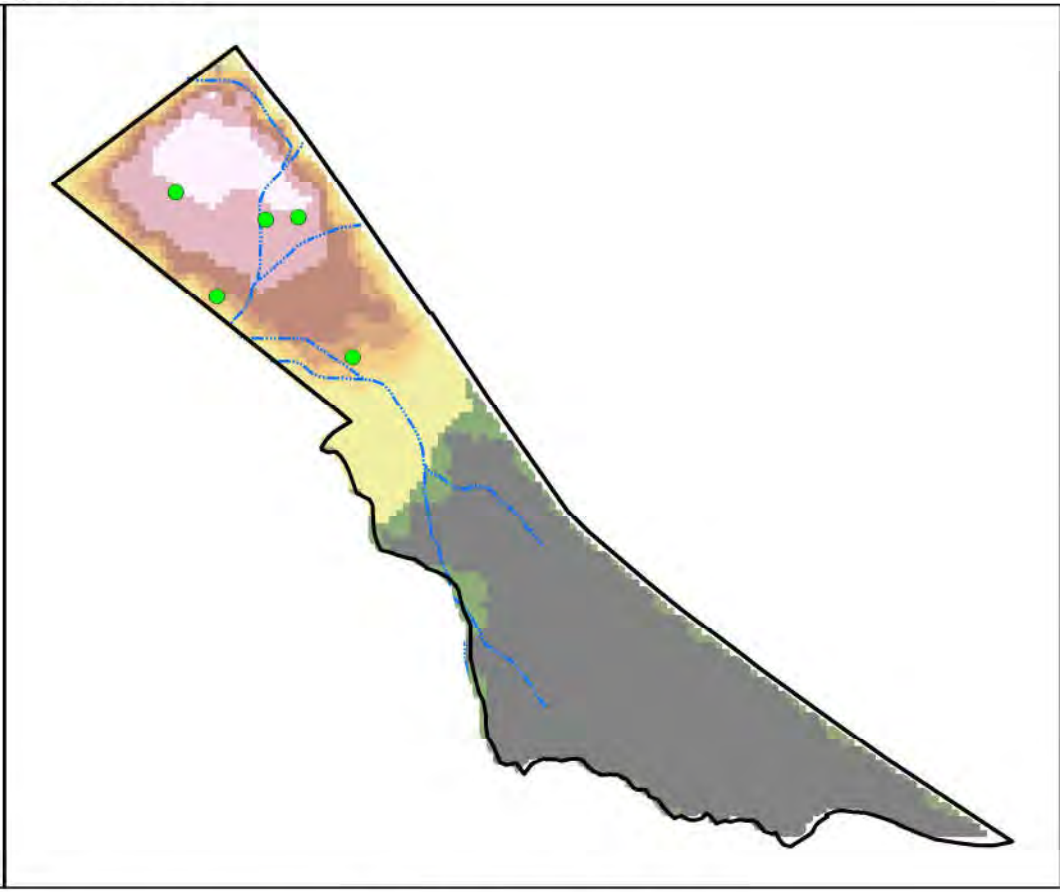
- What is a data gap?

- Should we limit the area of analysis to exclude areas with no data and/or limited aquifer volume?


Colton Groundwater Management Zone
All wells with TDS statistic used
in the 2018 ambient water quality
Wells with TDS statistic within
the last three years (2016-2018)
2018 Ambient TDS (mgl)
(TDS objective is 410 mgl)
398 - 400
>400 - 410
>410 - 450
>450 - 500
>500 - 550
>550 - 600
>600 - 640

Colton Groundwater Management Zone





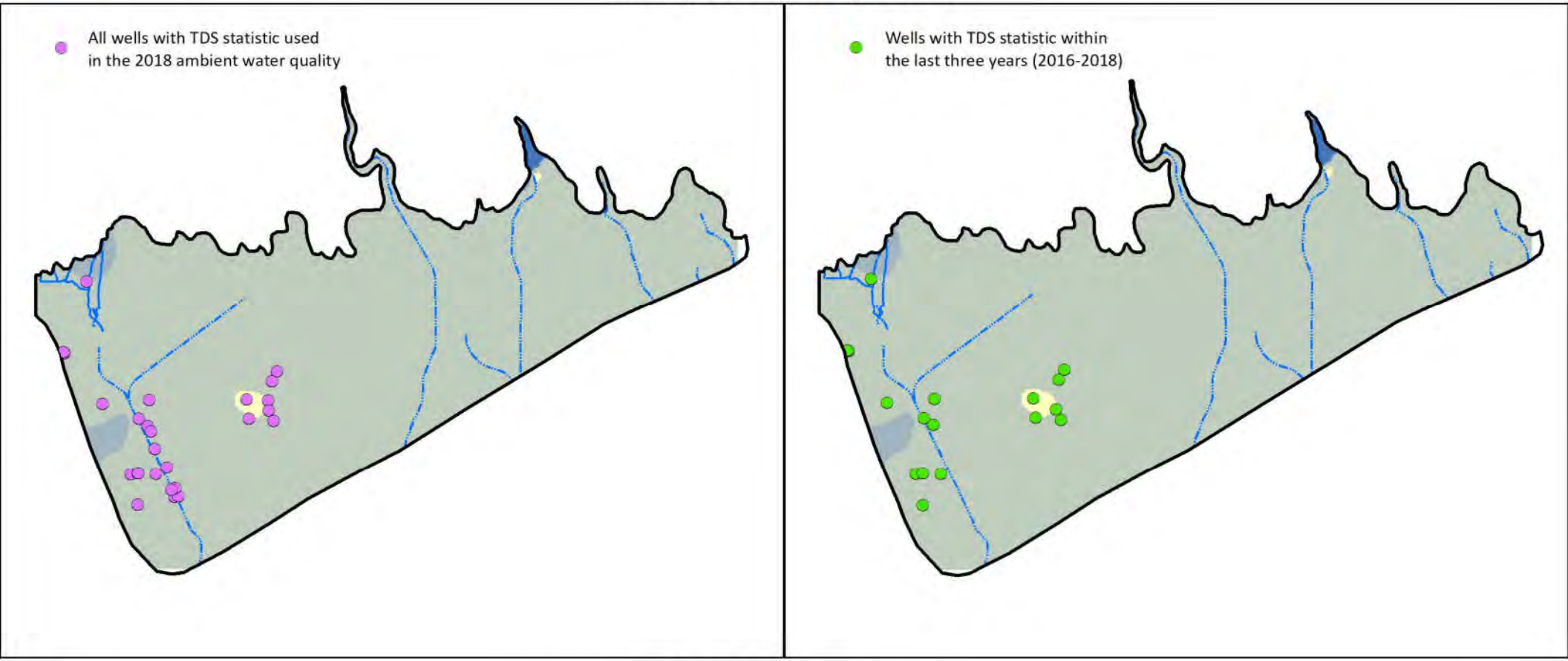
2018 Ambient TDS (mgl)
(TDS objective is 410 mgl)

398 - 400	>410 - 450	>500 - 550	>600 - 640
>400 - 410	>450 - 500	>550 - 600	

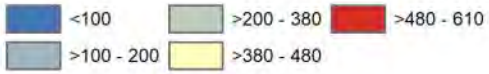
2018 Groundwater Storage (af)

0 - 1	>50 - 1,200	>1,600 - 2,000	>2,400 - 2,800	>3,200 - 3,410
>1 - 50	>1,200 - 1,600	>2,000 - 2,400	>2,800 - 3,200	

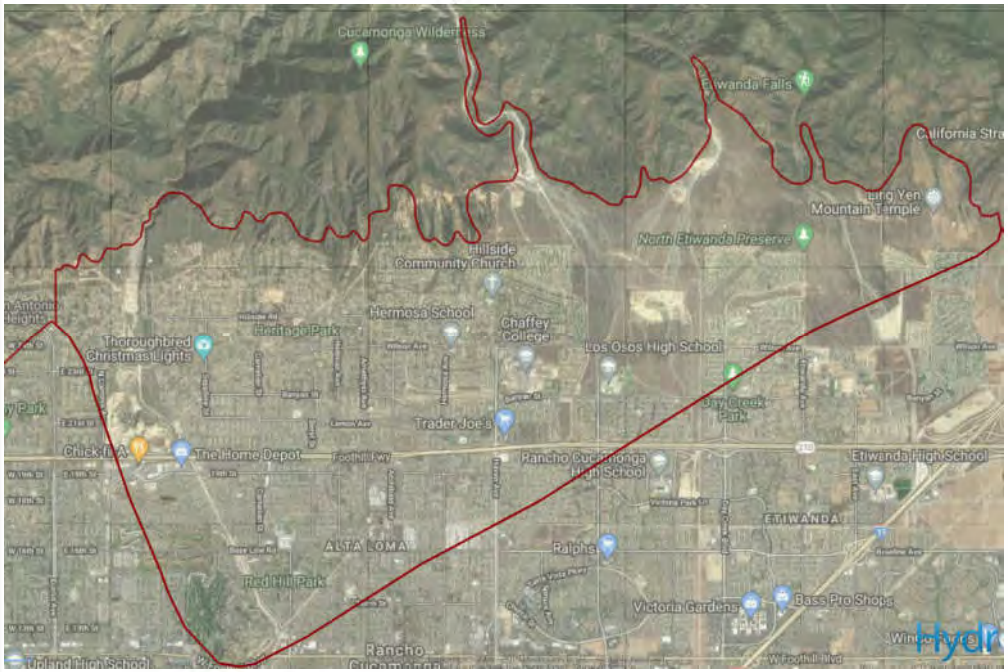
Cucamonga Groundwater Management Zone

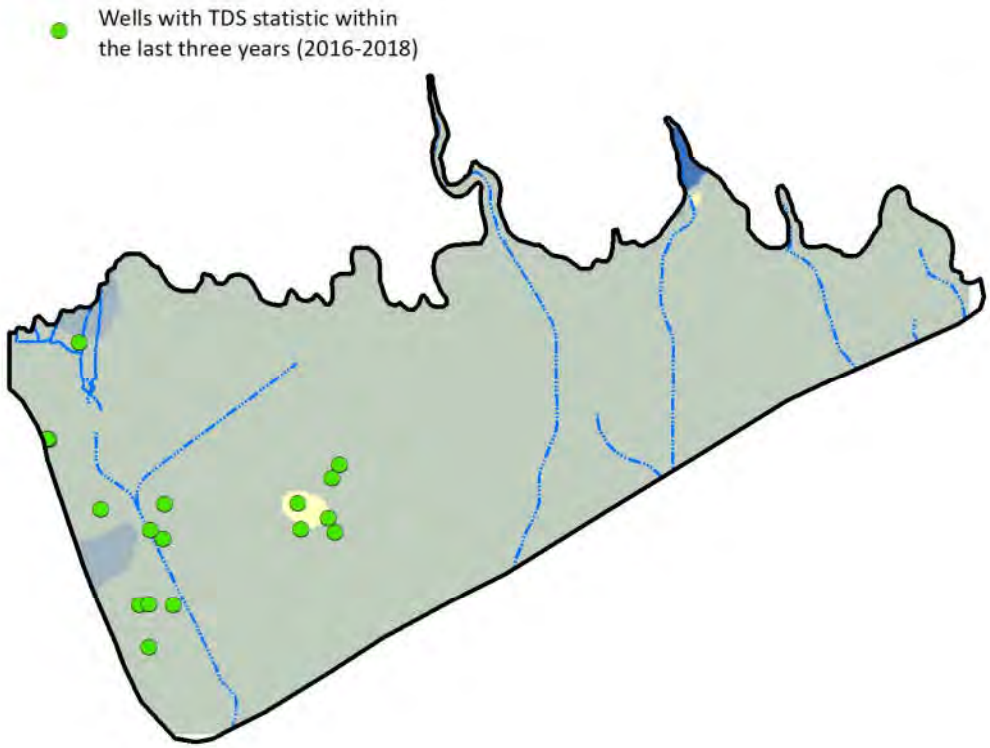


2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 380 mgl)



Cucamonga Groundwater Management Zone

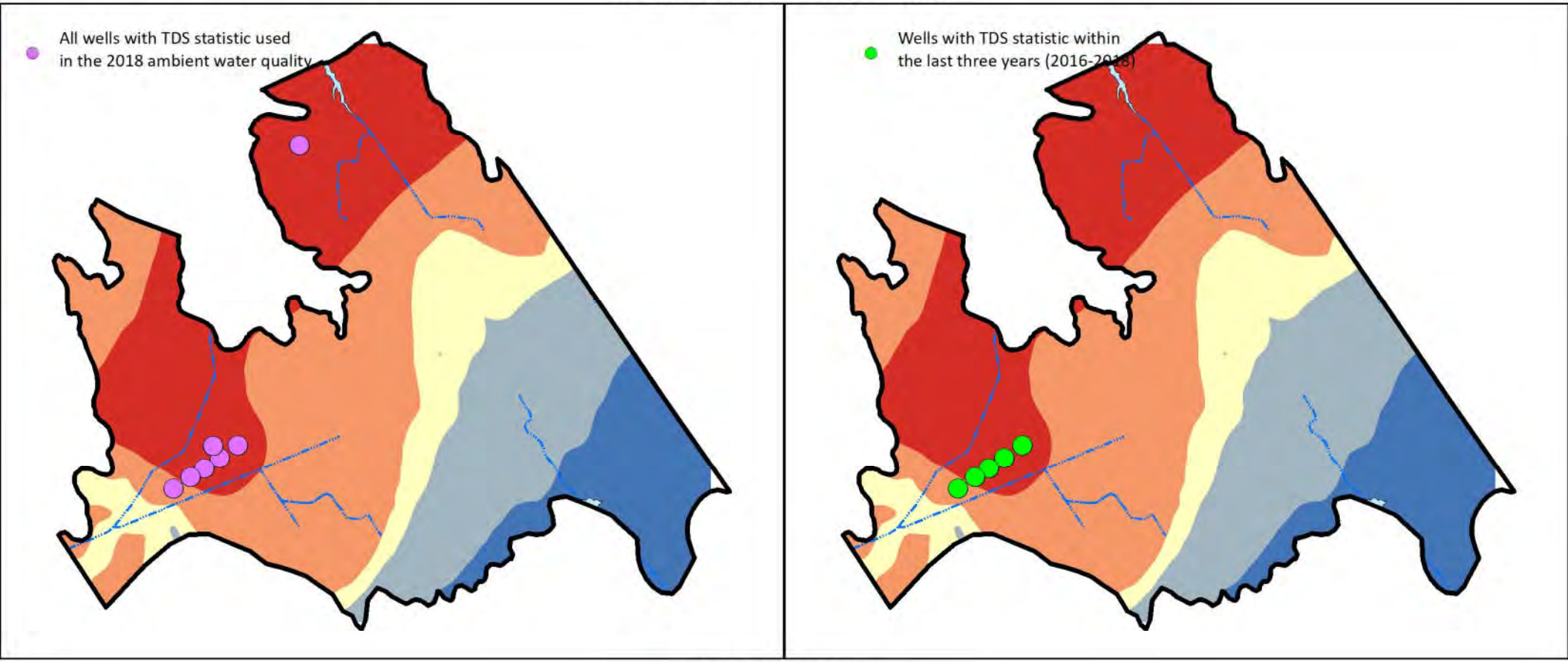




2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 380 mgl)

<100	>200 - 380	>480 - 610
>100 - 200	>380 - 480	

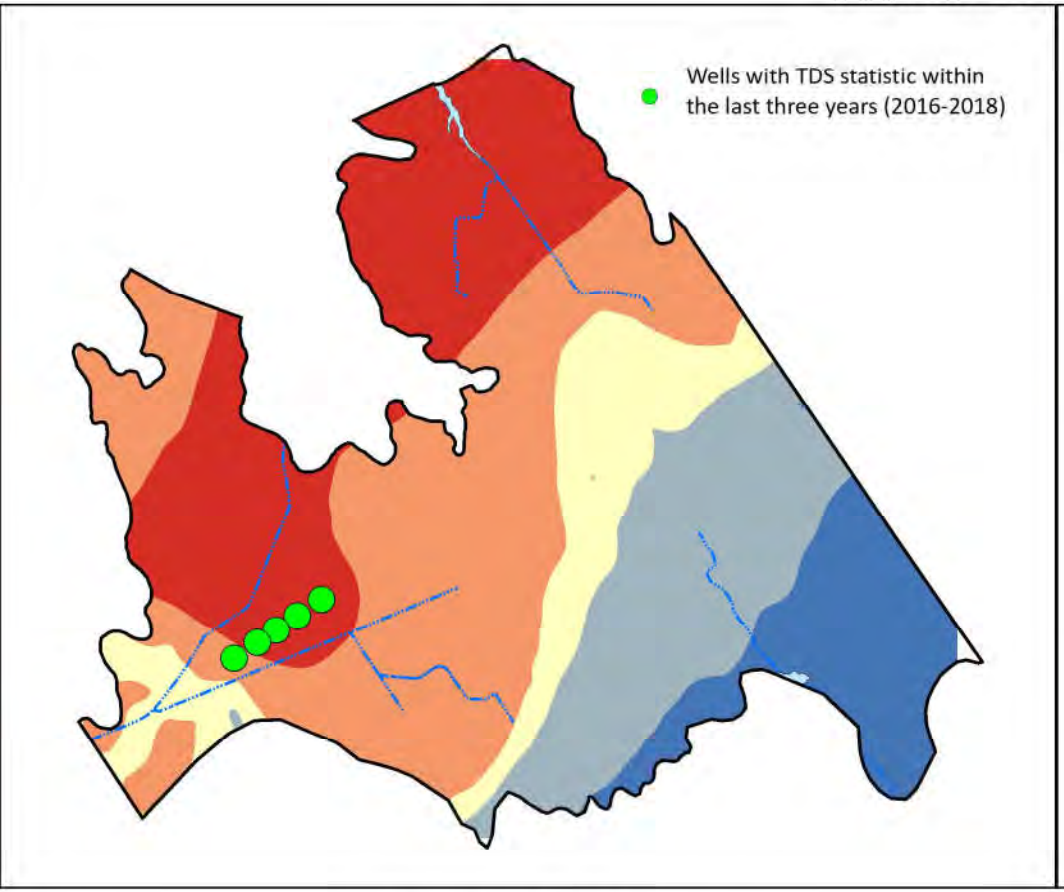
Arlington Groundwater Management Zone

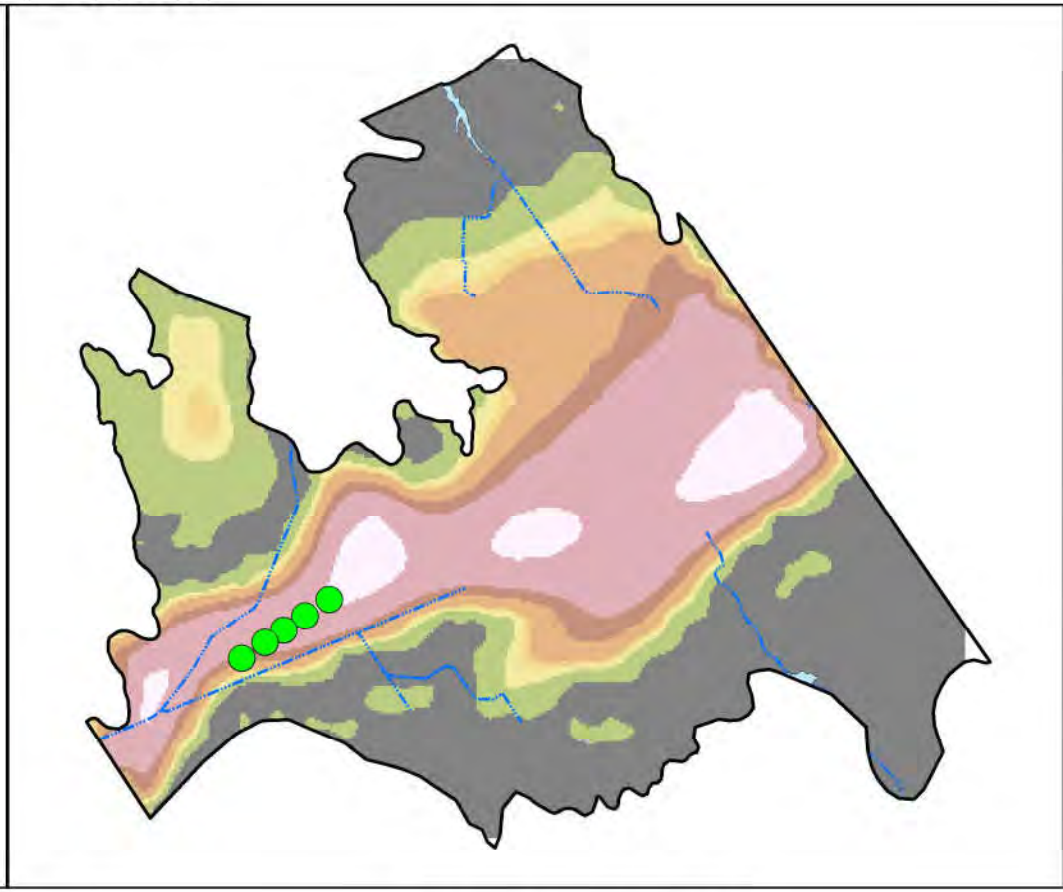


2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 980 mgll)

794 - 880	981 - 1,000	1,110 - 1,200
881 - 980	1,010 - 1,100	

Arlington Groundwater Management Zone



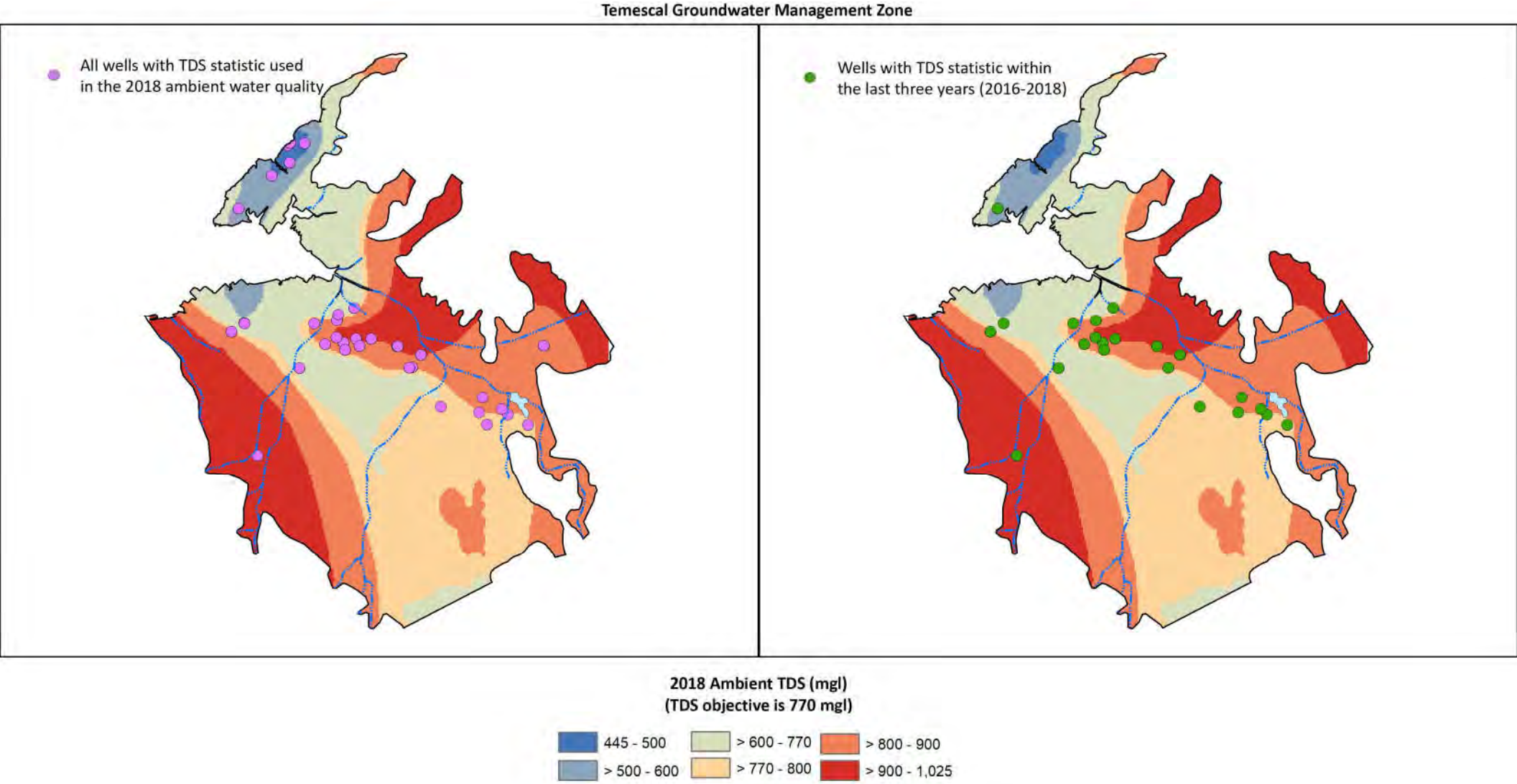


2018 Ambient TDS (mgl)
(TDS maximum benefit objective is 980 mgll)

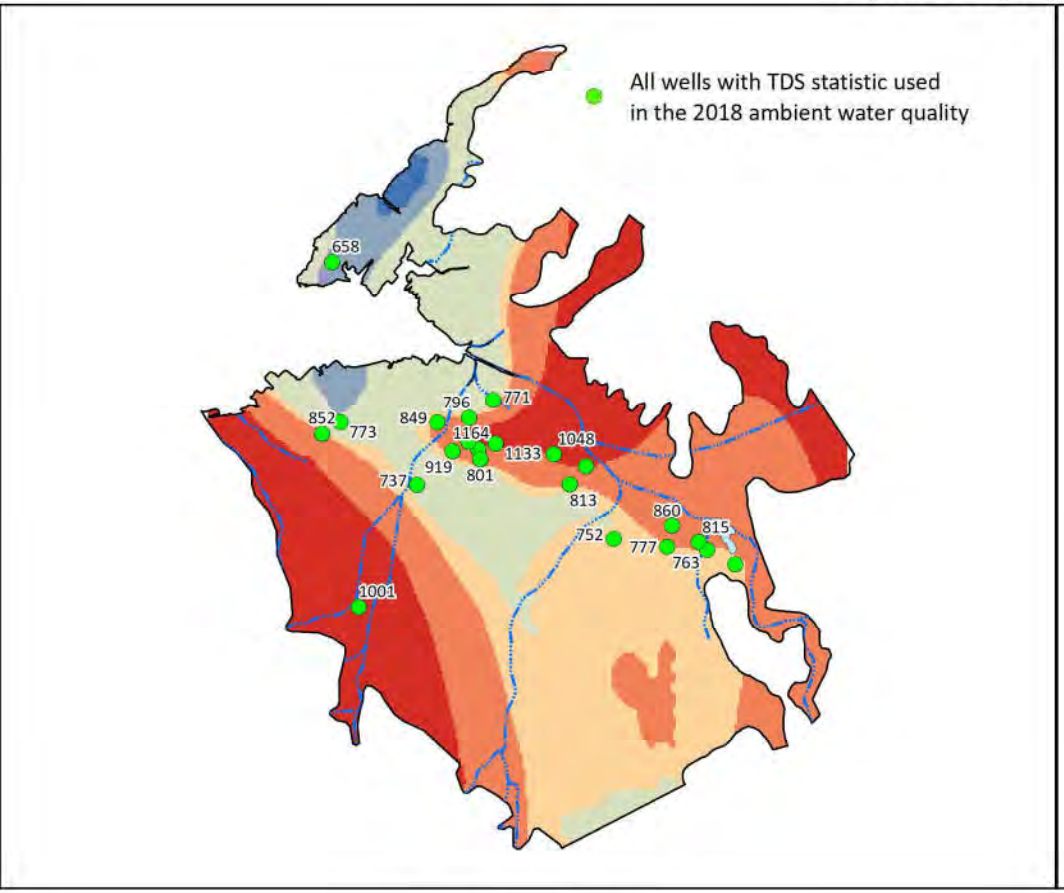
794 - 880	981 - 1,000	1,110 - 1,200
881 - 980	1,010 - 1,100	

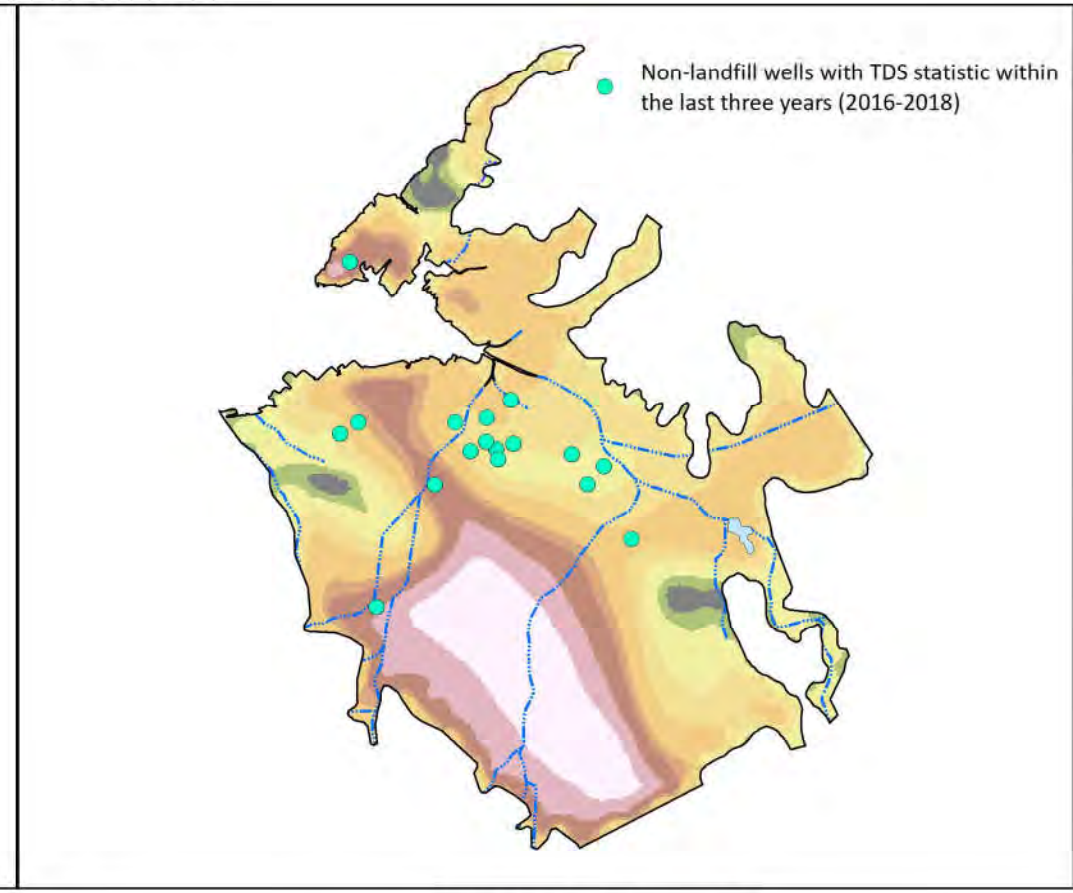
2018 Groundwater Storage (af)

0 - 1	>80 - 100	>300 - 600
>1 - 50	>100 - 200	>600 - 900
>50 - 80	>200 - 300	


Temescal Groundwater Management Zone
All wells with TDS statistic used in the 2018 ambient water quality
Wells with TDS statistic within the last three years (2016-2018)
2018 Ambient TDS (mgl)
(TDS objective is 770 mgl)
445 - 500
> 500 - 600
> 600 - 770
> 770 - 800
> 800 - 900
> 900 - 1,025

Temescal Groundwater Management Zone





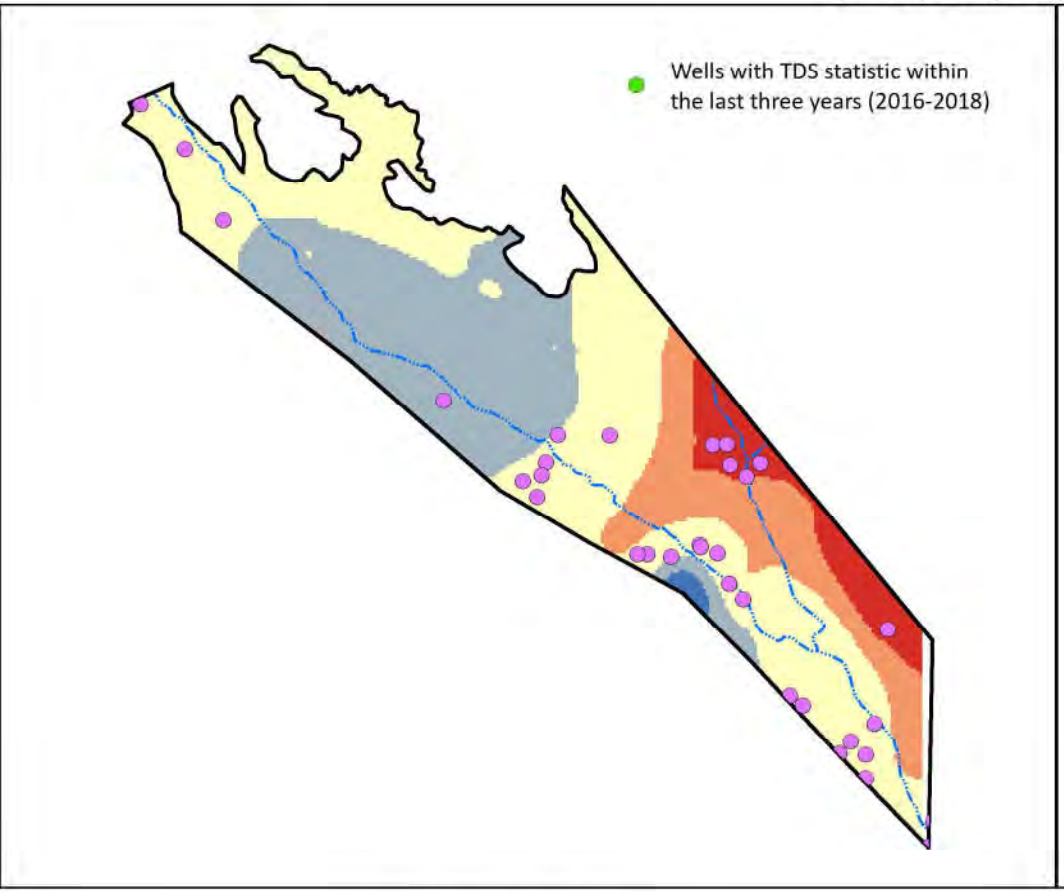
2018 Ambient TDS (mgl)
(TDS objective is 770 mgl)

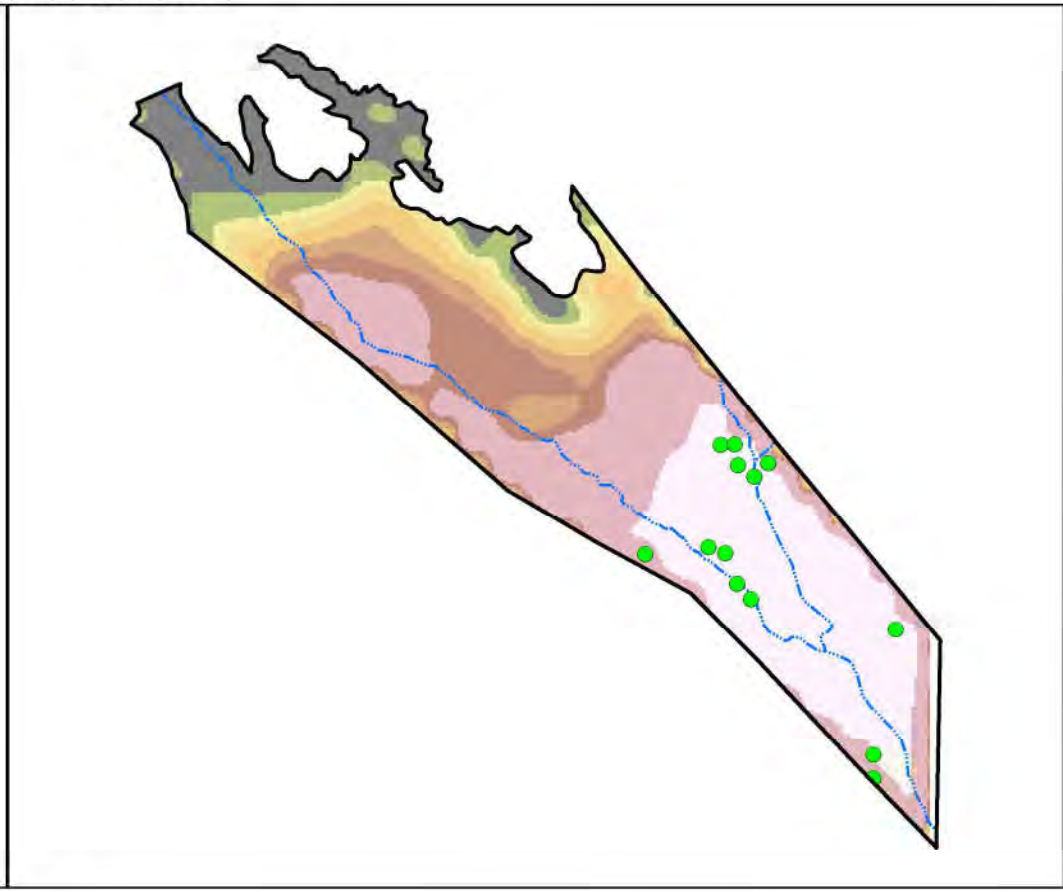
- 445 - 500
- > 500 - 600
- > 600 - 770
- > 770 - 800
- > 800 - 900
- > 900 - 1,025

2018 Groundwater Storage (af)

- 0 - 1
- >1 - 50
- >50 - 200
- >200 - 400
- >400 - 800
- >800 - 1,000
- >1,000 - 1,500
- >1,500 - 2,000
- >2,000 - 2,610

Lytle Creek Groundwater Management Zone





2018 Ambient TDS (mgl)
(TDS objective is 260 mgl)

> 120 - 160 | > 190 - 260
> 160 - 190 | > 260 - 300 | > 300 - 370

2018 Groundwater Storage (af)

< 1 | > 50 - 100 | > 250 - 500 | > 750 - 1,000
> 1 - 50 | > 100 - 250 | > 500 - 750 | > 1,000 - 3,000 | > 3,000 - 8,100

Questions for Consideration in Ongoing Methods and Data Collection

- Should we update the physical model of the groundwater basins if improved hydrogeologic characterizations are available since 2004?
  - storage properties – bottom of the aquifer, specific yield, aquifer layering

- If we update the physical model, do we need to go to the effort to re-compute the historical water quality?
  - If yes, why?
  - Remember the double-edged sword – what are the consequences of such an approach?

Which GMZs have Updated Aquifer Characterizations?

- Beaumont Basin
- Bunker Hill-A/B, Lytle
- Chino Basin
- Cucamonga Basin
- Elsinore Basin
- Rialto/Colton
- San Jacinto Upper Pressure
- Orange County

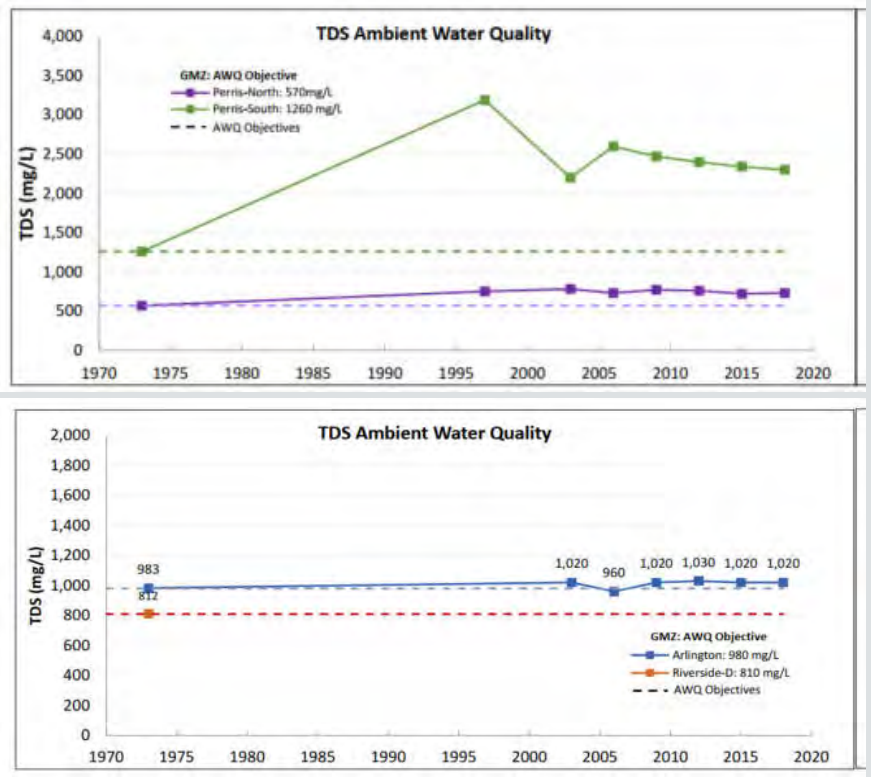
- Where else?

Questions for Consideration in Ongoing Methods and Data Collection

- Who should be responsible to pay for filling data gaps?
- Who should be responsible to pay for updating physical models?
- Who should be responsible to perform the technical work to fill data gaps and update physical models?
    - Entire Task Force?
    - Overlying agencies?
    - Agencies whose discharges affect GMZ?

Questions for Consideration in Ongoing Methods and Data Collection

- How do we prioritize our efforts to improve physical models and data collection?
  - Do we need to (or is it even possible) fill all the data gaps all at once?
  - Do we need to update the physical models all at once?
- Should we continue to perform full ambient water quality recomputation process in all GMZs?
- Can we prioritize based what we know from history of analysis and regulatory compliance challenges?
  - ***The case for prioritization***



What questions and ideas do you have?

Next Workshop

Date	Workshop Topic
August 2021	Overview of Recycled Water Policy – SNMP Monitoring and Analysis Requirements
October 2021	Critical Analysis of SAR SNMP Ambient Water Quality and Alternative Methods to Comply Pt. 1: What Have We Learned in 17 years of Implementation?
December 2021	Critical Analysis of SAR SNMP Ambient Water Quality and Alternative Methods to Comply Pt. 2: Consideration of Alternative Methods
January 2022	**Critical Analysis of SAR SNMP Ambient Water Quality and Alternative Methods to Comply Pt. 3: The Case for Prioritization and Levels of Analysis**
February 2022	Groundwater Monitoring for SNMP Compliance Pt. 1: Defining Key Wells, Data Gaps, and Responsible Parties
March 2022	Groundwater Monitoring for SNMP Compliance Pt 2: Database Management and Five-year Assessments
April 2022	Draft Work Plan Review
May 2022	Discuss Comments on Draft Work Plan
June 2022	Final Work Plan Review

THANK YOU

WESTYOST.COM

WE SUPPORT OUR COMMUNITIES

WE ARE WATER FOCUSED

WE TAKE PRIDE IN WHAT WE DO

WE DO WHAT'S RIGHT

WE STRIVE TO BECOME OUR BEST

WE BELIEVE IN QUALITY

WE LISTEN

WE SOLVE HARD PROBLEMS

WE SEE THE BIGGER PICTURE

WE TAKE OWNERSHIP

WE COLLABORATE

WE HAVE FUN

WE ARE WEST YOST

WEST YOST
Water. Engineered.

WEST YOST
Water. Engineered.

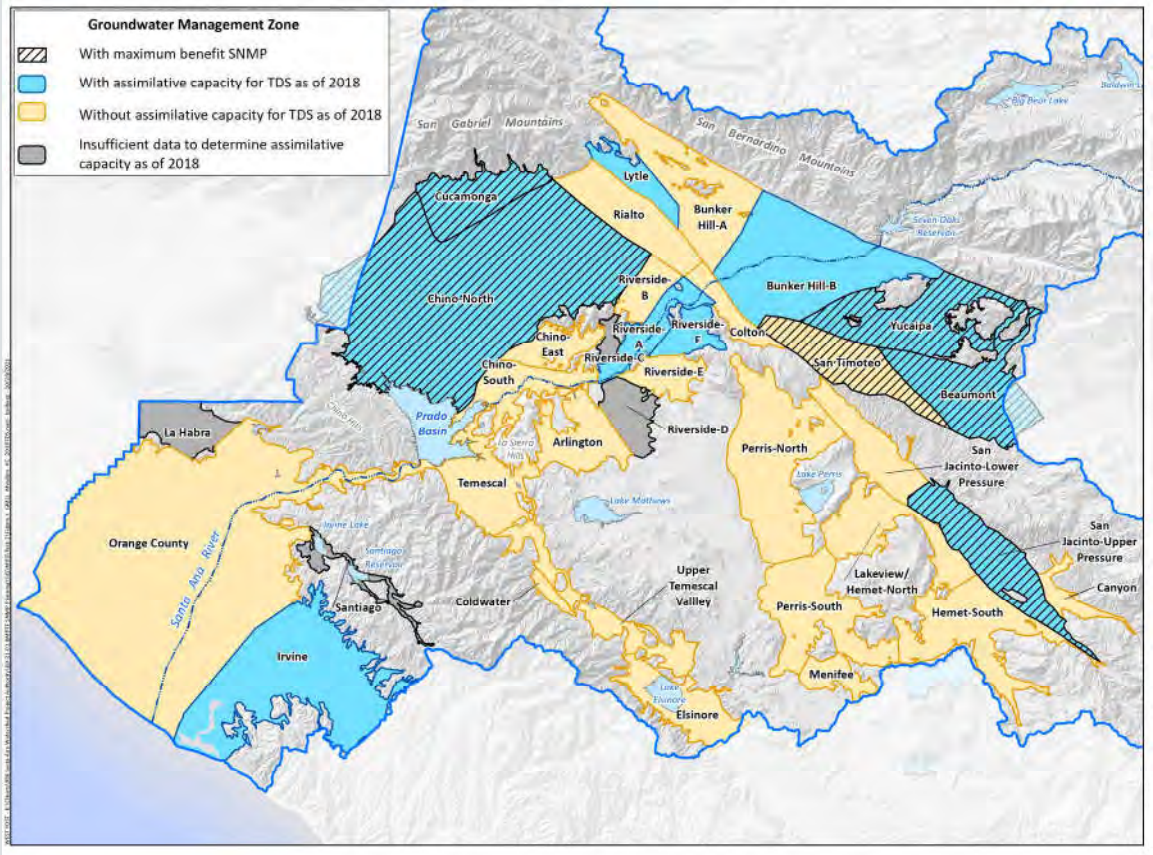
Task 2 Update – Groundwater Monitoring Program

February 22, 2022

Task 2 Progress

Agency Meetings Held

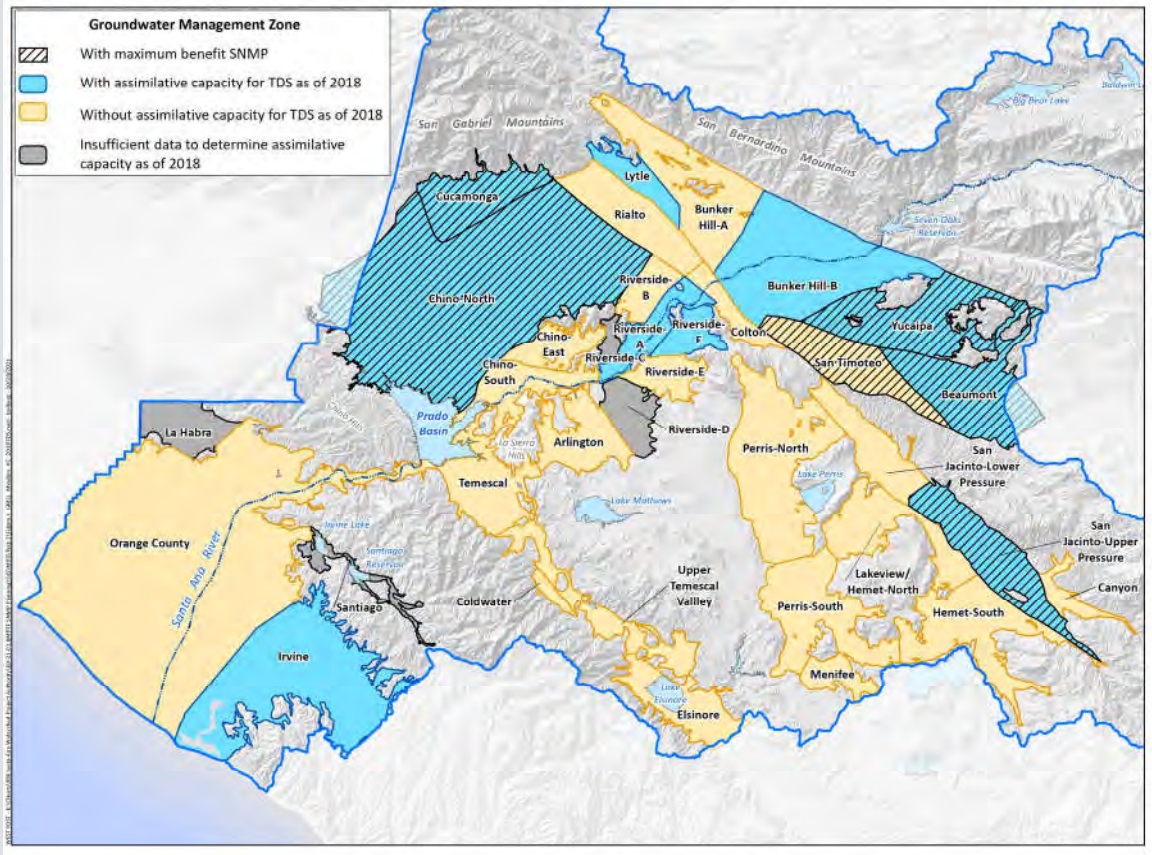
- Beaumont
- City of Corona
- Eastern MWD
- IEUA
- OCWD (2x)
- City of Riverside
- WMWD
- Yucaipa VWD



Task 2 Progress

Agency Meetings on the Calendar (or almost)

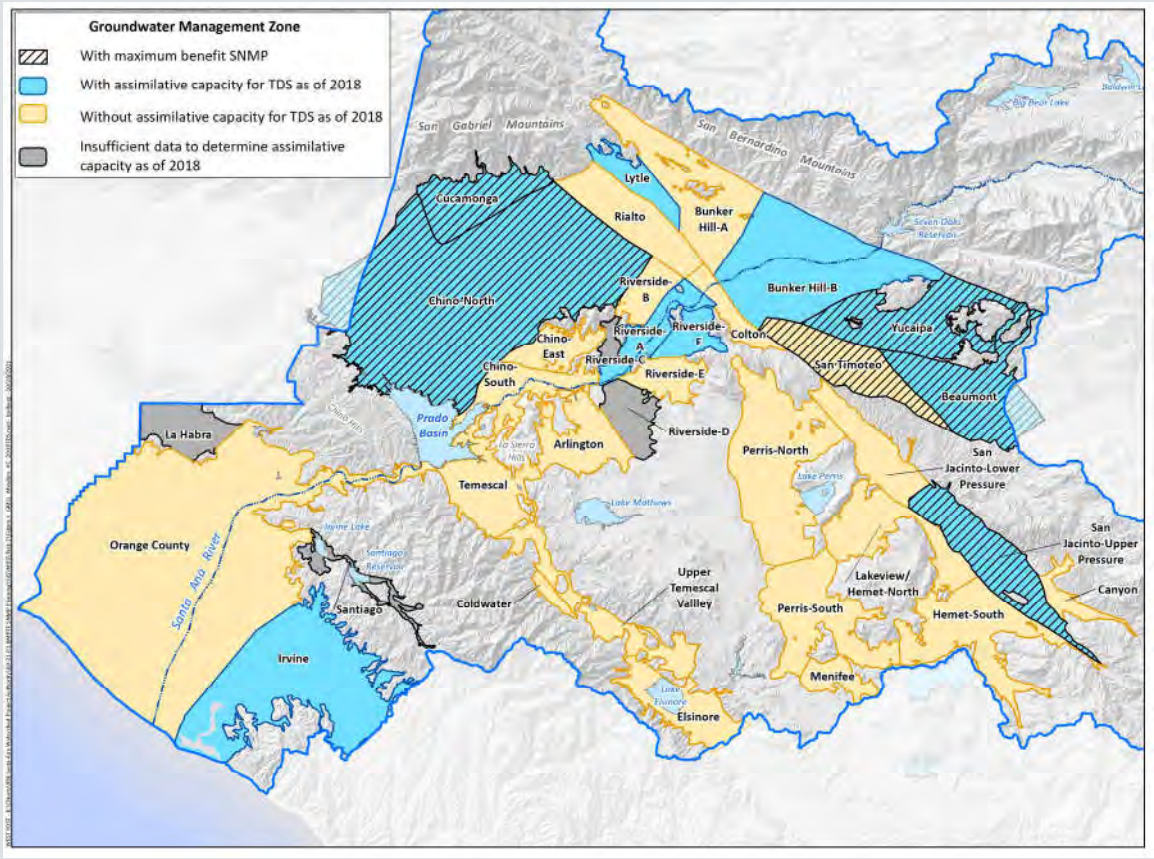
- Chino Basin Watermaster
- Elsinore Valley MWD
- Jurupa CSD
- Valley District



Task 2 Progress

No response

- BCVWD
- City of Banning
- City of Colton (TF member?)
- City of Redlands
- City of Rialto
- City of San Bernardino
- Irvine Ranch WD
- Pass Agency
- Temescal Valley WD



Task 2 Deliverable

Groundwater Monitoring Program

1. Introduction, Purpose, Approach
2. GMZ Monitoring Plans
   a. GMZ overview
   b. Table of wells (owner, frequency, etc.)
   c. Map of wells
   d. Data gap assessment
3. Plan/Schedule to fill data gaps
   a. Guidelines for responsible parties
   b. Schedule
4. Annual Data Compilation

Ambient Water Quality Methods

1. Overview of current methods
2. Overview of revisions considered
   a. Past recommendations from AWQ work
   b. New recommendations based on Task Force input
3. Recommended Scope for AWQ Recomputation due Oct 2023
   a. Pilot new methods

Task 2 Deliverable(s) – 1 or 2 Documents?

Groundwater Monitoring Program

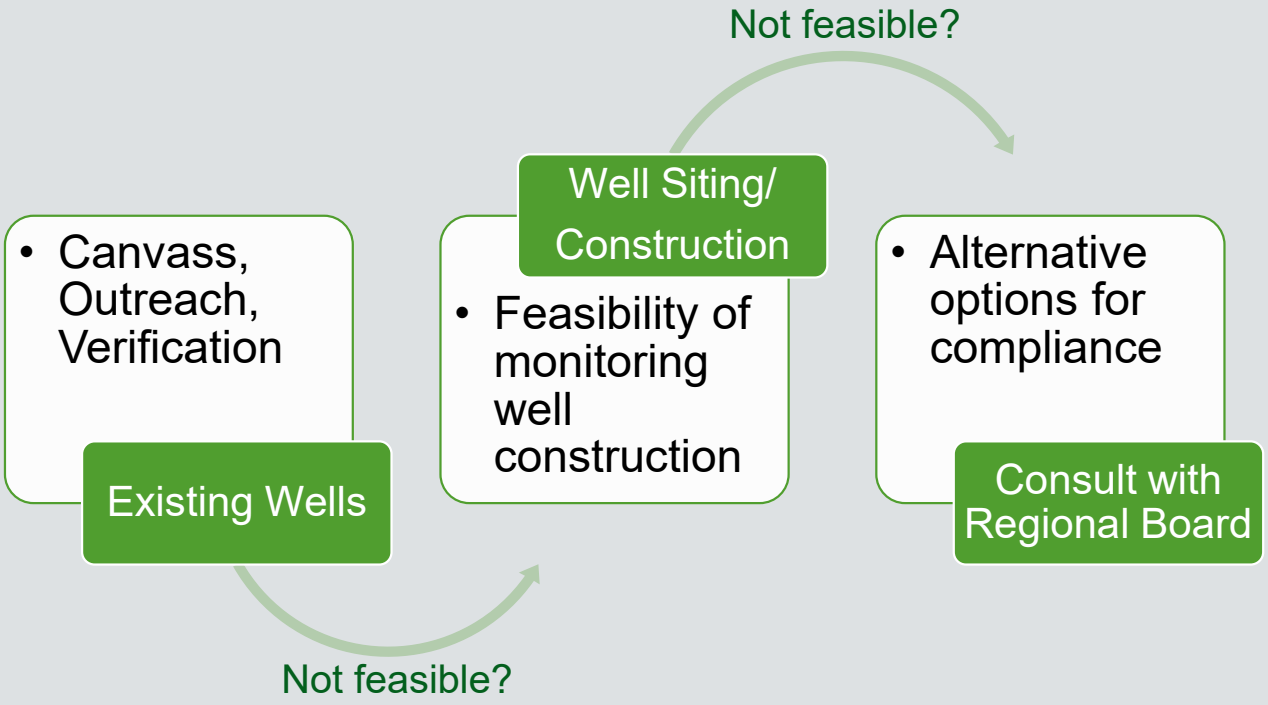
1. Introduction, Purpose, Approach
2. GMZ Monitoring Plans
   a. GMZ overview
   b. Table of wells (owner, frequency, etc.)
   c. Map of wells
   d. Data gap assessment
3. Plan/Schedule to fill data gaps
   a. Guidelines for responsible parties
   b. Schedule
4. Annual Data Compilation

Ambient Water Quality Methods

1. Overview of current methods
2. Overview of revisions considered
   a. Past recommendations from AWQ work
   b. New recommendations based on Task Force input
3. Recommended Scope for AWQ Recomputation due Oct 2023
   a. Pilot new methods

Prioritization of GMZs

Filling Data Gaps



Pending Questions to finalize deliverable concept

- Should we include the monitoring location details for GMZs with separate SNMP monitoring plan requirements with the Regional Board?
  - Beaumont
  - Yucaipa
  - San Timoteo
  - San Jacinto Upper Pressure
  - Cucamonga
  - Chino North
  - Elsinore (new
  - Upper Temescal Valley
  - Proposed SNMP: San Bernardino Basin Area GMZs (Bunker Hill A, Bunker Hill B, Lytle)

THANK YOU

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Critical Analysis of AWQ Methods – Pt 3
The Case for Prioritization

April 11, 2022

Basin Planning Priorities: Ambient Water Quality

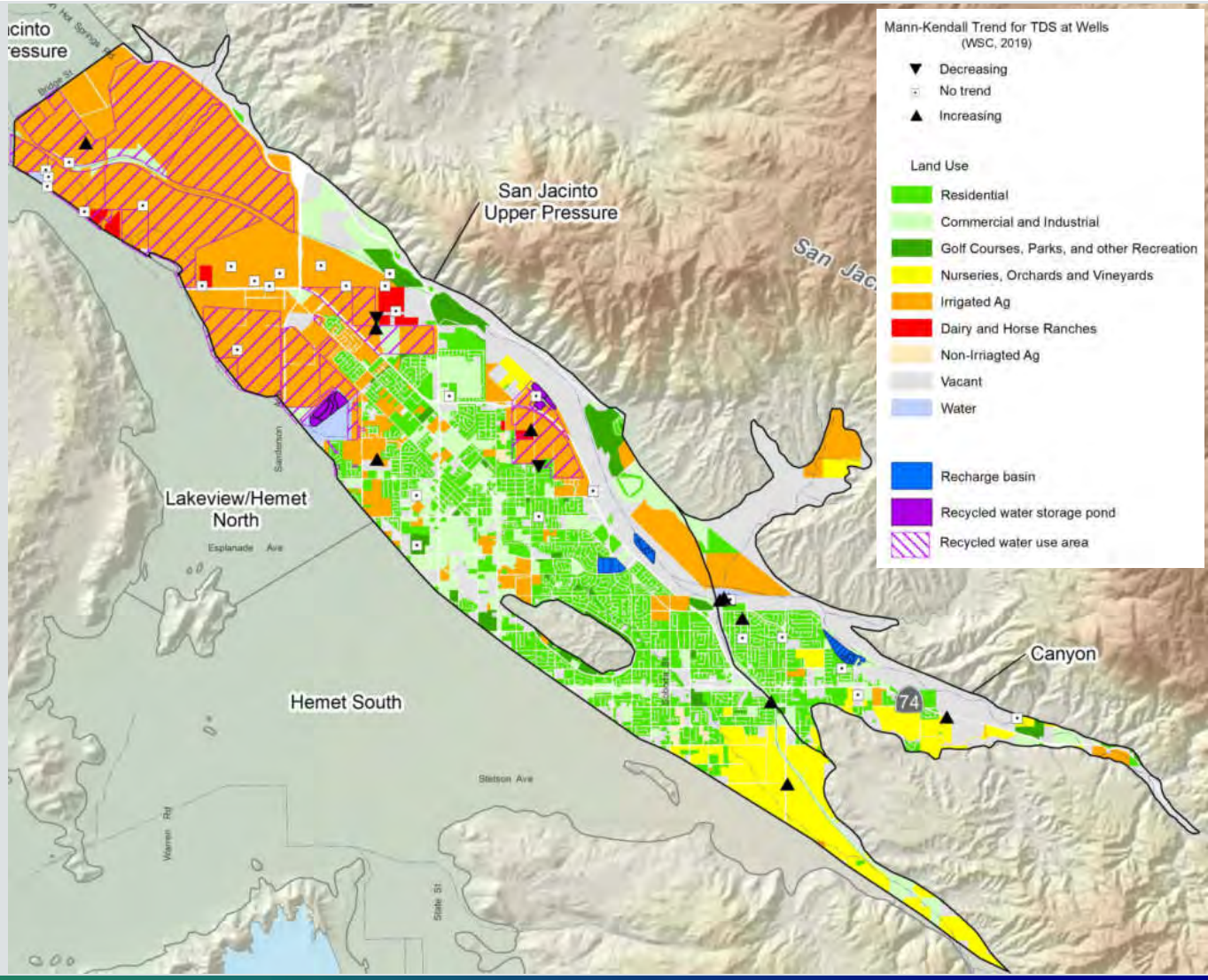
Two key priorities for current scope of work

1. Define groundwater monitoring program
    a. Define wells to be monitored and responsible parties
    b. Identify data gaps
    c. Define actions (and timeline) to improve monitoring networks to fill data gaps

2. Assess current ambient water quality methodology
    a. What changes can we make, enabled by 2019 Recycled Water Policy?
    b. What changes can we pilot for the required assessment due October 2023?

Advancements to Consider

- Selection of key wells rather than all wells available
- Applying tiered AWQ analysis approach to focus higher-cost efforts in most critical areas and simplify in other areas
- Mapping of loading factors
- Five-year frequency for analysis and reporting



Questions for Consideration in Ongoing Methods and Data Collection

- Should we continue to rely on a 20-year period of record?
  - → ***Generally, Yes. Focus on improved monitoring plan will improve data quality for analysis in the long term***
  - → ***Suggestion to explore alternative time periods since improved data availability***

- Should we continue to rely on a statistical analysis method developed in 2004?
  - → ***Generally, Yes***
  - → ***Case-specific changes may be warranted in a GMZ, but must be done as part of a GMZ specific SNMP (e.g. Upper Temescal Valley SNMP)***

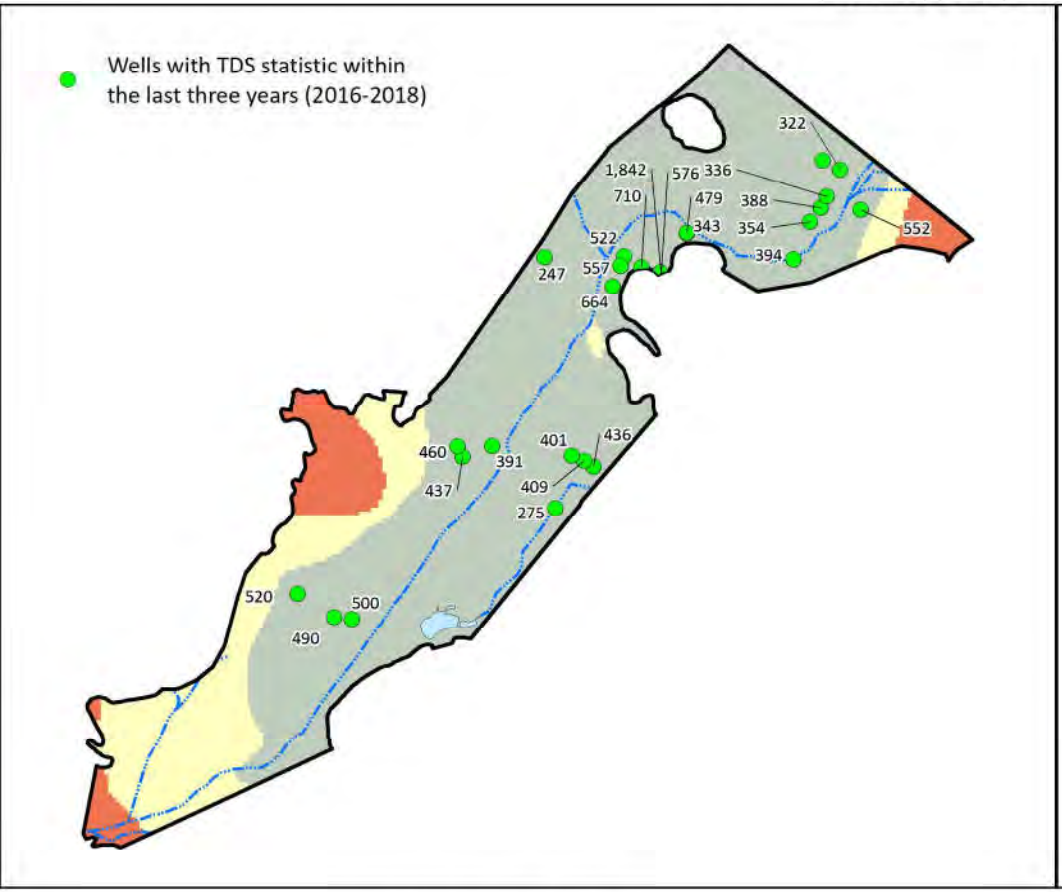
Questions for Consideration in Ongoing Methods and Data Collection

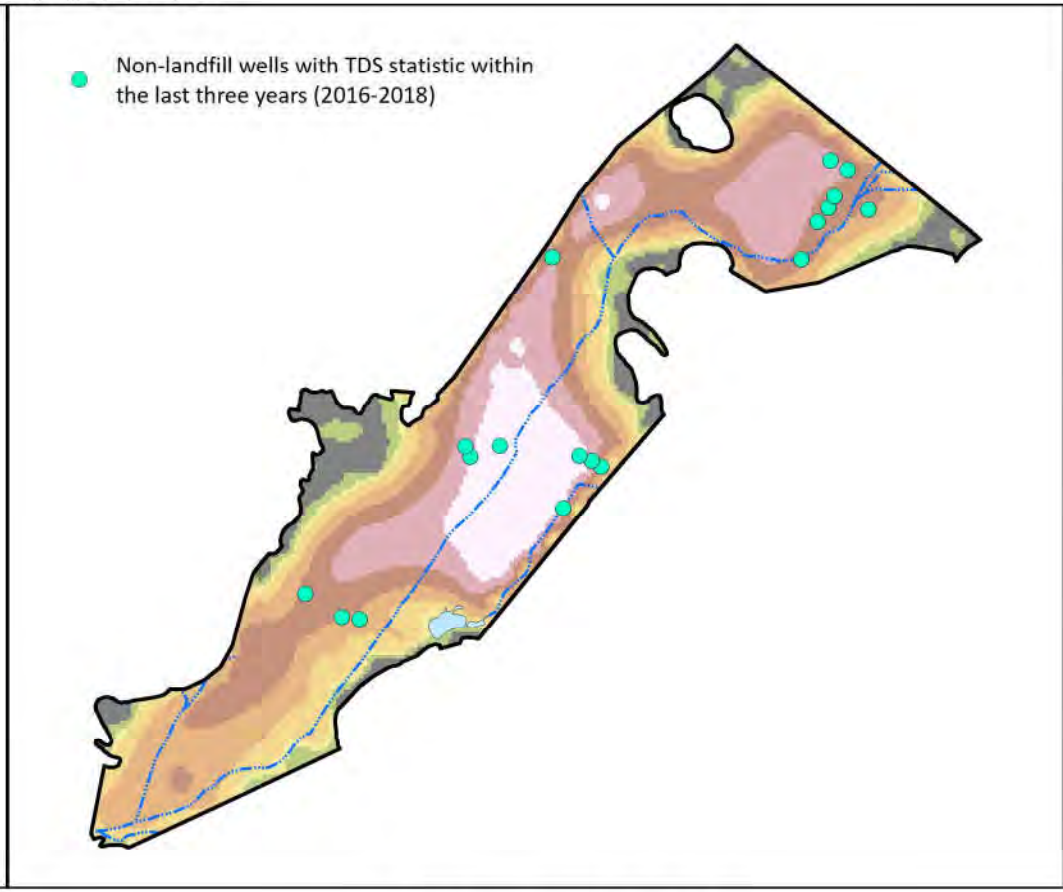
- Is all data good data?
  - Should we reduce the analysis to a set of key wells that MUST be monitored?
    - → ***NO, many GMZs are too complex to do this well. Focus on adequate spatial distribution of ongoing monitoring***
  - Should we prioritize wells with recent data in statistical analysis (e.g. only include these data in the analysis)
    - → ***NO***

Questions for Consideration in Ongoing Methods and Data Collection

- Is all data good data?
  - Should the high TDS concentrations along the Pacific Coast of Orange County GMZ be included in the ambient concentration – especially in light of regional groundwater management actions to address seawater intrusion?
    - → ***YES, part of aquifer system***
  - Should we include landfill monitoring wells? If so, which ones?
    - ***→Some, those within saturated aquifer system***

Riverside-A Groundwater Management Zone





2018 Ambient TDS (mgl)
(TDS objective is 560 mgl)

0 - 100	> 250 - 560	>750 - 1,100
> 100 - 260	>560 - 750	

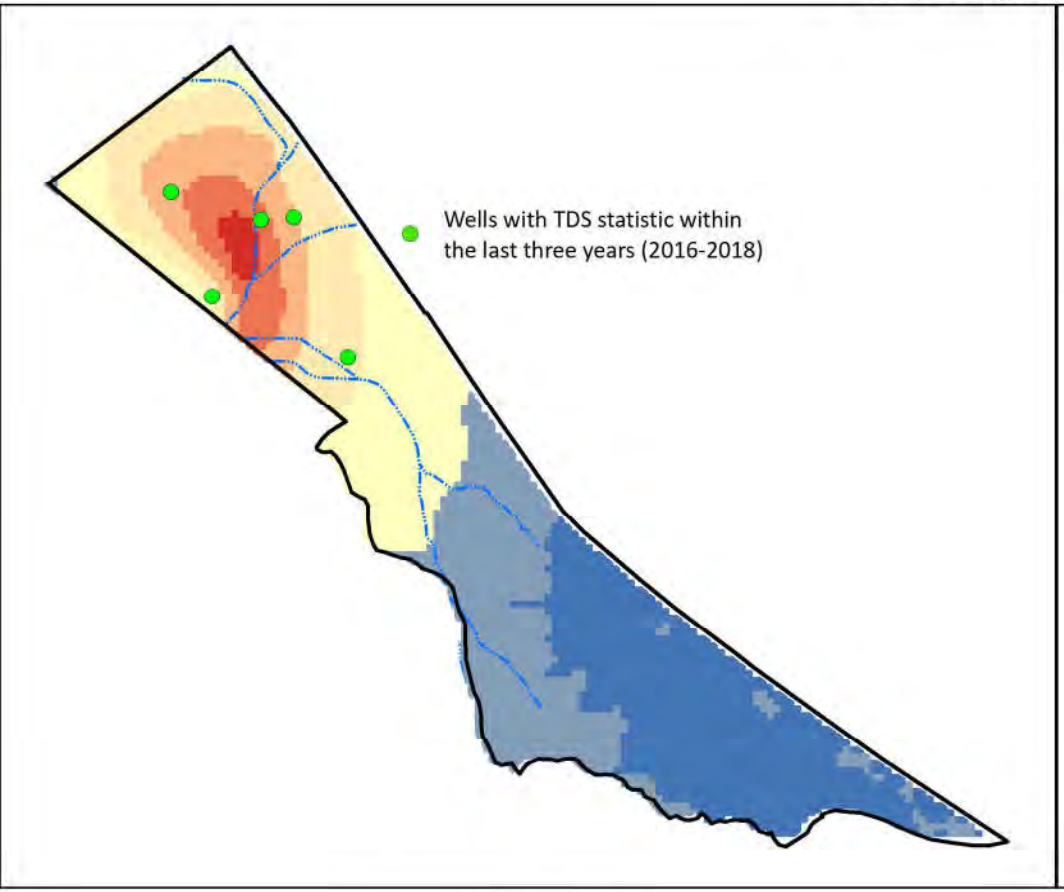
2018 Groundwater Storage (af)

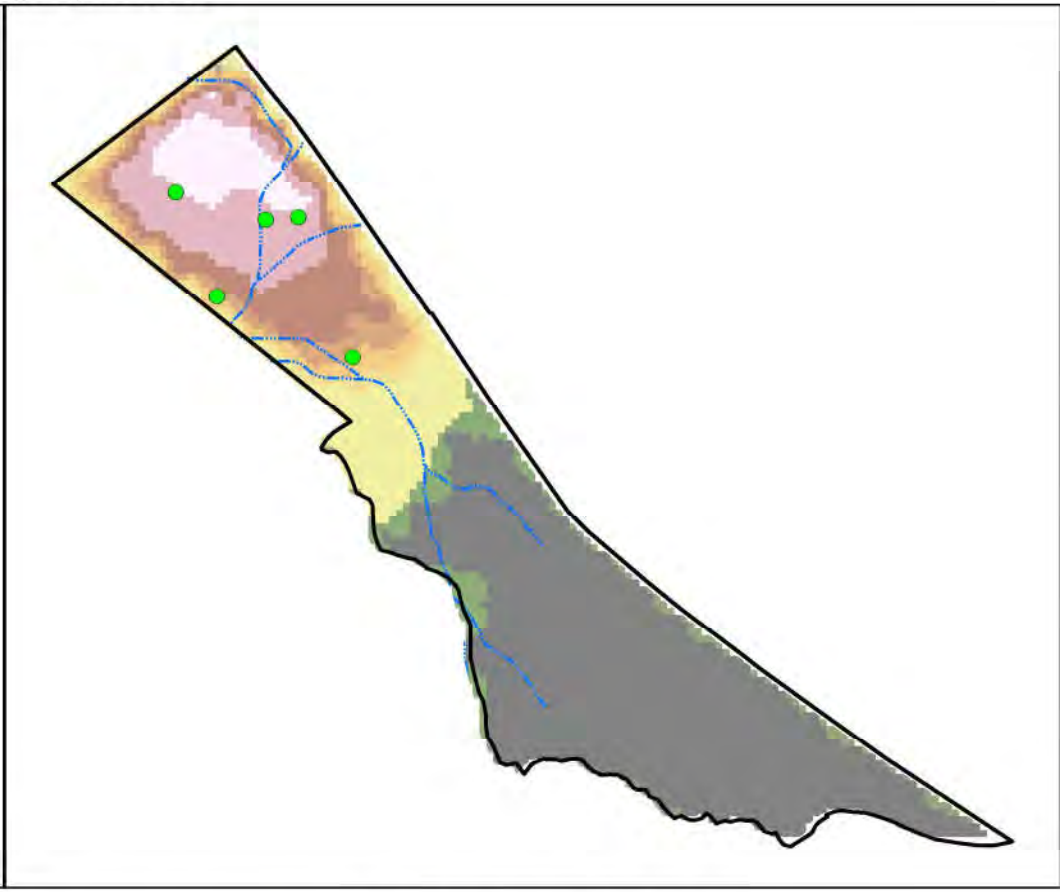
0 - 1	>50 - 100	>300 - 600	>1,000 - 1,500
>1 - 50	>100 - 300	>600 - 1,000	>1,500 - 2,840

Questions for Consideration in Ongoing Methods and Data Collection

- What other improvements could be considered:
  - Should we consider the extent of the saturated aquifer system in contouring, statistical analysis, and map presentations?
    - → ***Yes***
  - Should the aquifer parameters defined in 2004 be updated?
    - → ***Depends… Consider:***
      - ***new work performed***
      - ***timing of next update to aquifer parameters (e.g. Chino Basin model updates every five years)***
      - ***Not all at once if it will trigger re-do of objectives***

Colton Groundwater Management Zone





2018 Ambient TDS (mgl)
(TDS objective is 410 mgl)

398 - 400	>410 - 450	>500 - 550	>600 - 640
>400 - 410	>450 - 500	>550 - 600	

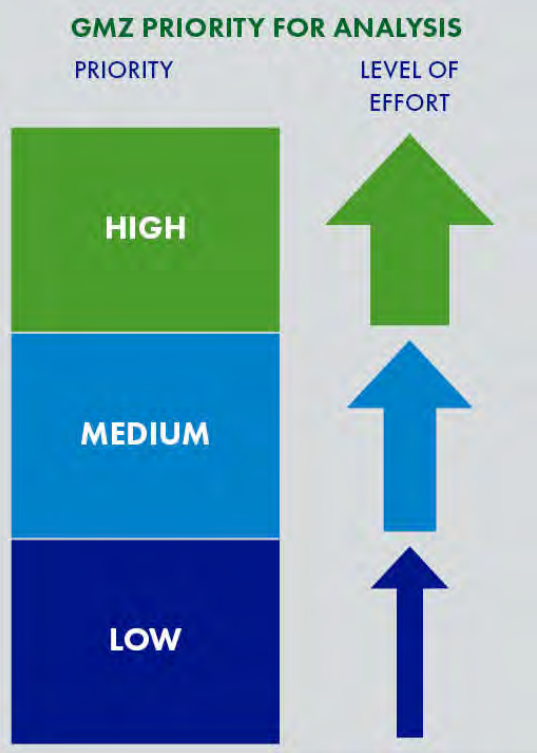
2018 Groundwater Storage (af)

0 - 1	>50 - 1,200	>1,600 - 2,000	>2,400 - 2,800	>3,200 - 3,410
>1 - 50	>1,200 - 1,600	>2,000 - 2,400	>2,800 - 3,200	

Questions for Consideration in Ongoing Methods and Data Collection

- Should we prioritize addressing data gaps, if there are many?
  - → ***Yes***
  - → ***Tiered approach: (1) time to identify existing wells, (2) well siting feasibility analysis to fill remaining gaps, if any, (3) construct wells if feasible***
- How should we prioritize addressing data gaps, if there are many?
  - Not yet discussed
- Can we reduce the level of effort to perform ambient water quality analysis by prioritizing our GMZs based on historical results, current water quality, and regulatory compliance factors?
  - Not yet discussed

GMZ Prioritization



- Focus effort on GMZs with highest priority challenges
- Reduce costs in the long-term
- Create equitable distribution of costs in the long-term
- Reduce rigidity of current one-size-fits all approach
- Could also ultimately…
  - Decentralize work in high priority GMZs to centers of knowledge
  - Enable Task Force to focus on **coordinating** and **integrating** work products rather than being a technical expert on ***all*** GMZs

Recycled Water Policy

Section 6.1.3 of Policy

- All groundwater basins are different in size, hydrogeologic complexity, and loading factors, which necessitates:
  - Stakeholder engagement to develop appropriate plans
  - allowing variable levels of analysis and management efforts in developing and implementing SNMPs

Five-Year Assessments

Section 6.2.6 of Policy

The regional water boards, in consultation with stakeholders, shall assess and review monitoring data generated from [the SNMP] every five years, unless an alternate timeline has been established in a basin plan amendment. The assessment shall include an evaluation of:

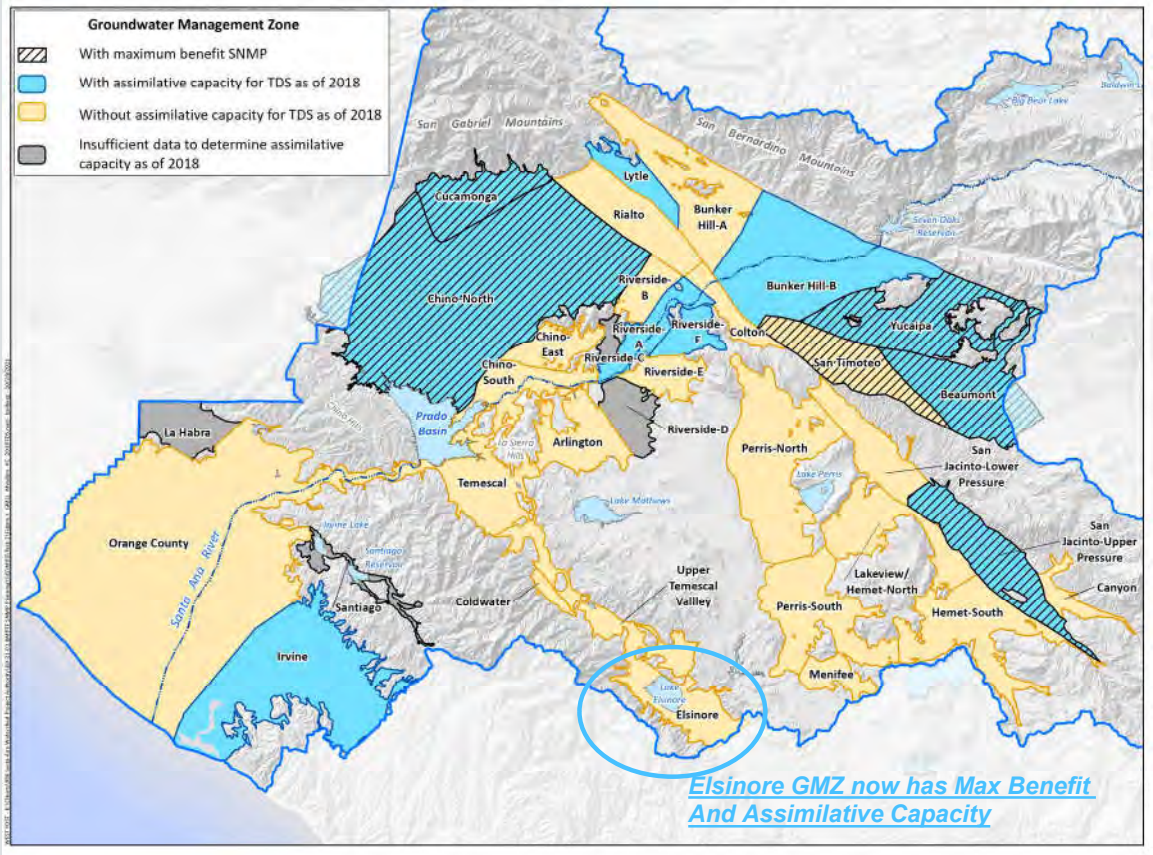
1. Observed trends in groundwater salinity with the predicted trends from the SNMP
2. The ability of the monitoring network to adequately characterize groundwater quality in each GMZ and
3. Potential new data gaps
4. The ability of any relied-upon models to adequately simulate groundwater quality
5. Available assimilative capacity based on observed trends and the most recent water quality data
6. The impact of new projects that are reasonably foreseeable at the time of the assessment

Prioritization – Decision Logic

- What are the trends in water quality over time – are they changing?
  - Historical record of ambient water quality findings from 2003 to 2018
  - Mann-Kendall Statistical Trend Analysis
- What is the regulatory implication of a change in ambient water quality compared to past recomputations?

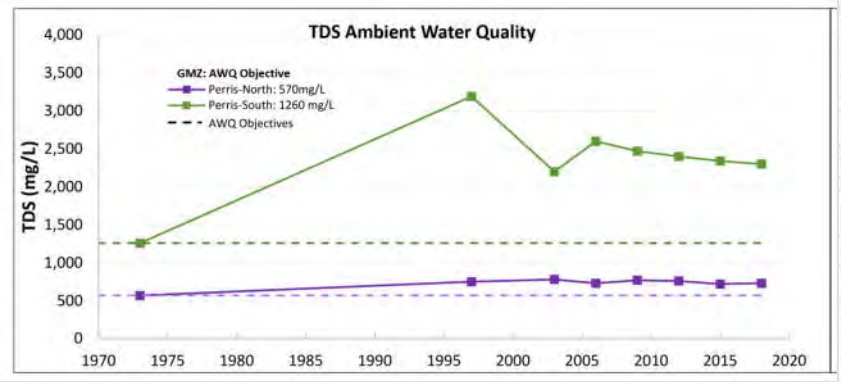
Assimilative Capacity for TDS As of 2018 AWQ

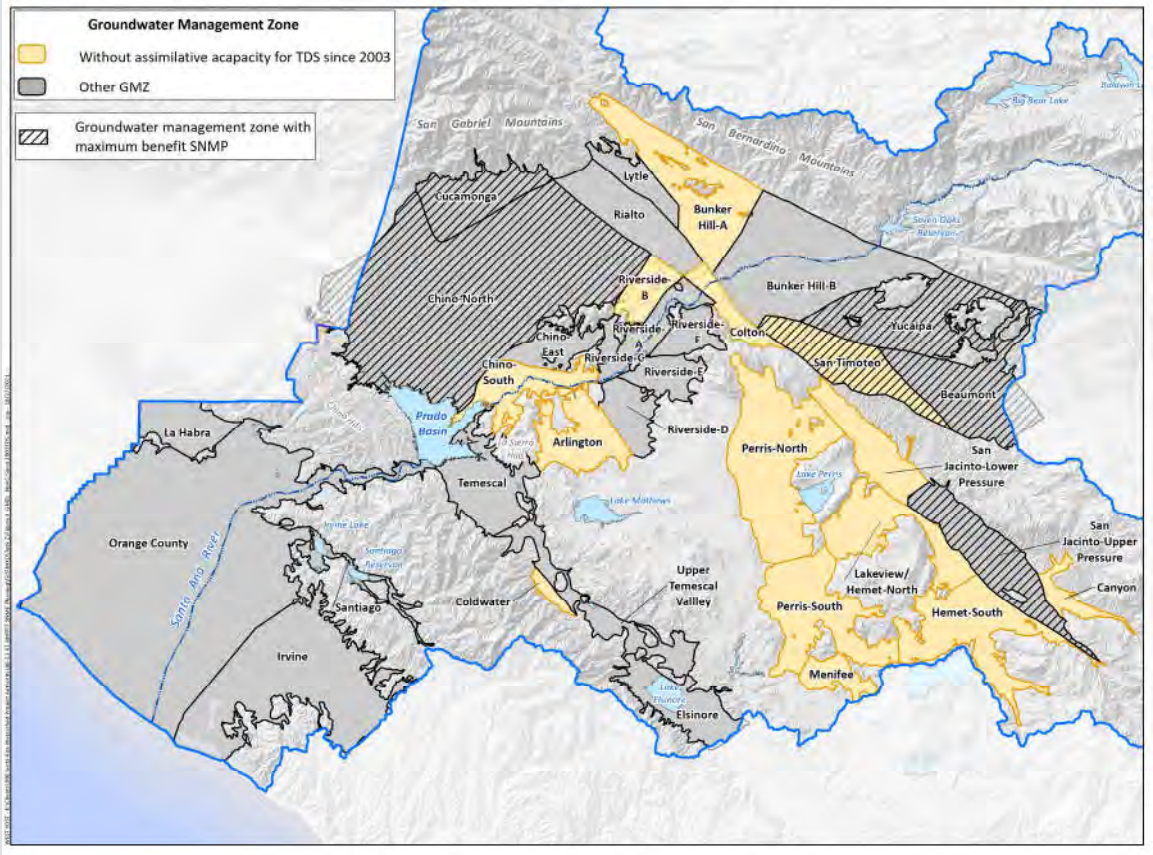
- 35 GMZs Total
- 11 GMZs with Assimilative Capacity
  - 6 are Maximum Benefit GMZs
- 20 with ***NO*** Assimilative Capacity
- 4 with no AWQ findings



Assimilative Capacity for TDS Since 2004

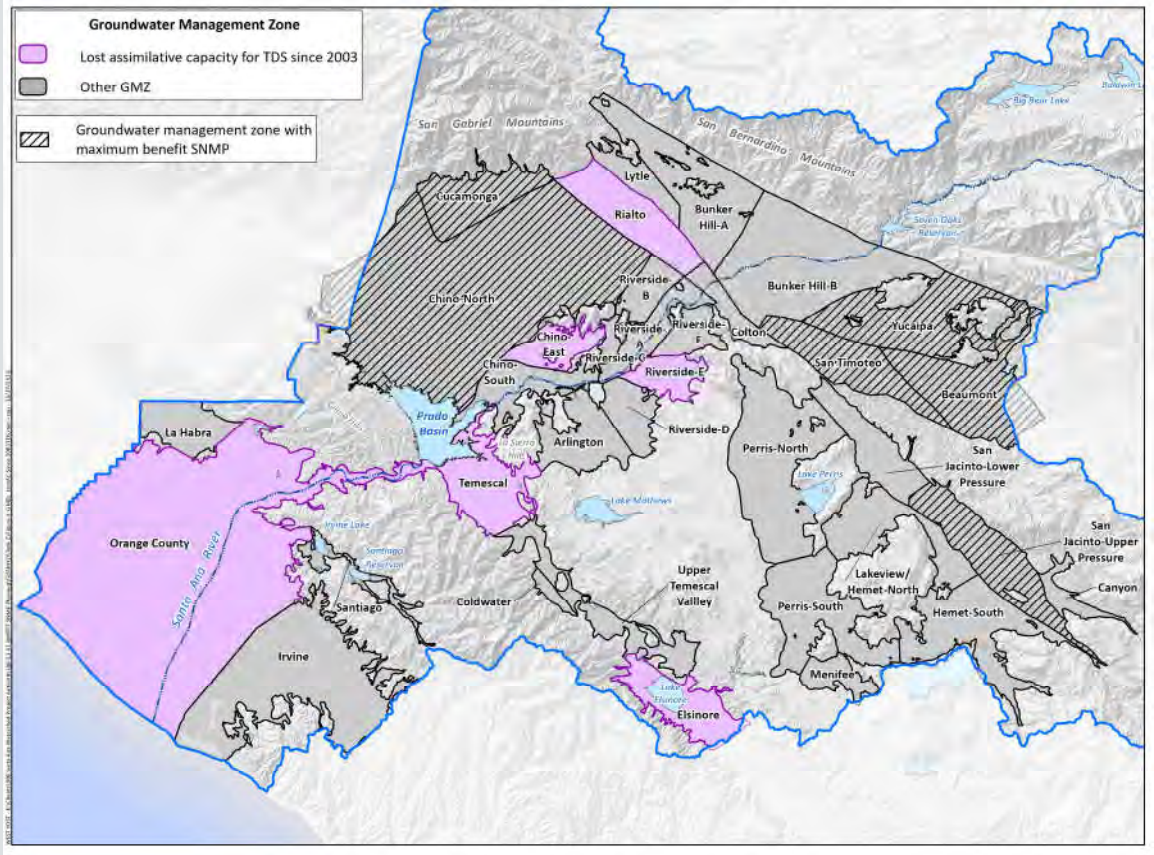
- 14 GMZs have had ***NO*** Assimilative Capacity since 2003 AWQ recomputation





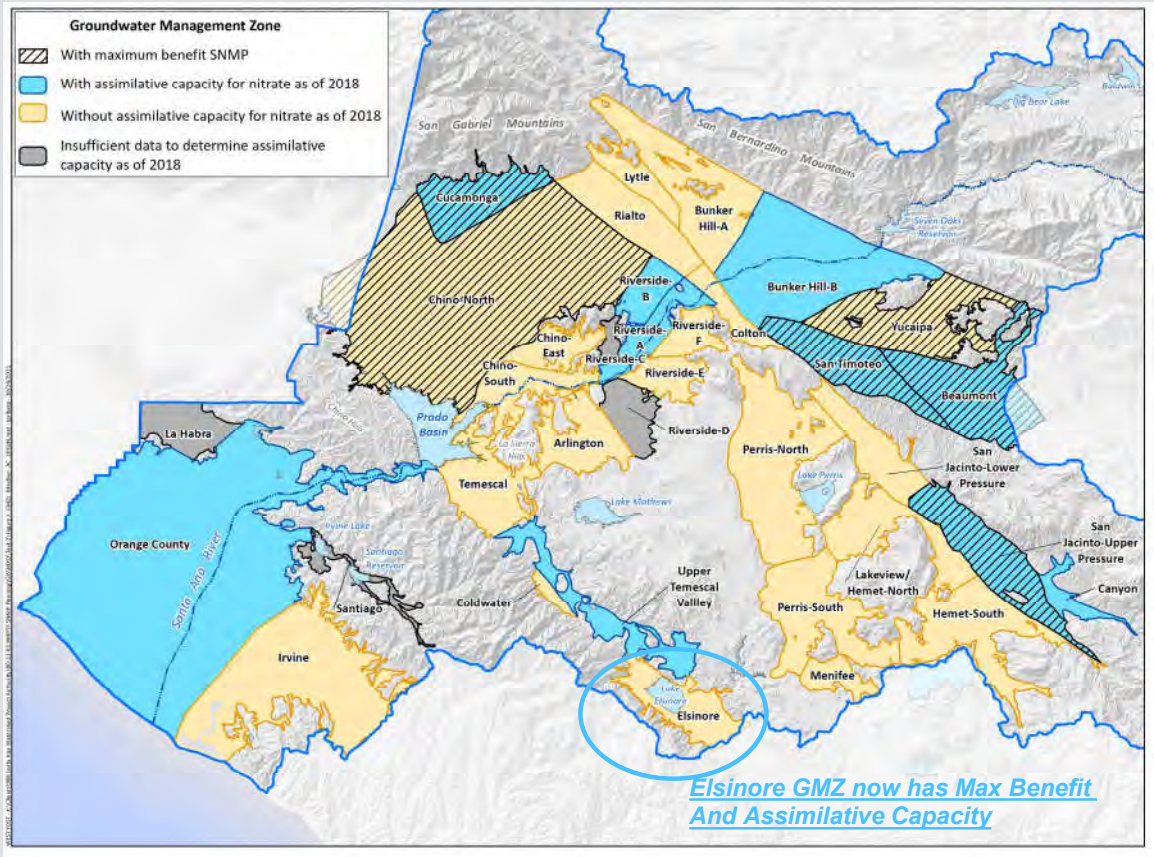
Assimilative Capacity for TDS Since 2004

- Six GMZs lost assimilative capacity for TDS since 2003
  - Rialto
  - Riverside-E
  - Chino East
  - Temescal
  - Elsinore
  - Orange County



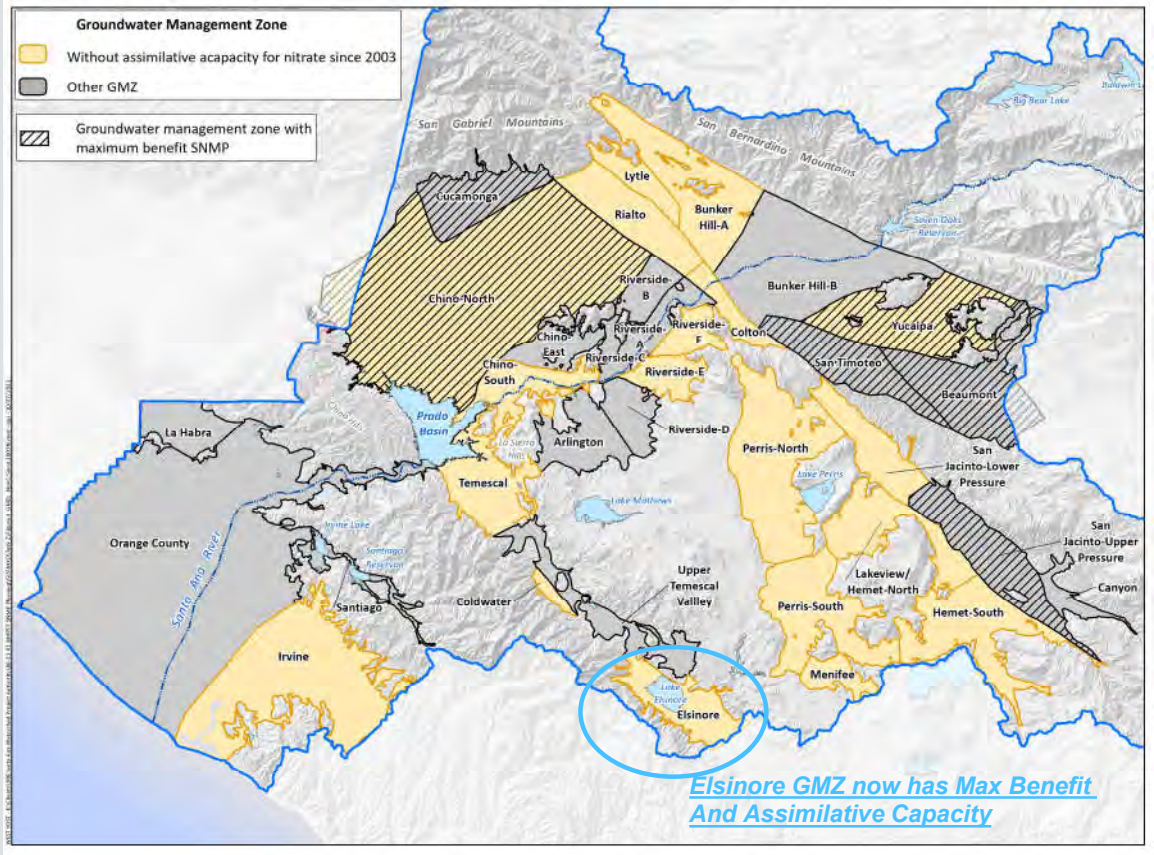
Assimilative Capacity for Nitrate As of 2018 AWQ

- 35 GMZs Total
- 11 with Assimilative Capacity
  - 5 are Maximum Benefit GMZs
- 20 with ***NO*** Assimilative Capacity
- 4 with no AWQ findings



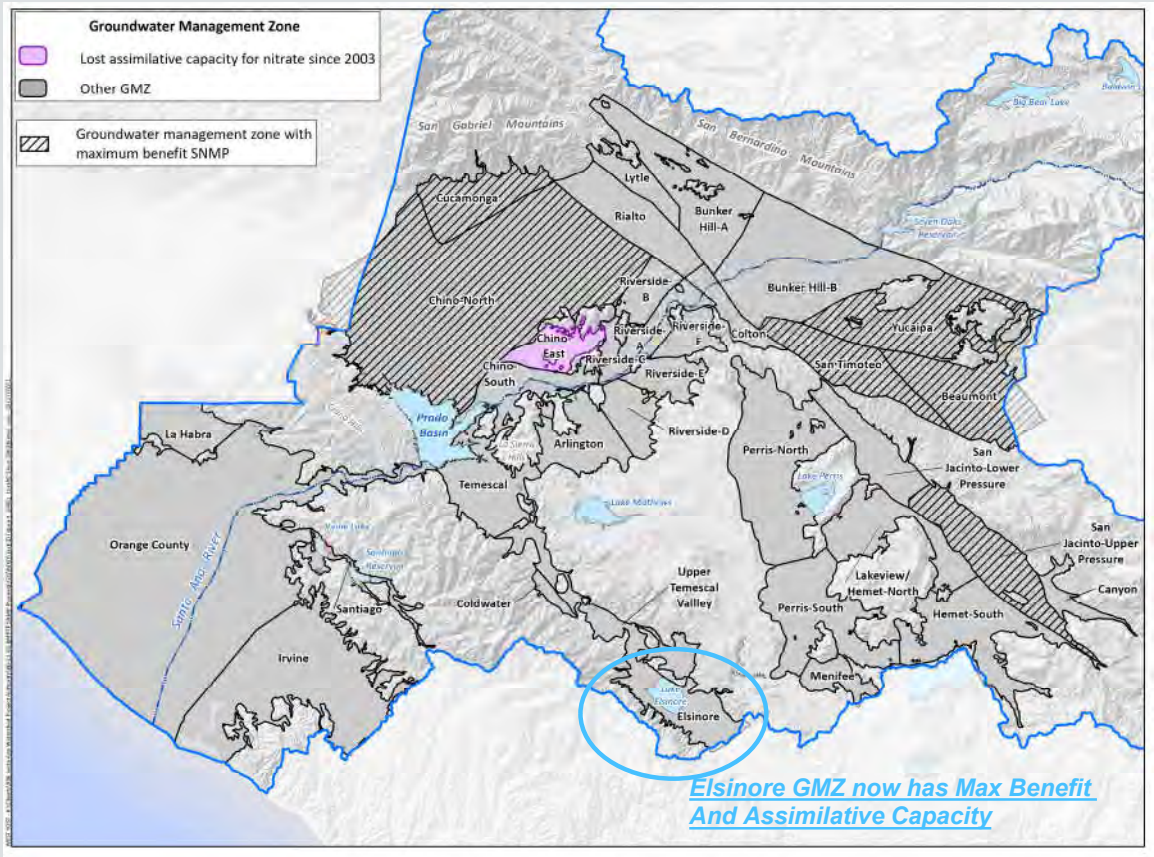
Assimilative Capacity for Nitrate Since 2004

- 18 GMZs have had ***NO*** Assimilative Capacity since 2003 AWQ recomputation

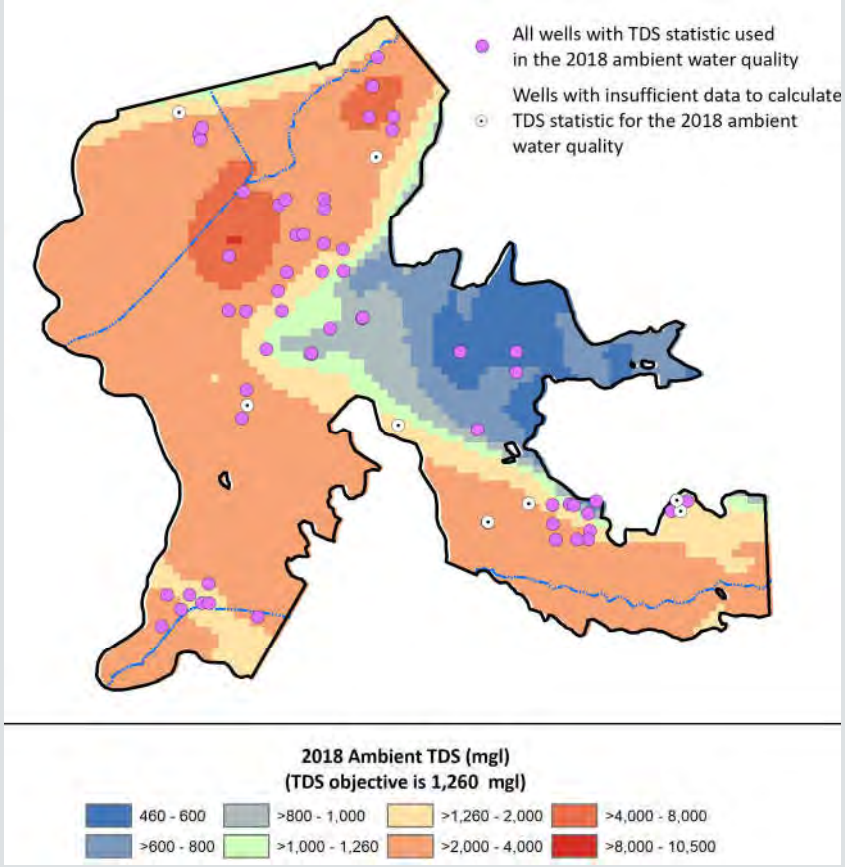


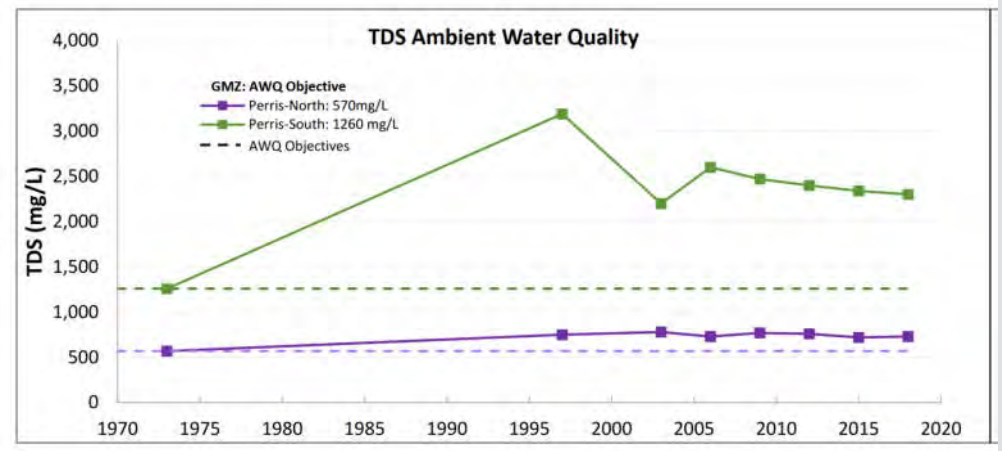
Assimilative Capacity for Nitrate Since 2004

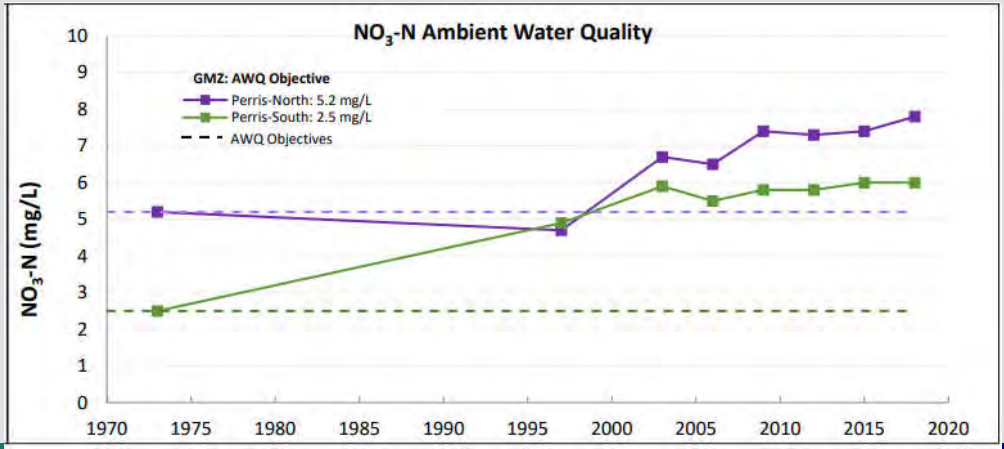
- One GMZ lost assimilative capacity for nitrate since 2003
  - Chino East GMZ
  - Methodological

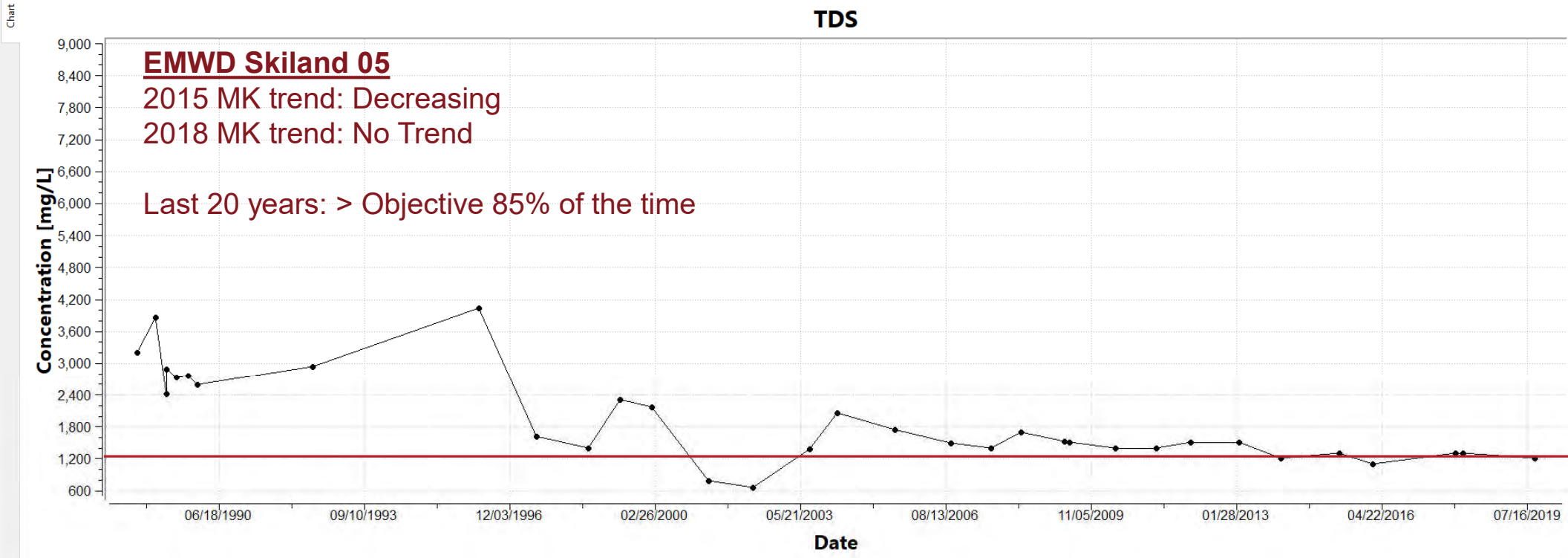


No Assimilative Capacity Since 2004 – Perris South









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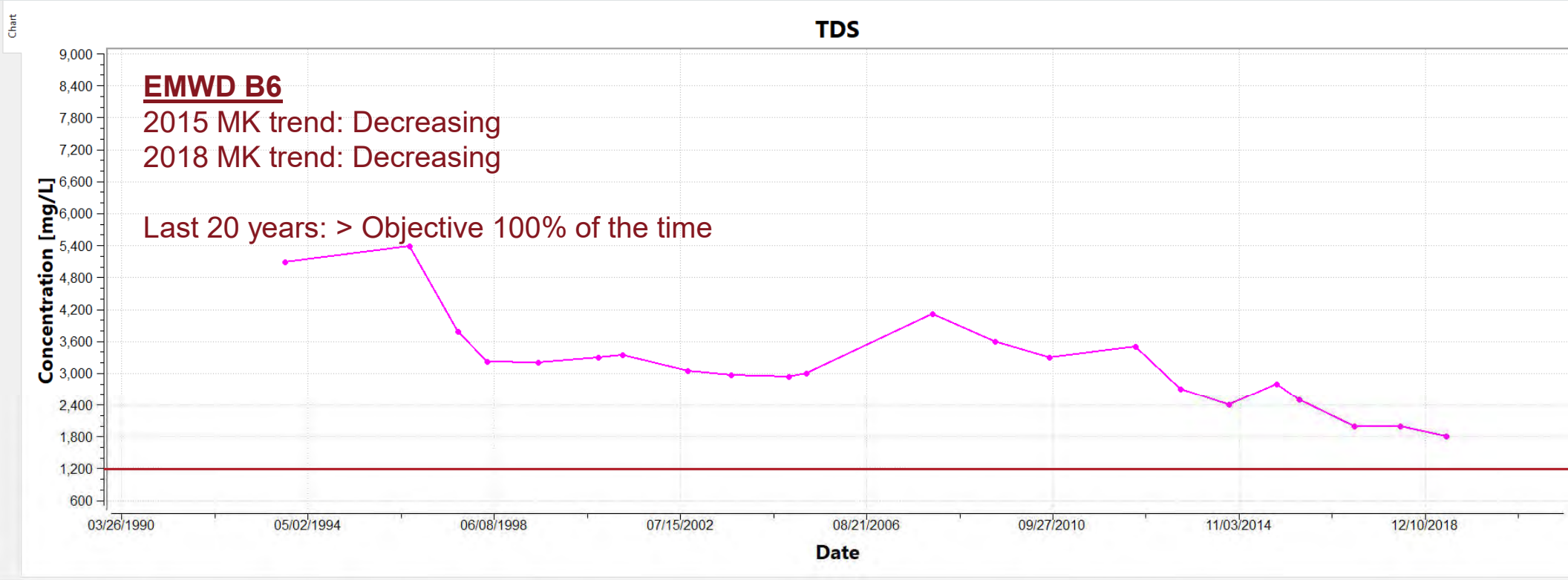
	Circle		1212350		EMWD Winchester Pond...	-117.128337	33.710115	Undetermined	Eastern Municipal Wat...	1448.00	1448.00			
	Circle		1212562		EMWD C4	-117.217021	33.690546	Undetermined	Eastern Municipal Wat...	1415.00	1415.00		200.00	220.00
	Circle		1212400		EMWD A1	-117.188843	33.757896	Undetermined	Eastern Municipal Wat...	1419.00	1419.00			
	Circle		1212394		EMWD B6	-117.180389	33.766570	Undetermined	Eastern Municipal Wat...	1423.00	1423.00			
	Circle		1212478		EMWD 76 McLaughlin	-117.197907	33.735538	Undetermined	Eastern Municipal Wat...	1420.00	1420.00			



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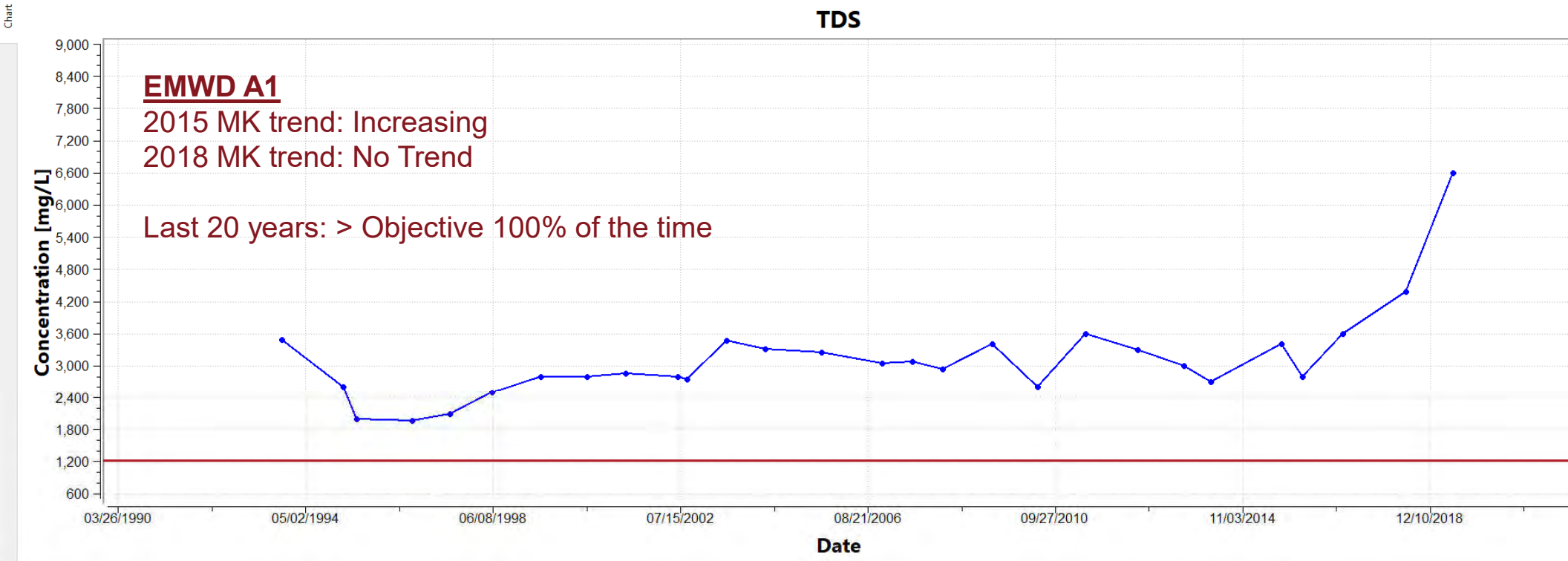

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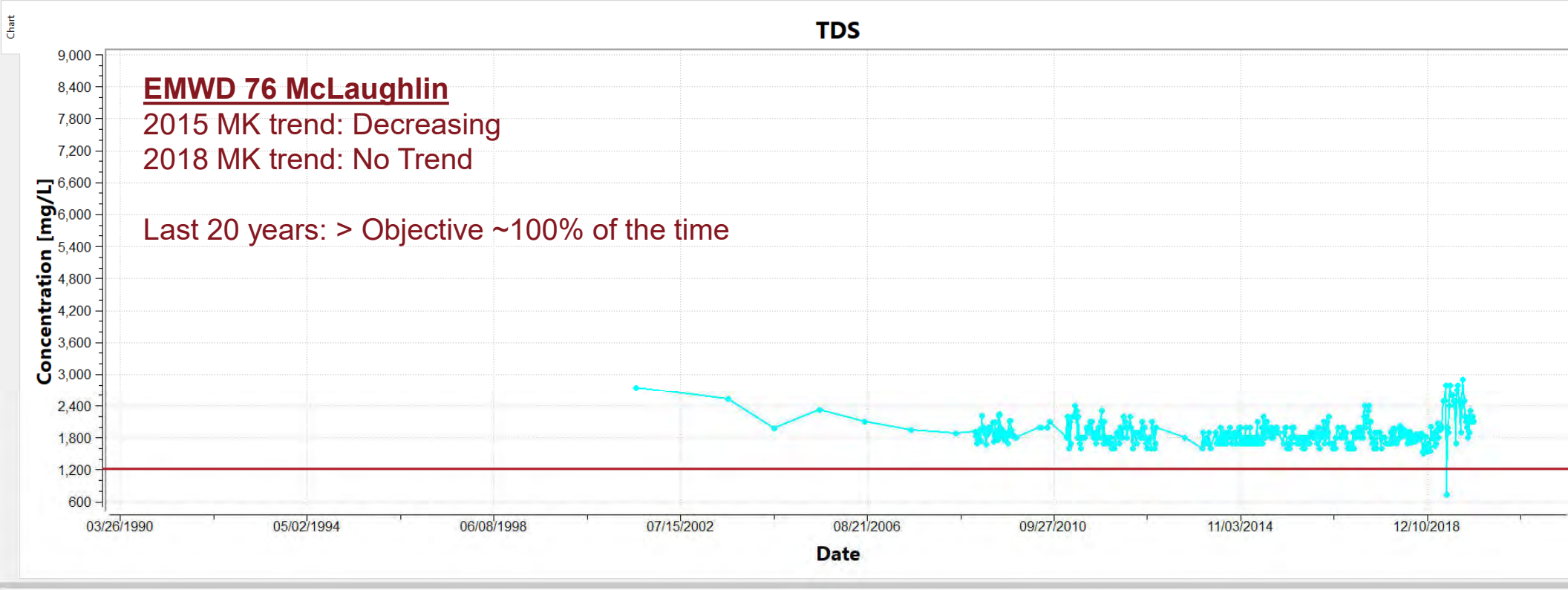

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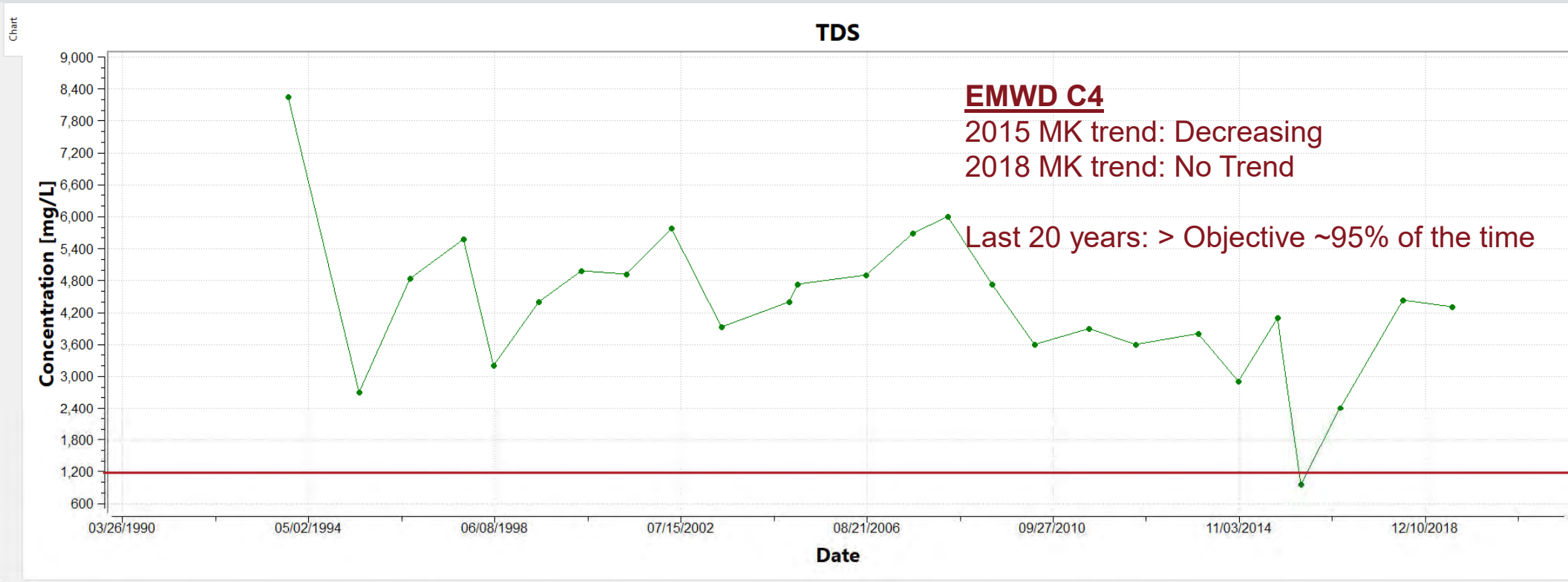

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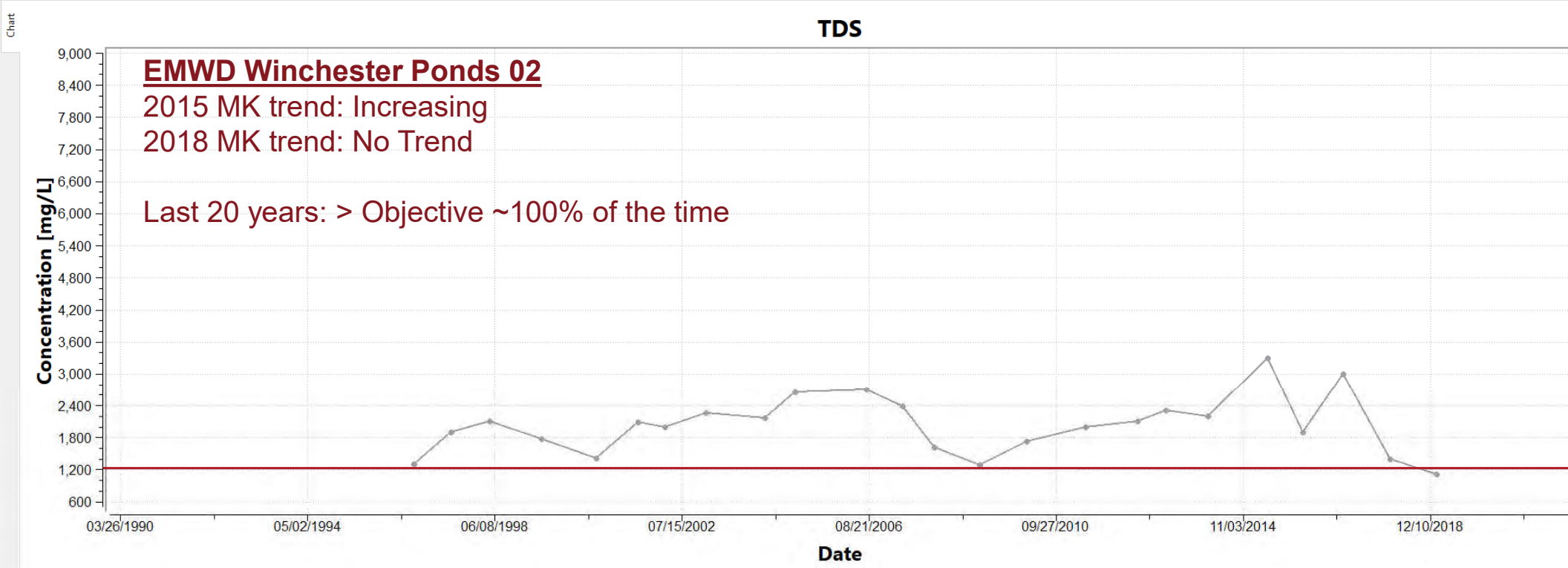

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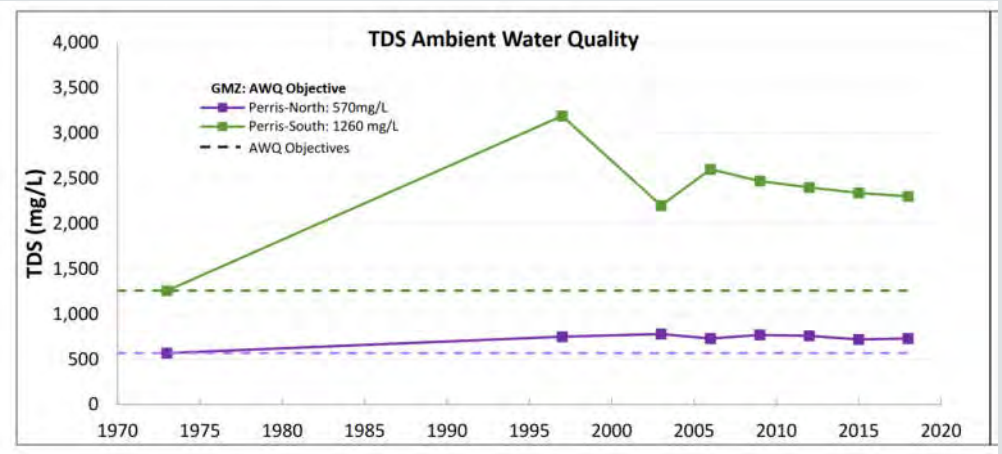
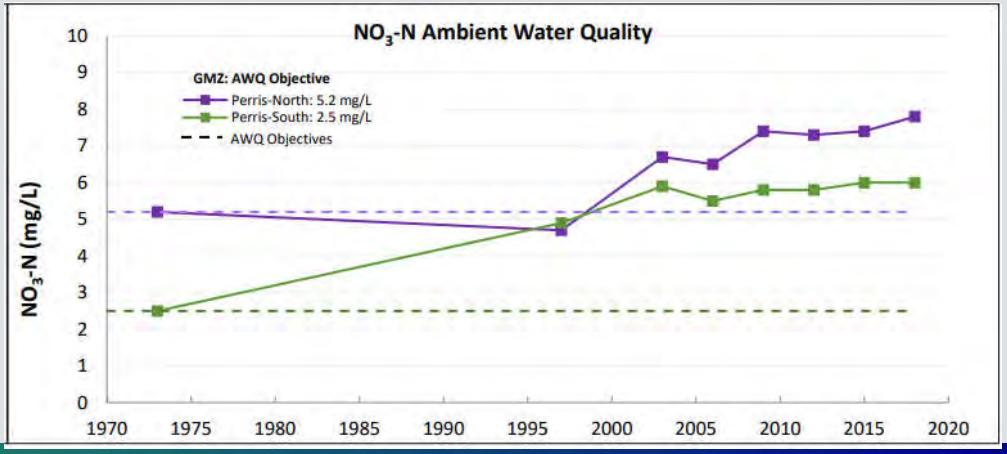
No Assimilative Capacity Since 2004 – Perris South

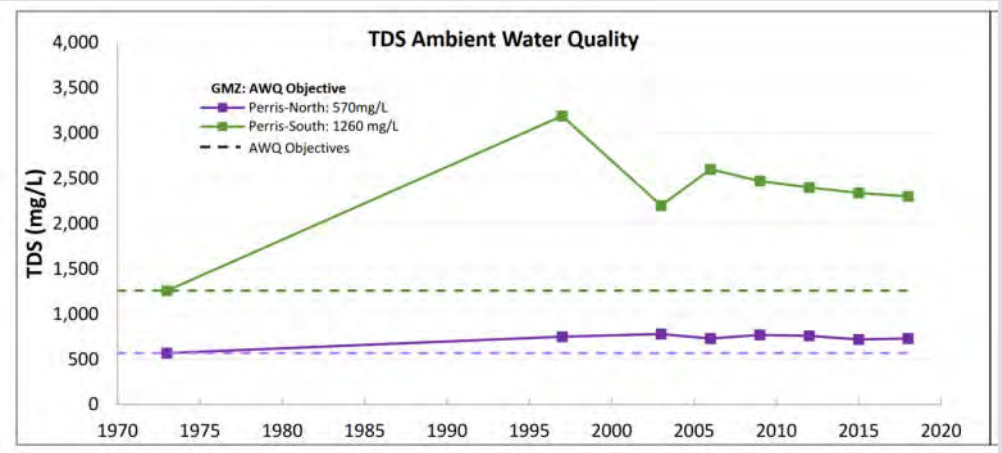
- If at majority of wells…
  - new data is still greater than the TDS objective
  - No significant change in trends across the basin
- Then, Perris South GMZ still has ***no assimilative capacity***
- For 2018 – 49 wells with current data , 30% (13 wells) had concentrations < TDS objective

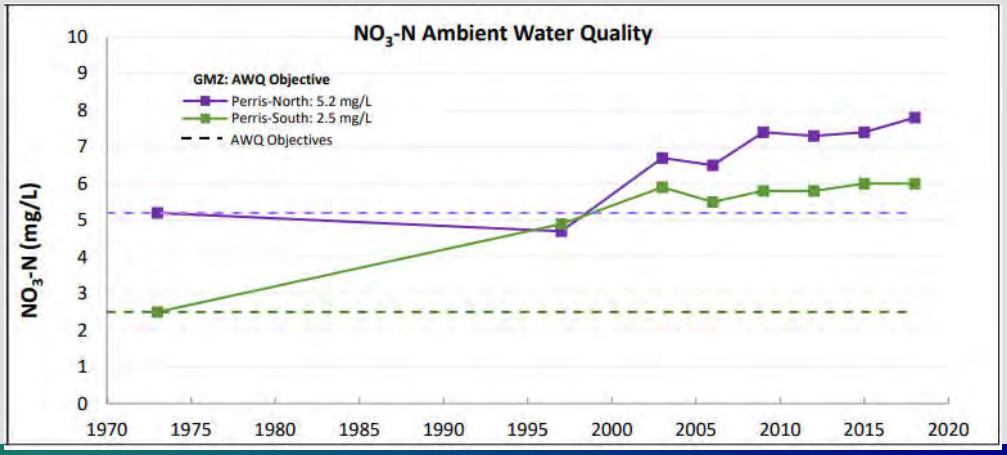




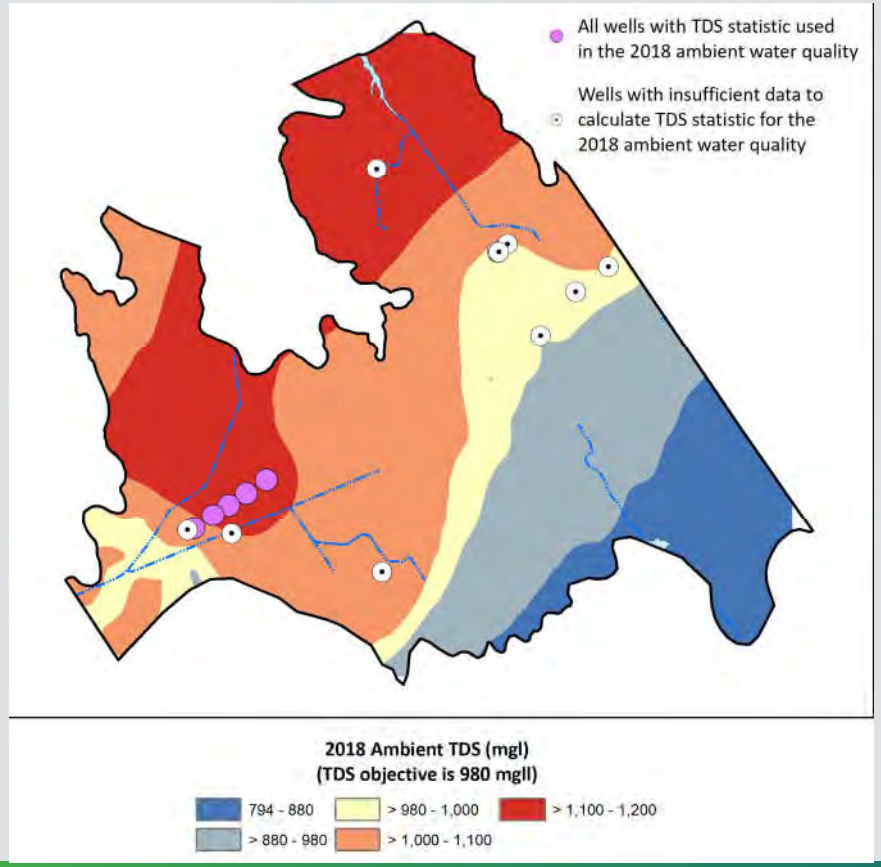
No Assimilative Capacity Since 2004 – Perris South

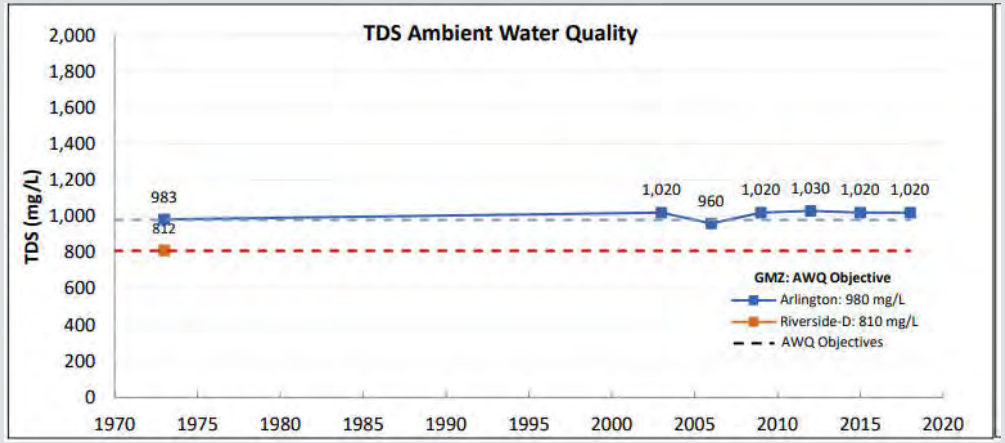
- Would change in the ambient water quality TDS concentration change the regulatory environment?
- No
  - TDS of RW used in GMZ is already less than objective of 1,200 mgl
  - Salt offsets already in place

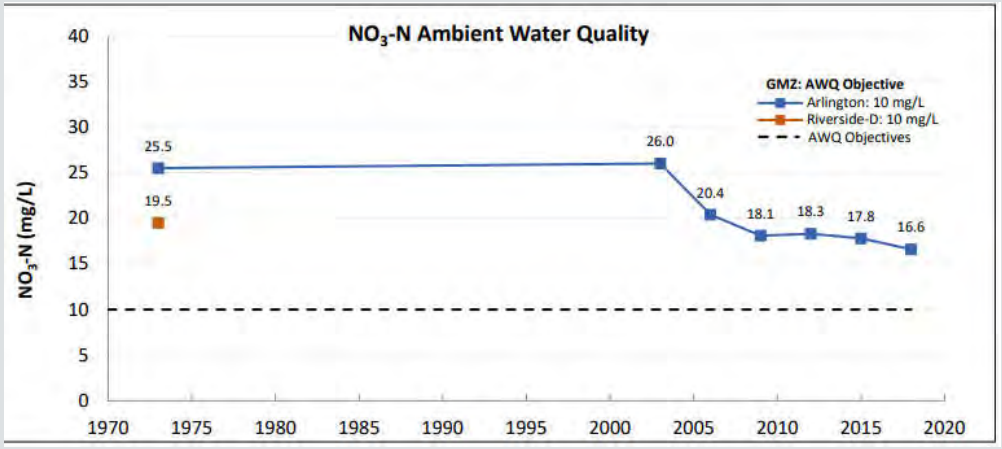




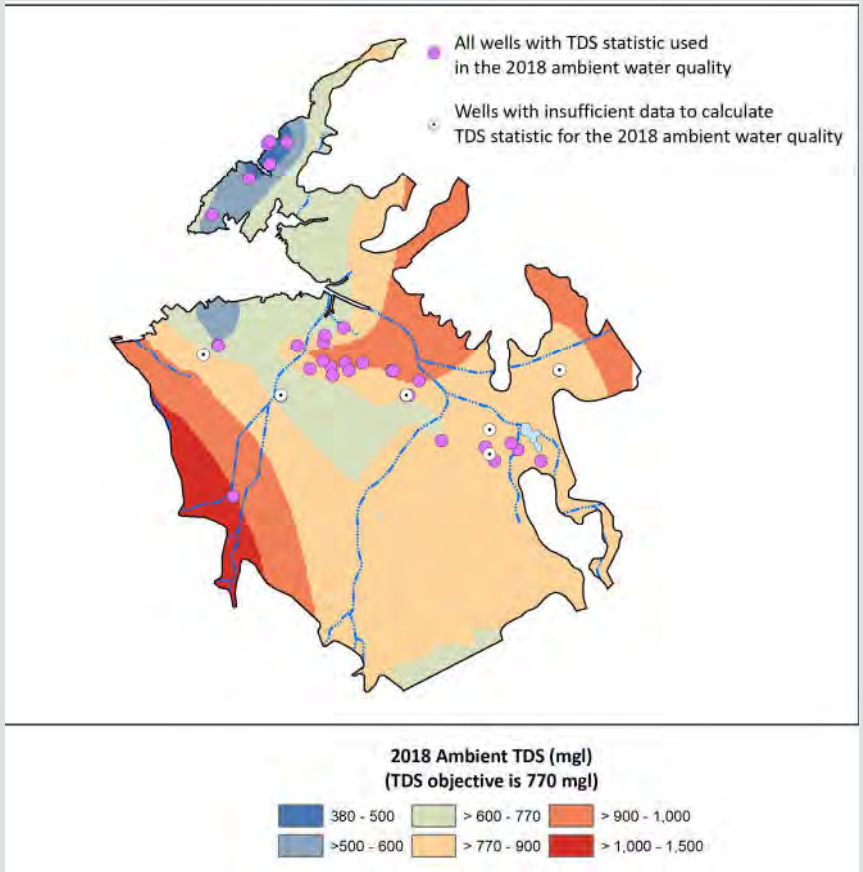
No Assimilative Capacity Since 2004 – Arlington

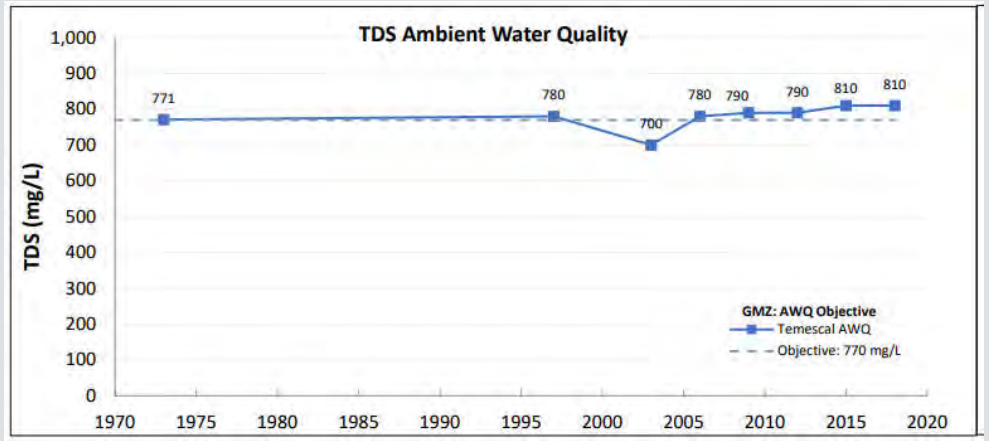


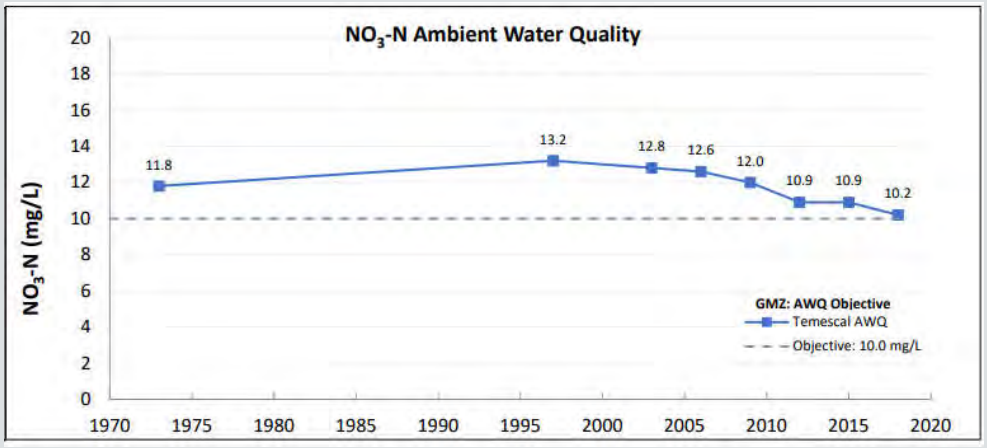




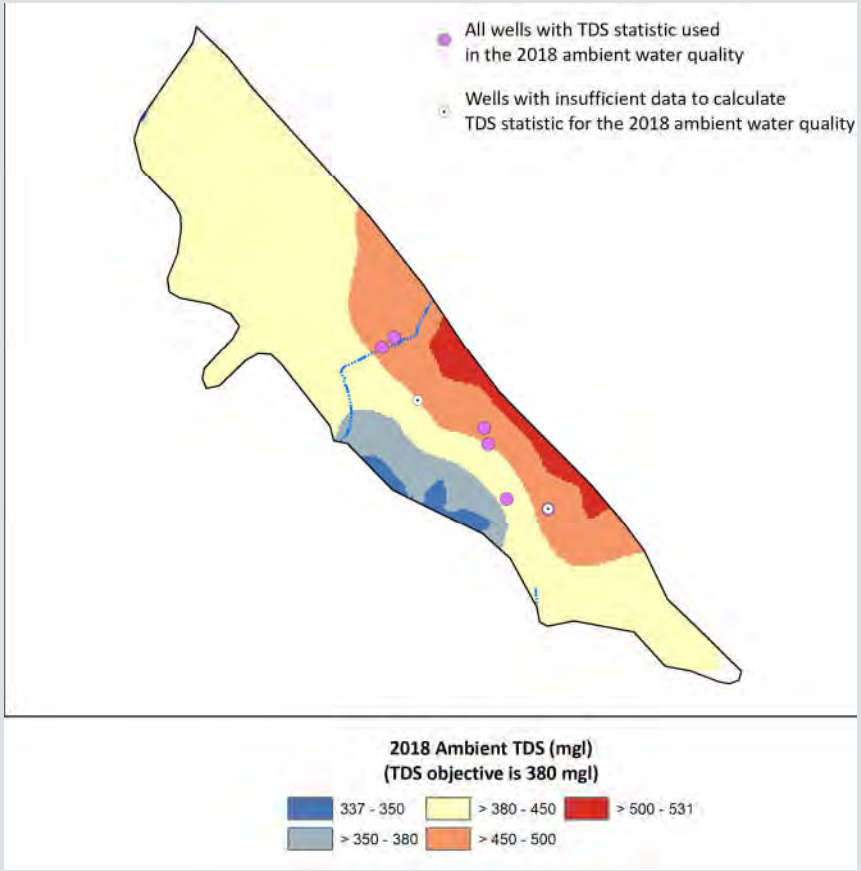
No Assimilative Capacity Since 2004 – Temescal

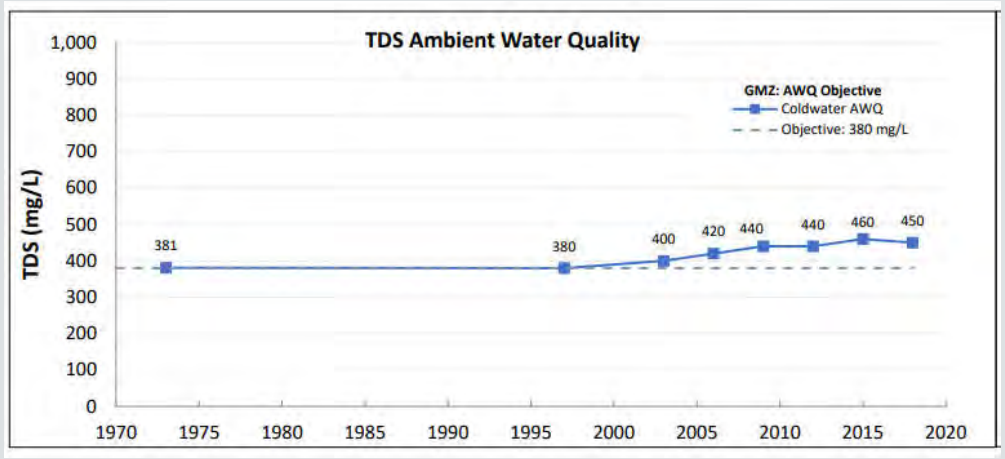


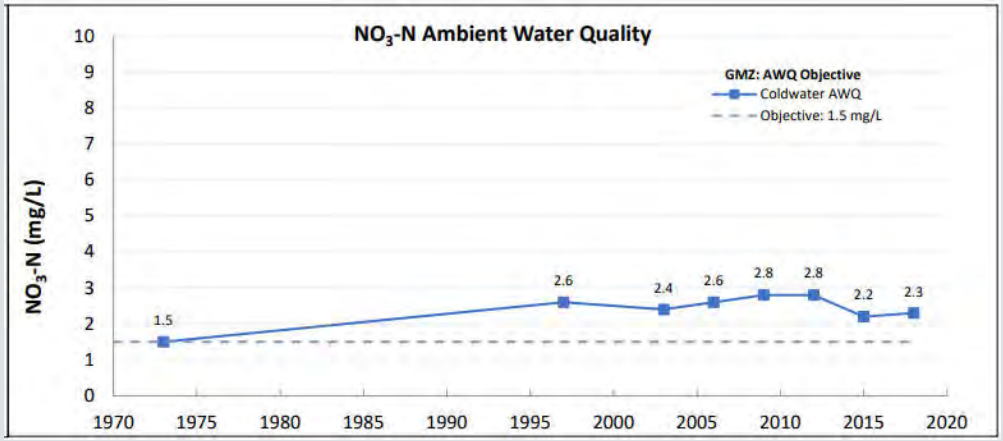




No Assimilative Capacity Since 2004 – Coldwater







Other GMZs with No Assimilative Capacity for TDS or Nitrate

- San Timoteo (TDS only)
- Yucaipa (N only)
- Bunker Hill A (TDS/N)
- Lytle (N only)
- Rialto (TDS/N)
- Colton (TDS/N)
- Riverside B (TDS only)
- Riverside F (N only)
- Riverside E (TDS/N)
- Chino North (N only)
- Chino South (TDS/N)
- Chino East (TDS/N)
- Perris North (TDS/N)
- Menifee (TDS/N)
- Hemet South (TDS/N)
- Lakeview Hemet North (TDS/N)
- San Jacinto Lower Pressure (TDS/N)
- Canyon (TDS only)
- Orange County (TDS only)
- Irvine (N only)

How Could Prioritization be Piloted for Recomputation of AWQ Through 2021?

1. Collect all data
2. Chart time histories and perform Mann-Kendall Trend Analysis
3. Make preliminary determination of AWQ based on water quality data and trends
4. Based on determination, select which GMZs to perform full method:
   a. All GMZs with Maximum Benefit SNMP (required by Basin Plan) – 7 GMZs
   b. GMZs with Assimilative Capacity where change in ambient will affect permitting considerations – likely to be 4-6 additional GMZs
   c. GMZs with change in trends (including new data) – TBD based on data

How Could Prioritization be Piloted for Recomputation of AWQ Through 2021?

5. For GMZs where full ambient water quality will be performed, could also pilot:
   a. Use of computer-assisted generation of contours (vs. hand contouring)
   b. Update of aquifer parameters to assess how different AWQ result is (2-3 GMZs)
   c. Limiting mapping to saturated aquifer (all GMZs)
6. For GMZs where data and trends used only, could pilot
   a. Mapping of loading factors to support interpretation of water quality trends
   b. Statistical trends based on 20-year period vs. entire time history of data available
7. Based on work performed, develop plan for ongoing ambient water quality methods and any pre-work to perform before the next assessment due (e.g. update aquifer properties and recompute objectives, if required)
   a. If 5-year frequency allowed, next assessment would be due July 2028

Prioritization for Filling Data Gaps

- What are the trends in water quality over time – are they changing?
  - Historical record of ambient water quality findings from 2003 to 2018
  - Mann-Kendall Statistical Trend Analysis from 2018
- Do any existing or known new permits depend on having robust ambient water quality finding compared to past recomputations?
- Example prioritization to fill data gaps
  - High Priority
    - Maximum Benefit GMZs – direct responsible agencies to update monitoring plan
    - NPDES or WDR permitting depends on ambient water quality result
  - Low priority
    - GMZs with no regulated discharges

Comments/Questions?

- GMZ specific concerns/questions on what analysis might be done under proposed process?
- Other prioritization factors?
  - Feedback:
    - Degree to which GMZ provides municipal water supply as a prioritization factor (Greg – OCWD)
    - Consider where the current aquifer properties show no water, but we know based on revised models that there is saturated aquifer (Michael Cruikshank – WSC)
    - Landfill wells – room for improvement in some GMZs (Eric. L – Regional Board)
      - Extrapolation from wells outside the boundary, behind slurry walls
      - In some cases, new wells are needed when landfill is all we have.
    - Rising groundwater outflow as a prioritization factor (Greg – OCWD)

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Groundwater Monitoring Plan and AWQ Methods – Status Update

May 24, 2022

Basin Planning Priorities: Ambient Water Quality

Two key priorities for current scope of work

1. Define groundwater monitoring program
    a. Define wells to be monitored and responsible parties
    b. Identify data gaps
    c. Define actions (and timeline) to improve monitoring networks to fill data gaps

2. Assess current ambient water quality methodology
    a. What changes can we make, enabled by 2019 Recycled Water Policy?
    b. What methods can we pilot for the required assessment due October 2023?

Groundwater Monitoring Plan

Introduction

- Background and regulatory requirements (Basin Plan and Recycled Water Policy)
- Methods and process to prepare the plan

Overall Monitoring Plan

- Big picture process for maintaining watershed-wide monitoring network overtime
- Big picture process for collecting data annually for Recycled Water Policy compliance and for use in periodic analyses of ambient water quality
- Big picture process for filling data gaps

Groundwater Monitoring Plan

Groundwater Management Zone Monitoring Plans

Subsection for each GMZ:

- Describe size, general setting, and SNMP regulatory compliance factors (discharge permits, recycled water use, etc.)
- Characterize distribution of data in recent AWQ analyses
- Characterize ongoing monitoring program in a map and table, including:
  - Listing of each well owner and name of wells that will be monitored
  - Current sampling frequency and party responsible for monitoring
  - Party responsible for annually delivering data to BMPTF
- Characterize data gaps and priority/schedule for addressing the data gaps

Ambient Water Quality Methods

Introduction

- Background and regulatory requirements (Basin Plan and Recycled Water Policy)
- Methods and process to prepare the recommendation

Considerations and Challenges with Existing AWQ Methods

Ambient Water Quality Methods

Introduction

- Background and regulatory requirements (Basin Plan and Recycled Water Policy)
- Methods and process to prepare the recommendation

Considerations and Challenges with Existing AWQ Methods

Recommended AWQ Methods for 2021 AWQ Recomputation (Due October 2023)

Implementation Plan

Schedule of Next Steps

- Summarize schedule of implementation actions and responsible parties for the period of Fiscal Year 2023 to Fiscal Year 2028 (July 2022 through June 2028)
- Budget level cost estimates (?)

GMZs with Potential Data Gaps to fill

Yucaipa	Bunker Hill-B	Colton	Canyon	Hemet South	San Jacinto Lower Pressure
Riverside A	Riverside B	Riverside C	Riverside D	Riverside E	Riverside F
Arlington	Coldwater	Temescal	Santiago	La Habra	

Questions for Consideration in Ongoing Methods and Data Collection

- Should we continue to rely on a 20-year period of record?
  - → ***Generally, Yes. Focus on improved monitoring plan will improve data quality for analysis in the long term***
  - → ***Suggestion to explore alternative time periods since improved data availability***

- Should we continue to rely on a statistical analysis method developed in 2004?
  - → ***Generally, Yes***
  - → ***Case-specific changes may be warranted in a GMZ, but should be done as part of a GMZ specific SNMP (e.g. Upper Temescal Valley SNMP)***

Questions for Consideration in Ongoing Methods and Data Collection

- Is all data good data?
  - Should we reduce the analysis to a set of key wells that MUST be monitored?
    - → ***NO, many GMZs are too complex to do this effectively. Focus on adequate spatial distribution of ongoing monitoring, and periodic check to fill data gaps as wells are lost***
  - Should we prioritize wells with recent data in statistical analysis (e.g. only include these data in the analysis)
    - → ***NO, we should continue to lose all data and focus on improved monitoring network going forward that deals with data gaps***

Questions for Consideration in Ongoing Methods and Data Collection

- Is all data good data?
  - Should the high TDS concentrations along the Pacific Coast of Orange County GMZ be included in the ambient concentration – especially in light of regional groundwater management actions to address seawater intrusion?
    - → ***YES, part of aquifer system***
  - Should we include landfill (or similar) monitoring wells? If so, which ones?
    - → ***Some, only those within saturated aquifer system***
    - → ***Exclude those isolated by slurry walls and outside aquifer system***

Questions for Consideration in Ongoing Methods and Data Collection

- What other improvements could be considered:
  - Should we consider the extent of the saturated aquifer system in contouring, statistical analysis, and map presentations?
    - → ***Yes, limit analysis to wells and extent of interpolation to extent of saturated aquifer***
  - Should the aquifer parameters defined in 2004 be updated?
    - → ***Yes, but consider:***
      - ***Not all at once because it will trigger re-do of objectives → Prioritize based on assimilative capacity and recycled water discharge/permitting needs***
      - ***Timing of next update of aquifer parameters (e.g. Chino Basin updates model every five years)***

Questions for Consideration in Ongoing Methods and Data Collection

- Should we prioritize addressing data gaps, if there are many?
  - → ***Yes, tiered approach: (1) time to identify existing wells, (2) well siting feasibility analysis to fill remaining gaps, if any, (3) construct wells if feasible***
- How should we prioritize addressing data gaps, if there are many?
  - → ***Yes, Prioritize based on assimilative capacity and recycled water discharge/permitting needs***
- Can we reduce the level of effort to perform ambient water quality analysis by prioritizing our GMZs based on historical results, current water quality, and regulatory compliance factors?
  - → ***Yes, this should be piloted, but there needs to be a focus to continue collecting data in all GMZs, and long-term cost of methods should not be equal or greater than if current methods continued***

Recommended Process to be Piloted for Recomputation of AWQ Through 2021

1. Collect all data through December 2021
2. Chart time histories, compute summary statistics, perform Mann-Kendall Trend Analysis, map results
3. Make preliminary determination of AWQ based on water quality data and trends
4. Assess ambient water quality as follows:
    a. Compute using standard methodology in GMZs with Maximum Benefit SNMP (required by Basin Plan) – 7 GMZs, plus 2-3 additional GMZs (Orange County, Riverside-A, and ?)
    b. Based on analysis of statistics and trends in remaining GMZs

Recommended Process to be Piloted for Recomputation of AWQ Through 2021

5. For GMZs where full ambient water quality will be performed, pilot:
   a. Use of computer-assisted generation of contours (vs. hand contouring)
   b. Update of aquifer parameters (if applicable)
   c. Limiting mapping/interpolation to extent of saturated aquifer
6. For GMZs where data and trends used only, pilot
   a. Statistical trends based on 20-year period vs. entire time history of data available
   b. Mapping of loading factors to support interpretation of water quality trends (2-3 GMZs)
7. Based on work performed, develop plan for ongoing ambient water quality methods and GMZ prioritization processes
8. Define schedule for any pre-work to perform before the next assessment due (e.g. update aquifer properties and recompute objectives, if required)
   a. If 5-year frequency allowed, next assessment would be due July 2028

THANK YOU

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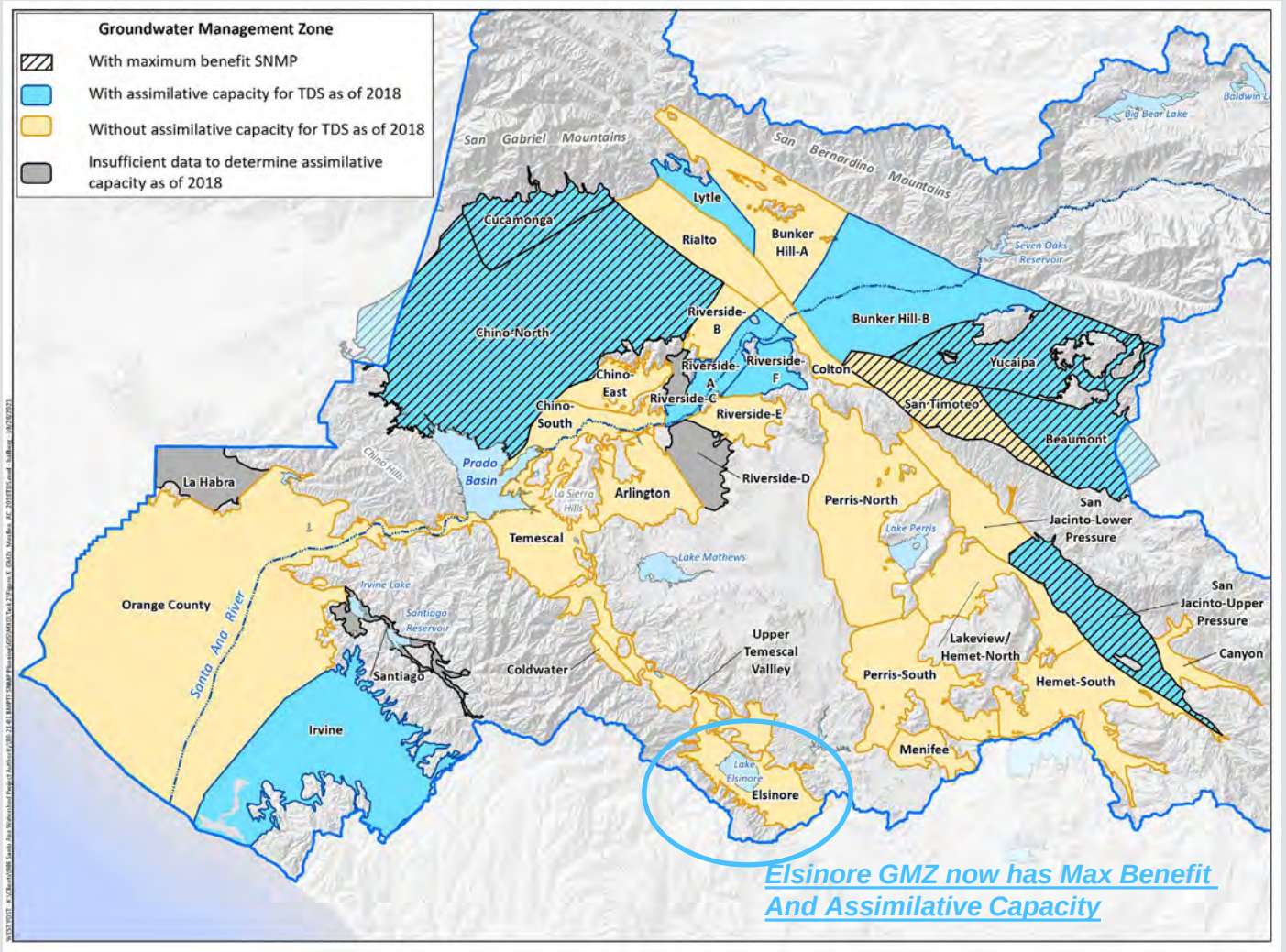
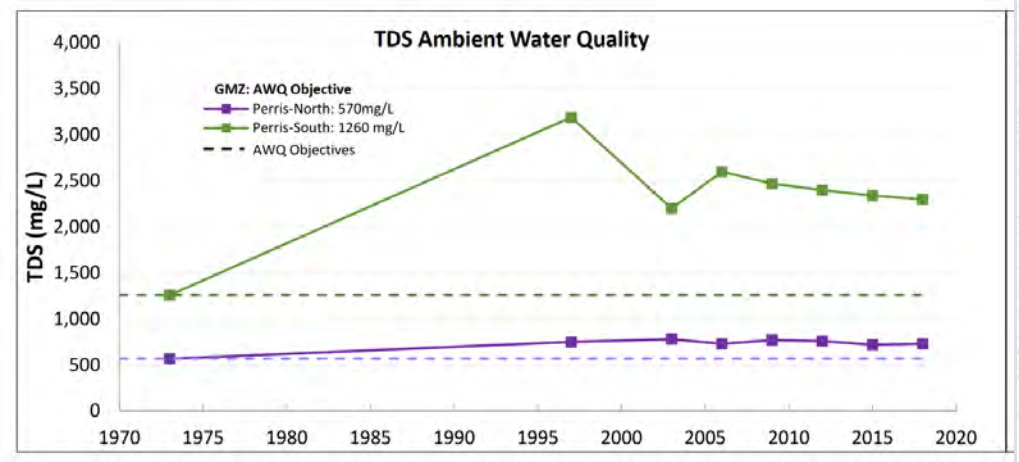
Assimilative Capacity for TDS As of 2018 AWQ

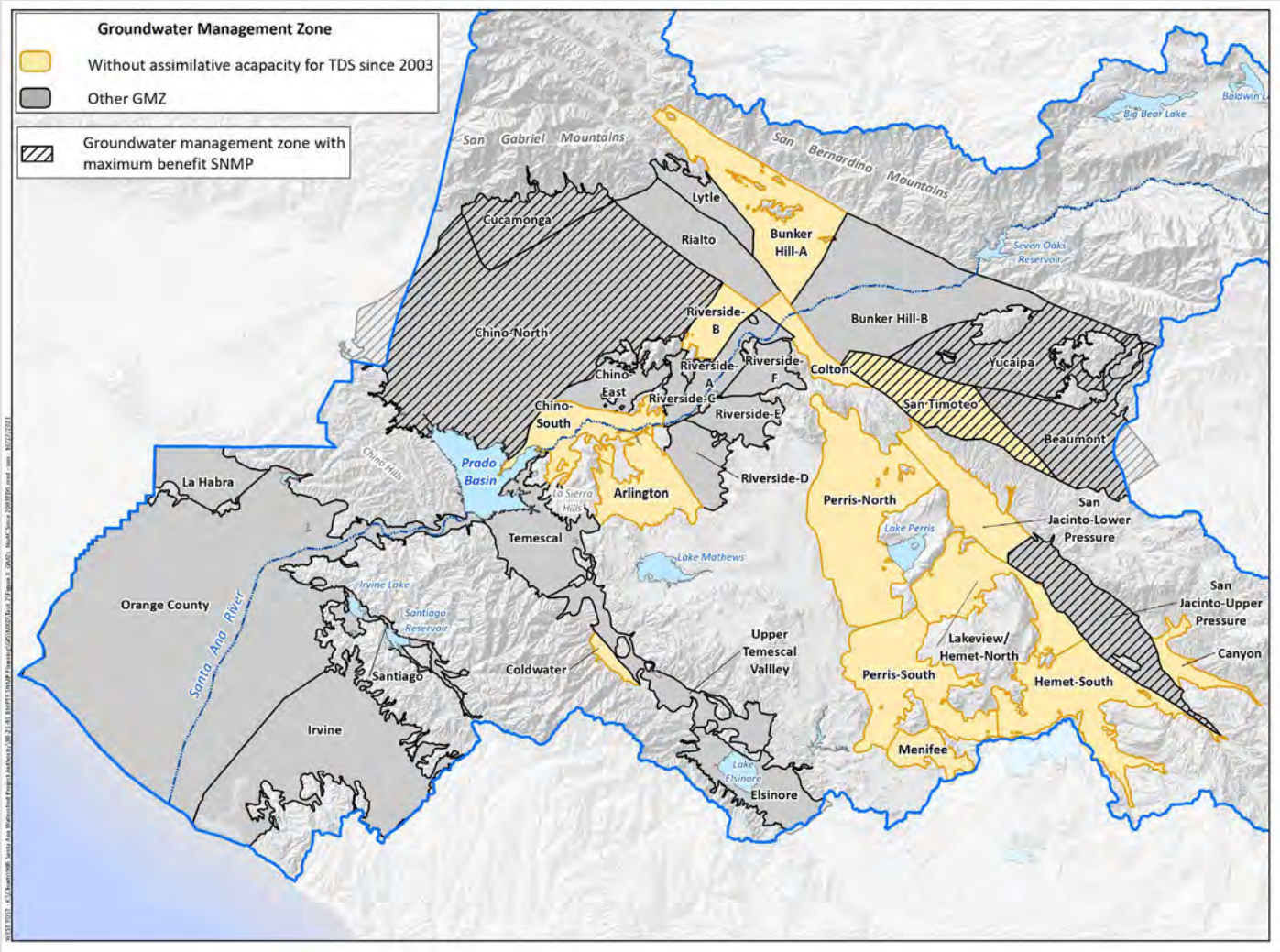
- 35 GMZs Total
- 11 GMZs with Assimilative Capacity
  - 6 are Maximum Benefit GMZs
- 20 with ***NO*** Assimilative Capacity
- 4 with no AWQ findings



Assimilative Capacity for TDS Since 2004

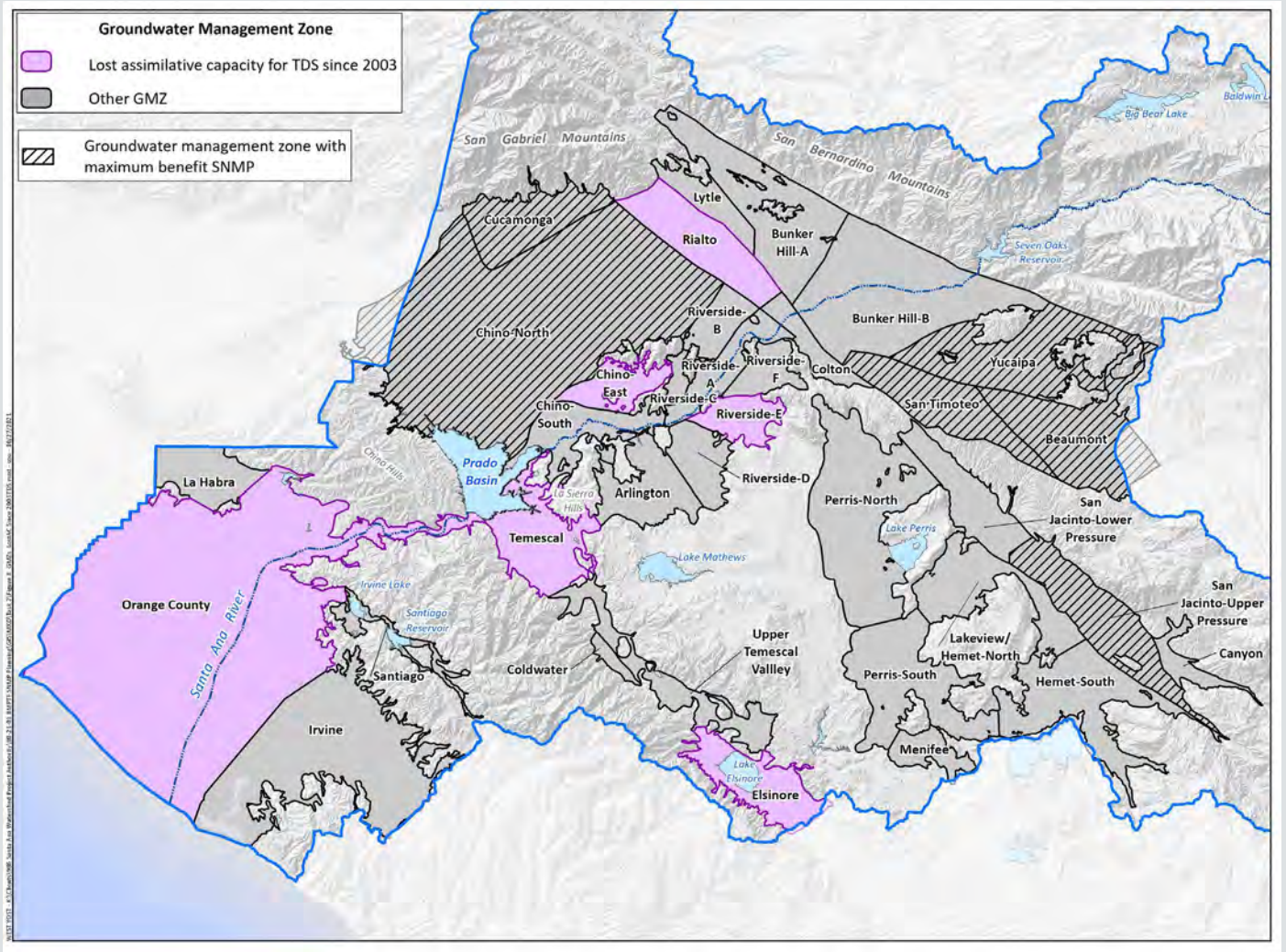
- 14 GMZs have had ***NO*** Assimilative Capacity since 2003 AWQ recomputation





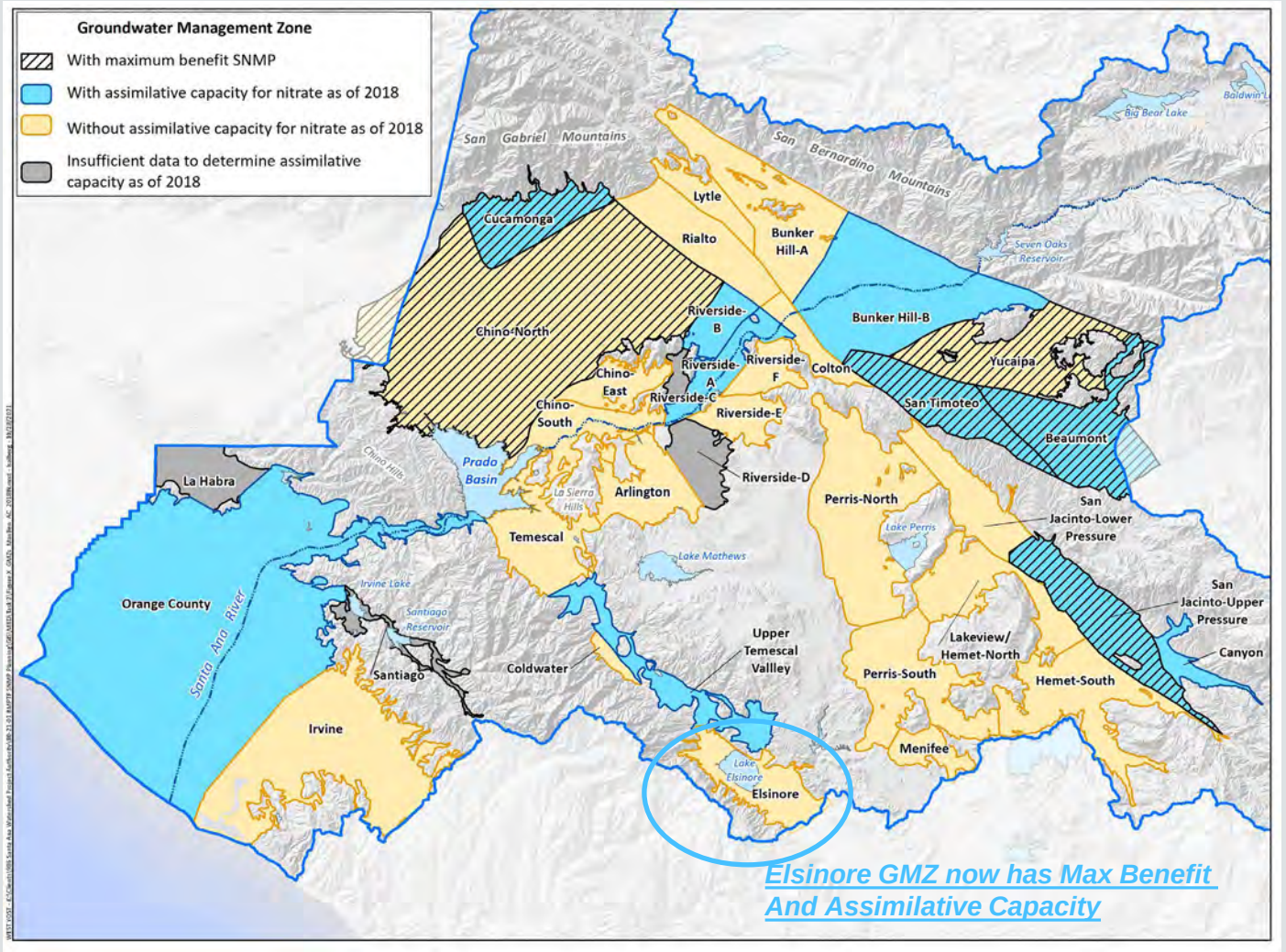
Assimilative Capacity for TDS Since 2004

- Six GMZs lost assimilative capacity for TDS since 2003
  - Rialto
  - Riverside-E
  - Chino East
  - Temescal
  - Elsinore
  - Orange County



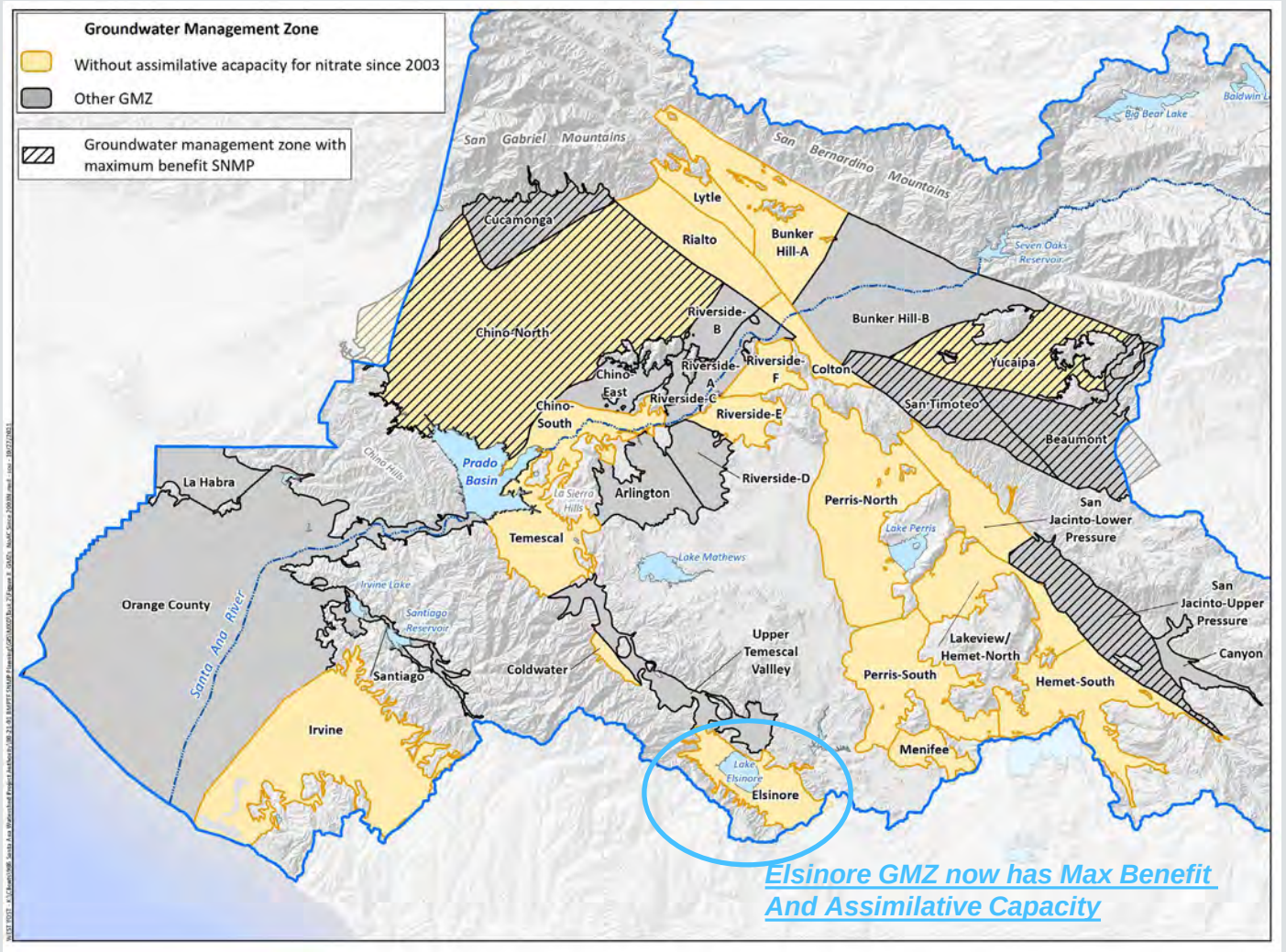
Assimilative Capacity for Nitrate As of 2018 AWQ

- 35 GMZs Total
- 11 with Assimilative Capacity
  - 5 are Maximum Benefit GMZs
- 20 with ***NO*** Assimilative Capacity
- 4 with no AWQ findings



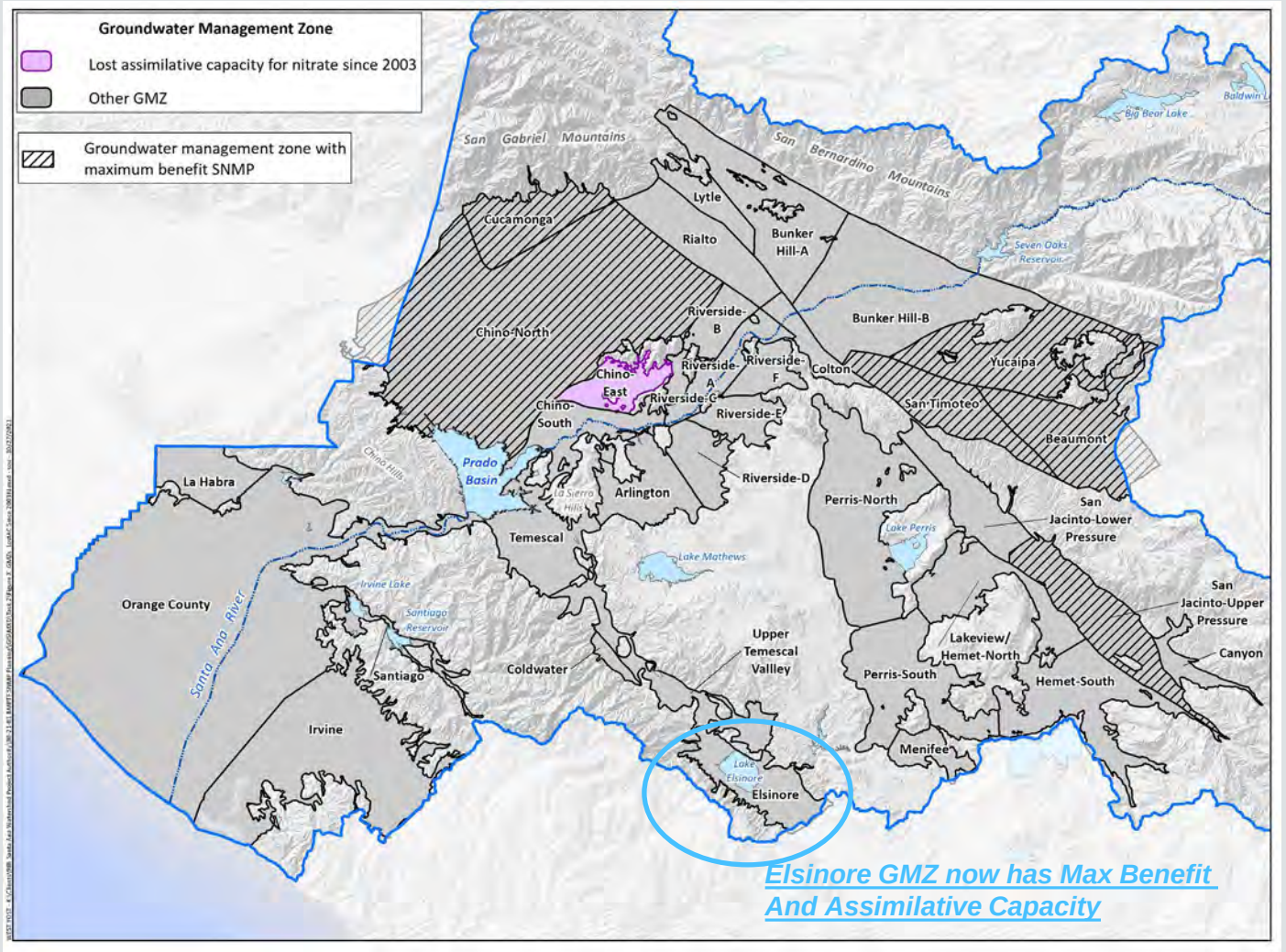
Assimilative Capacity for Nitrate Since 2004

- 18 GMZs have had ***NO*** Assimilative Capacity since 2003 AWQ recomputation



Assimilative Capacity for Nitrate Since 2004

- One GMZ lost assimilative capacity for nitrate since 2003
  - Chino East GMZ
  - Methodological



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Groundwater Monitoring Plan and AWQ Methods – Status Update

June 22, 2022

What is left to do to complete Task 2?

Since May Task Force meeting

1. Received remaining information from well owners on monitoring efforts completed maps and tables by GMZ of the monitoring program
2. Reviewed Landfill and Geotracker monitoring wells to determine if they are within the boundaries of the aquifer system and selected wells for inclusion in the monitoring plan
3. Working on assessment of monitoring data gaps based on complete information received from well owners
4. Identifying what additional data needs to be collected as part of the next AWQ update to fill historical gaps – e.g. data that existed through 2018 but was not collected for last AWQ update
5. Corresponded with Valley District on additional input on ambient water quality methods – concept to pilot use of integrated model for computing ambient water quality

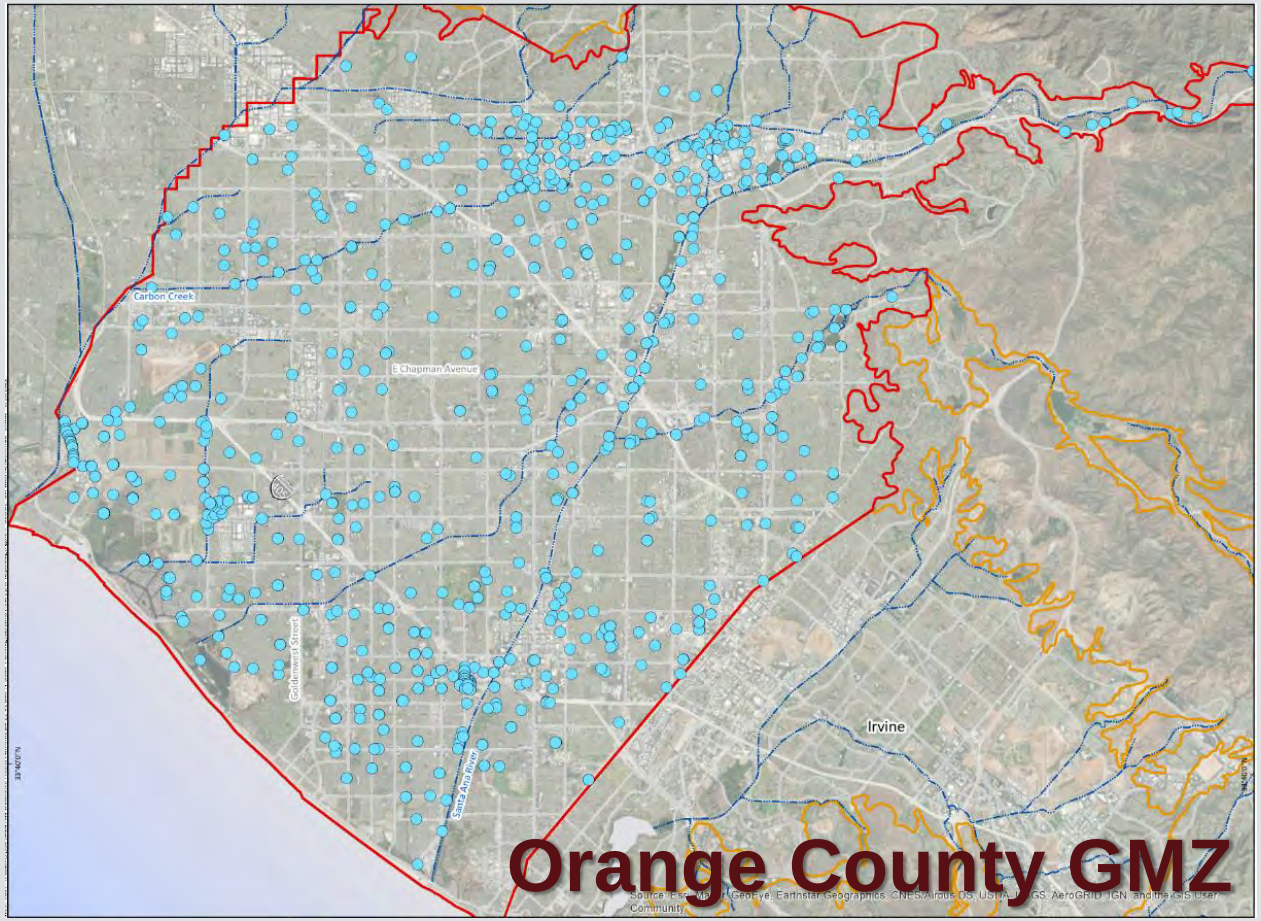
What is left to do to complete Task 2?

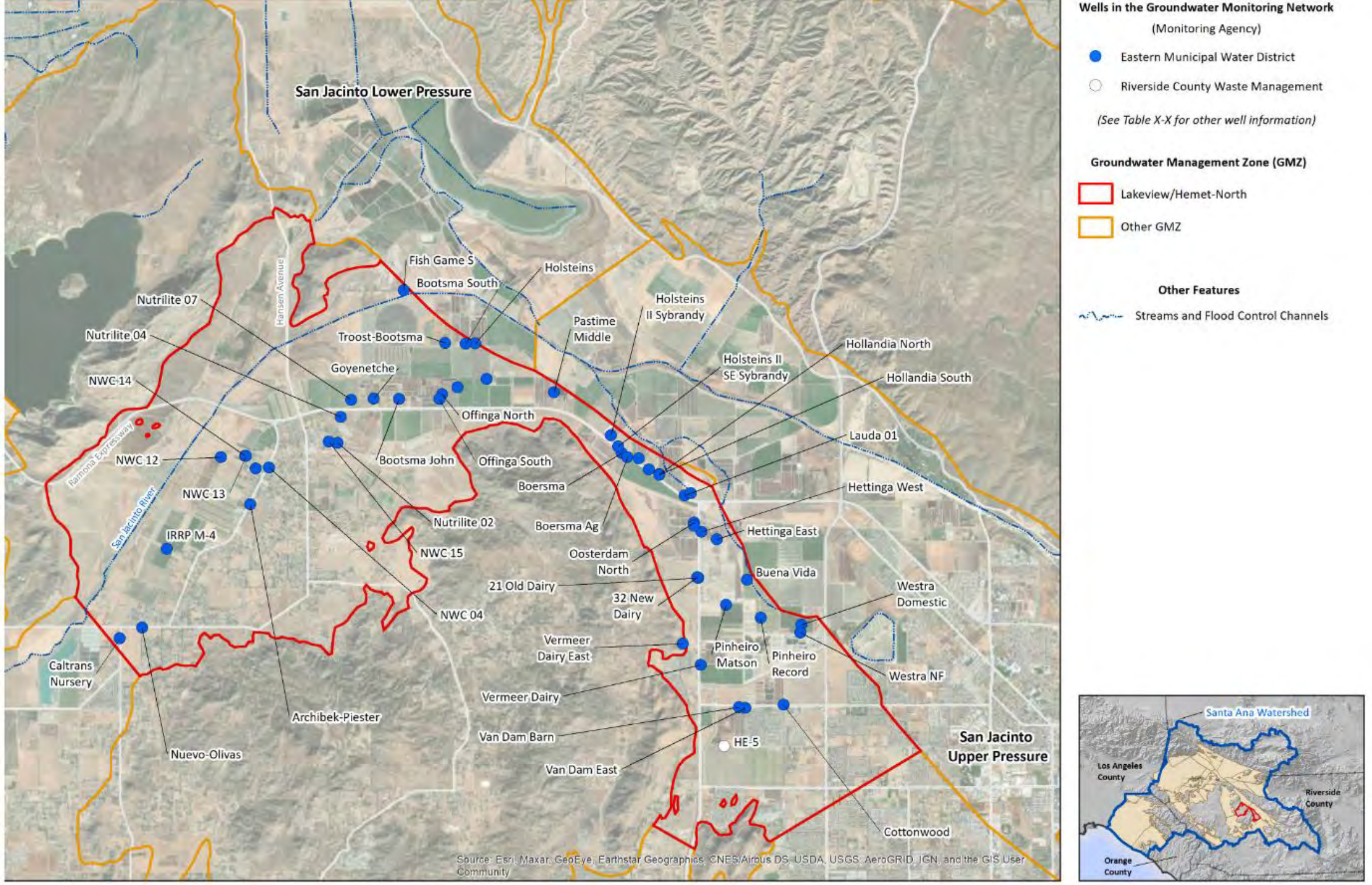
1. Send agencies:
   - maps and tables to confirm we interpreted monitoring information correctly
   - Share data gap assessment to get feedback
2. Obtain feedback on Valley District input on additional AWQ method to pilot
3. Working on assessment of monitoring data gaps based on complete information received from well owners
4. Identifying what additional data needs to be collected as part of the next AWQ update to fill historical gaps – e.g. data that existed through 2018 but was not collected for last AWQ update
5. Corresponded with Valley District on additional input on ambient water quality methods – concept to pilot use of integrated model for computing ambient water quality

What is left to do to complete Task 2?

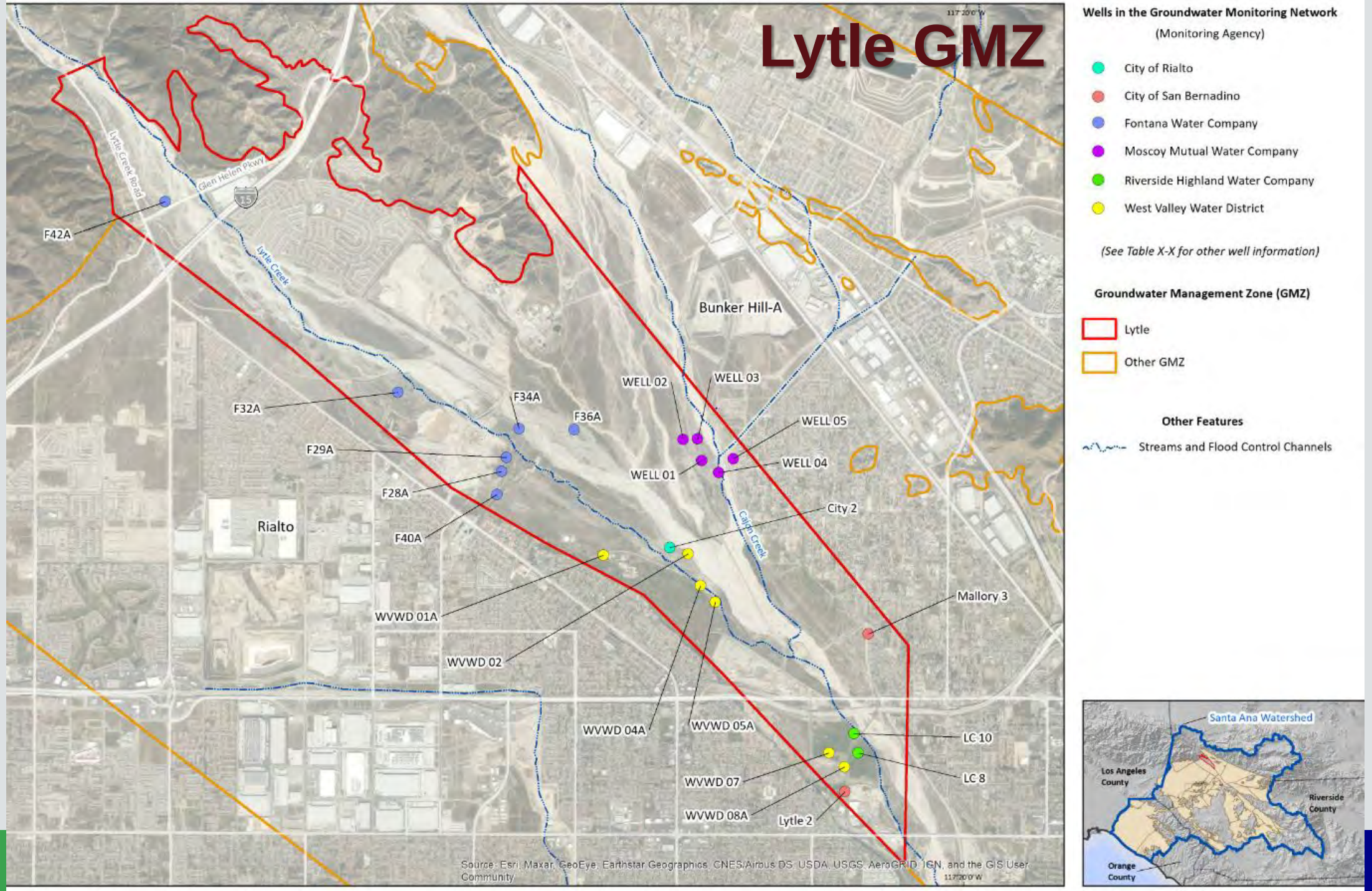
1. Send maps/tables to agencies for review:
   - maps and tables to confirm we interpreted monitoring information correctly
   - Share data gap assessment to get feedback
2. Get feedback from Task Force on Valley District recommendation for additional concept to pilot for 2021 AWQ: using integrated model
3. Estimate cost to perform 2021 AWQ study

What does a data gap look like?

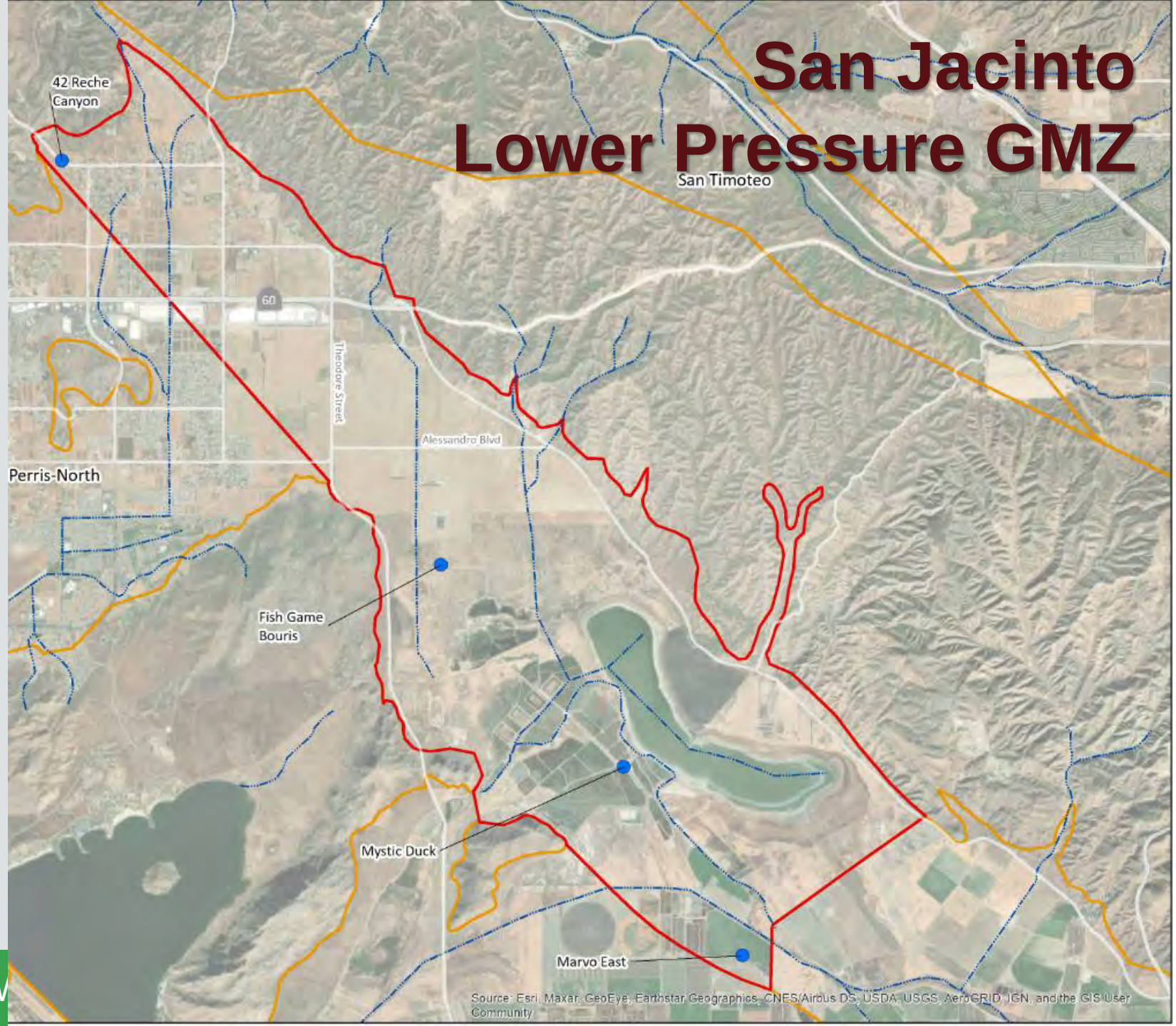



San Jacinto Lower Pressure
San Jacinto Upper Pressure
Fish Game S
Bootsma South
Holsteins
Nutrilite 07
Nutrilite 04
Troost-Bootsma
Pastime Middle
Holsteins II Sybrandy
Hollandia North
Holsteins II SE Sybrandy
Hollandia South
Goyenetche
NWC 14
Offinga North
Lauda 01
NWC 12
Bootsma John
Offinga South
Boersma
Hettinga West
NWC 13
Nutrilite 02
Boersma Ag
Hettinga East
IRRP M-4
NWC 15
Oosterdam North
Buena Vida
21 Old Dairy
32 New Dairy
Westra Domestic
NWC 04
Vermeer Dairy East
Pinheiro Matson
Pinheiro Record
Westra NF
Caltrans Nursery
Vermeer Dairy
Archibek-Piester
Van Dam Barn
HE-5
Nuevo-Olivas
Van Dam East
Cottonwood
Hansen Avenue
Ramona Expressway
San Jacinto River
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Wells in the Groundwater Monitoring Network
(Monitoring Agency)
Eastern Municipal Water District
Riverside County Waste Management
(See Table X-X for other well information)
Groundwater Management Zone (GMZ)
Lakeview/Hemet-North
Other GMZ
Other Features
Streams and Flood Control Channels
Santa Ana Watershed
Los Angeles County
Riverside County
Orange County

Lytle GMZ


Wells in the Groundwater Monitoring Network
(Monitoring Agency)
City of Rialto
City of San Bernadino
Fontana Water Company
Moscoy Mutual Water Company
Riverside Highland Water Company
West Valley Water District
(See Table X-X for other well information)
Groundwater Management Zone (GMZ)
Lytle
Other GMZ
Other Features
Streams and Flood Control Channels
Lytle Creek Road
Glen Helen Pkwy
Lytle Creek
Bunker Hill-A
Rialto
Cajon Creek
F42A
F32A
F34A
F36A
F29A
F28A
F40A
WELL 02
WELL 03
WELL 05
WELL 04
WELL 01
City 2
Mallory 3
WVWD 01A
WVWD 02
WVWD 04A
WVWD 05A
LC 10
LC 8
WVWD 07
WVWD 08A
Lytle 2
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Santa Ana Watershed
Los Angeles County
Riverside County
Orange County

San Jacinto Lower Pressure GMZ



Wells in the Groundwater Monitoring Network

(Monitoring Agency)

- Eastern Municipal Water District

(See Table X-X for other well information)

Groundwater Management Zone (GMZ)

- San Jacinto Lower Pressure
- Other GMZ

Other Features

- Streams and Flood Control Channels

Wells in the Groundwater Monitoring Network

(Monitoring Agency)

(See Table X-X for other well information)

Groundwater Management Zone (GMZ)

Riverside C

Other GMZ

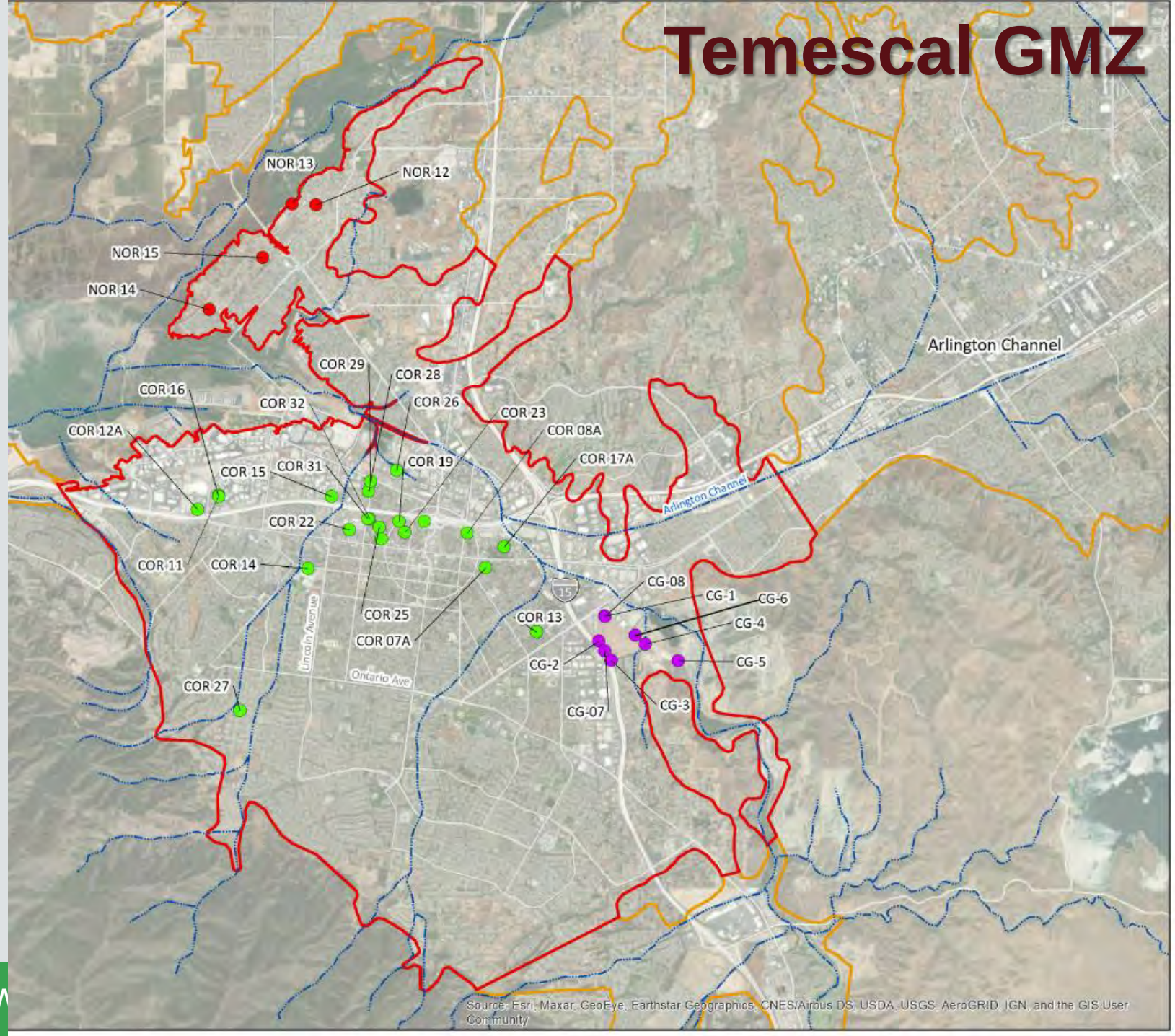
Other Features

Streams and Flood Control Channels

Riverside C GMZ

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Temescal GMZ



Wells in the Groundwater Monitoring Network

(Monitoring Agency)

- City of Corona
- City of Norco
- Riverside County Waste Management

(See Table X-X for other well information)

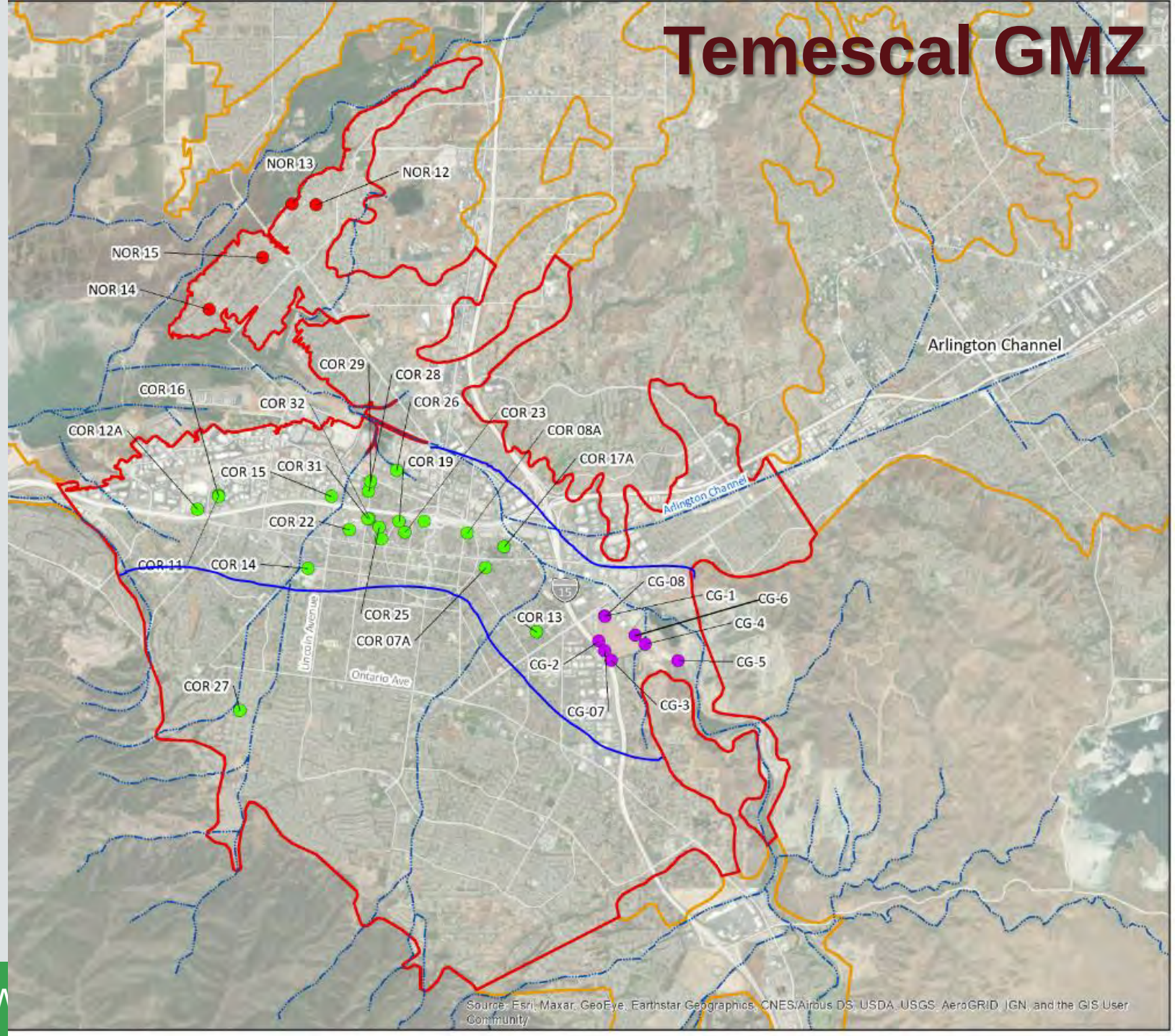
Groundwater Management Zone (GMZ)

- Temescal
- Other GMZ

Other Features

- Streams and Flood Control Channels

Temescal GMZ



Wells in the Groundwater Monitoring Network

(Monitoring Agency)

- City of Corona
- City of Norco
- Riverside County Waste Management

(See Table X-X for other well information)

Groundwater Management Zone (GMZ)

- Temescal
- Other GMZ

Other Features

- Streams and Flood Control Channels

THANK YOU

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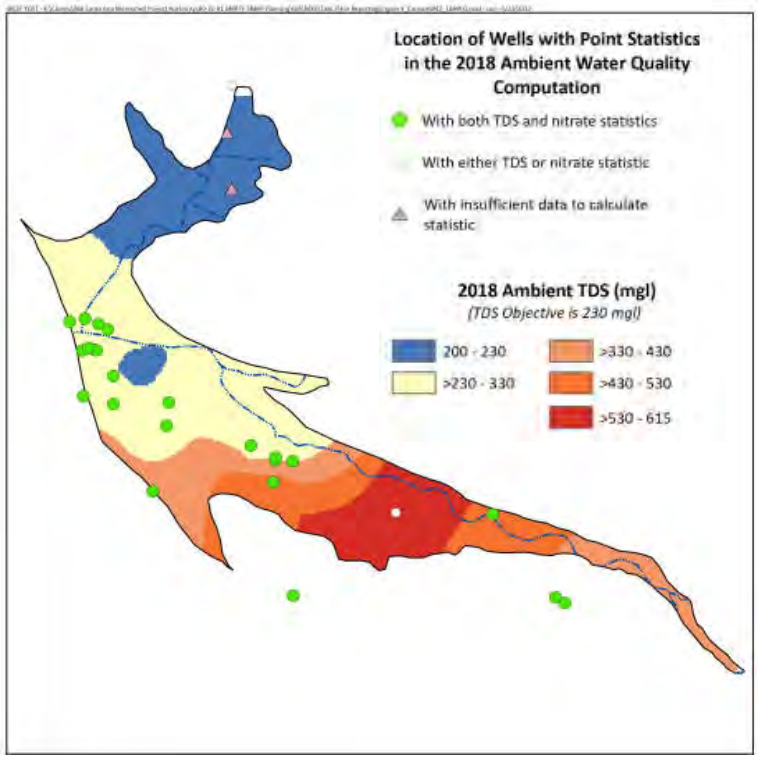
GW Monitoring Program Data Gaps

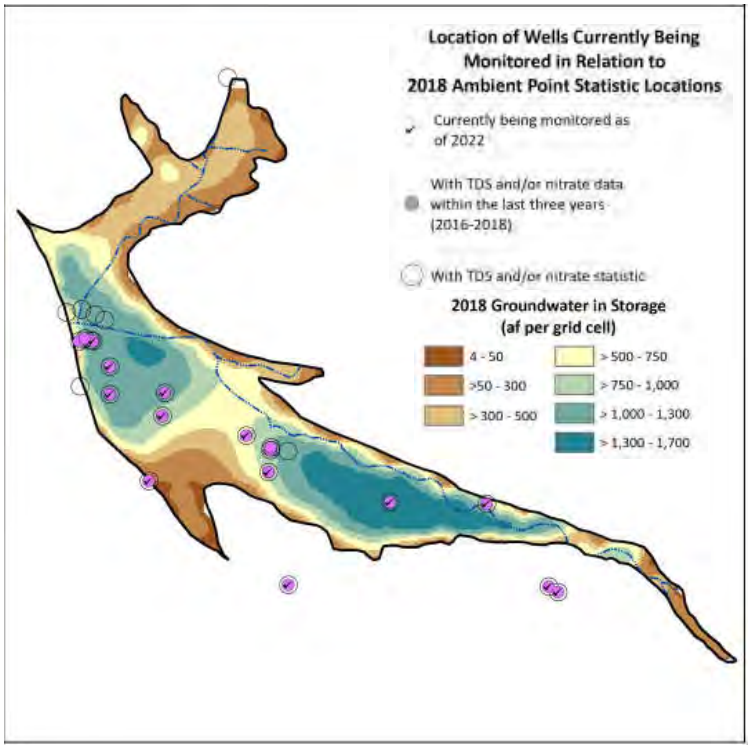
August 30, 2022

Groundwater Monitoring Network Overview

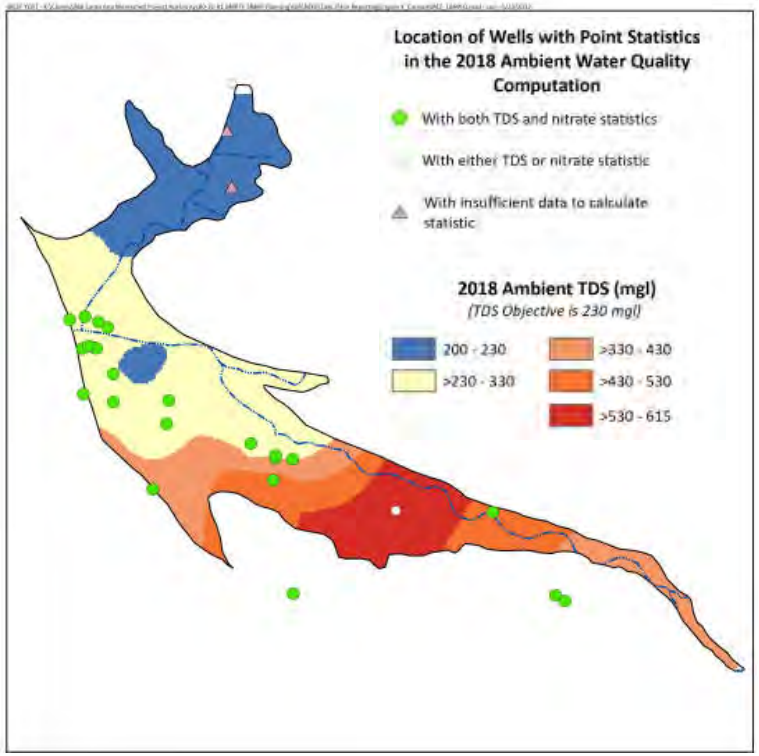
- Process to assess monitoring network and data gaps
- Monitoring Network - how documented in tables and exhibits
- Data gaps analysis
- Proposed process to fill data gaps
- Identification of Responsible Agencies to fill data gaps
- Monitoring Program implementation

Groundwater Monitoring Network Maps
Example: Canyon GMZ





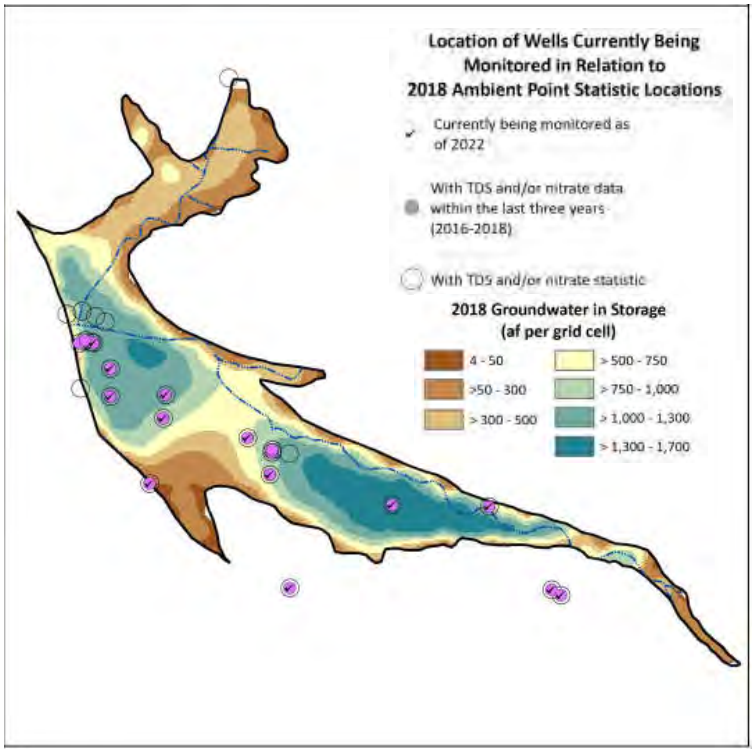
Groundwater Monitoring Network Maps
Example: Canyon GMZ



- **Green Circles** are wells that had enough data to compute a TDS and nitrate statistic in 2018.
- **White circles** are wells that only had a TDS or nitrate statistic. There was only enough qualifying data for one of the two constituents.
- **Purple triangles** are wells that had insufficient data available to calculate the ambient water quality statistic.
  - Considered in analysis at discretion of project scientists
  - Typically honor historical contours after point stats are lost

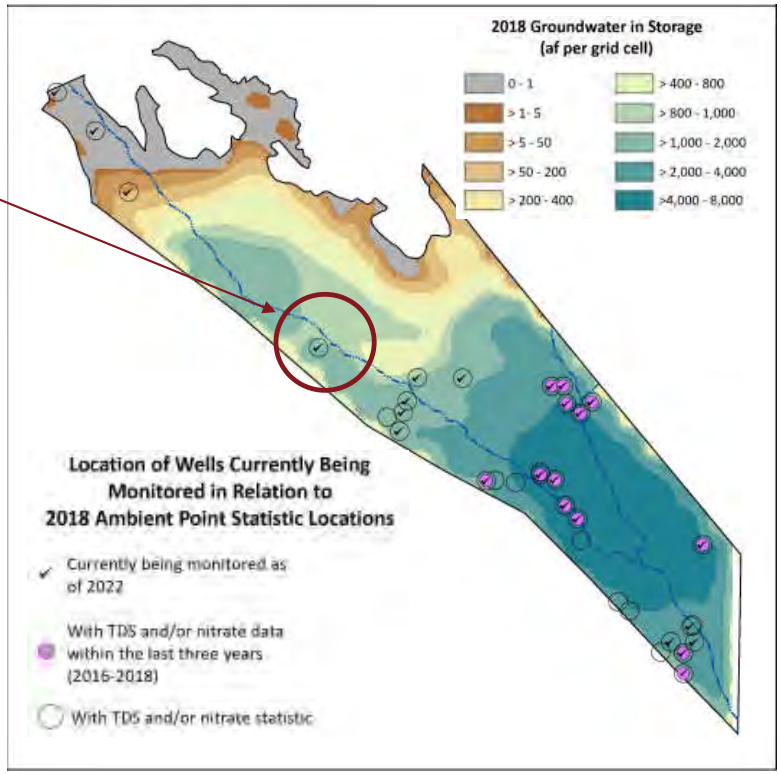
Groundwater Monitoring Network Maps
Example: Canyon GMZ

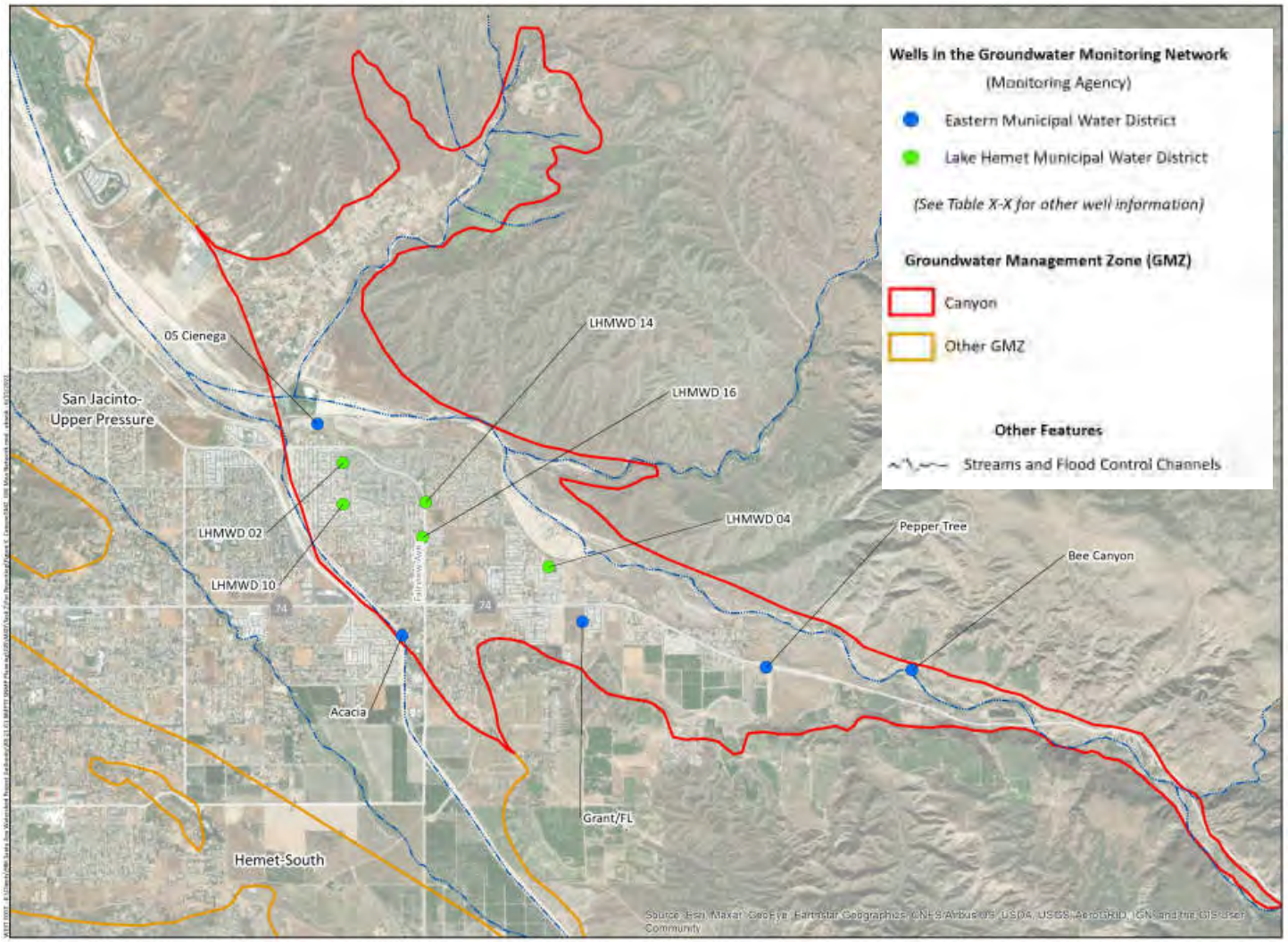
- **Open circle filled with a purple circle** - wells whose qualifying data to generate statistics included data in the last three years of the 20-year analysis period: 2016, 2017 and/or 2018.
  - This was an initial indication that the well location is still being monitored.
  - **Black check mark in the center of the purple circle**, we have confirmed the well continues to be monitored.
- **Open circle only** - wells whose qualifying data to generate statistics was limited to the time period from 1999 to 2015.
  - This was an initial indication that the well location is no longer monitored. As time progresses, these points will be lost as statistics since they are now confirmed to no longer be monitored.



Groundwater Monitoring Network Maps
Example: Lytle GMZ

- **Open circle with a black check mark** (no purple circle) - wells whose qualifying data to generate statistics was limited to the time period from 1999 to 2015 even though new data was available for the well in 2016, 2017, and/or 2018.
  - This means the data was not collected for the 2018 analysis.
  - See for example maps of San Jacinto Upper Pressure, Beaumont, and Lytle GMZs.
- **Black check mark only** are wells that are currently being monitored as of 2022, but did not have sufficient data to qualify for the 2018 analysis.





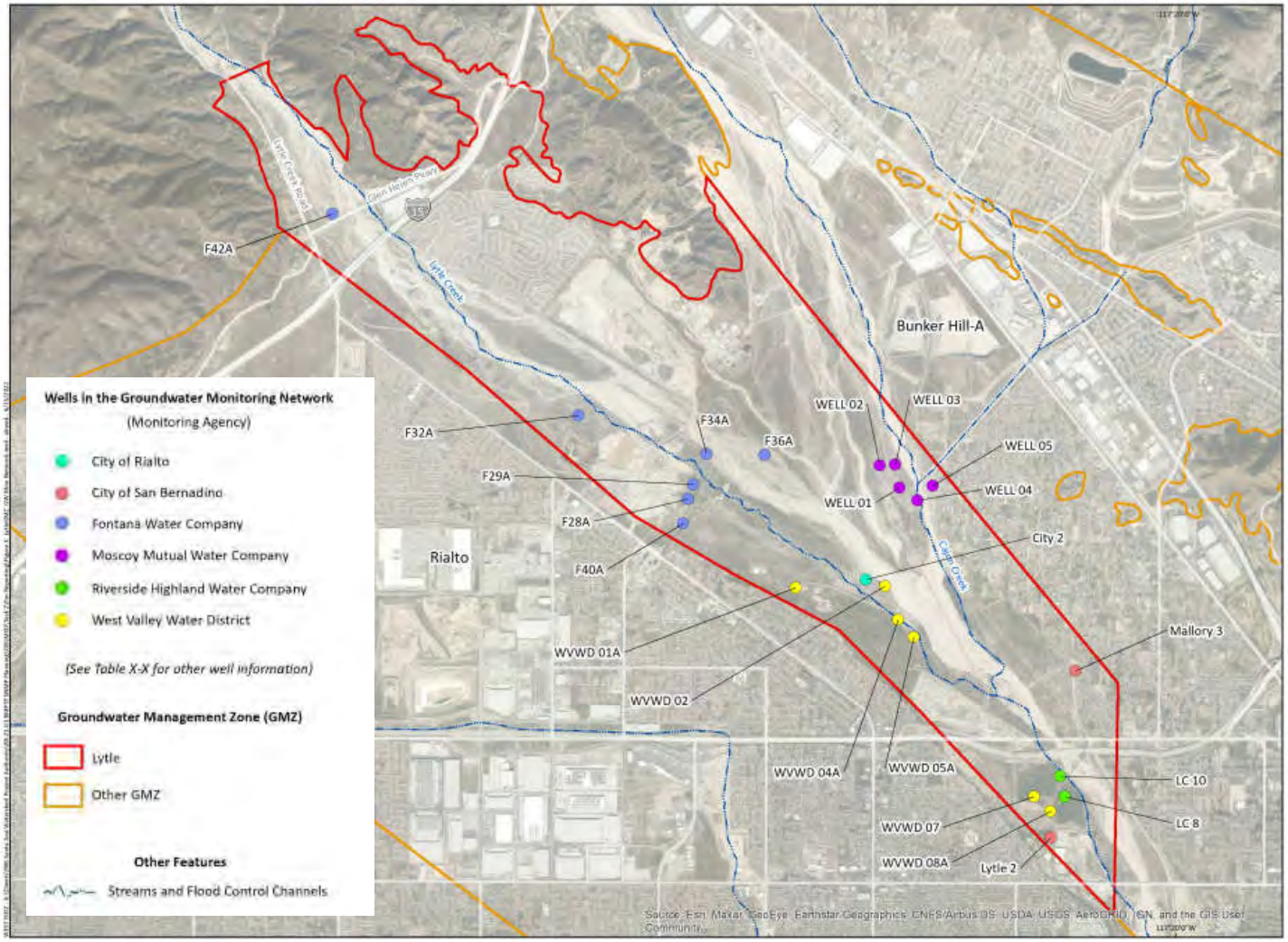
Groundwater Monitoring Network Maps

Example: Canyon GMZ

Groundwater Monitoring Network Table
Example: Canyon GMZ

Table X-X. Groundwater Monitoring Network - Canyon GMZ

Well ID	Owner	Well Name	Well Label (Figure X-X)	Sampling Frequency		Agency Responsible for Water Quality Monitoring	Agency Responsible to Compile and Deliver Data to BMPTF
				TDS	Nitrate		
1211731	Eastern Municipal Water District	EMWD 05 Cienega	05 Cienega	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District
1211735	Lake Hemet Municipal Water District	LHMWD 02	LHMWD 02	Annually	Annually	Lake Hemet Municipal Water District	Eastern Municipal Water District
1211772	Lake Hemet Municipal Water District	LHMWD 10	LHMWD 10	Annually	Annually	Lake Hemet Municipal Water District	Eastern Municipal Water District
1211780	Lake Hemet Municipal Water District	LHMWD 14	LHMWD 14	Annually	Annually	Lake Hemet Municipal Water District	Eastern Municipal Water District
2000104	Lake Hemet Municipal Water District	LHMWD 16	LHMWD 16	Annually	Annually	Lake Hemet Municipal Water District	Eastern Municipal Water District
1211787	Lake Hemet Municipal Water District	LHMWD 04	LHMWD 04	Annually	Annually	Lake Hemet Municipal Water District	Eastern Municipal Water District
1211812	Private	Record Doe Canyon West	Canyon W.	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District
1211814	Private	Record Doe Canyon	Doe Canyon	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District
1211792	Private	Washburn Grant/Florida	Grant/FL	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District
1210398	Private	McMillan Adobe 01 (East)	Adobe 1	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District
1211807	Private	McMillan Bee Canyon	Bee Canyon	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District
1211779	Private	McMillan Acacia	Acacia	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District
1211819	Private	Washburn Pepper Tree	Pepper Tree	Annually	Annually	Eastern Municipal Water District	Eastern Municipal Water District



Groundwater Monitoring Network Maps

Example: Lytle GMZ

Groundwater Monitoring Network Table

Example: Canyon GMZ

Table X-X. Groundwater Monitoring Network - Lytle GMZ

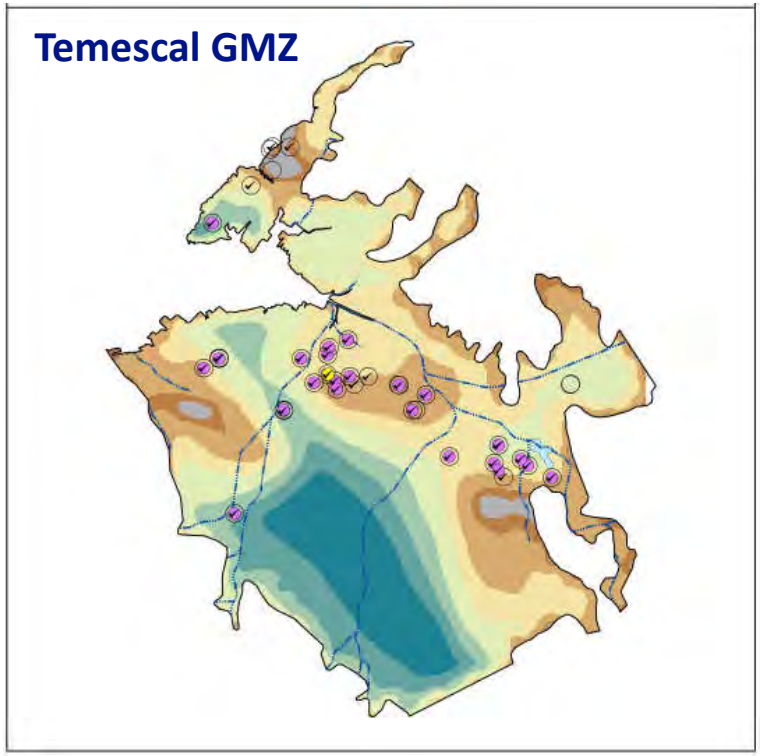
Well ID	Owner	Well Name	Well Label (Figure X-X)	Sampling Frequency		Agency Responsible for Water Quality Monitoring	Agency Responsible to Compile and Deliver Data to BMPTF
				TDS	Nitrate		
1000449	City of Rialto	CITY 2	City 2	Monthly	Annually	City of Rialto	City of Rialto
1000511	City of San Bernardino	SBWD Lytle Creek 02	Lytle 2	Annually	Annually	City of San Bernardino	City of San Bernardino
1000260	City of San Bernardino	SBWD Mallory Street Well (Mallory 03)	Mallory 3	Annually	Monthly	City of San Bernardino	City of San Bernardino
1000424	Fontana Water Company	F28A	F28A	Annually	Annually	Fontana Water Company	Fontana Water Company
1000421	Fontana Water Company	F29A	F29A	Annually	Annually	Fontana Water Company	Fontana Water Company
1000400	Fontana Water Company	F32A	F32A	Annually	Annually	Fontana Water Company	Fontana Water Company
1000398	Fontana Water Company	F34A	F34A	Annually	Annually	Fontana Water Company	Fontana Water Company
1000418	Fontana Water Company	F36A	F36A	Annually	Annually	Fontana Water Company	Fontana Water Company
1000425	Fontana Water Company	F40A	F40A	Annually	Annually	Fontana Water Company	Fontana Water Company
1000388	Fontana Water Company	F42A	F42A	Annually	Annually	Fontana Water Company	Fontana Water Company
1000439	Muscoy Mutual Water Company	WELL 01	WELL 01	Triennially	Annually	Muscoy Mutual Water Company	Muscoy Mutual Water Company
1000435	Muscoy Mutual Water Company	WELL 02	WELL 02	Triennially	Annually	Muscoy Mutual Water Company	Muscoy Mutual Water Company
1000436	Muscoy Mutual Water Company	WELL 03	WELL 03	Triennially	Annually	Muscoy Mutual Water Company	Muscoy Mutual Water Company
1000454	Muscoy Mutual Water Company	WELL 04	WELL 04	Triennially	Annually	Muscoy Mutual Water Company	Muscoy Mutual Water Company
1200208	Muscoy Mutual Water Company	WELL 05	WELL 05	Triennially	Annually	Muscoy Mutual Water Company	Muscoy Mutual Water Company
1000266	Riverside Highland Water Company	LC 10	LC 10	Triennially	Annually	Riverside Highland Water Company	Riverside Highland Water Company
1000267	Riverside Highland Water Company	LC 8	LC 8	Triennially	Annually	Riverside Highland Water Company	Riverside Highland Water Company
1208827	West Valley Water District	WVWD 01A	WVWD 01A	Triennially	Quarterly	West Valley Water District	West Valley Water District
1000450	West Valley Water District	WVWD 02	WVWD 02	Triennially	Quarterly	West Valley Water District	West Valley Water District
1208007	West Valley Water District	WVWD 04A	WVWD 04A	Triennially	Quarterly	West Valley Water District	West Valley Water District
1206896	West Valley Water District	WVWD 05A	WVWD 05A	Triennially	Quarterly	West Valley Water District	West Valley Water District
1000507	West Valley Water District	WVWD 07	WVWD 07	Triennially	Quarterly	West Valley Water District	West Valley Water District
1208008	West Valley Water District	WVWD 08A	WVWD 08A	Triennially	Quarterly	West Valley Water District	West Valley Water District

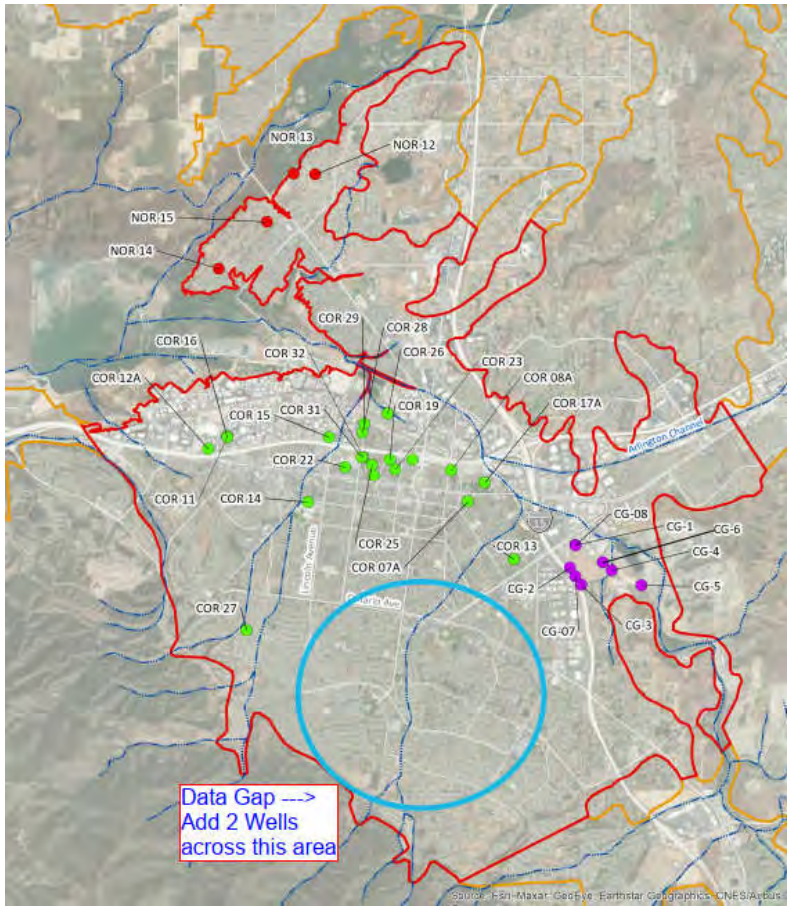
Groundwater Monitoring Network: Data Gaps

Data gaps were identified qualitatively as follows:

- In areas where the storage raster shows significant aquifer volume and there are either no wells monitored or there are large spatial gaps between monitored wells.

Groundwater Monitoring Network: Data Gaps





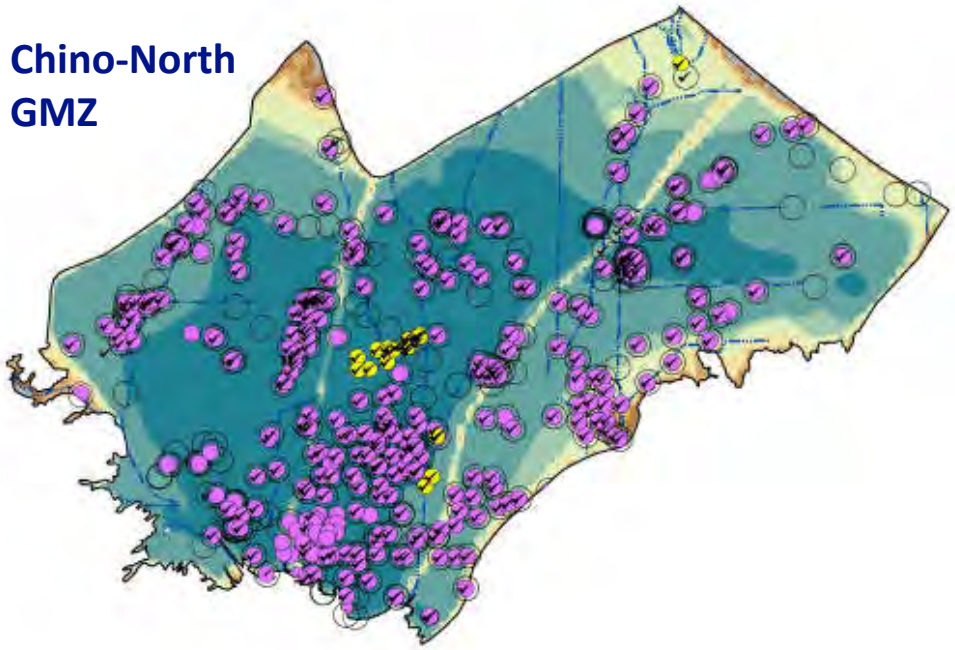
Groundwater Monitoring Network: Data Gaps

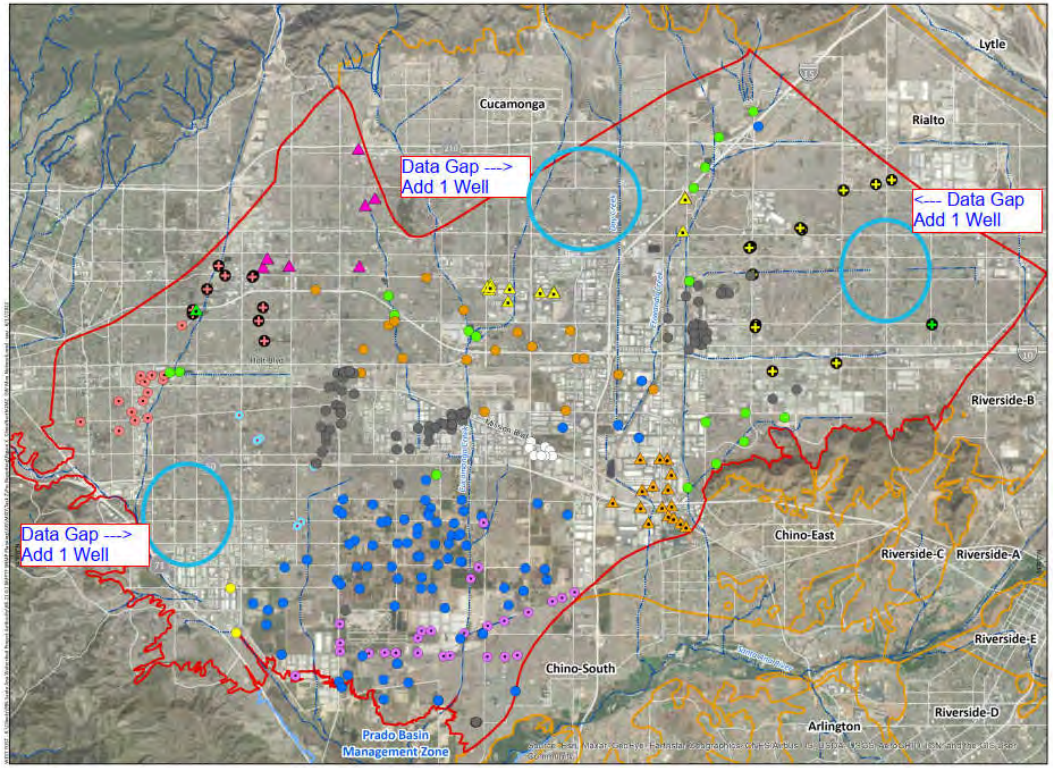
Data gaps were identified qualitatively as follows:

- In areas where a significant spatial gap is created by wells that have generated statistics in the past but are no longer monitored.

Groundwater Monitoring Network: Data Gaps

Chino-North GMZ





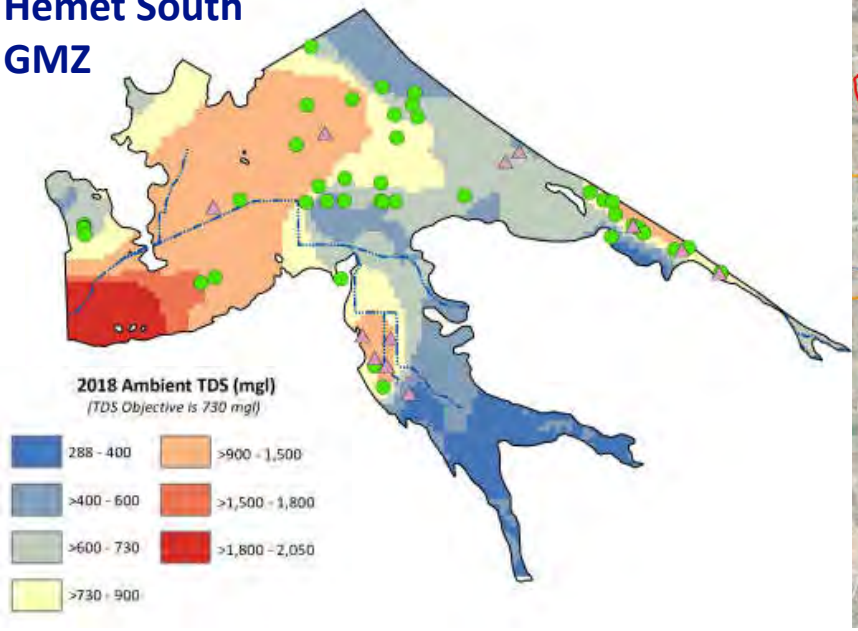
Groundwater Monitoring Network: Data Gaps

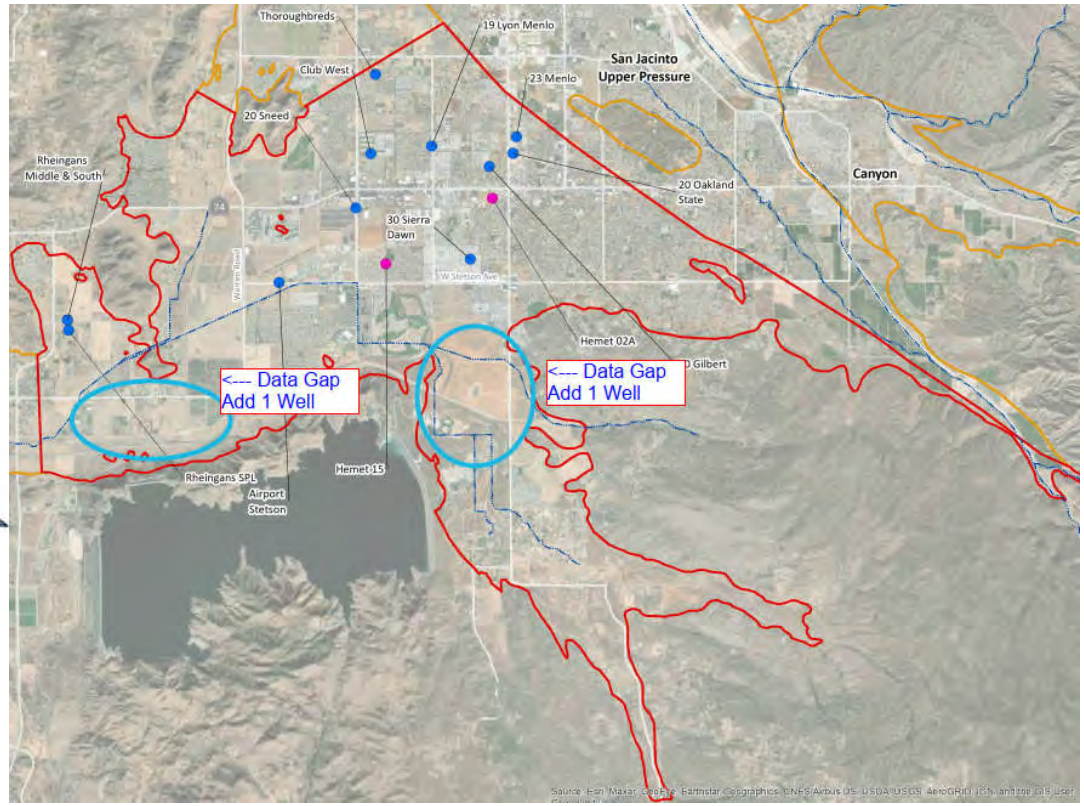
Data gaps were identified qualitatively as follows:

- In high TDS areas where a spatial gap is created by well(s) that have generated statistics in the past but are no longer monitored.

Groundwater Monitoring Network: Data Gaps

Hemet South GMZ



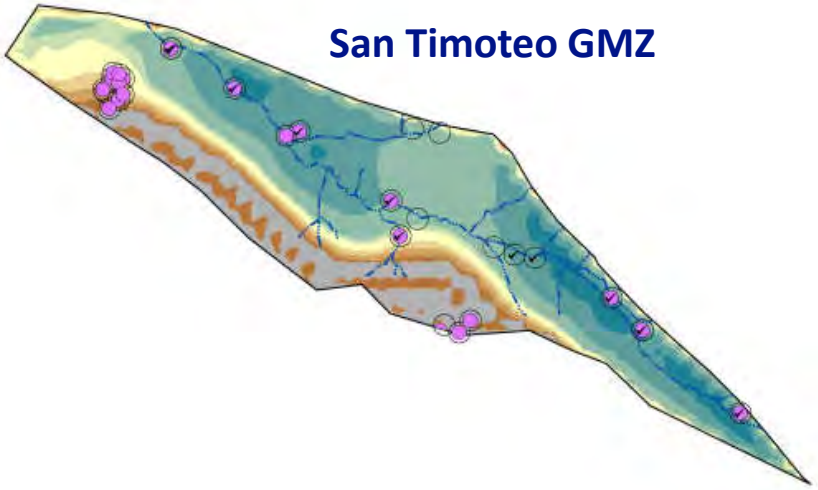


Groundwater Monitoring Network: Data Gaps

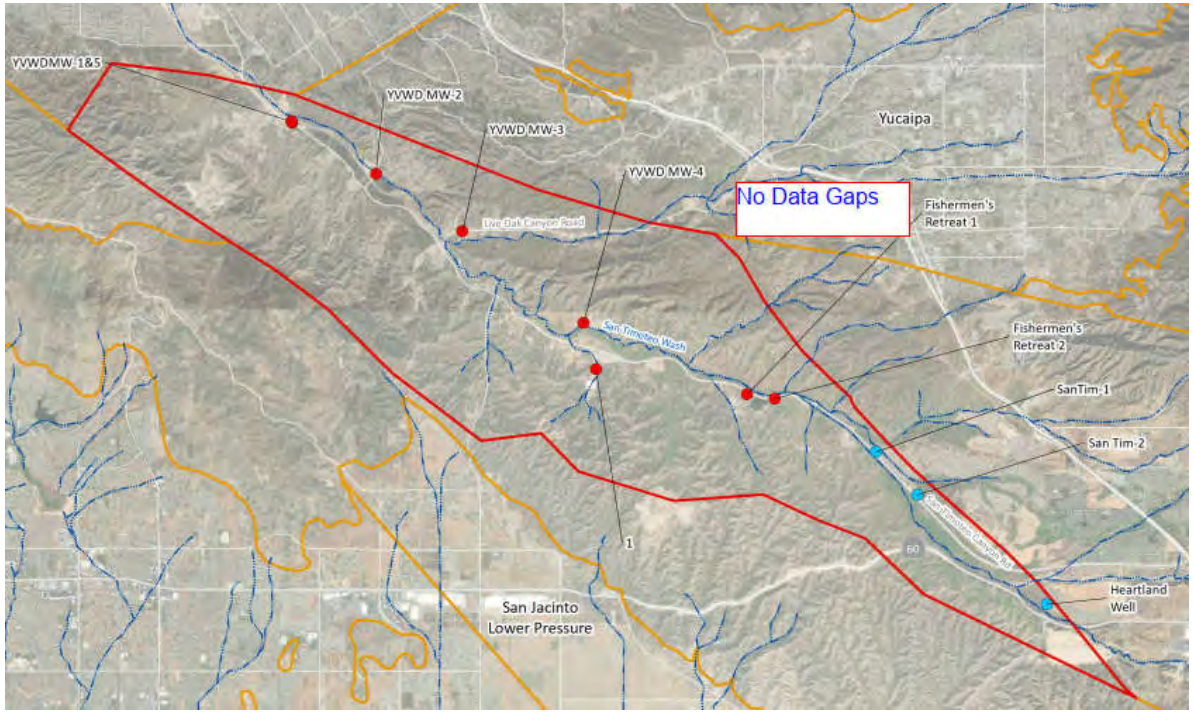
Data gaps were identified qualitatively as follows:

- If a well is no longer monitored but occurs in an area with limited aquifer storage (grey and brown areas, it was ***not deemed a data gap***.

Groundwater Monitoring Network: Data Gaps



San Timoteo GMZ

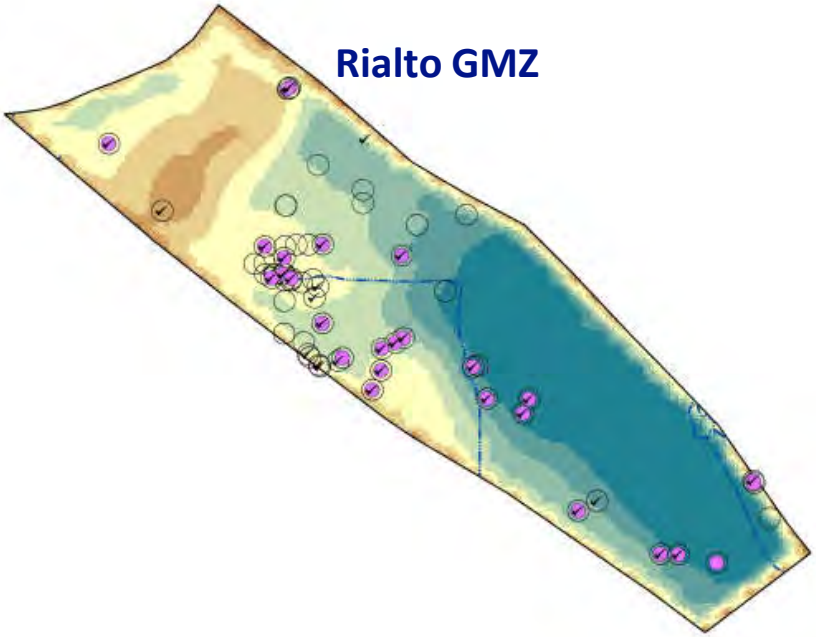


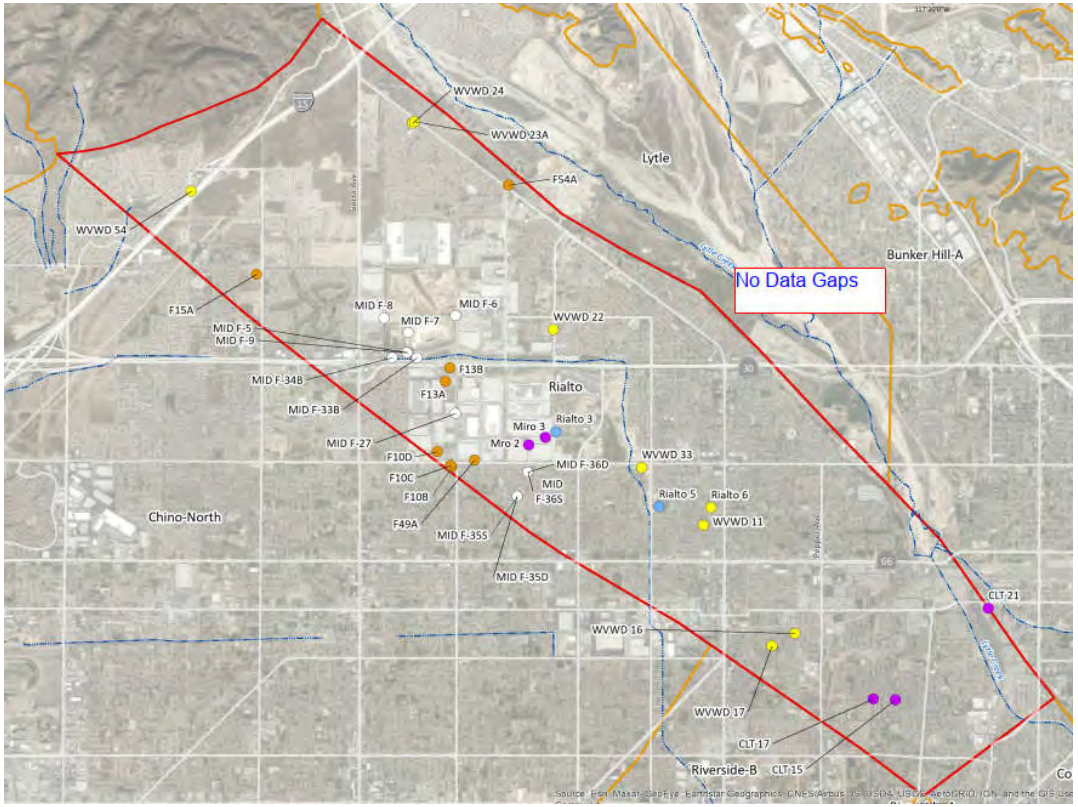
Groundwater Monitoring Network: Data Gaps

Data gaps were identified qualitatively as follows:

- If a well is no longer monitored, but is reasonable in proximity to wells that continue to be monitored, it was not deemed a data gap.

Groundwater Monitoring Network: Data Gaps





Groundwater Monitoring Network: Data Gaps

- Are all the data gaps real? … Probably not
  - It is not possible for us to learn enough about the specifics of updated hydrogeologic data that could refute the identification of the data gaps. This knowledge gap, which is best addressed by the agencies operating in the GMZs, was considered in the proposed process to address data gaps.

- Can all the data gaps be realistically filled? … Probably not
  - Filling data gaps may be prohibitive for a number of reasons, including access, cost, or other reasons. This was considered in the proposed process to address data gaps.

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Were Data Gaps identified in the 2022 Monitoring Program, or in any subsequent year during annual compilation of data?

- No – Responsible Agencies monitor wells and update program annually per 2022 Monitoring Program implementation plan.
- Yes – Responsible Agencies (1) proceed to Step 1 of addressing data gaps and (2) monitor existing wells and update program annually per 2022 Monitoring Program implementation plan.

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 1. Determine if data gaps affect Regional Board permitting

Do wastewater discharges to the Santa Ana River and its tributaries recharge the GMZ, is recycled water reuse (direct or recharge) currently permitted in the GMZ, and/or is imported water recharge occurring in the GMZ? If no, are any of these activities planned to occur in the next five years?

No – Data gaps do not need to be filled until discharge, reuse, or recharge is planned in the GMZ within the next five-year period. Responsible Agencies for the GMZ must (1) notify the Regional Board and Task Force in writing of this finding and (2) update Regional Board annually as to any changes to the projected discharge and reuse plans.

Yes – *Proceed to Step 2* of addressing data gaps.

Responsible Agencies have up to two months to address Step 1.

UPDATED COMPARED TO HANDOUT

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 2. Confirmation of Data Gaps

2a. Do the Responsible Agencies have technical information to refute the finding that a data gap exists? (For example, is there a new hydrogeologic conceptual model that illustrates that the ambient water quality storage model is outdated and would impact the identification of data gaps?)

No – Inform Regional Board and BMPTF and *immediately proceed to Step 3* of addressing data gaps.

Yes – Prepare a technical memorandum (TM) and submit to Regional Board and Task Force with the hydrogeologic evidence that identified data gaps do not need to be addressed.

The TM must include:

(1) characterization of evidence with references cited,

(2) a proposed updated delineation of aquifer/GMZ boundary (if appropriate), and

(3) new aquifer storage properties (including layers, if appropriate).

If yes, Responsible Agencies have up to six months to complete this step.

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 2. Confirmation of Data Gaps

2a. Did Regional Board accept findings of TM submitted in Step 2a (if applicable)?

- Yes – Immediately ***proceed to Step 2b*** of addressing data gaps.
- No – Immediately ***proceed to Step 3*** of addressing data gaps.

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 2. Confirmation of Data Gaps

2b. Recompute antidegradation objectives for the GMZ based on revised aquifer storage model. If the GMZ already has maximum benefit objectives, skip this step and proceed to Step 3.

- Must be performed with method for computing ambient water quality for the 1954 to 1973 period. Prepare a brief TM documenting the findings and submit to the Regional Board and BMPTF. ***Proceed to Step 2c***
- Alternatively, Responsible Agencies may recommend maximum-benefit objectives. If this is the recommended action, prepare a letter proposal citing the basis for selecting this approach and submit to Regional Board and Task Force for review. If the Regional Board approves, the maximum benefit demonstration will be completed based on a plan/schedule acceptable to the Regional Board.

Responsible Agencies have up to six months to complete 2b following written acceptance of 2a TM by Regional Board.

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 2. Confirmation of Data Gaps

2c. If applicable, do the new antidegradation objectives require a Basin Plan Amendment (meaning that based on the recalculation they are different than the current Basin Plan objectives)?

- No – Responsible Agencies continue to monitor existing wells and update program annually per 2022 Monitoring Program implementation plan.
- Yes – Responsible Agencies proceed to (1) support the Regional Board in preparing the Basin Plan Amendment and (2) monitor wells and update program annually per 2022 Monitoring Program implementation plan.
    - If a Basin Plan amendment is needed for multiple GMZs, the Regional Board can direct the Responsible Agencies or the Task Force to collaborate on a single amendment.

The timing to complete this step will be determined on a case-by-case basis

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 3. Fill Data Gaps

3a. Can data gaps be addressed by monitoring existing wells not initially identified for the monitoring program?

- Yes – Responsible Agencies prepare TM documenting expanded monitoring with newly identified existing wells and submit to the Regional Board and BMPTF. TM must include:

  (1) updated map and table of monitoring program, including identification of monitoring entities

  (2) commitment to annual sampling of new wells that have not previously been monitored for the first three years of monitoring, and

  (3) identify if data gaps are not fully addressed with existing wells. ***Proceed to Step 3b.***

- No – Responsible Agencies prepare TM documenting finding that no existing wells can be added to the monitoring network and submit to the Regional Board and BMPTF. ***Proceed to Step 3c***.

Responsible Agencies have up to six months to address Step 3a

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 3. Fill Data Gaps

3b. Based on TM in step 3a, does Regional Board find that data gaps have been fully address with newly identified existing wells?

- No – Responsible Agencies Immediately ***proceed to Step 3c*** to address remaining data gaps.
- Yes – Responsible Agencies proceed to monitor existing wells and update program annually per 2022 Monitoring Program implementation plan.

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 3. Fill Data Gaps

3c. Can remaining data gaps be filled through construction of new wells?

- No – if new wells cannot be constructed, Responsible Agencies must provide evidence to enable Regional Board to determine if that data gap cannot be reasonably addressed. Findings must be documented and submitted to the Regional Board and Task Force. Such a finding may trigger additional technical studies at the Regional Board's discretion. Responsible Agencies proceed to

  (1) implement any Regional Board recommendations and

  (2) monitor existing wells and update program annually per 2022 Monitoring Program implementation plan.

Responsible Parties have six months to complete 3c following Regional Board acknowledgement of completion of Step 3a or 3b.

Groundwater Monitoring Network: Proposed Process to Fill Data Gaps

Step 3. Fill Data Gaps

3c. Can remaining data gaps be filled through construction of new wells?

- Yes - Prepare a well siting study and monitoring well construction plan/schedule. Must include:
  - (1) well location(s) and technical specifications,
  - (2) detailed schedule to construct well(s),
  - (3) commitment to annual sampling of new for the first three years of monitoring.

  Responsible Agencies proceed to (1) implement construction plan and schedule following Regional Board approval and (2) continue to monitor existing wells and update program annually per 2022 Monitoring Program implementation plan.

Responsible Parties have six months to complete 3c following Regional Board acknowledgement of completion of Step 3a or 3b.

Who are the Responsible Agencies in each GMZ?

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																							
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																					
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD
San Jacinto Basins																											
Canyon			X	X	1	X																					
San Jacinto Upper Pressure		X	X	X	0	X																					
San Jacinto Lower Pressure		X			1	X																					
Hemet South		X		X	2	X																					
Lakeview/Hemet North		X		X	0	X																					
Perris North		X		X	0	X														X							
Perris South				X	0	X																					
Menifee		X		X	1	X																					

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																						
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD
Beaumont/Yucaipa Plain																												
Beaumont	X	X	X	X	1		X	X	X	X	X																	
San Timoteo	X			X	0				X		X																	
Yucaipa		X	X	X	2						X																	

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																						
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD
San Bernardino Basin																												
Lytle		X		X	1							X	X														
Bunker Hill-A		X	X	X	1							X	X														
Bunker Hill-B	X	X	X	X	1								X	X	X													
Rialto				X	0								?			?												
Colton	X			X	1								?				?		?									

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																						
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD
Riverside and Arlington Basins																												
Riverside-B		X		X	2											X											
Riverside-C					3 - 4																			X				
Riverside-A	X				2											X	X	X										
Riverside-F				X	2														X									
Riverside-E				X	1														X									
Riverside-D					2 - 3														X									
Arlington		X		X	2														X	X								

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																							
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD
Chino and Cucamonga Basins																													
Cucamonga				X	3																X	X	X					
Chino-North		X	X	X	2																	X	X	X				
Chino-East				X	3																	X		X				
Chino-South	X			X	3												X	X	X			X		X				

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																					
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD
Elsinore and Temescal Valleys																											
Elsinore		X		X	2																			X			
Upper Temescal Valley	X	X		X	0	X																		X			
Coldwater				X	0																			X	X	X	
Temescal	X	X		X	2																					X	

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																						
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Orange County																												
La Habra					2 - 3																							X
Orange County	X	X	X	X	0																							X
Santiago					2 - 3																							X
Irvine		X		X	0																							X

Monitoring Program Implementation

Each Year

- **April – June**
  - Collect data from agencies responsible to collect and compile data for delivery to SAWPA
  - Agencies to identify any wells that are not longer sampled, or new wells added
  - Process and load data to project database
- **July - August**
  - Based on agency input, update maps and tables, if necessary, ad check for any new data gaps created by loss of wells defined in 2022 Monitoring Program
  - Notify Responsible Agencies of data gap by August 30th
- **September**
  - Clock starts on process to fill data gaps, if applicable
- **Ongoing:** Track status of process to fill data gaps by GMZ

Next Steps

- Receive feedback on Data Gaps, Process to fill Data Gaps, and assignment of Responsible Agencies
- Document Monitoring Program and Data Gaps
- Circulate proposed scope for 2021 ambient water quality (within two weeks)
- Present proposed scope for 2021 ambient water quality (September meeting)
- Circulate draft groundwater monitoring program report (within two weeks of September meeting)

WE SUPPORT OUR COMMUNITIES

WE ARE WATER FOCUSED

WE TAKE PRIDE IN WHAT WE DO

WE DO WHAT'S RIGHT

WE STRIVE TO BECOME OUR BEST

WE BELIEVE IN QUALITY

WE LISTEN

WE SOLVE HARD PROBLEMS

WE SEE THE BIGGER PICTURE

WE TAKE OWNERSHIP

WE COLLABORATE

WE HAVE FUN

WE ARE WEST YOST

WEST YOST
Water. Engineered.

WEST YOST

Water. Engineered.

Recap and Recommended 2021 Ambient Water Quality Pilot Study

September 27, 2022

Agenda

- Recap of Groundwater Monitoring Plan requirements and purpose
- Recap of objectives and approach
- Recap of Recycled Water Policy requirements
- Path to Comply with Recycled Water Policy
- Summary of Stakeholder input on the groundwater monitoring program and 2021ambient water quality pilot discussions to date
- Recommended Process to be Piloted for Recomputation of AWQ Through 2021
- Vision to the Future – what needs to be accomplished in the coming years?

New Basin Plan Requirement

- Groundwater Monitoring Program

  No later than August 1, 2022 ... [the Task Force Members] … shall submit to the Regional Board for approval, an updated watershed-wide TDS and nitrogen monitoring program that will provide the data necessary to implement the TDS/nitrogen management plan. Data to be collected and analyzed shall address at a minimum

  (1) determination of current ambient quality in groundwater management zones;

  (2) determination of compliance with TDS and nitrate-nitrogen objectives for the management zones;

  (3) evaluation of assimilative capacity findings for groundwater management zones;

  (4) assessment of the effects of recharge of surface water POTW discharges on the quality of affected groundwater management zones; and

  (5) ***any other requirements specified in the State Water Board's Recycled Water Policy*** (Resolution No. 2018-0057)

New Basin Plan Requirement

- Ambient Water Quality

  The determination of current ambient quality can be accomplished using the method consistent with that employed by the N/TDS Task Force (20-yr running average) to develop the TDS and nitrogen water quality objectives included in the Basin Plan***, or an alternative method approved by the Executive Officer of the Regional Board***. The determination of current ambient groundwater quality throughout the watershed must be reported by October 1, 2023, and, at a minimum, ***every five years thereafter*** unless the Regional Board revises this schedule.

Purpose of the Ask

- Monitoring program hasn't been updated since 2005
- Past recommendations to revise ambient water quality methods
- 2019 Recycled Water Policy (Policy) Amendments
  - Requires the Regional Board and Task Force to address more than just the monitoring program and ambient water quality methods
  - Monitoring program and ambient water quality are elements identified as an early target for the RB in complying with the 2019 Policy amendments

Objectives and Approach

- Our approach was to start with the end in mind →compliance with 2019 Recycled Water Policy
- Our objective is to develop monitoring and reporting specifications that:
  - Create compliance with applicable regulations (Basin Plan objectives; Recycled Water Policy)
  - Leverage regulations to reduce frequency and cost of future assessments
  - Leverage technology advancements to create flexibility in assessment methods and reduce costs of future assessments
  - Create clear and actionable schedule to perform compliance actions through next ambient water quality update due by April 2029
- Build consensus through education and collecting stakeholder input

Objectives and Approach

Two key priorities for current scope of work

1. Define groundwater monitoring program
   a. Define wells to be monitored and responsible parties
   b. Identify data gaps
   c. Define actions (and timeline) to improve monitoring networks to fill data gaps

2. Assess current ambient water quality methodology
   a. What changes can we make, enabled by 2019 Recycled Water Policy?
   b. What methods can we pilot for the required assessment due October 2023?

Also… provides a framework for work over the next several years

Recap of Recycled Water Policy Requirements and Path to Comply

Recycled Water Policy: Five-Year Assessments

Section 6.2.1.3 of Policy

Salt and nutrient management plans adopted as a Basin Plan amendment or accepted by the regional water board prior to April 8, 2019 shall be evaluated pursuant to 6.2.6 and 6.2.7 by ***April 8, 2024***

Section 6.2.6 of Policy

1. Observed trends in groundwater salinity with the predicted trends from the SNMP
2. The ability of the monitoring network to adequately characterize groundwater quality in each GMZ and
3. Potential new data gaps
4. The ability of any relied-upon models to adequately simulate groundwater quality
5. Available assimilative capacity based on observed trends and the most recent water quality data
6. The impact of new projects that are reasonably foreseeable at the time of the assessment

SNMP Monitoring Plan Requirements

Section 6.2.4.1 of Policy

- Monitoring program must be representative – designed to address SNMP
- The monitoring plan must be designed to effectively evaluate water quality in the basin. The monitoring plan must focus on:
  - water supply wells,
  - areas proximate to
    - large water recycling projects, particularly groundwater recharge projects, and
    - other potential sources of salt and nutrients identified in the salt and nutrient management plan.
  - Also, monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with adjacent surface waters.
- Monitoring data must be submitted every year

A Vision to the Future – Path to Comply with Recycled Water Policy

Actions for September 2022 through April 2029

- Complete 2021 Ambient Water Quality Pilot Study (due October 2023)
  - Includes pilot assessment of ambient water quality and assimilative capacity methods
  - Recommends methodology for future assessments
- Document 5-year assessment of Basin Plan SNMP (Regional Board to complete by April 2024)
- Task Force implements process to collect all water quality data annually
- All priority data gaps identified in 2022 have been addressed through step-wise process
- Complete 5-year assessment of monitoring program data and SNMP (due April 2029)
  - Update groundwater monitoring program and identify any new data gaps
  - Assess ambient water quality and assimilative capacity per revised method

A Vision to the Future

Summary of Stakeholder Input

Recommendations for addressing questions for consideration and stakeholder feedback

Questions Posed for Consideration: Monitoring Program and Data Gaps

- Should we reduce the monitoring network from any well with data to a set of key wells that MUST be monitored?
    - → *NO, many GMZs are too complex to do this effectively. Focus on adequate spatial distribution of ongoing monitoring, and periodic check to fill data gaps as wells are lost*

Recommendation:

- Define initial monitoring network as all wells that are currently monitored or planned to be (***Drafted***)
- Identify data gaps (***Drafted***)

Questions Posed for Consideration: Monitoring Program and Data Gaps

- Should we include landfill (or similar) monitoring wells in the monitoring network? If so, which ones?
    - → *Some, only those within saturated aquifer system*
    - → *Exclude those isolated by slurry walls and outside saturated aquifer system*

Recommendation:

- Identify the wells that are in the saturated zone of each GMZ for inclusion in the monitoring program (***DONE, addressed in drafted network***)
- Collect and process the data from only the wells identified in the monitoring plan going forward each year

Questions Posed for Consideration: Monitoring Program and Data Gaps

- Should the high TDS concentrations along the Pacific Coast of Orange County GMZ be included in the ambient concentration – especially in light of regional groundwater management actions to address seawater intrusion?
    - → ***YES, part of aquifer system***

Recommendation:

- Include the high-TDS coastal wells that are in the saturated zone of the Orange County GMZ (***Done , addressed in drafted network***)

Questions Posed for Consideration: Monitoring Program and Data Gaps

- Should filling data gaps mean construction of new wells?
  - → *No, need tiered approach to fill data gaps that allows (1) time to identify additional existing wells that could be monitored but currently are not, (2) well siting feasibility analysis to fill remaining gaps, if any, (3) construct wells, if feasible*

Recommendation:

- Fill spatial data gaps through step-wise process over the next several years (***Process Drafted presented in August 2022***, pending modification based on stakeholder feedback)

Questions Posed for Consideration: Monitoring Program and Data Gaps

- Should we prioritize addressing data gaps? How?
  - → *Yes, Prioritize based on assimilative capacity, recycled water discharge/permitting needs, drinking water supply*
  - → *Need exceptions if recycled water use is very limited (small amounts, spatially concentrated)*
  - → *Re-assess if new data gaps exist every five years, as required by RW Policy*

Recommendation:

- Define criteria for deferring filling data gaps to next data gap analysis (***Process Drafted).*** Proposed criteria…
  - Data gaps do not need to be filled until recycled water discharge/reuse, or imported water recharge, is planned in the GMZ within the next five-year period.
- Reassess data gaps every five years

Questions Posed for Consideration: Monitoring Program and Data Gaps

- Who should be responsible for filling data gaps?
  - → *Agencies with recycled water use or discharge that affects GMZ*
  - → *Water supply agencies with wells in the GMZs should collaborate*

Recommendation:

- Create matrix that identifies responsible parties for each GMZ in the Santa Ana River Watershed (***Drafted, requires feedback on assignment of responsible parties***)

Feedback on Monitoring Program and Data Gap Analysis Thus Far

- Need alternative terminology to “Data Gap”
  - **Recommendation**: change terminology. ***SUGGESTIONS?***
- The step-wise process need not define every detail of what we do – some items may warrant further discussion.
  - Example: don’t need to state the details about recomputing objective if storage model changes
    - What would trigger an update to TDS/N objective? (***TBD***)
  - **Recommendation**: Reduce specificity of actions in proposed process to create flexibility
- Recycled Water Policy only requires updating data gaps every five years
  - **Recommendation**: modify process to include update data gaps analysis every five years

Feedback on Monitoring Program and Data Gap Analysis Thus Far

- What is Regional Board authority to require filing of the data gaps?
  - Regional Board not interested in issuing orders, desires collaborative process to address data gaps
  - Data gaps need to be filled, prior efforts through attrition analysis did not result in data gaps being addressed
  - Goal is to have a process to address them over time
- What to do about La Habra and Santiago GMZs?
  - Not in OCWD purview – agencies not involved in task force - How to address this?
- Need longer timeframe to perform the defined steps
- There are existing wells out there that can be sampled, but need some sort of documentation of why it is required to encourage well owners to allow sampling
- Can SBVMWD and WMWD be responsible agencies on behalf of their members?

Questions Posed for Consideration: Ambient Water Quality Methods

Questions Posed for Consideration: Ambient Water Quality Methods

- Should we continue to rely on a 20-year period of record?
  - → *Generally, Yes. Focus on improved monitoring plan will improve data quality for analysis in the long term*
  - → *Suggestion to explore alternative time periods since improved data availability*

Recommendation: Continue to rely on 20-year period of analysis and do not pilot different analysis period

Basis

- At many wells, data is only collected every three years and limiting period to shorter than 20 years could greatly reduce data-set for computing statistics or other trend analyses. A shorter timeframe would necessitate higher sampling frequency and increase costs

Questions for Consideration in Ongoing Methods and Data Collection

- Should we continue to rely on the statistical analysis method developed in 2004?
  - → *Generally, Yes,*
    - *beneficial to pilot other ideas*
    - *Identify ways to streamline analysis*
  - → *Case-specific changes may be warranted in a GMZ, but should be done as part of a GMZ-specific SNMP (e.g. Upper Temescal Valley SNMP)*

Recommendation:

- Continue to rely a statistical analysis method developed in 2004 to prepare point statistics at wells and compute volume-weighted ambient water quality, where warranted per the outcomes of the 2021 AWQ Pilot Study

Questions Posed for Consideration: Ambient Water Quality Methods

- Should we prioritize only those wells with recent data that are still monitored in statistical analysis (e.g. only include these data in the analysis)
    - → *NO, we should continue to use all data and focus on improved monitoring network going forward that deals with data gaps*

Recommendation:

- Use all available data for all wells within the saturated zone of the GMZs, even if the well is no longer monitored
- Fill identified data gaps to ensure sufficient spatial coverage of GMZ in the future when the wells with historical data are no longer in the timeframe of the analysis

Questions for Consideration in Ongoing Methods and Data Collection

- Can we reduce the level of effort to perform ambient water quality analysis by prioritizing our GMZs based on historical results, current water quality, and regulatory compliance factors?
  - → *Yes, this should be piloted, but there needs to be a focus to continue collecting data in all GMZs, and long-term cost of methods should not be equal or greater than if current methods continued*

Recommendation:

- Pilot procedures to make the standard method more efficient
- Pilot alternative approaches based on historical trends and statistics and use this information to determine if a full analysis per standard method is appropriate (e.g. because change in trend)

Questions for Consideration in Ongoing Methods and Data Collection

- Should we consider the extent of the saturated aquifer system in contouring, statistical analysis, and map presentations?
    - → ***Yes, limit analysis to wells and extent of interpolation to extent of saturated aquifer***

Recommendation:

- For Pilot study, develop contours, rasters, and other characterizations that do not extrapolate beyond the boundaries of the saturated system

Questions for Consideration in Ongoing Methods and Data Collection

- Should the aquifer parameters defined in 2004 be updated?
  - → *Yes, but consider:*
    - *Not doing it all at once because it could be more cost effective to do over time and timing may be best to address based on the timing of next update of aquifer parameters for GMZs (e.g. Chino Basin updates the model every five years)*
    - *The impact to Basin Plan Objectives – do they need to be recomputed?*

Recommendation:

- The 2021 AWQ Pilot Study deliverable should:
  - Update aquifer parameters for maximum-benefit GMZs, if timing is appropriate
  - Include a plan and schedule to complete the update of aquifer parameters in remaining GMZs before the next 5-year assessment is due in April 2029

Questions for Consideration in Ongoing Methods and Data Collection

- What other updates should be considered?
  - → *Ideas for improving the efficiency and reducing the cost of the routine analyses*

Recommendation:

- Use the 2021 AWQ Pilot Study as an opportunity to pilot using available water level contours prepared for the GMZs by others to reduce data collection, processing, and analysis costs (e.g. water level contours prepared for SGMA annual reporting)
- Use the 2021 AWQ Pilot Study as an opportunity to develop processes (e.g. coding for automation) to reduce analysis time

Questions for Consideration in Ongoing Methods and Data Collection

- What other updates should be considered?
  - → *Pilot using ISARM to perform ambient water quality*

Recommendation:

- Could be considered, but not enough detail was provided on how to do this to be included in the recommended pilot study

Recommended 2021 Ambient Water Quality Pilot Study

Recommended 2021 Ambient Water Quality Pilot Study

1. Collect all water quality data through December 2021
    a. Collect data
    b. Perform QA/QC checks (including time history charts by well)
        a. Develop code to automate this process and that can be used for future assessments

Recommended 2021 Ambient Water Quality Pilot Study

2. For 2002-2021 20-year analysis period:
   a. Prepare table of TDS/N summary statistics by GMZ, including AWQ statistic
   b. Perform Mann-Kendall trend analysis at all wells, document in tables/charts
   c. Map spatial distribution of TDS/N statistics and trends
   d. Develop code to automate these processes and that can be used again in future assessments

Recommended 2021 Ambient Water Quality Pilot Study

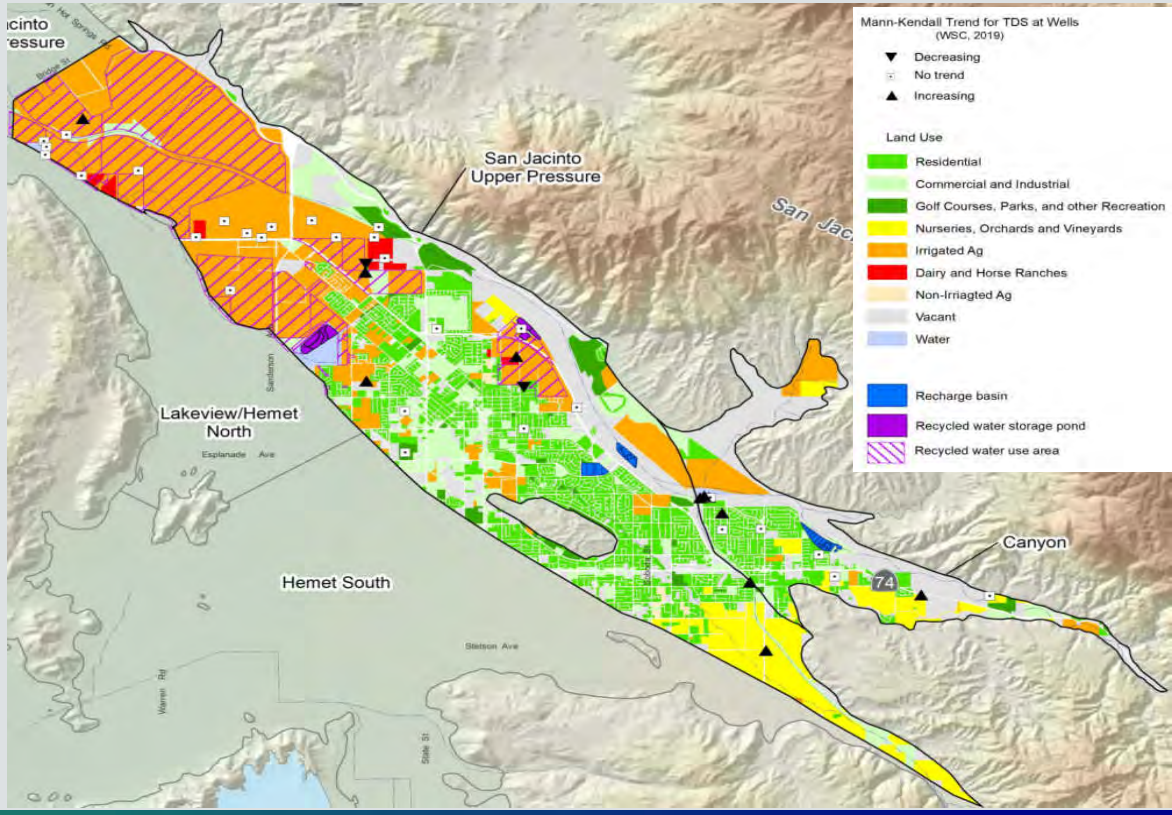
3. Assess ambient water quality and assimilative capacity as follows:
    a. For GMZs with Maximum Benefit SNMP (required by Basin Plan for Beaumont, San Timoteo, Yucaipa, Elsinore, San Jacinto Upper Pressure, Chino-North, Cucamonga) – plus Orange County GMZ:
        a. Compute ambient water quality using standard methodology Max Benefit GMZs: Beaumont, San Timoteo, Yucaipa, Elsinore, San Jacinto Upper Pressure, Chino-North, Cucamonga
    b. Remaining GMZs
        a. Based on analysis of historical trends, current statistics, and spatial distribution of TDS/N in GMZs, determine if state of assimilative capacity has changed since 2021
            i. Has there been a change in the trends at wells and across the GMZ?
            ii. Does the change in the statistic value suggest the ambient concentration might be significantly different?

Recommended 2021 Ambient Water Quality Pilot Study

4. For GMZs where standard ambient water quality method will be performed:
   a. Update of aquifer parameters (if applicable)
   b. Pilot use of computer-assisted generation of contours (vs. hand contouring)
   c. Pilot limiting mapping/interpolation to extent of saturated aquifer
   d. Pilot using available groundwater-level contours to reduce cost of analysis

Recommended 2021 Ambient Water Quality Pilot Study

5. For GMZs where data and trends used only, pilot
   a. Mapping of loading factors (e.g. land use, recycled water use areas, septic tanks) to support interpretation of water quality trends (pilot in 2 GMZs only)



Recommended 2021 Ambient Water Quality Pilot Study

6. Based on work performed, develop recommended plan for ongoing ambient water quality and assimilative capacity methods
7. Define schedule for any pre-work to performed before the next assessment due (e.g. update aquifer properties)
    a. If 5-year frequency allowed, next assessment would be due before April 2029

A Vision to the Future – Path to Comply with Recycled Water Policy

A Vision to the Future – Path to Comply with Recycled Water Policy

Actions for September 2022 through April 2029

- Complete 2021 Ambient Water Quality Pilot Study (due October 2023)
  - Includes pilot assessment of ambient water quality and assimilative capacity methods
  - Recommends methodology for future assessments
- Document 5-year assessment of Basin Plan SNMP (Regional Board to complete by April 2024)
- Task Force implements process to collect all water quality data annually
- All GMZ storage models updated to reflect latest hydrogeologic conceptual models
- All priority data gaps identified in 2022 have been addressed through step-wise process
- Complete 5-year assessment of monitoring program data and SNMP (due April 2029)
  - Update groundwater monitoring program and identify any new data gaps
  - Assess ambient water quality and assimilative capacity per revised method

A Vision to the Future

- Additional Wish List of Items to Support Basin Plan SNMP
  - Create single database of all water quality data collected and used for all past AWQ assessments, including objective setting period
  - Geodatabase of all shapefiles produced and used for AWQ assessments back to objective setting period
  - Detailed GMZ summary information that characterizes features of GMZ relative to SNMP and permitting factors (recycled water uses, amounts, and locations, other key loading features, history of ambient water quality results and assimilative capacity)

A Vision for the Future

FY 2022/23
- Complete Groundwater Monitoring Plan Update
- Collect groundwater data through December 2021
- Initiate 2021 AWQ Pilot Study

FY 2023/24
- Complete 2021 AWQ Pilot Study
- Document 5-Yr Assessment of Basin Plan SNMP (to support Basin Plan Amendment or Declaration of Conformance)
- Responsible parties start steps for addressing data gaps

FY 2024/25
- Collect groundwater data through Dec 2024
- Update aquifer storage models for selected GMZs
- Progress report on filling data gaps to Regional Board
- Optional: Address additional wish-list items

FY 2025/26
- Collect groundwater data through Dec 2025
- Update aquifer storage models for selected GMZs
- Progress report on filling data gaps to Regional Board
- Optional: Address additional wish-list items

FY 2026/27
- Collect groundwater data through Dec 2026
- Update aquifer storage models for selected GMZs
- Progress report on filling data gaps to Regional Board
- Optional: Address additional wish-list items

FY 2027/28
- Collect groundwater data through Dec 2027
- Start 5-Yr Assessment of Data and SNMP:
  - *Update Monitoring Program*
  - *Data Gap Analysis*

FY 2028/29
- Collect groundwater data through Dec 2028
- Complete 5-Yr Assessment of Data and SNMP
  - *Assess ambient water quality and assimilative capacity per methodology defined in 2021 Pilot Study*

A Vision to the Future – Costs

- TBD depending on final scope. Initial estimates for tasks in next 2-3 years
  - Collect and process data for 2021 AWQ Pilot Study: $85,000 to $100,000
  - 2021 AWQ Pilot Study: $225,000 to $250,000
  - Technical support on 5-year SNMP assessment: $20,000
  - Ongoing annual data collection and management costs: $35,000 to $40,000
  - Annually track progress on data gaps progress: $15,000
  - Process to update storage model updates: $10,000 to $20,000 per year over three years

THANK YOU

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Who are the Responsible Agencies in each GMZ?

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

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San Jacinto Basins																											
Canyon			X	X	1	X																					
San Jacinto Upper Pressure		X	X	X	0	X																					
San Jacinto Lower Pressure		X			1	X																					
Hemet South		X		X	2	X																					
Lakeview/Hemet North		X		X	0	X																					
Perris North		X		X	0	X														X							
Perris South				X	0	X																					
Menifee		X		X	1	X																					

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Beaumont/Yucaipa Plain																											
Beaumont	X	X	X	X	1		X	X	X	X	X																
San Timoteo	X			X	0				X		X																
Yucaipa		X	X	X	2						X																

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San Bernardino Basin																												
Lytle		X		X	1							X	X														
Bunker Hill-A		X	X	X	1							X	X														
Bunker Hill-B	X	X	X	X	1								X	X	X													
Rialto				X	0								?			?												
Colton	X			X	1								?				?		?									

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Riverside and Arlington Basins																												
Riverside-B		X		X	2											X											
Riverside-C					3 - 4																			X				
Riverside-A	X				2											X	X	X										
Riverside-F				X	2														X									
Riverside-E				X	1														X									
Riverside-D					2 - 3														X									
Arlington		X		X	2														X	X								

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																						
	GMZ receives recharge of recycled water discharged to SAR/tributaries	Existing recycled water direct use or recharge in GMZ	Imported water recharge in GMZ	GMZ used for municipal or domestic supply		Eastern MWD	Beaumont Cherry Valley WD	City of Banning	City of Beaumont	San Gorgonio Pass WA	Yucaipa Valley WD	San Bernardino County Special Districts Department	San Bernardino Valley MWD	City of Redlands	East Valley WD	City of Rialto	City of Colton	City of San Bernardino	City of Riverside	Western Municipal WD	Cucamonga Valley WD	Chino Basin Watermaster	Inland Empire Utilities Agency	Jurupa CSD	Elsinore Valley MWD	Lee Lake Water District	City of Corona	Orange County WD
Chino and Cucamonga Basins																												
Cucamonga				X	3																X	X	X					
Chino-North		X	X	X	2																	X	X	X				
Chino-East				X	3																	X		X				
Chino-South	X			X	3												X	X	X			X		X				

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																					
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Elsinore and Temescal Valleys																											
Elsinore		X		X	2																			X			
Upper Temescal Valley	X	X		X	0	X																		X			
Coldwater				X	0																			X	X	X	
Temescal	X	X		X	2																					X	

Summary of Data Gaps and Responsible Agencies to Address Data Gaps - ***DRAFT FOR REVIEW***

Refer to maps for Data Gap Locations

Groundwater Management Zones	GMZ Features				Number of Data Gaps Identified to Fill	Responsible Agencies for Addressing Data Gaps																						
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Orange County																												
La Habra					2 - 3																							X
Orange County	X	X	X	X	0																							X
Santiago					2 - 3																							X
Irvine		X		X	0																							X

WE SUPPORT OUR COMMUNITIES

WE ARE WATER FOCUSED

WE TAKE PRIDE IN WHAT WE DO

WE DO WHAT'S RIGHT

WE STRIVE TO BECOME OUR BEST

WE BELIEVE IN QUALITY

WE LISTEN

WE SOLVE HARD PROBLEMS

WE SEE THE BIGGER PICTURE

WE TAKE OWNERSHIP

WE COLLABORATE

WE HAVE FUN

WE ARE WEST YOST

WEST YOST
Water. Engineered.