Recomputation of Ambient Water Quality in the Santa Ana River Watershed

BMPTF: November 13, 2019

WSC
Water Systems Consulting, Inc.

Ambient Water Quality Phases

1: Data Gathering

- ✓ Data Compilation
- ✓ QA/QC, Process, and Upload recent data

2: Point Statistics

- ✓ Calculate Water Quality Point Statistics
- ✓ Shapiro-Wilk Test for Normality

3: Computations

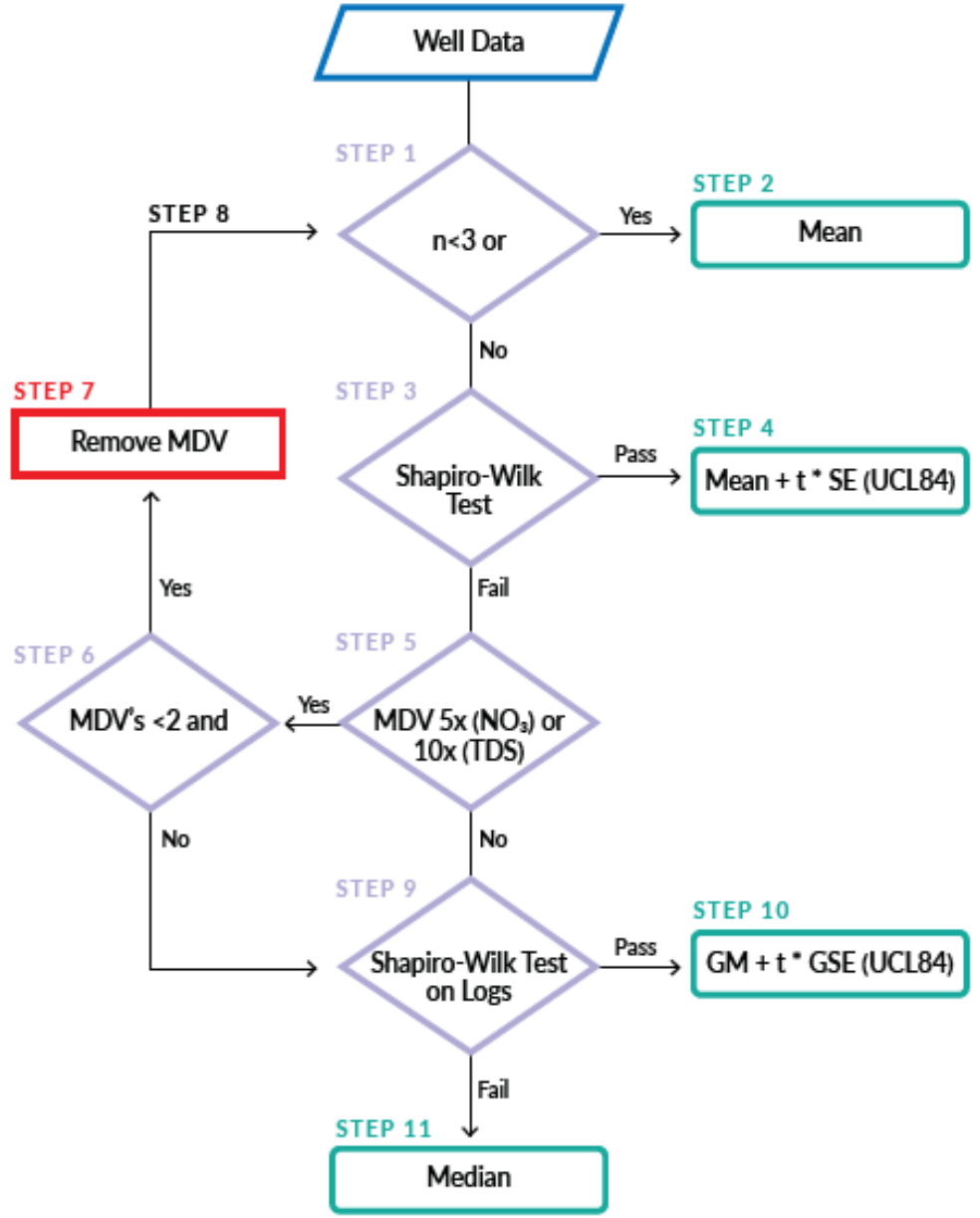
- ✓ Groundwater Elevation Contours
- ✓ Nitrate, TDS Concentrations
- ✓ Compute ambient water quality for GMZ's

4: Interpretive Tools

- ✓ Innovative Interpretive Tool

2: Point Statistics

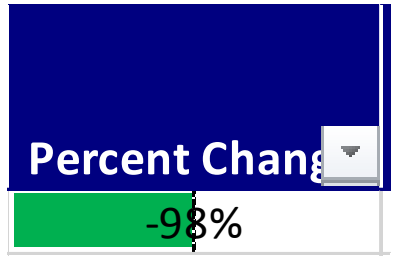
- Annualized Averages
- At least 3 years of water quality (TDS or NO3-N) in 20-year period
- Shapiro Wilk test for normality
- Point Statistics – mean plus t*standard error of the mean



MDV: Most discordant value from median
SE: Standard error at student's t
GM: Geometric Mean
GSE: Geometric standard error
UCL84: 84% upper confidence limit of me

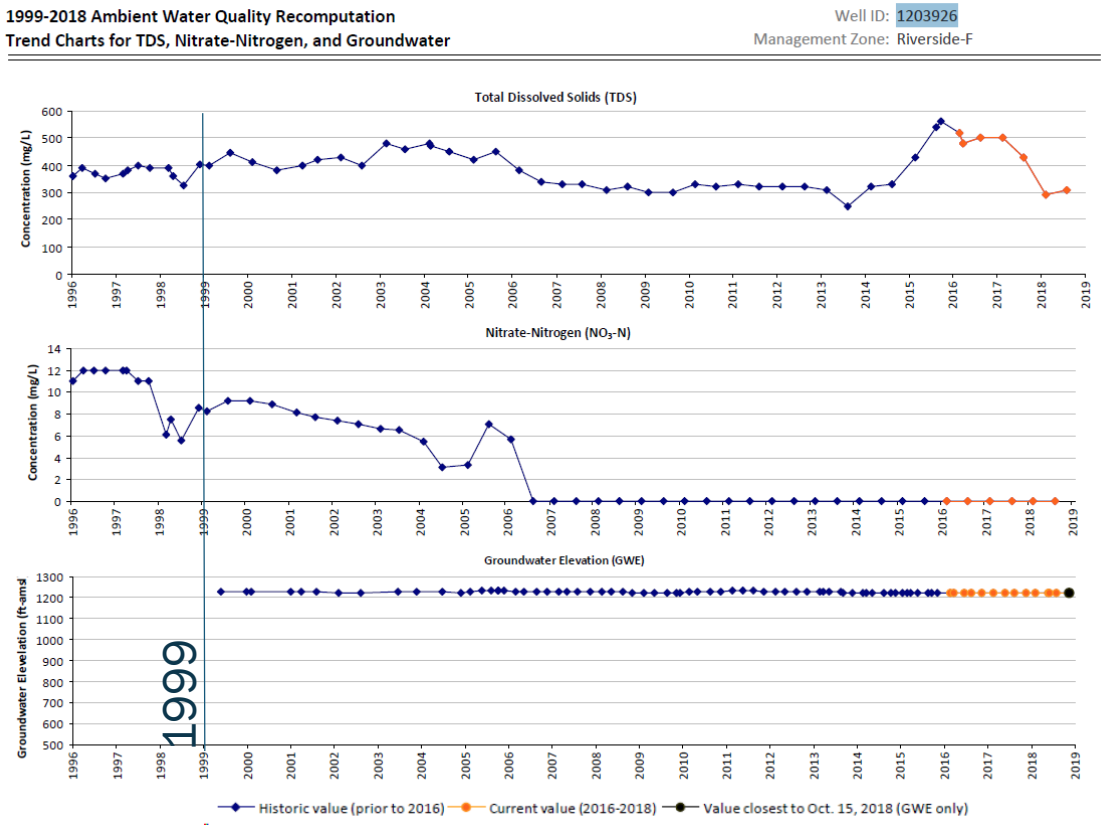
WSC
Water Systems Consulting, Inc.

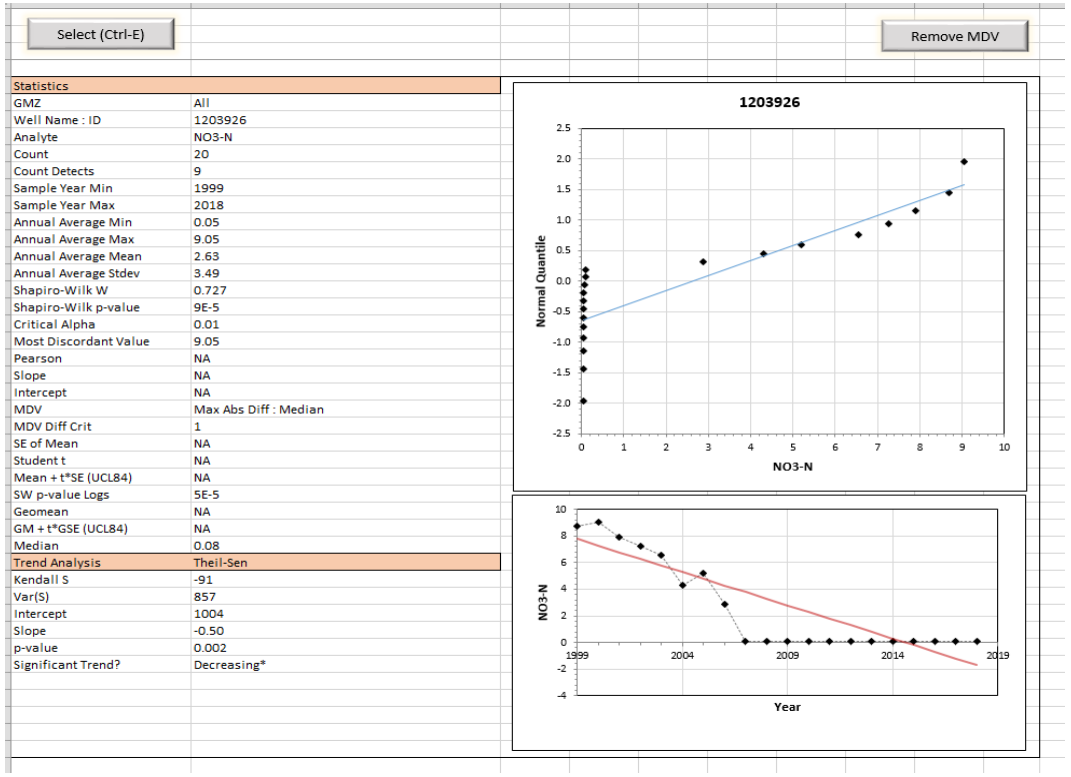
Nitrate Example



Well ID: 1203926

Well ID	Latitude	Longitude	Well Name	Well Owner[1]	Groundwater Management Zone	Number of Samples[2]	Number of Accepted Samples[3]	Number of Annualized Average Concentration Values	# of outliers (ie, rejected annualized average conc values)	Mean of Annual Average Concentration Values	Normal Distribution of Data[4]	Shapiro Wilk Test Result[5]	Standard Error Mean/Standard Error Geometric Mean	Standard Deviation	tValue	Statistic = [Mean Concentration + tValue * Standard Erro	2015 Final Value[6]	2015 Method Outcon	2018 Final Value[6]	2018 Method Outcome	Status Change	Percent Chan	Percent Chan	Absolute Percent Chan	Absolute Percent Rank
1203926	34.00538935	-117.2876524	Highgrove HG-3	Riverside County Waste Management Depa	Riverside-F	40	40	20	0	2.63	NO	FAIL	NA	3.49	NA		3.59	Median	0.08	Median	Average - No Change	-98%	-98%	98%	0.973





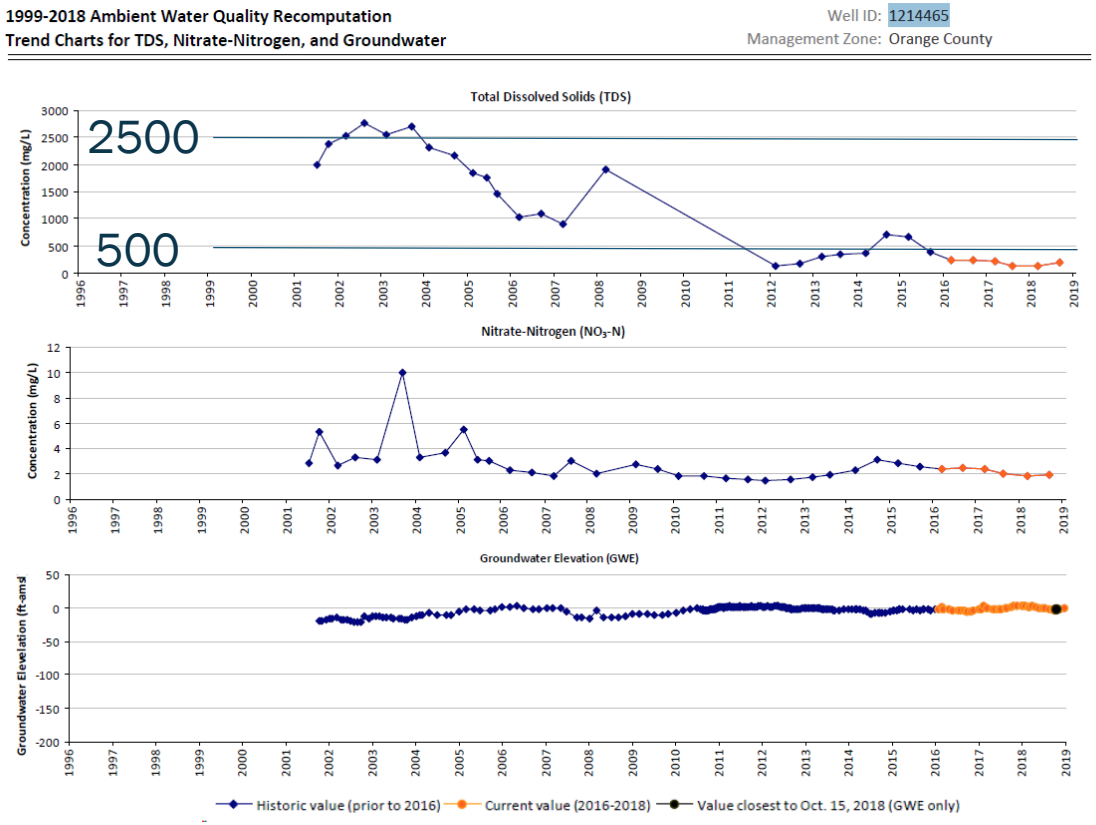
[Point Statistics Web Map]

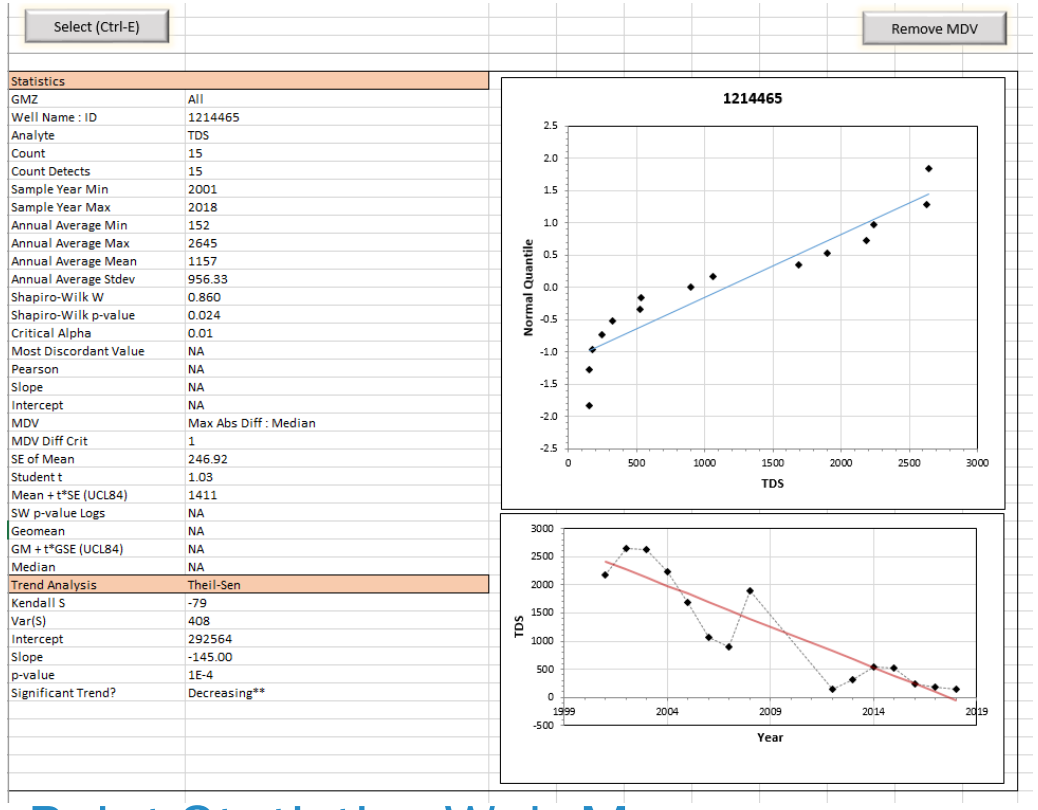
TDS Example

Percent Change
-16%

Well ID: 1203926

Well ID	Latitude	Longitude	Well Name	Well Owner[1]	Groundwater Management Zone	Number of Samples[2]	Number of Accepted Samples[3]	Annualized Average Concentration	outliers (ie, rejected	Mean of Annual Average Concentration Values	Normal Distribution of Data[4]	Shapiro Wilk Test Result[5]	Mean/Standard Error Geometric Mean	Standard Deviation	tValue	= [Mean Concentration + tValue *	2015 Final Value[6]	2015 Method Outcome	2018 Final Value[6]	Method Outcome	Status Change	Percent Change	Percent Change	Absolute % Change	Absolute Percent Rank
1214465	33.69755913	-117.994906	OCWD-M42/1	Orange County Wat	Orange County	29	29	15	0	1157	YES	PASS	246.92	956.33	1.03	1411	**1674**	Mean + SE (UCL84)	**1411**	Mean + SE (UCL84)	Statistic - No Change	-16%	-16%	16%	0.966



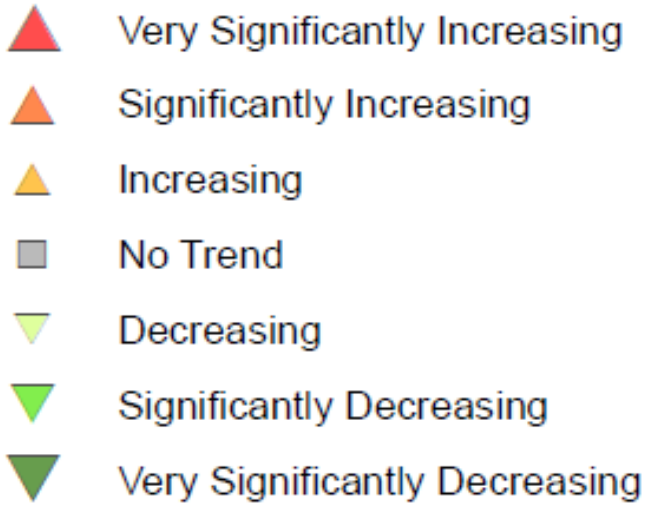


[Point Statistics Web Map]

Trend Analysis
Mann-Kendall Test

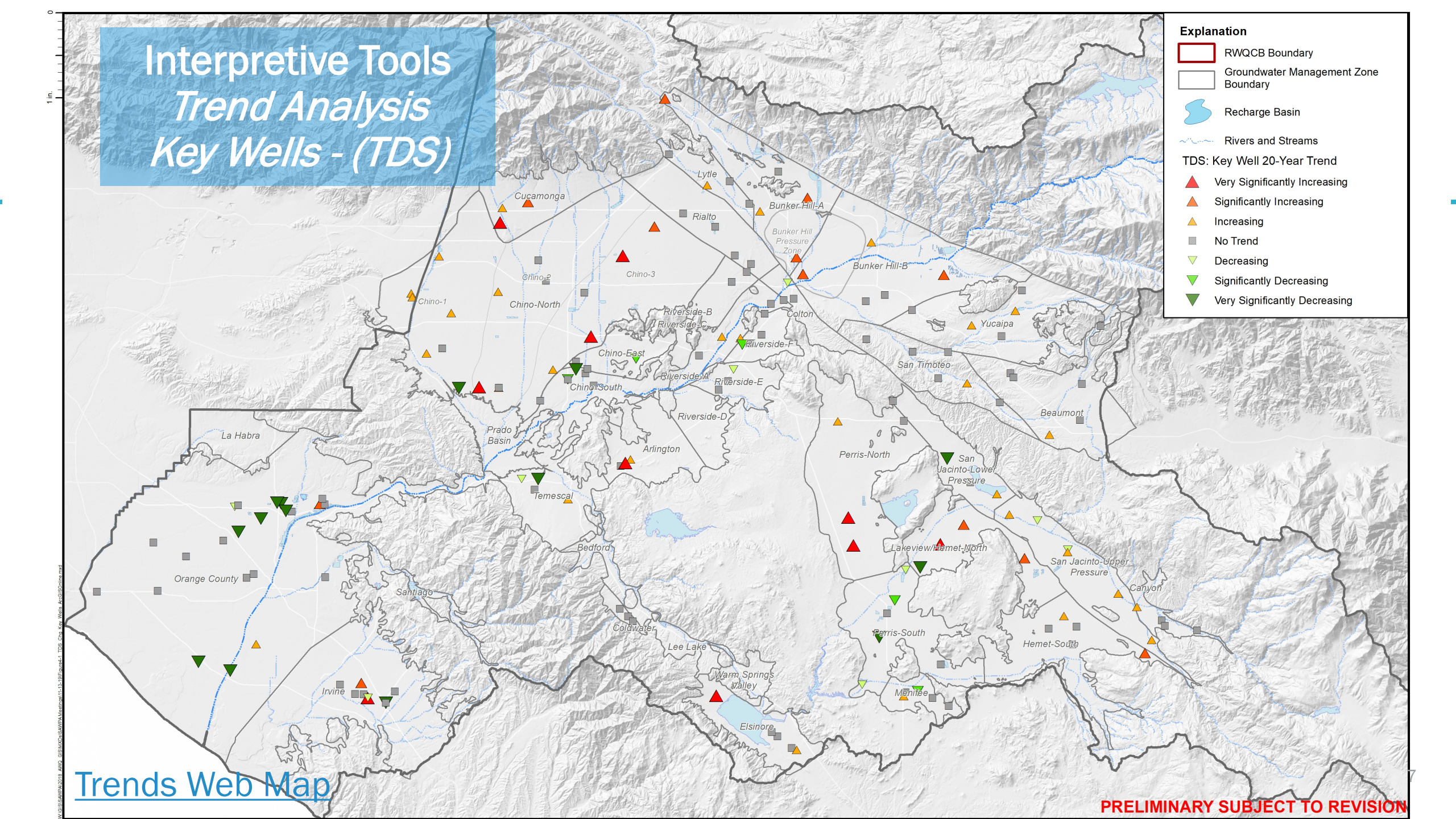
The Mann-Kendall test is applied to determine if there is a significant trend in water quality (increasing, no trend, or decreasing) for up to 20 annualized average values within the 2018 AWQ recomputation dataset.

A very significant increasing trend does not necessarily mean that the trend has a high positive slope or that the concentrations are high; it means only that the trend is monotonically increasing.



WSC
Water Systems Consulting, Inc.

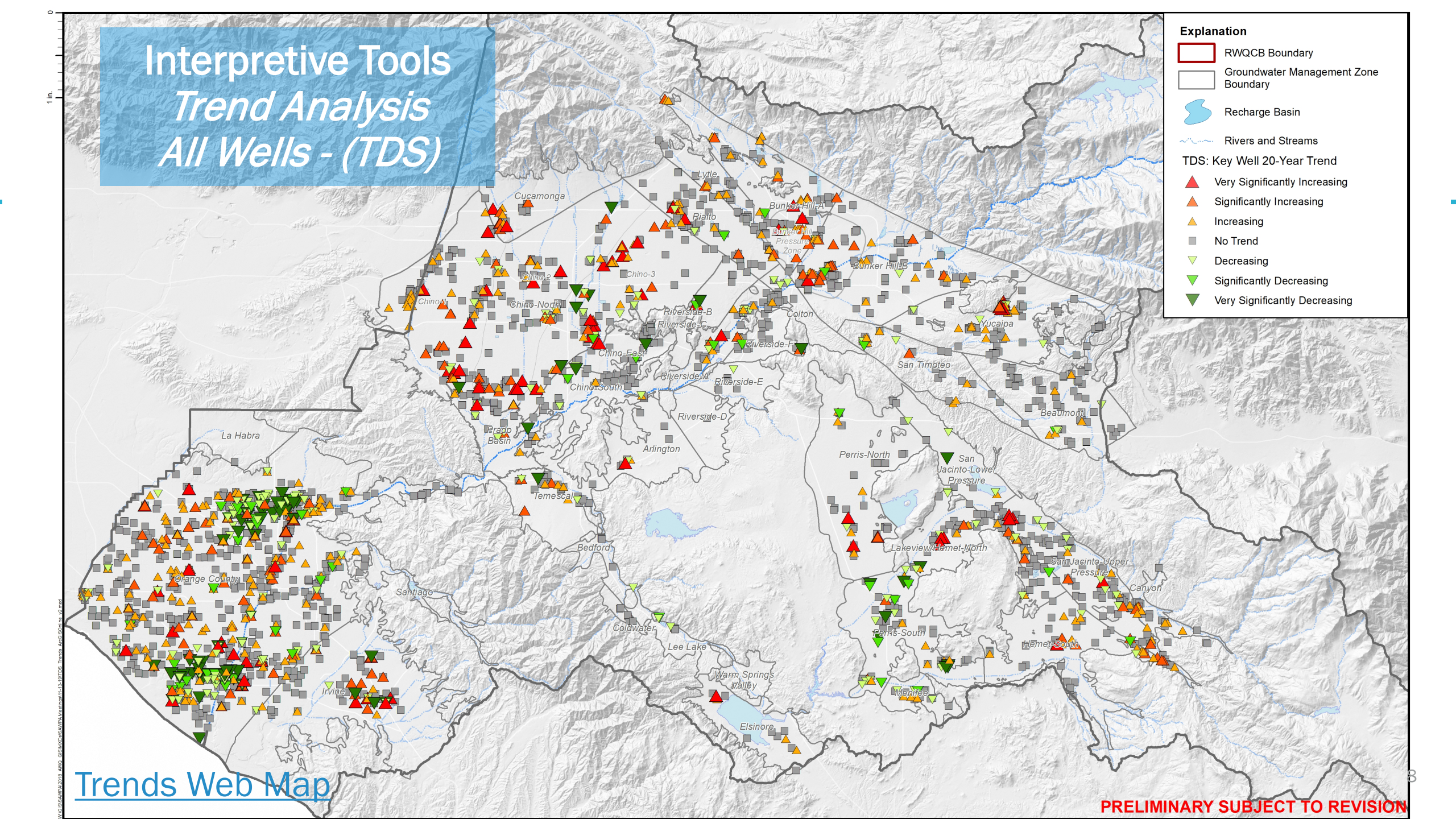
Interpretive Tools
Trend Analysis
Key Wells - (TDS)



Trends Web Map

PRELIMINARY SUBJECT TO REVISION

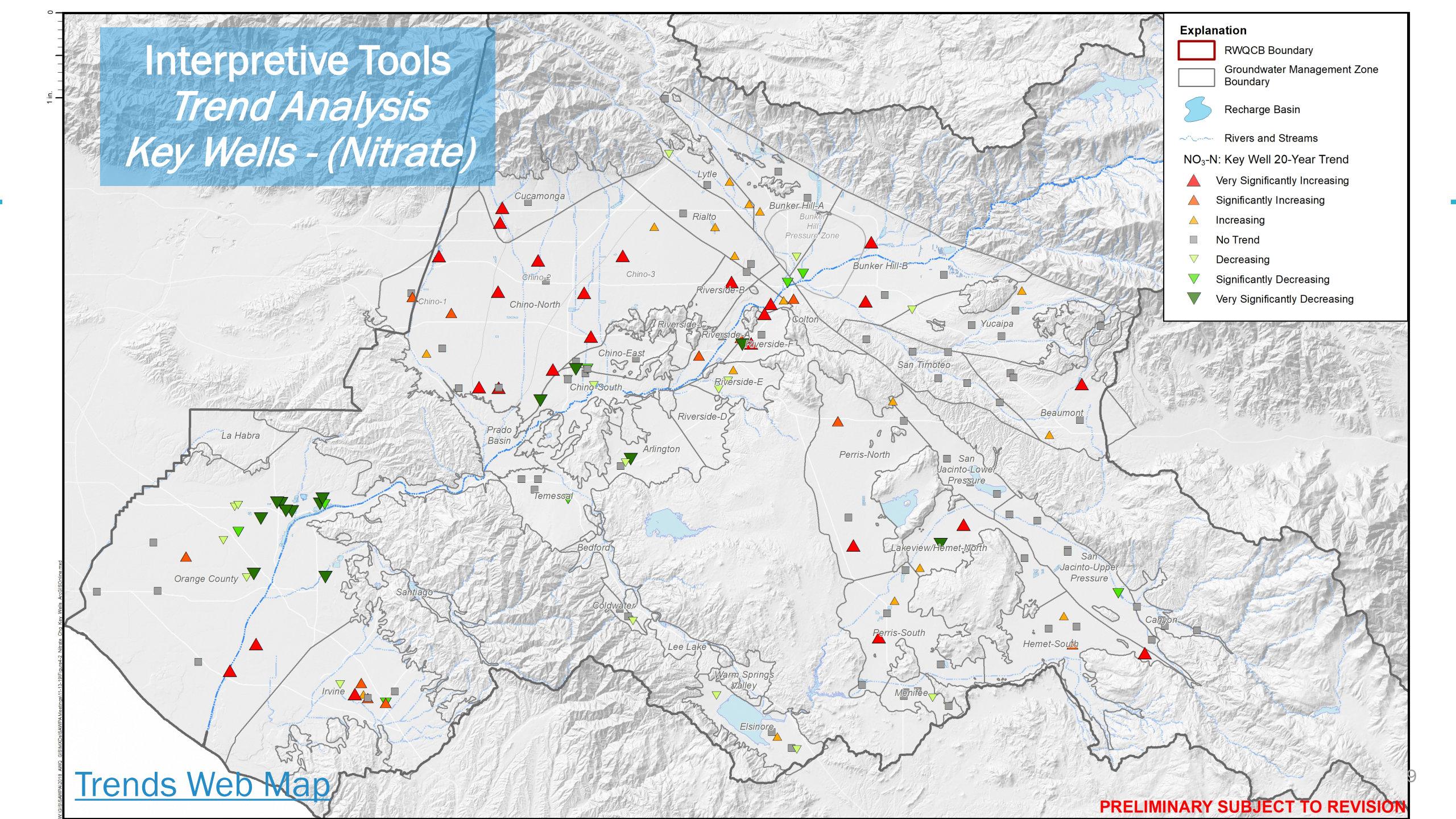
Interpretive Tools
Trend Analysis
All Wells - (TDS)



Trends Web Map

PRELIMINARY SUBJECT TO REVISION

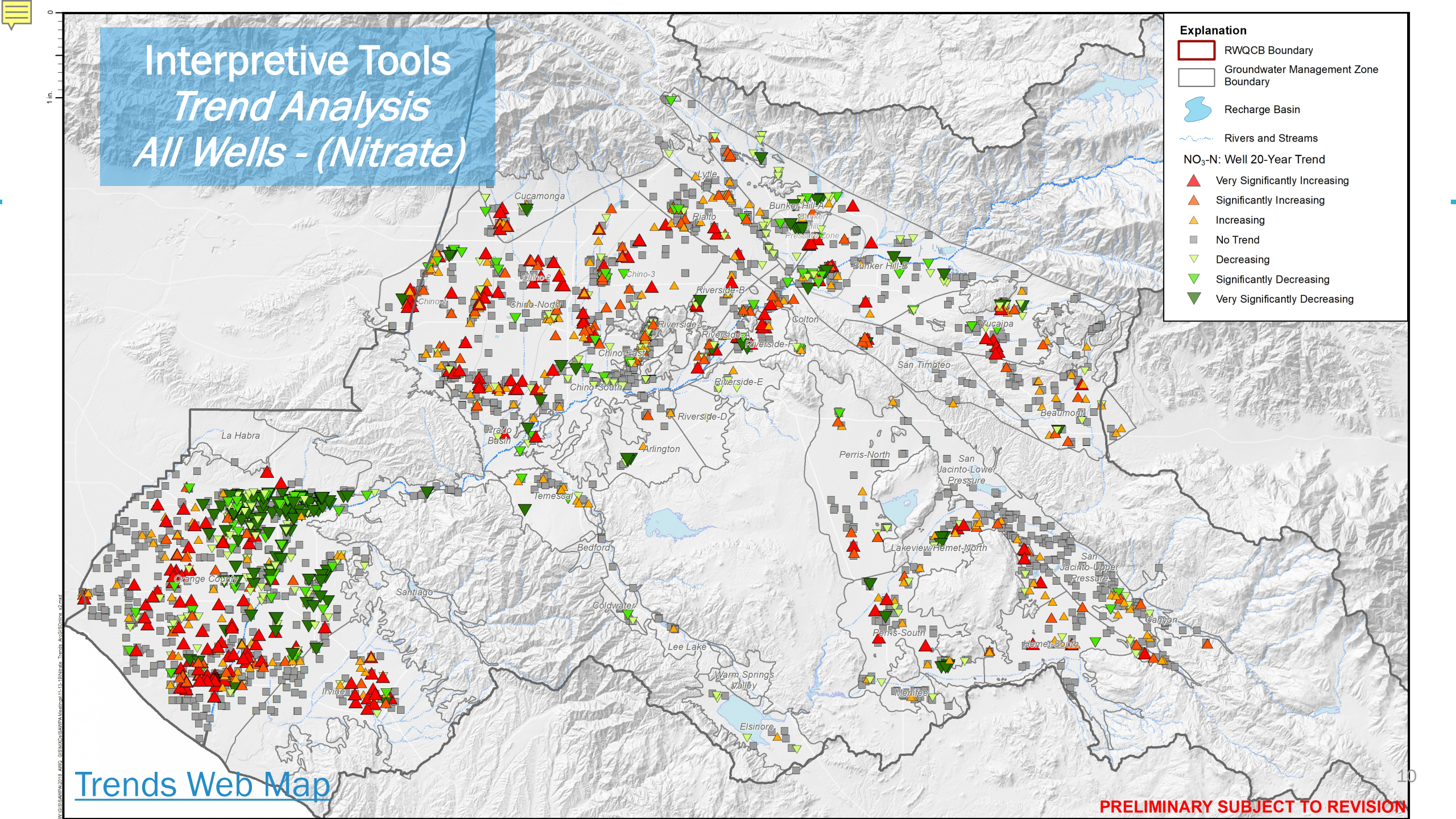
Interpretive Tools
Trend Analysis
Key Wells - (Nitrate)



[Trends Web Map]

PRELIMINARY SUBJECT TO REVISION

Interpretive Tools
Trend Analysis
All Wells - (Nitrate)



Trends Web Map

PRELIMINARY SUBJECT TO REVISION

Well Attrition Analysis

- *High Risk Point Statistic*

  Wells with computed water quality point statistics that will not qualify for inclusion in the next recomputation (2002 to 2021) of AWQ if no data are collected during 2019-2021.

- *Medium Risk Point Statistic*

  Wells with computed water quality point statistics that will not qualify for inclusion in the following recomputation (2005 to 2024) of AWQ if no data are collected during 2019-2024.

- *New Point Statistics*

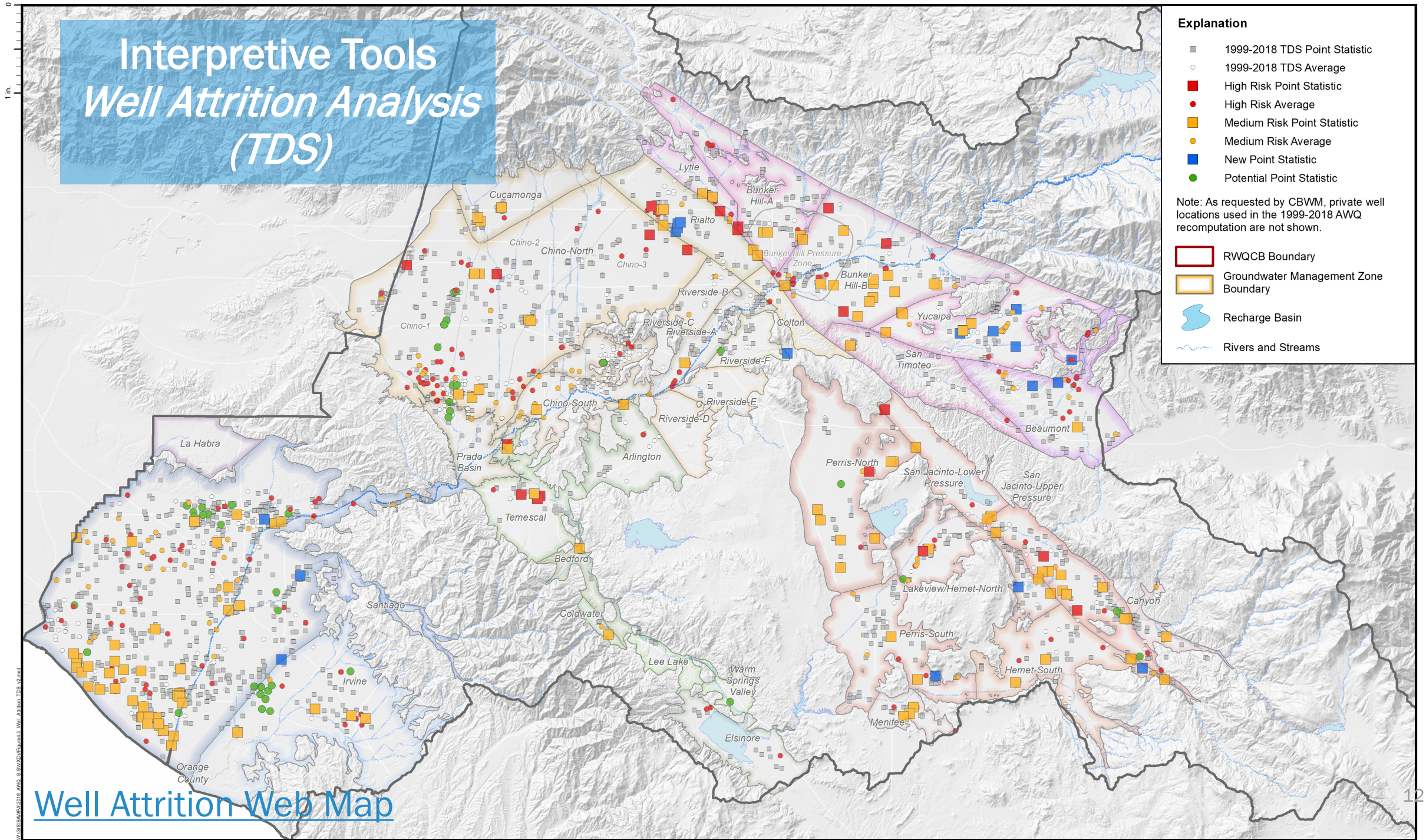
  Wells that are now eligible to have a water quality point statistic computed for the 2018 current AWQ recomputation period.

- *Potential Point Statistic*

  Wells that will be eligible to have a water quality point statistic computed for the next period (2002 to 2021), if a sample is collected and analyzed in the 2019 to 2021 period.

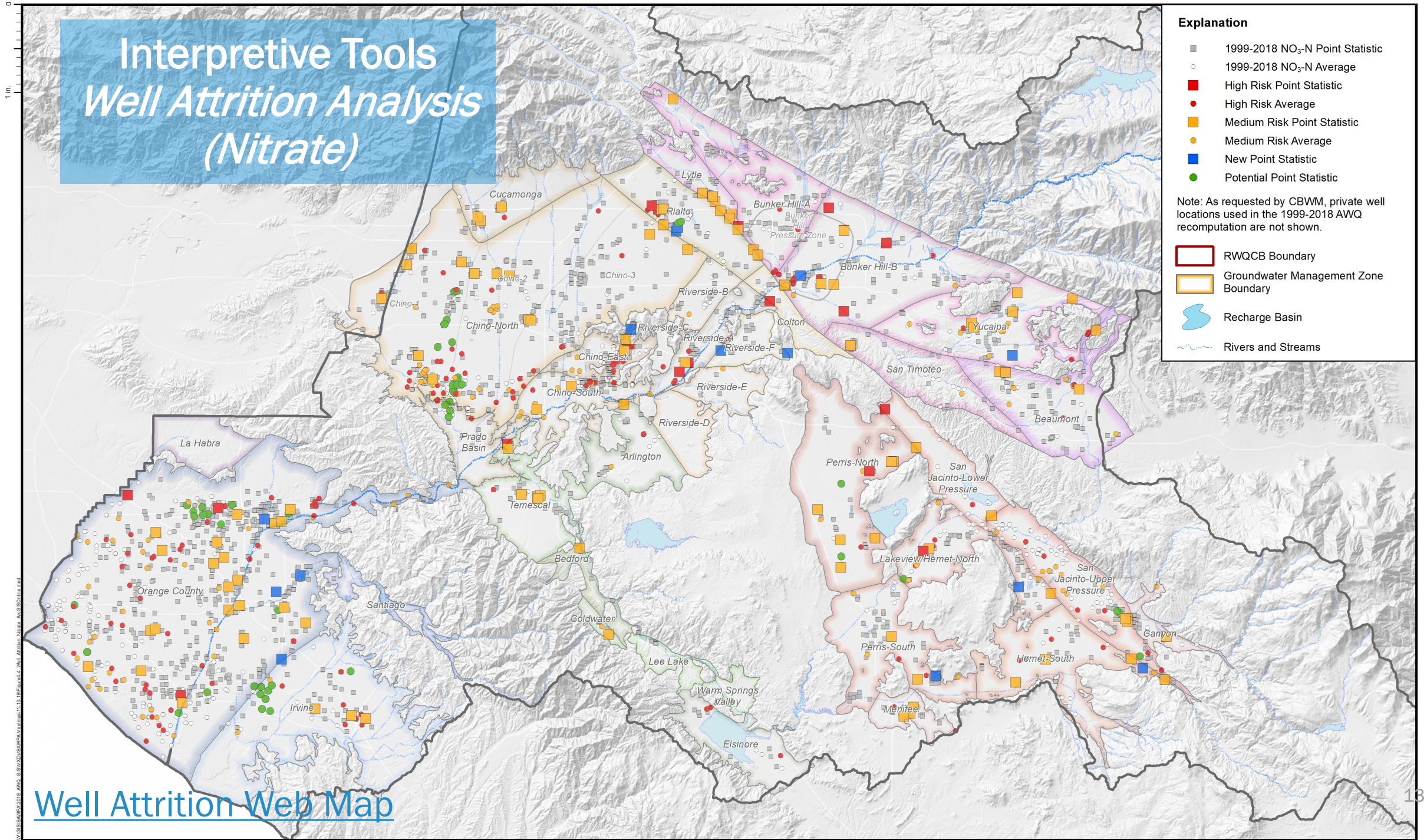
WSC
Water Systems Consulting, Inc.

Interpretive Tools
Well Attrition Analysis (TDS)



[Well Attrition Web Map]

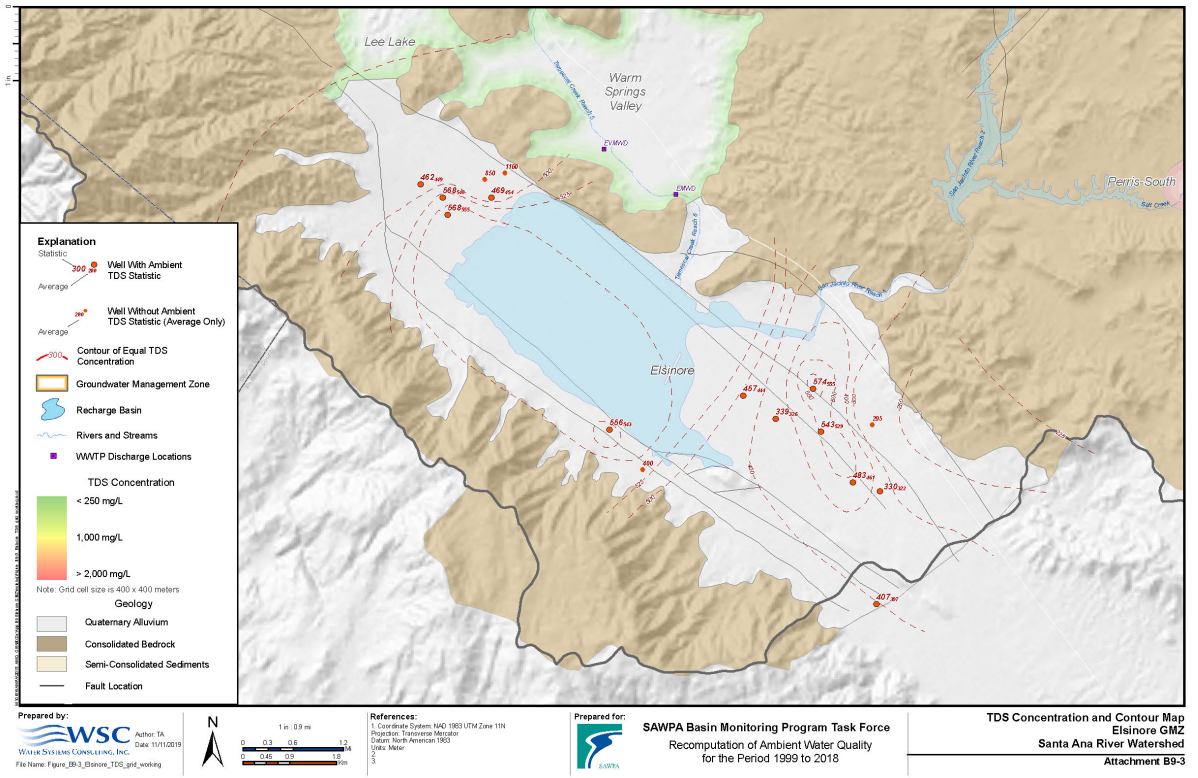
Interpretive Tools
Well Attrition Analysis (Nitrate)



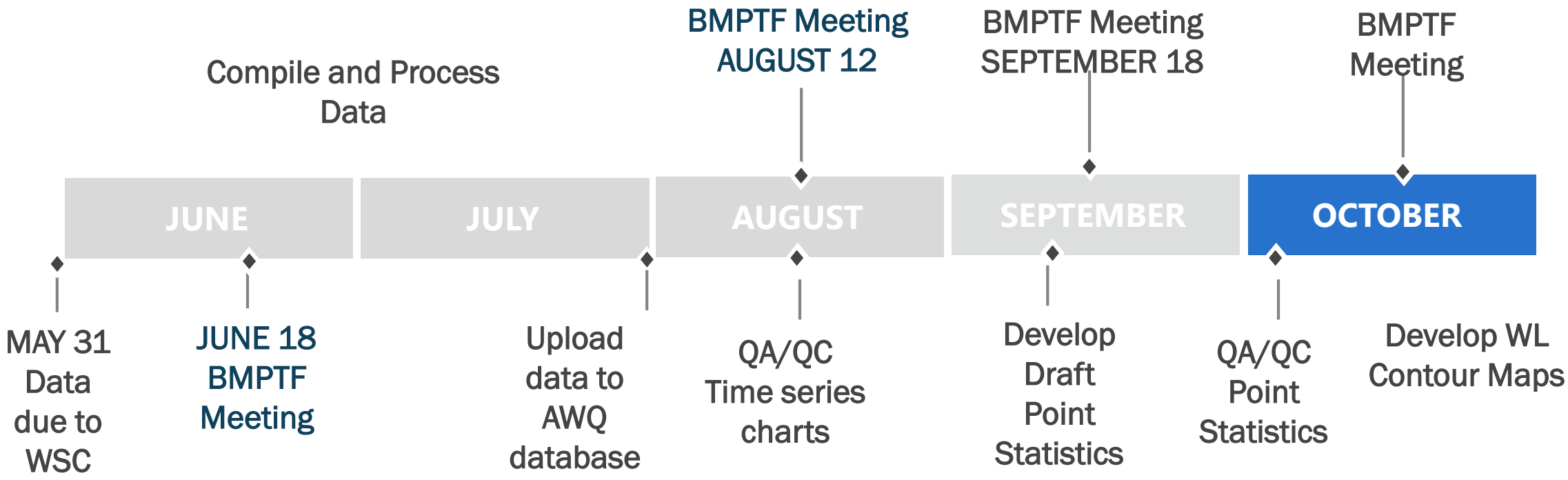
[Well Attrition Web Map]

Review of Nitrate and TDS AWQ Maps (1999-2018)

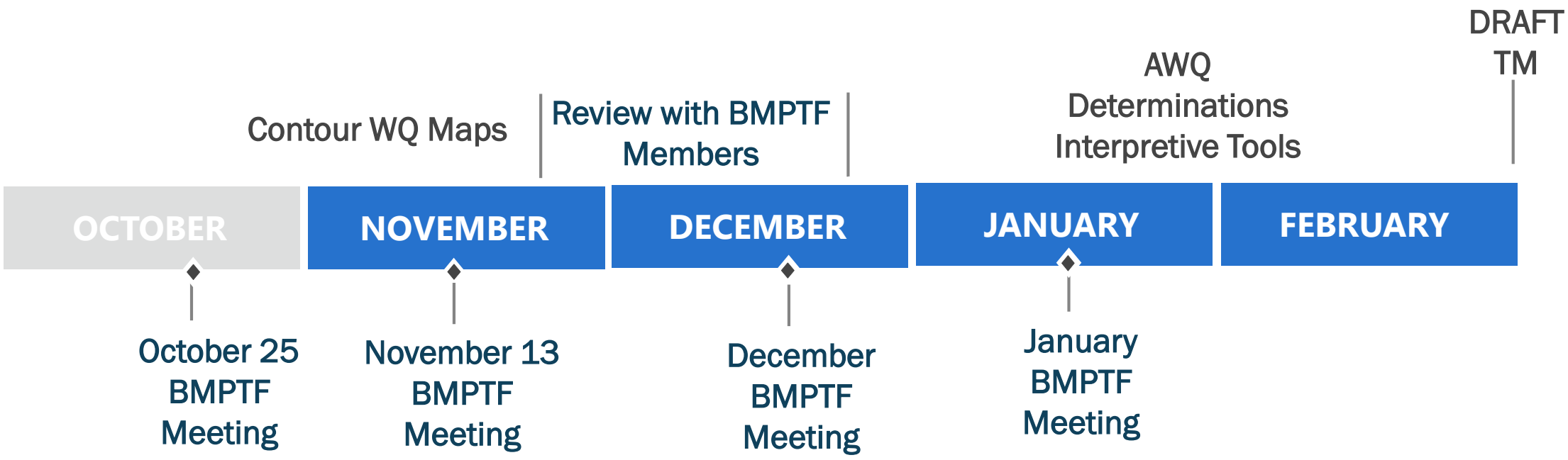
[FTP Site to view and QA/QC Maps]



Schedule


BMPTF Meeting AUGUST 12
BMPTF Meeting SEPTEMBER 18
BMPTF Meeting
Compile and Process Data
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
MAY 31 Data due to WSC
JUNE 18 BMPTF Meeting
Upload data to AWQ database
QA/QC Time series charts
Develop Draft Point Statistics
QA/QC Point Statistics
Develop WL Contour Maps

Near-term Schedule



WSC
Water Systems Consulting, Inc.