Recomputation of Ambient Water Quality in the Santa Ana River Watershed

BMPTF: October 25, 2019

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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

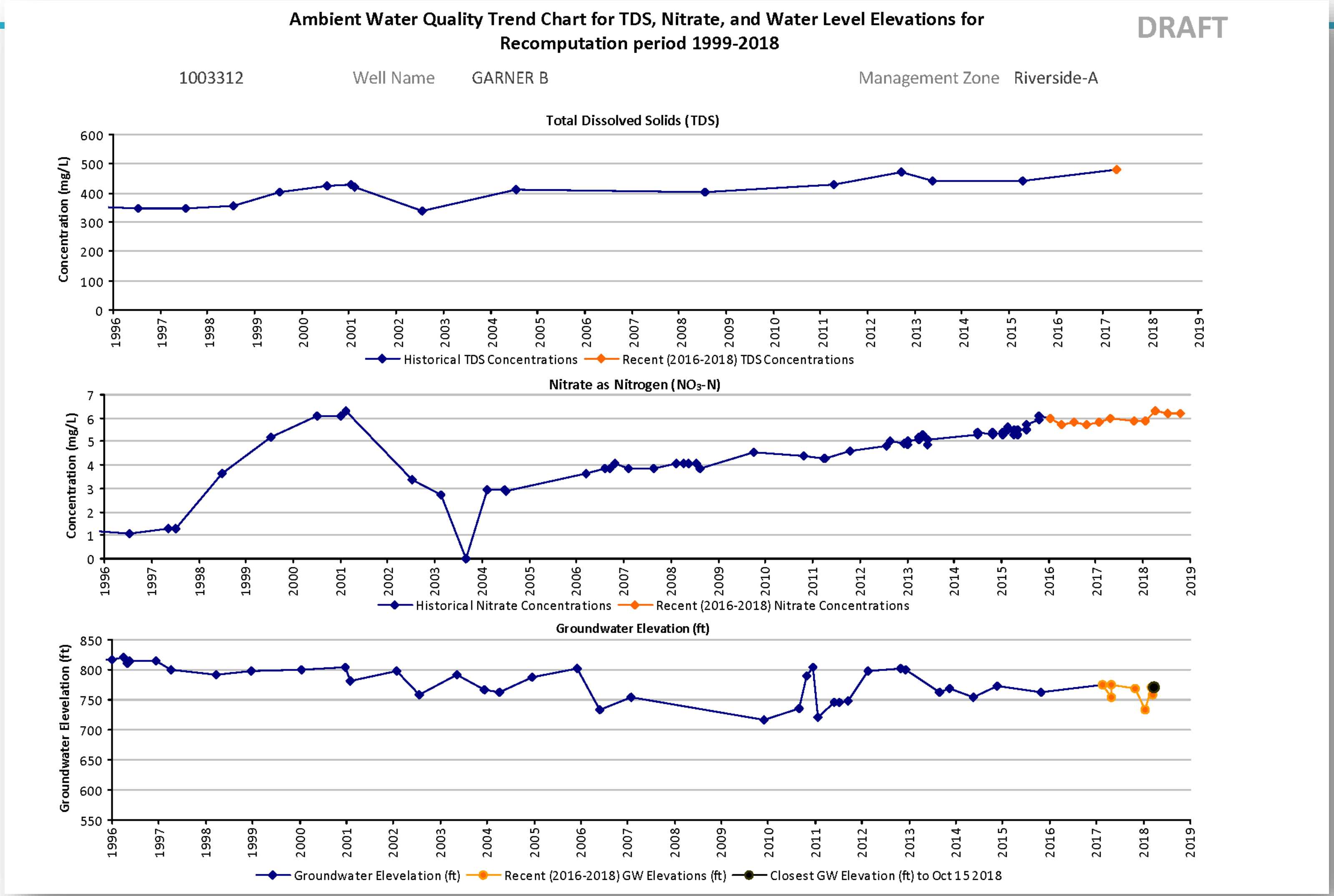
- ✓ Groundwater Elevation Contours
- ✓ Nitrate, TDS Concentrations
- ✓ Compute ambient water quality for GMZ's

4: Interpretive Tools

- ✓ Innovative Interpretive Tool

1: Data Gathering

QA/QC, Process, and Upload Recent Data



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Nitrate-Nitrogen and Nitrate Conversion

- AWQ uses Nitrate as Nitrogen (NO3-N) in mg/L
  - Atomic weight of Nitrogen is 14.0067
  - Molar mass of nitrate anion (NO_3^-) is 62.0049 g/mole
- Nitrate (NO3) = 4.43 x Nitrate-Nitrogen (NO3-N)
- Nitrate-Nitrogen (NO3-N)= 0.226 x Nitrate (NO3)

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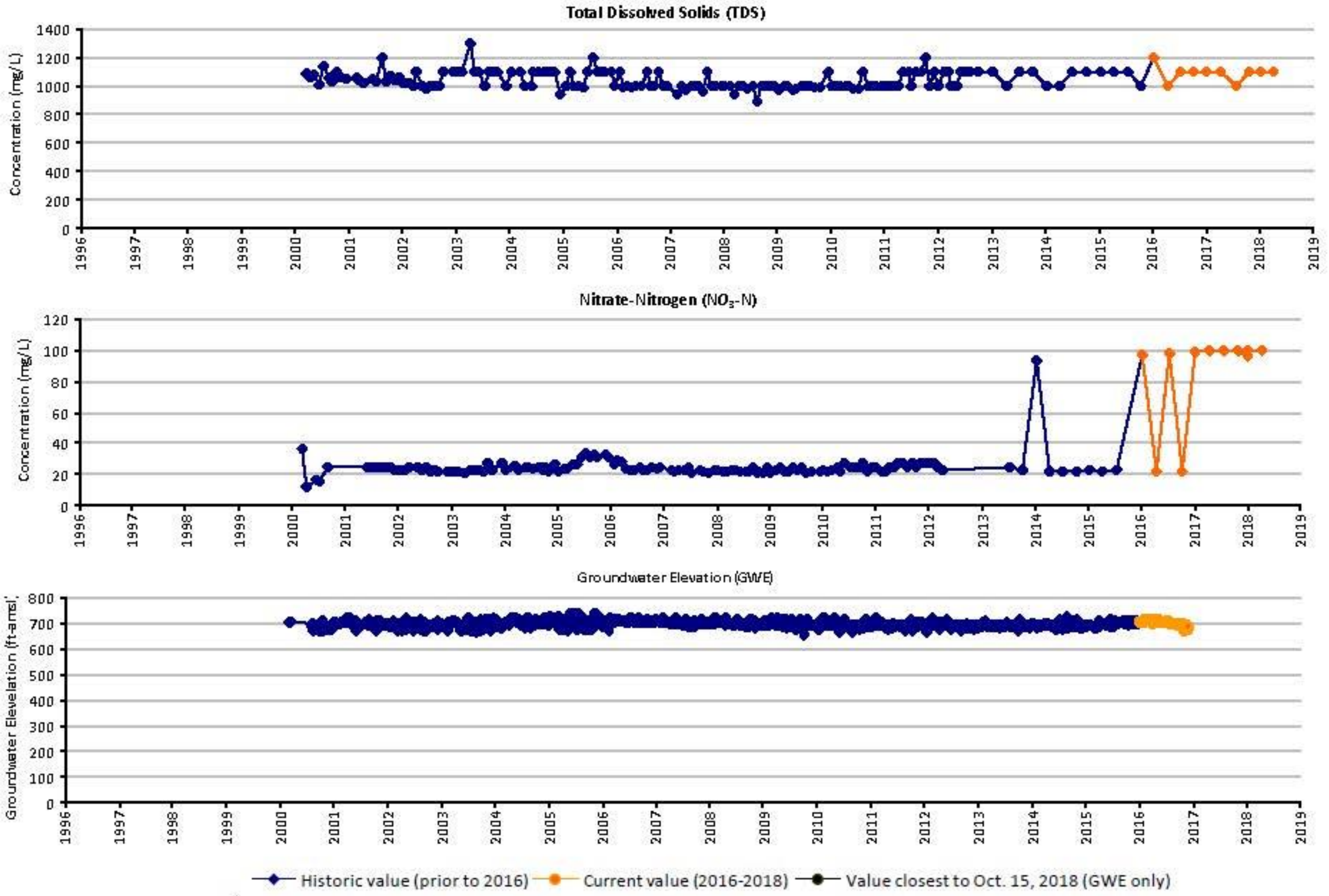
1999-2018 Ambient Water Quality Recomputation
Trend Charts for TDS, Nitrate-Nitrogen, and Groundwater

Well ID: 1207151
Management Zone: Chino-East



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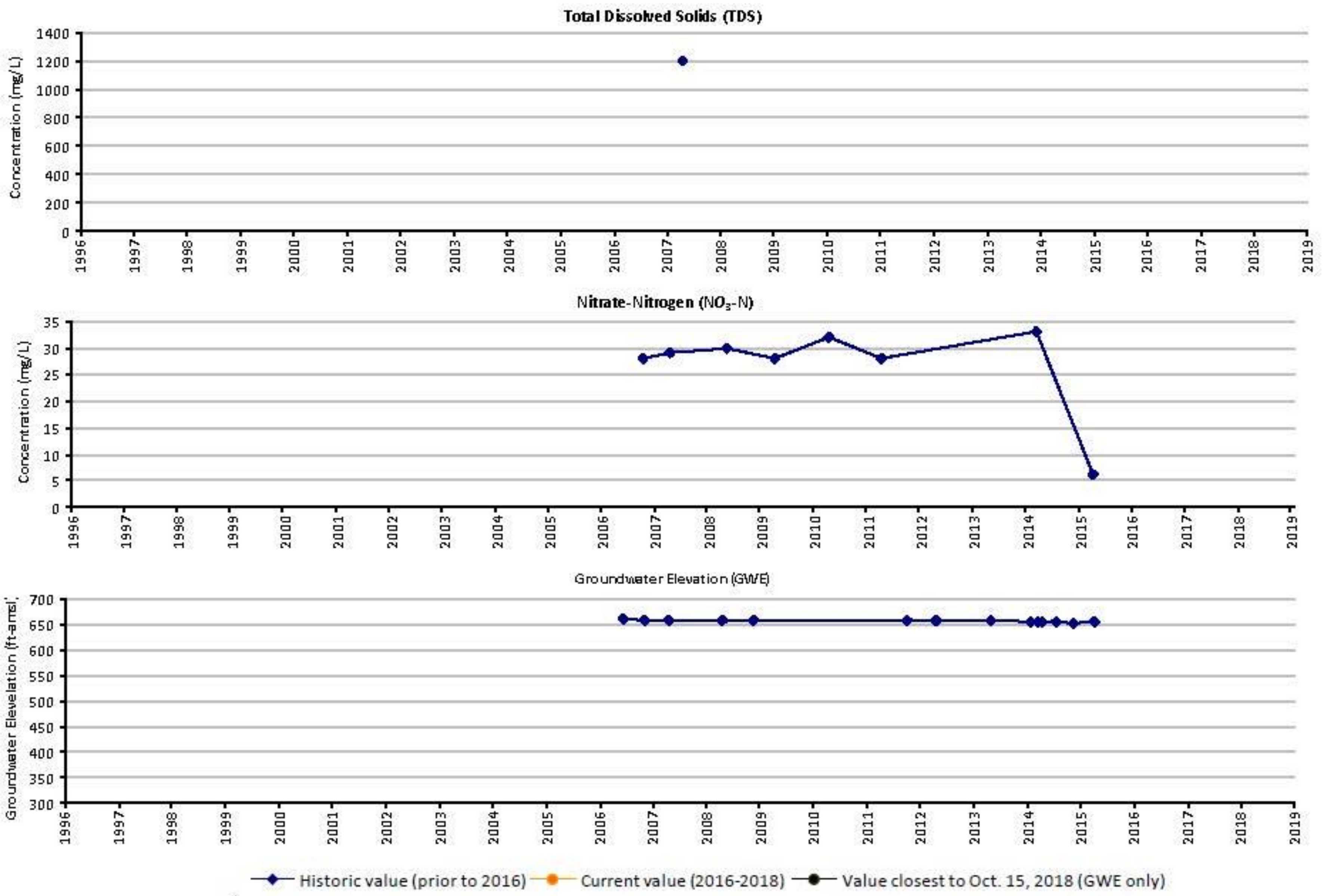
1999-2018 Ambient Water Quality Recomputation
Trend Charts for TDS, Nitrate-Nitrogen, and Groundwater

Well ID: 1208964
Management Zone: Chino-South



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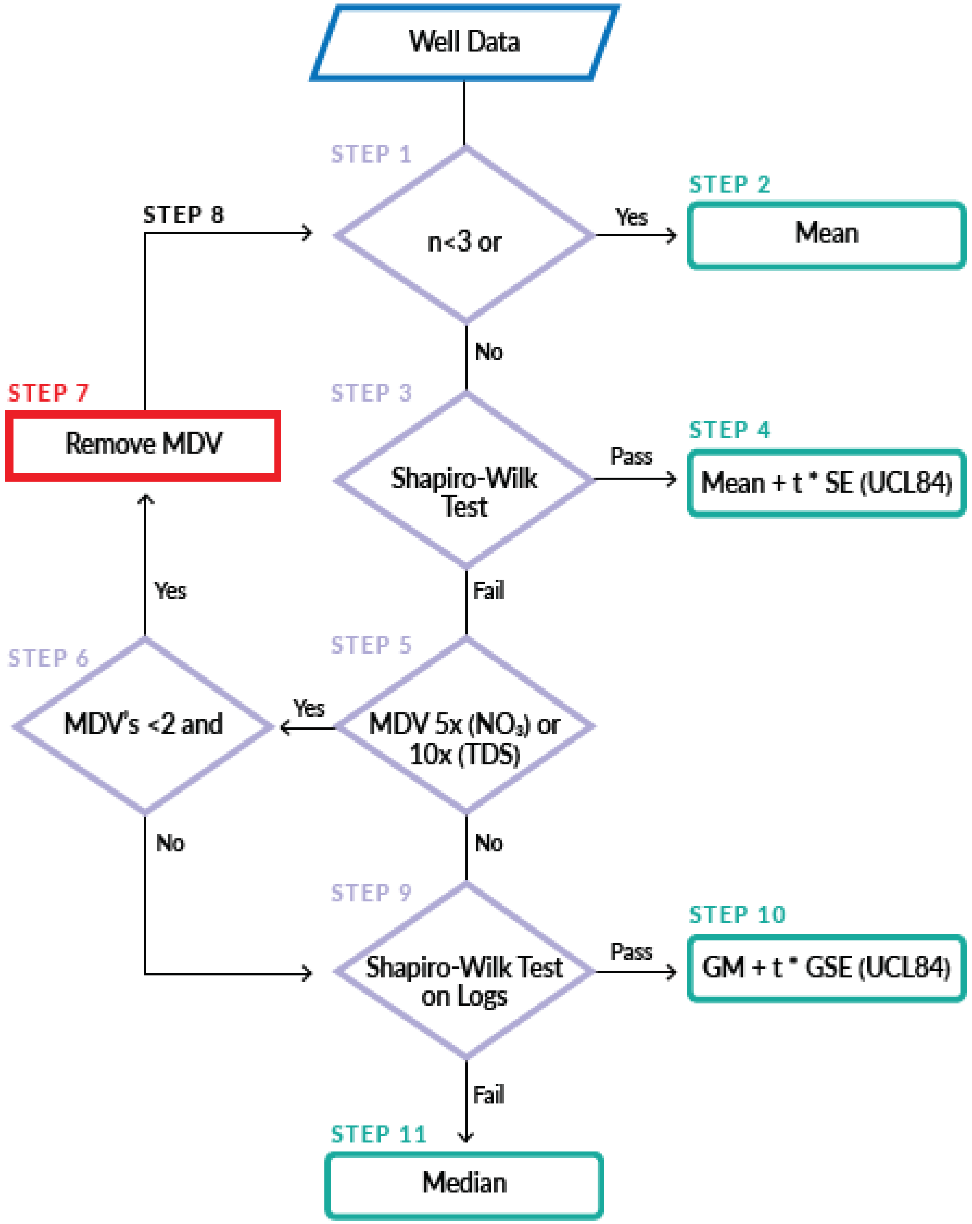
2: Point Statistics

- 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

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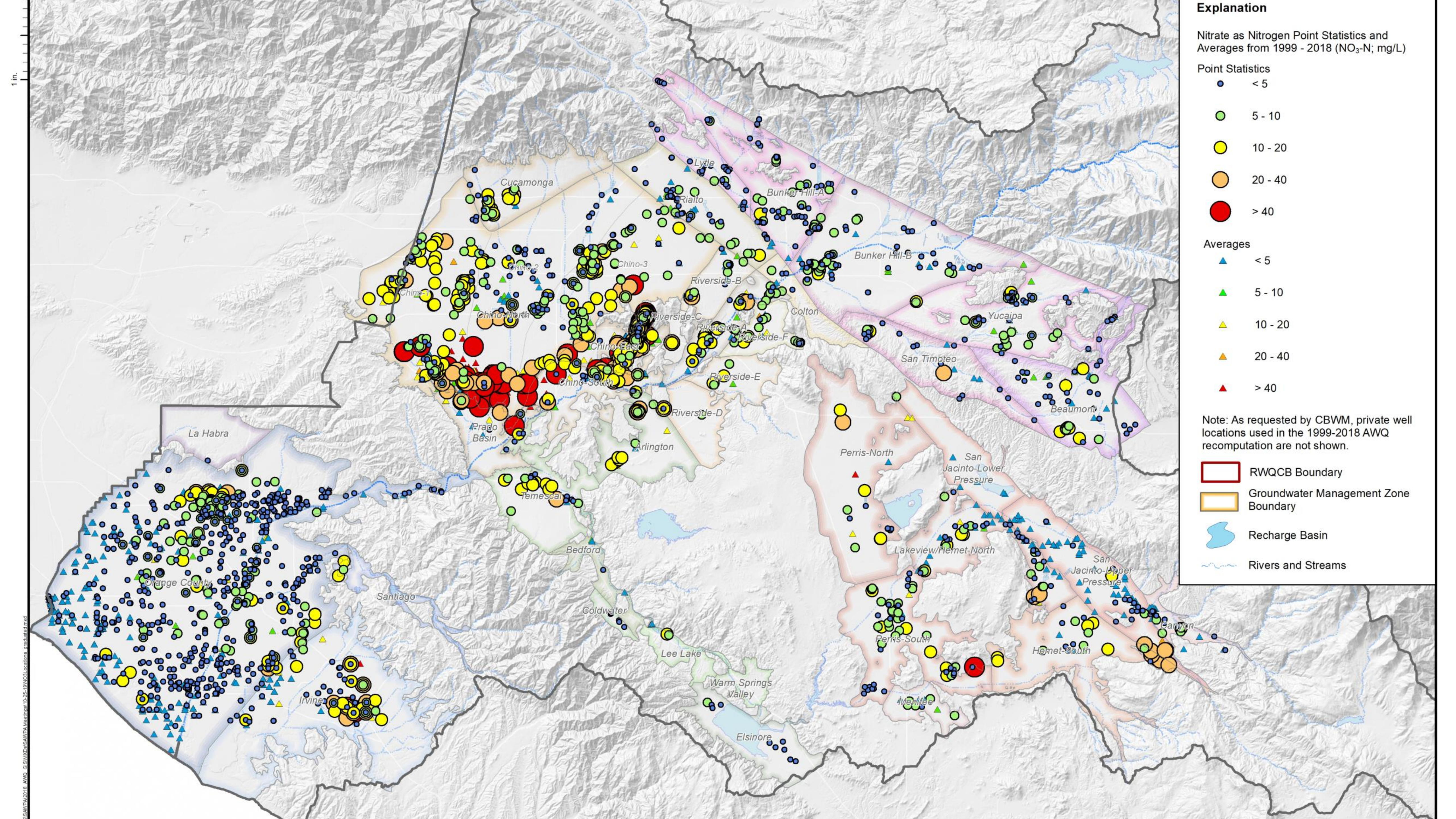
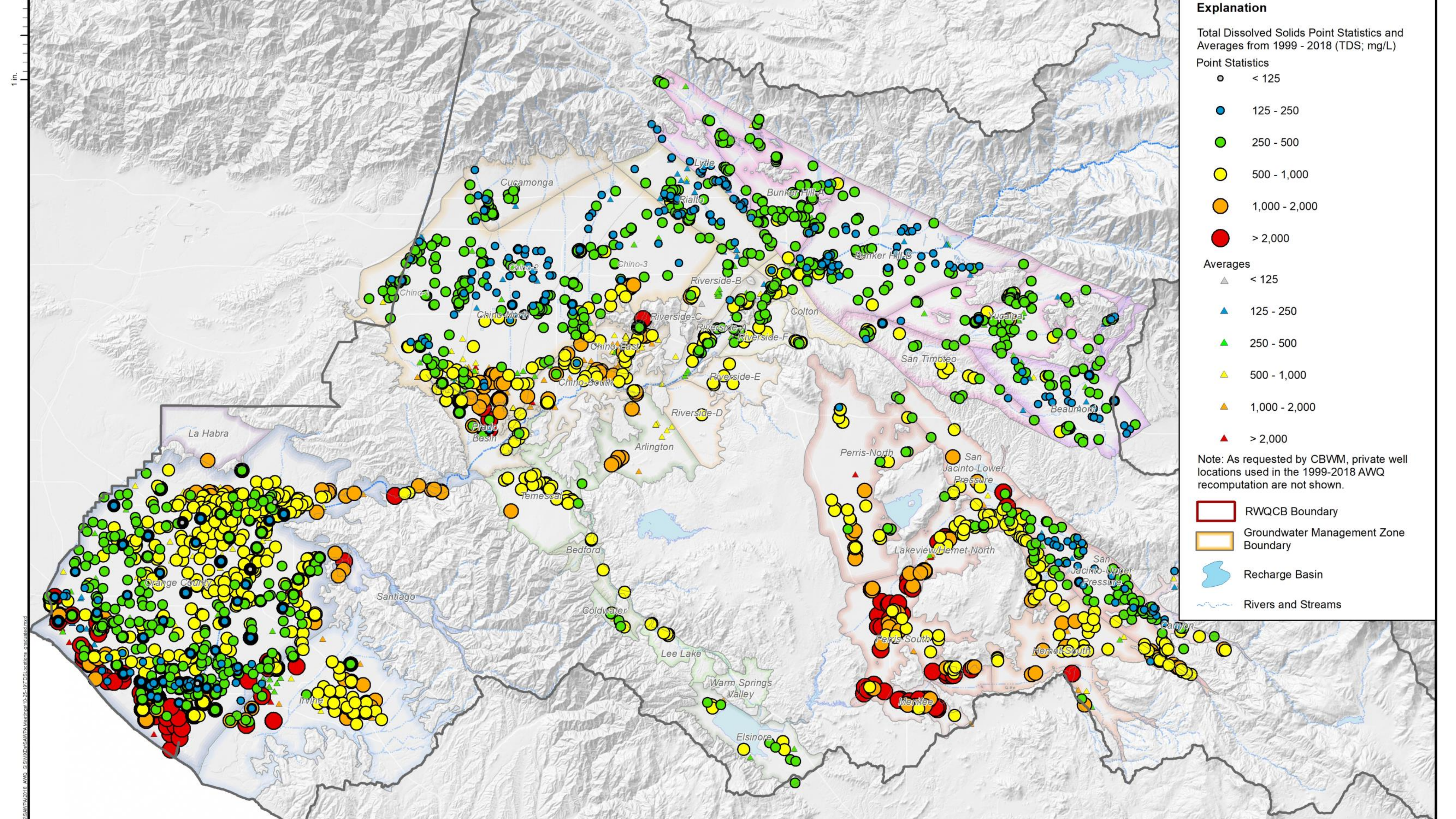

Explanation
Nitrate as Nitrogen Point Statistics and Averages from 1999 - 2018 (NO_3-N; mg/L)
Point Statistics
< 5
5 - 10
10 - 20
20 - 40
> 40
Averages
< 5
5 - 10
10 - 20
20 - 40
> 40
Note: As requested by CBWM, private well locations used in the 1999-2018 AWQ recomputation are not shown.
RWQCB Boundary
Groundwater Management Zone Boundary
Recharge Basin
Rivers and Streams
Cucamonga
Lytle
Rialto
Bunker Hill-A
Bunker Hill-B
Chino-1
Chino-2
Chino-3
Chino-North
Chino-East
Chino-South
Riverside-A
Riverside-B
Riverside-C
Riverside-D
Riverside-E
Riverside-F
Colton
Yucaipa
San Timoteo
Beaumont
Prado Basin
La Habra
Arlington
Temescal
Perris-North
Perris-South
San Jacinto-Lower Pressure
San Jacinto-Upper Pressure
Lakeview/Hemet-North
Hemet-South
Canyon
Menifee
Bedford
Coldwater
Lee Lake
Warm Springs Valley
Elsinore
Orange County
Santiago
Irvine



Explanation
Total Dissolved Solids Point Statistics and Averages from 1999 - 2018 (TDS; mg/L)
Point Statistics
< 125
125 - 250
250 - 500
500 - 1,000
1,000 - 2,000
> 2,000
Averages
< 125
125 - 250
250 - 500
500 - 1,000
1,000 - 2,000
> 2,000
Note: As requested by CBWM, private well locations used in the 1999-2018 AWQ recomputation are not shown.
RWQCB Boundary
Groundwater Management Zone Boundary
Recharge Basin
Rivers and Streams
1 in.
Cucamonga
Lytle
Rialto
Bunker Hill-A
Bunker Hill-B
Chino-1
Chino-2
Chino-3
Riverside-B
Riverside-C
Riverside-A
Riverside-F
Colton
Yucaipa
Chino-North
Chino-East
Chino-South
San Timoteo
Riverside-E
Riverside-D
Prado Basin
Arlington
Beaumont
La Habra
Perris-North
San Jacinto-Lower Pressure
Temescal
Bedford
Lakeview/Hemet-North
San Jacinto-Upper Pressure
Orange County
Santiago
Coldwater
Canyon
Perris-South
Hemet-South
Lee Lake
Warm Springs Valley
Irvine
Menifee
Elsinore

TDS Statistics Table

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 Concentrat on + tValue	Final Value[6]	Method Outcome
1000032	34.14172185	-117.2283441	PL 39	East Valley Water District	Bunker Hill-B	21	21	19	0	378	NO	FAIL	NA	25.35	NA		380	Median
1000034	34.13844449	-117.2408292	PL 41	East Valley Water District	Bunker Hill-B	3	3	3	0	330	YES	PASS	7.54	13.05	1.31	340	340	Mean + SE (UCL84)
1000107	34.2069347	-117.3317829	SBWD Devil Canyon 7	City of San Bernardino	Bunker Hill-A	18	18	16	0	318	YES	PASS	12.55	50.21	1.03	331	331	Mean + SE (UCL84)
1000108	34.20679863	-117.3319091	SBWD Devil Canyon 6	City of San Bernardino	Bunker Hill-A	18	18	15	0	310	YES	PASS	13.57	52.57	1.03	324	324	Mean + SE (UCL84)
1000113	34.20266895	-117.3340595	SBWD Devil Canyon 4	City of San Bernardino	Bunker Hill-A	19	19	16	0	340	NO	FAIL	NA	60.23	NA		360	Median
1000114	34.20210676	-117.3336528	SBWD Devil Canyon 3	City of San Bernardino	Bunker Hill-A	19	19	16	0	379	YES	PASS	11.31	45.22	1.03	391	391	Mean + SE (UCL84)
1000121	34.18953971	-117.3415463	SBWD Devil Canyon 2	City of San Bernardino	Bunker Hill-A	18	18	16	0	357	YES	PASS	9.69	38.77	1.03	367	367	Mean + SE (UCL84)
1000122	34.18299809	-117.3303984	SBWD Devil Canyon 1	City of San Bernardino	Bunker Hill-A	18	18	16	0	331	YES	PASS	9.11	36.45	1.03	340	340	Mean + SE (UCL84)
1000123	34.18546341	-117.3327072	SBWD Devil Canyon 5	City of San Bernardino	Bunker Hill-A	18	18	16	0	316	YES	PASS	9.59	38.34	1.03	326	326	Mean + SE (UCL84)
1000133	34.16518361	-117.2734043	SBWD 40th & Valencia	City of San Bernardino	Bunker Hill-A	17	17	15	0	388	YES	PASS	9.84	38.12	1.03	398	398	Mean + SE (UCL84)
1000142	34.17314344	-117.312913	SBWD Newmark 1	City of San Bernardino	Bunker Hill-A	19	19	16	0	341	YES	PASS	9.08	36.33	1.03	350	350	Mean + SE (UCL84)
1000143	34.17308679	-117.3116422	SBWD Newmark 2	City of San Bernardino	Bunker Hill-A	19	19	16	0	341	YES	PASS	9.30	37.19	1.03	351	351	Mean + SE (UCL84)
1000144	34.17206105	-117.3126897	SBWD Newmark 3	City of San Bernardino	Bunker Hill-A	18	18	16	0	366	YES	PASS	4.95	19.81	1.03	371	371	Mean + SE (UCL84)
1000145	34.17338112	-117.3133926	SBWD Newmark 4	City of San Bernardino	Bunker Hill-A	19	19	16	0	325	YES	PASS	7.65	30.58	1.03	333	333	Mean + SE (UCL84)
1000183	34.14929368	-117.2466689	PL 27	East Valley Water District	Bunker Hill-A	13	13	11	0	496	YES	PASS	11.38	37.74	1.05	508	508	Mean + SE (UCL84)
1000186	34.14902477	-117.2536038	PL 25A	East Valley Water District	Bunker Hill-A	23	23	18	0	424	YES	PASS	6.83	29.00	1.02	431	431	Mean + SE (UCL84)
1000187	34.14380103	-117.2556138	PL 107	East Valley Water District	Bunker Hill-A	15	15	14	0	361	YES	PASS	8.66	32.42	1.03	370	370	Mean + SE (UCL84)
1000199	34.14704444	-117.2635825	PL 24B	East Valley Water District	Bunker Hill-A	24	24	18	0	383	YES	PASS	5.99	25.39	1.02	389	389	Mean + SE (UCL84)
1000200	34.14736999	-117.2642252	PL 24A	East Valley Water District	Bunker Hill-A	20	20	18	0	374	YES	PASS	12.40	52.61	1.02	387	387	Mean + SE (UCL84)
1000206	34.14615298	-117.2691749	SBWD Lynwood	City of San Bernardino	Bunker Hill-A	23	23	17	0	357	YES	PASS	7.44	30.67	1.03	364	364	Mean + SE (UCL84)
1000222	34.13618243	-117.2740717	SBWD Perris Hill 5	City of San Bernardino	Bunker Hill-A	11	11	10	0	419	YES	PASS	5.03	15.91	1.05	424	424	Mean + SE (UCL84)
1000227	34.14852837	-117.2797272	SBWD Waterman Ave.	City of San Bernardino	Bunker Hill-A	21	21	18	0	394	YES	PASS	6.90	29.28	1.02	401	401	Mean + SE (UCL84)
1000228	34.14788614	-117.2805597	SBWD Leroy	City of San Bernardino	Bunker Hill-A	21	21	18	0	358	YES	PASS	6.47	27.46	1.02	365	365	Mean + SE (UCL84)
1000229	34.14766457	-117.2872599	SBWD 31st & Mt. View	City of San Bernardino	Bunker Hill-A	21	21	18	0	359	YES	PASS	5.52	23.41	1.02	365	365	Mean + SE (UCL84)

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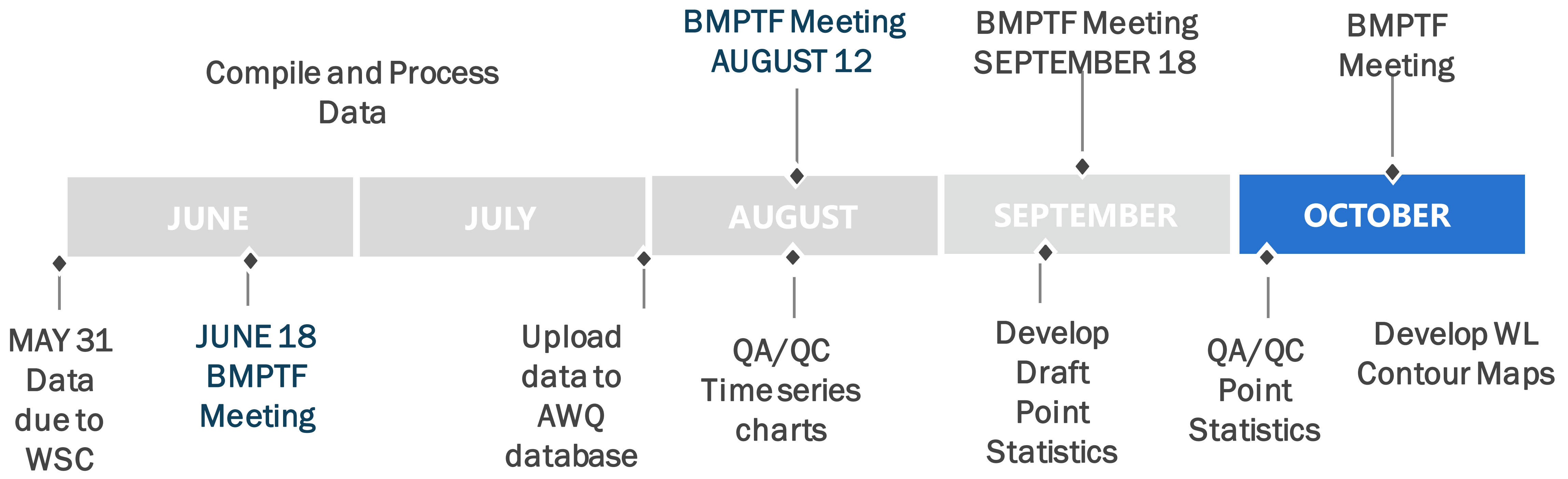
Schedule



Compile and Process Data
BMPTF Meeting AUGUST 12
BMPTF Meeting SEPTEMBER 18
BMPTF Meeting
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

WQ Contour Maps

Review with BMPTF Members

AWQ Determinations Interpretive Tools

DRAFT TM

OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY
October 25 BMPTF Meeting	November 13 BMPTF Meeting	December BMPTF Meeting	January BMPTF Meeting	


QUESTIONS?
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