

Attachment B1

Arlington and Riverside-D GMZs

Attachment Contents:

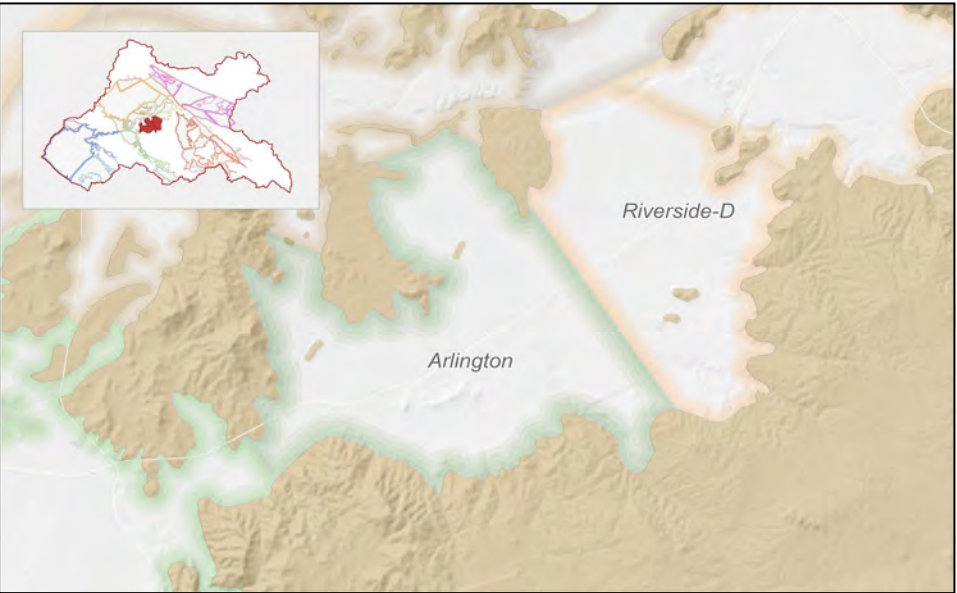
B1-1 Groundwater Storage and Elevation Contours Fall 2018

B1-2 NO₃-N Concentration and Contour Map

B1-3 TDS Concentration and Contour Map

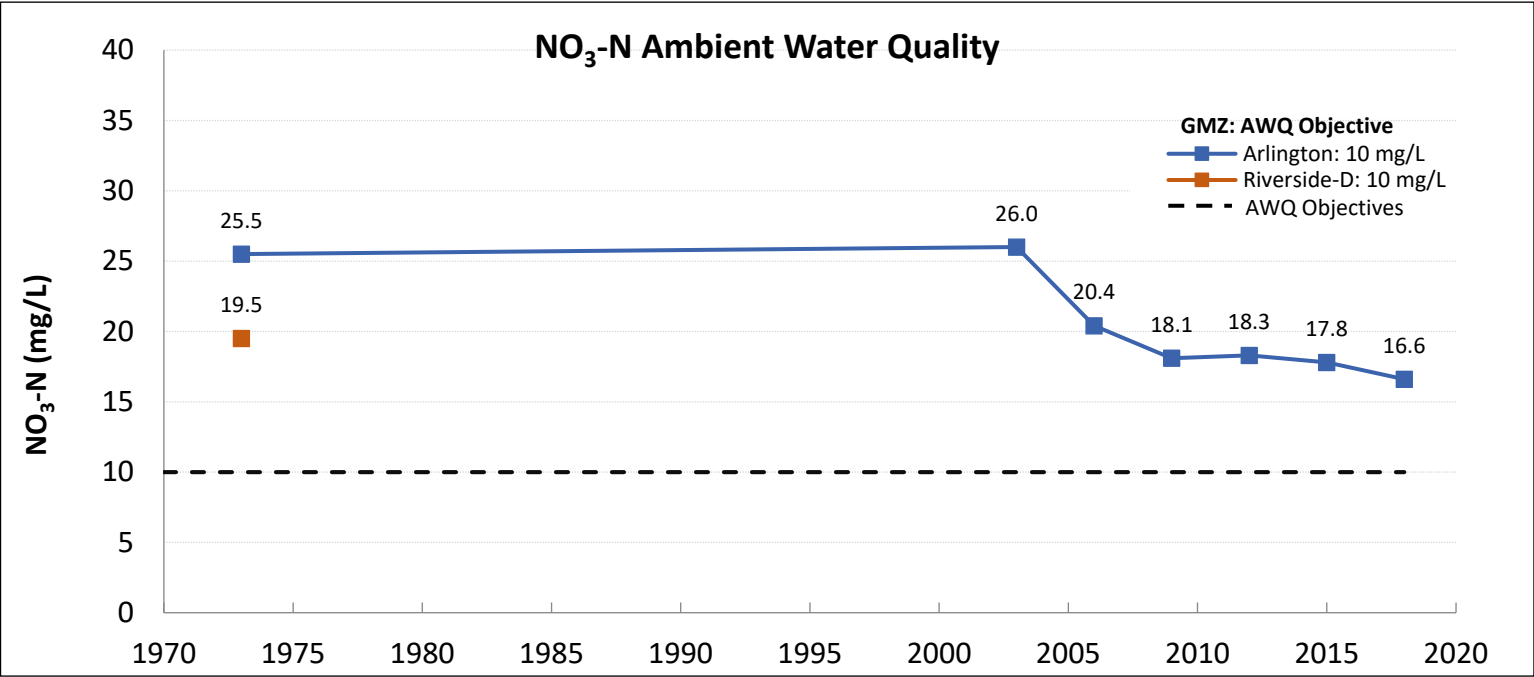
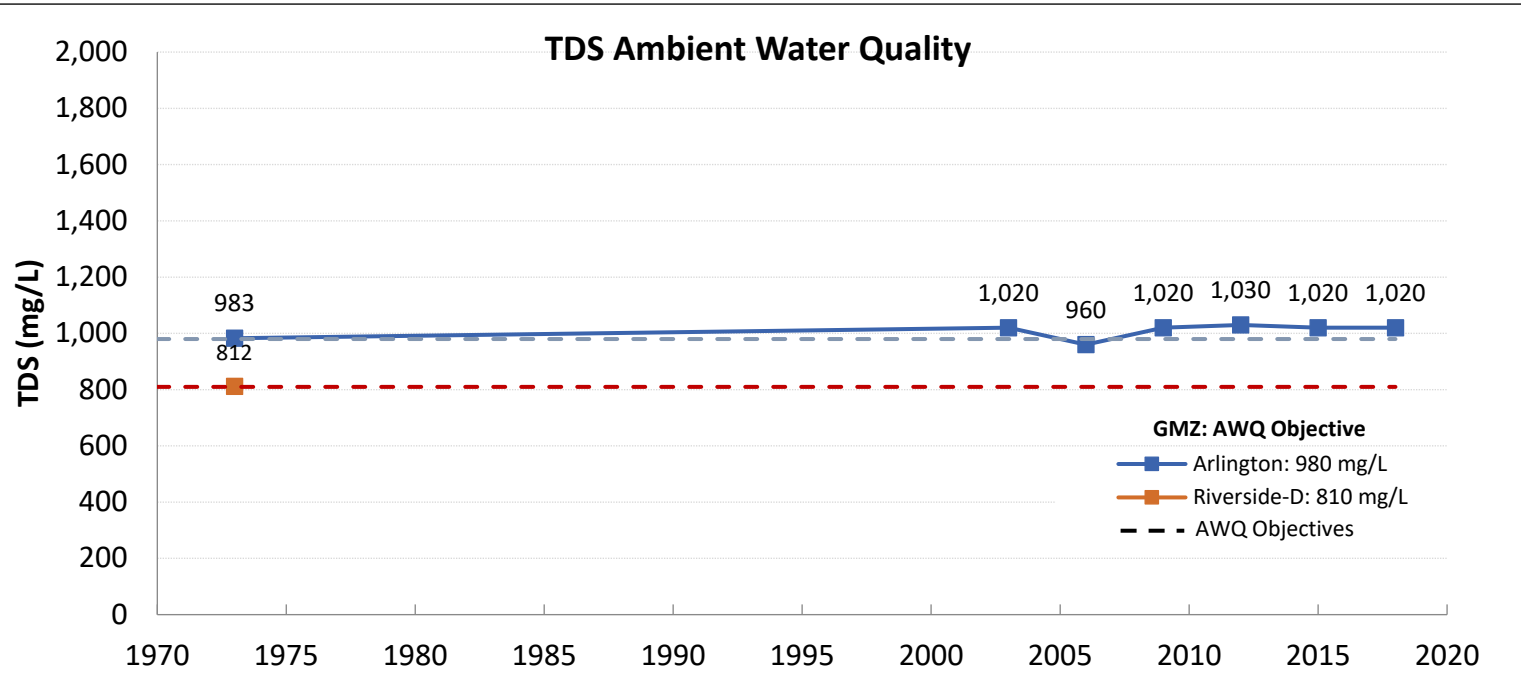
B1-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

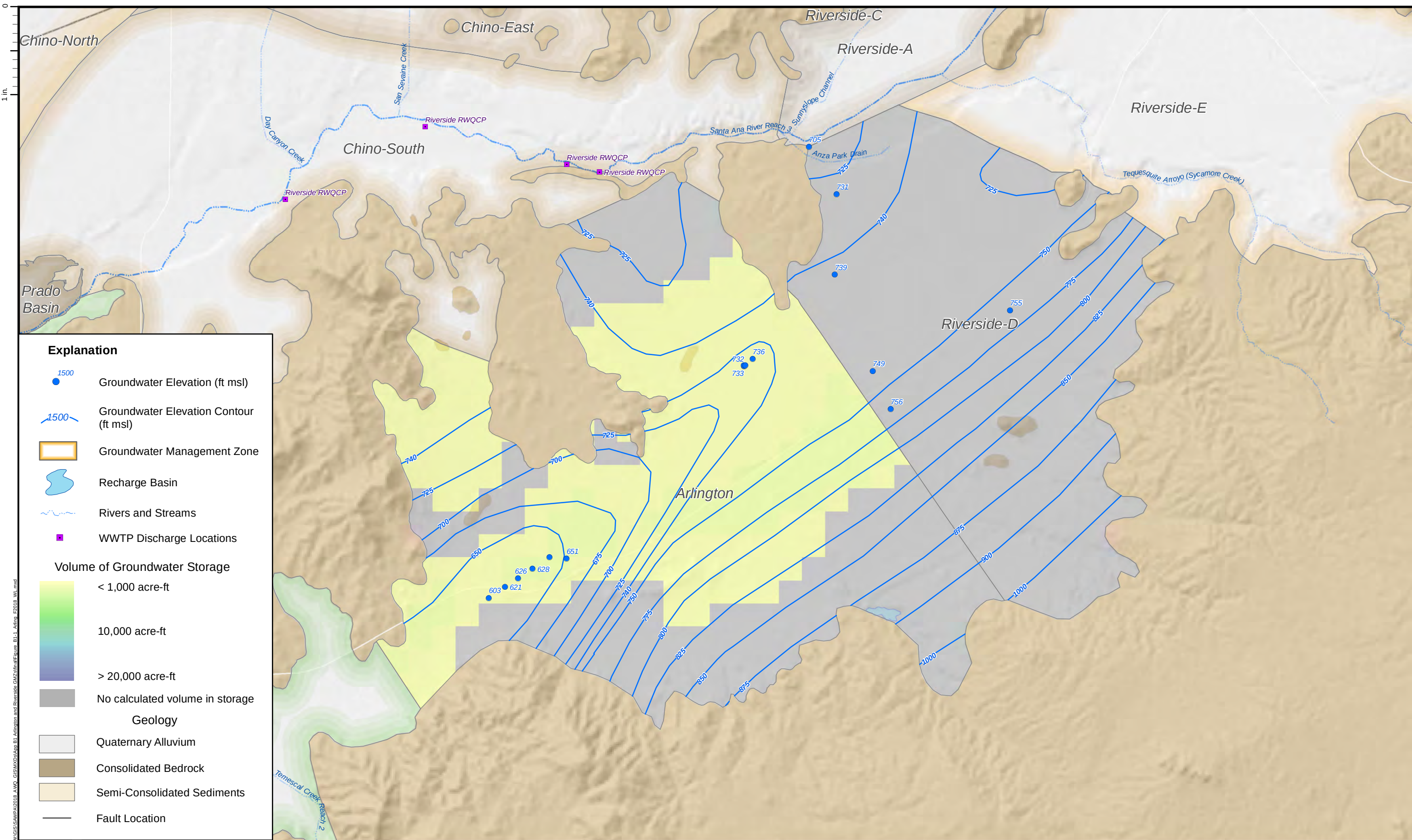
B1-5 TDS Concentration Change (1996-2015 to 1999-2018)

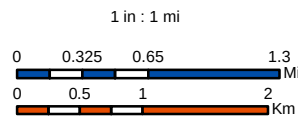
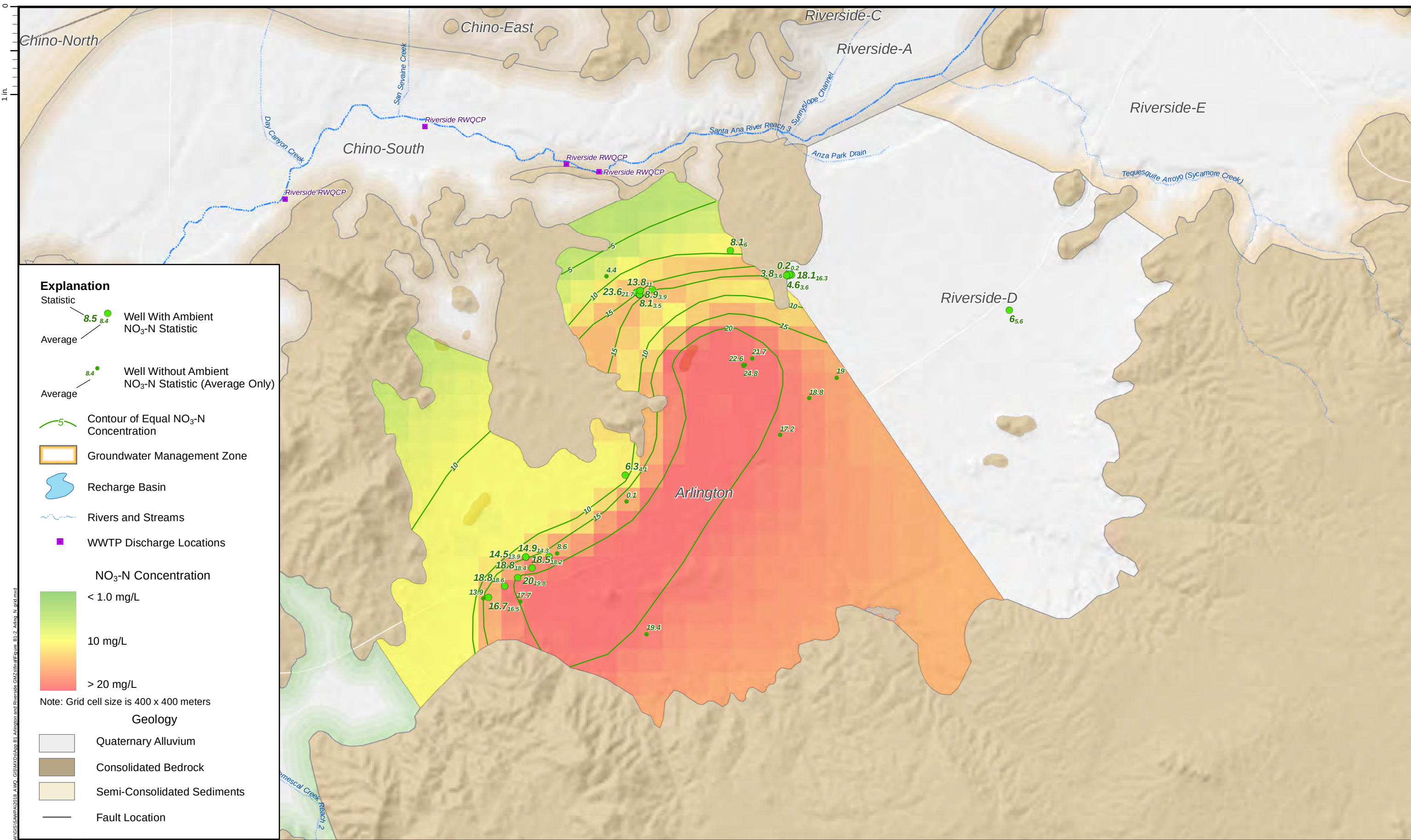


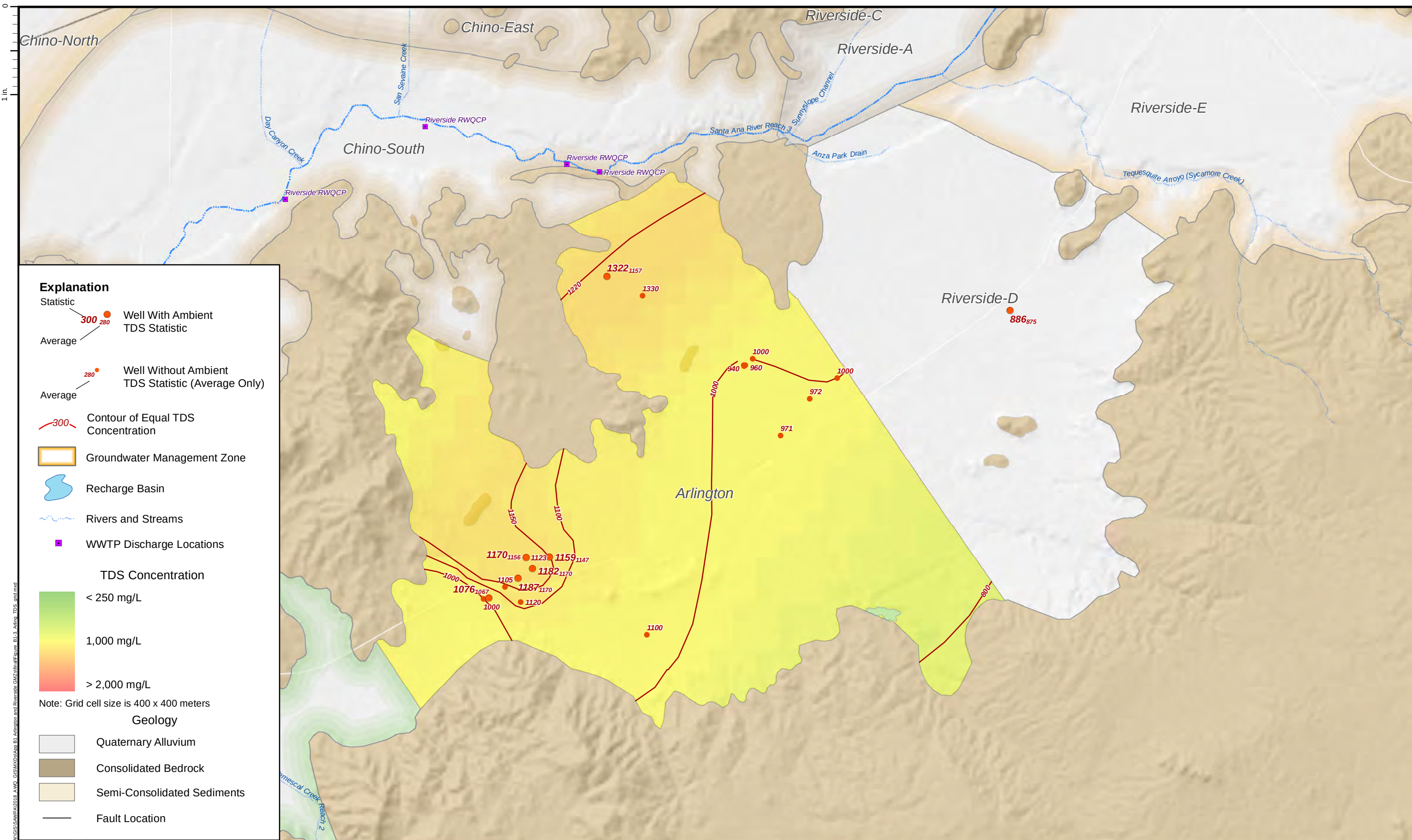
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

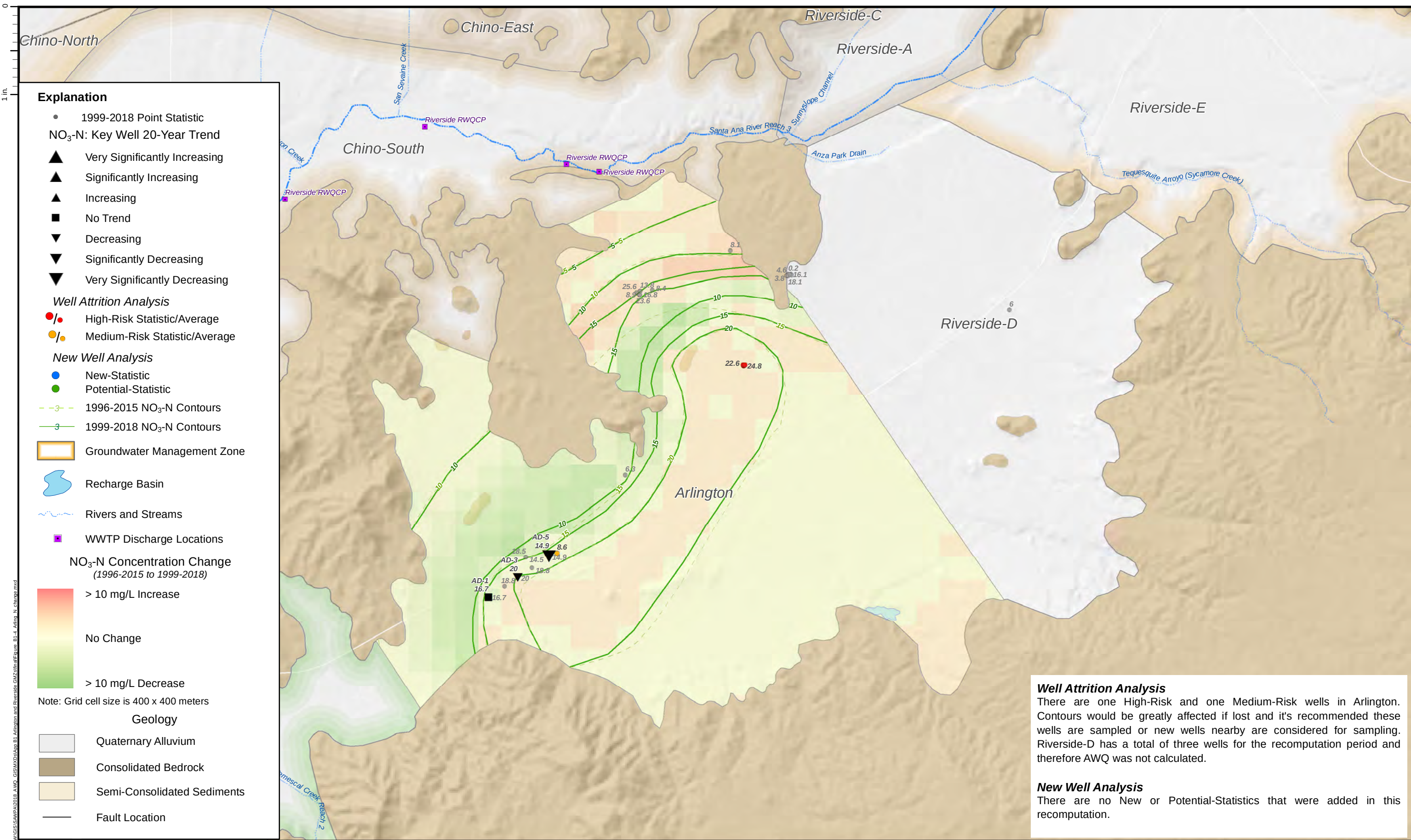
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Arlington	980	983	?	1020	960	1020	1030	1020	1020	0	None (-40)
Riverside-D	810	812	?	?	?	?	?	?	?	?	?
Nitrate as Nitrogen (mg/L)											
Arlington	10.0	25.5	?	26.0	20.4	18.1	18.3	17.8	16.6	-1.2	None (-6.6)
Riverside-D	10.0	19.5	?	?	?	?	?	?	?	?	?

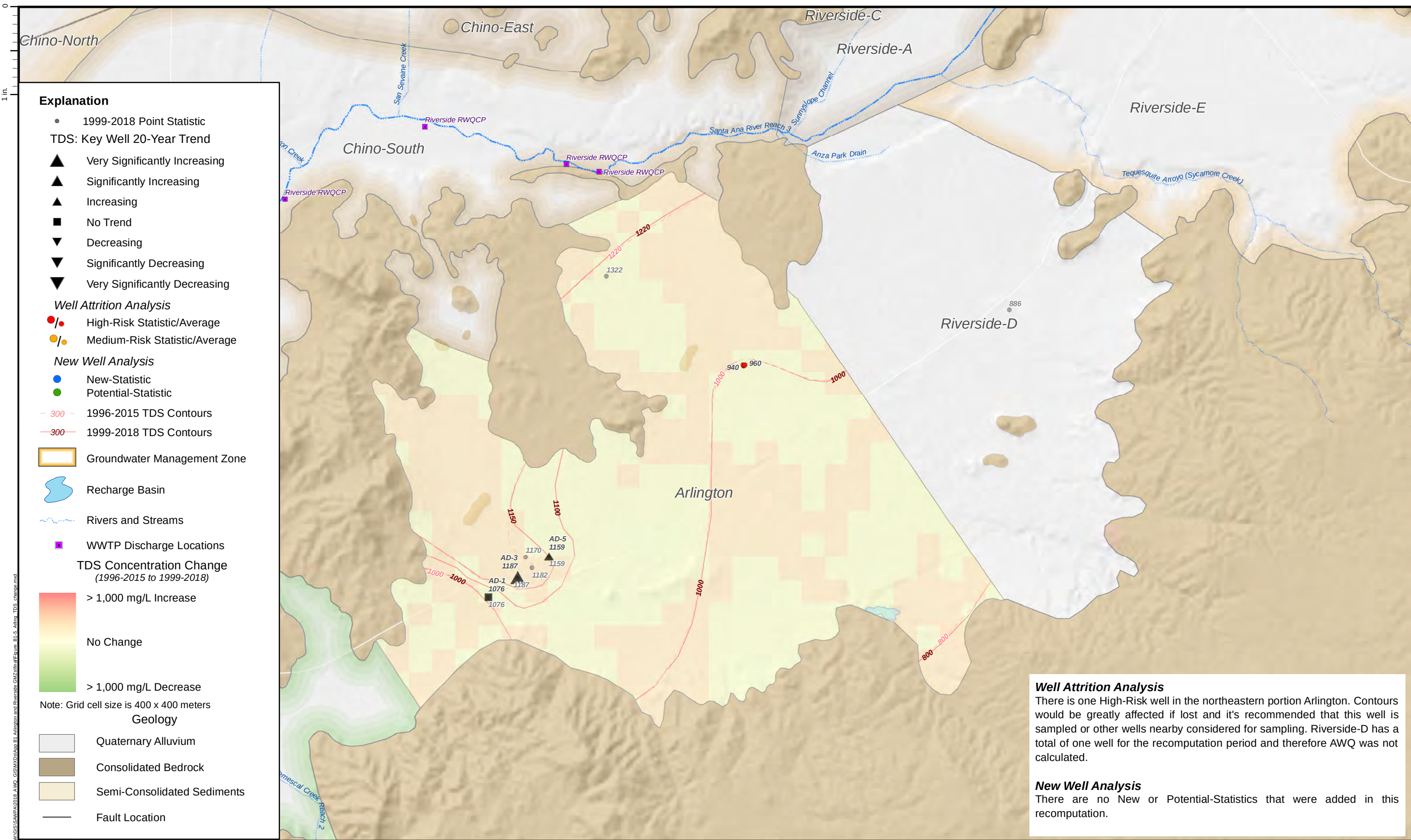












Attachment B2

Beaumont GMZ

Attachment Contents:

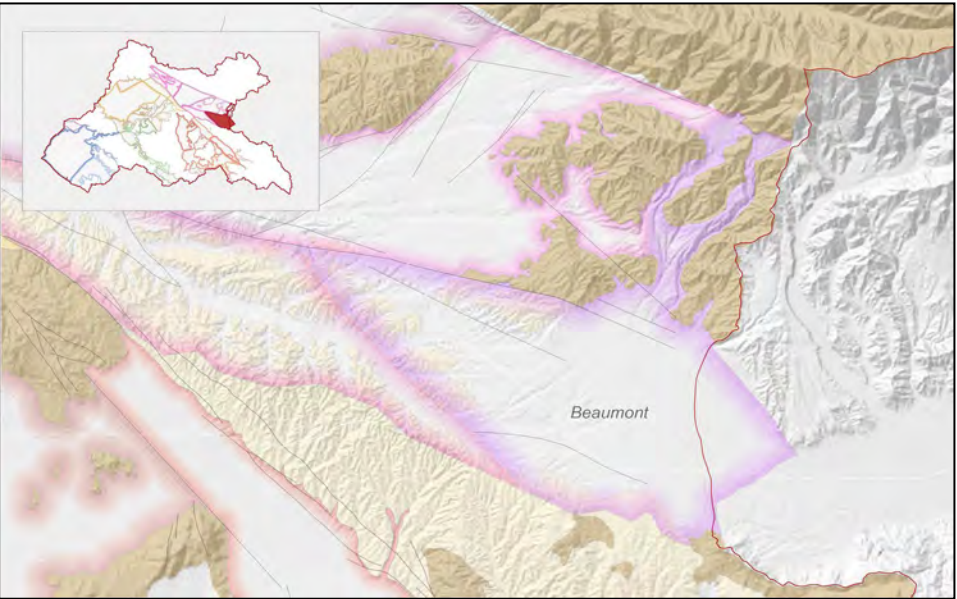
B2-1 Groundwater Storage and Elevation Contours Fall 2018

B2-2 NO₃-N Concentration and Contour Map

B2-3 TDS Concentration and Contour Map

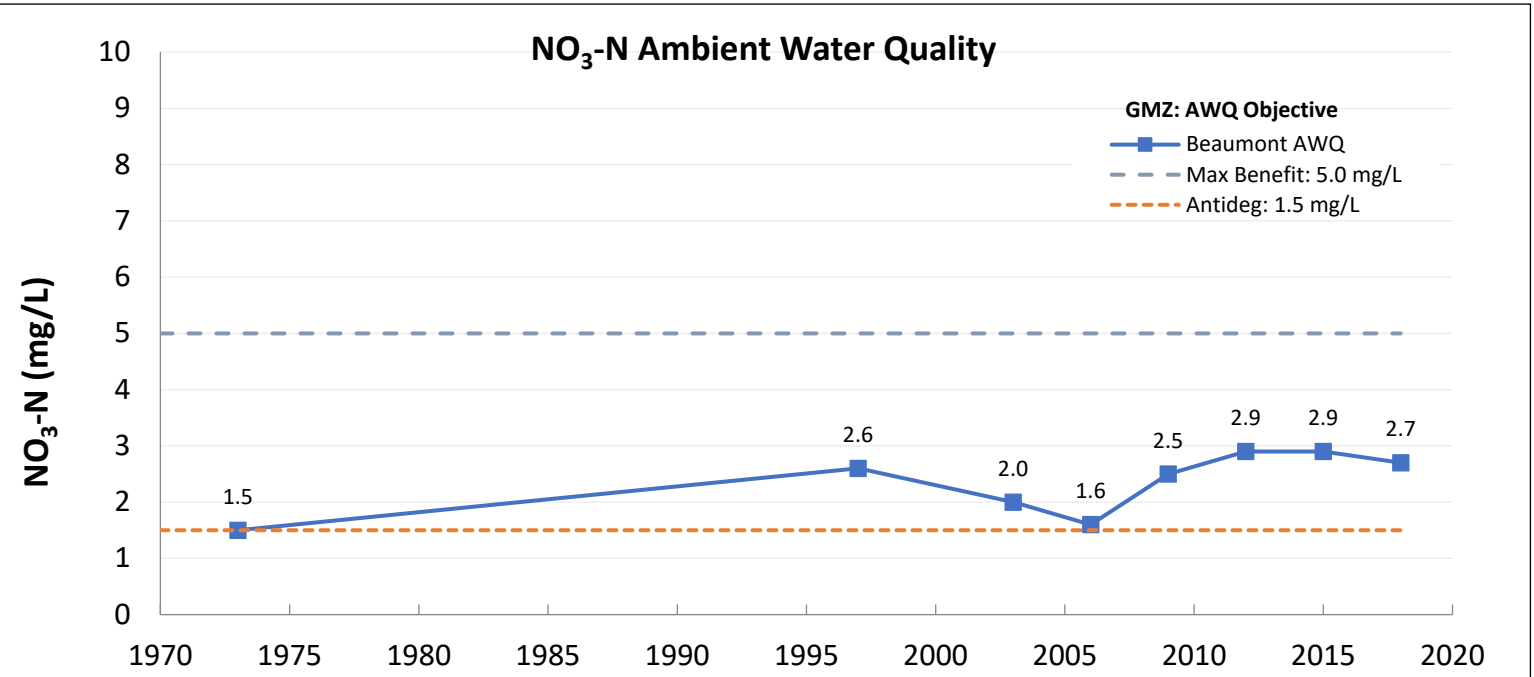
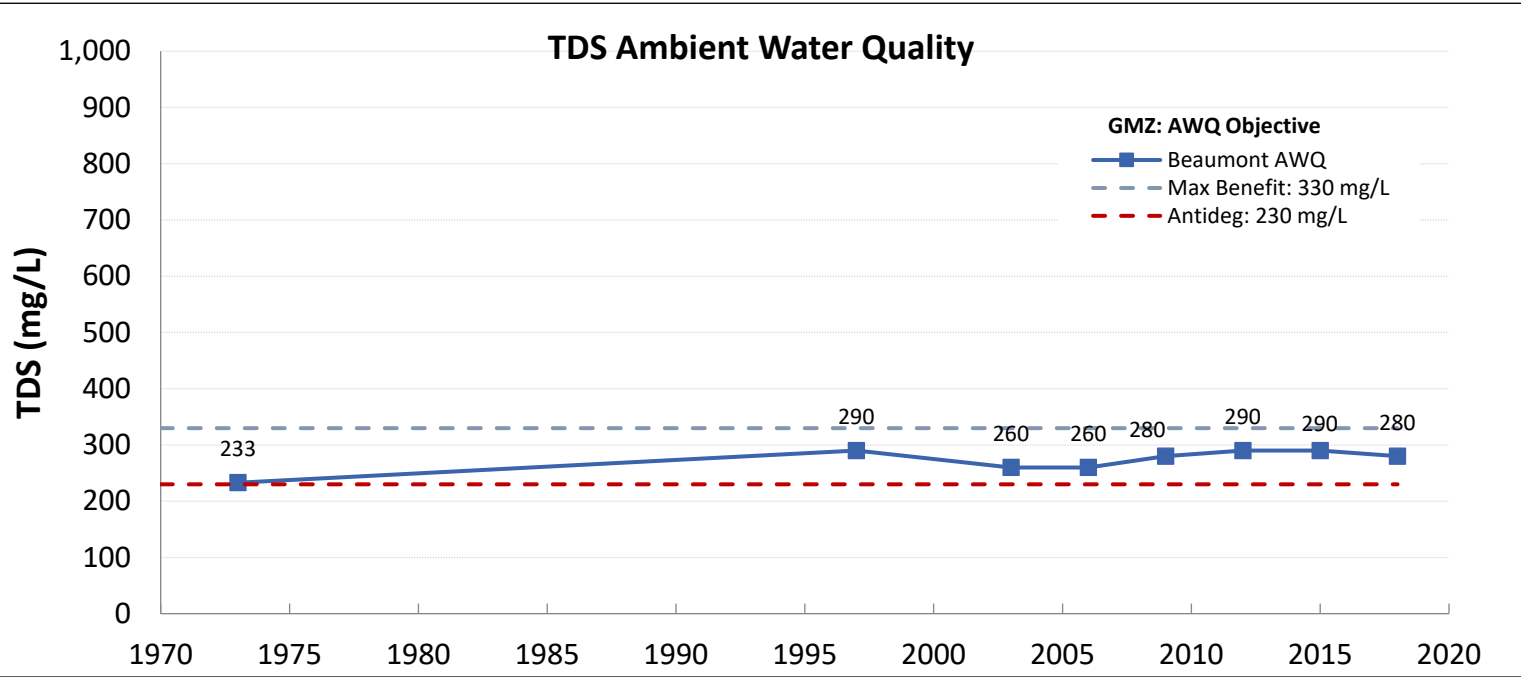
B2-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

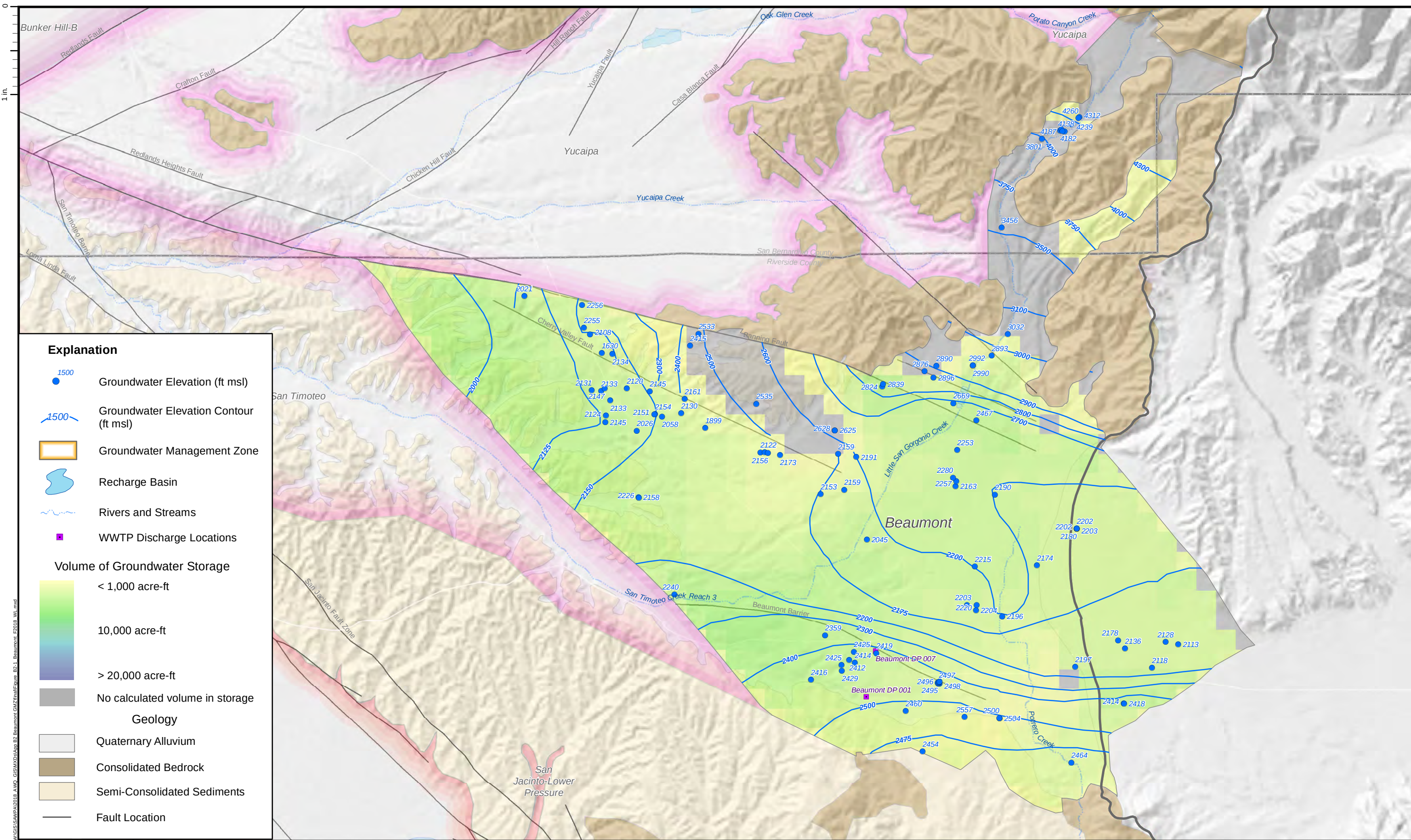
B2-5 TDS Concentration Change (1996-2015 to 1999-2018)

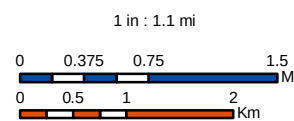
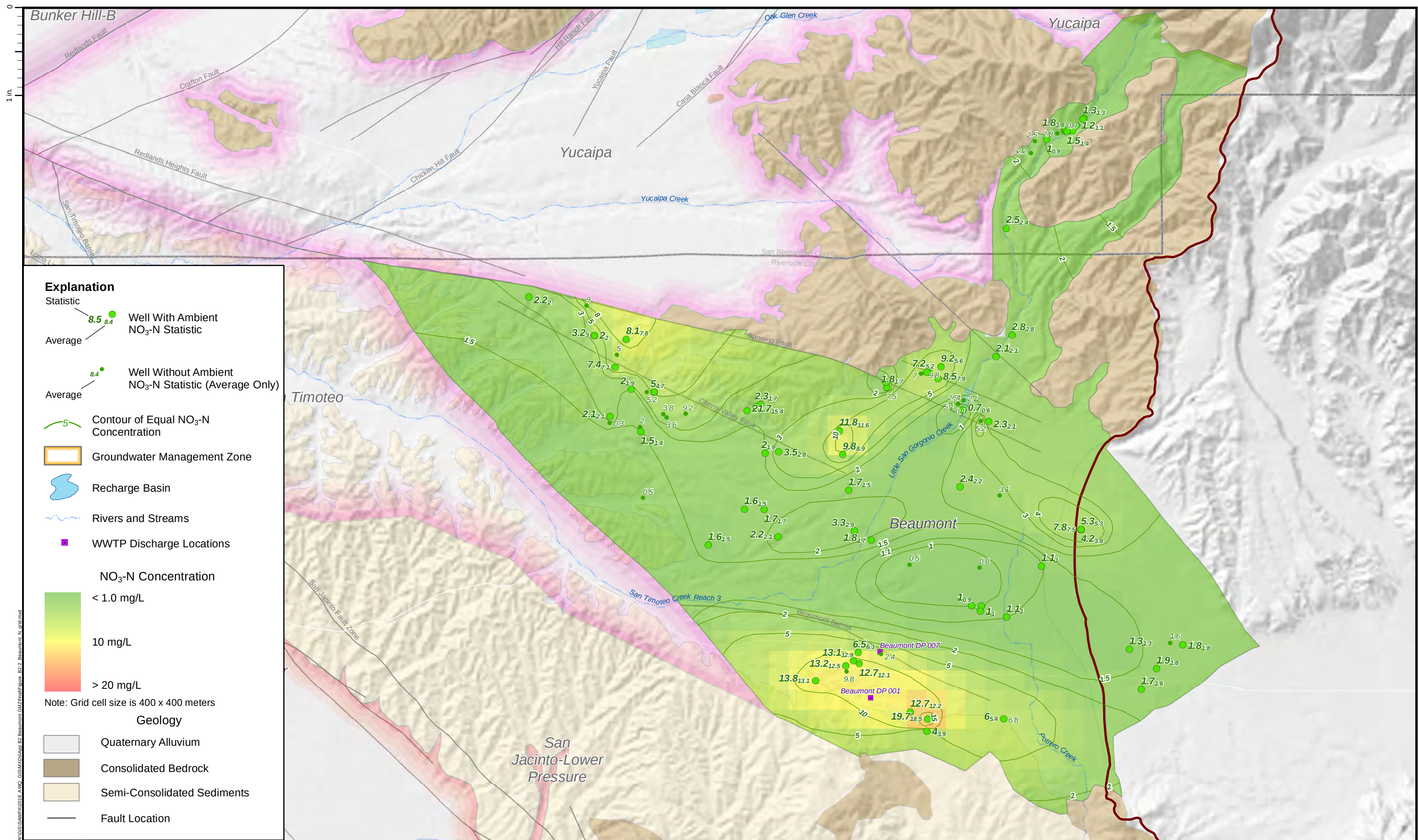


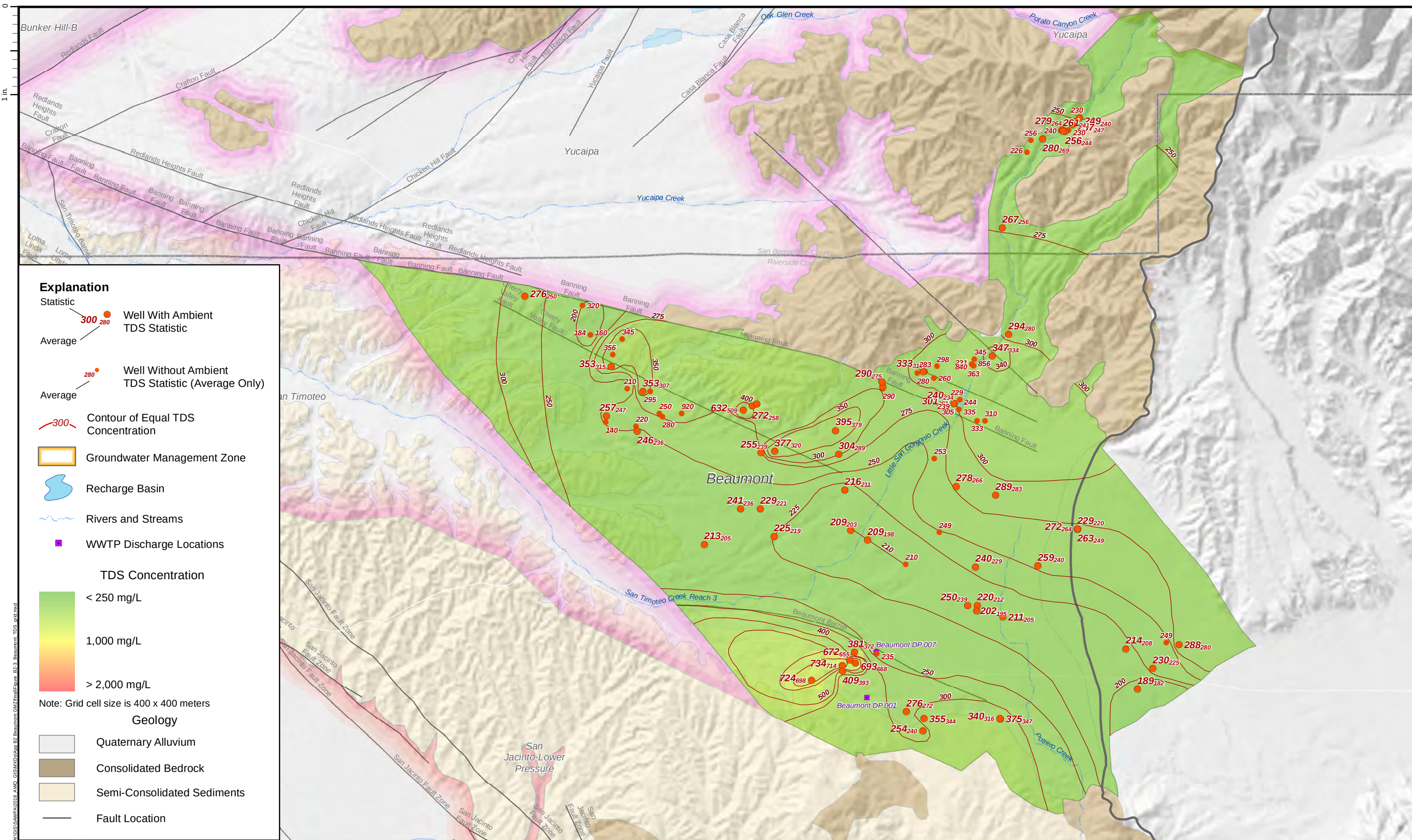
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

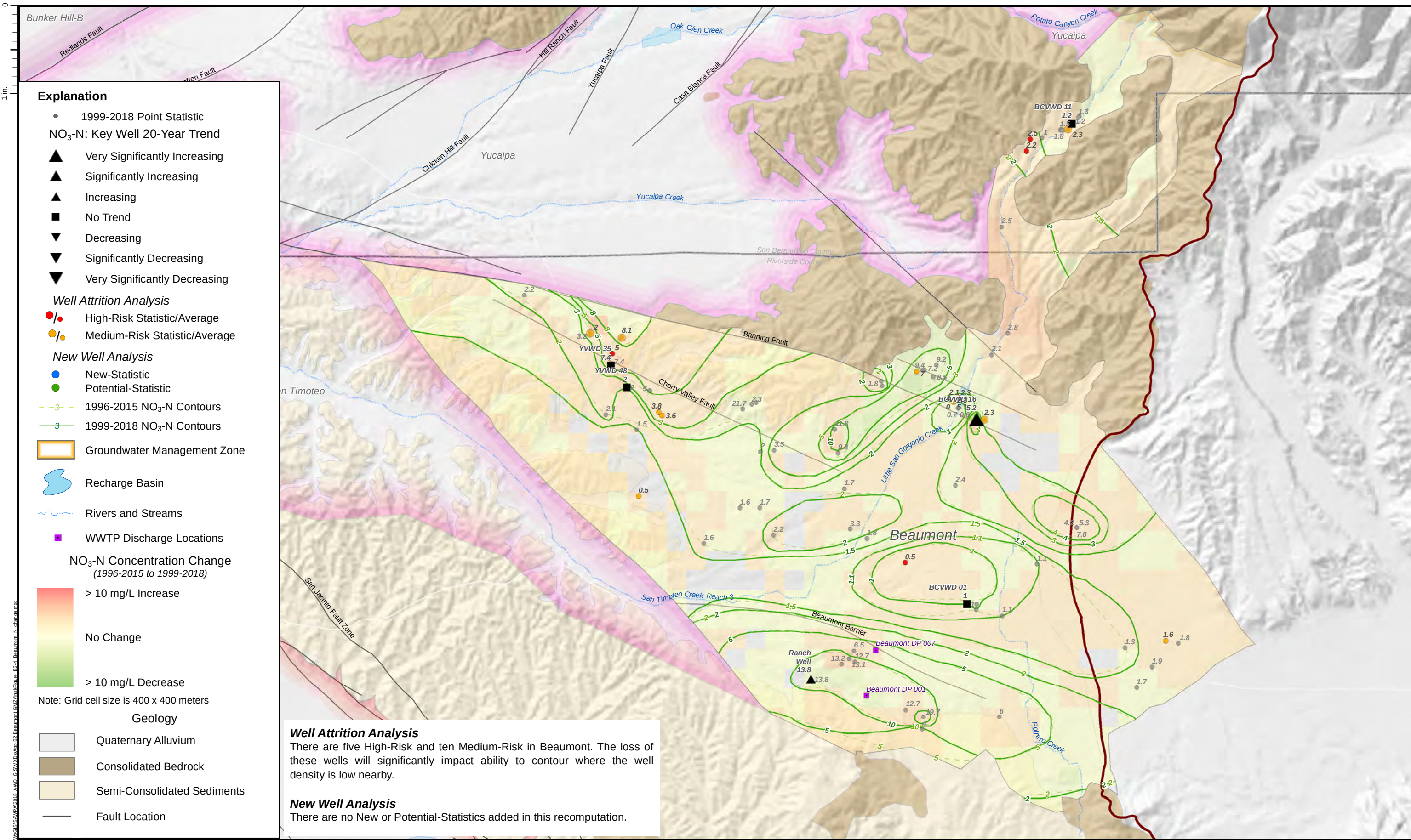
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Beaumont -- "max benefit"	330	233	290	260	260	280	290	290	280	-10	50
Beaumont -- "antideg"	230	233	290	260	260	280	290	290	280	-10	None (-50)
Nitrate as Nitrogen (mg/L)											
Beaumont -- "max benefit"	5.0	1.5	2.6	2.0	1.6	2.5	2.9	2.9	2.7	-0.2	2.3
Beaumont -- "antideg"	1.5	1.5	2.6	2.0	1.6	2.5	2.9	2.9	2.7	-0.2	None (-1.2)

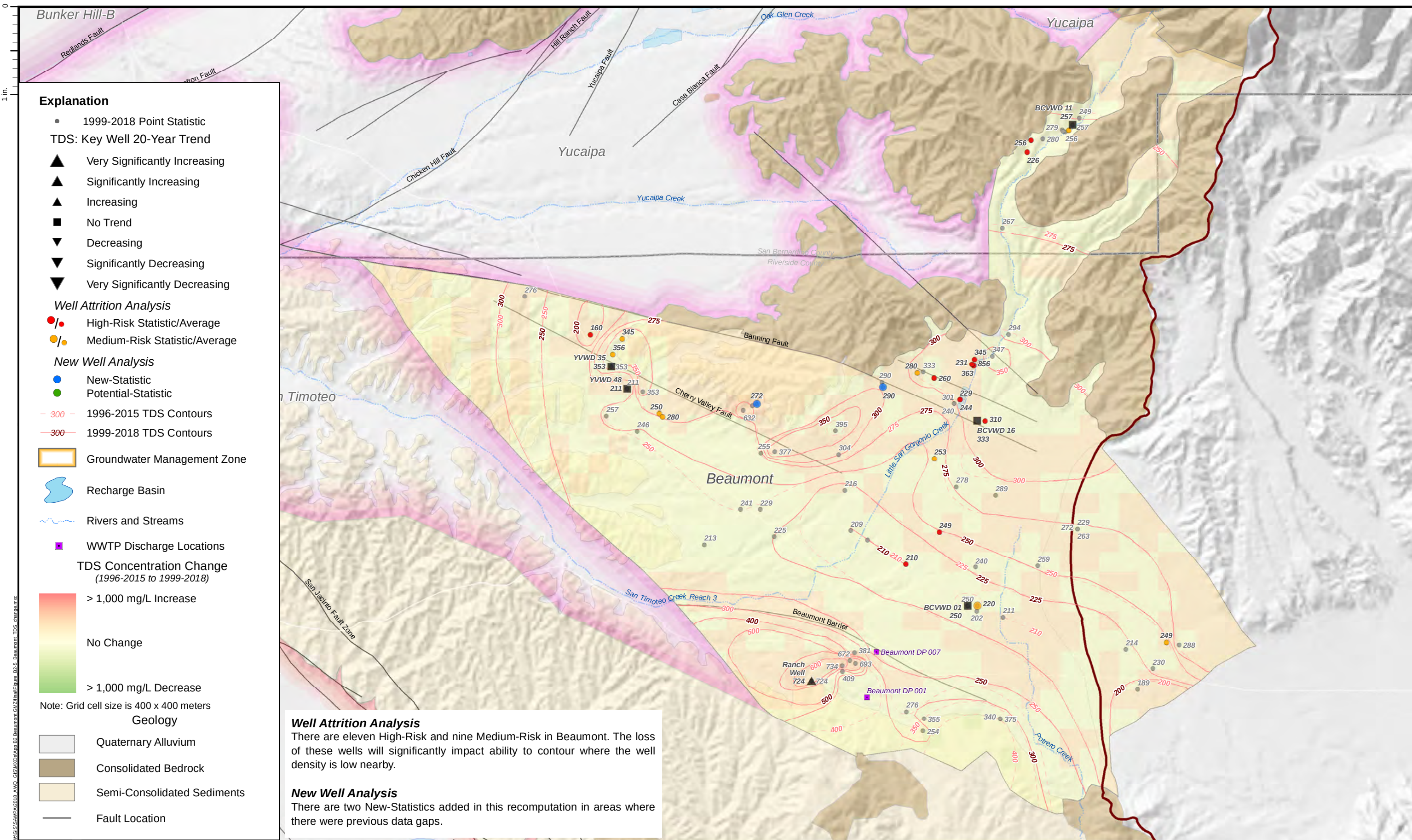












Attachment B3

Bunker Hill-A and Bunker Hill-B GMZs

Attachment Contents:

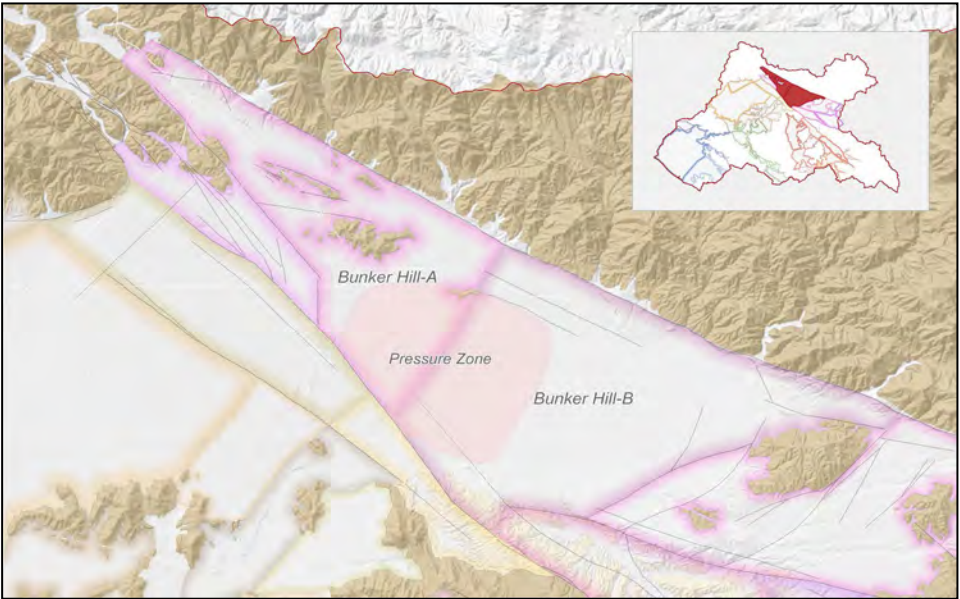
B3-1 Groundwater Storage and Elevation Contours Fall 2018

B3-2 NO₃-N Concentration and Contour Map

B3-3 TDS Concentration and Contour Map

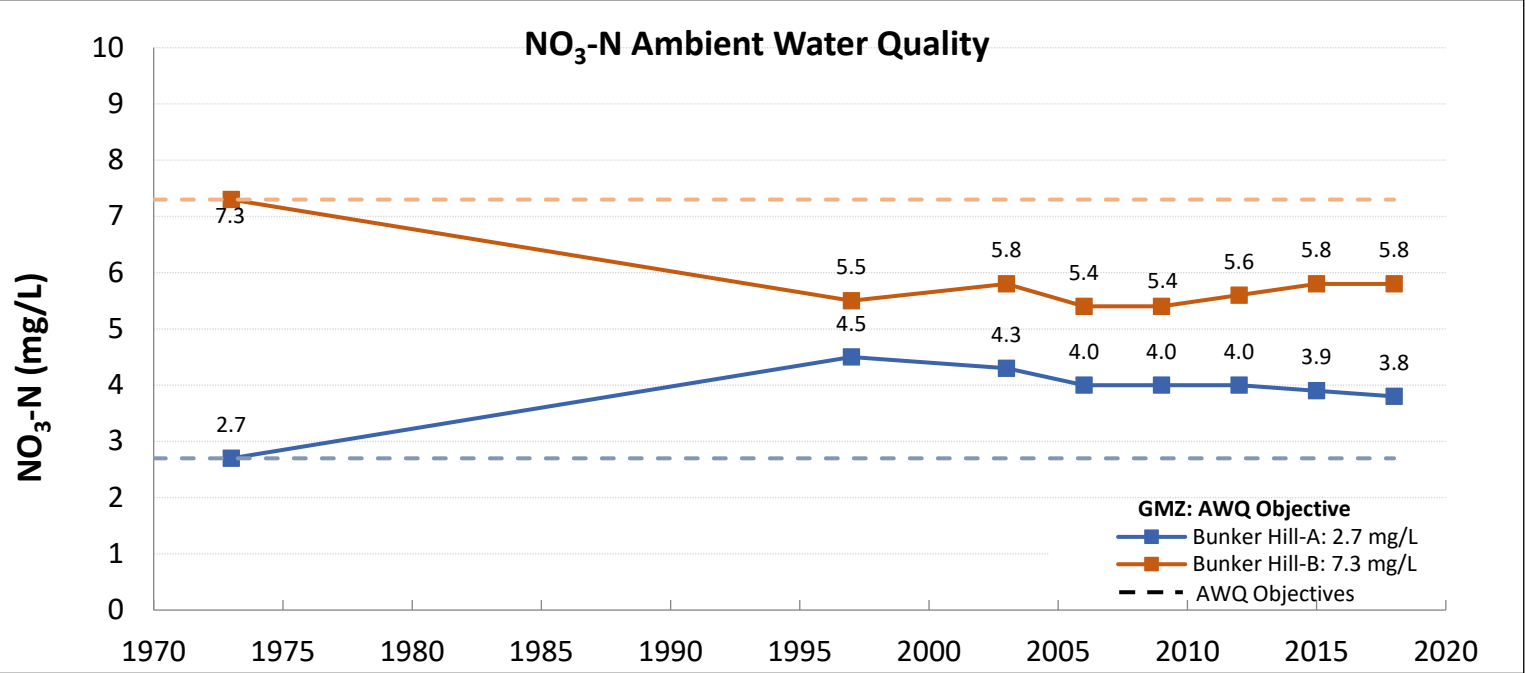
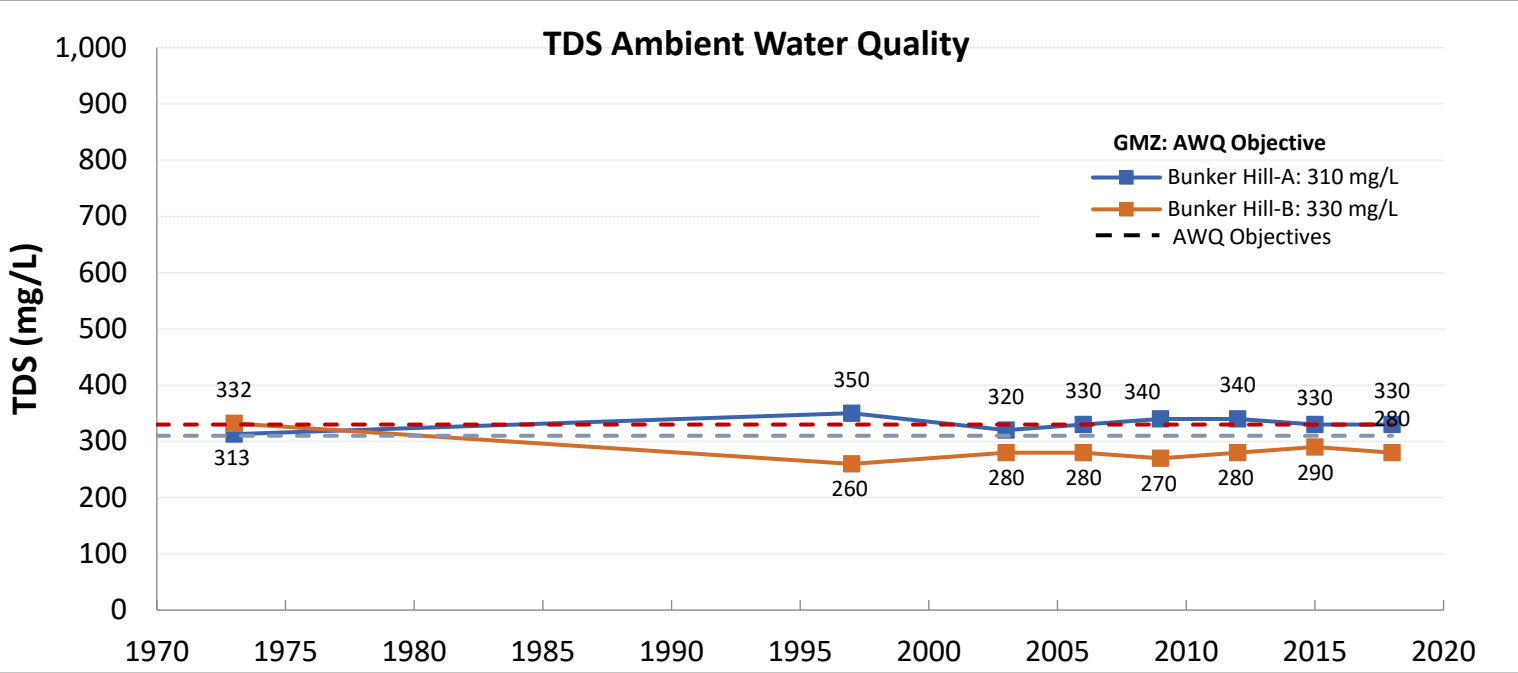
B3-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

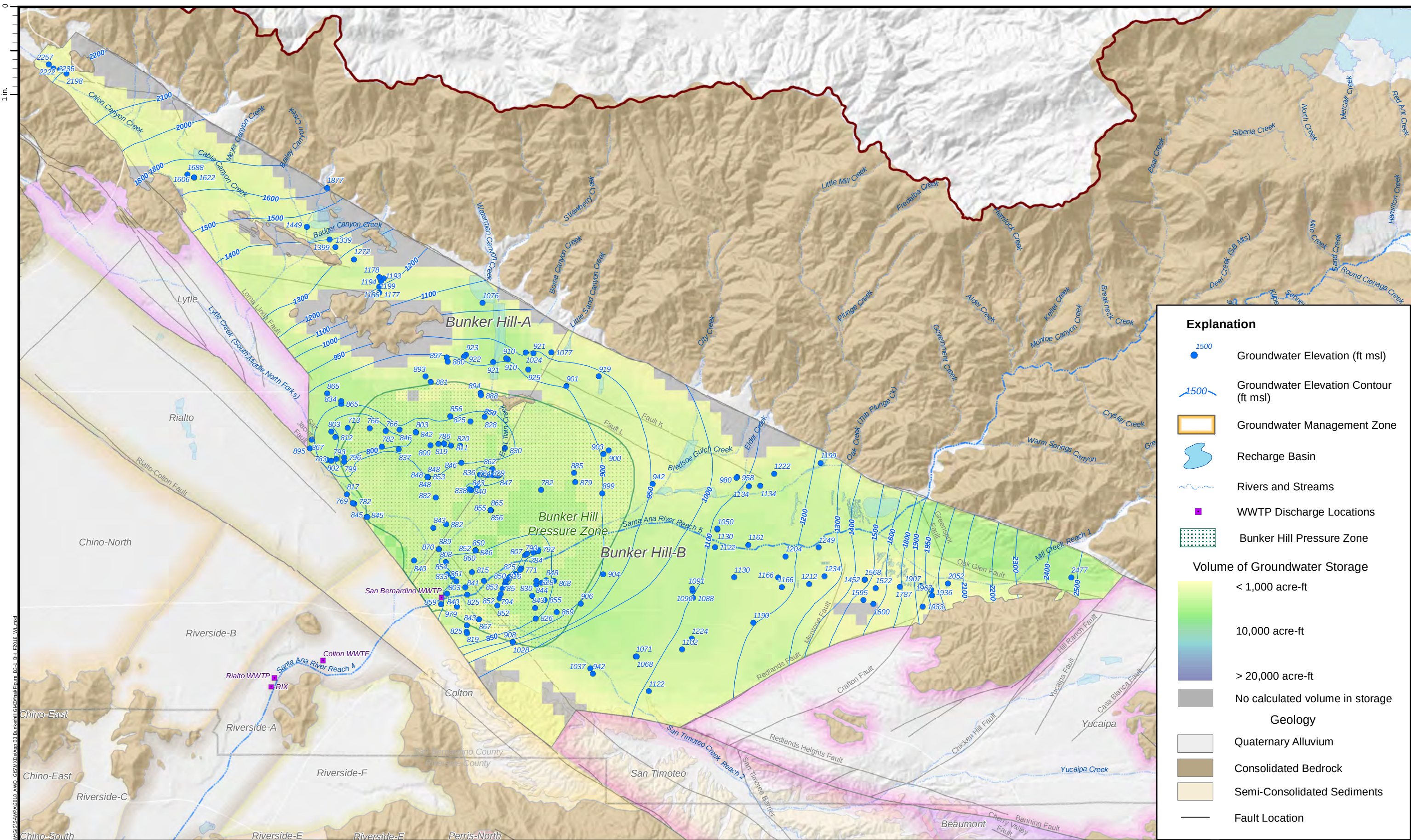
B3-5 TDS Concentration Change (1996-2015 to 1999-2018)

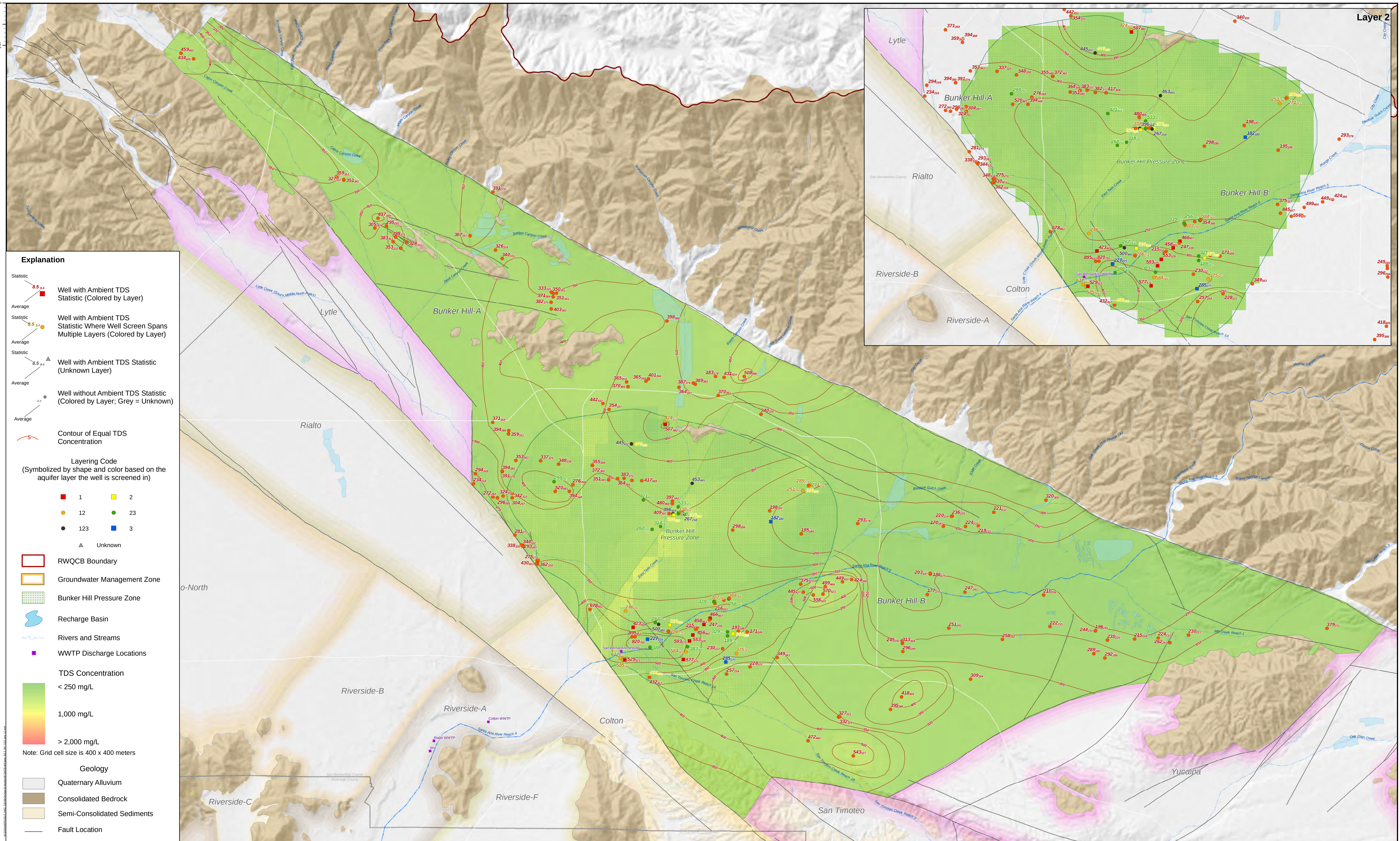


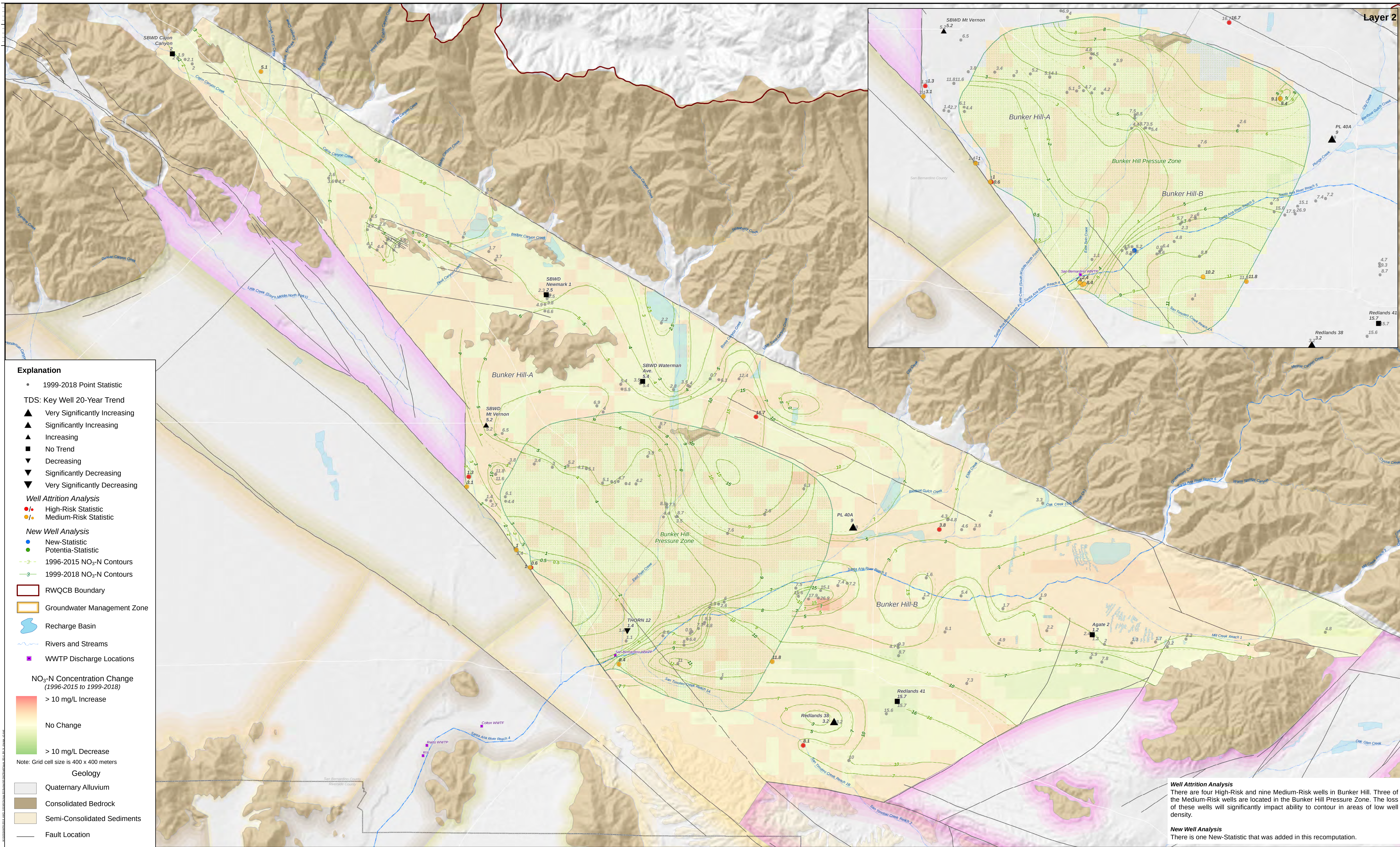
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

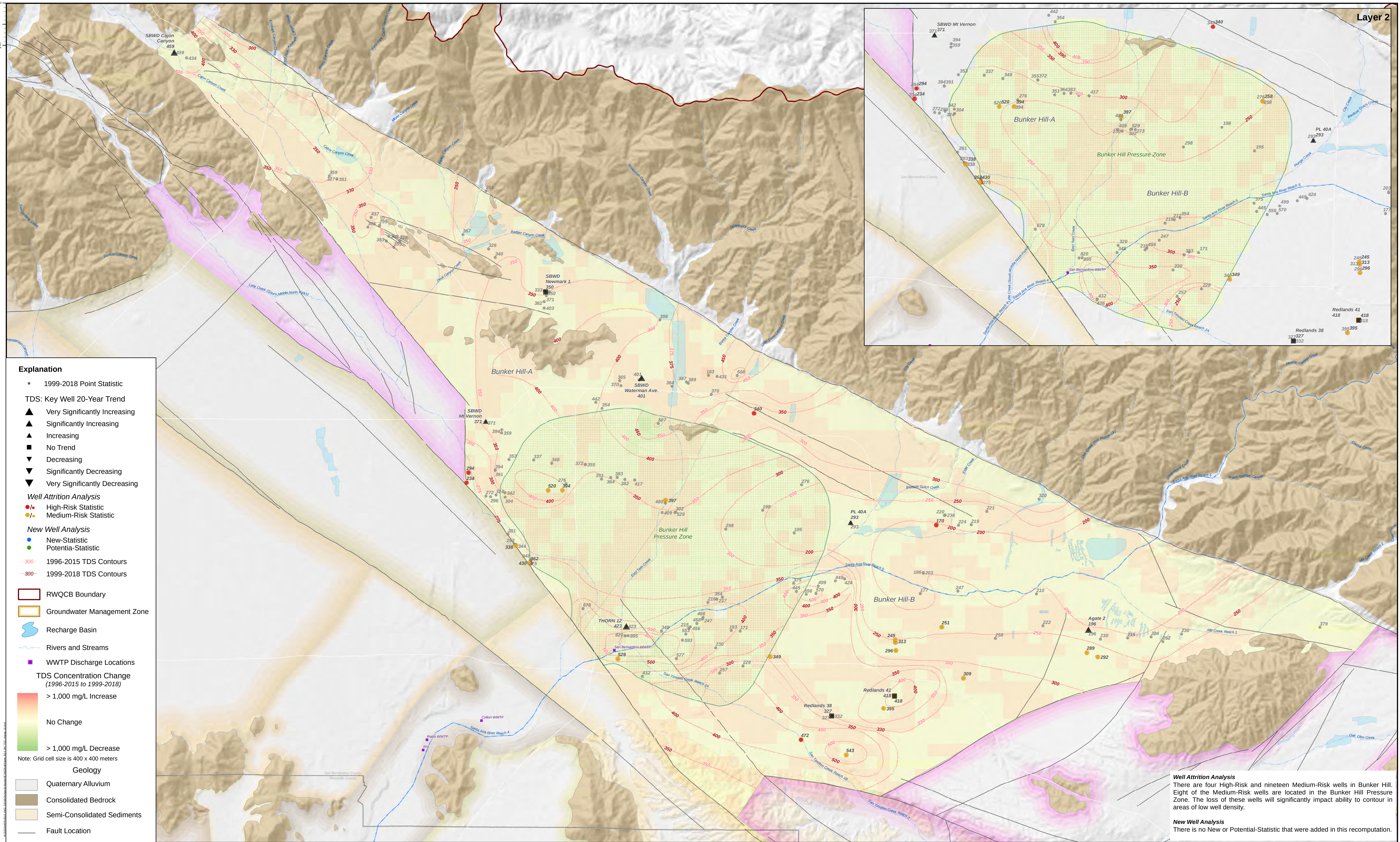
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Bunker Hill-A	310	313	350	320	330	340	340	330	330	0	None (-20)
Bunker Hill-B	330	332	260	280	280	270	280	290	280	-10	50
Nitrate as Nitrogen (mg/L)											
Bunker Hill-A	2.7	2.7	4.5	4.3	4.0	4.0	4.0	3.9	3.8	-0.1	None (-1.1)
Bunker Hill-B	7.3	7.3	5.5	5.8	5.4	5.4	5.6	5.8	5.8	0.0	1.5











Attachment B4

Canyon GMZ

Attachment Contents:

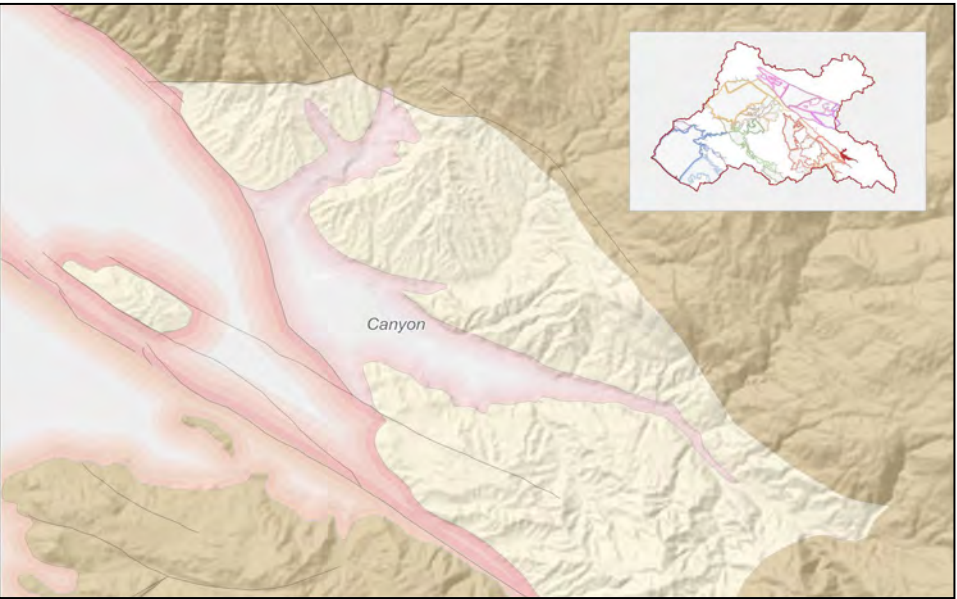
B4-1 Groundwater Storage and Elevation Contours Fall 2018

B4-2 NO₃-N Concentration and Contour Map

B4-3 TDS Concentration and Contour Map

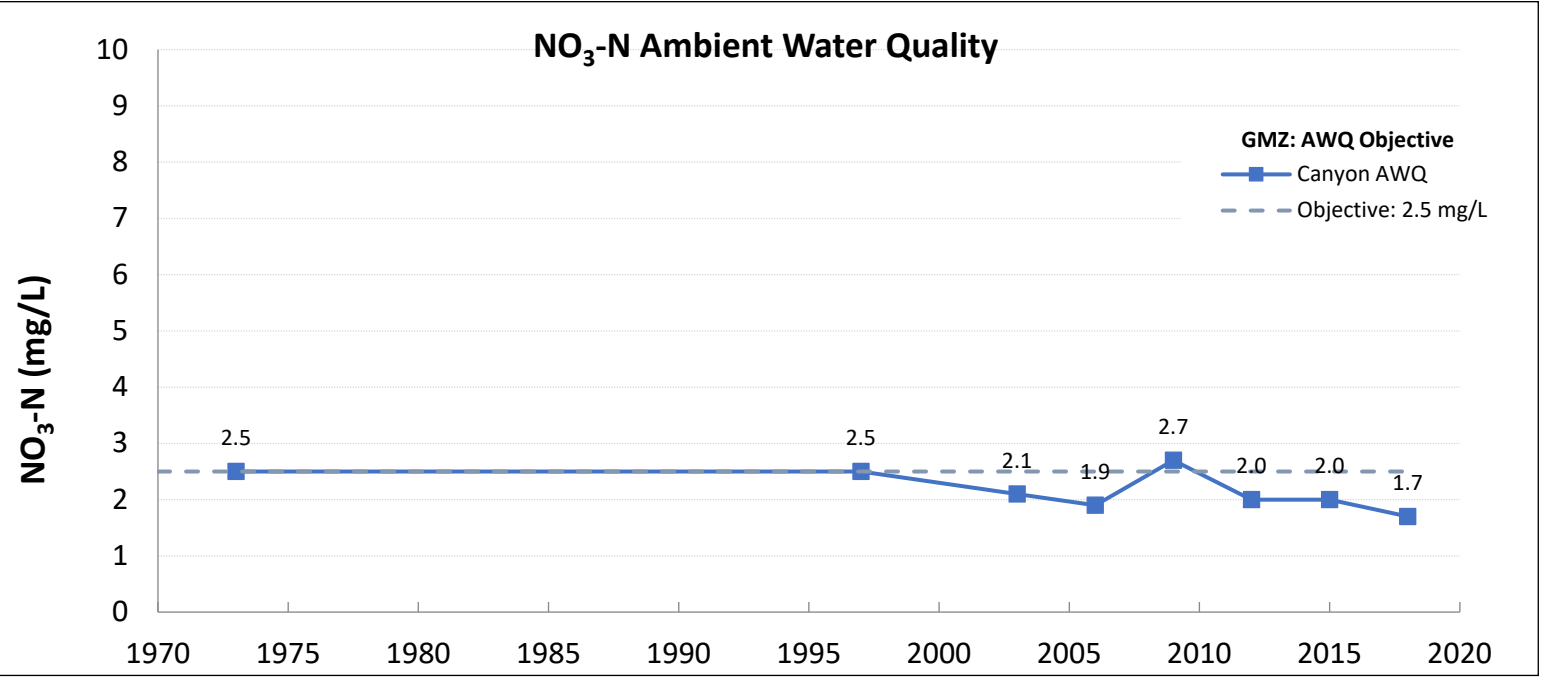
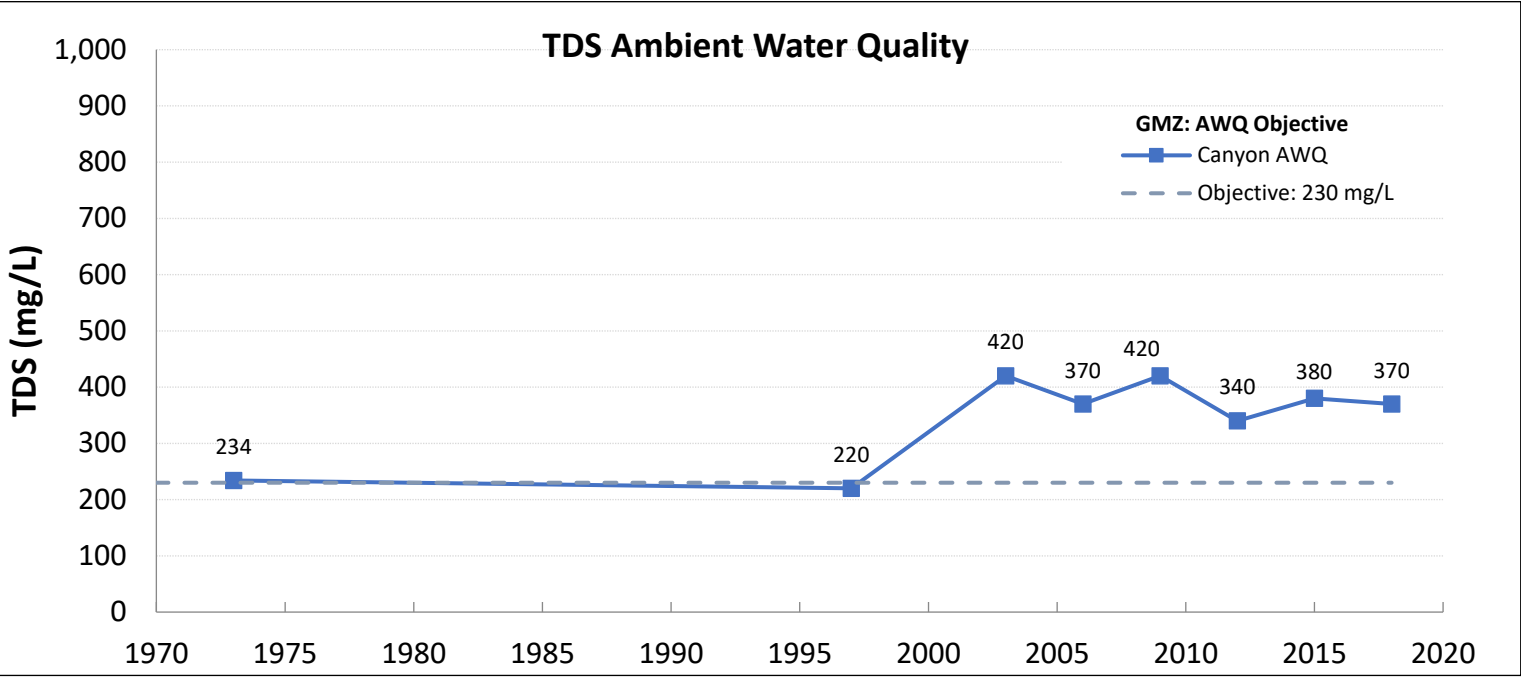
B4-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

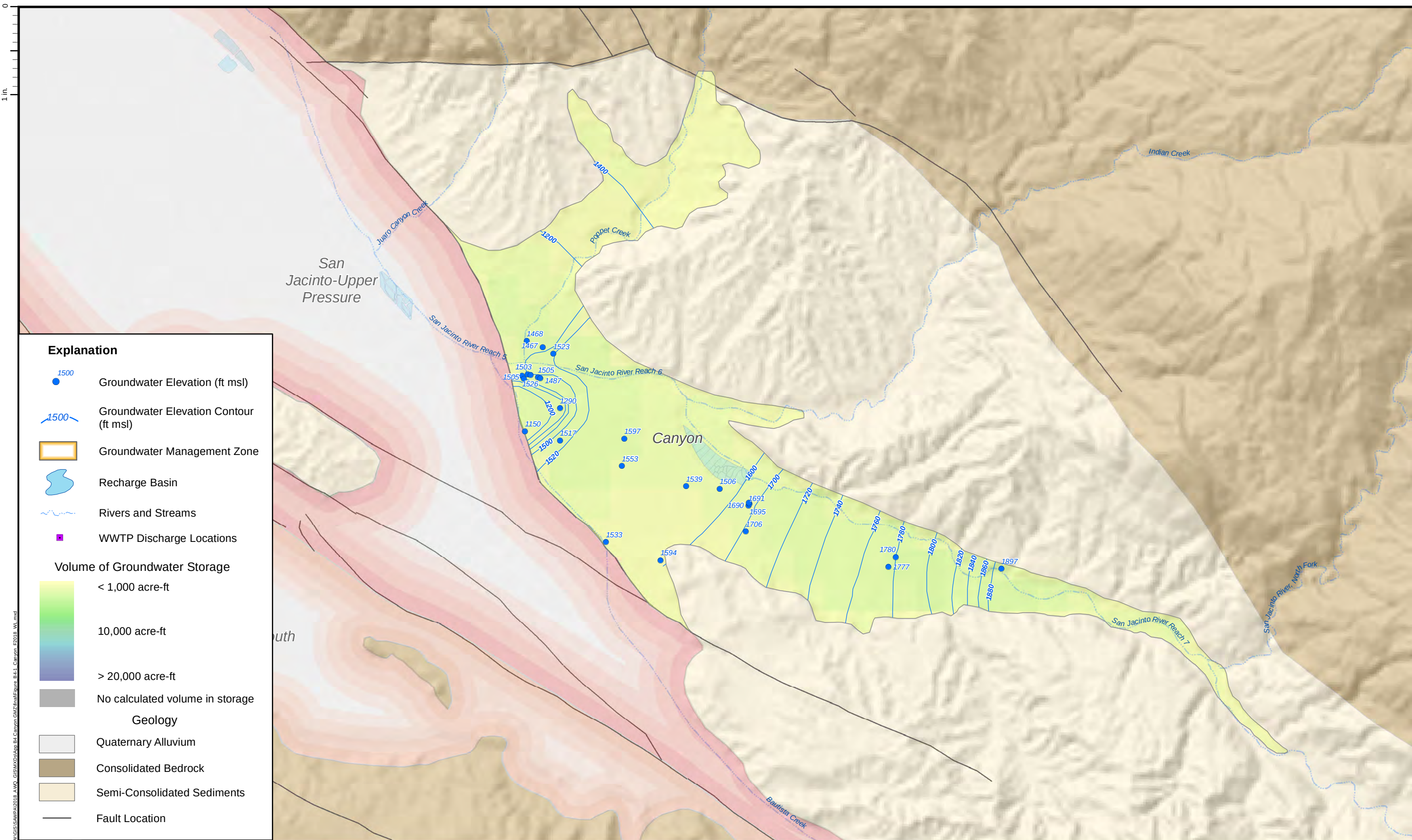
B4-5 TDS Concentration Change (1996-2015 to 1999-2018)

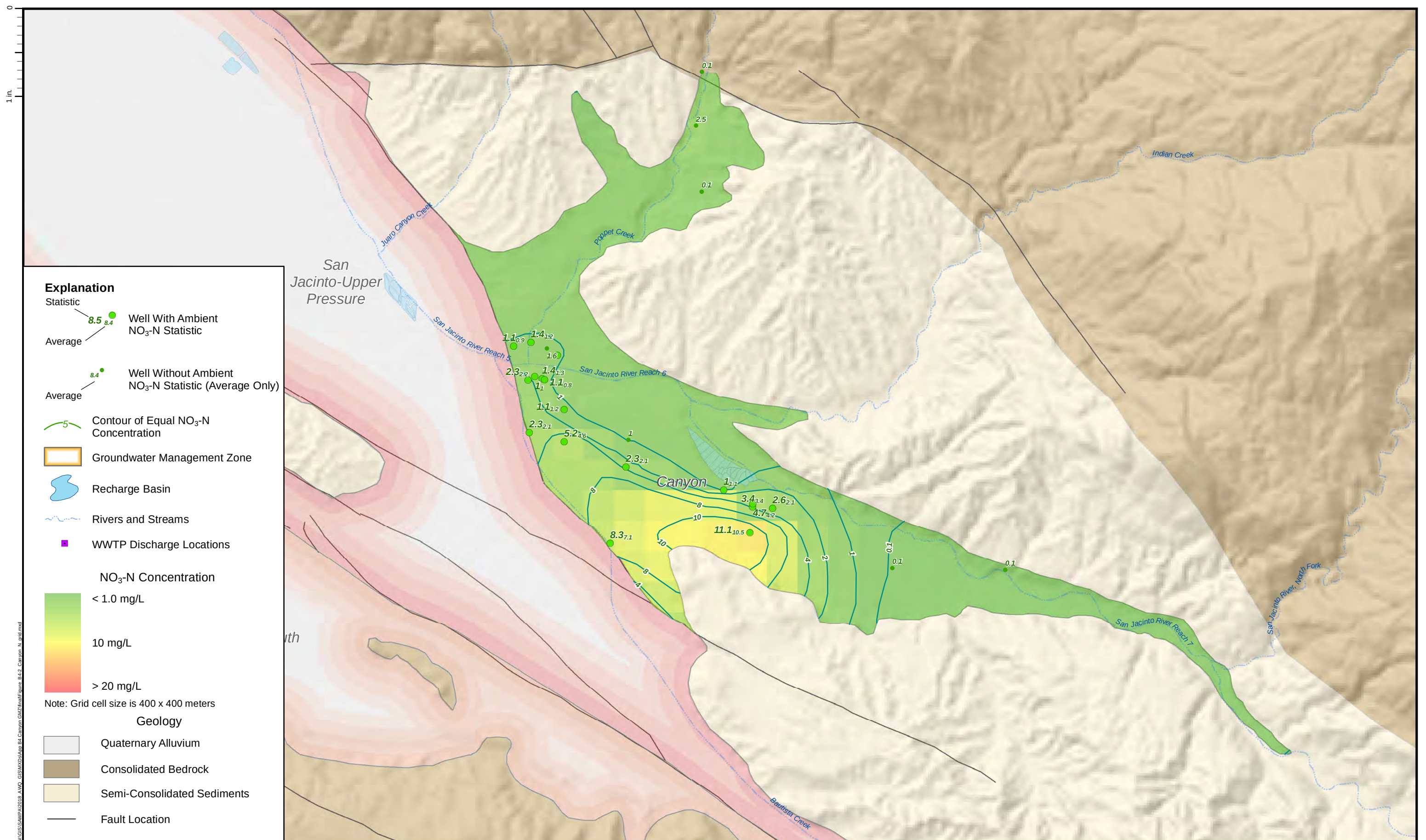


TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Canyon	230	234	220	420	370	420	340	380	370	-10	None (-140)
Nitrate as Nitrogen (mg/L)											
Canyon	2.5	2.5	1.6	2.1	1.9	2.7	2.0	2.0	1.7	-0.3	0.8







Prepared by:

Author: EC
Date: 3/24/2020

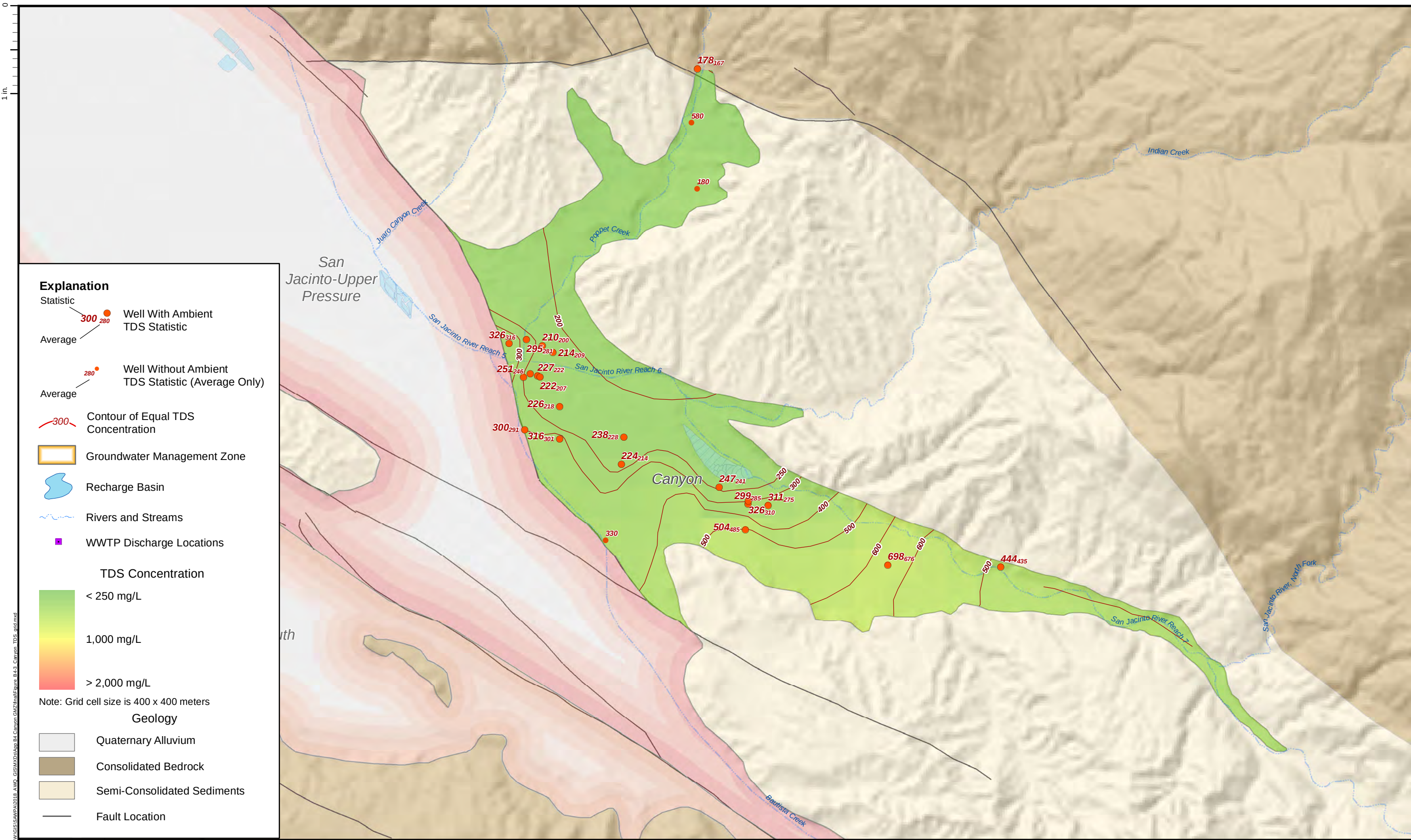
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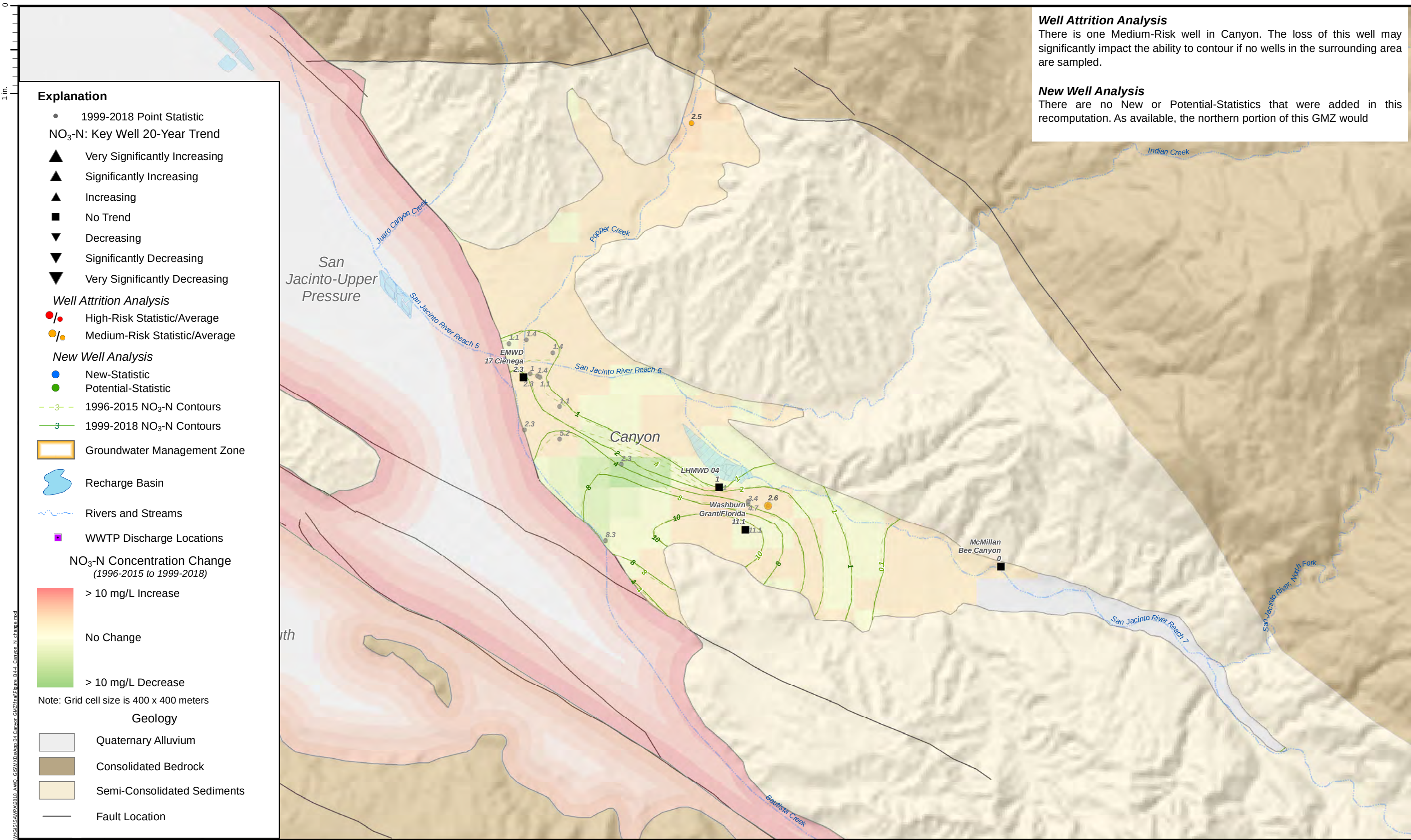
A graphic scale bar showing distances in miles and kilometers. The top bar is blue and labeled 'Mi' at the right end, with tick marks at 0, 0.225, 0.45, and 0.9. The bottom bar is orange and labeled 'Km' at the right end, with tick marks at 0, 0.375, 0.75, and 1.5.

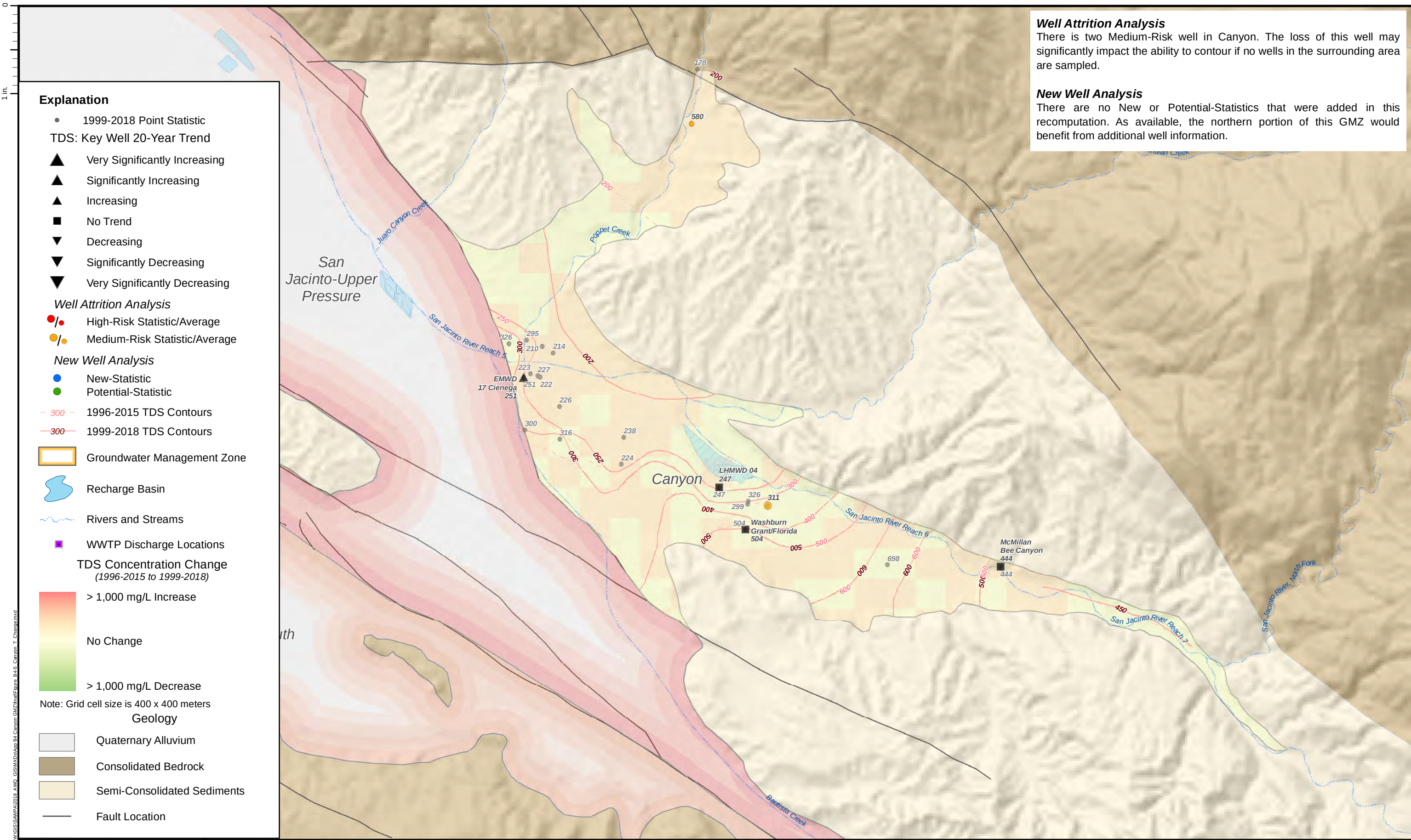
0 0.225 0.45 0.9 Mi

0 0.375 0.75 1.5 Km

SAWPA Basin Monitoring Program Task Force
Recomputation of Ambient Water Quality
for the Period 1999 to 2018







Attachment B5
Chino-North GMZ

Attachment Contents:

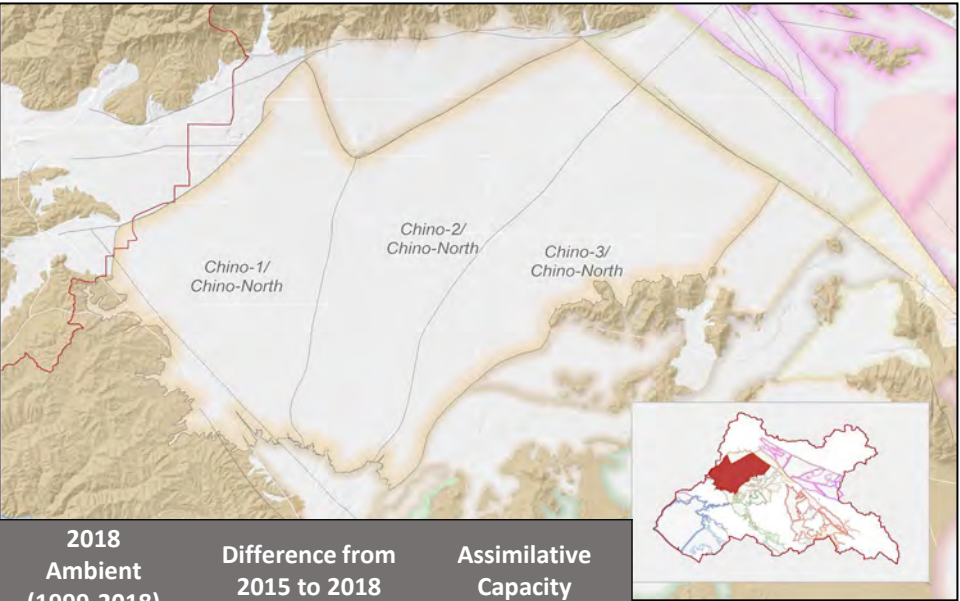
B5-1 Groundwater Storage and Elevation Contours Fall 2018

B5-2a,b,c NO₃-N Concentration and Contour Map

B5-3a,b,c TDS Concentration and Contour Map

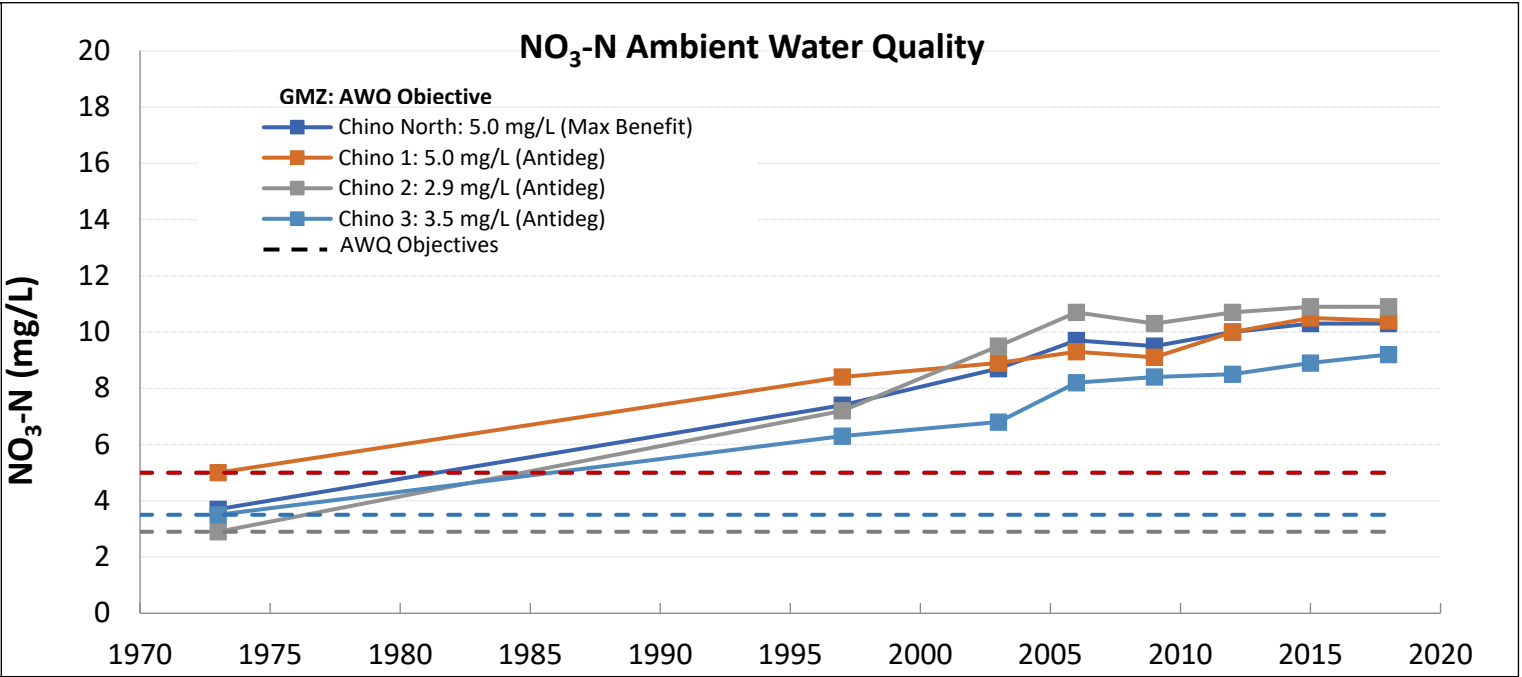
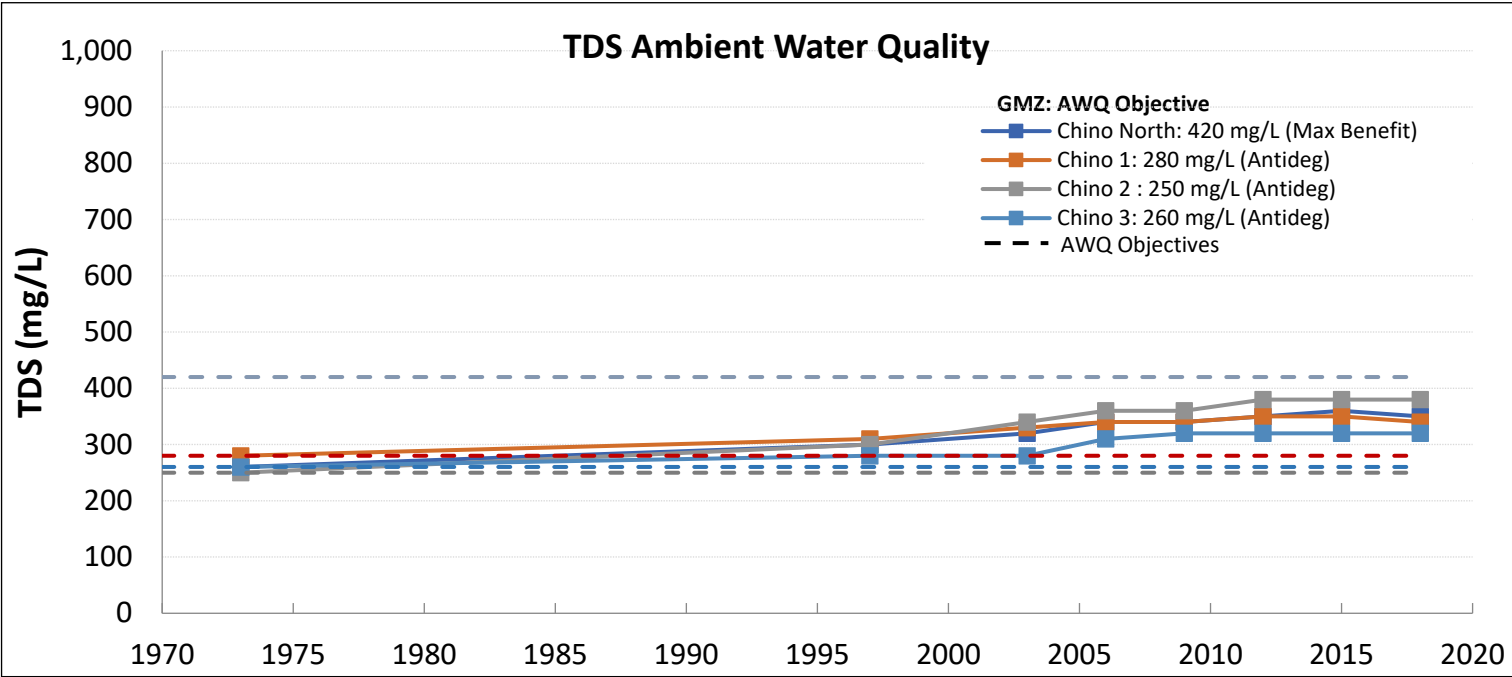
B5-4a,b,c NO₃-N Concentration Change (1996-2015 to 1999-2018)

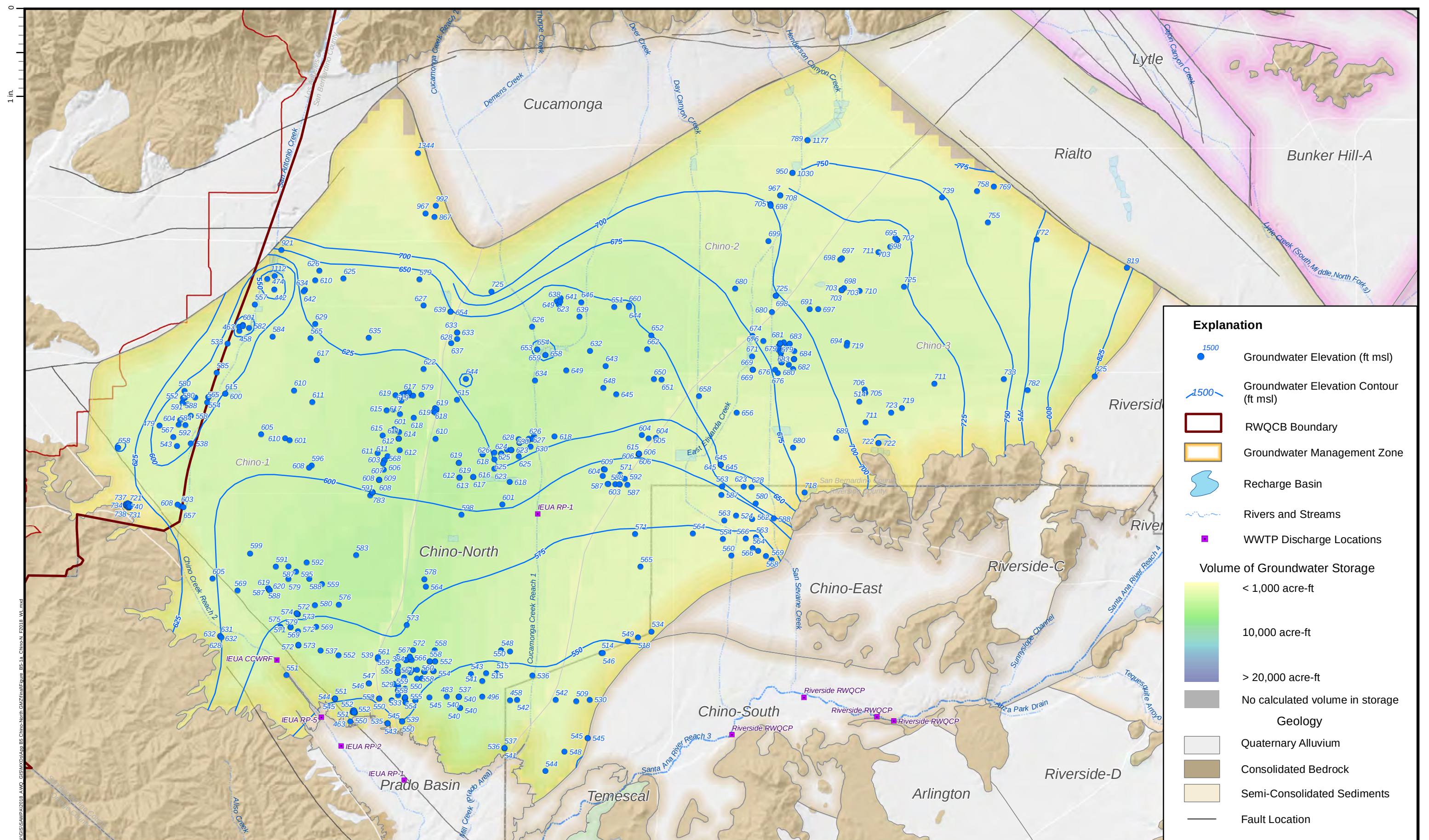
B5-5a,b,c TDS Concentration Change (1996-2015 to 1999-2018)



TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Chino-North -- "max benefit"	420	260	300	320	340	340	350	360	350	-10	70
Chino 1 -- "antideg"	280	280	310	330	340	340	350	350	340	-10	None (-60)
Chino 2 -- "antideg"	250	250	300	340	360	360	380	380	380	0	None (-130)
Chino 3 -- "antideg"	260	260	280	280	310	320	320	320	320	0	None (-60)
Nitrate as Nitrogen (mg/L)											
Chino-North -- "max benefit"	5.0	3.7	7.4	8.7	9.7	9.5	10.0	10.3	10.3	0	None (-5.3)
Chino 1 -- "antideg"	5.0	5.0	8.4	8.9	9.3	9.1	10.0	10.5	10.4	-0.1	None (-5.4)
Chino 2 -- "antideg"	2.9	2.9	7.2	9.5	10.7	10.3	10.7	10.9	10.9	0	None (-8)
Chino 3 -- "antideg"	3.5	3.5	6.3	6.8	8.2	8.4	8.5	8.9	9.2	0.3	None (-5.7)





Prepared by:

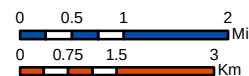


Author: EC
Date: 4/1/2020

File Name: Figure_B5-1a_Chino-N_F2018_WL



1 in : 1.8 mi



References:

1. Coordinate System: NAD 1983 UTM Zone 11N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter

Prepared for:

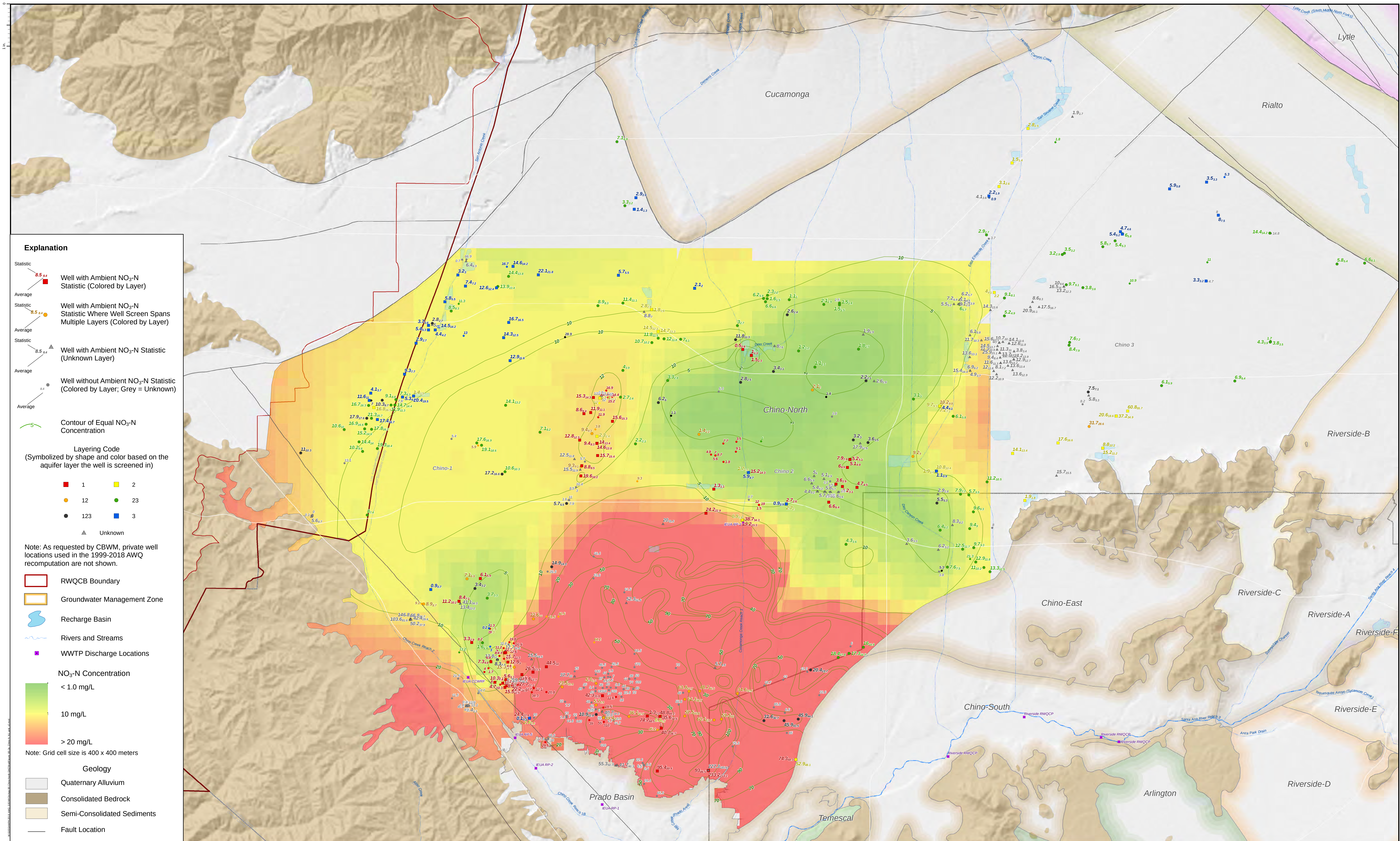


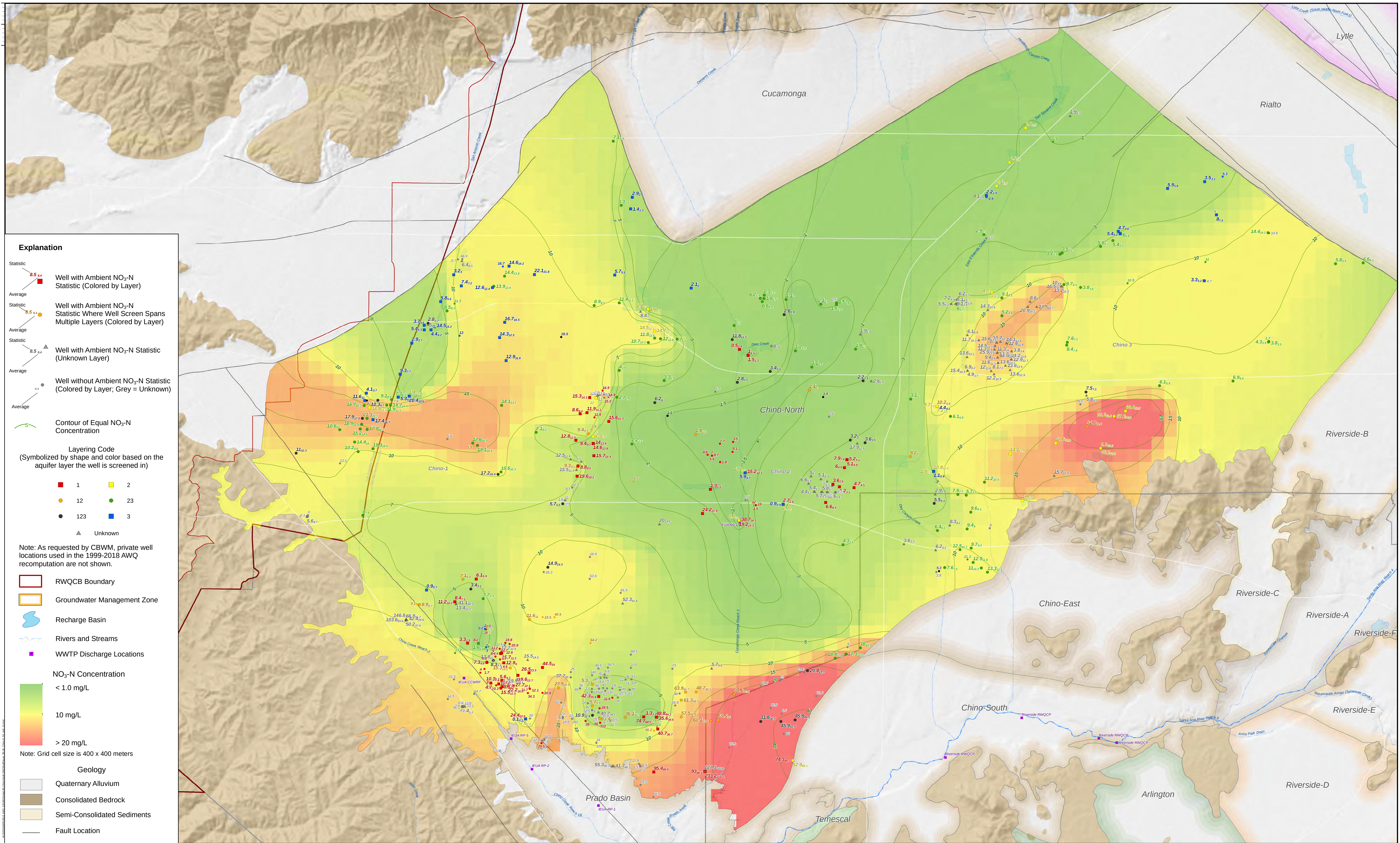
SAWPA Basin Monitoring Program Task Force

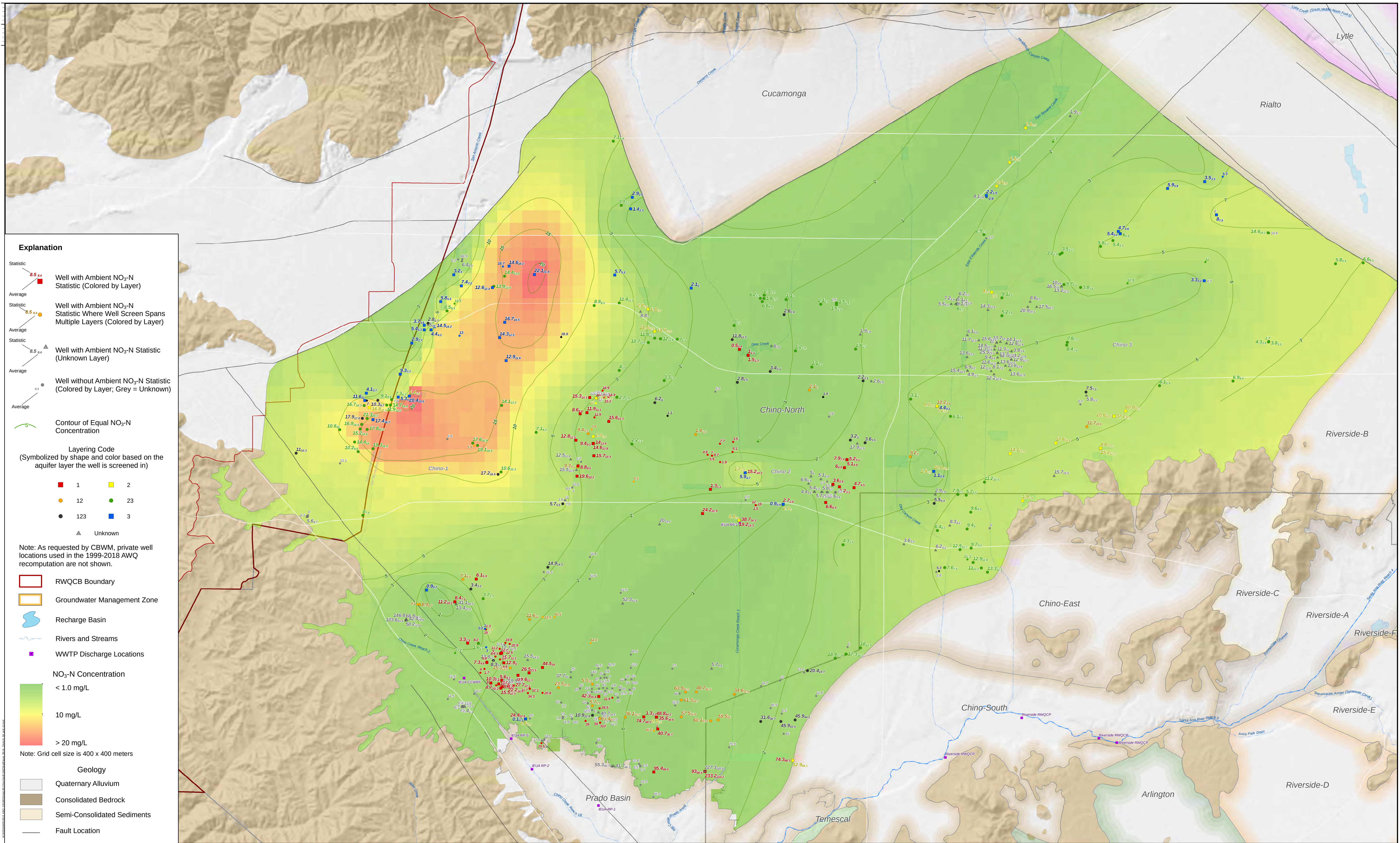
Recomputation of Ambient Water Quality for the Period 1999 to 2018

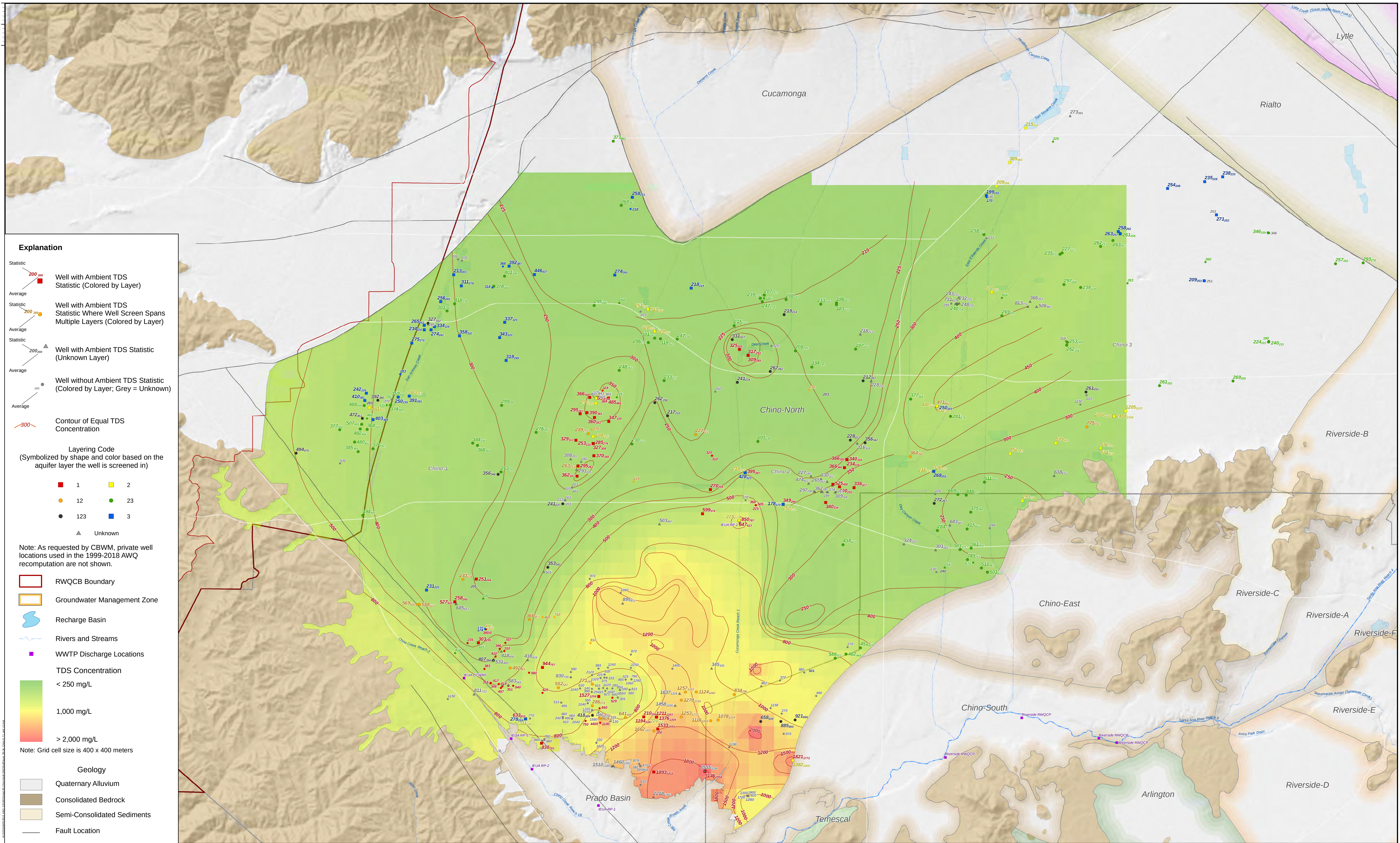
**Groundwater Storage and Elevation Contours
Fall 2018 - Chino-North GMZs
Santa Ana River Watershed**

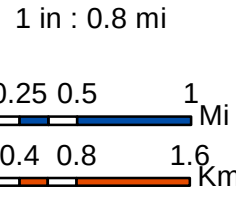
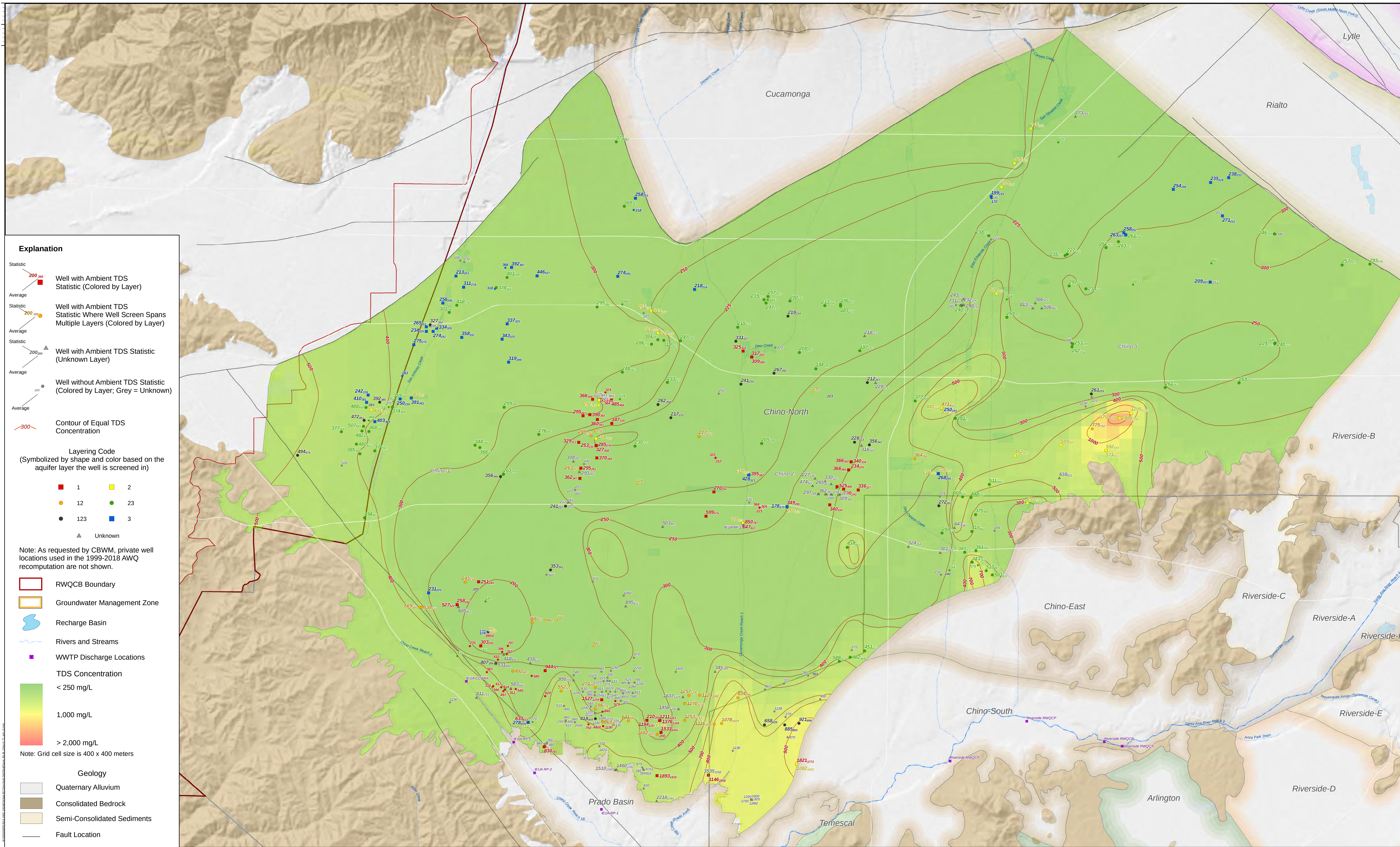
Attachment B5-1

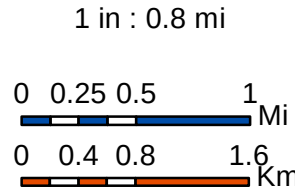
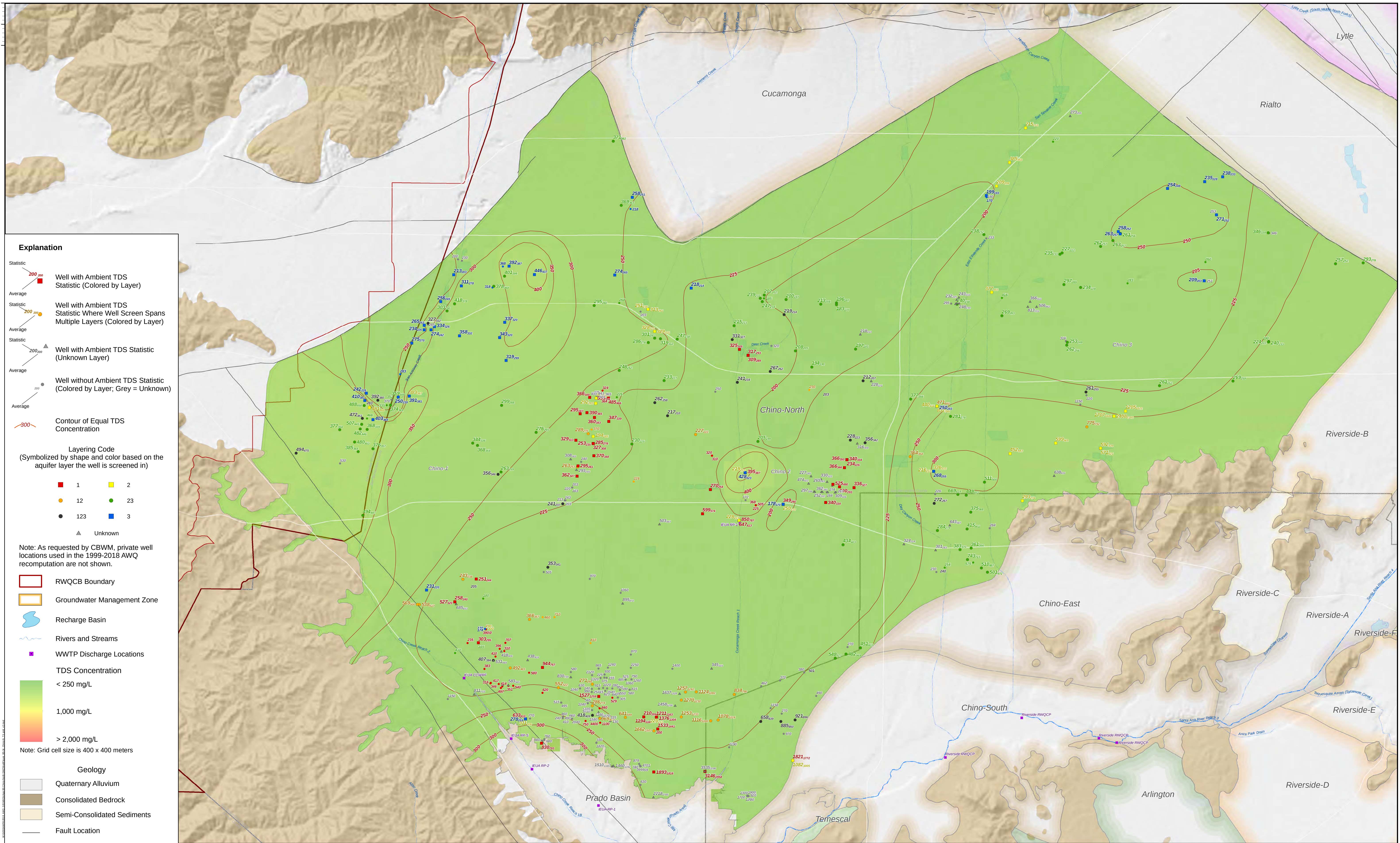


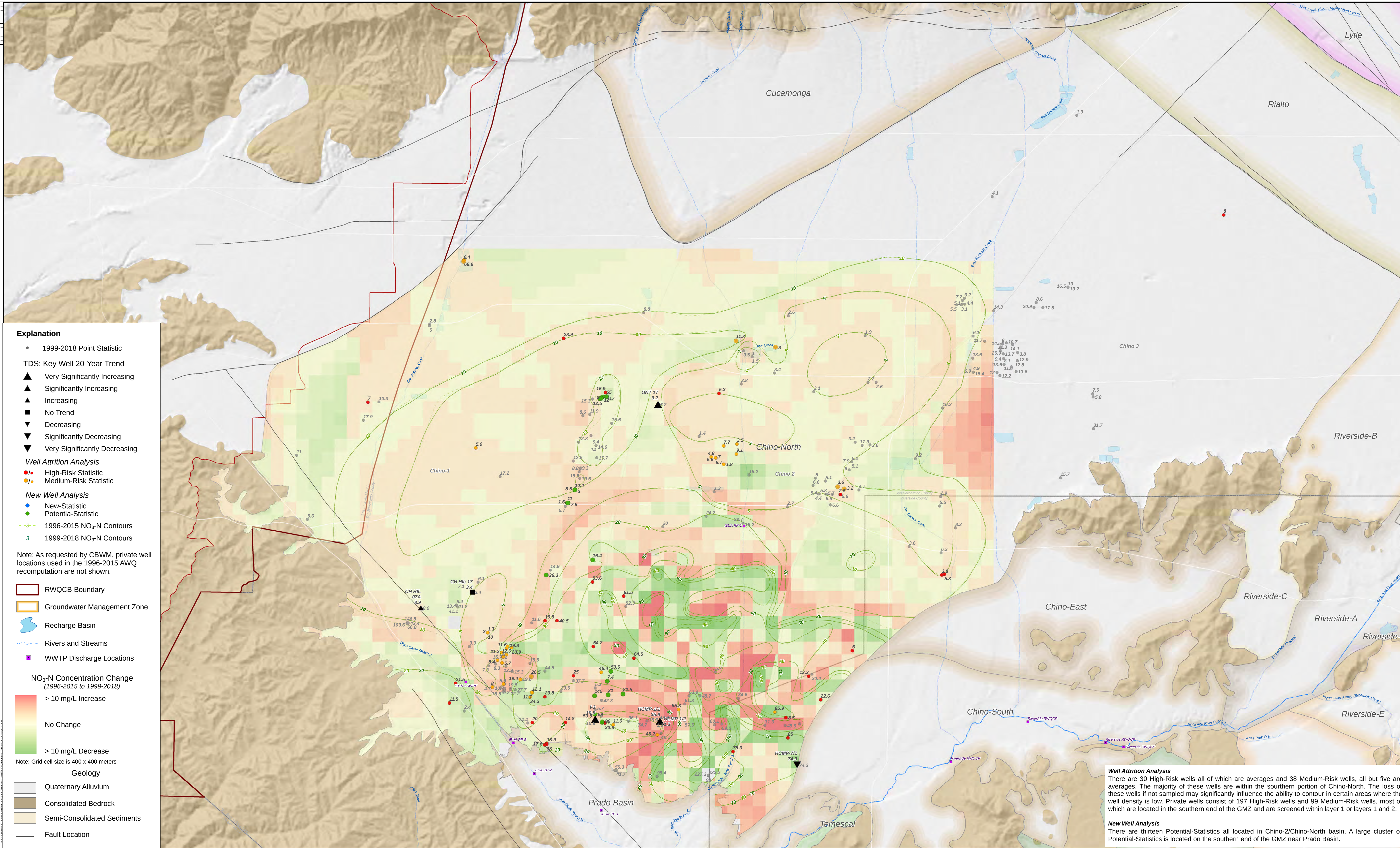


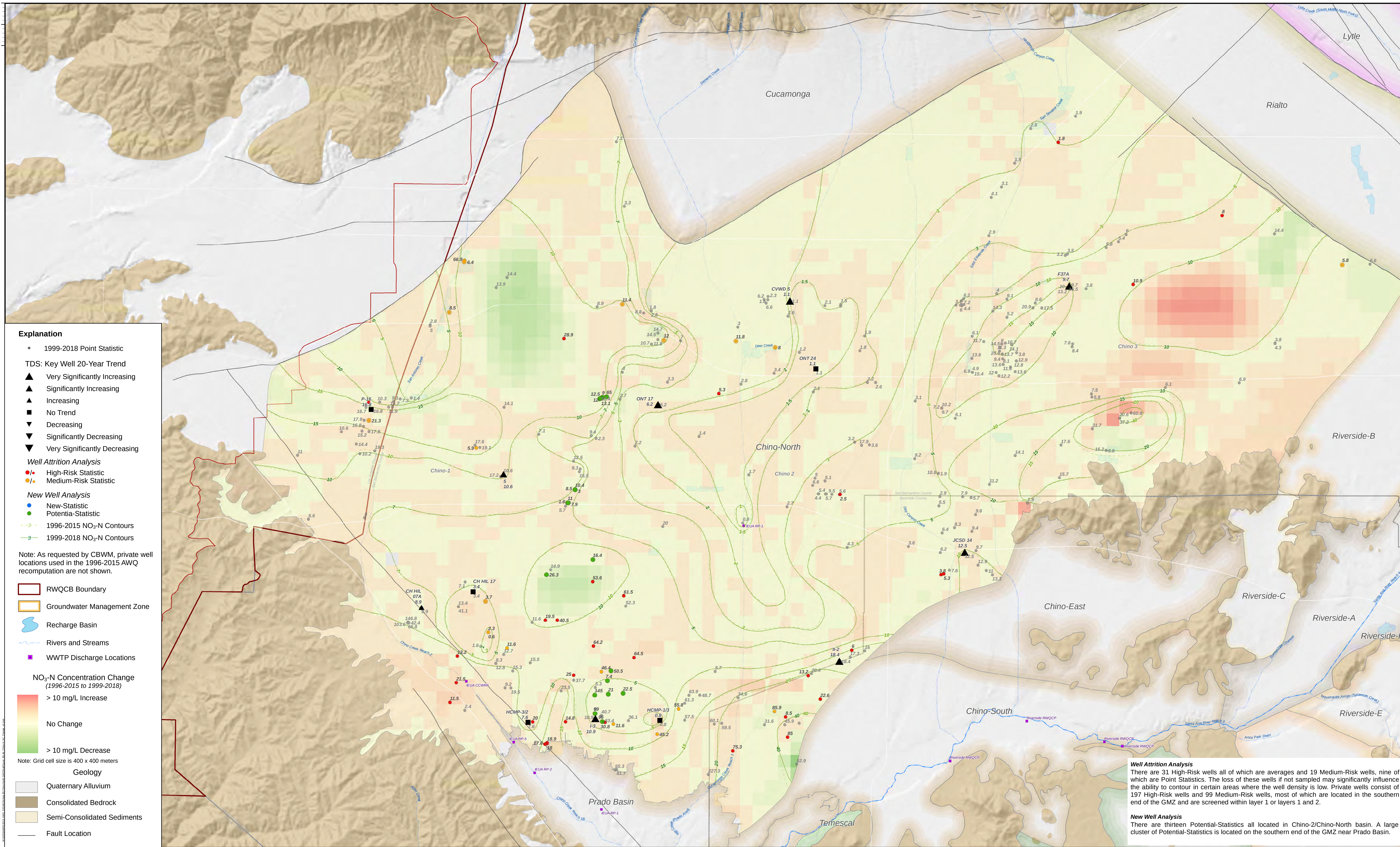












Explanation

- 1999-2018 Point Statistic

TDS: Key Well 20-Year Trend

- Very Significantly Increasing
- Significantly Increasing
- Increasing
- No Trend
- Decreasing
- Significantly Decreasing
- Very Significantly Decreasing

Well Attrition Analysis

- High-Risk Statistic
- Medium-Risk Statistic

New Well Analysis

- New-Statistic
- Potential-Statistic

NO₃-N Concentration Change (1996-2015 to 1999-2018)

- > 10 mg/L Increase
- No Change
- > 10 mg/L Decrease

Geology

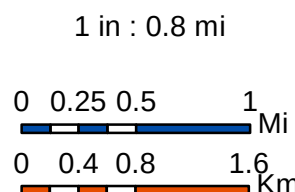
- Quaternary Alluvium
- Consolidated Bedrock
- Semi-Consolidated Sediments

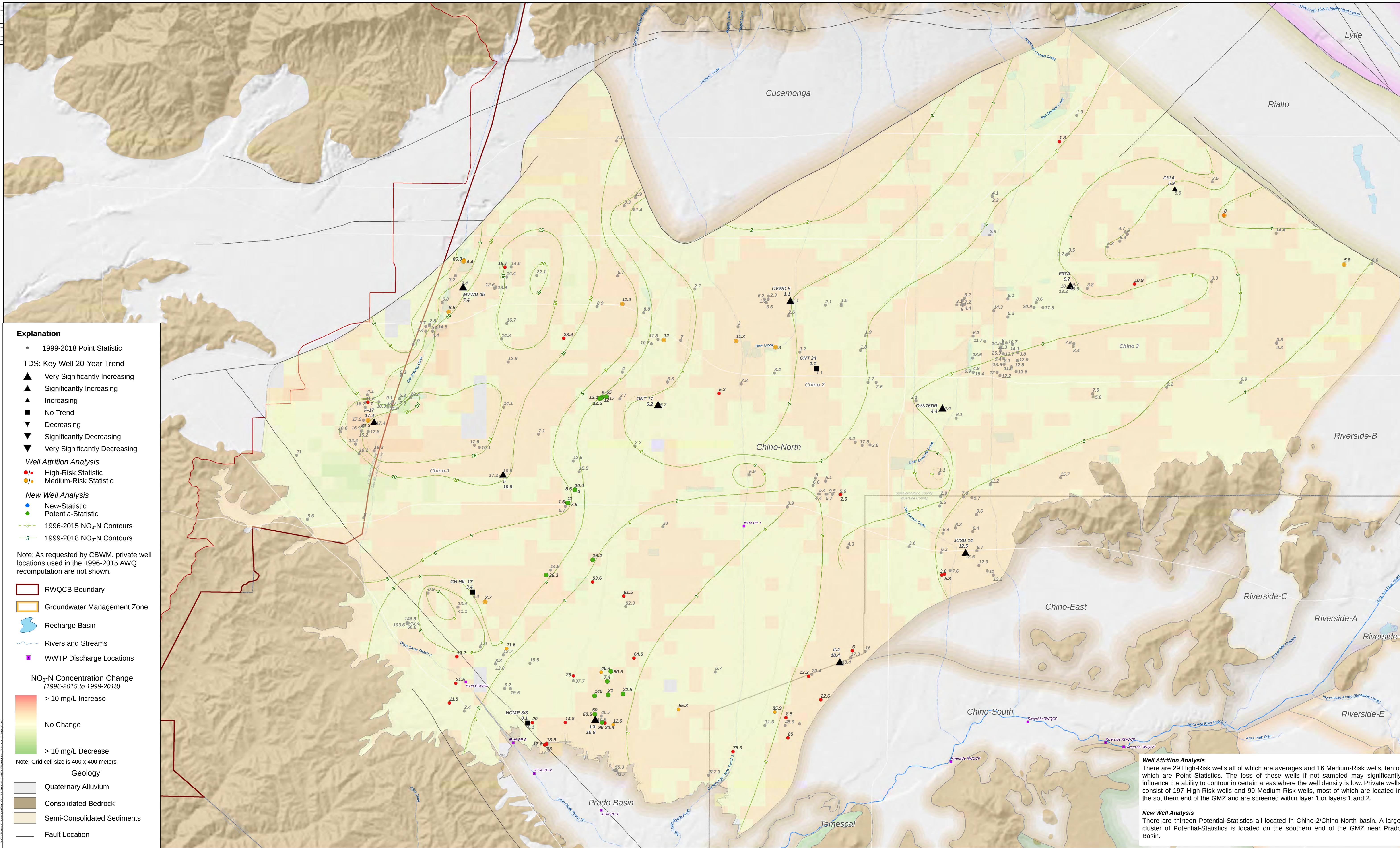
Other Features

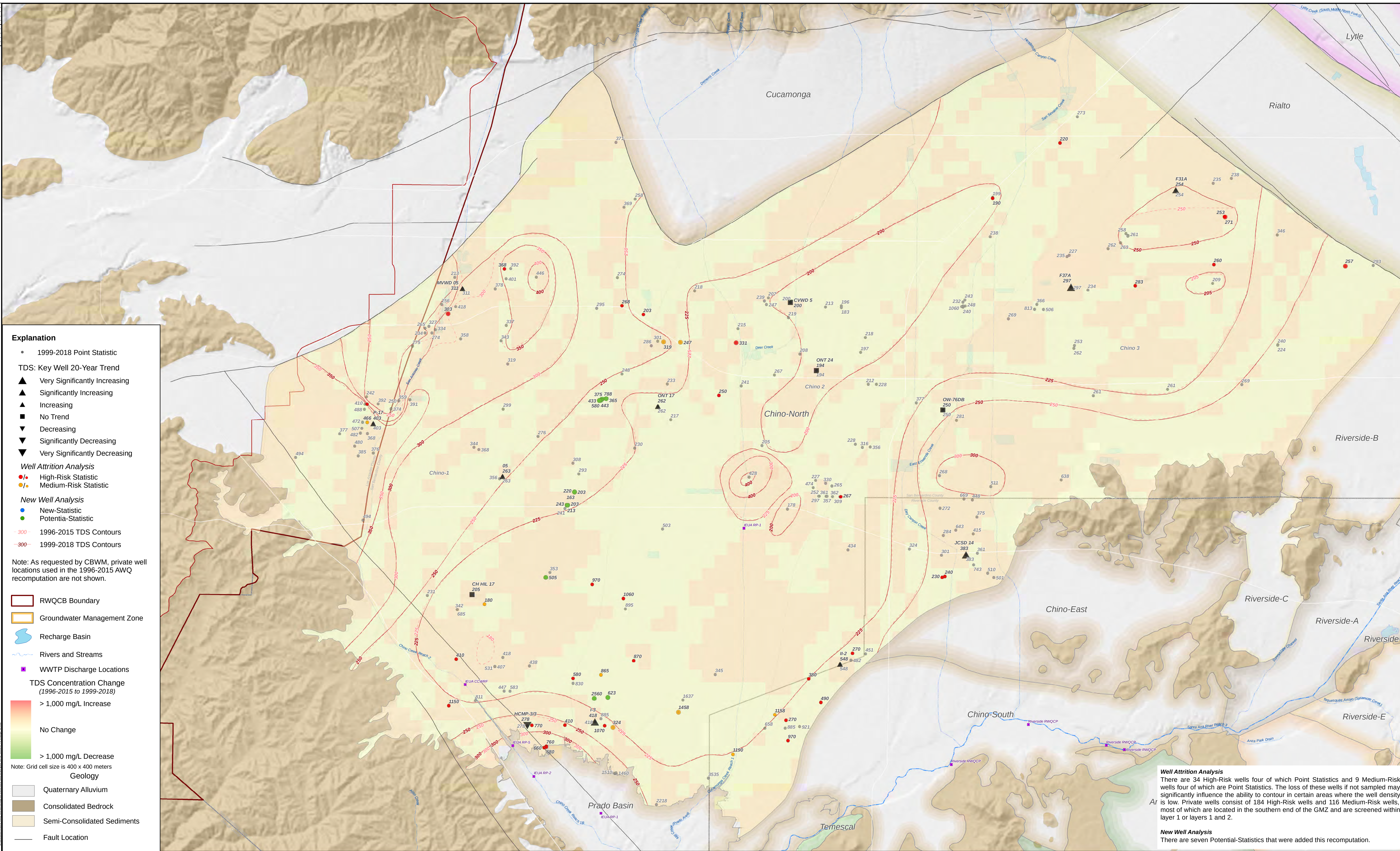
- RWQCB Boundary
- Groundwater Management Zone
- Recharge Basin
- Rivers and Streams
- WWTP Discharge Locations
- Fault Location

Well Attrition Analysis
There are 31 High-Risk wells all of which are averages and 19 Medium-Risk wells, nine of which are Point Statistics. The loss of these wells if not sampled may significantly influence the ability to contour in certain areas where the well density is low. Private wells consist of 197 High-Risk wells and 99 Medium-Risk wells, most of which are located in the southern end of the GMZ and are screened within layer 1 or layers 1 and 2.

New Well Analysis
There are thirteen Potential-Statistics all located in Chino-2/Chino-North basin. A large cluster of Potential-Statistics is located on the southern end of the GMZ near Prado Basin.







Attachment B6

Chino-South and Chino-East GMZs

Attachment Contents:

B6-1 Groundwater Storage and Elevation Contours Fall 2018

B6-2 NO₃-N Concentration and Contour Map

B6-3 TDS Concentration and Contour Map

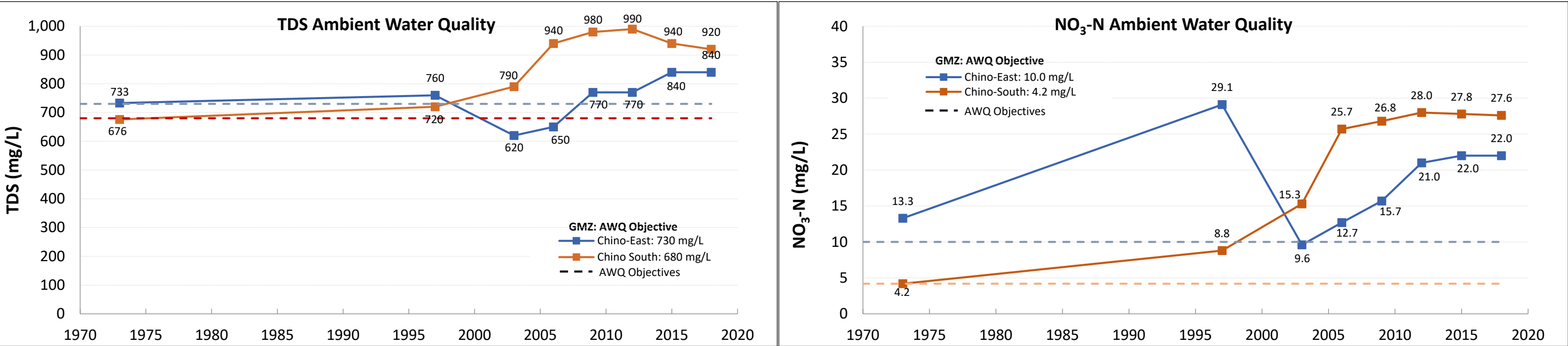
B6-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

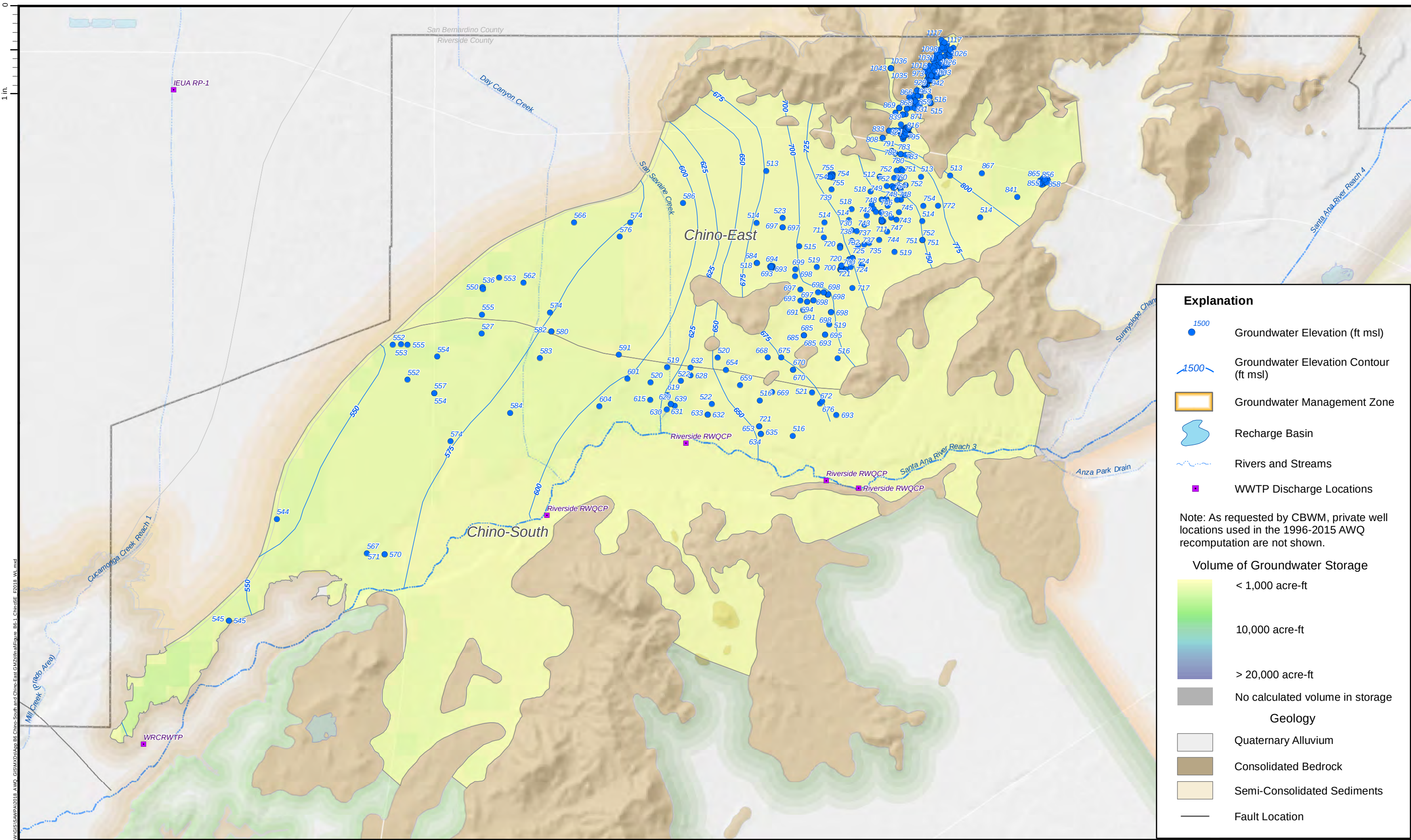
B6-5 TDS Concentration Change (1996-2015 to 1999-2018)



TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Chino-East	730	733	760	620	650	770	770	840	840	0	None (-110)
Chino-South	680	676	720	790	940	980	990	940	920	-20	None (-240)
Nitrate as Nitrogen (mg/L)											
Chino-East	10.0	13.3	29.1	9.6	12.7	15.7	21.0	22.0	22.0	0	None (-12)
Chino-South	4.2	4.2	8.8	15.3	25.7	26.8	28.0	27.8	27.6	-0.2	None (-23.4)





Explanation

1500

Groundwater Elevation (ft msl)

1500

Groundwater Elevation Contour (ft msl)

Groundwater Management Zone

Recharge Basin

Rivers and Streams

WWTP Discharge Locations

Note: As requested by CBWM, private well locations used in the 1996-2015 AWQ recomputation are not shown.

Volume of Groundwater Storage

< 1,000 acre-ft

10,000 acre-ft

> 20,000 acre-ft

No calculated volume in storage

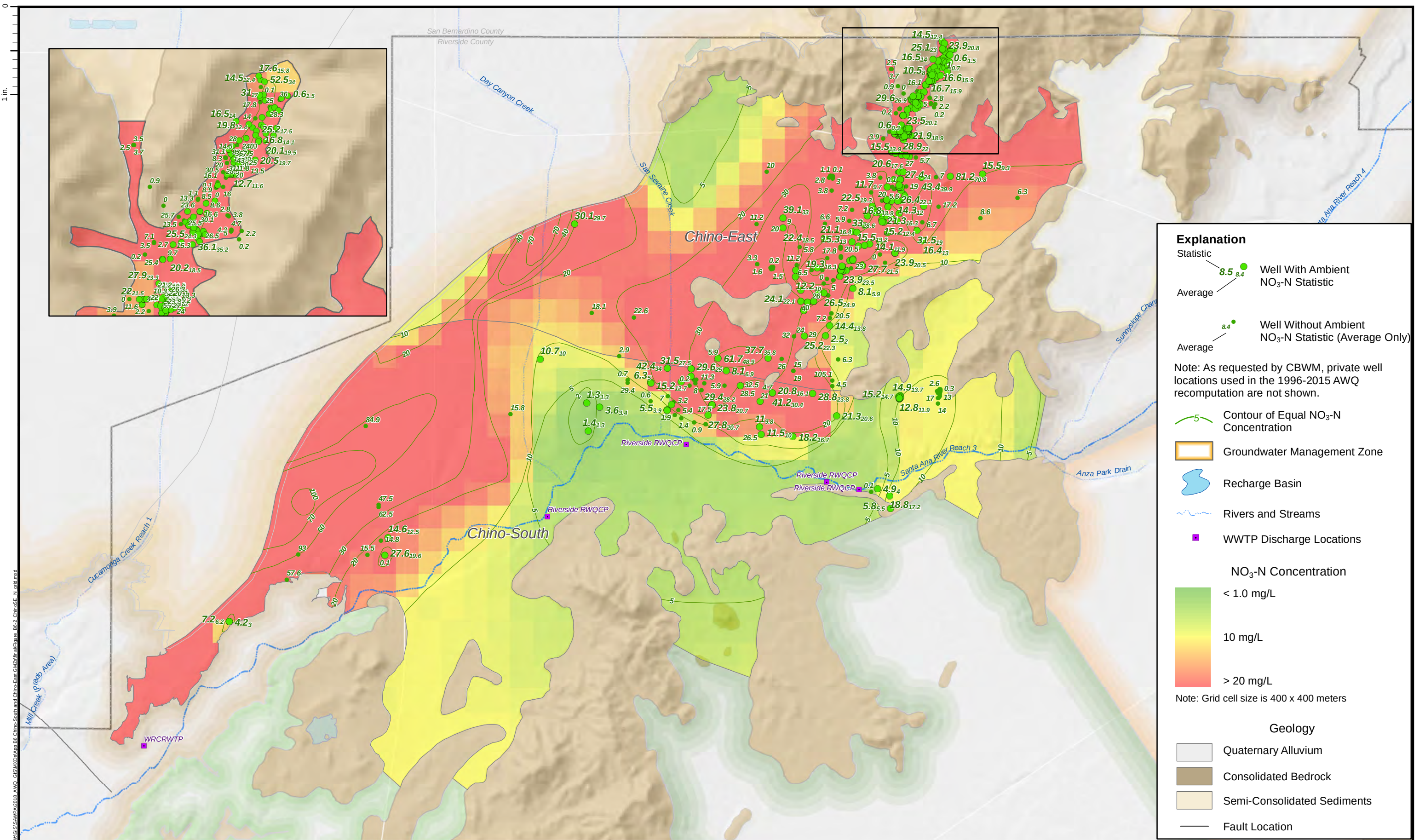
Geology

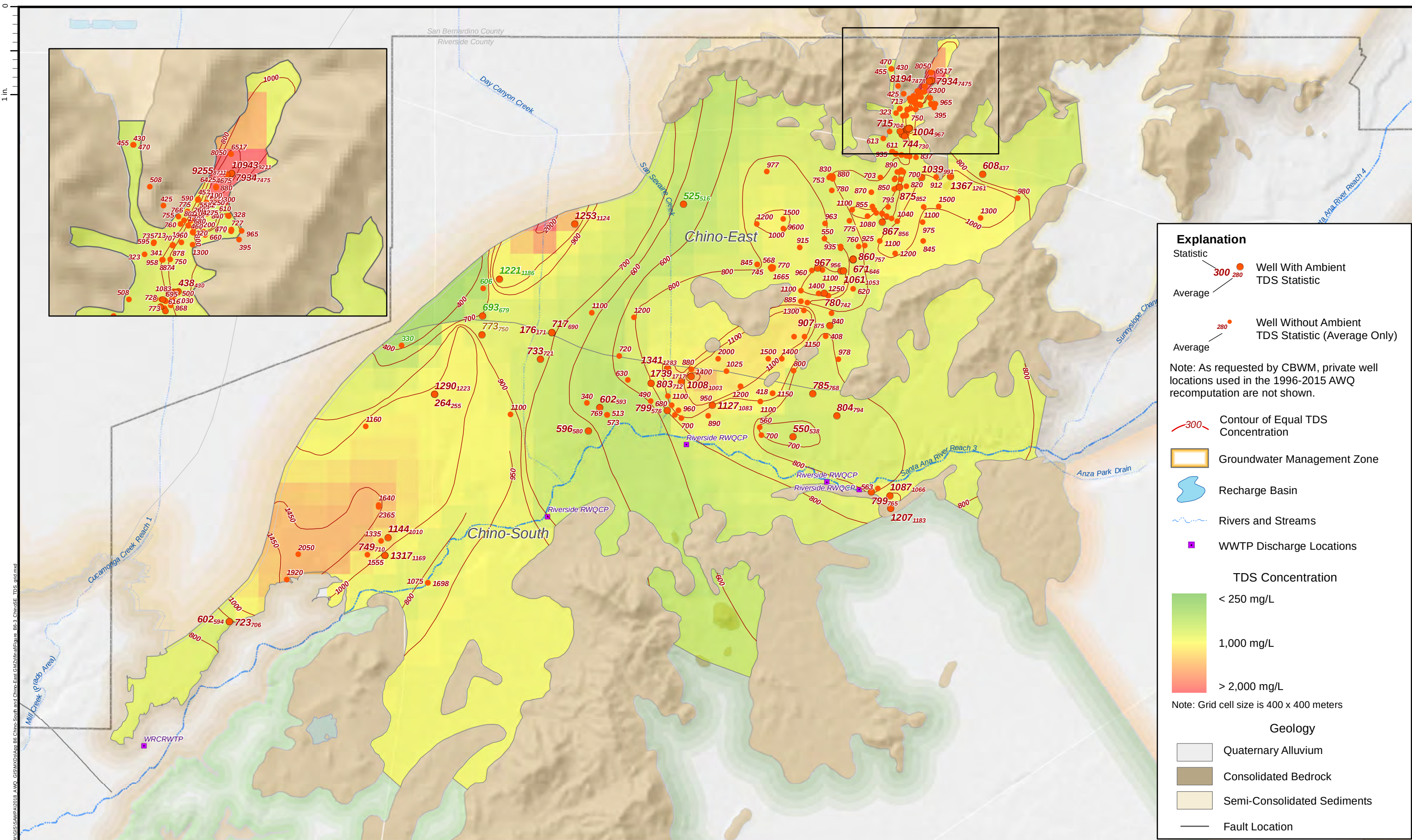
Quaternary Alluvium

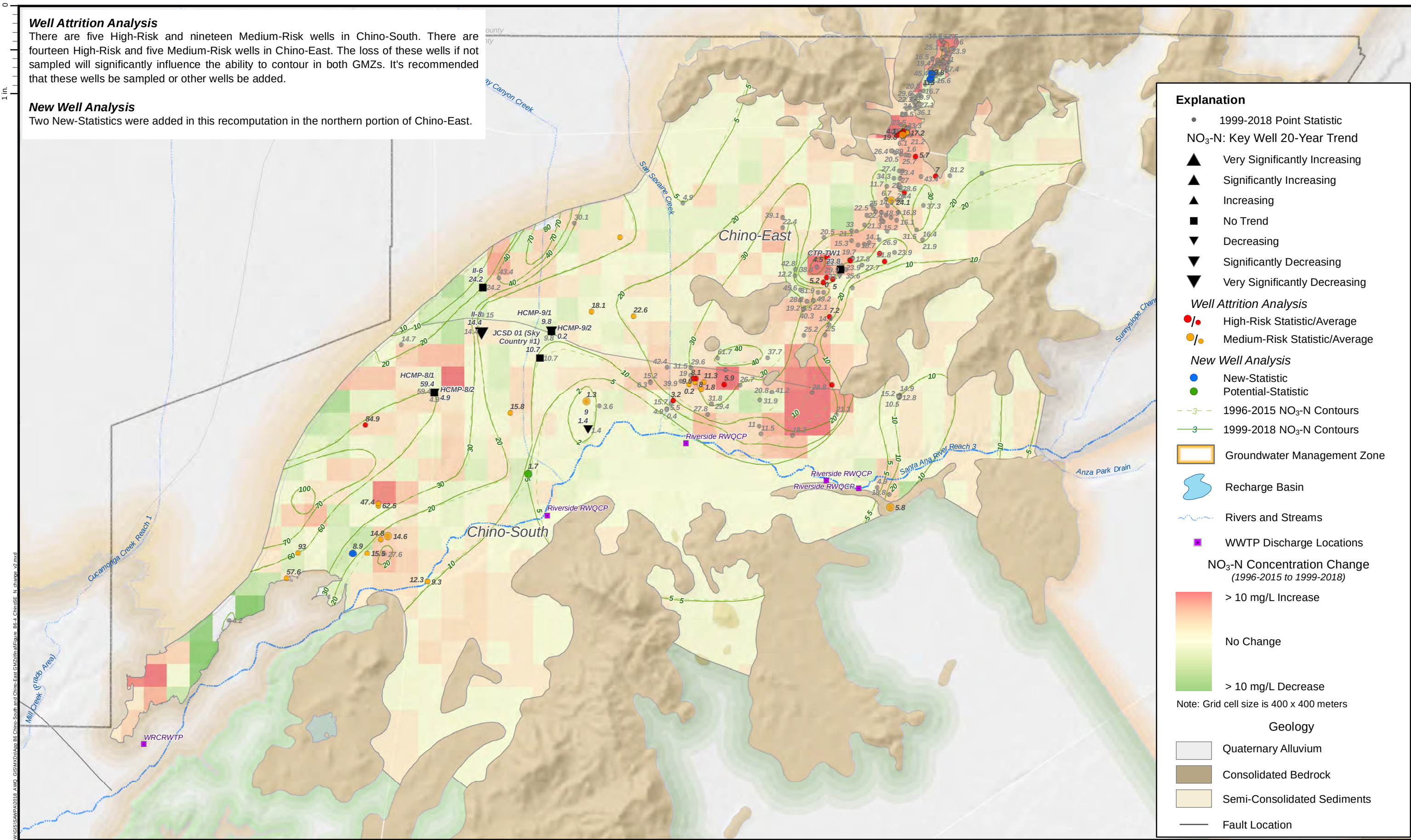
Consolidated Bedrock

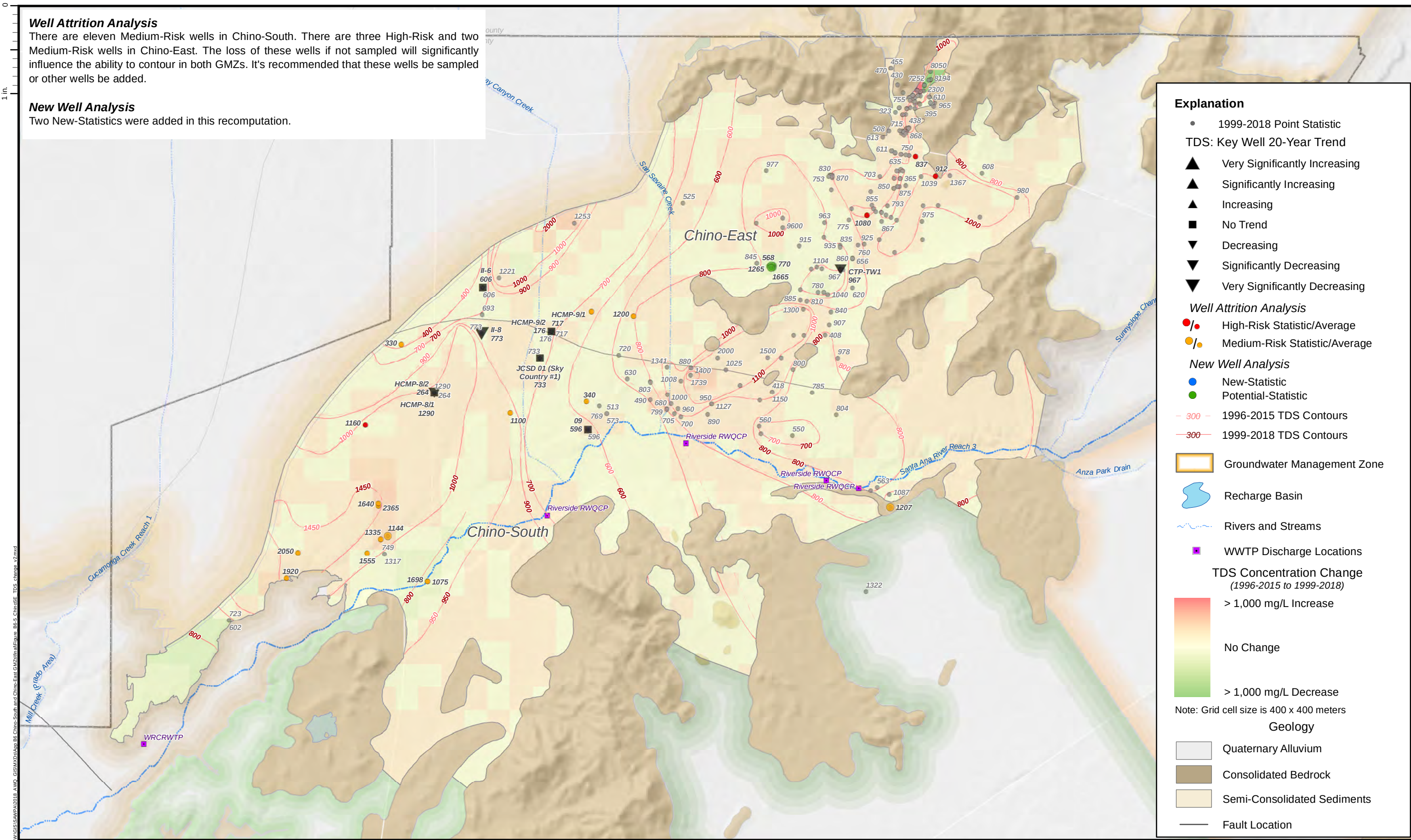
Semi-Consolidated Sediments

Fault Location









Attachment B7

Coldwater and Bedford GMZs

Attachment Contents:

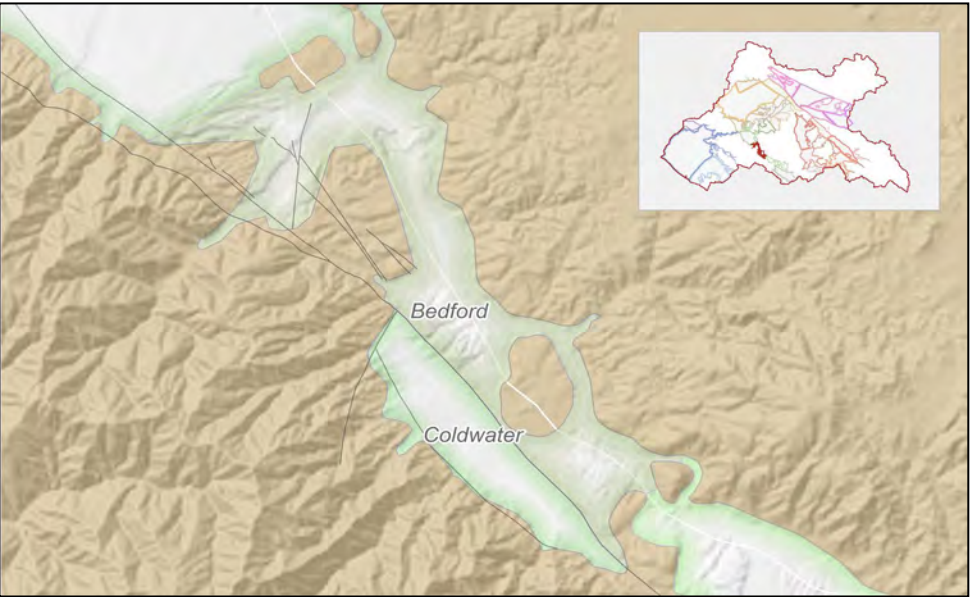
B7-1 Groundwater Storage and Elevation Contours Fall 2018

B7-2 NO₃-N Concentration and Contour Map

B7-3 TDS Concentration and Contour Map

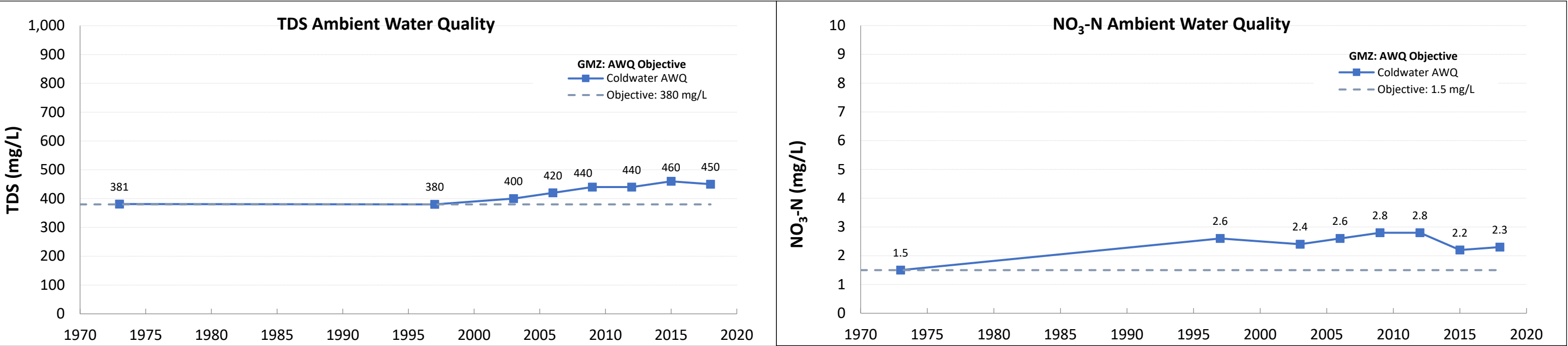
B7-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

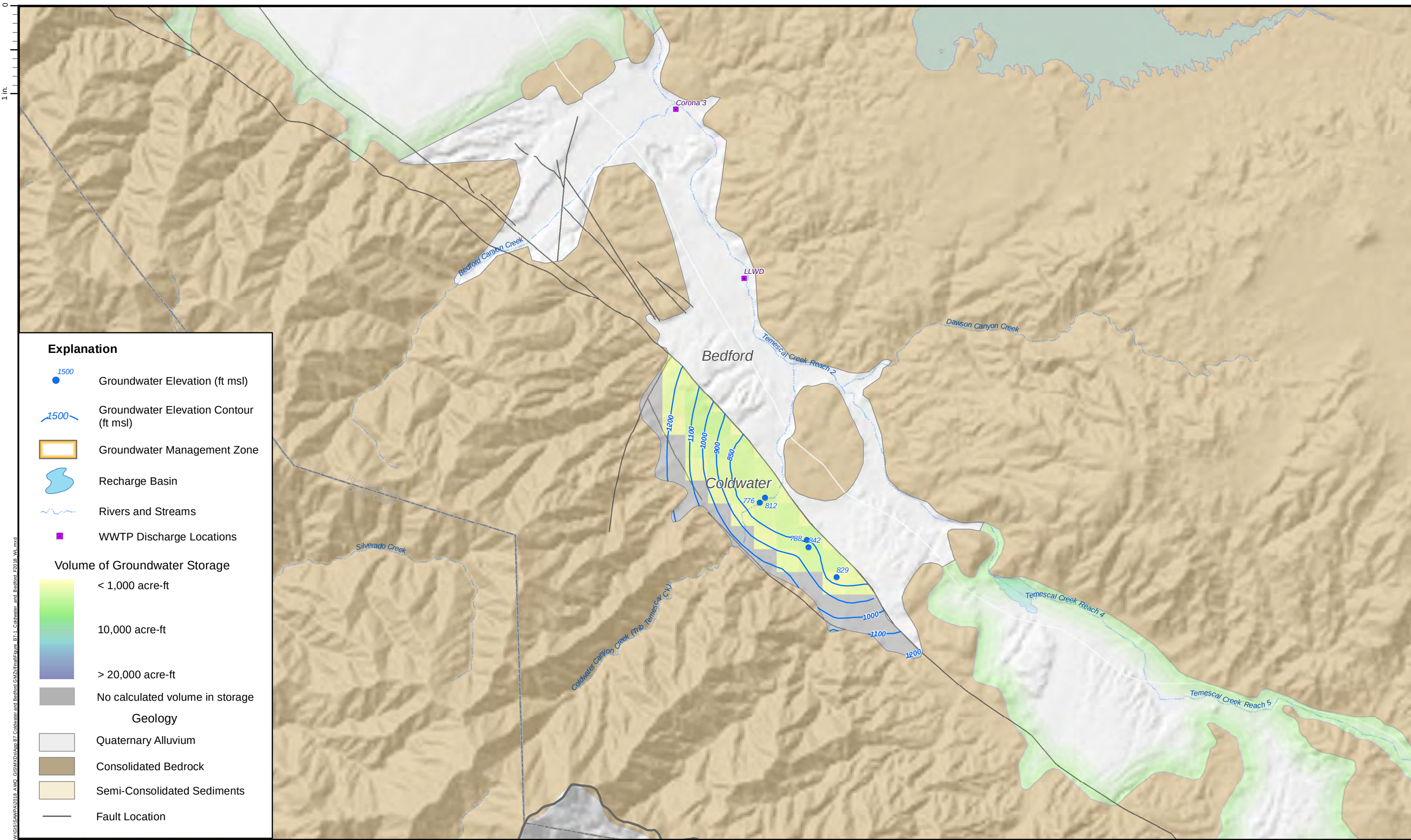
B7-5 TDS Concentration Change (1996-2015 to 1999-2018)

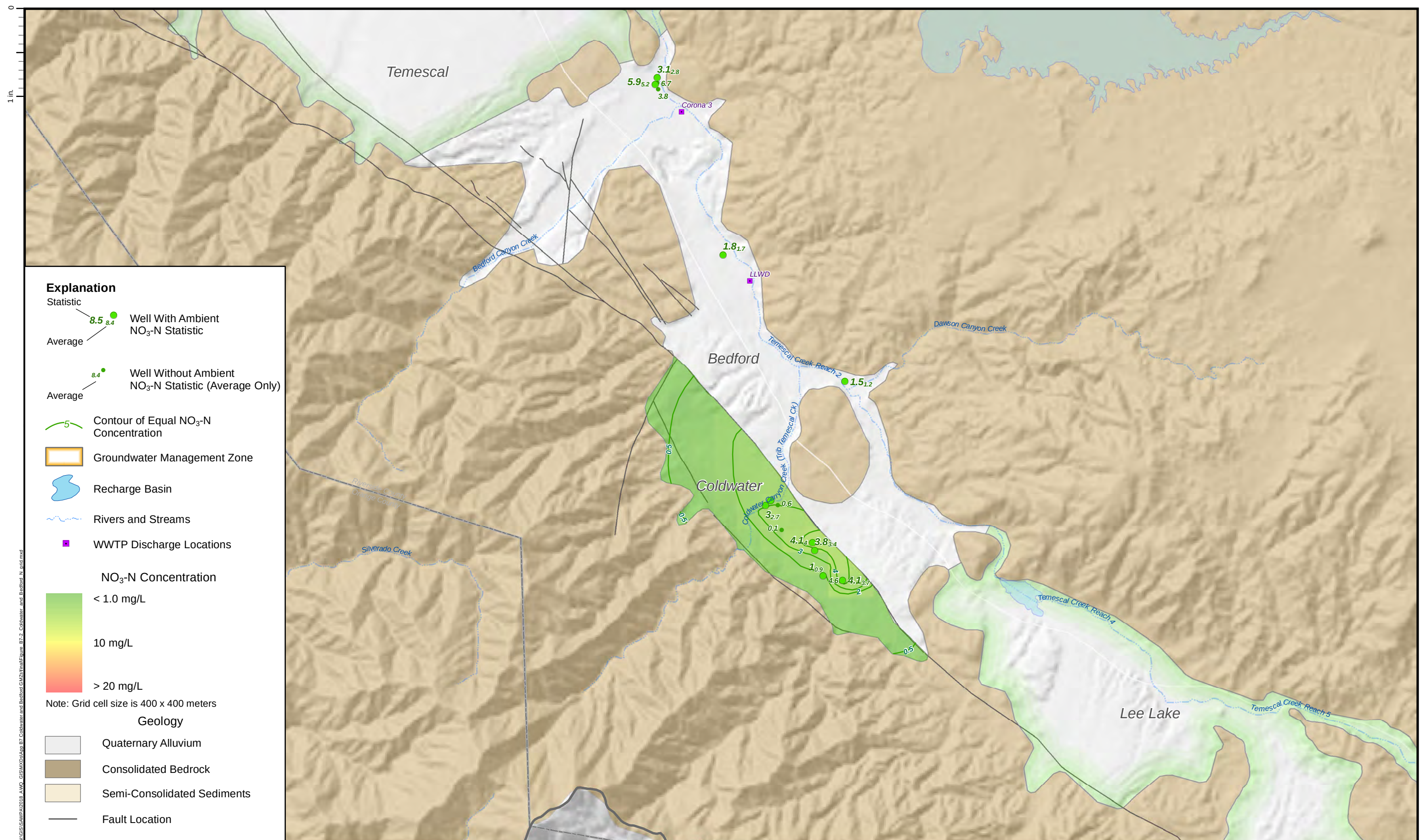


TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Bedford	?	?	?	740	?	?	?	?	?	?	?
Coldwater	380	381	380	400	420	440	440	460	450	-10	None (-70)
Nitrate as Nitrogen (mg/L)											
Bedford	?	?	?	2.8	?	?	?	?	?	?	?
Coldwater	1.5	1.5	2.6	2.4	2.6	2.8	2.8	2.2	2.3	0.1	None (-0.8)







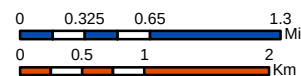
Prepared by:



Author: EC
Date: 3/24/2020



1 in : 1 mi



References:

1. Coordinate System: NAD 1983 UTM Zone 11N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter

Prepared for:

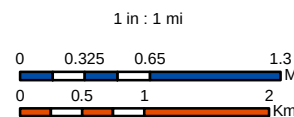
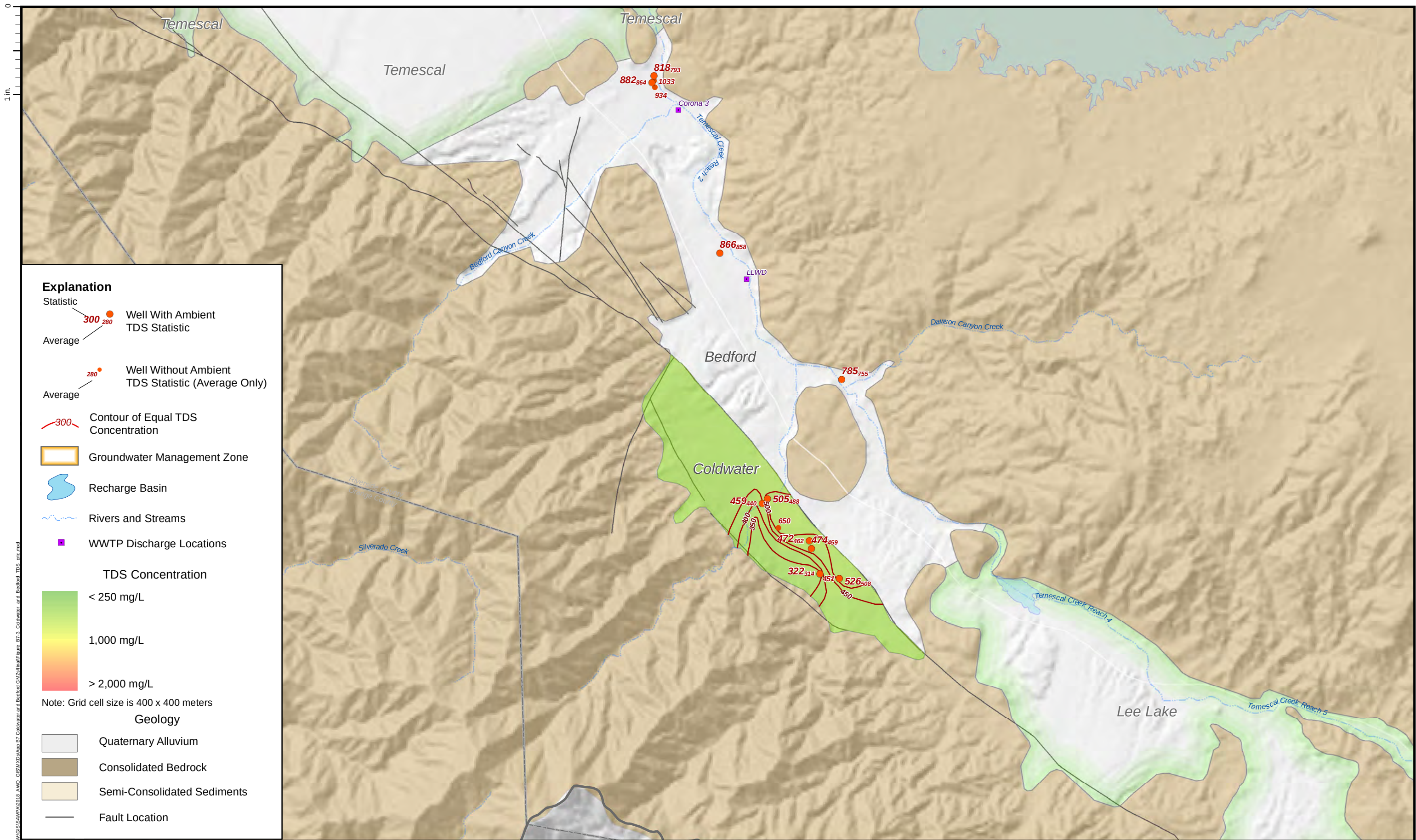


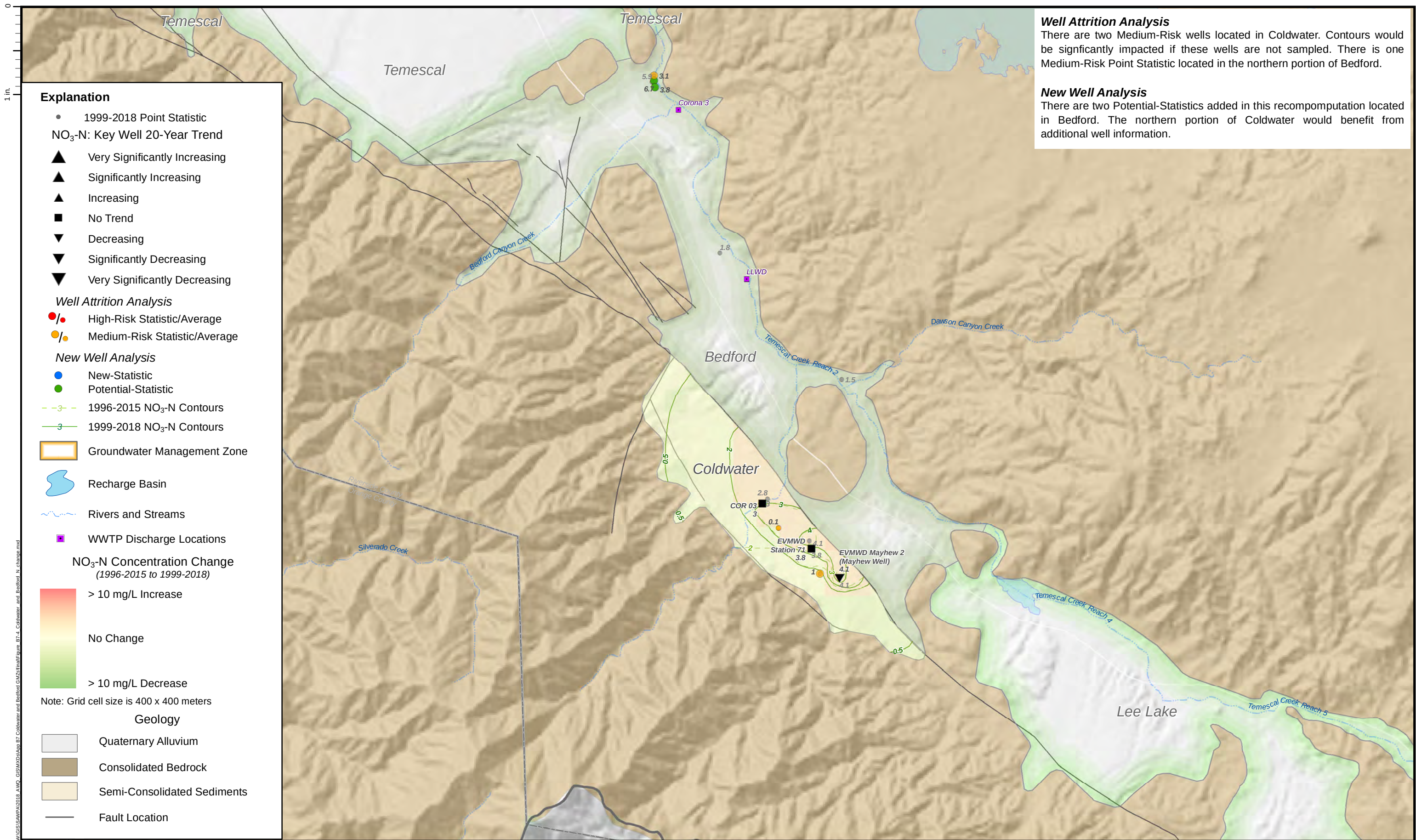
SAWPA Basin Monitoring Program Task Force

Recomputation of Ambient Water Quality for the Period 1999 to 2018

NO₃-N Concentration and Contour Map Arlington and Riverside-D GMZs Santa Ana River Watershed

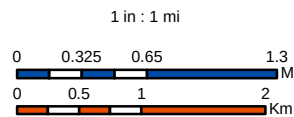
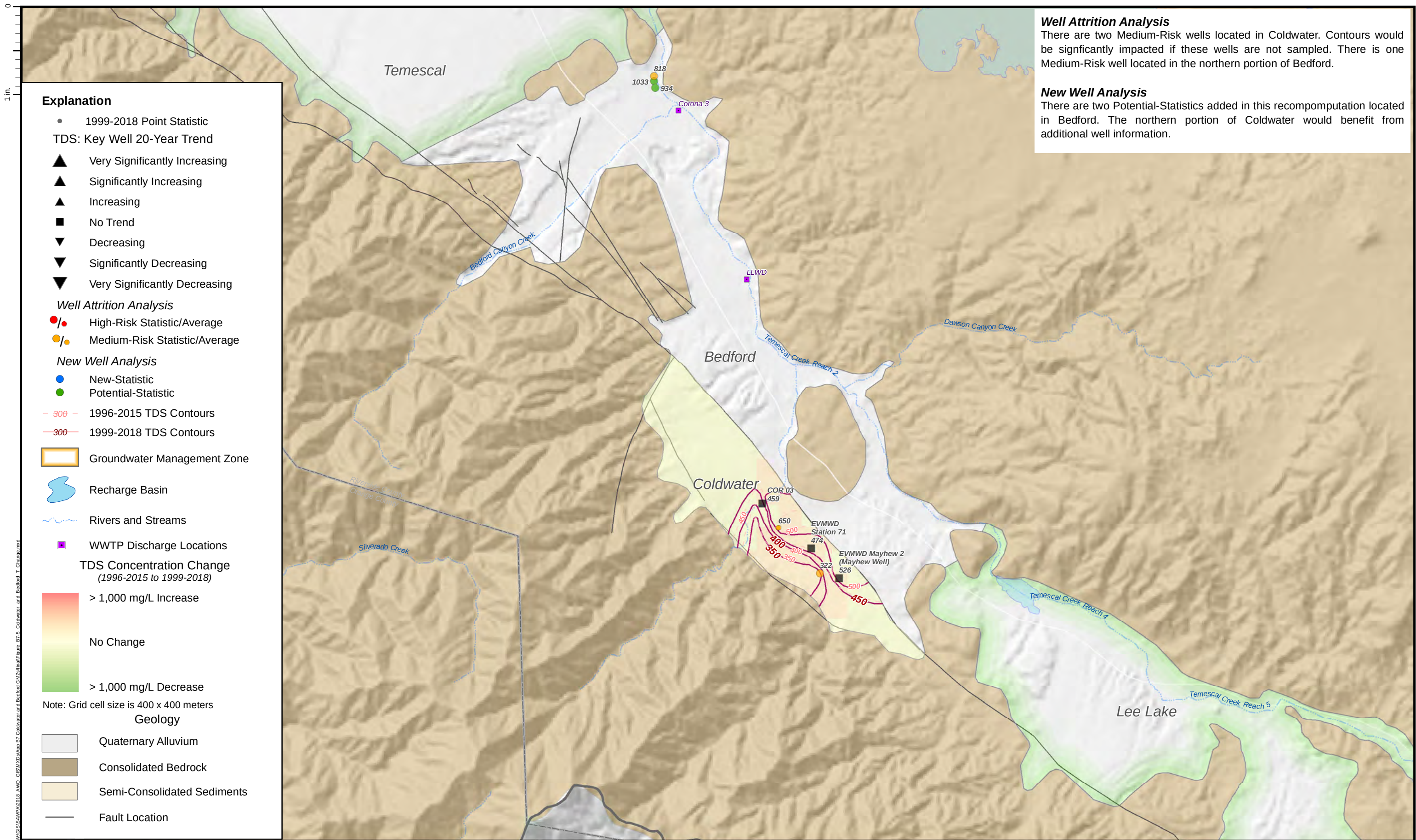
Attachment B1-2





Well Attrition Analysis
There are two Medium-Risk wells located in Coldwater. Contours would be significantly impacted if these wells are not sampled. There is one Medium-Risk Point Statistic located in the northern portion of Bedford.

New Well Analysis
There are two Potential-Statistics added in this recomputation located in Bedford. The northern portion of Coldwater would benefit from additional well information.



Attachment B8
Cucamonga GMZ

Attachment Contents:

B8-1 Groundwater Storage and Elevation Contours Fall 2018

B8-2 NO₃-N Concentration and Contour Map

B8-3 TDS Concentration and Contour Map

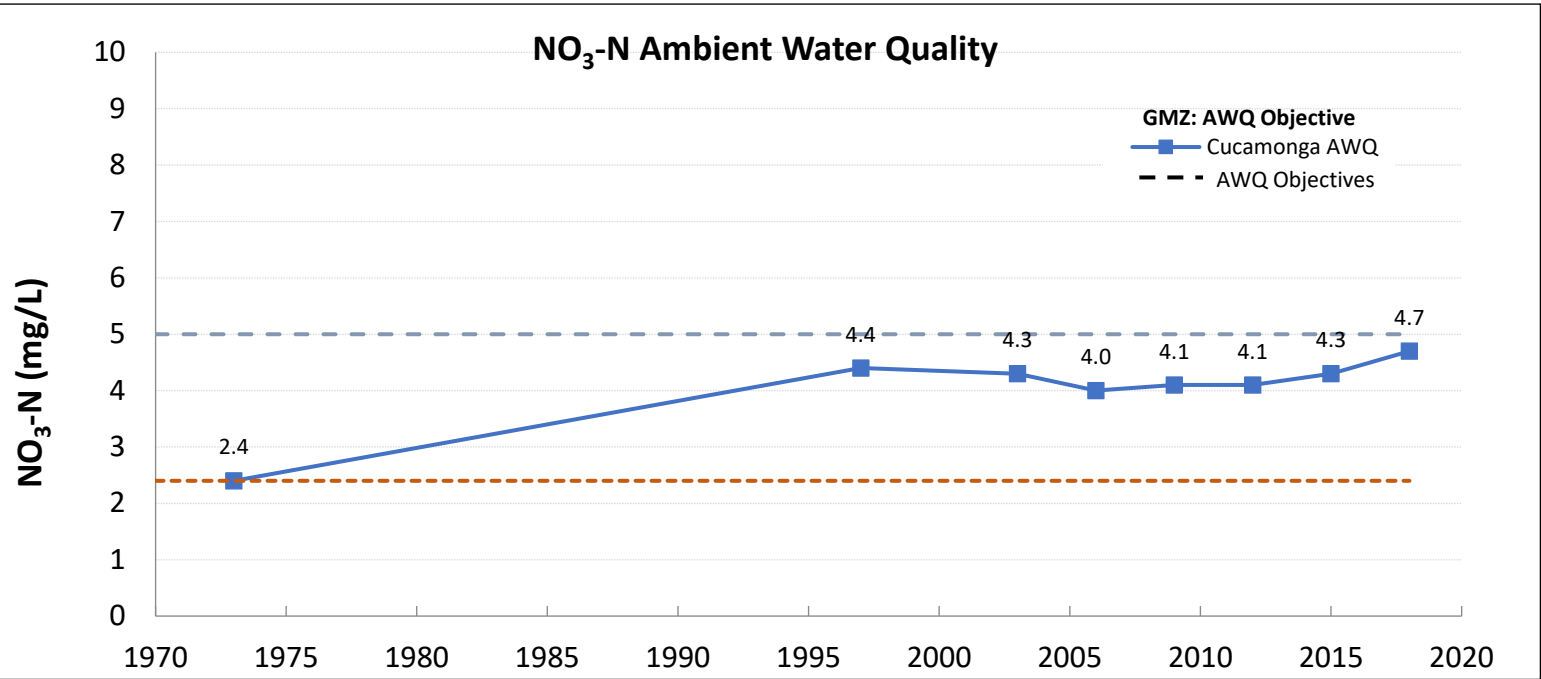
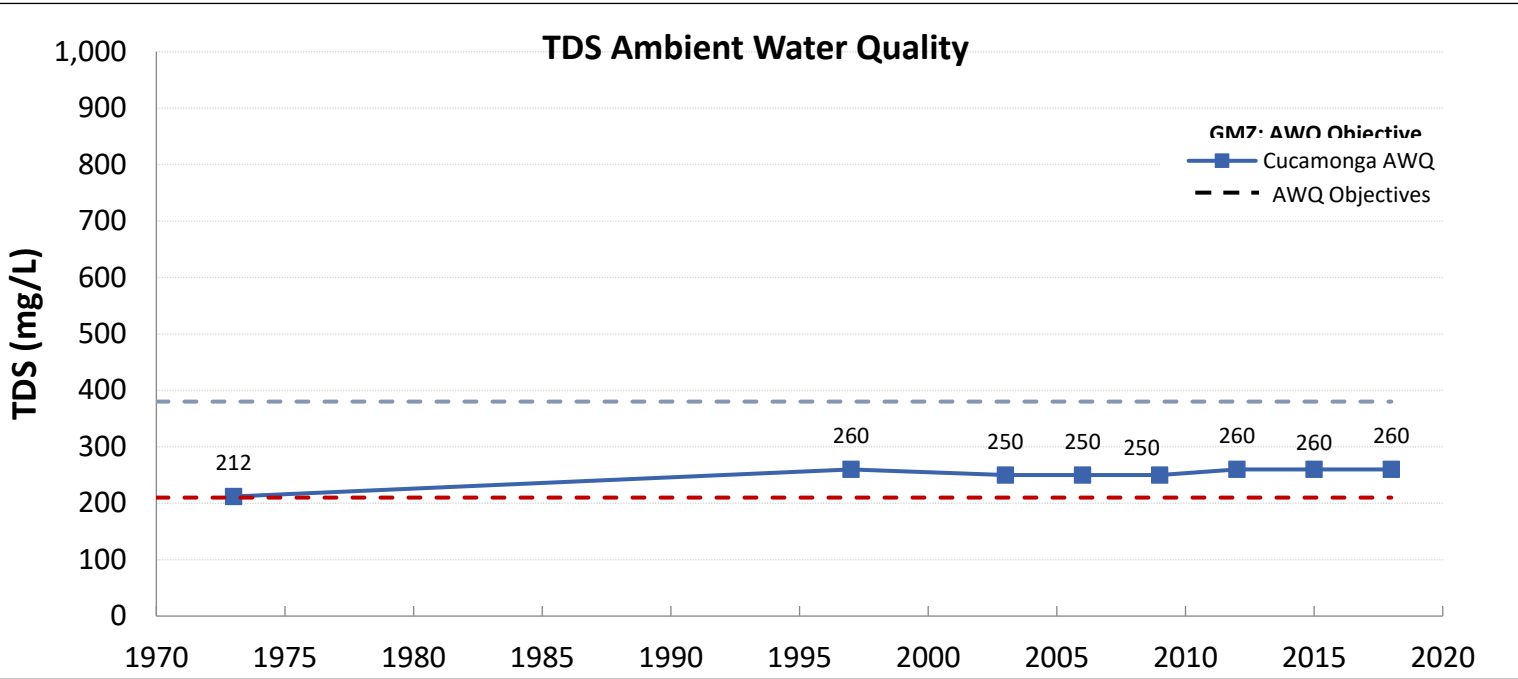
B8-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

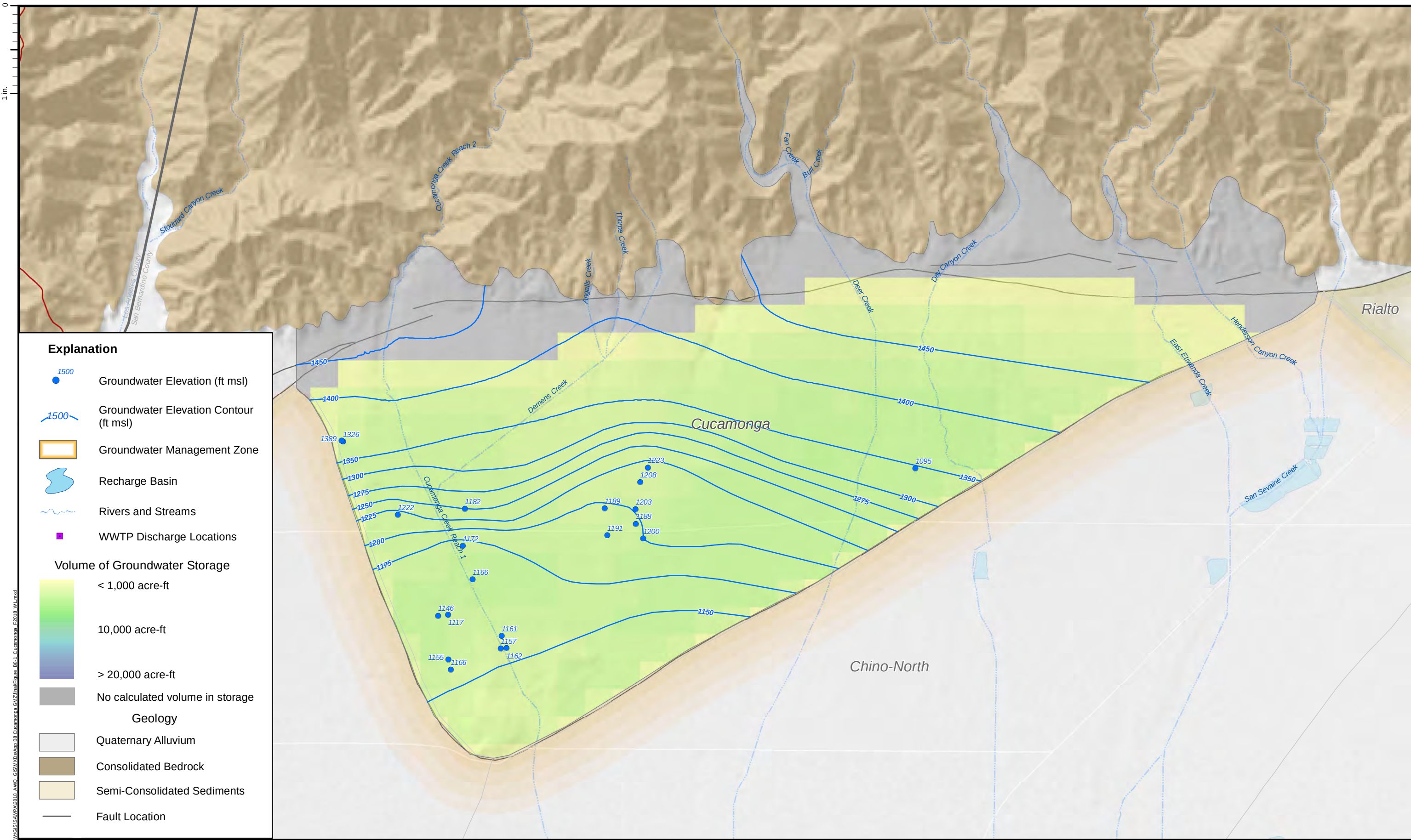
B8-5 TDS Concentration Change (1996-2015 to 1999-2018)

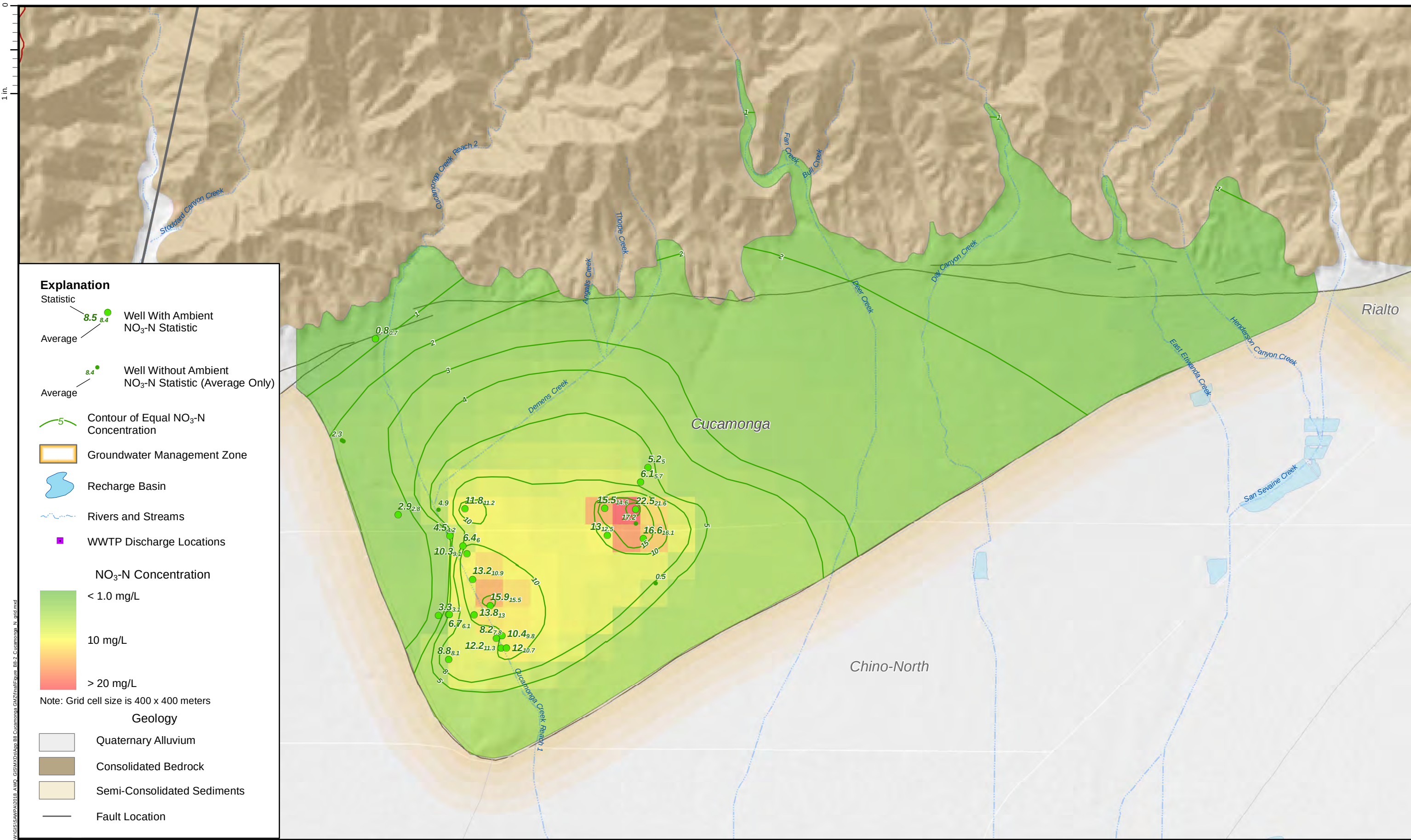


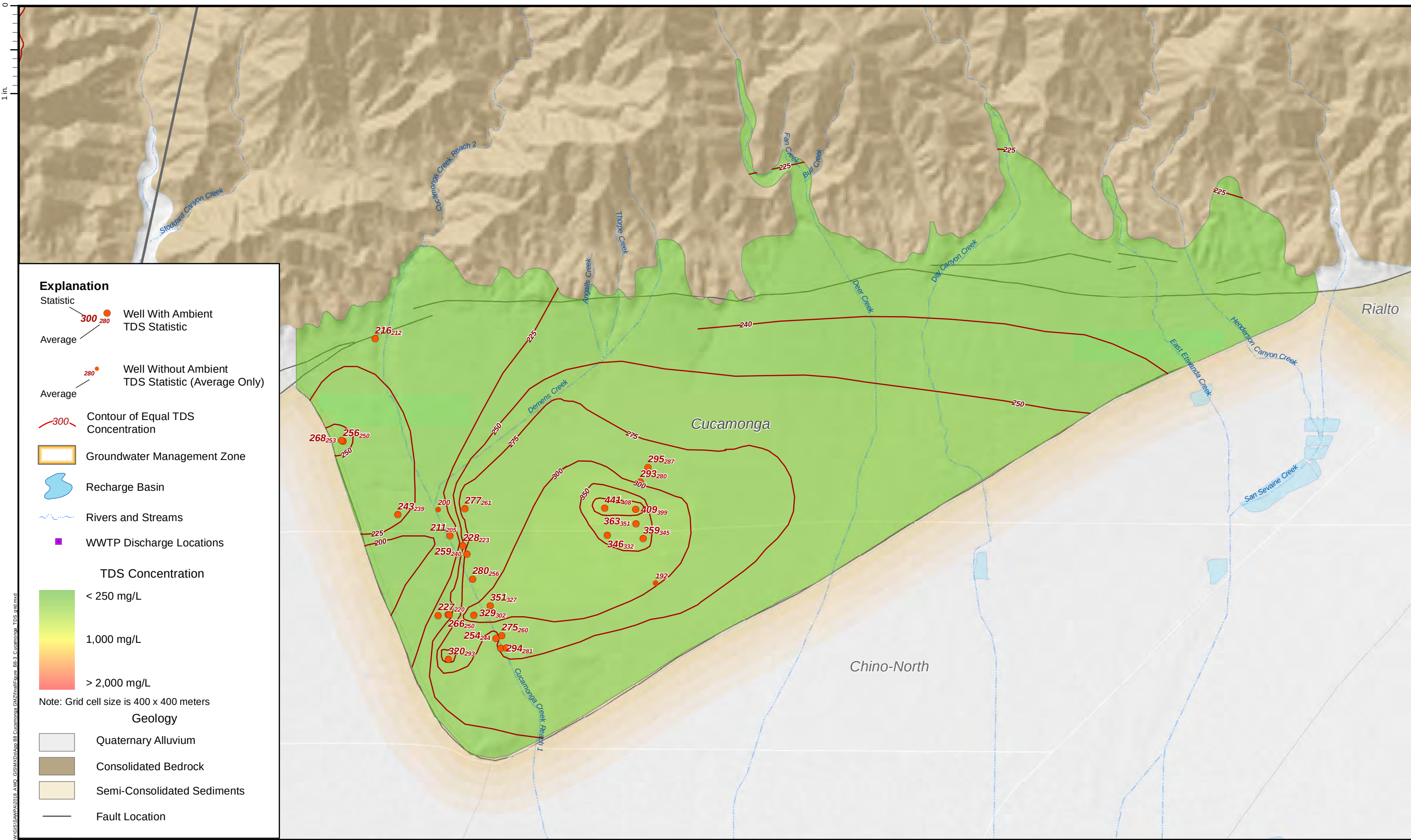
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

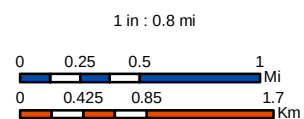
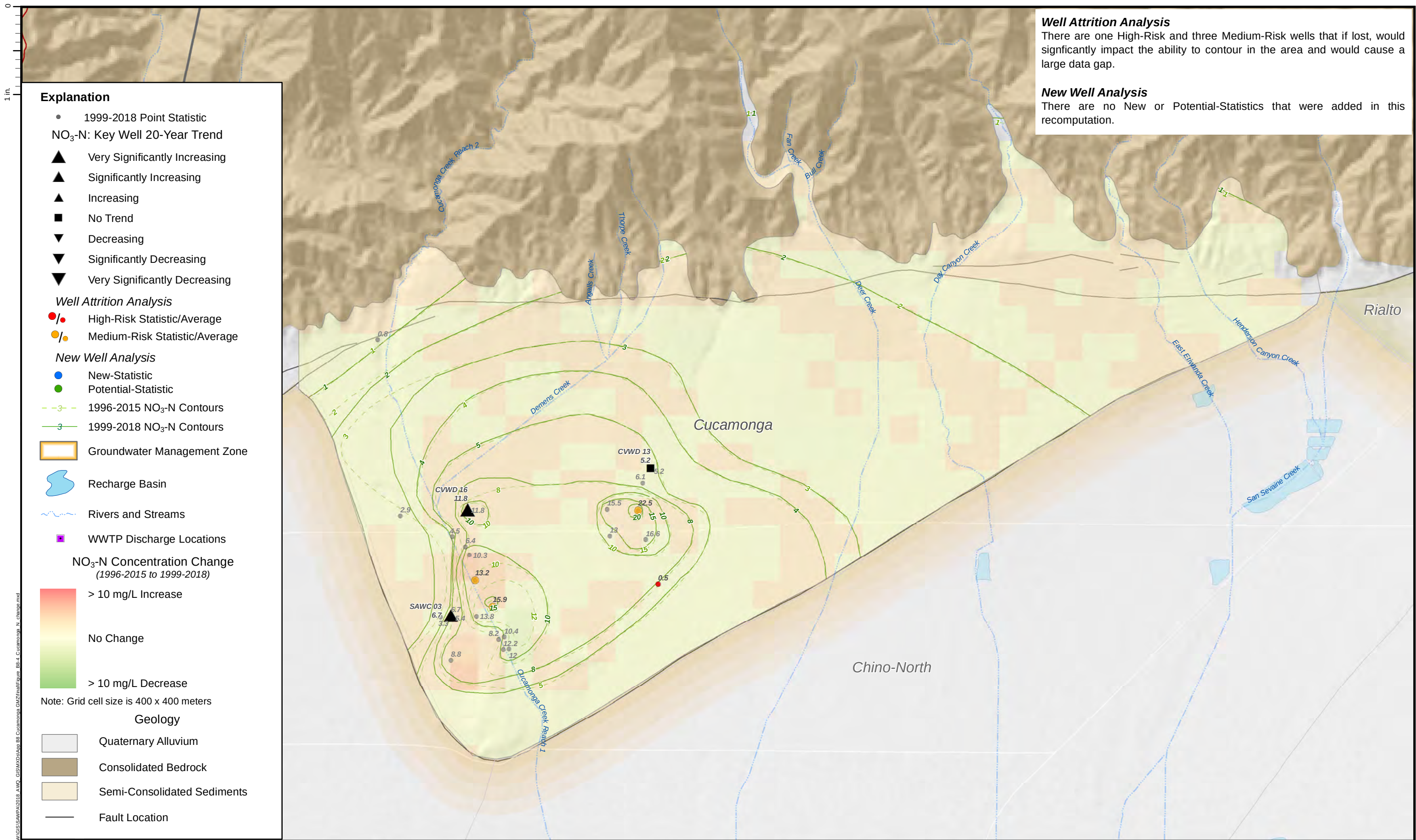
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Cucamonga -- "max benefit"	380	212	260	250	250	250	260	260	260	0	120
Cucamonga -- "antideg"	210	212	260	250	250	250	260	260	260	0	None (-50)
Nitrate as Nitrogen (mg/L)											
Cucamonga -- "max benefit"	5.0	2.4	4.4	4.3	4.0	4.1	4.1	4.3	4.7	0.4	0.3
Cucamonga -- "antideg"	2.4	2.4	4.4	4.3	4.0	4.1	4.1	4.3	4.7	0.4	None (-2.3)

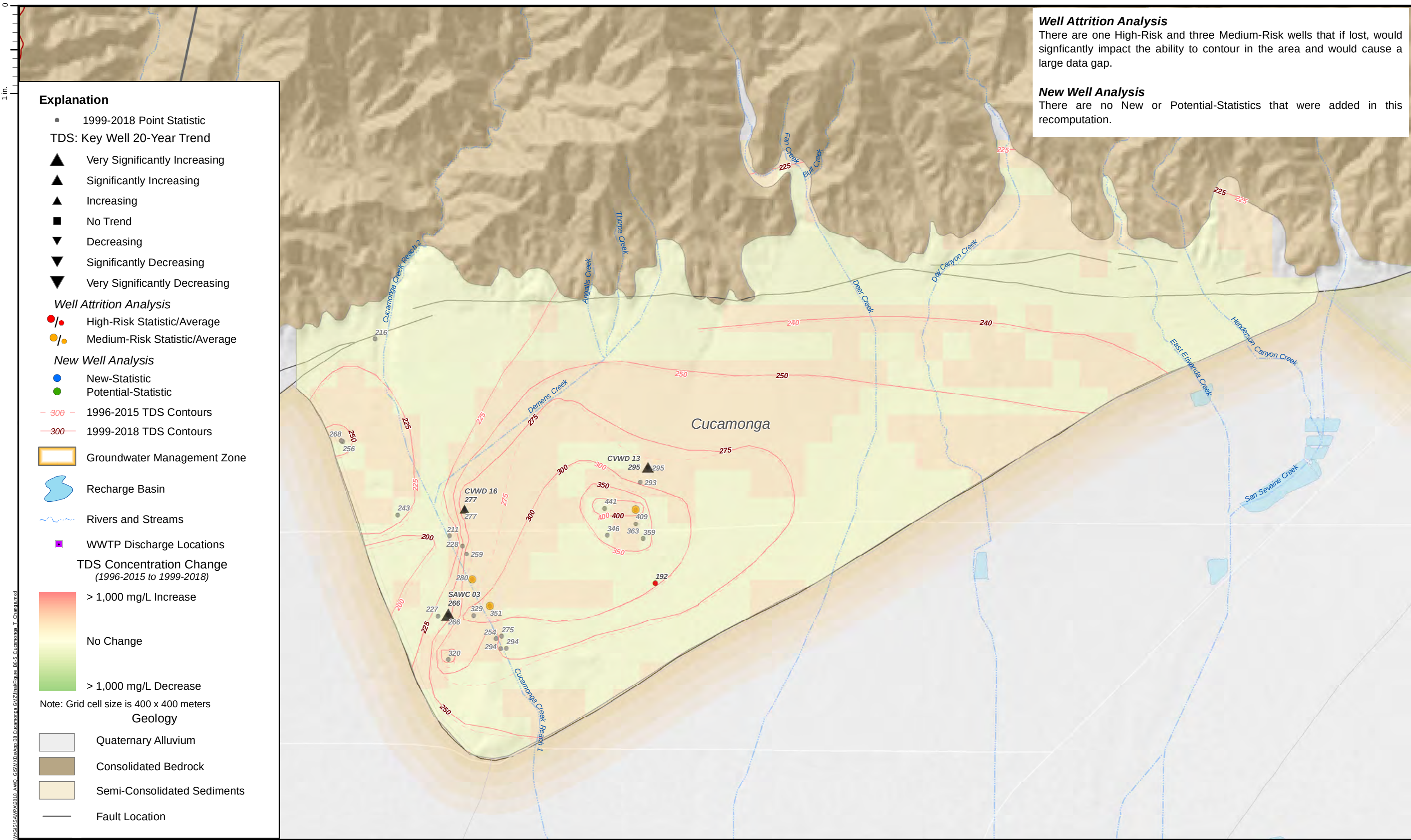












Attachment B9

Elsinore GMZ

Attachment Contents:

B8-1 Groundwater Storage and Elevation Contours Fall 2018

B8-2 NO₃-N Concentration and Contour Map

B8-3 TDS Concentration and Contour Map

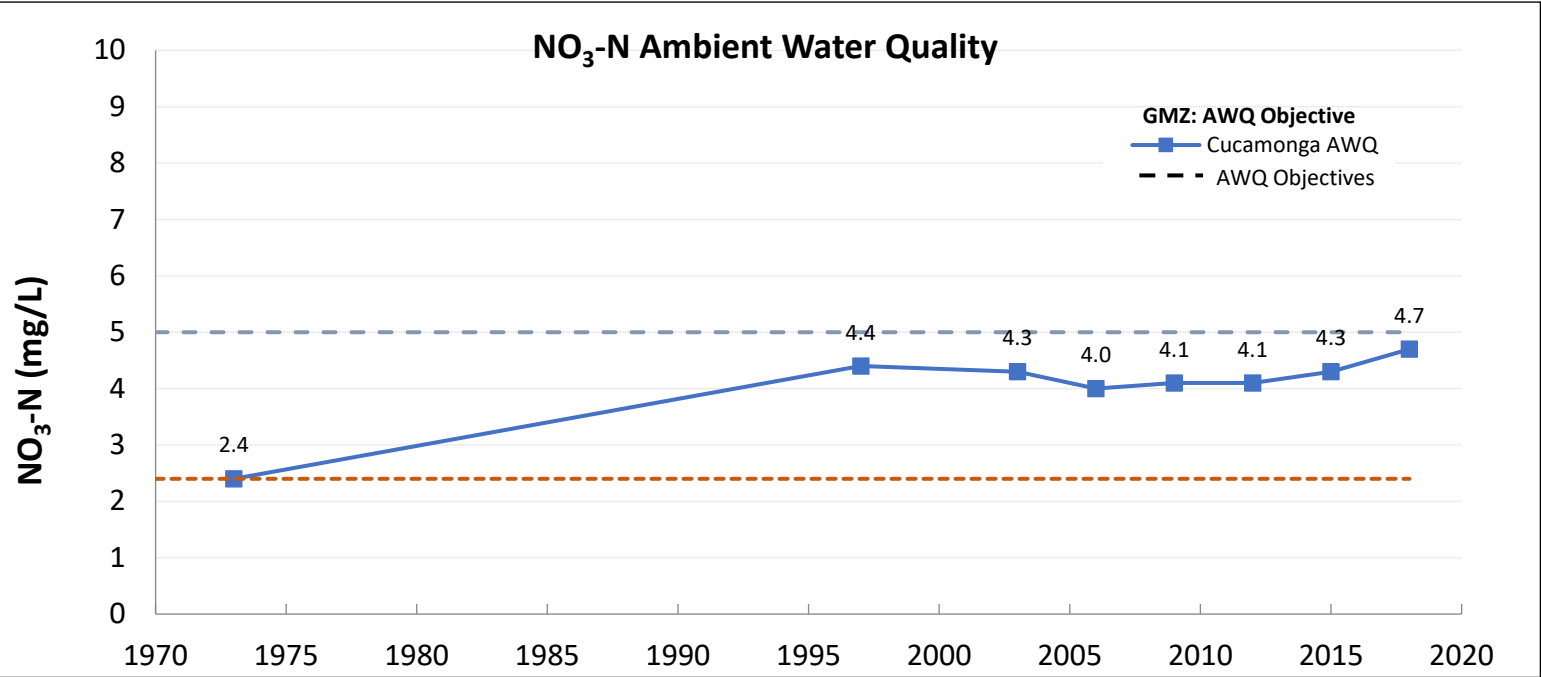
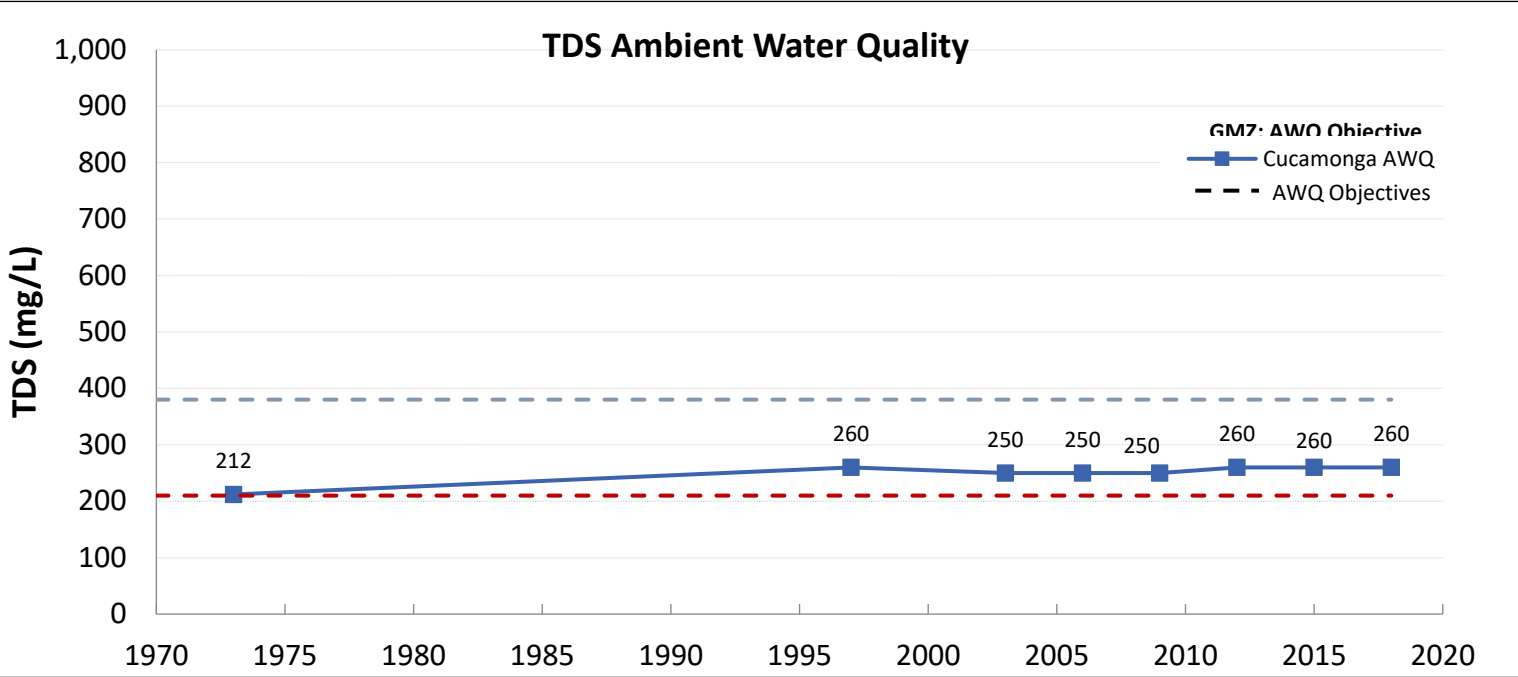
B8-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

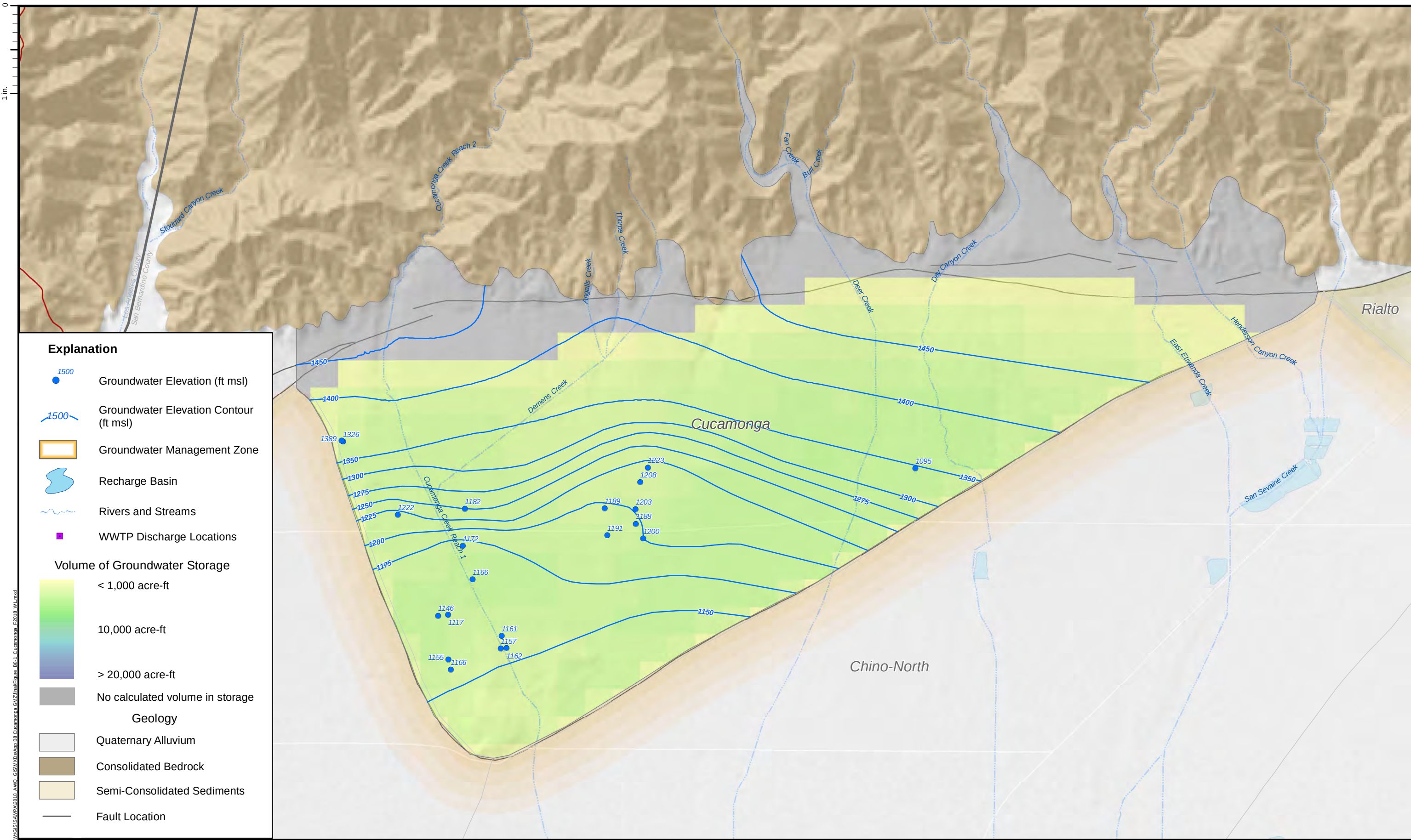
B8-5 TDS Concentration Change (1996-2015 to 1999-2018)

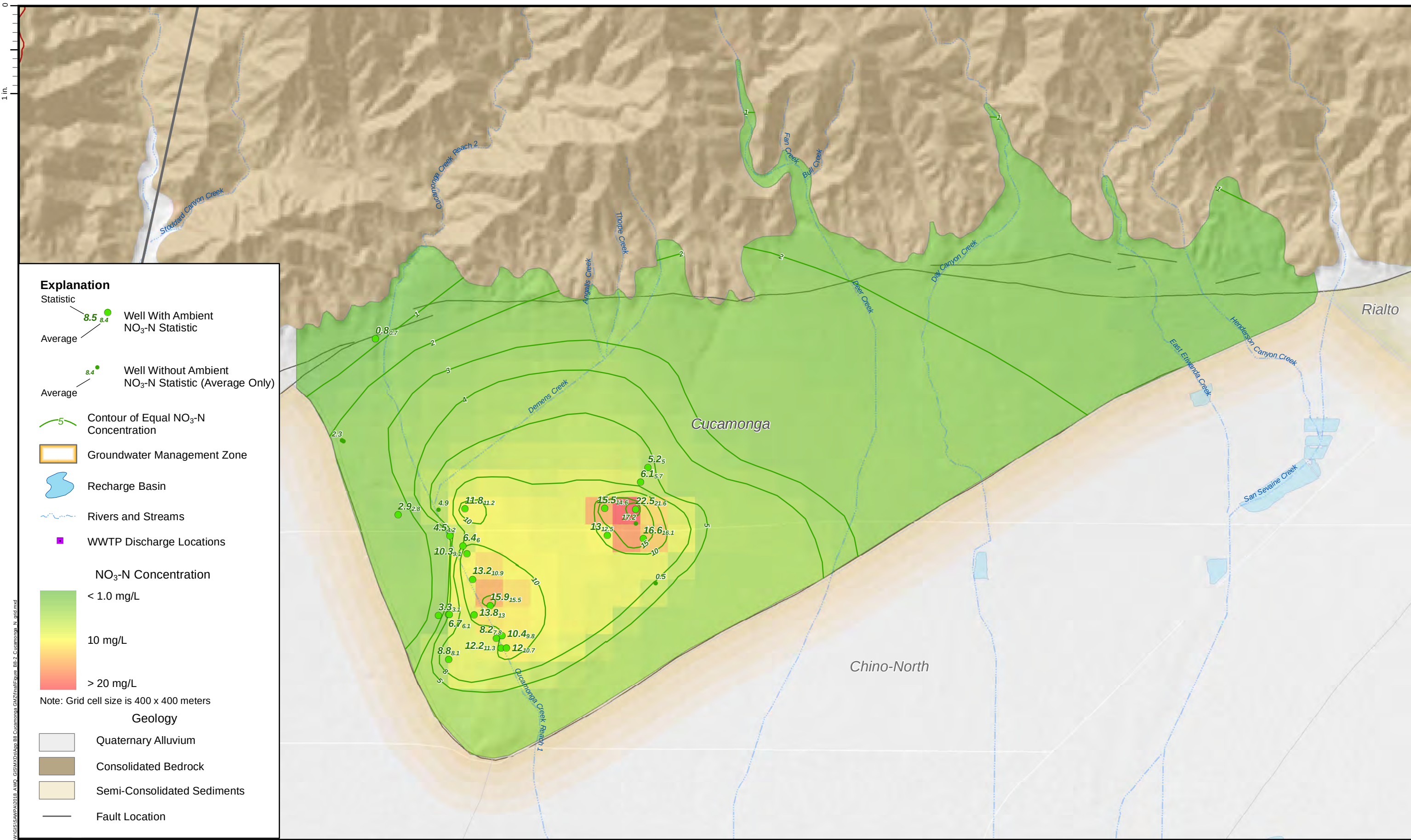


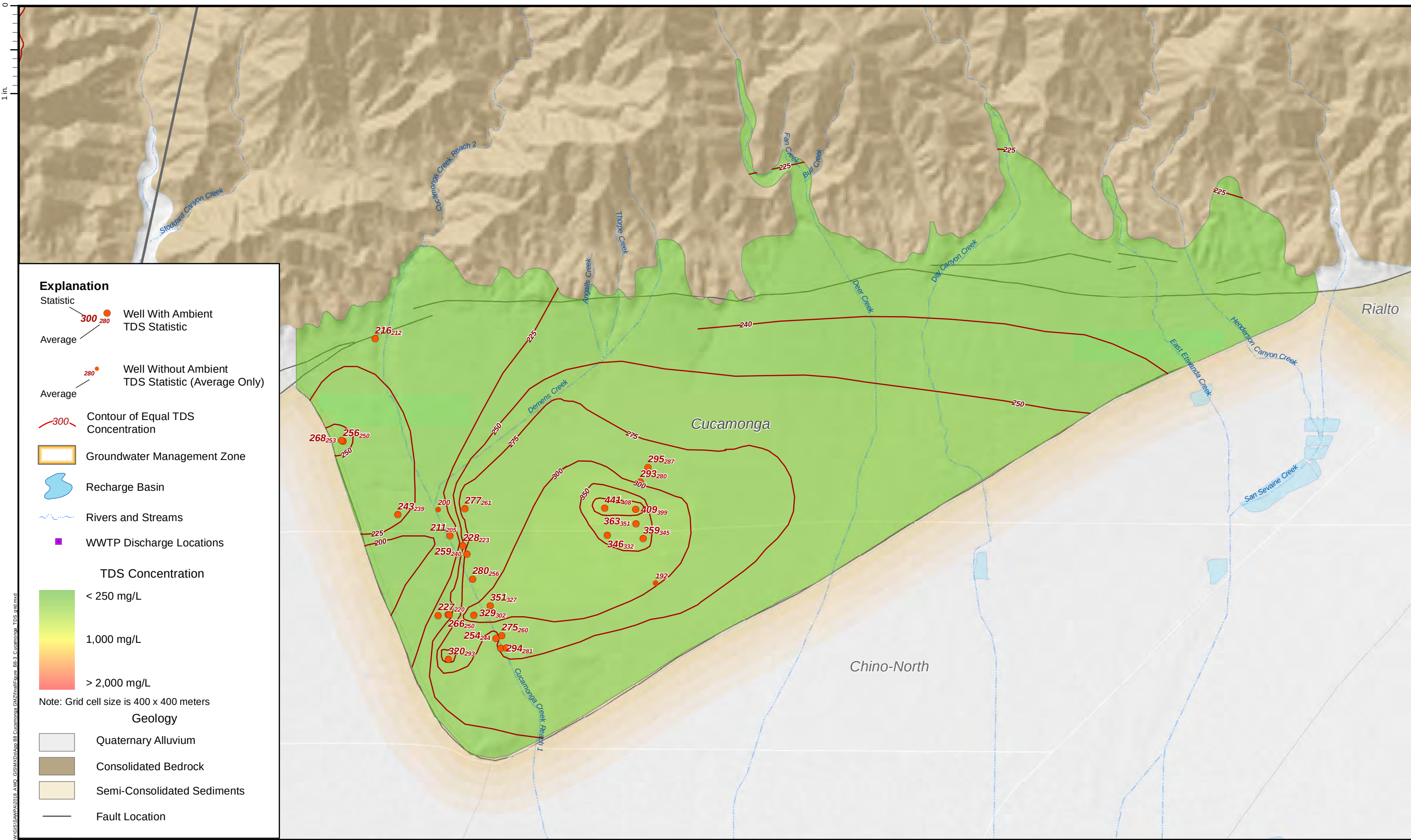
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

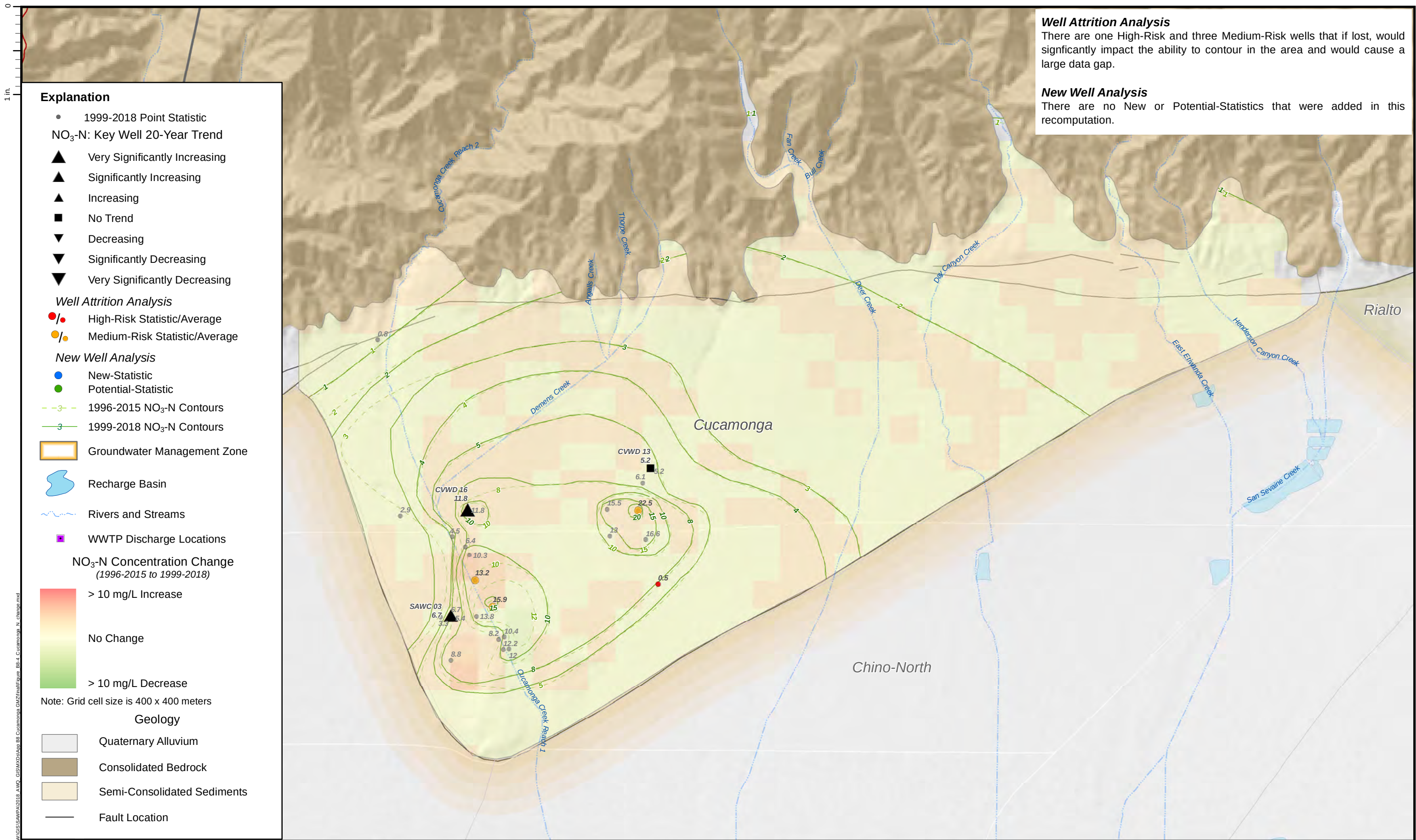
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Cucamonga -- "max benefit"	380	212	260	250	250	250	260	260	260	0	120
Cucamonga -- "antideg"	210	212	260	250	250	250	260	260	260	0	None (-50)
Nitrate as Nitrogen (mg/L)											
Cucamonga -- "max benefit"	5.0	2.4	4.4	4.3	4.0	4.1	4.1	4.3	4.7	0.4	0.3
Cucamonga -- "antideg"	2.4	2.4	4.4	4.3	4.0	4.1	4.1	4.3	4.7	0.4	None (-2.3)

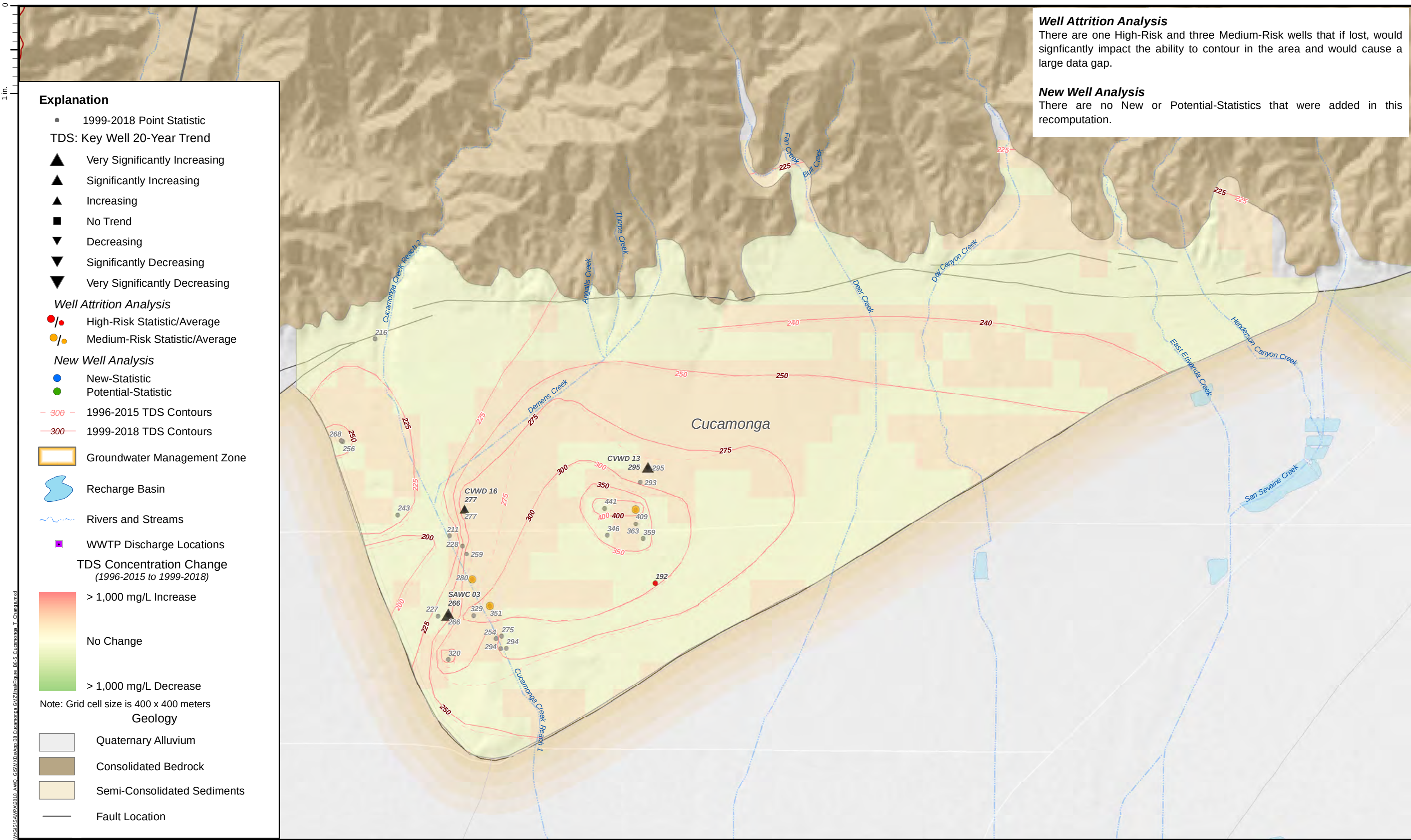












Attachment B10

Lytle GMZ

Attachment Contents:

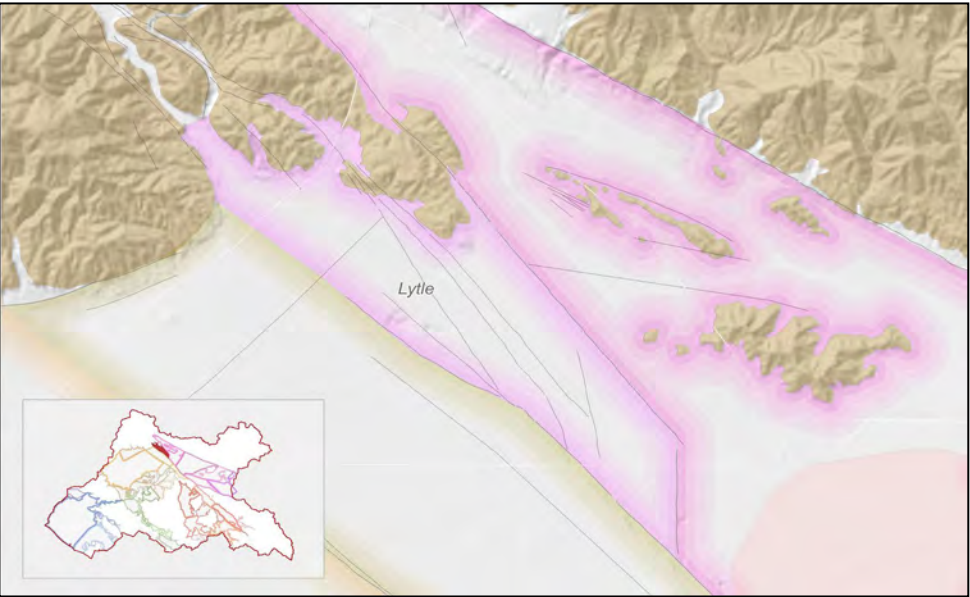
B10-1 Groundwater Storage and Elevation Contours Fall 2018

B10-2 NO₃-N Concentration and Contour Map

B10-3 TDS Concentration and Contour Map

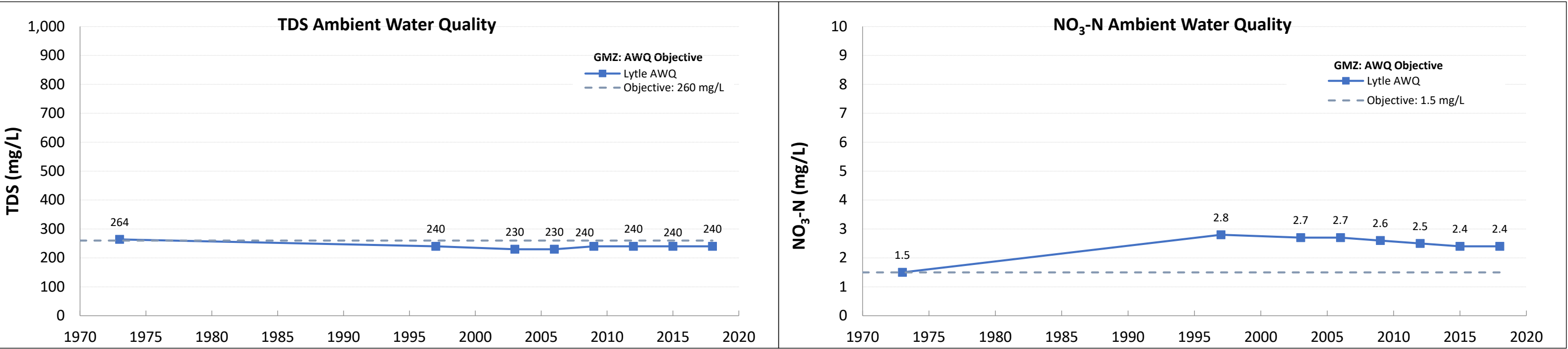
B10-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

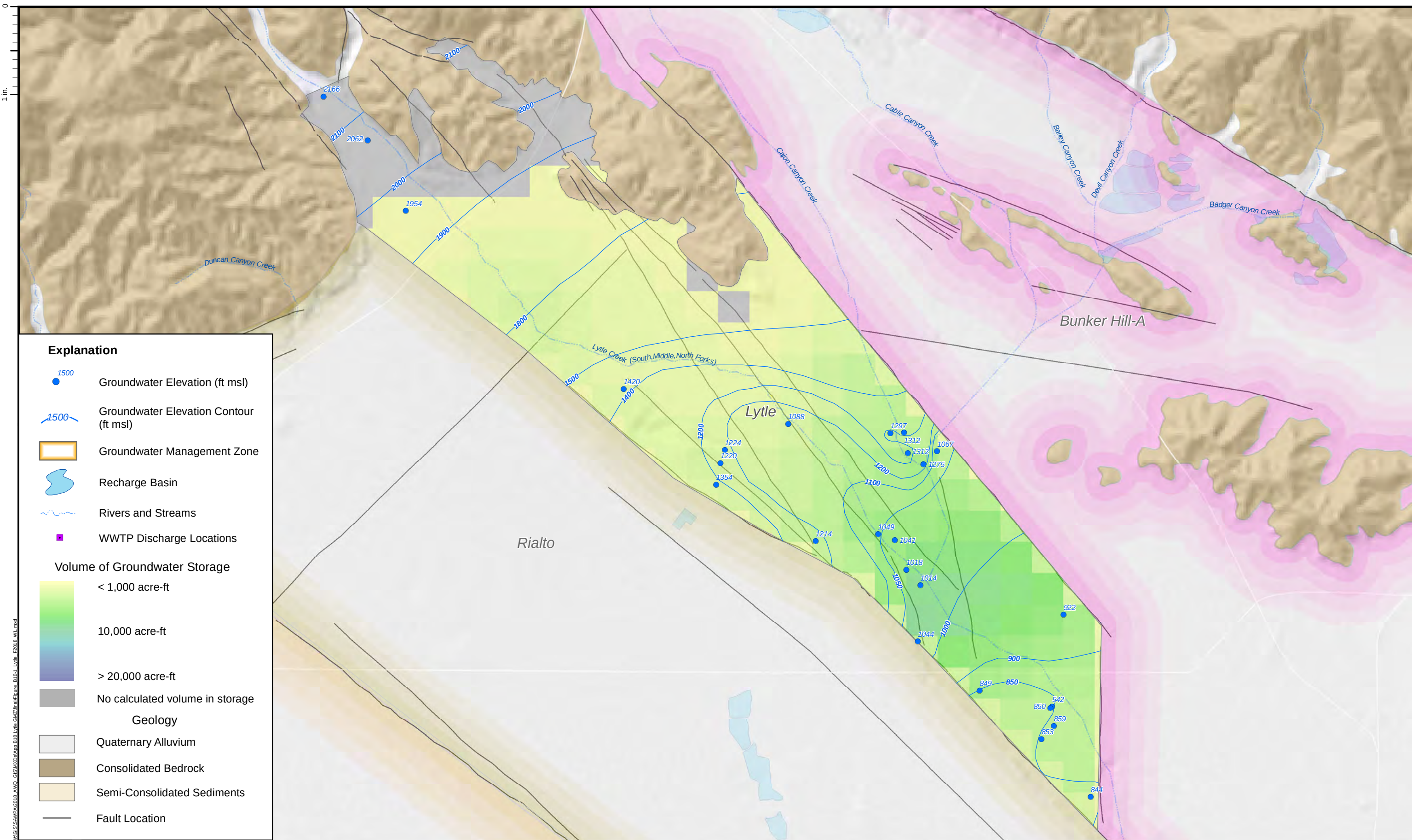
B10-5 TDS Concentration Change (1996-2015 to 1999-2018)

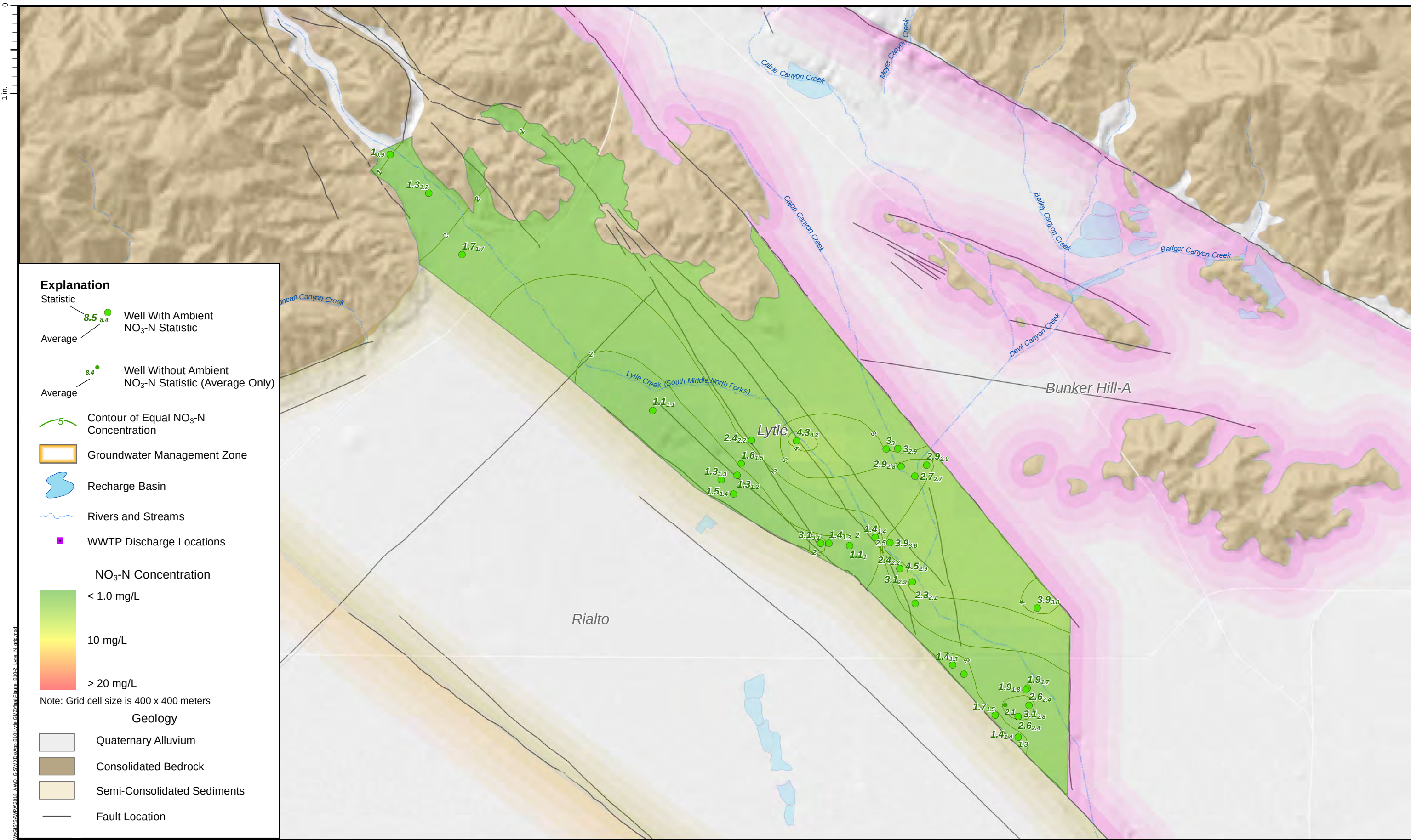


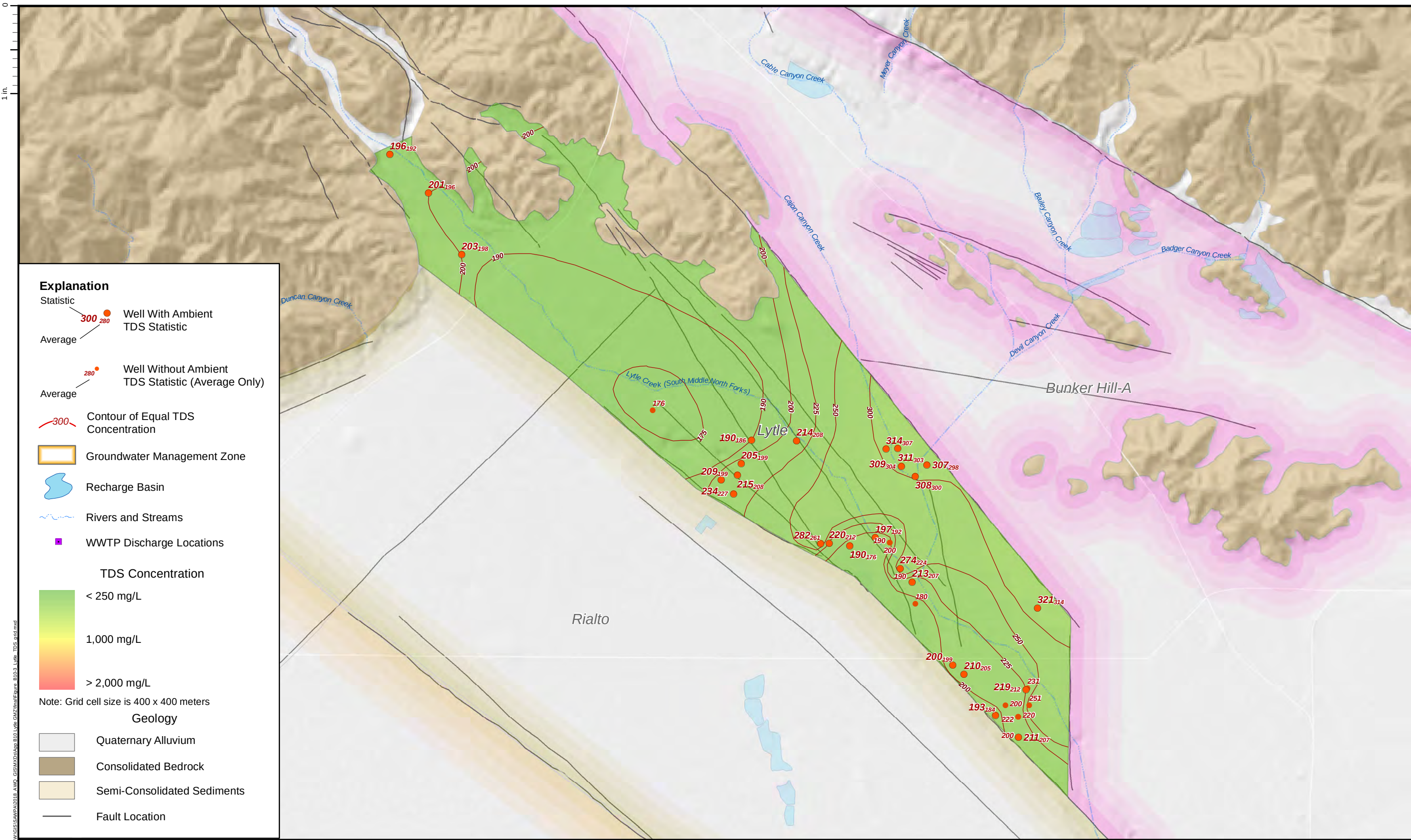
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

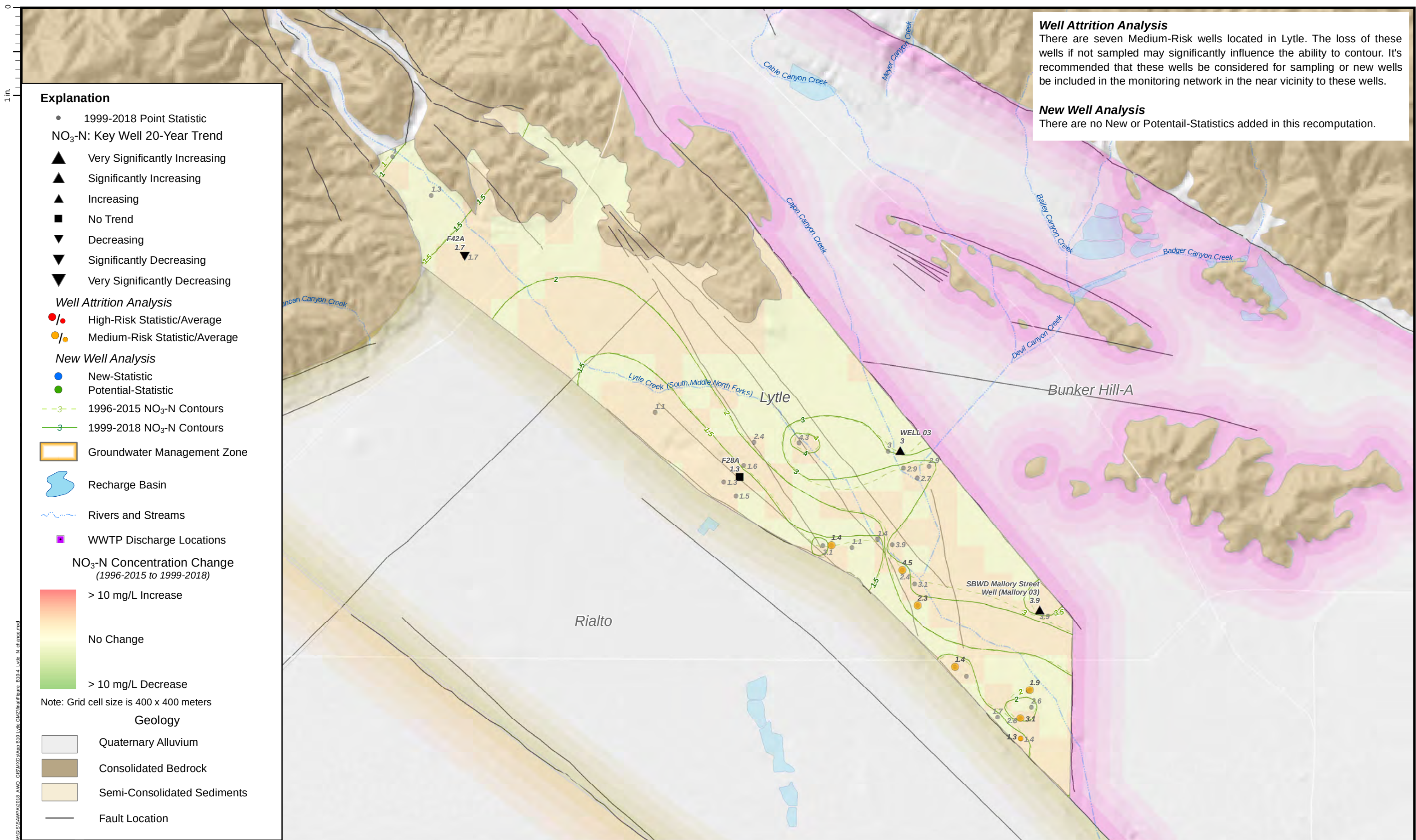
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Lytle	260	264	240	230	230	240	240	240	240	0	20
Nitrate as Nitrogen (mg/L)											
Lytle	1.5	1.5	2.8	2.7	2.7	2.6	2.5	2.4	2.4	0.0	None (-0.9)

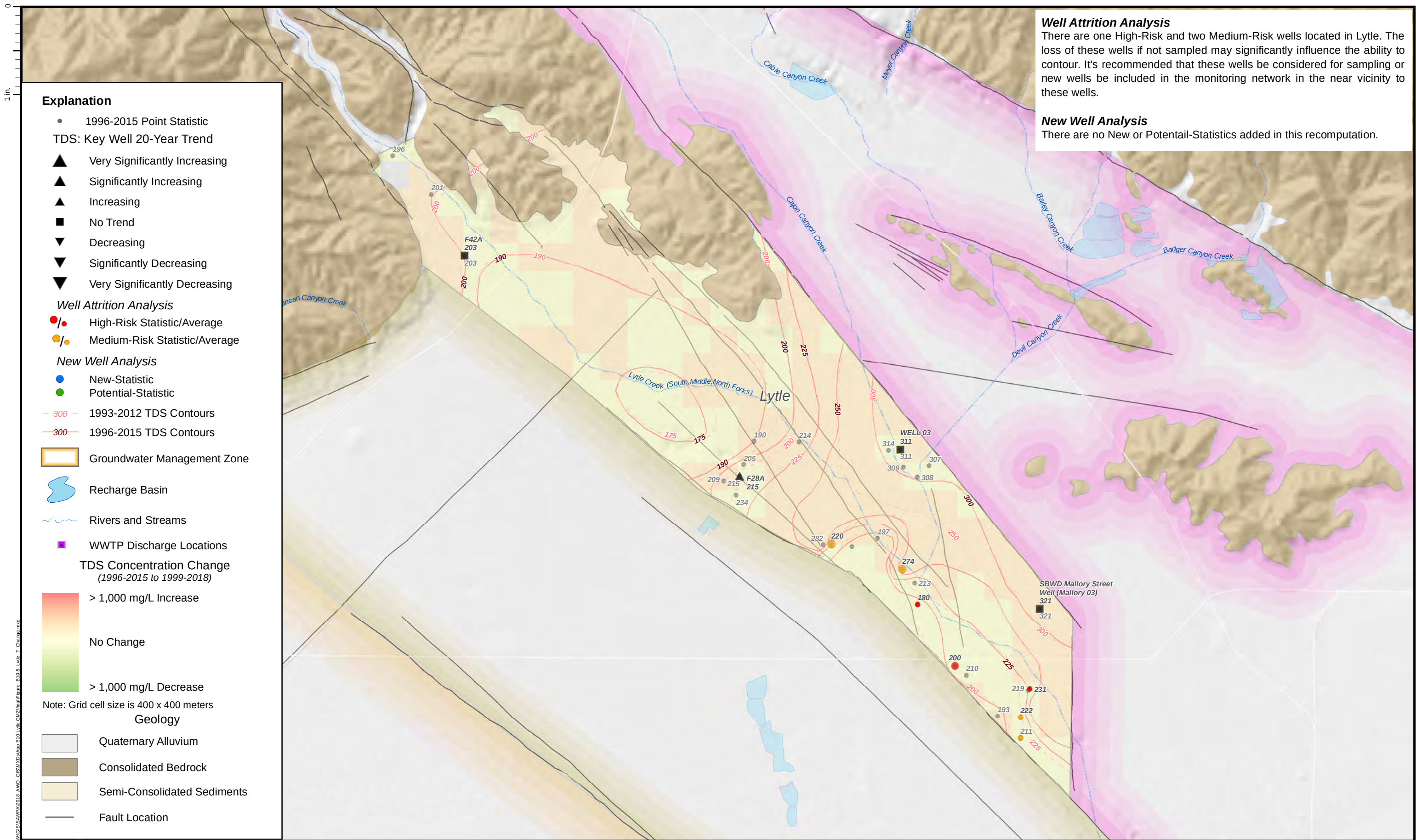












Attachment B11

Orange County and Irvine GMZs

Attachment Contents:

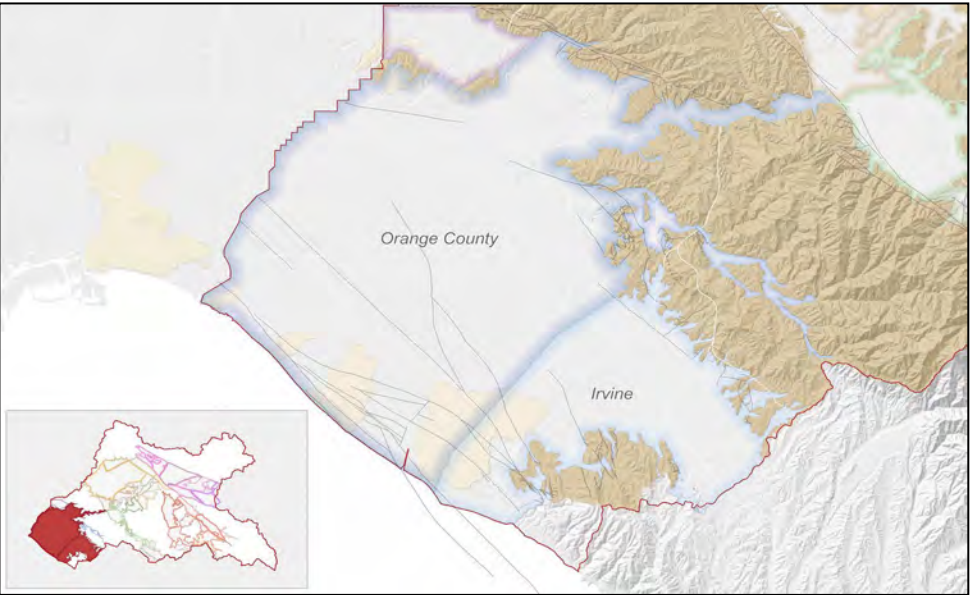
B11-1a,b Groundwater Storage and Elevation Contours Fall 2018

B11-2a,b NO₃-N Concentration and Contour Map

B11-3a,b TDS Concentration and Contour Map

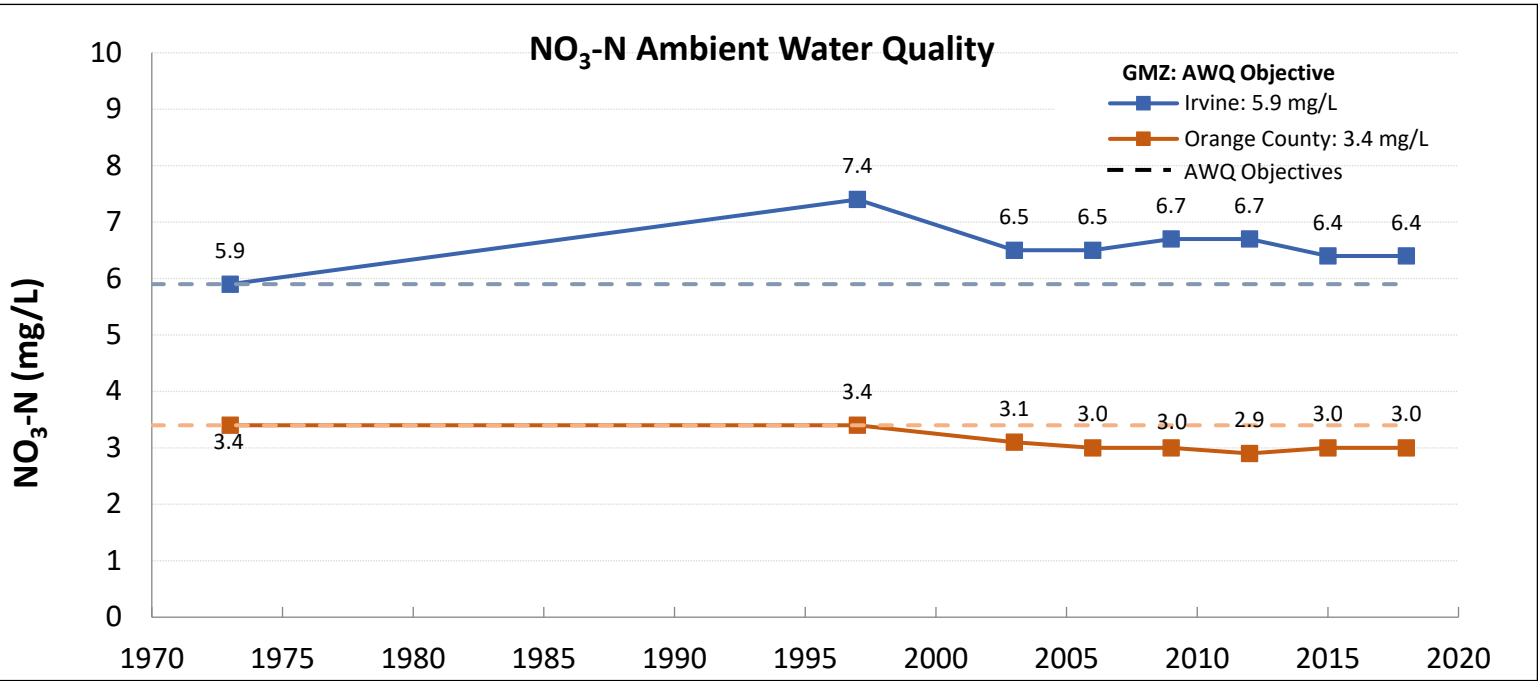
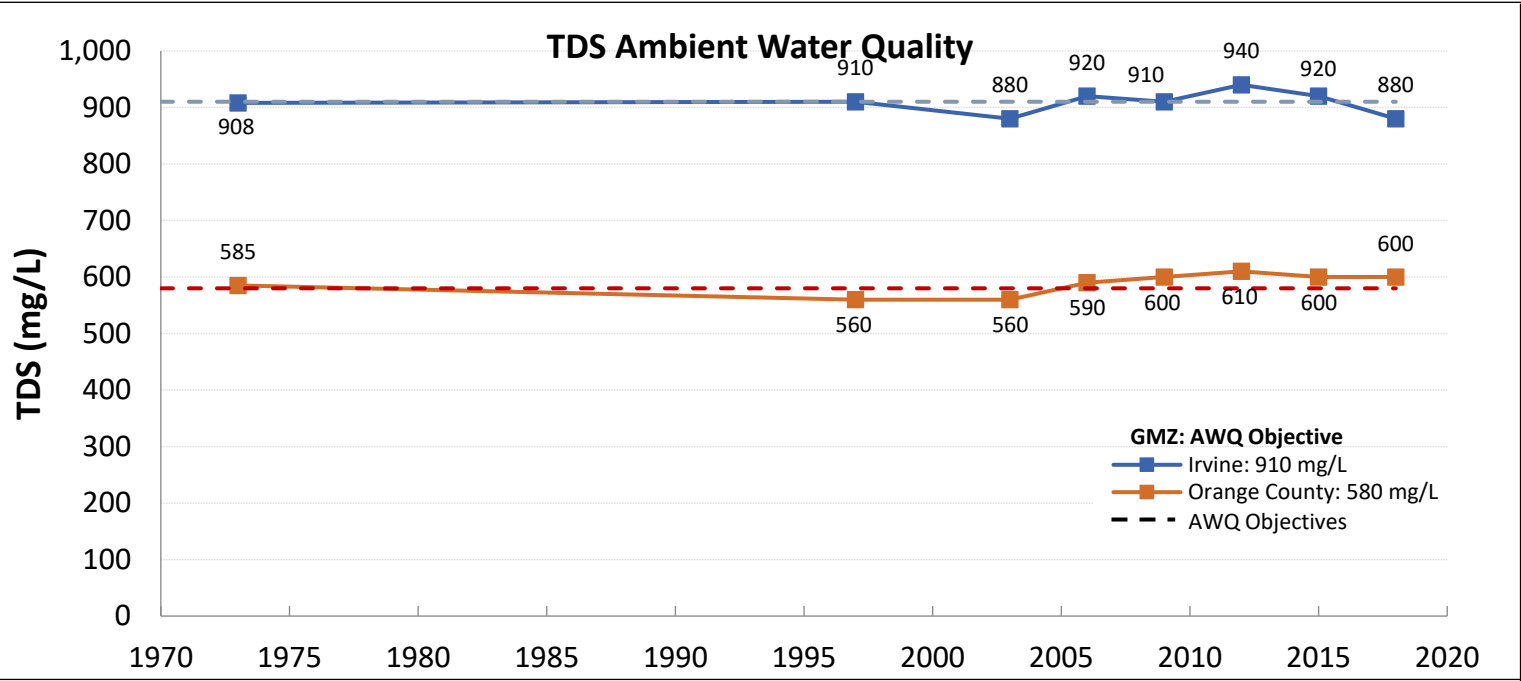
B11-4a,b NO₃-N Concentration Change (1996-2015 to 1999-2018)

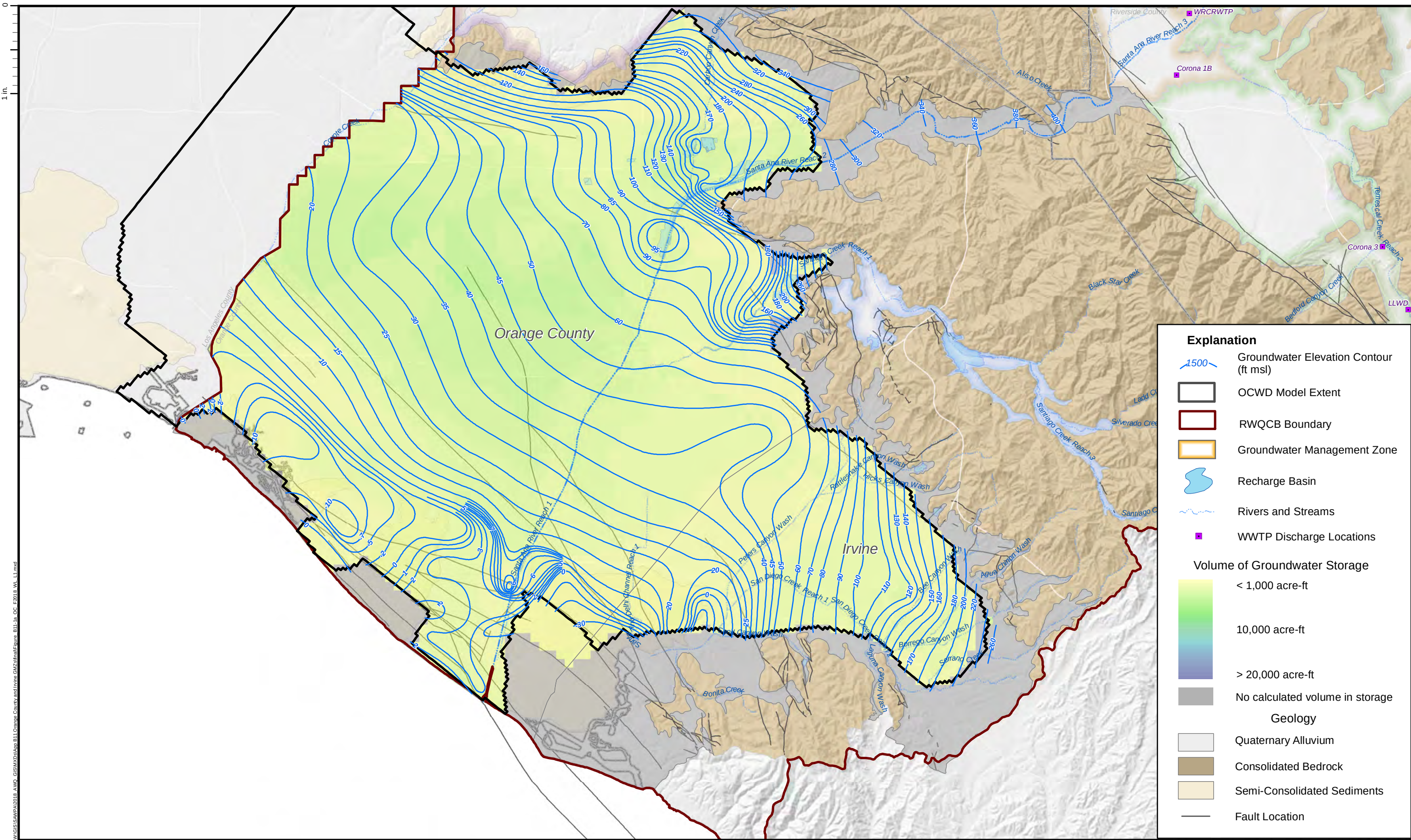
B11-5a,b TDS Concentration Change (1996-2015 to 1999-2018)

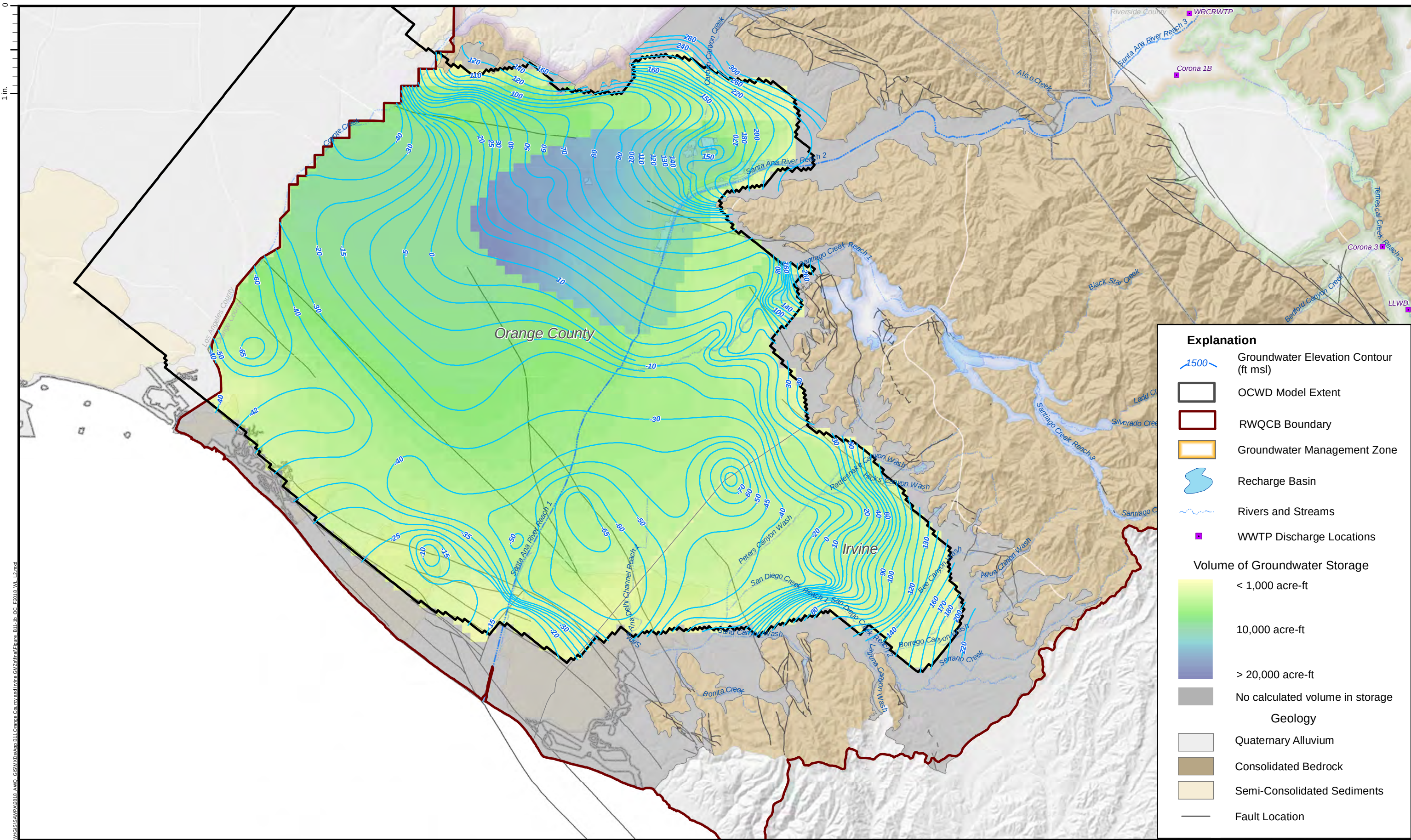


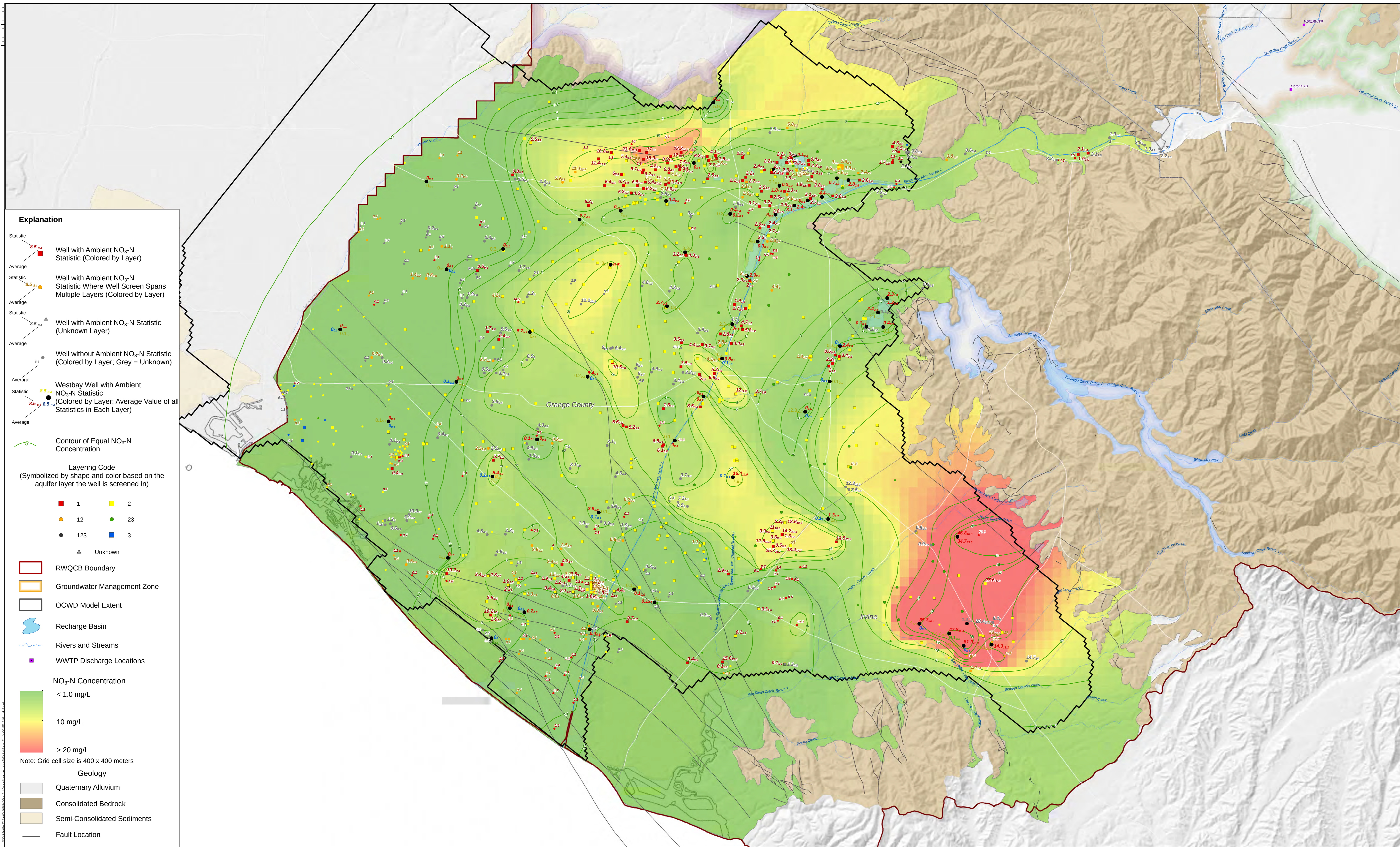
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Irvine	910	908	910	880	920	910	940	920	880	-40	30
Orange County	580	585	560	560	590	600	610	600	600	0	None (-20)
Nitrate as Nitrogen (mg/L)											
Irvine	5.9	5.9	7.4	6.5	6.5	6.7	6.7	6.4	6.4	0.0	None (-0.5)
Orange County	3.4	3.4	3.4	3.1	3.0	3.0	2.9	3.0	3.0	0.0	0.4









Explanation

Statistic

8.5 8.4

Well with Ambient NO₃-N
Statistic (Colored by Layer)

Average

8.5 8.4

Well with Ambient NO₃-N
Statistic Where Well Screen Spans
Multiple Layers (Colored by Layer)

Average

8.5 8.4

Well with Ambient NO₃-N Statistic
(Unknown Layer)

Average

8.4

Well without Ambient NO₃-N Statistic
(Colored by Layer; Grey = Unknown)

Statistic

8.5 8.4

Westbay Well with Ambient
NO₃-N Statistic
(Colored by Layer; Average Value of all
Statistics in Each Layer)

Average

8.5 8.4

5

Contour of Equal NO₃-N
Concentration

Layering Code
(Symbolized by shape and color based on the
aquifer layer the well is screened in)

1

2

12

23

123

3

Unknown

RWQCB Boundary

Groundwater Management Zone

OCWD Model Extent

Recharge Basin

Rivers and Streams

WWTP Discharge Locations

NO₃-N Concentration

< 1.0 mg/L

10 mg/L

> 20 mg/L

Note: Grid cell size is 400 x 400 meters

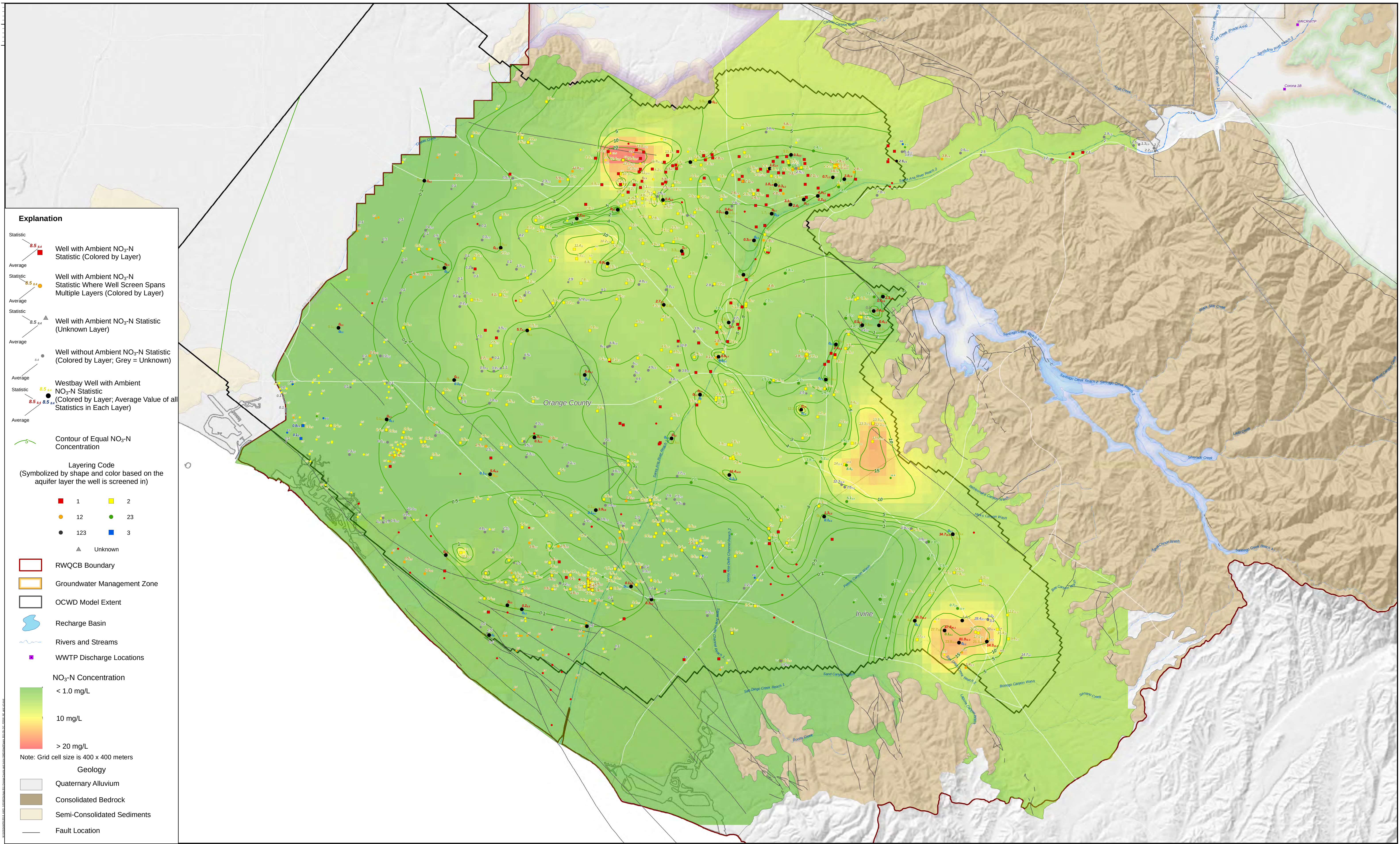
Geology

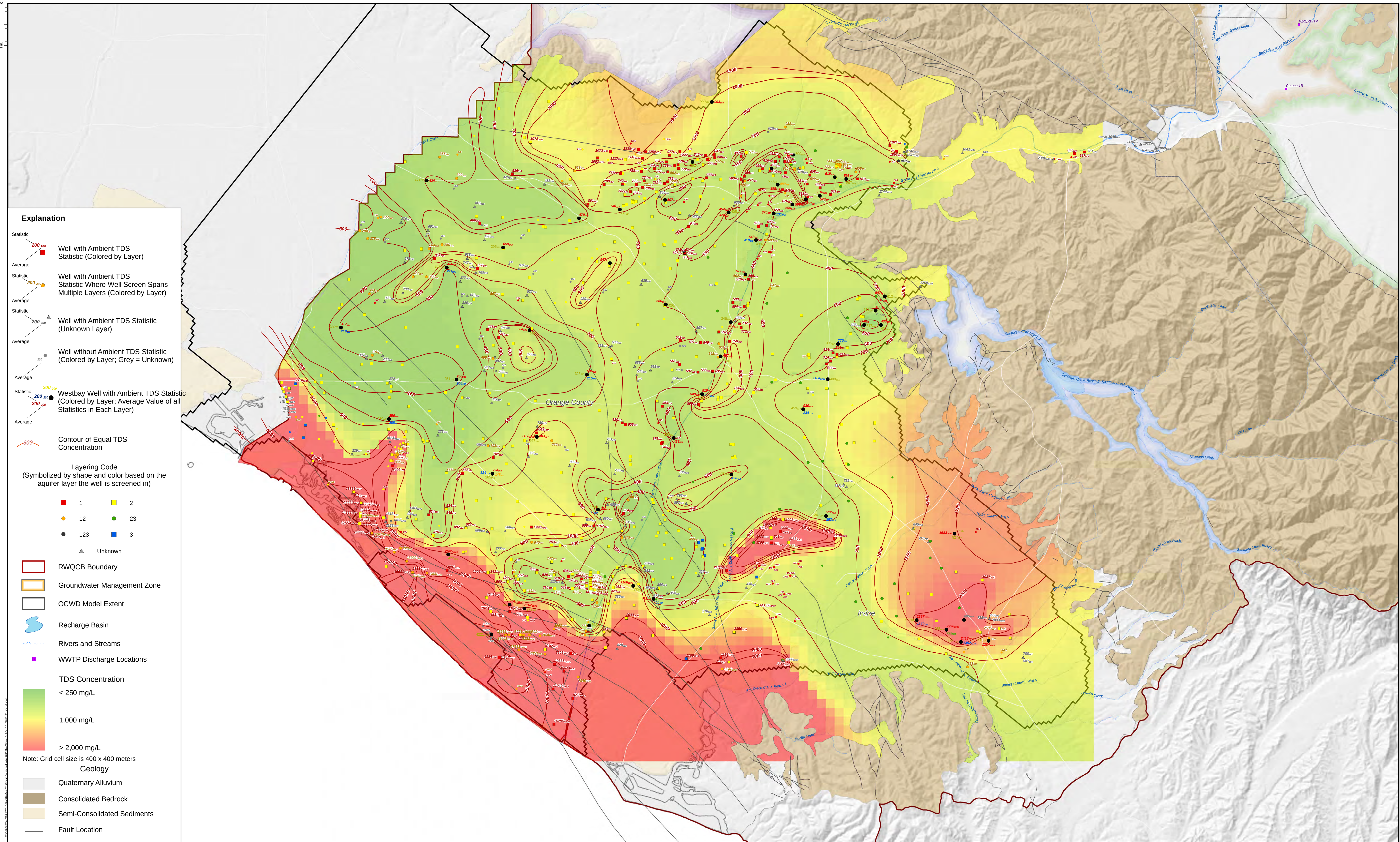
Quaternary Alluvium

Consolidated Bedrock

Semi-Consolidated Sediments

Fault Location





Explanation

Statistic

200 200

Well with Ambient TDS
Statistic (Colored by Layer)

Average

Statistic

200 200

Well with Ambient TDS
Statistic Where Well Screen Spans
Multiple Layers (Colored by Layer)

Average

Statistic

200 200

Well with Ambient TDS Statistic
(Unknown Layer)

Average

Statistic

200 200

Well without Ambient TDS Statistic
(Colored by Layer; Grey = Unknown)

Statistic

200 200

Westbay Well with Ambient TDS Statistic
(Colored by Layer; Average Value of all
Statistics in Each Layer)

Average

Statistic

200 200

Contour of Equal TDS
Concentration

Layering Code
(Symbolized by shape and color based on the
aquifer layer the well is screened in)

1

2

12

23

123

3

Unknown

RWQCB Boundary

Groundwater Management Zone

OCWD Model Extent

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

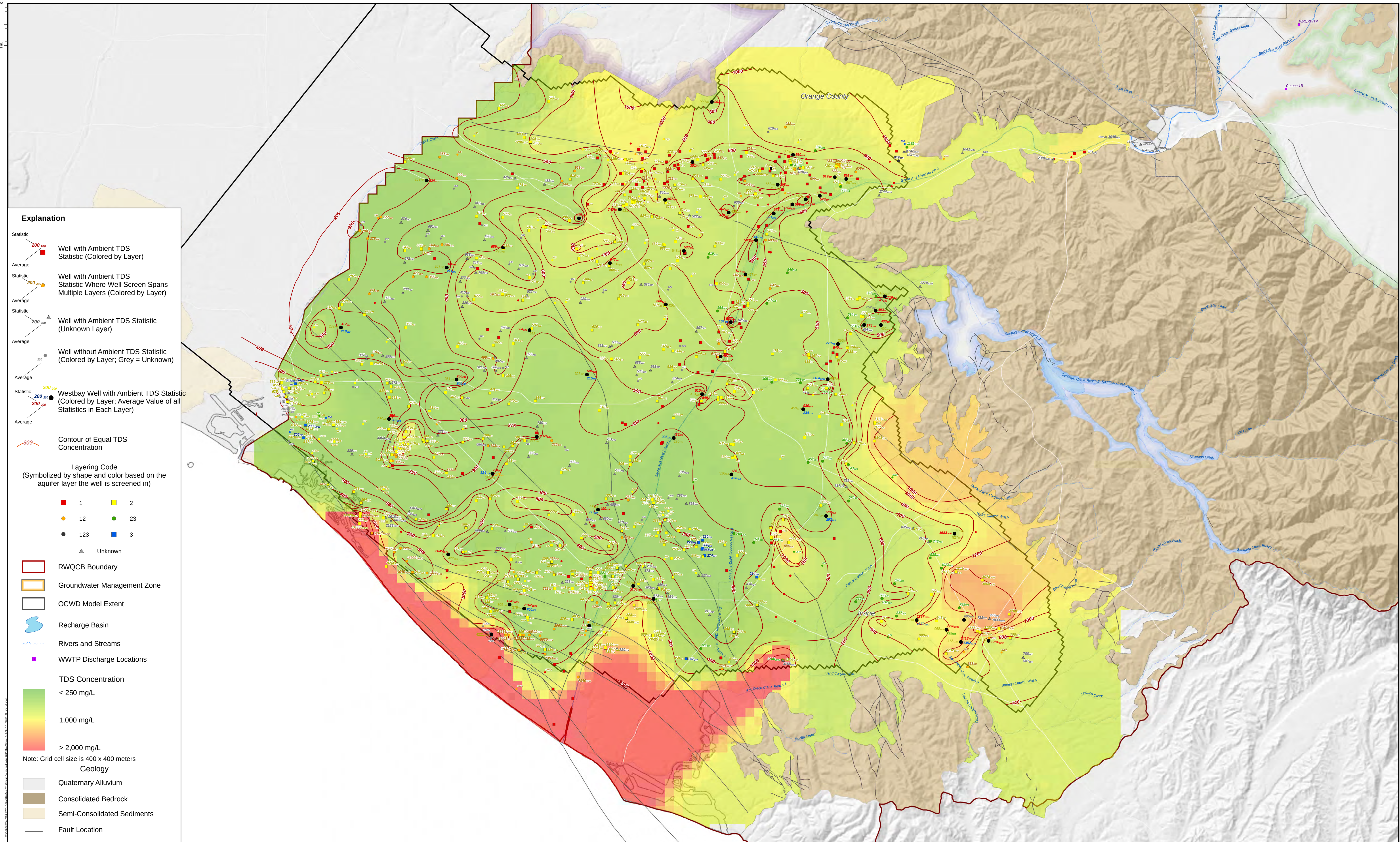
Quaternary Alluvium

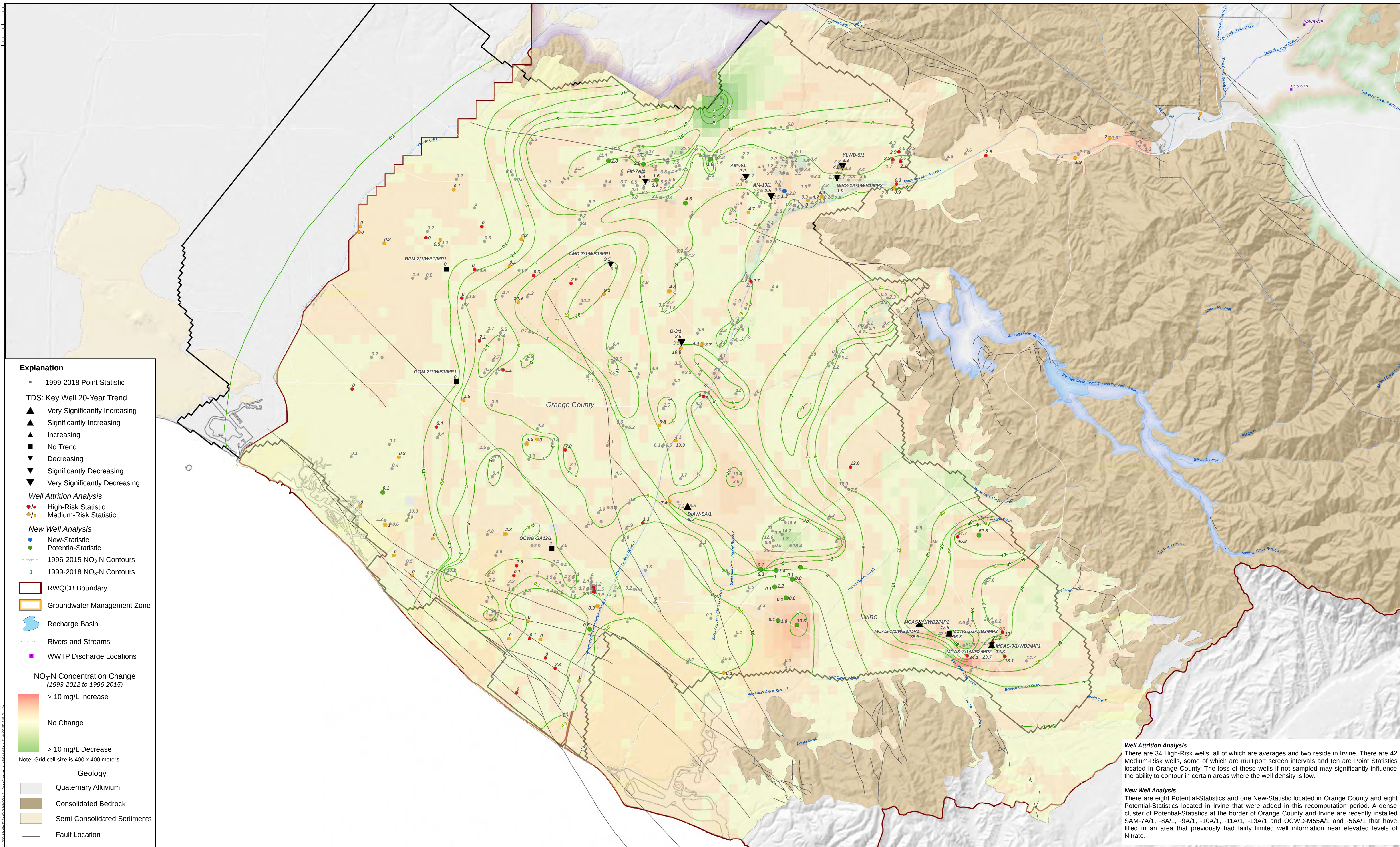
Consolidated Bedrock

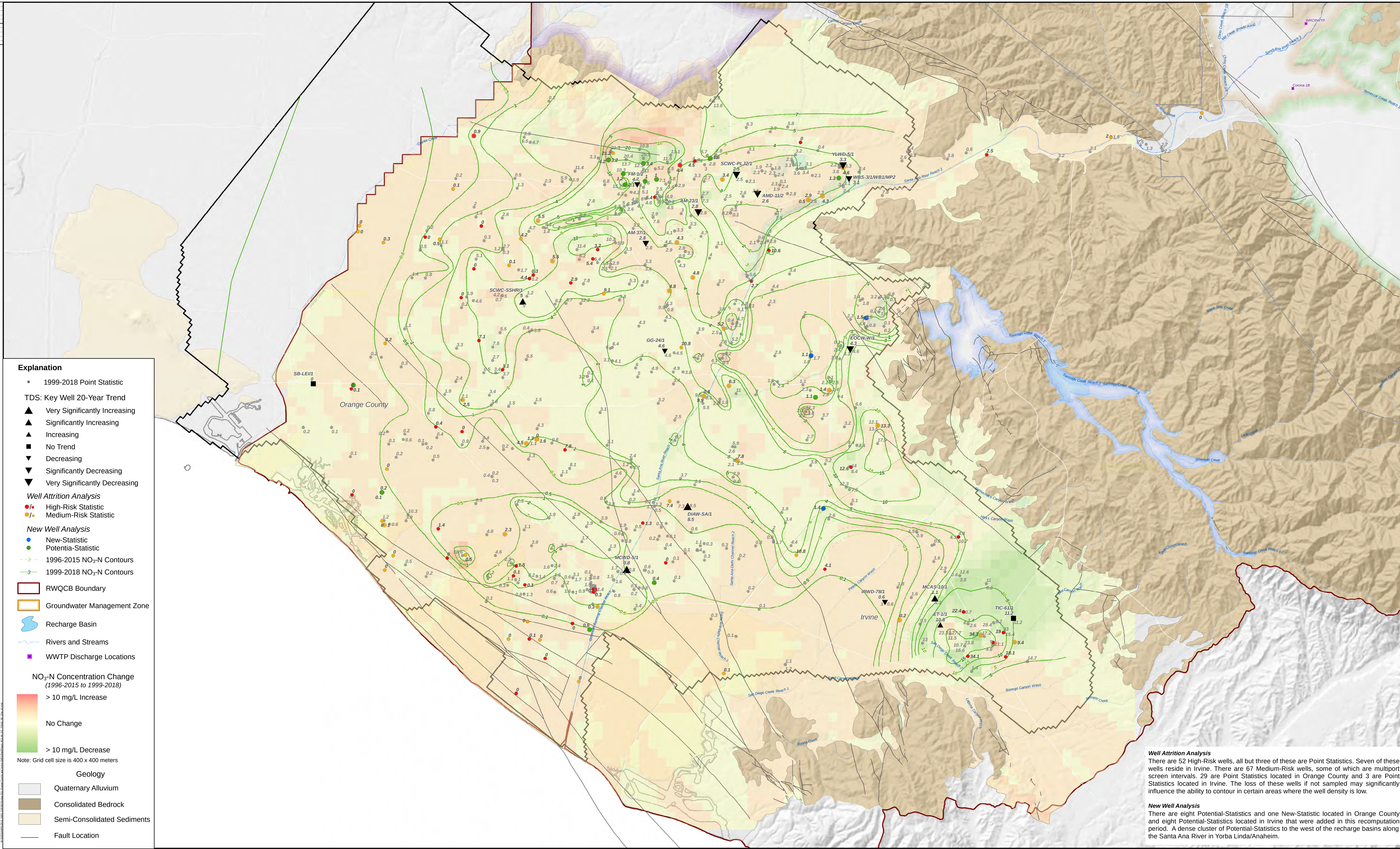
Semi-Consolidated Sediments

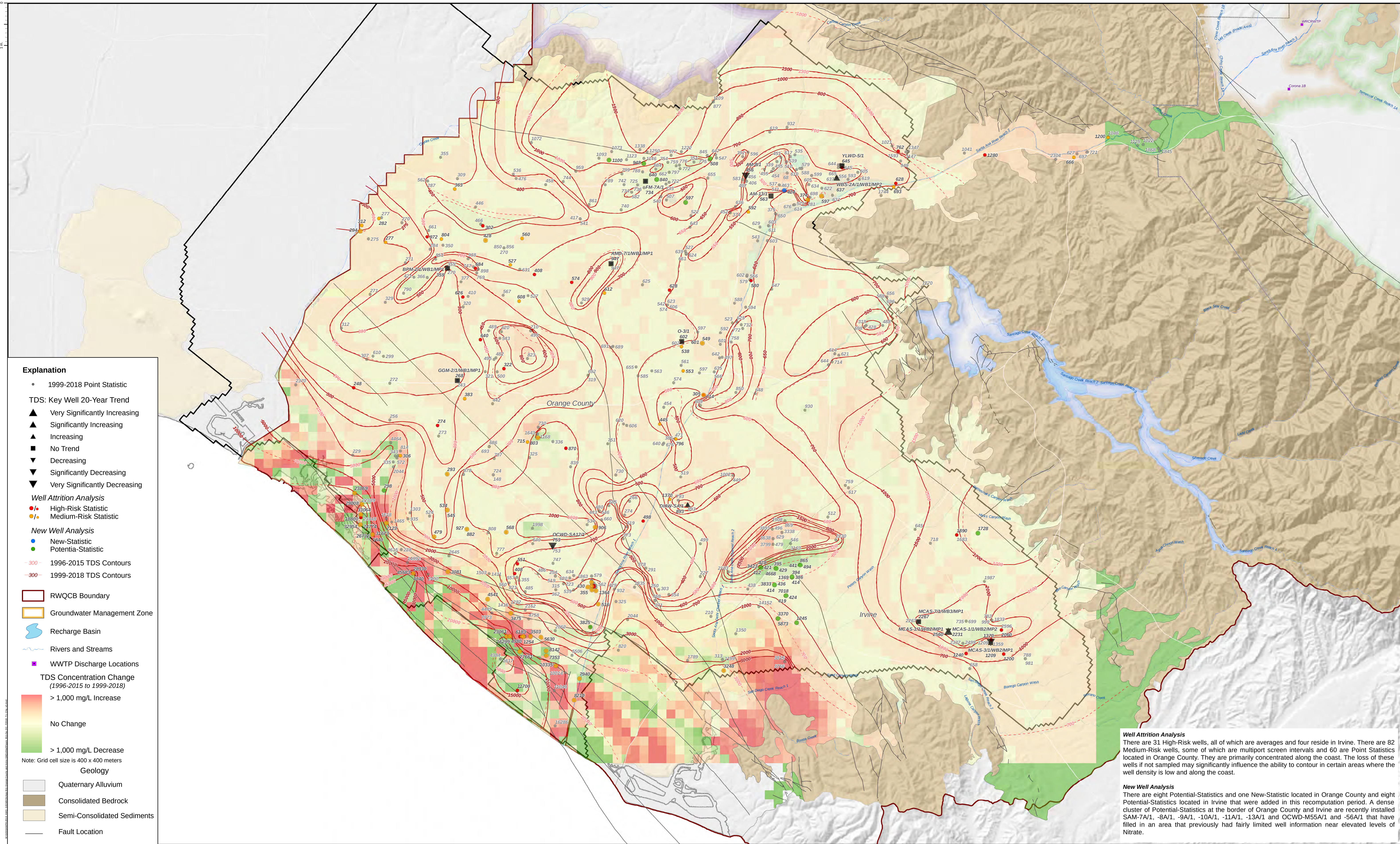
Fault Location

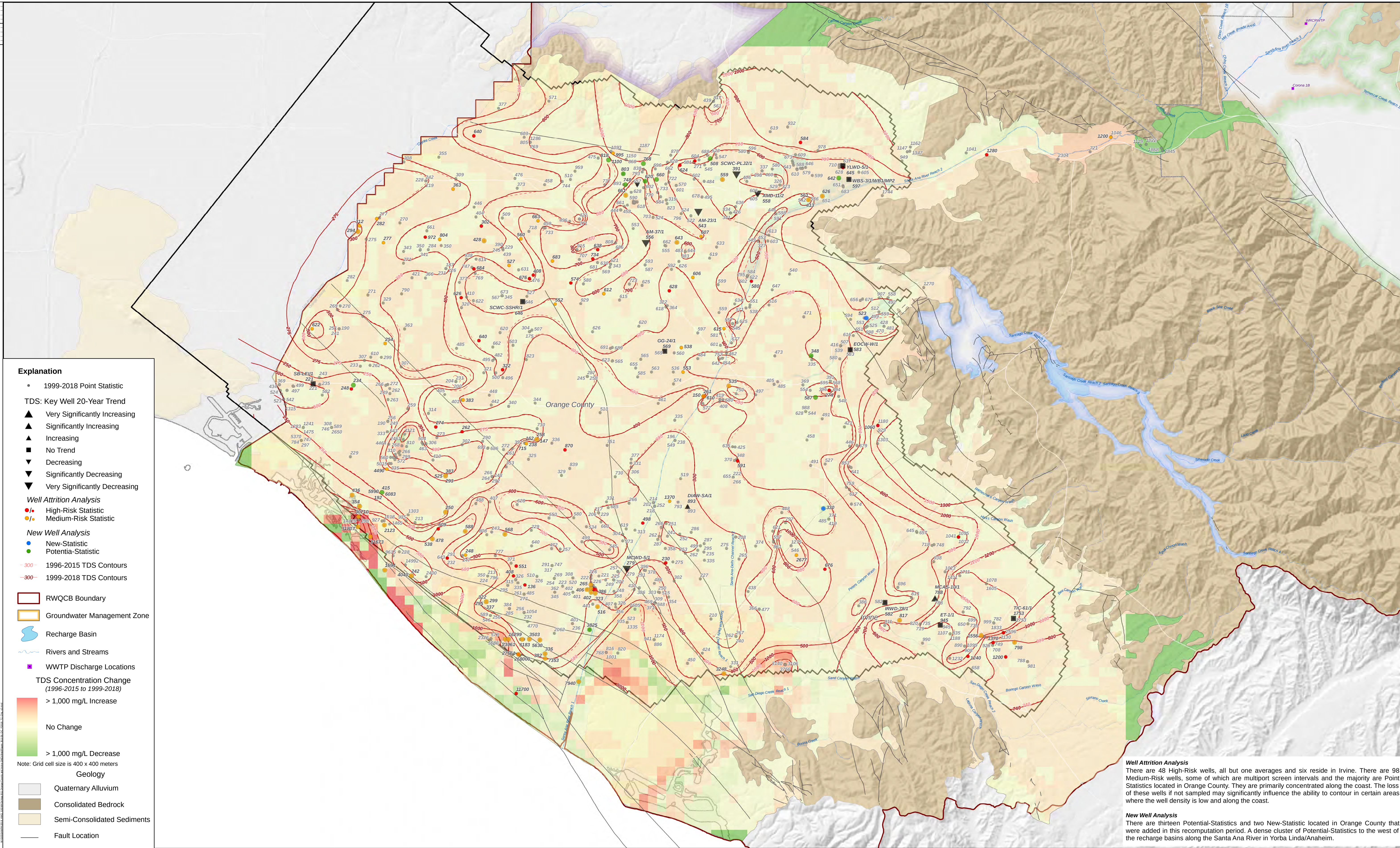












Well Attrition Analysis
There are 48 High-Risk wells, all but one averages and six reside in Irvine. There are 98 Medium-Risk wells, some of which are multiport screen intervals and the majority are Point Statistics located in Orange County. They are primarily concentrated along the coast. The loss of these wells if not sampled may significantly influence the ability to contour in certain areas where the well density is low and along the coast.

New Well Analysis
There are thirteen Potential-Statistics and two New-Statistic located in Orange County that were added in this recomputation period. A dense cluster of Potential-Statistics to the west of the recharge basins along the Santa Ana River in Yorba Linda/Anaheim.

Attachment B12

Rialto and Colton GMZs

Attachment Contents:

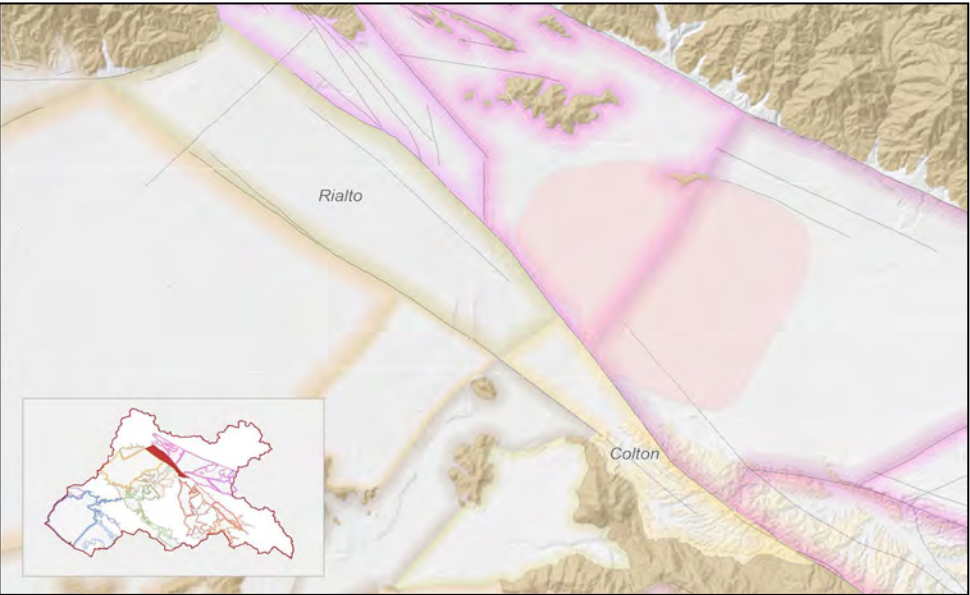
B12-1 Groundwater Storage and Elevation Contours Fall 2018

B12-2 NO₃-N Concentration and Contour Map

B12-3 TDS Concentration and Contour Map

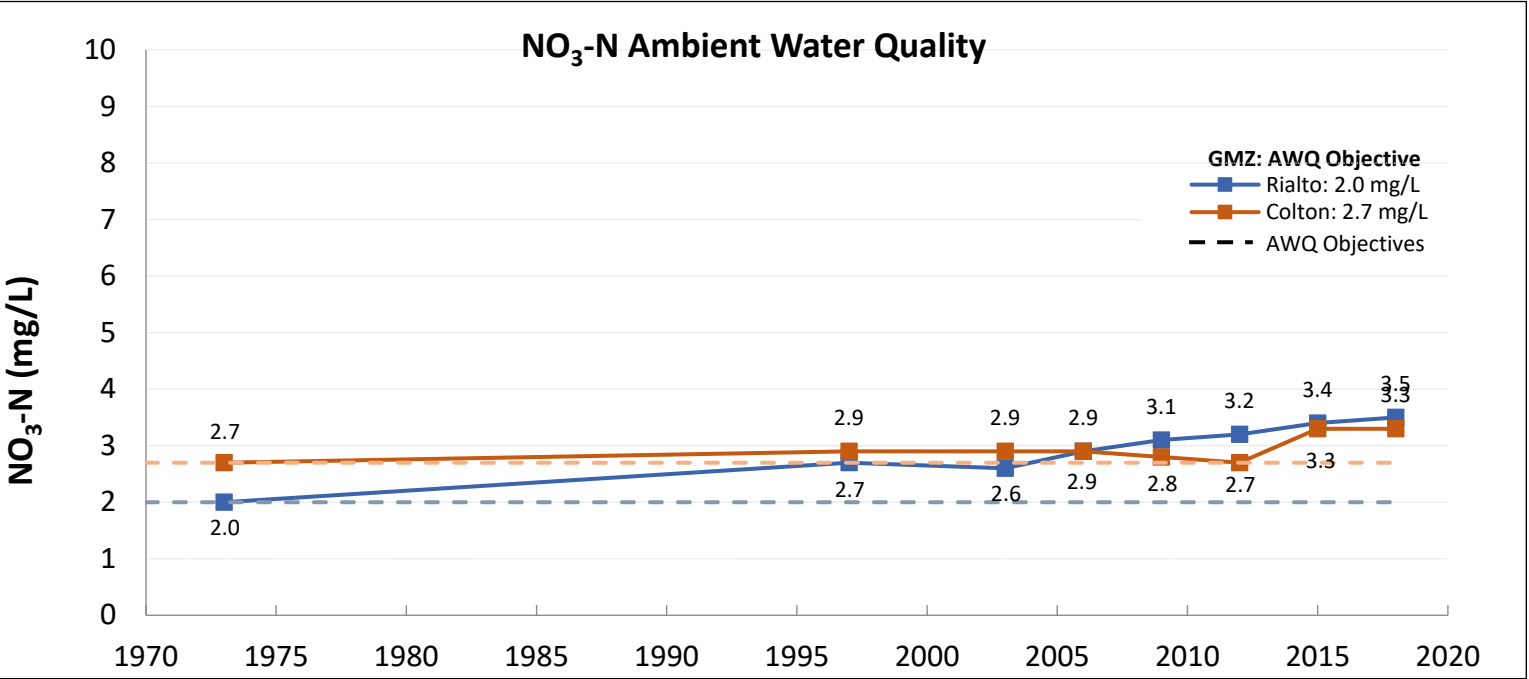
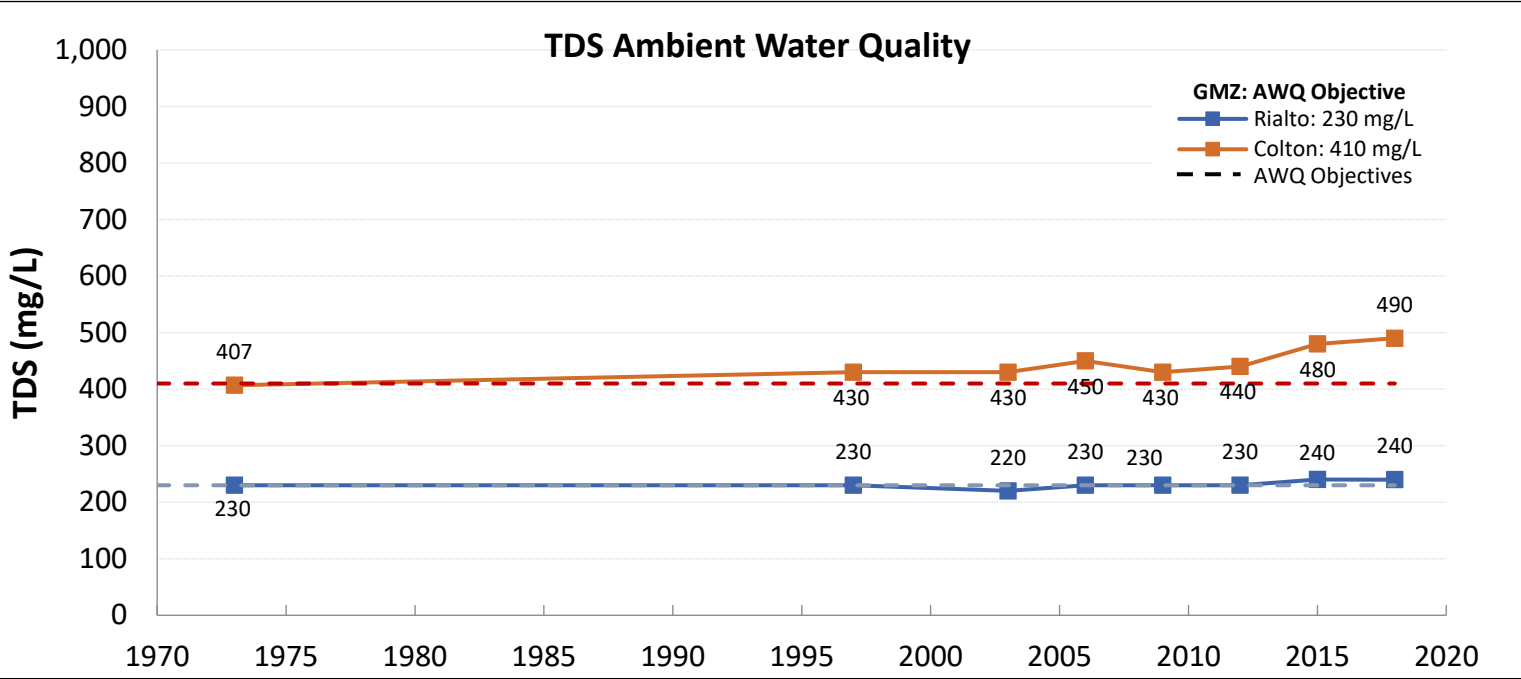
B12-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

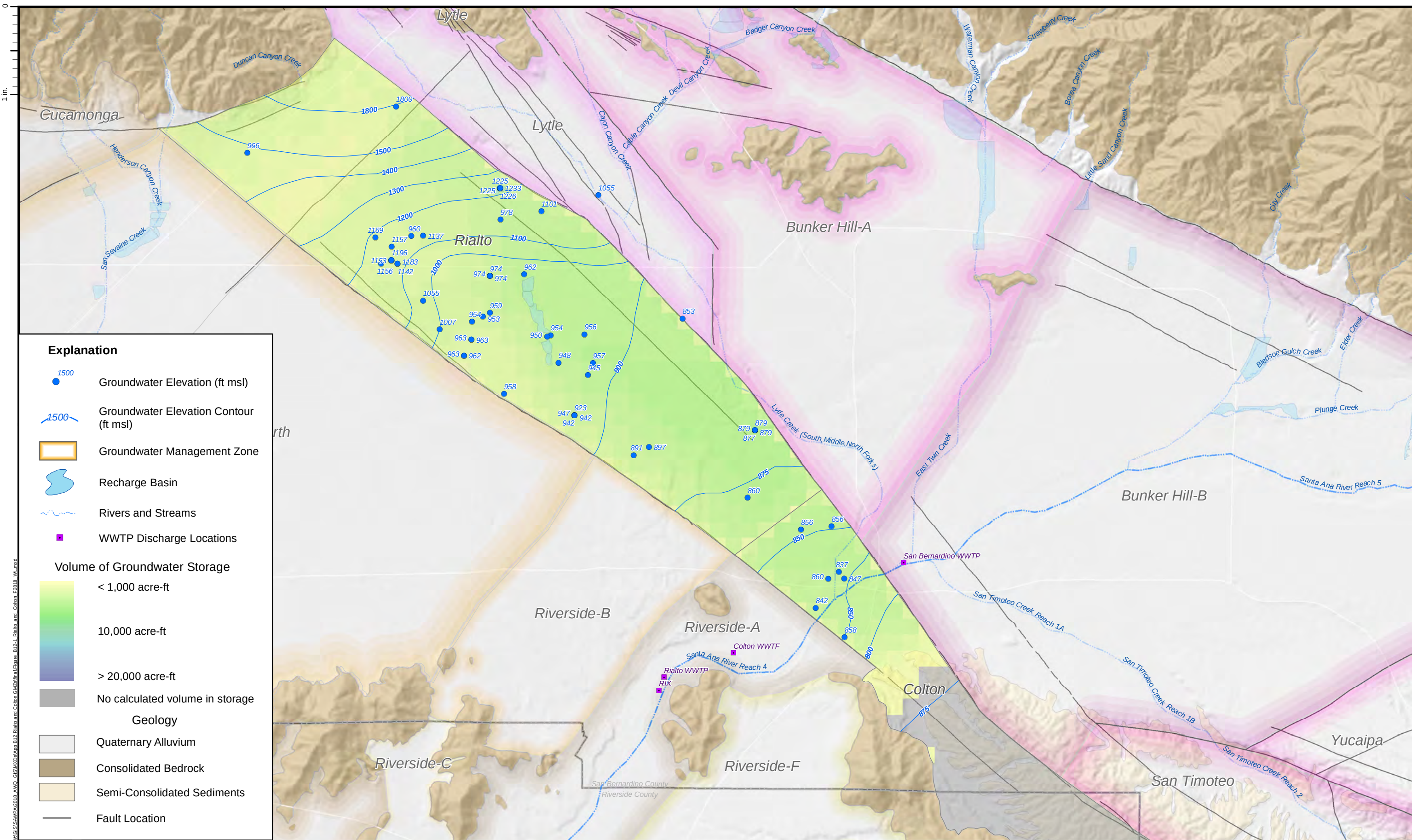
B12-5 TDS Concentration Change (1996-2015 to 1999-2018)

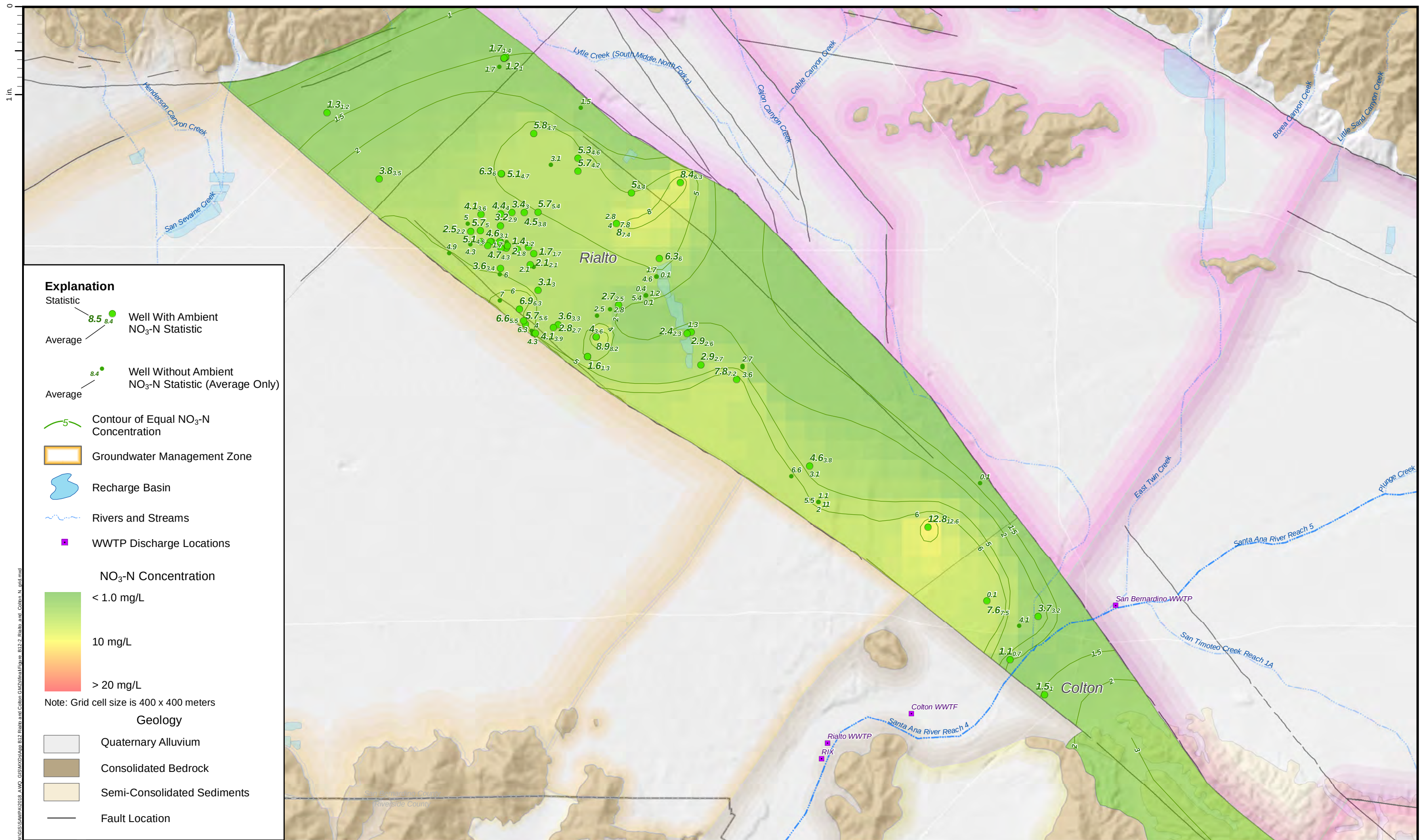


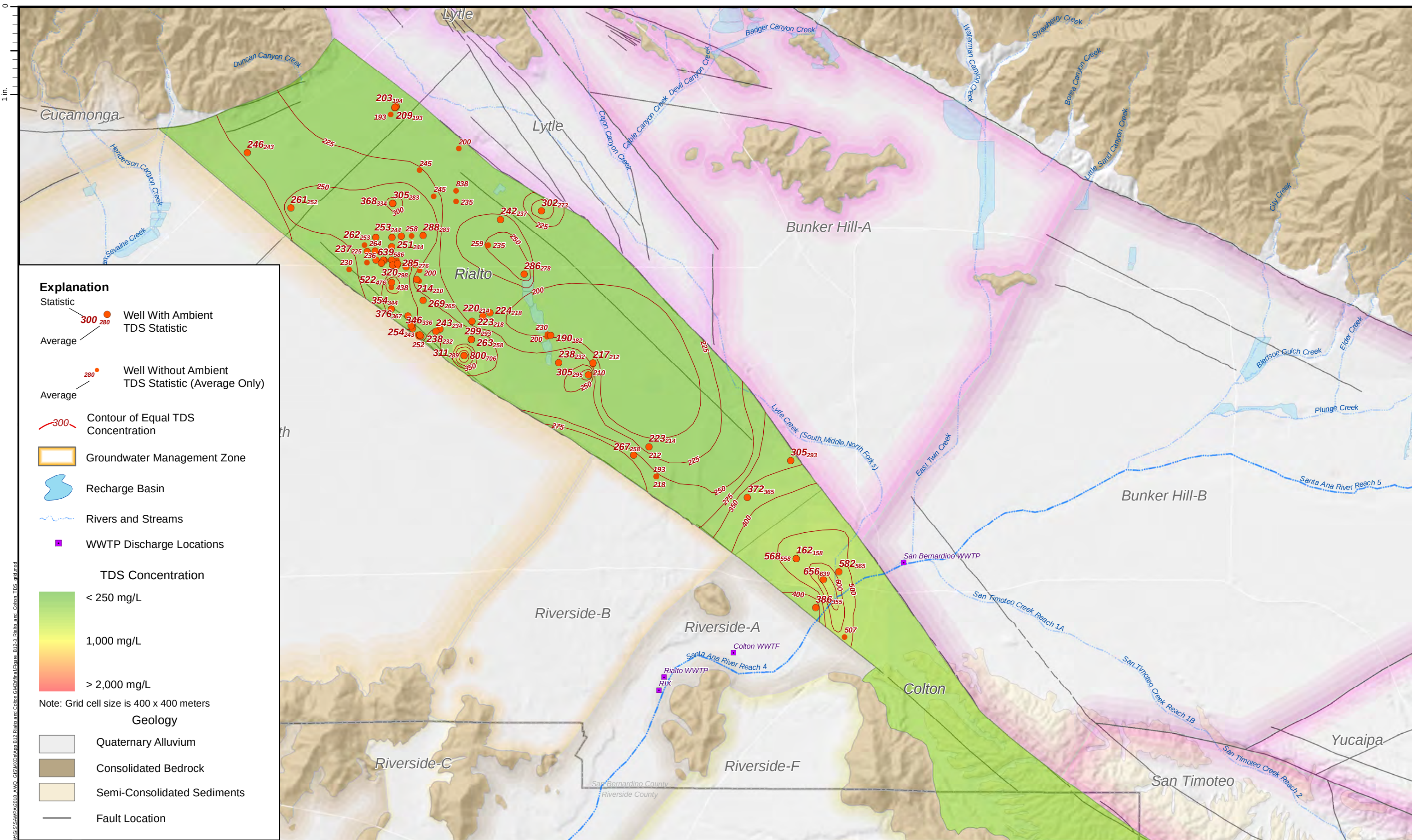
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

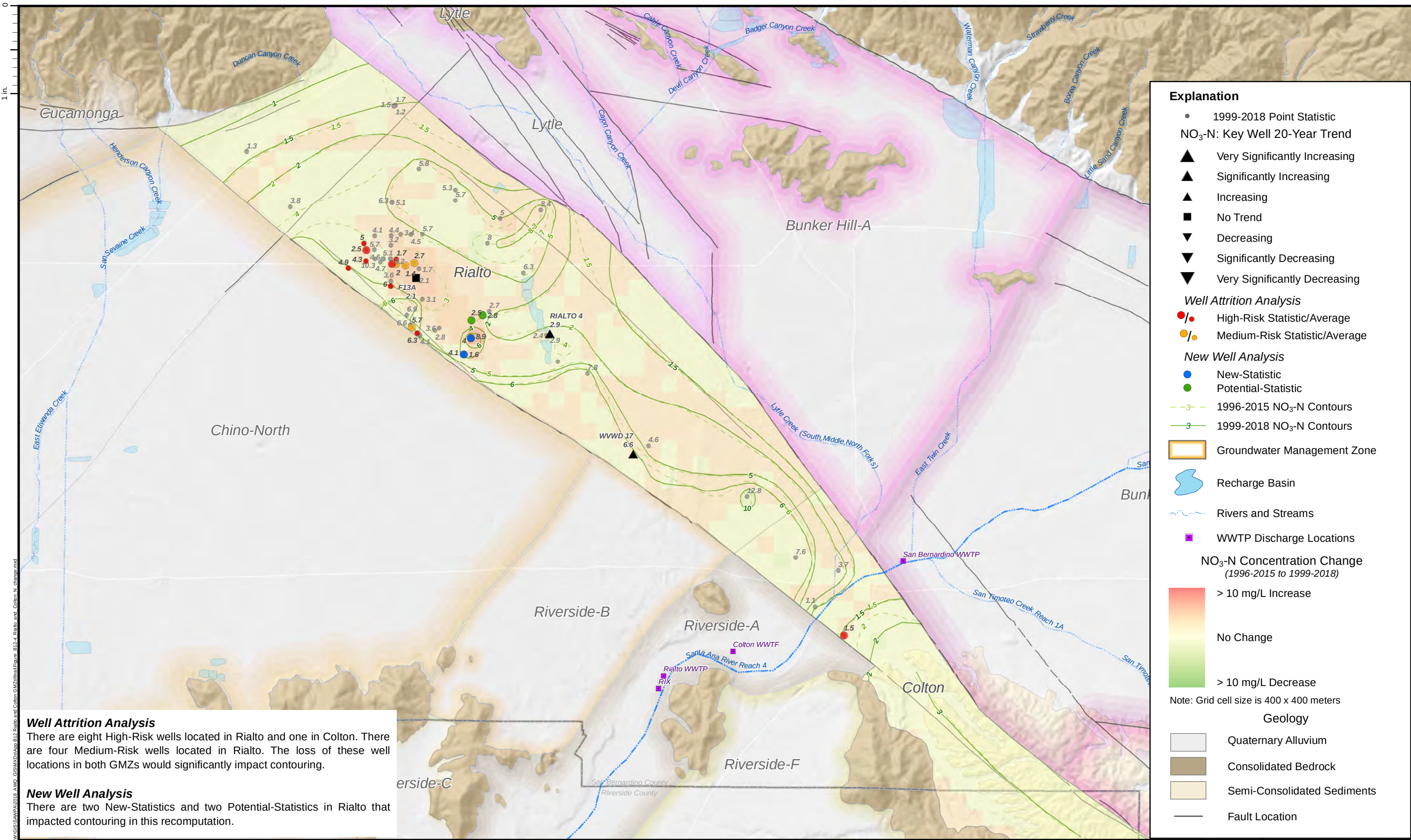
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Colton	410	407	430	430	450	430	440	480	490	10	None (-80)
Rialto	230	230	230	220	230	230	230	240	240	0	None (-10)
Nitrate as Nitrogen (mg/L)											
Colton	2.7	2.7	2.9	2.9	2.9	2.8	2.7	3.3	3.3	0.0	None (-0.6)
Rialto	2.0	2.0	2.7	2.6	2.9	3.1	3.2	3.4	3.5	0.1	None (-1.5)





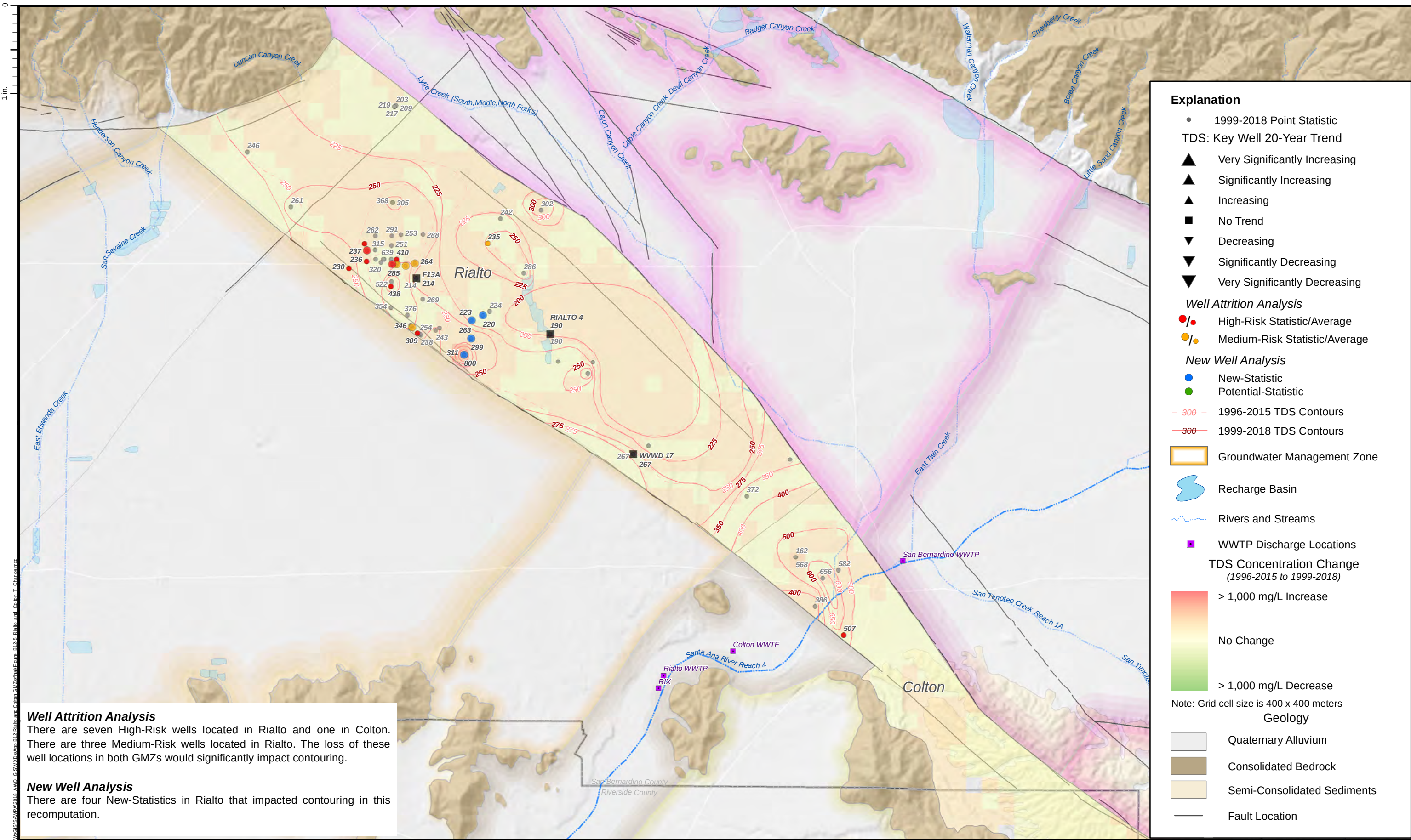






Well Attrition Analysis
There are eight High-Risk wells located in Rialto and one in Colton. There are four Medium-Risk wells located in Rialto. The loss of these well locations in both GMZs would significantly impact contouring.

New Well Analysis
There are two New-Statistics and two Potential-Statistics in Rialto that impacted contouring in this recomputation.



Explanation

- 1999-2018 Point Statistic
- TDS: Key Well 20-Year Trend
 - Very Significantly Increasing
 - Significantly Increasing
 - Increasing
 - No Trend
 - Decreasing
 - Significantly Decreasing
 - Very Significantly Decreasing
- Well Attrition Analysis
 - High-Risk Statistic/Average
 - Medium-Risk Statistic/Average
- New Well Analysis
 - New-Statistic
 - Potential-Statistic
- 1996-2015 TDS Contours
- 1999-2018 TDS Contours
- Groundwater Management Zone
- Recharge Basin
- Rivers and Streams
- WWTP Discharge Locations
- TDS Concentration Change (1996-2015 to 1999-2018)
 - > 1,000 mg/L Increase
 - No Change
 - > 1,000 mg/L Decrease
- Note: Grid cell size is 400 x 400 meters
- Geology
 - Quaternary Alluvium
 - Consolidated Bedrock
 - Semi-Consolidated Sediments
- Fault Location

Well Attrition Analysis
There are seven High-Risk wells located in Rialto and one in Colton. There are three Medium-Risk wells located in Rialto. The loss of these well locations in both GMZs would significantly impact contouring.

New Well Analysis
There are four New-Statistics in Rialto that impacted contouring in this recomputation.

Attachment B13
Riverside-A, -B, -C, -E, and -F GMZs

Attachment Contents:

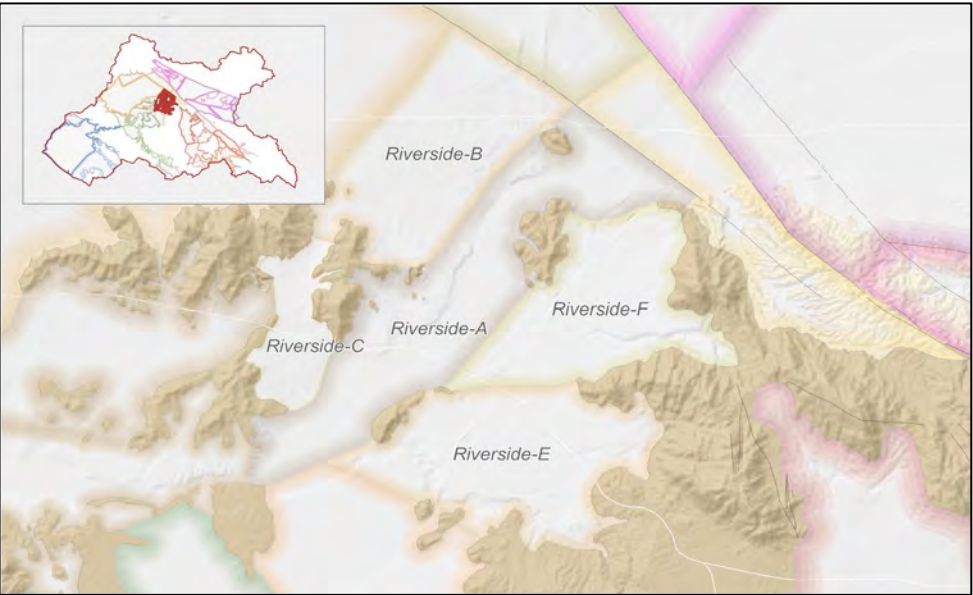
B13-1 Groundwater Storage and Elevation Contours Fall 2018

B13-2 NO₃-N Concentration and Contour Map

B13-3 TDS Concentration and Contour Map

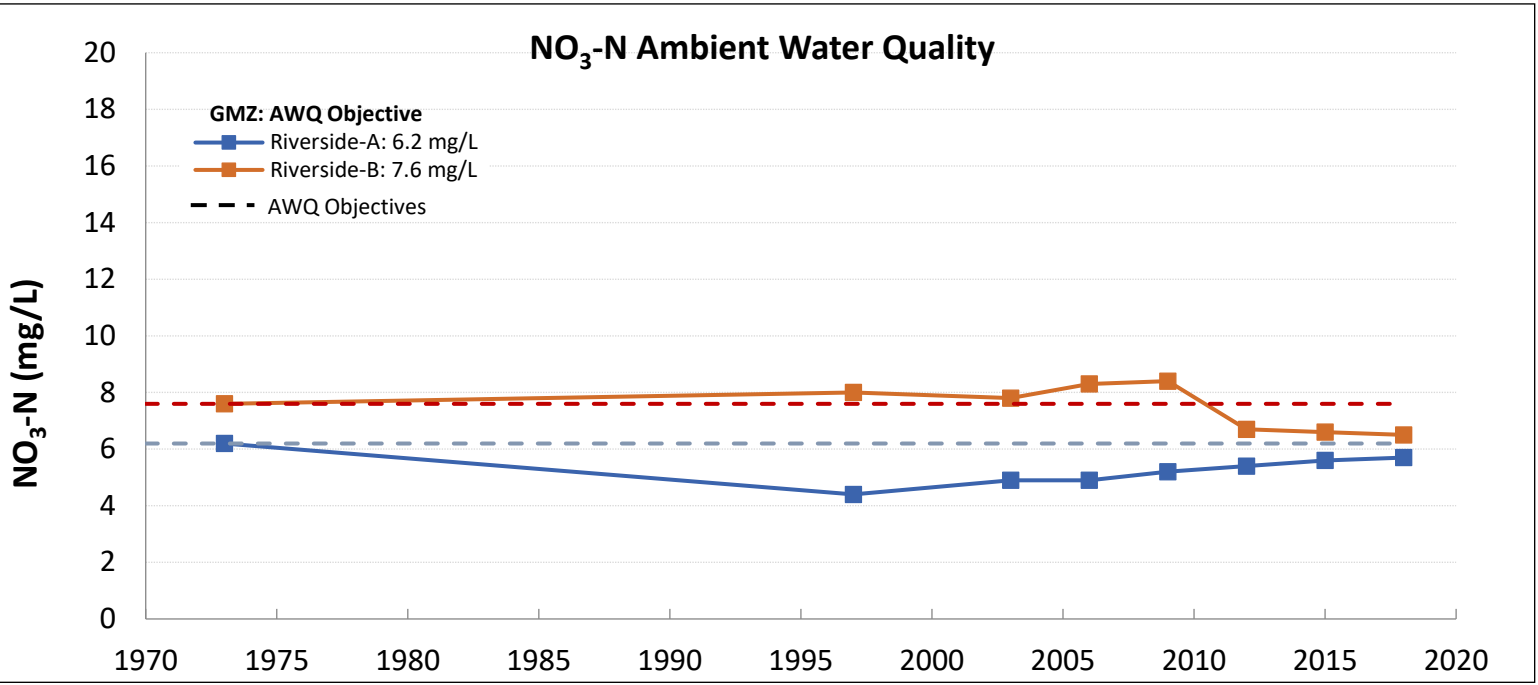
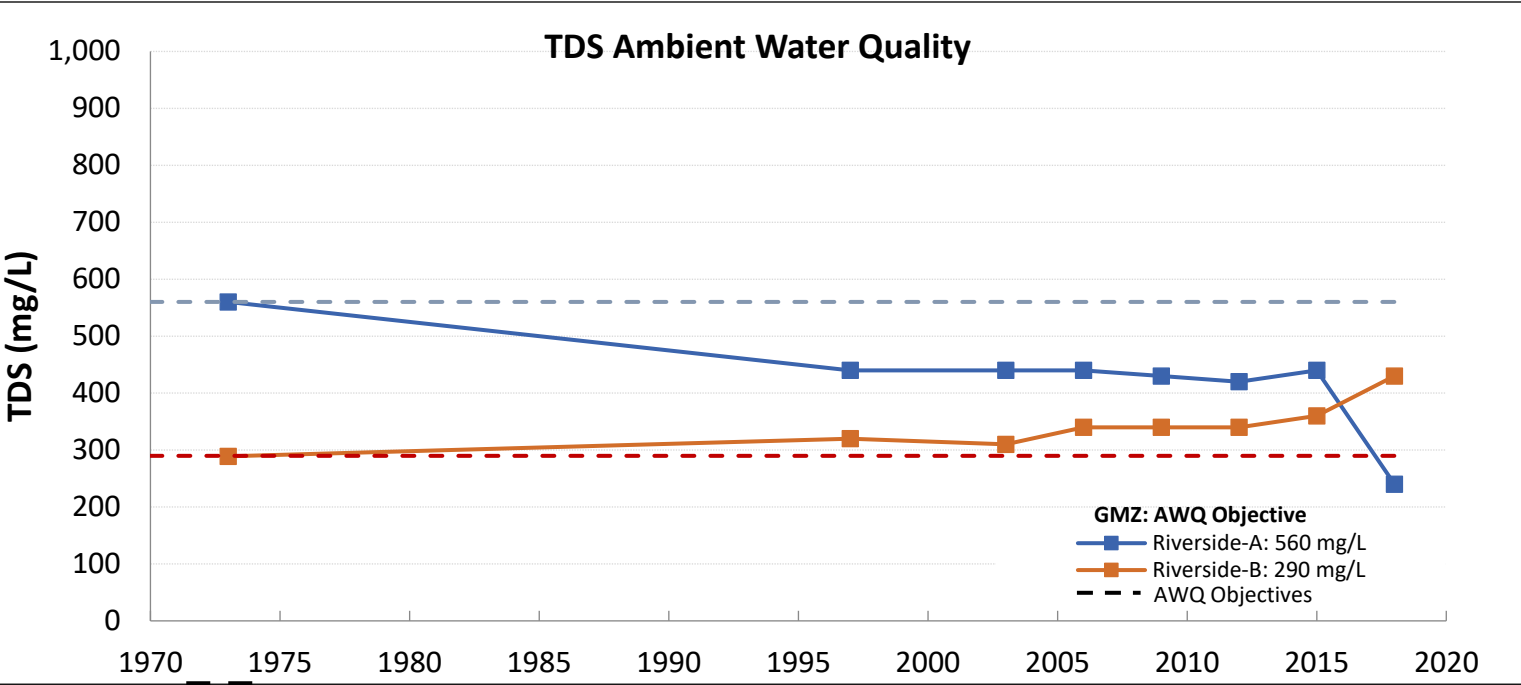
B13-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

B13-5 TDS Concentration Change (1996-2015 to 1999-2018)



TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Riverside-A	560	560	440	440	440	430	420	440	430	-10	130
Riverside-B	290	289	320	310	340	340	340	360	340	-20	None (-50)
Nitrate as Nitrogen (mg/L)											
Riverside-A	6.2	6.2	4.4	4.9	4.9	5.2	5.4	5.6	5.7	0.1	0.5
Riverside-B	7.6	7.6	8.0	7.8	8.3	8.4	6.7	6.6	6.5	-0.1	1.1



Attachment Contents:

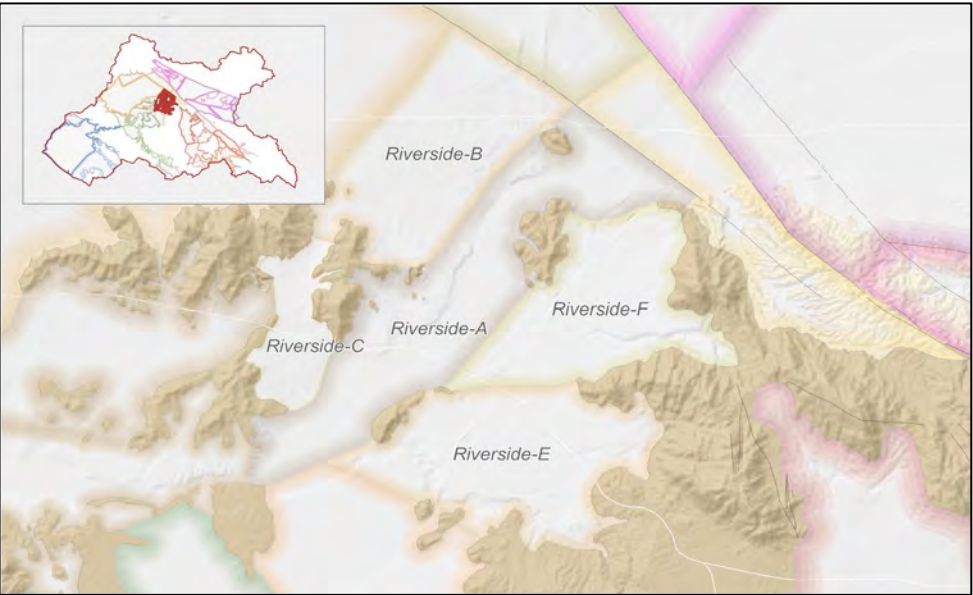
B13-1 Groundwater Storage and Elevation Contours Fall 2018

B13-2 NO₃-N Concentration and Contour Map

B13-3 TDS Concentration and Contour Map

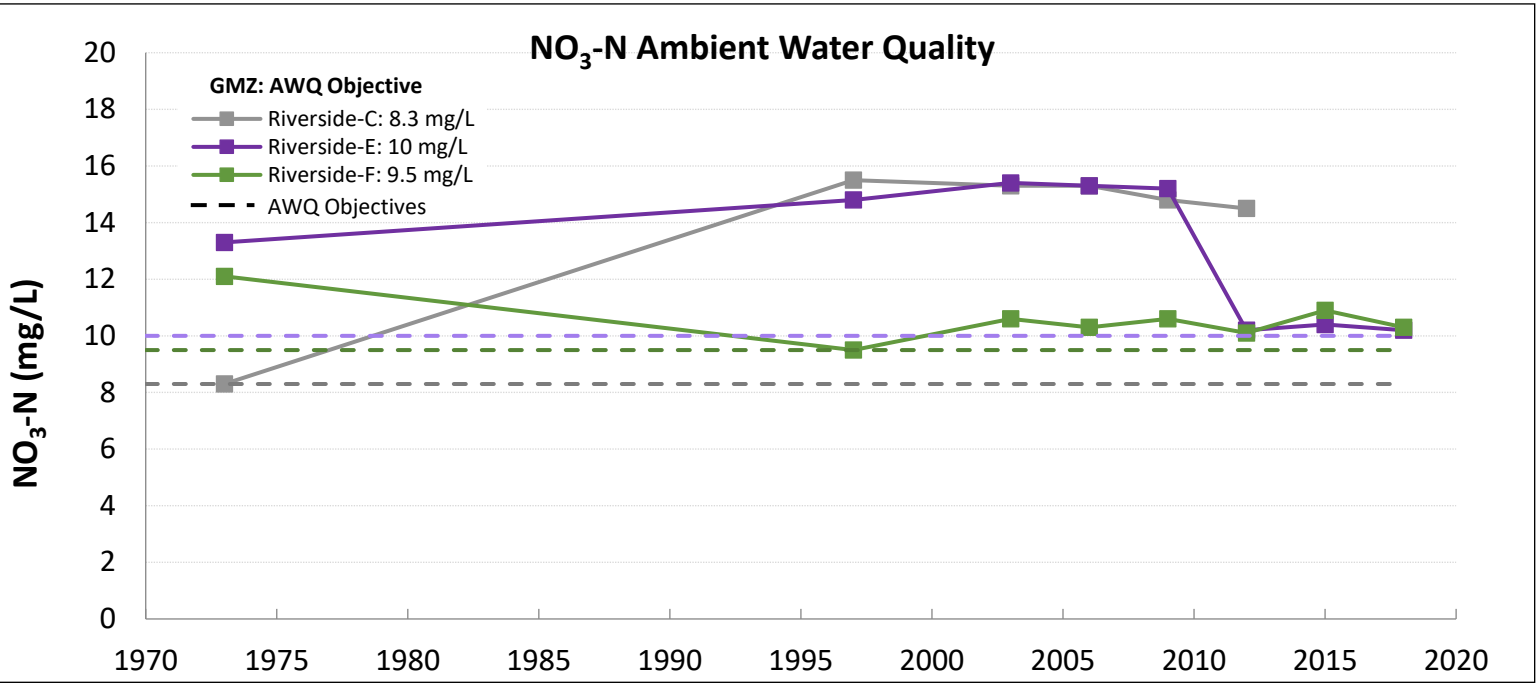
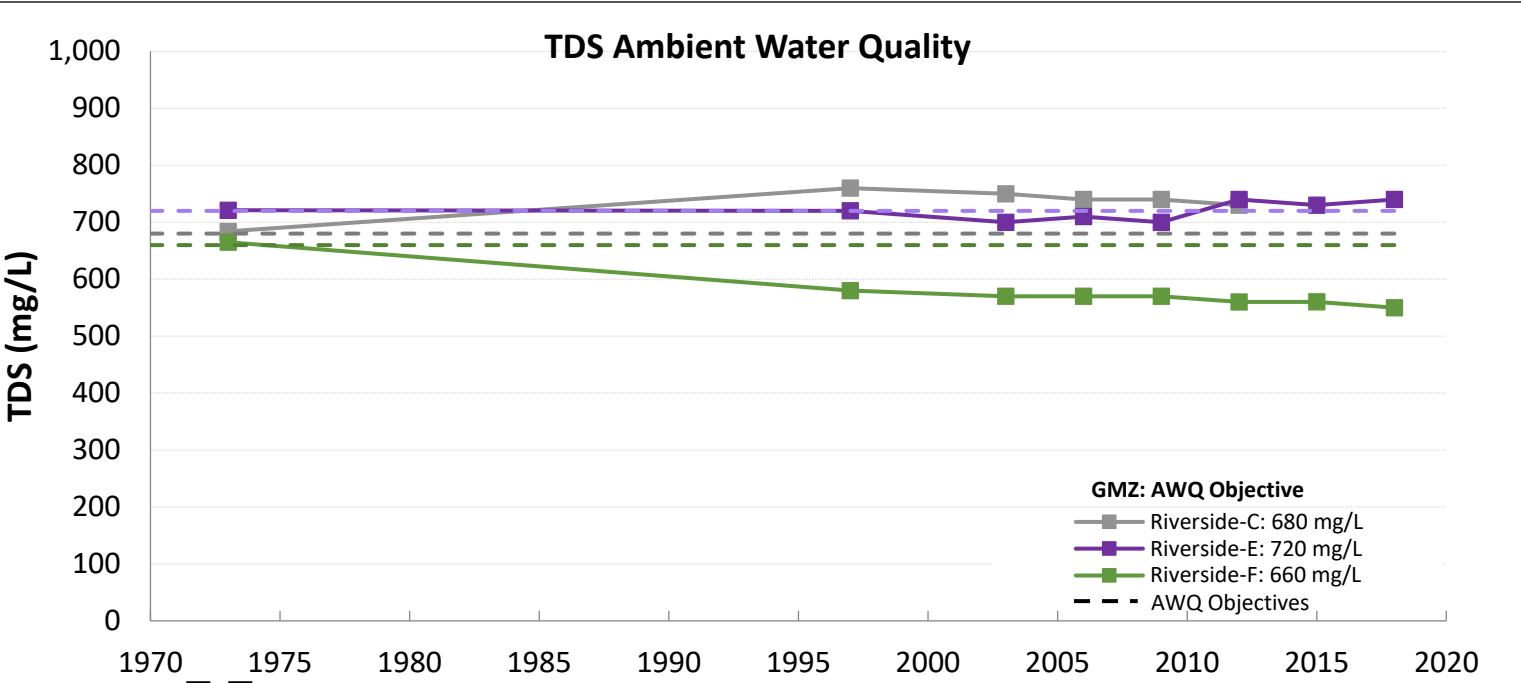
B13-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

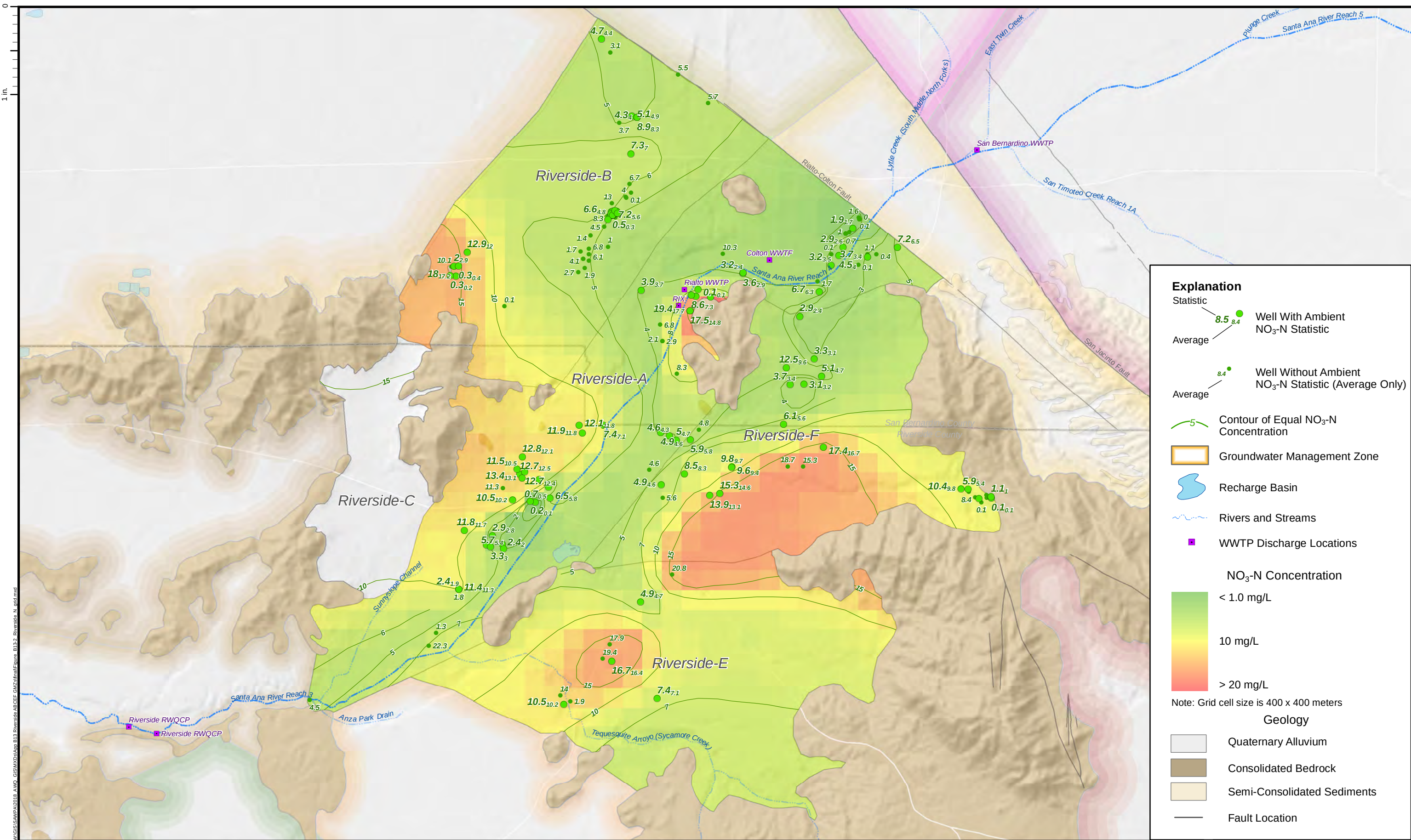
B13-5 TDS Concentration Change (1996-2015 to 1999-2018)

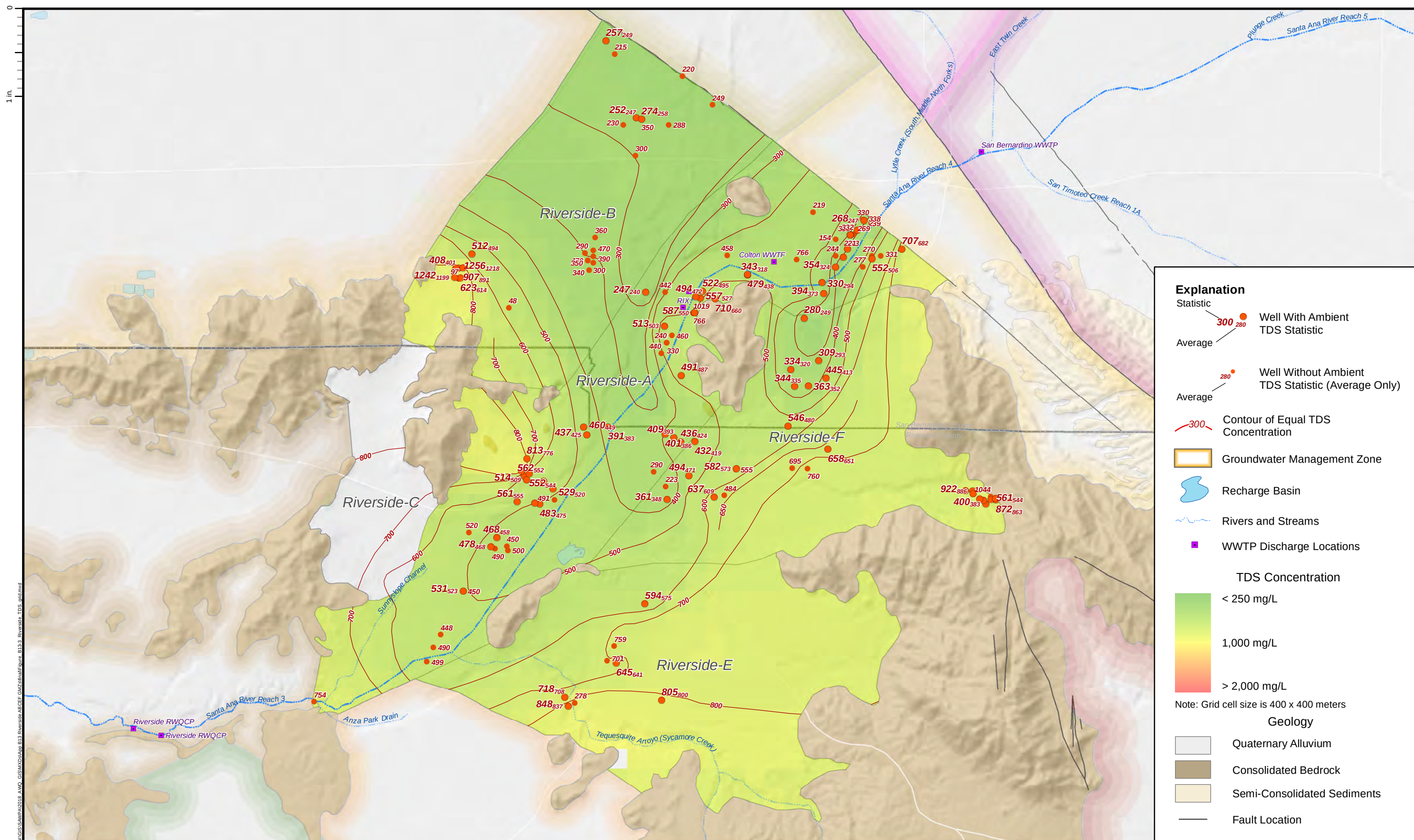


TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Riverside-C	680	684	760	750	740	740	730	?	?	?	?
Riverside-E	720	721	720	700	710	700	740	730	740	10	None (-20)
Riverside-F	660	665	580	570	570	570	560	560	550	-10	110
Nitrate as Nitrogen (mg/L)											
Riverside-C	8.3	8.3	15.5	15.3	15.3	14.8	14.5	?	?	?	?
Riverside-E	10.0	13.3	14.8	15.4	15.3	15.2	10.2	10.4	10.2	-0.2	None (-0.19)
Riverside-F	9.5	12.1	9.5	10.6	10.3	10.6	10.1	10.9	10.3	-0.6	None (-0.8)







Prepared by:

Author: EC
Date: 3/24/2020

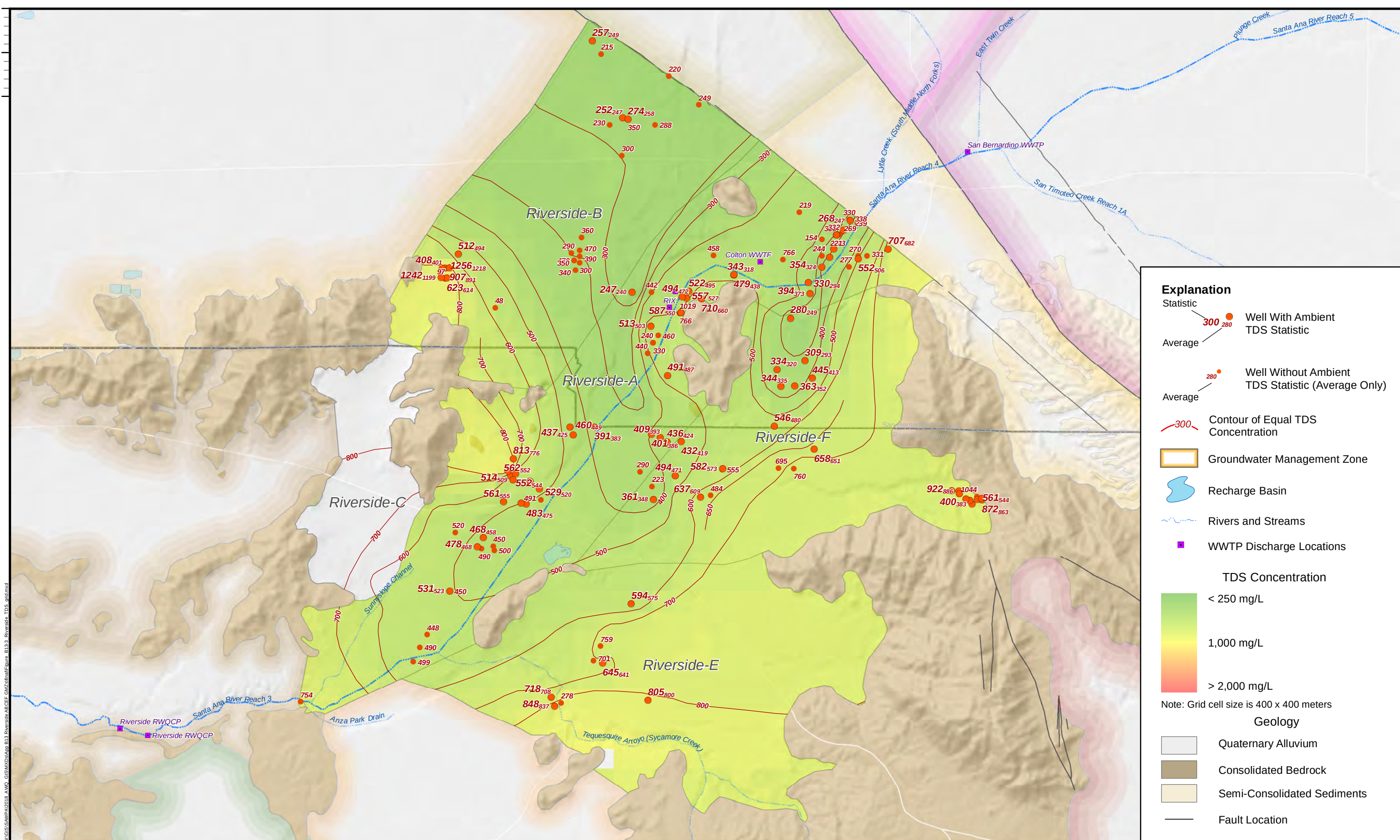


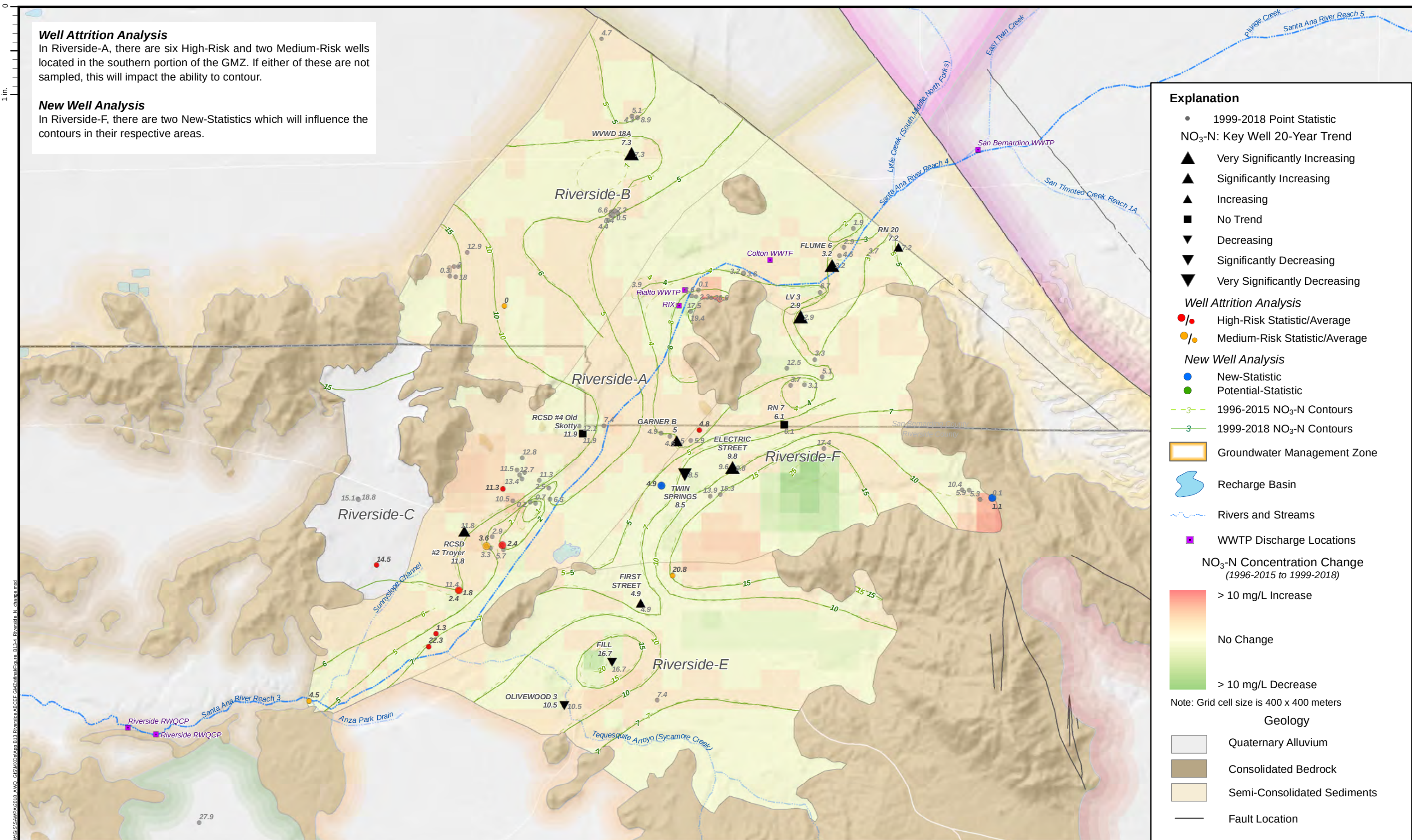
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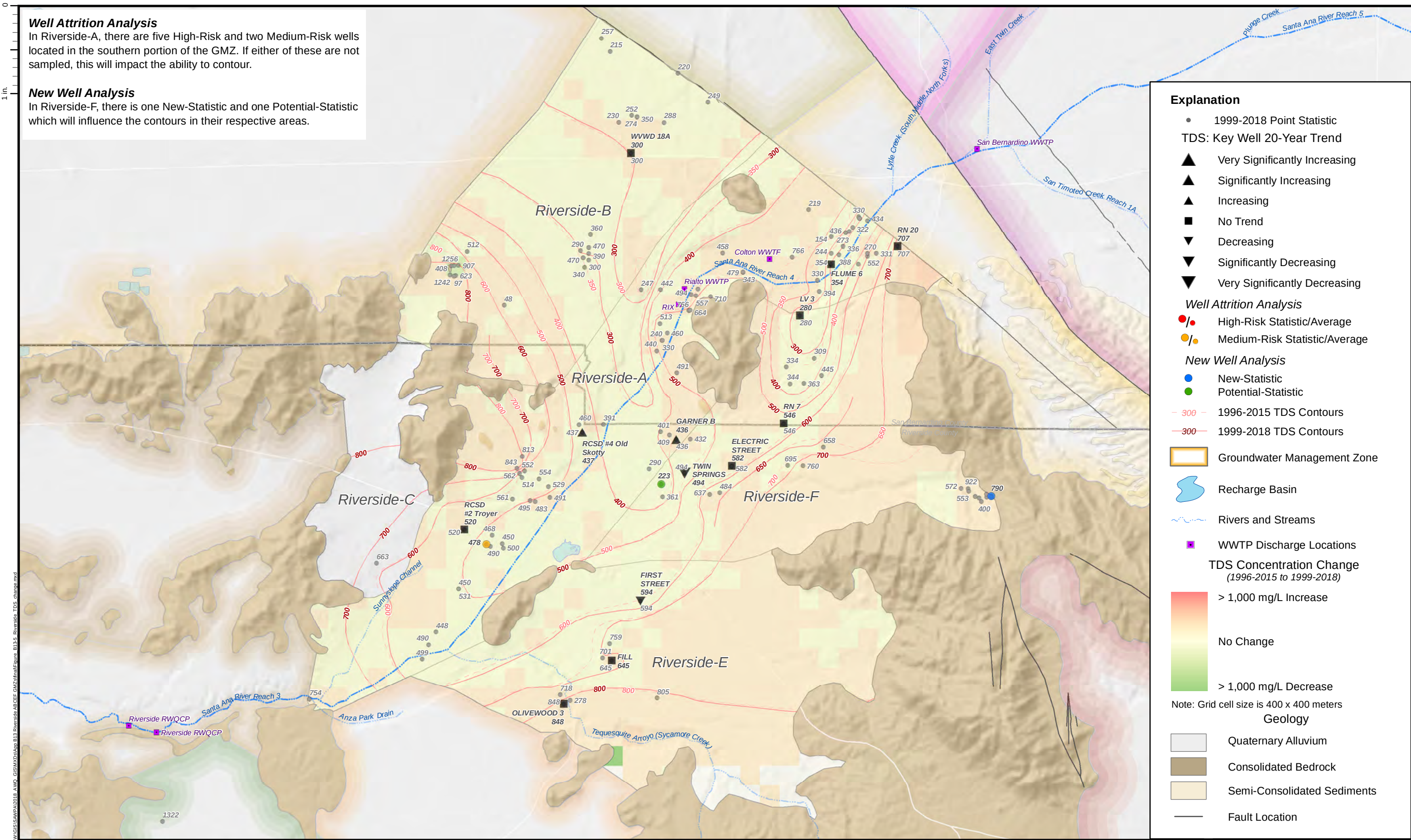
Prepared for:

SAWPA Basin Monitoring Program Task Force

TDS Concentration and Contour Map Riverside A,B,C,E and F GMZs Santa Ana River Watershed







Well Attrition Analysis
In Riverside-A, there are five High-Risk and two Medium-Risk wells located in the southern portion of the GMZ. If either of these are not sampled, this will impact the ability to contour.

New Well Analysis
In Riverside-F, there is one New-Statistic and one Potential-Statistic which will influence the contours in their respective areas.

- Explanation**
- 1999-2018 Point Statistic
 - TDS: Key Well 20-Year Trend
 - ▲ Very Significantly Increasing
 - ▲ Significantly Increasing
 - ▲ Increasing
 - No Trend
 - ▼ Decreasing
 - ▼ Significantly Decreasing
 - ▼ Very Significantly Decreasing
 - Well Attrition Analysis**
 - /● High-Risk Statistic/Average
 - /● Medium-Risk Statistic/Average
 - New Well Analysis**
 - New-Statistic
 - Potential-Statistic
 - 300 — 1996-2015 TDS Contours
 - 300 — 1999-2018 TDS Contours
 - Groundwater Management Zone
 - Recharge Basin
 - Rivers and Streams
 - WWTP Discharge Locations
 - TDS Concentration Change (1996-2015 to 1999-2018)
 - > 1,000 mg/L Increase
 - No Change
 - > 1,000 mg/L Decrease
 - Note: Grid cell size is 400 x 400 meters
 - Geology**
 - Quaternary Alluvium
 - Consolidated Bedrock
 - Semi-Consolidated Sediments
 - Fault Location

Attachment B14

San Jacinto GMZ

Attachment Contents:

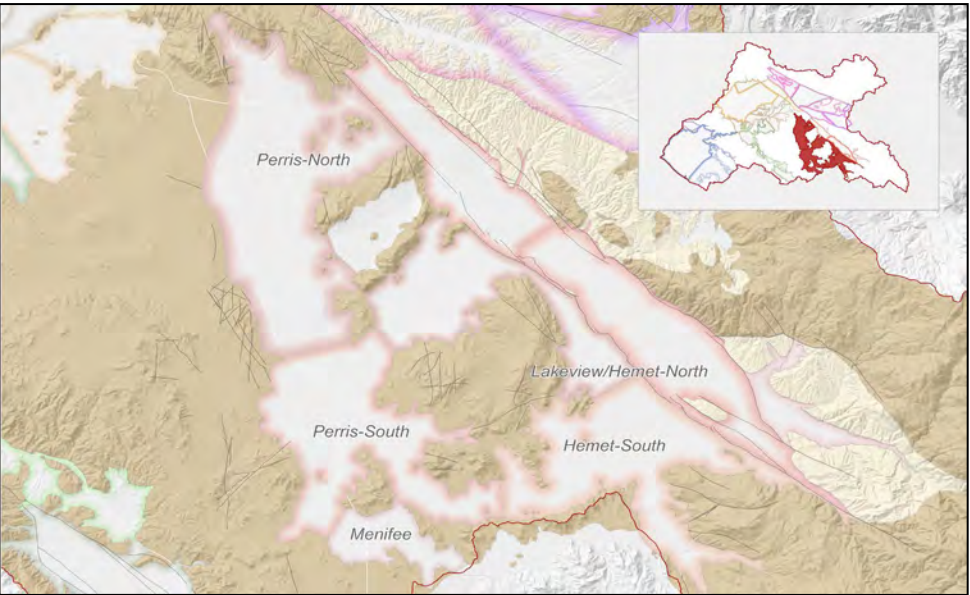
B14-1 Groundwater Storage and Elevation Contours Fall 2018

B14-2 NO₃-N Concentration and Contour Map

B14-3 TDS Concentration and Contour Map

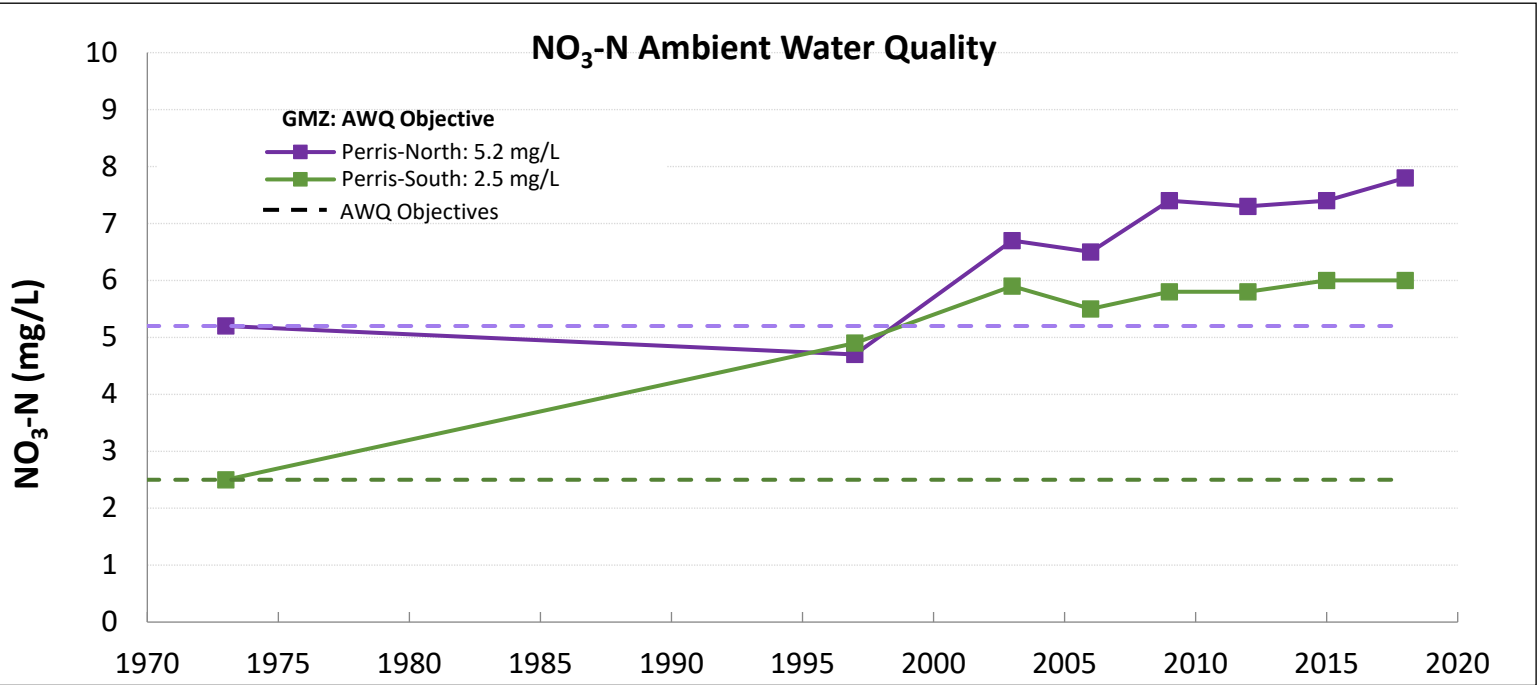
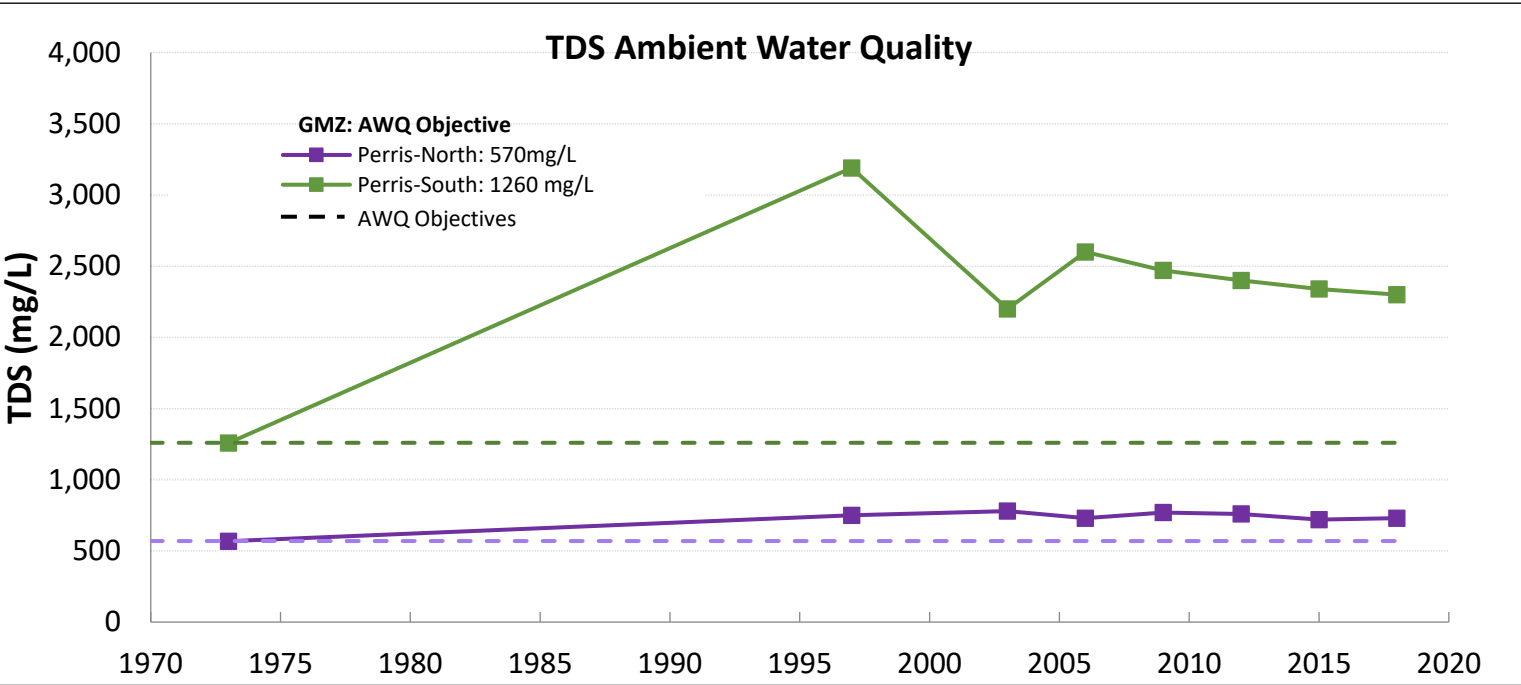
B14-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

B14-5 TDS Concentration Change (1996-2015 to 1999-2018)



TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Perris-North	570	568	750	780	730	770	760	720	730	10	None (-160)
Perris-South	1260	1258	3190	2200	2600	2470	2400	2340	2300	-40	None (-1040)
Nitrate as Nitrogen (mg/L)											
Perris-North	5.2	5.2	4.7	6.7	6.5	7.4	7.3	7.4	7.8	0.4	None (-2.6)
Perris-South	2.5	2.5	4.9	5.9	5.5	5.8	5.8	6.0	6.0	0.0	None (-3.5)



SAWPA Basin Monitoring Program Task Force



Recomputation of Ambient Water Quality
for the Period 1999 to 2018

AMBIENT WATER QUALITY (1999 TO 2018)
Interpretive Tools Summary
San Jacinto GMZs
Attachment B14



Attachment Contents:

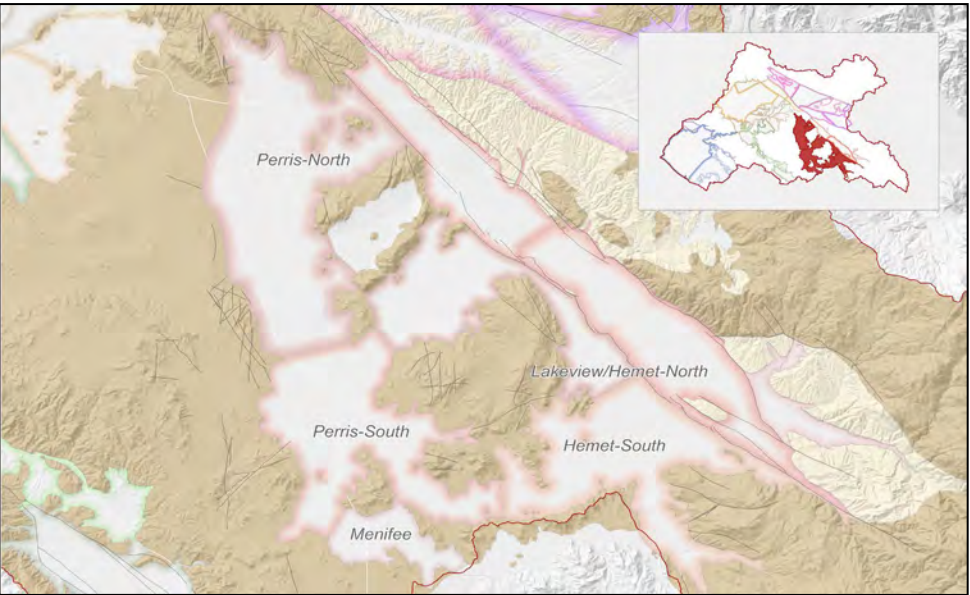
B14-1 Groundwater Storage and Elevation Contours Fall 2018

B14-2 NO₃-N Concentration and Contour Map

B14-3 TDS Concentration and Contour Map

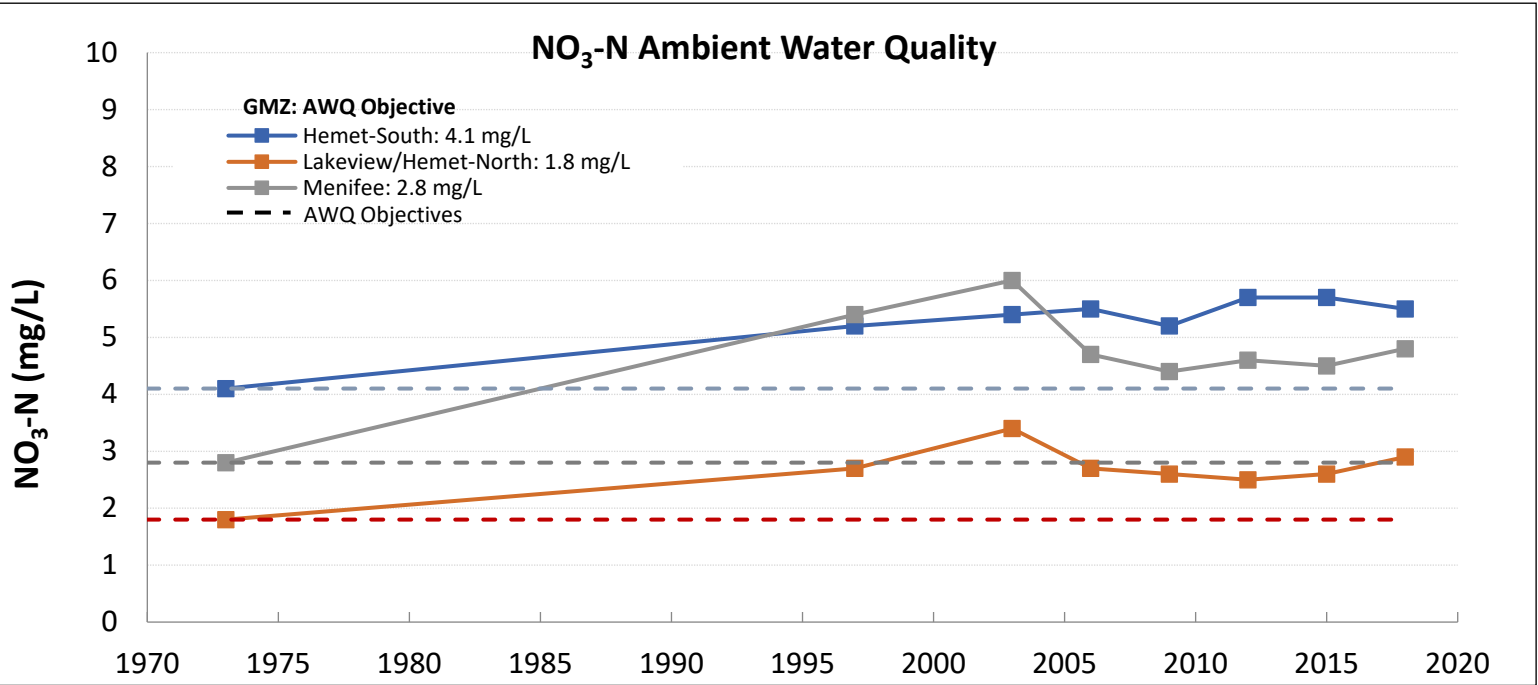
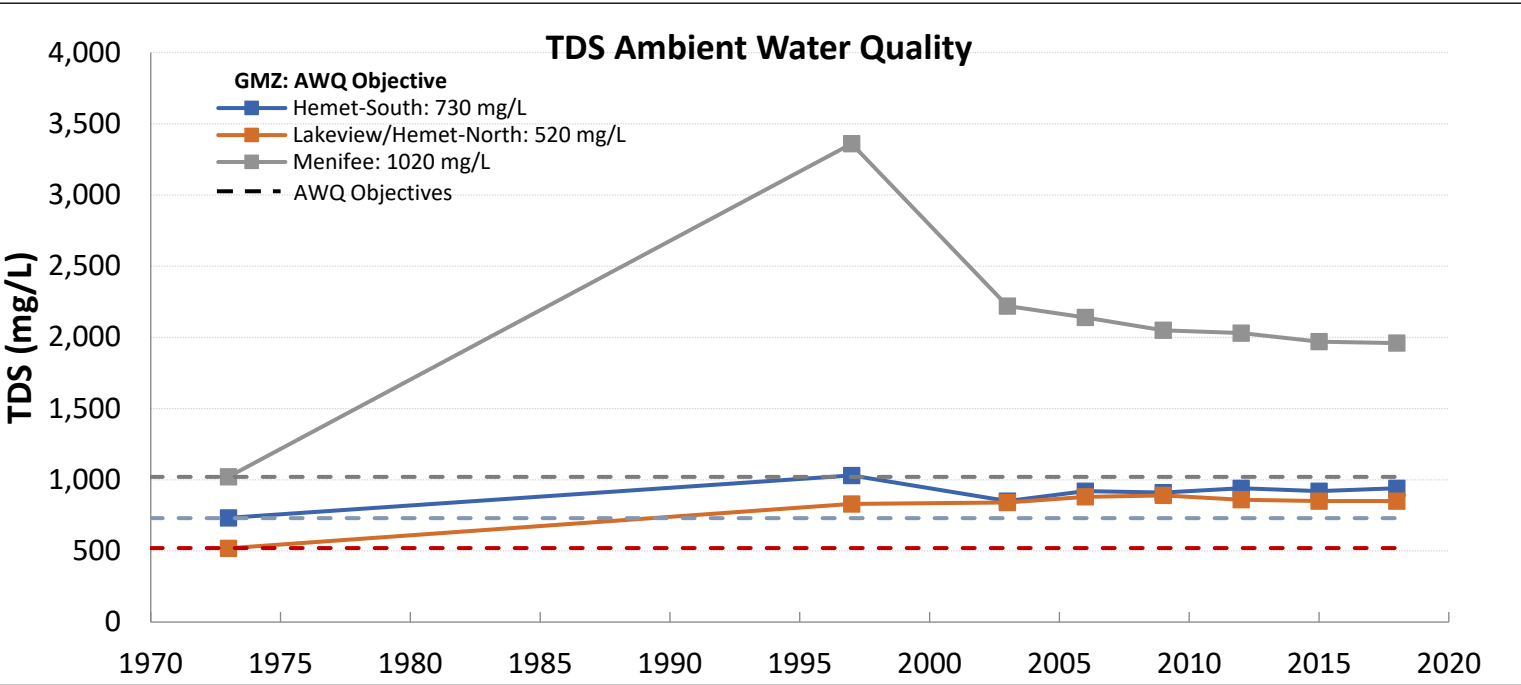
B14-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

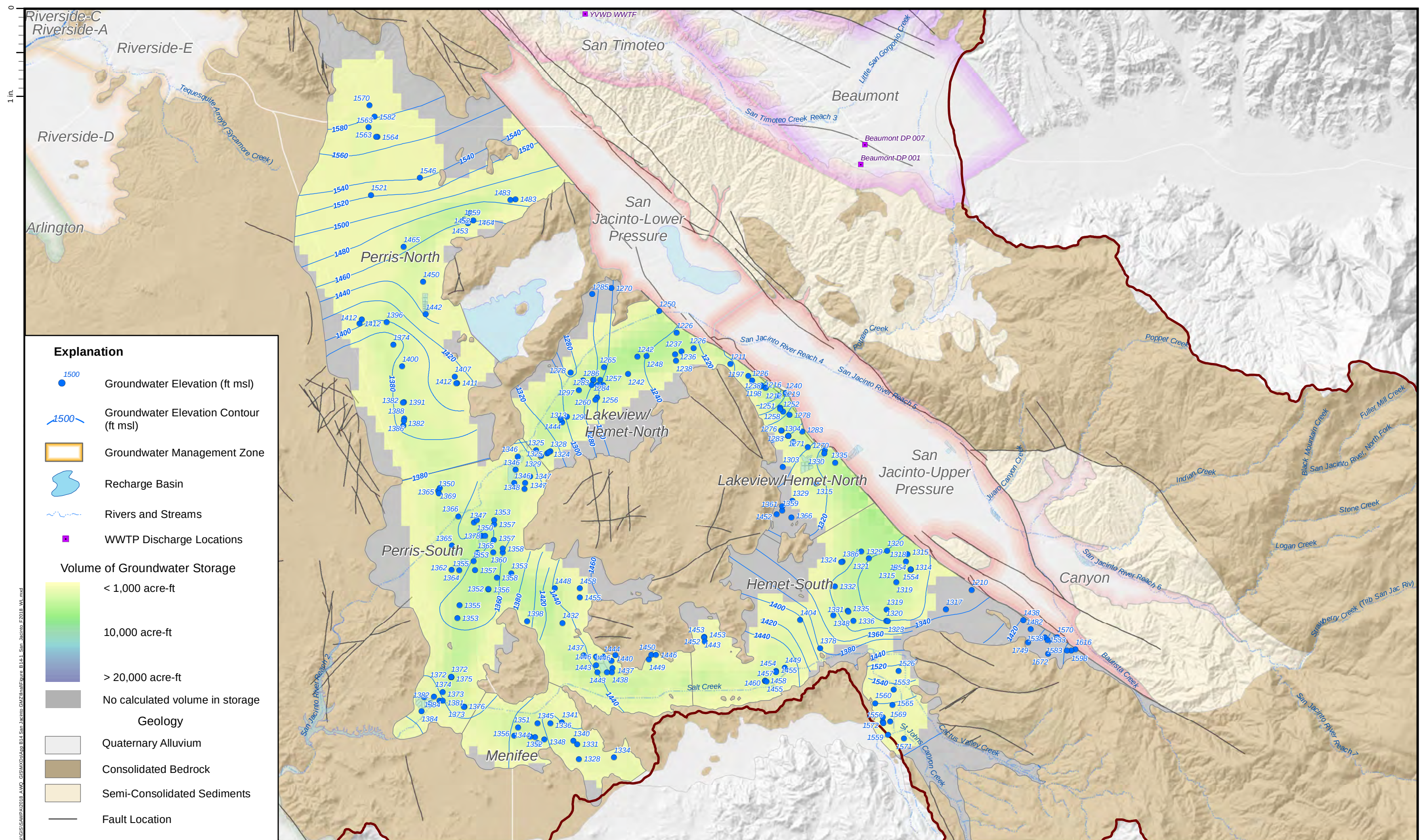
B14-5 TDS Concentration Change (1996-2015 to 1999-2018)

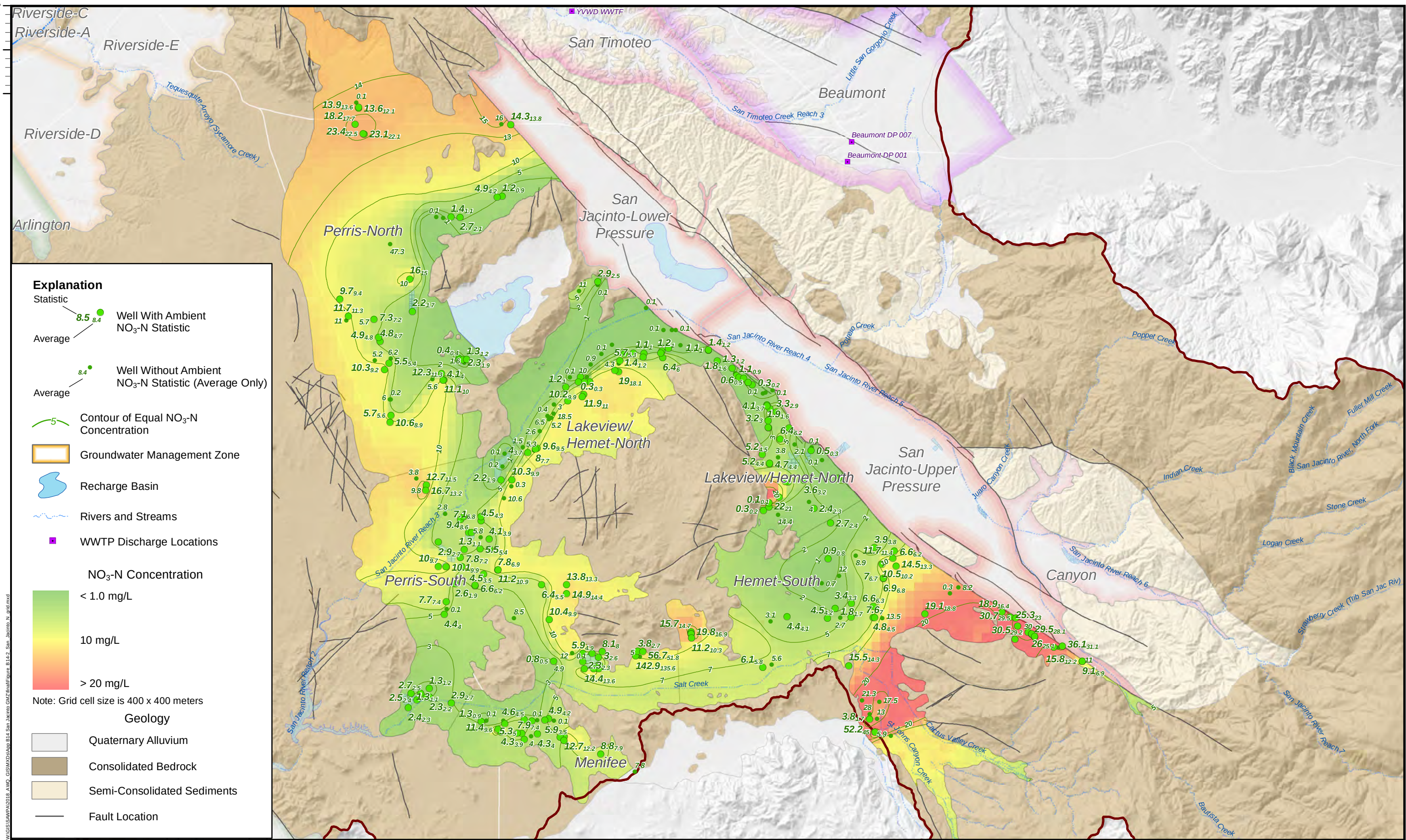


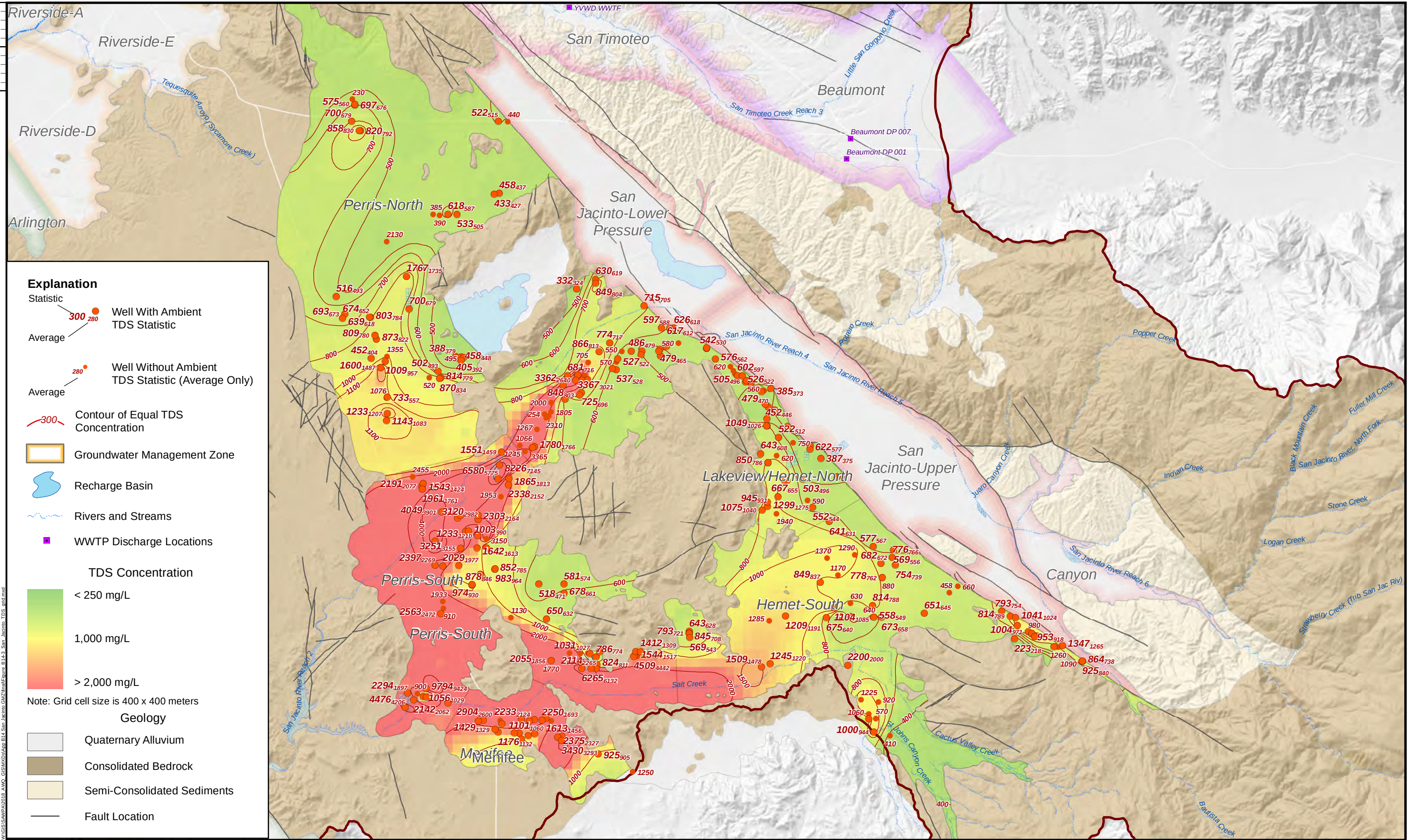
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

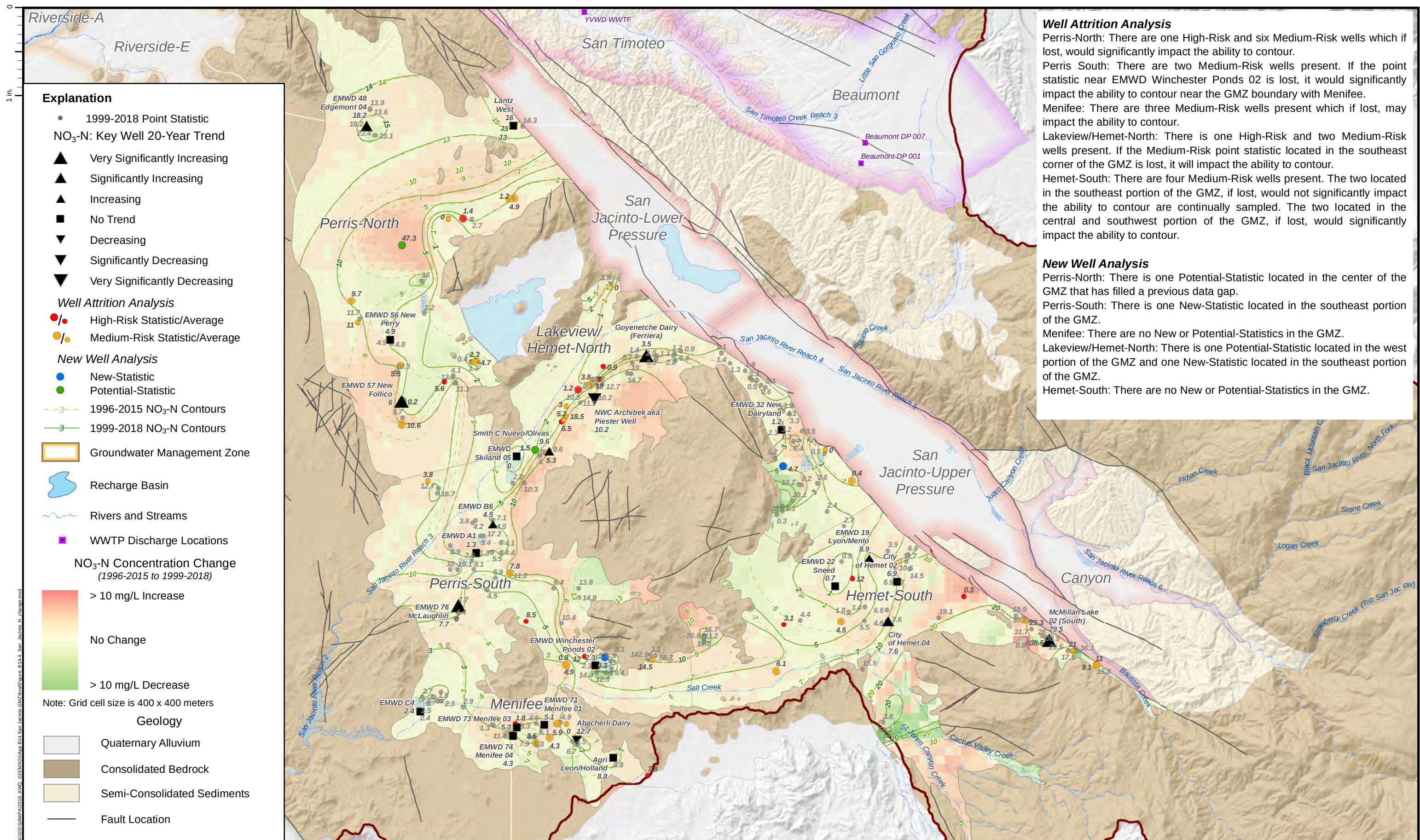
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Hemet-South	730	732	1030	850	920	910	940	920	940	20	None (-210)
Lakeview/Hemet-North	520	519	830	840	880	890	860	850	850	0	None (-330)
Menifee	1020	1021	3360	2220	2140	2050	2030	1970	1960	-10	None (-940)
Nitrate as Nitrogen (mg/L)											
Hemet-South	4.1	4.1	5.2	5.4	5.5	5.2	5.7	5.7	5.5	-0.2	None (-1.4)
Lakeview/Hemet-North	1.8	1.8	2.7	3.4	2.7	2.6	2.5	2.6	2.9	0.3	None (-1.1)
Menifee	2.8	2.8	5.4	6.0	4.7	4.4	4.6	4.5	4.8	0.3	None (-2)





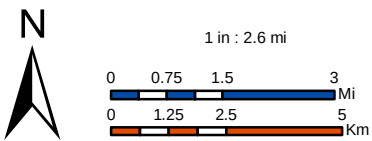


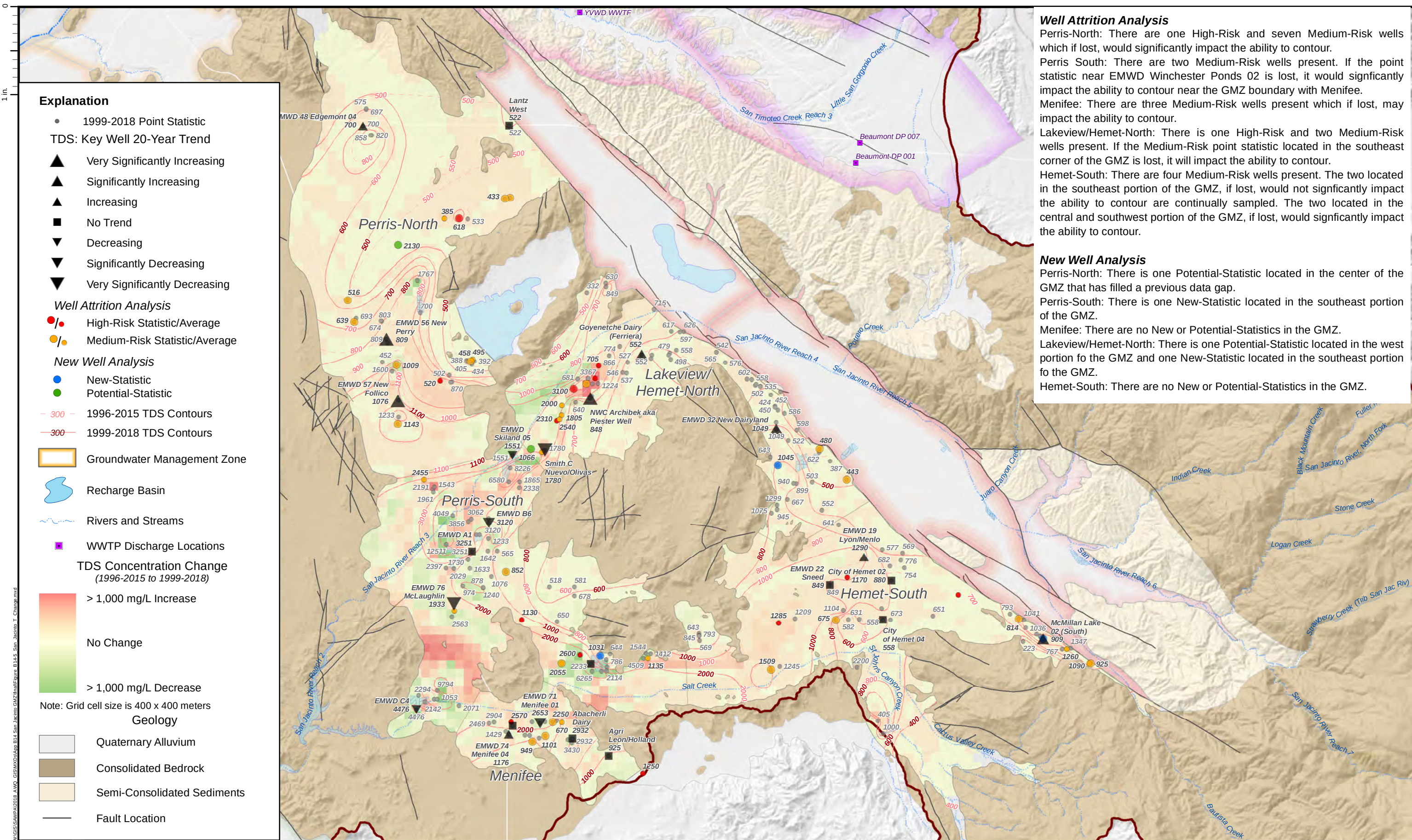




Well Attrition Analysis
Perris-North: There are one High-Risk and six Medium-Risk wells which if lost, would significantly impact the ability to contour.
Perris South: There are two Medium-Risk wells present. If the point statistic near EMWD Winchester Ponds 02 is lost, it would significantly impact the ability to contour near the GMZ boundary with Menifee.
Menifee: There are three Medium-Risk wells present which if lost, may impact the ability to contour.
Lakeview/Hemet-North: There is one High-Risk and two Medium-Risk wells present. If the Medium-Risk point statistic located in the southeast corner of the GMZ is lost, it will impact the ability to contour.
Hemet-South: There are four Medium-Risk wells present. The two located in the southeast portion of the GMZ, if lost, would not significantly impact the ability to contour are continually sampled. The two located in the central and southwest portion of the GMZ, if lost, would significantly impact the ability to contour.

New Well Analysis
Perris-North: There is one Potential-Statistic located in the center of the GMZ that has filled a previous data gap.
Perris-South: There is one New-Statistic located in the southeast portion of the GMZ.
Menifee: There are no New or Potential-Statistics in the GMZ.
Lakeview/Hemet-North: There is one Potential-Statistic located in the west portion of the GMZ and one New-Statistic located in the southeast portion of the GMZ.
Hemet-South: There are no New or Potential-Statistics in the GMZ.





Attachment B15

San Jacinto Upper and Lower Pressure GMZs

Attachment Contents:

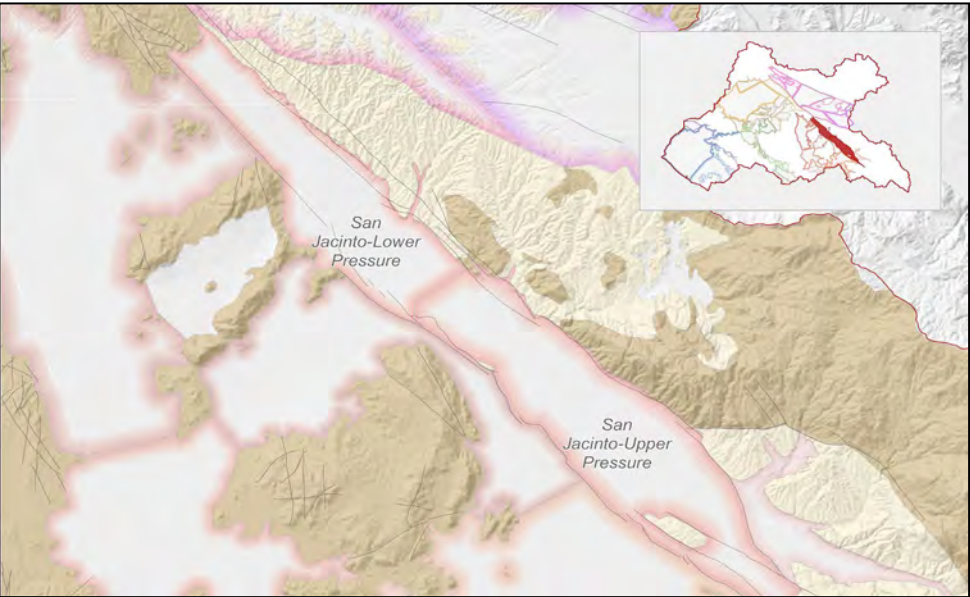
B15-1 Groundwater Storage and Elevation Contours Fall 2018

B15-2 NO₃-N Concentration and Contour Map

B15-3 TDS Concentration and Contour Map

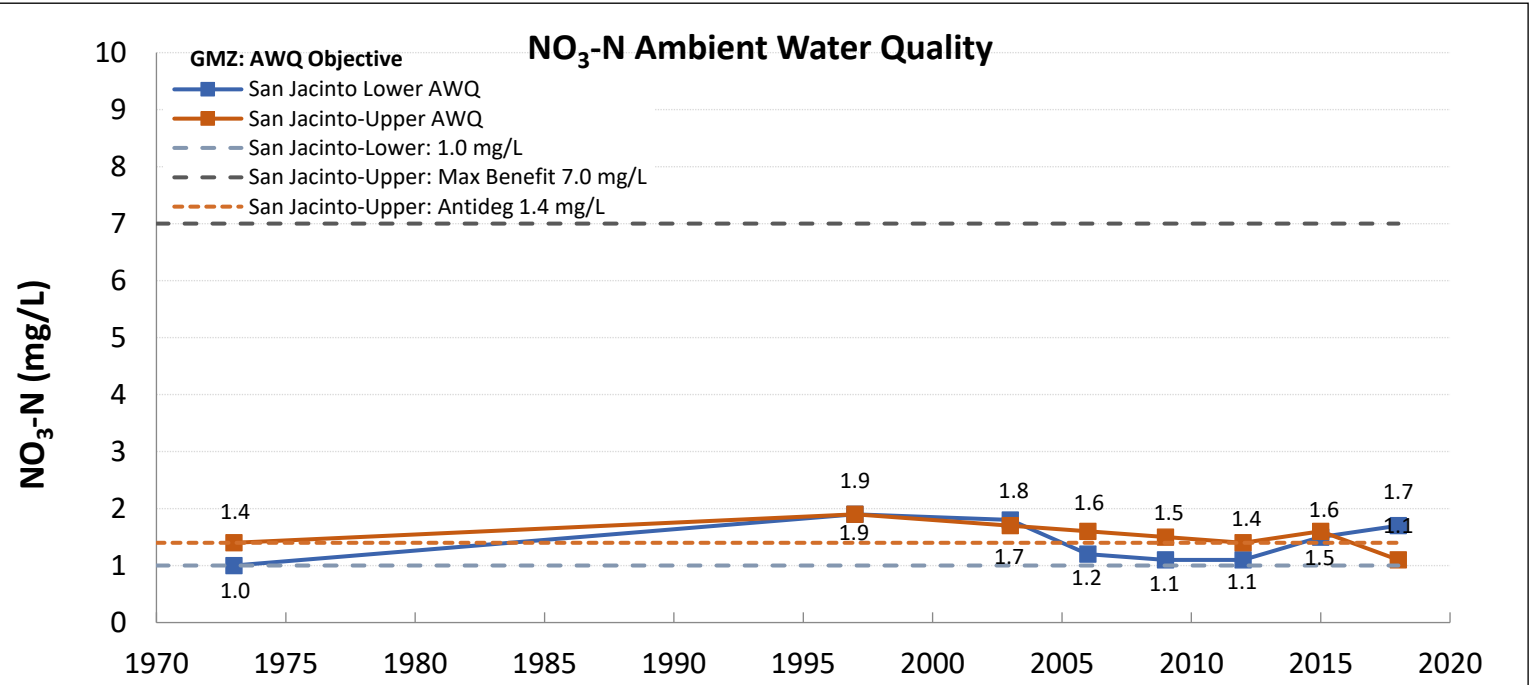
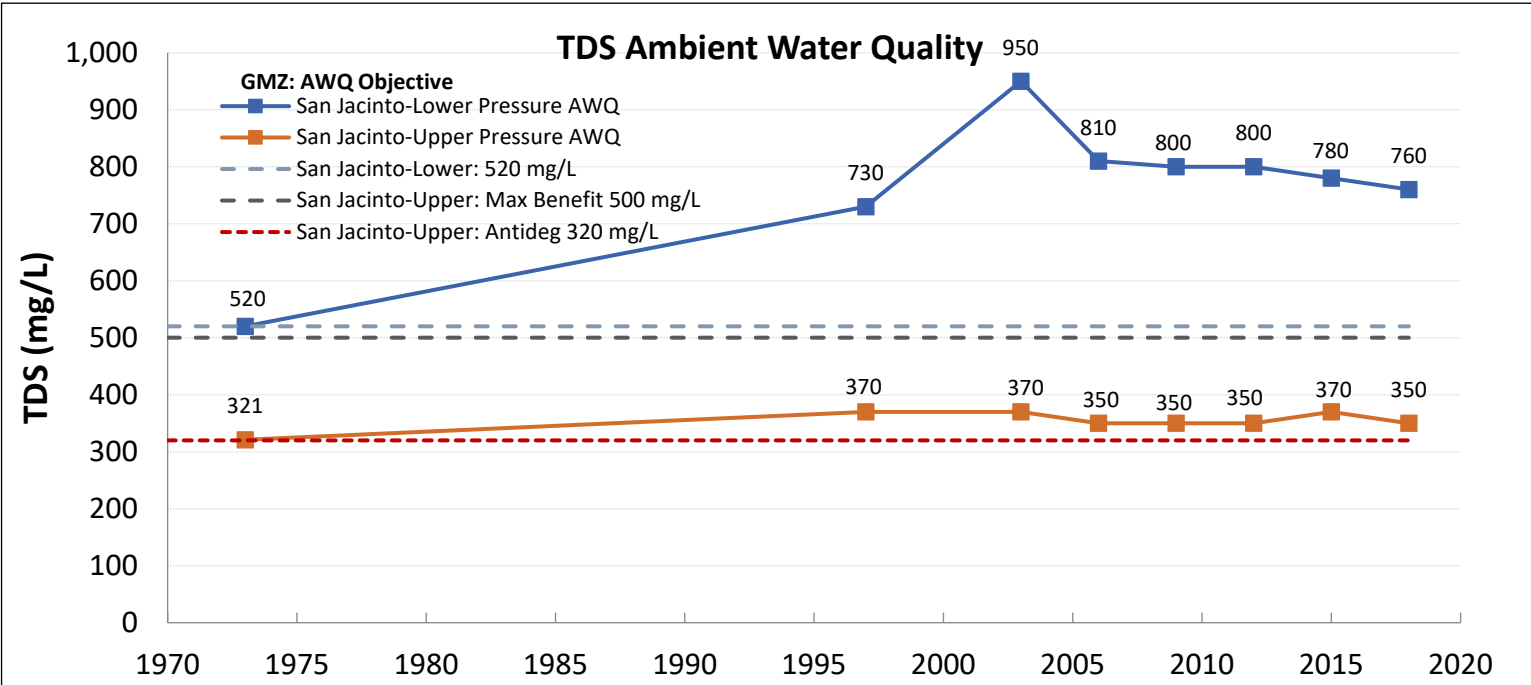
B15-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

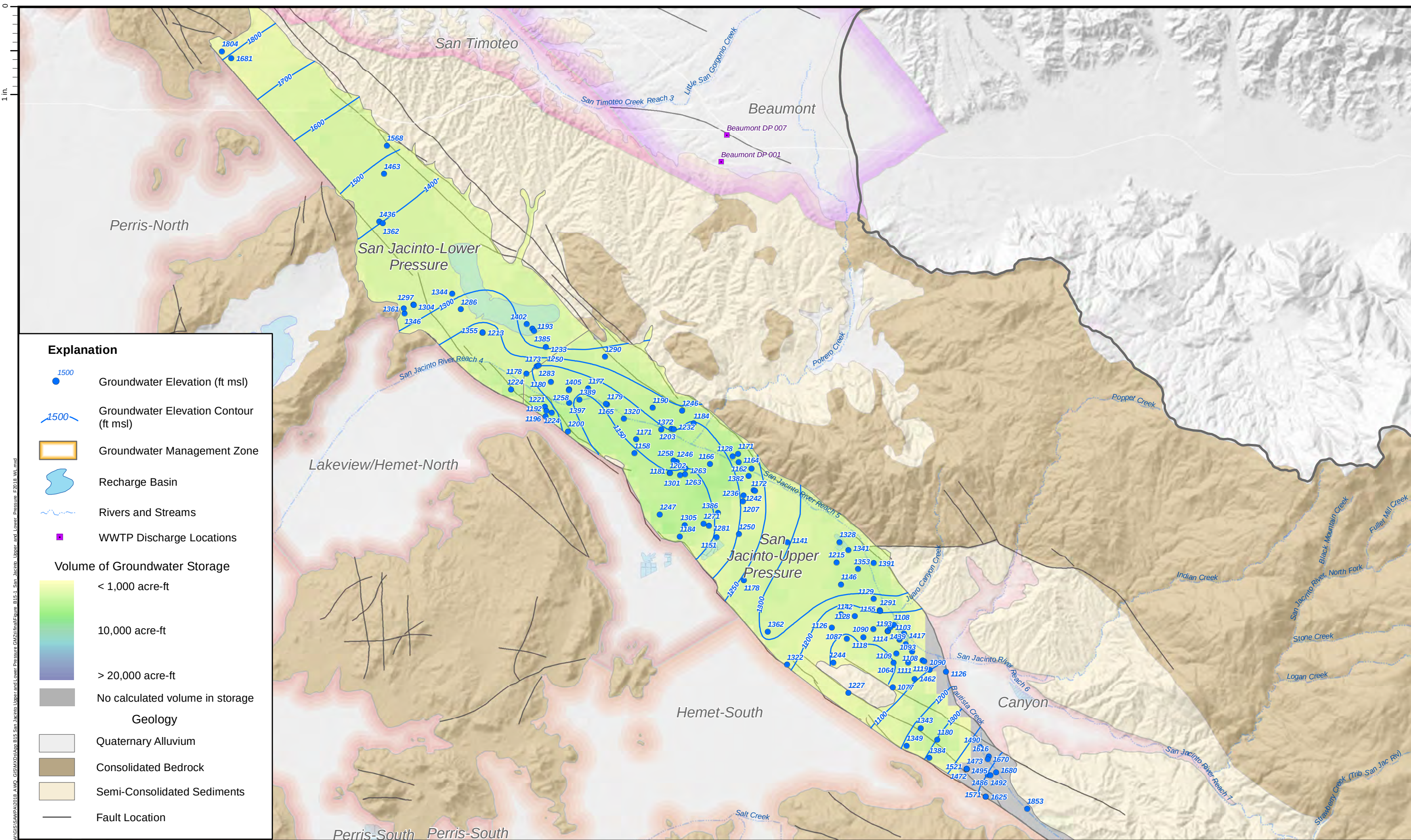
B15-5 TDS Concentration Change (1996-2015 to 1999-2018)

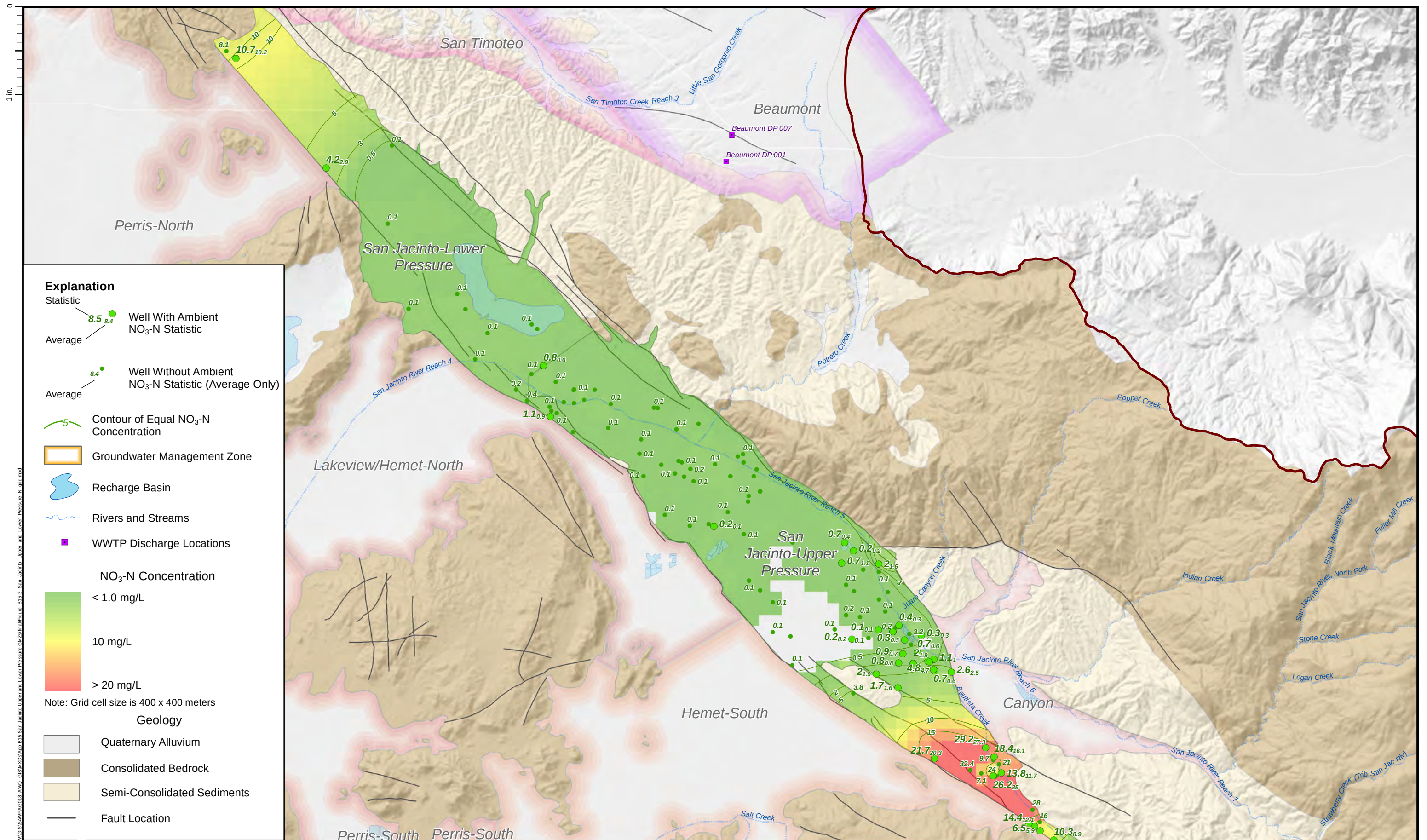


TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
San Jacinto-Lower	520	520	730	950	810	800	800	780	760	-20	None (-240)
San Jacinto-Upper -- "max benefit"	500	321	370	370	350	350	350	370	350	-20	150
San Jacinto-Upper-- "antideg"	320	321	370	370	350	350	350	370	350	-20	None (-30)
Nitrate as Nitrogen (mg/L)											
San Jacinto-Lower	1.0	1.0	1.9	1.8	1.2	1.1	1.1	1.5	1.7	0.2	None (-0.7)
San Jacinto-Upper -- "max benefit"	7.0	1.4	1.9	1.7	1.6	1.5	1.4	1.6	1.1	-0.5	5.9
San Jacinto-Upper-- "antideg"	1.4	1.4	1.9	1.7	1.6	1.5	1.4	1.6	1.1	-0.5	None (0.3)







Explanation

Statistic
Average

Well With Ambient NO₃-N Statistic

Well Without Ambient NO₃-N Statistic (Average Only)

Contour of Equal NO₃-N Concentration

Groundwater Management Zone

Recharge Basin

Rivers and Streams

WWTP Discharge Locations

NO₃-N Concentration

< 1.0 mg/L

10 mg/L

> 20 mg/L

Note: Grid cell size is 400 x 400 meters

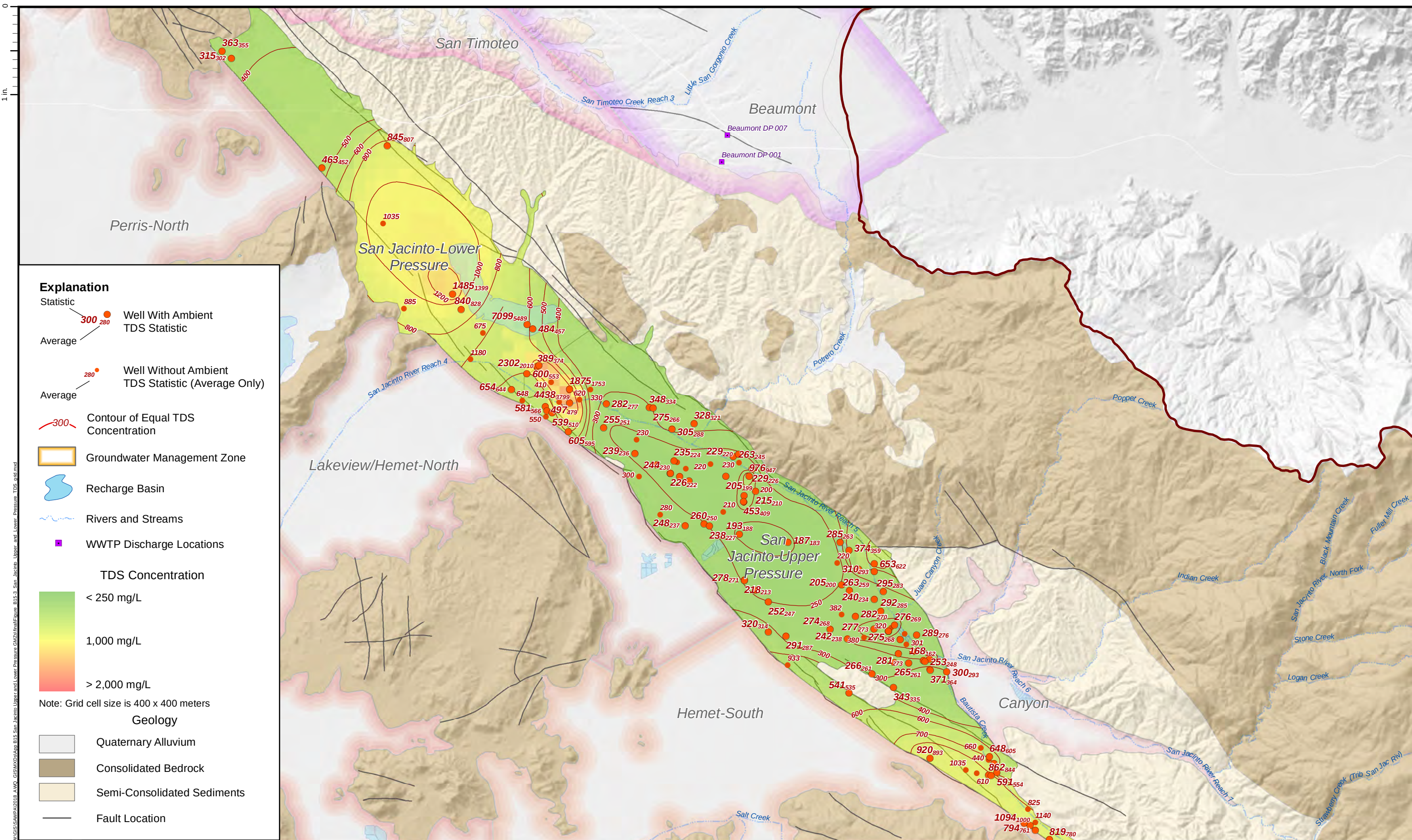
Geology

Quaternary Alluvium

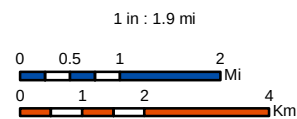
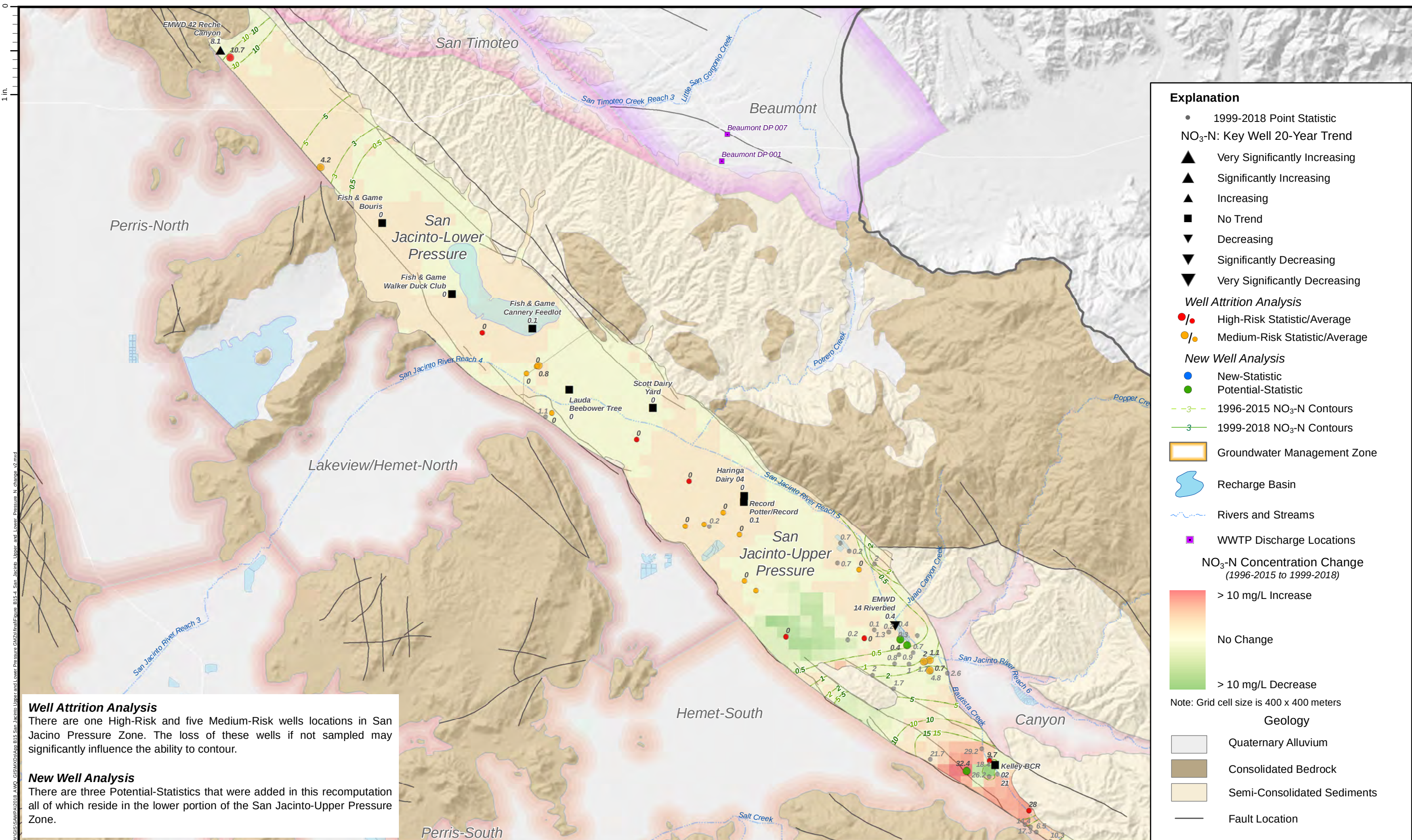
Consolidated Bedrock

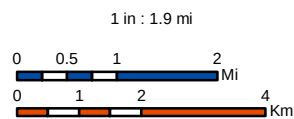
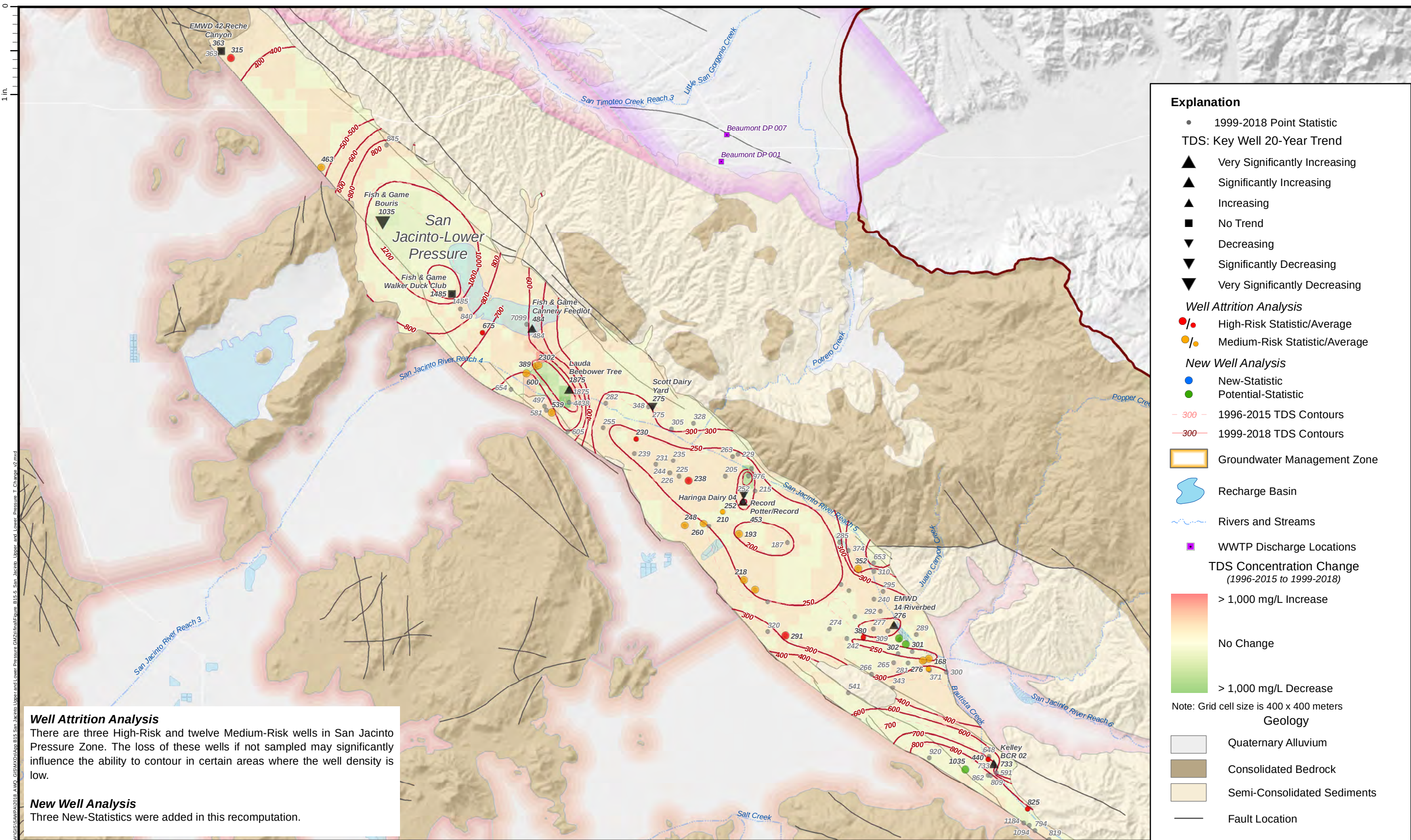
Semi-Consolidated Sediments

Fault Location



W:\GIS\SAWPA\2018_AMO_GIS\WXS\Map B15 San Jacinto Upper and Lower Pressure GMZs\final\Figure B15-3 San Jacinto Upper and Lower Pressure TDS grid.mxd





Attachment B16
San Timoteo GMZ

Attachment Contents:

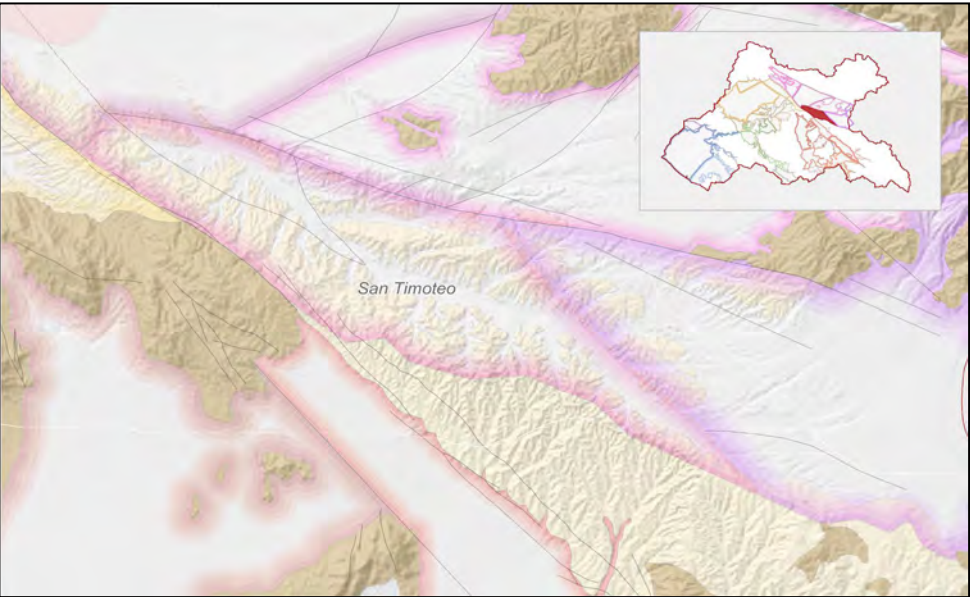
B16-1 Groundwater Storage and Elevation Contours Fall 2018

B16-2 NO₃-N Concentration and Contour Map

B16-3 TDS Concentration and Contour Map

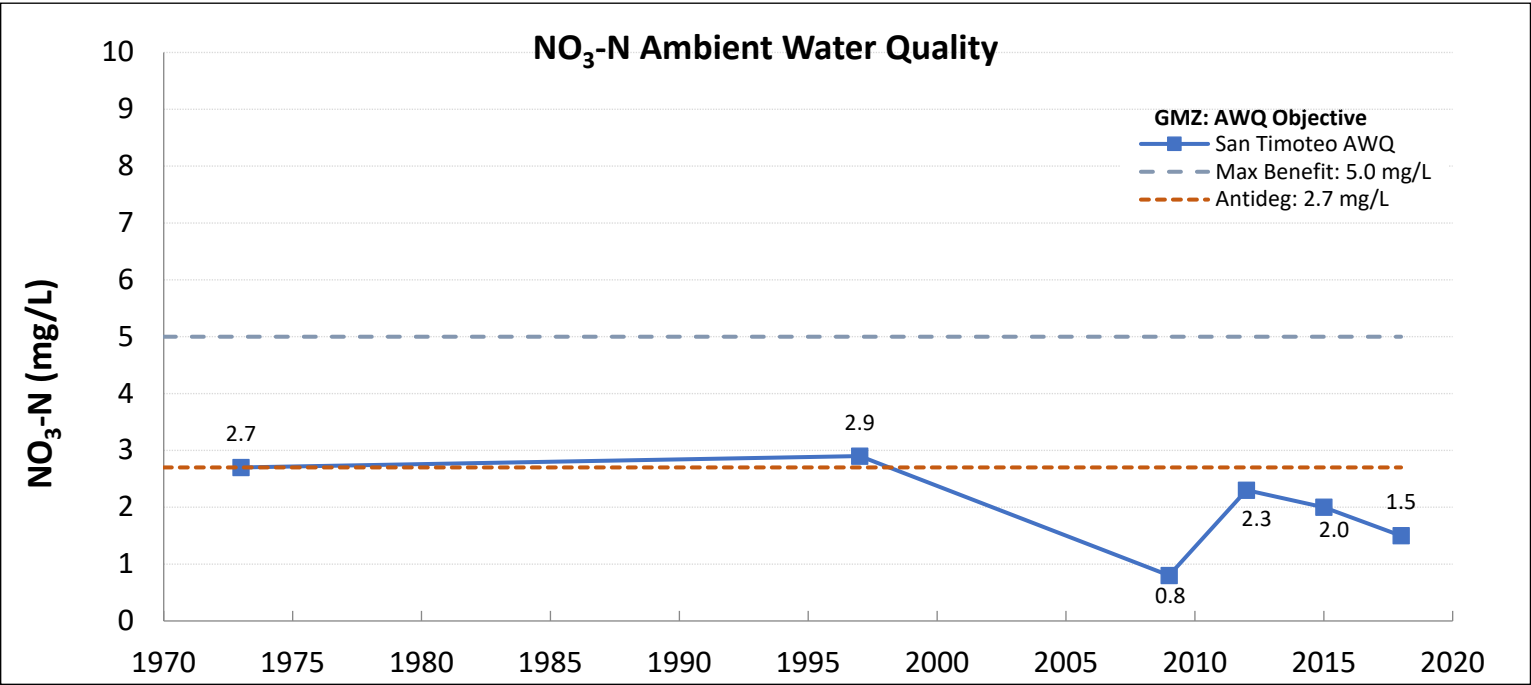
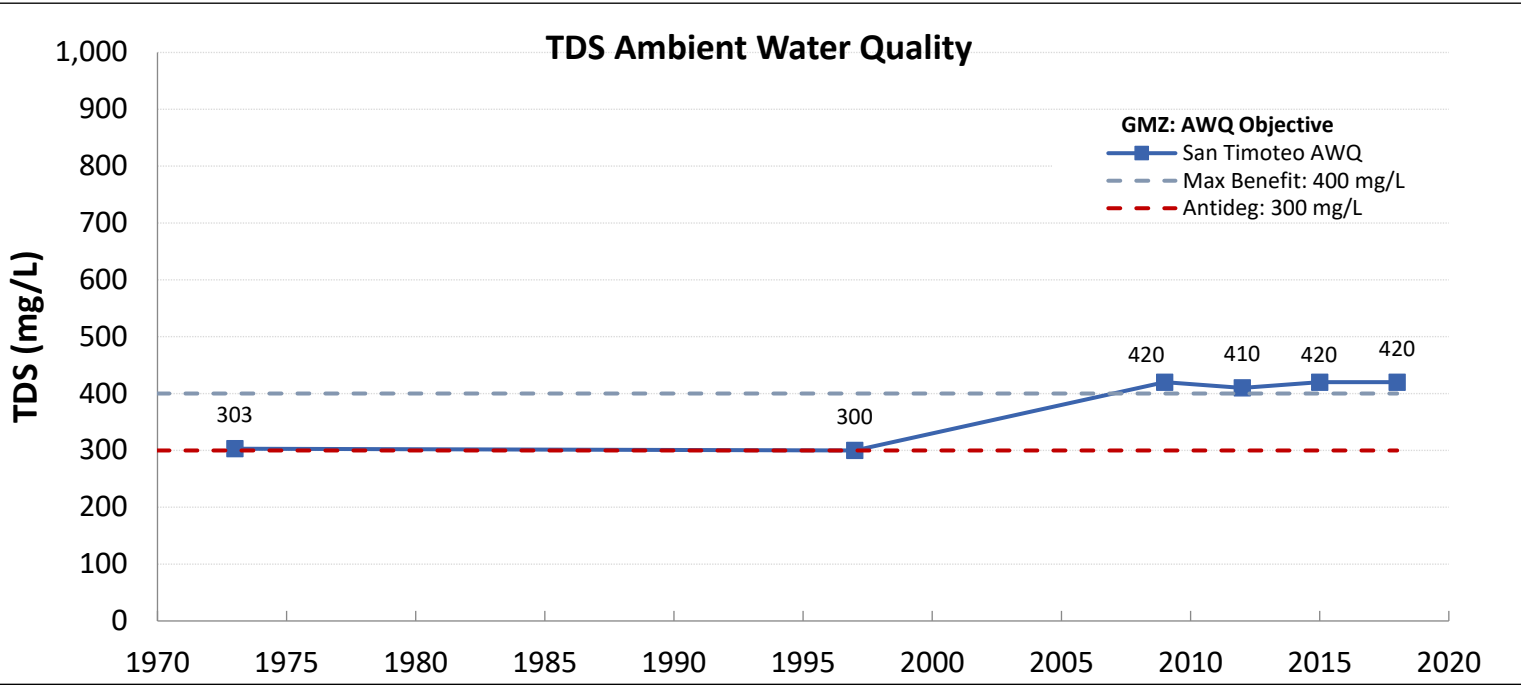
B16-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

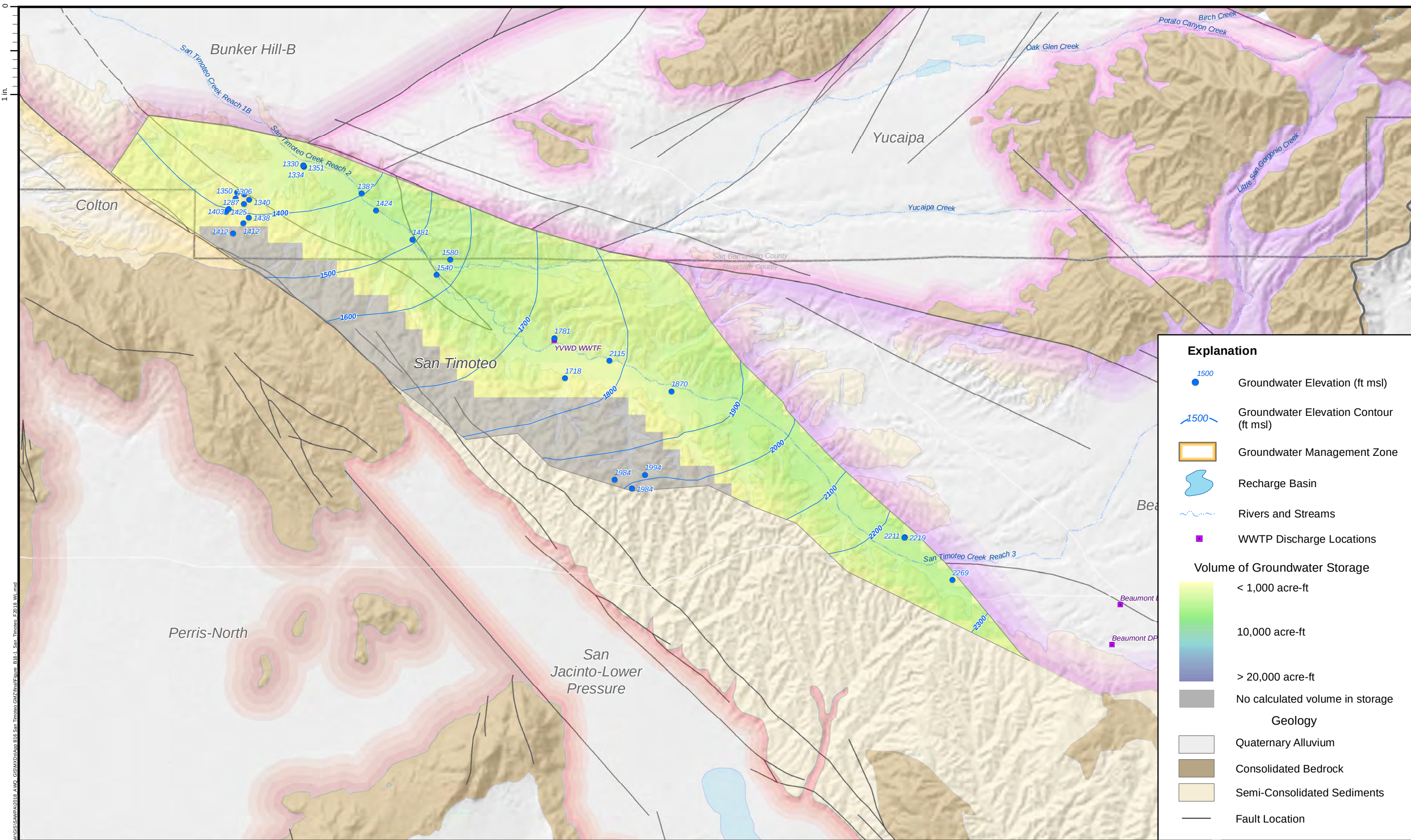
B16-5 TDS Concentration Change (1996-2015 to 1999-2018)

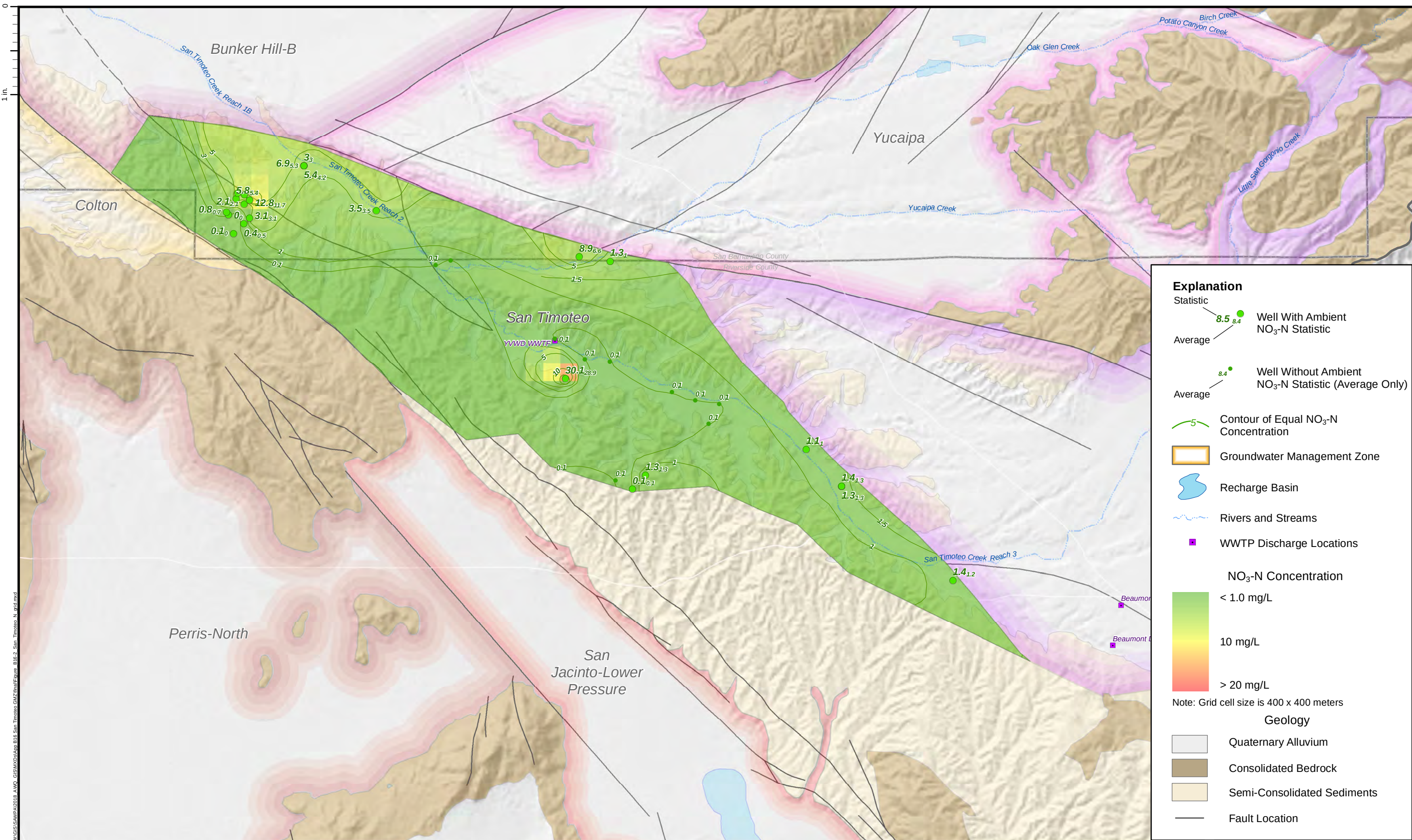


TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
San Timoteo -- "max benefit"	400	303	300	?	?	420	410	420	420	0	None (-20)
San Timoteo -- "antideg"	300	303	300	?	?	420	410	420	420	0	None (-120)
Nitrate as Nitrogen (mg/L)											
San Timoteo -- "max benefit"	5.0	2.7	2.9	?	?	0.8	2.3	2.0	1.5	-0.5	3.5
San Timoteo -- "antideg"	2.7	2.7	2.9	?	?	0.8	2.3	2.0	1.5	-0.5	1.2





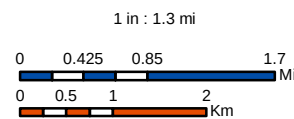


Prepared by:



Author: EC
Date: 3/24/2020

File Name: Figure_B16-2_San_Timoteo_N_grid



References:

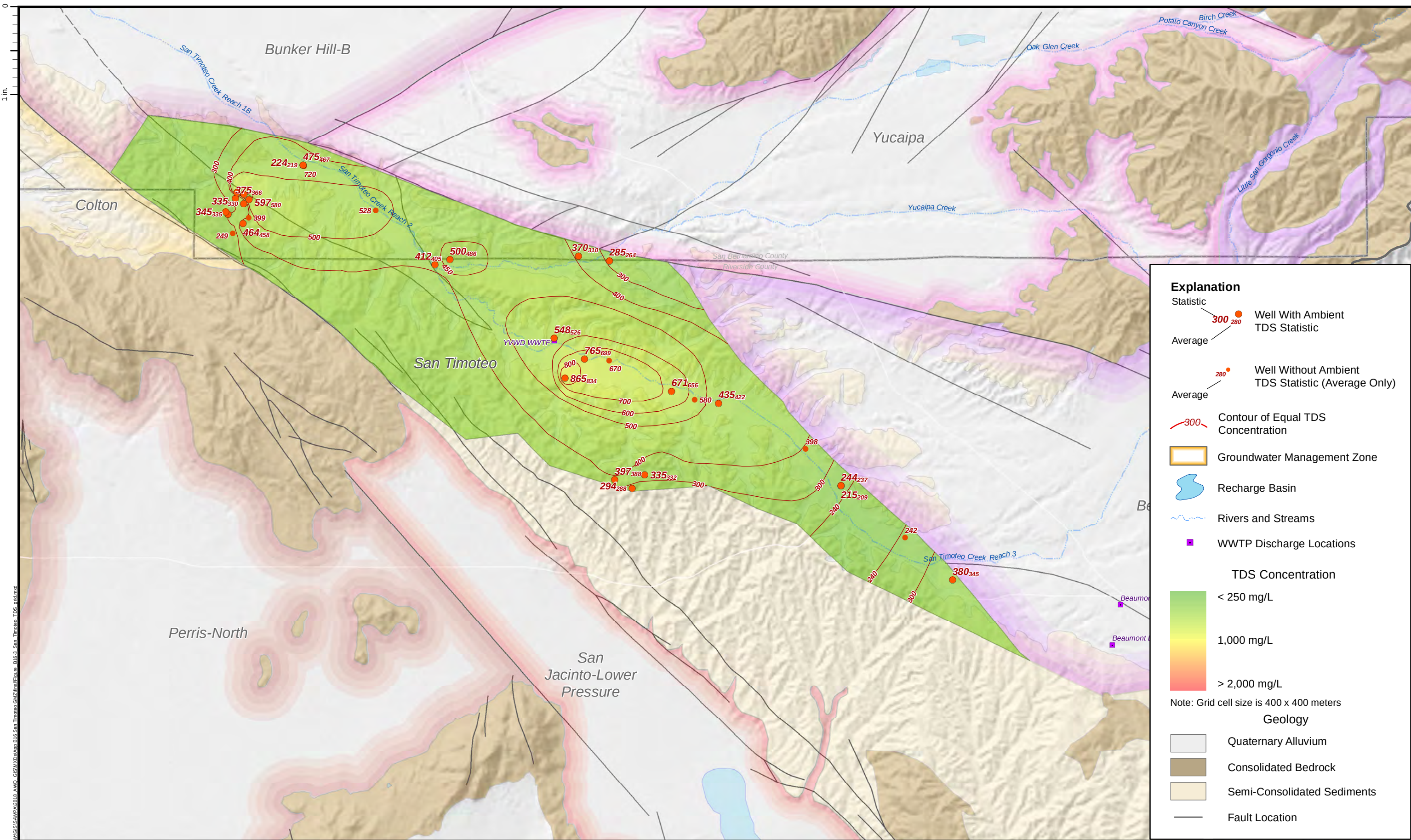
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2. Projection: Transverse Mercator
3. Datum: North American 1983
- Units: Meter

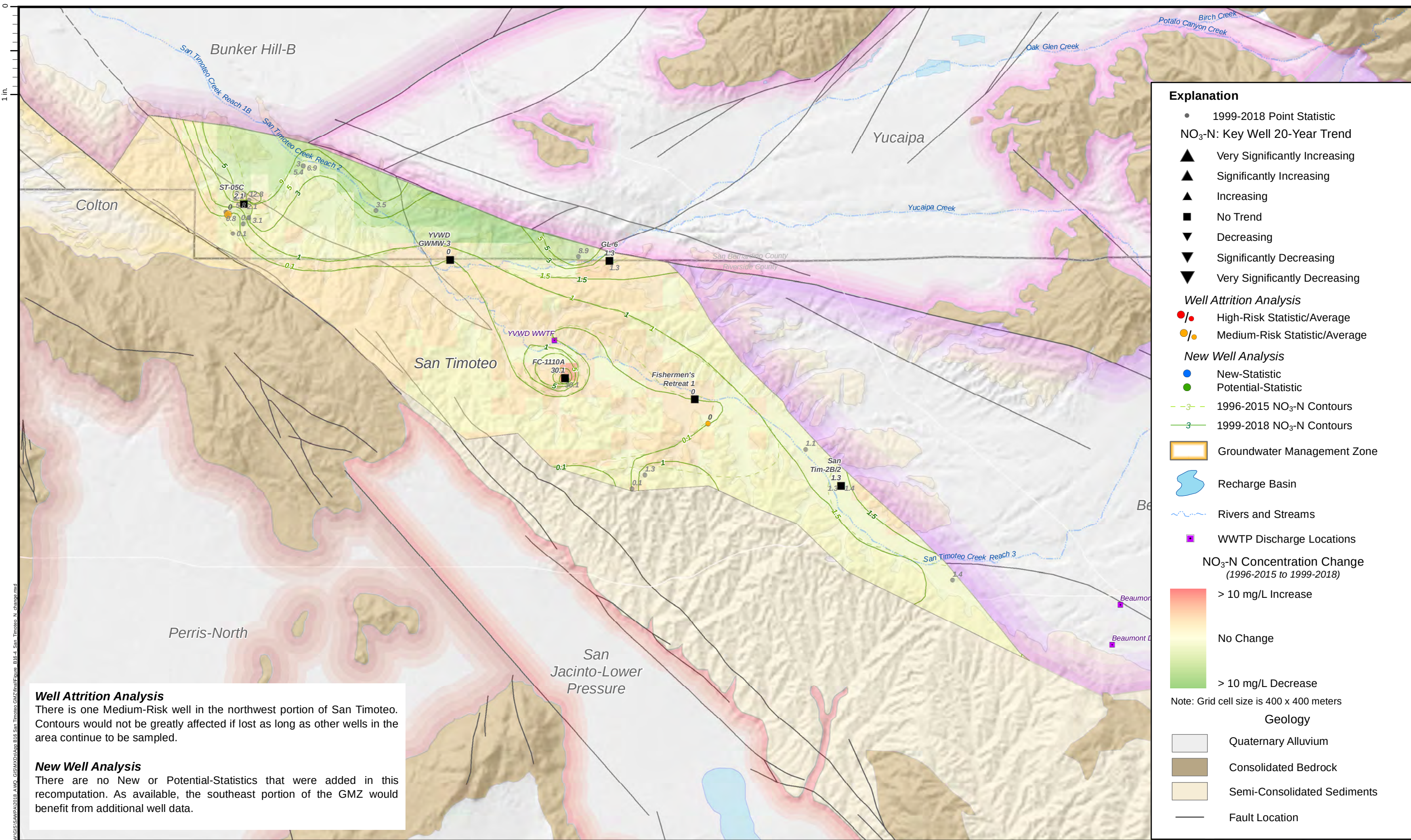
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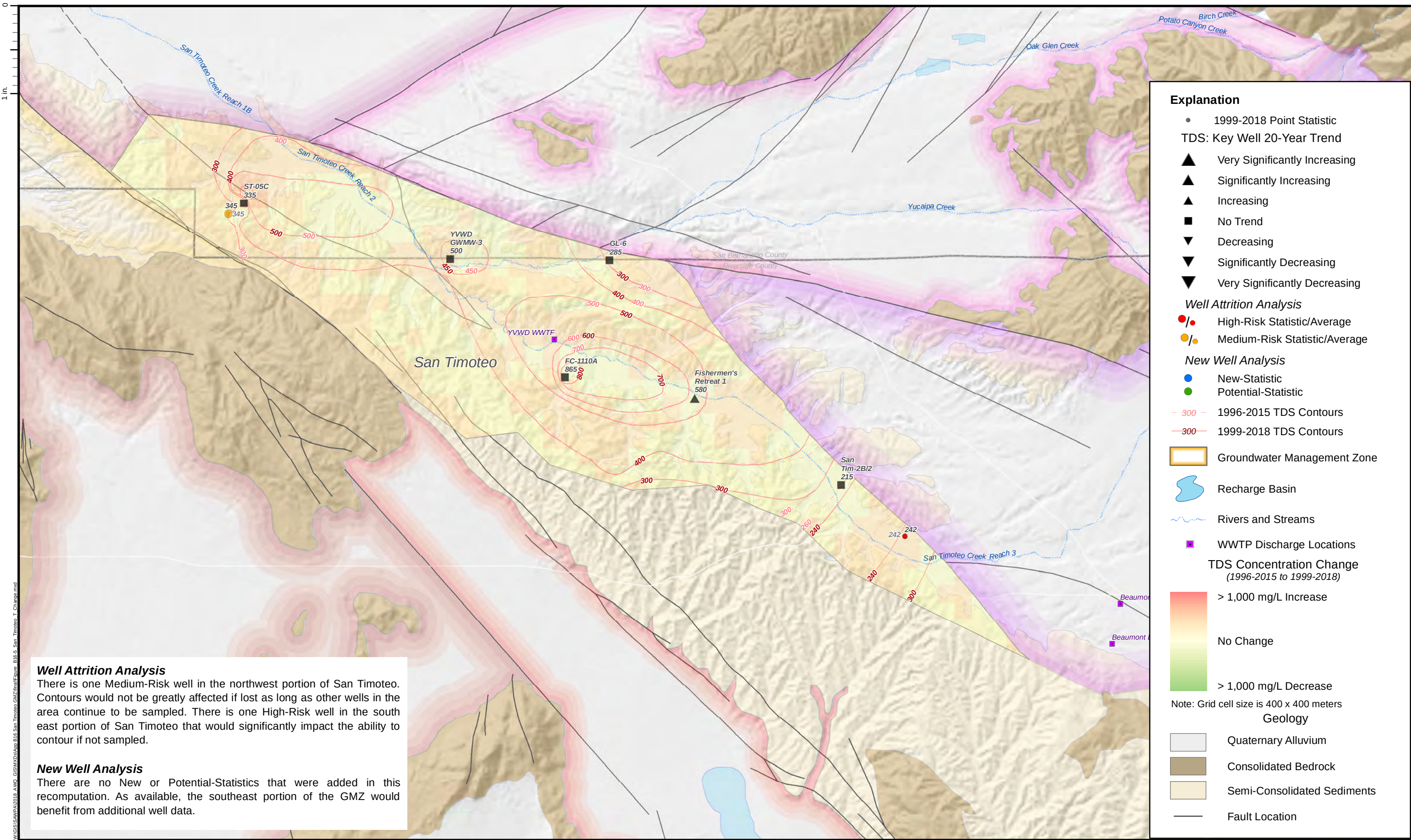


SAWPA Basin Monitoring Program Task Force
Recomputation of Ambient Water Quality
for the Period 1999 to 2018

NO₃-N Concentration and Contour Map
San Timoteo GMZ
Santa Ana River Watershed
Attachment B16-2







Attachment B17

Temescal GMZ

Attachment Contents:

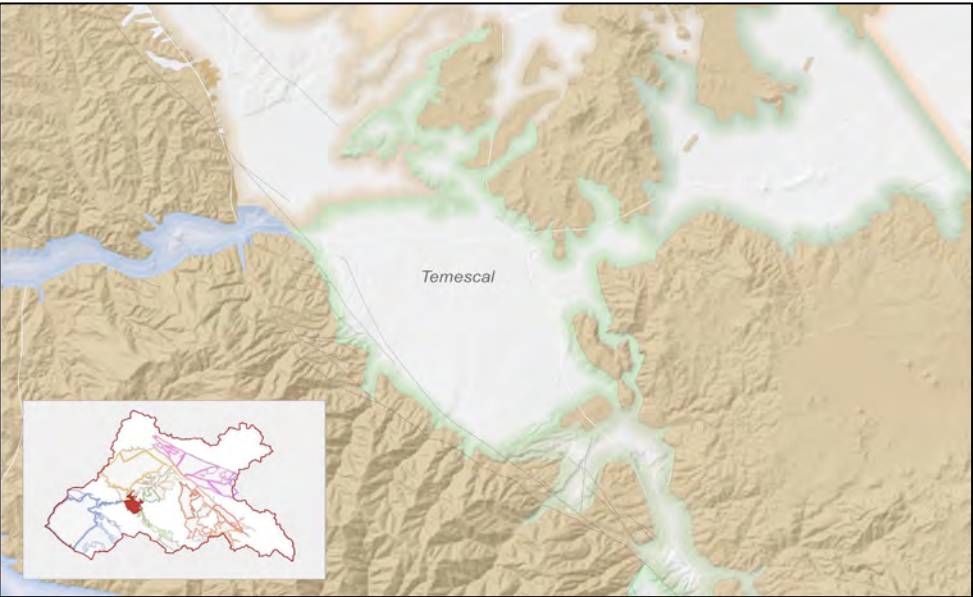
B17-1 Groundwater Storage and Elevation Contours Fall 2018

B17-2 NO₃-N Concentration and Contour Map

B17-3 TDS Concentration and Contour Map

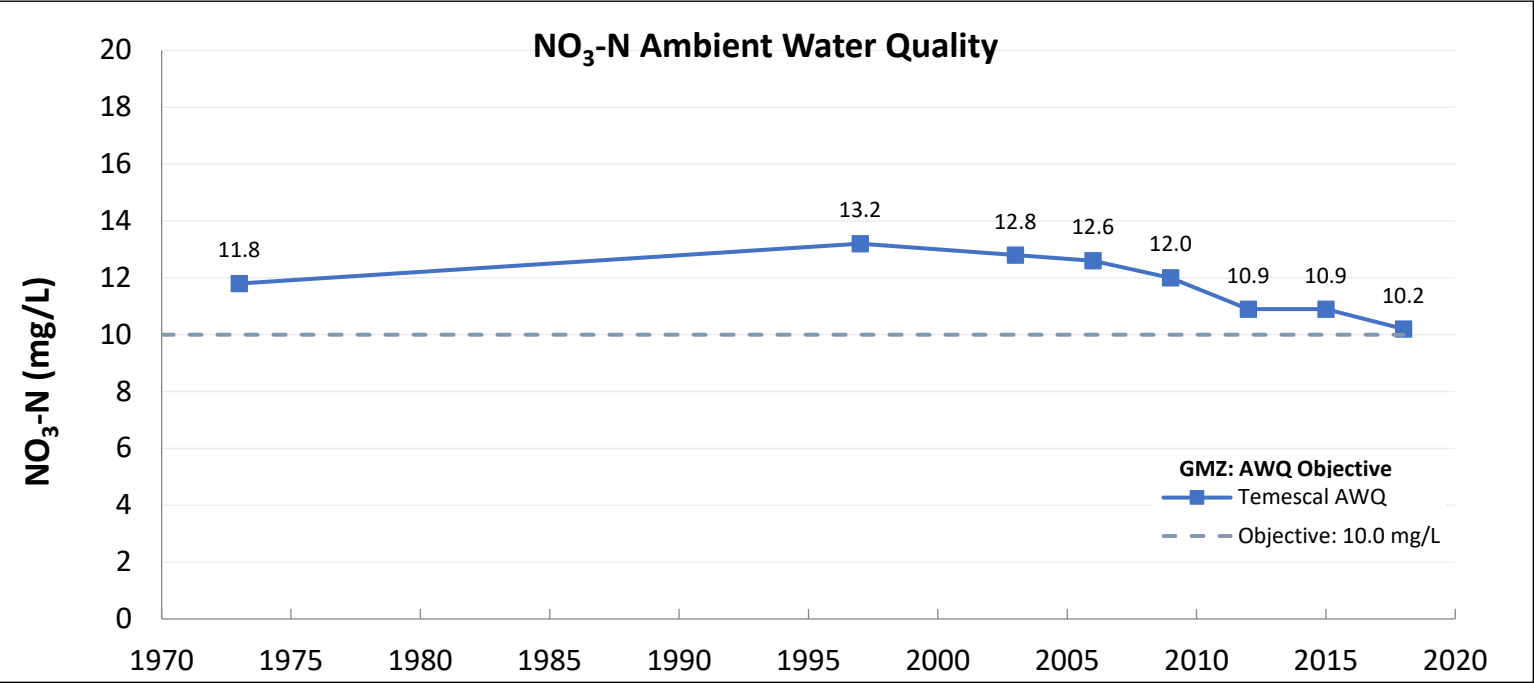
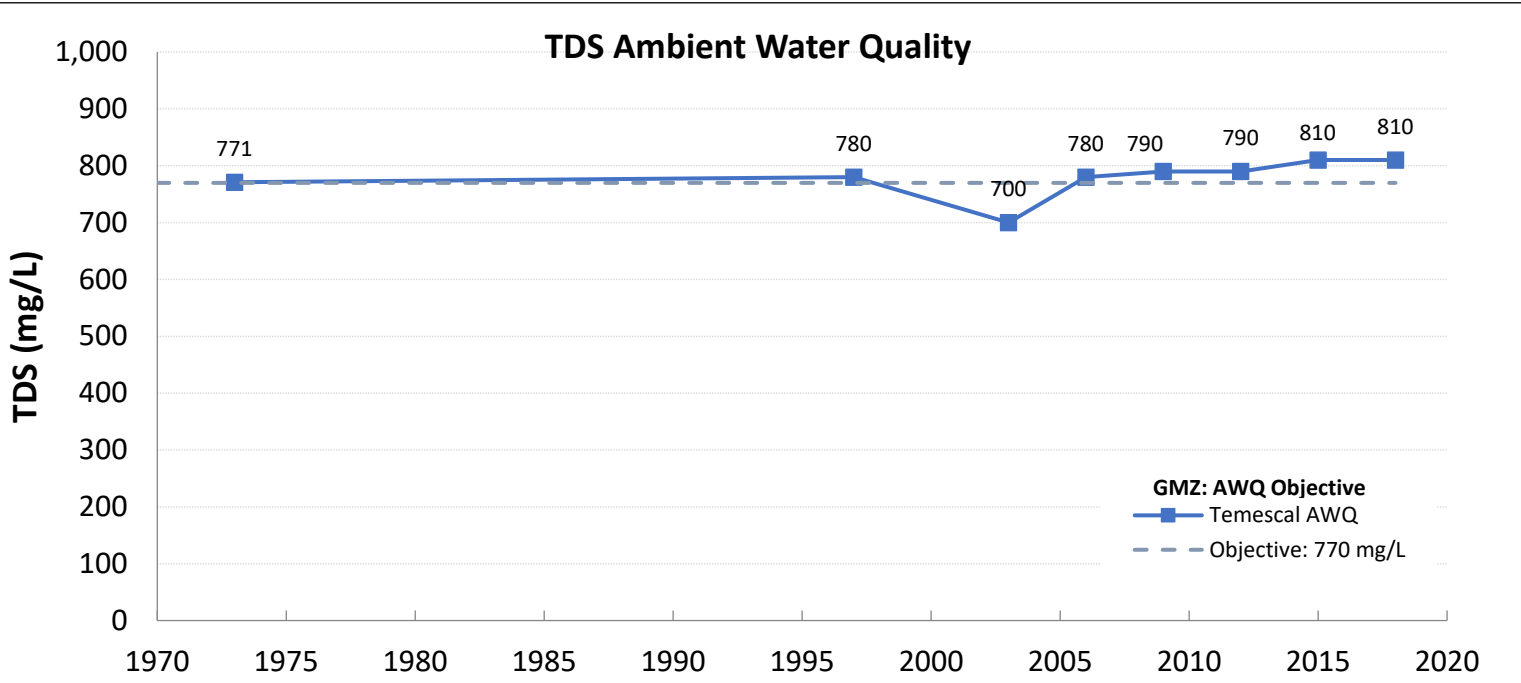
B17-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

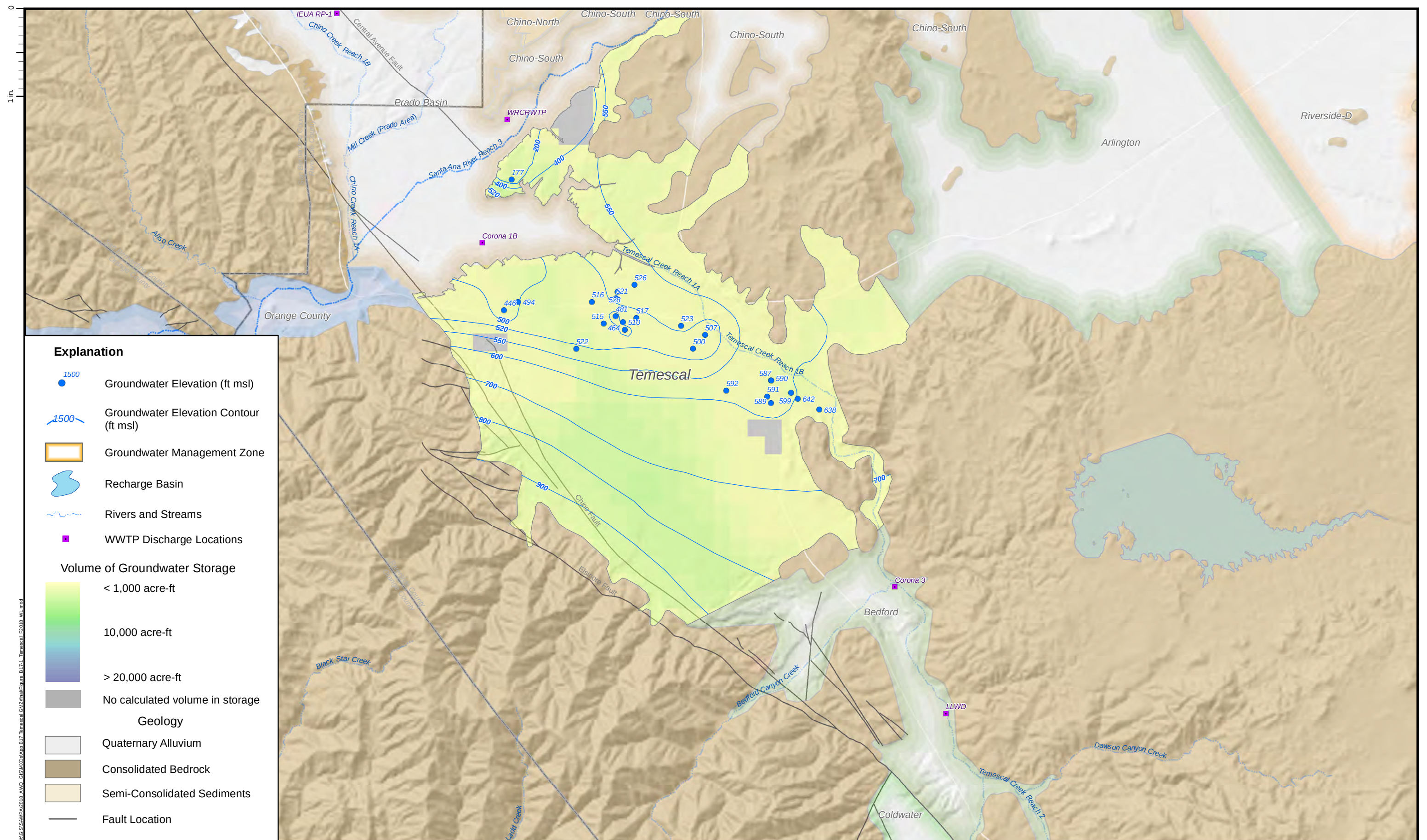
B17-5 TDS Concentration Change (1996-2015 to 1999-2018)

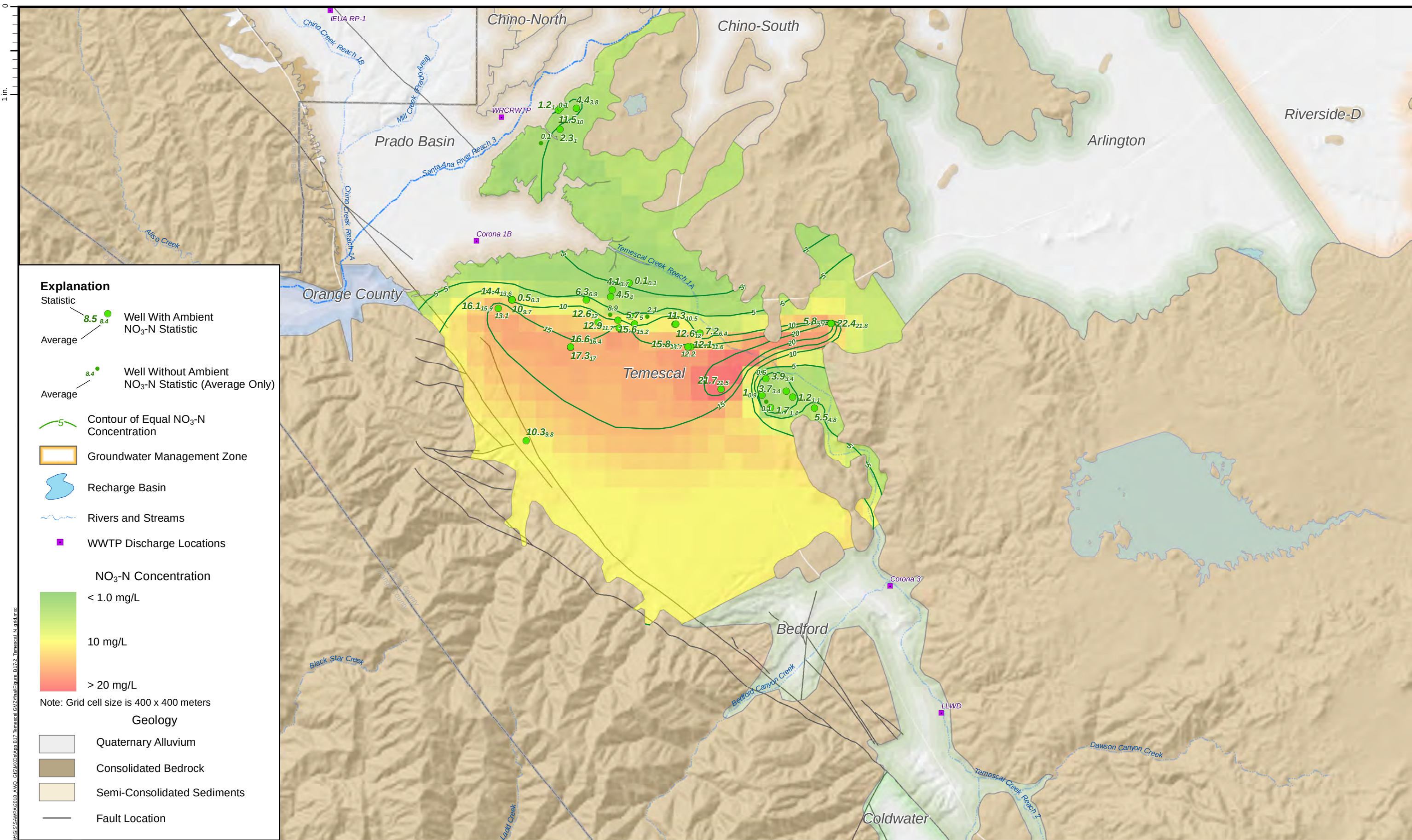


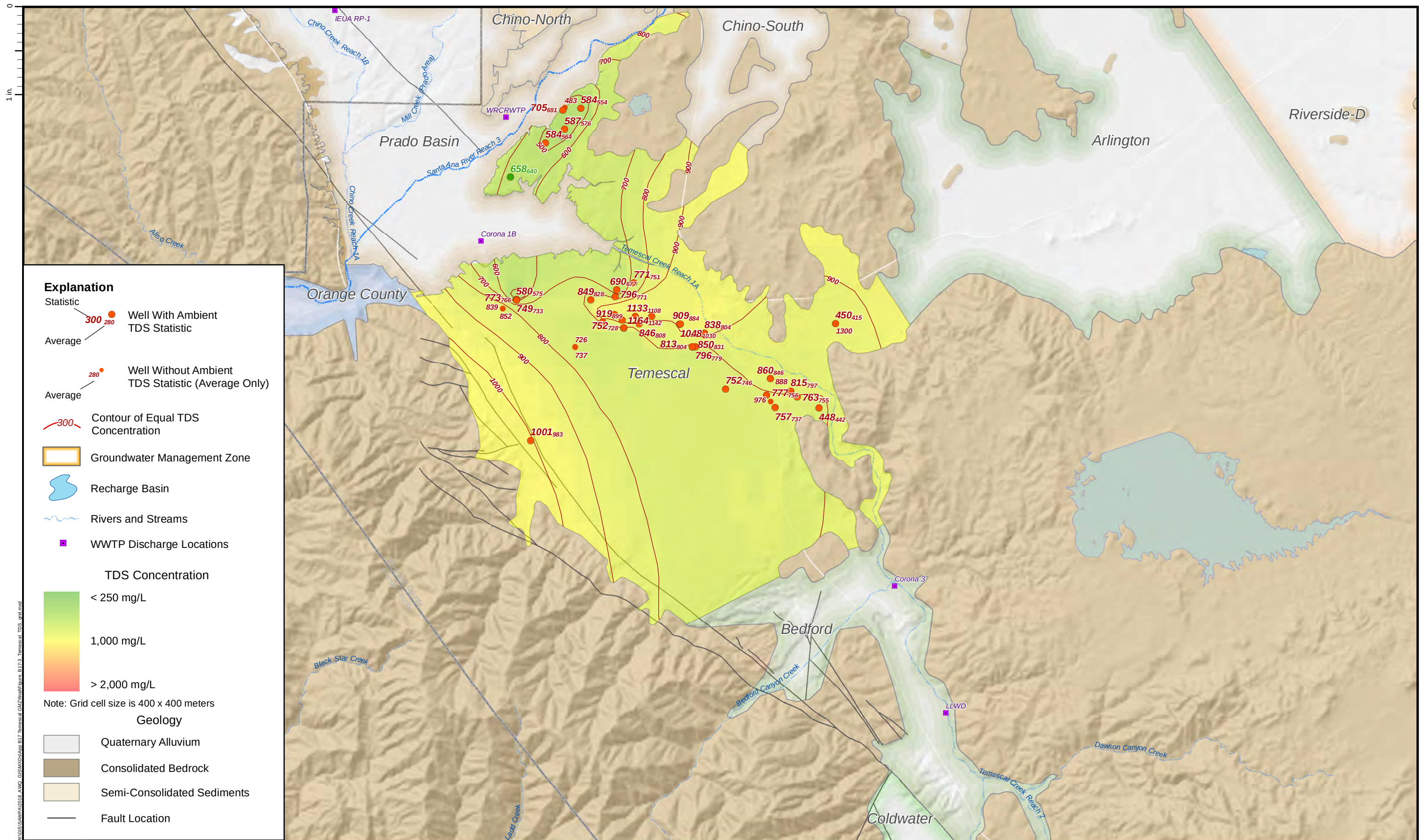
TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

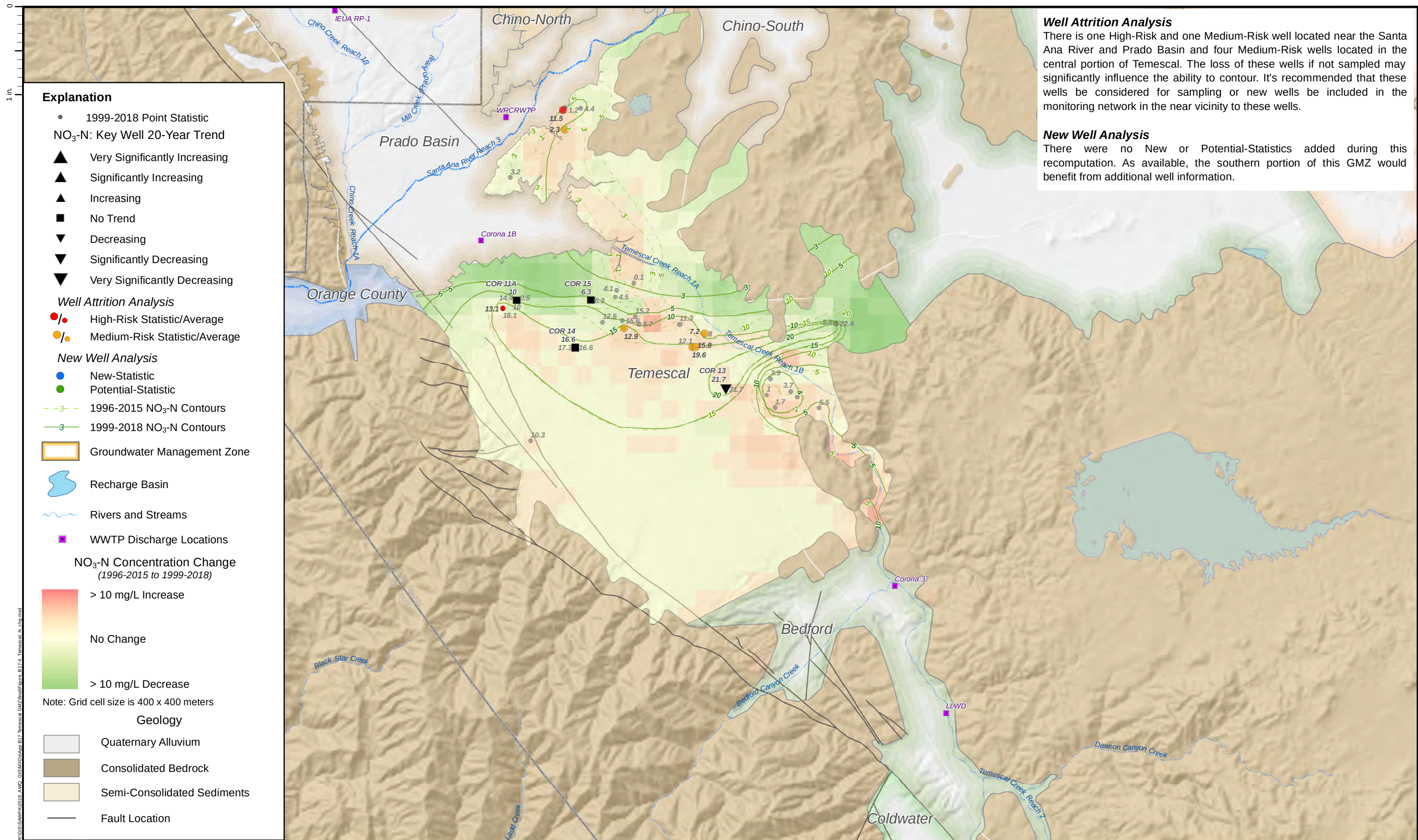
Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Temescal	770	771	780	700	780	790	790	810	810	0	None (-40)
Nitrate as Nitrogen (mg/L)											
Temescal	10.0	11.8	13.2	12.8	12.6	12.0	10.9	10.9	10.2	-0.7	None (-0.2)









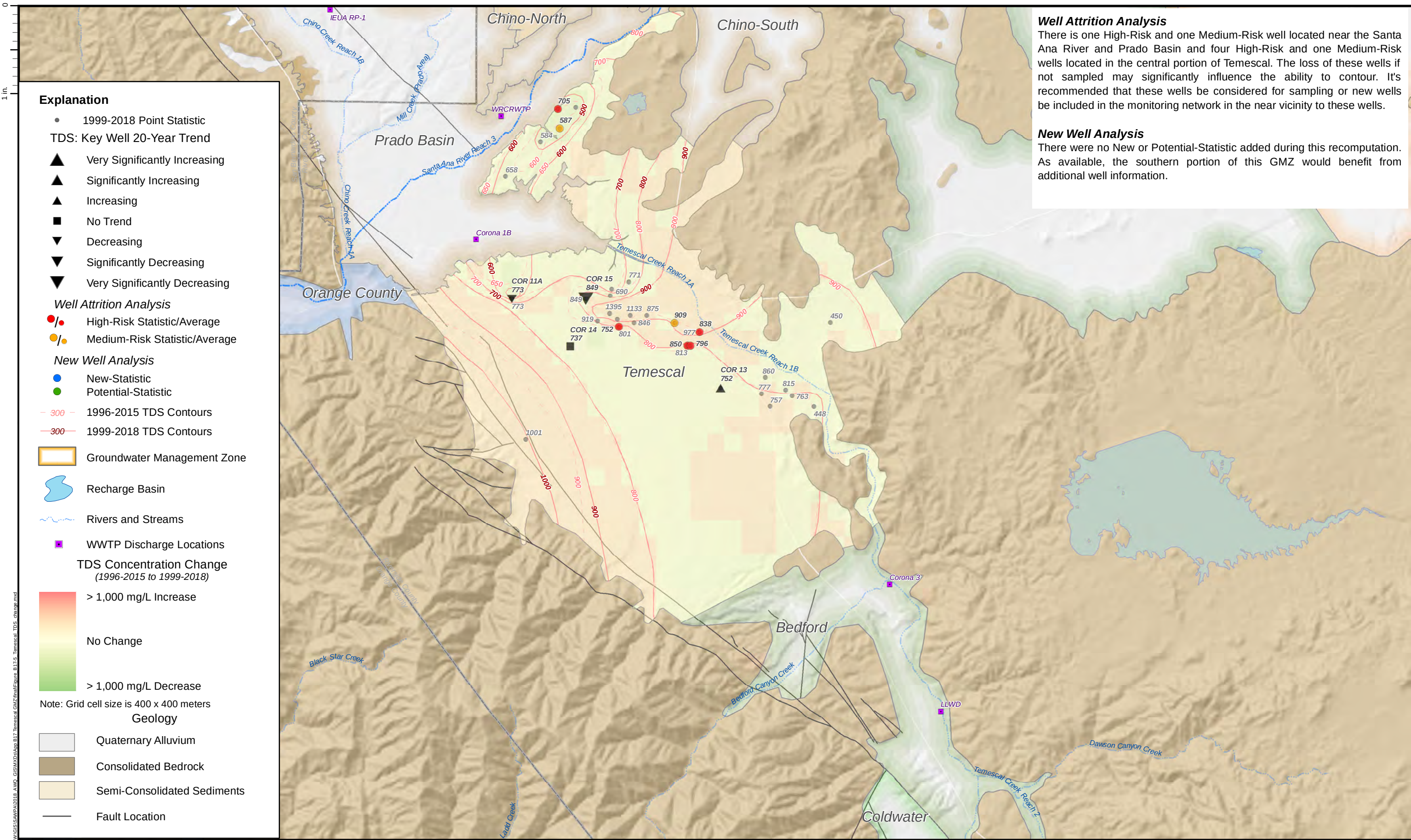


Well Attrition Analysis

There is one High-Risk and one Medium-Risk well located near the Santa Ana River and Prado Basin and four Medium-Risk wells located in the central portion of Temescal. The loss of these wells if not sampled may significantly influence the ability to contour. It's recommended that these wells be considered for sampling or new wells be included in the monitoring network in the near vicinity to these wells.

New Well Analysis

There were no New or Potential-Statistics added during this recomputation. As available, the southern portion of this GMZ would benefit from additional well information.



Well Attrition Analysis
There is one High-Risk and one Medium-Risk well located near the Santa Ana River and Prado Basin and four High-Risk and one Medium-Risk wells located in the central portion of Temescal. The loss of these wells if not sampled may significantly influence the ability to contour. It's recommended that these wells be considered for sampling or new wells be included in the monitoring network in the near vicinity to these wells.

New Well Analysis
There were no New or Potential-Statistic added during this recomputation. As available, the southern portion of this GMZ would benefit from additional well information.

Attachment B18

Yucaipa GMZ

Attachment Contents:

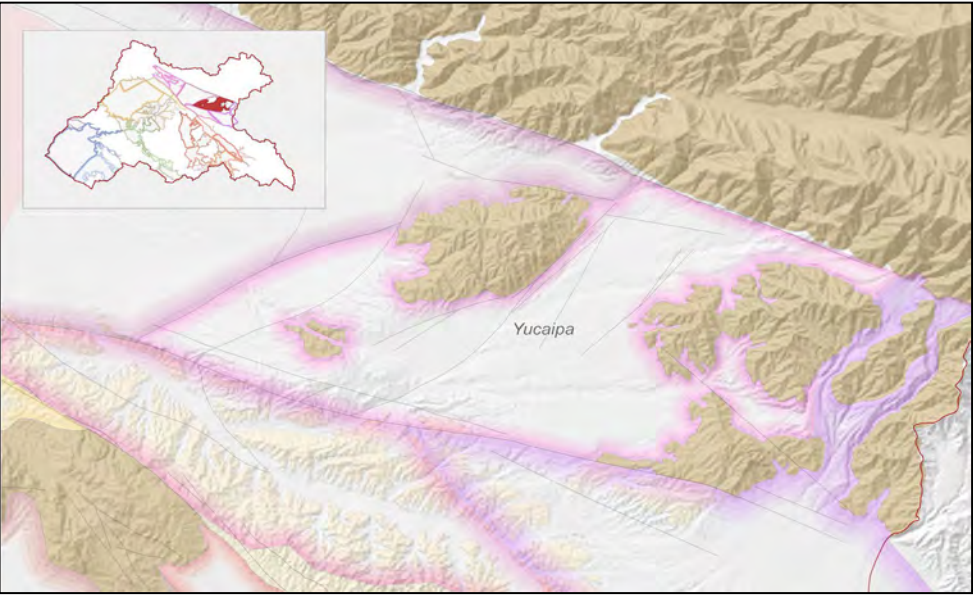
B18-1 Groundwater Storage and Elevation Contours Fall 2018

B18-2 NO₃-N Concentration and Contour Map

B18-3 TDS Concentration and Contour Map

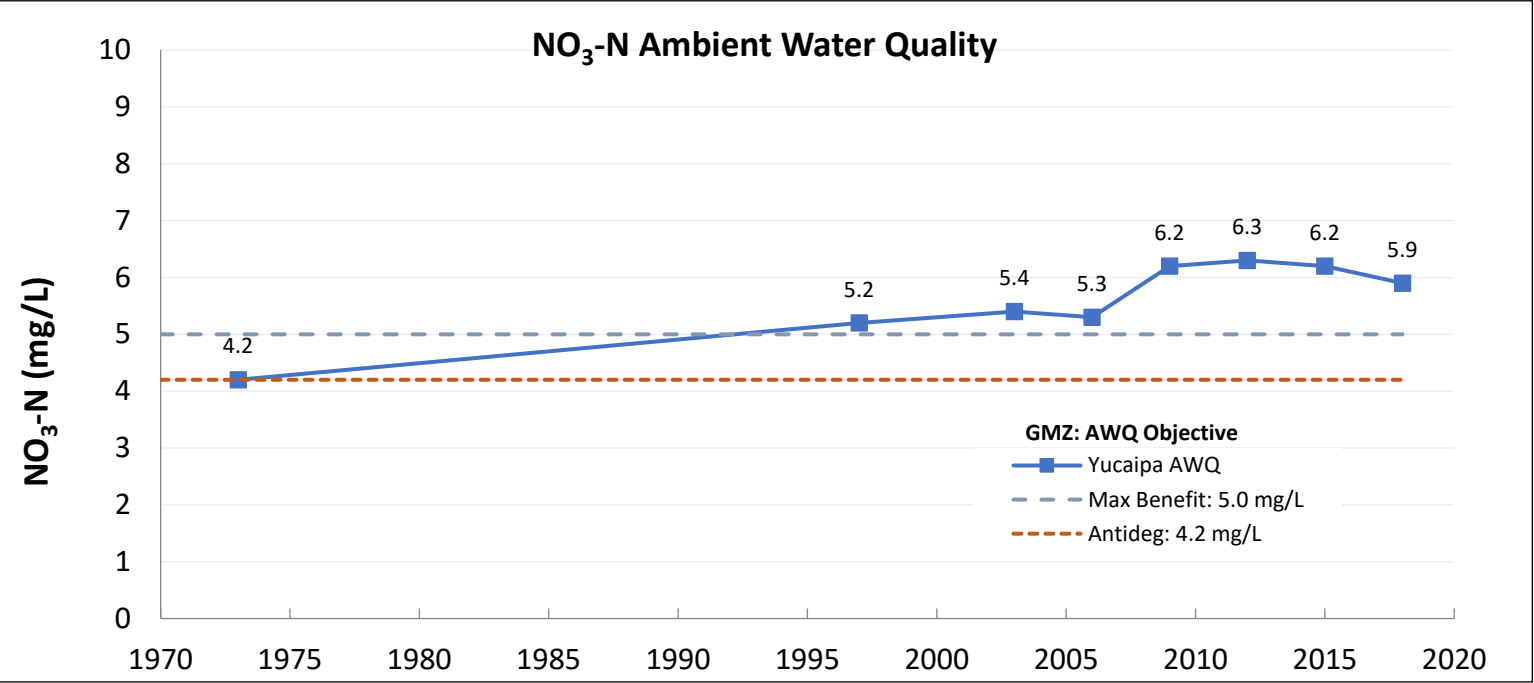
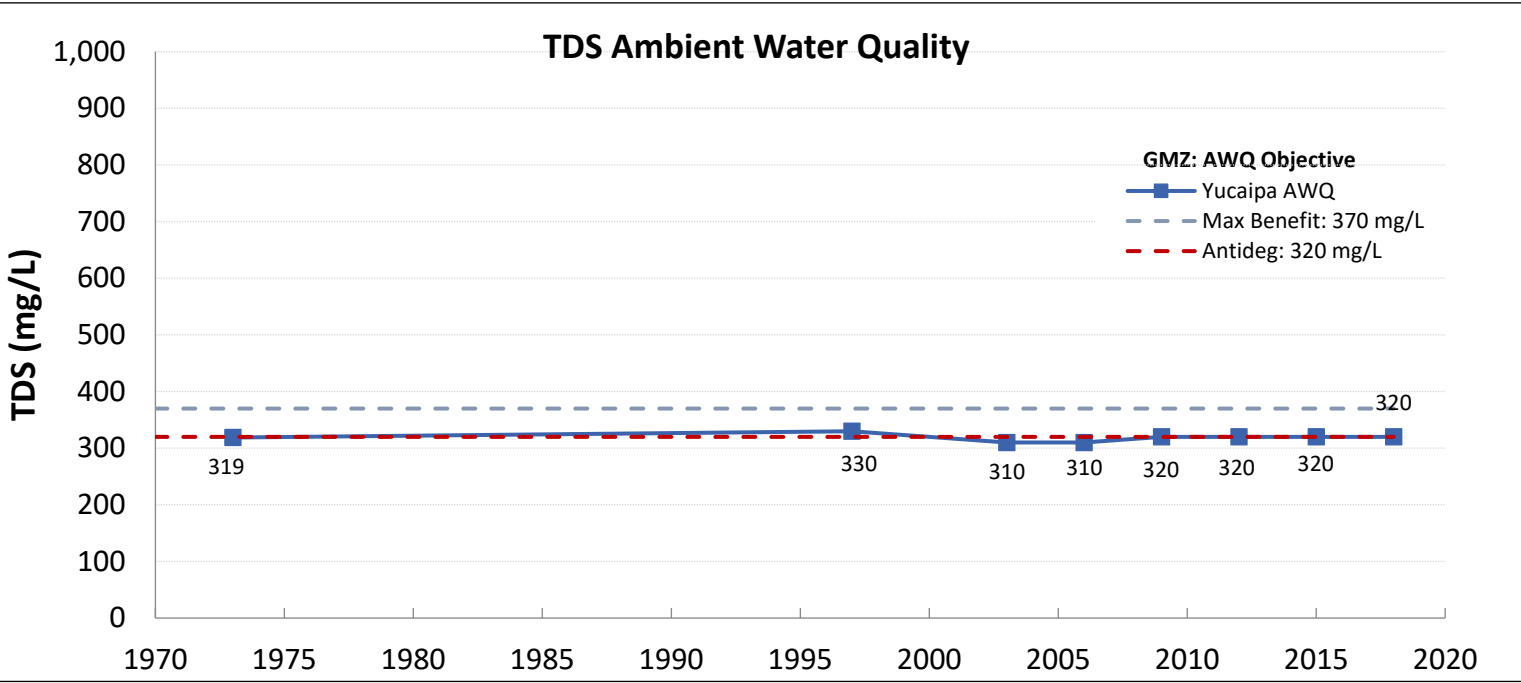
B18-4 NO₃-N Concentration Change (1996-2015 to 1999-2018)

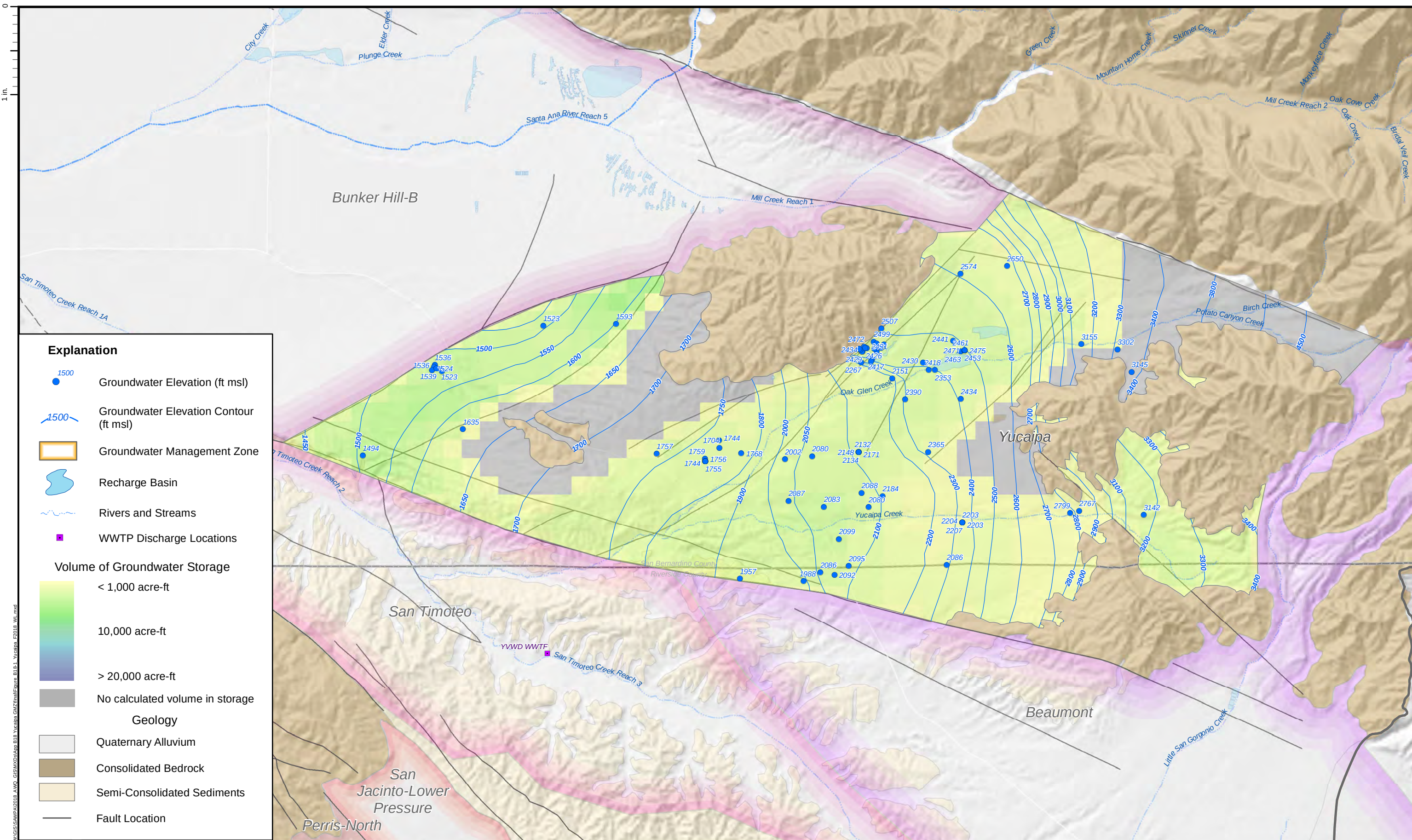
B18-5 TDS Concentration Change (1996-2015 to 1999-2018)

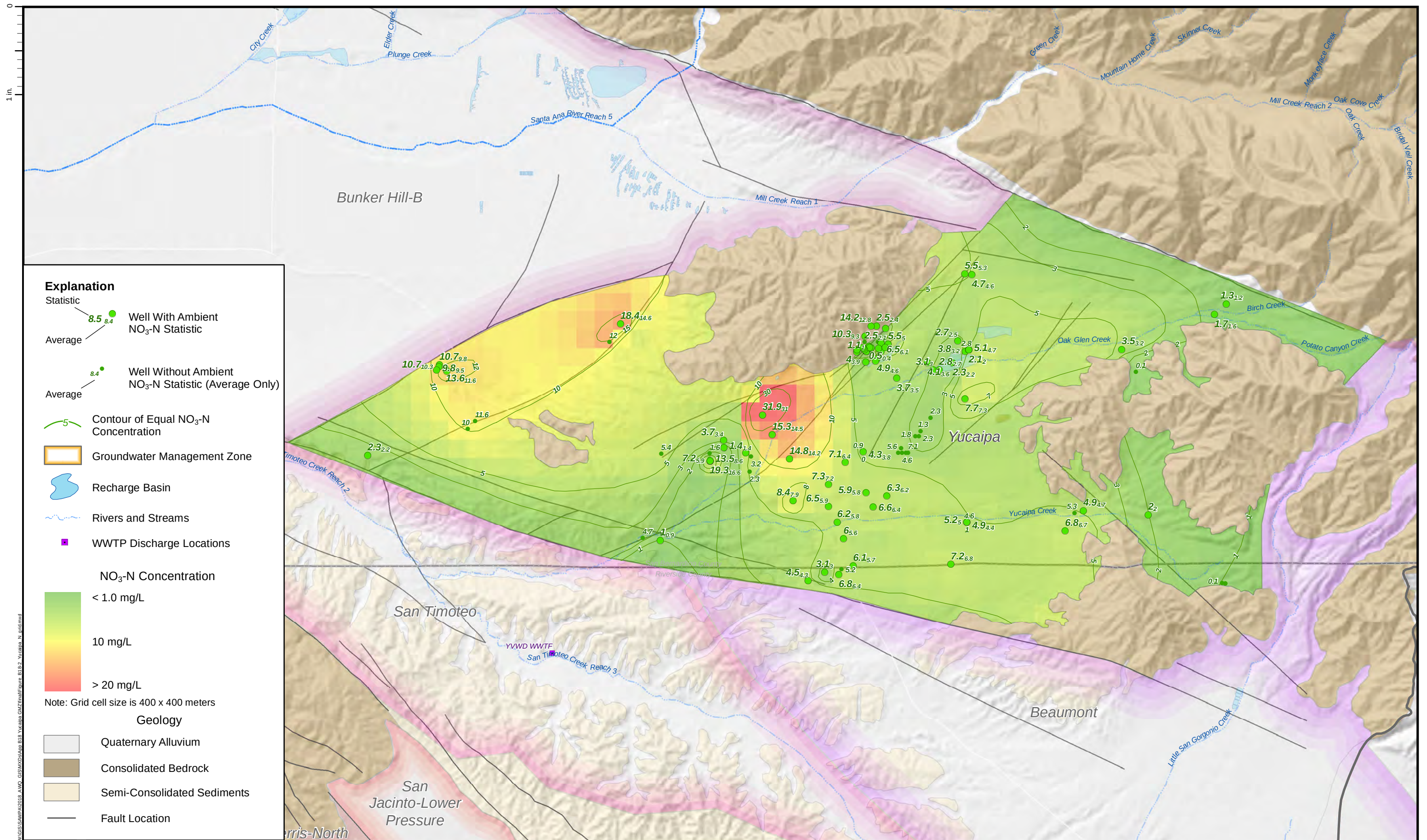


TDS and Nitrate Water Quality Objectives, Ambient Water Quality, and Assimilative Capacity

Management Zone	Water Quality Objective	Historical Ambient (1954-1973) ¹	1997 Ambient (1978-1997)	2003 Ambient (1984-2003)	2006 Ambient (1987-2006)	2009 Ambient (1990-2009)	2012 Ambient (1993-2012)	2015 Ambient (1996-2015)	2018 Ambient (1999-2018)	Difference from 2015 to 2018	Assimilative Capacity
Total Dissolved Solids (mg/L)											
Yucaipa -- "max benefit"	370	319	330	310	310	320	320	320	320	0	50
Yucaipa -- "antideg"	320	319	330	310	310	320	320	320	320	0	0
Nitrate as Nitrogen (mg/L)											
Yucaipa -- "max benefit"	5.0	4.2	5.2	5.4	5.3	6.2	6.3	6.2	5.9	-0.3	None (-0.9)
Yucaipa -- "antideg"	4.2	4.2	5.2	5.8	5.3	6.2	6.3	6.2	5.9	-0.3	None (-1.7)





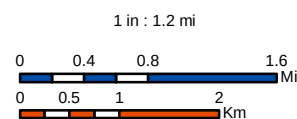


Prepared by:



Author: EC
Date: 3/24/2020

File Name: Figure_B18-2_Yucaipa_N_grid



References:

1. Coordinate System: NAD 1983 UTM Zone 11N
2. Projection: Transverse Mercator
3. Datum: North American 1983
- Units: Meter

Prepared for:



SAWPA Basin Monitoring Program Task Force
Recomputation of Ambient Water Quality
for the Period 1999 to 2018

NO₃-N Concentration and Contour Map
Yucaipa GMZ
Santa Ana River Watershed
Attachment B18-2

