

Santa Ana River Wasteload Allocation Model Update

BASIN MONITORING PROGRAM TASK FORCE

October 25, 2019



10/25/19



Overview

- **Results from Task 3h – Recalculate Baseflow Average at Santa Ana River Below Prado Dam**
- **Results from Task 3i – Recalculate Streambed Recharge for Beaumont and Bunker Hill-B Groundwater Management Zones**
- **Next Steps**

Overview

- **Results from Task 3h – Recalculate Baseflow Average at Santa Ana River Below Prado Dam**
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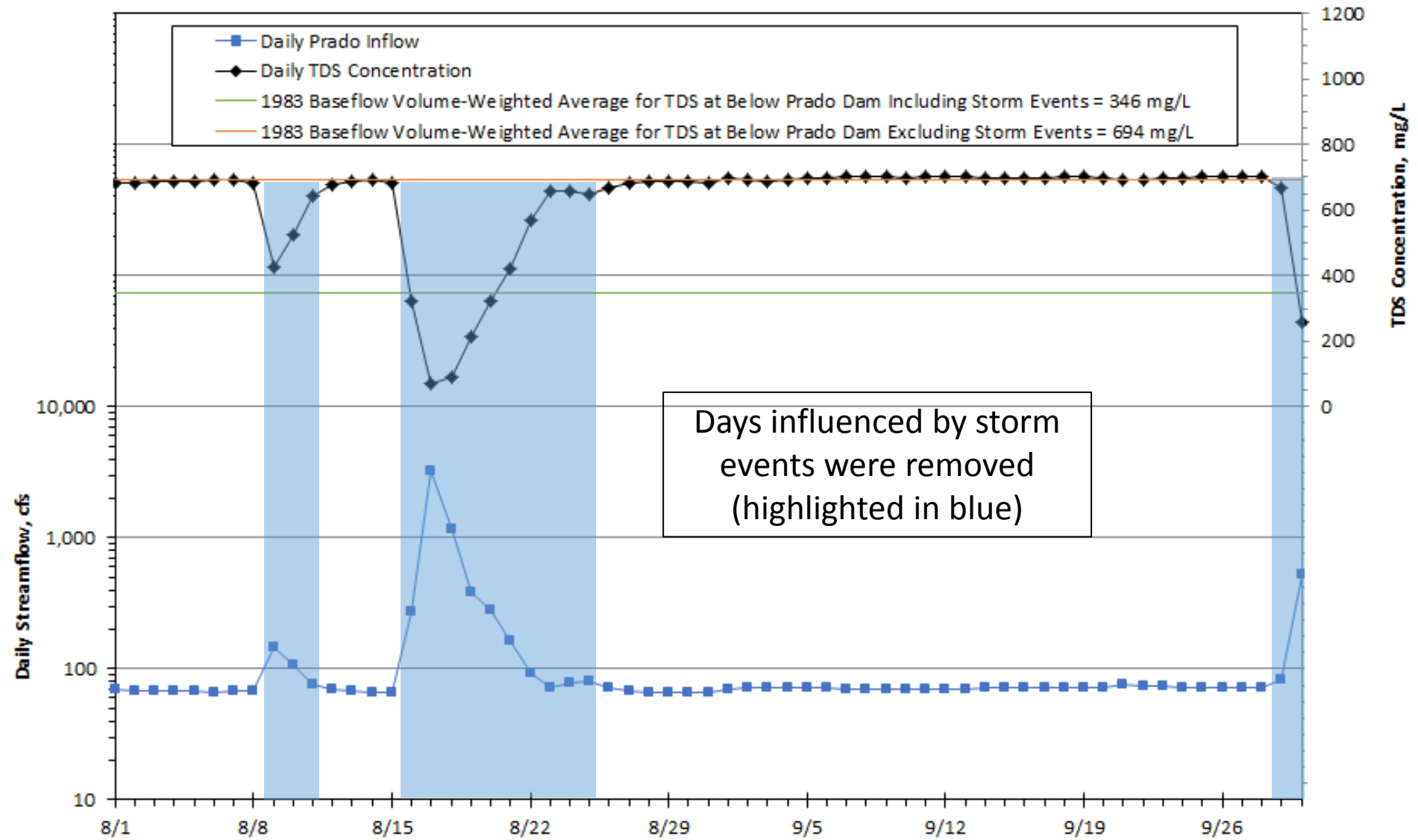
Comments on Draft TM No. 6 from Risk Sciences – Comment No. 36

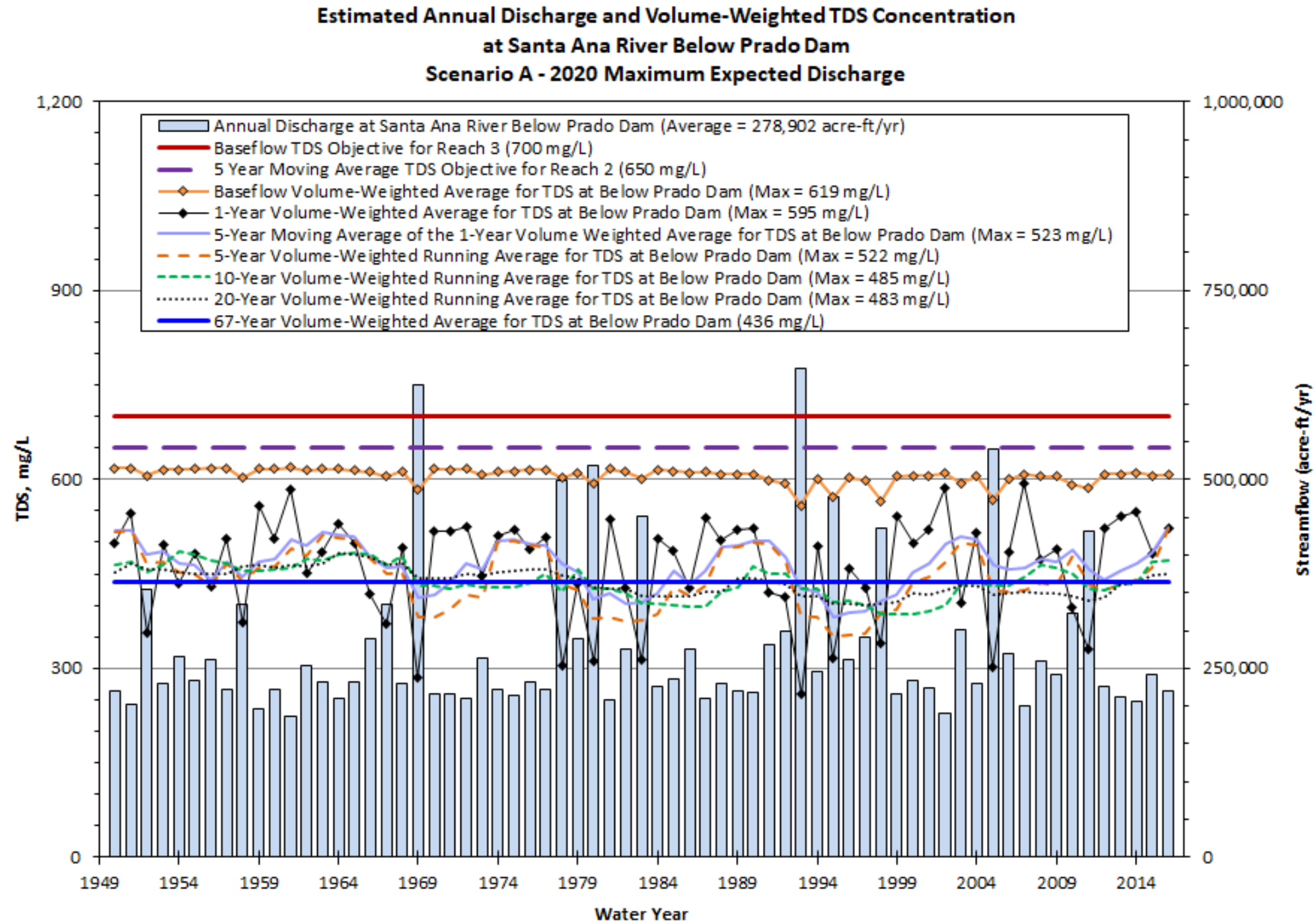
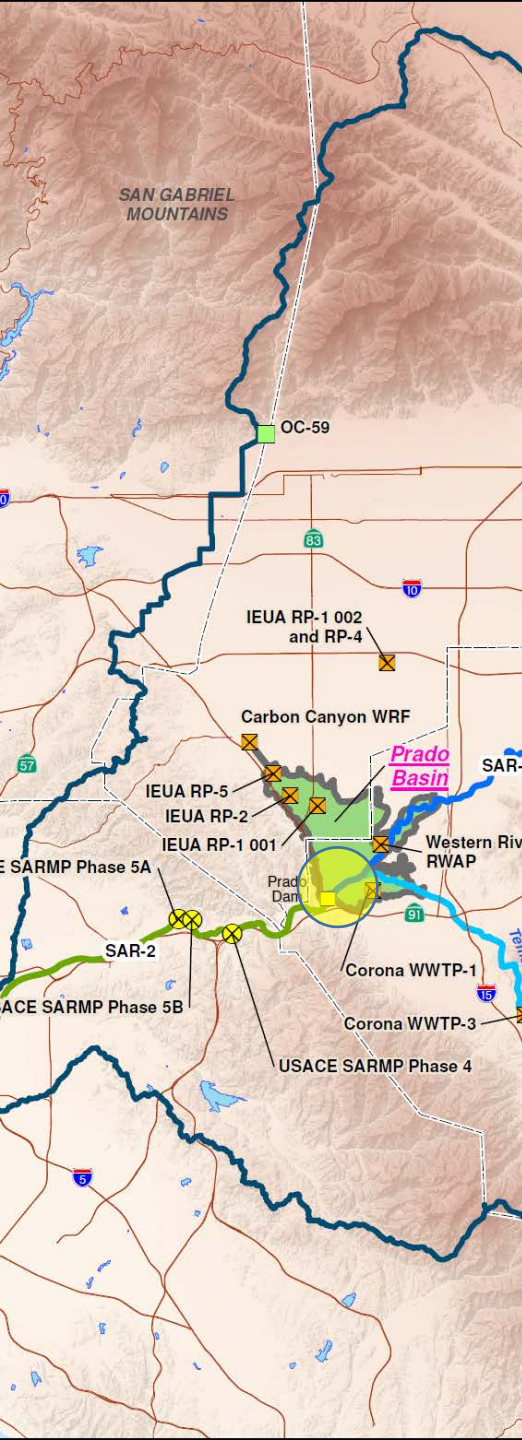
No.	Section	Pg.	Comment	GEOSCIENCE Response
<u>36</u>	Appendix	Appendix A	Appendix Pg. A-28: TDS objective at this location is for baseflow conditions (e.g. average of August and September data w/o storm influenced flows). Please confirm that the retrospective line represents just this baseflow condition.	Currently, this concentration is calculated for August-only, following the convention used in the previous WLAM reports but modified based on findings from Risk Sciences (removed days influenced by storm events). Changing this value would require out of scope work to recompile and analyze precipitation for September to identify storm events. Will proceed based on input from the Task Force

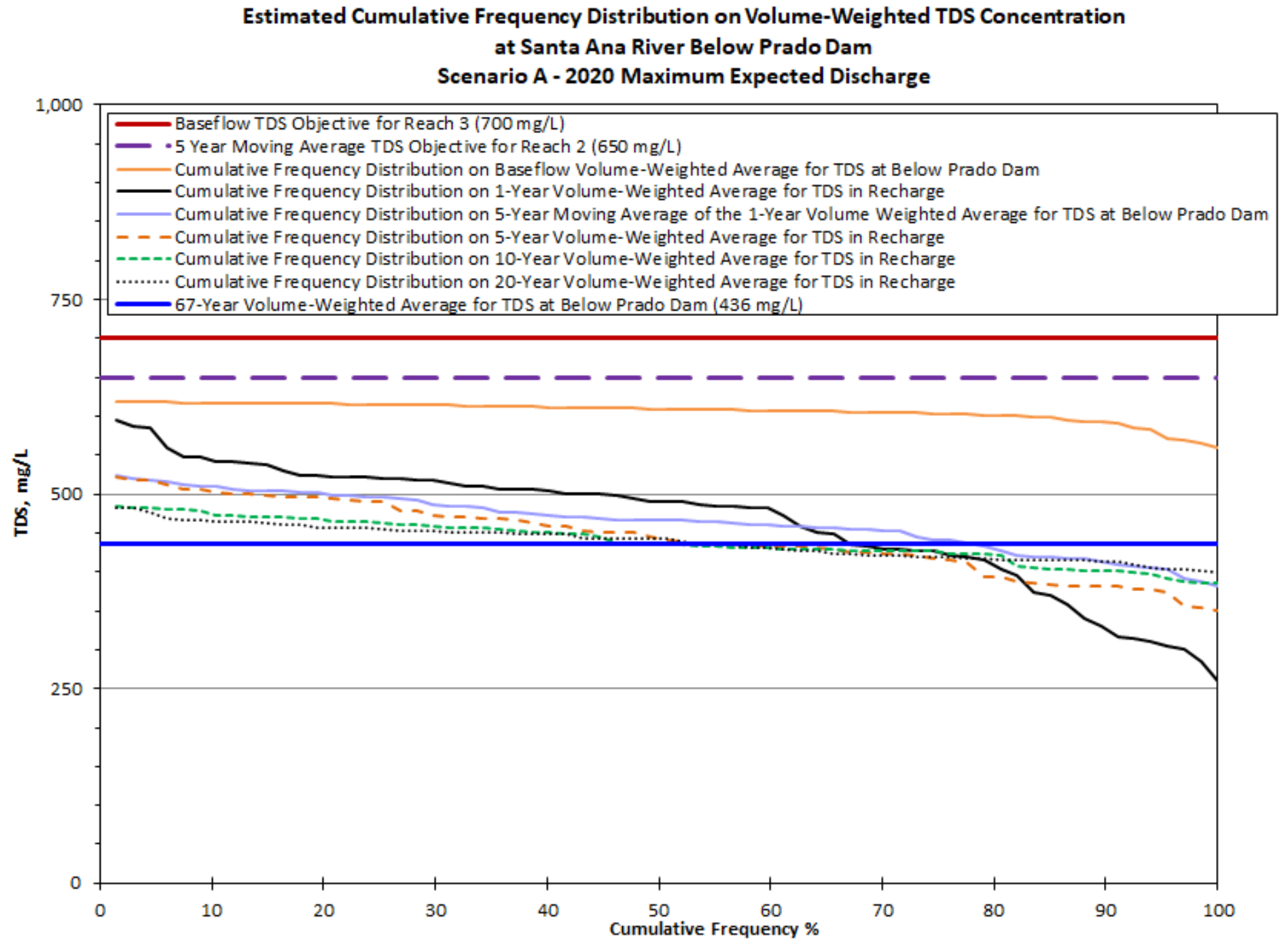
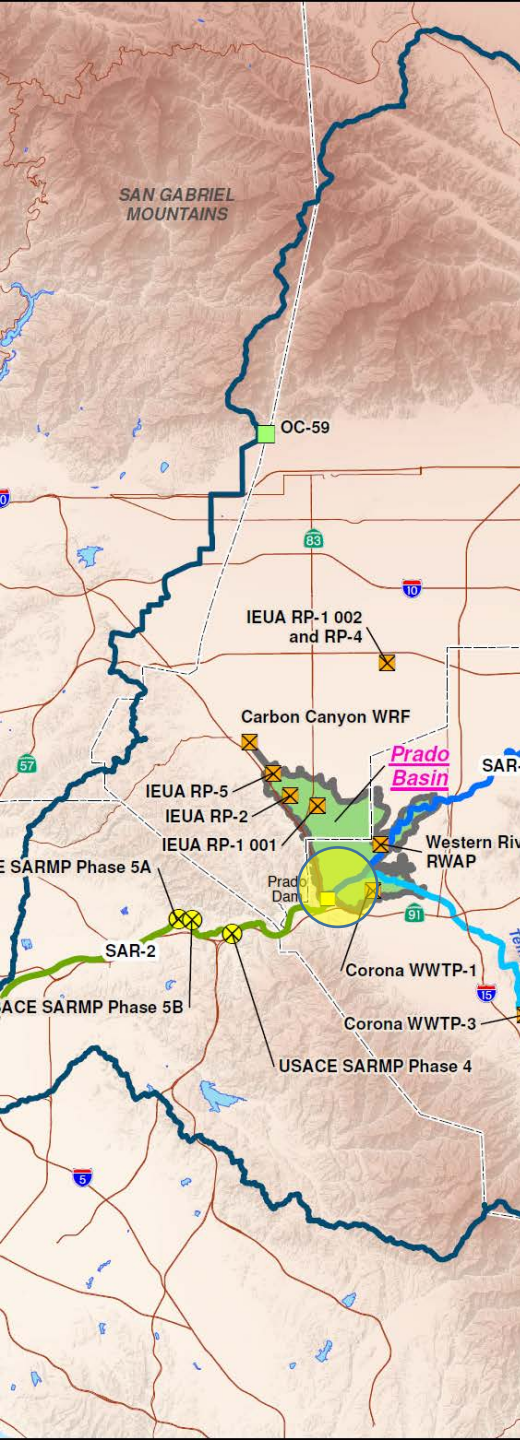
Comments on Draft TM No. 6 from Risk Sciences – Comment No. 20

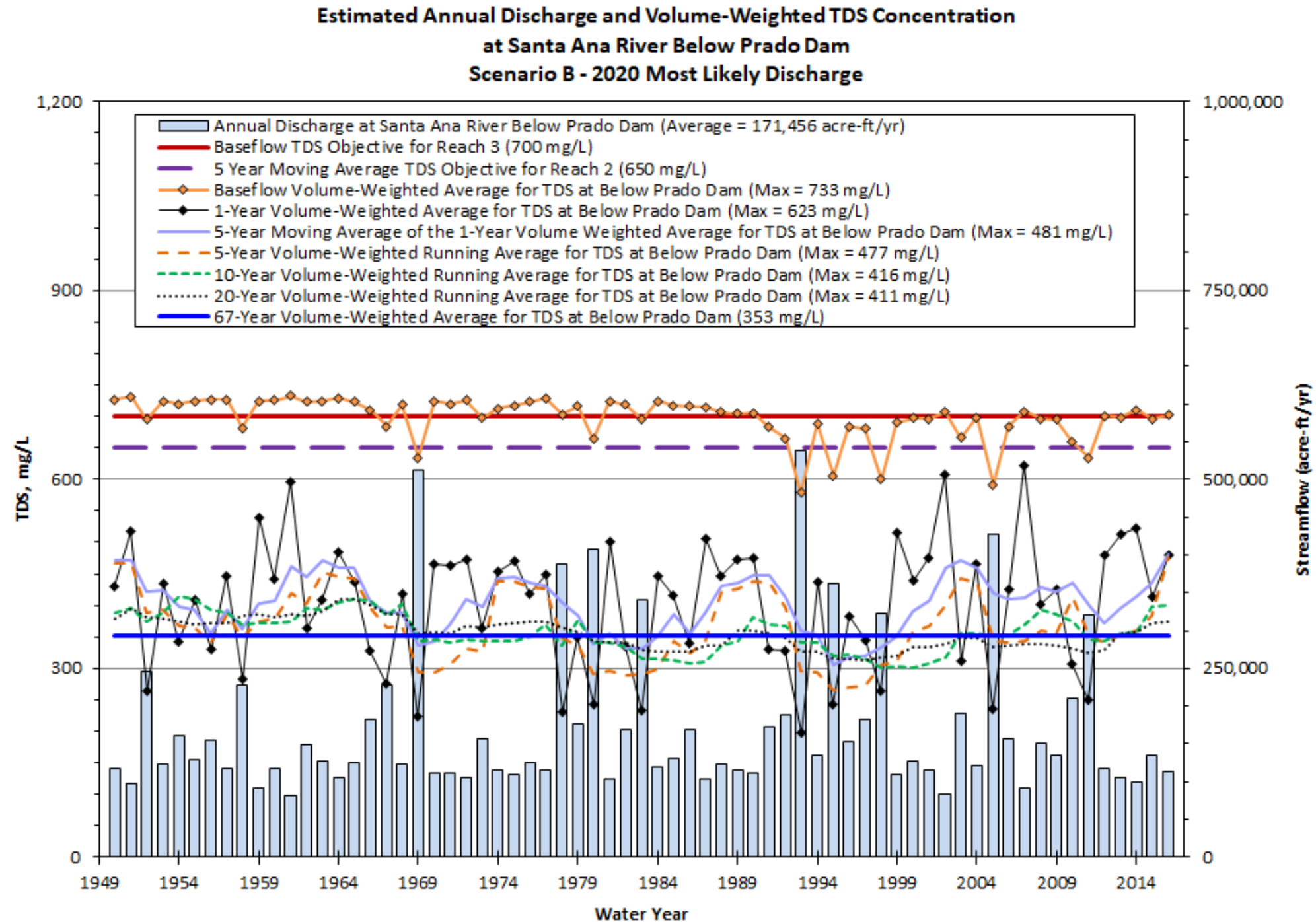
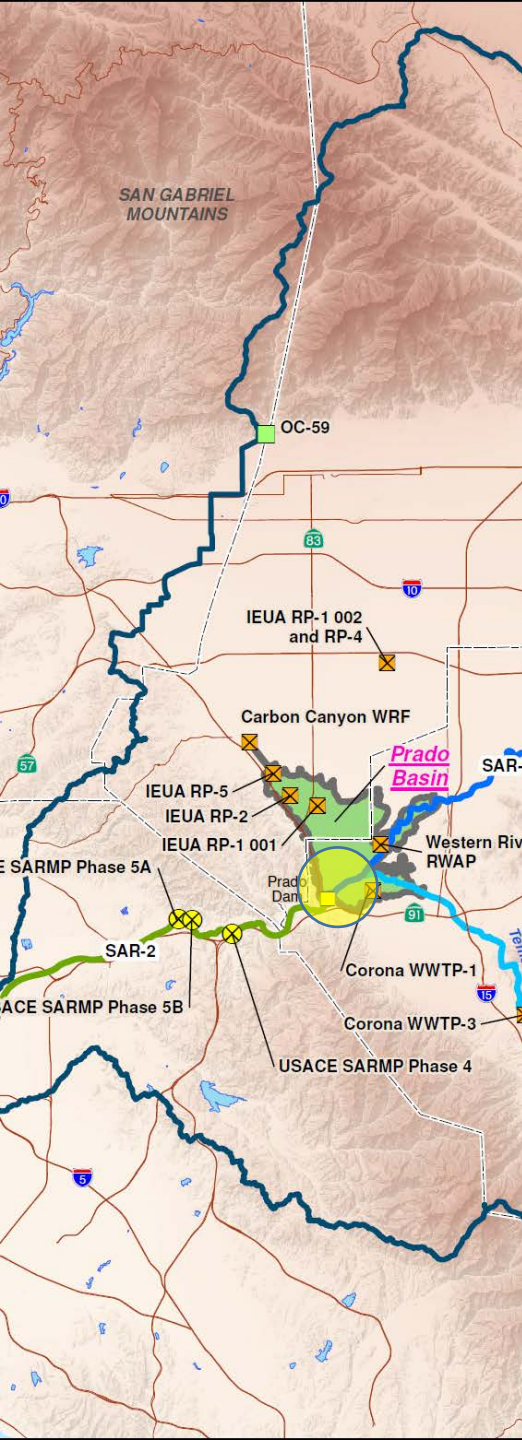
No.	Section	Pg.	Comment	GEOSCIENCE Response
20	2.2.1	16	Geosciences should do a global search and replace throughout all reports to eliminate the phrase "August Only" and use the phrase "Baseflow Average." The Basin Plan describes this as flow and water quality conditions which prevail, principally during August and September, when the contribution from stormwater runoff and rising groundwater is at its annual minimum. It also excludes any anthropogenic water transfers that may occur during this monitoring period. "August Only" is an unofficial colloquialism that is used as short-hand to quickly convey a more complex concept.	Terminology will be changed and documented in the Final Report

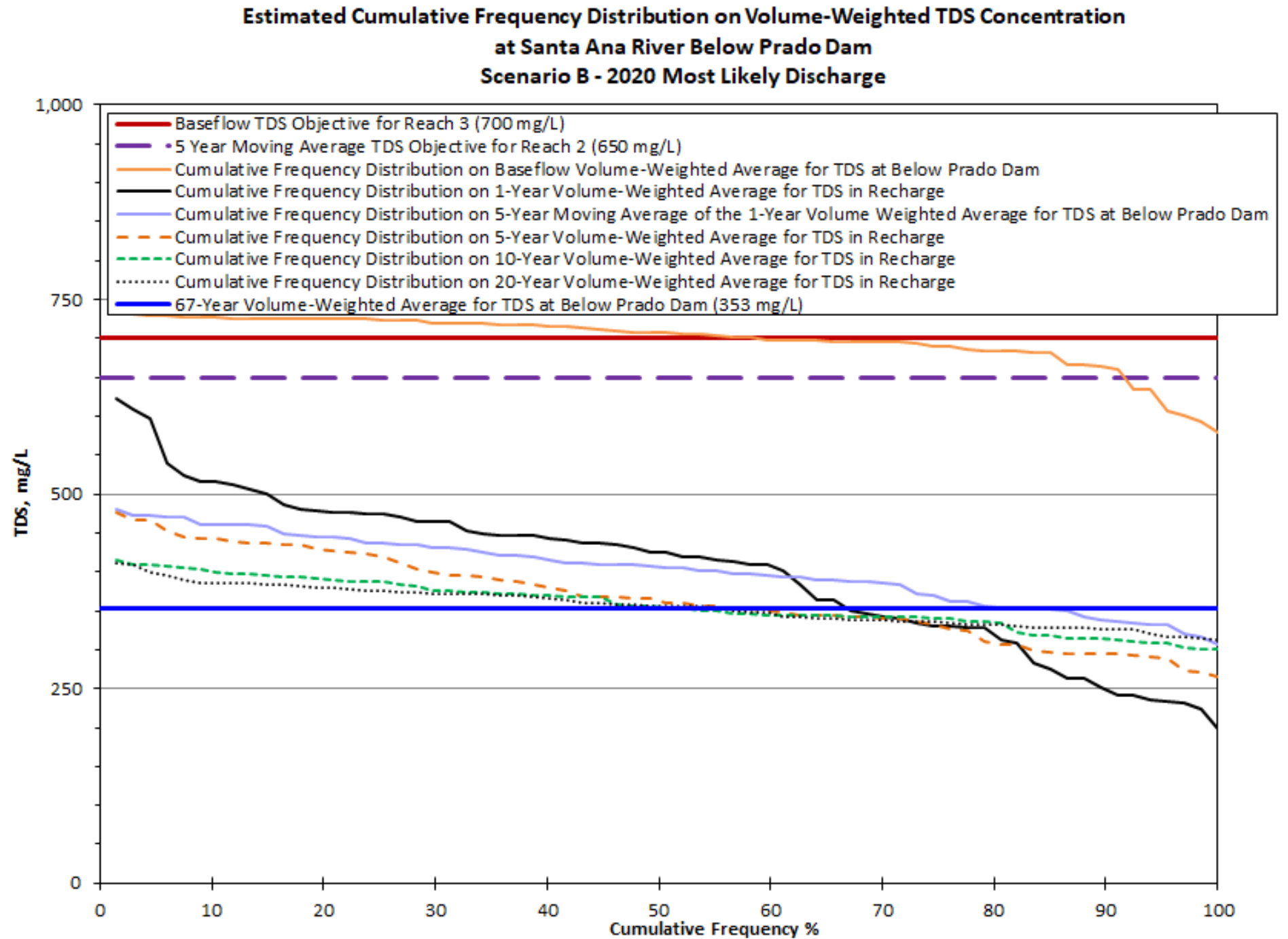
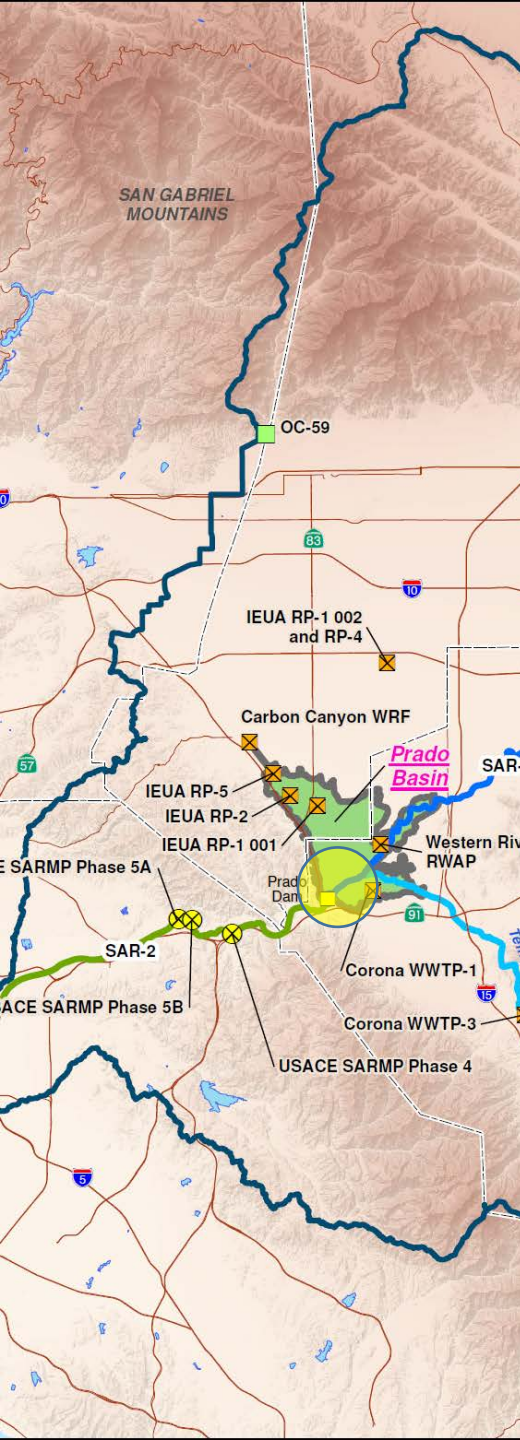
Daily Streamflow and TDS Concentration below Prado Dam under Scenario B for August and September 1983

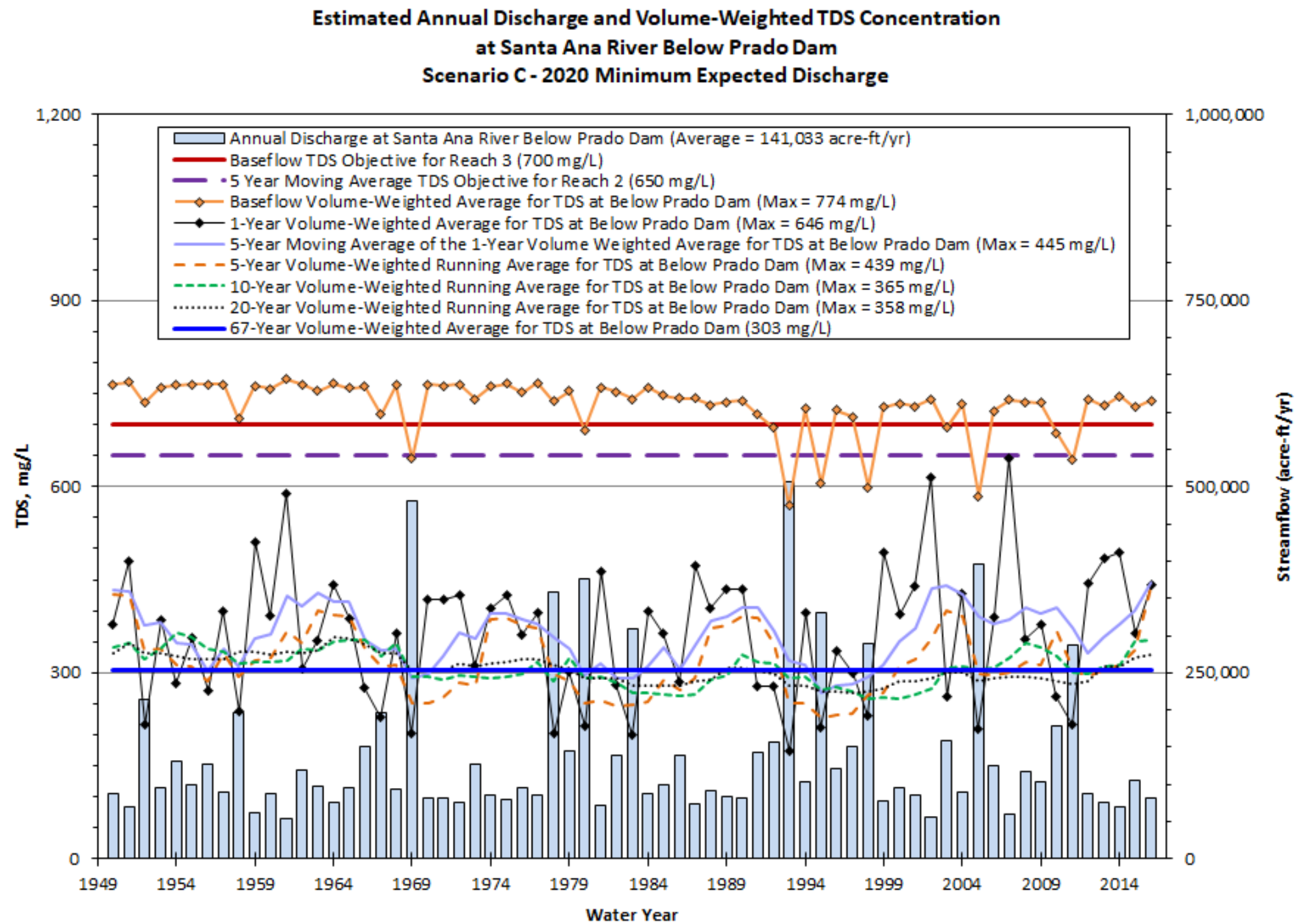
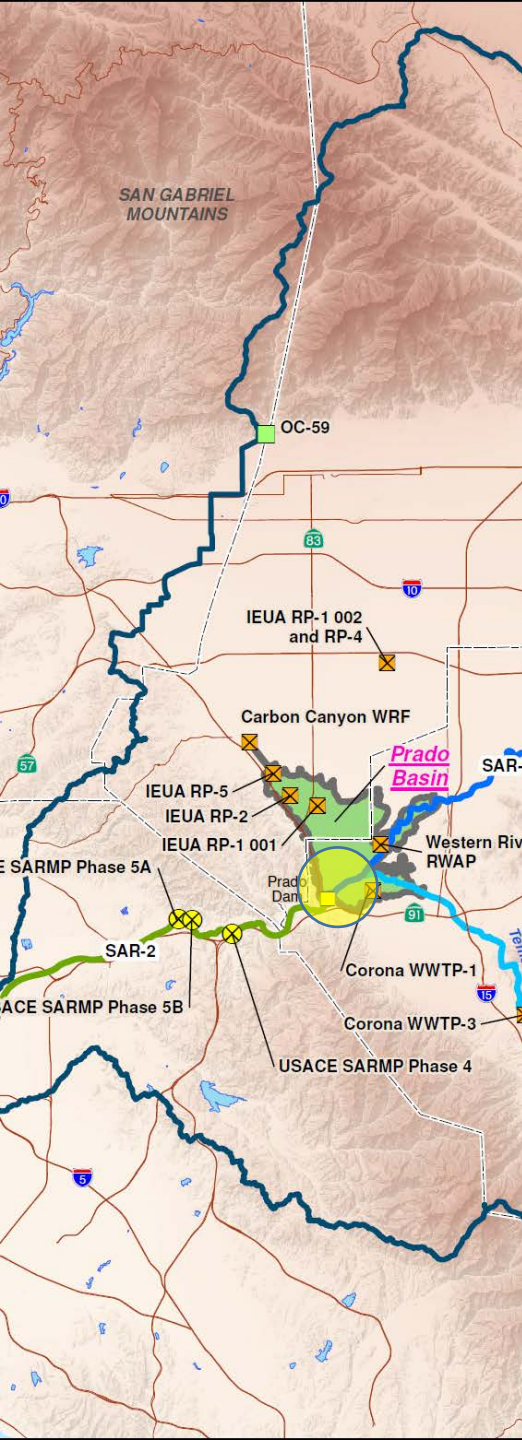


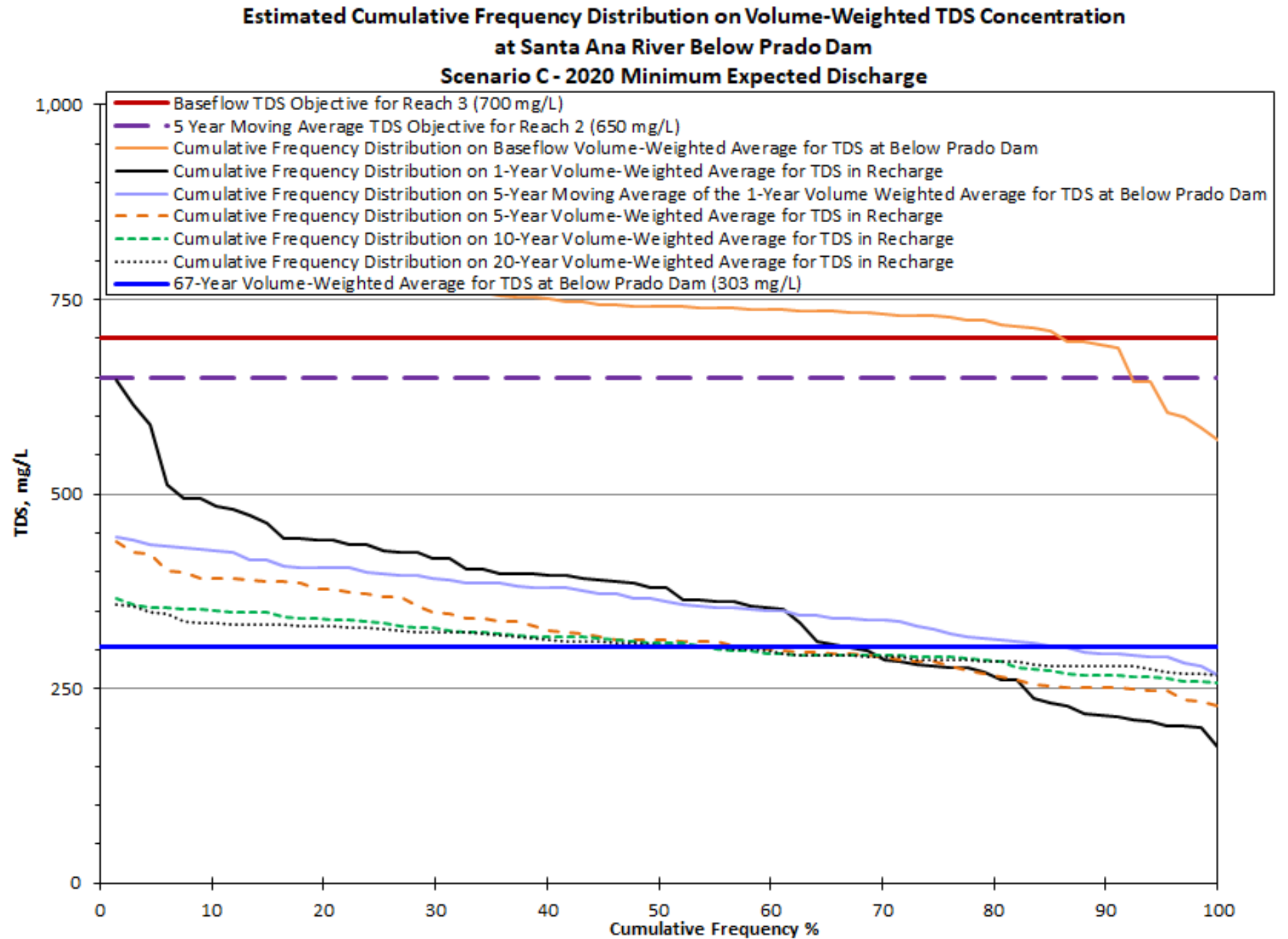
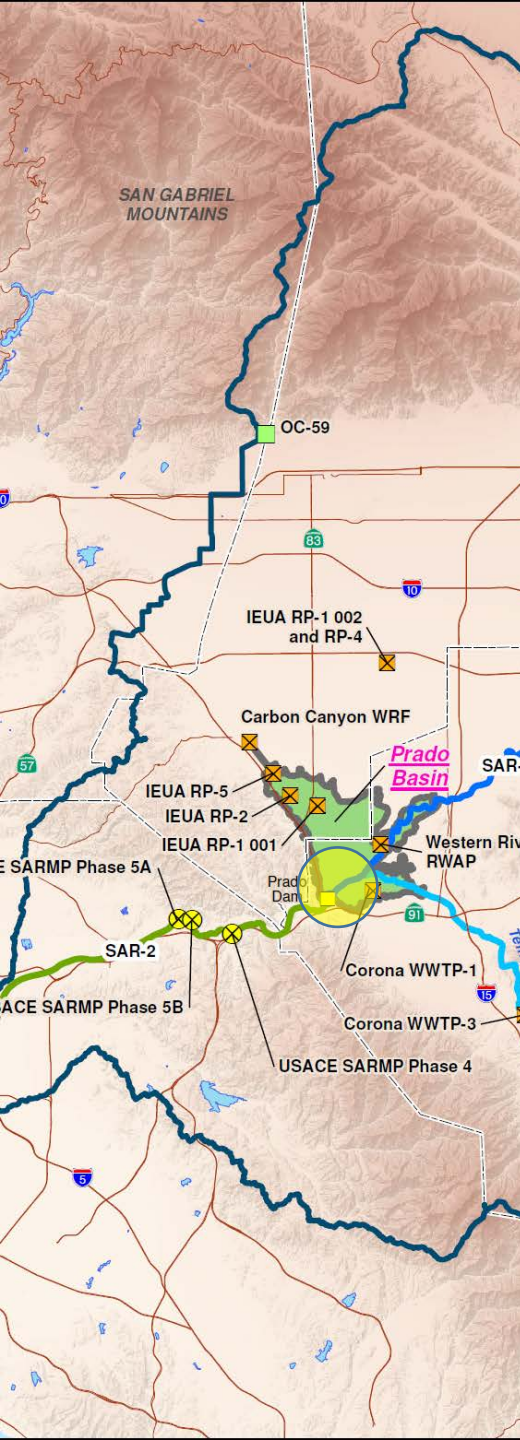


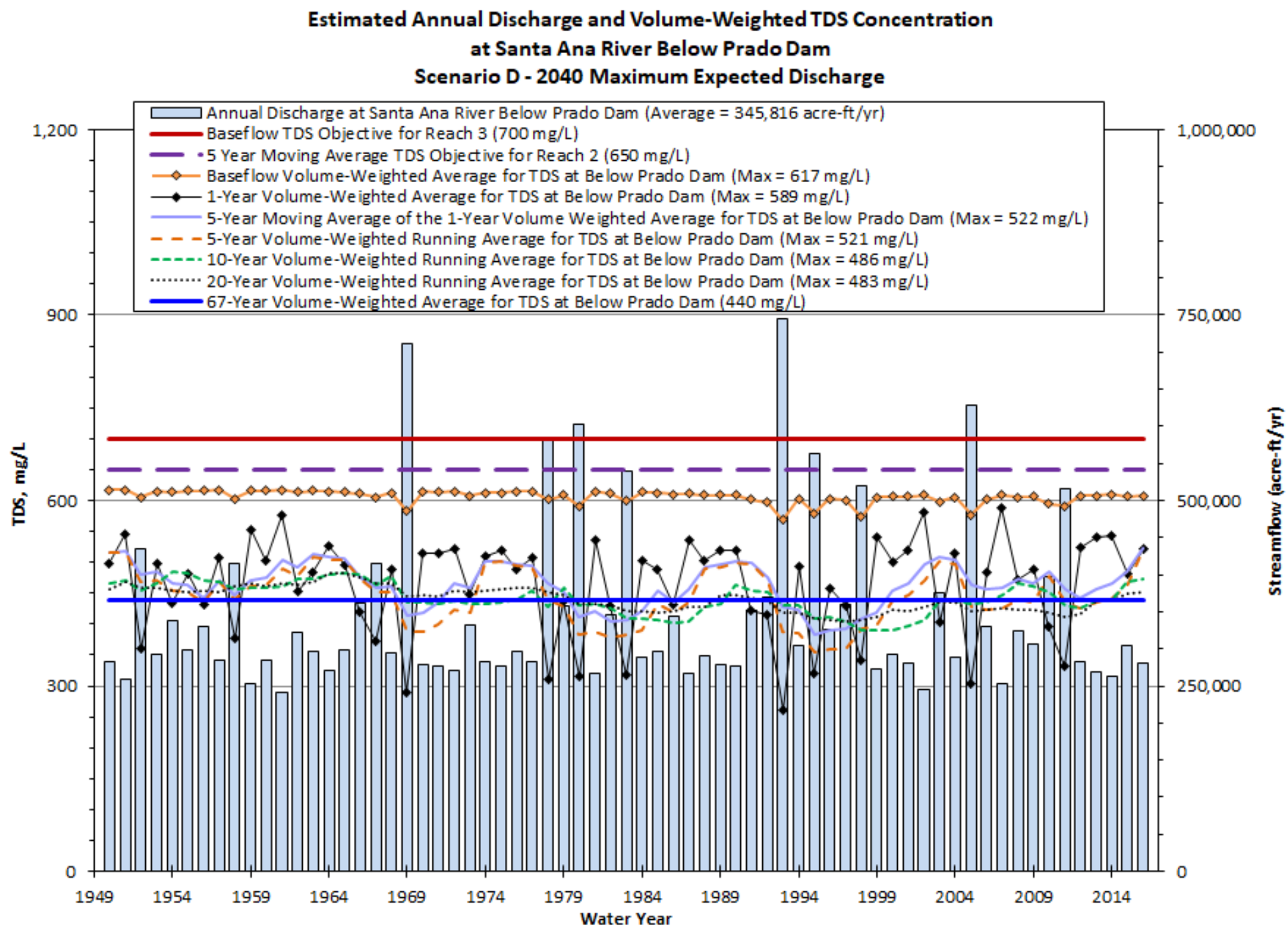
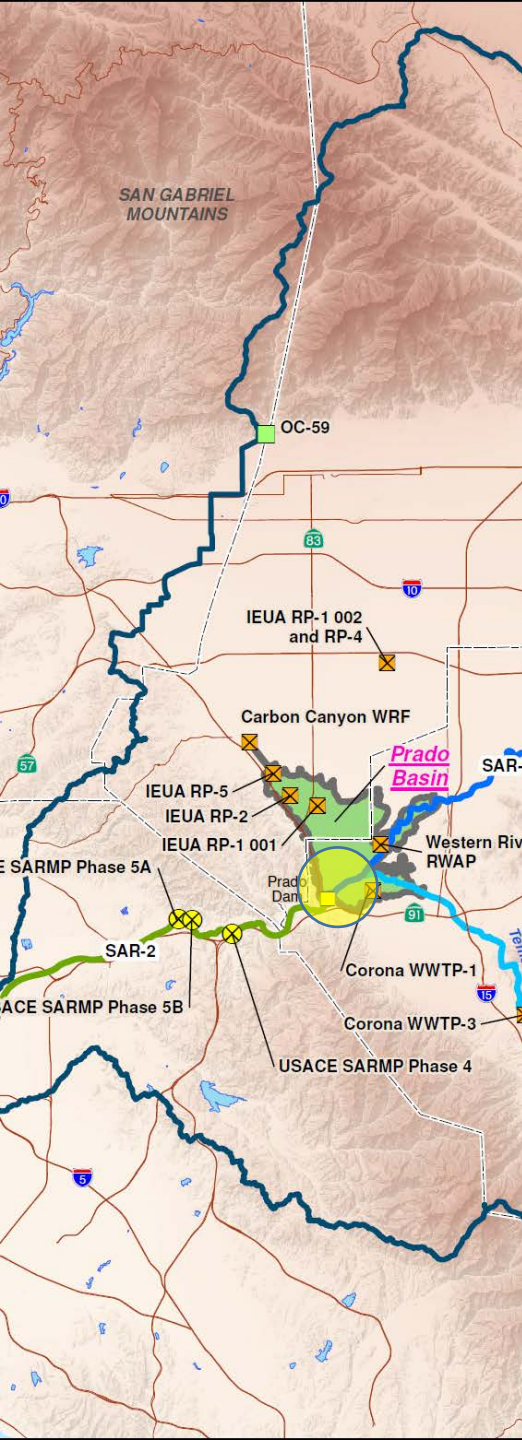


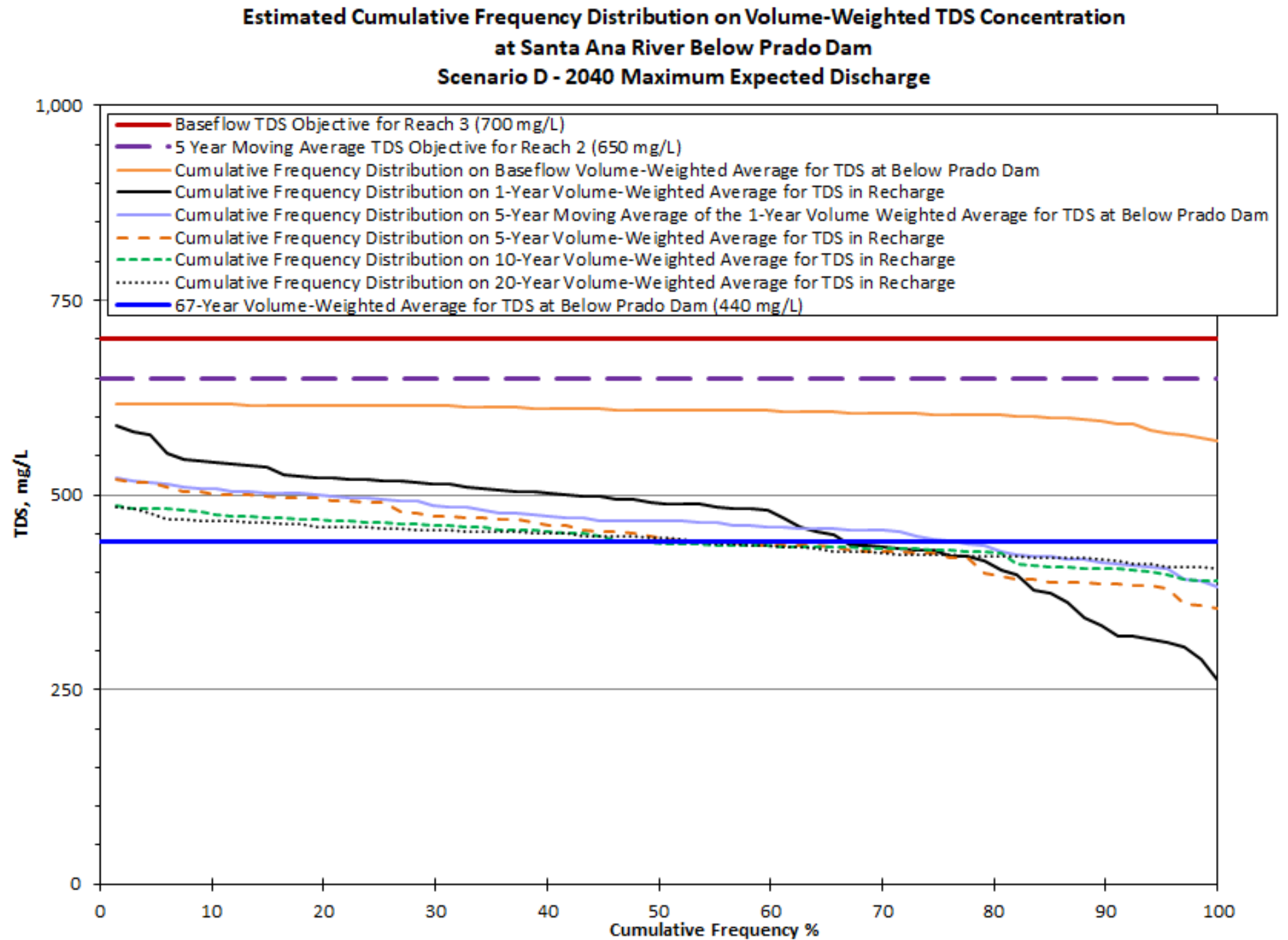
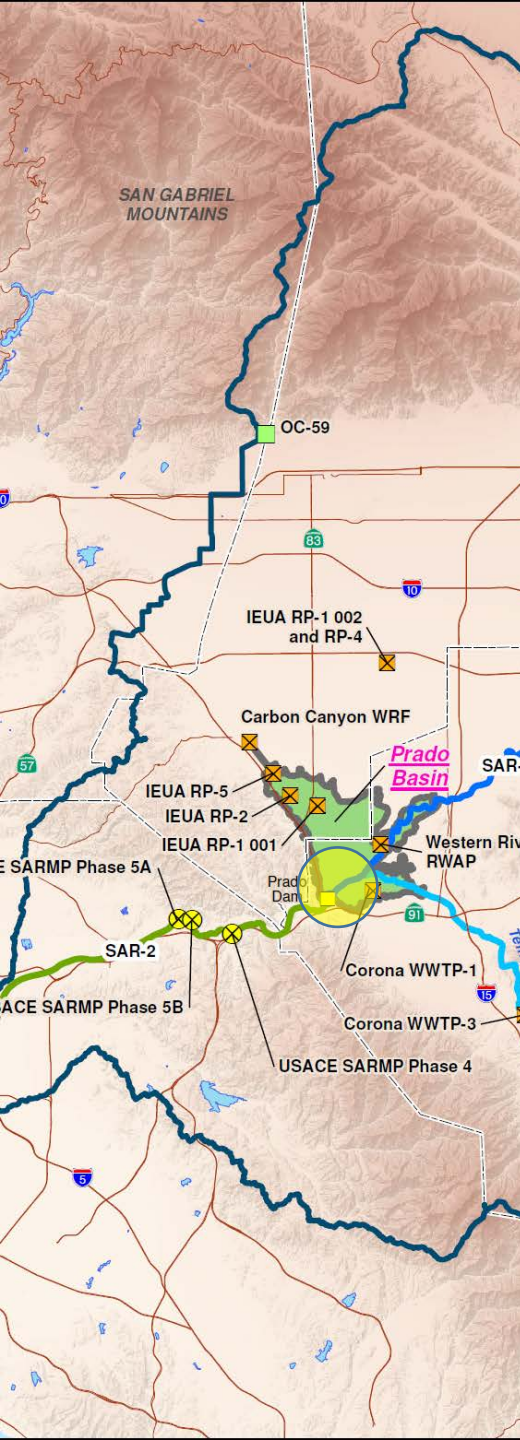


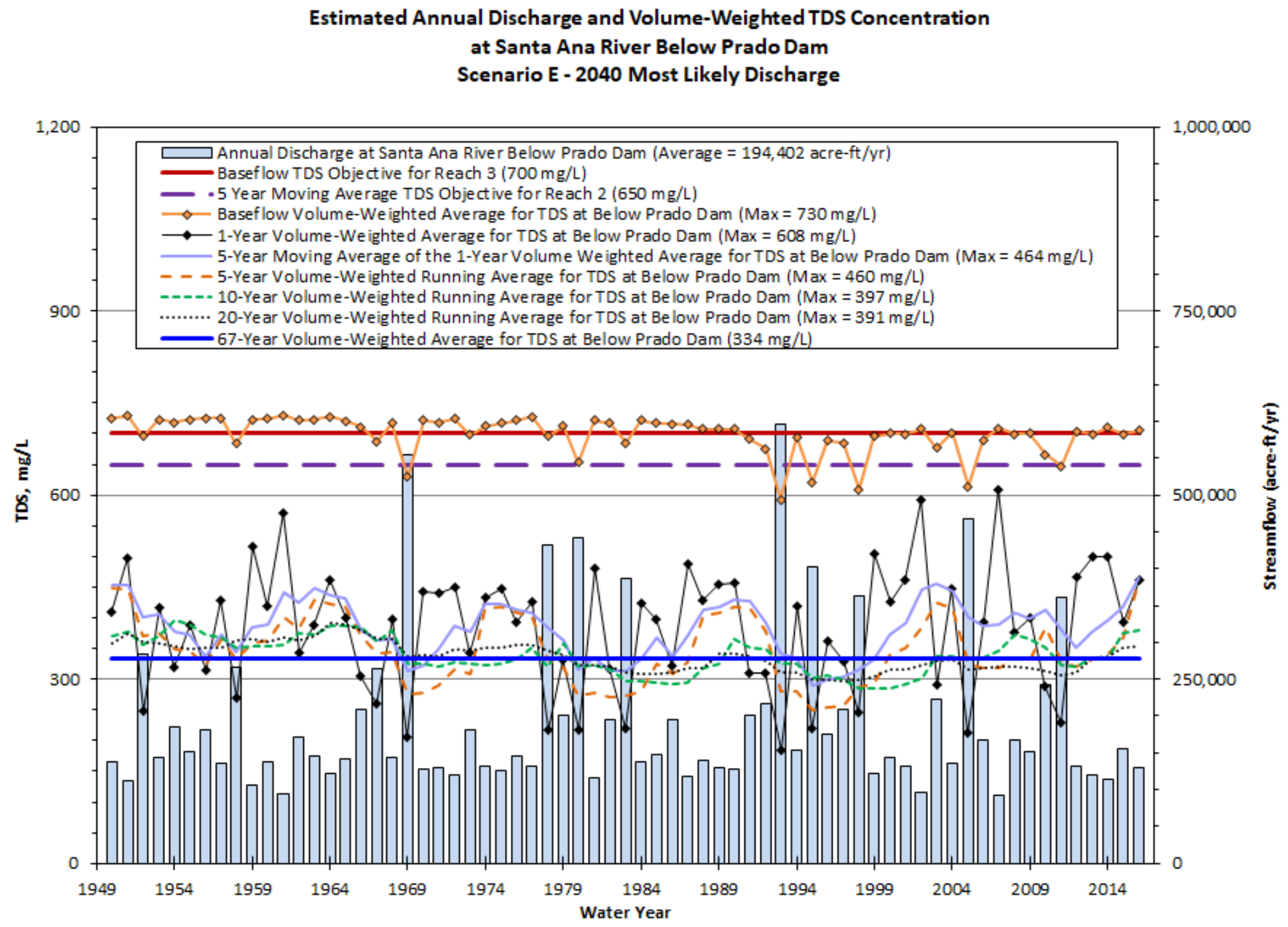
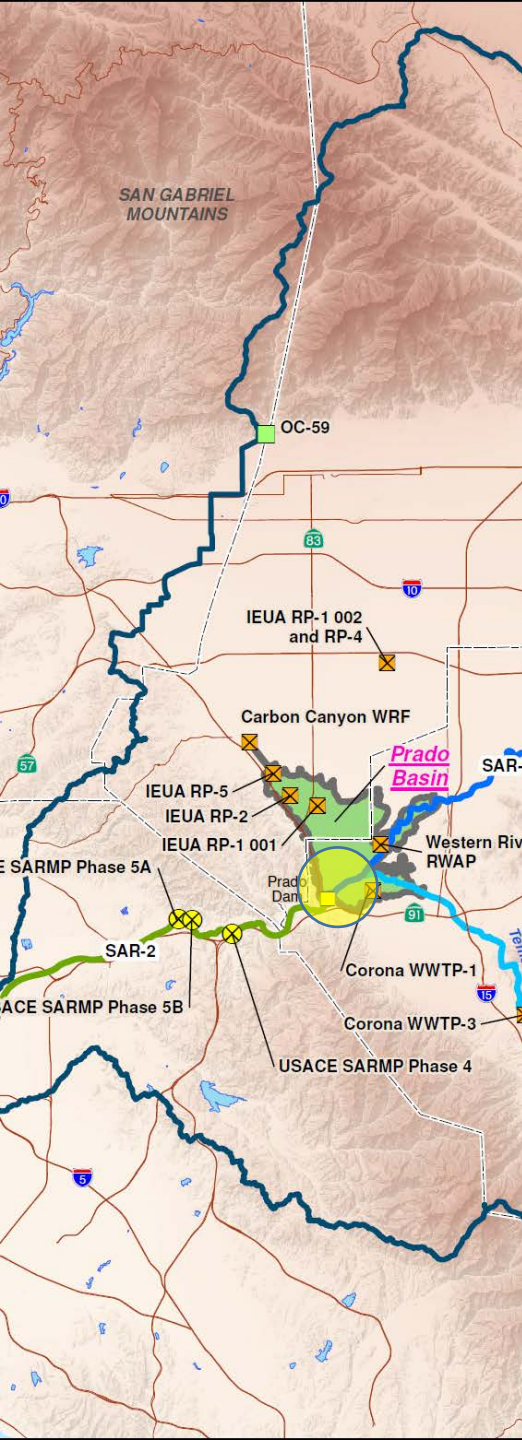


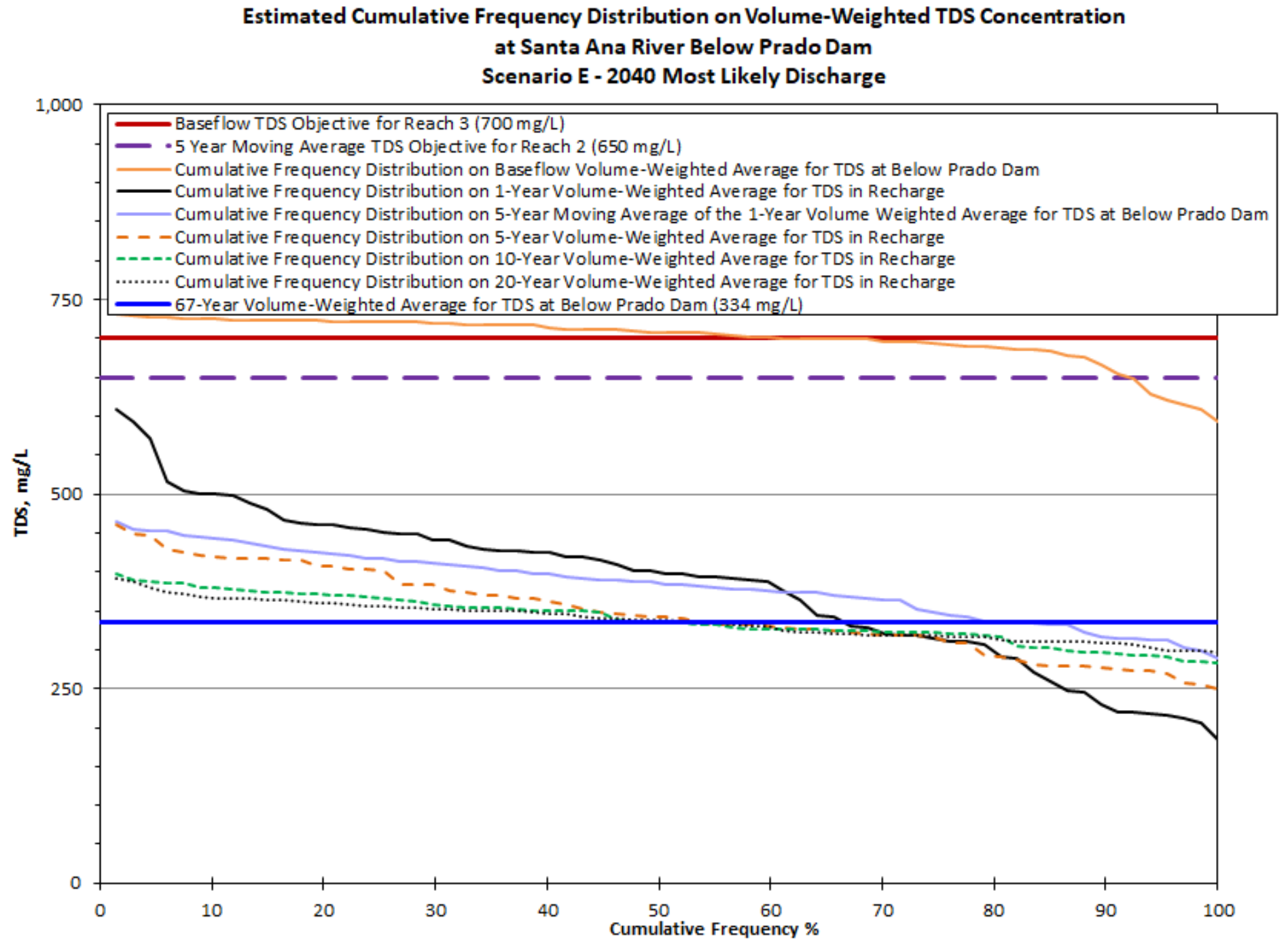
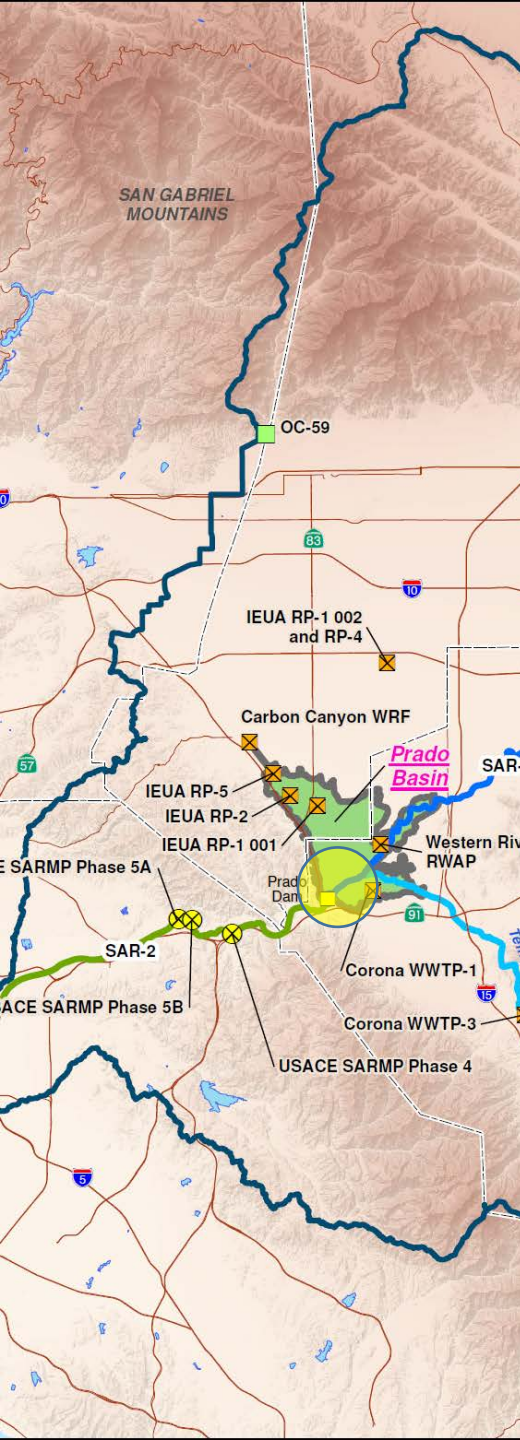


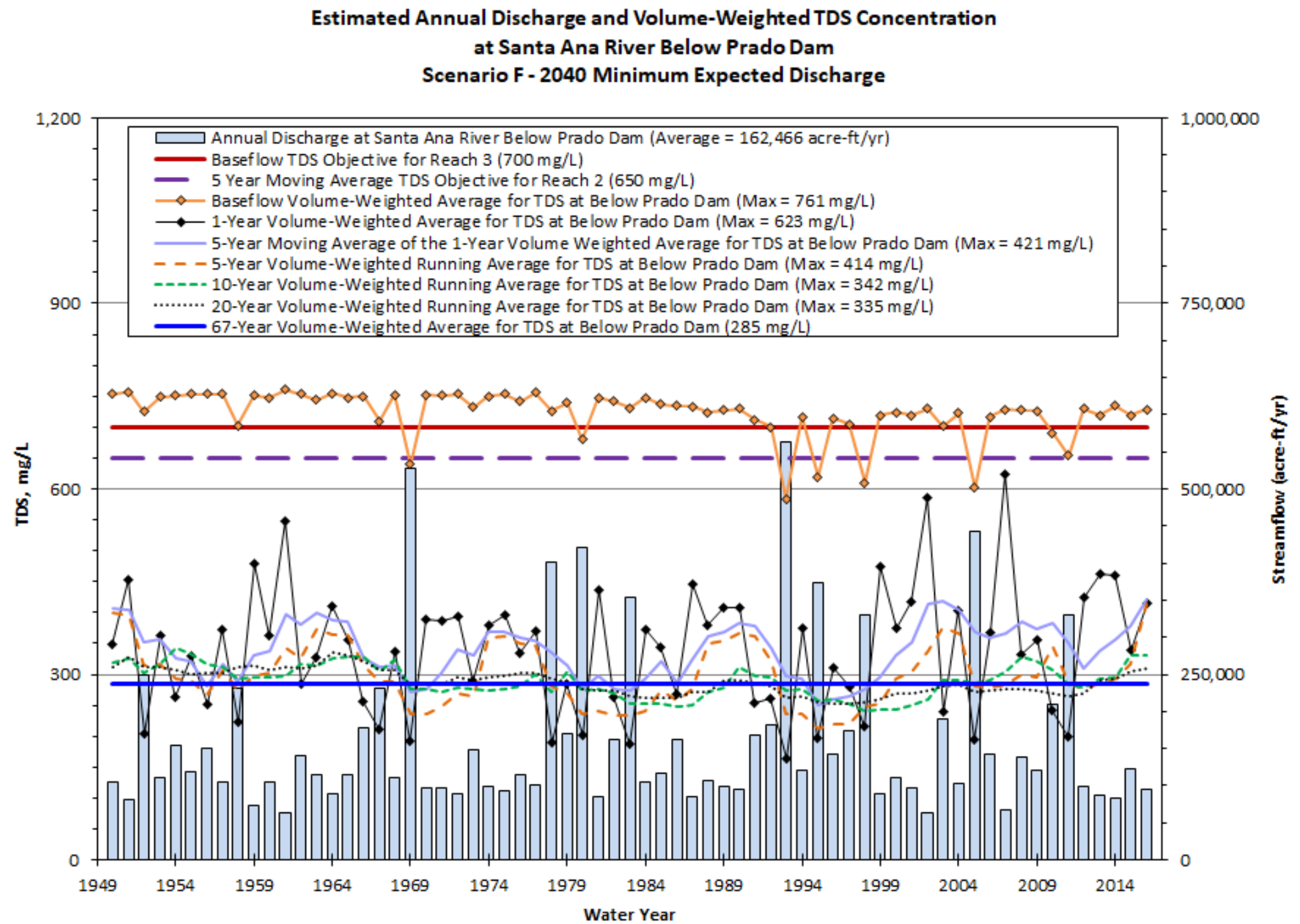
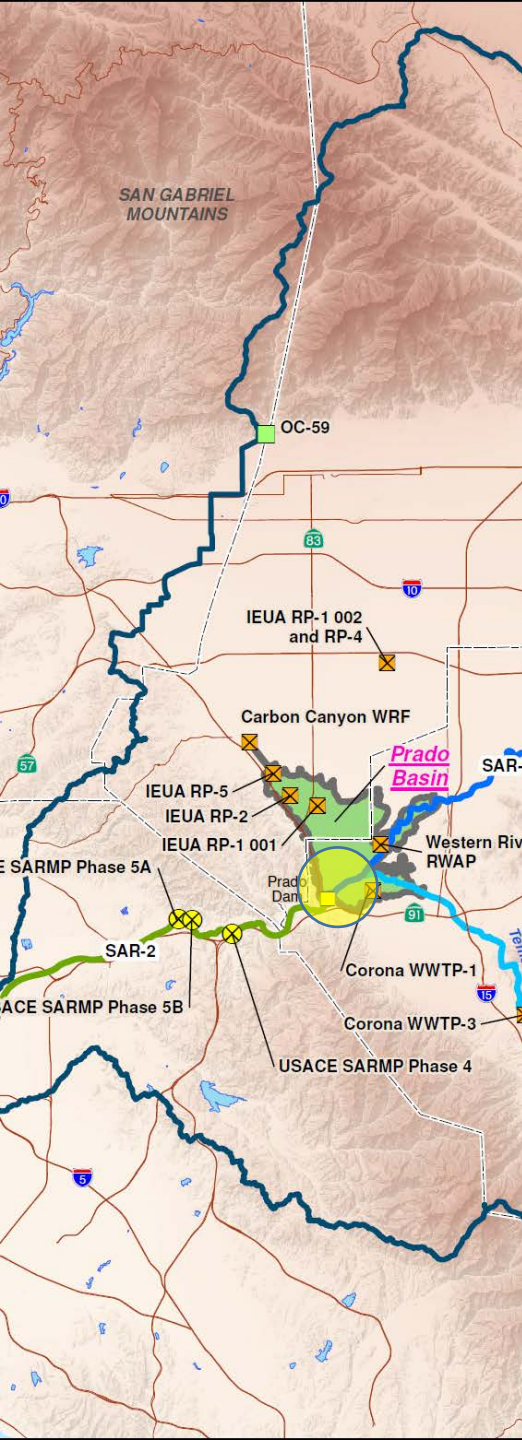


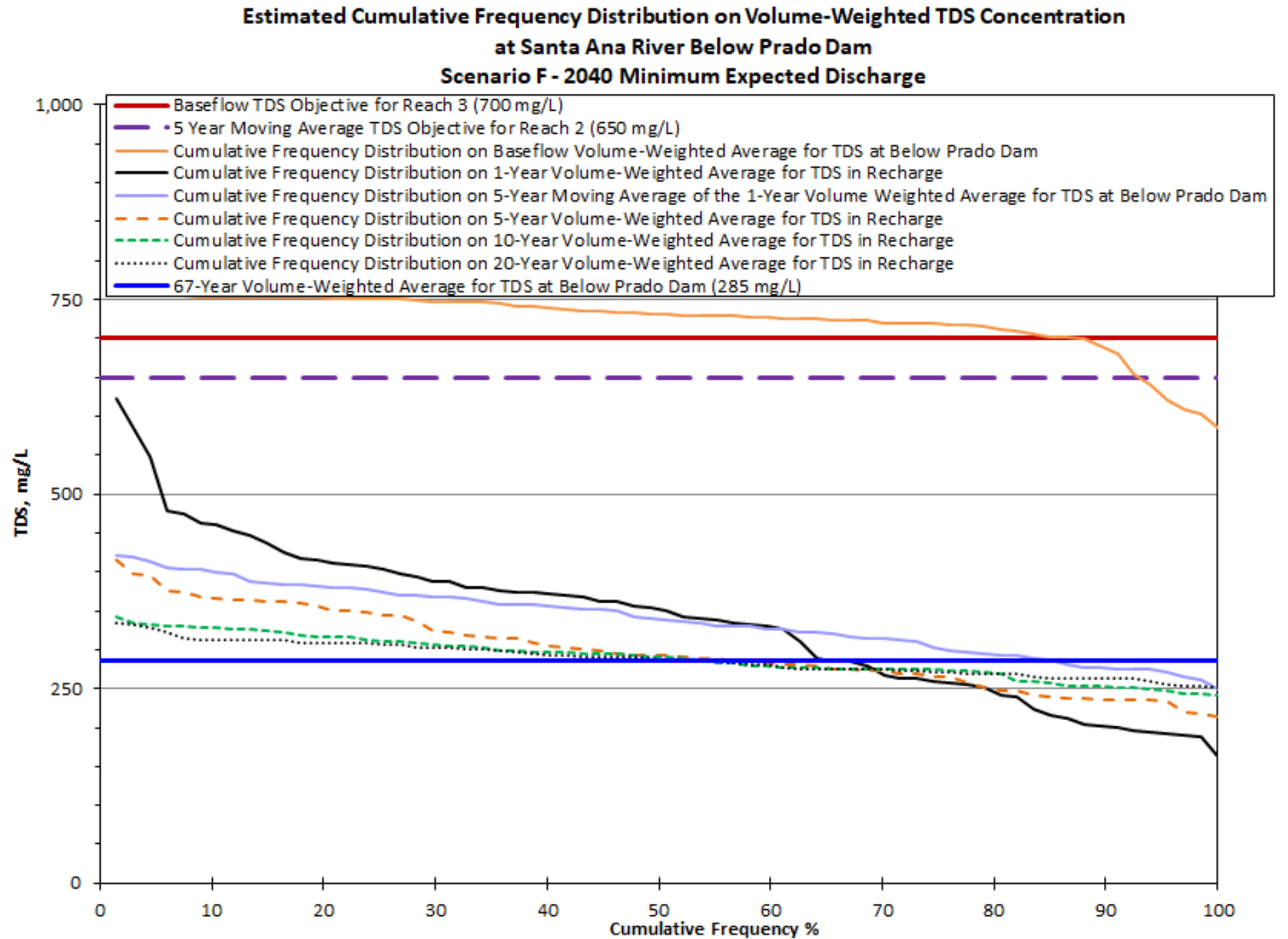
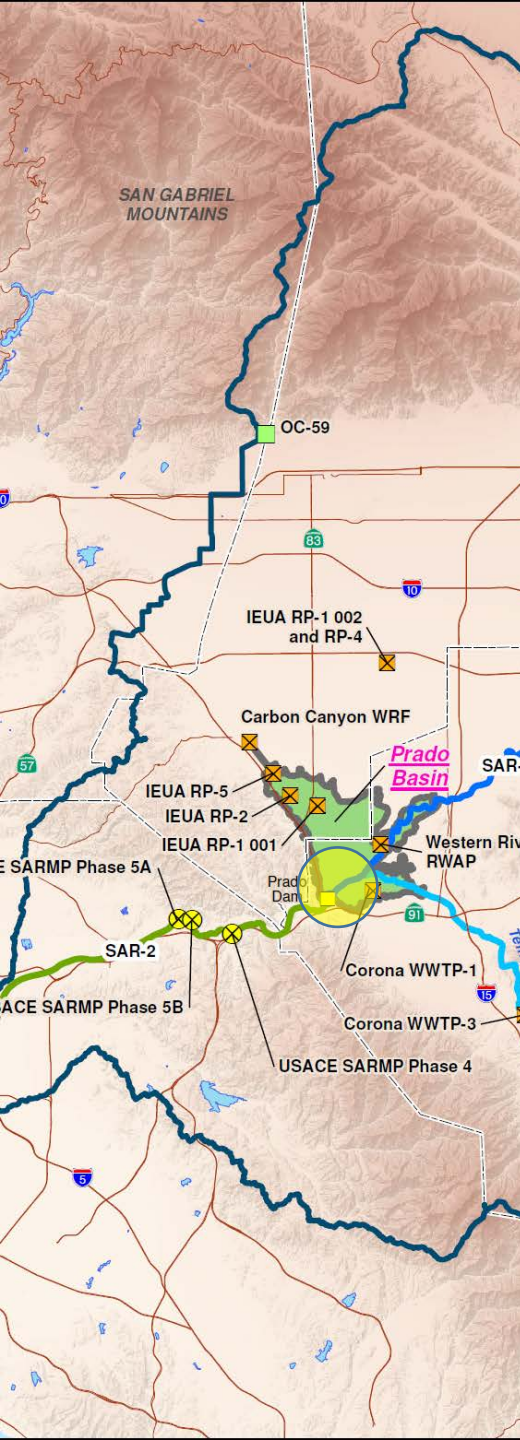


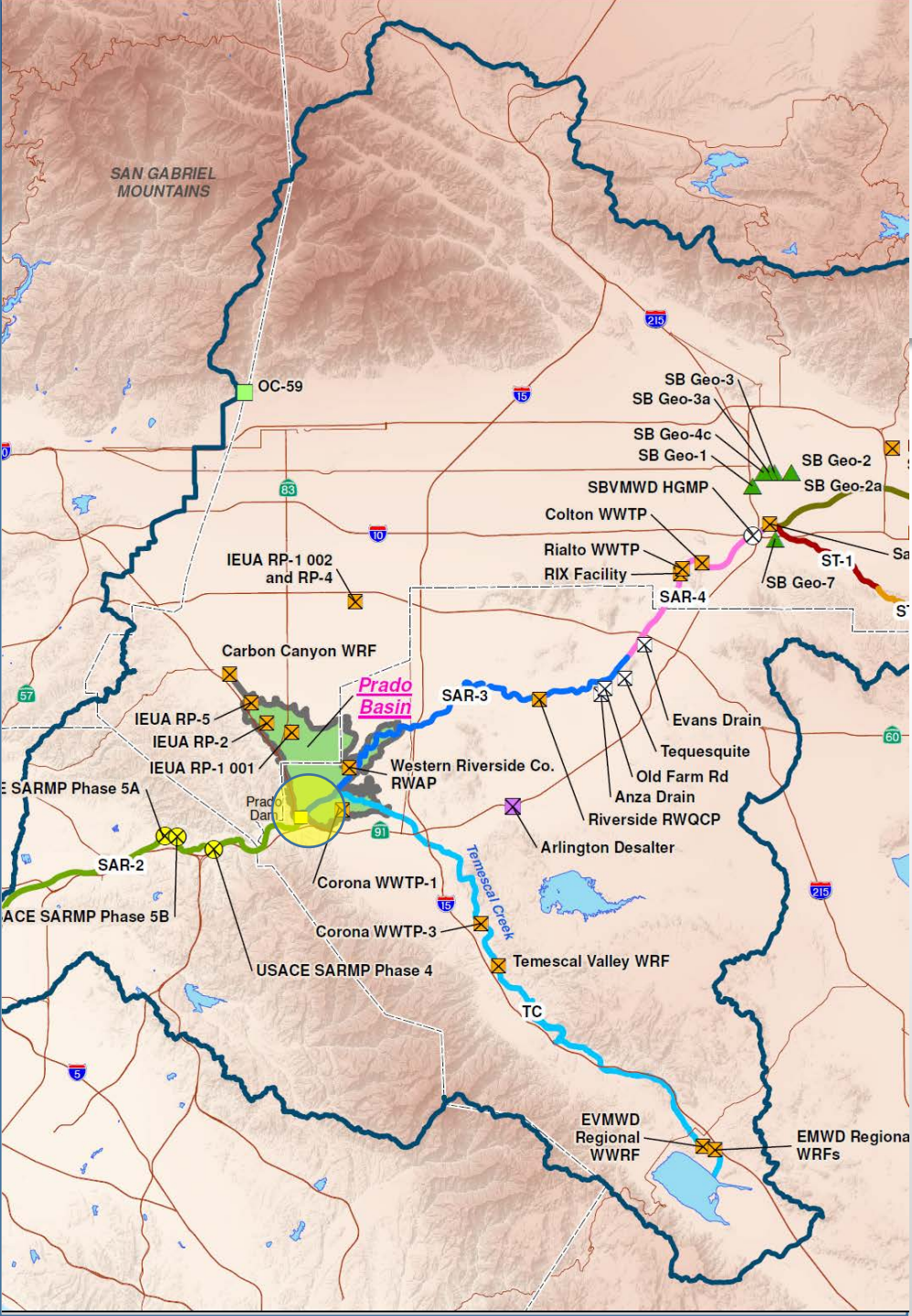












Santa Ana River Reach 3 Below Prado Dam

Maximum Value for the Volume-Weighted Stream Concentration (Units in mg/L)

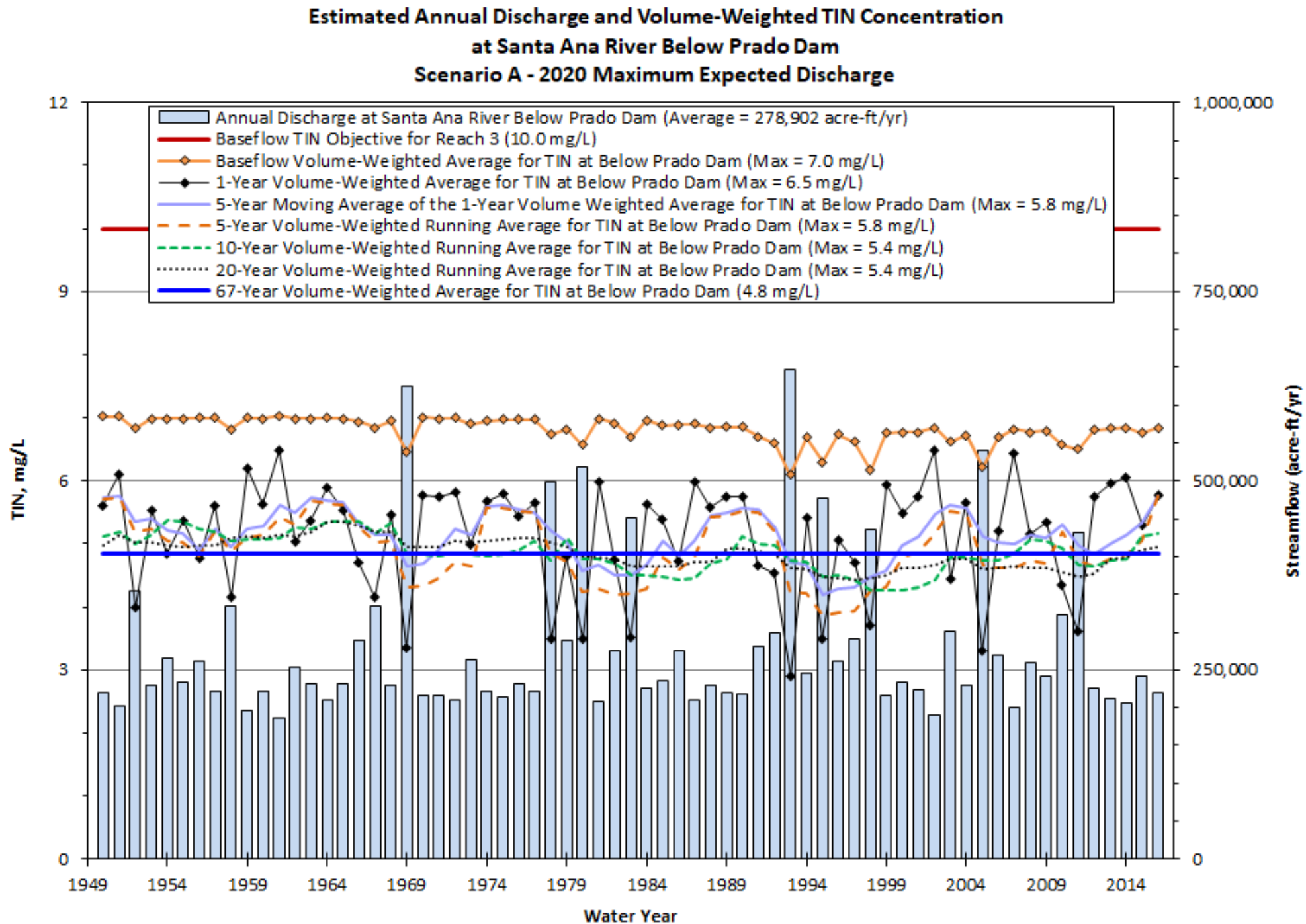
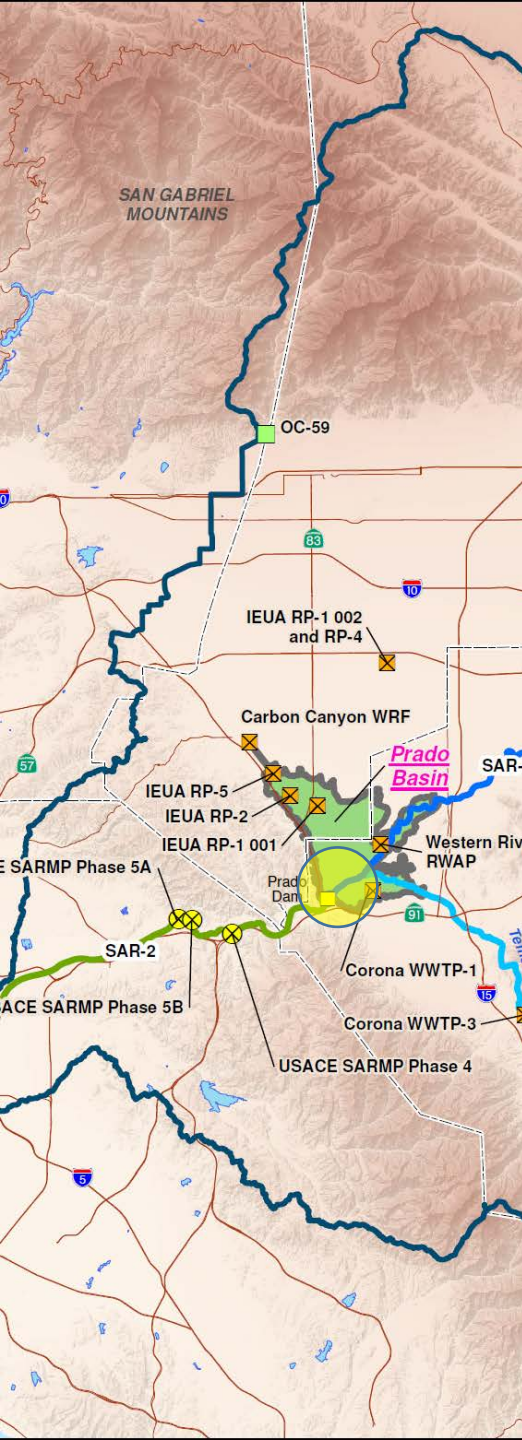
Original Calculation

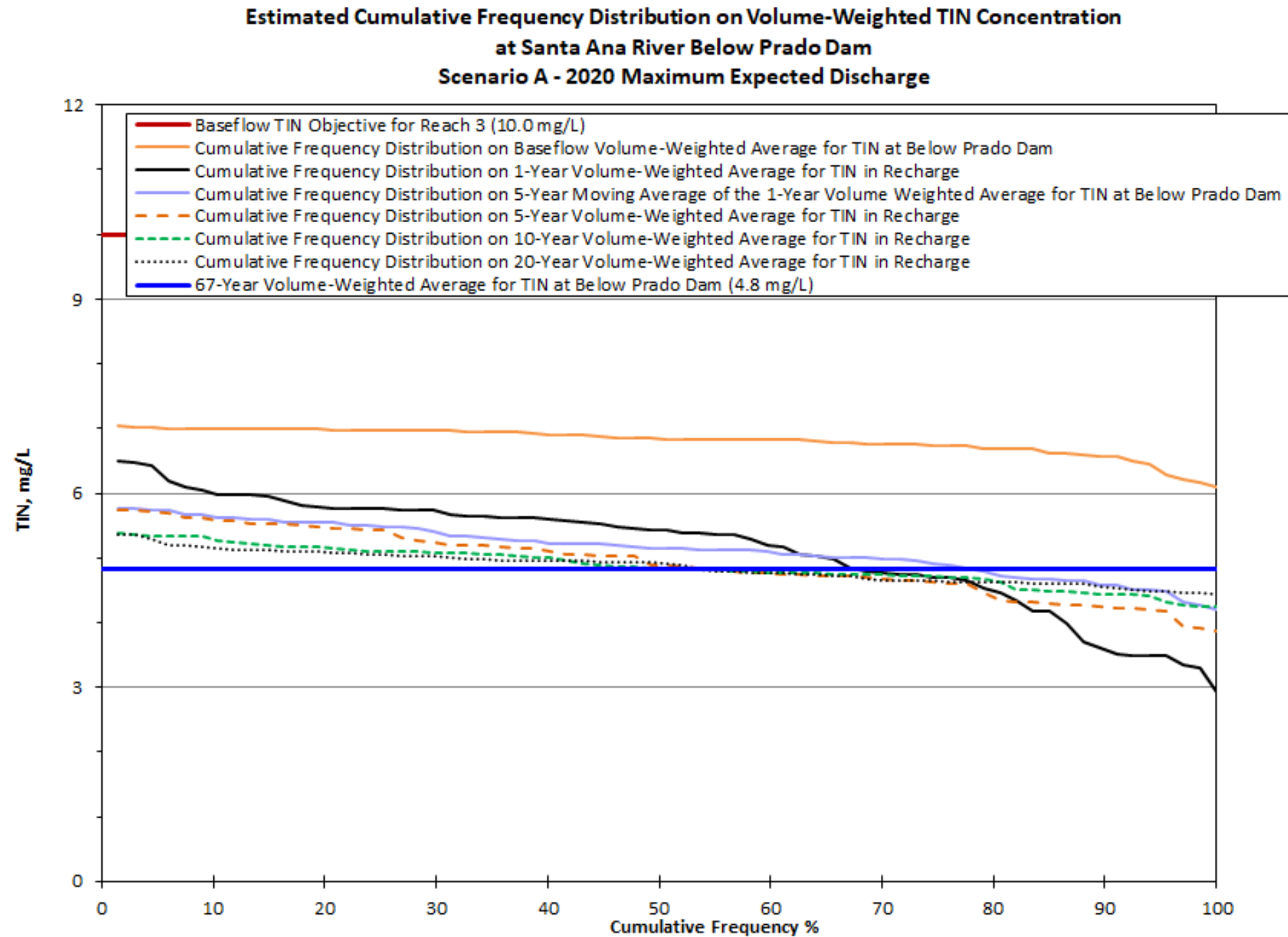
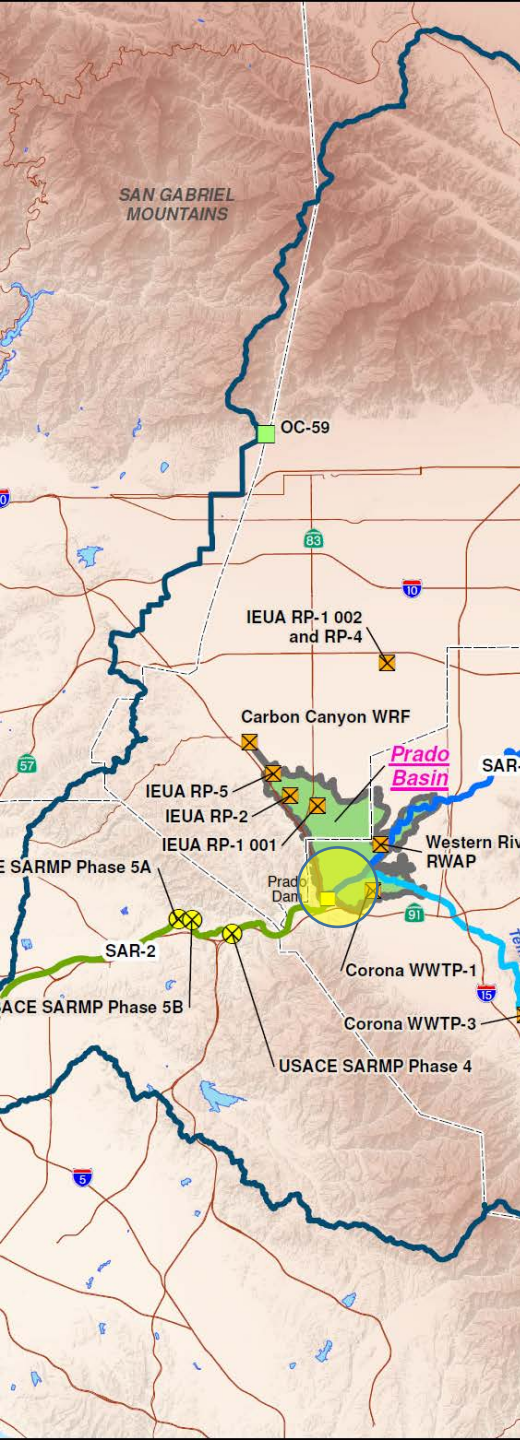
	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TDS	700	na	na	August Only	616	722	746	615	721	736

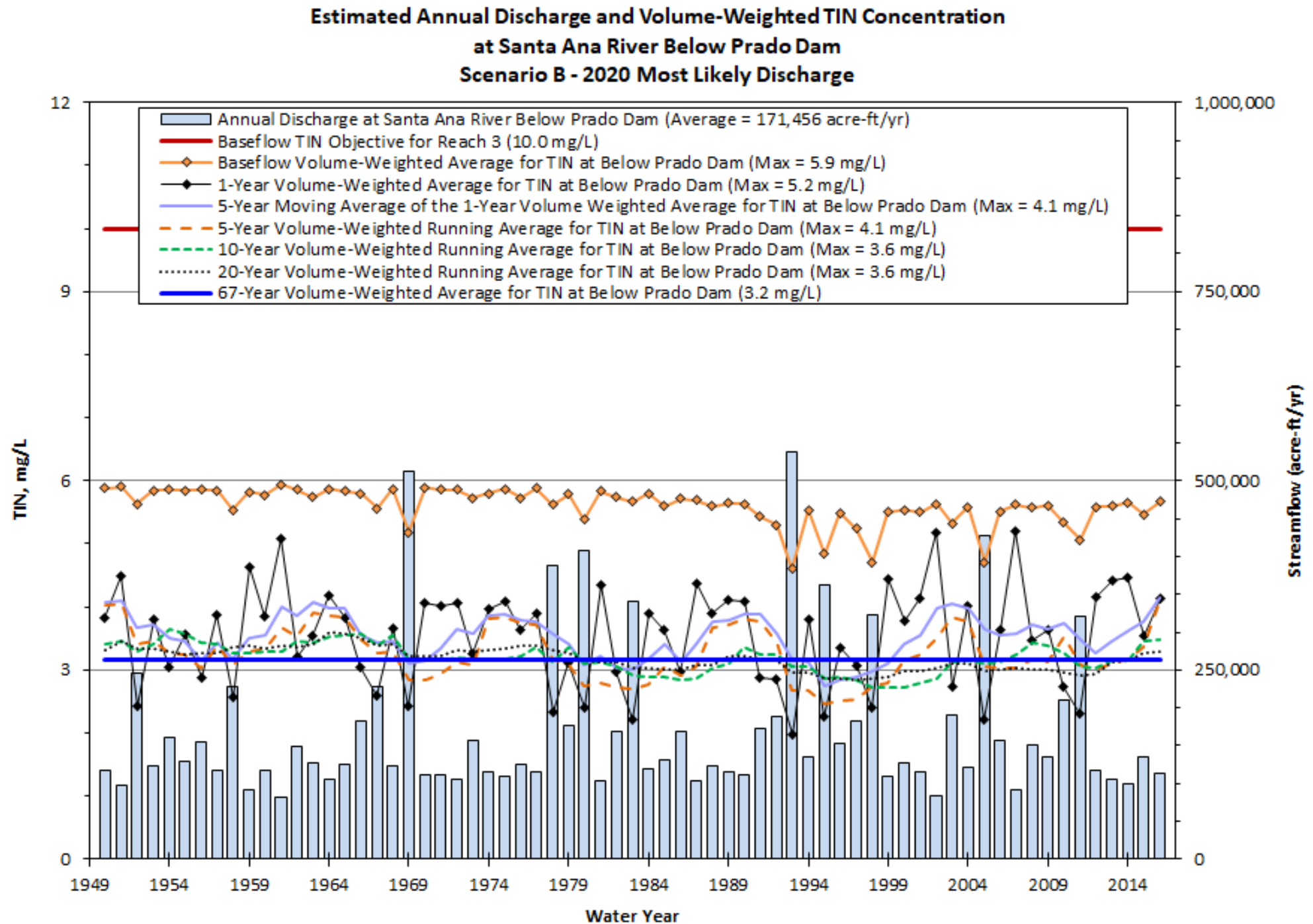
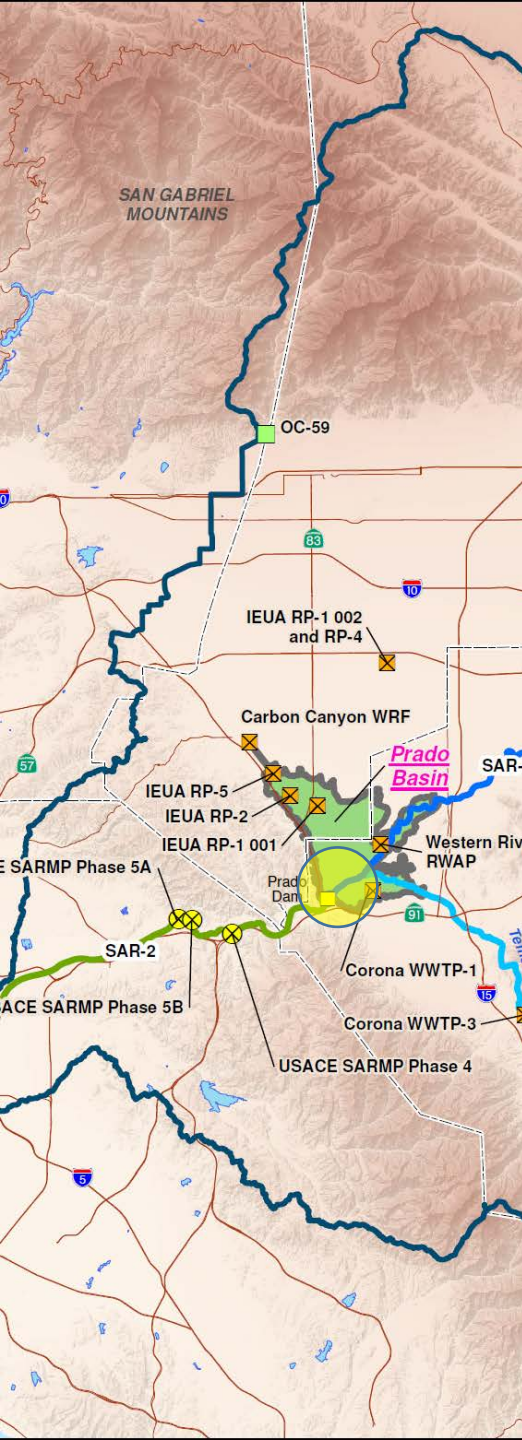
Revised Calculation

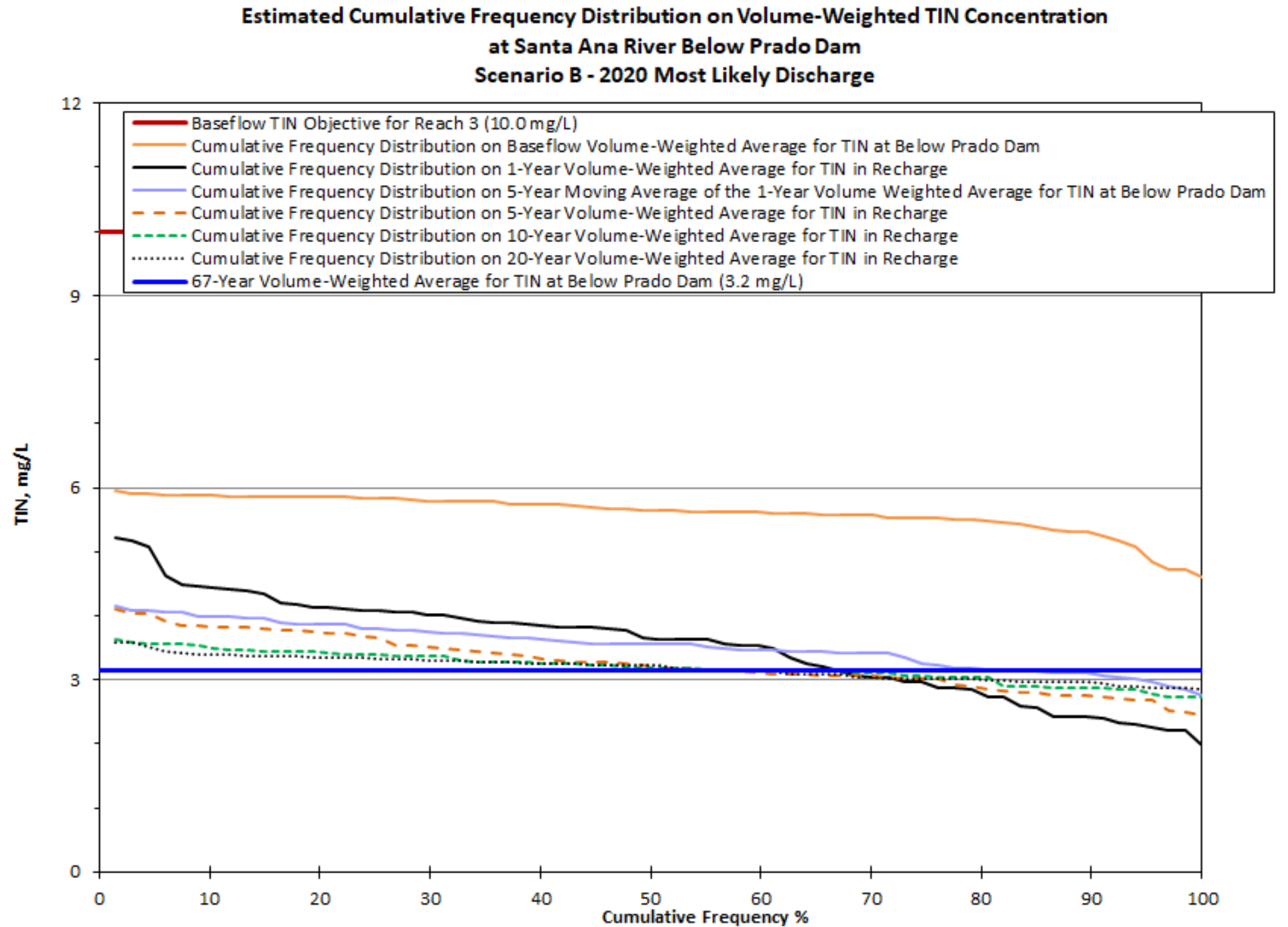
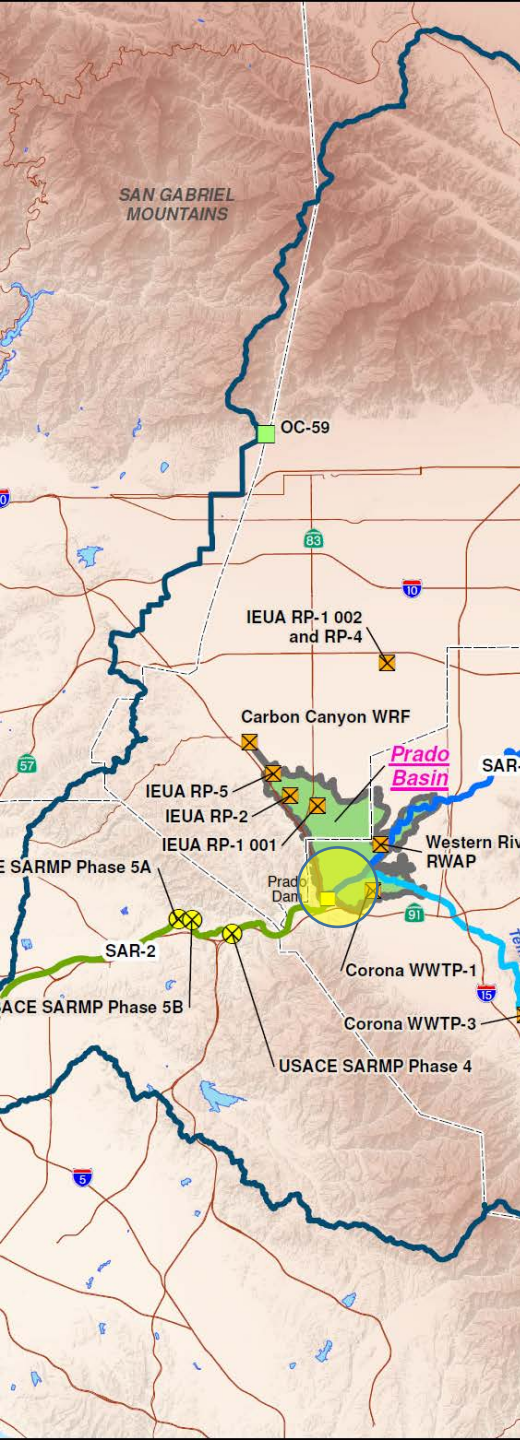
	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TDS	700	na	na	Baseflow Average	619	733	774	617	730	761

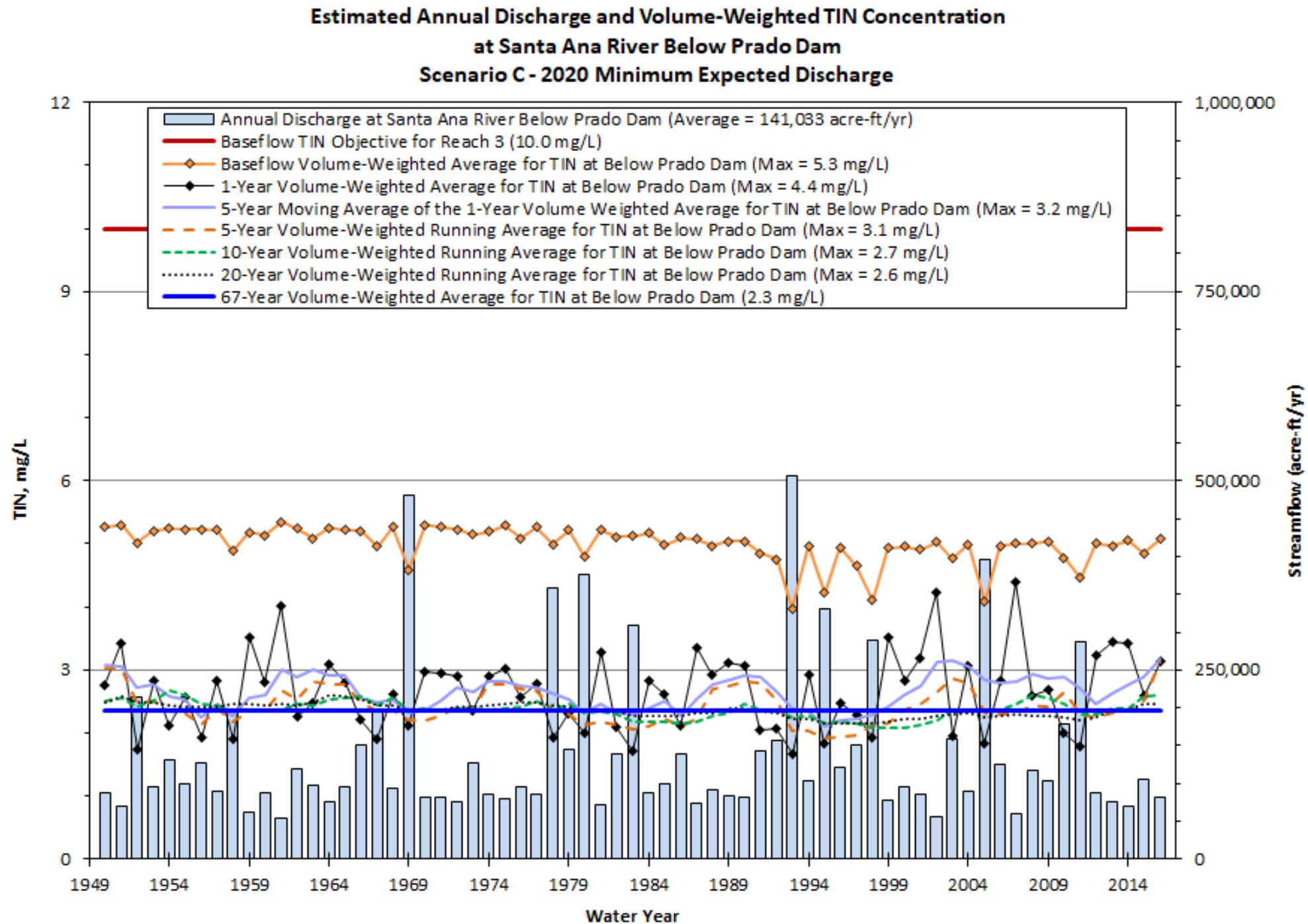
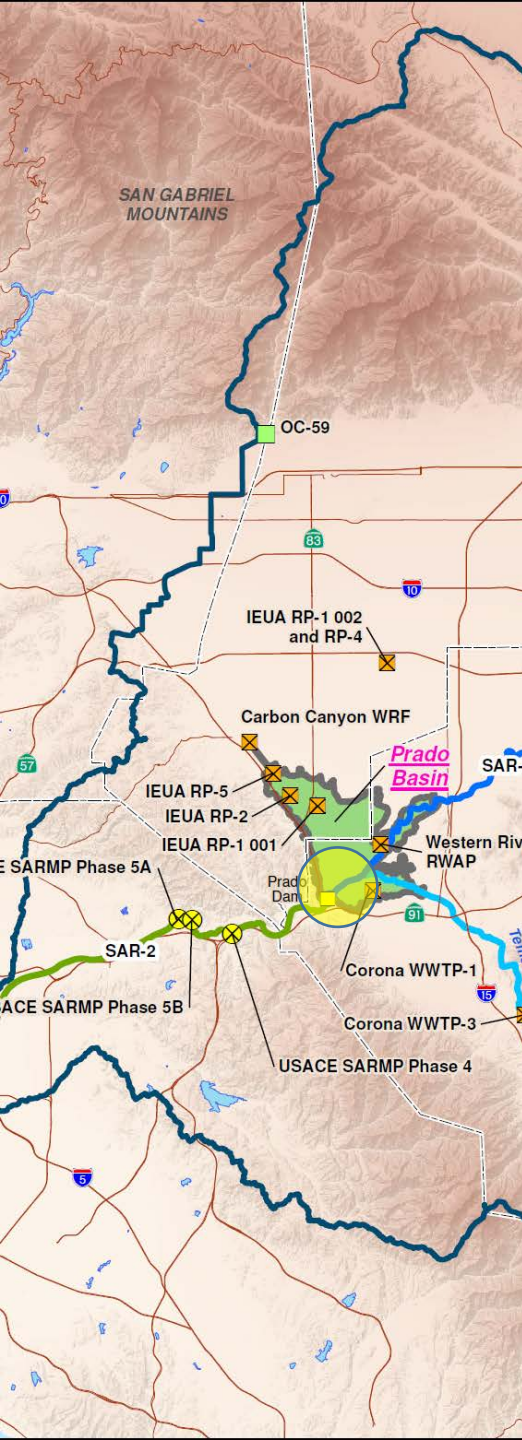
Bold red values represent concentrations above basin objective.

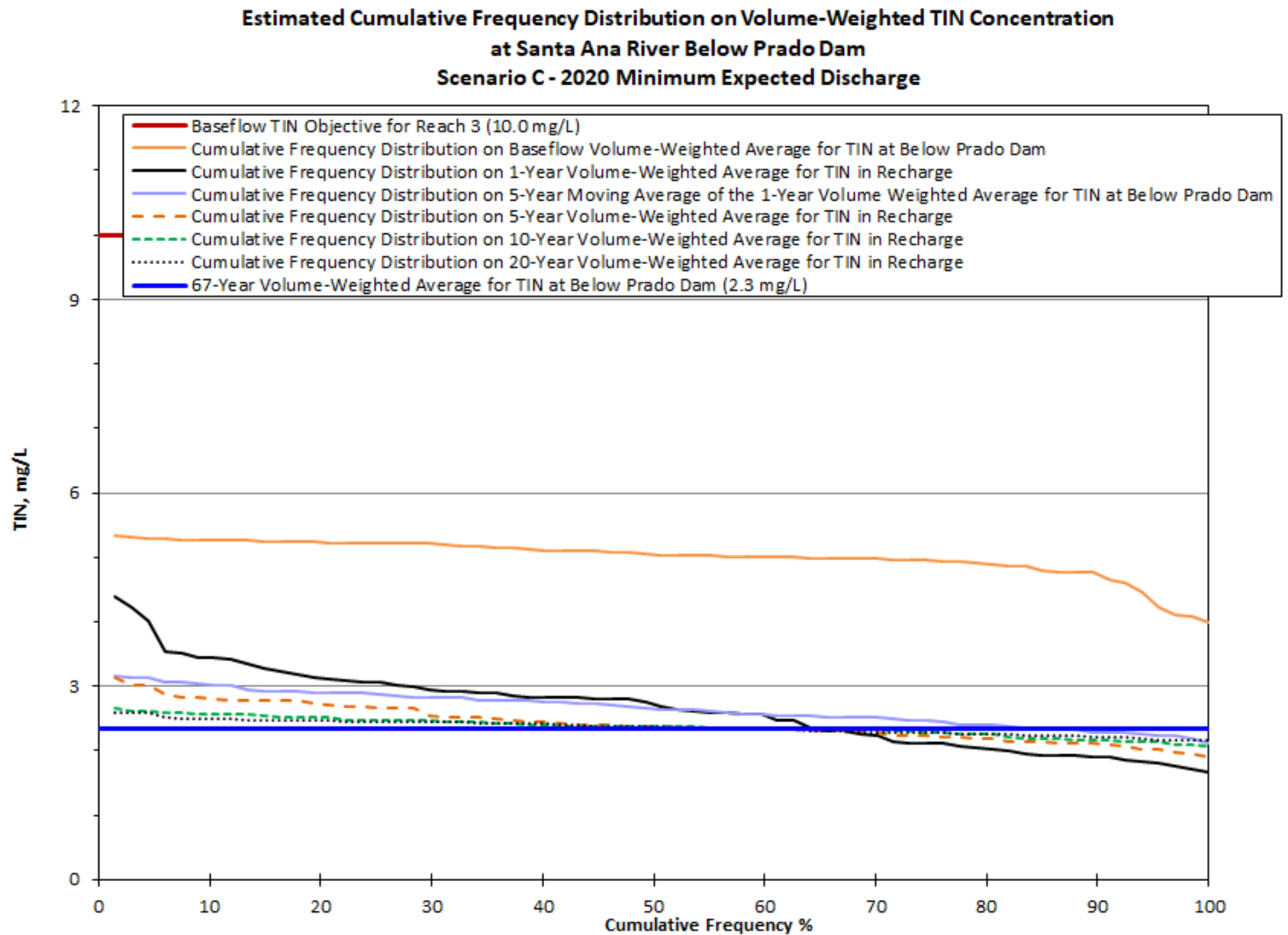
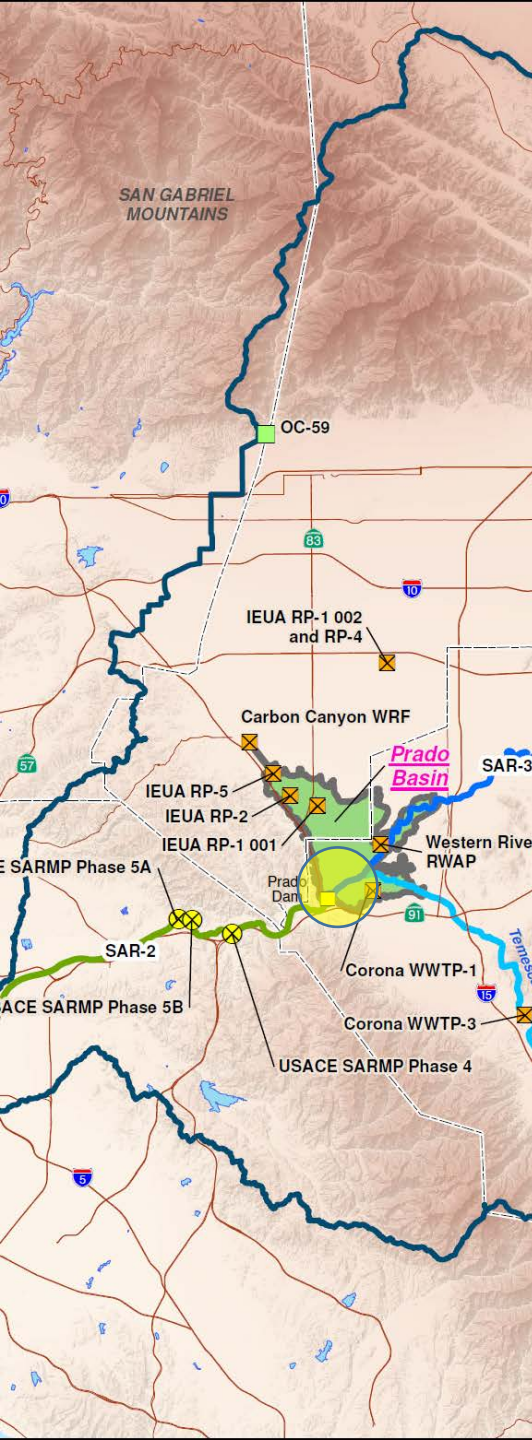


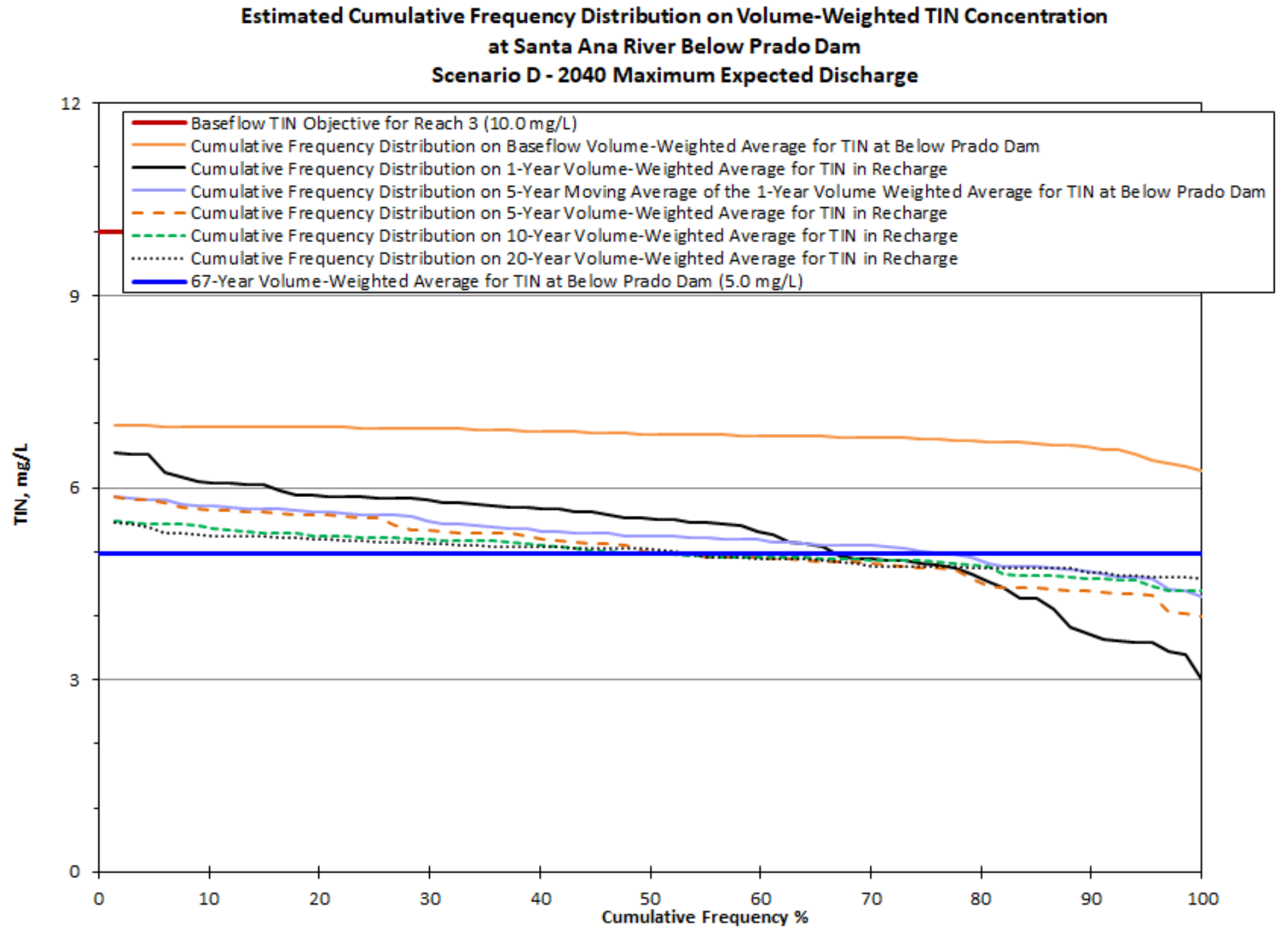
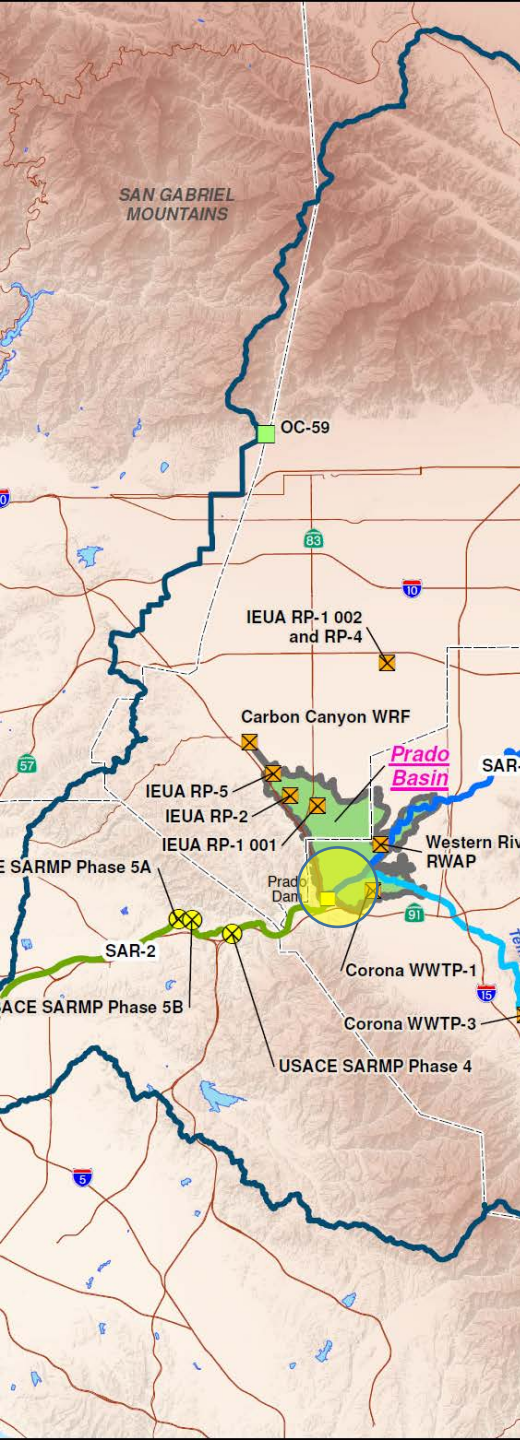


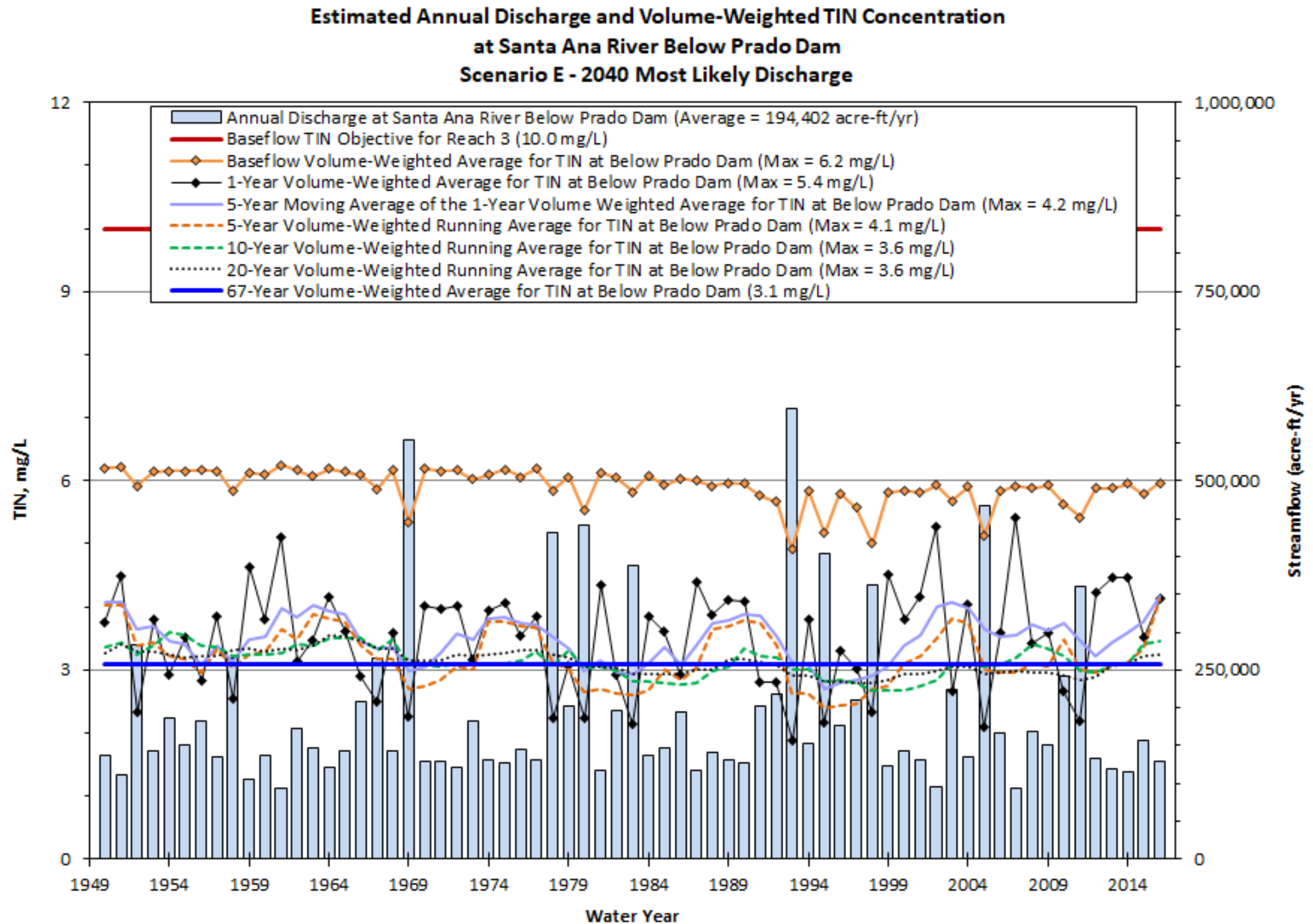
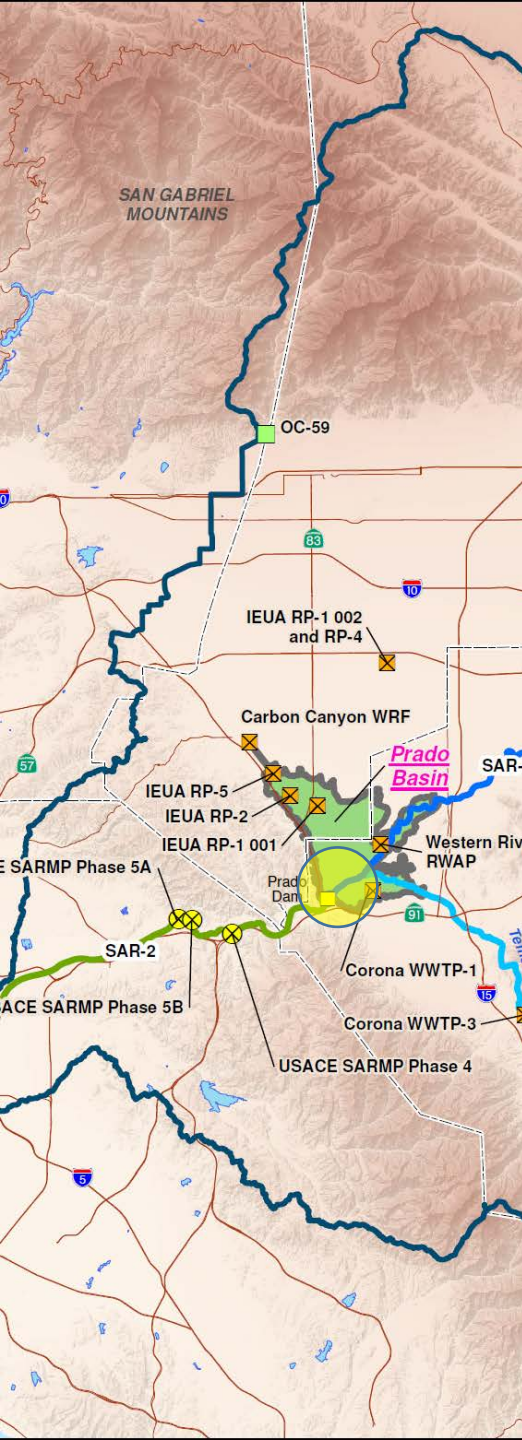


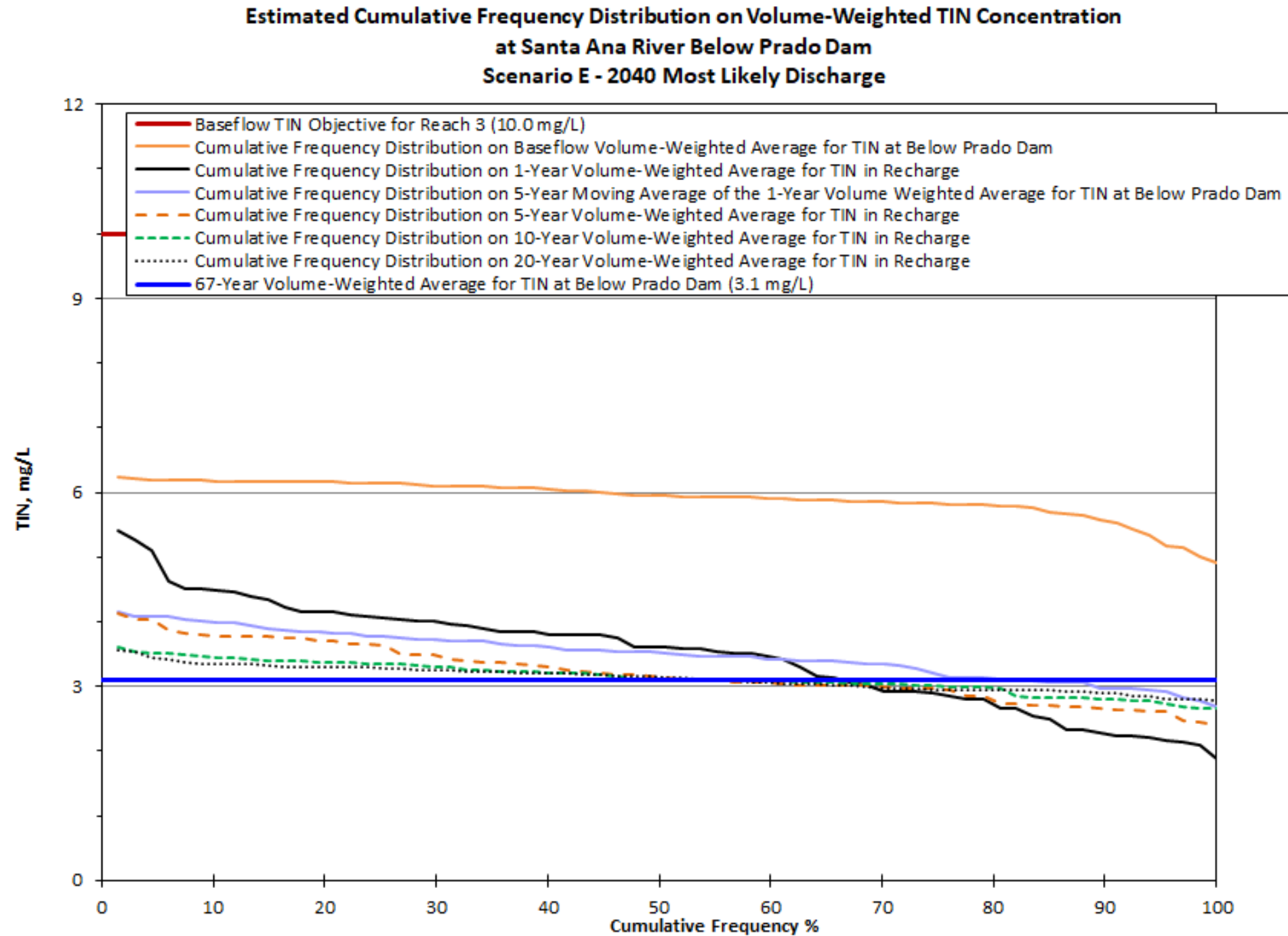
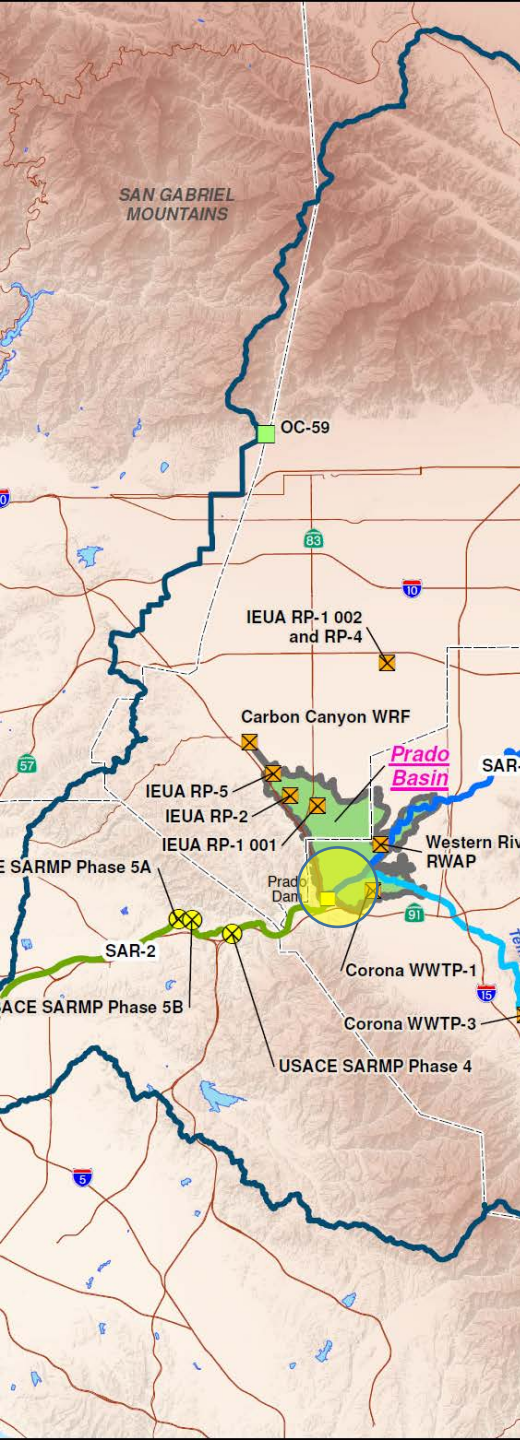


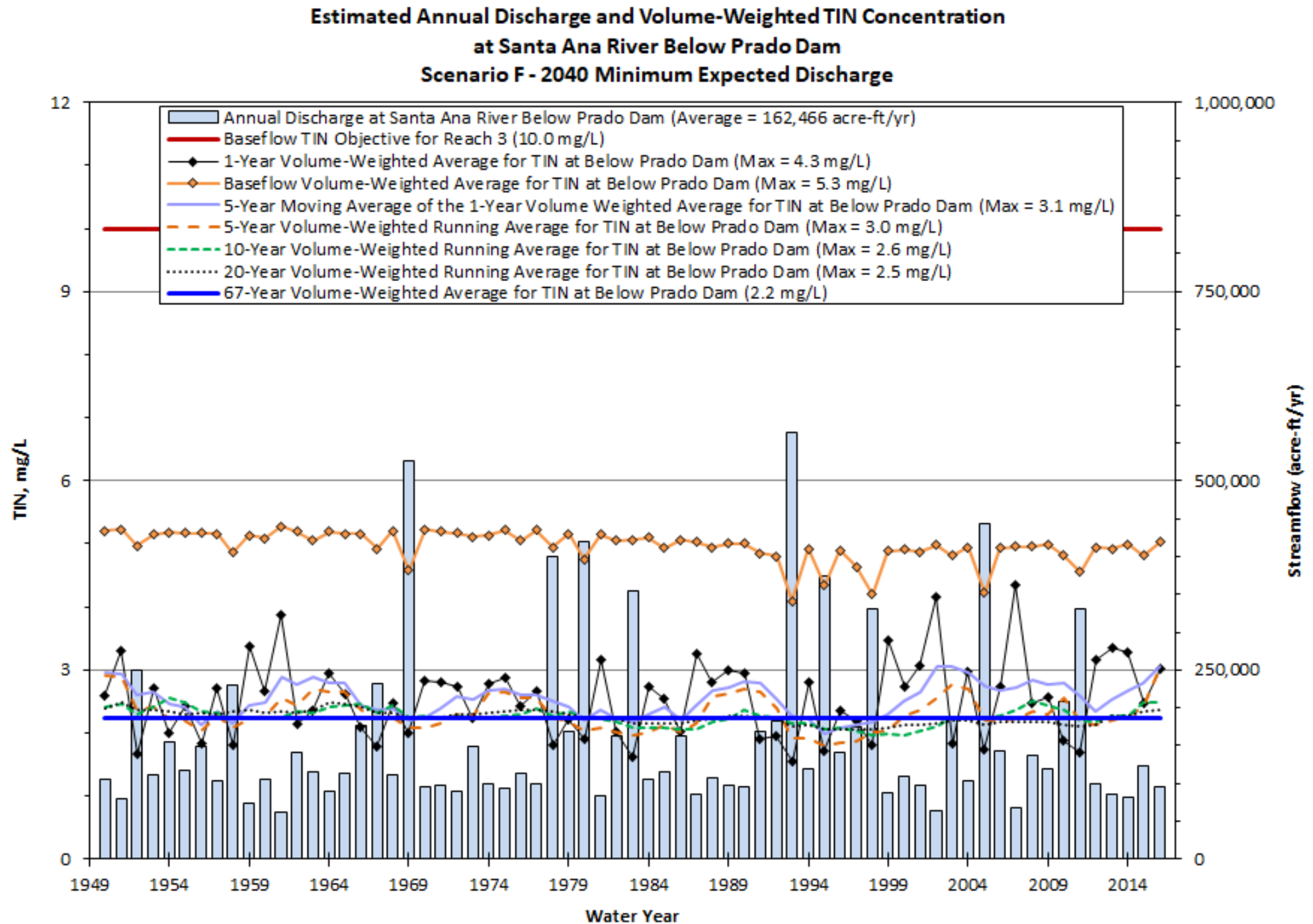
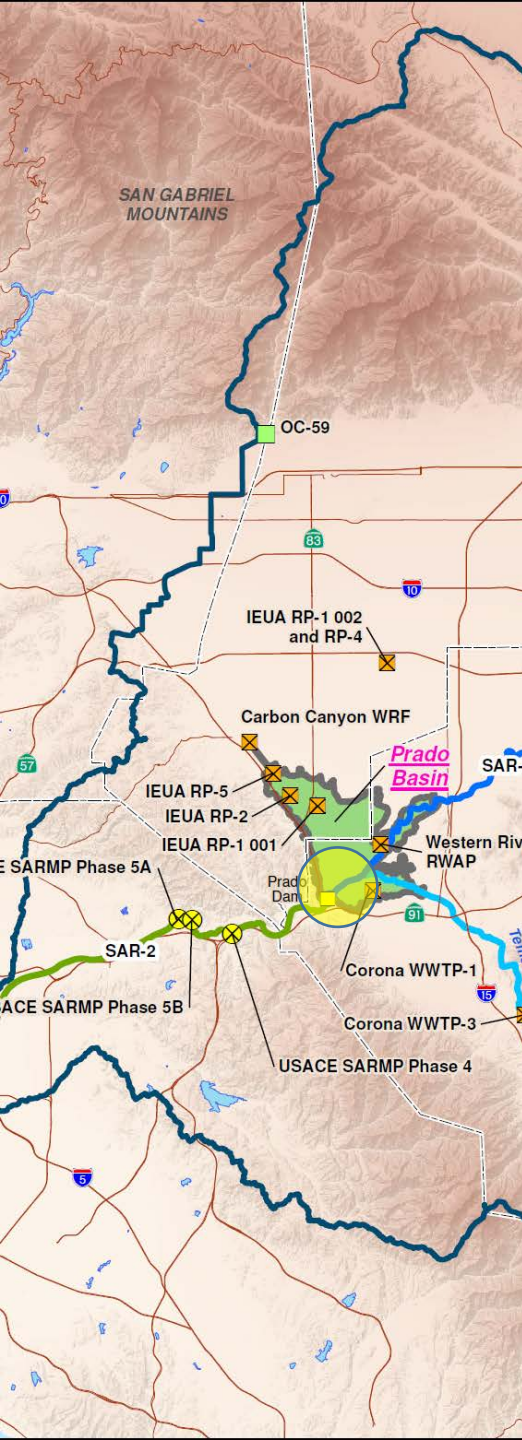


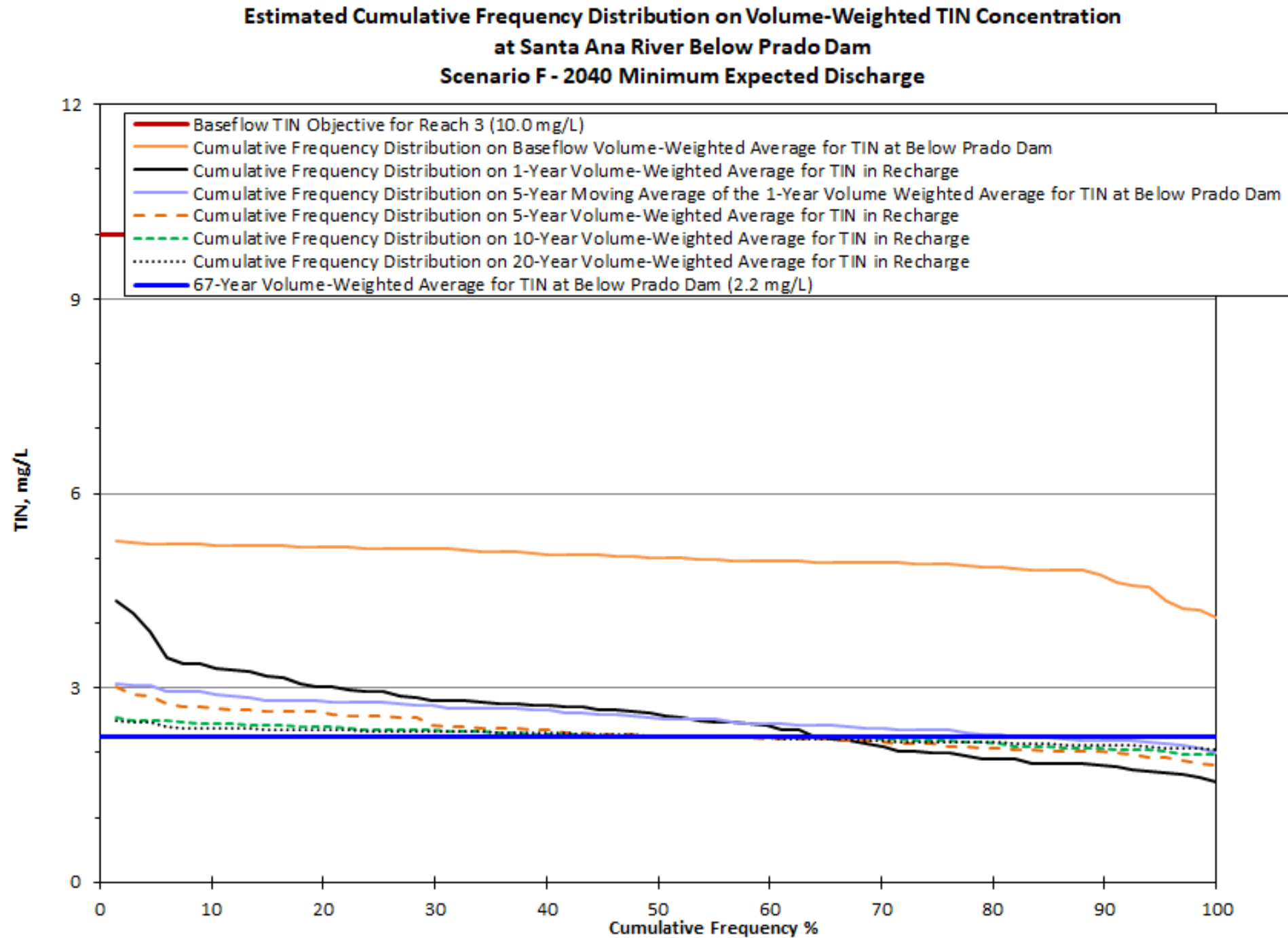
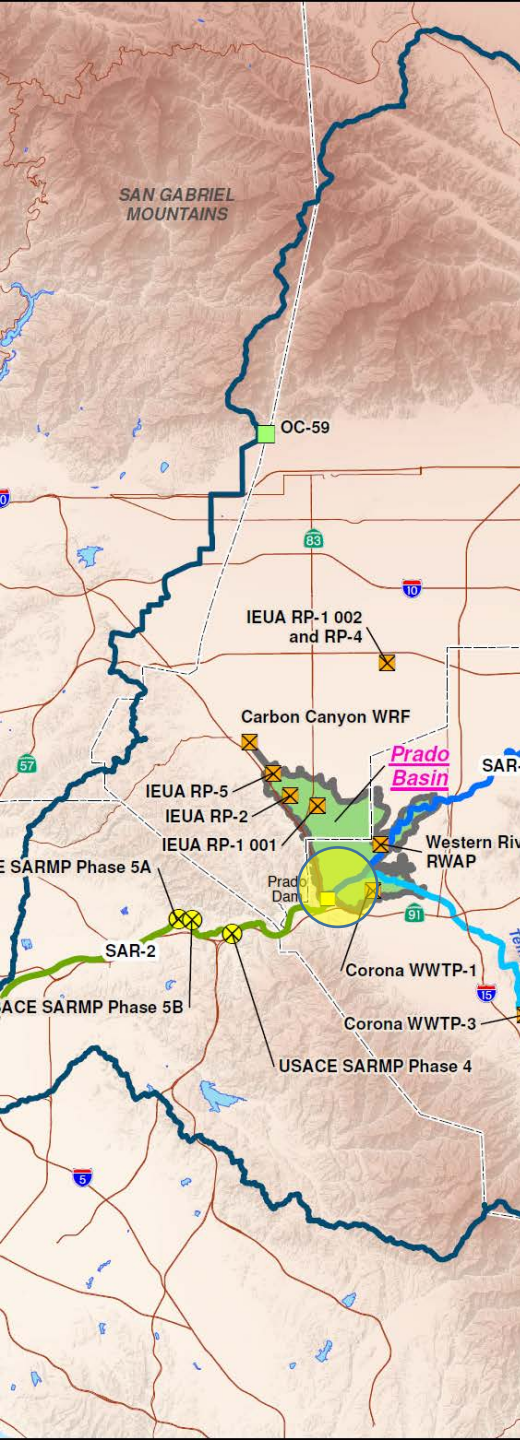


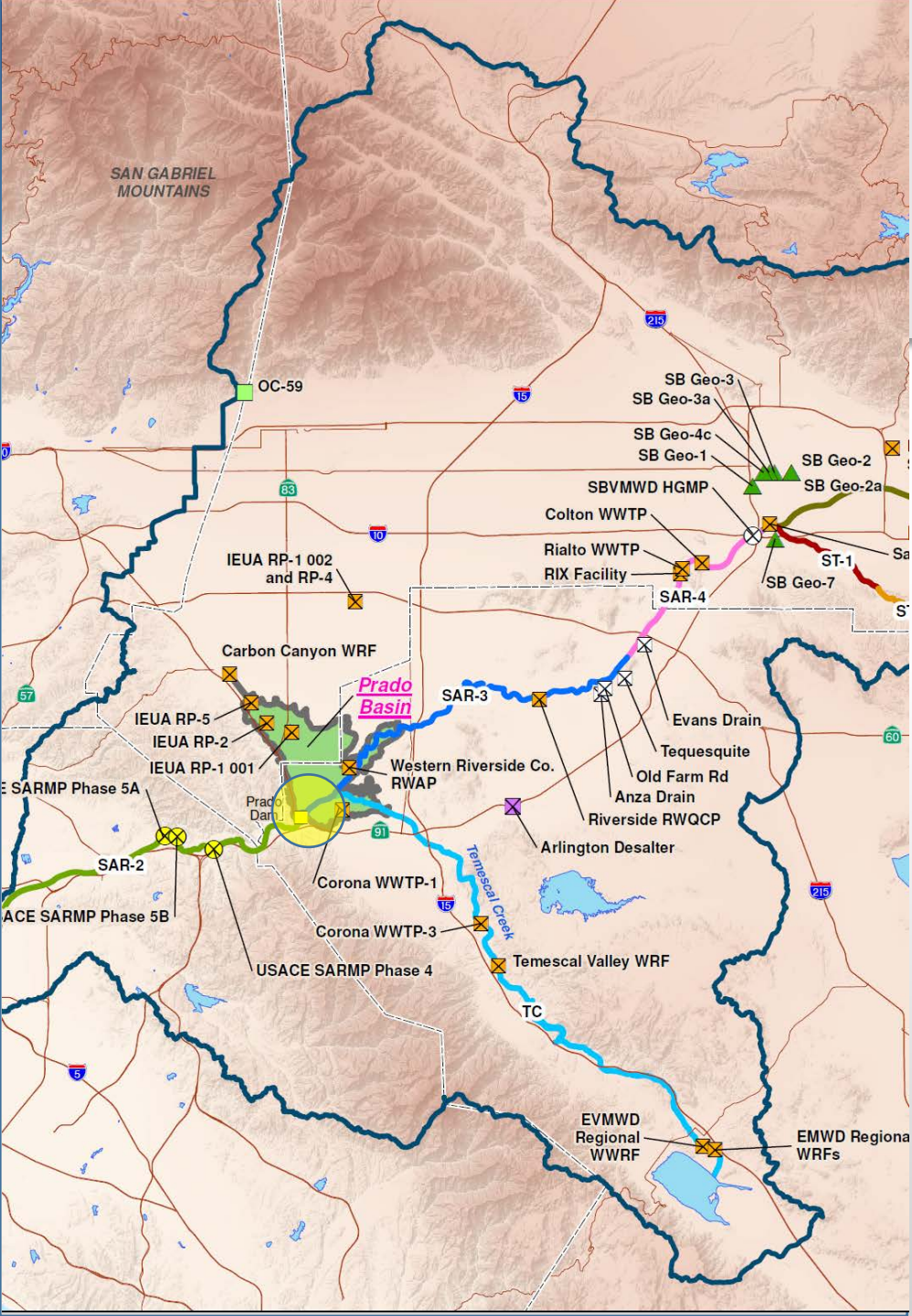












Santa Ana River Reach 3 Below Prado Dam

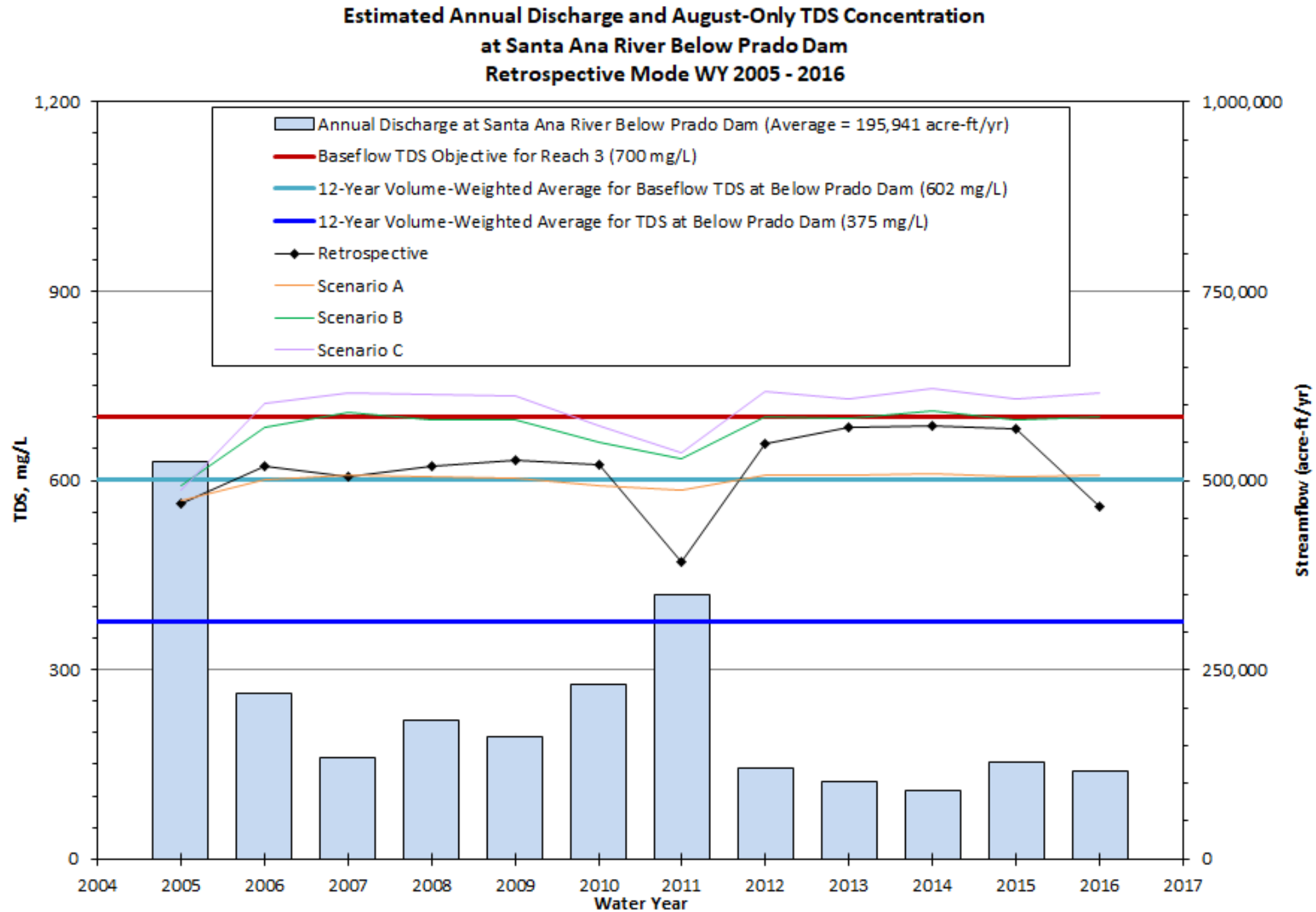
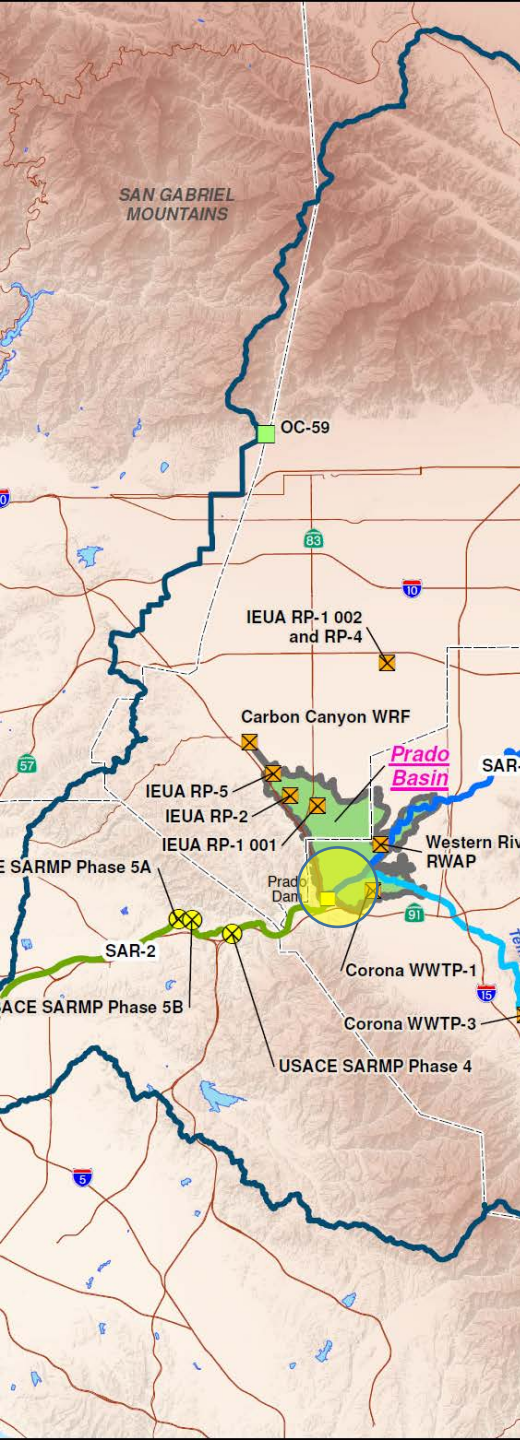
Maximum Value for the Volume-Weighted Stream Concentration (Units in mg/L)

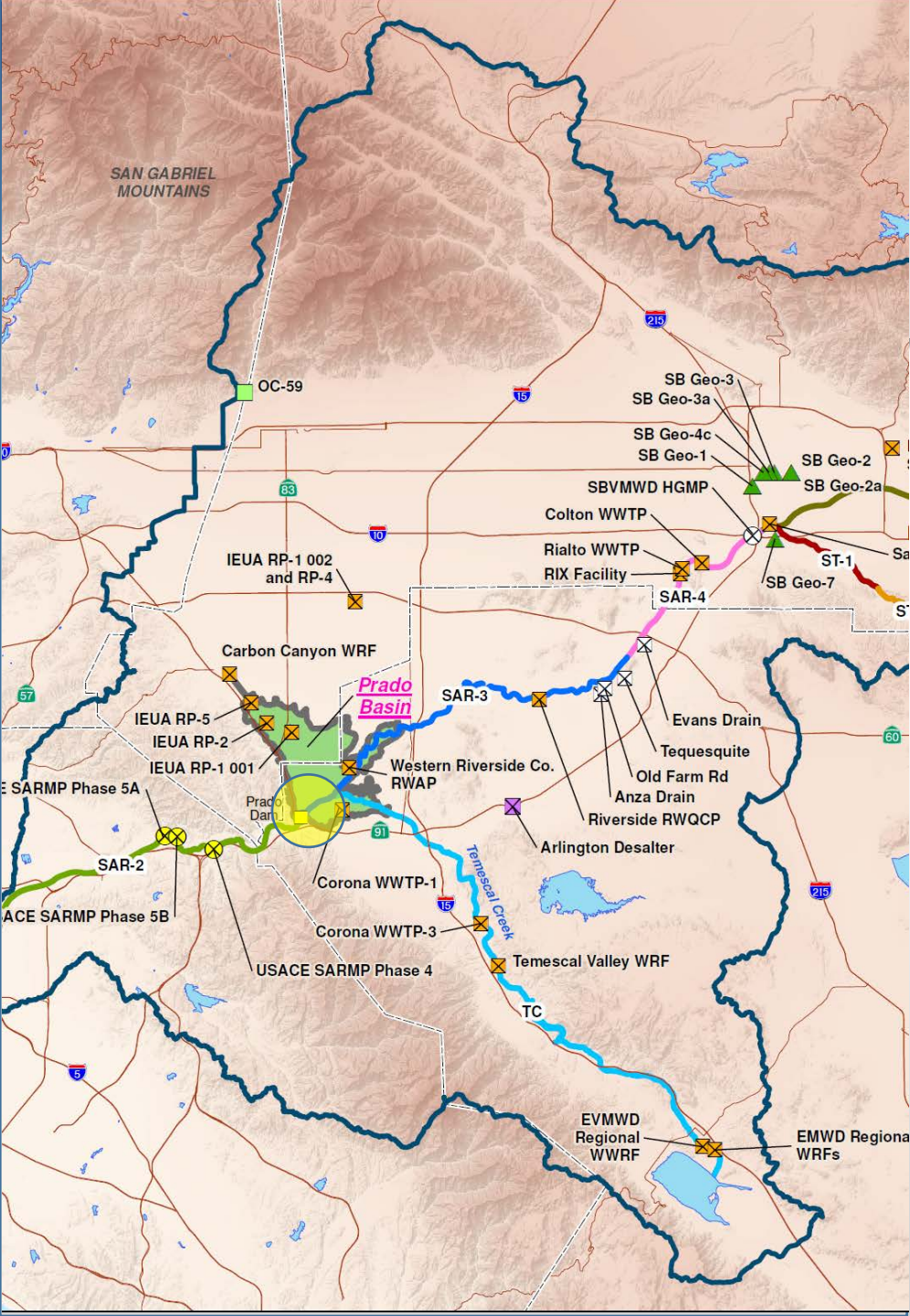
Original Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TIN	10.0	na	na	August Only	6.98	5.69	5.01	6.94	6.03	4.99

Revised Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TIN	10.0	na	na	Baseflow Average	7.04	5.95	5.34	6.98	6.25	5.28





Santa Ana River Reach 3 Below Prado Dam (Scenario A-C and Retrospective Mode)

Maximum Value for the Volume-Weighted Stream Concentration (Units in mg/L)

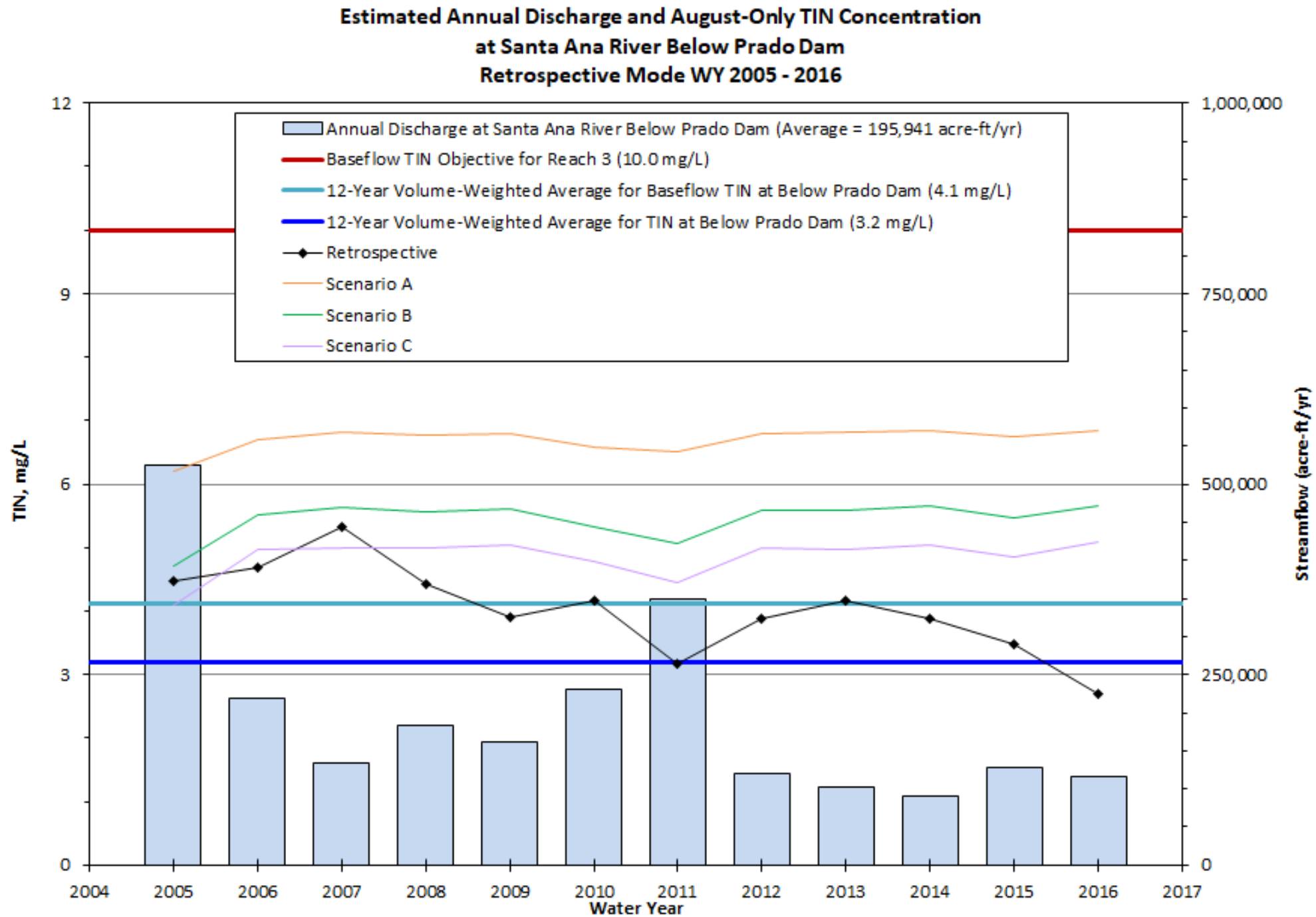
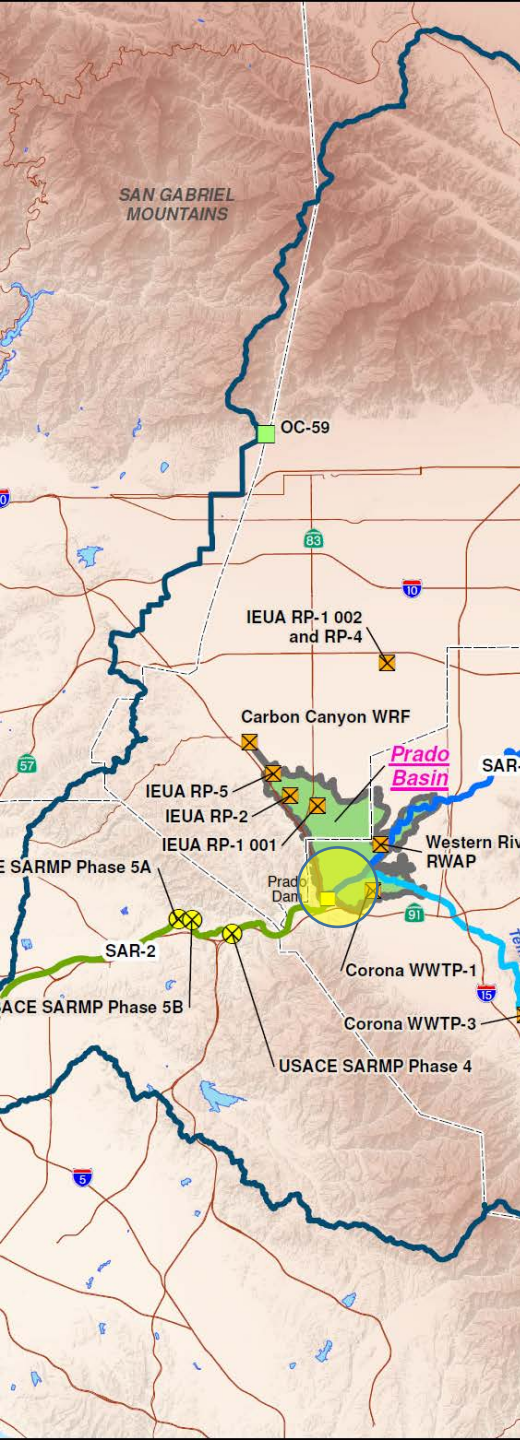
Original Calculation

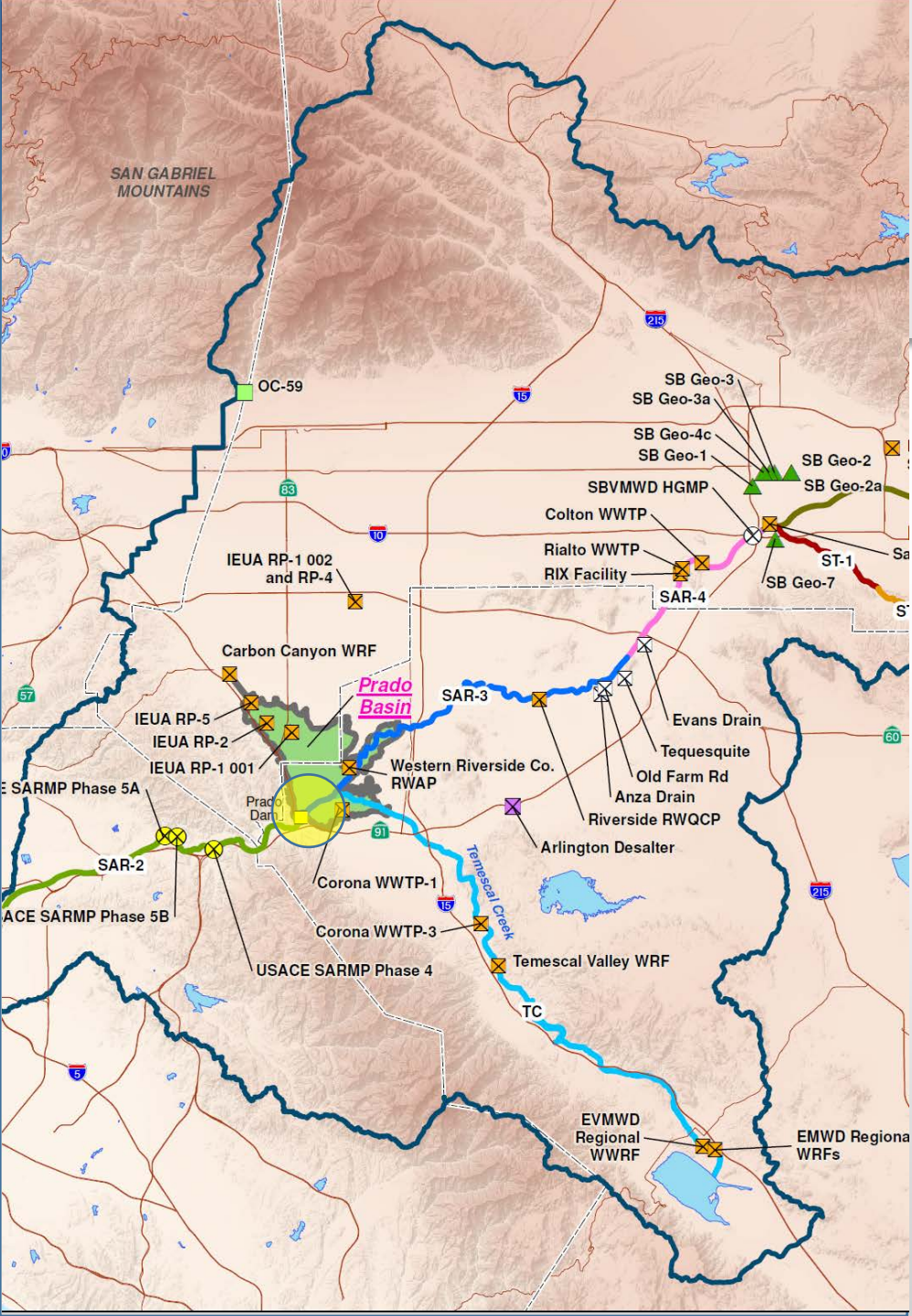
	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TDS	700	na	na	August Only	616	722	746	681

Revised Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TDS	700	na	na	Baseflow Average	619	733	774	686

Bold red values represent concentrations above basin objective.





Santa Ana River Reach 3 Below Prado Dam (Scenario A-C and Retrospective Mode)

Maximum Value for the Volume-Weighted Stream Concentration (Units in mg/L)

Original Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TIN	10.0	na	na	August Only	6.98	5.69	5.01	5.12

Revised Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TIN	10.0	na	na	Baseflow Average	7.04	5.95	5.34	5.32

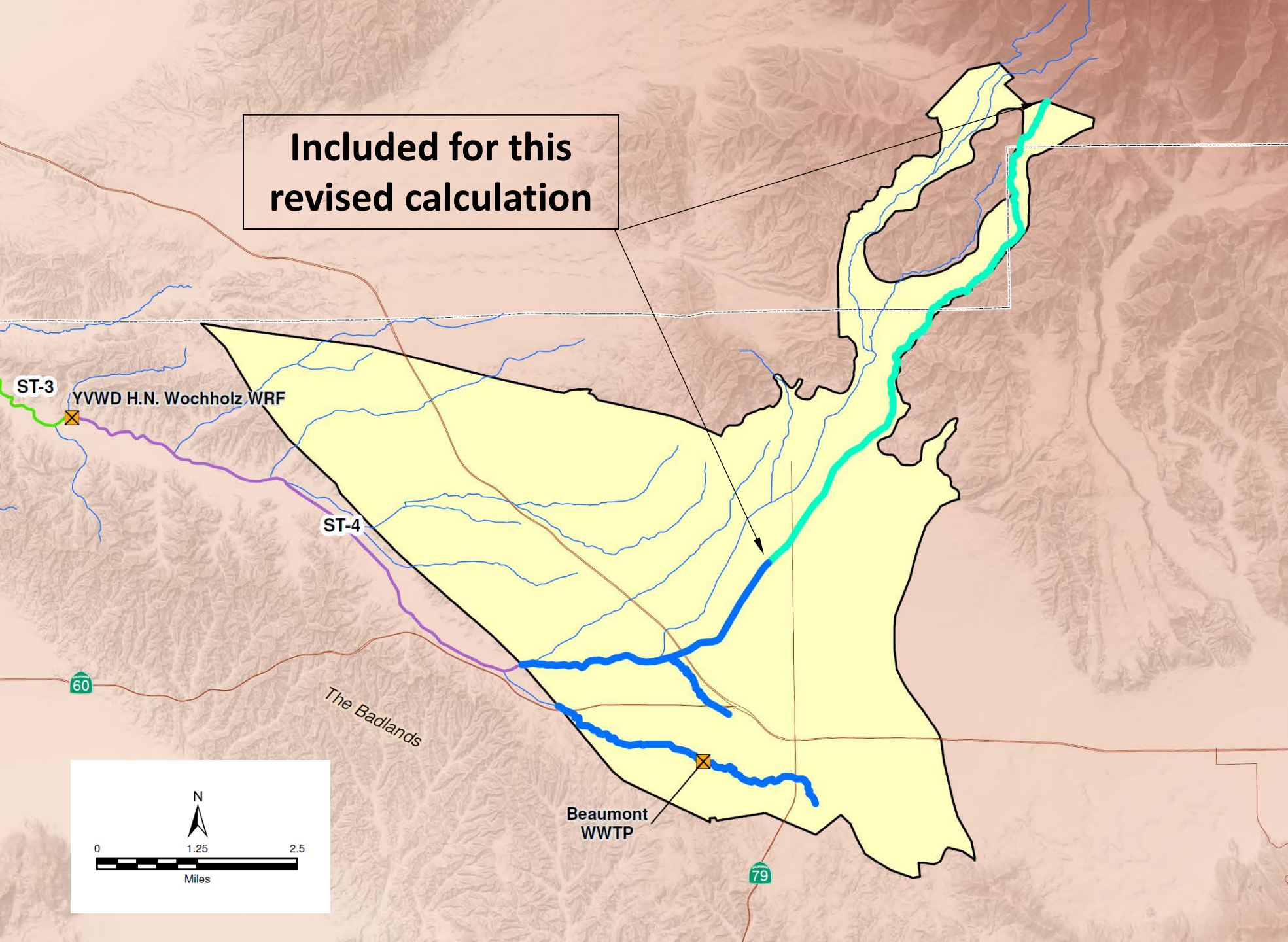
Overview

- Results from Task 3h – Recalculate Baseflow Average at Santa Ana River Below Prado Dam
- **Results from Task 3i – Recalculate Streambed Recharge for Beaumont and Bunker Hill-B Groundwater Management Zones**
- Next Steps

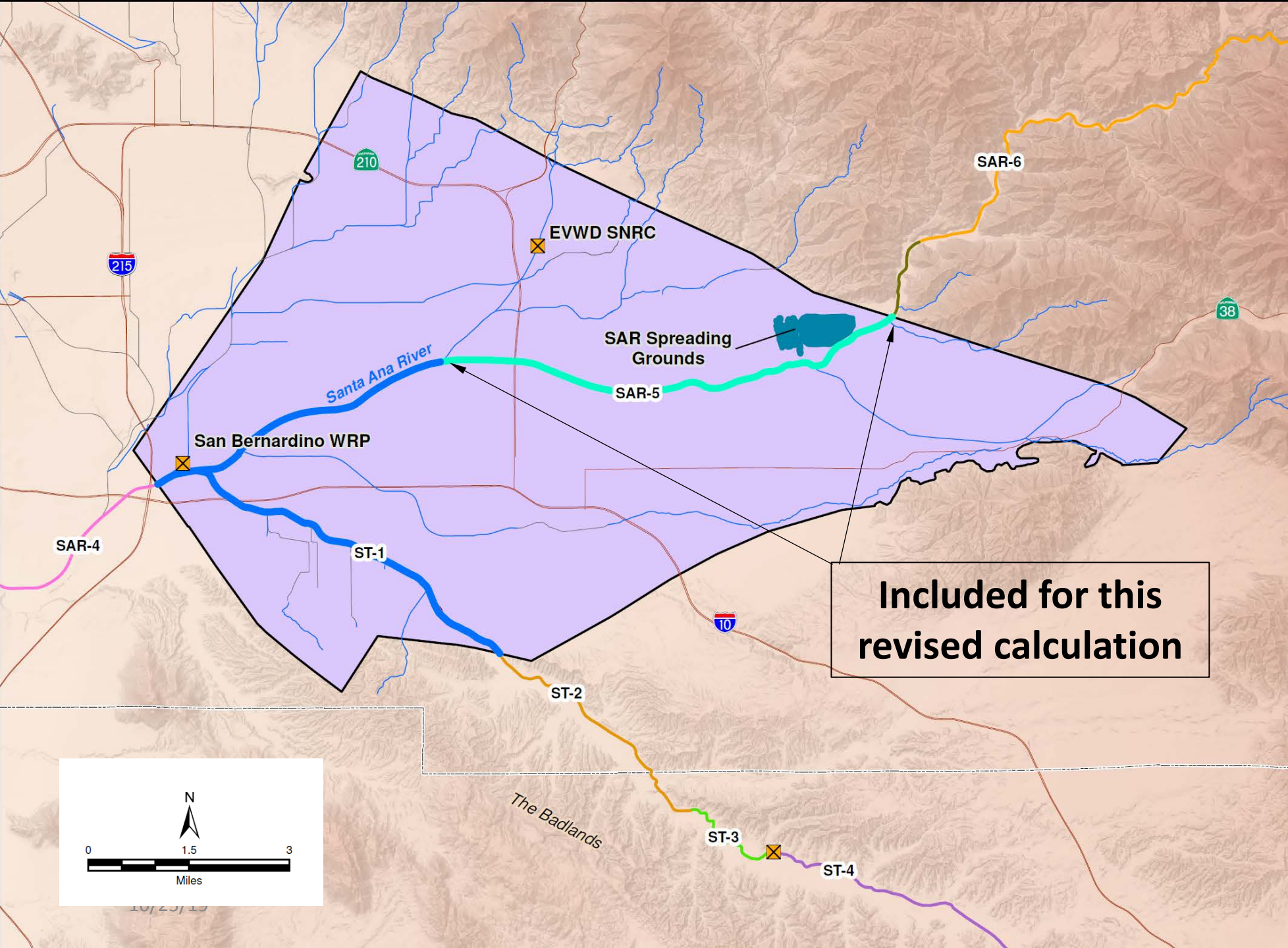
Comments on Draft TM No. 6 from Risk Sciences – Comment No 17

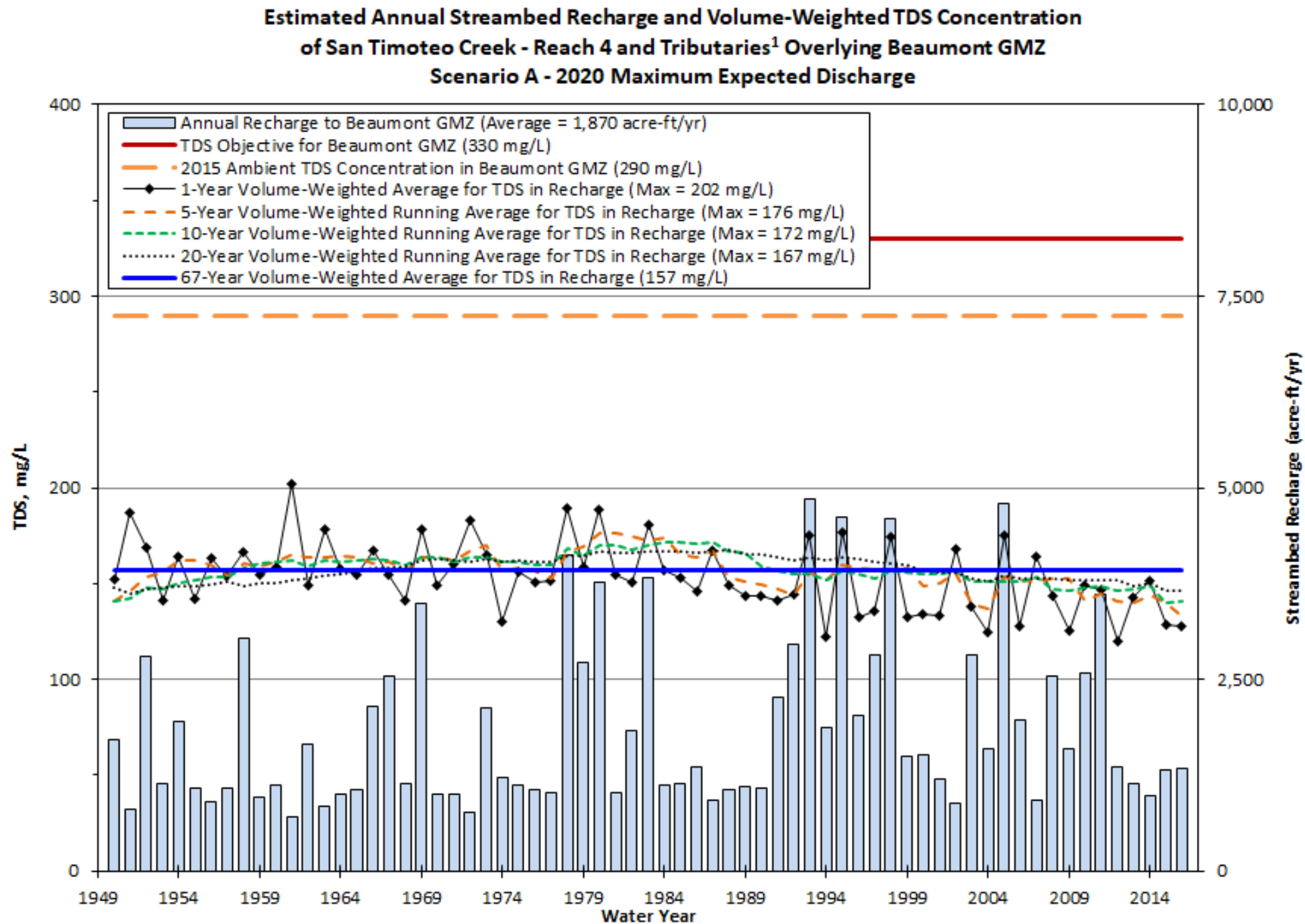
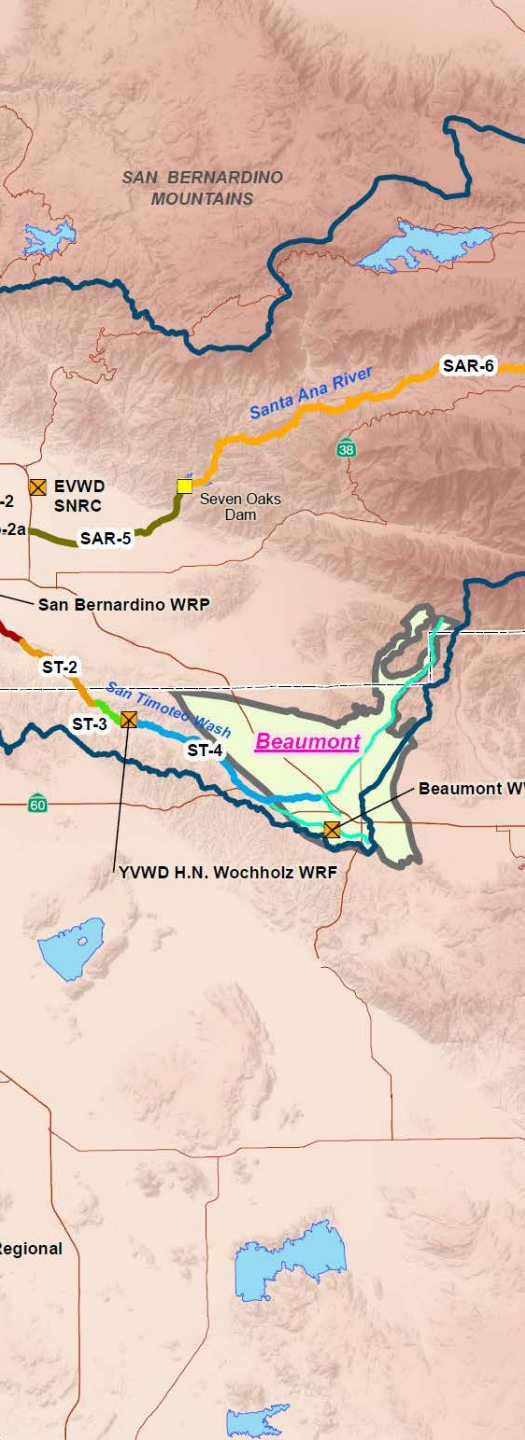
No.	Section	Pg.	Comment	GEOSCIENCE Response
<u>17</u>	6.1	83	Pg. 83, Section 6.1: text states that streambed recharge in Reach 4 of San Timoteo Creek was only evaluated for the segment of the stream below the City of Beaumont's outfall. There is no technical justification for this approach and it produces a biased and inaccurate picture of the probable impact on the underlying aquifer. All streambed recharge from Reach 4 of STC to the Beaumont GMZ should be included in the calculation.	Per WEI description of calculation area (see pg. 6 of Scenario 8 WLAM Addendum). Will proceed based on input from the Task Force

Streambed Recharge for Beaumont Groundwater Management Zone

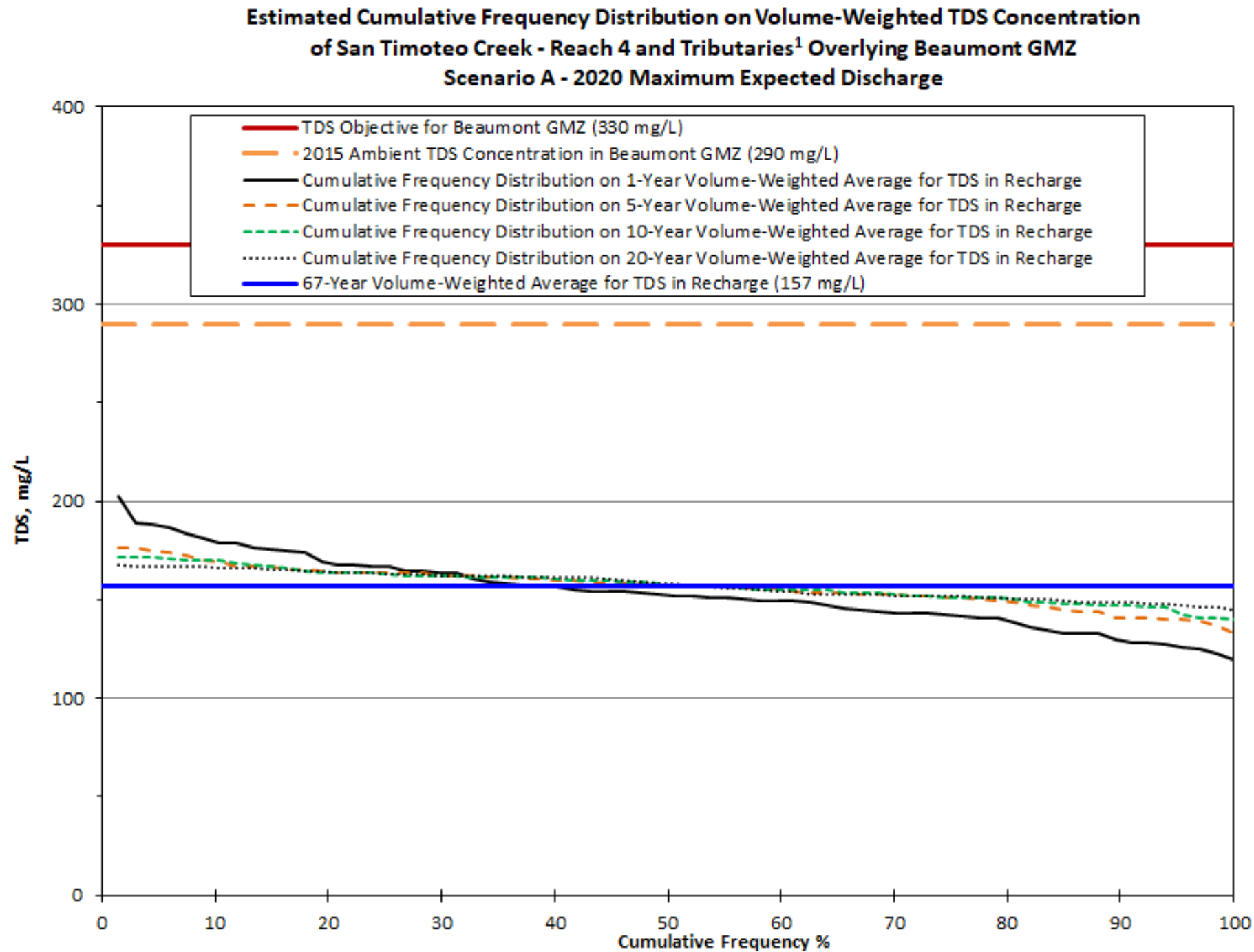
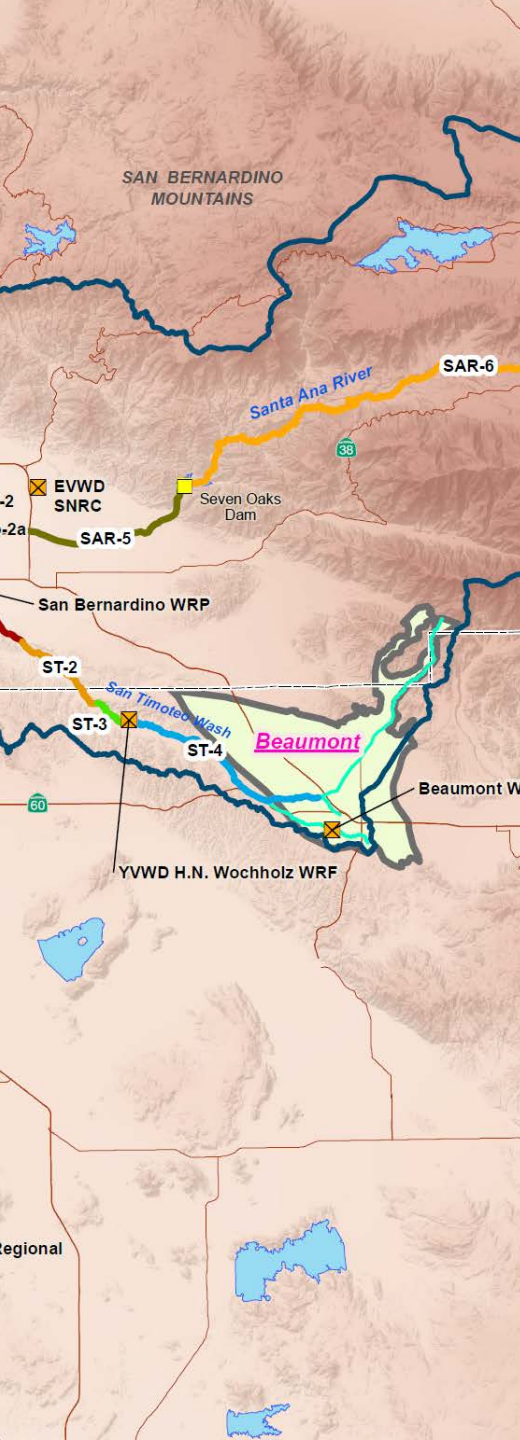


Streambed Recharge for Bunker Hill-B Groundwater Management Zone

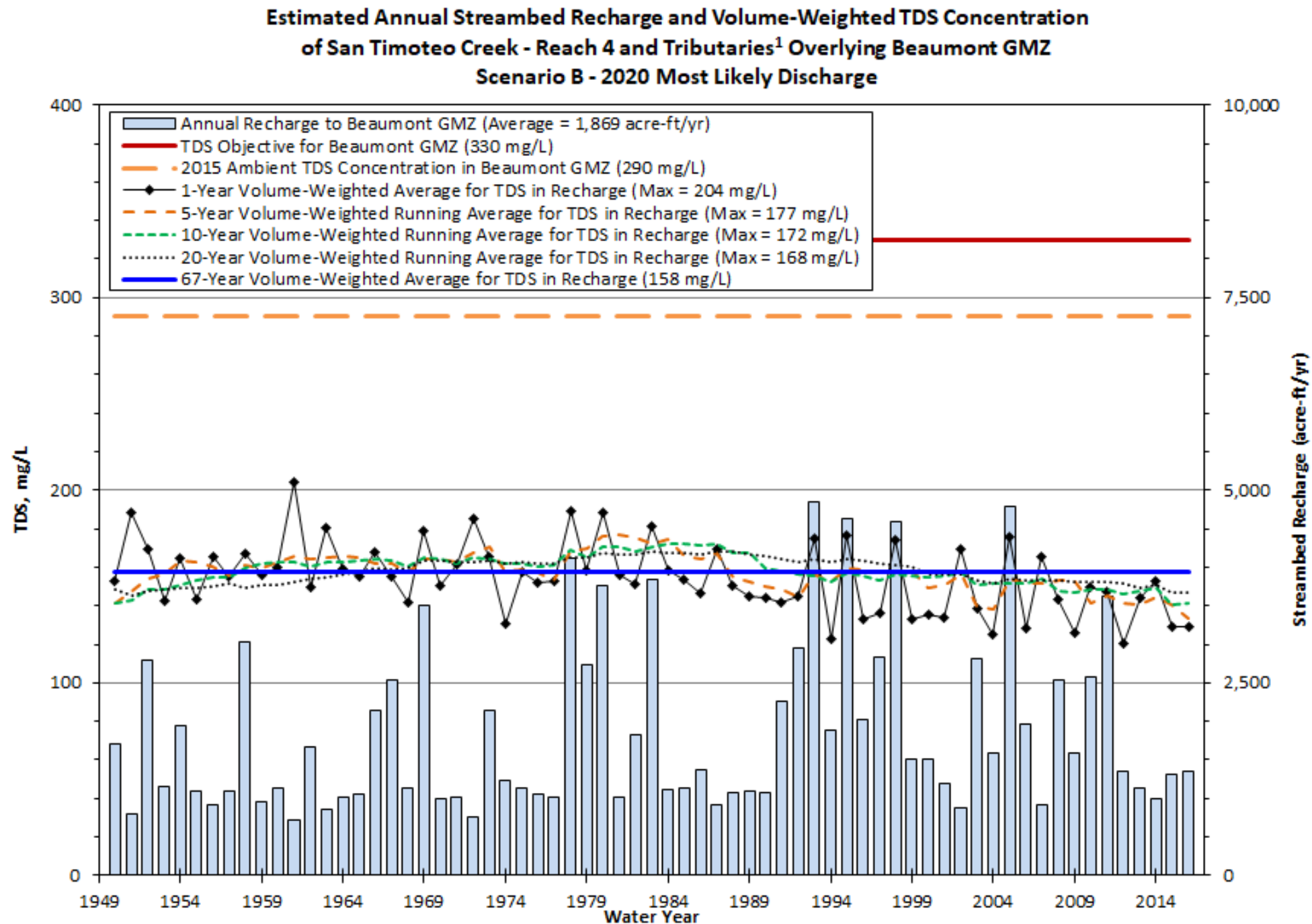
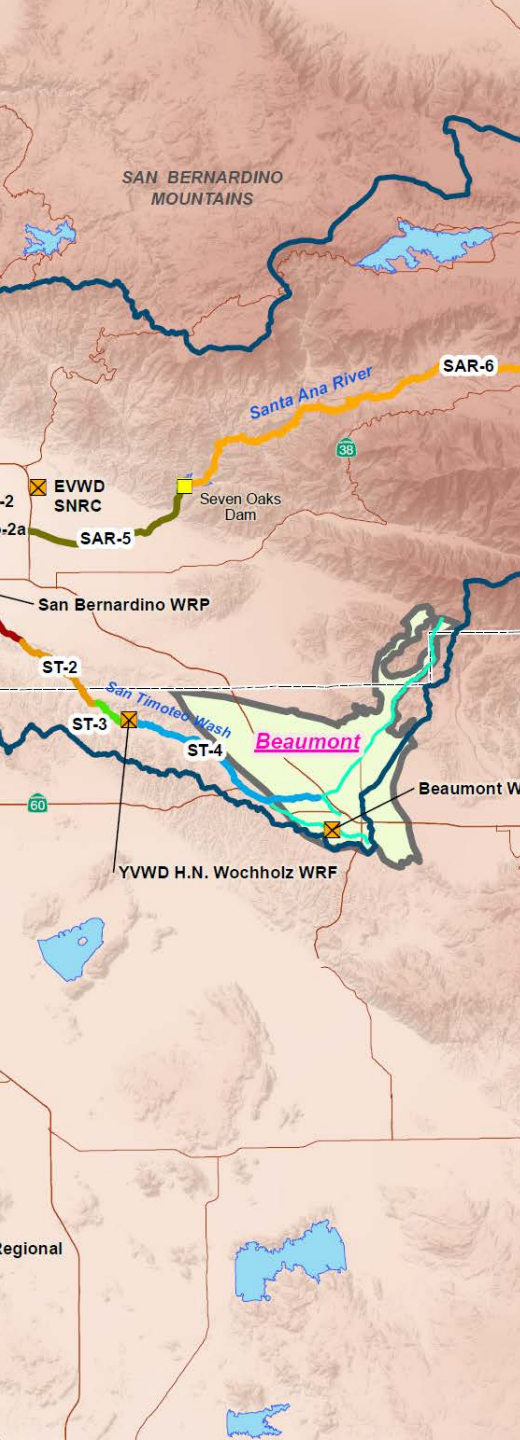


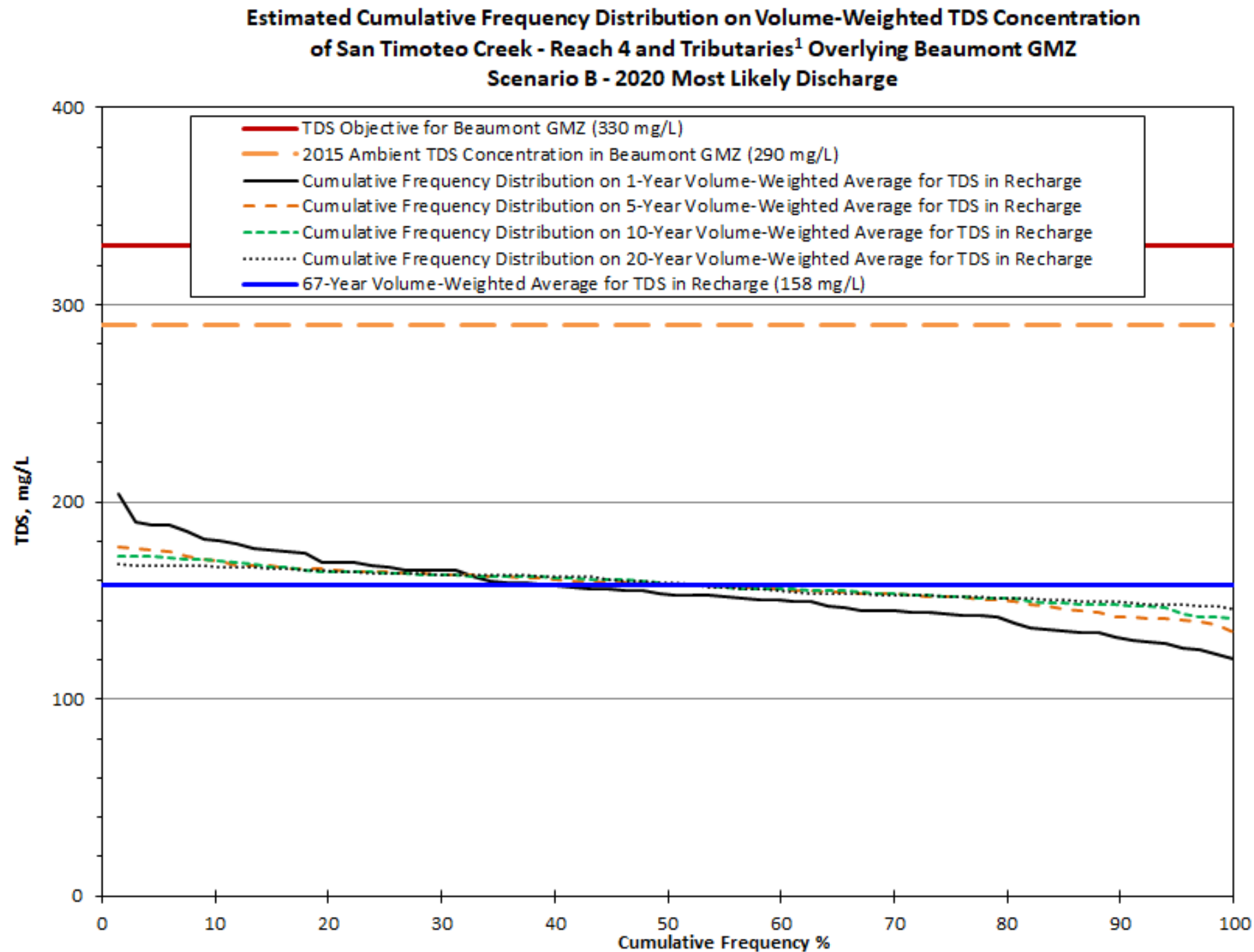
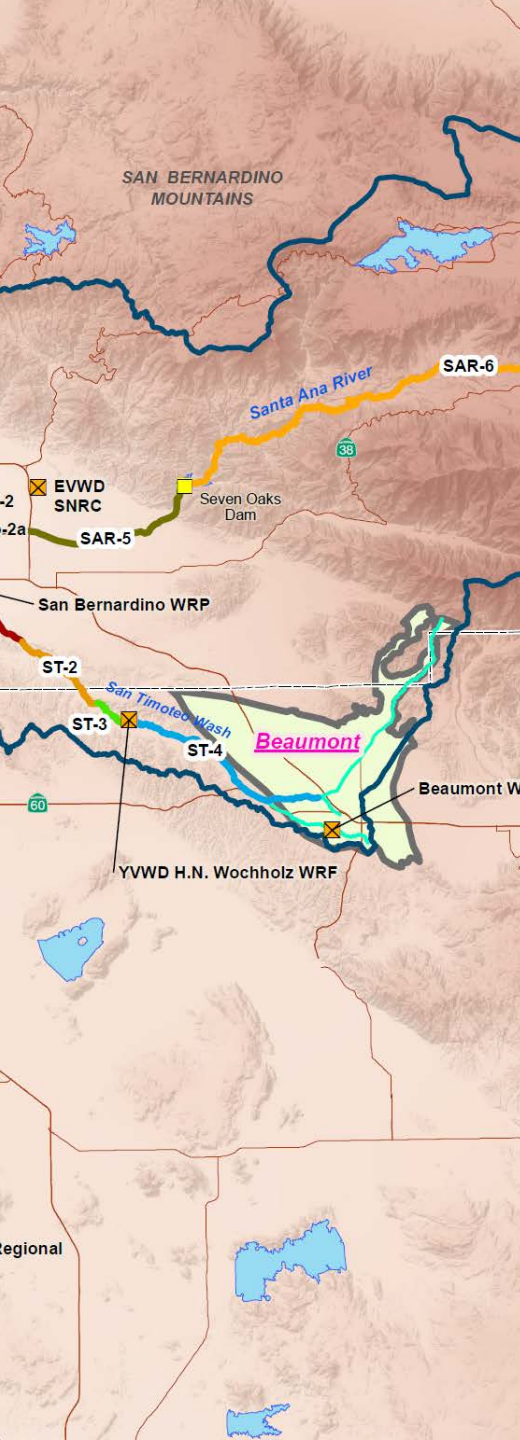


¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek

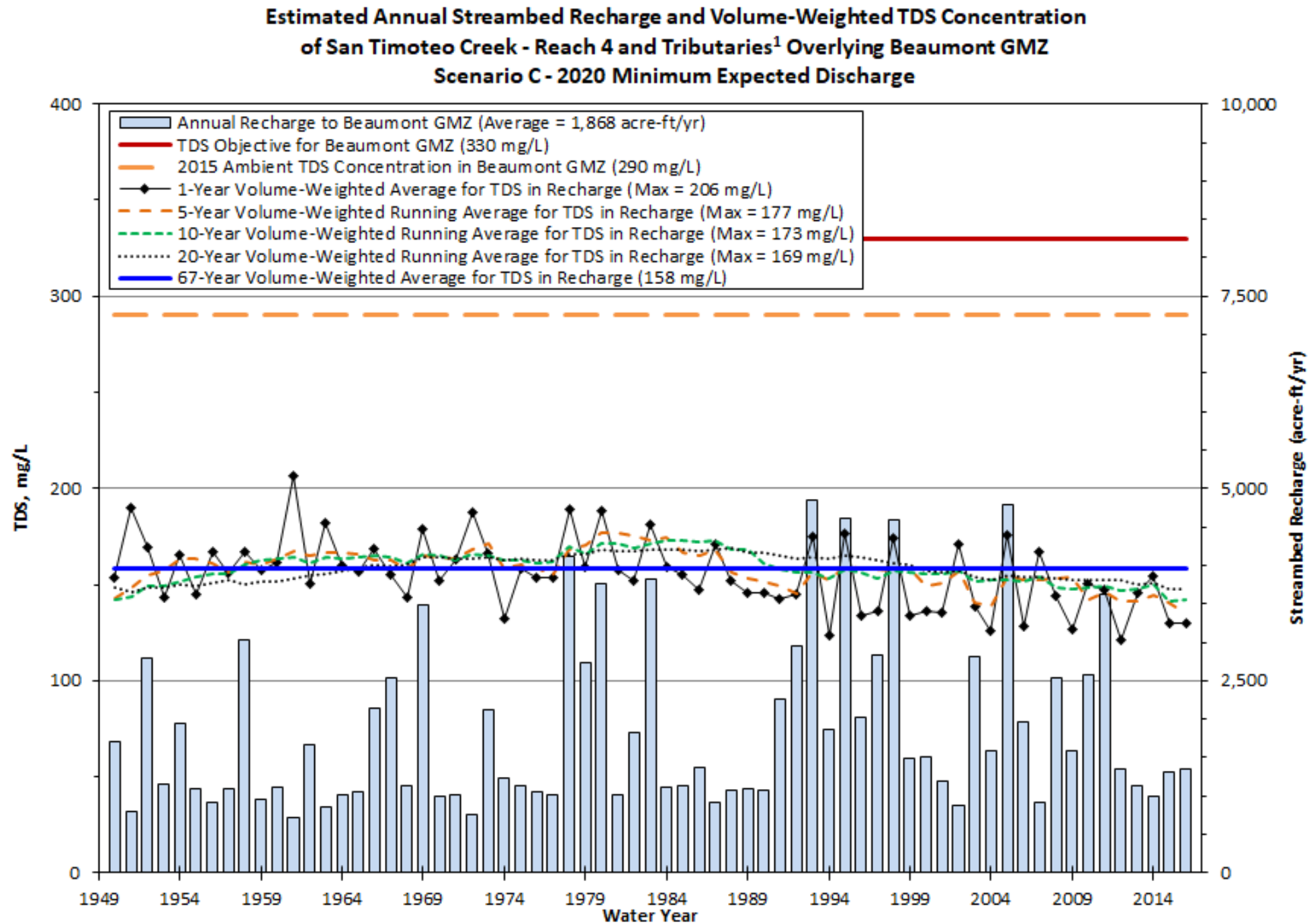
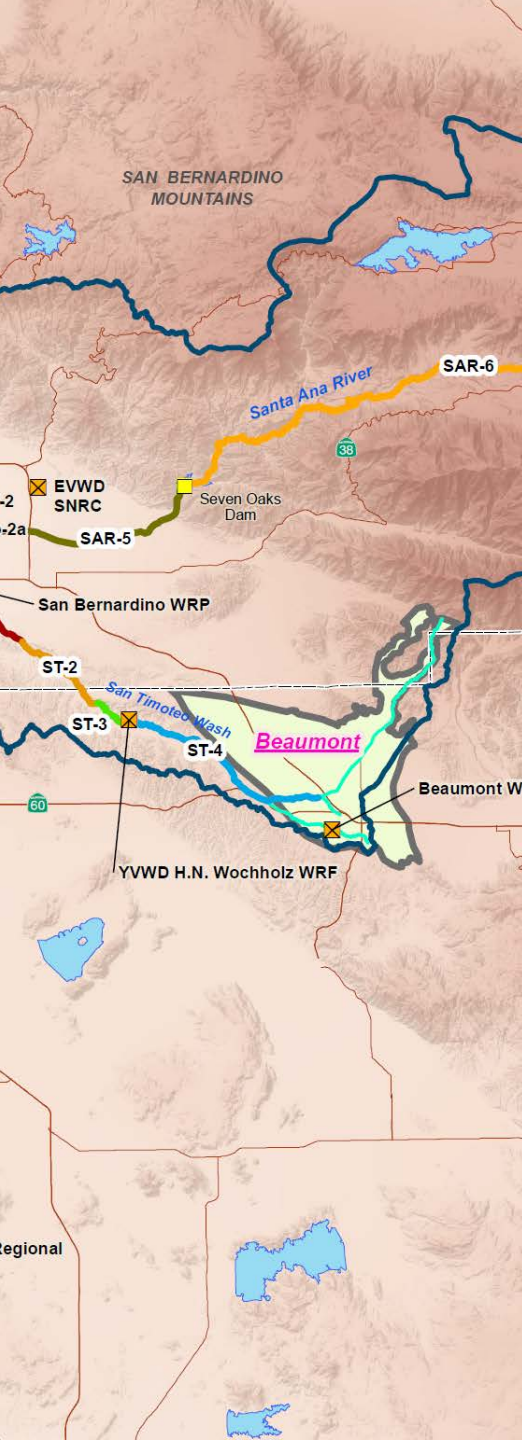


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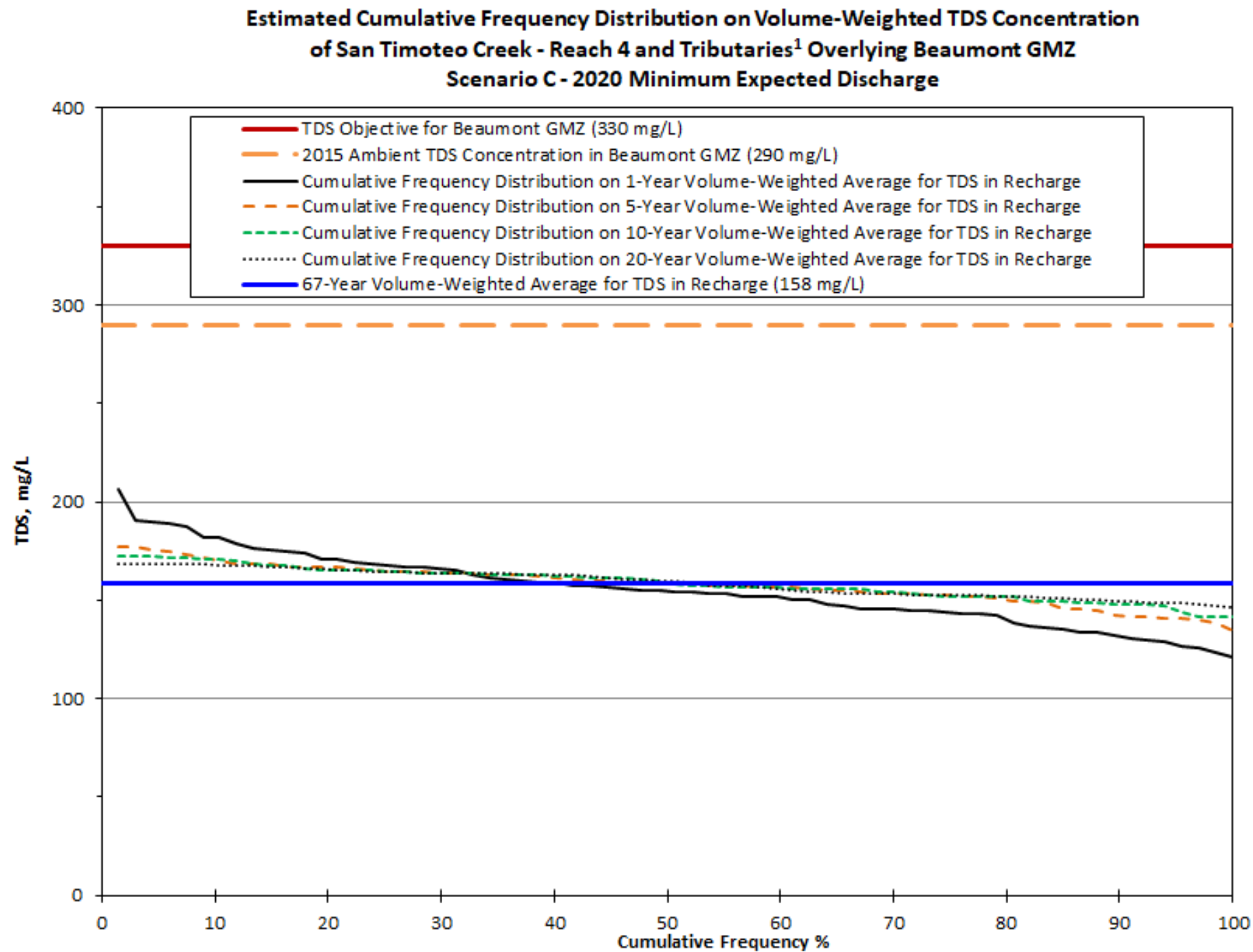
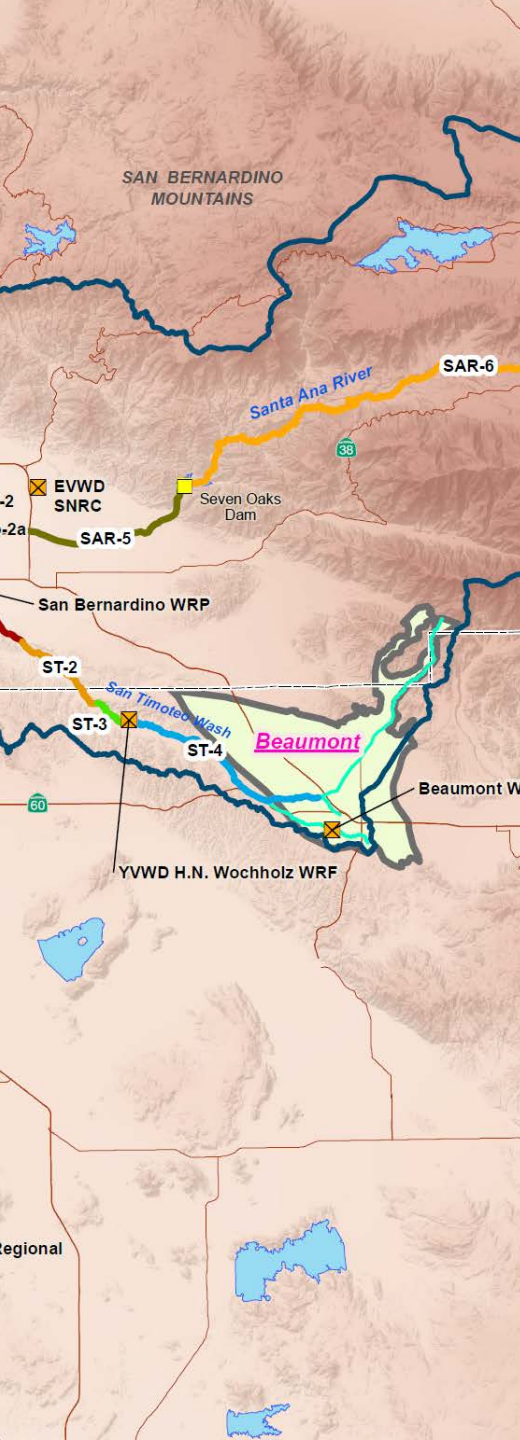


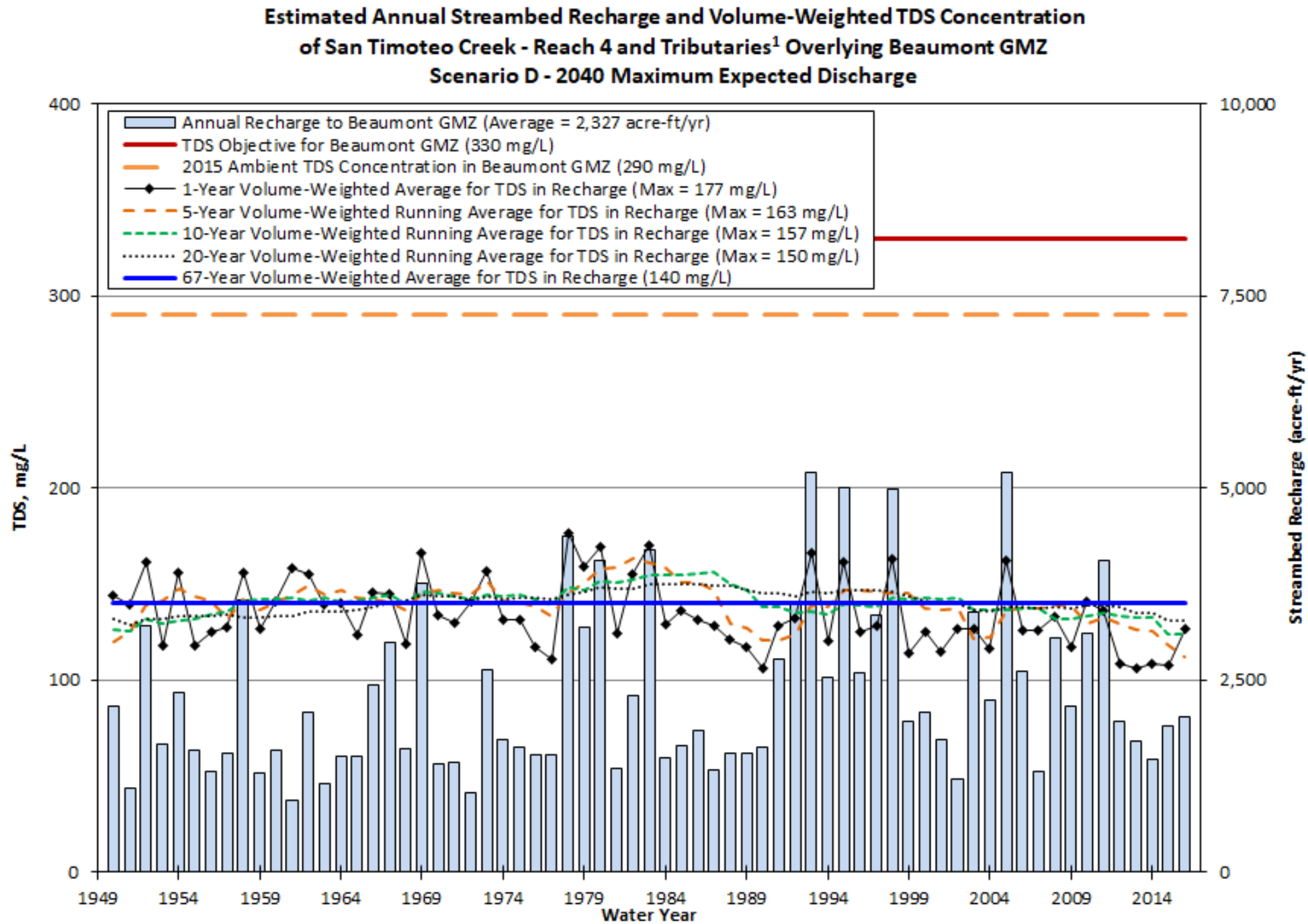
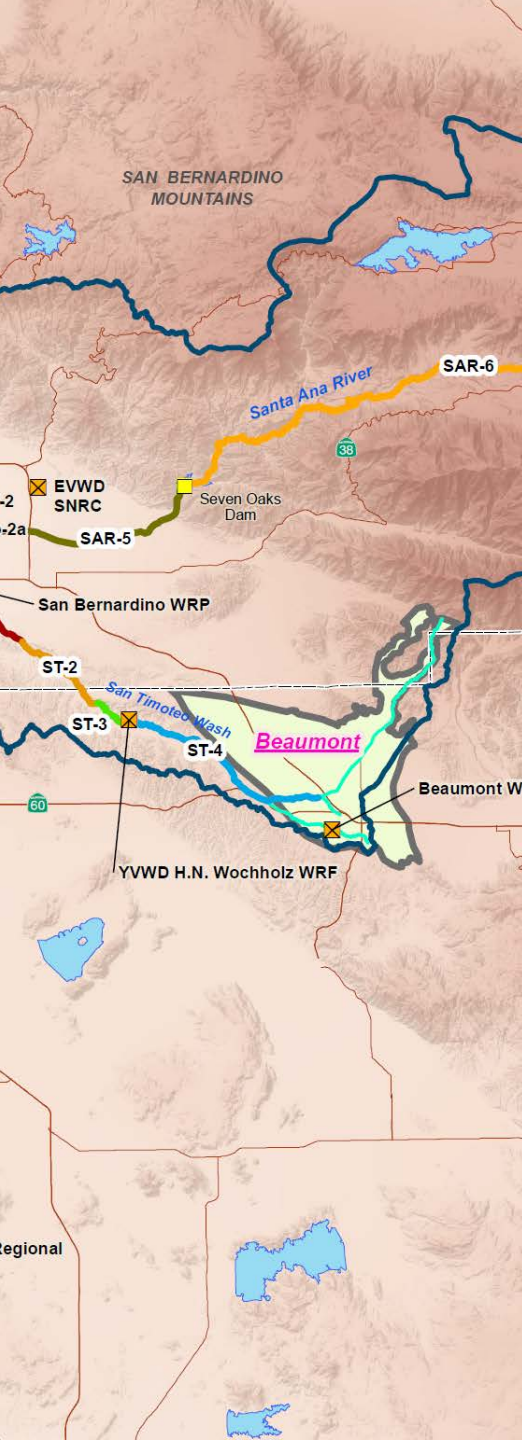


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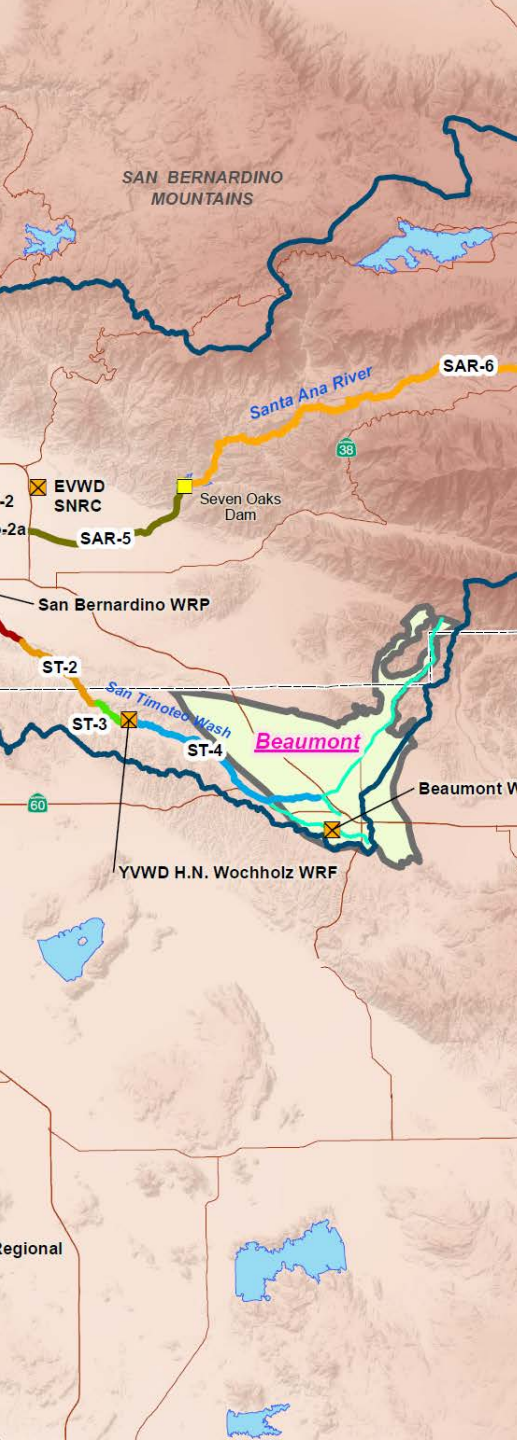


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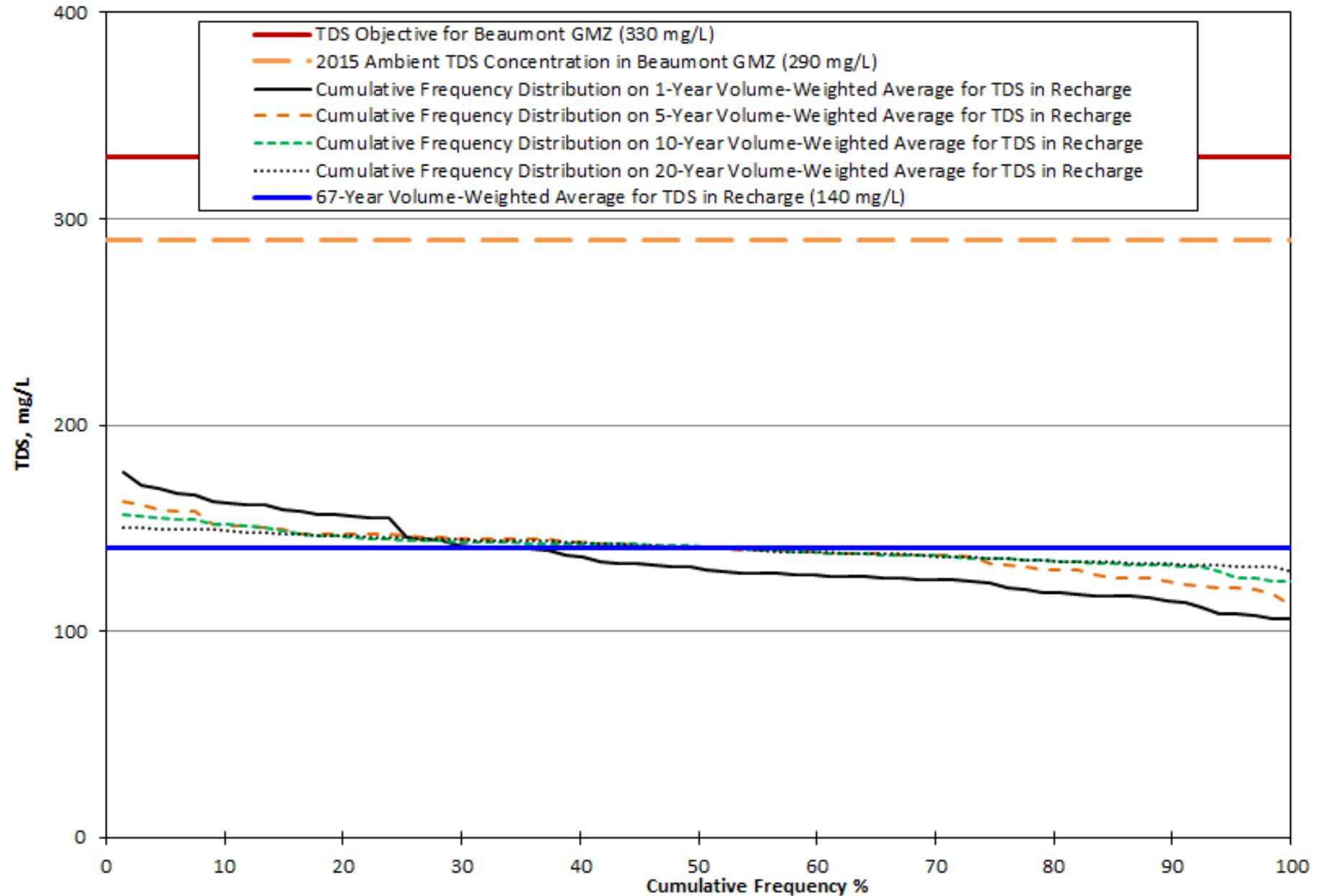




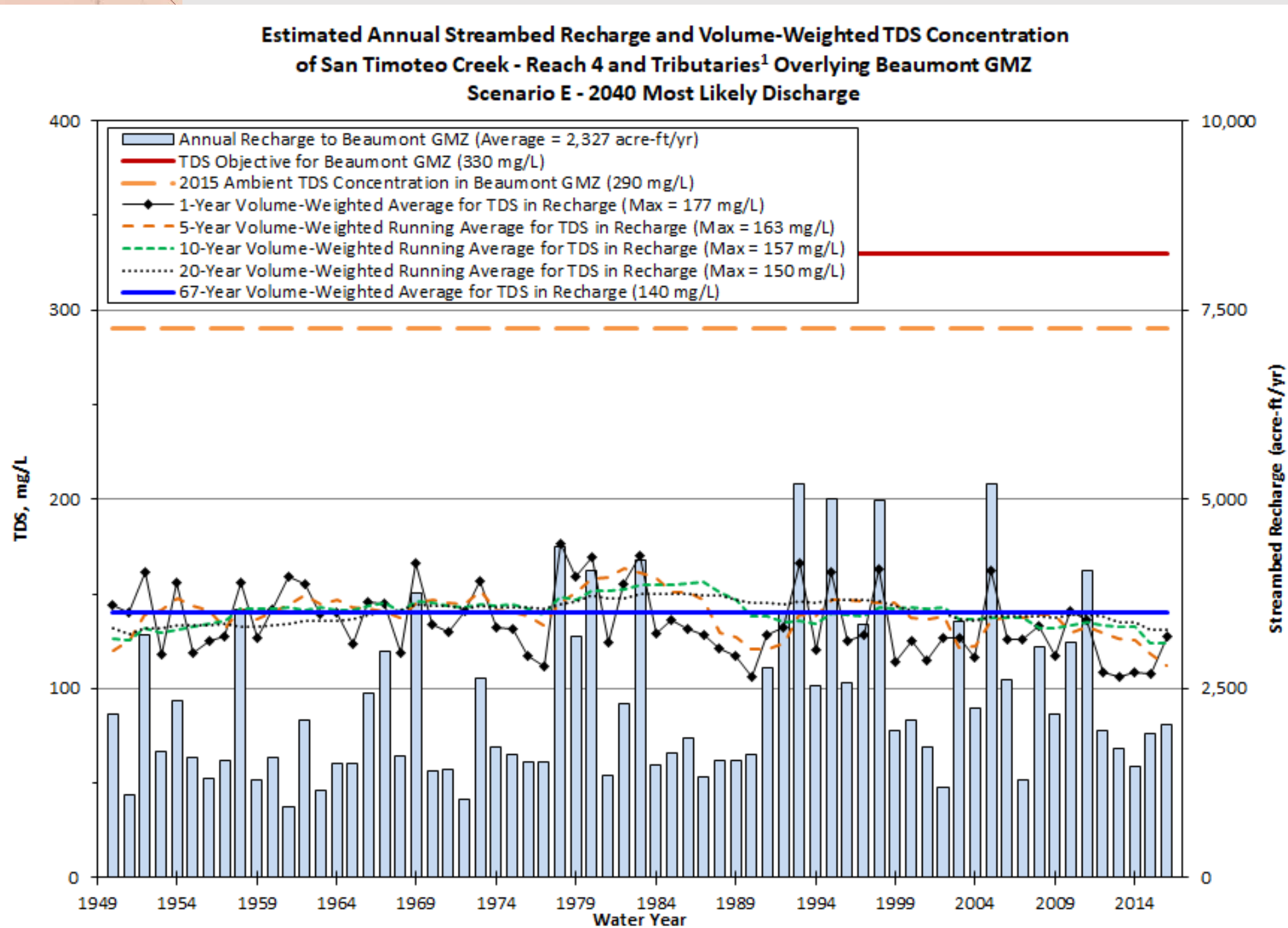
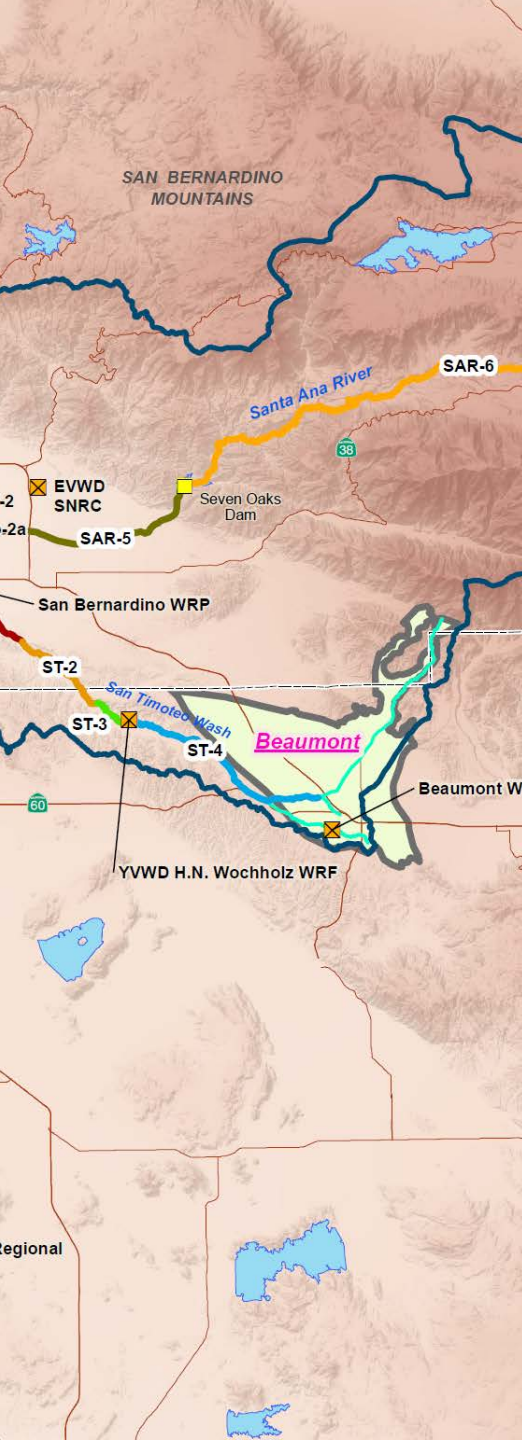
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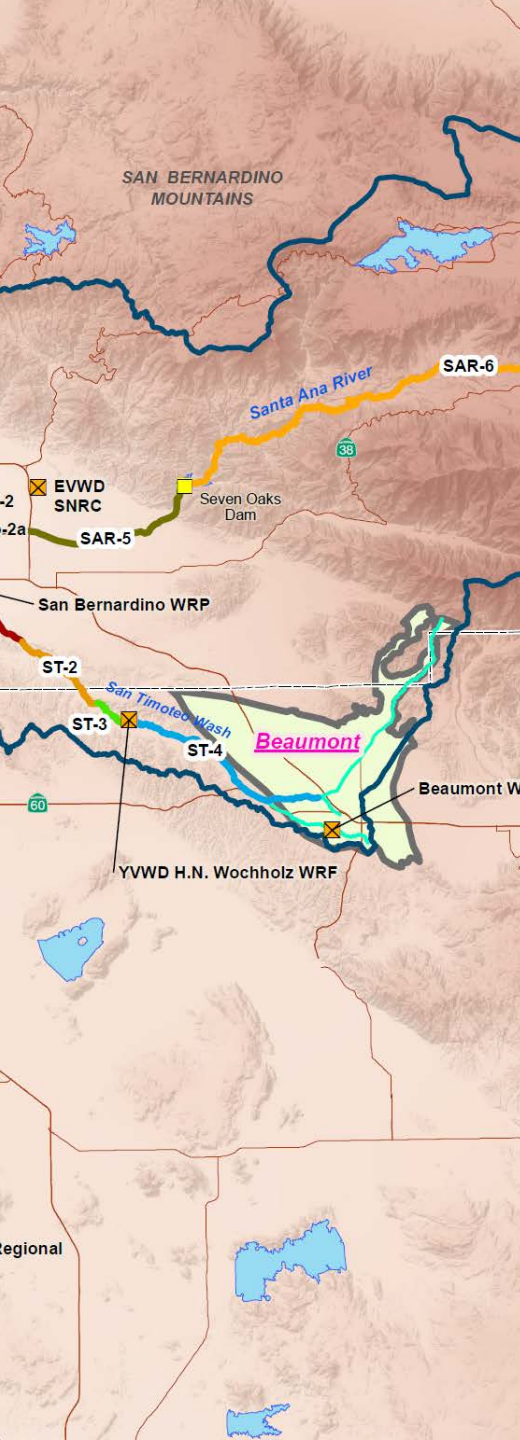


Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 4 and Tributaries¹ Overlying Beaumont GMZ Scenario D - 2040 Maximum Expected Discharge

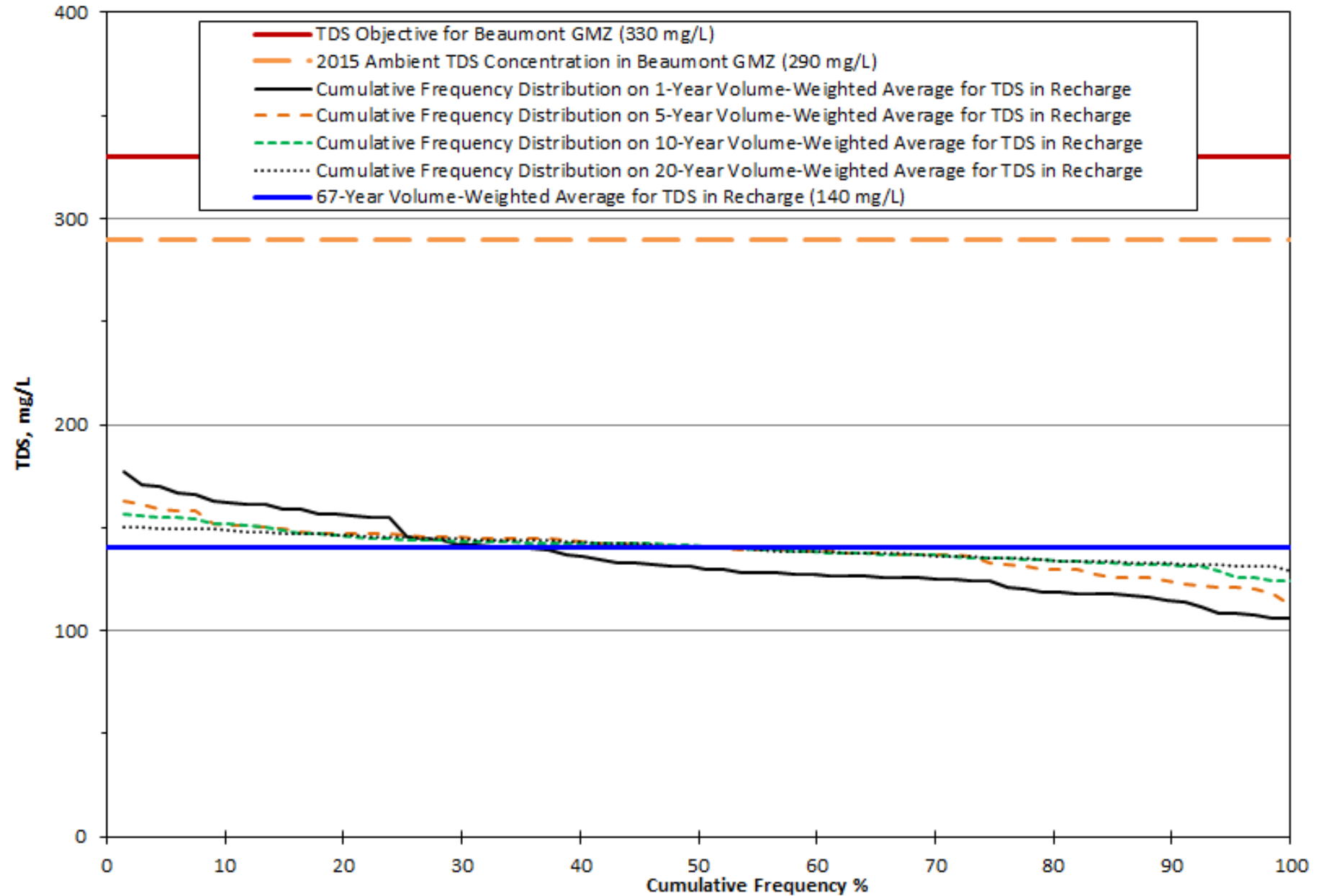


¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek

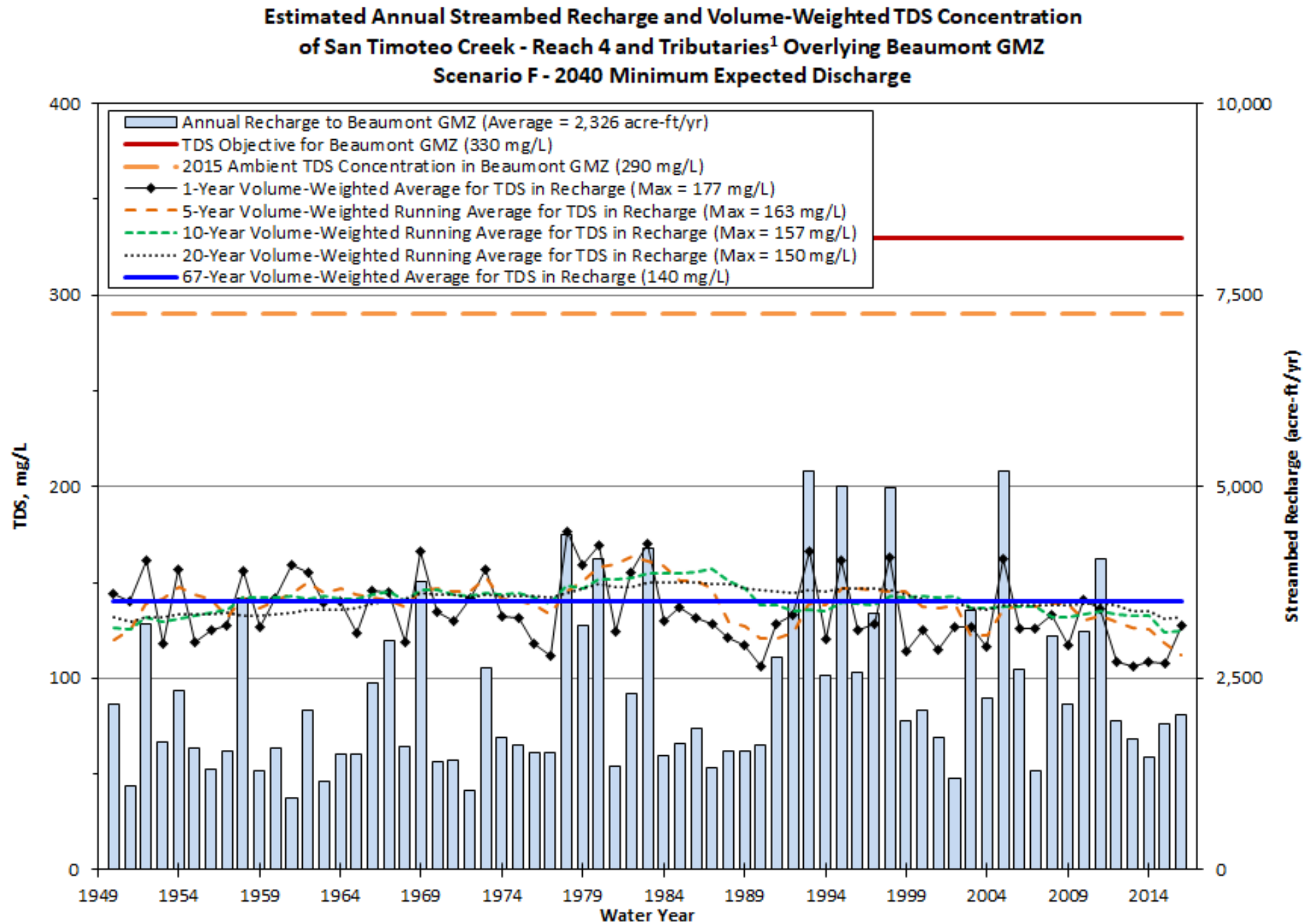
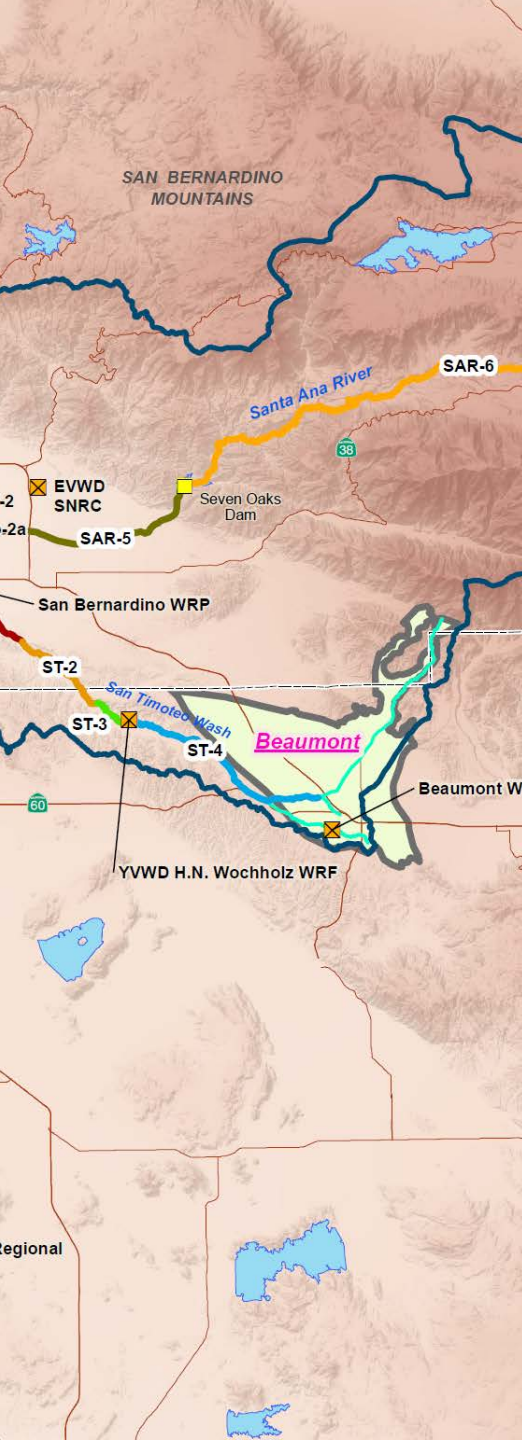




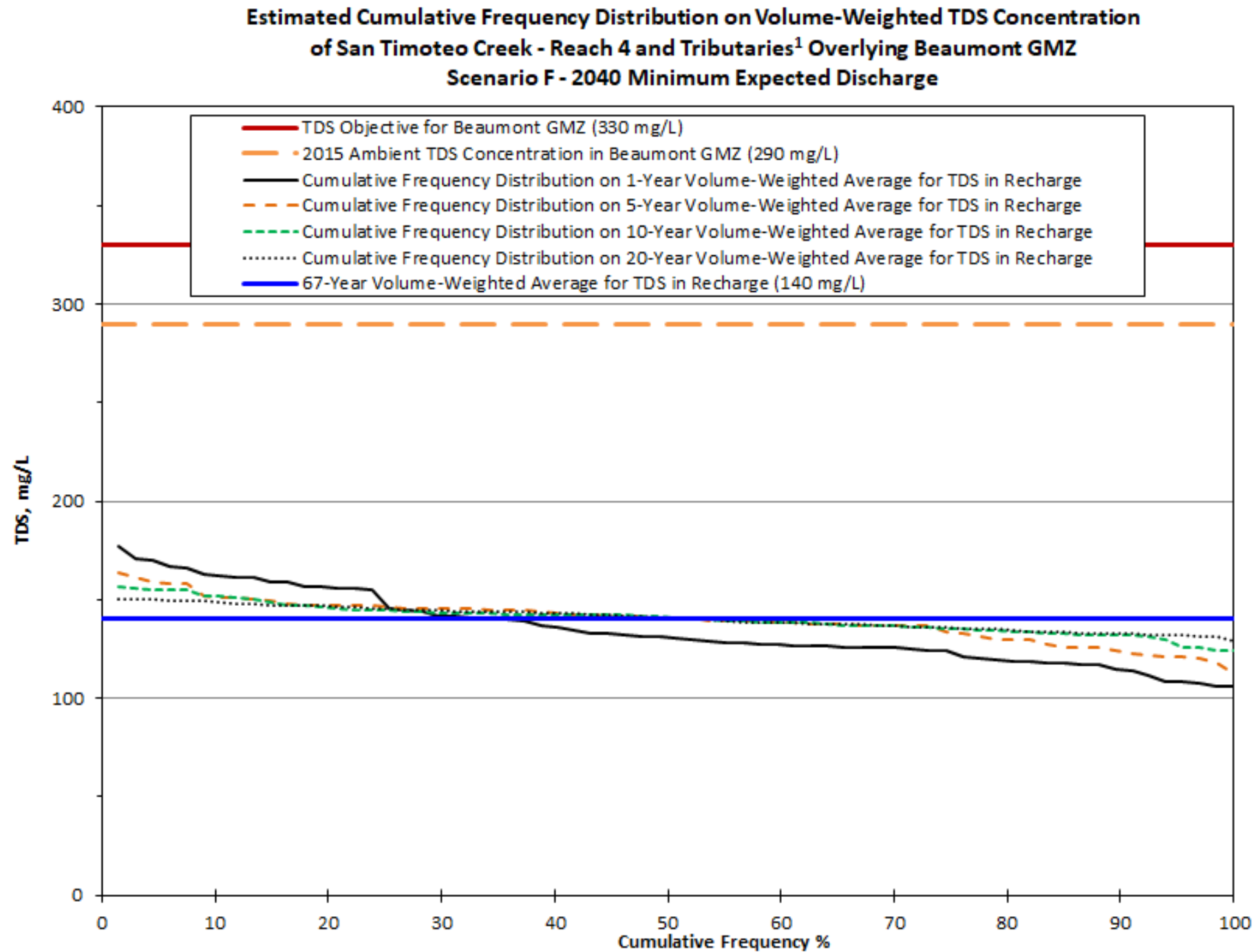
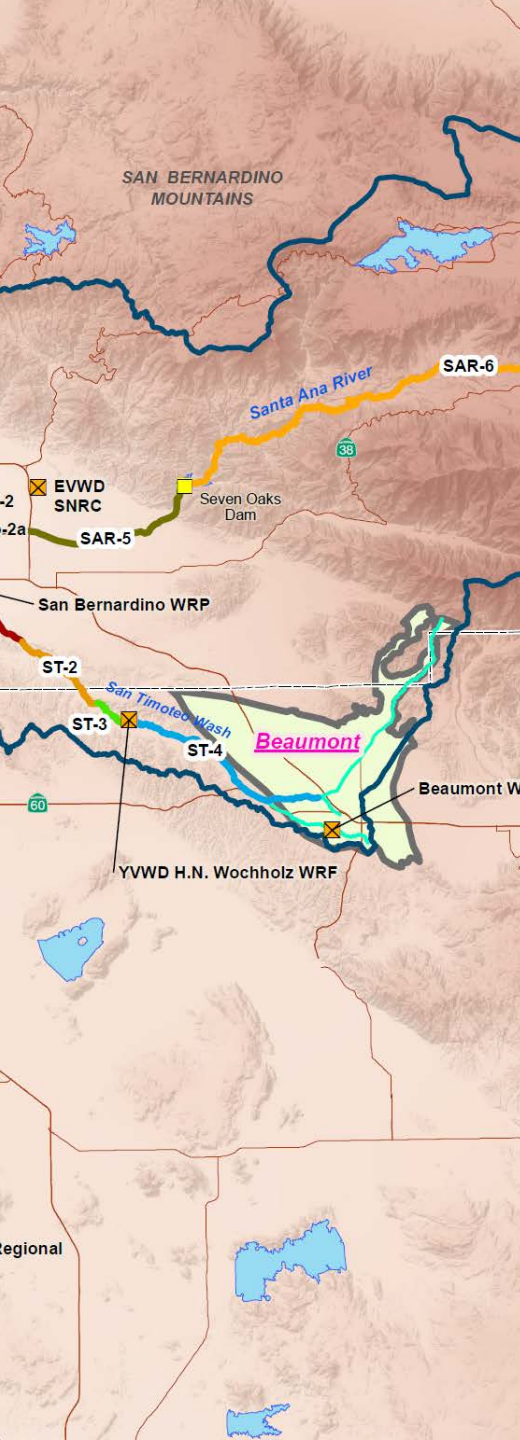
Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 4 and Tributaries¹ Overlying Beaumont GMZ Scenario E - 2040 Most Likely Discharge



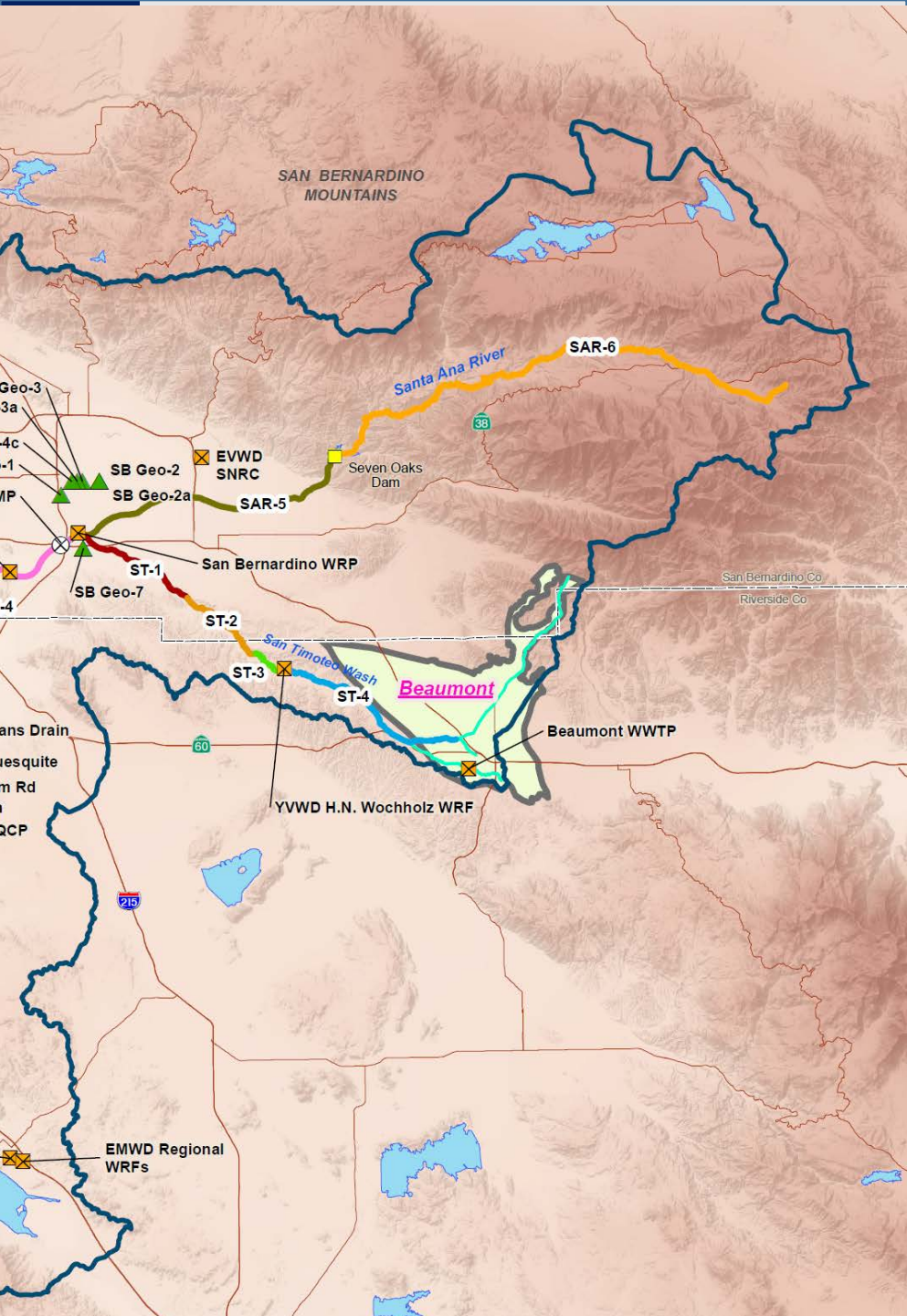
¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007: Cooper's Creek



¹Noble Creek; unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek



¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek



San Timoteo Creek – Reach 4 Overlying Beaumont GMZ

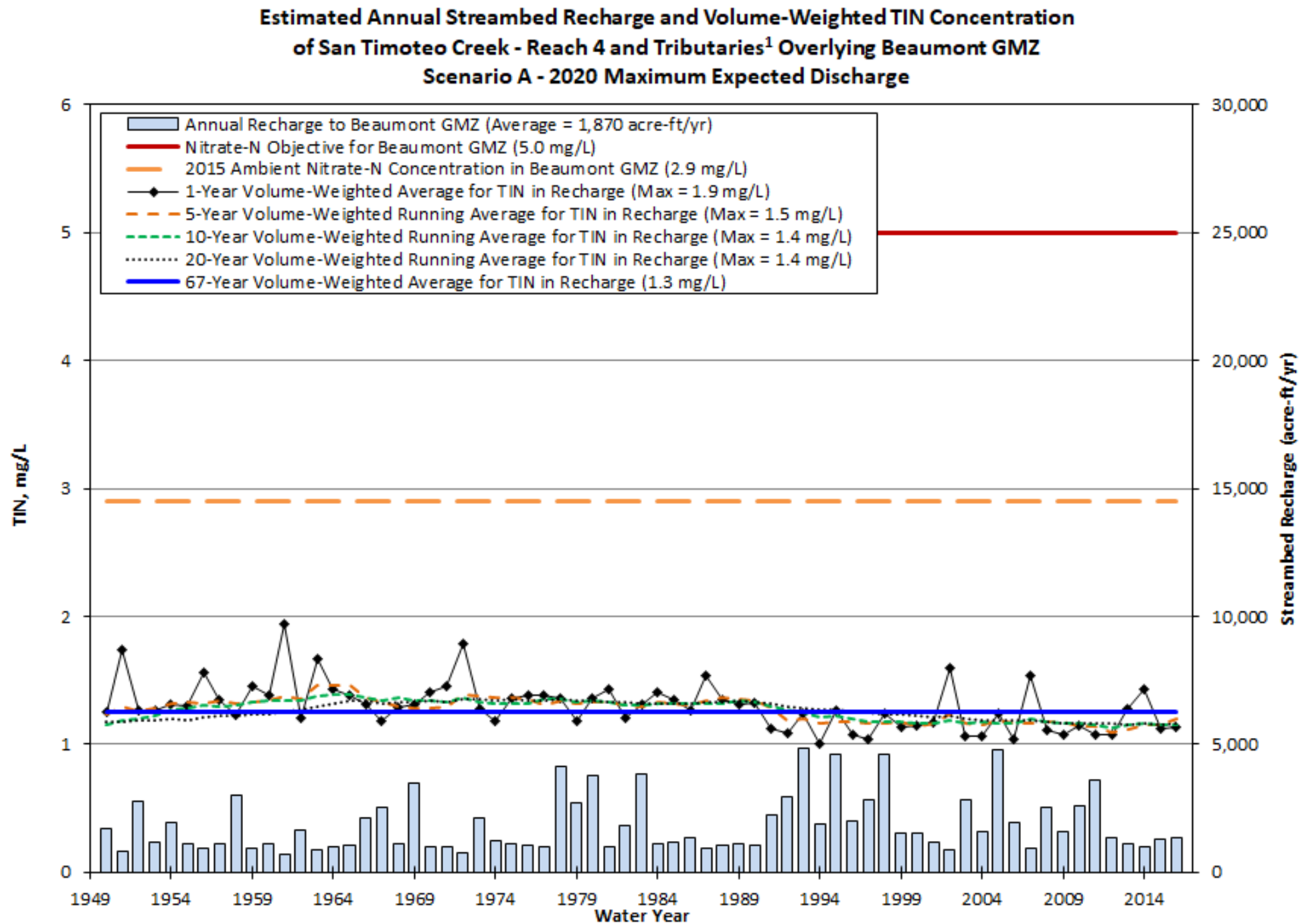
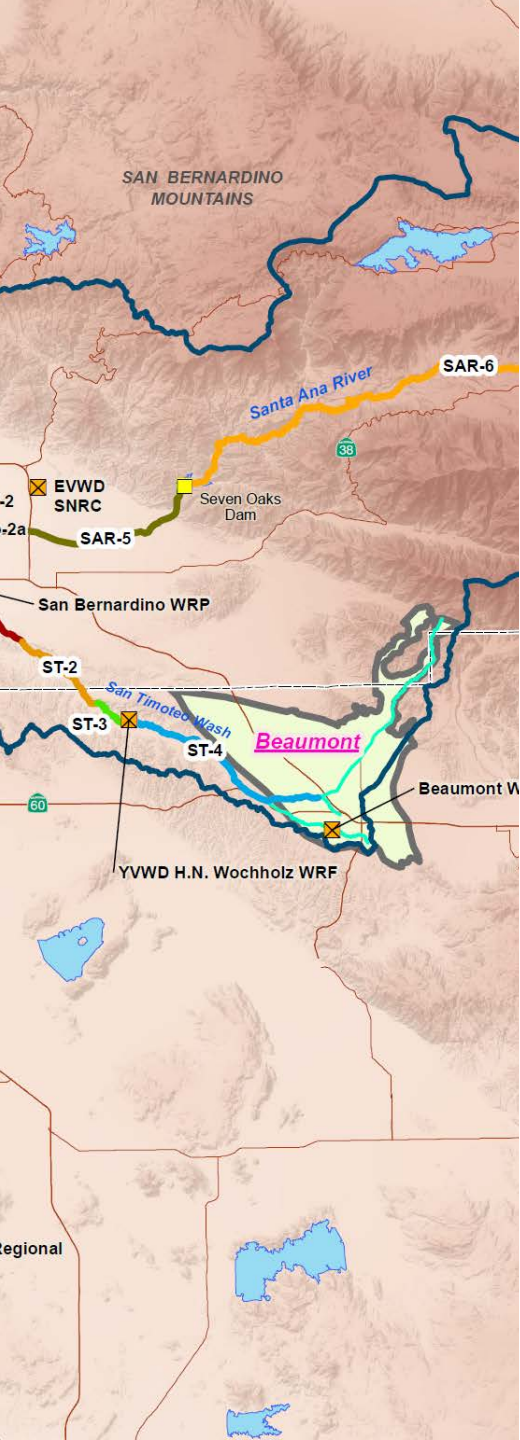
Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

Original Calculation

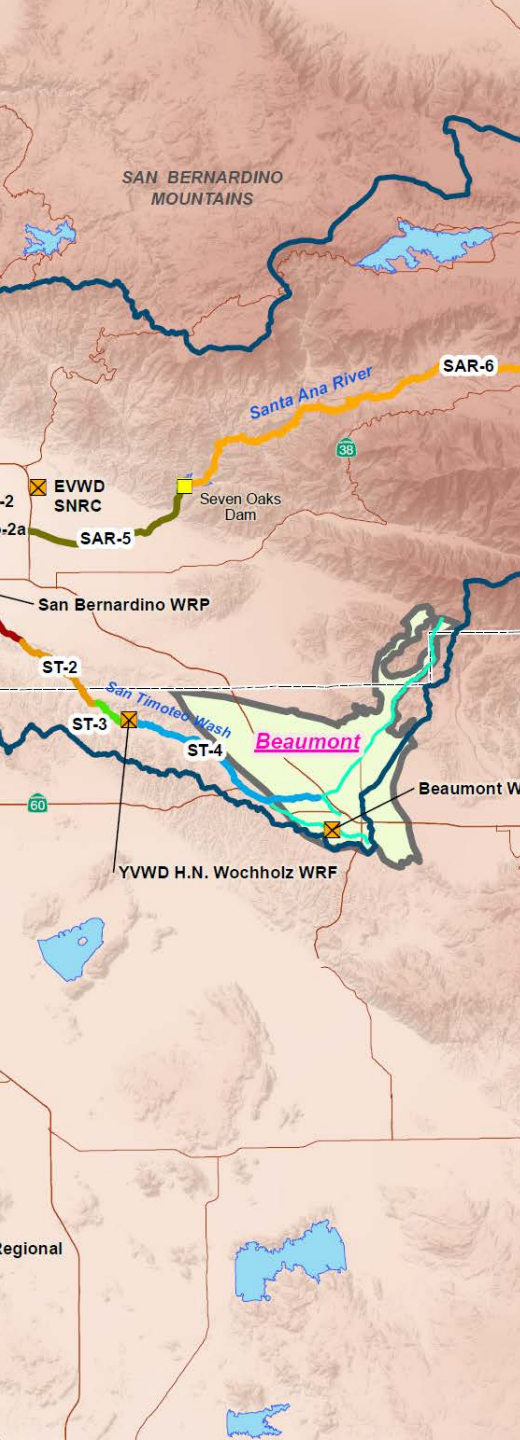
	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TDS	330/230	290	40	1-year	228	230	233	203	203	204
				5-year	196	198	200	175	176	176
				10-year	187	189	190	167	167	168
				20-year	185	186	187	166	166	166

Revised Calculation

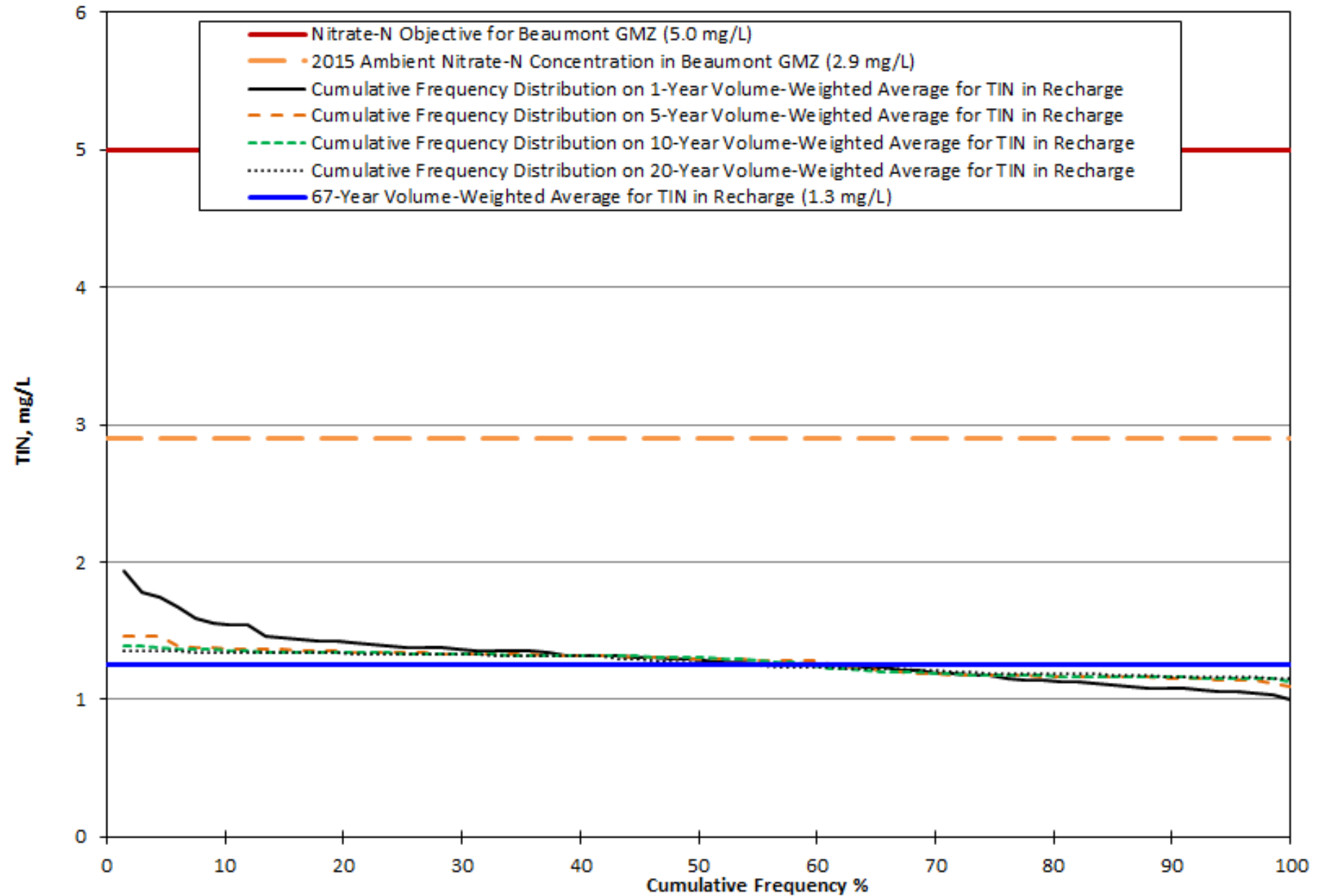
TDS	330/230	290	40	1-year	202	204	206	177	177	177
				5-year	176	177	177	163	163	163
				10-year	172	172	173	157	157	157
				20-year	167	168	169	150	150	150



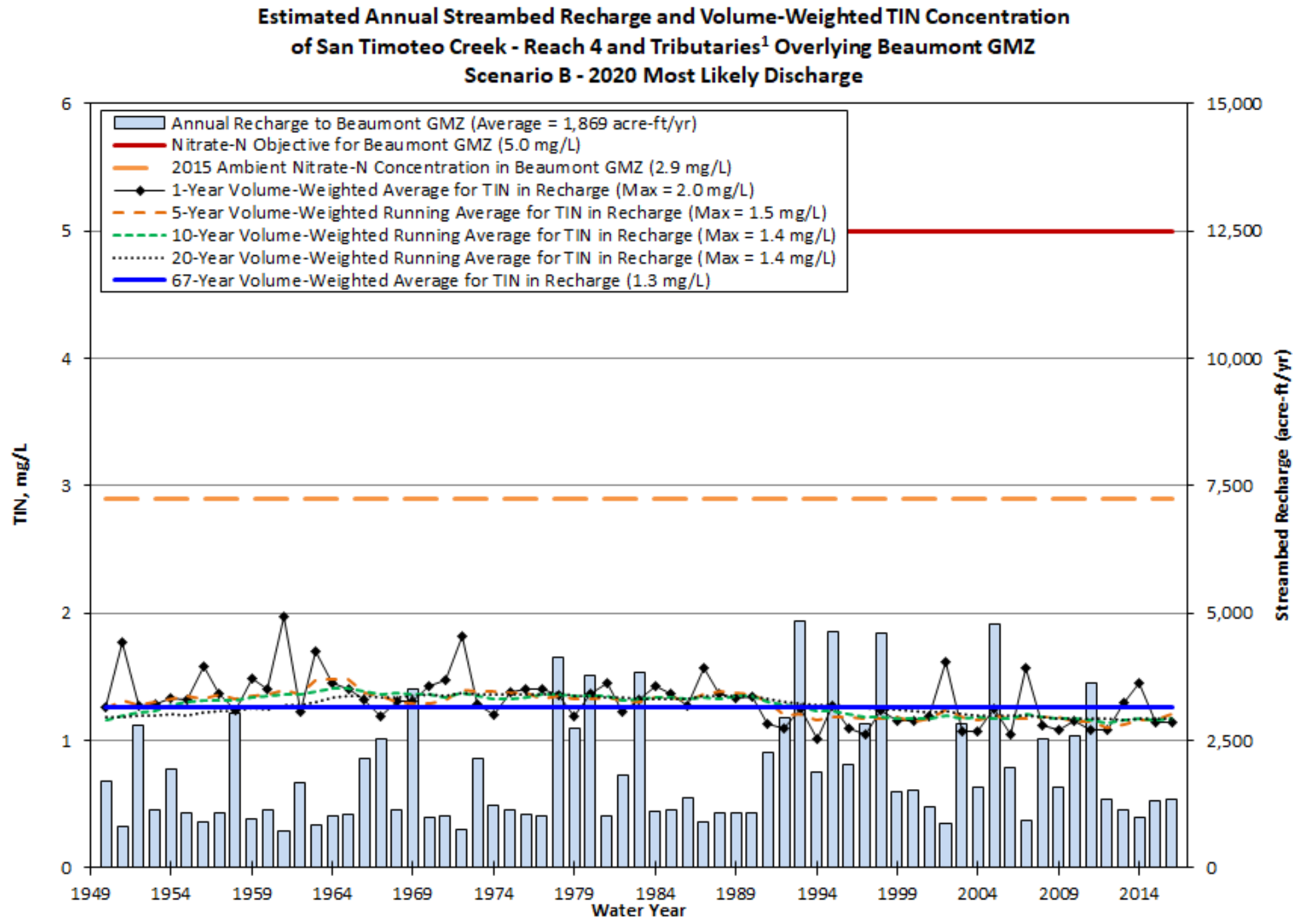
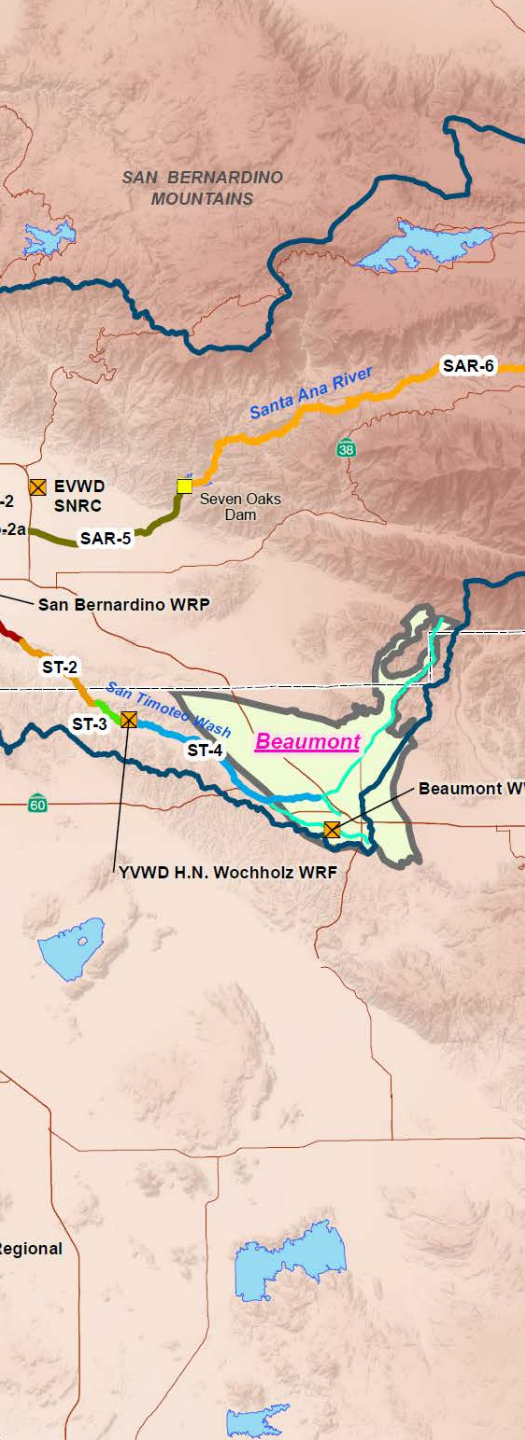
¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007: Cooper's Creek



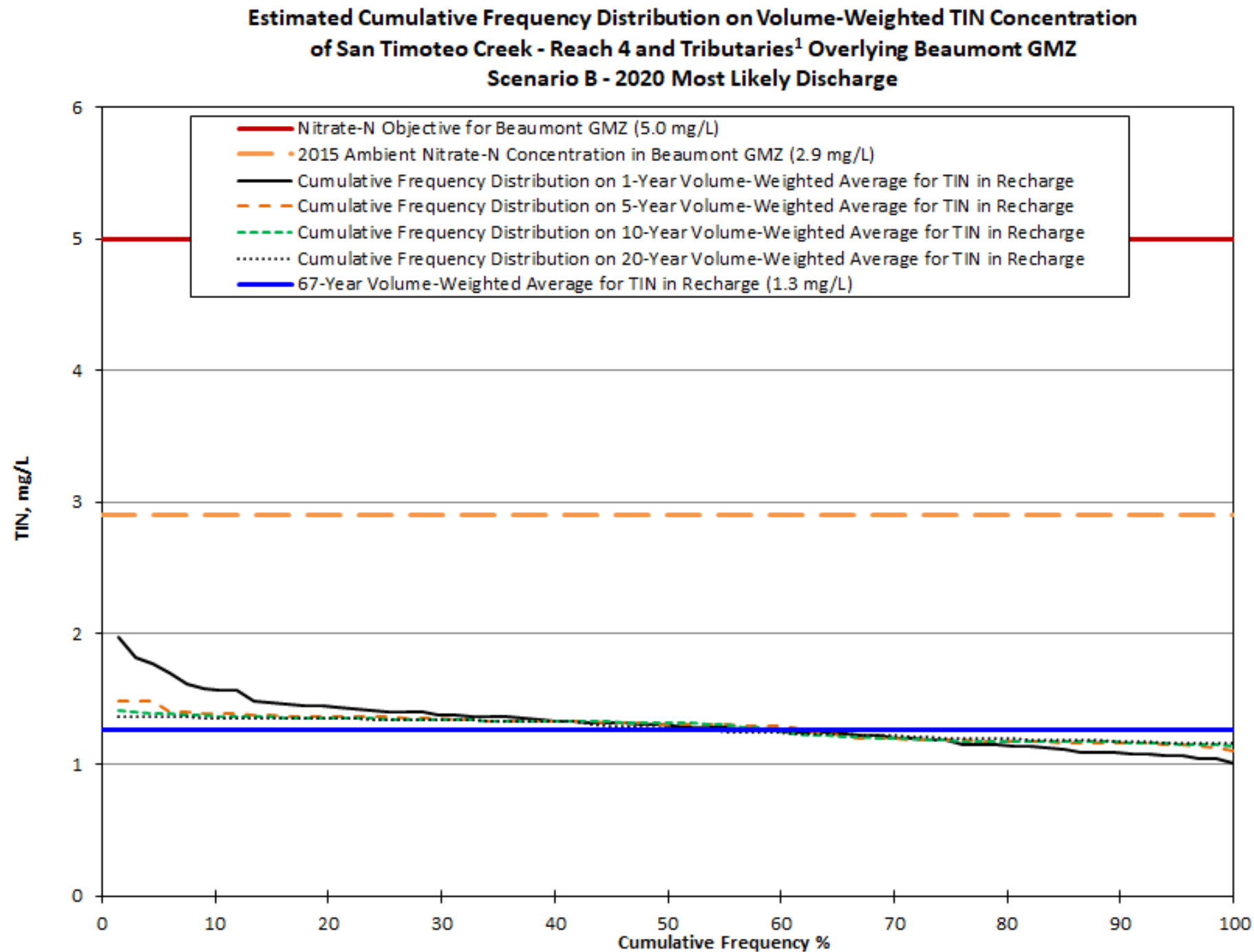
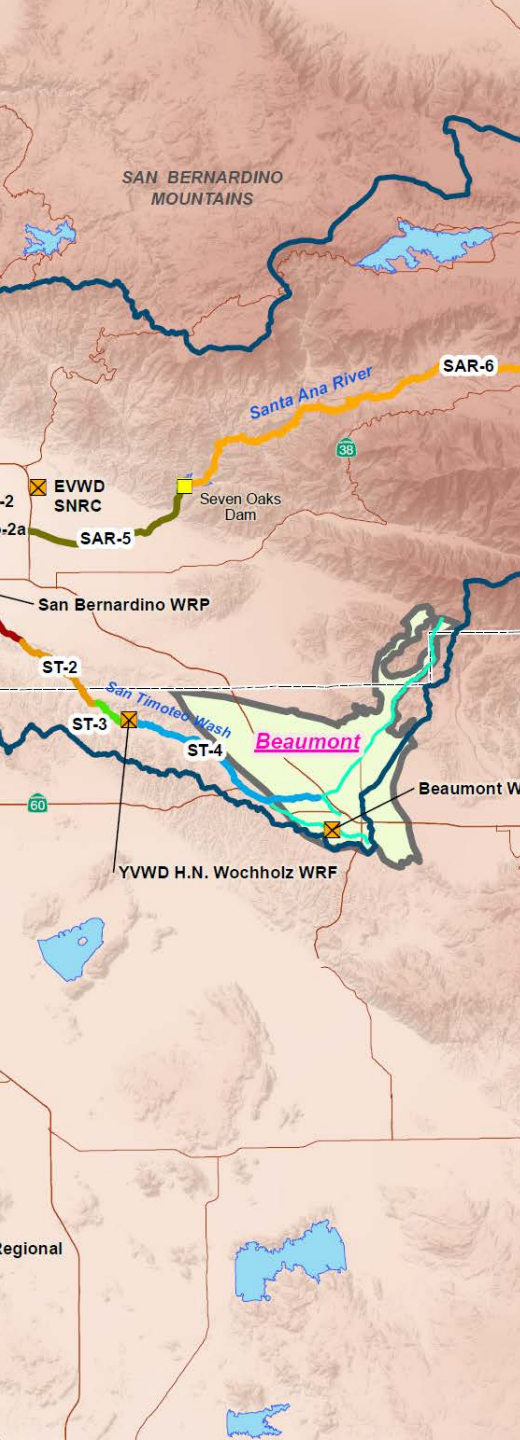
Estimated Cumulative Frequency Distribution on Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 4 and Tributaries¹ Overlying Beaumont GMZ Scenario A - 2020 Maximum Expected Discharge



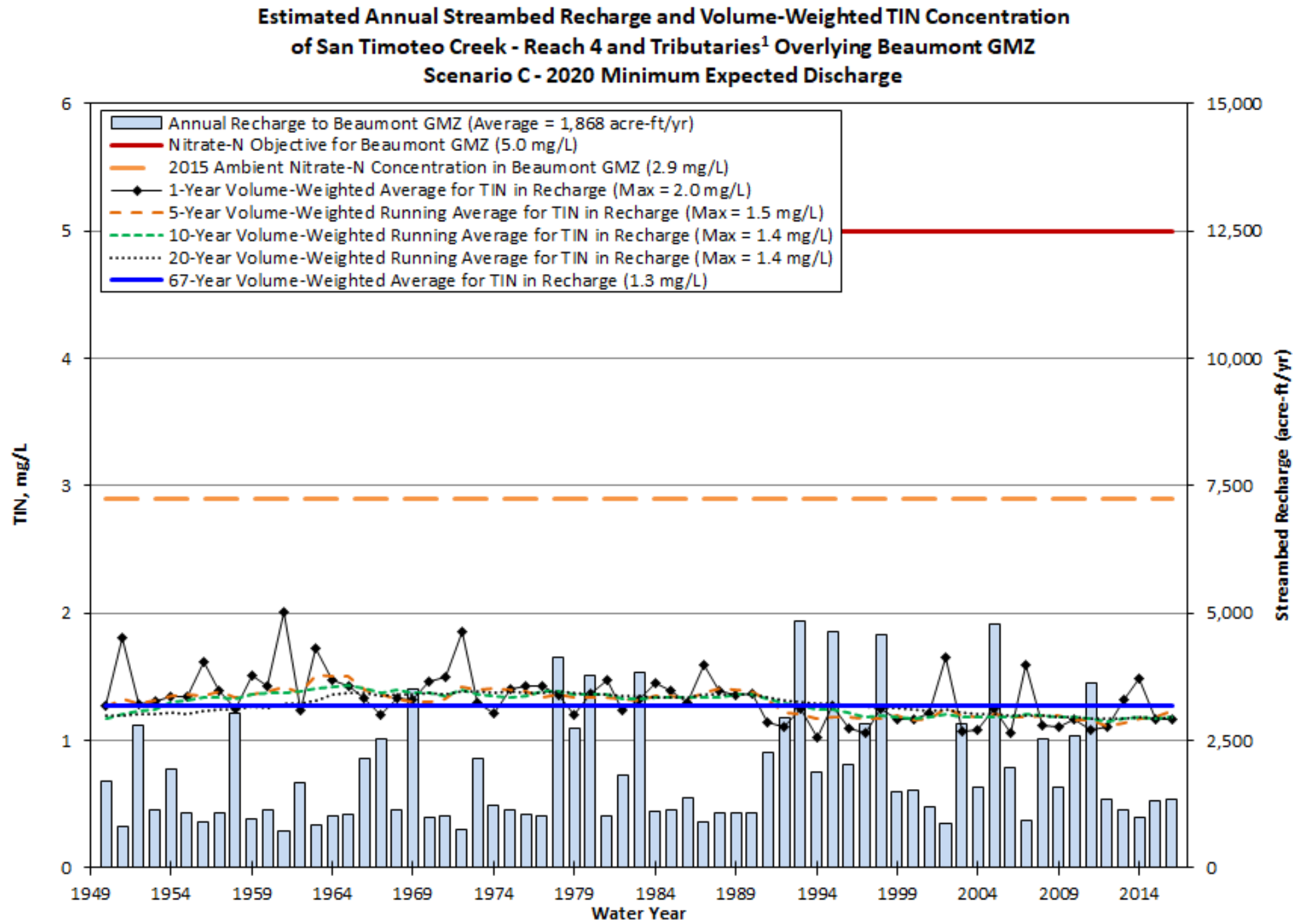
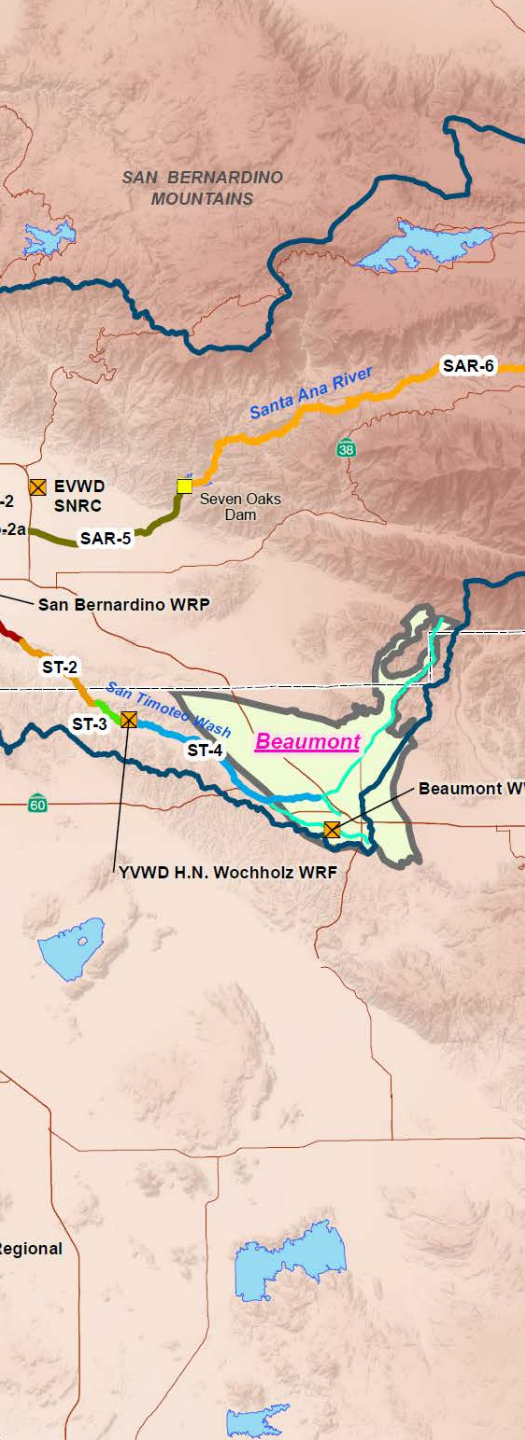
¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek



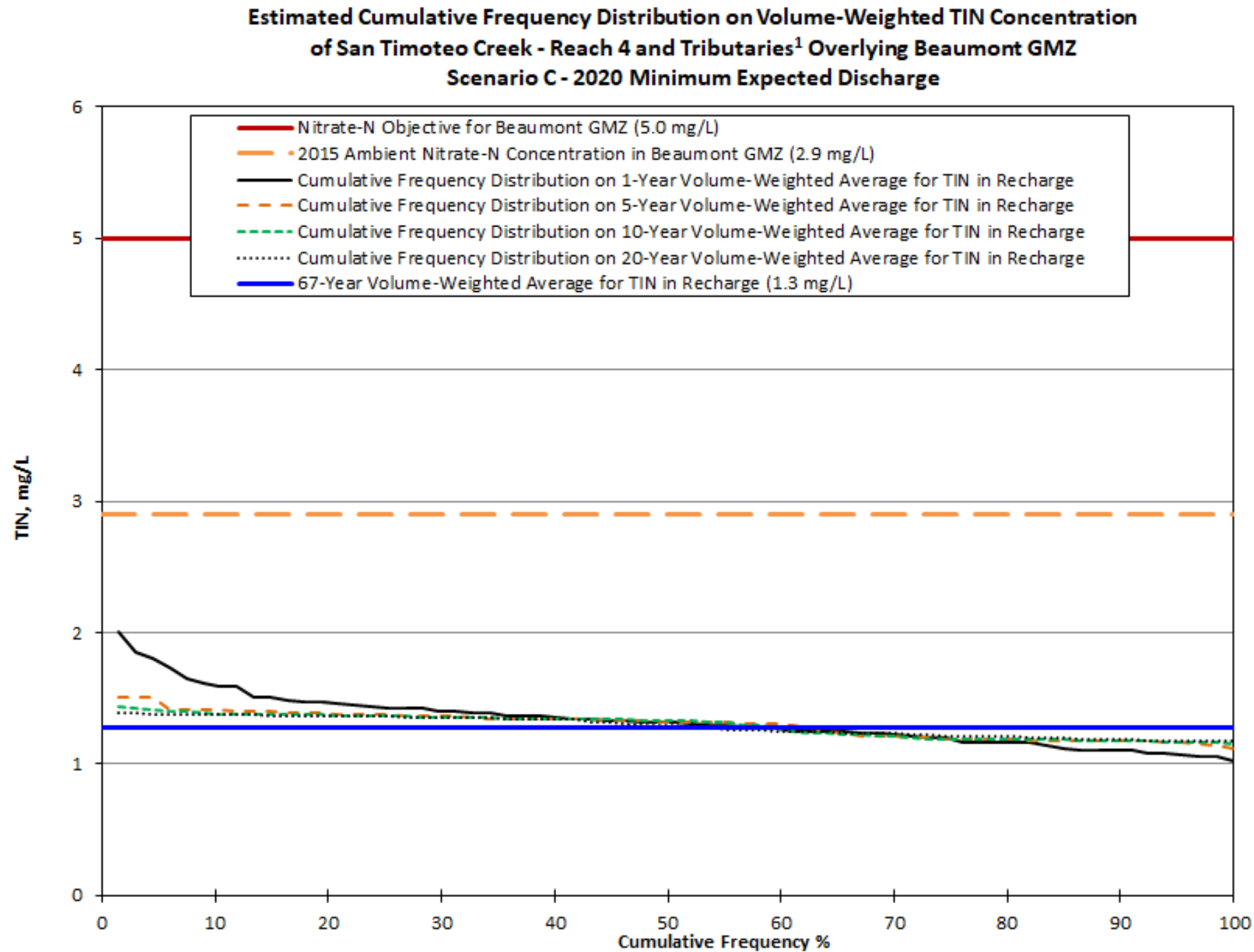
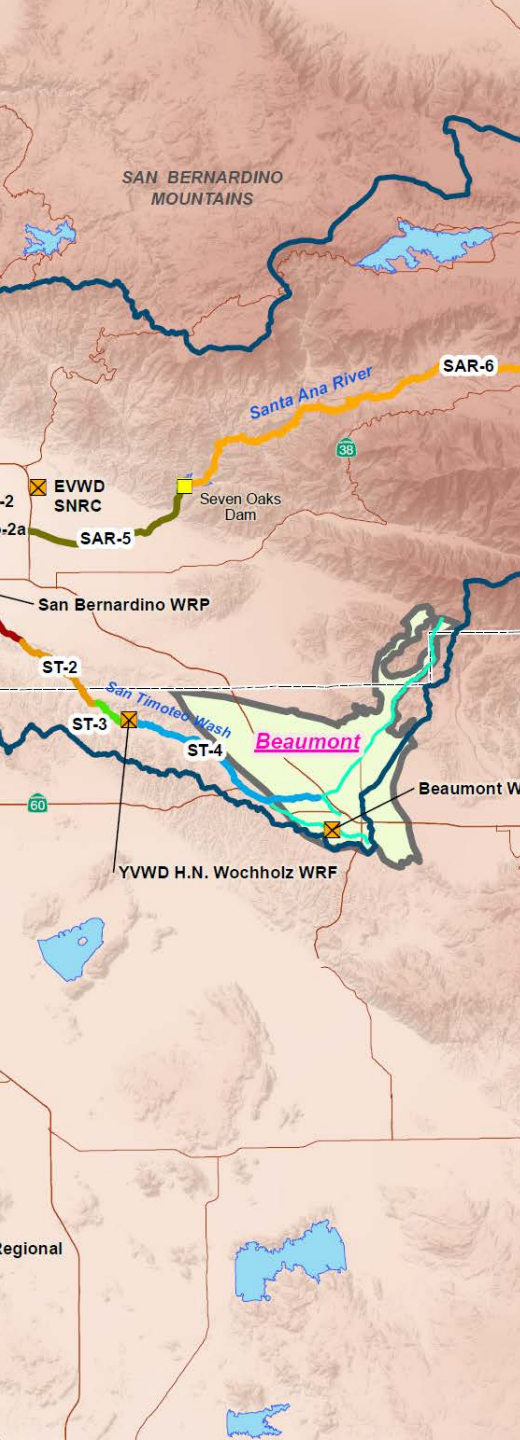
¹Noble Creek; unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek

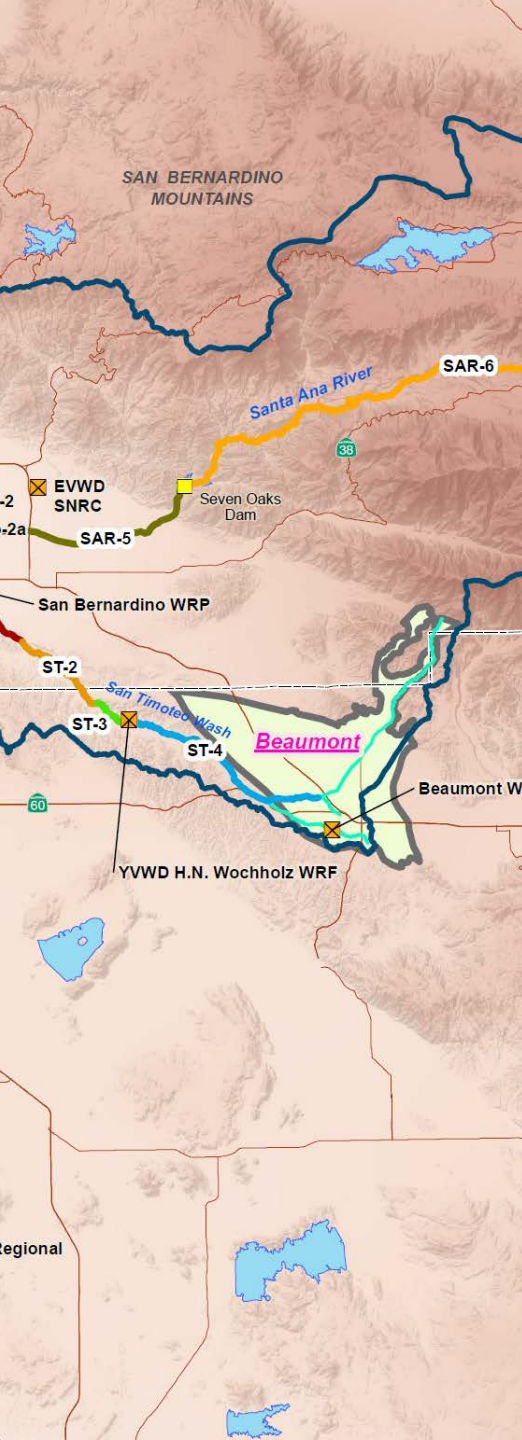


¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek

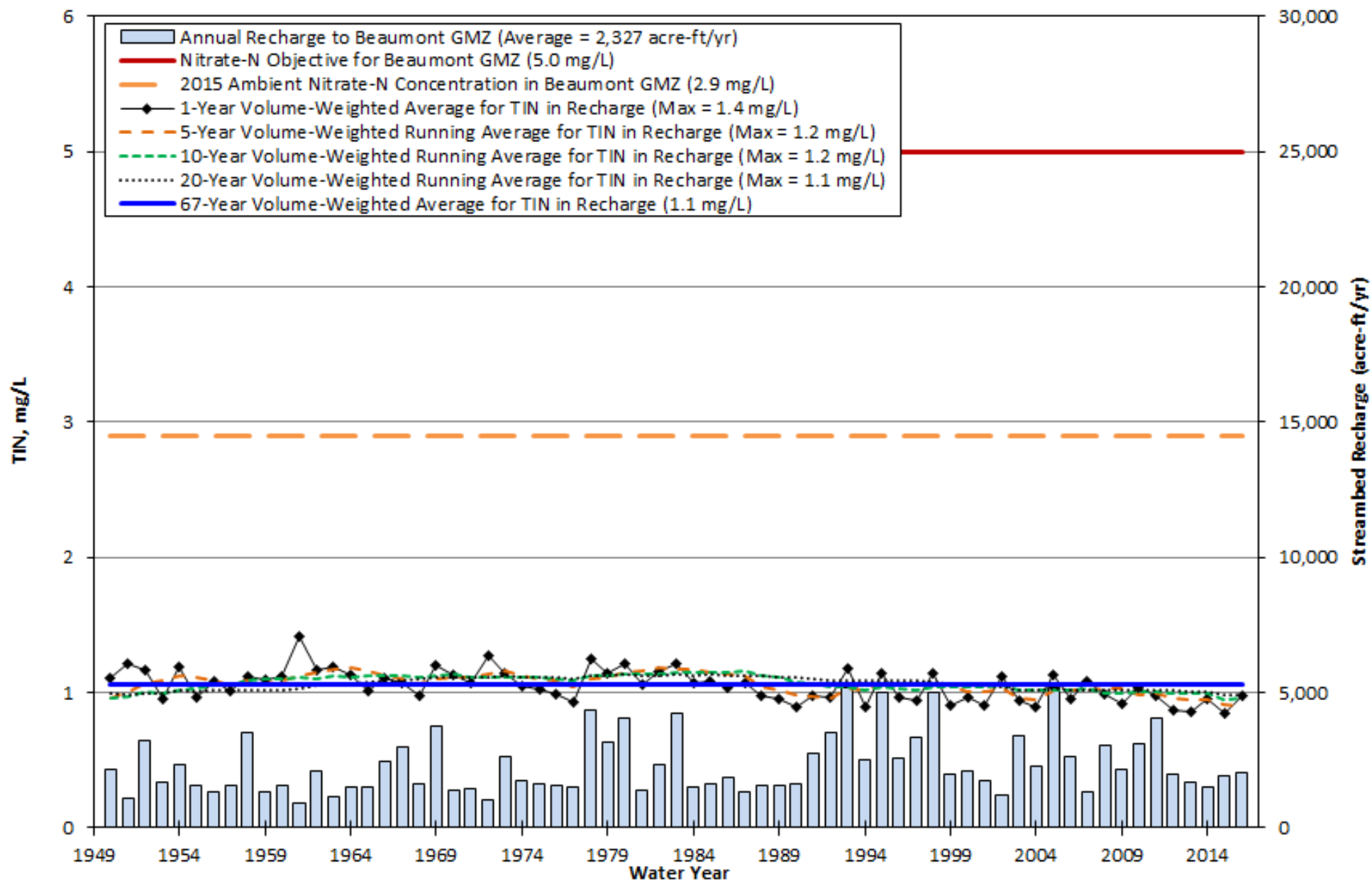


¹Noble Creek; unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek

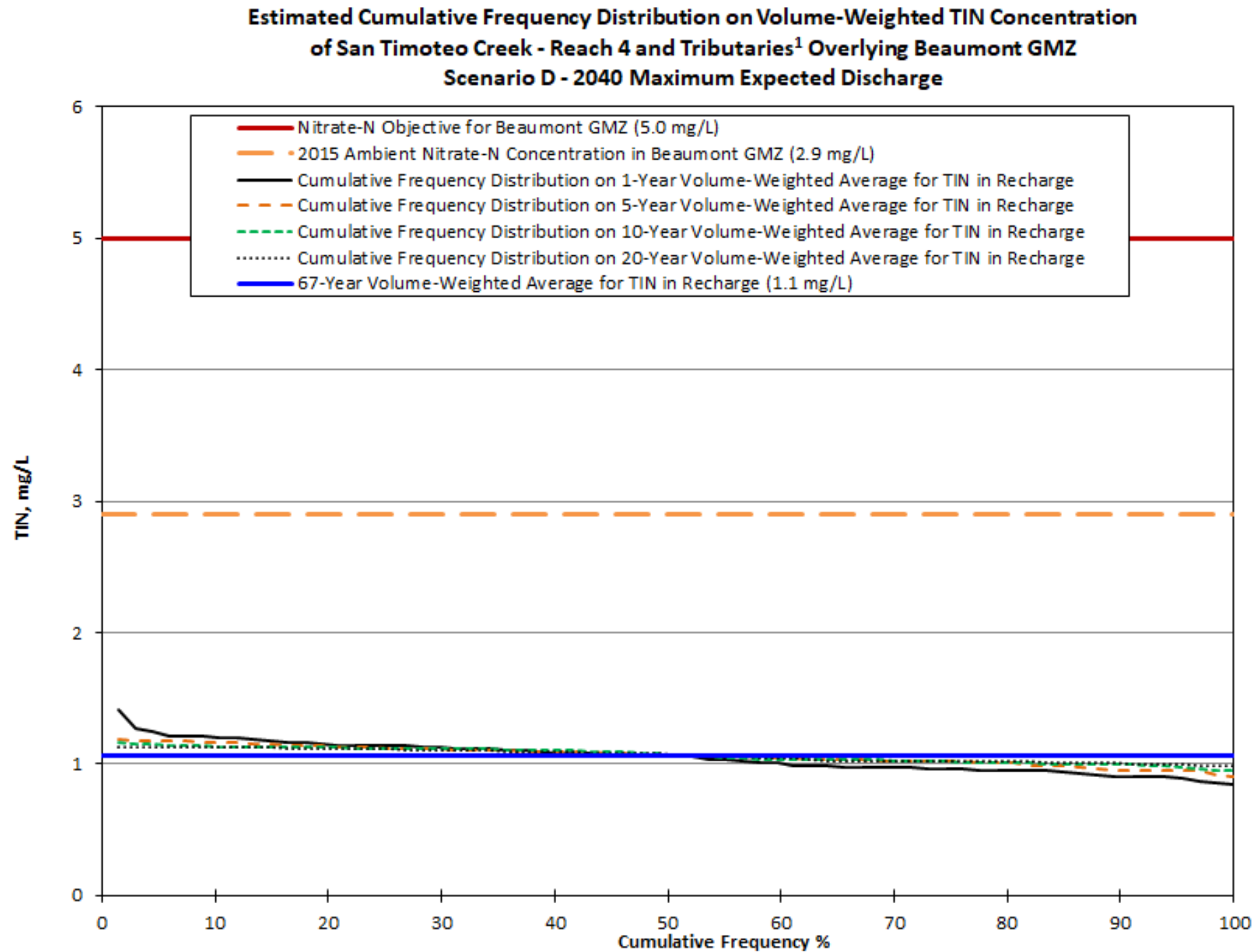
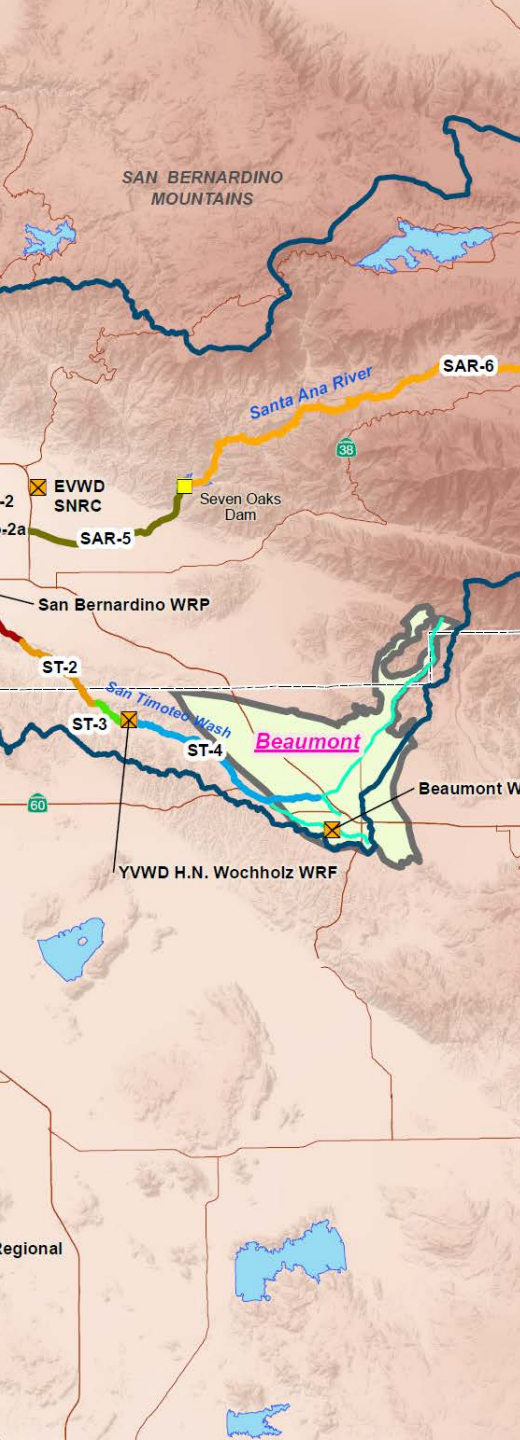


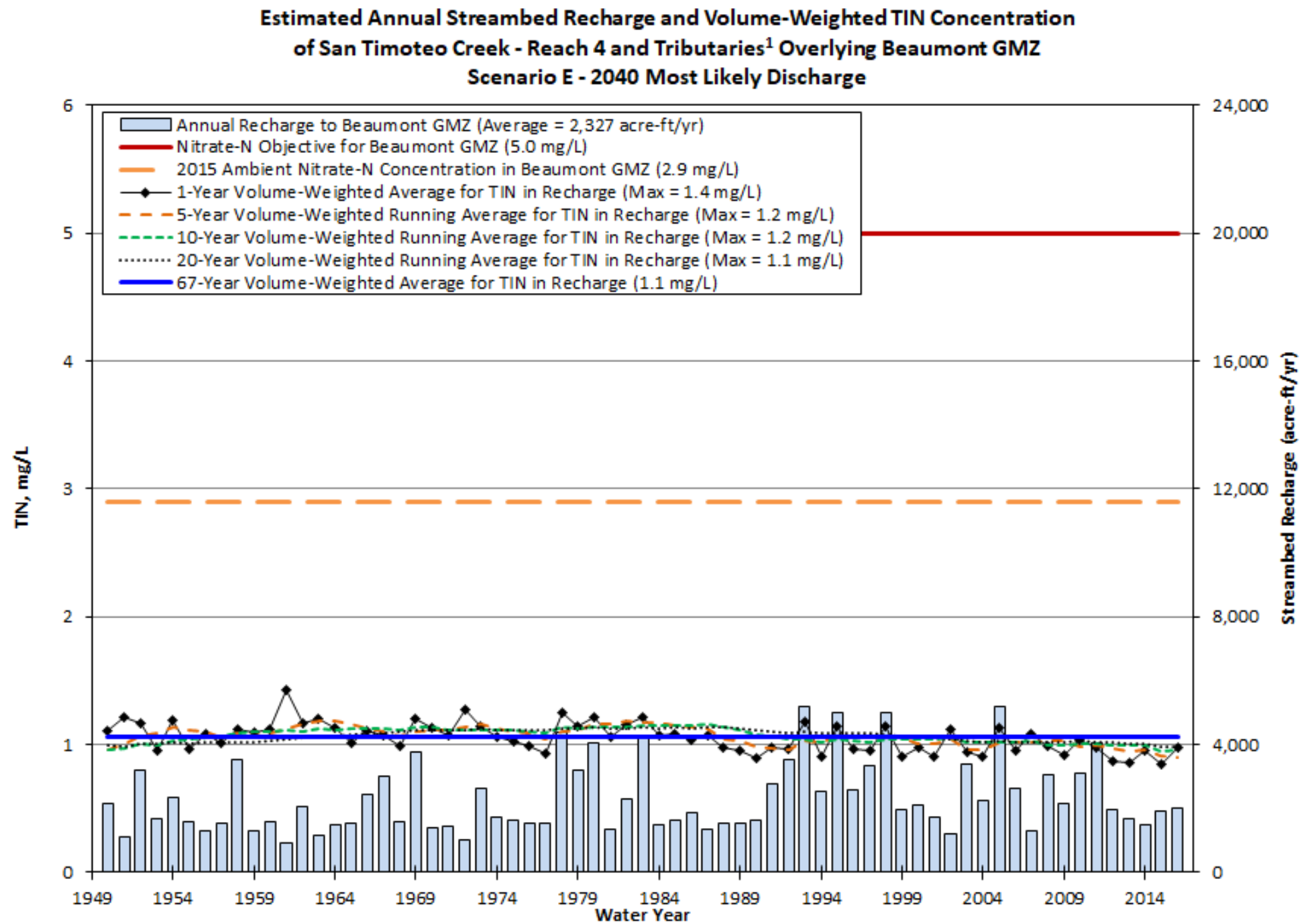
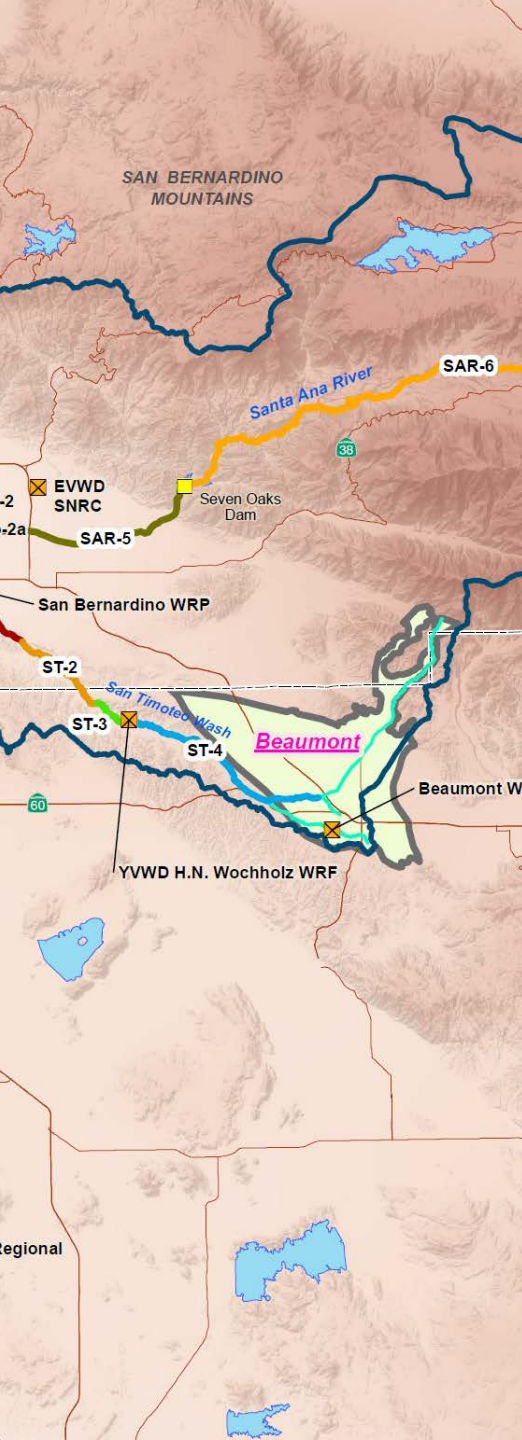


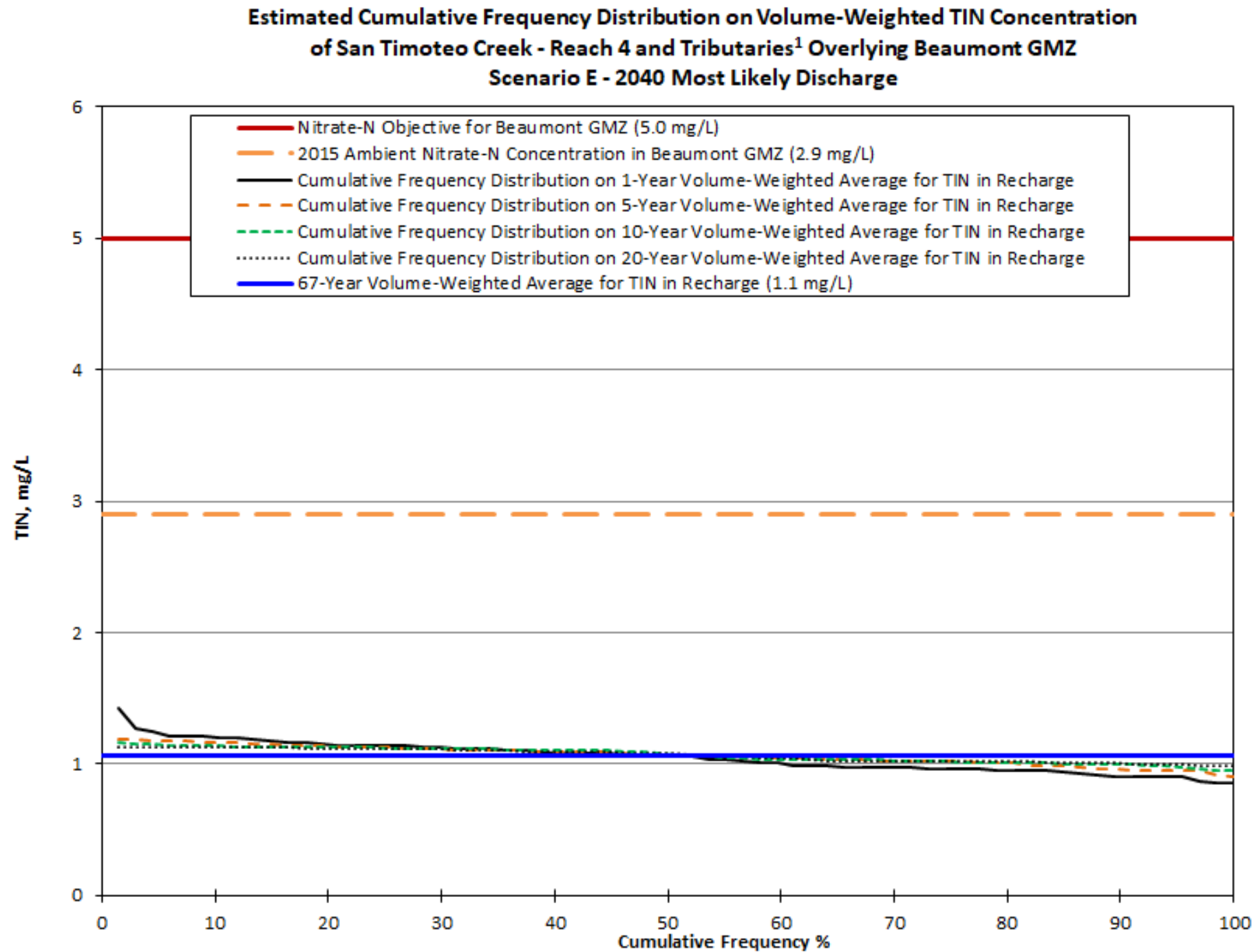
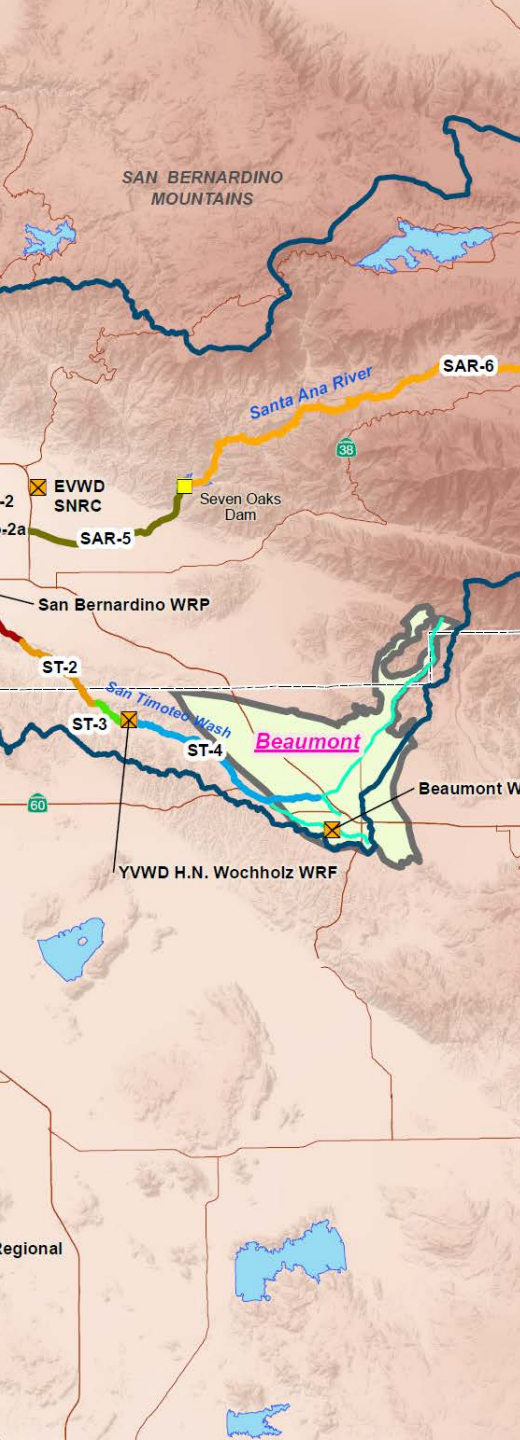
Estimated Annual Streambed Recharge and Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 4 and Tributaries¹ Overlying Beaumont GMZ Scenario D - 2040 Maximum Expected Discharge



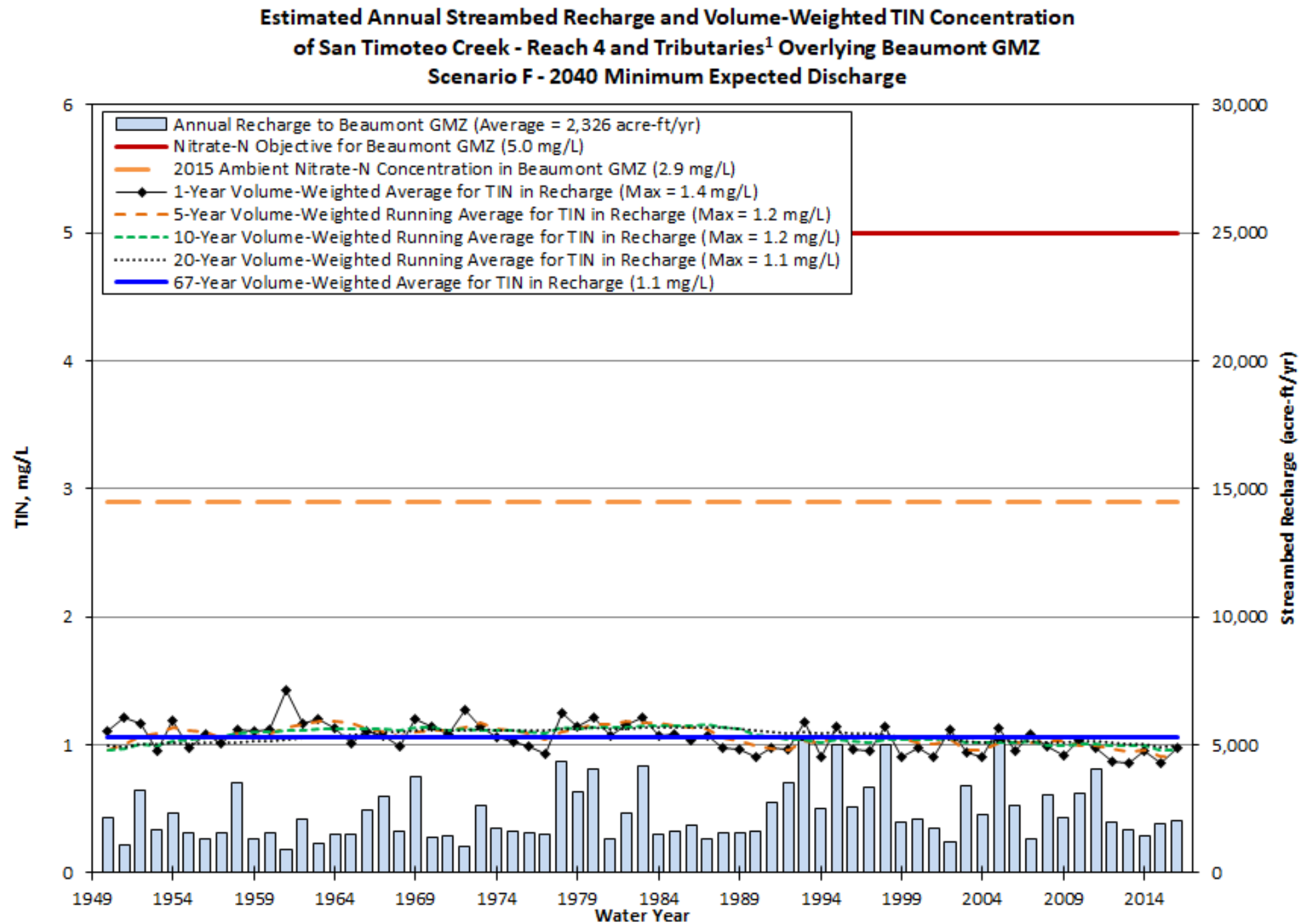
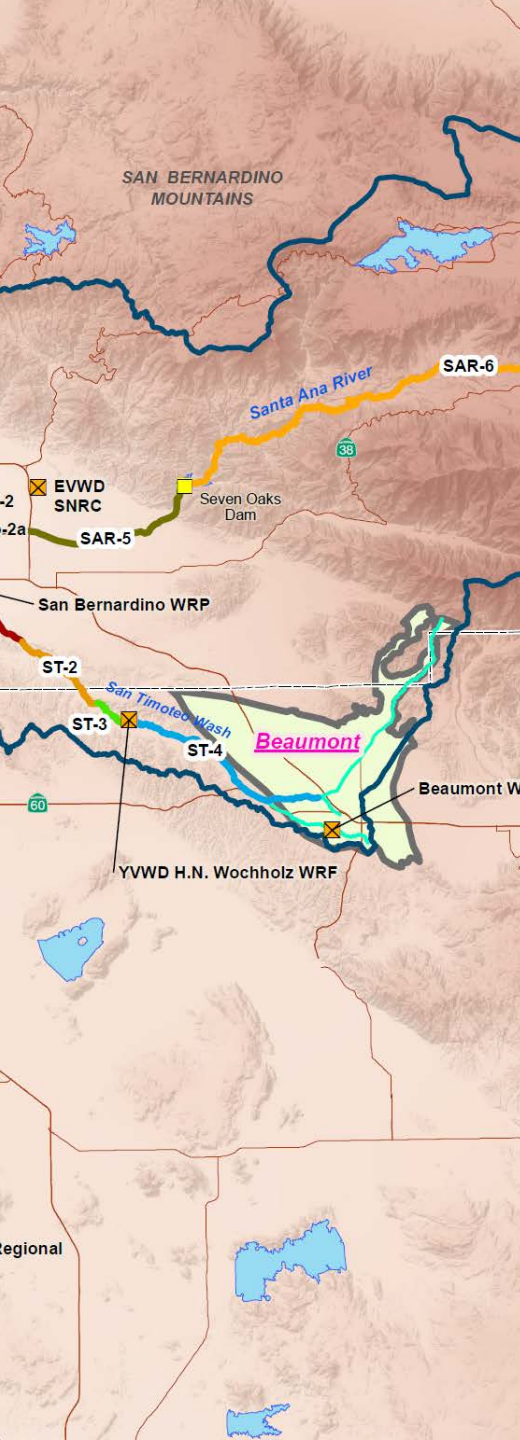
¹Noble Creek; unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek

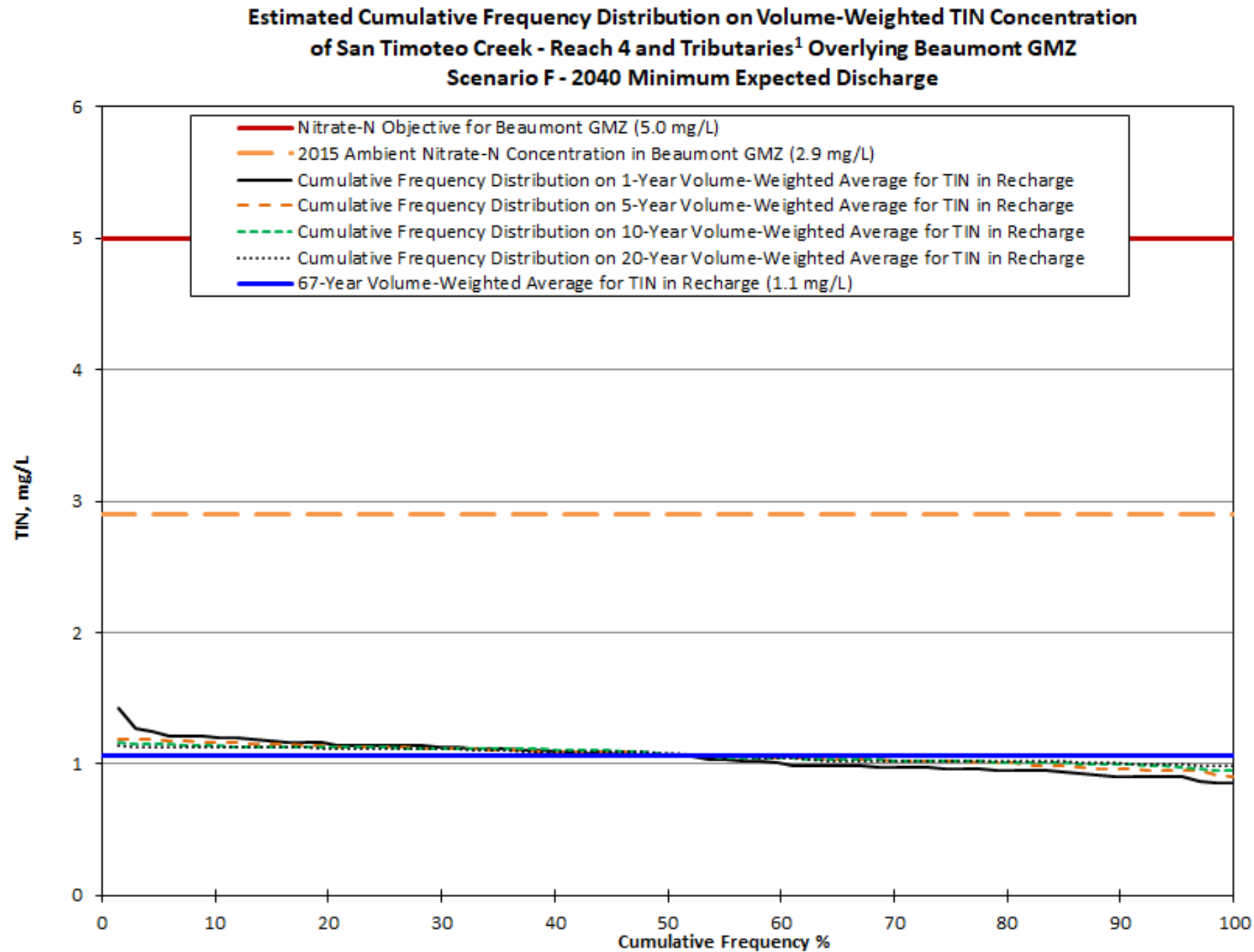
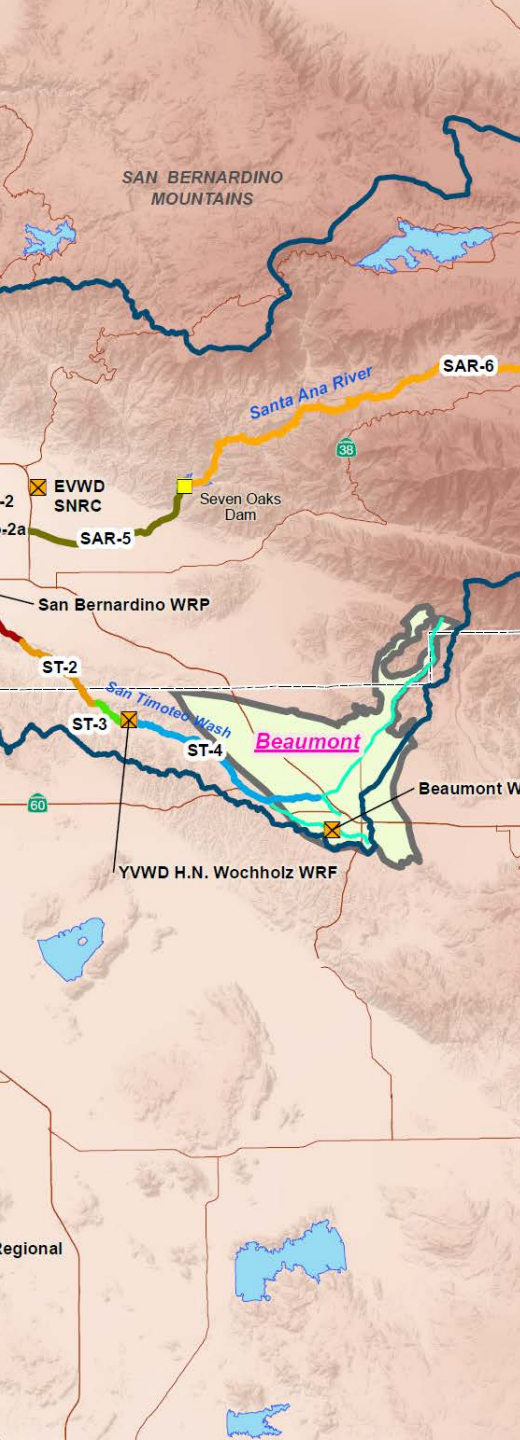




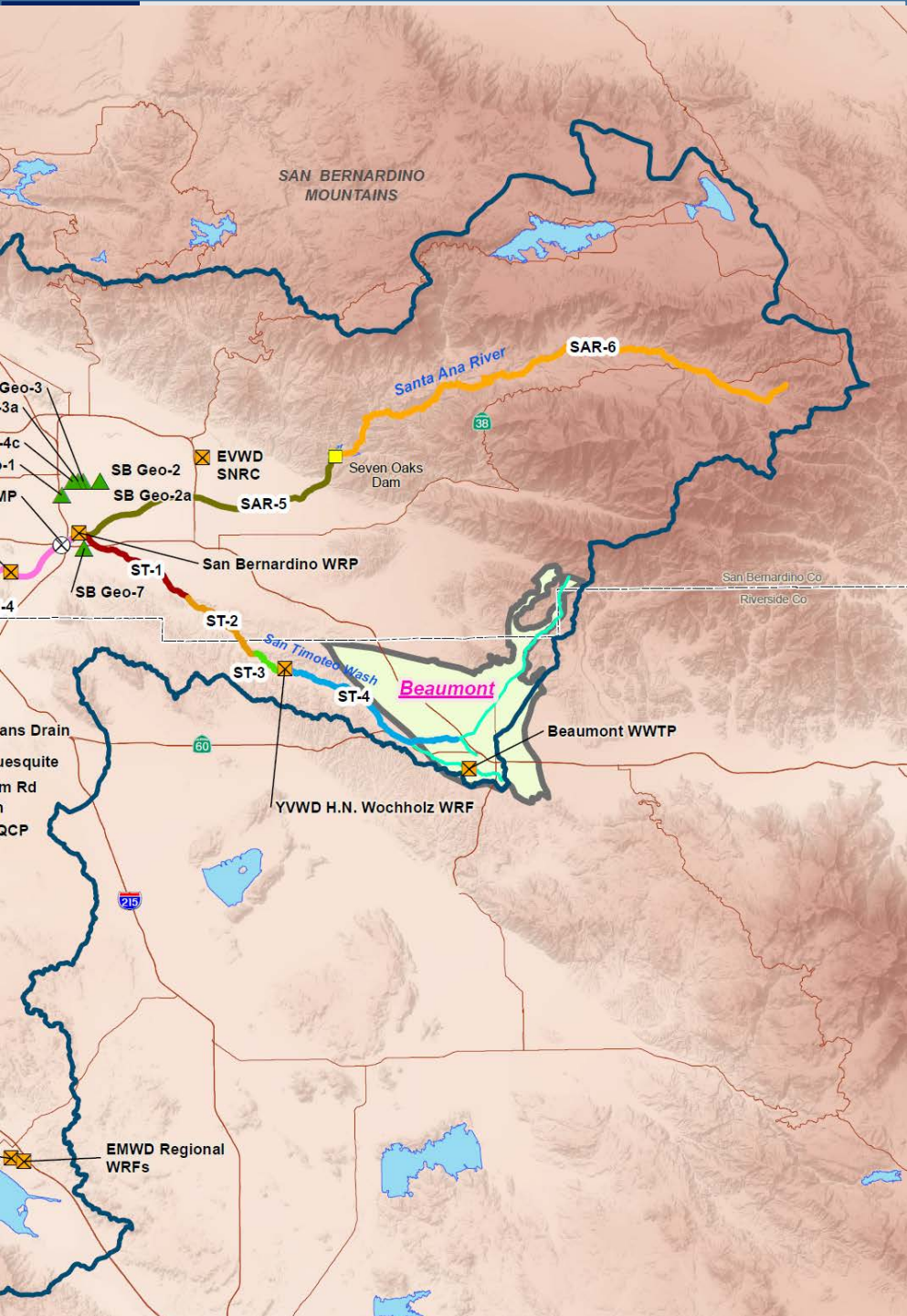


¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek





¹Noble Creek: unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek



San Timoteo Creek – Reach 4 Overlying Beaumont GMZ

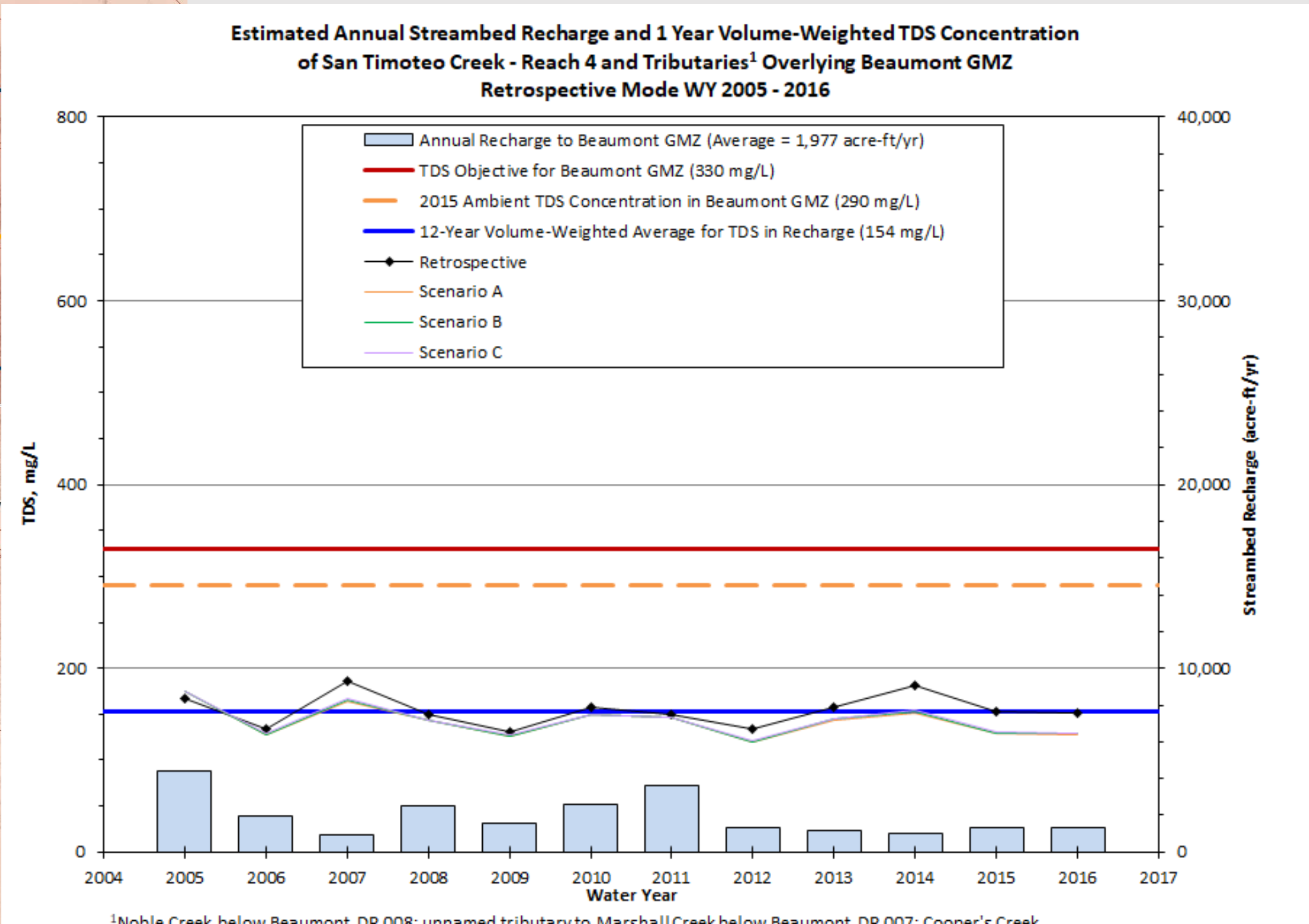
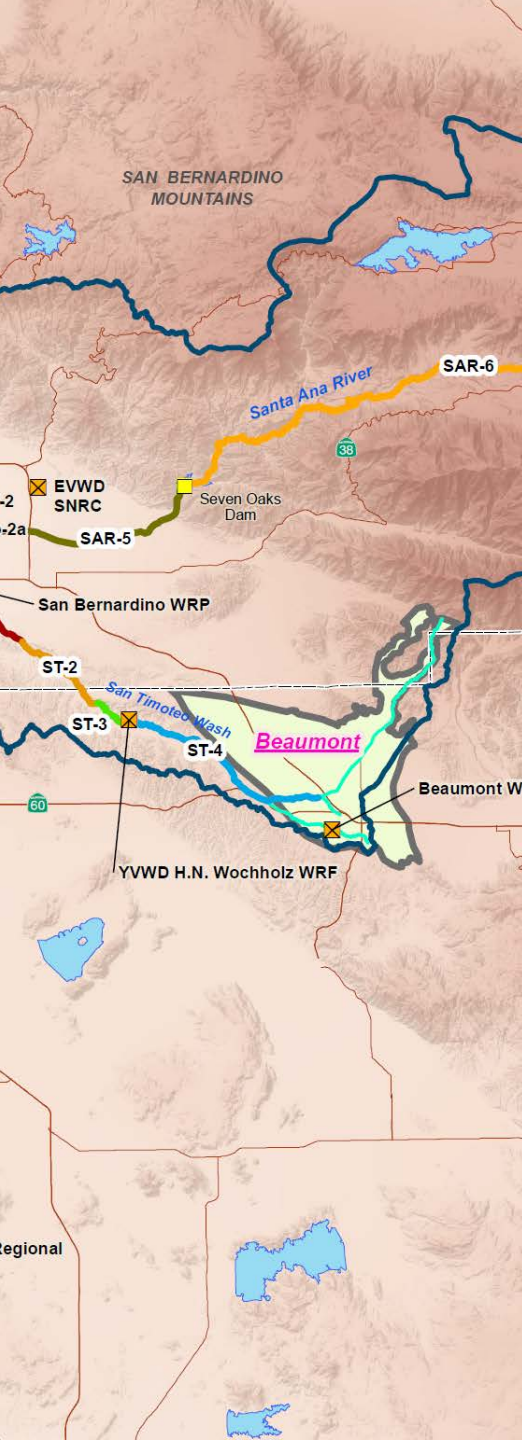
Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

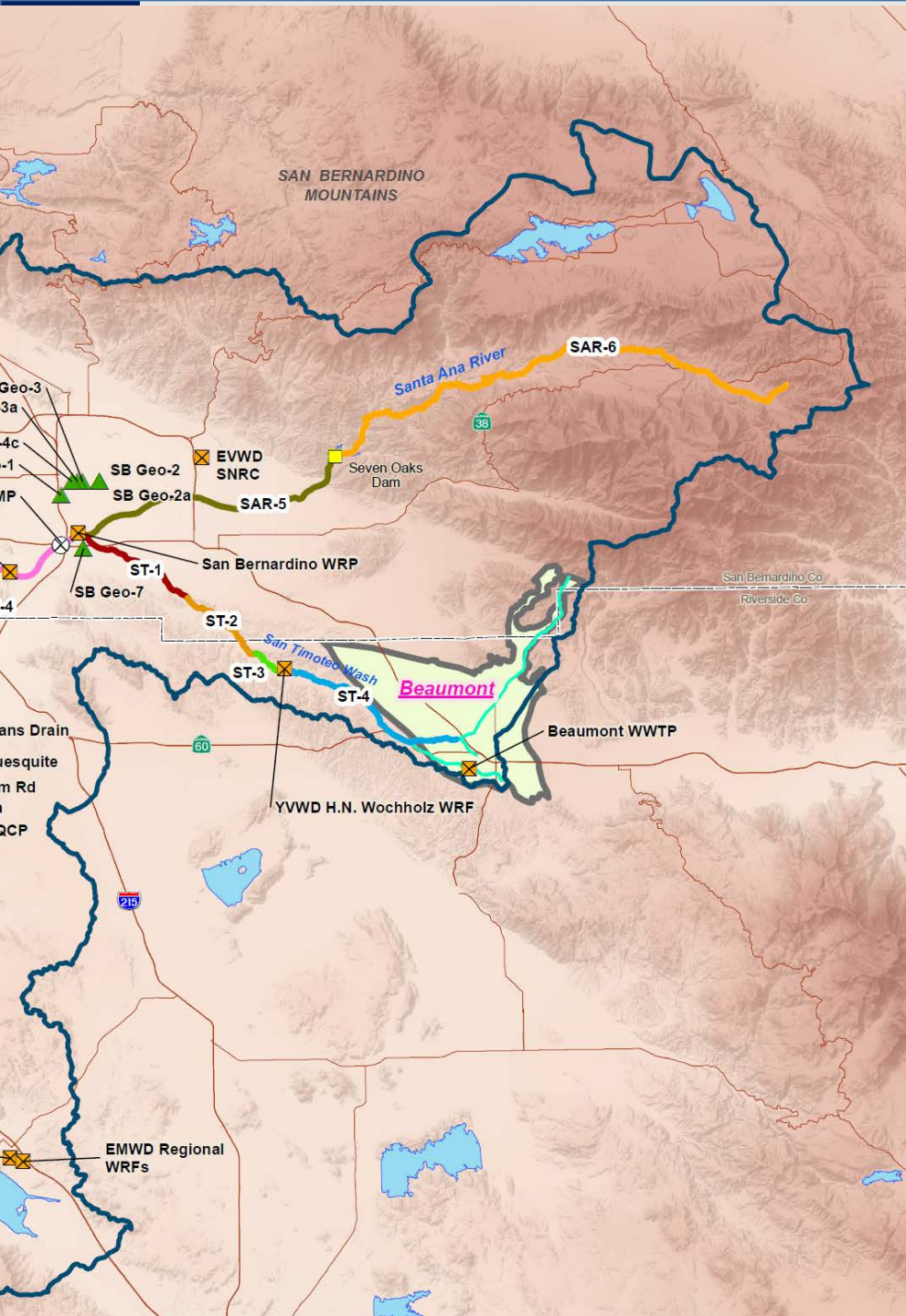
Original Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TIN	5.0/1.5	2.9	2.1	1-year	2.20	2.24	2.28	1.85	1.86	1.87
				5-year	1.82	1.85	1.89	1.52	1.52	1.53
				10-year	1.69	1.71	1.74	1.40	1.40	1.41
				20-year	1.62	1.65	1.67	1.36	1.37	1.37

Revised Calculation

TIN	5.0/1.5	2.9	2.1	1-year	1.94	1.97	2.01	1.42	1.42	1.43
				5-year	1.46	1.49	1.51	1.19	1.19	1.19
				10-year	1.40	1.41	1.43	1.16	1.16	1.16
				20-year	1.36	1.37	1.39	1.13	1.13	1.14





San Timoteo Creek – Reach 4 Overlying Beaumont GMZ (Scenario A-C and Retrospective Mode)

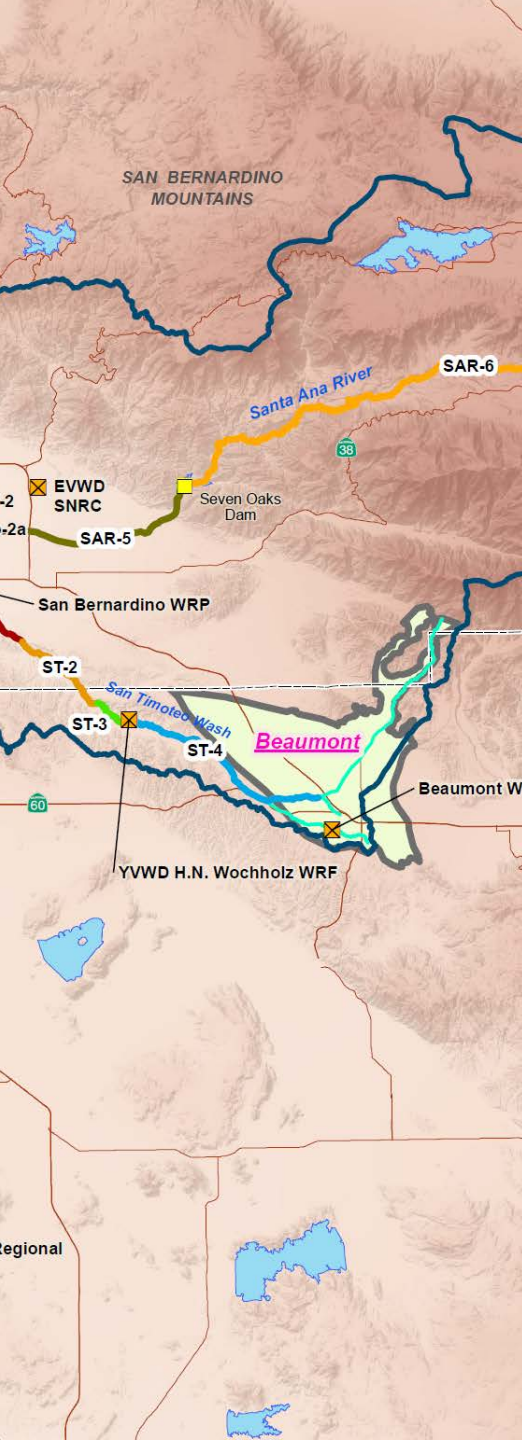
Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

Original Calculation

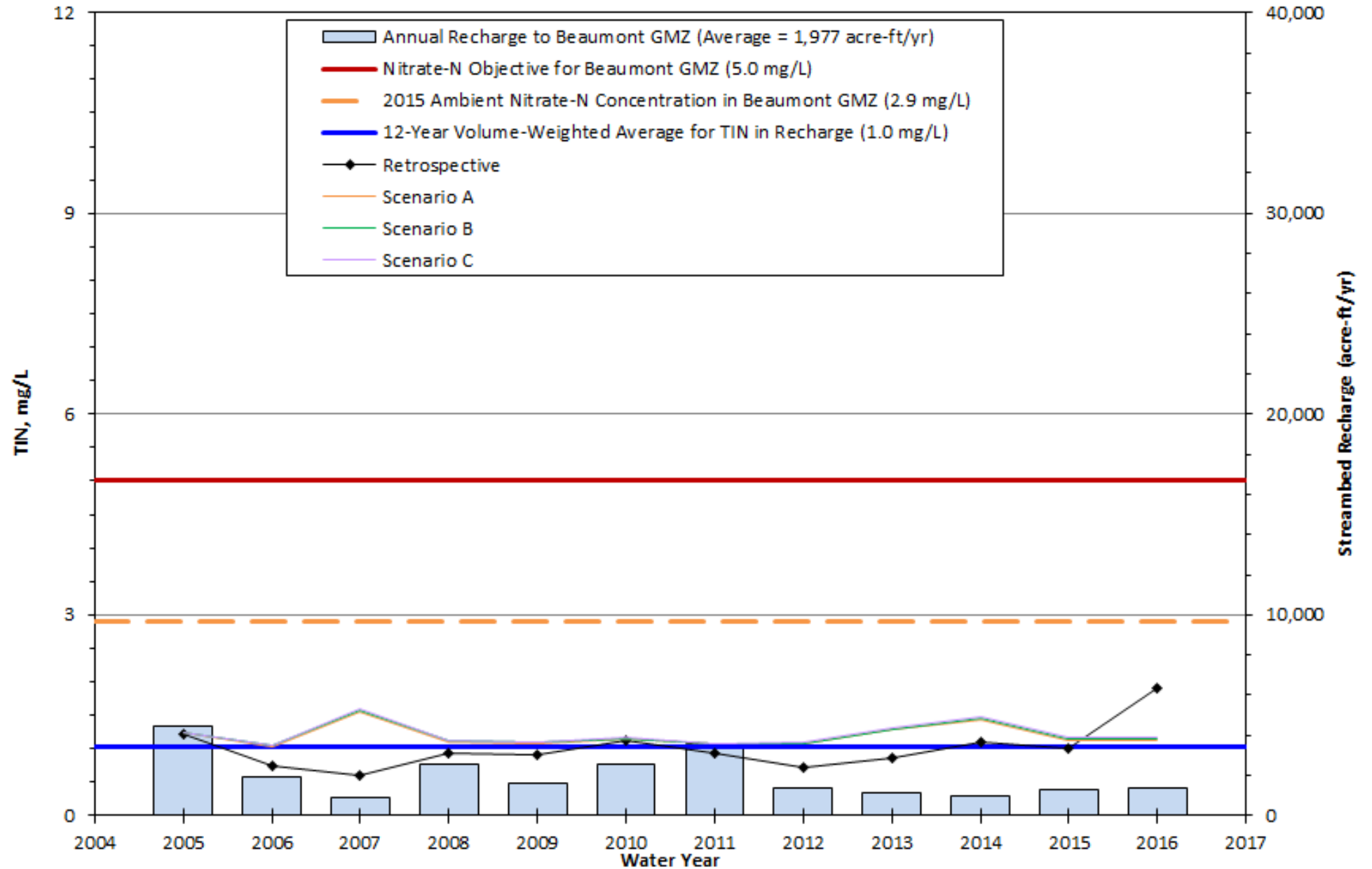
	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TDS	330/230	290	40	1-year	228	230	233	231
				5-year	196	198	200	200
				10-year	187	189	190	177
				20-year	185	186	187	na

Revised Calculation

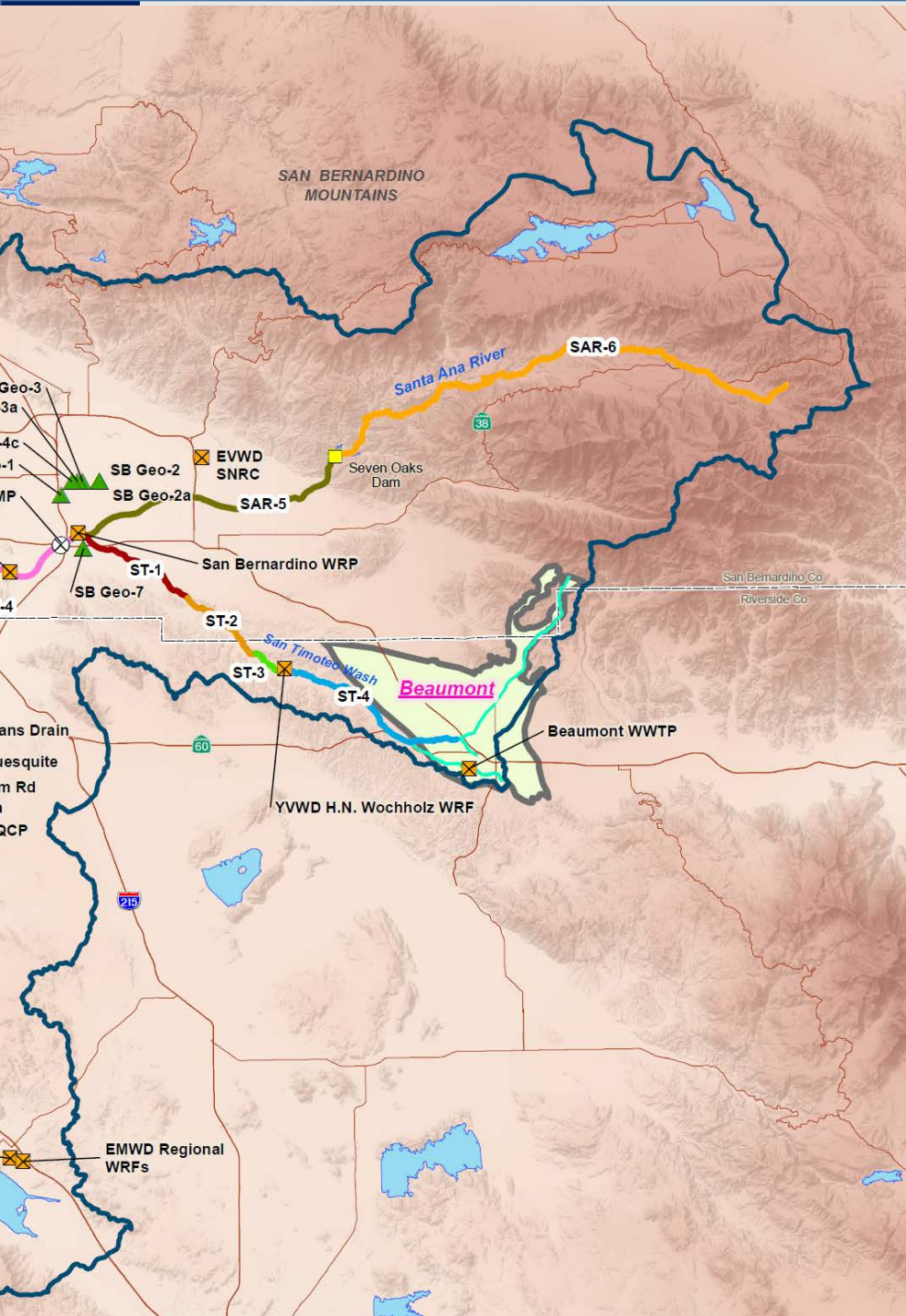
TDS	330/230	290	40	1-year	202	204	206	185
				5-year	176	177	177	163
				10-year	172	172	173	156
				20-year	167	168	169	na



Estimated Annual Streambed Recharge and 1 Year Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 4 and Tributaries¹ Overlying Beaumont GMZ Retrospective Mode WY 2005 - 2016



¹Noble Creek below Beaumont DP 008; unnamed tributary to Marshall Creek below Beaumont DP 007; Cooper's Creek



San Timoteo Creek – Reach 4 Overlying Beaumont GMZ (Scenario A-C and Retrospective Mode)

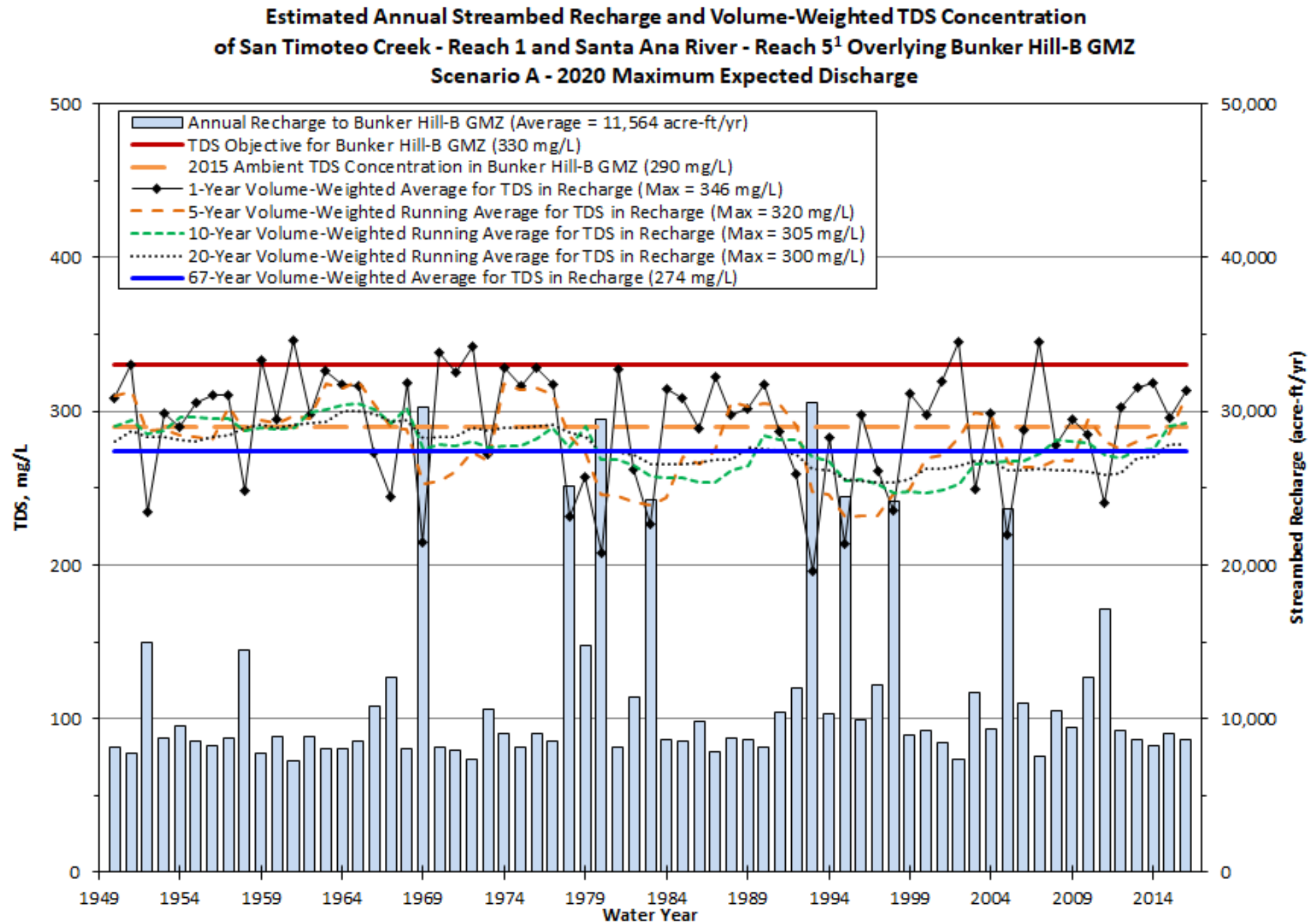
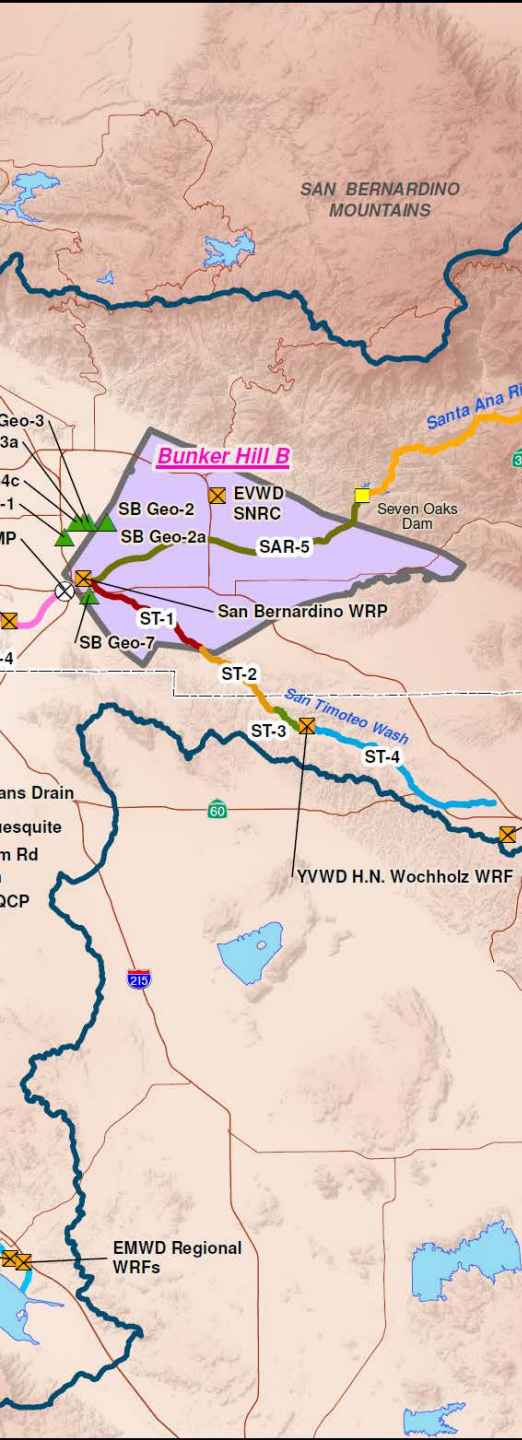
Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

Original Calculation

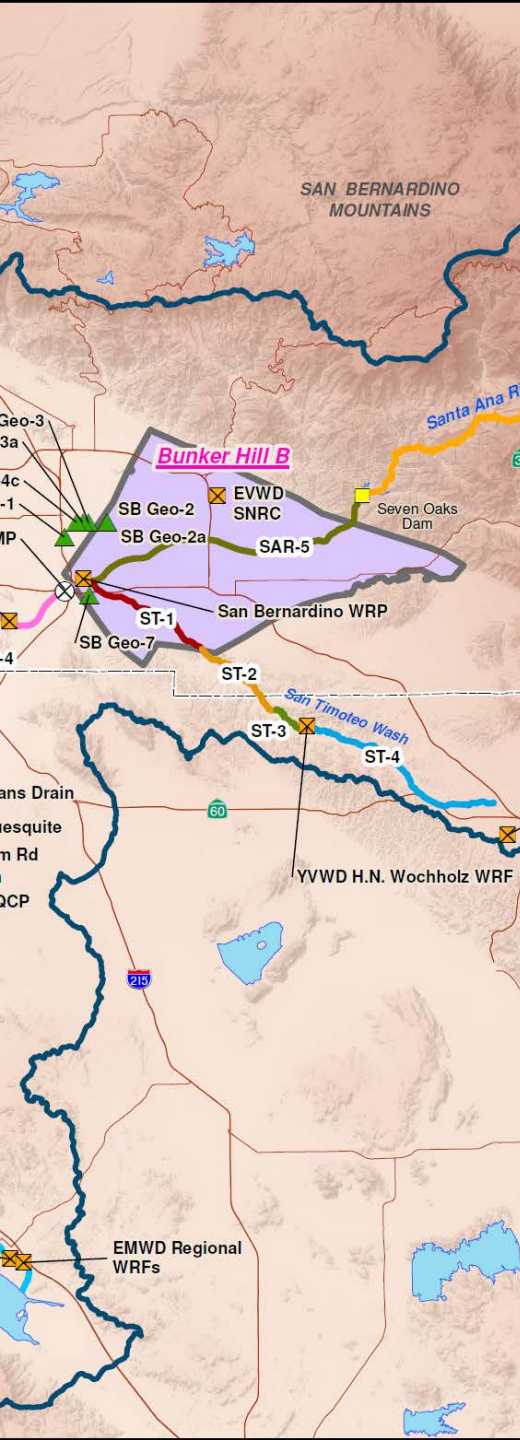
	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TIN	5.0/1.5	2.9	2.1	1-year	2.20	2.24	2.28	2.68
				5-year	1.82	1.85	1.89	1.48
				10-year	1.69	1.71	1.74	1.17
				20-year	1.62	1.65	1.67	na

Revised Calculation

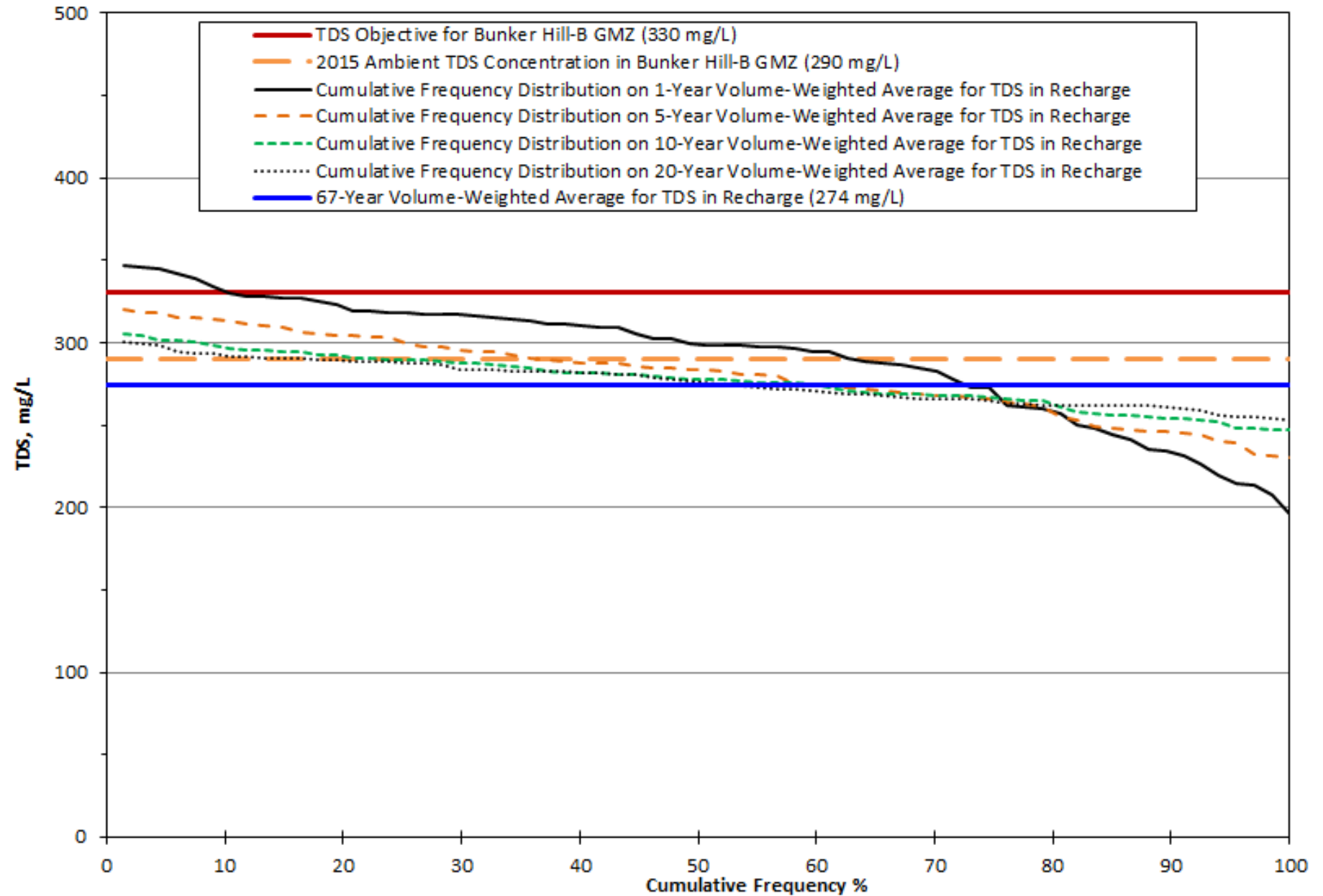
TIN	5.0/1.5	2.9	2.1	1-year	1.94	1.97	2.01	1.91
				5-year	1.46	1.49	1.51	1.23
				10-year	1.40	1.41	1.43	1.07
				20-year	1.36	1.37	1.39	na



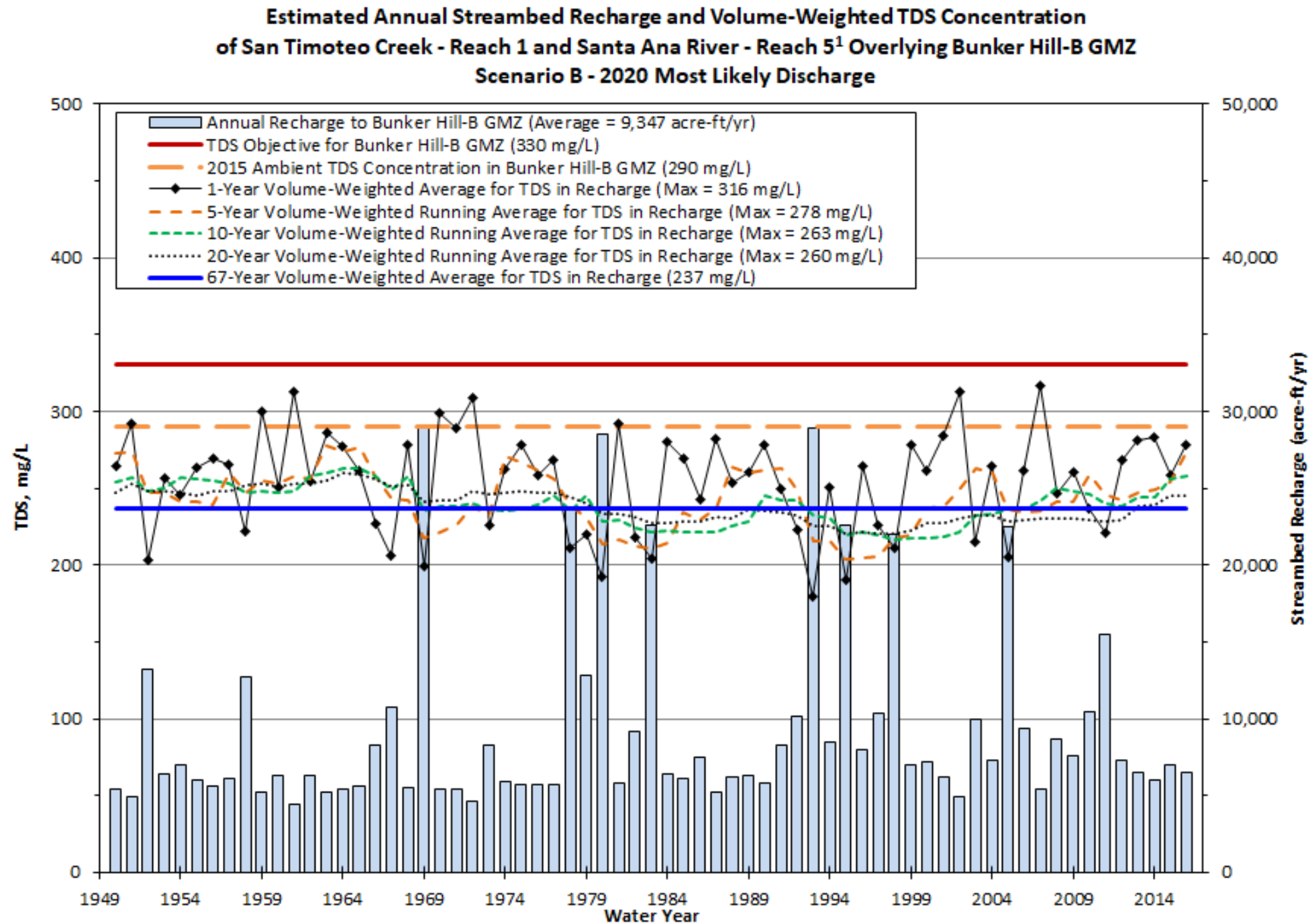
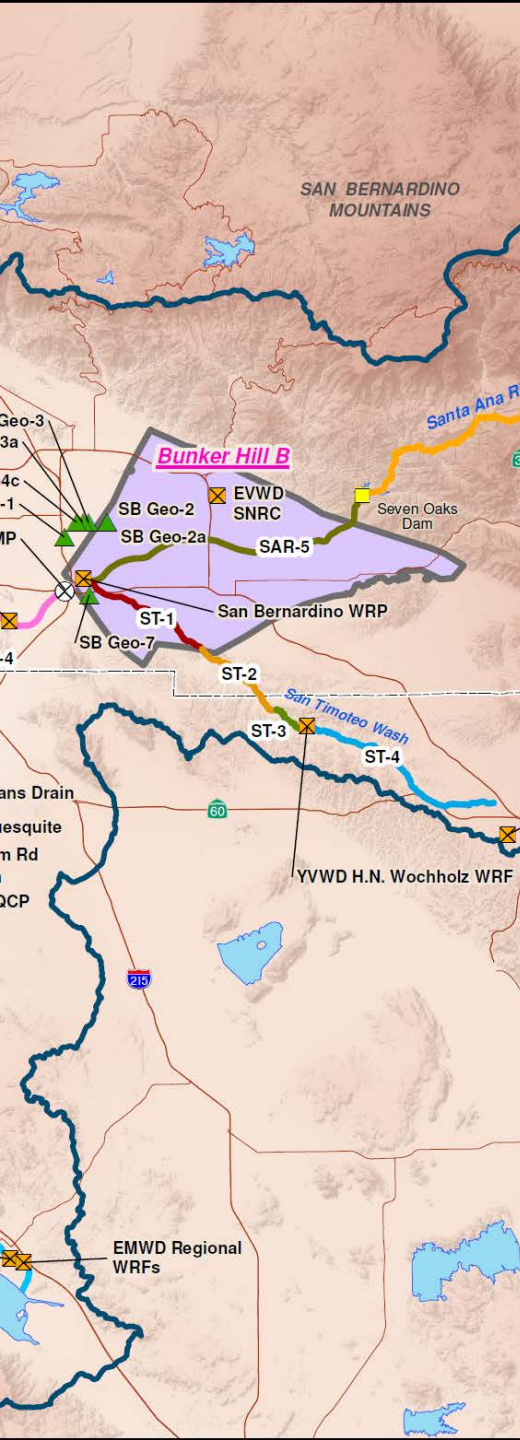
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault

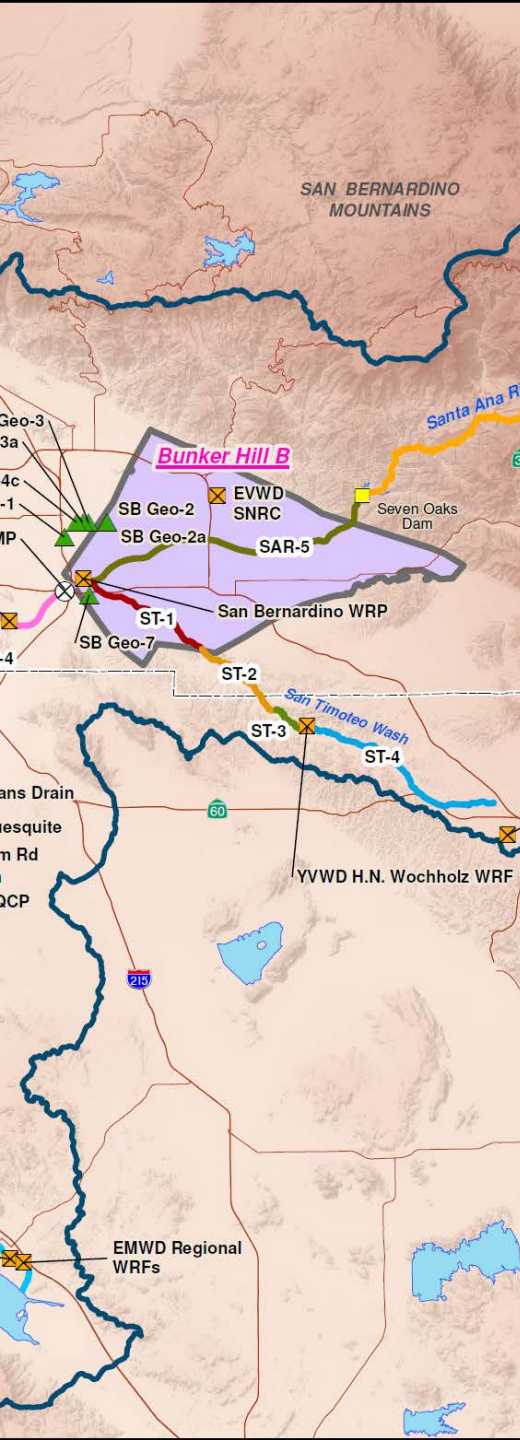


**Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario A - 2020 Maximum Expected Discharge**

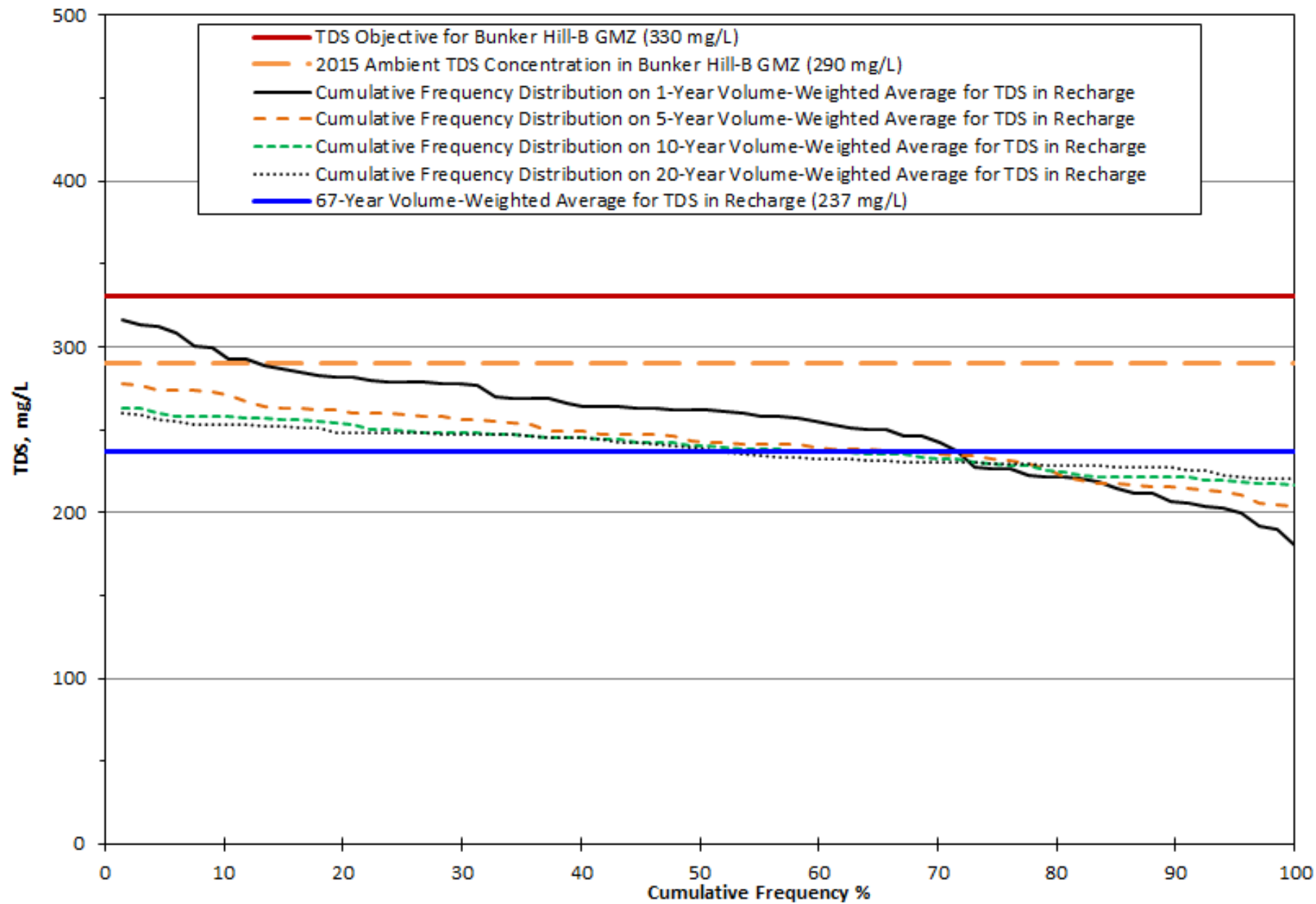


¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault

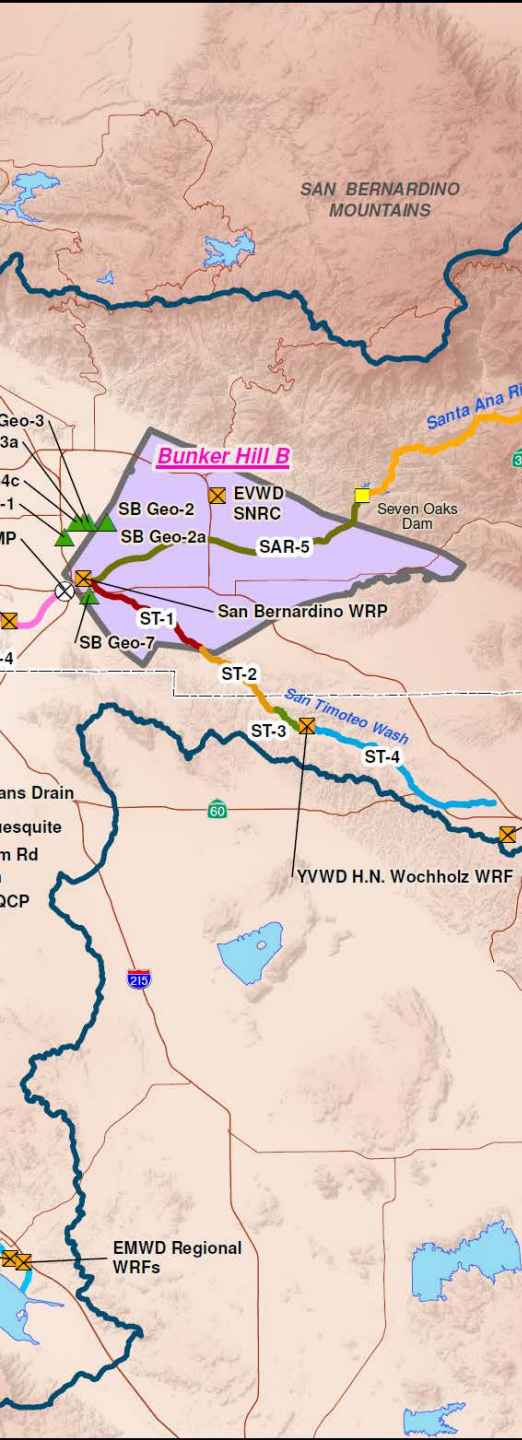




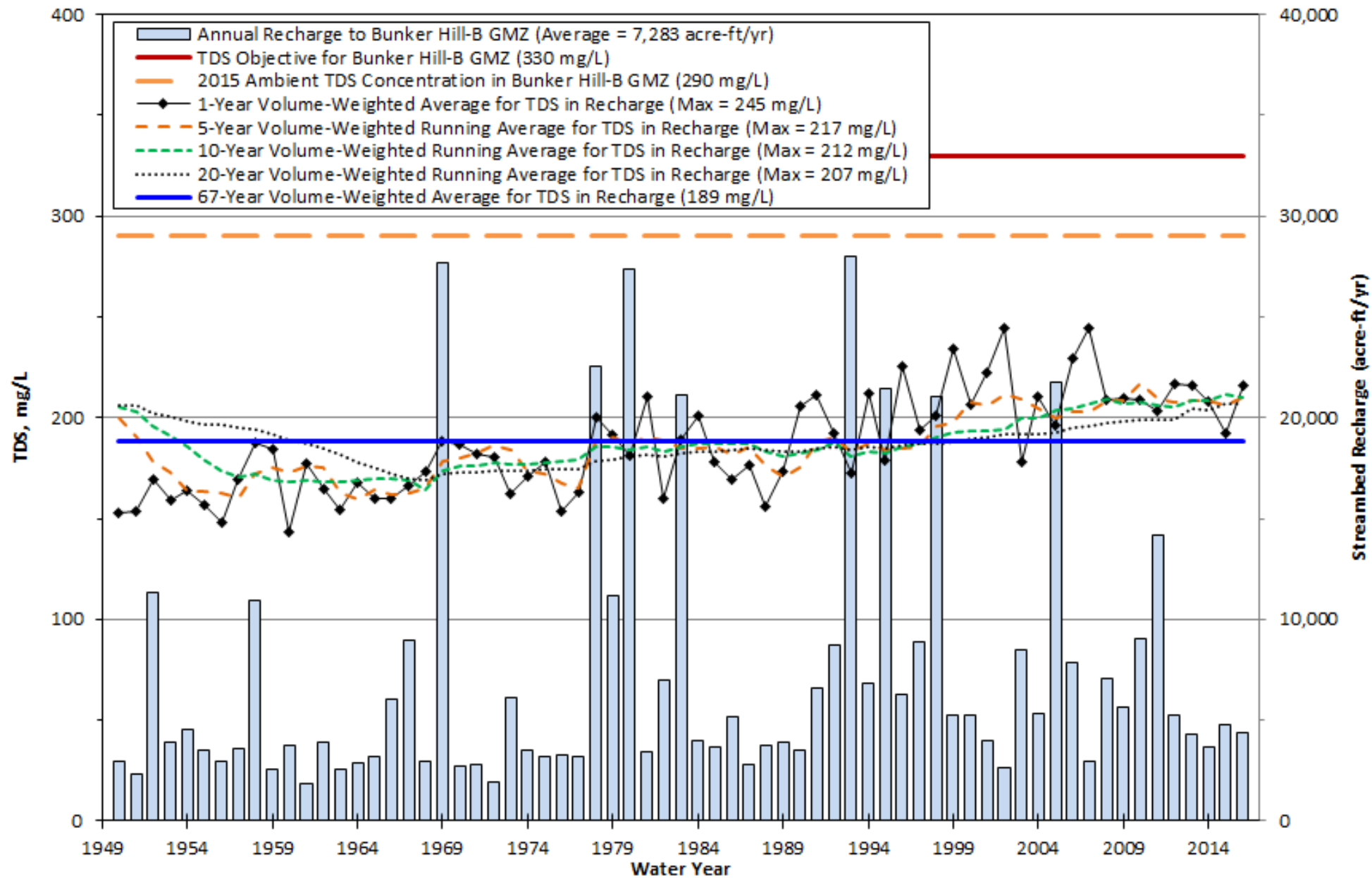
Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario B - 2020 Most Likely Discharge



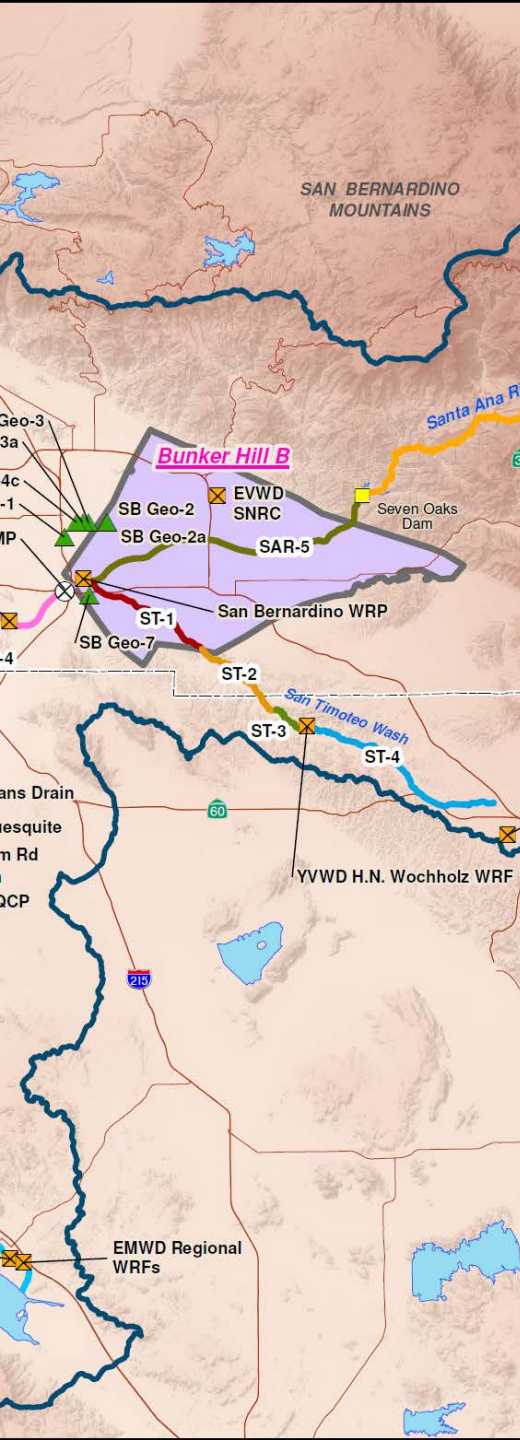
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



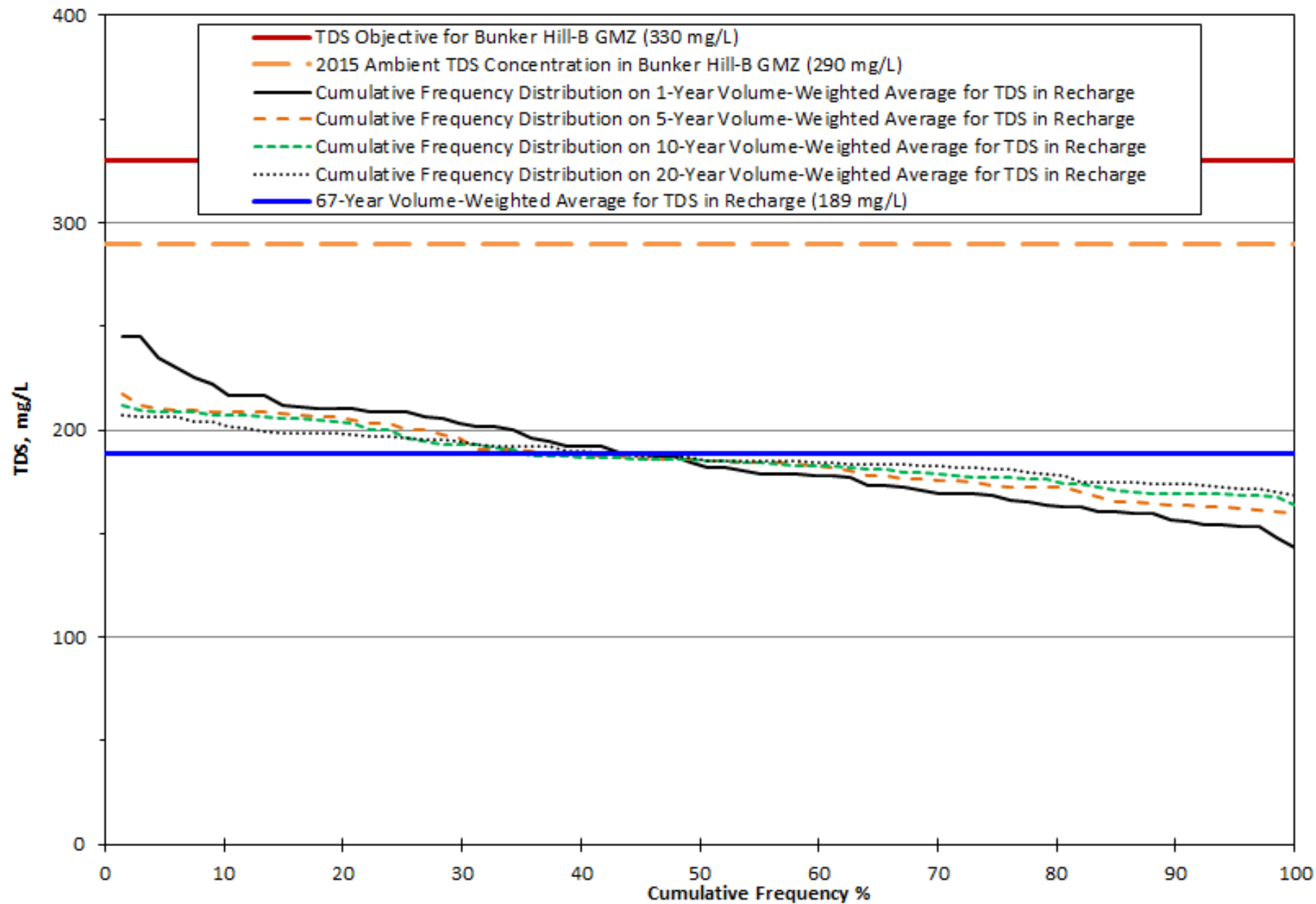
Estimated Annual Streambed Recharge and Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ Scenario C - 2020 Minimum Expected Discharge



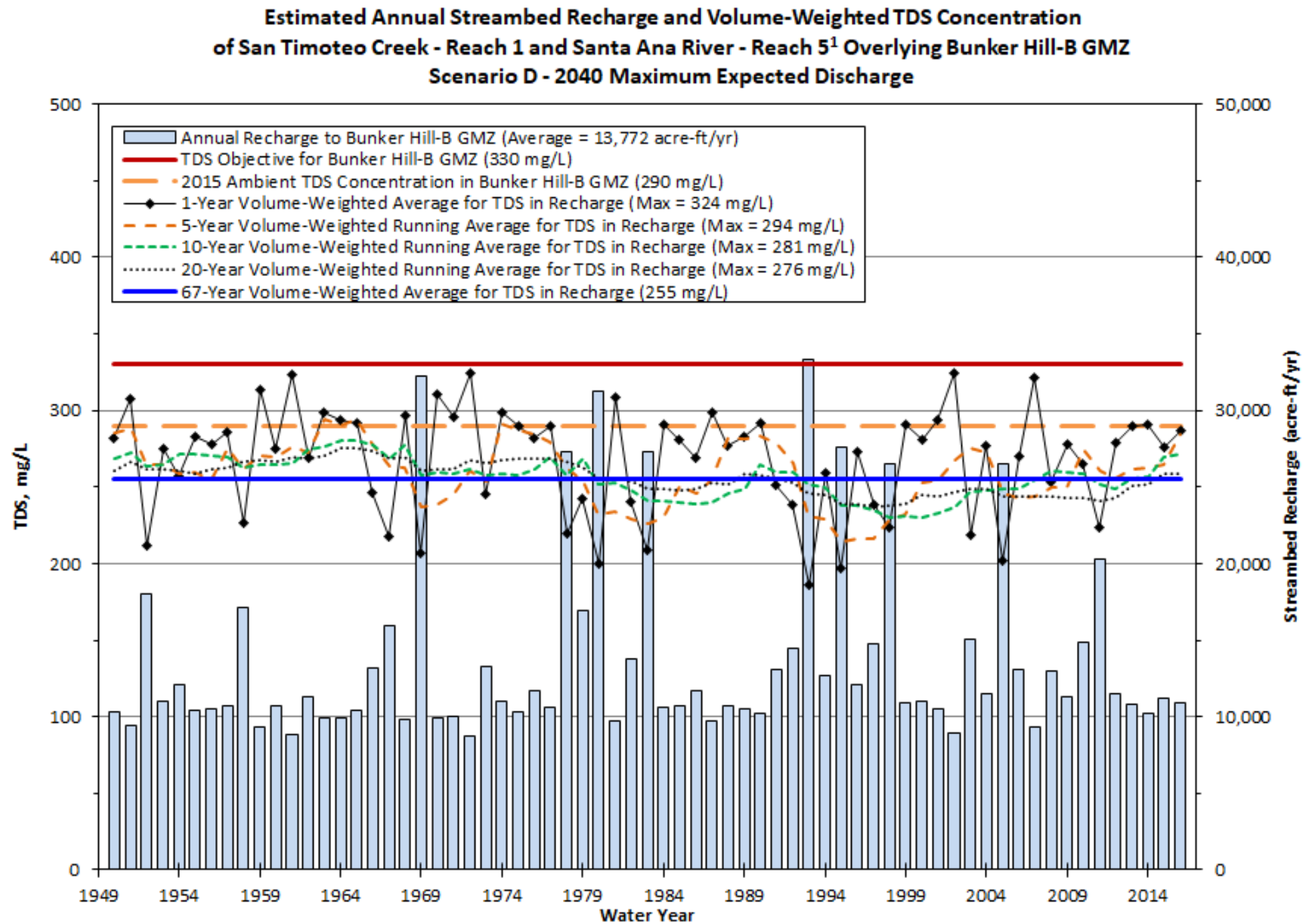
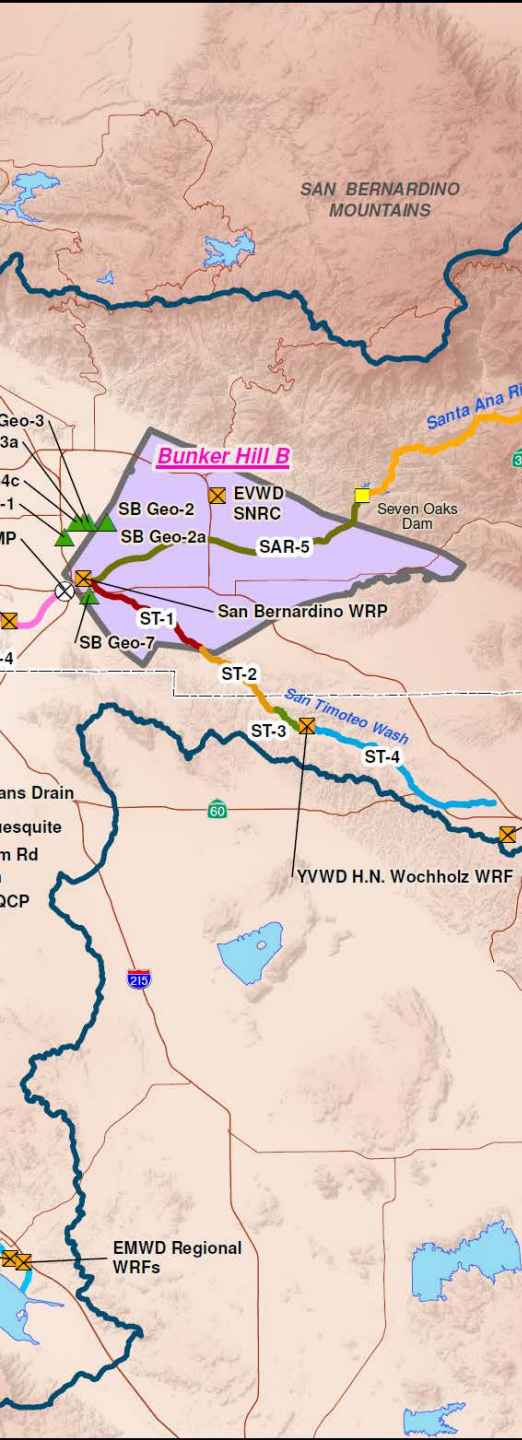
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault

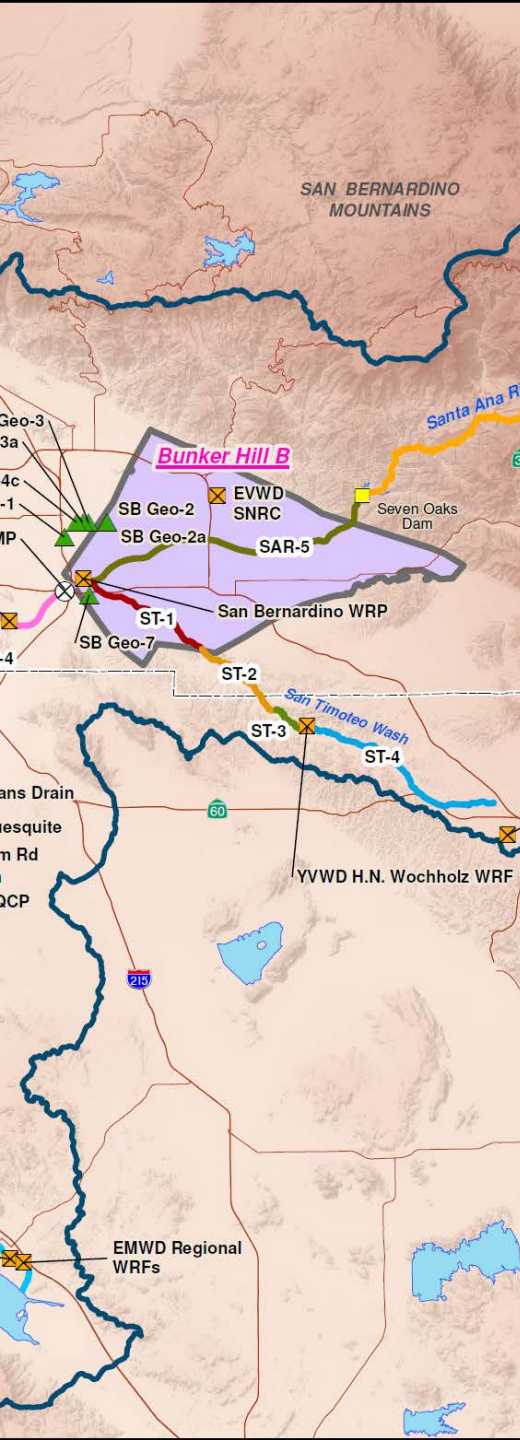


Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario C - 2020 Minimum Expected Discharge

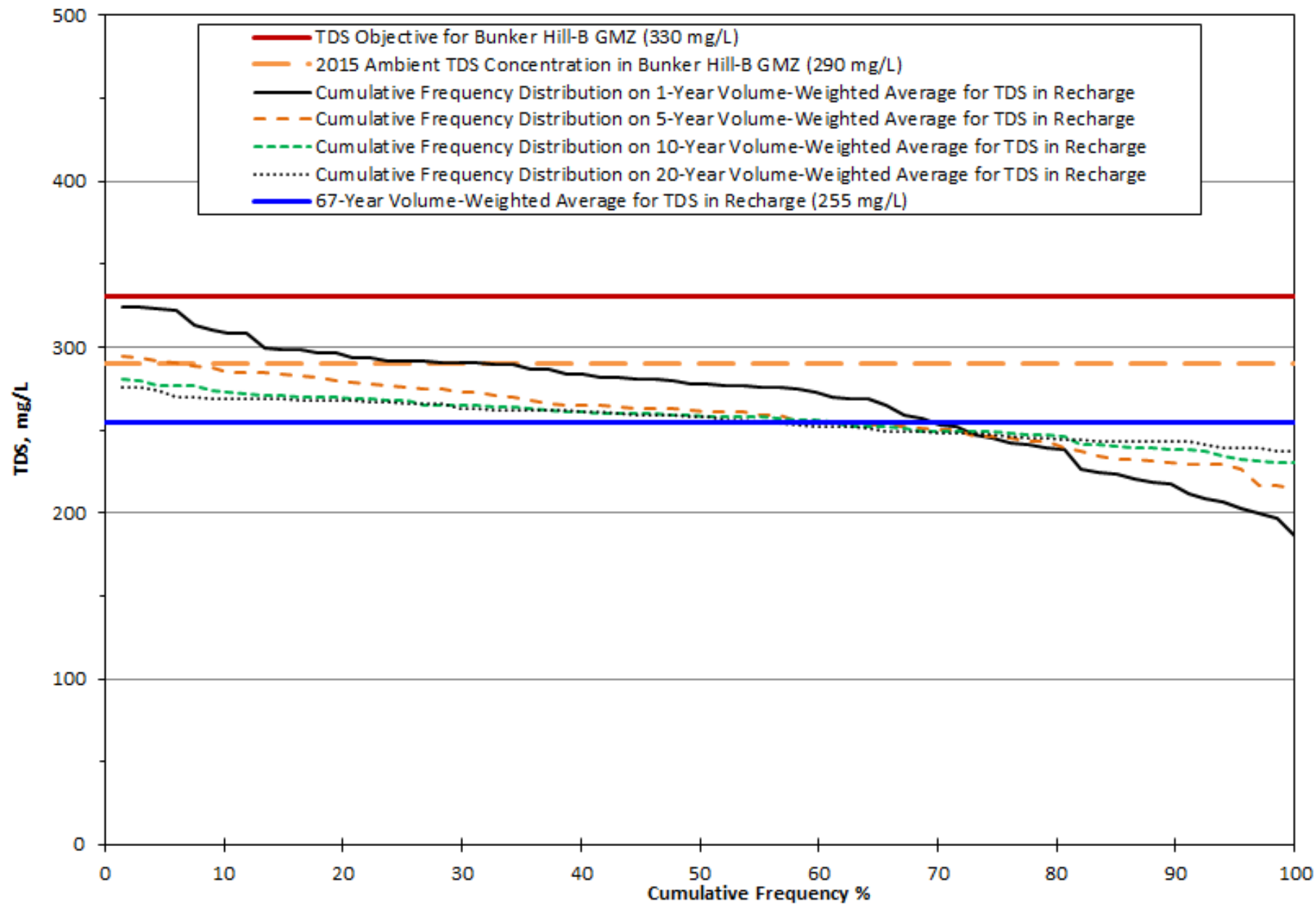


¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault

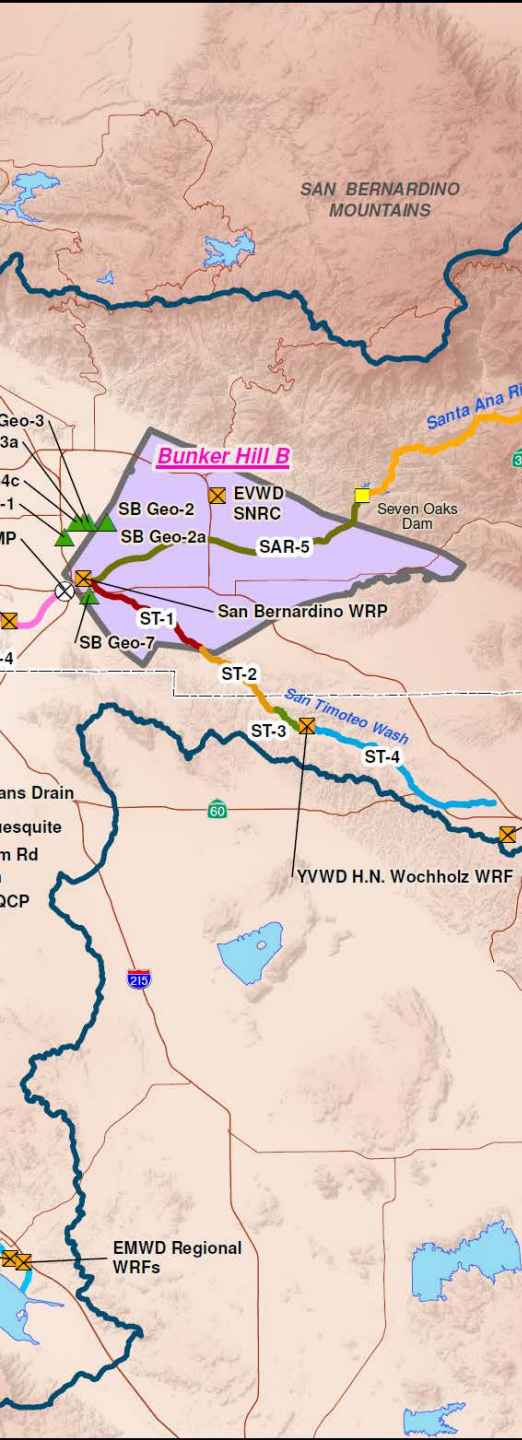




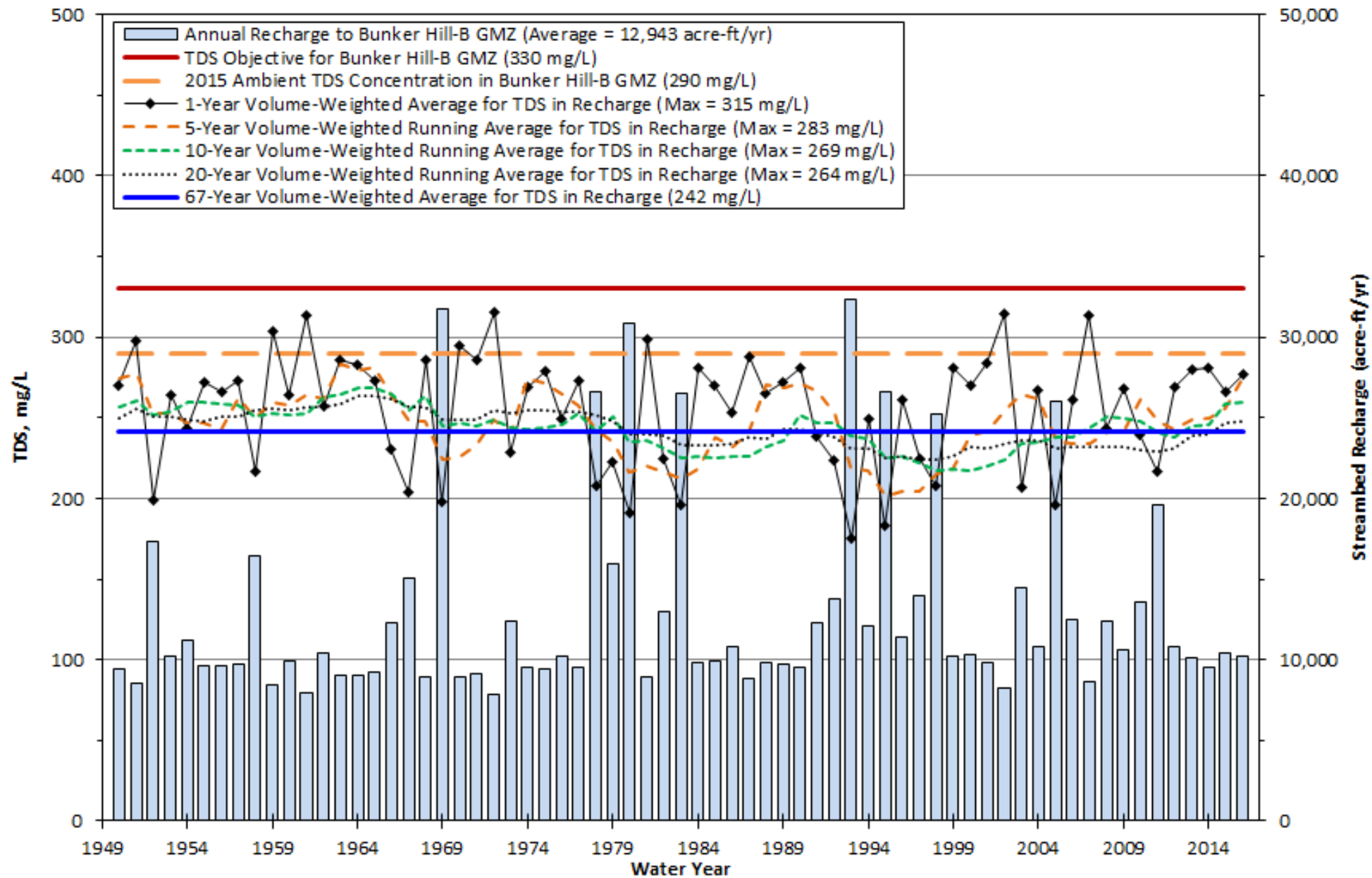
Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario D - 2040 Maximum Expected Discharge



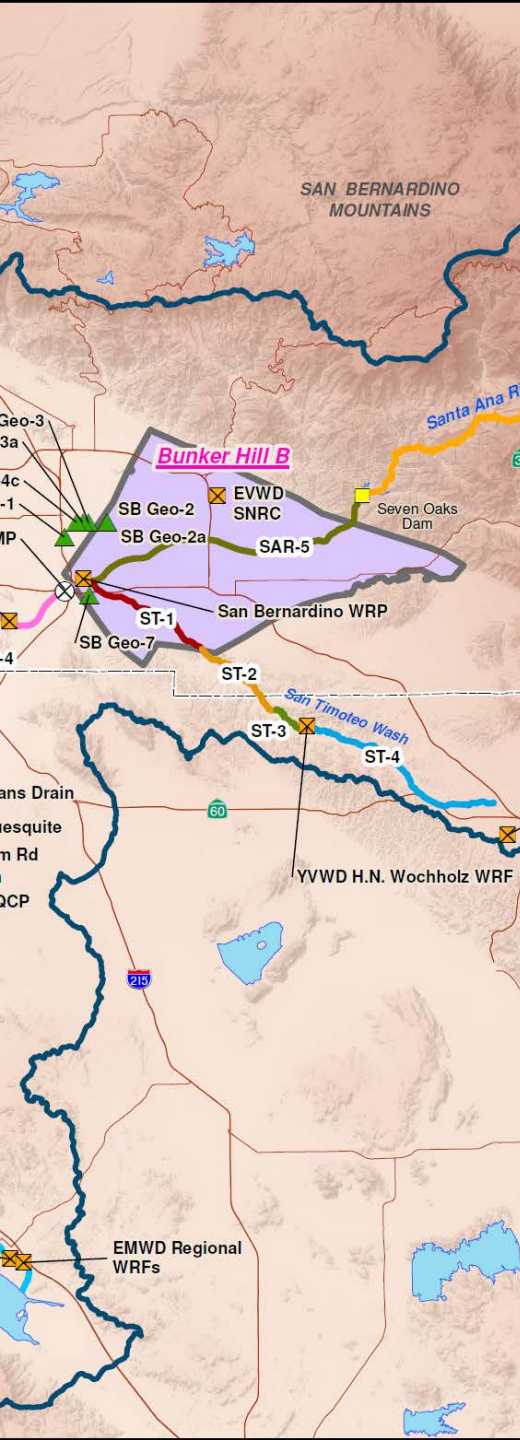
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



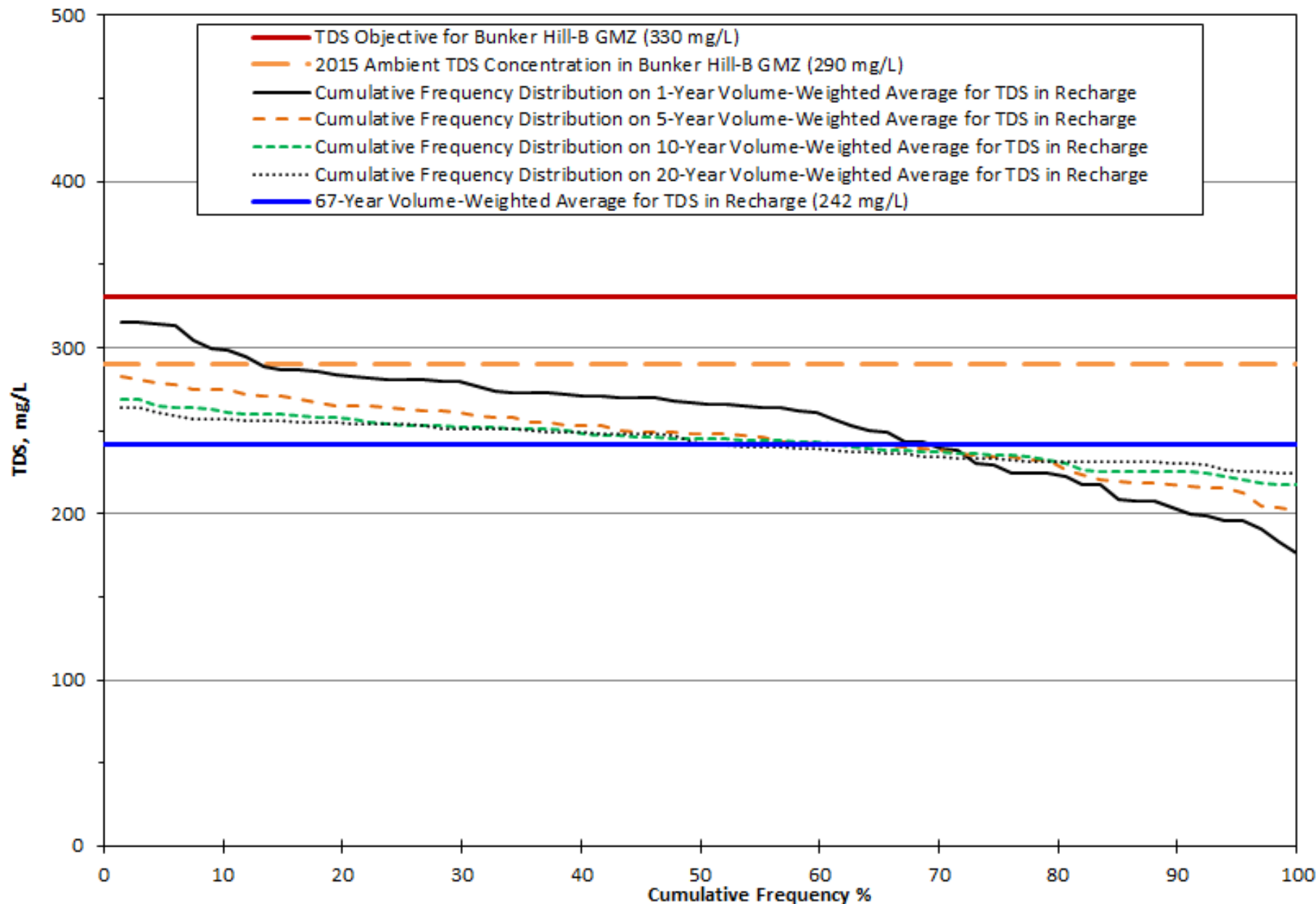
Estimated Annual Streambed Recharge and Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ Scenario E - 2040 Most Likely Discharge



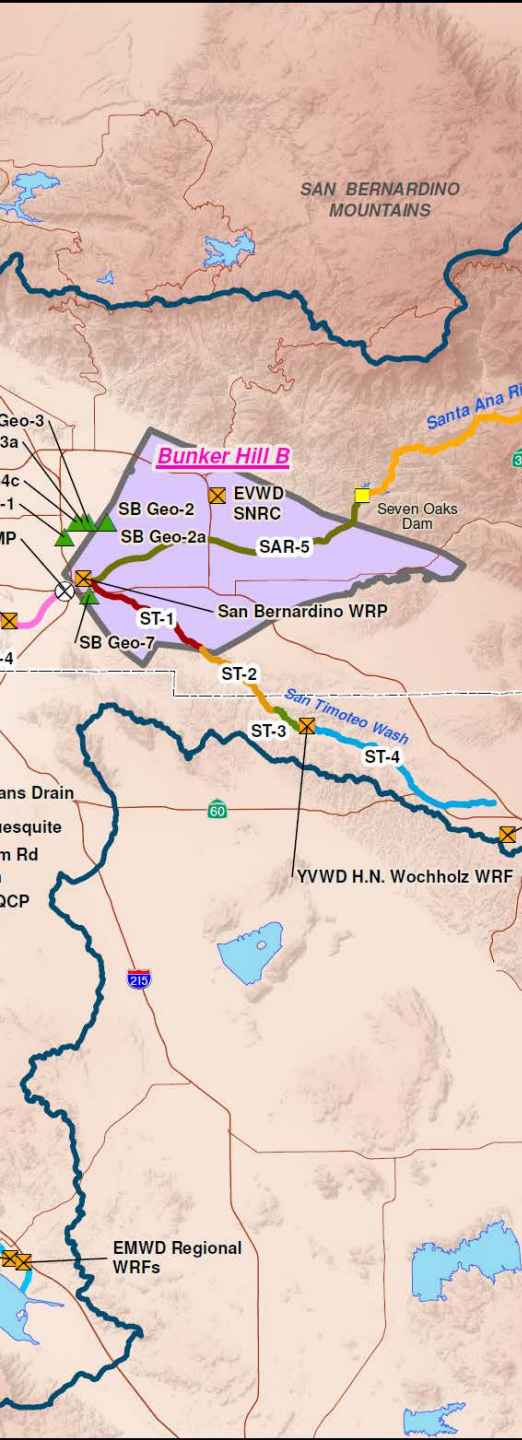
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



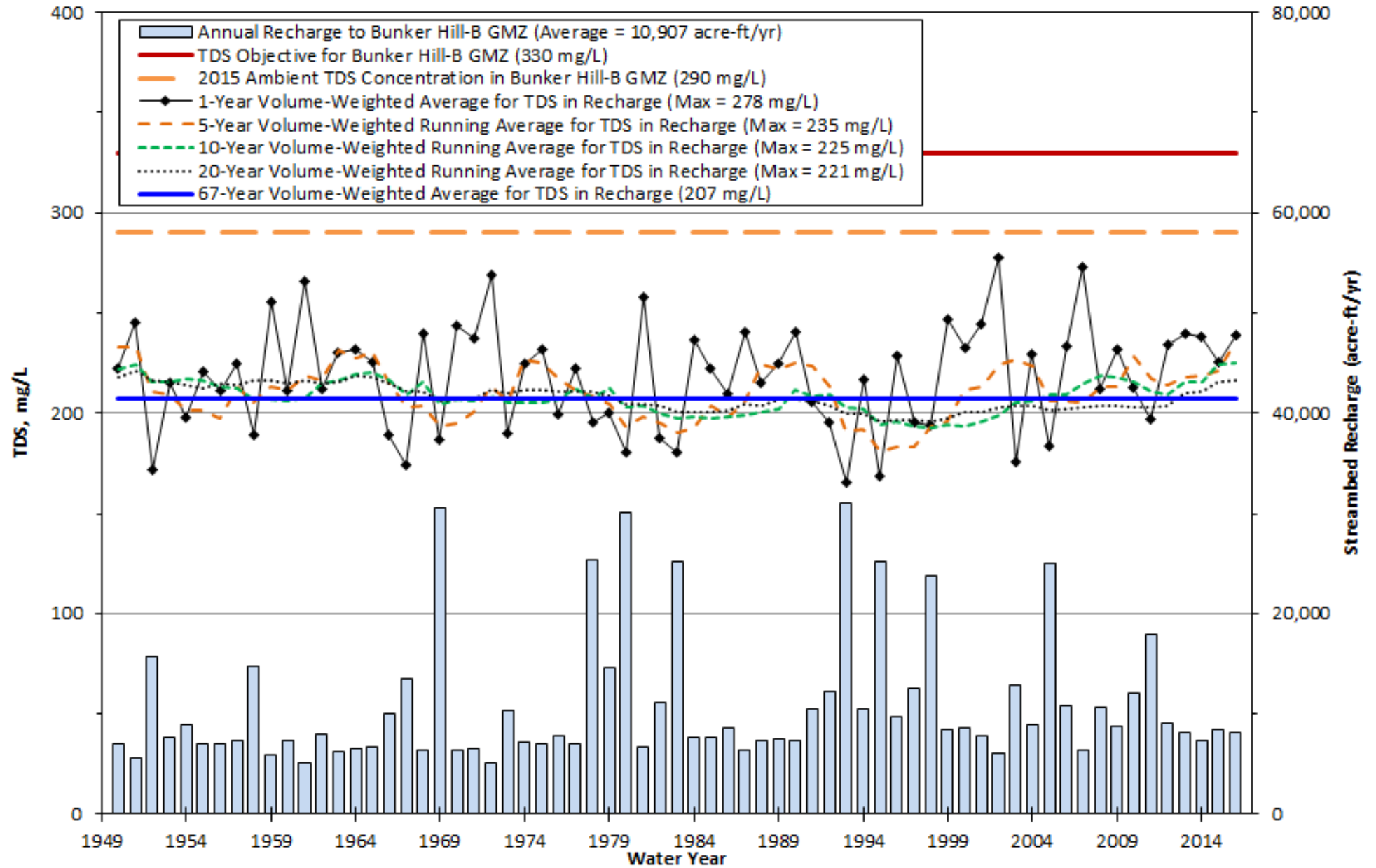
Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ Scenario E - 2040 Most Likely Discharge



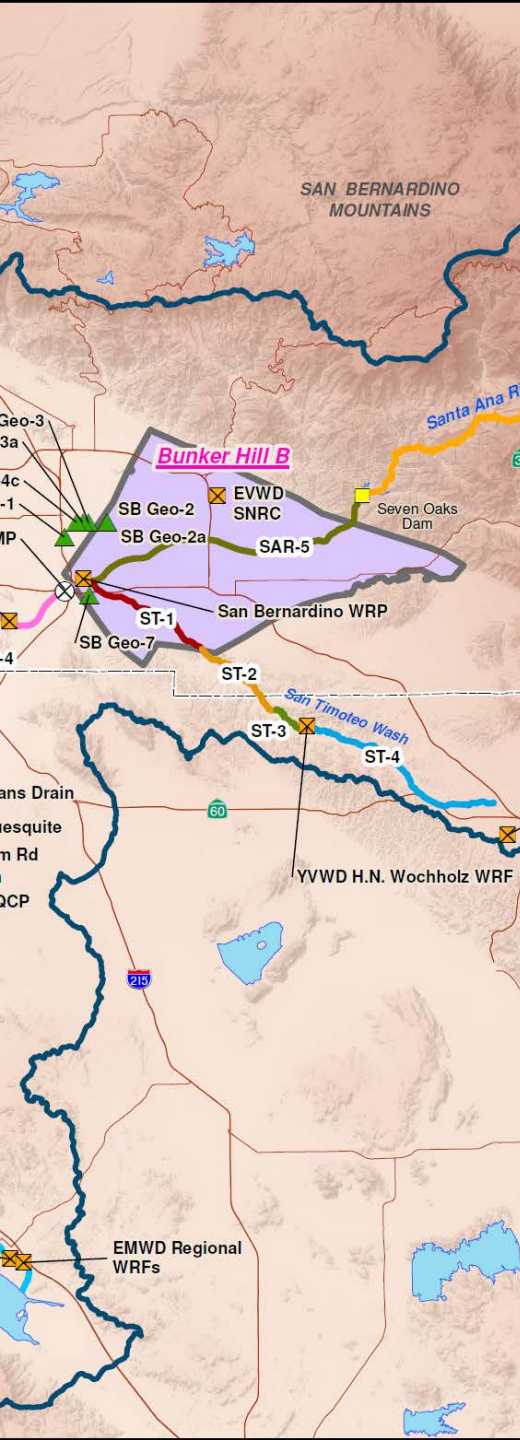
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



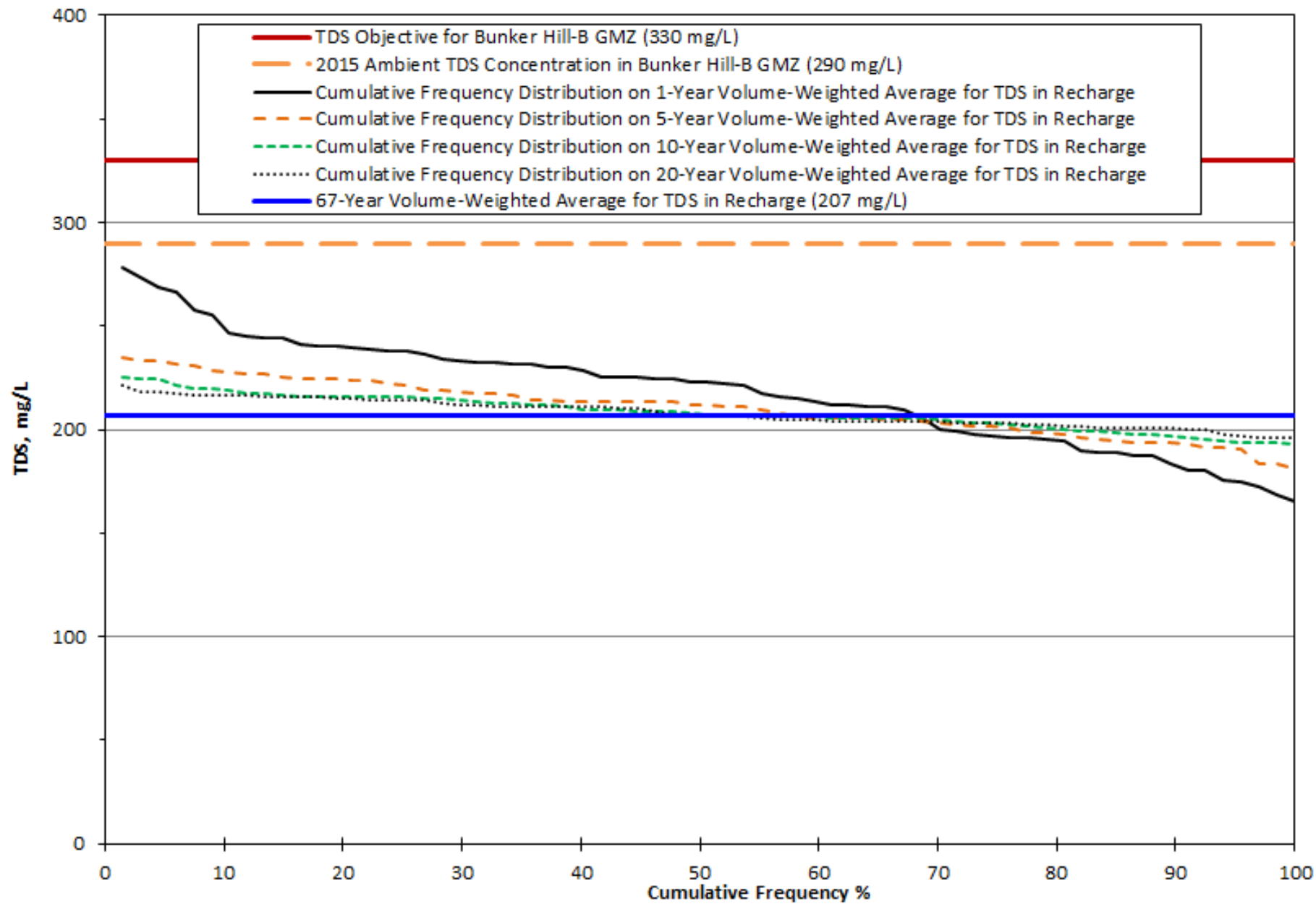
Estimated Annual Streambed Recharge and Volume-Weighted TDS Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ Scenario F - 2040 Minimum Expected Discharge



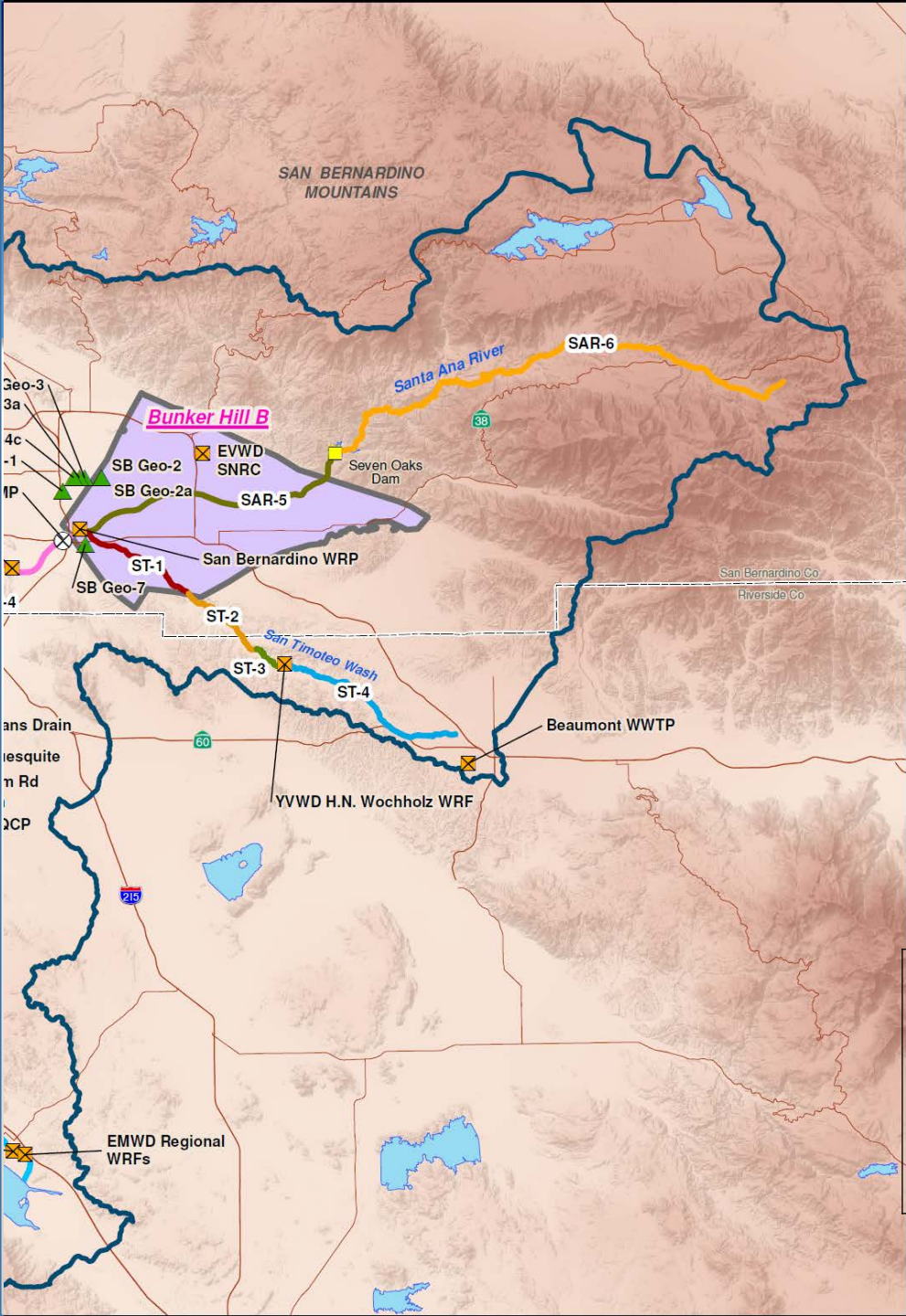
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



**Estimated Cumulative Frequency Distribution on Volume-Weighted TDS Concentration
of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario F - 2040 Minimum Expected Discharge**



¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



San Timoteo Creek – Reach 1; Santa Ana River - Reach 5 Overlying Bunker Hill-B GMZ

Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

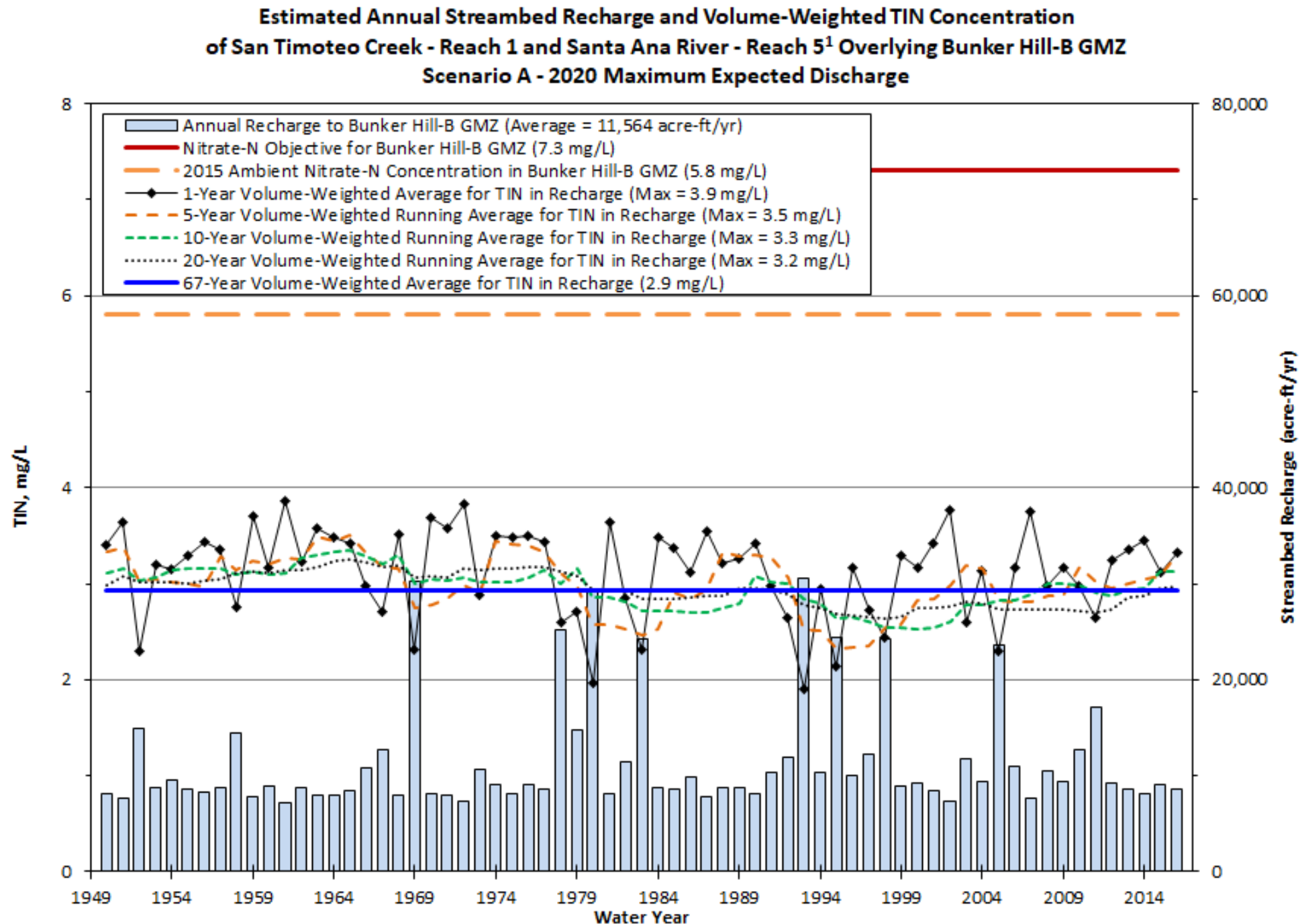
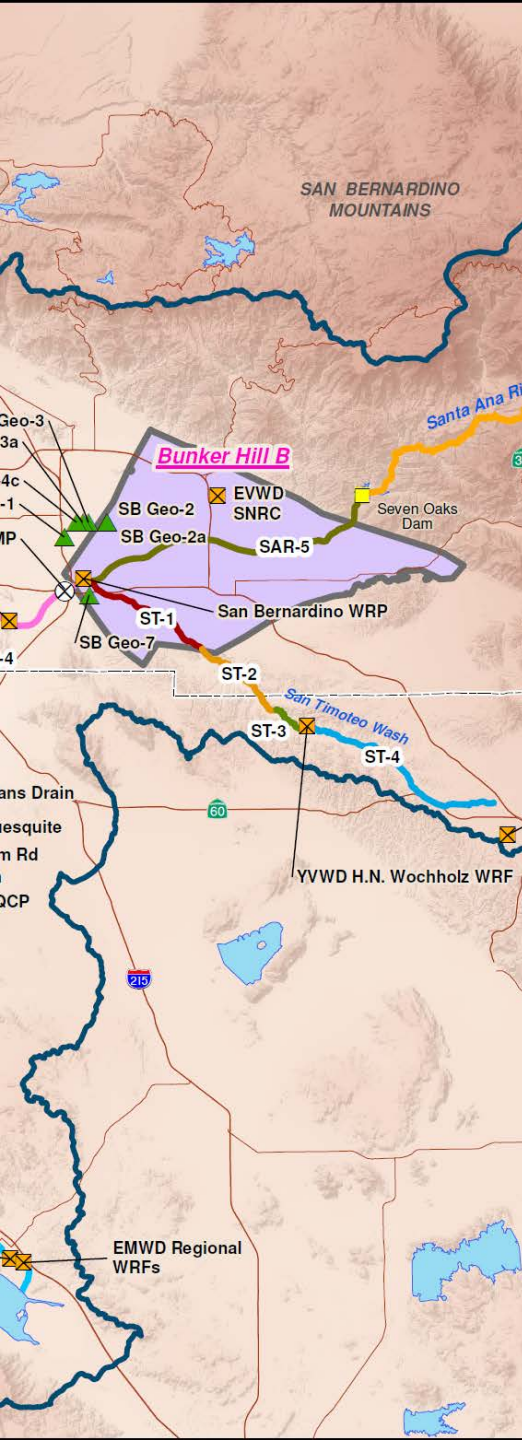
Original Calculation

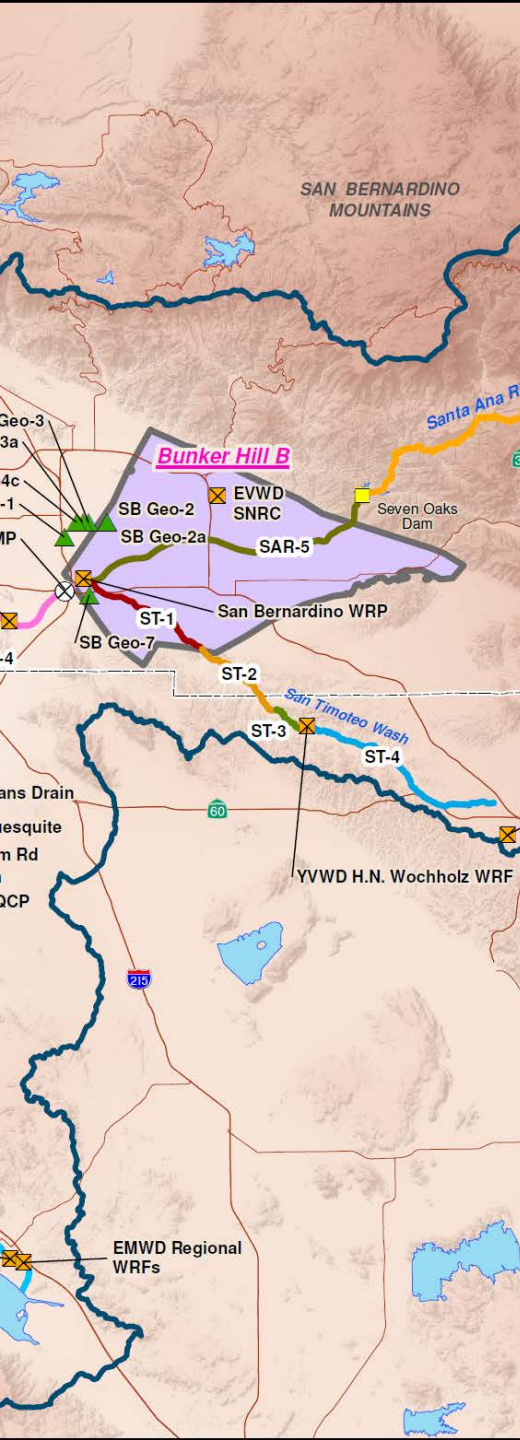
	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TDS	330	290	40	1-year	346	316	245	324	315	278
				5-year	320	278	217	294	283	235
				10-year	305	263	212	281	269	225
				20-year	291	248	207	269	255	216

Revised Calculation

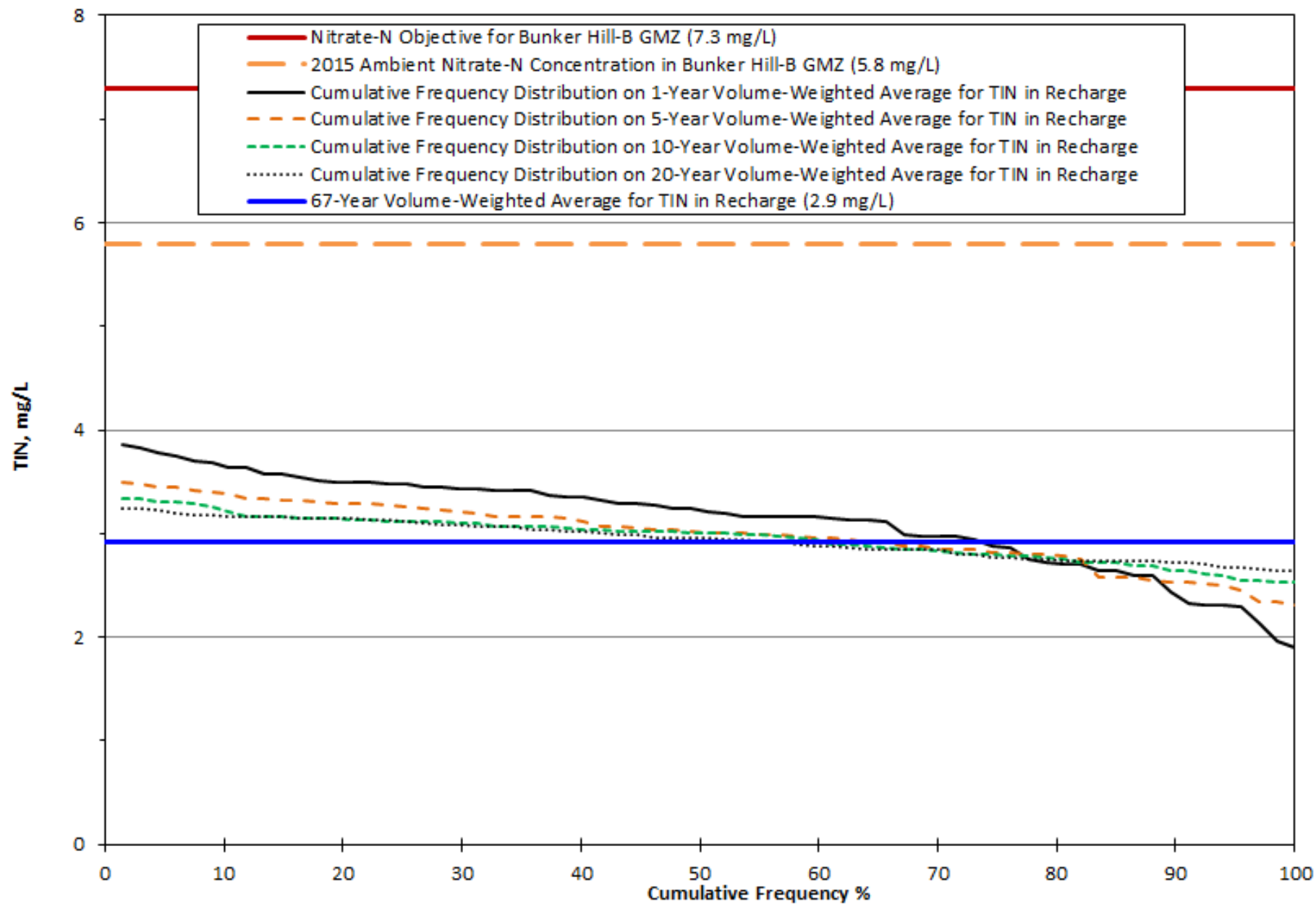
TDS	330	290	40	1-year	328	294	239	310	301	266
				5-year	294	261	226	271	262	230
				10-year	281	249	220	260	250	225
				20-year	264	240	216	249	240	218

Bold black values represent concentrations above ambient, but below objective.
Bold red values represent concentrations above basin objective.

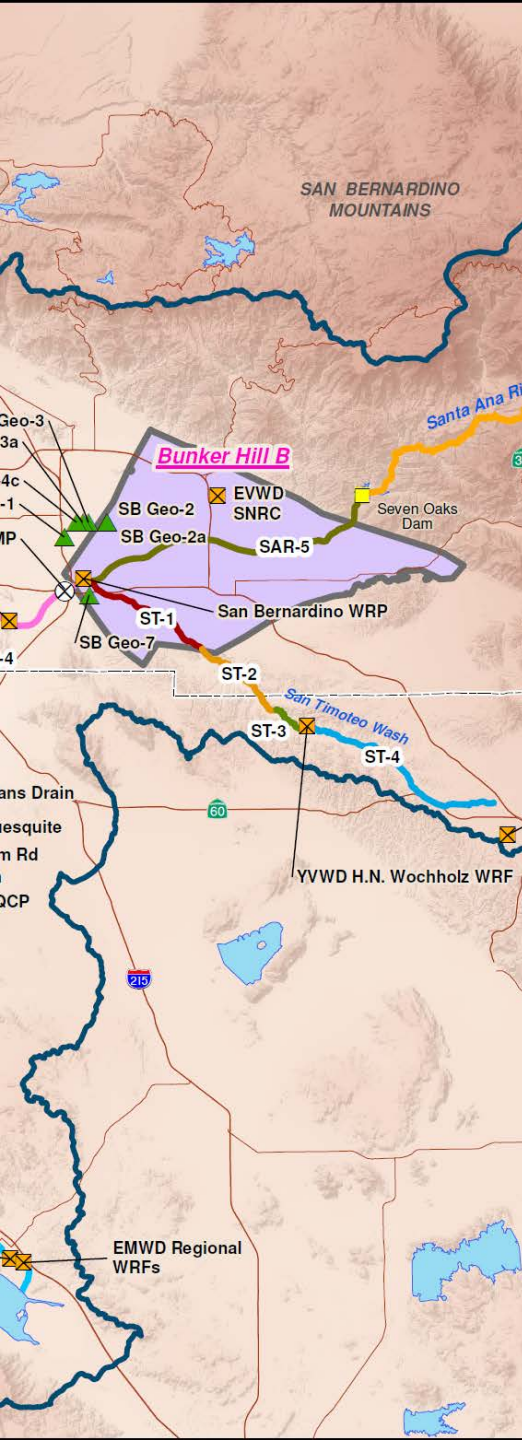




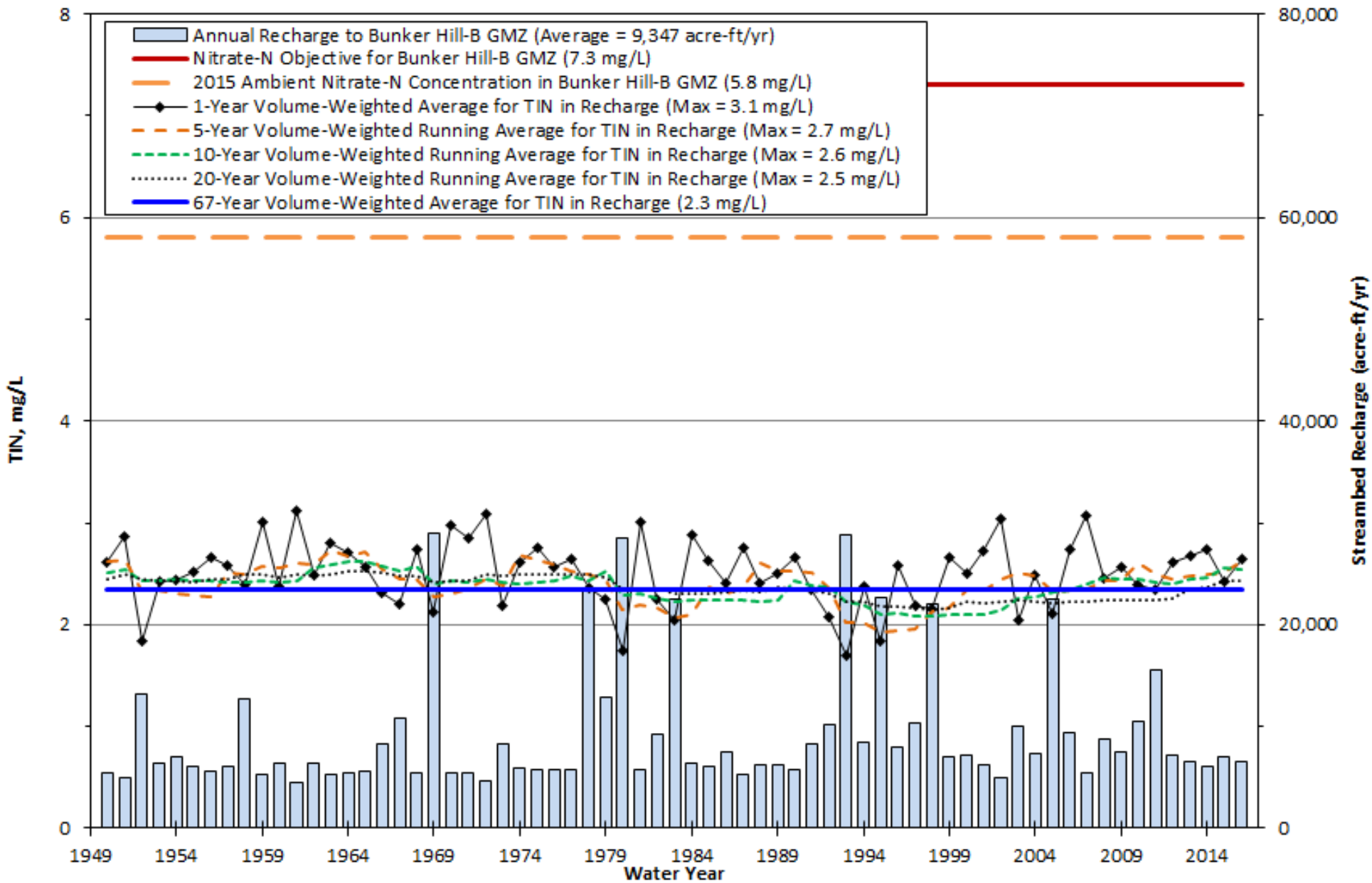
**Estimated Cumulative Frequency Distribution on Volume-Weighted TIN Concentration
of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario A - 2020 Maximum Expected Discharge**



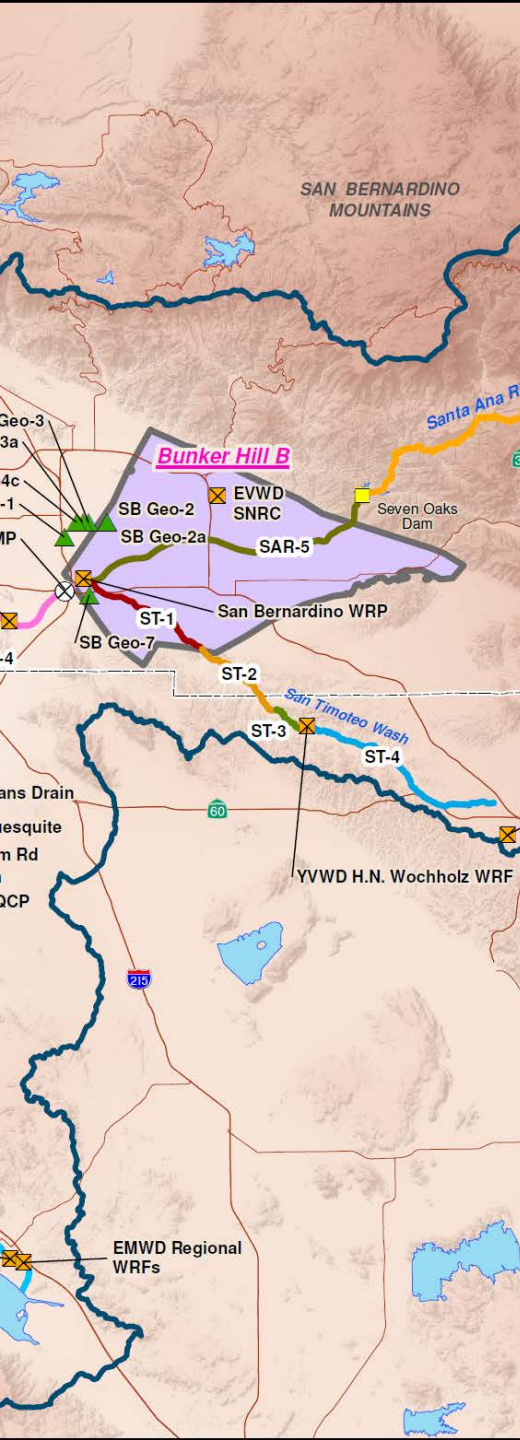
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



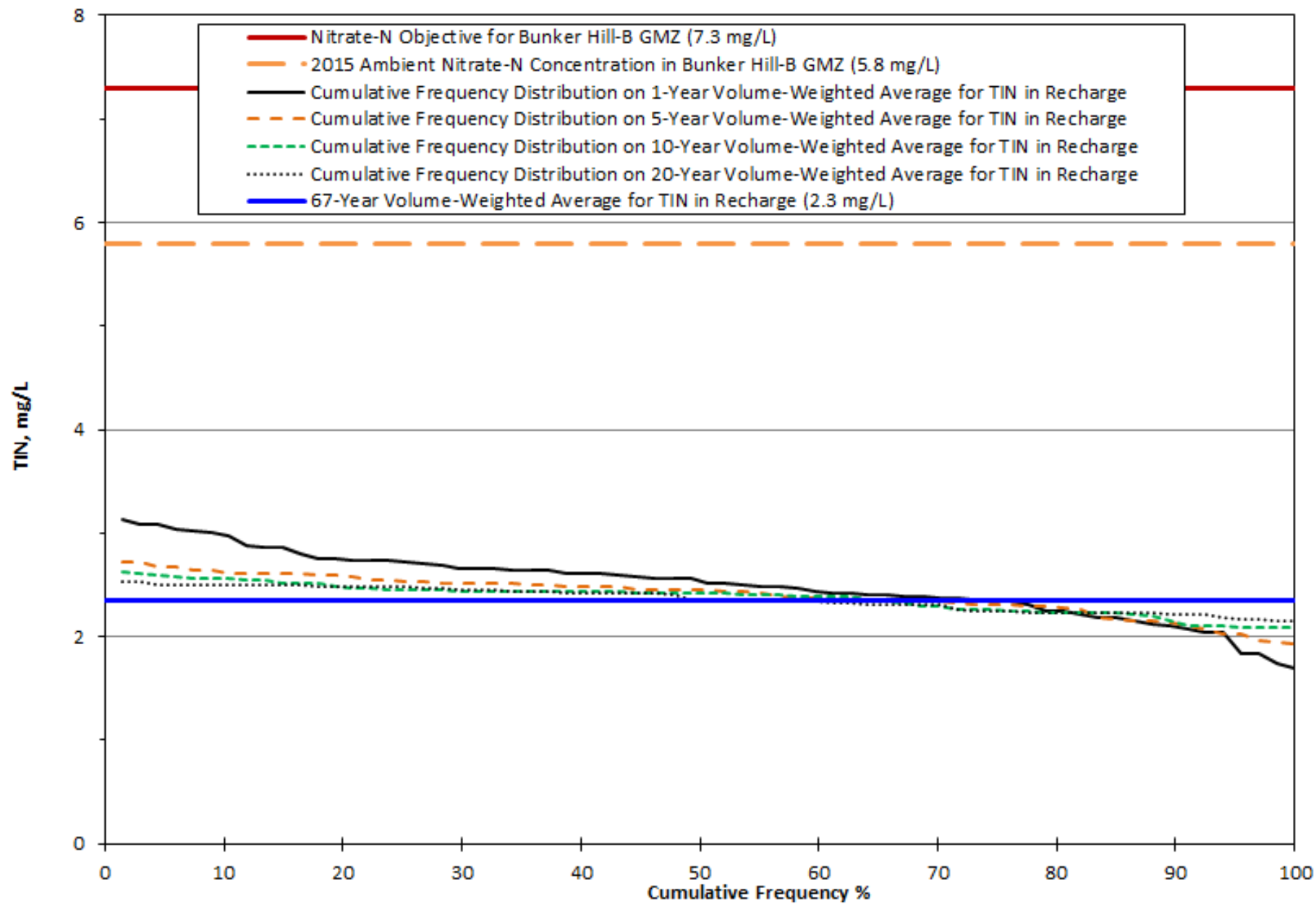
Estimated Annual Streambed Recharge and Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ Scenario B - 2020 Most Likely Discharge



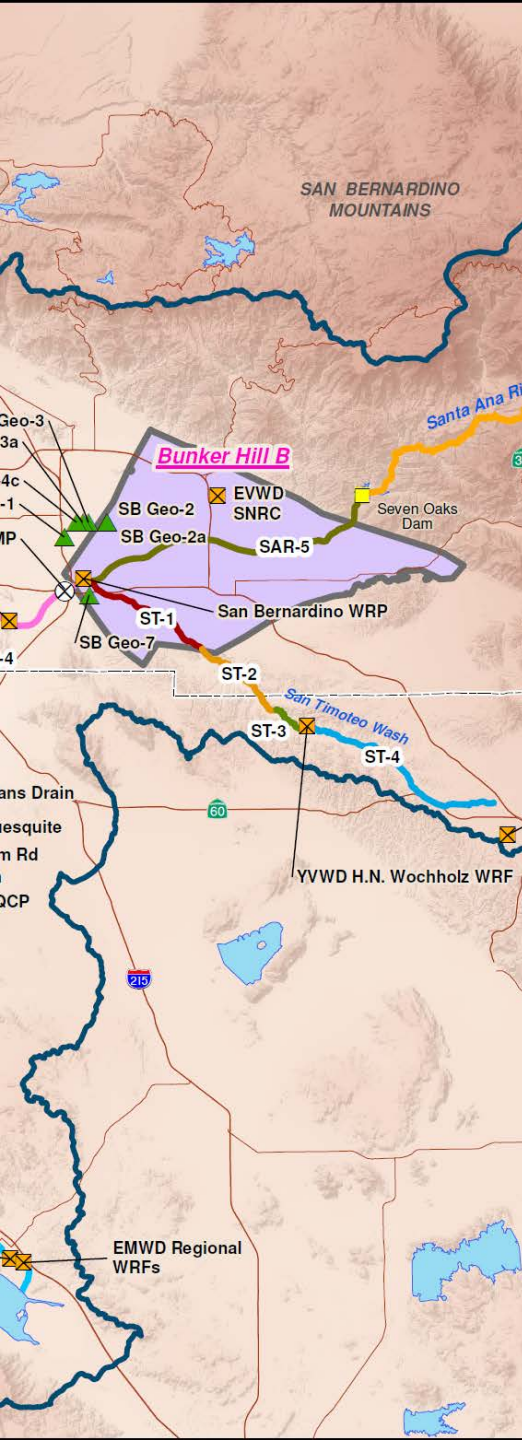
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



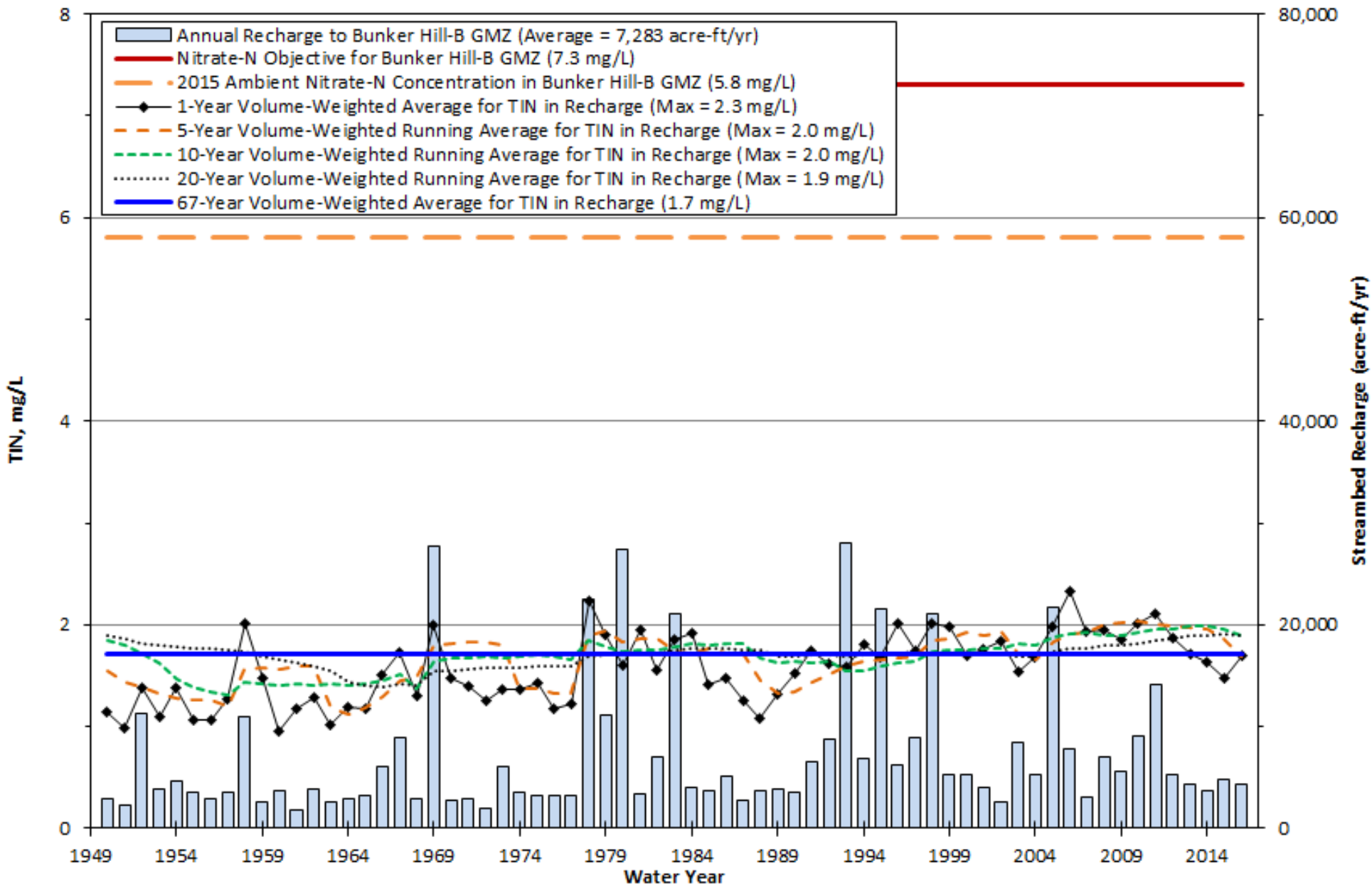
**Estimated Cumulative Frequency Distribution on Volume-Weighted TIN Concentration
of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario B - 2020 Most Likely Discharge**



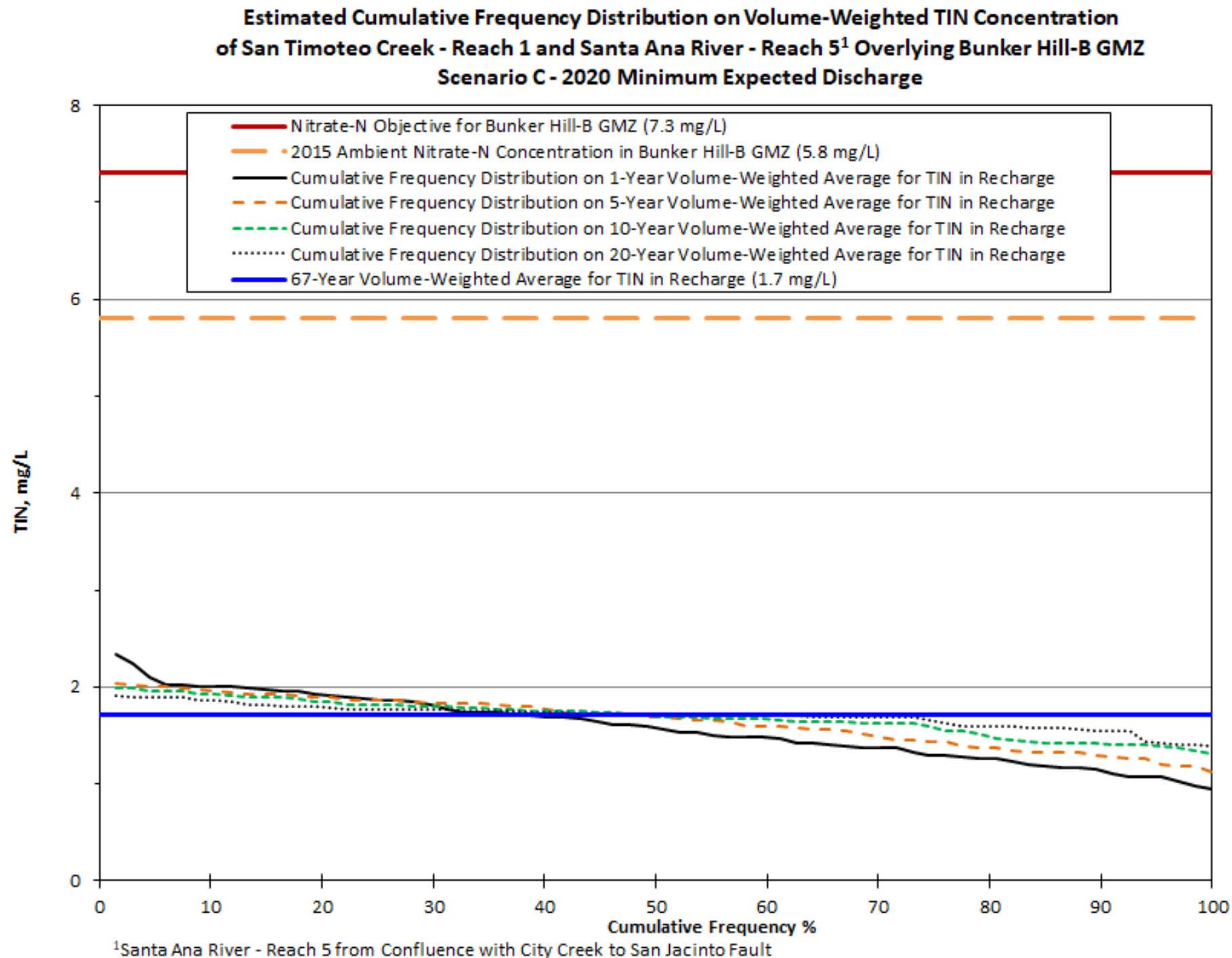
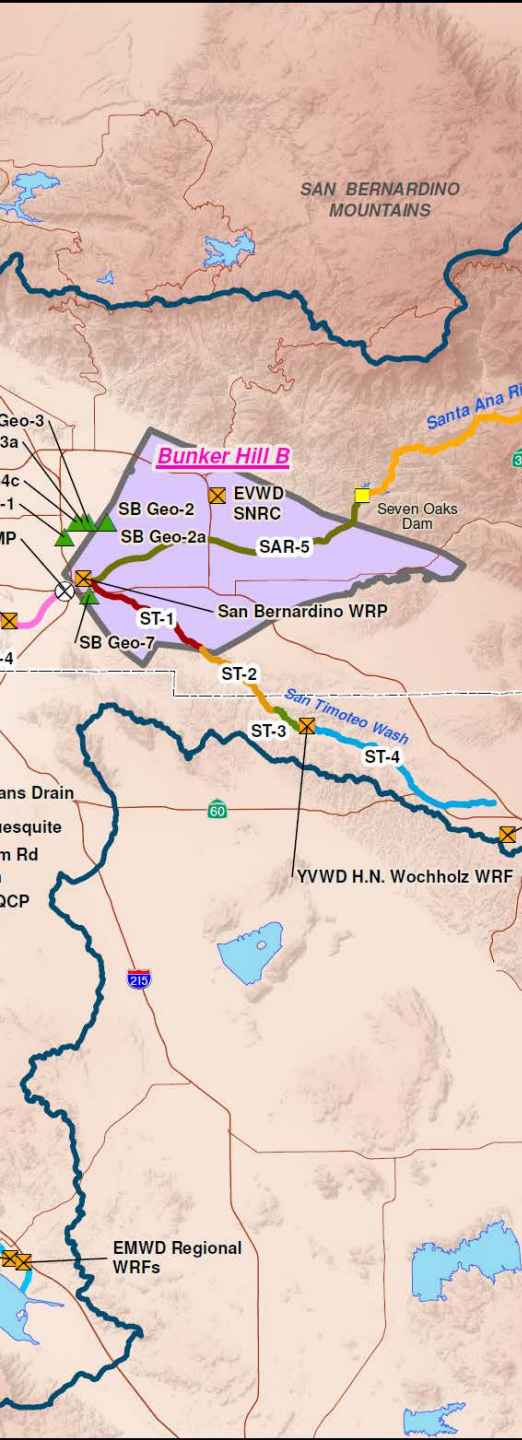
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault

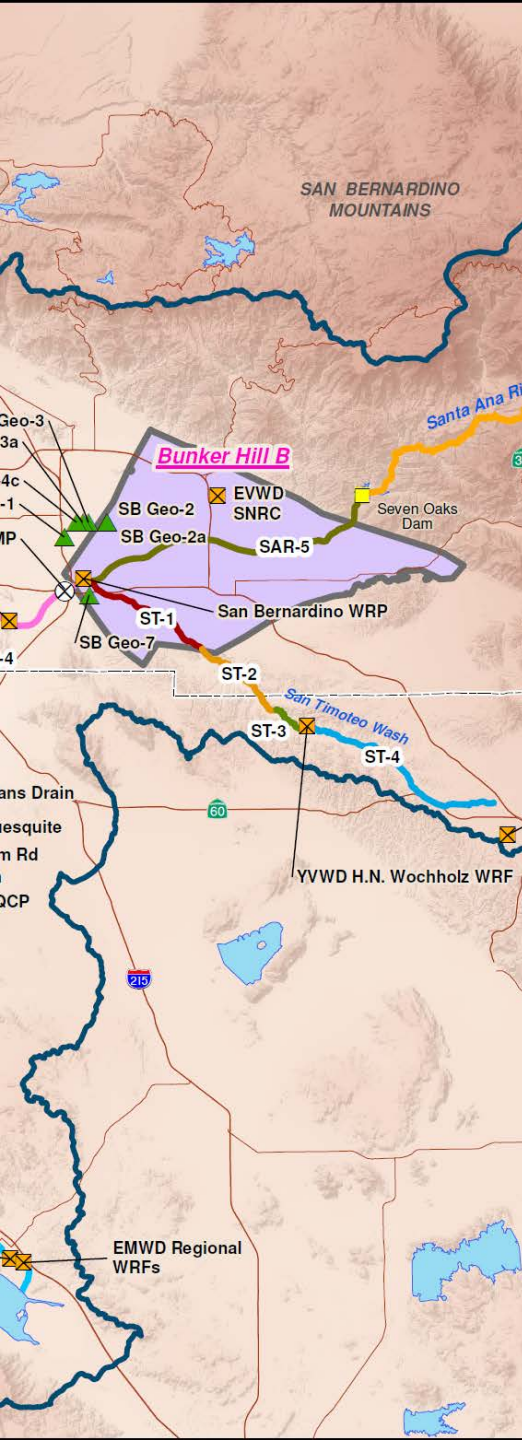


Estimated Annual Streambed Recharge and Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario C - 2020 Minimum Expected Discharge

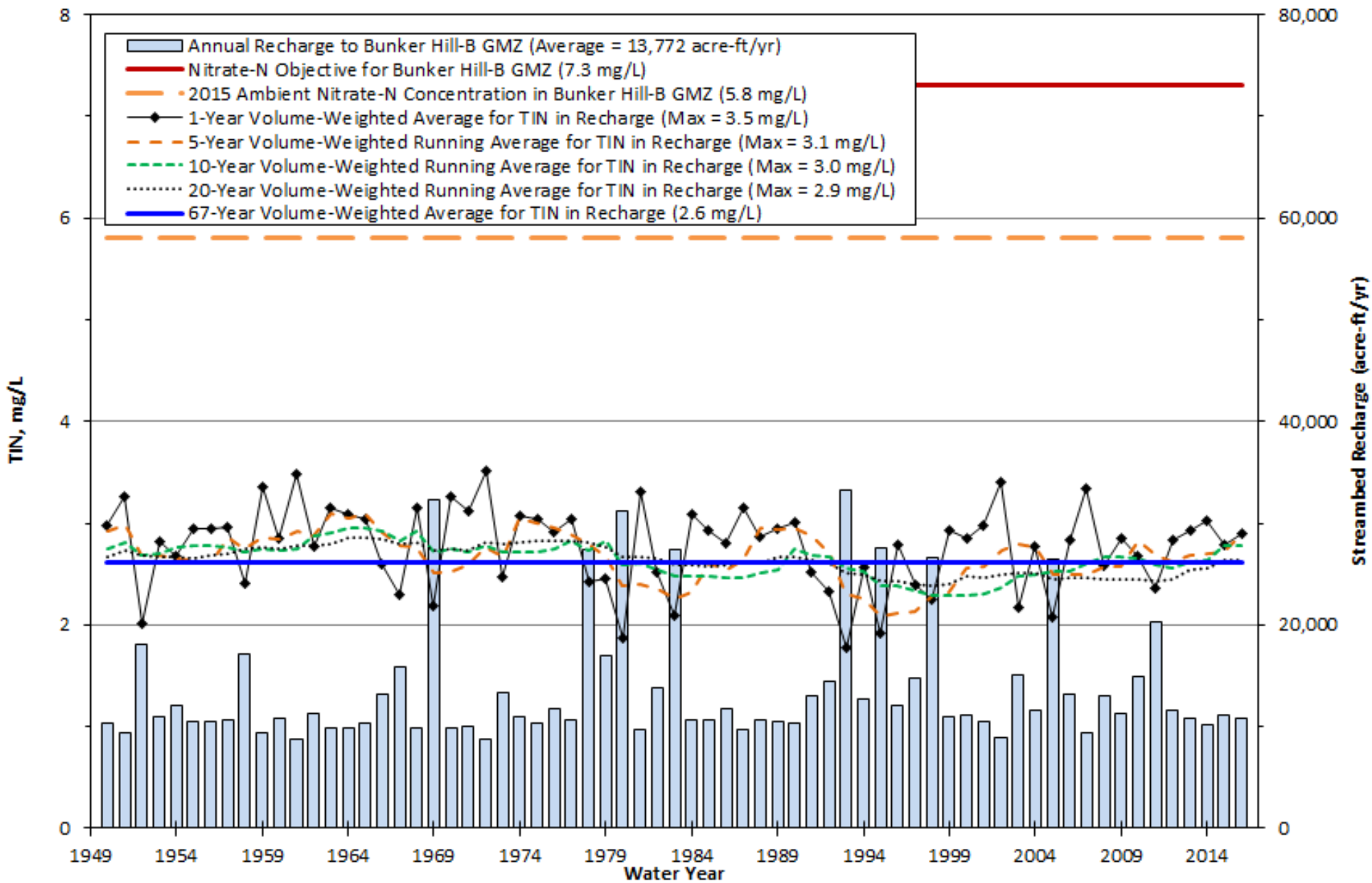


¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault

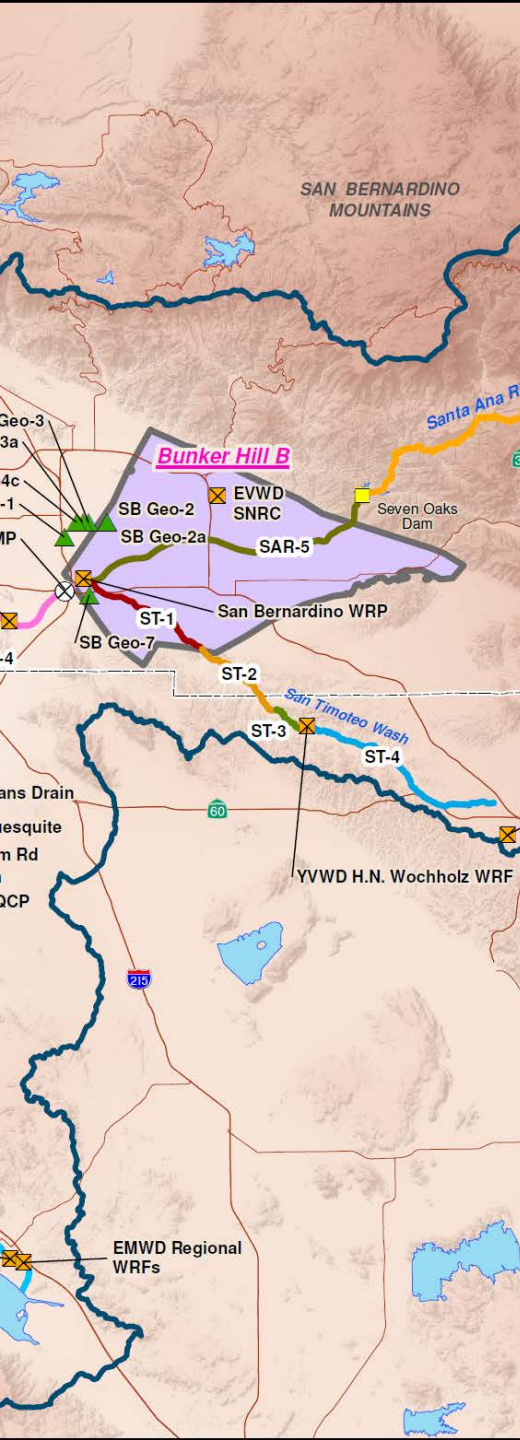




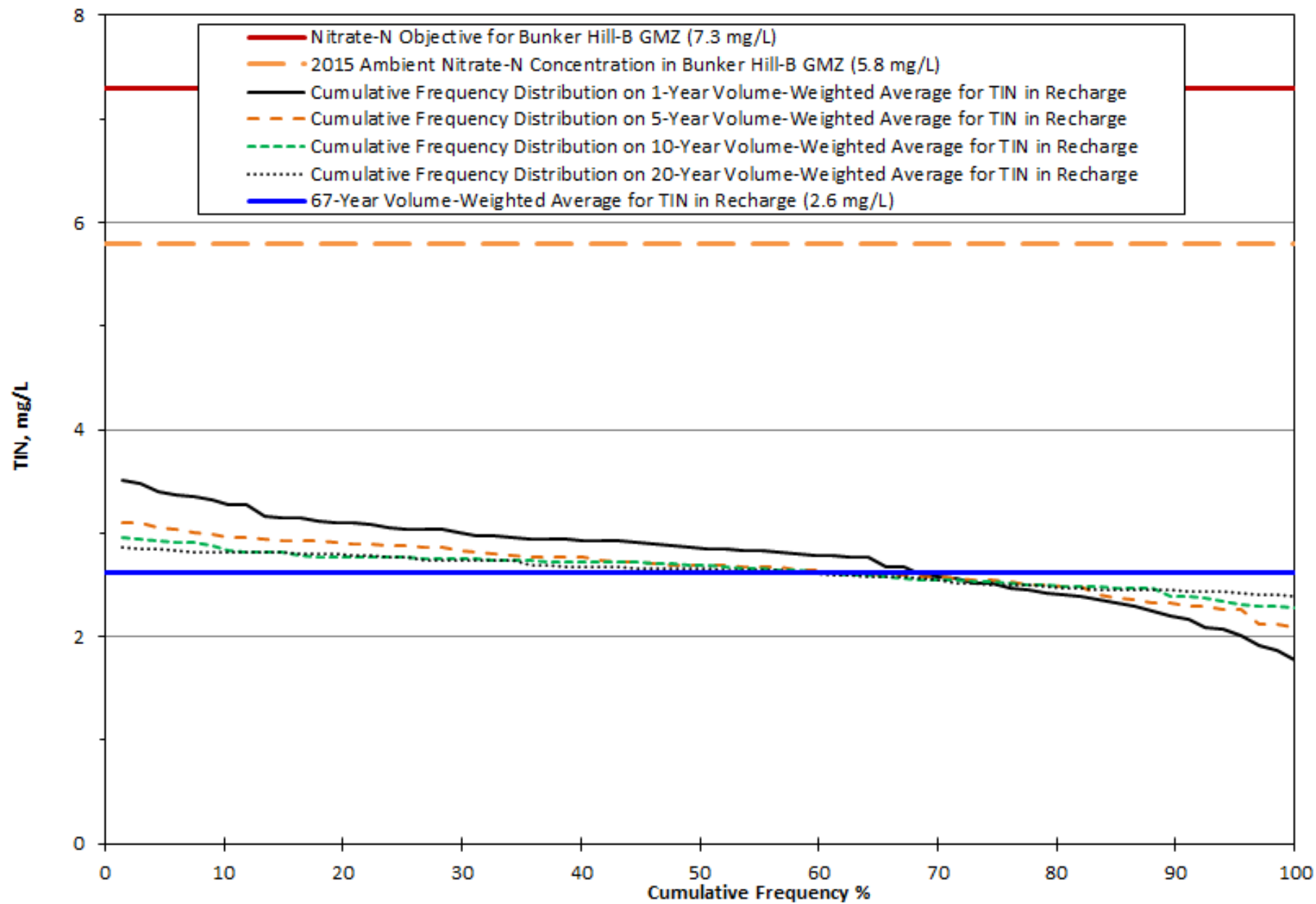
**Estimated Annual Streambed Recharge and Volume-Weighted TIN Concentration
of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario D - 2040 Maximum Expected Discharge**



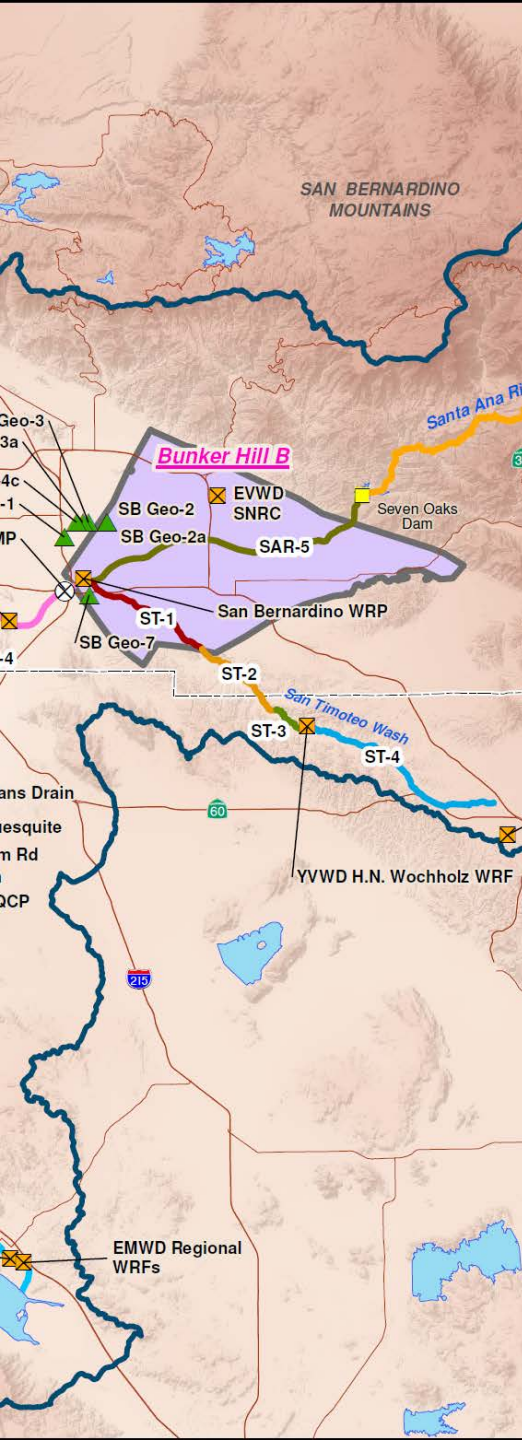
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



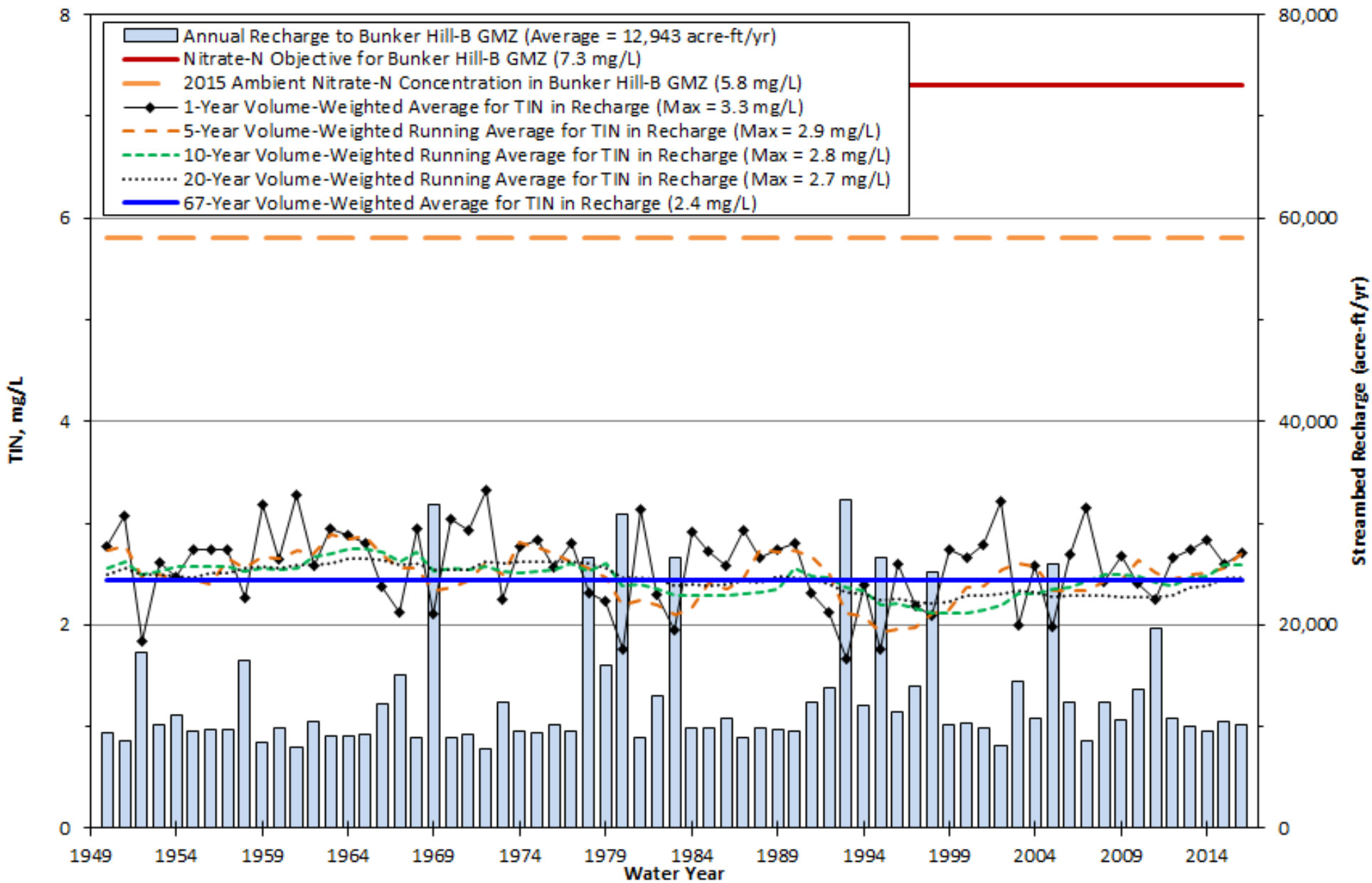
**Estimated Cumulative Frequency Distribution on Volume-Weighted TIN Concentration
of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario D - 2040 Maximum Expected Discharge**



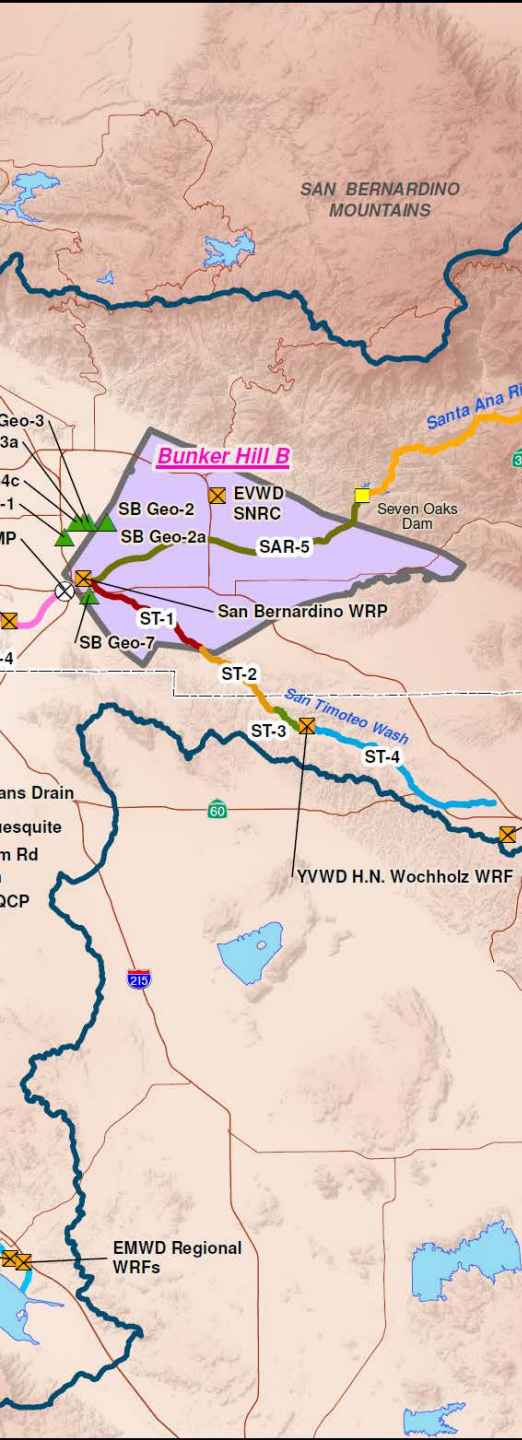
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



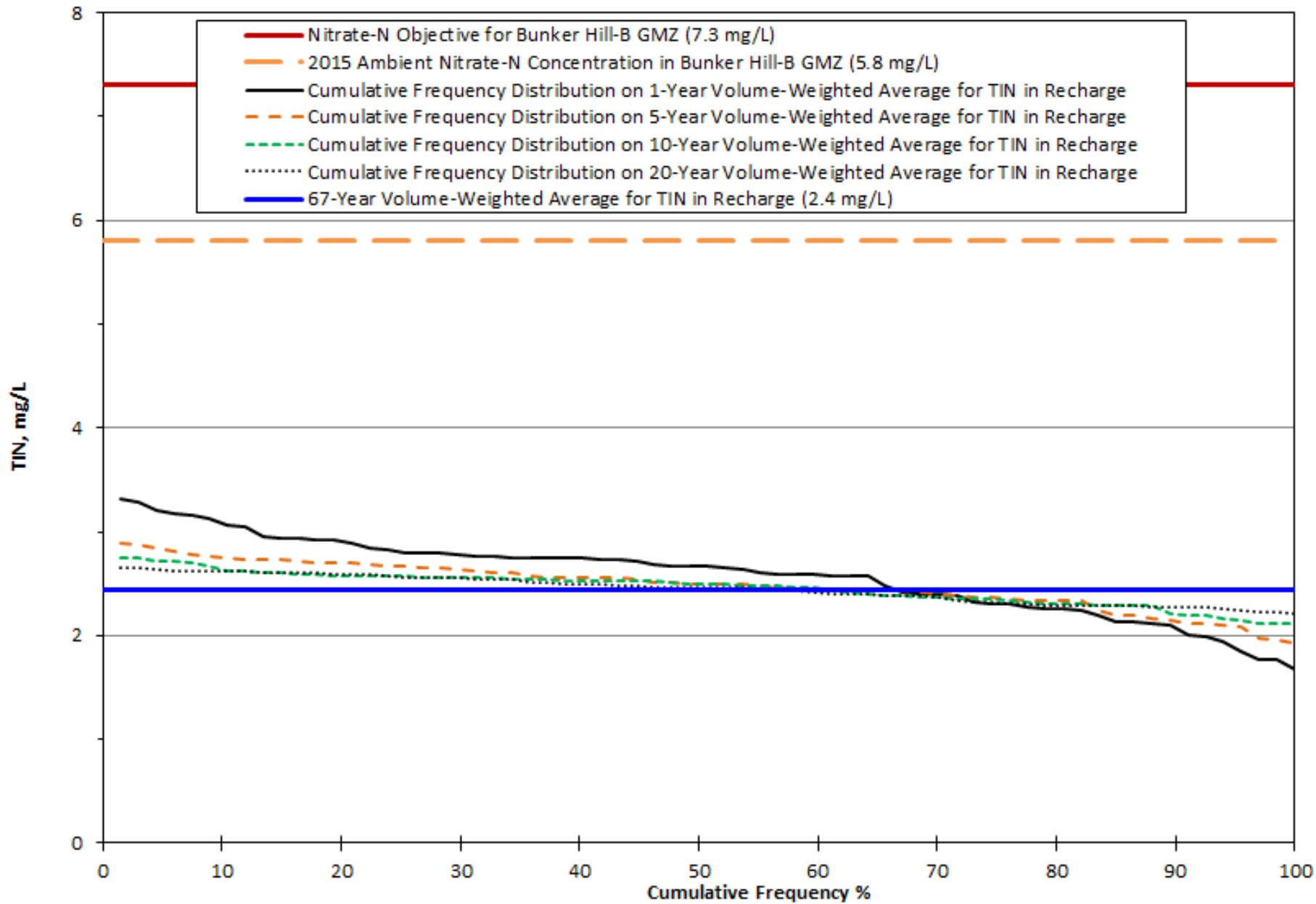
**Estimated Annual Streambed Recharge and Volume-Weighted TIN Concentration
of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario E - 2040 Most Likely Discharge**



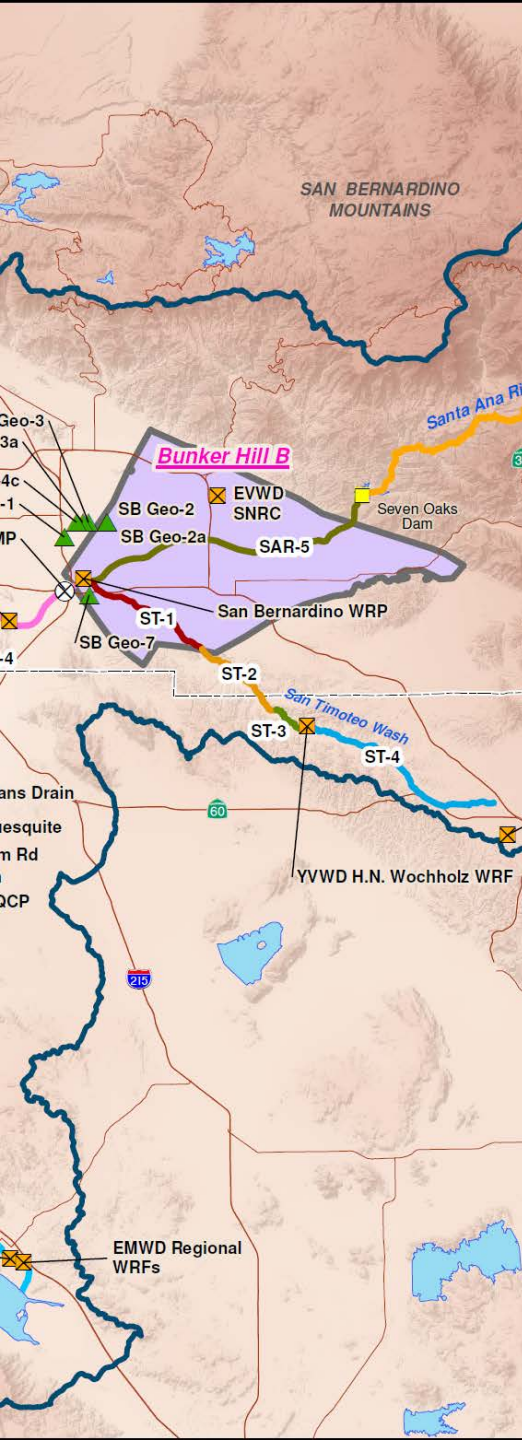
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



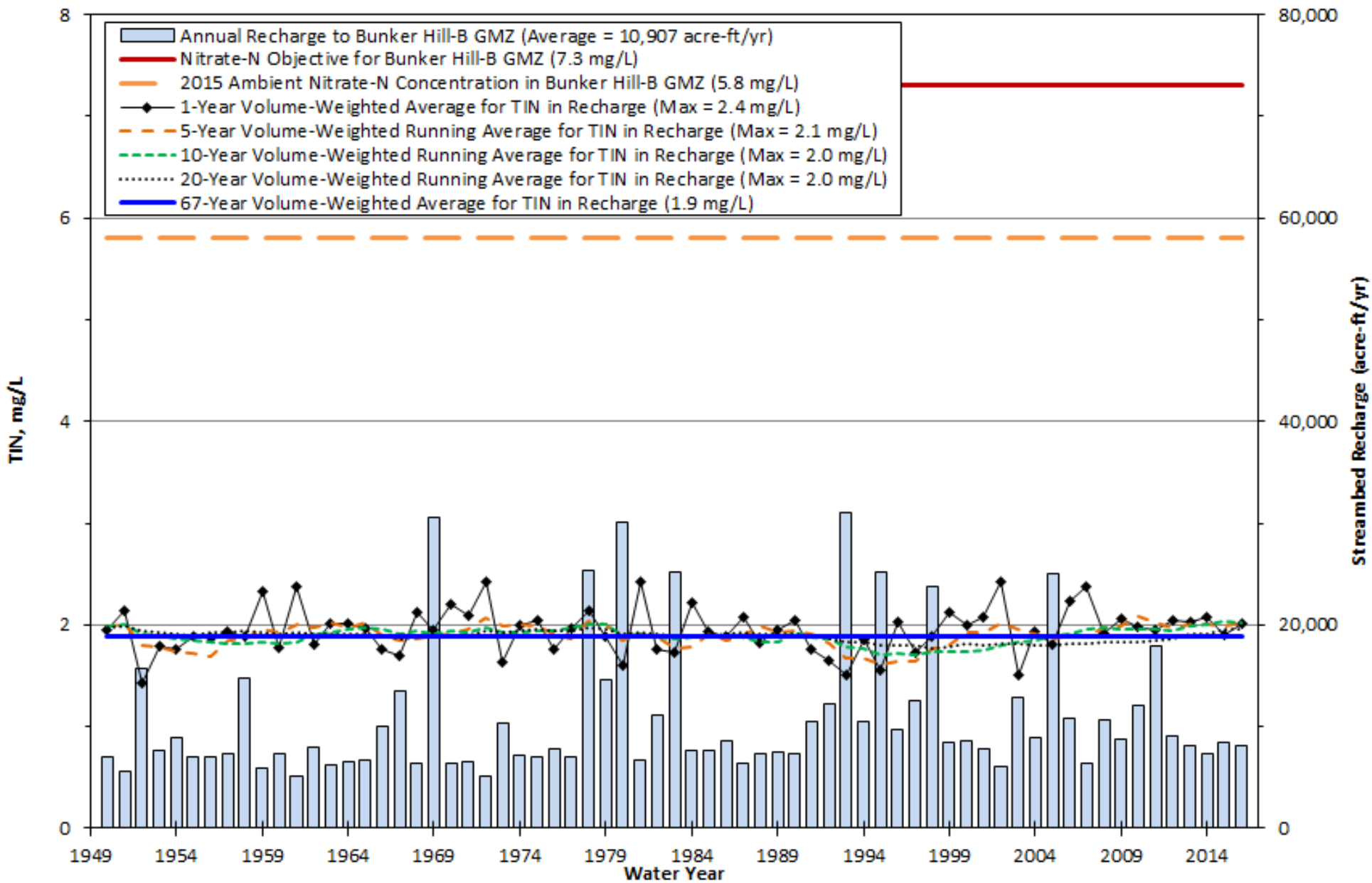
**Estimated Cumulative Frequency Distribution on Volume-Weighted TIN Concentration
of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ
Scenario E - 2040 Most Likely Discharge**



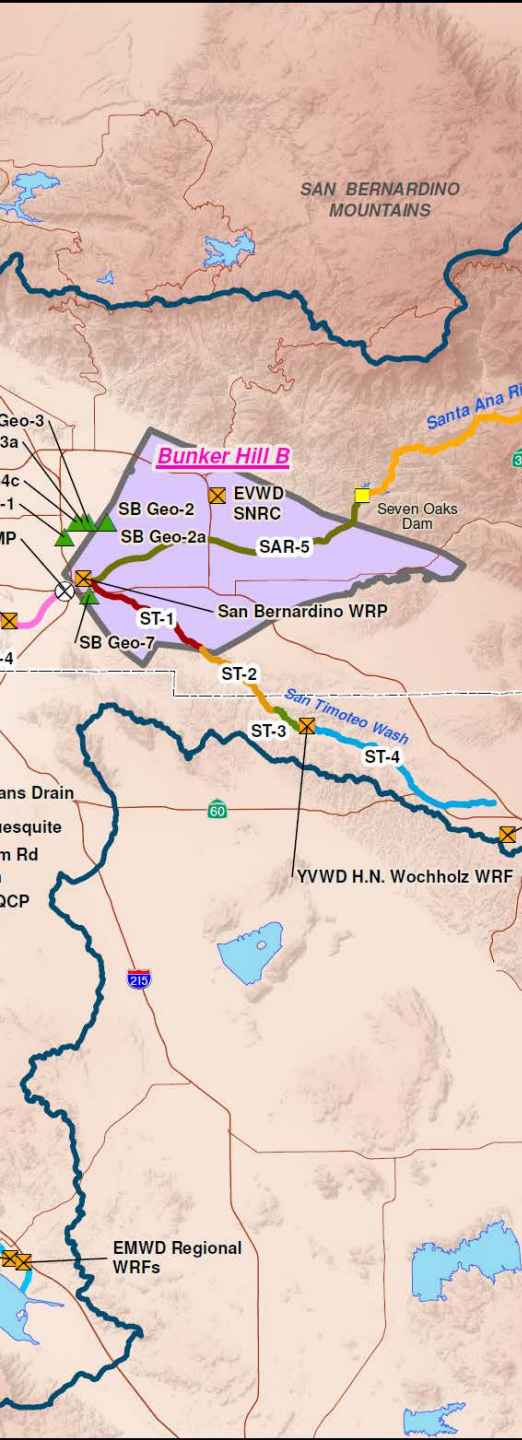
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



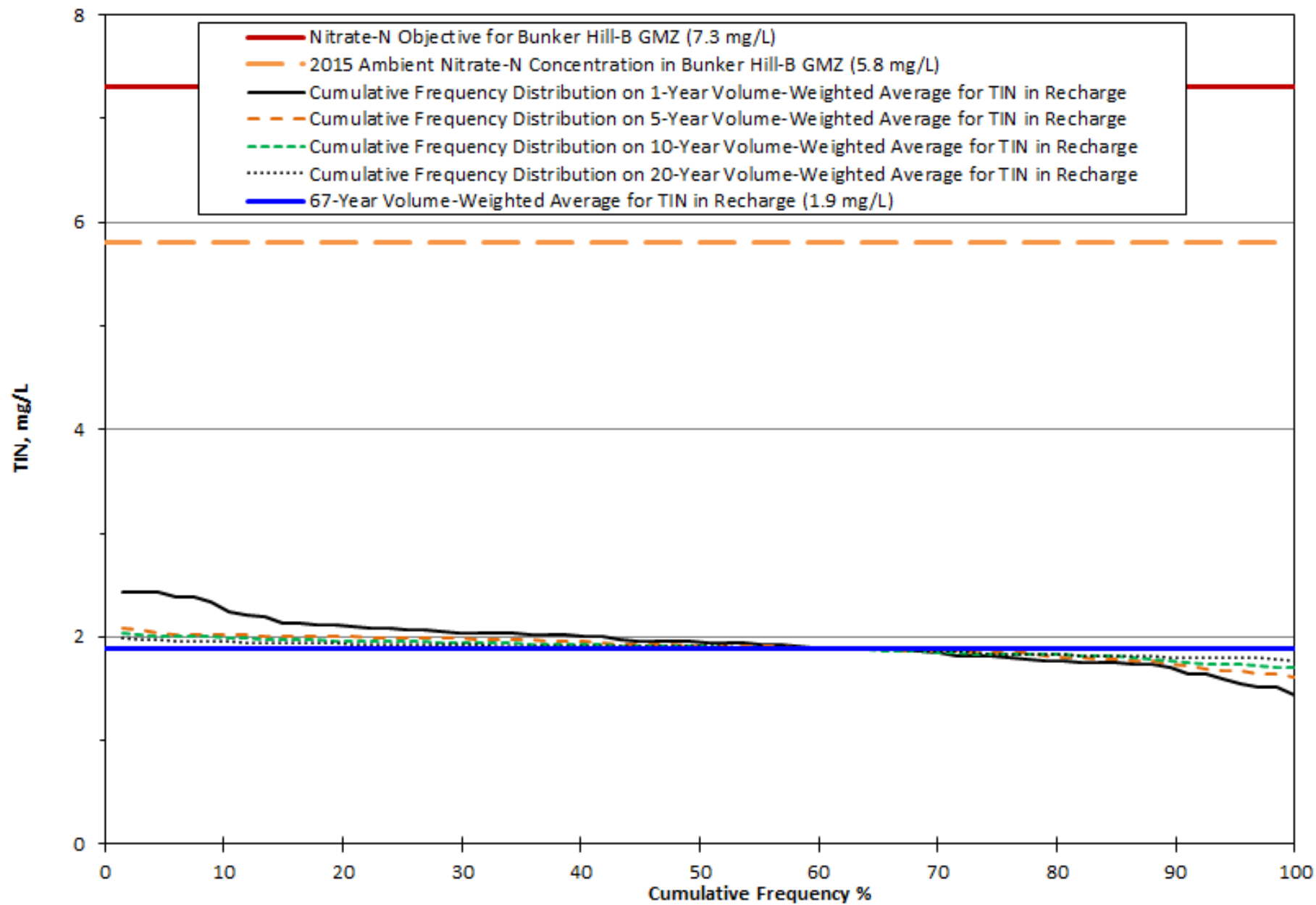
Estimated Annual Streambed Recharge and Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ Scenario F - 2040 Minimum Expected Discharge



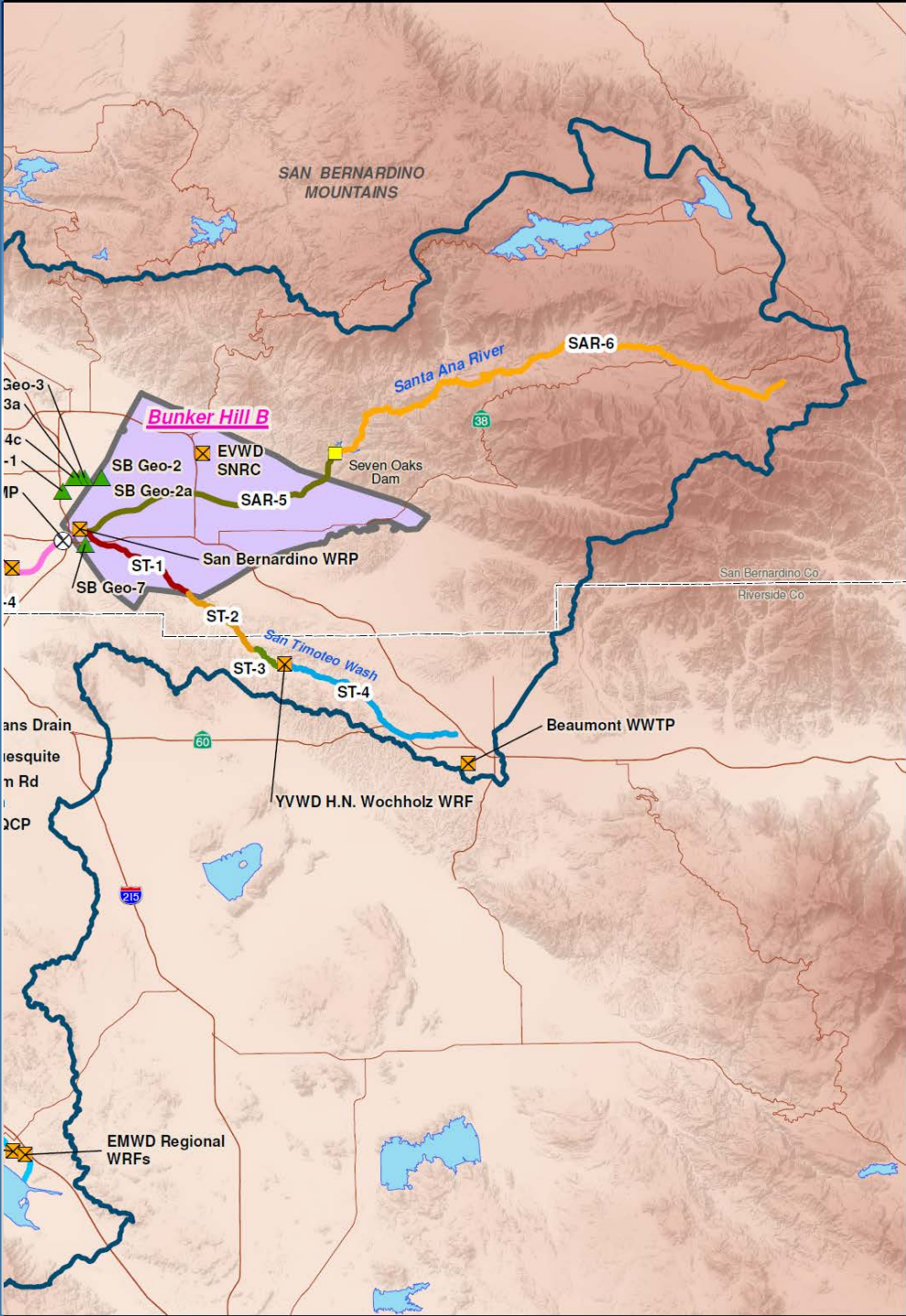
¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



Estimated Cumulative Frequency Distribution on Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5¹ Overlying Bunker Hill-B GMZ Scenario F - 2040 Minimum Expected Discharge



¹Santa Ana River - Reach 5 from Confluence with City Creek to San Jacinto Fault



San Timoteo Creek – Reach 1; Santa Ana River - Reach 5 Overlying Bunker Hill-B GMZ

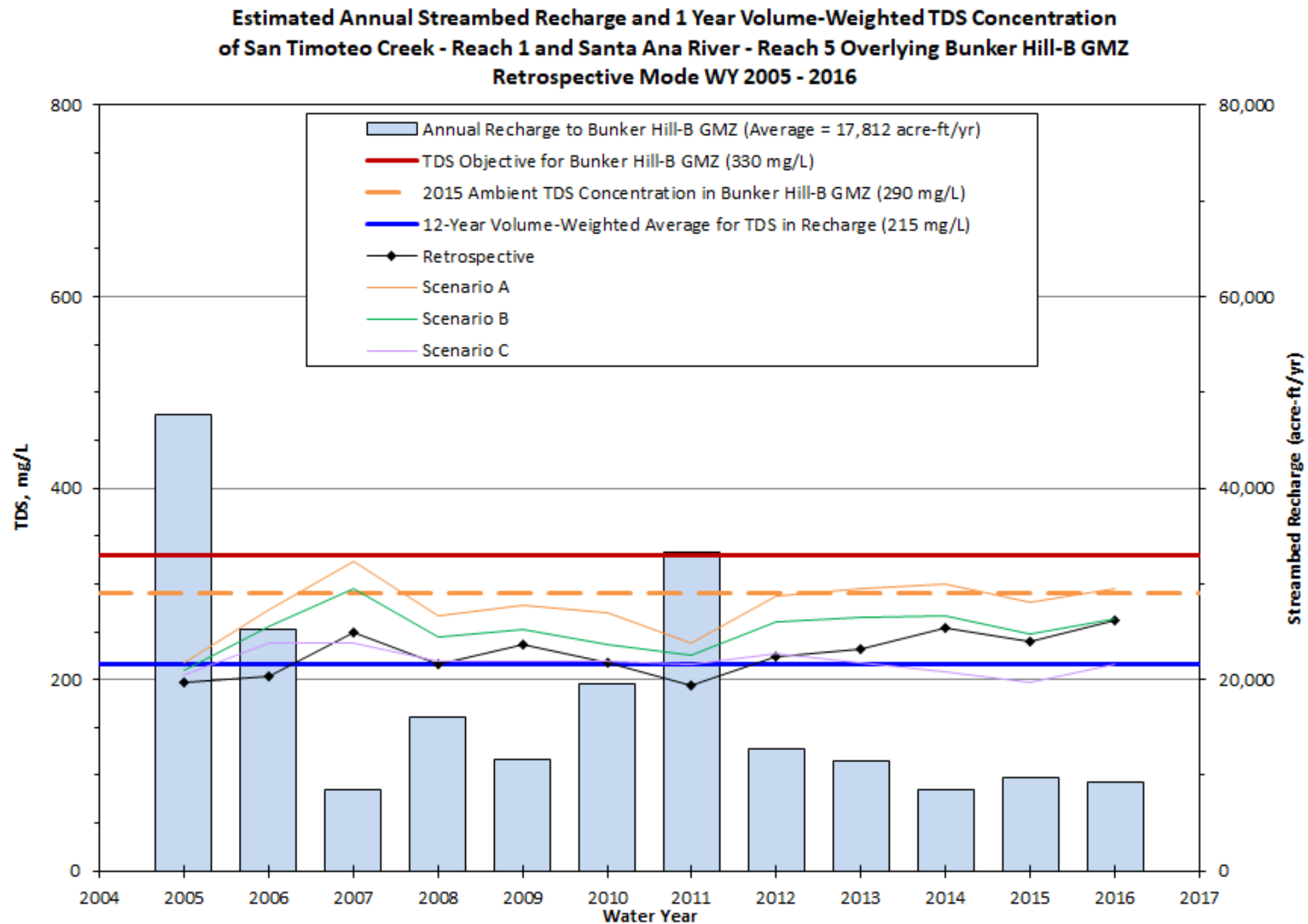
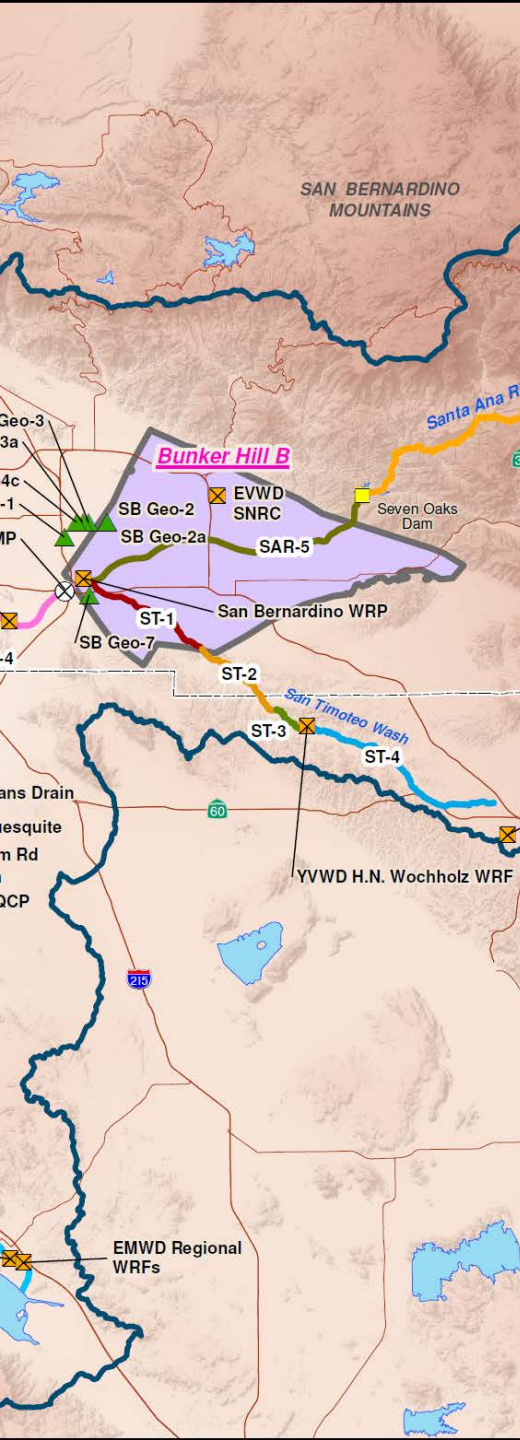
Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

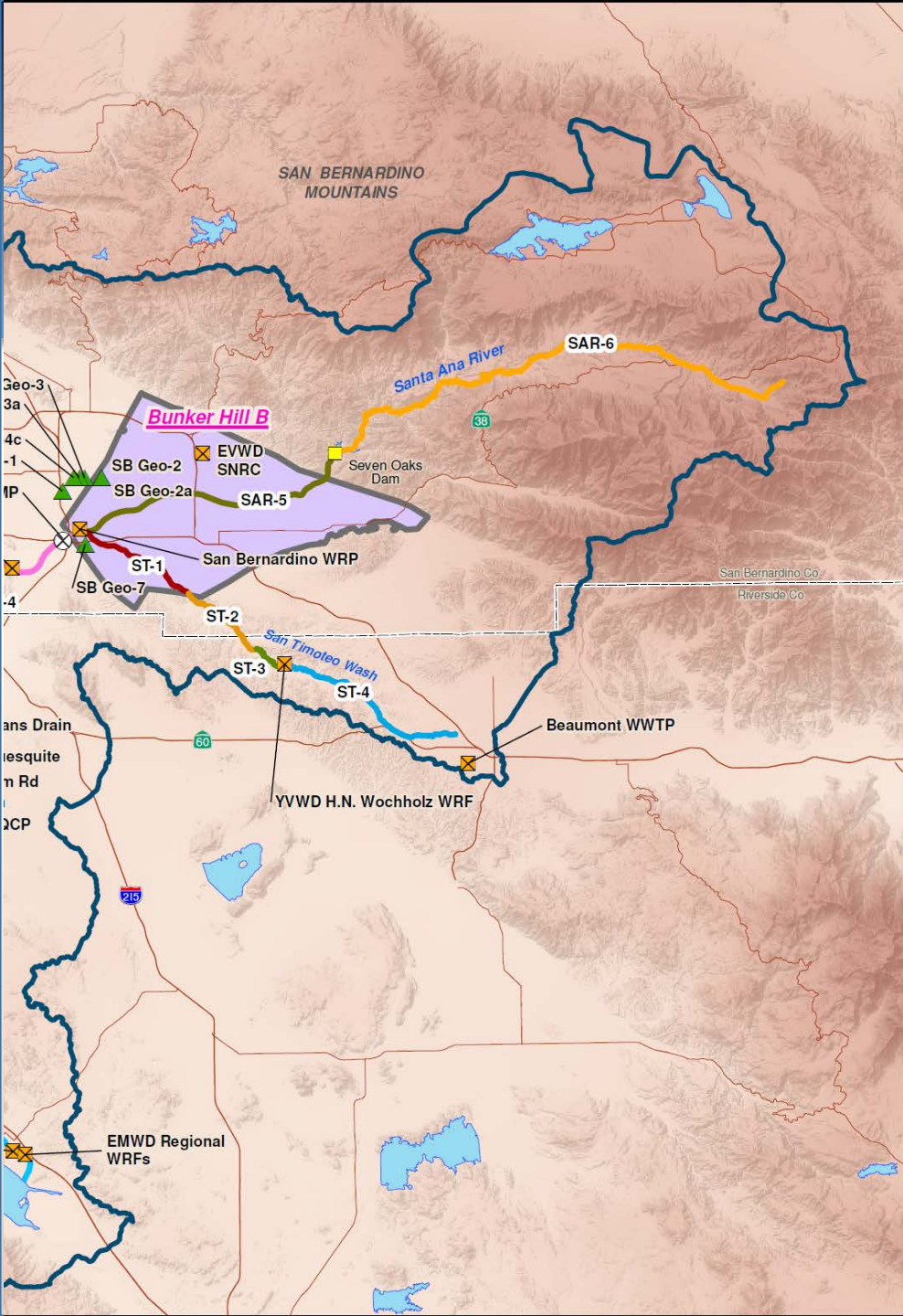
Original Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	SCE D	SCE E	SCE F
					2020 Expect Discharge			2040 Expect Discharge		
					Max.	Ave.	Min.	Max.	Ave.	Min.
TIN	7.3	5.8	1.5	1-year	3.86	3.13	2.33	3.51	3.32	2.43
				5-year	3.50	2.72	2.04	3.10	2.90	2.09
				10-year	3.34	2.62	1.99	2.96	2.75	2.04
				20-year	3.17	2.50	1.91	2.82	2.63	1.98

Revised Calculation

TIN	7.3	5.8	1.5	1-year	3.63	3.25	2.84	3.35	3.23	2.81
				5-year	3.21	2.69	2.36	2.83	2.67	2.28
				10-year	3.09	2.62	2.27	2.74	2.59	2.21
				20-year	2.88	2.50	2.19	2.61	2.48	2.13





San Timoteo Creek – Reach 1; Santa Ana River - Reach 5 Overlying Bunker Hill-B GMZ

Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

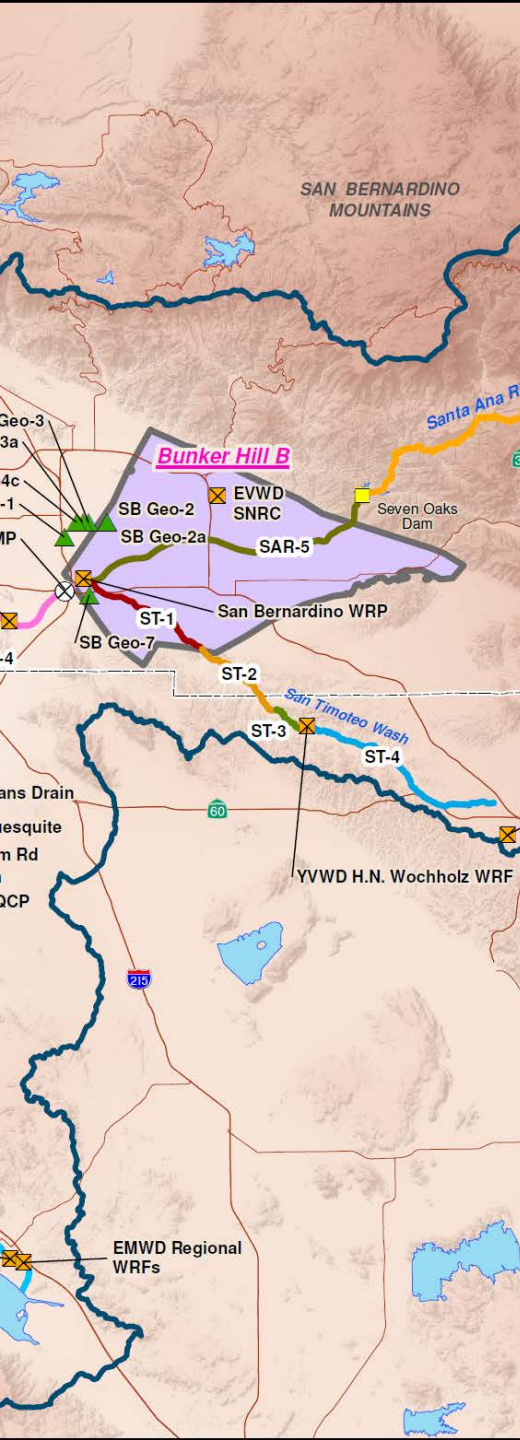
Original Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TDS	330	290	40	1-year	346	316	245	310
				5-year	320	278	217	272
				10-year	305	263	212	249
				20-year	291	248	207	na

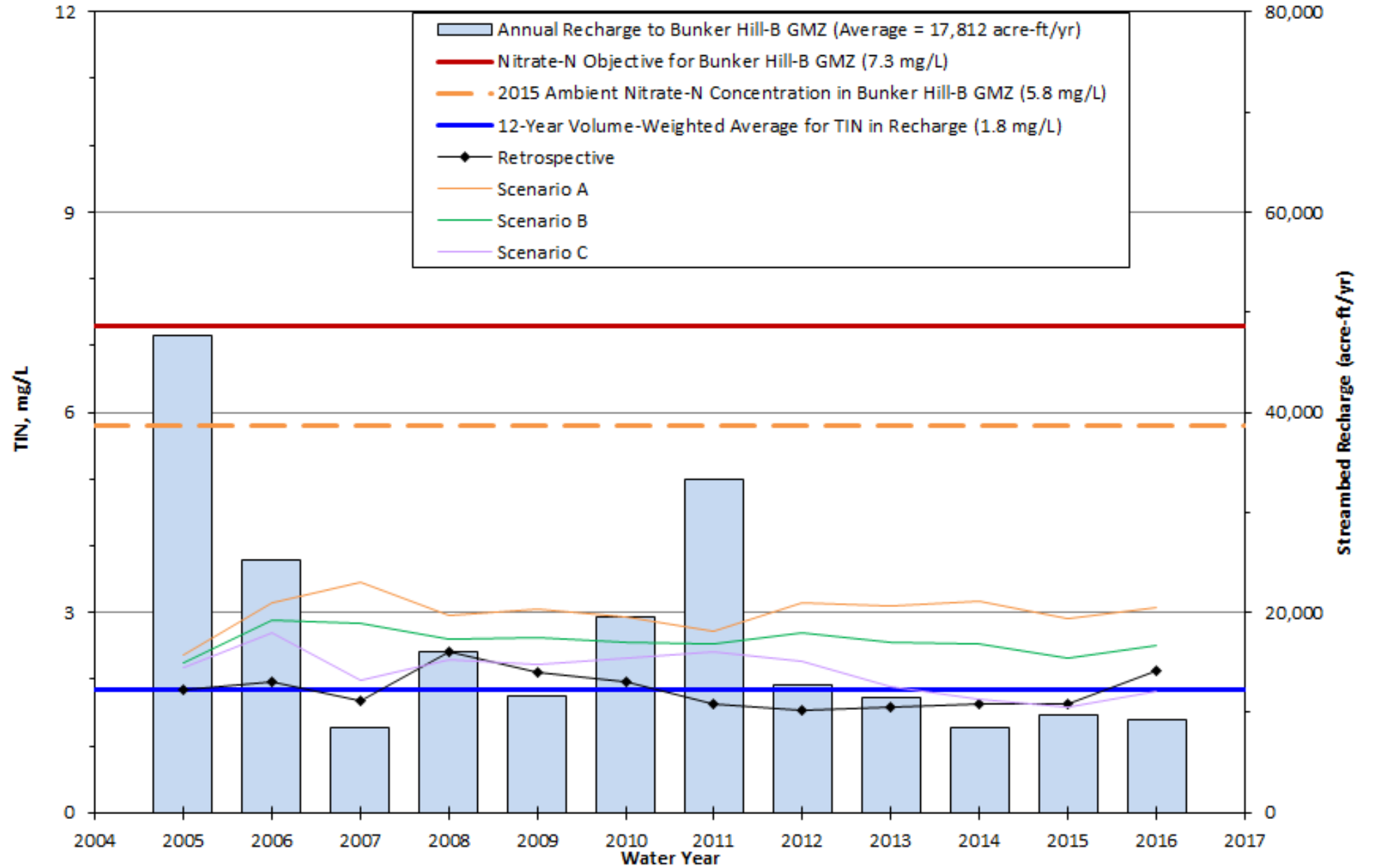
Revised Calculation

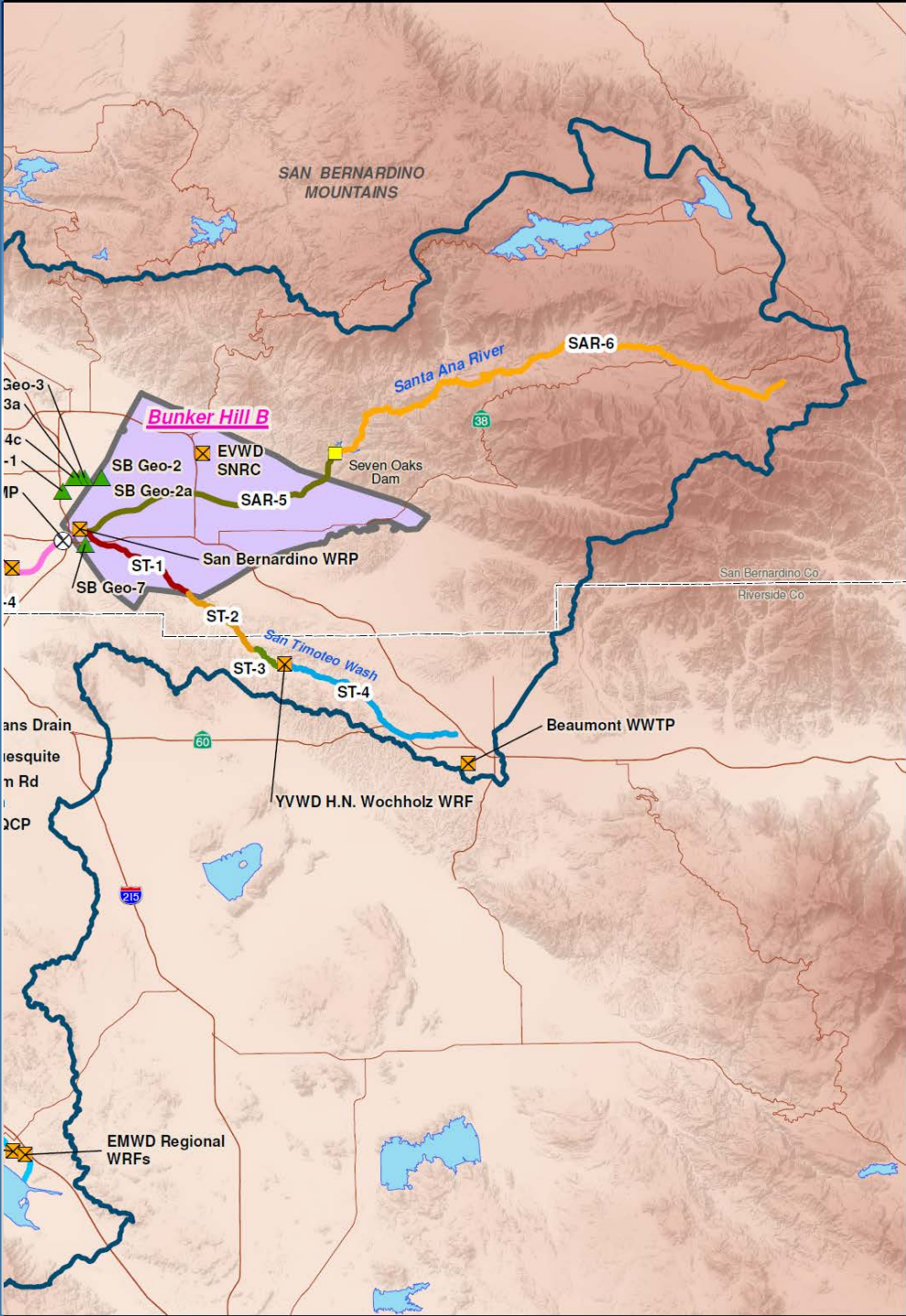
TDS	330	290	40	1-year	328	294	239	262
				5-year	294	261	226	241
				10-year	281	249	220	224
				20-year	264	240	216	na

Bold black values represent concentrations above ambient, but below objective.
Bold red values represent concentrations above basin objective.



Estimated Annual Streambed Recharge and 1 Year Volume-Weighted TIN Concentration of San Timoteo Creek - Reach 1 and Santa Ana River - Reach 5 Overlying Bunker Hill-B GMZ
Retrospective Mode WY 2005 - 2016





San Timoteo Creek – Reach 1; Santa Ana River - Reach 5 Overlying Bunker Hill-B GMZ

Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

Original Calculation

	Objective	Ambient	Assimila- tive Capacity	Period	SCE A	SCE B	SCE C	Retrospective Mode WY 2005 - 2016
					2020 Expect Discharge			
					Max.	Ave.	Min.	
TIN	7.3	5.8	1.5	1-year	3.86	3.13	2.33	3.09
				5-year	3.50	2.72	2.04	2.43
				10-year	3.34	2.62	1.99	2.07
				20-year	3.17	2.50	1.91	na

Revised Calculation

TIN	7.3	5.8	1.5	1-year	3.63	3.25	2.84	2.41
				5-year	3.21	2.69	2.36	2.04
				10-year	3.09	2.62	2.27	1.91
				20-year	2.88	2.50	2.19	na

Overview

- Results from Task 3h – Recalculate Baseflow Average at Santa Ana River Below Prado Dam
- Results from Task 3i – Recalculate Streambed Recharge for Beaumont and Bunker Hill-B Groundwater Management Zones
- **Next Steps**