Santa Ana River Wasteload Allocation Model Update

Basin Monitoring Program Task Force

June 24, 2020

SAWPA

GEOSCIENCE

Overview

- WLAM Recalibration in Upper Temescal Valley GMZ
- WLAM Recalibration Results
- Changes in Assumptions of Predictive Scenarios
- Updated Results of Predictive Scenarios
- Overview of Revised Summary Report

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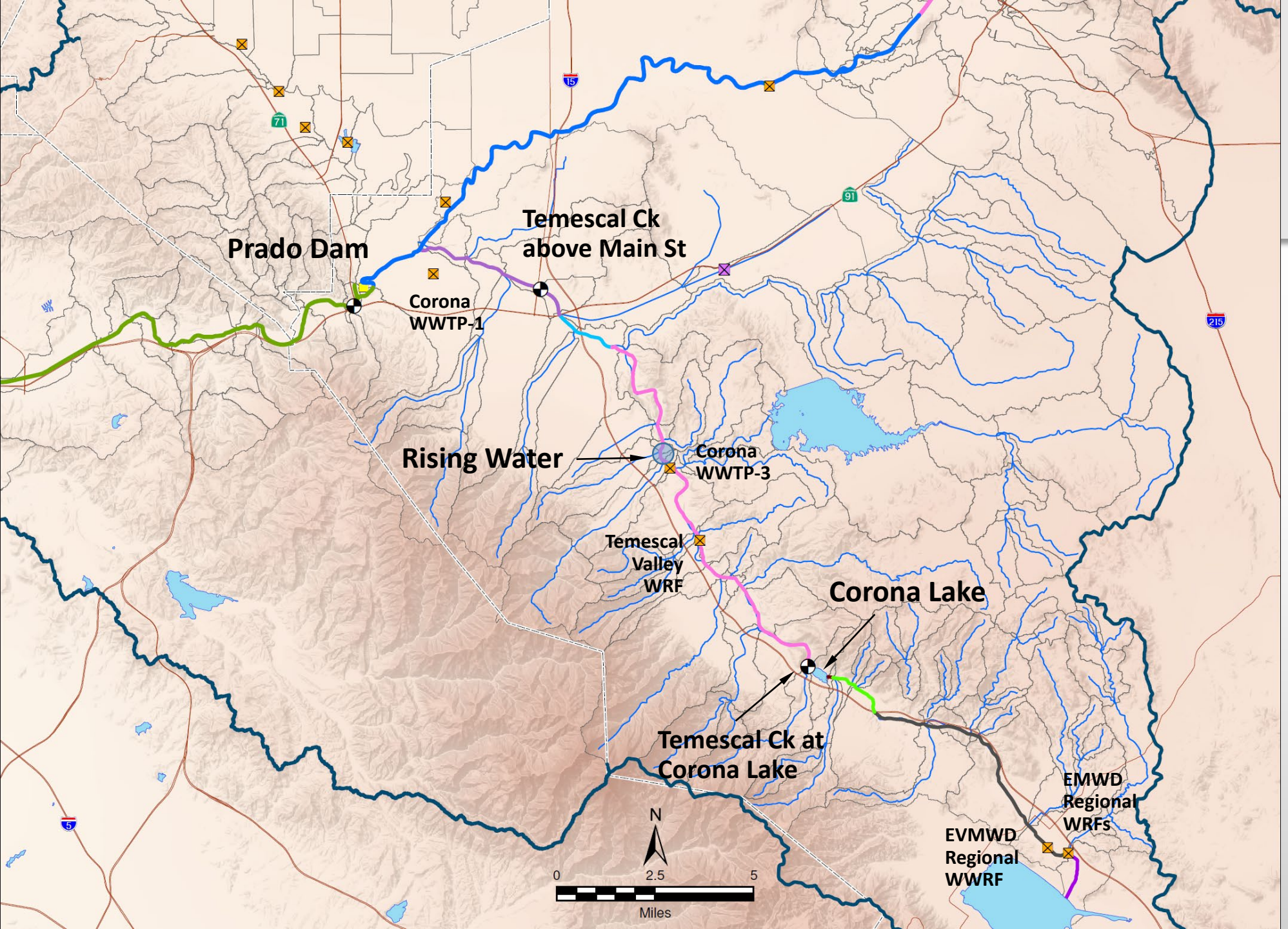
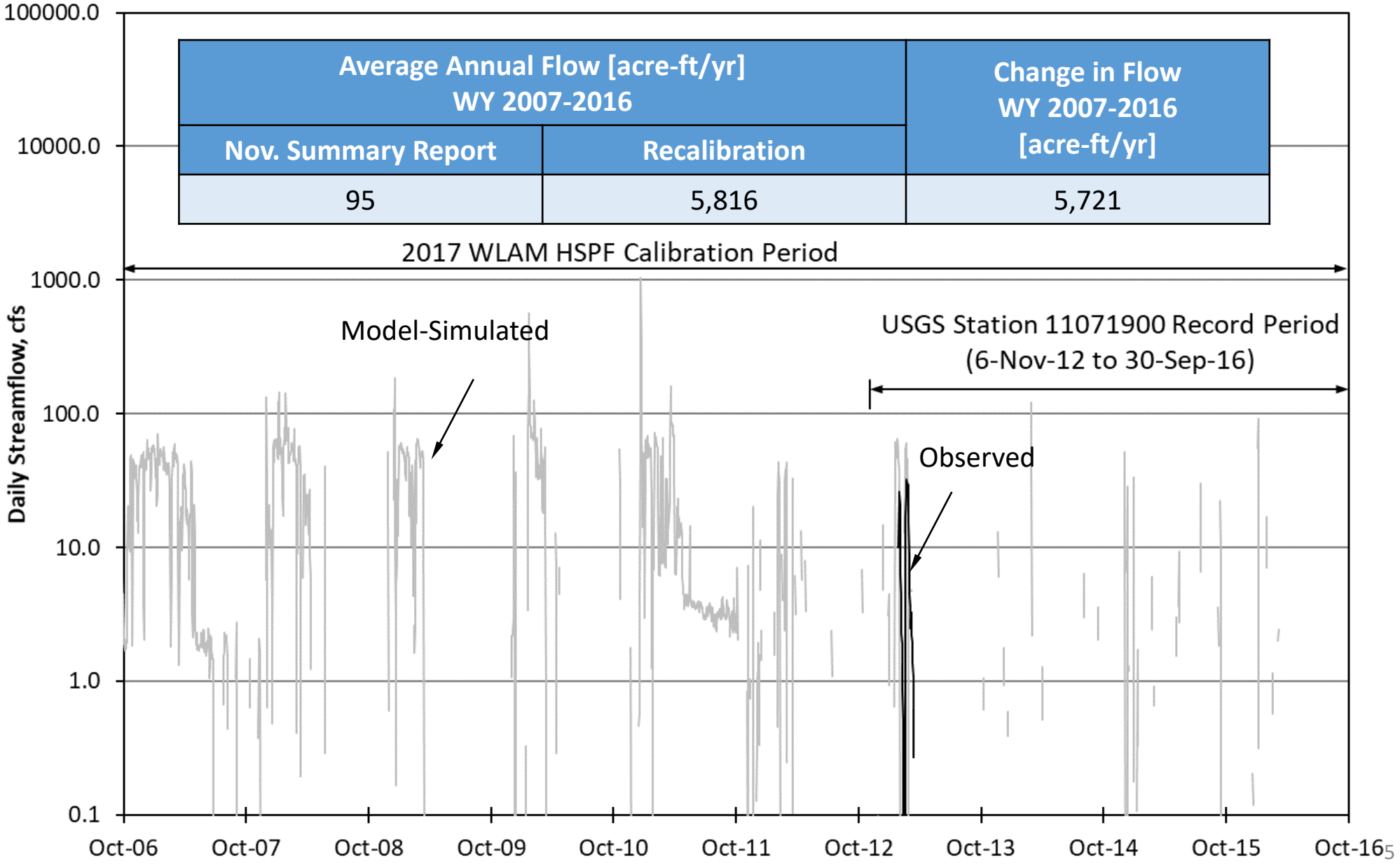
Temescal Creek Subwatersheds

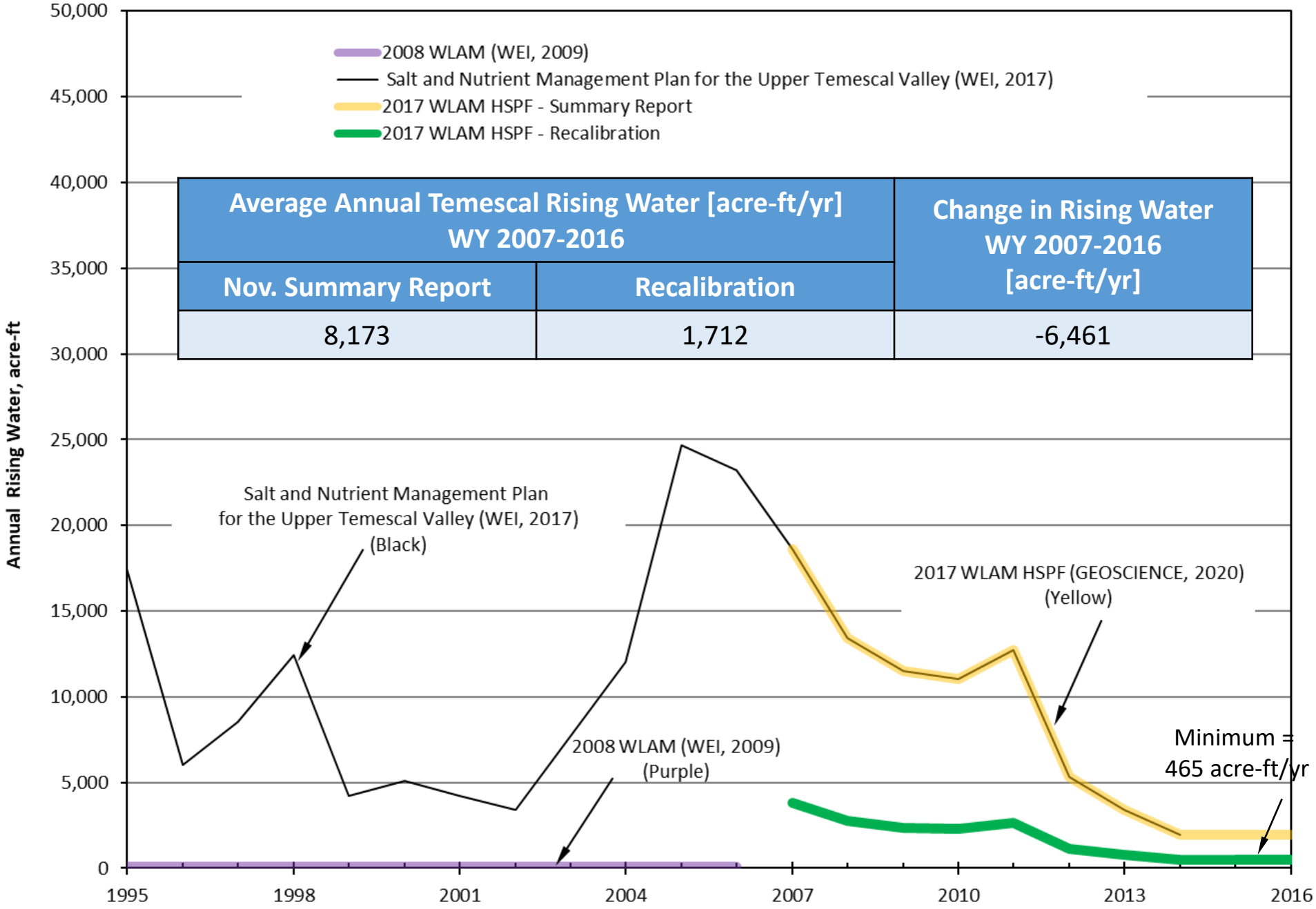


Daily Streamflow at Temescal Ck at Corona Lake

Average Annual Flow [acre-ft/yr] WY 2007-2016		Change in Flow WY 2007-2016 [acre-ft/yr]
Nov. Summary Report	Recalibration	
95	5,816	5,721



Annual Rising Water from Upper Temescal Valley to Temescal Creek



Average Annual Temescal Rising Water [acre-ft/yr] WY 2007-2016		Change in Rising Water WY 2007-2016 [acre-ft/yr]
Nov. Summary Report	Recalibration	
8,173	1,712	-6,461

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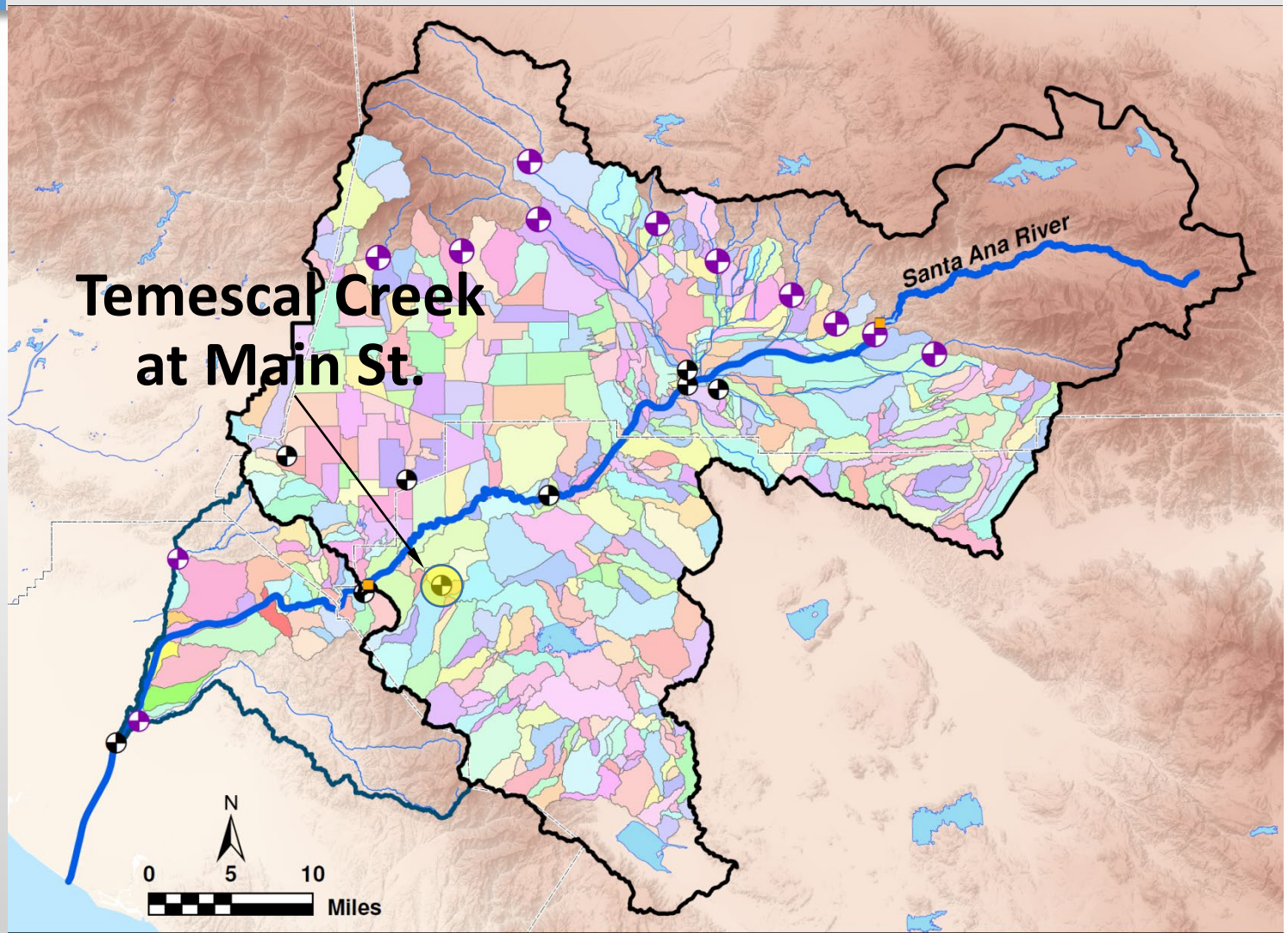
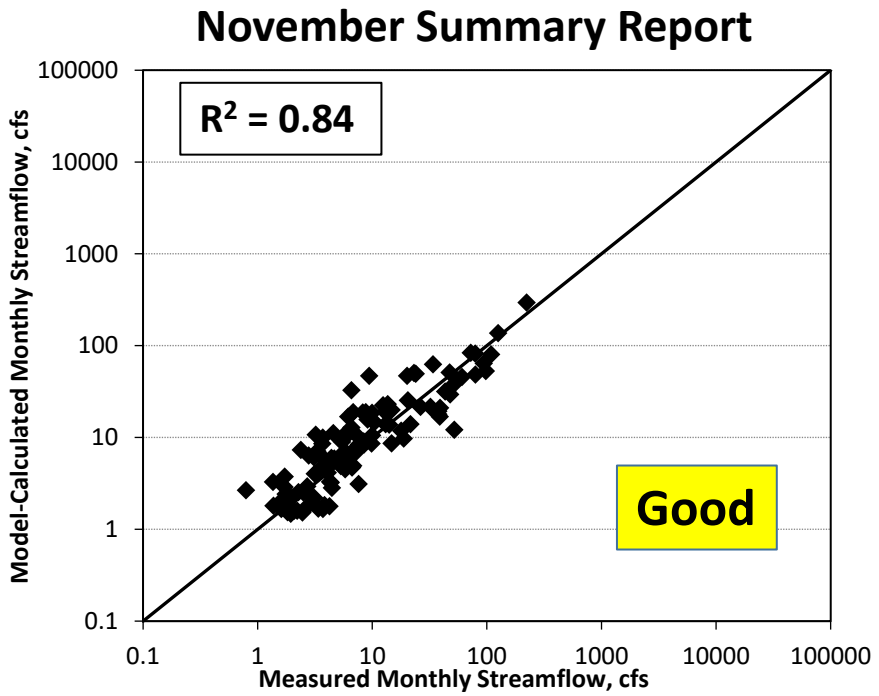
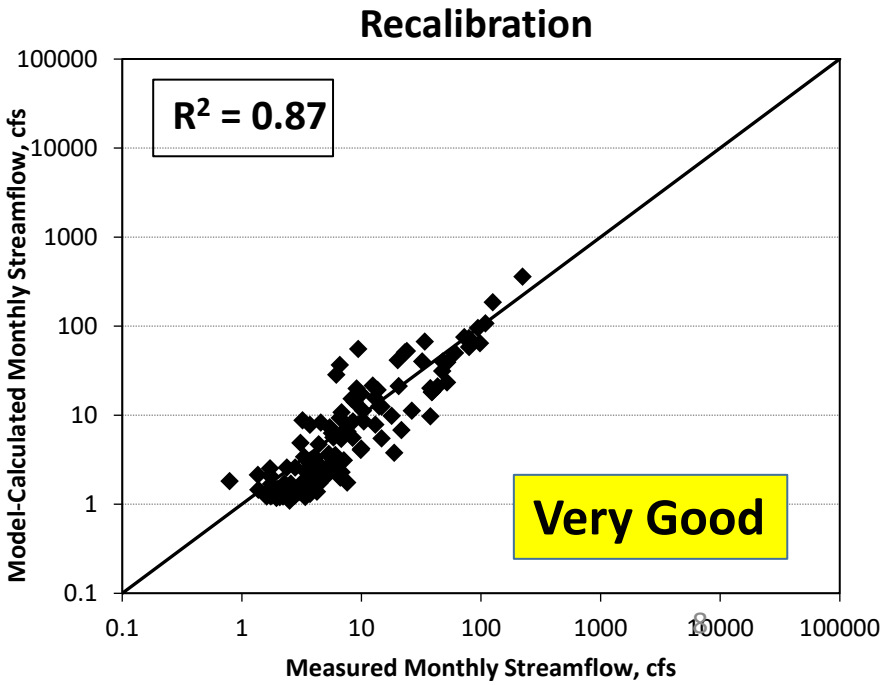
XY Scatter Plot of Monthly Streamflow –WY 2007-2016 Temescal Creek at Main St.



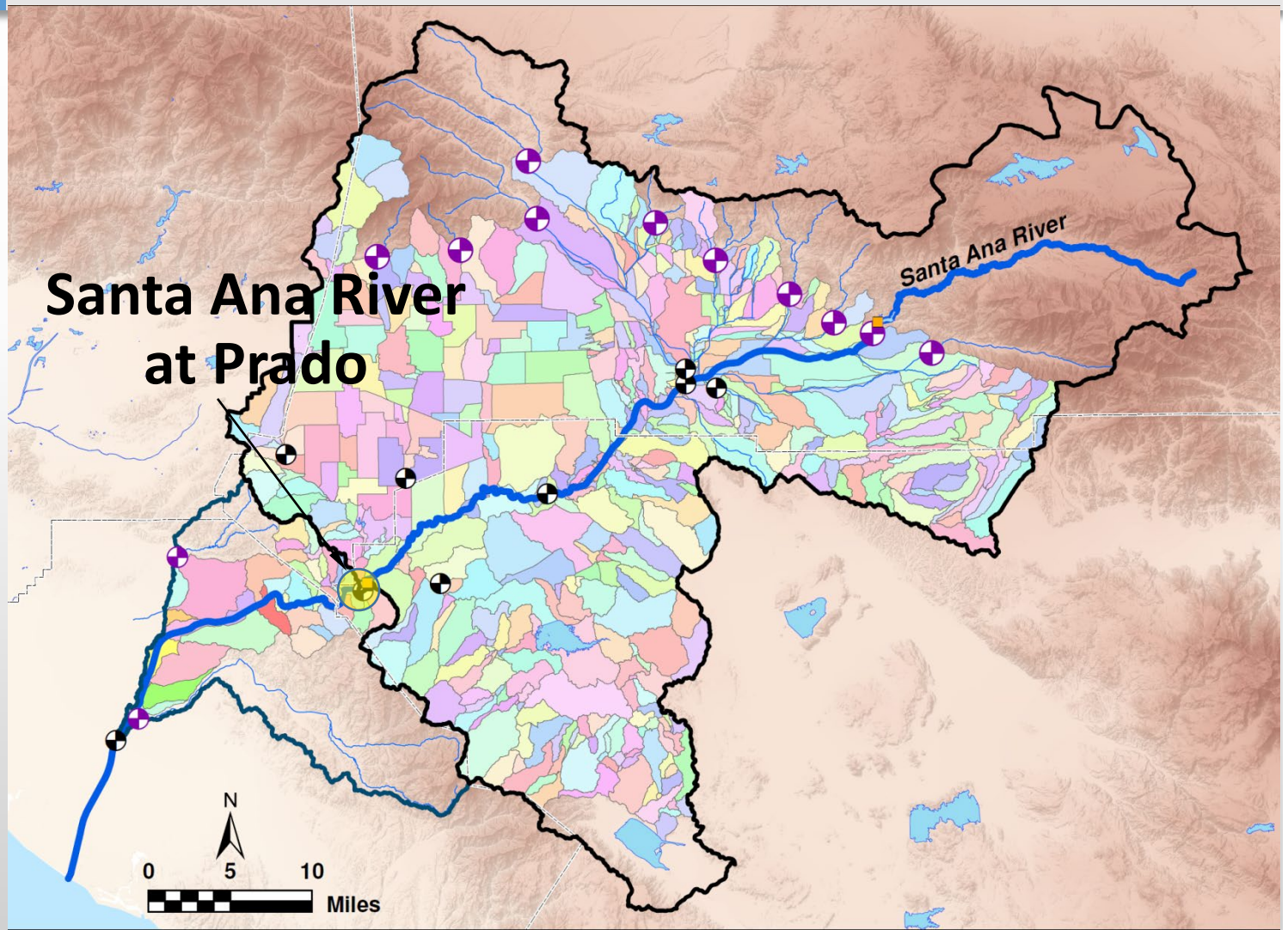


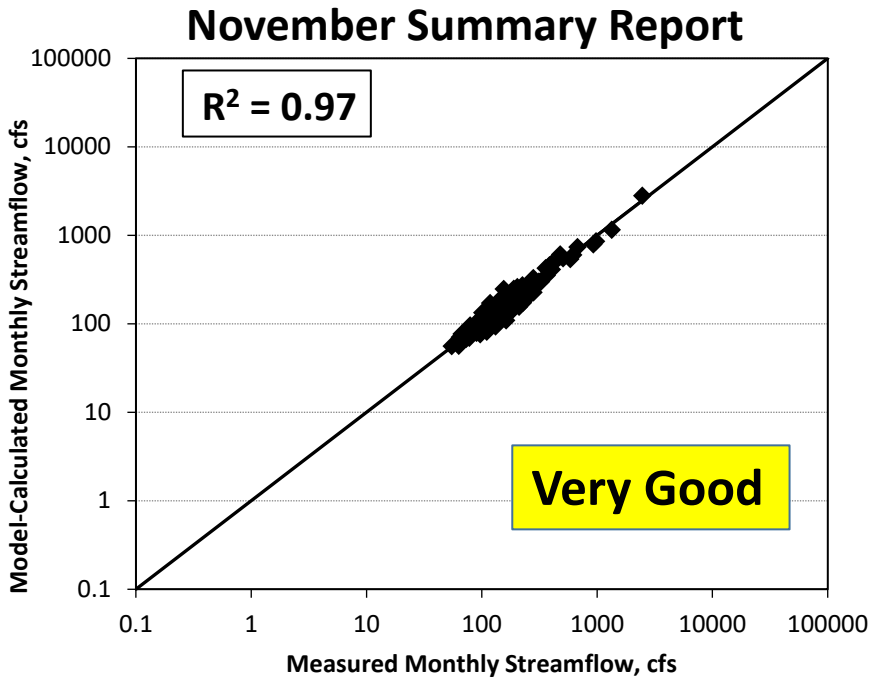


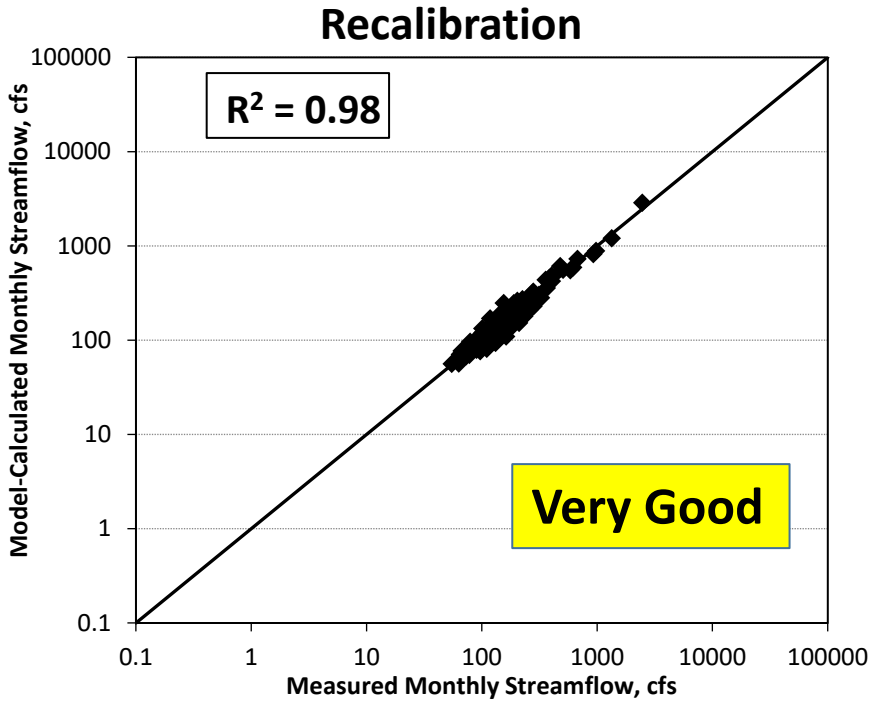
Calibration Results
Monthly Streamflow at the Temescal Creek at Main Street

Gaging Station	2017 WLAM HSPF November Summary Report WY 2007-2016	2017 WLAM HSPF Recalibration WY 2007-2016
Temescal Ck at Main Street		
R^2	0.84	0.87
Calibration Performance	Good	Very Good
Average Residual, cfs	-0.7	-0.5
Average of Observed, cfs	17.3	17.3
Average Residual Percentage of Average Observed, %	-4%	-3%
RMSE	13.2	17.4
RMSE as Percentage of Range of Observed, %	6%	8%

XY Scatter Plot of Monthly Streamflow –WY 2007-2016
Santa Ana River at Prado



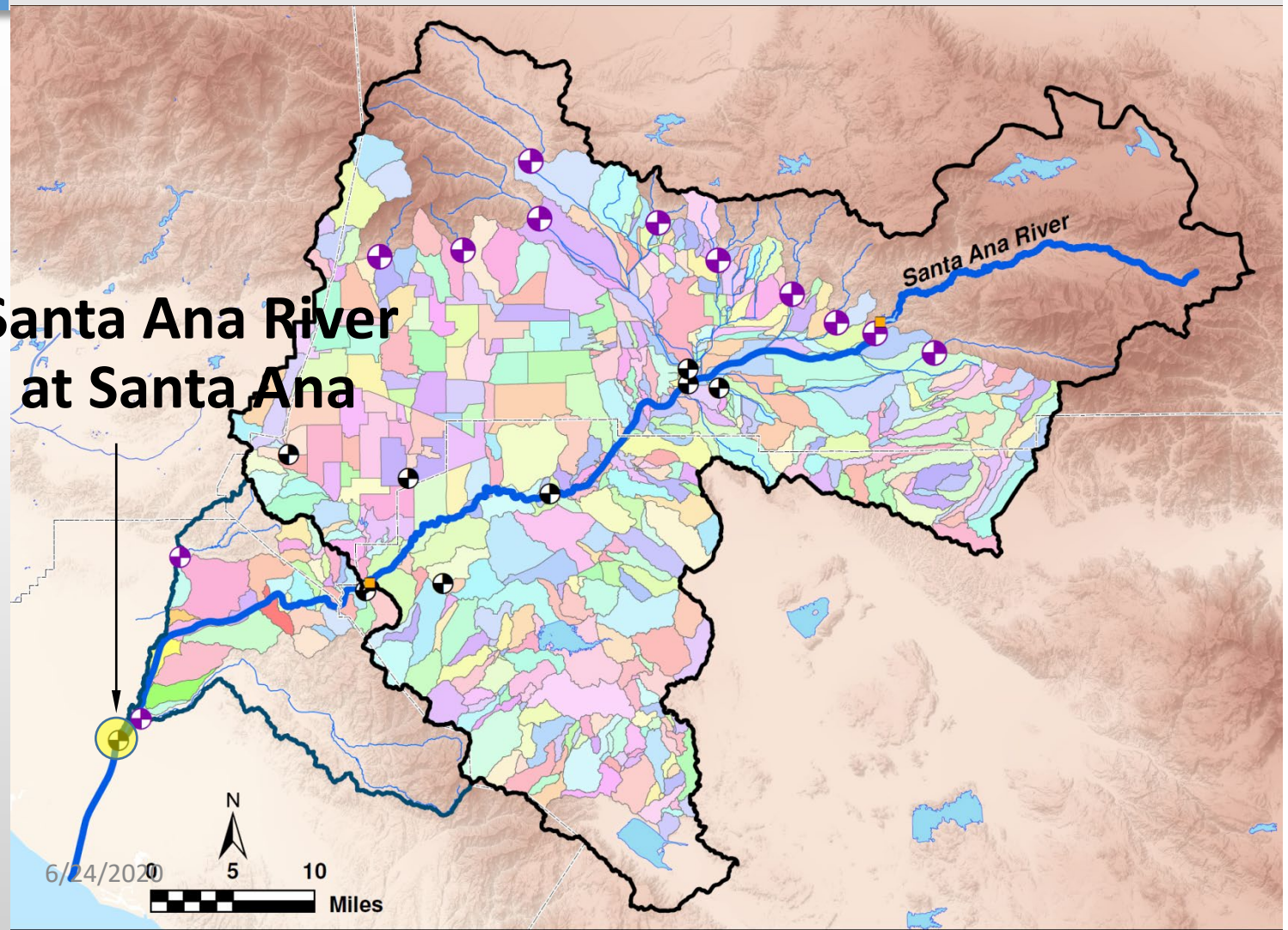


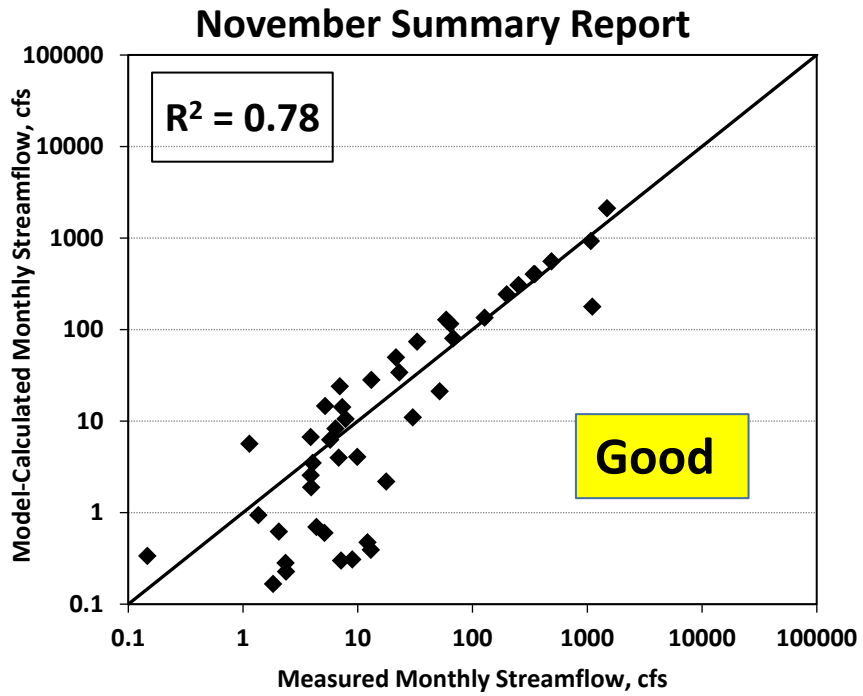


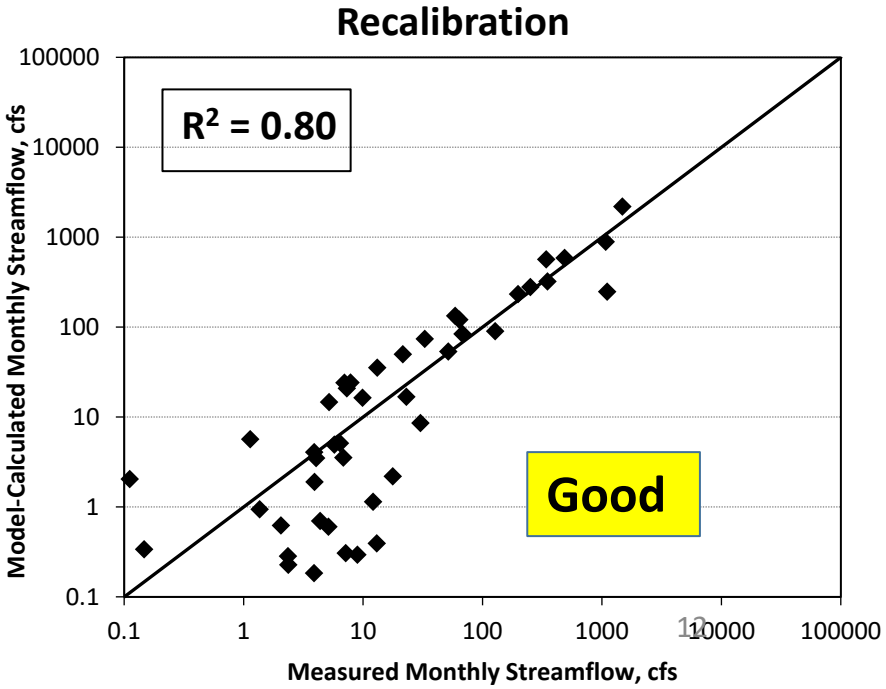
Calibration Results
Monthly Streamflow at the Santa Ana River at Prado

Gaging Station	2017 WLAM HSPF November Summary Report WY 2007-2016	2017 WLAM HSPF Recalibration WY 2007-2016
Santa Ana River into Prado Dam		
R^2	0.97	0.98
Calibration Performance	Very Good	Very Good
Average Residual, cfs	0.1	-1.7
Average of Observed, cfs	223.6	223.6
Average Residual Percentage of Average Observed, %	0%	-1%
RMSE	50.7	52.3
RMSE as Percentage of Range of Observed, %	2%	2%

XY Scatter Plot of Monthly Streamflow – WY 2007-2016
Santa Ana River at Santa Ana







Calibration Results
Monthly Streamflow at the Santa Ana River at Santa Ana

Gaging Station	2017 WLAM HSPF November Summary Report WY 2007-2016	2017 WLAM HSPF Recalibration WY 2007-2016
Santa Ana River at Santa Ana		
R^2	0.78	0.80
Calibration Performance	Good	Good
Average Residual, cfs	0.2	-1.3
Average of Observed, cfs	49.7	49.7
Average Residual Percentage of Average Observed, %	0%	-3%
RMSE	104.8	105.9
RMSE as Percentage of Range of Observed, %	7%	7%

Calibration Results
Monthly TDS Concentration at the Santa Ana River at Prado

Gaging Station	2017 WLAM HSPF November Summary Report WY 2007-2016	2017 WLAM HSPF Recalibration WY 2007-2016
Santa Ana River below Prado Dam		
Average Residual, mg/L	-6.1	-5.5
Average of Observed, mg/L	613	613
10-Year Volume-Weighted Average of Observed, mg/L (3,300 out of 3,653 Days of Data Available)	527	527
Average Residual Percentage of Average Observed, %	-1.0%	-0.9%
Standard Deviation, mg/L	48.9	49.0
RMSE	49.1	49.1

Calibration Results
Monthly TIN Concentration at the Santa Ana River at Prado

Gaging Station	2017 WLAM HSPF November Summary Report WY 2007-2016	2017 WLAM HSPF Recalibration WY 2007-2016
Santa Ana River below Prado Dam		
Average Residual, mg/L	-0.50	-0.54
Average of Observed, mg/L	3.96	3.96
10-Year Volume-Weighted Average of Observed, mg/L (323 out of 3,653 Days of Data Available)	3.45	3.45
Average Residual Percentage of Average Observed, %	-12.7%	-13.6%
Standard Deviation, mg/L	1.09	1.14
RMSE	1.20	1.26

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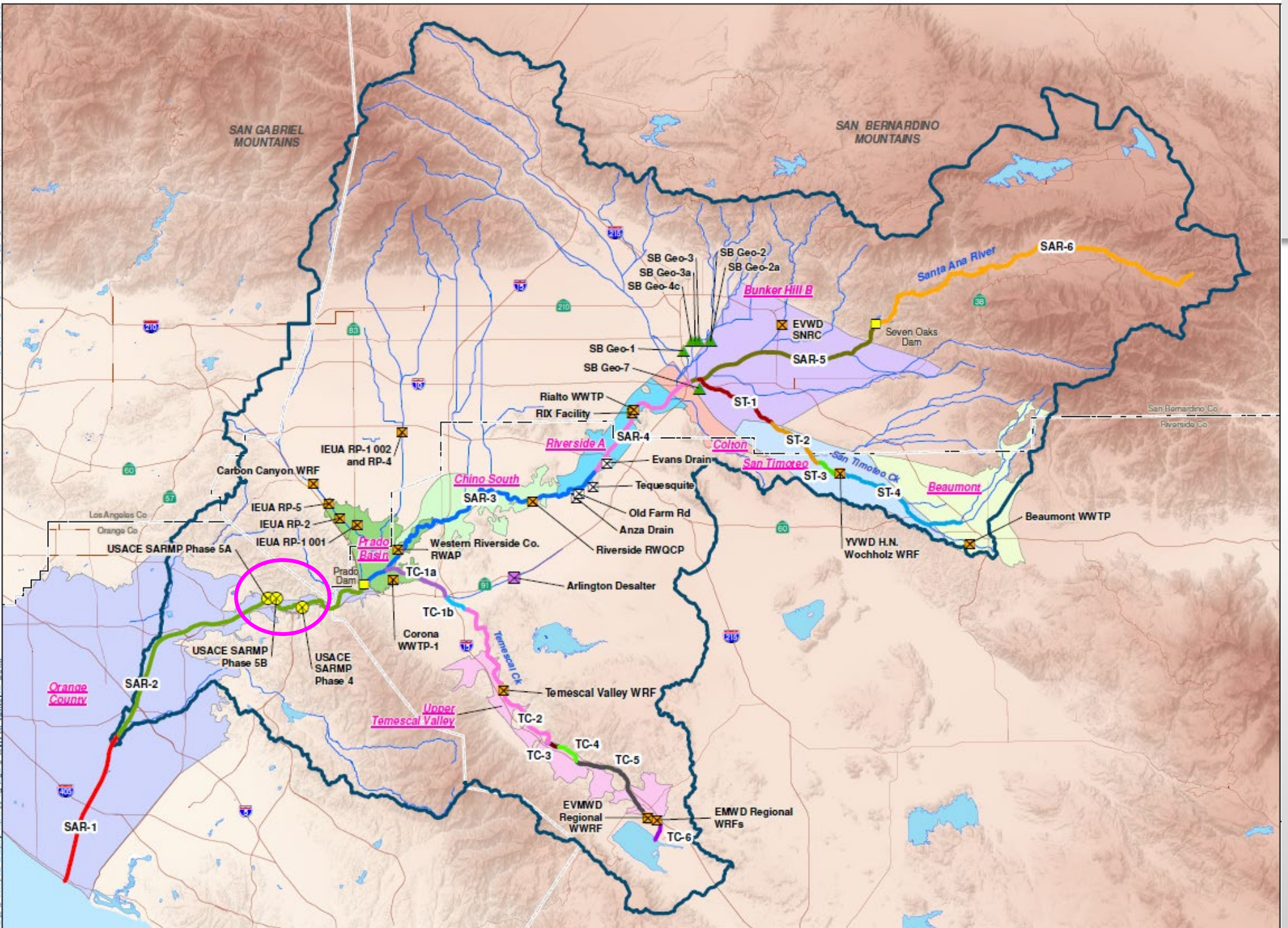
Changes in Assumptions for Predictive Scenarios

Model Scenario	Hydrologic Period	Model Conditions	Land Use	Recycled Water Discharge to Surface Water			TDS and TIN	
				Maximum Expected Discharge	Most Likely Discharge	Minimum Expected Discharge	Permit TDS	Permit TIN
A	WY 1950 - 2016	WY 2020	2012	X			X	X
B					X		X	X
C						X	X	X
D		WY 2040	General Plan (2040)	X			X	X
E					X		X	X
F						X	X	X

US Army Corps of Engineers – Santa Ana River Mainstem Project



US Army Corps of Engineers – Santa Ana River Mainstem Project (SARMP)[H]

Facility / Discharge Point	Scenario A 2012 Land Use			Scenario B 2012 Land Use			Scenario C 2012 Land Use			Scenario D General Plan (2040) Land Use			Scenario E General Plan (2040) Land Use			Scenario F General Plan (2040) Land Use		
	2020 Maximum Expected Discharge [MGD]	Permit TDS [mg/L]	Permit TIN [mg/L]	2020 Most Likely Discharge [MGD]	Permit TDS [mg/L]	Permit TIN [mg/L]	2020 Minimum Expected Discharge [MGD]	Permit TDS [mg/L]	Permit TIN [mg/L]	2040 Maximum Expected Discharge [MGD]	Permit TDS [mg/L]	Permit TIN [mg/L]	2040 Most Likely Discharge [MGD]	Permit TDS [mg/L]	Permit TIN [mg/L]	2040 Minimum Expected Discharge [MGD]	Permit TDS [mg/L]	Permit TIN [mg/L]
Santa Ana River Reach 2																		
Santa Ana River Mainstem Project (SARMP)[H] Dewatering Phase 4	6.8[I]	985[I]	1.0[I]	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
SARMP Dewatering Phase 5A	5.8	950	1.0	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
SARMP Dewatering Phase 5B	7.7	1,020	1.0	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Note:
H. De minimis discharge project that is only anticipated to operate for approximately 3 years.
I. No data available for Phase 4. Value represents the average of observed discharges or concentrations from Phase 5A and 5B monthly monitoring reports.

USACE dewatering removed from Scenario A and Table 20 in revised Summary Report

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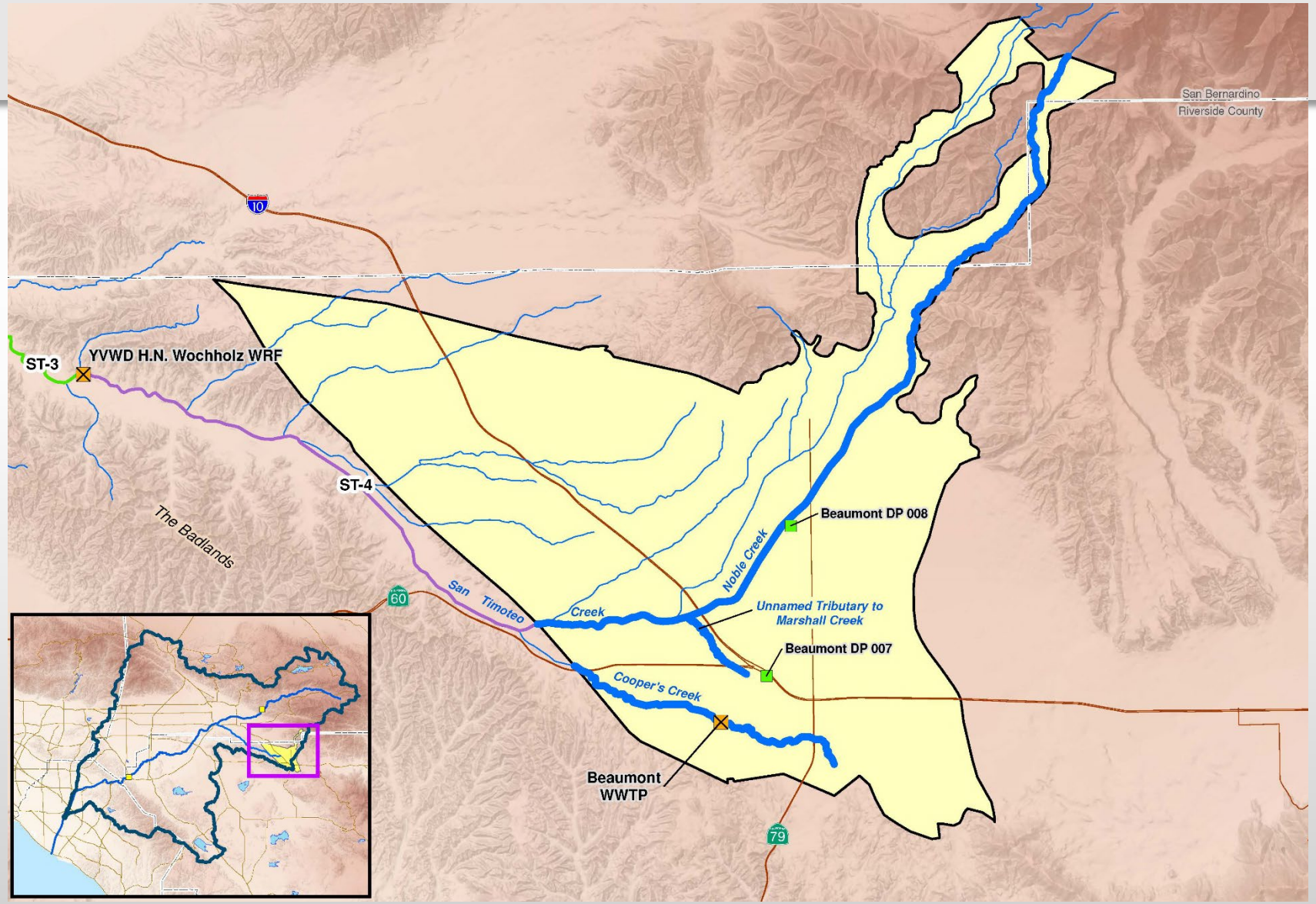
Noble Creek and San Timoteo Creek – Reach 4 Overlying Beaumont GMZ



Noble Creek and San Timoteo Creek – Reach 4 Overlying Beaumont GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	330[1]/230[2]	280[3]	50[4]	1-year	255	257	259	228	228	228
				5-year	226	227	228	208	208	208
				10-year	218	220	221	204	204	204
				20-year	217	218	219	203	203	203
November 2019 Summary Report										
TDS	330[1]/230[2]	290[5]	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

1. "Maximum benefit" objective
2. "Antidegradation" objective
3. 2018 estimate of ambient water quality (WSC, 2020)
4. Based on maximum benefit objectives
5. 2015 estimate of ambient water quality (DBSA, 2017)

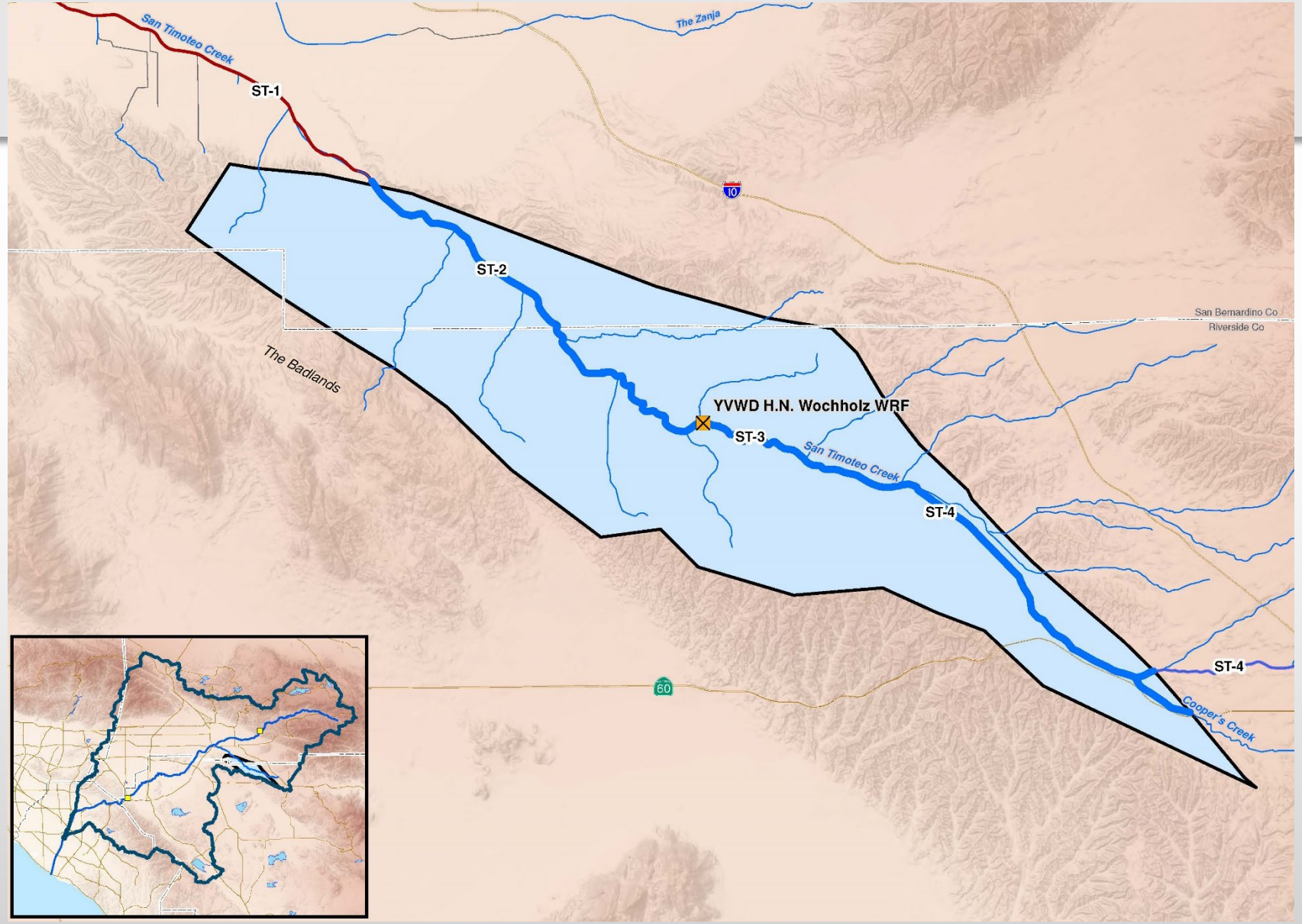
Noble Creek and San Timoteo Creek – Reach 4 Overlying Beaumont GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	5.0[1]/1.5[2]	2.7[3]	2.3[4]	1-year	2.29	2.32	2.36	1.86	1.87	1.88
				5-year	1.88	1.90	1.92	1.60	1.61	1.61
				10-year	1.77	1.79	1.81	1.54	1.54	1.54
				20-year	1.74	1.75	1.77	1.52	1.52	1.53
November 2019 Summary Report										
TIN	5.0[1]/1.5[2]	2.9[5]	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

1. "Maximum benefit" objective
2. "Antidegradation" objective
3. 2018 estimate of ambient water quality (WSC, 2020)
4. Based on maximum benefit objectives
5. 2015 estimate of ambient water quality (DBSA, 2017)

San Timoteo Creek – Reach 2, 3, and 4 Overlying San Timoteo GMZ



San Timoteo Creek – Reach 2, 3, and 4 Overlying San Timoteo GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	400[1]/300[2]	420[3]	none	1-year	372	369	369	349	346	329
				5-year	356	353	353	307	304	288
				10-year	338	335	334	281	278	266
				20-year	338	335	332	280	277	266
November 2019 Summary Report										
TDS	400[1]/300[2]	420[4]	none	1-year	371	368	369	348	344	327
				5-year	355	353	352	305	302	286
				10-year	337	335	333	280	277	265
				20-year	337	334	331	279	276	264

1. "Maximum benefit" objective
2. "Antidegradation" objective
3. 2018 estimate of ambient water quality (WSC, 2020)
4. 2015 estimate of ambient water quality (DBSA, 2017)

San Timoteo Creek – Reach 2, 3, and 4 Overlying San Timoteo GMZ

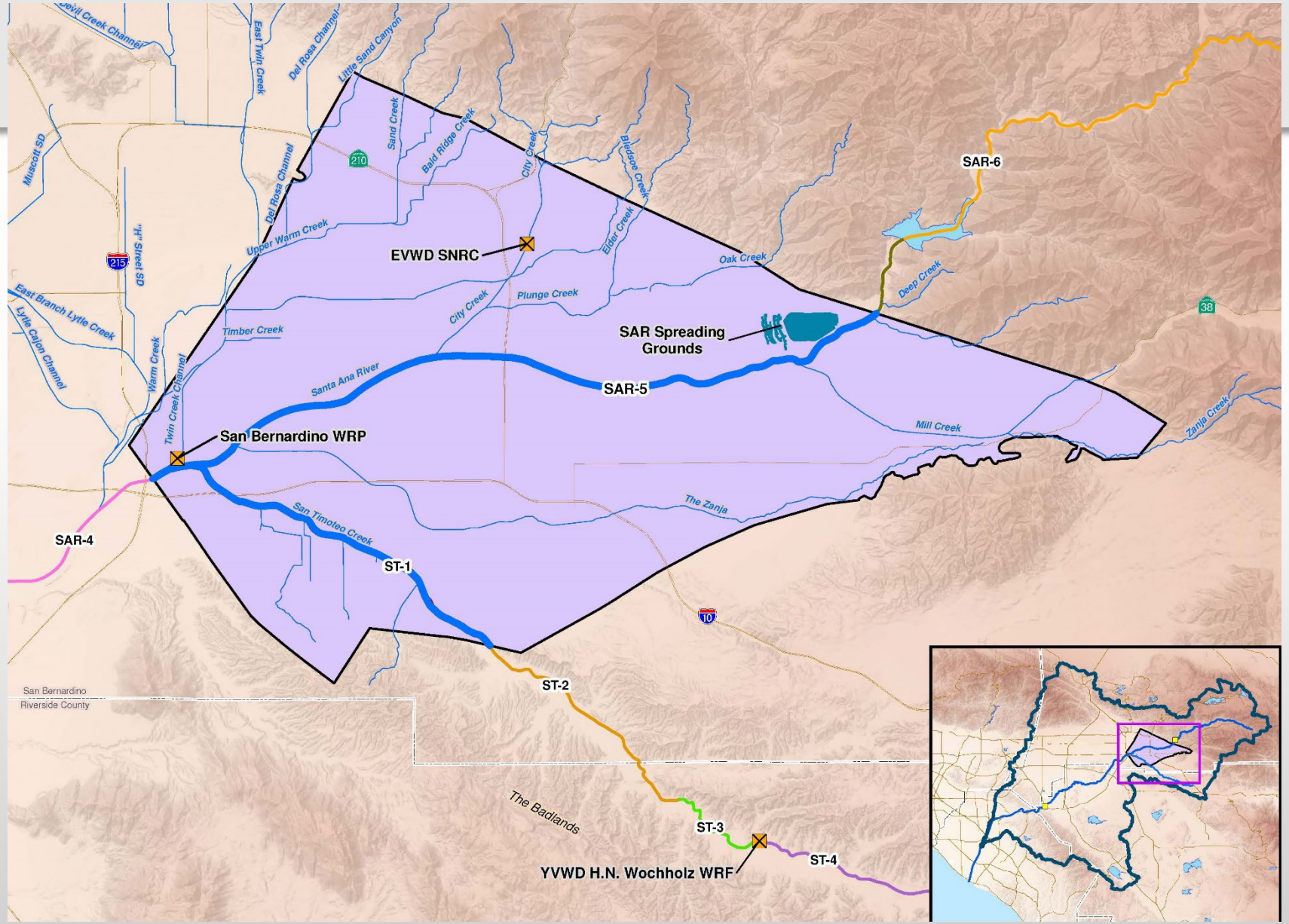
Maximum Value for the Volume-Weighted Recharge (Units in mg/L)

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	5.0[1]/2.7[2]	1.5[3]	3.5[4]	1-year	***4.27***	***4.15***	***4.02***	***3.80***	***3.71***	***3.26***
				5-year	***4.07***	***3.95***	***3.81***	***3.27***	***3.18***	***2.84***
				10-year	***3.85***	***3.73***	***3.58***	***2.98***	***2.92***	***2.61***
				20-year	***3.84***	***3.70***	***3.53***	***2.98***	***2.91***	***2.59***
November 2019 Summary Report										
TIN	5.0[1]/2.7[2]	2.0[5]	3.0[4]	1-year	***4.26***	***4.14***	***4.01***	***3.79***	***3.70***	***3.25***
				5-year	***4.07***	***3.94***	***3.80***	***3.26***	***3.17***	***2.84***
				10-year	***3.84***	***3.72***	***3.57***	***2.98***	***2.92***	***2.61***
				20-year	***3.83***	***3.69***	***3.53***	***2.98***	***2.91***	***2.58***

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

1. "Maximum benefit" objective
2. "Antidegradation" objective
3. 2018 estimate of ambient water quality (WSC, 2020)
4. Based on maximum benefit objectives
5. 2015 estimate of ambient water quality (DBSA, 2017)

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



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)

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	330	280[1]	50	1-year	***329***	***295***	239	***311***	***302***	267
				5-year	***300***	261	226	277	266	230
				10-year	***287***	250	221	265	254	226
				20-year	277	245	216	257	247	220
November 2019 Summary Report										
TDS	330	290[2]	40	1-year	***328***	***294***	239	***310***	***301***	266
				5-year	***294***	261	226	272	262	230
				10-year	281	249	220	260	250	225
				20-year	273	244	216	254	246	220

Bold black values represent concentrations above ambient, but below objective.
1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

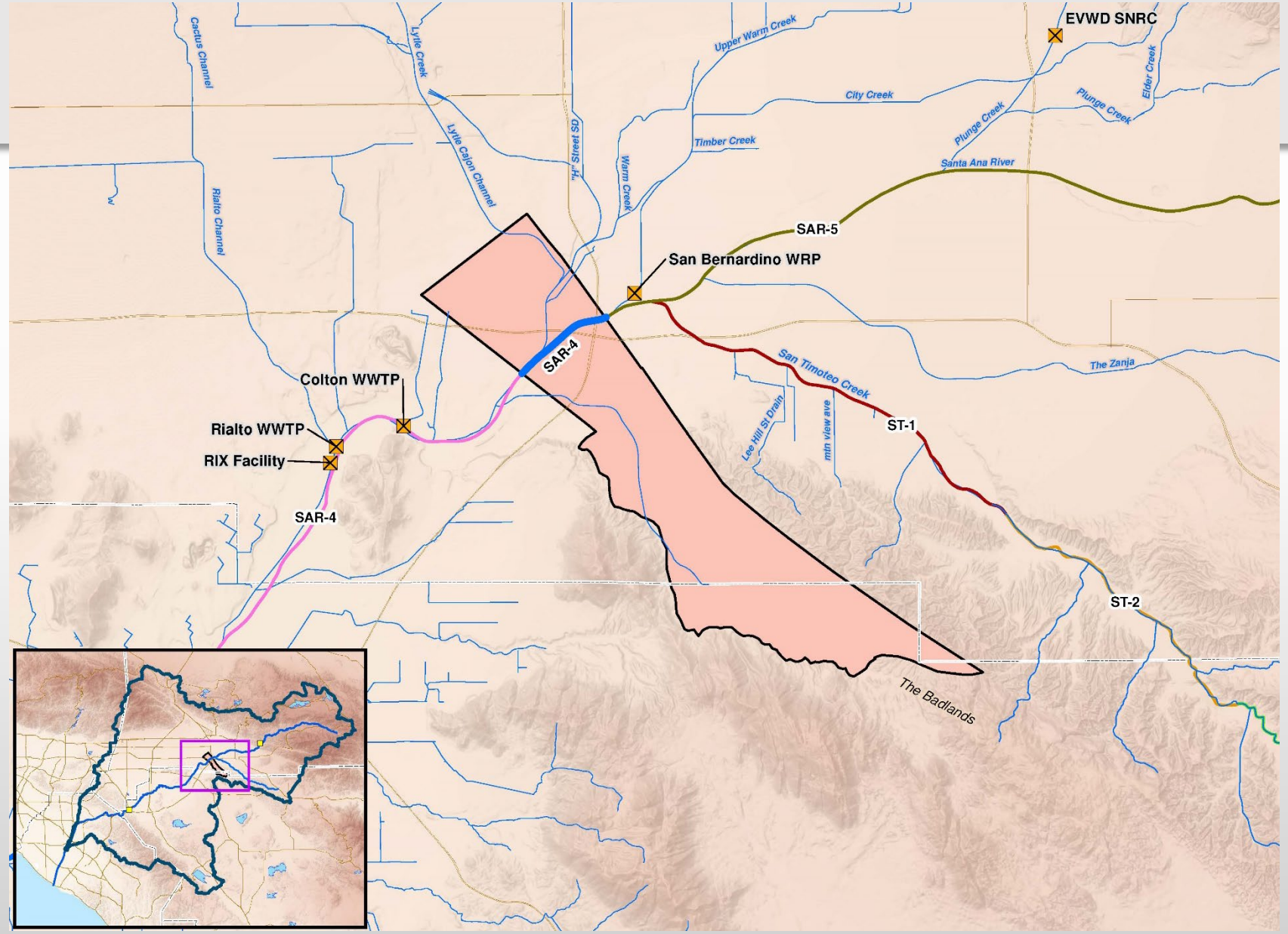
San Timoteo Creek – Reach 1; Santa Ana River - Reach 5 Overlying Bunker Hill-B GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	7.3	5.8[1]	1.5	1-year	3.63	3.26	2.84	3.35	3.23	2.82
				5-year	3.24	2.69	2.37	2.87	2.68	2.29
				10-year	3.14	2.62	2.27	2.78	2.60	2.21
				20-year	2.93	2.51	2.20	2.65	2.52	2.14
November 2019 Summary Report										
TIN	7.3	5.8[2]	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	2.93	2.50	2.19	2.65	2.51	2.13

1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

Santa Ana River – Reach 4 Overlying Colton GMZ



Santa Ana River – Reach 4 Overlying Colton GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	410	490[1]	none	1-year	399	307	260	346	356	293
				5-year	340	250	221	307	300	237
				10-year	317	246	217	290	281	233
				20-year	305	237	211	282	275	225
November 2019 Summary Report										
TDS	410	480[2]	none	1-year	399	307	260	346	356	293
				5-year	340	250	221	307	300	237
				10-year	317	246	217	290	281	233
				20-year	305	237	211	282	275	225

1. 2018 estimate of ambient water quality (WSC, 2020)
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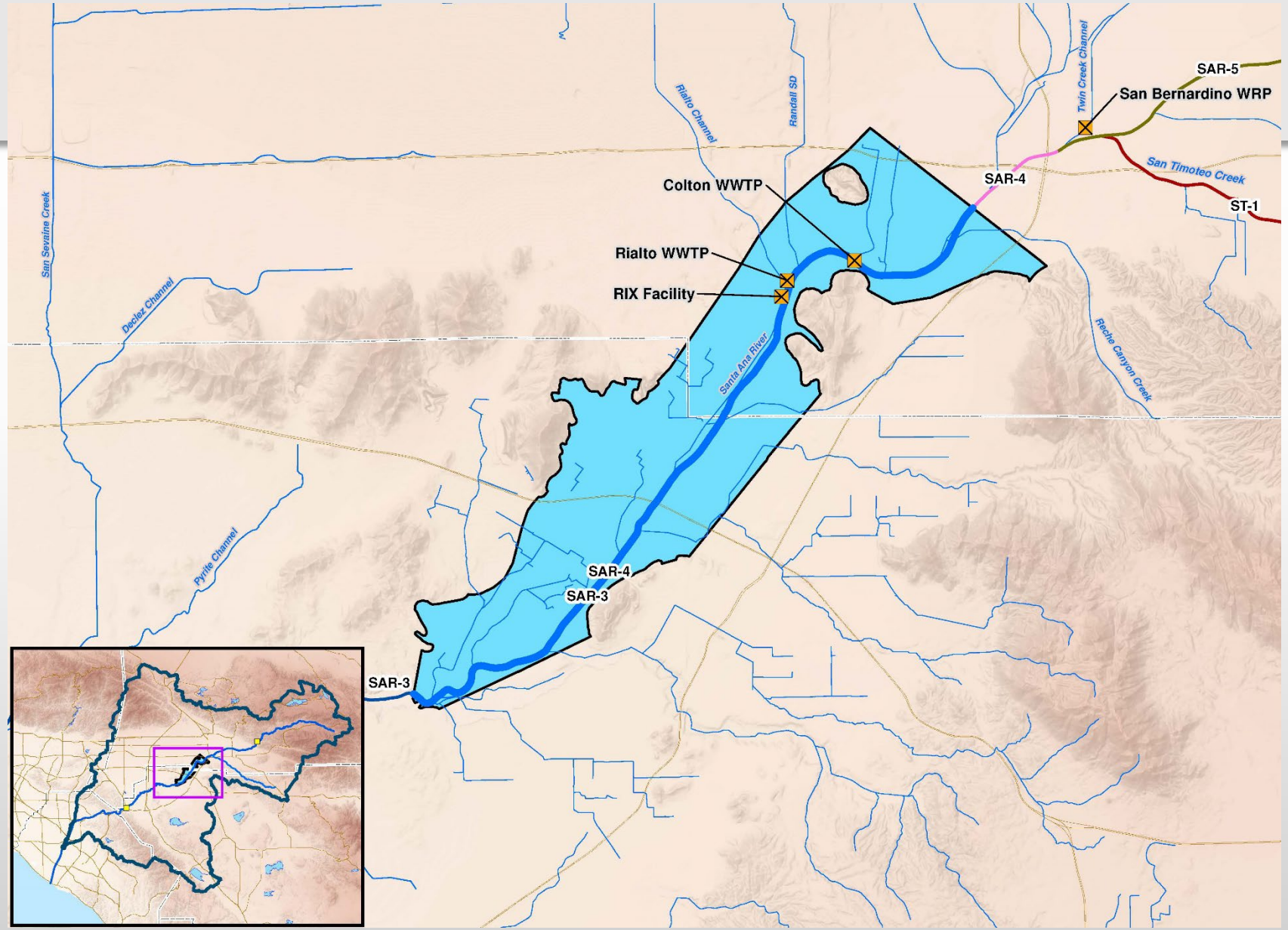
Santa Ana River – Reach 4 Overlying Colton GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	2.7	3.3[1]	none	1-year	***3.97***	2.36	2.31	***3.53***	***3.43***	2.24
				5-year	***3.33***	1.99	1.82	***3.02***	***2.76***	1.85
				10-year	***3.12***	1.95	1.66	***2.87***	2.64	1.81
				20-year	***3.01***	1.84	1.58	***2.81***	2.58	1.72
November 2019 Summary Report										
TIN	2.7	3.3[2]	none	1-year	***3.97***	2.35	2.30	***3.53***	***3.43***	2.23
				5-year	***3.33***	1.99	1.81	***3.02***	***2.76***	1.85
				10-year	***3.12***	1.95	1.64	***2.87***	2.64	1.81
				20-year	***3.01***	1.84	1.56	***2.81***	2.58	1.72

Bold red values represent concentrations above basin objective.
1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

Santa Ana River – Reach 4 Overlying Riverside-A GMZ



Santa Ana River – Reach 4 Overlying Riverside-A GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	560	430[1]	130	1-year	***511***	***488***	***486***	***492***	***478***	***472***
				5-year	***487***	***454***	***450***	***467***	***447***	***433***
				10-year	***477***	***441***	***437***	***457***	***434***	418
				20-year	***472***	***435***	***431***	***452***	428	411
November 2019 Summary Report										
TDS	560	440[2]	120	1-year	***510***	***487***	***486***	***492***	***477***	***471***
				5-year	***487***	***453***	***449***	***467***	***446***	431
				10-year	***477***	440	436	***457***	434	417
				20-year	***472***	434	430	***452***	428	410

Bold black values represent concentrations above ambient, but below objective.
1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

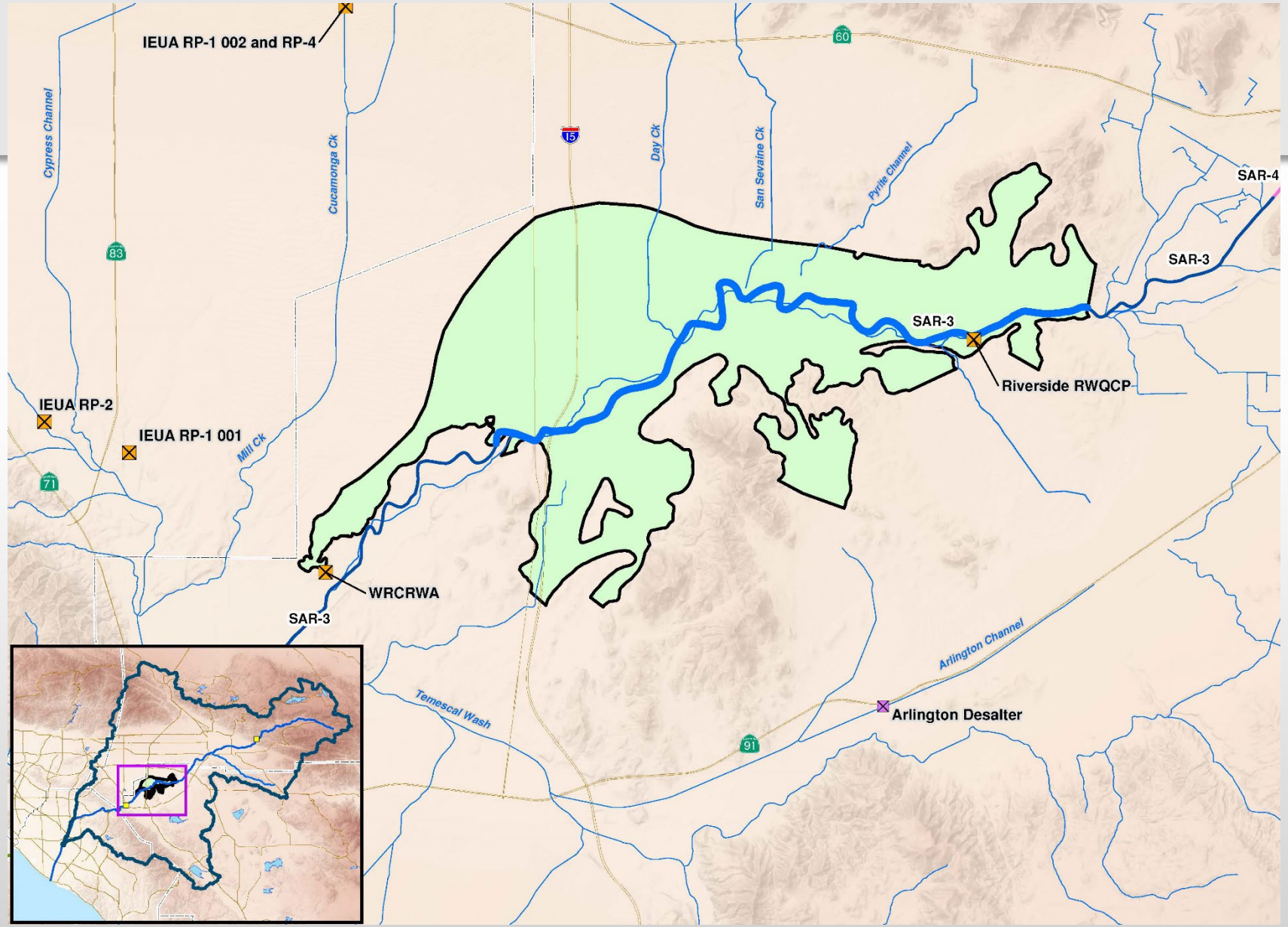
Santa Ana River – Reach 4 Overlying Riverside-A GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	6.2	5.7[1]	0.5	1-year	***6.95***	***6.68***	***6.64***	***6.80***	***6.59***	***6.39***
				5-year	***6.60***	***6.16***	***6.10***	***6.42***	***6.09***	***5.79***
				10-year	***6.45***	***5.97***	***5.91***	***6.27***	***5.91***	5.58
				20-year	***6.35***	***5.83***	***5.77***	***6.16***	***5.78***	5.43
November 2019 Summary Report										
TIN	6.2	5.6[2]	0.6	1-year	***6.95***	***6.67***	***6.63***	***6.80***	***6.57***	***6.38***
				5-year	***6.59***	***6.15***	***6.09***	***6.42***	***6.09***	***5.78***
				10-year	***6.44***	***5.96***	***5.90***	***6.27***	***5.90***	5.57
				20-year	***6.35***	***5.83***	***5.77***	***6.16***	***5.77***	5.42

Bold black values represent concentrations above ambient, but below objective.
Bold red values represent concentrations above basin objective.
1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

Santa Ana River – Reach 3 Overlying Chino-South GMZ



Santa Ana River – Reach 3 Overlying Chino-South GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	680	920[1]	none	1-year	629	644	646	599	618	624
				5-year	497	506	509	461	461	464
				10-year	458	466	468	417	419	422
				20-year	457	465	466	415	418	420
November 2019 Summary Report										
TDS	680	940[2]	none	1-year	629	644	646	599	618	624
				5-year	497	506	509	461	461	464
				10-year	458	466	468	417	419	422
				20-year	457	465	466	415	418	420

1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

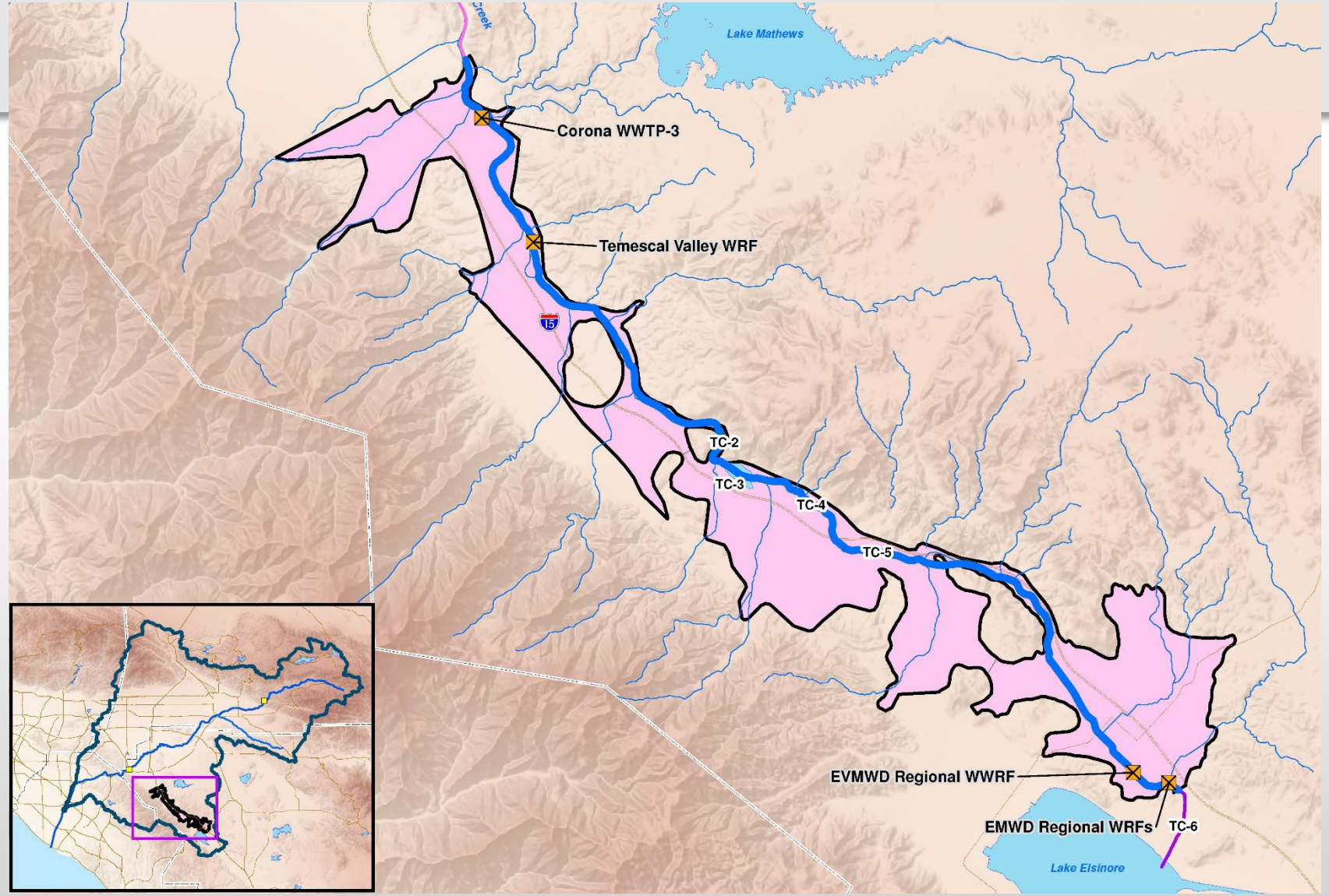
Santa Ana River – Reach 3 Overlying Chino-South GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	5.0	27.6[1]	none	1-year	4.47	4.45	4.42	4.35	4.27	4.25
				5-year	3.48	3.47	3.45	3.29	3.12	3.11
				10-year	3.20	3.18	3.16	2.96	2.84	2.82
				20-year	3.20	3.17	3.15	2.95	2.83	2.81
November 2019 Summary Report										
TIN	5.0	27.8[2]	none	1-year	4.47	4.45	4.42	4.35	4.27	4.25
				5-year	3.48	3.47	3.45	3.29	3.12	3.11
				10-year	3.20	3.18	3.16	2.96	2.84	2.82
				20-year	3.20	3.17	3.15	2.95	2.83	2.81

1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

Temescal Creek - Reach 2, 3, 4, 5 and 6 Overlying Upper Temescal Valley GMZ



Temescal Creek - Reach 2, 3, 4, 5 and 6 Overlying Upper Temescal Valley GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	820[1]	750[2]	70	1-year	676	584	544	662	560	509
				5-year	662	537	469	645	502	445
				10-year	658	519	442	638	481	419
				20-year	654	514	430	631	472	405
November 2019 Summary Report										
TDS	820[1]	750[2]	70	1-year	657	404	317	645	431	378
				5-year	639	367	292	615	393	343
				10-year	629	354	279	604	374	327
				20-year	624	349	276	595	367	320

1. Proposed TDS objective from June 2018 CEQA Scoping Meeting
2. Based on Salt and Nutrient Management Plan for the Upper Temescal Valley, Table 6-B (WEI, 2017)

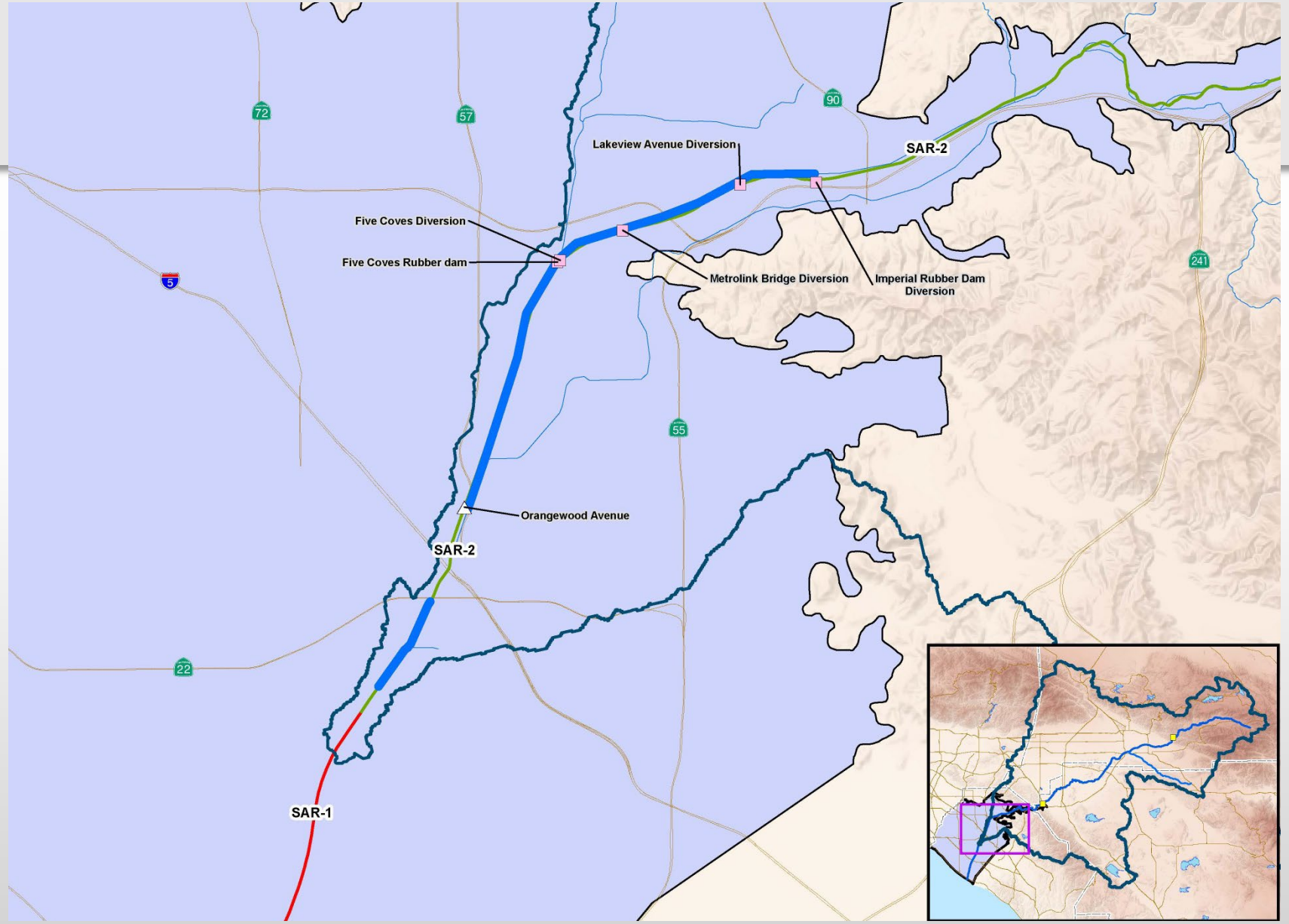
Temescal Creek - Reach 2, 3, 4, 5 and 6 Overlying Upper Temescal Valley GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	7.9[1]	4.7[2]	3.2	1-year	***7.20***	***6.38***	***5.47***	***7.05***	***6.09***	***5.38***
				5-year	***7.14***	***5.77***	***4.71***	***6.93***	***5.31***	4.46
				10-year	***7.08***	***5.57***	4.41	***6.82***	***5.05***	4.16
				20-year	***7.02***	***5.49***	4.32	***6.73***	***4.95***	4.03
November 2019 Summary Report										
TIN	7.9[1]	4.7[2]	3.2	1-year	***7.03***	4.48	3.44	***6.88***	***4.80***	4.17
				5-year	***6.89***	4.02	3.11	***6.65***	4.29	3.68
				10-year	***6.80***	3.84	2.92	***6.50***	4.04	3.44
				20-year	***6.73***	3.75	2.86	***6.40***	3.93	3.36

Bold black values represent concentrations above ambient, but below objective.
1. Proposed TDS objective from June 2018 CEQA Scoping Meeting
2. Based on Salt and Nutrient Management Plan for the Upper Temescal Valley, Table 6-B (WEI, 2017)

Santa Ana River – Reach 2 Overlying Orange County GMZ



Santa Ana River – Reach 2 Overlying Orange County GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	580	600[1]	none	1-year	***603***	***681***	***734***	***589***	***684***	***728***
				5-year	568	***649***	***690***	547	***645***	***677***
				10-year	529	***609***	***629***	510	***593***	***607***
				20-year	525	***604***	***623***	504	***591***	***603***
November 2019 Summary Report										
TDS	580	600[2]	none	1-year	***632***	***679***	***732***	***588***	***684***	***726***
				5-year	***601***	***647***	***684***	546	***645***	***676***
				10-year	561	***610***	***634***	509	***597***	***611***
				20-year	555	***602***	***622***	504	***593***	***607***

Bold red values represent concentrations above basin objective.
1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

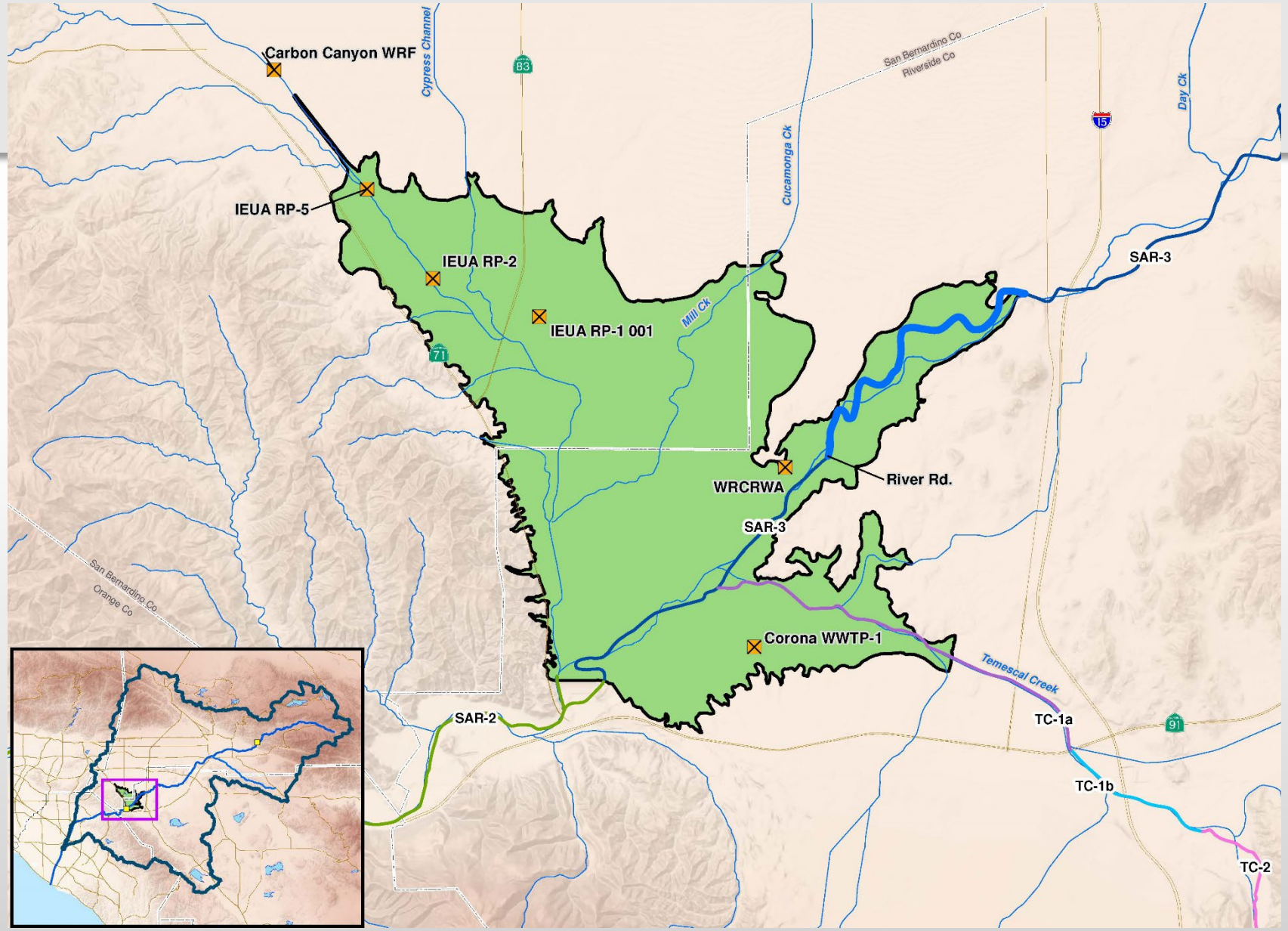
Santa Ana River – Reach 2 Overlying Orange County GMZ

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	3.4	3.0[1]	0.4	1-year	***3.60***	***3.10***	2.66	***3.58***	***3.25***	2.68
				5-year	***3.41***	2.97	2.49	***3.34***	***3.06***	2.52
				10-year	***3.20***	2.81	2.32	***3.13***	2.84	2.30
				20-year	***3.19***	2.78	2.29	***3.11***	2.83	2.27
November 2019 Summary Report										
TIN	3.4	3.0[2]	0.4	1-year	***3.23***	***3.05***	2.62	***3.51***	***3.21***	2.64
				5-year	***3.06***	2.92	2.48	***3.32***	***3.03***	2.51
				10-year	2.88	2.78	2.33	***3.10***	2.84	2.30
				20-year	2.84	2.74	2.28	***3.08***	2.81	2.28

Bold black values represent concentrations above ambient, but below objective.
Bold red values represent concentrations above basin objective.
1. 2018 estimate of ambient water quality (WSC, 2020)
2. 2015 estimate of ambient water quality (DBSA, 2017)

Santa Ana River – Reach 3 Overlying Prado Basin MZ above River Rd.



Santa Ana River – Reach 3 Overlying Prado Basin MZ above River Rd.

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

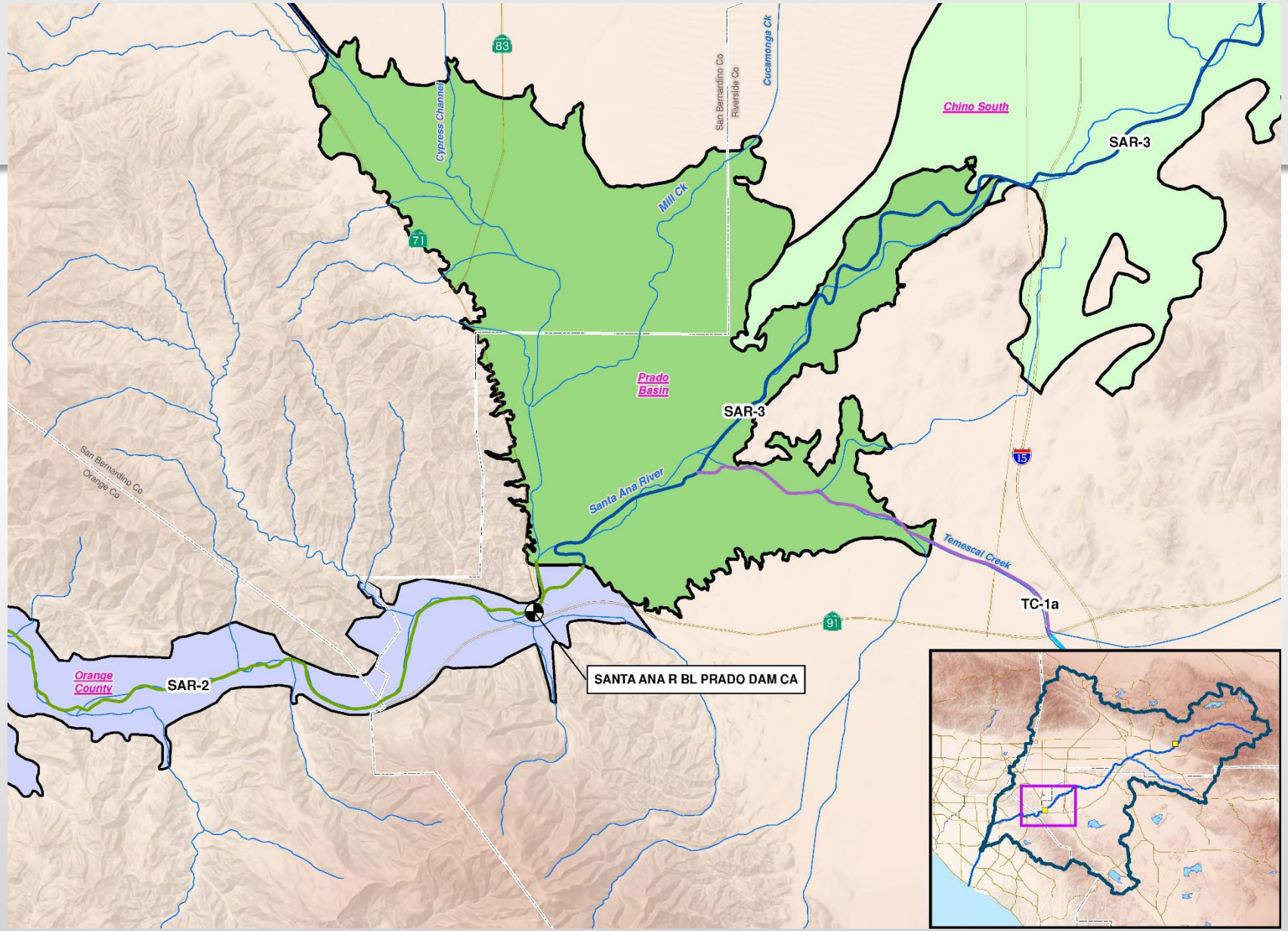
	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	na	na	na	1-year	652	662	666	636	650	654
				5-year	637	646	649	622	635	638
				10-year	630	638	640	616	627	629
				20-year	621	629	630	607	617	619
November 2019 Summary Report										
TDS	na	na	na	1-year	652	662	666	636	650	654
				5-year	637	646	649	622	635	638
				10-year	630	638	640	616	627	629
				20-year	621	629	630	607	617	619

Santa Ana River – Reach 3 Overlying Prado Basin MZ above River Rd.

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	na	na	na	1-year	6.46	6.34	6.26	6.53	6.29	6.21
				5-year	6.30	6.18	6.09	6.38	6.13	6.05
				10-year	6.24	6.10	6.00	6.31	6.05	5.97
				20-year	6.16	6.02	5.92	6.24	5.97	5.88
November 2019 Summary Report										
TIN	na	na	na	1-year	6.46	6.34	6.26	6.53	6.29	6.21
				5-year	6.30	6.18	6.09	6.38	6.13	6.05
				10-year	6.24	6.10	6.00	6.31	6.05	5.97
				20-year	6.16	6.02	5.92	6.24	5.97	5.88

Santa Ana River Reach 3 Below Prado Dam



Santa Ana River Reach 3 Below Prado Dam

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	700	na	na	Baseflow Average	621	***733***	***774***	618	***730***	***761***
	650	na	na	5-year moving average of the 1-year volume-weighted average	525	485	445	521	464	416
November 2019 Summary Report										
TDS	700	na	na	Baseflow Average	619	***733***	***774***	617	***730***	***761***
	650	na	na	5-year moving average of the 1-year volume-weighted average	523	481	445	522	464	421

Bold red values represent concentrations above basin objective.

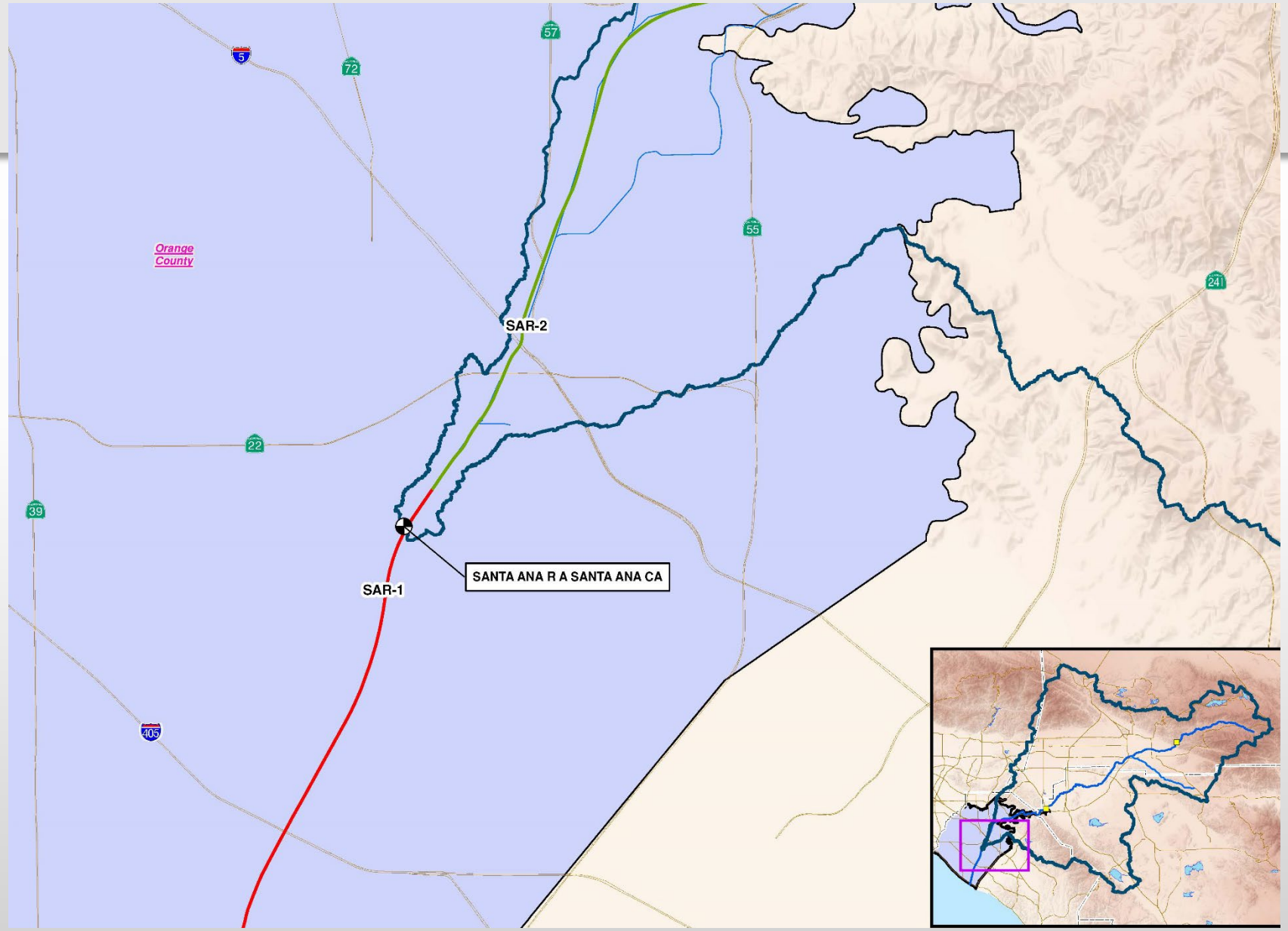
Santa Ana River Reach 3 Below Prado Dam

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	10.0	na	na	Baseflow Average	7.05	5.95	5.34	6.99	6.25	5.28
	na	na	na	5-year moving average of the 1-year volume-weighted average	5.90	4.28	3.17	5.89	4.25	3.03
November 2019 Summary Report										
TIN	10.0	na	na	Baseflow Average	7.04	5.95	5.34	6.98	6.25	5.28
	na	na	na	5-year moving average of the 1-year volume-weighted average	5.77	4.14	3.17	5.86	4.16	3.06

Bold red values represent concentrations above basin objective.

Santa Ana River Reach 2 at Santa Ana



Santa Ana River Reach 2 at Santa Ana

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TDS	650	na	na	5-year moving average of the 1-year volume-weighted average	331	197	146	395	161	135
November 2019 Summary Report										
TDS	650	na	na	5-year moving average of the 1-year volume-weighted average	363	159	141	375	177	139

Santa Ana River Reach 2 at Santa Ana

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

	Objective	Ambient	Assimilative Capacity	Period	SCEN A	SCEN B	SCEN C	SCEN D	SCEN E	SCEN F
					2020 Expected Discharge			2040 Expected Discharge		
					Max.	Avg.	Min.	Max.	Avg.	Min.
Revised Summary Report										
TIN	na	na	na	5-year moving average of the 1-year volume-weighted average	2.80	1.29	0.94	3.33	1.33	1.14
November 2019 Summary Report										
TIN	na	na	na	5-year moving average of the 1-year volume-weighted average	2.61	1.15	1.02	3.11	1.41	1.15

Overview

- WLAM Recalibration in Upper Temescal Valley GMZ
- WLAM Recalibration Results
- Changes in Assumptions of Predictive Scenarios
- Updated Results of Predictive Scenarios
- **Overview of Revised Summary Report**

Revised Summary Report

- New Appendix T:
  - Summary of changes
  - PowerPoint presentations
    - Geoscience Slides from 24-Mar-20 BMP Task Force Meeting
    - Geoscience Slides from 22-Apr-20 Technical Conference Call
    - WEI Slides from 13-May-20 BMP Task Force Meeting
    - Geoscience Slides from 13-May-20 BMP Task Force Meeting

Revised Summary Report

- **Updated Text:**
  - Remove Corona Lake from Section 2.5 (Streamflow Data), Table 3-3 (WLAM Differences), and Figure 8 (Streamflow Gages)
  - Update calibration results and mass balance in Section 4.0 (Calibration) and associated figures
  - Remove USACE dewatering from Section 5.0 (Predictive Scenario Assumptions), Table 20 , Figure 88 (Discharge Locations), and Appendix F (Submitted Forms for Scenarios)
  - Update scenario results, AWQ values and references (WSC, 2020), and assimilative capacity in Section 6.0 (Predictive Scenario Results), Section 8.0 (Retrospective Run), and Appendices G-N, P, Q, and S