APPENDIX Q

WATER QUALITY OBJECTIVES/GOALS AND RELATED BENEFICIAL USE TABLES (Q1-Q3)

Appendix Q1: Basin Plan Objectives for the San Joaquin Basin

Water Quality Objectives and Targets used to analyze San Joaquin River SWAMP data

Constituent	Location/Comment		Dates	Objective		
SACRAMENTO-SAN JOAQUIN BASIN PLAN OBJECTIVES (CVRWQCB, 1998)						
Numeric						
Arsenic (Dissolved)	Sacramento-San Joaquin Delta		all	0.01 mg/L		
Boron (Total)	San Joaquin River, mouth of the Merced River to Vernalis		Mar 15- Sept 15	2.0 mg/L		
				Monthly mean	0.8 mg/L	
			Sept 16 -Mar 14	2.6 mg/L		
				Monthly mean	1.0 mg/L	
			Critical Year[10]	Monthly mean	1.3 mg/L	
Copper (Dissolved)	Sacramento-San Joaquin Delta		all	0.01 mg/L		
Dissolved Oxygen	Within Delta (legal boundaries)	San Joaquin River between Turner Cut and Stockton.	Sept 1- Nov 30	6.0 mg/L		
		All other[2] Delta waters, excluding bodies of water constructed for special purposes and from which fish have been excluded or where the fishery is not important as a beneficial use.	all	5.0 mg/L		
	Outside Delta (legal boundaries)[4]	Cold/Spawning: Cosumnes, Mokelumne, Calaveras, Stanislaus from Goodwin Dam to SJR, Tuolumne from New Don Pedro Dam to SJR, Friant Dam to Mendota Pool, McSWAIN reservoir to SJR, Spawning[3]: Mendota dam to Vernalis, Mud Slough North, Salt Slough.	all	7.0 mg/L		
		Merced River from Cressy to New Exchequer Dam	all	8.0 mg/L		
		Tuolumne River from Waterford to La Grange	Oct 15 - Jun 15	8.0 mg/L		
Electrical Conductivity	San Joaquin River at Airport Way Bridge, Vernalis; Old River at Tracy Road Bridge[11]		Apr 1- Aug 31	700 µmhos/cm		
			Sep 1- Mar 31	1000 µmhos/cm		
Molybdenum (Total)	San Joaquin River, mouth of the Merced River to Vernalis		all	15 µg/L		
				Monthly mean	10 µg/L	
	Salt Slough, Mud Slough (north), San Joaquin River from Sack Dam to the mouth of Merced River		all	50 µg/L		
				Monthly mean	19 µg/L	
pH[5]	In fresh waters with designated COLD or WARM beneficial uses.		all	6.5 - 8.5		
Selenium (Total)	San Joaquin River, mouth of the Merced River to Vernalis		all	12 µg/L		
				4 day Average	5 µg/L	
	Salt Slough, Mud Slough (north), and the San Joaquin River from Sack Dam to the mouth of Merced River		all	20 µg/L		
				4 day Average	5 µg/L	
	Salt Slough and constructed and re-constructed water supply channels in the Grassland watershed listed in Appendix 40 (See Basin Plan).		all	20 µg/L		
				Monthly mean	2 µg/L	
Temperature[5]	Deer Creek, source to Cosumnes River. The following applies to daily maximum temperature. For Monthly average temperature see Resolution R5-2005-0119 (ephemeral water body).		See Resolution R5-2005-0119	Range 63-81ºF		
Turbidity	Delta waters[6]: except for periods of storm runoff	Central Delta	all	50 NTU		
		other Delta waters	all	150 NTU		
	Sacramento River and San Joaquin River Basins[6]		all	Where natural turbidity is between:	0-5 NTU	no >1 NTU
					5-50 NTU	no >20%
					50-100 NTU	no >10 NTU
					>100 NTU	no >10%
	Deer Creek, source to Cosumnes River. The following applies to daily maximum turbidity. For daily average turbidity see Resolution R5-2002-0127. (ephemeral water body)		all	Where the dilution ratio for discharges is < 20:1 and natural turbidity is:	<1 NTU	no >5 NTU
				Where natural turbidity is:	1-5 NTU	no >5 NTU
				Where the dilution ratio for discharges is ≥20:1 and natural turbidity is:	>5 NTU	General turbidity objectives
Zinc (Dissolved)	Sacramento-San Joaquin Delta		all	0.1 mg/L		

Appendix Q1: Basin Plan Objectives for the San Joaquin Basin continued…

Constituent	Location/Comment	Dates	Objective		
Narrative					
pH[5]	Sacramento River and San Joaquin River Basins	all	Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses.		
Temperature[5]	Sacramento River and San Joaquin River Basins	all	At no time or place shall the temperature of intrastate waters be increased more than 5 ºF above natural receiving water temperature.		
Toxicity	Sacramento River and San Joaquin River Basins	all	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.		
TSS	Sacramento River and San Joaquin River Basins	all	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.		
SACRAMENTO-SAN JOAQUIN BASIN PLAN OBJECTIVES*					
Arsenic (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	50 µg/L		
Cadmium (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	5 µg/L		
Chloride	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Secondary MCL	all	Maximum Contaminant Level Ranges	Recommended Upper Short Term	250 mg/L 500 mg/L 600 mg/L
Chromium (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	50 µg/L		
Copper (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Secondary MCL	all	1000 µg/L		
Lead (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	15 µg/L		
Mercury (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	2 µg/L		
Nickel (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	100 µg/L		
Nitrate (as NO_3)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	45 mg/L		
Nitrate-N	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	10 mg/L		
Electrical Conductivity	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Secondary MCL	all	Maximum Contaminant Level Ranges	Recommended Upper Short Term	900 µmhos/cm 1600 µmhos/cm 2200 µmhos/cm
Selenium	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Primary MCL	all	50 µg/L		
Sulfate	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Secondary MCL	all	Maximum Contaminant Level Ranges	Recommended Upper Short Term	250 mg/L 500 mg/L 600 mg/L
TDS	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Secondary MCL	all	Maximum Contaminant Level Ranges	Recommended Upper Short Term	500mg/L 1000mg/L 1500 mg/L
Turbidity	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Secondary MCL	all	5 NTU		
Zinc (Total)	Water Bodies Designated as Municipal and Domestic Supply (MUN)- Drinking Water. California Secondary MCL	all	5000 µg/L		
BAY-DELTA AUTHORITY TARGETS (CALFED Water Quality Program plan, 2000)					
Temperature[7/ 8]	San Joaquin River at Vernalis	April 1 - Jun 30 and Sept 1- Nov 30	<68 ºF		
TOC	Source water quality for the Delta	all	3.0 mg/L		

*Title 22 of the California code of regulations, which are incorporated by reference into the Sacramento-San Joaquin Basin Plan Objectives: Table 64431-A (Inorganic Chemicals), Table 64449-A (Secondary Maximum contaminant Levels-consumer Acceptance Limits) and Table 64449-B (Secondary Maximum Contaminant Levels-Ranges). Lead is stated in Article 19, Section 64468.1 and also in the Basin plan (III-3). Use the following objectives unless otherwise stated above.

[2] Refers to the above cell and the following: Sacramento river (below the I Street Bridge) and in all Delta waters west of the Antioch Bridge.

[3] Spawning was used in areas designated as WARM and SPAWNING (Applied most limiting)

[4] Apply most limiting.

[5] Contains narrative and Numeric. Apply most limiting.

[6] Exceptions to the following limit will be considered when a dredging operation can cause an increase in turbidity.

[7] Daily average temperature in all water-year types.

[8] Central Valley Regional Water Quality Control Board (CVRWQCB) Water Quality Control Plan

[10] See Table IV-3 in Basin Plan

[11] Maximum 30-day running average of mean daily, in µmhos/cm

Appendix Q2: Water Quality Goals for the San Joaquin Basin

Indicator(s)	Units	SJR-BENEFICIAL USE(S)			
		Drinking Water	Aquatic Life	Irrig. Water Supply	Rec. Use
Ammonia Nitrogen (NH_3-N)	mg N/L		24.1[u1]		
			36.1[u2]		
Arsenic (dissolved)	µg/L		340[f]		
Arsenic (total)	µg/L	0.004[m]		100[e]	
		10[t]			
Boron (total)	mg/L	1[a]		0.7[e]	
Cadmium (dissolved)	µg/L		1.6[r]		
Cadmium (total)	µg/L	0.07[m]	1.6[r]	10[e]	
Chloride	mg/L		860[j]	106[e]	
Copper (dissolved)	µg/L		5.7[h]		
Copper (total)	µg/L	1300[g]	5.9[h]	200[e]	
		170[m]			
E. coli	MPN/100mL				235[v]
					298[w]
					409[x]
					575[y]
Electrical Conductivity	µmhos/cm			700[e]	
Sodium	mg/L	30-60[c]		69[e]	
		20[d]			
Lead (dissolved)	µg/L		23.5[l]		
Lead (total)	µg/L	2[m]	25.4[l]	5000[e]	
Mercury (total)	µg/L	0.05[g]	1.4[j]		
		1.2[m]			
Molybdenum	µg/L			10[e]	35[q]
Nickel (dissolved)	µg/L		215.7[n]		
Nickel (total)	µg/L	610[g]	216.1[n]	200[e]	
		12[m]			

Appendix Q2: Water Quality Goals for the San Joaquin Basin continued…

Indicator(s)	Units	SJR-BENEFICIAL USE(S)			
		Drinking Water	Aquatic Life	Irrig. Water Supply	Rec. Use
Nitrate-nitrogen (NO_3-N)	mg/L	10[m]			
Selenium	µg/L		20[b]	20[e]	35[q]
Total Dissolved Solids	mg/L			450[e]	
Zinc (total)	µg/L		55.1[o]	2000[e]	2100[q]
Zinc (dissolved)	µg/L		53.9[o]		

[a] California DHS Action Level for drinking water

[b] National Toxics Rule (USEPA) / 1-hour average (total)

[c] Taste and odor threshold (USEPA Drinking Water Advisory)

[d] USEPA Drinking Water Advisory for persons on restricted sodium diet

[e] Water Quality for Agriculture (Ayers & Westcot)

[f] California Toxics Rule (USEPA)/ 1-hour average

[g] California Toxics Rule (USEPA) for sources of drinking water

[j] USEPA National Ambient W Q Criteria / 1-hour average

[h] California Toxics Rule (USEPA): The concluding concentration was determined by using a 40 mg/L hardness. Where deviations from 40 mg/L of water hardness occur, the goals, in mg/L, shall be determined using the following formulas: (As hardness increases copper increases)

Maximum concentration(1-hour Average,total recoverable) =(e(0.9422*LN(hardness)-1.700))

Maximum concentation (1-hour Average,dissolved) =(e(0.9422*LN(hardness)-1.700))*(0.960)

[l] California Toxics Rule (USEPA): The concluding concentration was determined by using a 40 mg/L hardness. Where deviations from 40 mg/L of water hardness occur, the goals, in mg/L, shall be determined using the following formulas: (As hardness increases lead increases)

Maximum concentration (1-hour Average, dissolved) =(e(1.273*LN(hardness)-1.460))*(1.46203-(LN(hardness)*0.145712))

Maximum concentration (1-hour Average, total recoverable) =(e(1.273*LN(hardness)-1.460))

[m] California Public Health Goal for Drinking Water

Appendix Q2: Water Quality Goals for the San Joaquin Basin continued…

[n] California Toxics Rule (USEPA): The concluding concentration was determined by using a 40 mg/L hardness. Where deviations from 40 mg/L of water hardness occur, the goals, in mg/L, shall be determined using the following formulas: (As hardness increases nickel increases)

Maximum concentration(1-hour Average, dissolved)=e(0.8460*LN(hardness)+2.255))*(0.998)

Maximum concentration(1-hour Average, total recoverable)=e(0.8460*LN(hardness)+2.255)

[o] California Toxics Rule (USEPA): The concluding concentration was determined by using a 40 mg/L hardness. Where deviations from 40 mg/L of water hardness occur, the goals, in mg/L, shall be determined using the following formulas: (As hardness increases zinc increases)

Maximum concentration (1-hour Average, total recoverable)=(e(0.8473*LN(hardness)+0.884))

Maximum concentration(1-hour Average, dissolved)=(e(0.8473*LN(hardness)+0.884))*(0.978)

[q] USEPA IRIS Reference Dose (Assumes 70 kg body weight, 2 liters per day drinking water consumption, and 20 percent relative source contrubution. An additional undertainty factor of 10 is used for Class C carcinogens.)

[r] California Toxics Rule (USEPA): The concluding concentration was determined by using a 40 mg/L hardness. Where deviations from 40 mg/L of water hardness occur, the goals, in mg/L, shall be determined using the following formulas: (As hardness increases cadmium increases)

Maximum concentration (1-hour Average, dissolved) =(exp(1.128*LN(hardness)-3.6867))*(1.136672-(LN(hardness)*0.041838))

Maximum concentration (1 hour Average, total recoverable) =(exp(1.128*LN(hardness)-3.6867))

[t] USEPA Primary MCL

[u1&2] USEPA National Ambient Water Quality Criteria: the concluding concentration was determined by using a pH of 7. Where deviations from pH of 7 occur, the goal, in mg/L, shall be determined using the following formulas: (As pH becomes more acidic total ammonia Nitrogen increases)

Criteria Maximum concentration 1-hour Average (mg N/L):

Salmonids

1- Present: $$CMC = \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}$$

2- Absent: $$CMC = \frac{0.411}{1+10^{7.204-pH}} + \frac{58.4}{1+10^{pH-7.204}}$$

[v] USEPA Guideline - Single Sample Maximum Allowable Density: designated Beach Area (upper 75% C.L.)

[w] USEPA Guideline - Single Sample Maximum Allowable Density: moderate full body contact recreation (upper 82% C.L.)

[x] USEPA Guideline - Single Sample Maximum Allowable Density: lightly used full body contact recreation (upper 90% C.L.)

[y] USEPA Guideline - Single Sample Maximum Allowable Density: infrequently used full body contact recreation (upper 95% C.L.)

Appendix Q3: Site Specific Representations and Beneficial Use(s) By Sub-Areas

(All identified uses are being evaluated whether or not designated in current Basin plan)

				AGRICULTURE		INDUSTRY			RECREATION			FRESHWATER		MIGRATION		SPAWNING			
			MUN	AGR		Process	IND	POW	REC-1		REC-2	WARM	COLD	MIGR		SPWN		WILD	
SITE SPECIFIC MONITORING BY PROGRAM AND SUB-AREA BASIN	Site ID	Applicable Basin Plan Objective Surface Water Body Designation	Municipal and Domestic Supply	Irrigation	Stock Watering	Process	Service Supply	Power	Contact	Canoeing and Rafting	Other Noncontact	Warm	Cold	Warm	Cold	Warm	Cold	Wildlife Habitat	Designated (D) or Tributary (T)
MAIN STEM SAN JOAQUIN RIVER																			
SJR @Sack Dam	541MAD007		P	E	E	E			E	E	E	E		E	E	E	P	E	D
SJR @ Lander	541MER522		P	E	E	E			E	E	E	E		E	E	E	P	E	D
SJR @ Fremont Ford	541MER538		P	E	E	E			E	E	E	E		E	E	E	P	E	D
SJR @ Hills Ferry	541STC512		P	E	E	E			E	E	E	E		E	E	E	P	E	D
SJR @ Crows	535STC504		P	E	E	E			E	E	E	E		E	E	E		E	D
SJR @ Patterson	541STC507		P	E	E	E			E	E	E	E		E	E	E		E	D
SJR @ Maze	541STC510		P	E	E	E			E	E	E	E		E	E	E		E	D
SJR @ Airport Way/Vernalis	541SJC501		P	E	E	E			E	E	E	E		E	E	E		E	D
DRAINAGE BASIN INFLOWS TO SJR																			
North East Basin																			
Cosumnes River @ Twin Cities Rd.	531SAC001		E	E	E				E	E	E	E	E	E	E	E	E	E	D
Mokelumne River @ New Hope Rd.	544SAC002			E	E				E	E	E	E	E	E	E	E	E	E	D
Pixley Slough @Davis Rd. *	544SJC507		E	E	E	E	E		E		E	E	E	E	E	E		E	T
Bear Creek @Thornton Rd (J8) *	544SJC508		E	E	E	E	E		E		E	E	E	E	E	E		E	T
Bear Creek @Lower Sacramento Rd. *	531SJC515		E	E	E	E	E		E		E	E	E	E	E	E		E	T

Appendix Q3: Site Specific Representations and Beneficial Use(s) By Sub-Areas continued…

SITE SPECIFIC MONITORING BY PROGRAM AND SUB-AREA BASIN	Site ID	Applicable Basin Plan Objective Surface Water Body Designation	MUN	AGRICULTURE		INDUSTRY			RECREATION			FRESHWATER		MIGRATION		SPAWNING		WILD	Designated (D) or Tributary (T)
				AGR		Process	IND	POW	REC-1		REC-2	WARM	COLD	MIGR		SPWN			
			Municipal and Domestic Supply	Irrigation	Stock Watering	Process	Service Supply	Power	Contact	Canoeing and Rafting	Other Noncontact	Warm	Cold	Warm	Cold	Warm	Cold	Wildlife Habitat	
Eastside Basin																			
Lone Tree Creek *	531SJC503		E	E	E	E	E		E		E	E	E	E	E	E		E	T
French Camp Slough @ Airport *	531SJC504		E	E	E	E	E		E		E	E	E	E	E	E		E	T
Merced River Hatfield Park (River Road)	541MER546		E		E	E	E	E	E	E	E	E	E	E	E	E	E	E	D
Turner Slough @ 4th Avenue *	535MER576		P	E	E	E			E	E	E	E		E	E	E	P	E	T
TID 5 (Harding Drain)*	535STC501		P	E	E	E			E	E	E	E		E	E	E		E	T
Tuolumne River @ Shiloh	535STC513		P	E	E			E	E	E	E	E	E		E	E	E	E	D
Stanislaus River @Caswell	535STC514		P	E	E	E	E	E	E	E	E	E	E		E	E	E	E	D
Southeast Basin																			
Lone Willow Slough *	545MAD006		P	E	E	E			E	E	E	E		E	E	E	P	E	T
Bear Creek @ Bert Crane Rd. *	535MER007		P	E	E	E			E	E	E	E		E	E	E	P	E	T
Deep Slough Green House Rd. *	535MER577		P	E	E	E			E	E	E	E		E	E	E	P	E	T
Grassland Basin																			
Discharge from San Luis Drain (SLD)*	541MER535			L	E				E		E	E				E		E	T
Mud Slough (upstream of SLD)	541MER536			L	E				E		E	E				E		E	D
Mud Slough (Downstream of SLD)	541MER542			L	E				E		E	E				E		E	D
Salt Slough @Lander/Hwy 165	541MER531			E	E				E		E	E				E		E	D

Appendix Q3: Site Specific Representations and Beneficial Use(s) By Sub-Areas continued…

SITE SPECIFIC MONITORING BY PROGRAM AND SUB-AREA BASIN	Site ID	Applicable Basin Plan Objective Surface Water Body Designation	MUN	AGRICULTURE		INDUSTRY			RECREATION			FRESHWATER		MIGRATION		SPAWNING		WILD	Designated (D) or Tributary (T)
				AGR		Process	IND	POW	REC-1		REC-2	WARM	COLD	MIGR		SPWN			
			Municipal and Domestic Supply	Irrigation	Stock Watering	Process	Service Supply	Power	Contact	Canoeing and Rafting	Other Noncontact	Warm	Cold	Warm	Cold	Warm	Cold	Wildlife Habitat	
West Side Basin																			
Orestimba Creek @ River Rd. *	541STC019		P	E	E	E			E	E	E	E		E	E	E		E	T
Solado Creek @ Hwy 33 *	541STC515		P	E	E	E			E	E	E	E		E	E	E		E	T
Del Puerto Creek @Vineyard *	541STC516		P	E	E	E			E	E	E	E		E	E	E		E	T
Grayson Drain *	541STC030		P	E	E	E			E	E	E	E		E	E	E		E	T
Ingram Creek @River Rd. *	541STC040		P	E	E	E			E	E	E	E		E	E	E		E	T
Hospital Creek @River Rd. *	541STC042		P	E	E	E			E	E	E	E		E	E	E		E	T
Delta Basin																			
New Jerusalem Drain*	544SJC501			E	E	E	E		E		E	E	E	E	E	E		E	T
Tom Payne Slough @Paradise Rd.	544SJC505		E	E	E	E	E		E		E	E	E	E	E	E		E	D
Old River @Tracy Blvd	544SJC506		E	E	E	E	E		E		E	E	E	E	E	E		E	D
Mt. House Creek @ Mt. House Parkway	S544SJC509		E	E	E	E	E		E		E	E	E	E	E	E		E	T

* = Beneficial uses not specifically designated, therefore current listing based on downstream beneficial use
E = Exisiting beneficial uses
P = Potential beneficial uses
L=Existing Limited Beneficial Use