Appendix C.3

Water Quality

C.3 Water Quality

C.3.1 Surface Water Quality

The majority of the surface water quality concerns in the region relate to environmental end uses, but surface water also supports drinking water, irrigation and recreation uses throughout the region. Table C.3-1 summarizes water quality constituents of concern that are affecting these four end uses. It includes constituents that are under regulation by the Regional Water Quality Control Board as part of the 303(d) listing of impaired water bodies indicated as an "x" as well as constituents that local stakeholders have noted as affecting end uses as indicated by an "*".

Table C.3-1: Surface Water Quality Constituents of Concern by Use – check the X and * with Basin Plan beneficial uses

	End use			
Constituent	**Drinking Water**	**Irrigation**	**Environmental**	**Recreation**
Upper Cache Creek Planning Area				
Boron		X		
Mercury			X	
Nutrients	X		*	*
Pesticides			*	
Sediment			*	
Cyanotoxins	*		*	*
Upper Putah Creek Planning Area				
Boron		X		
Mercury			X	
Nickel			X	
Valley Floor Planning Area				
Azinphos-methyl (Guthion)			X	
Boron		X		
Carbofuran			X	
Chlordane			X	
DDT			X	
Diazinon			X	
Dieldrin			X	
E. coli				X
Electrical Conductivity		X		
Fecal Coliform				X
Low Dissolved Oxygen			X	
Malathion			X	
Mercury			X	
Organic Carbon	*			

	End use			
Constituent	**Drinking Water**	**Irrigation**	**Environmental**	**Recreation**
Pesticides (Group A)			X	
PCBs			X	
Salinity (Total Dissolved Solids, Electrical Conductivity)	X			
Sediment			*	
Selenium			*	
Turbidity	*			

X = Constituent on 303(d) list water quality regulations

* = Constituent identified by local stakeholders as source of impairment

303(d) listing refers to Section 303(d) of the Clean Water Act, which requires that water bodies that do not meet water quality standards for a beneficial use be identified/listed. The 303(d) list identifies the impaired water body as well as the pollutant causing the impairment. The Clean Water Act also requires that a Total Maximum Daily Load (TMDL) be developed for each listing; the TMDL is designed to control the amount of the pollutant entering the water body.

A number of waterways in the Westside Region are identified as impaired water bodies and have been placed on the 303(d) list. Table C.3-2 provides the details of the water body and sources of impairment. As indicated in the Table C.3-2, mercury is a common source of water quality impairment throughout the Westside Region.

Table C.3-2: 303(d) Listed Water Bodies

WATER BODY NAME	ESTIMATED SIZE AFFECTED	UNIT	Azinphos-methyl	Boron	Carbofuran	Chlordane	Chlorpyrifos	DDT	Diazinon	Dieldrin	E. coli	Electrical Conductivity	Fecal Coliform	Group A Pesticides	Invasive Species	Malathion	Mercury	Nickel	Nutrients	Oxygen, Dissolved	PCBs	Salinity	Unknown Toxicity
Upper Cache Creek Planning Area																							
Clear Lake	40070	Acres															X		X				
Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)	96	Miles		X													X						
Indian Valley Reservoir (Lake County)	3469	Acres															X						
Cache Creek, North Fork (below Indian Valley Reservoir, Lake County)	14	Miles															X						
Harley Gulch	6	Miles															X						
Davis Creek (upstream from Davis Creek Reservoir, Yolo County)	5	Miles															X						
Davis Creek Reservoir	163	Acres															X						
Davis Creek (downstream from Davis Creek Reservoir, Yolo County)	6	Miles															X						
Sulfur Creek (Colusa County)	14	Miles															X						
Bear Creek (Colusa County)	15	Miles															X						
Upper Putah Creek Planning Area																							
James Creek	6	Miles															X	X					
Berryessa, Lake	19083	Acres															X						
Putah Creek (Solano Lake to Putah Creek Sinks; partly in Delta Waterways, northwestern portion)	27	Miles		X													X						

WATER BODY NAME	ESTIMATED SIZE AFFECTED	UNIT	Azinphos-methyl	Boron	Carbofuran	Chlordane	Chlorpyrifos	DDT	Diazinon	Dieldrin	E. coli	Electrical Conductivity	Fecal Coliform	Group A Pesticides	Invasive Species	Malathion	Mercury	Nickel	Nutrients	Oxygen, Dissolved	PCBs	Salinity	Unknown Toxicity
Valley Floor Planning Area																							
Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)	96	Miles		X													X						
Winters Canal (Yolo County)	15	Miles							X														
Gordon Slough (from headwaters and Goodnow Slough to Adams Canal, Yolo County)	8	Miles																		X			
Colusa Basin Drain	49	Miles	X		X			X	X	X	X			X		X	X			X			X
Sycamore Slough (Yolo County)	17	Miles																		X			
Willow Slough (Yolo County)	10	Miles		X																			
Willow Slough Bypass (Yolo County)	6	Miles		X							X		X										
Tule Canal (Yolo County)	11	Miles		X							X		X									X	
Solano, Lake	15	Acres															X						
Putah Creek (Solano Lake to Putah Creek Sinks; partly in Delta Waterways, northwestern portion)	27	Miles		X													X						
Ulatis Creek (Solano County)	17	Miles					X		X														
Delta Waterways (northern portion)	6795	Acres				X	X	X	X	X				X	X		X				X		X
Delta Waterways (northwestern portion)	2587	Acres					X	X	X			X		X	X		X						X
Duck Slough (in Delta Waterways, northern portion)	3	Miles					X																

C.3.2 Groundwater Quality

Groundwater quality concerns in the region relate to drinking water and irrigation uses. Table C.3-3 identifies constituents of concern with respect to these end uses that have been identified by local stakeholders through previous planning efforts.

Table C.3-3: Groundwater Quality Constituents of Concern by Use

Constituent	End use	
	Drinking Water	Irrigation
Upper Cache Creek Planning Area		
Arsenic	X	
Boron		X
Iron	X	
Magnesium	X	
Nitrate	X	
Total Dissolved Solids	X	X
Upper Putah Creek Planning Area		
None identified		
Valley Floor Planning Area		
Arsenic	X	
Boron		X
Chromium	X	
Electrical Conductivity (salinity)	X	X
Flame Retardant Chemicals	X	
Iron	X	X
Manganese	X	X
Nitrate	X	
Selenium		X
Total Dissolved Solids	X	X

Impairment of groundwater can be assessed by comparing concentrations of constituents of concern in the groundwater against drinking water maximum contaminant levels (MCLs) and agricultural water quality standards. MCLs consist of primary and secondary MCLs. Primary MCLs are assigned to constituents for which a health-based risk is associated with consumption of water that exceeds a particular concentration. Secondary MCLs are assigned to constituents for which there is no health risk, but for which there may be aesthetic concerns above a particular concentration. Tolerance for water quality constituents vary by crop type, but general irrigation water quality standards have been developed based on literature review. Table C.3-4 identifies target drinking water and irrigation levels for constituents of concern compared to available data for the region. As indicated by the blanks in the table, there are gaps in the data.

In addition to the specific drinking water regulatory limits or agricultural use limits, constituents found in groundwater such as selenium, boron, and salinity that are delivered for municipal potable supply are discharged in the municipal wastewater to local surface water bodies. The levels in the wastewater are approaching concentrations that are in excess of the Regional Board's basin plan limits or in quantities that limit the downstream beneficial uses of the local surface water bodies. This water quality challenge is of particular concern in the Valley Floor Planning area.

Table C.3-4: Groundwater Quality Targets Compared to Measured Range of Values

	EC (umhos/cm)	TDS (ppm)	Nitrate (ppm as NO_3)	Boron (ppb)	Arsenic (ppb)	Chromium (ppb Total)	Manganese (ppb)	Selenium (ppb)	Iron (ppb)	Mercury (ppb)
End Use Target										
Drinking Water	900	500	45	1000	10	50	50	50	300	2
Agricultural	700	450	--	700	100	--	200	20	500	--
Upper Cache Creek Planning Area Groundwater Basins										
Upper Lake Valley Basin										
Scotts Valley Basin										
Big Valley Basin[1]		350-1200		100-2500						
High Valley Basin										
Burns Valley Basin										
Lower Lake Basin										
Long Valley										
Clear Lake Cache Formation Basin										
Middle Creek Basin										
Clear Lake Volcanics Groundwater Source Area										
Bear Valley										
Upper Putah Creek Planning Area Groundwater Basins										
Coyote Valley Basin										
Collayomi Valley Basin										
Pope Valley										
Berryessa Valley										

	EC (umhos/cm)	TDS (ppm)	Nitrate (ppm as NO_3)	Boron (ppb)	Arsenic (ppb)	Chromium (ppb Total)	Manganese (ppb)	Selenium (ppb)	Iron (ppb)	Mercury (ppb)
Valley Floor Planning Area Groundwater Subbasins										
Sacramento River Subbasin (Colusa, Yolo and Solano Subbasins) [2]	1200-1750	671-1052	<0.1-135	140-1500	<15	<5	162	<15	404	<0.5
Dunnigan Hills Subbasin (Colusa Subbasin) [2]	363-590	213-355	>40	400-1200						
Capay Valley Subbasin [2]	330-6100	340-3200	<0.1-39	392-9490	<15	<5-190	<5-1700	<15-11	<100-541	<0.5-0.6
Buckeye Creek Subbasin (Colusa Subbasin) [2]	400-666	250-379	<0.1-48	1300-1500	<2-<5	<10-30	<10-110	<5	140-2100	<0.2-<1
West Yolo Subbasin (Colusa and Yolo Subbasins) [2]	292-1100	181-690	<0.1-120	<20-2200	<2-4	<5-31	<5-290	<5-7.8	<100-6190	<0.2-<1
East Yolo Subbasin (Colusa and Yolo Subbasins) [2]	860-2000	430-1300	22-66	700-3440	<15	<5-46.2	<5-34.1	<15-57.7	<100-1510	<0.5
Solano Subbasin [3]				<500						