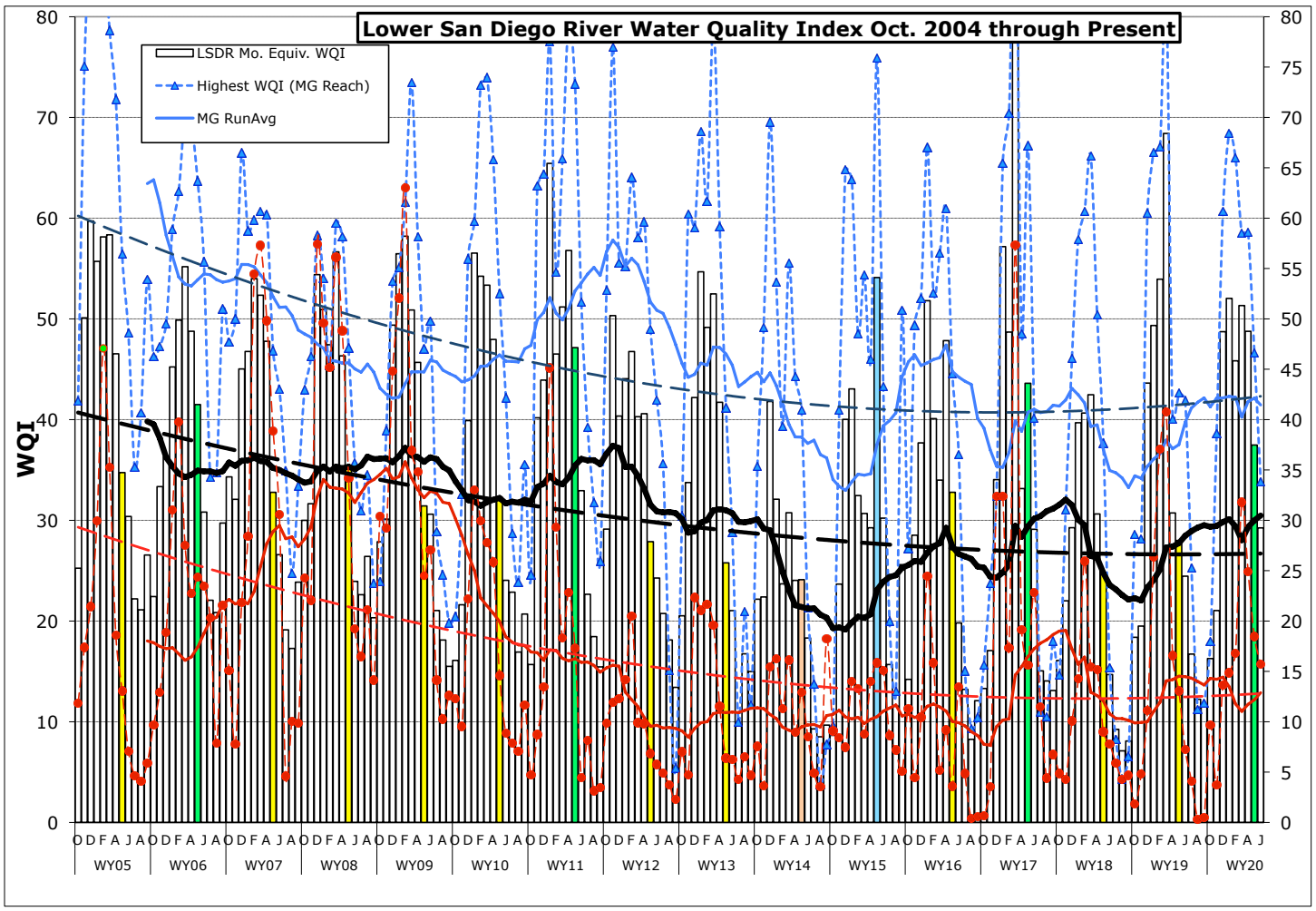
Monthly WQM Report

Lower San Diego River - May 2020



Lower SDRWQ Monitoring Data Summary

Table 1 presents a summary of water quality data monitored by the SDRPF RiverWatch Team within the Lower San Diego River subbasin over the past two months (May and April). The May index fell 12 points from last month to a level five points above the 16-yr May average of 32. Overall water quality in the lower San Diego River hydrologic unit (HSU 907.1) declined for C+ (Fair) to D+ (Marginal).

Table 1 - May/April 2020 WQM Data Summary

	West - MV	Mid - MG	East - SB	LSDR	Percent Variance from		
[Sites]	[1-7] May/Aprl	[8-10] May/Aprl	[11-15] May/Aprl	[1-15] May/Aprl	Last Mo (4'20)	Last Yr (5'19)	16-yr Avg (May)
Temperature, oC	21.2/17.4	18.5/17.9	18.8/17.1	19.7/17.4	13%	1%	-2%
Sp.Cond., mS/cm	2.39/0.93	1.11/0.63	1.27/0.97	1.67/0.94	77%	-11%	-23%
DO, mg/L	4.48/6.41	6.86/7.64	4.54/5.69	4.94/6.23	-18%	34%	-2%
DO, % of Sat.	52/68	74/78	49/59	55/65			
pH	7.82/7.71	8.11/8.22	7.85/7.81	7.83/7.77	1%	12%	2%
3-day ADF, cfs	13/146	10/66	10/57	11/90	-88%	-3%	56%
WQ Index	**38**/47	**47**/59	**34**/45	**37**/49	-23%	34%	17%
May/April	C-/C	C/B	D/C	D+/C+			
May/ April '20	Fair/Fair	Fair/Good	Marginal/ Fair	Marginal/ Fair	**Index fell 12 points overall from last month**		

Negative variance (declines from norms) and DO depletions (< 5.0 mg/L or 55% of Sat) expressed in red.

LSDR **water temperatures** increased nearly 2.3 degrees (13%) from last month to 2% below the 16-yr May norm of 20.1 oC. Overall **specific conductivity** of 1.67 mS/cm constitutes a 77% jump from last month, but 11% less than last May and 23 below the 16-yr norm of 2.18 mS/cm. The overall **dissolved oxygen** level of 4.94 mg/L (52%Sat.) is 18% less than last month but 34% above last May and 2% under the 16-yr norm of 5.12 mg/L (60%Sat). **Streamflow** over the antecedent 3-day period of 11 cfs is down 88% from last month to the same level as a year ago and twice the 16-yr norm. This month's LSDR **water quality index** (WQI) declined 11 points (-23%) from last month to a level five points above the 16-yr May norm of 32.

Monthly WQI values occurring over the past 26 months of record for the three sections of the lower river system and the overall LSDR average, along with average 30-day antecedent flow (ADF) and rainfall (MRF), are expressed in **Table 2** on the next page.

Table 2 - WQI Values, Average Daily Flow and Monthly Rainfall (3'18 - 5'20)							
	Mission Valley	Mission Gorge	Santee Basin	LSDR		ADF, cfs	MRF, in
April	31 (D)	50 (B-)	22 (E)	31 (D)	t	2.8	0.02
May'18	**24 (E+)**	**37 (D+)**	**18 (E)**	**24 (E+)**	**t**	**2.3**	**0.12**
June	12 (F+)	15 (E)	17 (E)	15 (E)	DW	1.3	0.00
July	12 (F+)	8 (F)	8 (F)	9 (F)	DW	0.7	0.00
Aug.	8 (F)	4 (F)	8 (F)	7 (F)	DW	0.3	0.02
Sept	9 (F)	7 (F)	8 (F)	8 (F)	DW	0.3	0.00
Oct	24 (D-)	29 (D)	9 (F)	18 (E)	t	3.2	0.57
Nov	21 (E+)	28 (D)	14 (E-)	19 (E)	t	9.6	0.81
Dec.	54 (B)	61 (B)	25 (D-)	44 (C)	WW	48	3.02
Jan.'19	47 (C)	66 (B)	43 (C)	49 (C+)	WW	39	2.80
Feb.	51 (B-)	67 (B)	51 (B-)	54 (B)	WW	179	2.98
Mar.	76 (A-)	82 (A)	55 (B)	68 (B)	WW	25	1.28
April	33 (D)	40 (C)	24 (E+)	31 (D)	t	8.6	0.46
May'19	**28 (D)**	**43 (C)**	**21 (E)**	**28 (D)**	**t**	**14**	**0.51**
June	21 (E)	42 (C)	20 (E)	24 (E+)	t	4.3	0.38
July	17 (E)	25 (D-)	13 (E-)	17 (E)	DW	1.2	0.01
Aug.	16 (E)	11 (F)	9 (F)	12 (F+)	DW	0.9	0.02
Sept	15 (E)	12 (F+)	8 (F)	11 (F+)	DW	1.2	0.03
Oct	18 (E)	18 (E-)	15 (E)	16 (E)	DW	0.9	0.00
Nov.	20 (E)	39 (C)	14 (E)	21 (E)	t	37	0.52
Dec.	60 (B)	61 (B)	31 (D)	49 (C+)	WW	78	3.51
Jan. '20	62 (B)	68 (B)	34 (D)	52 (B-)	WW	18	2.90
Feb.	47 (C)	66 (B)	35 (D)	46 (C)	ww	10	0.38
March	52 (B-)	58 (B)	46 (C)	51 (B-)	WW	48	1.97
April	47 (C)	59 (B)	45 (C)	49 (C+)	WW	181	3.58
May '20	**38 (C-)**	**47 (C)**	**34 (D)**	**37 (D+)**	**t**	**13**	**0.06**

The **cover page** chart presents monthly WQI values and their range (high-low) for the Lower San Diego River sub-basin as determined over the past 16 years of RiverWatch monitoring. This months values (May) for each year are expressed as color-shaded bars; blue B (50 or >) is Good, green C (38-49) Fair, yellow D (25-37) Marginal, brown E (13-24) Poor and pink F-(12 or <) Very Poor. Running average index values for LSDR (flow-weighted averages of all sites) are shown as a heavy black line. Monthly values for the consistently highest/best quality reach (Mission Gorge) are shown as a blue line while the consistently lowest/poorest reach (Upper Santee Basin) are shown in red. The generally downward slope in index over the 16-year period is primarily attributed to declining dissolved oxygen levels extending throughout protracted low-flow (dry-weather) years. The dashed black line represents an overall downward trend of -2.5% per annum in index value since late 2004. WY05 witnessed best overall water quality while poorest water quality was experienced during the summer months of 2014 extending through November.

Monthly WQI values extending from Oct. '04 through May of this year are presented in **Chart 1** (next page) together with 12-mo. running averages for each of the five principal reaches of the lower river system and overall (i.e., LSDR). The current running average WQI of 30 is seven percent below the 16-yr LSDR flow-weighted average index of 32.7; several index points above a year ago. The running average May low of 21 (-37% below the norm) occured in 2015. The highest running average WQI for May of 36 (10% above norm) occured in 2009. The overall LSDR running average (12-month trendline shown dashed in black), has declined approximately ten index points over the span of 180 months (15.7 years).

Monthly and 12-mo. running average WQI values for the poorest reach (Upper Santee Basin) and best (Mission Gorge) are presented in **Chart 2**. Although water quality improved within the Upper Santee Basin over the past year, resurgent growth and subsequent decay of aquatic invasives such as floating primrose-willow (Ludwigia peploides) in conjunction with low-flow and increased organic benthos are primary causes of deteriorated water quality both within this reach and deep portions of Mission Valley (e.g., Kaiser Ponds). The greatest downward trend (red-dashed line) is associated with the poorest reach (Upper Santee Basin) encompasing monitoring sites 13 (Mast Park) and 14 (Magnolia Ave/RCP).

Spatial WQI values by monitoring site over the past three months are shown in **Charts 3, 4 and 5** on page 6. Both May (chart 4) and early June (chart 5) results (color bars w/values in black) are considerably lower than April values (chart 3). Only 20% of the sites (3) show Good (B) water quality in May compared to six (40%) in April. Marginal (D) sites rose from none in April to five (33%) in May. It is anticipated that reduced streamflow combined with increased water temperatures and elevated rates of oxygen depletion over the comming months will result in further decline throughout the remaining months of the water year. DO concentration values monitored in the Upper Santee Basin (Sites 13 & 14) have been below chronic hypoxic levels (<2.5 mg/L) for most of the past decade. There are also several hypoxic hotspots in the Mission Valley river secgment (sites 5 and 6) observed on a degular basis throughout dry-weather flow months of June thru October.

(JCK 6/05/20)

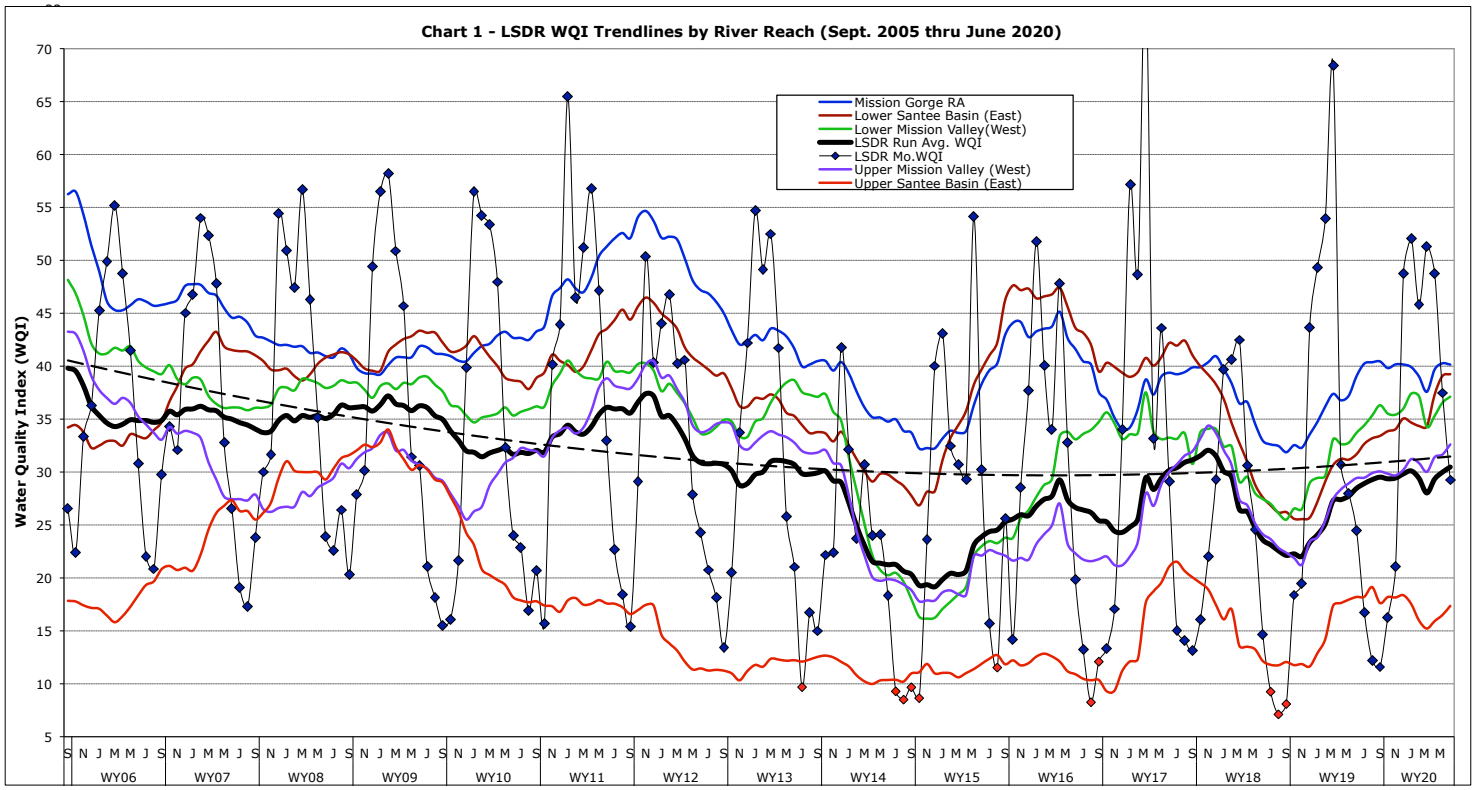


Chart 1 - LSDR WQI Trendlines by River Reach (Sept. 2005 thru June 2020)
Water Quality Index (WQI)
Mission Gorge RA
Lower Santee Basin (East)
Lower Mission Valley(West)
LSDR Run Avg. WQI
LSDR Mo.WQI
Upper Mission Valley (West)
Upper Santee Basin (East)
WY06
WY07
WY08
WY09
WY10
WY11
WY12
WY13
WY14
WY15
WY16
WY17
WY18
WY19
WY20

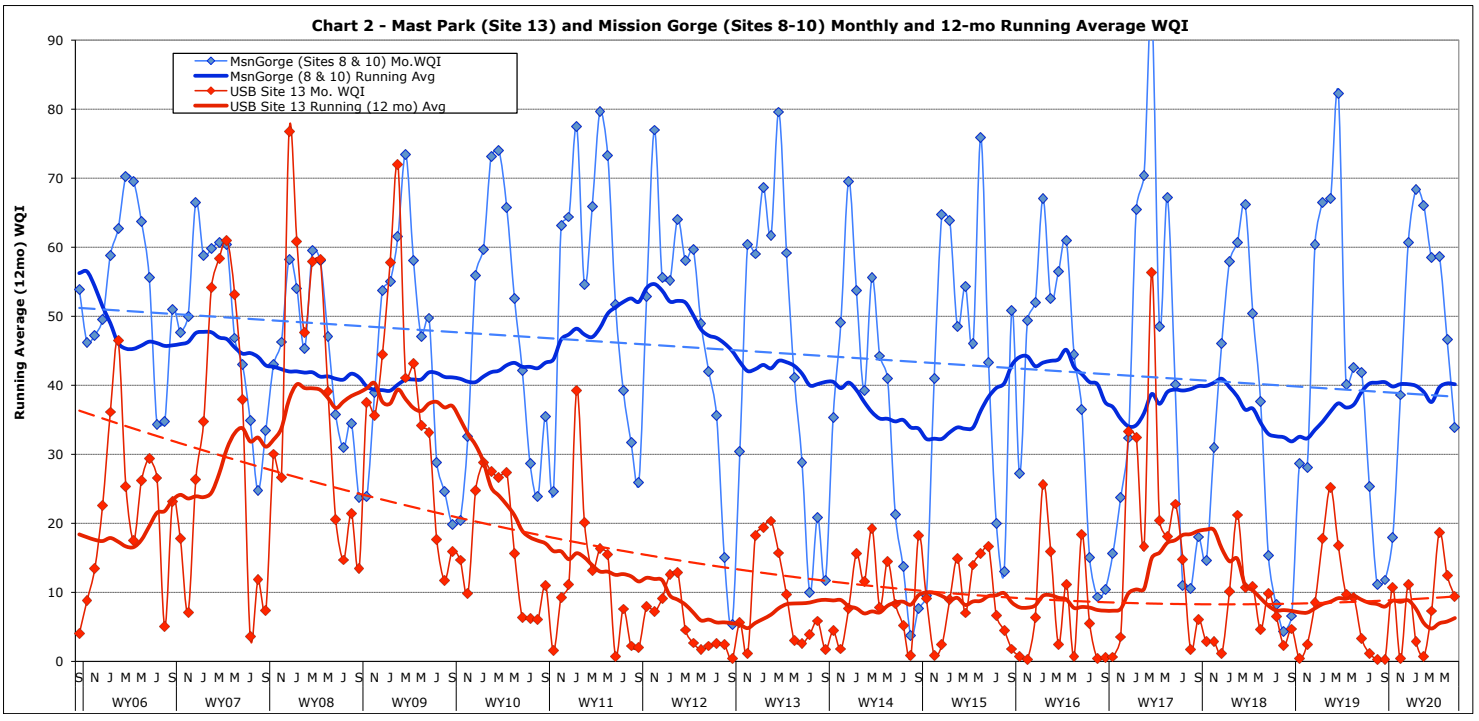


Chart 2 - Mast Park (Site 13) and Mission Gorge (Sites 8-10) Monthly and 12-mo Running Average WQI
Running Average (12mo) WQI
MsnGorge (Sites 8 & 10) Mo.WQI
MsnGorge (8 & 10) Running Avg
USB Site 13 Mo. WQI
USB Site 13 Running (12 mo) Avg
WY06
WY07
WY08
WY09
WY10
WY11
WY12
WY13
WY14
WY15
WY16
WY17
WY18
WY19
WY20

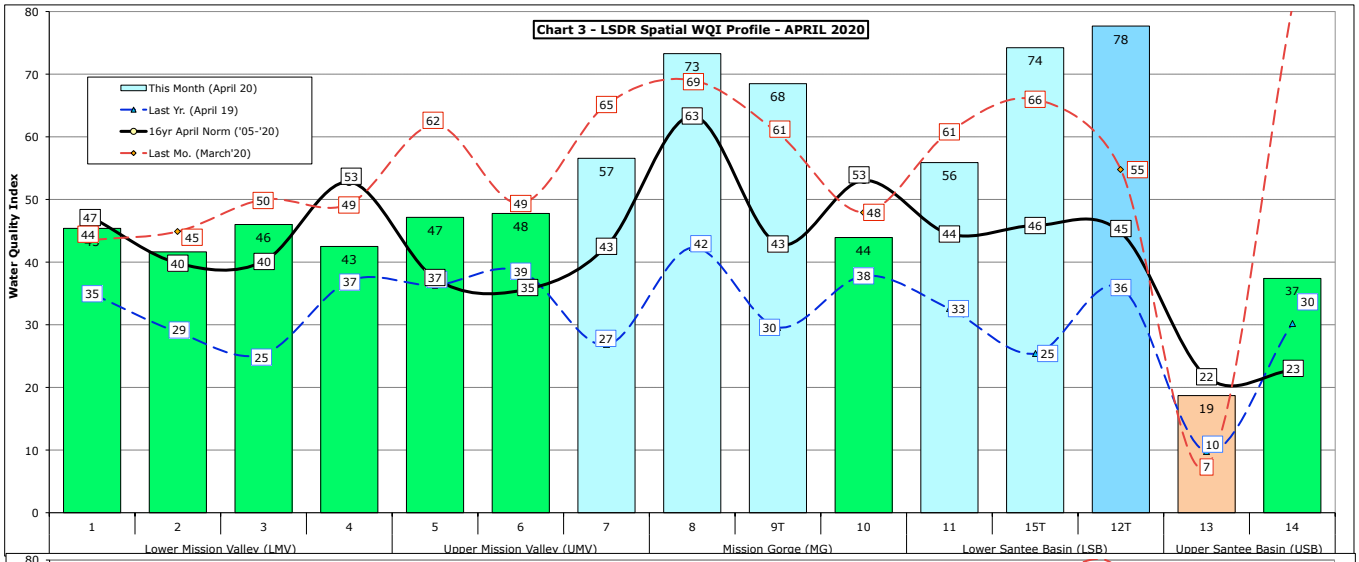


Chart 3 - LSDR Spatial WQI Profile - APRIL 2020
This Month (April 20)
Last Yr. (April 19)
16yr April Norm ('05-'20)
Last Mo. (March'20)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)

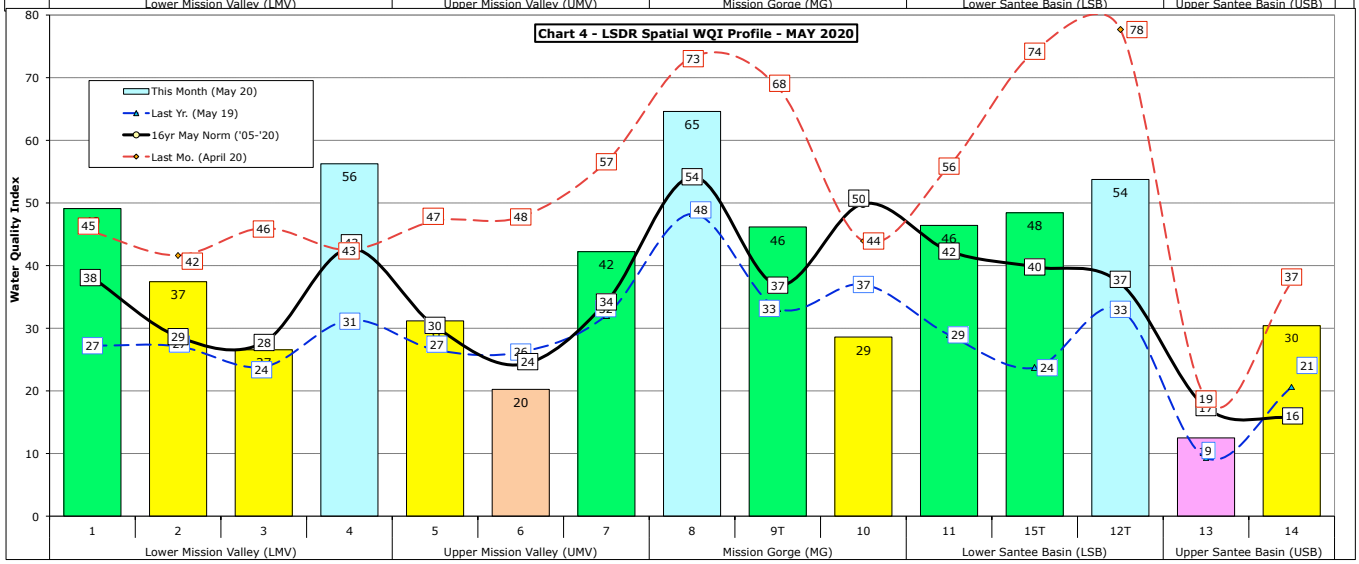


Chart 4 - LSDR Spatial WQI Profile - MAY 2020
This Month (May 20)
Last Yr. (May 19)
16yr May Norm ('05-'20)
Last Mo. (April 20)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)

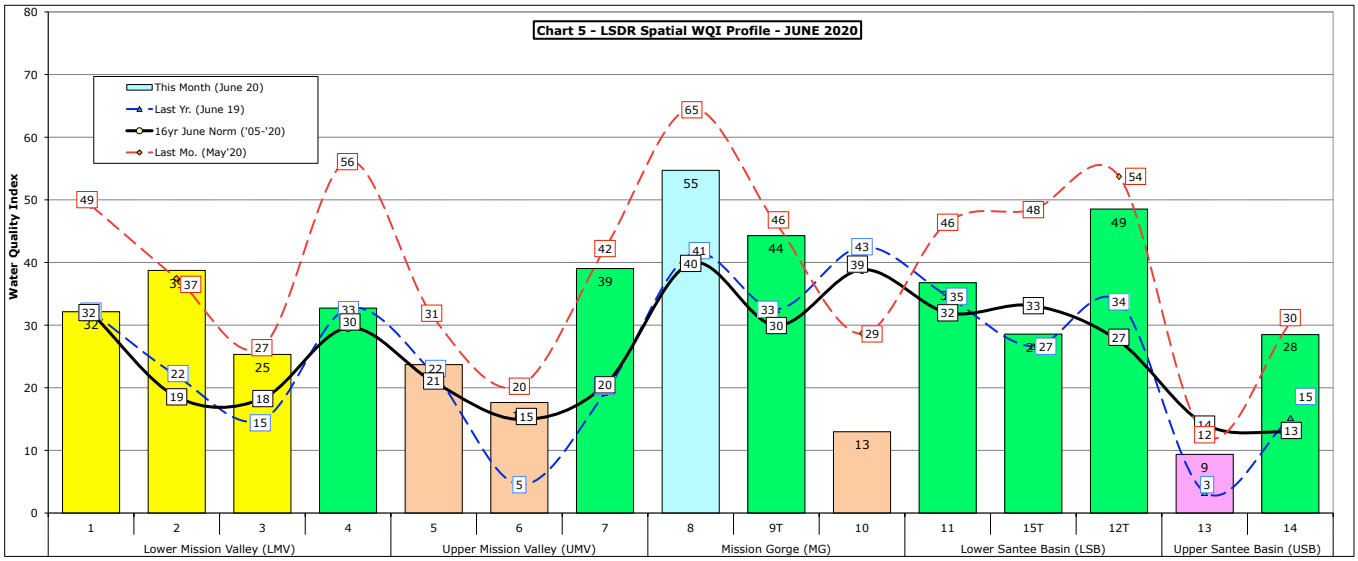


Chart 5 - LSDR Spatial WQI Profile - JUNE 2020
This Month (June 20)
Last Yr. (June 19)
16yr June Norm ('05-'20)
Last Mo. (May'20)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)