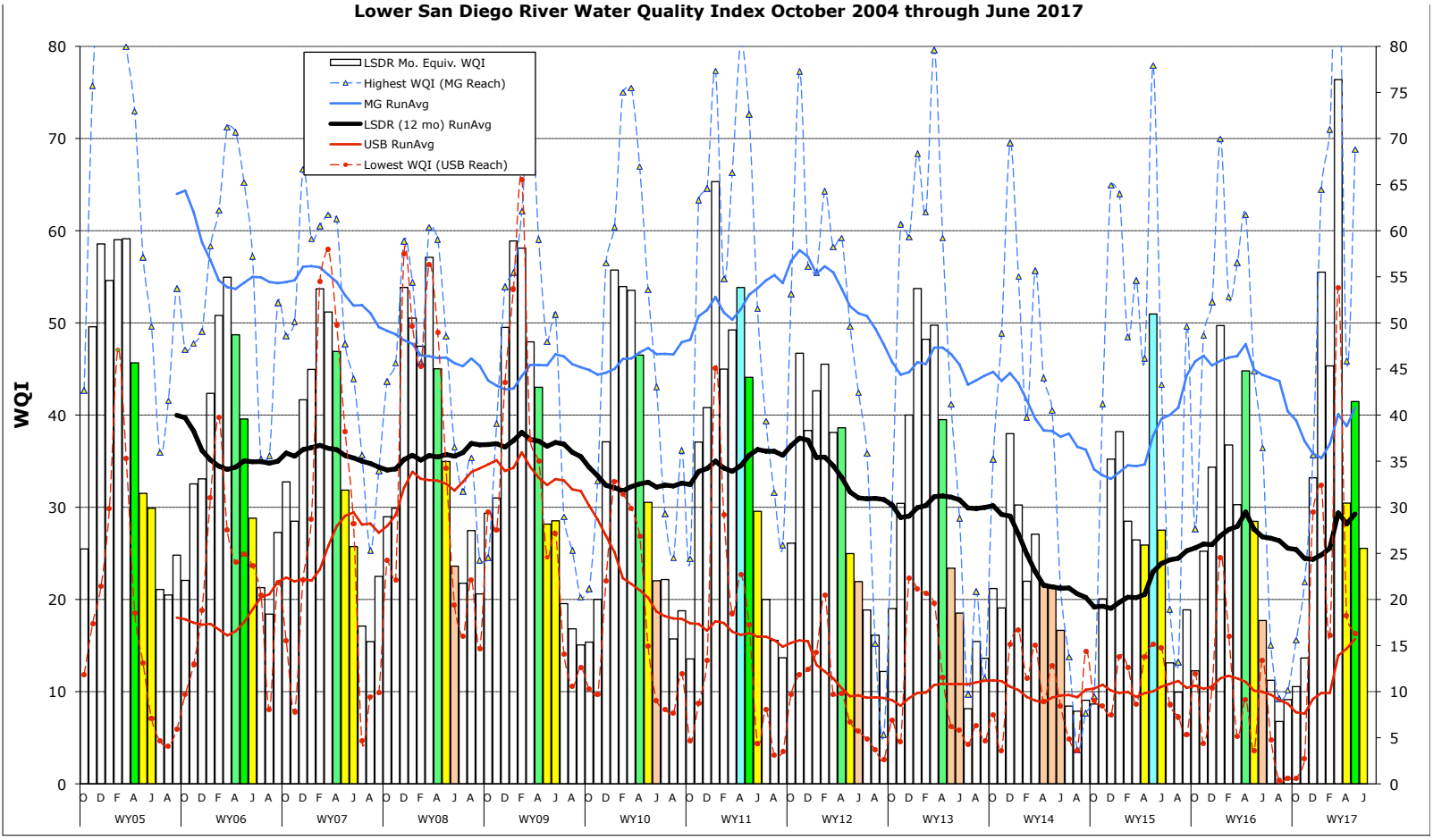
Monthly WQM Report

Lower San Diego River - June 2017



Lower SDR WQ Monitoring Data Summary

Table 1 presents a summary of water quality data monitored by SDRPF's RiverWatch Team within the Lower San Diego River watershed over the past two months. May and June constitute the last month of spring and first of summer. This month's index is down 14 points from last month; a value 7 points higher than a year ago June and the same as the 12-yr monthly norm. Overall water quality of the lower hydrologic unit (HSU 907.1) is rated Marginal (D-) for June, down from last month's rating of Fair (C).

Table 1 - May/June 2017 WQM Data Summery

	West - MV	Mid - MG	East - SB	**LSDR**	Percent Variance from		
[Sites]	[1-7] May/June	[8-10] May/June	[11-15] May/June	**[1-15] May/June**	Last Mo (5/'17)	Last Yr (6/'16)	12-Yr Avg (June)
Temperature, oC	22.0/23.8	18.1/22.1	19.3/23.2	**20.1/23.2**	15%	1%	6%
Sp.Cond., mS/cm	1.64/2.63	1.51/1.87	1.58/2.20	**1.63/2.40**	47%	-5%	-7%
DO, mg/L	5.51/3.20	9.05/7.38	4.91/4.49	**5.93/4.42**	-23%	14%	-1%
DO, % of Sat.	64/38	97/85	55/53	**66/52**			
pH	7.95/-	7.98/-	8.01/-	**7.99/-**			
30-day ADF, cfs	20.8/5.0	17/2.7	15.7/2.0	**17.8/3.2**	-82%	200%	-38%
WQ Index	43/22	69/40	34/31	**41/27**	-35%	36%	2%
Grade(May/Jun)	C/E	B/C	D/D	**C/D-**			
May 2017/ **June 2017**	Fair/ **Poor**	Good/ **Fair**	Marginal/ **Marginal**	Fair/ **Marginal**	**WQI down 14 points from last month**		

Overall, LSDR **water temperatures** are up three degrees (15%) from last month at one percent above last June and six percent above the 12-yr monthly norm of 22°C. **Specific Conductivities** rose 47% from last month to 5% below last June and 7% below the 12-yr monthly norm of 2.59 mS/cm. Overall **Dissolved oxygen** of 4.42 mg/L is down 23% from last month at 14% above last June and 1 percent below the 12-yr monthly norm of 4.52 mg/L. **Streamflow** over the antecedent 30-day period of 3.2 cfs is down 82% from last month at 38% below the 12-yr norm of 5.3 cfs. This month's LSDR **water quality index** (WQI) of 27(D-) fell 14 points (36%) from last month's value of 41(C) to 6 points above a year ago June reaching the 12-yr monthly norm of 25 (D).
Conclusion:

The Lower San Diego River water quality index fell 14 points (36%)
from **41 (C) Fair to 27 (D-) Marginal** over the past month.

A summary of monthly WQI values occurring over the past two years of record for the three sections of the lower river system as well as the overall LSDR average are listed in **Table 2** along with average daily flow (ADF) and total monthly rainfall (MRF).

Table 2 - WQI Values, Average Daily Flow and Monthly Rainfall (June 2015 - June 2017)

	Mission Valley	Mission Gorge	Santee Basin	LSDR		ADF, cfs	MRF, in
June'15	26(D-)	43(C)	31(D)	31(D)	DW	3.2	0.01
July	12(F)	19(E)	15(E)	15(E)		9.5	1.71
Aug	8(F)	13(E-)	15(E)	12(F+)	DW	2.7	0.00
Sept	8(F)	50(B-)	32(D)	26(D-)		5.5	1.25
Oct	5(F)	28(D)	17(E)	14(E)		4.9	0.42
Nov	28(D)	49(C+)	20(E)	29(D)		7.8	1.53
Dec.	40(C)	52(B)	29(D)	38(C-)		7.5	0.45
Jan.'16	54(B)	70(B)	42(C)	52(B)	WW	92.7	3.21
Feb.	40(C)	53(B)	35(D)	40(C)		12.3	0.05
March	32(D)	57(B)	25(D-)	34(D)		14.0	0.72
April	63(B)	62(B)	30(D)	49(C+)		11.5	0.55
May	38(C)	45(C)	26(D-)	34(D)		5.8	0.43
June	14(E)	36(D)	18(E)	20(E)	DW	1.2	0.02
July	14(E)	15(E)	12(F+)	13(E-)	DW	0.6	0.00
Aug	10(F)	9(F)	6(F)	8(F)	DW	0.4	0.00
Sept	12(F+)	10(F)	12(F+)	12(F+)	DW	0.4	0.32
Oct	13(E-)	16(E)	13(E-)	13(E-)	DW	0.8	0.07
Nov.	16 (E)	23(E)	14(E)	14(E)		1.2	0.61
Dec.	27(D)	36(D)	37(D+)	33(D)	WW	19.4	4.22
Jan. '17	62(B)	64(B)	49(C+)	56(B)	WW	128.2	3.01
Feb.	49(C+)	71(B)	36(D+)	45(C)	WW	122.8	3.14
March	82(A)	95(A+)	63(B)	76(A-)	WW	176.6	0.07
April	33(D)	39(C)	19(E)	30(D)		8.2	0.02
May	43(C)	69(B)	34(D)	41(C)		17.8	0.92
June'17	22(E)	40(C)	31(D)	27(D-)		3.2	0.00

The **cover page** chart presents monthly WQI values and their range (high-low) for the Lower San Diego River as determined over the past 12 and-a-half years of RiverWatch monitoring. April and May values for each of the last 12 years are expressed as color-shaded bars. Running average index values for LSDR (for 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 overall upward trend in the index through the past seven months has concluded. Dry-weather conditions now prevail. Surface flow is now absent at two upper Santee Basin sites; RCP/Cottonwood (14) and Sycamore Ck/Santee Lakes (12).

Monthly WQI values extending from Oct. 2004 through June 2017 are presented in **Chart 1** (next page) together with 12-month running averages (trend-lines) for each of the five principal reaches of the river and overall (i.e., for the Lower SDR). The current running average WQI for the LSDR of 30 is only 5% below the 12-yr annual norm of 32. A year ago (June 2016) the running average WQI was three points lower (27) at 15% below the 12-yr norm. The improved DO values monitored throughout all reaches of the lower river system that were associated with hydraulic flushing during this year's wet-weather months (Dec-March) are now declining rapidly with the return to dry-weather conditions.

Monthly and 12-mo. running average WQI values for the poorest reach (Upper Santee Basin) and best Mission Gorge section (Sites 8-10) are presented in **Chart 2** also on next page. Although water quality has improved to some extent in the Upper Santee Basin, excessive growth of invasive aquatic plants such as floating primrose-willow (*Ludwigia hextapetala*) is now, following months of flushing, on the upsurge while surface flows are now minimal to absent.

Spatial WQI results by site for the past three months of monitoring are shown on **Charts 3, 4 and 5** on page 6. June WQI values (color bars w/index values in black) have declined significantly from. May. The May values witnessed a return toward 12-yr normalized results due to several rainfall events during the month. During May of this year sixty percent (9 of 15) of the sites were in the Fair (C) range (WQI>37) while four more (27%) were Good (B). During June, five of 13 sites were Poor (4) to Very Poor (1) while six were Marginal and only two (Mission Gorge) were Fair. Further declines in water quality at most sites are anticipated throughout the dry summer months.

The water quality index values are expected to further decline over the next 3-4 months at most monitoring sites based on lowered dissolved oxygen levels and streamflow in conjunct with increases in specific conductivity and water temperature. Dissolved oxygen concentrations are anticipated to fall below the hypoxic threshold of 4 mg/L throughout multiple reaches of the lower river this coming month.

jck (6/29/2017)

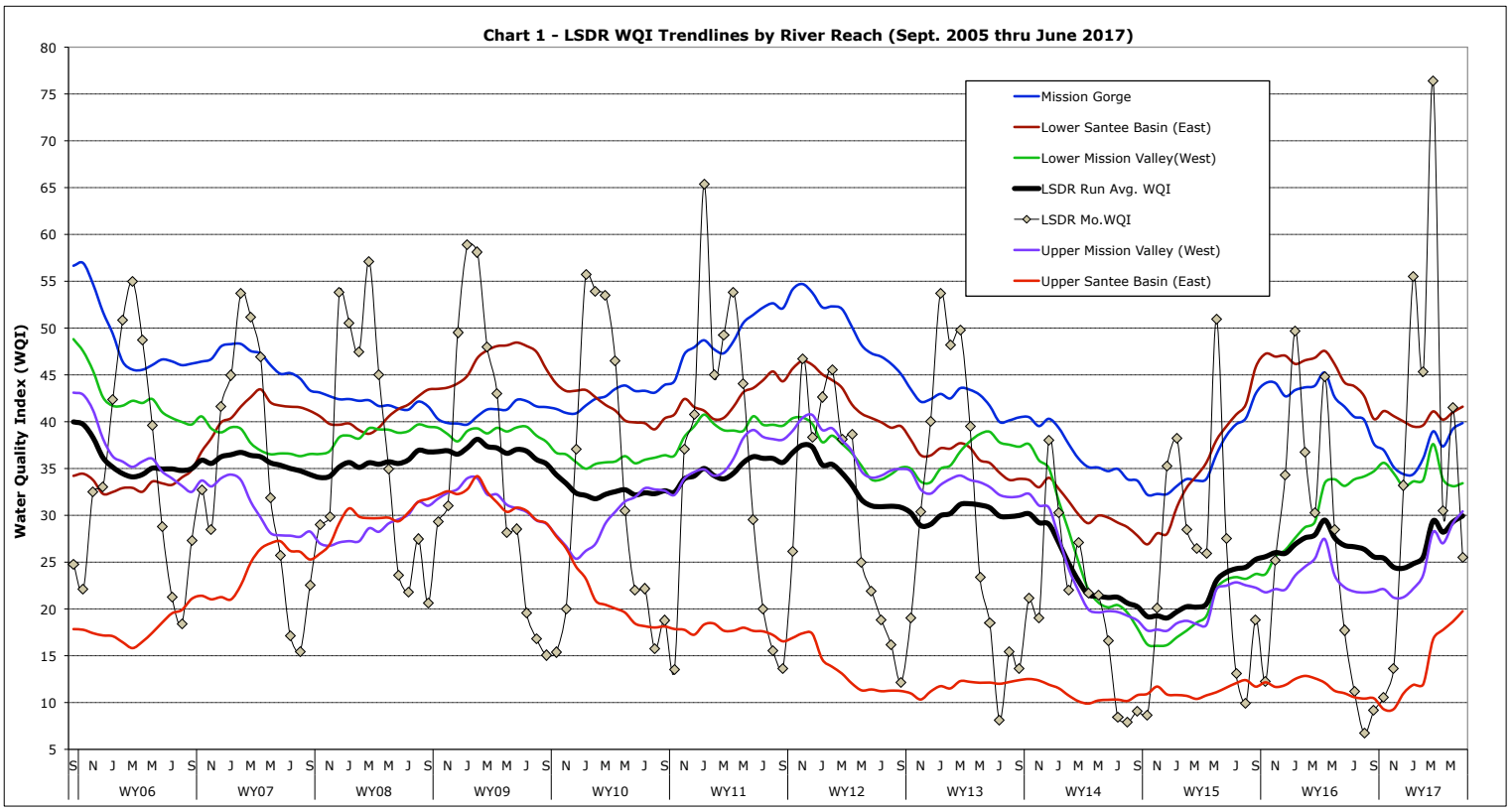


Chart 1 - LSDR WQI Trendlines by River Reach (Sept. 2005 thru June 2017)
Water Quality Index (WQI)
Mission Gorge
Lower Santee Basin (East)
Lower Mission Valley(West)
LSDR Run Avg. WQI
LSDR Mo.WQI
Upper Mission Valley (West)
Upper Santee Basin (East)
WY06
WY07
WY08
WY09
WY10
WY11
WY12
WY13
WY14
WY15
WY16
WY17

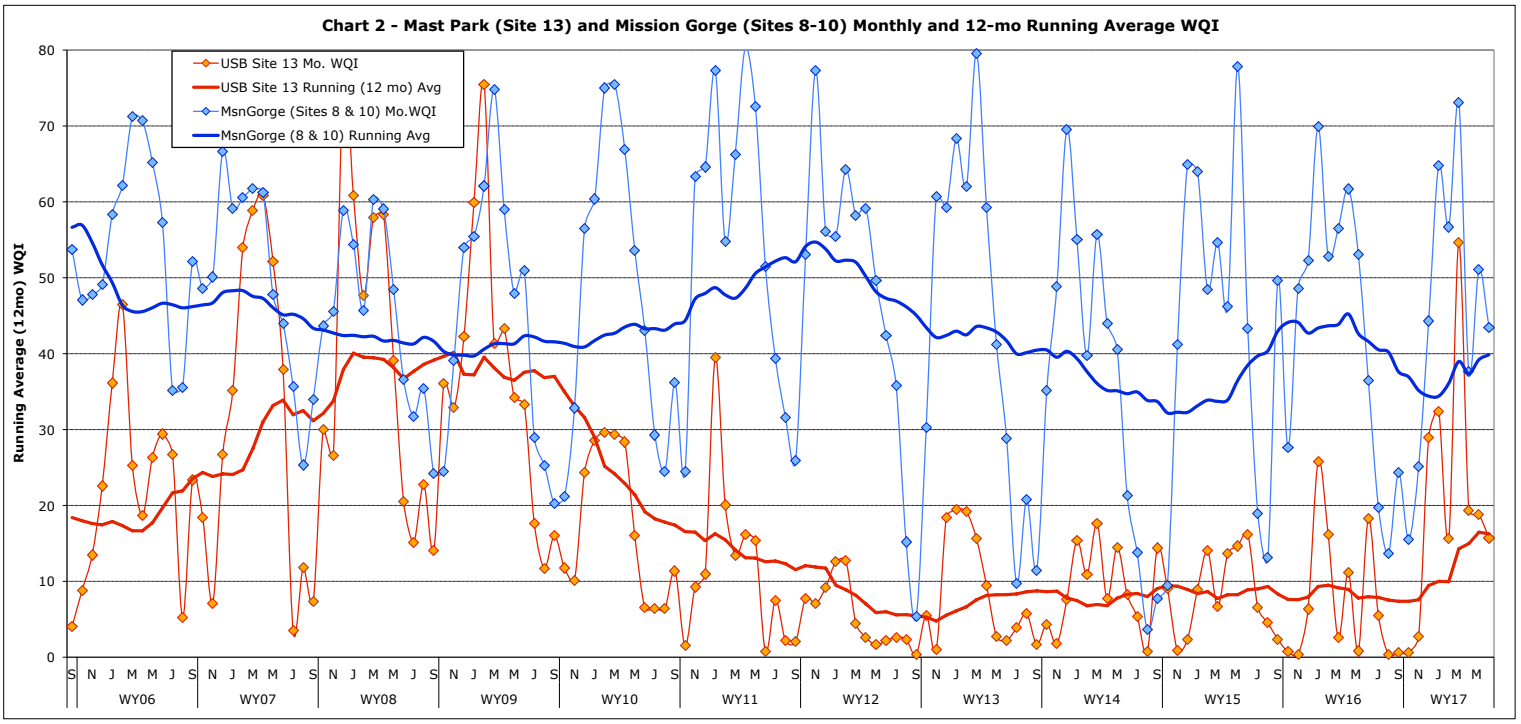


Chart 2 - Mast Park (Site 13) and Mission Gorge (Sites 8-10) Monthly and 12-mo Running Average WQI
Running Average (12mo) WQI
USB Site 13 Mo. WQI
USB Site 13 Running (12 mo) Avg
MsnGorge (Sites 8 & 10) Mo.WQI
MsnGorge (8 & 10) Running Avg
WY06
WY07
WY08
WY09
WY10
WY11
WY12
WY13
WY14
WY15
WY16
WY17

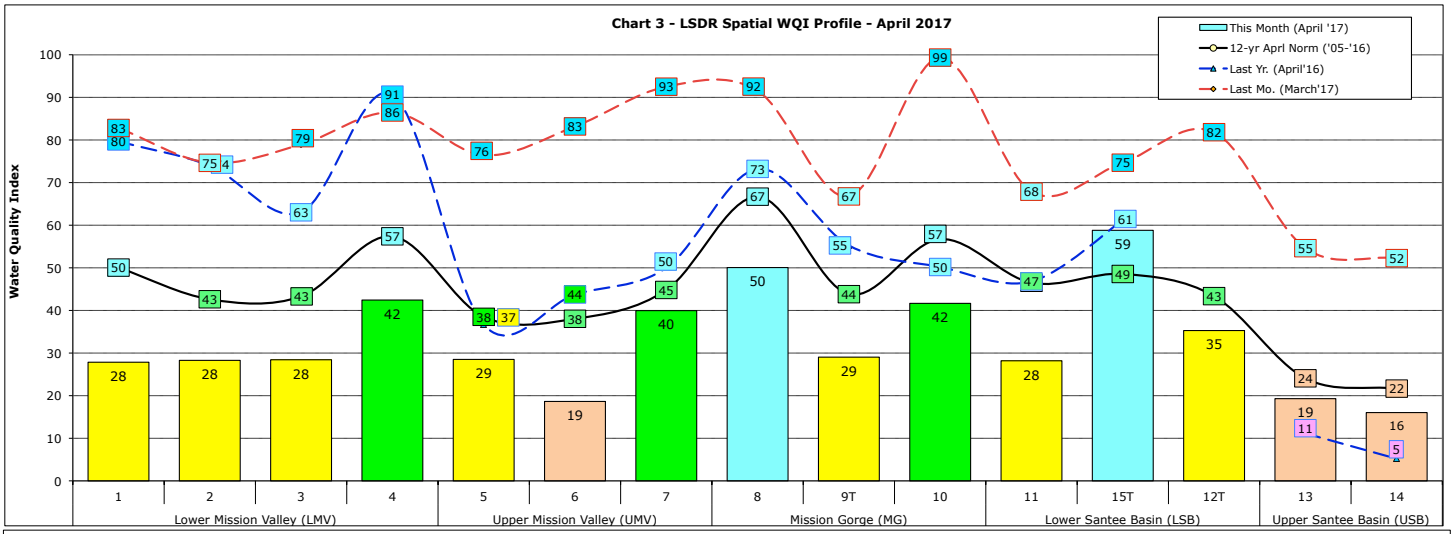


Chart 3 - LSDR Spatial WQI Profile - April 2017
This Month (April '17)
12-yr Aprl Norm ('05-'16)
Last Yr. (April'16)
Last Mo. (March'17)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)

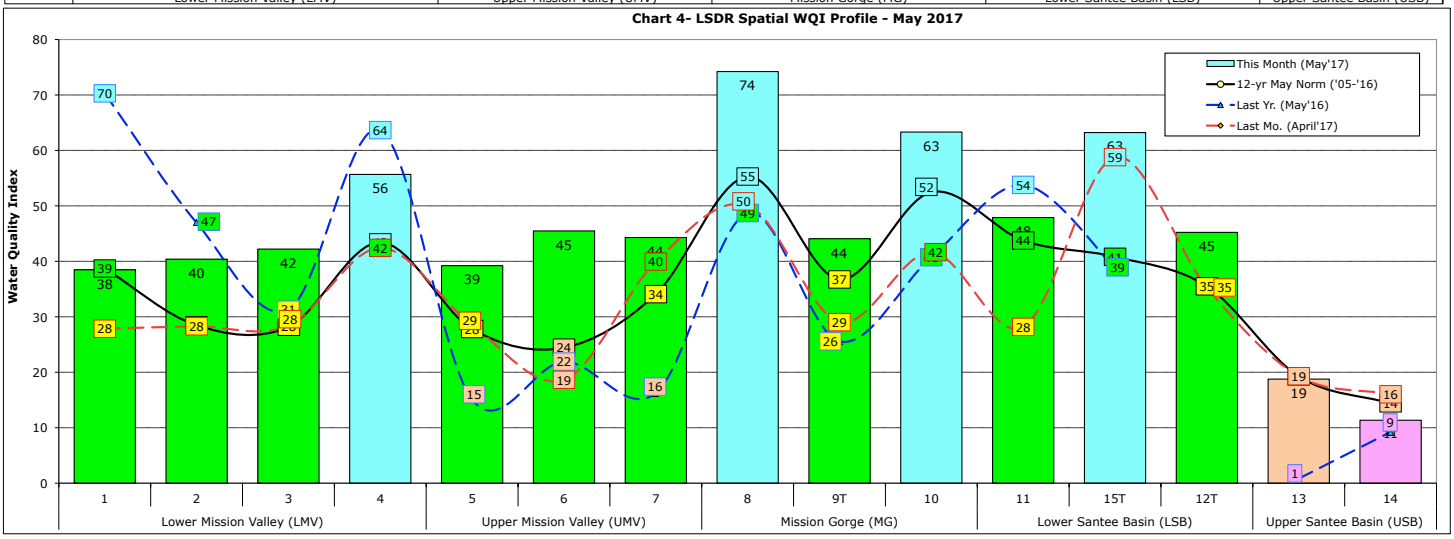


Chart 4- LSDR Spatial WQI Profile - May 2017
This Month (May'17)
12-yr May Norm ('05-'16)
Last Yr. (May'16)
Last Mo. (April'17)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)

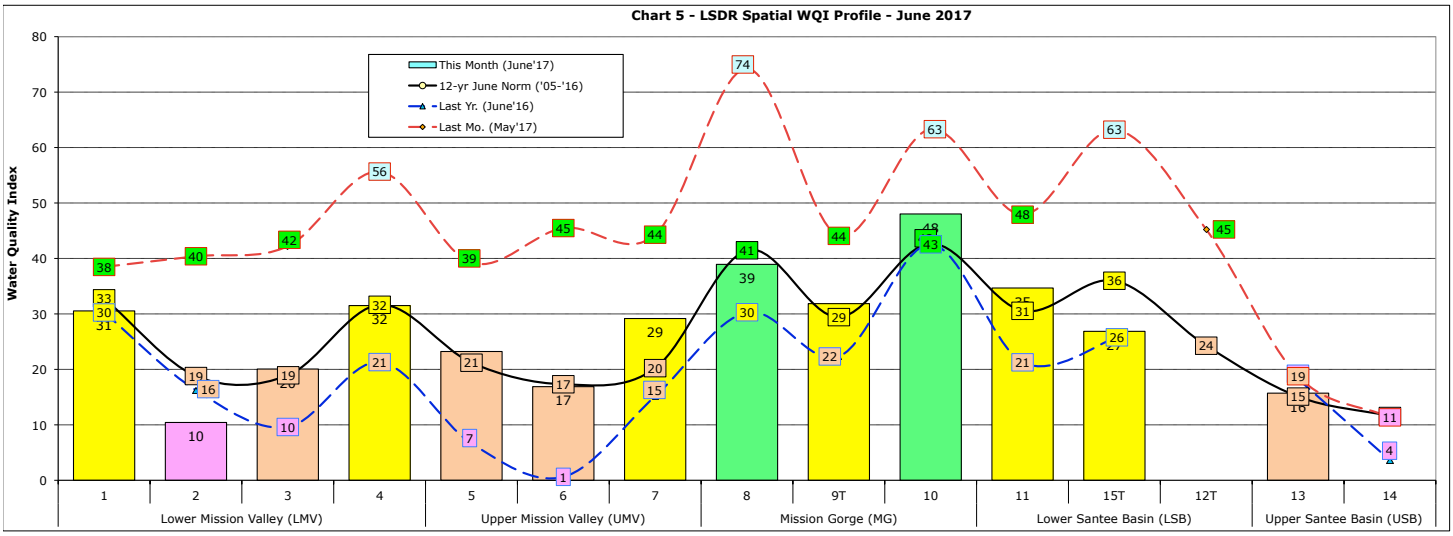


Chart 5 - LSDR Spatial WQI Profile - June 2017
This Month (June'17)
12-yr June Norm ('05-'16)
Last Yr. (June'16)
Last Mo. (May'17)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)