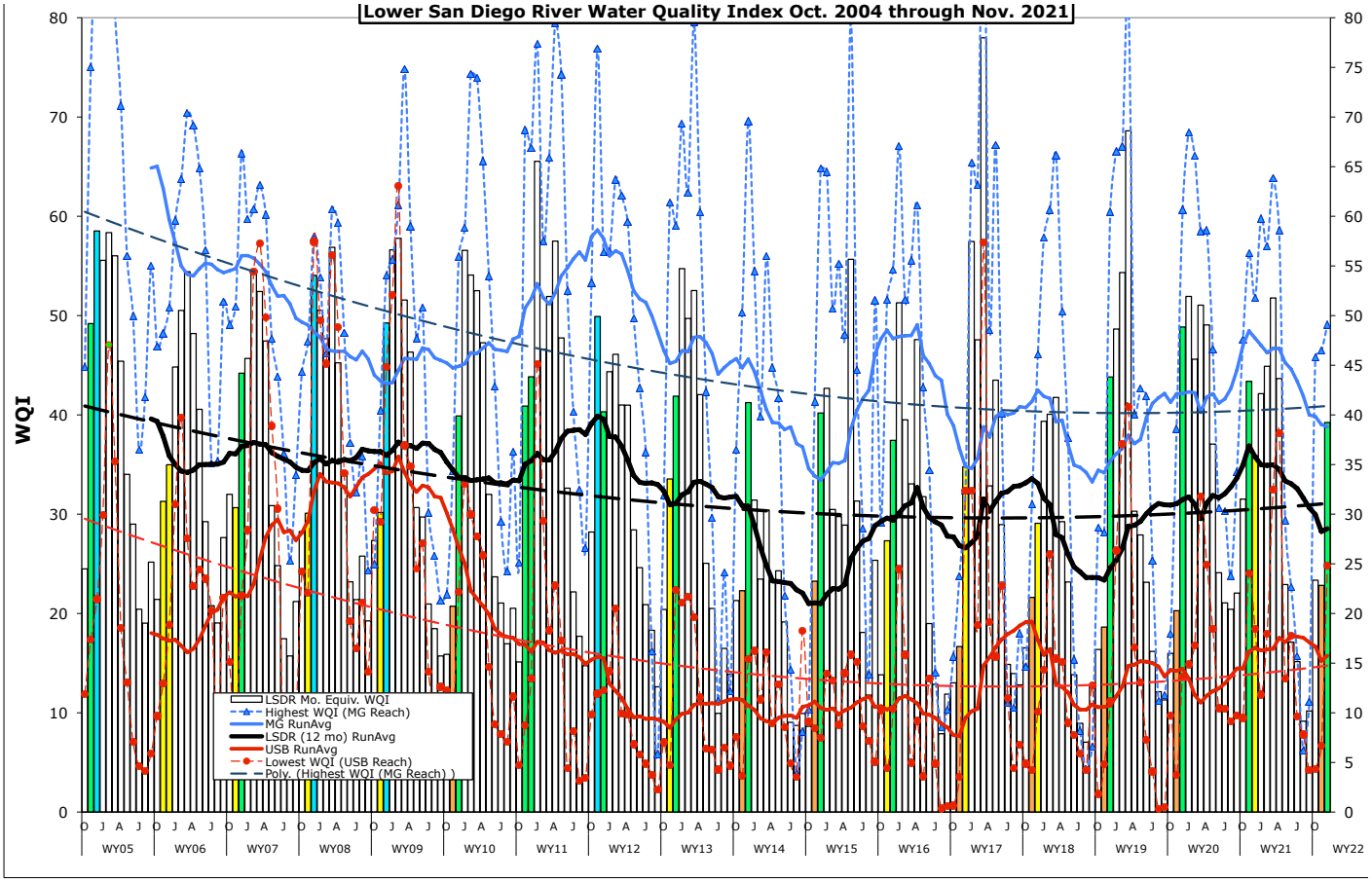
Monthly WQM Report

Lower San Diego River - December 2021



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 (Nov./Dec.). This month's overall index of 39 is 16 points higher than last month, 3 points (9%) over last Dec. and 7% below the 17-yr average of 42. Overall water quality in the lower San Diego River hydrologic unit (HSU 907.1) rose from a grade of E+ (Poor) last month to a grade of C- (Fair) for December.

Table 1 - Nov./Dec. 2021 WQM Data Summary

	West - MV	Mid - MG	East - SB	LSDR	Percent Variance from		
[Site #s]	[1-7] Nov/Dec	[8-10] Nov/Dec	[11-15] Nov/Dec	[1-15] Nov/Dec	Last Mo. (11/'21)	Last Yr. (12/'20)	17-yr Avg (Dec.)
Temperature, oC	16.2/12.6	14.7/11.0	15.6/12.3	15.6/12.1	-22%	15%	3%
Sp.Cond., mS/cm	2.86/1.47	2.20/1.11	2.25/1.43	2.67/1.30	-50%	-50%	-30%
DO, mg/L	2.88/5.74	7.73/7.67	4.46/5.70	3.98/6.04	45%	-13%	-10%
DO, % of Sat.	23/54	76/73	45/53	40/57			
pH	7.65/7.28	7.98/7.73	7.88/7.50	7.80/7.41	-5%	-9%	-4%
3-day ADF, cfs	2.6/129	2.3/133	2.3/133	2.4/132	5000%	3500%	450%
WQ Index	16/**37**	46/**49**	22/**37**	23/**39**	72%	9%	-7%
Nov/**Dec**, Grade	E/**D+**	C/**C**	E/**D+**	E+/**C-**			
Nov./ **Dec. 2021**	Poor/ **Marginal**	Fair/ **Fair**	Poor/ **Marginal**	Poor/ **Fair**	**Index up 16 points overall from last month**		

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

LSDR **water temperatures** declined 3.5 degrees (22%) from last month to 3% above the 17-yr monthly norm of 11.8 oC. Overall **specific conductance** of 1.30 mS/cm constitutes a 50% decrease from last month and a year ago to 30% below the 17-yr monthly norm of 1.88 mS/cm. The overall **dissolved oxygen** level of 6.04 mg/L (57%Sat.) is 45% greater than last month, but remains 13% less than a year ago and 10% below the 17-yr norm of 6.75 mg/L (62%Sat). **Streamflow** over the antecedent 3-day period of 132 cfs is 50 times greater than last month, 35 times more than a year ago and 450% above the 17-yr norm of 24 cfs. This month's overall LSDR **water quality index** (WQI) of 39 increased by 72% from last month to 9% more than a year ago. to just 7% less than the 17-yr monthly norm of 42.

Monthly WQI values occurring over the past two years of record for the three main sections of the lower river system, the overall LSDR average, plus 30-day antecedent average daily streamflow (ADF) and total monthly rainfall (MRF) values, are expressed in **Table 2** on the next page.

Table 2 - WQI Values, Average Daily Flow and Monthly Rainfall (Nov. '19 - Dec. '21)							
	Mission Valley	Mission Gorge	Santee Basin	LSDR		ADF,cfs	TMRF,in
Nov. '19	20 (E)	39 (C-)	14 (E)	21 (E)	t	36	0.52
Dec. '19	**60 (B)**	**61 (B)**	**31 (D)**	**48 (C+)**	**WW**	**79**	**3.51**
Jan.'20	62 (B)	68 (B)	34 (D)	52 (B-)	WW	18	2.90
Feb.	47 (C)	66 (B)	35 (D)	45 (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	38 (C-)	47 (C)	37 (D+)	37 (D+)	t	13	0.06
June	25 (D-)	31 (D)	21 (E)	24 (E+)	t	5.7	0.02
July '20	18 (E)	30 (D)	21 (E)	21 (E)	DW	2.1	0.001
Aug.'20	23 (E+)	24(E+)	18 (E)	21 (E)	DW	1.3	0.00
Sept '20	21 (E)	34 (D)	19 (E)	22 (E)	DW	1.3	0.00
Oct.'20	32 (D)	48 (C+)	26 (D-)	33 (D)	t	2.4	0.21
Nov. '20	45 (C)	56 (B)	37 (D+)	44 (C)	t	7.6	0.11
Dec. '20	**34 (D)**	**52 (B)**	**32 (D)**	**36 (D+)**	**t**	**2.9**	**0.06**
Jan. '21	46 (C)	60 (B)	30 (D)	42 (C)	WW	10	1.10
Feb.	52 (B-)	57 (B)	35 (D)	45 (C)	ww	35	0.50
March	55 (B)	64 (B)	45 (B)	53 (B-)	WW	28	2.32
April	29 (D)	59 (B)	51 (B-)	43 (C)	t	7.9	0.12
May	25 (D-)	29 (D)	20 (E)	24 (E+)	t	3.7	0.04
June	14 (E)	23 (E+)	19 (E)	17 (E)	DW	1.7	0.002
July '21	15 (E)	16 (E)	17 (E)	15 (E)	DW	0.8	0.004
Aug. '21	11 (F+)	6 (F)	10 (F)	9 (F)	DW	0.6	0.22
Sept '21	12 (F+)	11 (F+)	10 (F)	10 (F)	DW	0.6	0.004
Oct. '21	19 (E)	46 (C)	18 (E)	23 (E+)	t	6.4	0.80
Nov. '21	16 (E)	46 (C)	22 (E)	23 (E+)	t	2.4	0.21
Dec. '21	**37 (D+)**	**49 (C+)**	**37 (D+)**	**39 (C-)**	**ww**	**21**	**1.10**

The **cover page** of this report presents monthly WQI values and range (high/low) for the Lower San Diego River watershed over the past 17+ years of monitoring. December, the first month of winter, values for each year are expressed as color-shaded bars; blue (50 or >) B-Good, green (38-49) C-Fair, yellow (25-37) D-Marginal, brown (13-24) E-Poor and pink (12 or <) F-Very Poor. Running average index values for LSDR (weighted averages of all sites) are shown as a heavy black line. Running averages for the consistently highest (best) quality section (Mission Gorge) are shown as a blue line while the consistently lowest (poorest) reach (Upper Santee Basin) is expressed in red. The generally downward slope in index values, represented by the dashed trendlines, are primarily attributed to depleted DO levels extending throughout protracted low-flow peroiods of time. The dashed lines express an overall negative slope of -0.71 points per annum in index value over the entire monitoring period. The irregular solid black line (12-month running average index values), generally increasing since reaching a low in Dec. 2014, is currently at 29. This month's overall value of 39 is the 15th time the Dec. index has reached a Fair (C) or better water quality range since the monitoring program was iniated in 2004.

WQI values extending from Oct. '04 through this month are presented in **Chart 1** (next page) together with 12-mo. running averages for each of the five reaches of the lower river system and overall (i.e., LSDR). The current running average WQI of 29 is 12 percent below the 17-yr to-date LSDR weighted average value of 32.2. The running average low of 21 (35% below the current norm) occured in 2014. The highest running average WQI for the month of 40 (23% above norm) occured in 2011. The fact the river has experieced well below average rainfall (and runoff) over the past 3 years suggests significant improvement in water quality will reguire well above normal hydrologic conditions within the watershed persisting over an extended period of time.

Monthly and 12-mo. running average WQI values for the 'poorest" (Upper Santee Basin) and "best" (Mission Gorge) reaches of the lower river system are presented in **Chart 2**. Although water quality improved somewhat within the upper-most reach over the last several years, resurgent invasive aquatic plants and subsequent decay in conjunction with low streamflow with accrual of rich organics in ponded portions are considered the principal causes of poor water quality. The greatest downward trend (red-dashed line) is associated with the poorest reach (Upper Santee Basin) encompasing Mast Park (13E/W) and Magnolia Ave. (14) monitoring sites. The Mission Gorge (blue line) section continues to demonstrate the least decline in index values over the entire monitoring period. The poorest quality Mission Valley site is the Kaiser Ponds outlet at San Diego Mission Rd.

Spatial WQI values determined over the last three months in order of occurance upstream are shown in **Charts 3, 4 and 5** on page 6. Dec. results (color bars w/values in black shown on Chart 5) are well above those from last month (Chart 4) and in October (Chart 3). Only one out of 15 sites this month is graded Poor (E), while 75% (11 of 15) are 'Marginal-to-Fair' and three are Good (B). This month's index values (solid colored columns) are also generally above a year ago (dashed columns), last month (red dashed line) and in-part (Santee Basin) the 17-yr running averages (solid back line). The Mission Valley sites show slower response to improved streamflow. The overall water quality index of 39 for December constitutes the eight time over the past 10 years that the monthly value has been in the Fair (C) range (38-49). *(12/20/21 JCK)*

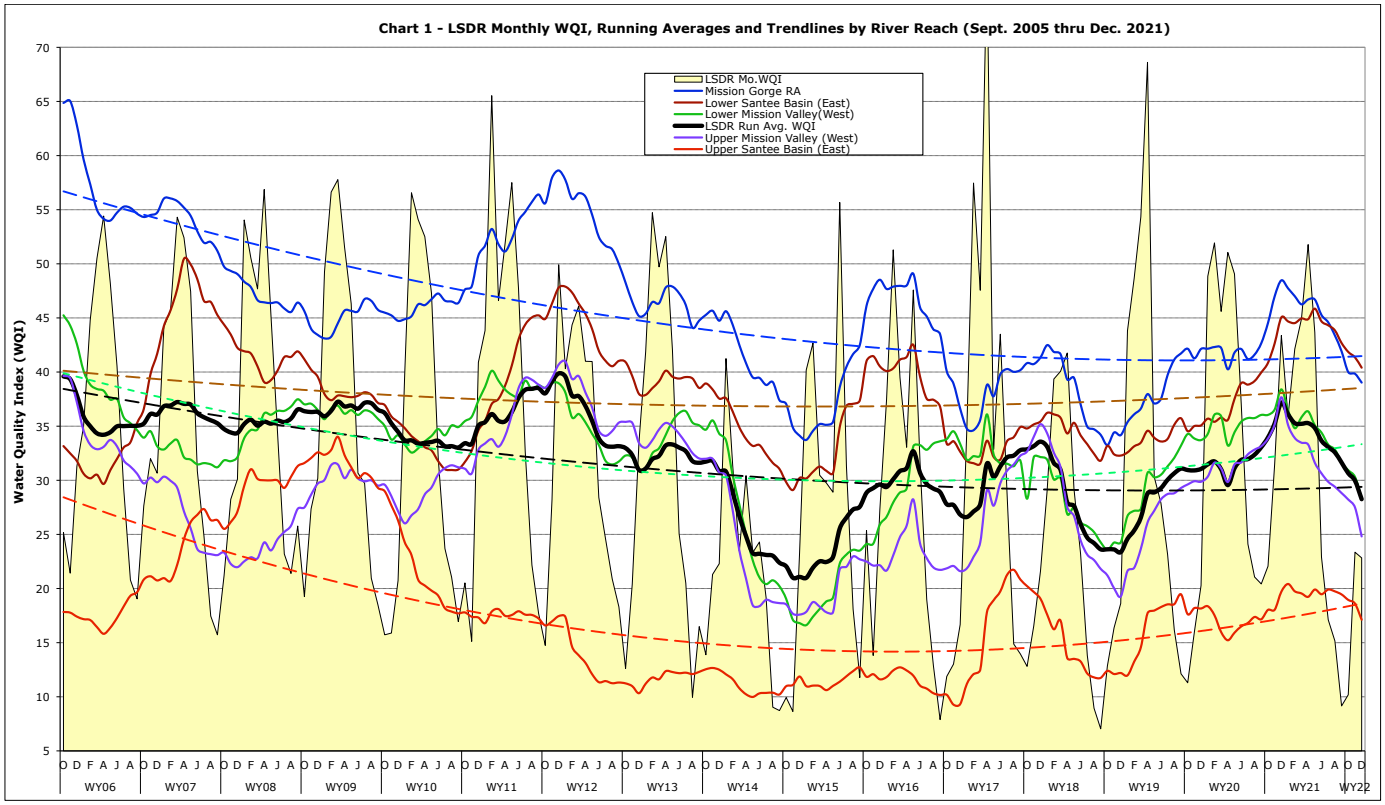


Chart 1 - LSDR Monthly WQI, Running Averages and Trendlines by River Reach (Sept. 2005 thru Dec. 2021)
LSDR Mo.WQI
Mission Gorge RA
Lower Santee Basin (East)
Lower Mission Valley(West)
LSDR Run Avg. WQI
Upper Mission Valley (West)
Upper Santee Basin (East)
Water Quality Index (WQI)
WY06
WY07
WY08
WY09
WY10
WY11
WY12
WY13
WY14
WY15
WY16
WY17
WY18
WY19
WY20
WY21
WY22

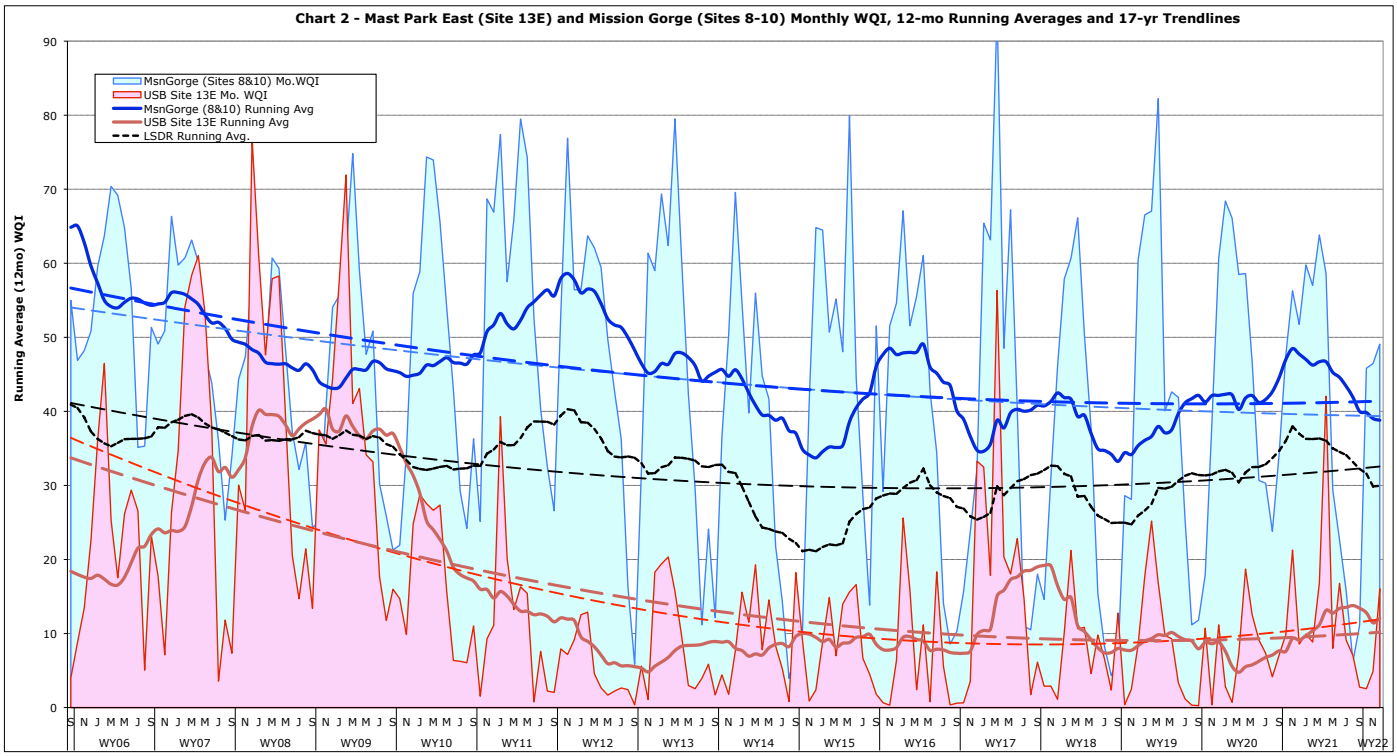


Chart 2 - Mast Park East (Site 13E) and Mission Gorge (Sites 8-10) Monthly WQI, 12-mo Running Averages and 17-yr Trendlines
MsnGorge (Sites 8&10) Mo.WQI
USB Site 13E Mo. WQI
MsnGorge (8&10) Running Avg
USB Site 13E Running Avg
LSDR Running Avg.
Running Average (12mo) WQI
WY06
WY07
WY08
WY09
WY10
WY11
WY12
WY13
WY14
WY15
WY16
WY17
WY18
WY19
WY20
WY21
WY22

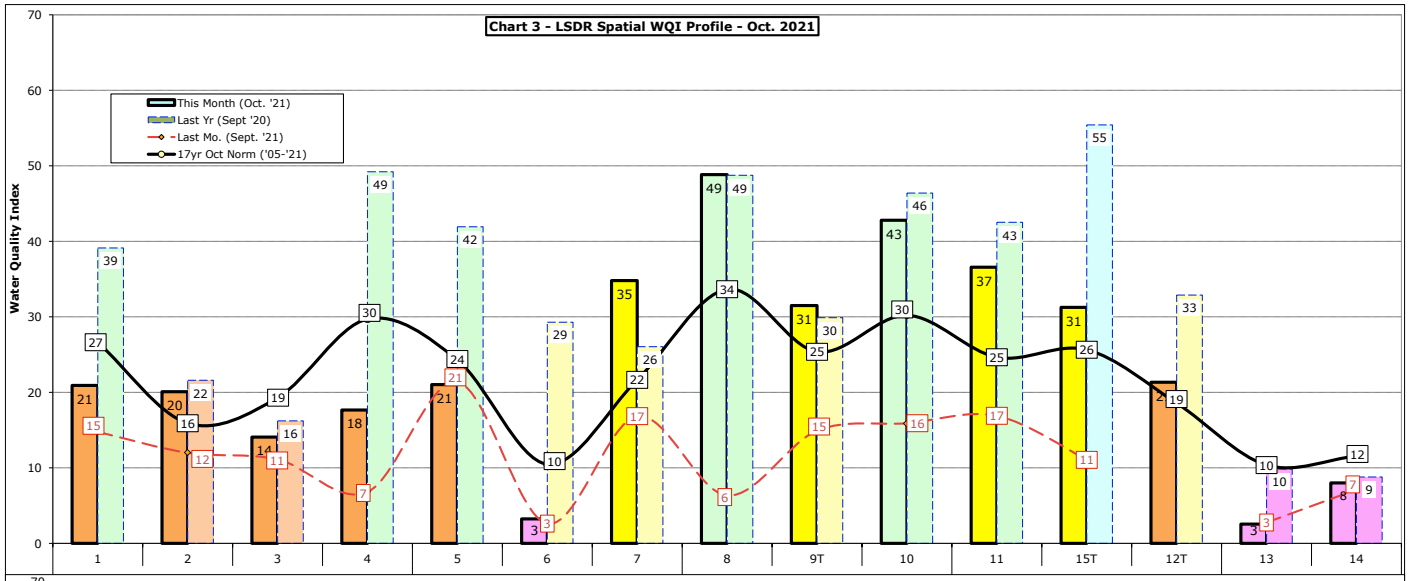


Chart 3 - LSDR Spatial WQI Profile - Oct. 2021
This Month (Oct. '21)
Last Yr (Sept '20)
Last Mo. (Sept. '21)
17yr Oct Norm ('05-'21)
Water Quality Index
1
2
3
4
5
6
7
8
9T
10
11
15T
12T
13
14

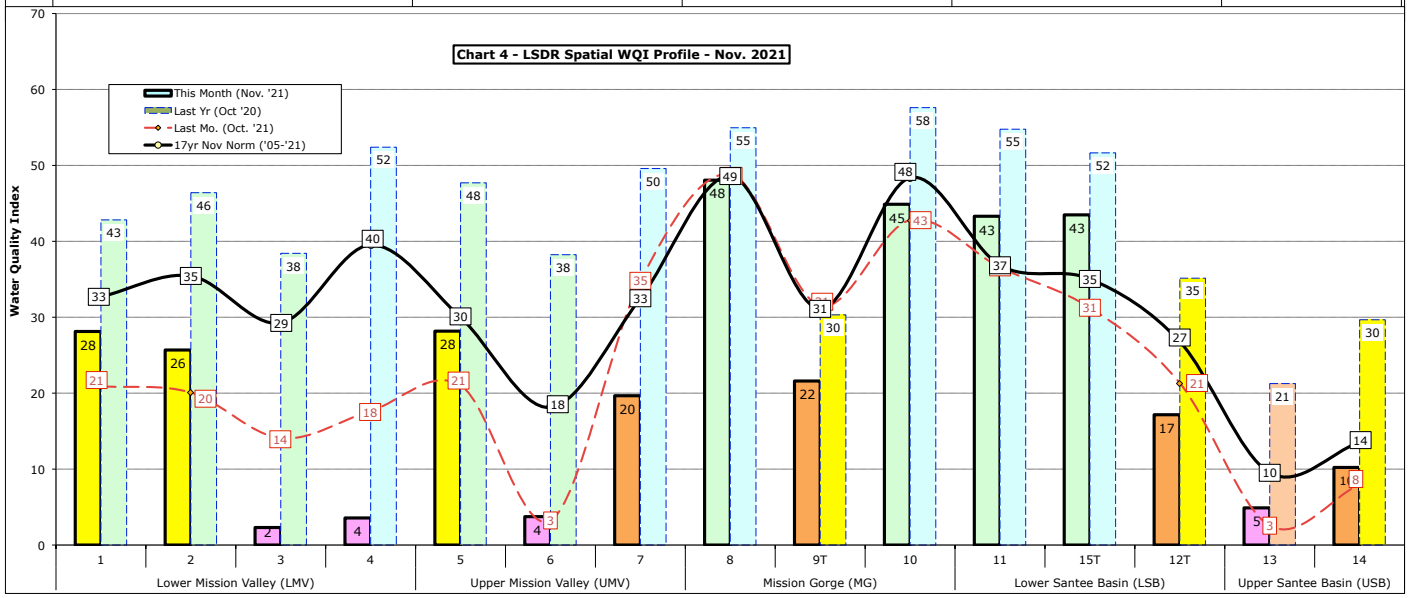


Chart 4 - LSDR Spatial WQI Profile - Nov. 2021
This Month (Nov. '21)
Last Yr (Oct '20)
Last Mo. (Oct. '21)
17yr Nov Norm ('05-'21)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)

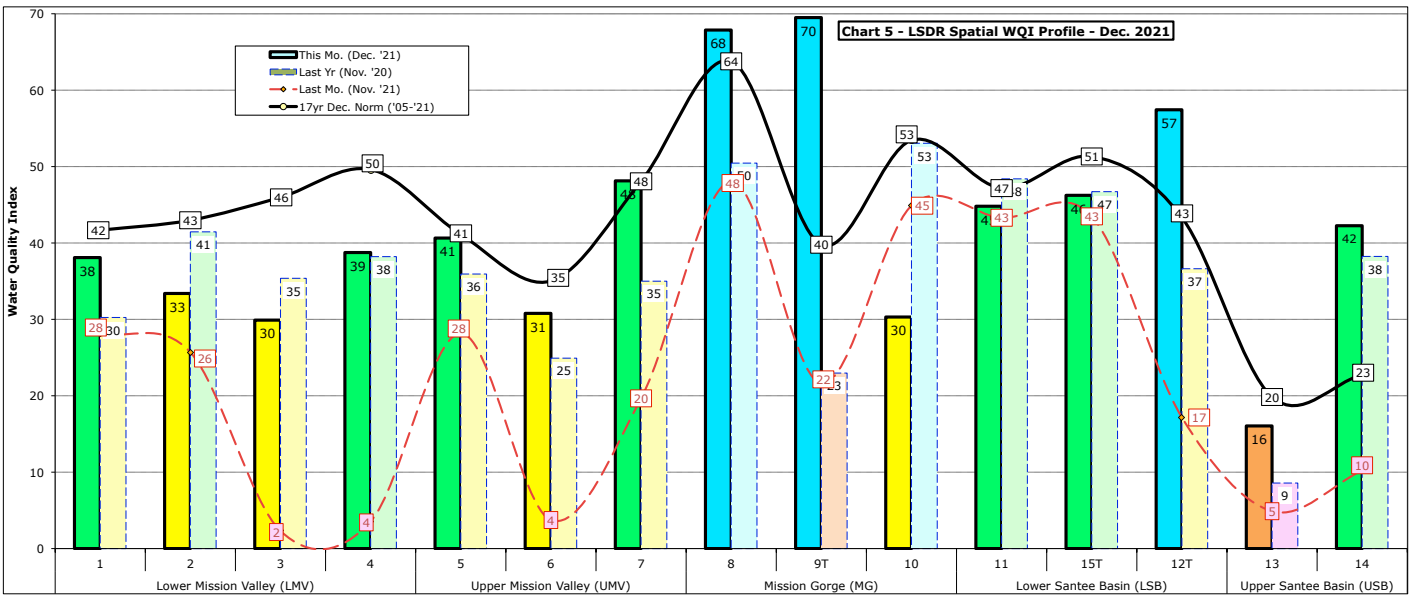


Chart 5 - LSDR Spatial WQI Profile - Dec. 2021
This Mo. (Dec. '21)
Last Yr (Nov. '20)
Last Mo. (Nov. '21)
17yr Dec. Norm ('05-'21)
Water Quality Index
Lower Mission Valley (LMV)
Upper Mission Valley (UMV)
Mission Gorge (MG)
Lower Santee Basin (LSB)
Upper Santee Basin (USB)