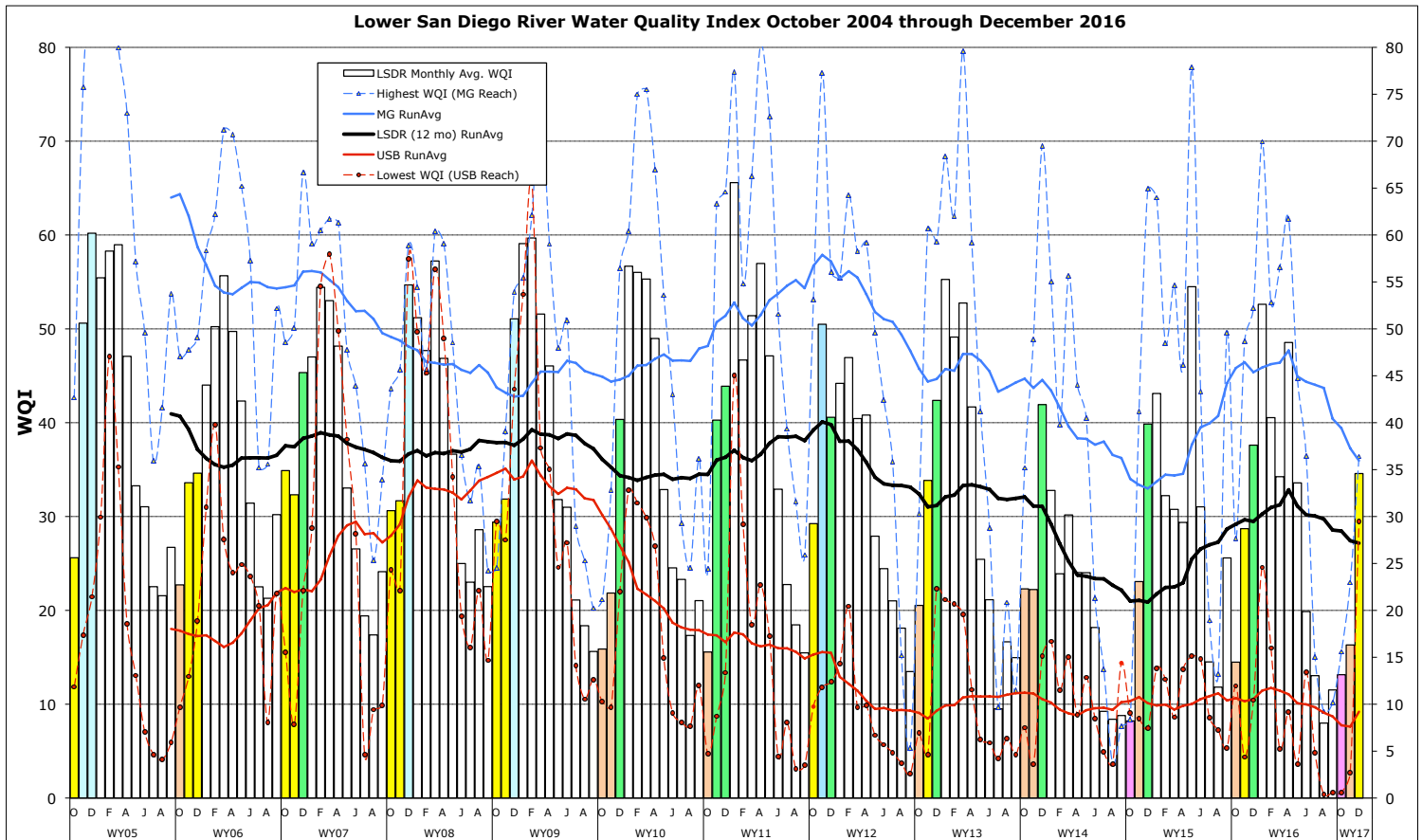


Monthly WQM Report

Lower San Diego River - December 2016



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. November and December constitute the last month of fall and the first month of winter. This month's index value is considerably up from last month, but remains slightly lower than last December and below the 12-yr monthly norm for the river. General water quality of the lower hydrologic unit (HSU 907.1) is Marginal (D) in all three sections.

Table 1 - November/December 2016 WQM Data Summary							
	West - MV	Mid - MG	East - SB	LSDR	Percent Variance from		
[Sites]	[1-7] Nov/Dec	[8-10] Nov/Dec	[11-15] Nov/Dec	[1-15] Nov/Dec	Last Mo (11/'16)	Last Yr (12/'15)	12-Yr Avg (Dec.)
Temperature, oC	15.6/13.5	13.8/10.7	15.1/13.0	15.0/12.7	-15%	17%	8%
Sp.Cond., mS/cm	3.59/1.58	2.81/1.55	2.61/1.62	3.16/1.42	-55%	-22%	-17%
DO, mg/L	3.07 /4.36	5.96/5.97	4.11/5.59	3.82/5.08	22%	-27%	-27%
DO, % of Sat.	31 /42	57/54	40/53	38/48			
pH	7.62/7.35	7.78/7.99	7.87/7.87	7.62/7.65	0%	-6%	0%
ADF, cfs	8/43	2/23	2/22	2/20	1200%	130%	-62%
WQ Index	16/30	23/36	14/37	16/35	112%	-8%	-22%
Grade(Nov/Oct)	E/D	E/D+	E-/D+	E/D			
December 2016	Marginal	Marginal	Marginal	Marginal	Up 19 pts from last mo.		

DO values in red indicate hypoxic (DO < 4 mg/L) conditions.

Overall, LSDR **water temperatures** are down 2.3 degrees Celsius (-15%) from last month, but remain 1.6 degrees above last Dec. (10.8°C) and 8 percent above the 12-yr norm of 11.6°C. **Specific Conductivities** dropped considerably (-55%) from last month, last Dec. (-22%) and the 12-yr monthly norm of 1.72 mS/cm by -17%. **Dissolved oxygen** levels are up 22% from last month, but remain well below (-27%) both last Dec. and the 12-yr monthly norm of 7.07 mg/L. **Streamflow** increased 1200% from last month and is 130 times greater than last December although still 62% below the 12-yr norm of 53 cfs. This month's LSDR **water quality index** (WQI) of 35(D) is up 19 points (112%) from last month's value of 16(E), but remains 8% lower than a year ago and 22% below the 12-yr December norm of 44 (D).

Conclusion:

The Lower San Diego River water quality index increased by 19 points, rising from **16 (E Poor)** to **35 (D Marginal)** over the past 30 days.

A summary of WQI values occurring over the past two years of record for the three main 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 (Dec. 2014 - Dec. 2016)							
	Mission Valley	Mission Gorge	Santee Basin	LSDR		ADF, cfs	MRF, in
Dec	35(D)	65(B)	32(D)	40(C)	WW	35.6	4.5
Jan.'15	37(D+)	64(B)	39(C-)	43(C)		10.3	0.38
Feb.	28(D)	48(C+)	29(D)	32(D)		6.1	0.18
March	24(E+)	55(B)	26(D-)	31(D)		14.6	0.93
April	24(E+)	46(C)	27(D-)	29(D)	DW	2.2	0.02
May	55(B)	78(A-)	41(C)	54(B)		13.3	2.4
June	26(D-)	43(C)	31(D)	31(D)	DW	2.1	0.01
July	12(F)	19(E)	15(E)	15(E)		14.9	1.71
Aug	8(F)	13(E-)	15(E)	12(F+)	DW	1.4	0.00
Sept	8(F)	50(B-)	32(D)	26(D-)		6.0	1.25
Oct	5(F)	28(D)	17(E)	14(E)		4.2	0.42
Nov	28(D)	49(C+)	20(E)	29(D)		8.9	1.53
Dec.	40(C)	52(B)	29(D)	38(C-)		13.2	0.45
Jan.'16	54(B)	70(B)	42(C)	52(B)	WW	89.8	3.21
Feb.	40(C)	53(B)	35(D)	40(C)		8.9	0.05
March	32(D)	57(B)	25(D-)	34(D)		13.9	0.72
April	63(B)	62(B)	30(D)	49(C+)		11.9	0.55
May	38(C)	45(C)	26(D-)	34(D)		5.6	0.43
June	14(E)	36(D)	18(E)	20(E)	DW	0.9	0.02
July	14(E)	15(E)	12(F+)	13(E-)	DW	0.5	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	1.9	0.32
Oct	13(E-)	16(E)	13(E-)	13(E-)	DW	1.3	0.07
Nov.	16 (E)	23(E)	14(E)	16(E)		5.9	0.61
Dec.'16	27(D)	36(D)	37(D+)	35(D)	WW	20.1	2.27

WQI values are expected to continue rising at most monitoring sites over the next month.

The **cover page** chart presents monthly WQI values and their range (high-low) for the Lower San Diego River determined over the past 12 years of RiverWatch monitoring. The October, November and December 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. This month's value of 35 is the lowest recorded over the past 12 years for the month of December. The past three-month running average of 21 is also the lowest computed quarterly value since monitoring began in Oct. 2004.

Monthly WQI values extending from Oct. 2004 through Dec. 2016 are presented in **Chart 1** (next page) together with 12-month running averages (trend-lines) for each of the five individual reaches and overall (i.e., for the LSDR). The current overall running average WQI for the LSDR of **28** is 17% below the 12-yr annual norm of 34. A year ago (Dec. 2015) the running average WQI was two points higher (30) at 11% below the annual norm. Greatest declines in the index over the past year are associated with the Mission Gorge and Upper Mission Valley segments.

Monthly and 12-mo. running average WQI values for the poorest section (Upper Santee Basin) and best Mission Gorge reach (Sites 8-10) are presented in **Chart 2** (also on next page). Water quality at Sites 13 and 14 has noticeably improved over the past month. Excessive growth of the invasive non-native aquatic plant floating primrose-willow (*Ludwigia hextapetala*), observed throughout many of the slower-moving reaches of the river that is considered a major contributor of recurrent dissolved oxygen deficits ($DO < 4.0$ mg/L) and resultant poor-to-very poor water quality index values during the dry-weather period of this and prior years has been considerably reduced by the series of recent storm water flow events.

Spatial WQI results for the past three months of monitoring are shown in **Charts 3, 4 and 5** on page 6. WQI values (color bars w/index values in black) have changed most noticeably in the upper Mission Valley and Mission Gorge reaches. Only two of the 15 sites remain in the Poor (E) range this month. Twelve sites are in the Fair (3) or Marginal (9) categories. Forester Creek was the only site found in the Good (B) range.

Water quality index values can be expected to continue to improve over the next month at most monitoring sites assuming greater streamflow, lower water temperatures and further improvement in dissolved oxygen levels. Dissolved oxygen concentrations at most sites are likely to remain well above hypoxic conditions (< 4 mg/L) throughout the next several months of wet weather. Overall LSDR water quality is expected to improve from Marginal (D) to Fair (C) and possibly to Good (B), depending on the quantity of flow and resultant flushing effect on the river.

jck (12/24/2016)

Chart 1 - LSDR WQI Trendlines by River Reach (Sept. 2005 thru Dec. 2016)

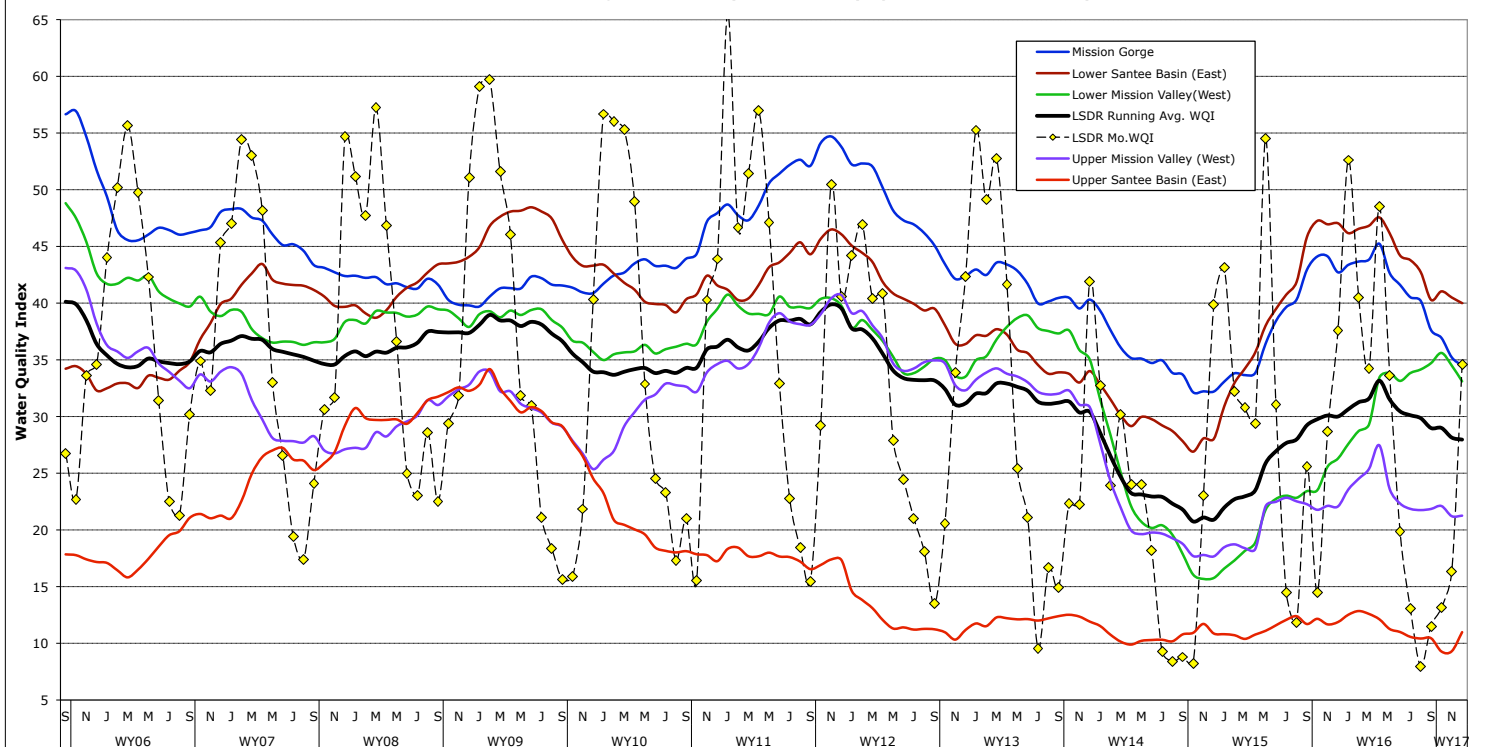


Chart 2 - Mast Park (Site 13) and Mission Gorge (Sites 8-10) Monthly and 12-mo Running Average WQI

