

Appendix B - Tables

Technical Report for Rainbow Creek Nutrient
TMDLs

October 15,, 2004

Table B-1. Historic Annual Averages for Nitrate, 1970-87

Historic Annual Averages					
Station: Willow Glen					
All Values In mg/L Nitrate					
	NO ₃ ave.	# of samples	max	min	median
1970	3.74	10	7.50	0.00	3.90
1971	3.69	11	6.20	0.90	3.50
1972	4.22	11	12.00	0.50	3.50
1973	4.23	12	21.20	0.00	1.05
1974	0.92	12	2.30	0.00	0.60
1975	4.03	12	16.00	0.40	2.65
1976	6.27	12	21.00	3.00	4.60
1977	8.78	9	25.00	3.50	6.50
1978	5.71	11	13.00	2.40	5.00
1979	3.20	11	8.00	1.00	2.40
1980	3.50	11	6.60	1.70	3.10
1981	10.19	12	40.00	0.50	8.10
1982	25.94	12	72.00	1.70	19.00
1983	55.82	11	177.00	0.30	25.00
1984	50.97	7	180.00	14.00	35.00
1986	215.83	11	338.00	22.80	242.50
1987	185.09	8	256.00	77.00	208.50

1970-1980 NO₃ ave. **4.4**

NO₃ as N ave. 0.99

1981-1987 NO₃ ave. **90.6**

NO₃ as N ave. 20.5

Drinking Water Standard
NO₃ = 45 mg/L
as N = 10 mg/L

Maximum NO₃ Values

Date	Result
Oct-85	319.3
Jun-86	310.3
Jun-86	338

Note: 1985 only contained one sample point, therefore it was included with the 1986 data
Source: Leedshill-Herkenhoff, Inc., 1988

Table B-2. Water Quality Monitoring Results, 2000
San Diego Regional Water Quality Control Board

Date	Willow Glen - 4 (Station 4)							Date	Riverhouse (Station 5b)						
	Flow ¹	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS		Flow ²	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS
	cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L		cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L
1/4/00	0.42	52	7.1	7.7	0.40	0.38		1/4/00		53	11	11	0.23	0.21	
1/18/00	0.38	55	3.7	4	0.35	0.37		1/18/00		58	9.1	9.2	0.21	0.21	
2/1/00	0.5	54	14	15	0.26	0.47		2/1/00		56	17	17	0.31	0.34	
2/15/00	0.85	56	14	15	0.51	0.52		2/15/00		58	14	15	0.40	0.40	
2/29/00	1.4	52	12	12	0.49	0.55		2/29/00		54	12	12	0.42	0.46	
3/15/00	0.85	54	18	19	0.55	0.52	1140	3/15/00		56	18	18	0.45	0.44	1070
3/28/00	0.4	55	13	14	0.32	0.37	1110	3/28/00		58	15	15	0.28	0.36	1140
4/11/00	0.53	54	12	13	0.33	0.34	1130	4/11/00		58	16	17	0.14	0.32	1200
4/25/00	0.56	62	13	13	0.14	0.32	1110	4/25/00		63	14	15	0.15	0.34	1110
5/9/00	0.53	62	9.4	9.8	0.37	0.46	1090	5/9/00		63	12	13	0.31	0.31	1140
5/23/00	0.53	NR	9.5	9.9	0.33	0.35	1120	5/23/00		63	12	12	0.21	0.26	1180
6/6/00	0.59	60	21	23	0.43	0.51	1240	6/6/00		61	19	19	0.33	0.41	1210
6/20/00	0.27	64	19	20	0.36	0.38	1190	6/20/00		66	16	17	0.22	0.23	1200
7/5/00	0.1	63	12	12	0.37	0.36	1120	7/5/00		65	16	16	0.23	0.23	1190
7/18/00	0.07	68	7.9	8.6	0.30	0.39	1090	7/18/00		68	15	15	0.19	0.24	1140
8/1/00	0.09	68	8.9	9.4	0.32	0.43	1310	8/1/00		68	14	14	0.17	0.25	1230
8/15/00	0.06	71	4.7	5.3	0.44	0.49	1100	8/15/00	0.13	71	14	15	0.22	0.22	1240
8/22/00	0.07	66	5.6	6.1	0.29	0.39	1000	8/22/00	0.18	68	15	16	0.14	0.27	1180
8/29/00	0.06	66	4.3	5	0.33	0.52	1020	8/29/00	0.15	67	15	15	0.14	0.36	1190
9/5/00	0.05	66	3	3.6	0.41	0.39	1010	9/5/00	0.15	65	15	15	0.14	0.23	1150
9/12/00	0.05	68	3.5	4.1	0.47	0.45	1010	9/12/00	0.16	67	14	14	0.21	0.20	1180
9/19/00	0.05	66	2.8	3.4	0.29	0.49	980	9/19/00	0.15	66	13	14	0.13	0.16	1190
9/26/00	0.06	67	3.2	3.5	0.41	0.44	1060	9/26/00	0.13	68	14	14	0.17	0.20	1240
10/3/00	0.07	NR	2	2.3	0.42	0.46	1070	10/3/00	0.21	NR	13	13	0.17	0.18	1240
10/10/00	0.07	64	1.7	2.1	0.33	0.45	1020	10/10/00	0.18	64	12	12	0.12	0.20	1100
mean	0.3	61	9.0	9.6	0.37	0.43	1096	mean	0.16	63	14.2	14.5	0.23	0.28	1176
st. dev	0.3	6	5.6	5.9	0.09	0.07	83	st. dev	0.03	5	2.2	2.3	0.09	0.09	48
st. error	0.07	1	1.13	1.17	0.02	0.01	19	st. error	0.01	1	0.44	0.45	0.02	0.02	11

Note: These stations include data collected as part of the Algae Presence Survey, January 4 - August 1, 2000.

NR not reported

¹ Flow measurements are from USGS Gaging Station (#11044250)

² Flow based on USGS measurements, adding calculated flow from WGT1

Table B-2. Water Quality Monitoring Results, 2000 – Cont.
San Diego Regional Water Quality Control Board

Date	2068 Willow Glen (Station 5a)						
	Flow ²	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS
	cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L
1/4/00		52	11	11	0.23	0.22	
1/18/00		58	8.5	8.5	0.21	0.22	
2/1/00		54	17	18	0.32	0.34	
2/15/00		56	15	16	0.4	0.4	
2/29/00		54	12	13	0.44	0.49	
3/15/00		56	18	19	0.47	0.47	1140
3/28/00		56	14	15	0.31	0.38	1140
4/11/00		59	17	17	0.32	0.33	1210
4/25/00		63	14	14	0.17	0.36	1180
5/9/00		63	11	12	0.33	0.34	1120
5/23/00		62	12	12	0.21	0.27	1160
6/6/00		62	20	21	0.33	0.77	1210
6/20/00		65	16	16	0.26	0.29	1170
7/5/00		66	15	15	0.2	0.22	1170
7/18/00		68	15	15	0.16	0.2	1210
8/1/00		68	14	14	0.16	0.25	1220
8/15/00	0.13	70	15	15	0.22	0.24	1250
8/22/00	0.18	68	15	18	0.13	0.21	1360
8/29/00	0.15	67	15	15	0.13	0.21	1170
9/5/00	0.15	65	ND ³	ND ³	0.11	0.18	1120
9/12/00	0.16	66	15	15	0.19	0.19	1190
9/19/00	0.15	66	13	14	0.11	0.18	1230
9/26/00	0.13	66	14	15	0.17	0.2	1250
10/3/00	0.21	NR	12	12	0.14	0.18	1250
10/10/00	0.18	64	11	12	0.12	0.17	1120
mean	0.16	62	14.1	14.7	0.23	0.29	1194
st. dev	0.03	5	2.6	2.8	0.10	0.14	59
st. error	0.01	1	0.52	0.56	0.02	0.03	13.08

NR not reported

² Flow based on USGS measurements, adding calculated flow from WGT1

³ Sample result was deemed an outlier. Assumed to be laboratory error.

Table B-2. Water Quality Monitoring Results, 2000 – Cont.

October 15, 2004

San Diego Regional Water Quality Control Board

Date	Oak Crest (Station 3)							Date	Willow Glen Tributary (WGT1)						
	Flow ⁴	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS		Flow ⁵	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS
	cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L		cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L
8/22/00	0.03	70	11	14	1.4	1.5	1590	8/15/00	0.07	70	20	20	< 0.05	< 0.05	1420
8/29/00	0.03	68	11	12	1.2	1.3	1680	8/22/00	0.11	66	20	20	< 0.05	< 0.05	1370
9/5/00	0.06	70	8.1	9.4	0.59	0.93	1580	8/29/00	0.09	66	20	20	< 0.05	0.16	1360
9/12/00	0.03	67	5.1	7.6	0.67	0.78	1800	9/5/00	0.10	63	19	19	< 0.05	< 0.05	1250
9/19/00	0.01	67	1.2	3.1	0.52	0.93	1580	9/12/00	0.11	67	18	18	< 0.05	0.06	1370
9/26/00	0.00	68	13	15	1.1	1.3	1940	9/19/00	0.10	64	17	17	< 0.05	0.28	1370
10/3/00	0.00	66	9.5	11	0.81	0.99	1830	9/26/00	0.07	66	18	18	< 0.05	< 0.05	1430
10/10/00	0.03	63	12	14	0.71	0.88	1640	10/3/00	0.14	NR	17	18	< 0.05	< 0.05	1440
10/17/01	0.03	61	12	13	0.68	1.6	1760	10/10/00	0.11	63	17	17	< 0.05	< 0.05	1290
mean	0.02	67	9.2	11.0	0.85	1.13	1711	mean	0.10	66	18.4	18.6		0.17	1367
st. dev	0.02	3	3.9	3.8	0.31	0.30	128	st. dev	0.02	2	1.3	1.2		0.11	64
st. error	0.01	1.0	1.28	1.27	0.10	0.10	45	st. error	0.01	0.6	0.45	0.42		0.06	23

Date	Via Milpas Tributary (VMT1)							Date	Stage Coach (Station 6)						
	Flow ⁵	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS		Flow ⁶	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS
	cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L		cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L
8/15/00	0.11	67	14	14	< 0.05	0.08	1330	8/15/00	0.24	68	13	13	0.18	0.20	1200
8/22/00	0.10	66	16	17	< 0.05	0.1	1320	8/22/00	0.23	68	13	14	0.14	0.21	1210
8/29/00	0.11	66	16	17	< 0.05	0.38	1370	8/29/00	0.26	66	14	14	0.14	0.79	1240
9/5/00	0.16	62	16	16	< 0.05	0.08	1170	9/5/00	0.31	62	14	16	0.20	0.43	1110
9/12/00	0.12	64	15	15	< 0.05	< 0.05	1390	9/12/00	0.28	64	13	14	0.22	0.36	1260
9/19/00	0.14	62	14	15	< 0.05	< 0.05	1360	9/19/00	0.29	63	12	14	0.13	0.19	1200
9/26/00	0.12	64	15	15	< 0.05	< 0.05	1090	9/26/00	0.25	65	13	13	0.16	0.19	1260
10/3/00	0.14	NR	15	15	< 0.05	< 0.05	1460	10/3/00	0.35	NR	12	12	0.17	0.17	990
10/10/00	0.17	62	14	14	< 0.05	< 0.05	1440	10/10/00	0.35	63	12	13	0.12	0.18	1170
mean	0.13	64	15.0	15.3		0.16	1326	mean	0.28	65	12.9	13.7	0.16	0.30	1182
st. dev	0.02	2	0.9	1.1		0.15	122	st. dev	0.04	2	0.8	1.1	0.03	0.20	86
st. error	0.01	0.7	0.29	0.37		0.07	41	st. error	0.01	0.8	0.26	0.37	0.01	0.07	29

⁴ Flow measured by Hines Nursery staff using 24-hr water level recorder and Parshall flume installation. Flume installation was damaged during a storm event and was out of commission 9/24 through 10/4/00.

⁵ Flow calculated in the field using the float method (leaf).

⁶ Flow based on USGS measurements, adding calculated flow from WGT1 and VMT1

NR not reported

San Diego Regional Water Quality Control Board

Date	Rainbow Glen Tributary (RGT1)							Date							
	Flow ⁴	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS		Flow ⁷	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS
	cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L		cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L
8/15/00	0.10	68	2	2.4	< 0.05	< 0.05	890		Margarita Glen Tributary (MGT1) ⁸						
8/22/00	0.10	64	2.1	2.5	< 0.05	< 0.05	1210								
8/29/00	0.10	68	2.3	2.7	< 0.05	0.12	890	8/29/00	0.01	66	20	21	< 0.05	0.32	1340
9/5/00	0.08	60	1.9	2.1	< 0.05	< 0.05	710		Jubilee (Upstream ~200 yards) ⁹						
9/12/00	0.05	62	2.2	2.6	< 0.05	0.08	880								
9/19/00	0.09	62	1.6	2	< 0.05	< 0.05	790	9/26/00	< 0.01	NR	7.8	8.5	< 0.05	< 0.05	1160
9/26/00	0.10	62	2	2.3	< 0.05	< 0.05	870	10/3/00	< 0.01	66	5	5.3	< 0.05	< 0.05	1200
10/3/00	0.09	NR	2	2.2	< 0.05	< 0.05	900	10/11/00	< 0.01	64	4.8	5.2	< 0.05	< 0.05	1160
10/10/00	0.11	62	2.3	2.6	< 0.05	< 0.05	820	10/17/00	< 0.01	63	5.9	6.5	< 0.05	< 0.05	1170
mean	0.09	64	2.0	2.4		0.10	884			64	6	6			1173
st. dev	0.02	3	0.2	0.2		0.03	137			2	1	2			19
st. error	0.01	1.1	0.07	0.08		0.02	46			1	1	1			9

⁴ Flow calculated in the field using the float method (leaf).

NR not reported

⁷ Flow calculated in the field using a timed-volume (bucket) method.

⁸ The monitoring location was dry and was not sampled. Surface water was found upstream of this location and was sampled on 8/29/00. It was located on the property at the base of the drainage area.

⁹ Jubilee Station was found to be dry. Groundwater was found surfacing upstream on 9/26/00 by RB staff. The location was sampled for the remainder of the monitoring period by Hines Nursery.

Date	Hines Nurseries (Station 2)							
	Flow ¹⁰	ADF ¹¹	Temp	NO ₃ -N	Total N	PO ₄ -P	Total P	TDS
	cfs	cfs	°F	mg/L	mg/L	mg/L	mg/L	mg/L
8/15/00								
8/22/00	0	0						
8/29/00	0	0.003						
9/5/00	0	0						
9/12/00	0	0						
9/19/00	0.41	0.279	67	17	22	0.96	1.7	1510
9/26/00	0	0						
10/3/00	0	0						
10/11/00	0	0						
10/17/00	0	0.025						
mean	0.05	0.03						
st. dev	0.14	0.09						
st. error	0.05	0.03						

¹⁰ Flow measurement recorded at time of sampling. Flow measured by Hines Nursery staff using 24-hr water level recorder and Parshall flume installation. Only one sample was collected from flowing water being discharged from the Hines Property at the time of sample collection.

¹¹ ADF is average daily flow measured by water level recorder.