Supplemental Table S1. Site name, tributary or mainstem location, latitude/longitude (NAD 83 datum), percent of total watershed area (total area = 419.1 km^2), and site description.

Site Name	Category	Latitude	Longitude	Watershed Area (% of total)	Site Description
ORIGINAL SITES					
San Diego River @ Ingraham St	Mainstem	32.75901	-117.226552	99.84	Located near the mouth of the San Diego River: downstream from the avian refuge but just upstream from Ocean Beach. It is influenced by ocean tides.
Morena Blvd Drain	Tributary	32.76036	-117.201957	2.08	City of San Diego MS4 outfall DW0133, drains Old Town/Point Loma area. Receives flows from a pump station. Influenced by ocean tides.
San Diego River @ Fashion Valley	Mainstem	32.76508	-117.168689	97.92	Co-located with the USGS station at Fashion Valley. It is downstream of other major tributaries, but upstream of Morena Blvd.
Murphy Canyon Creek	Tributary	32.79448	-117.112834	7.50	Murphy Canyon Creek, confluence just south of Murphy Canyon Road cul de sac
Alvarado Creek	Tributary	32.78145	-117.0904	8.49	Alvarado Creek, between Mission Gorge Pl and Alvarado Canyon Rd
San Diego River @ Mission Rd	Mainstem	32.78386	-117.10413	72.68	San Diego Mission Road site above both Murphy Canyon Creek and Alvarado Creek
San Diego River @ Mission Trails	Mainstem	32.838879	-117.045112	65.78	San Diego River at Mission Trails Park Footbridge (downstream of dam)
Sycamore Canyon Creek	Tributary	32.84398	-117.006431	10.56	Sycamore Creek at Carlton Oaks Dr. Downstream of Padre Dam
Forrester Creek	Tributary	32.83119	-116.98562	14.25	Forrester Creek at Prospect Ave
San Diego River @ Carlton Hills	Mainstem	32.84333	-116.997522	28.86	San Diego River at Carlton Hills Blvd.
Los Coches Creek	Tributary	32.85709	-116.929587	9.81	Los Coches Creek, upstream of Winter Gardens Blvd.
Eucalyptus Hills	Tributary	32.86747	-116.944943	1.07	Eucalyptus Hills at Chase Creek Lane.
San Diego River @ Channel Rd	Mainstem	32.86519	-116.927016	10.89	Channel Rd. Above all major tributaries. Typically does not flow, may need alternate
NEW SITES					
Murray Canyon Creek	Tributary	32.772285	-117.159077	2.00	Tributary not included in initial study
San Diego River @ Mission Center Rd	Mainstem	32.769911	-117.154528	94.80	Camino del Este is an alternate

Site Name	Category	Latitude	Longitude	Watershed Area (% of total)	Site Description
Ruffin Canyon (W of Qualcomm Stadium)	Tributary	32.786809	-117.133130	1.03	Flow to SD River is unquantified
Upstream Murphy Cyn @ Balboa Ave	Tributary	32.820411	-117.117120	6.02	Former City of San Diego Stream Gauge Study monitoring location.
Upstream Murphy Cyn @ Claremont Mesa Blvd	Tributary	32.834644	-117.120378	2.20	Upstream spatial coverage of Murphy Canyon Creek
Upstream Alvarado Ck @ Alvarado Blvd	Tributary	32.772911	-117.036506	3.45	Upstream spatial coverage of Alvarado Creek
Lake Murray Discharge	Tributary	32.778952	-117.051097	2.32	Bridge over Lake Murray Discharge. Input to Alvarado Creek
SDR @ Admiral Baker Golf Course	Mainstem	32.798073	-117.096183	70.97	
Upstream Forrester Ck @ Vernon Way	Tributary	32.812132	-116.973360	10.31	Upstream spatial coverage of Forrester Creek
Upstream Forrester Ck @ Washington Channel	Tributary	32.803801	-116.965826	7.51	Upstream spatial coverage of Forrester Creek
SDR @ RIverford Rd	Mainstem	32.857177	-116.947176	7.51	Below Los Coches and Eucalyptus Hills confluences
Los Coches @ USGS Station	Tributary	32.836037	-116.900479	2.83	Upstream spatial coverage of Los Coches Ck
Los Coches @ Flinn Springs	Tributary	32.848769	-116.859672	2.00	Upstream spatial coverage of Los Coches Ck
ALTERNATE SITES					
SDR @ PCH Bridge	Mainstem	32.761307	-117.203101	99.76	
SDR @ Mission Valley Preserve Presidio Little League	Mainstem	32.762192	-117.193271	99.12	
SDR @ Camino del Este	Mainstem	32.772717	-117.144588	94.51	TMDL site.
SDR upstream from Kumeyaay Lake	Mainstem	32.840556	-117.027639	60.35	Upstream from drainages near Sycamore landfill; downstream from Padre Dam's sewer service boundary.
Tributary @ Riverwalk and Park Center Dr	Tributary	32.851496	-116.976007	1.79	Tributary upstream from Carlton Hills Site

Supplemental Table S2. Site name and concentration of Enterococcus, E. Coli, Total Coliforms, and HF183 from Dry Weather Survey Events 1-3.

Site Name	*Enterococcus* (MPN per 100ml)			*E. coli* (MPN per 100ml)			Total Coliforms (MPN per 100ml)			HF183 (gene copies per 100 mL)		
ORIGINAL SITES	Event 1	Event 2	Event 3	Event 1	Event 2	Event 3	Event 1	Event 2	Event 3	Event 1	Event 2	Event 3
San Diego River @ Ingraham St	31	41	52	400	173	272	241,960	15,531	6867	ND	ND	ND
Morena Blvd Drain	583	3,448	1725	5475	3,255	1243	248,960	113,700	17,329	ND	<35	<35
San Diego River @ Fashion Valley	31	85	31	256	1,396	75	22,820	17,850	20,640	ND	<35	ND
Murphy Canyon Creek	74	85	74	148	121	161	43,520	14,136	4,352	ND	72	ND
Alvarado Creek	422	187	20	341	323	52	120,330	20,140	2,098	<35	<35	ND
San Diego River @ Mission Rd	119	121	20	10	132	10	66,670	8,664	9,208	<35	ND	ND
San Diego River @ Mission Trails	158	359	41	63	546	10	15,150	20,980	7,701	ND	<35	ND
Sycamore Canyon Creek	N/A	148	776	N/A	63	203	N/A	14,136	29,870	ND	ND	ND
Forrester Creek	789	3,873	1,071	173	613	798	1,299,700	17,329	30,760	<35	1160	124
San Diego River @ Carlton Hills	74	98	199	20	63	<10	8,664	2,755	6,488	ND	ND	ND
Los Coches Creek	1421	9,208	11,199	<10	9,208	833	2,489	218,700	141,360	<35	412	ND
Eucalyptus Hills	N/A	N/A	1,723	N/A	N/A	74	N/A	N/A	248,900	ND	ND	ND
San Diego River @ Channel Rd	N/A	83	164	N/A	52	<10	N/A	17,820	16,160	ND	ND	ND
NEW SITES												
Murray Canyon Creek	63	1,674	906	121	2,014	148	27,550	38,730	48,840	<35	162	ND
San Diego River @ Mission Center Rd	<10	187	10	41	1,782	85	36,540	86,640	5,475	ND	ND	ND
Ruffin Canyon (W of Qualcomm Stadium)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND
Upstream Murphy Cyn @ Balboa Ave	1,421	426	602	1,076	1,017	305	17,250	120,330	15,760	<35	ND	<35
Upstream Murphy Cyn @ Claremont Mesa Blvd	N/A	882	N/A	N/A	233	N/A	N/A	>241,960	N/A	ND	ND	ND
Upstream Alvarado Ck @ Alvarado Blvd	1,153	2,012	199	435	480	7,556	686,700	27,550	43,520	ND	ND	ND
Lake Murray Discharge	318	233	156	282	185	20	141,360	13,540	6,488	ND	ND	57
SDR @ Admiral Baker Golf Course	94	241	52	<10	684	20	23,590	30,760	6,488	ND	<35	<35
Upstream Forrester Ck @ Vernon Way	2,359	1,450	3,255	6,488	450	677	648,800	15,531	68,670	ND	4840	594
Upstream Forrester Ck @ Washington Channel	985	6,131	15,650	2481	1,658	2,282	285,100	26,130	461,100	100	480	196

SDR @ RIverford Rd	110	95	63	<10	464	<10	11,199	20,640	16,160	ND	ND	ND
Los Coches @ USGS Station	189	464	265	161	933	86	12,033	12,997	8,664	<35	1020	ND
Los Coches @ Flinn Springs	450	512	175	161	201	10	64,880	15,530	9,208	<35	660	ND
ALTERNATE SITES												
SDR @ PCH Bridge	20	84	62	823	218	121	20,980	8,664	26,130	ND	ND	ND
SDR @ Mission Valley Preserve Presidio Little League	74	72	10	31	145	41	38,730	6,488	9,804	ND	ND	<35
SDR @ Camino del Este	31	N/A	20	41	N/A	52	23,820	N/A	3,654	ND	ND	ND
SDR upstream from Kumeyaay Lake	119	N/A	N/A	52	N/A	N/A	18,500	N/A	N/A	ND	ND	ND
Tributary @ Riverwalk and Park Center Dr	189	279	10	<10	231	10	14,136	7,270	6,131	ND	<35	<35
Upstream Forrester Ck @ Terra Ln	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND

All Field Blanks and lab blanks were <1 MPN per 100mL. N/A is not applicable because site was dry. < is below limit of quantification. ND is not detectable or < 1 gene copy per 100 mL.

Supplemental Table S3. Site name and concentration of Enterococcus, E. Coli, and Total Coliforms from Wet Weather Survey Events 1-3.

Site and Sampling Information			Fecal Indicator Bacteria Concentrations (MPN per 100mL)			Human Marker Concentrations (gene copies per 100ml)
Site Name (All original sites)	**Event** No.	**Date**	***Enterococcus***	***E. coli***	**Total Coliform**	**HF183**
Alvarado Creek	1	3/3/2021	19890	15531	116000	11722
Carlton Hills	1	3/3/2021	2755	11199	36090	2062
Eucalyptus Hills	1	3/3/2021	26130	7915	>241960	23928
Fashion Valley	1	3/3/2021	5172	4106	77010	1429
Forrester Creek	1	3/3/2021	32550	15150	160700	6582
Ingraham Street	1	3/3/2021	26130	10462	173290	281
Los Coches Creek	1	3/3/2021	72700	43520	307600	7806
Mast Blvd	1	3/3/2021	61310	15410	387300	13416
Mission Road	1	3/3/2021	11199	17230	64880	6557
Mission Trails	1	3/3/2021	1187	457	6867	239
Morena Blvd	1	3/3/2021	34480	61310	325500	13884
Murphy Canyon Creek	1	3/3/2021	8164	15970	307600	24455
Sycamore Canyon Creek	1	3/3/2021	1616	1723	15290	1079
USGS Los Coches Creek	1	3/3/2021	198630	68670	313000	7387
Alvarado Creek	2	3/10/2021	14390	4352	111990	15992
Carlton Hills	2	3/10/2021	683	420	5172	<35
Eucalyptus Hills	2	3/10/2021	17230	5475	129970	5125
Fashion Valley	2	3/10/2021	1046	602	32550	250
Forrester Creek	2	3/10/2021	13540	8164	156500	8587
Ingraham Street	2	3/10/2021	457	441	38730	<35
Los Coches Creek	2	3/10/2021	13960	11199	120330	3587
Mast Blvd	2	3/10/2021	17329	8664	129970	3468
Mission Road	2	3/10/2021	228	52	5475	<35

Site and Sampling Information			Fecal Indicator Bacteria Concentrations (MPN per 100mL)			Human Marker Concentrations (gene copies per 100ml)
Site Name (All original sites)	**Event** No.	**Date**	***Enterococcus***	***E. coli***	**Total Coliform**	**HF183**
Mission Trails	2	3/10/2021	301	301	9804	99
Morena Blvd	2	3/10/2021	11530	10462	344100	40955
Murphy Canyon Creek	2	3/10/2021	9804	3873	48840	978
Sycamore Canyon Creek	2	3/10/2021	417	135	5794	99
USGS Los Coches Creek	2	3/10/2021	15531	5172	64880	2186
Alvarado Creek	3	12/14/2021	13170	16070	185000	13425
Carlton Hills	3	12/14/2021	27820	5630	325500	109
Eucalyptus Hills	3	12/14/2021	61310	15531	461100	2472
Fashion Valley	3	12/14/2021	17890	15530	461100	44768
Forrester Creek	3	12/14/2021	34480	21870	435200	2153
Ingraham Street	3	12/14/2021	3130	1333	222400	109
Los Coches Creek	3	12/14/2021	114500	38730	344800	1145
Mast Blvd	3	12/14/2021	18420	13340	547500	4256
Mission Road	3	12/14/2021	7270	1918	54750	233
Mission Trails	3	12/14/2021	1396	1314	72700	<35
Morena Blvd	3	12/14/2021	12033	11199	727000	2062
Murphy Canyon Creek	3	12/14/2021	7701	12997	141360	2241
Sycamore Canyon Creek	3	12/14/2021	13540	5794	98040	1823
USGS Los Coches Creek	3	12/14/2021	86640	48840	727000	2020