Supplemental Information

Terrestrial nutrient loads and fluxes to the Southern California Bight, USA

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Table SI-1. The annual, wet and dry weather discharge, and TN, TP loads from the POTWs in the SCB.

Outfall	POTW	Total			Wet Weather			Dry Weather		
		Discharge (m^3/year)	TN load (Kg)	TP Load (Kg)	Discharge (m^3/year)	TN load (Kg)	TP Load (Kg)	Discharge (m^3/year)	TN load (Kg)	TP Load (Kg)
Direct Ocean Outfall	HTP	3.32E+08	1.55E+07	9.91E+05	8.63E+07	4.02E+06	2.58E+05	2.45E+08	1.14E+07	7.33E+05
	JWPCP	3.46E+08	1.35E+07	2.25E+05	9.00E+07	3.50E+06	5.86E+04	2.56E+08	9.95E+06	1.66E+05
	OCSD	1.91E+08	8.01E+06	3.75E+05	5.85E+07	2.46E+06	1.15E+05	1.32E+08	5.56E+06	2.60E+05
	PLWTP	1.89E+08	6.74E+06	5.65E+05	4.76E+07	1.70E+06	1.42E+05	1.41E+08	5.04E+06	4.23E+05
Los Angeles River	D. C. Tillman	6.92E+07	5.53E+05	1.87E+05	1.80E+07	1.44E+05	4.87E+04	5.12E+07	4.09E+05	1.38E+05
	Burbank Western	5.53E+06	4.98E+04	5.53E+02	1.44E+06	1.30E+04	1.44E+02	4.09E+06	3.68E+04	4.09E+02
	Glendale Burbank	1.66E+07	8.30E+04	1.66E+03	4.32E+06	2.16E+04	4.32E+02	1.23E+07	6.14E+04	1.23E+03
San Gabriel River	San Jose Creek East	5.88E+07	5.71E+05	7.61E+03	1.53E+07	1.49E+05	1.98E+03	4.35E+07	4.22E+05	5.63E+03
	Los Coyotes	1.94E+07	1.65E+05	2.32E+03	5.05E+06	4.29E+04	6.04E+02	1.44E+07	1.22E+05	1.72E+03
	Long Beach	2.77E+07	2.08E+05	2.77E+03	7.21E+06	5.41E+04	7.21E+02	2.05E+07	1.54E+05	2.05E+03
	Pomona	-	-	-	-	-	-	-	-	-
	Whittier	-	-	-	-	-	-	-	-	-
Total Sum		1.25E+09	4.53E+07	2.36E+06	3.34E+08	1.21E+07	6.27E+05	9.20E+08	3.32E+07	1.73E+06

Table SI-2. Runoff coefficients (C) for stormwater discharge and average concentrations of ammonium, nitrate, phosphate and total nitrogen and phosphorus in runoff from land uses based on literature and regional stormwater studies - Values are from Ackerman and Schiff (2003) unless otherwise noted.

Land Use Type	Runoff Coefficient	Ammonium ($mg\ L^{-1}$)	Nitrate ($mg\ L^{-1}$)	Phosphate ($mg\ L^{-1}$)	Total Nitrogen ($mg\ L^{-1}$)	Total Phosphorus ($mg\ L^{-1}$)
Agriculture	0.10	1.34	7.31	3.27	10.41	11.30
Commercial	0.61	0.45	1.30[b]	0.09	3.56	0.56
Industrial	0.64	0.34	1.29[b]	0.32	3.55	1.33
Open	0.06	0.04[a]	0.34[a]	0.03[a]	2.46[a]	0.35[b]
Residential	0.39	0.42	1.65[b]	0.25[b]	3.96	1.10
Other Urban	0.41	0.40	0.80	0.17	3.00	0.83

[a] Value from Yoon and Stein (2007)

[b] Value from Stein et al. (2007)

Table SI-3. Watersheds of southern California Bight with percentage land use.

Watershed	Watershed Area	Land use %					
		AG	COM	IND	OPEN	RES	Other
San Gabriel River (20)	3.00E+08	0.93	17.41	8.96	12.17	60.34	0.19
Chollas Creek (7)	8.70E+07	0.06	9.33	30.95	14.27	45.4	0
Agua Hedionda Creek (1)	7.90E+07	10.6	3.16	18.14	40.77	27.33	0
Los Penasquitos Creek (14)	3.40E+07	2.35	4.98	18.35	52.92	21.39	0
Newport Bay (16)	3.70E+08	1.01	12.95	4.63	35.35	45.86	0.21
Tecolote Creek (30)	2.50E+07	0	13.82	23.1	20.83	42.26	0
Tijuana River (31)	5.70E+08	5.77	1.01	3.24	88.63	1.35	0
Secunda Deschecha (28)	2.80E+07	0	5.96	1.98	60.68	30.84	0.55
Calleguas Creek (5)	8.70E+08	26.62	3.28	1.99	52.89	15.18	0.03
San Marcos Creek (23)	1.50E+08	10.98	4.61	14.56	44.72	25.14	0
Los Angeles River (13)	1.40E+09	0.77	12.13	5.48	28.49	52.94	0.18
Malibu Creek (15)	1.20E+08	1.17	0.99	0.52	90.48	6.84	0
San Dieguito River (19)	1.40E+08	11.59	2.2	9.36	52.7	24.15	0
Ballona Creek (2)	3.20E+08	0.03	16.46	3.32	18.4	61.44	0.34
Escondido Creek (9)	2.20E+08	1.97	0	0	84.45	13.58	0
Prima Deschecha (17)	2.10E+07	0	3.99	1.46	56.54	38.02	0
Goleta Slough (10)	1.30E+08	4.82	3.16	0	75.4	15.96	0.66
Dominguez Channel (8)	1.70E+08	1.24	19.15	25.09	8.58	45.52	0.42
Santa Ana Channel (3)	5.80E+08	1.01	12.95	4.63	35.35	45.86	0.21
Buena Vista Creek (4)	5.80E+07	2.23	10.53	17.9	22.54	46.81	0
Santa Margarita River (27)	9.80E+08	16.15	1.27	1.06	71.22	10.24	0.07
San Diego River (18)	4.50E+08	1.86	6.35	15.29	52.3	24.2	0
Carpenteria Creek (6)	9.40E+07	4.13	1.35	0	86.75	7.49	0.26
Santa Clara River (26)	3.10E+09	5.42	0.75	1.16	88.41	4.24	0.01
Sweetwater Creek (29)	1.20E+08	0.26	7.46	19.76	31.33	41.19	0
San Juan Creek (21)	4.50E+08	2.13	2.33	0.79	81.11	13.55	0.08
San Luis Rey River (22)	9.20E+08	25.28	0.69	3.5	66.99	3.54	0
San Mateo Creek (24)	3.40E+08	2.07	0.06	0.14	96.18	1.56	0
Zuma Creek (34)	2.60E+07	3.08	0.84	0	82.78	13.29	0
Laguna Creek (11)	2.70E+07	0.23	3.36	2.1	69.76	24.43	0.12
Ventura River (33)	7.80E+08	6.36	0.81	2.78	84	6.04	0.01
Topanga Creek (32)	5.10E+07	0.55	0.26	0.02	88.06	11.11	0
Las Flores Creek (12)	7.80E+07	0.12	0.56	0	89.91	9.41	0
San Onofre Creek (25)	1.50E+08	0	0.08	2.25	97.25	0.42	0

Table SI-4. Results of least squares regression between measured and modeled nutrient loads where slope represents the accuracy of the prediction modeled load = Slope (measured load), R^2 represents precision.

Nutrient Form	Slope	R^2
TN	0.50	0.63
TP	0.63	0.30
NH_4	0.63	0.71
NO_2+NO_3	0.14	0.29
PO_4	0.50	0.56

Table SI-5. Area by land use (km^2) for the entire Bight, and the six sub-regions.

	Open Space	Agriculture	Developed	Total Area
Bight wide	19812.92	1067.48	8083.71	29216.31
Santa Barbara	666.45	37.44	120.26	825.20
Ventura	5008.22	375.07	604.38	6025.56
Santa Monica Bay	466.24	6.20	499.39	974.71
San Pedro	4680.40	137.44	4642.13	9520.70
North San Diego	6181.50	491.49	1456.27	8205.37
South San Diego	2810.11	19.84	761.28	3664.76

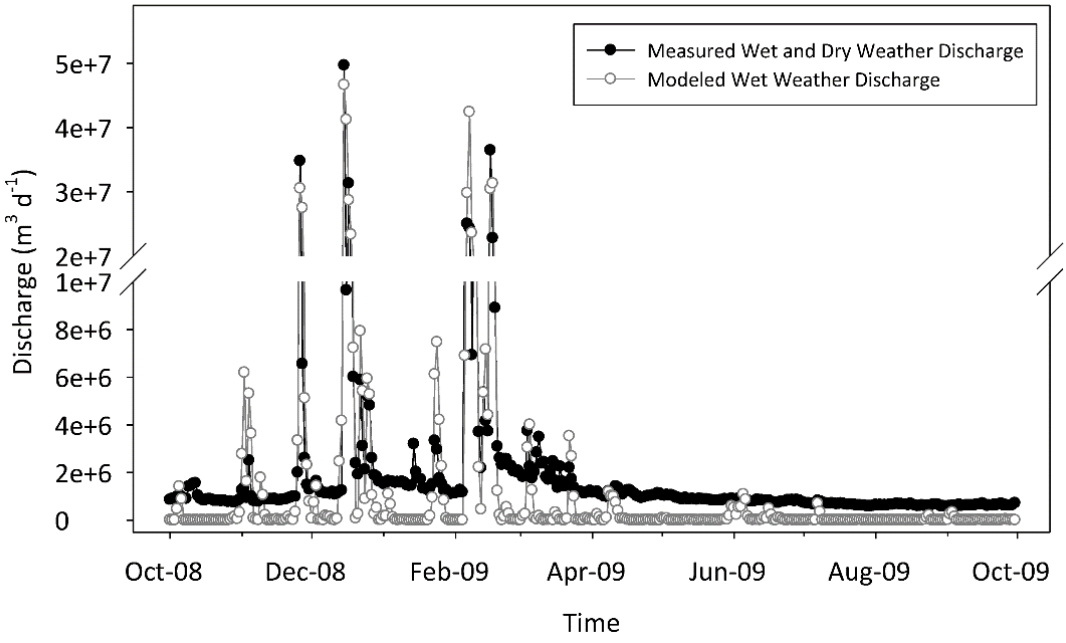

Figure SI-1. Comparison of total wet and dry weather measured versus modeled wet discharge (m^3 day^{-1}) to the Southern California Bight for October 2008-2009.