

Table 2. Suspended-sediment load, annual runoff, and peak flow in the San Lorenzo River, Santa Cruz, California, in water years 2009 and 2010

	Water year 2009	Water year 2010	Average annual value
Suspended sediment, in metric tons	7,236	41,237	140,000*
Annual runoff, in cubic kilometers per year	0.05	0.12	0.11
Annual peak flood discharge, in cubic meters per second	134	360	
Suspended sediment transported in largest storm, in metric tons	4,562	26,733	
Percentage of annual suspended sediment transported during largest storm	63	65	
Percentage of WY 2009-2010 suspended sediment transported during largest storm	9	55	
Suspended sediment, in metric tons, transported between 1237 PST on January 20, 2010, and 1115 PST on January 21, 2010 (see fig. 6)		20,411	

*From Best and Griggs (1991).

Table 3. Polyaromatic hydrocarbon (PAH) compounds analyzed, including deuterated surrogate, San Lorenzo River, Santa Cruz, California, during water year 2010.

Native PAH	Deuterated surrogate
Naphthalene	D ₈ -Naphthalene
2-Methyl_Naphthalene	D ₈ -Naphthalene
1-Methyl_Naphthalene	D ₈ -Naphthalene
Acenaphthylene	D ₈ -Acenaphthylene
Acenaphthene	D ₁₀ -Acenaphthene
Fluorene	D ₁₀ -Fluorene
Dibenzothiophene	D ₁₀ -Phenanthrene
Phenanthrene	D ₁₀ -Phenanthrene
Anthracene	D ₁₀ -Anthracene
2-Methyl_Anthracene	D ₁₀ -Phenanthrene
4,5-Methylene_Phenanthrene	D ₁₀ -Phenanthrene
1-Methyl_Phenanthrene	D ₁₀ -Phenanthrene
Fluoranthene	D ₁₀ -Fluoranthene
Pyrene	D ₁₀ -Pyrene
Retene	D ₁₀ -Pyrene
1-Methyl_Pyrene	D ₁₀ -Pyrene
Benzo[b]naphtho[2,1-d]thiophene	D ₁₂ -Benz[a]anthracene
Benz[a]anthracene	D ₁₂ -Benz[a]anthracene
Chrysene	D ₁₂ -Chrysene
Benzo[b]fluoranthene	D ₁₂ -Benzo[b]fluoranthene
Benzo[k]fluoranthene	D ₁₂ -Benzo[k]fluoranthene
Benzo[e]pyrene	D ₁₂ -Benzo[k]fluoranthene
Benzo[a]pyrene	D ₁₂ -Benzo[a]pyrene
Perylene	D ₁₂ -Benzo[k]fluoranthene
Indeno[1,2,3-c,d]pyrene	D ₁₂ -Indeno[1,2,3-c,d]pyrene
Dibenz[a,h]anthracene	D ₁₄ -Dibenz[a,h]anthracene
Benzo[g,h,i]perylene	D ₁₂ -Benzo[g,h,i]perylene

Table 4A. Concentration (ng/L) of low molecular weight polyaromatic hydrocarbons in water samples collected from the San Lorenzo River, Santa Cruz, California, in water year 2010.
 [ND, not detected at the specified limit of detection]

Date	Time	Flow (m ³ /s)	Flow (ft ³ /s)	Naphthalene	2-Methyl Naphthalene	1-Methyl Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Dibenzothiophene	Phenanthrene	Anthracene	2-Methyl Anthracene	4,5-Methylene Phenanthrene	1-Methyl Phenanthrene	Sum of low molecular weight PAHs
10/13/09	14:15	39.6	1,400	19.6	ND	ND	ND	4.6	4.7	1.8	29.5	ND	ND	3.1	4.6	68
10/13/09	17:40	99.1	3,500	17.8	4.5	3.0	ND	3.1	4.7	ND	30.1	ND	ND	2.7	3.3	69
10/13/09	17:50	101.3	3,580	422.9	ND	ND	ND	ND	6.4	1.2	35.2	2.0	ND	2.7	3.0	473
1/18/10	16:00	45.6	1,610	28.4	5.7	4.7	ND	ND	5.2	2.0	39.9	2.4	ND	4.4	7.2	100
1/19/10	14:00	93.7	3,310	37.7	ND	ND	ND	ND	3.7	ND	34.7	3.6	ND	3.8	4.3	88
1/20/10	11:20	226.4	8,000	69.2	9.7	8.1	ND	ND	8.1	3.0	67.5	6.6	ND	7.4	14.5	194
1/20/10	14:00	342.4	12,100	37.6	26.9	26.7	1.8	53.5	26.2	5.2	114.9	16.1	2.7	10.4	8.4	331
1/20/10	16:00	232.1	8,200	112.5	133.8	144.6	ND	14.5	21.0	10.1	111.2	6.2	ND	6.6	34.5	595
1/26/10	13:00	20.7	732	15.3	ND	ND	ND	ND	1.3	ND	21.4	1.1	ND	2.3	5.7	47
2/5/10	8:10	69.3	2,450	37.3	8.2	7.2	ND	3.2	3.6	1.4	37.4	3.2	ND	2.4	6.8	111
2/24/10	10:30	34.0	1,200	13.1	ND	ND	ND	ND	2.6	ND	26.7	3.1	1.7	2.7	4.0	54
2/27/10	12:05	21.6	762	24.5	ND	ND	ND	ND	1.7	ND	11.9	ND	ND	ND	1.7	40
3/3/10	10:30	26.8	948	432.5	3.4	ND	ND	ND	ND	ND	9.6	1.6	ND	1.4	2.5	451
4/12/10	11:45	24.7	872	115.1	ND	ND	ND	ND	1.7	ND	9.1	ND	ND	ND	ND	126
4/12/10	11:50	24.6	870	12.7	1.5	1.4	ND	ND	1.3	ND	9.6	ND	ND	ND	ND	26

Table 4B. Concentration (ng/L) of high molecular weight polyaromatic hydrocarbons in water samples collected from the San Lorenzo River, Santa Cruz, California, in water year 2010.
 [ND, not detected at the specified limit of detection]

Date	Time	Flow (m ³ /s)	Flow (ft ³ /s)	Fluoranthene	Pyrene	Retene	1-Methyl Pyrene	Benzo[b]naphtho[2,1-d]thiophene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[e]pyrene	Benzo[a]pyrene	Perylene	Indeno[1,2,3-c,d]pyrene	Dibenz[a,h]anthracene	Benzo[g,h,i]perylene	Sum of high molecular weight PAHs
10/13/09	14:15	39.6	1,400	36.2	33.5	89.7	3.2	3.9	6.5	13.8	16.5	22.7	13.8	13.2	12.4	14.2	6.1	19.7	305
10/13/09	17:40	99.1	3,500	31.1	23.9	12.7	3.2	3.5	10.0	13.6	15.6	17.8	11.9	14.1	14.2	15.1	4.6	18.0	209
10/13/09	17:50	101.3	3,580	34.9	32.3	19.8	3.2	2.9	7.0	14.8	11.4	77.0	11.6	13.0	12.6	11.1	3.0	15.5	270
1/18/10	16:00	45.6	1,610	42.6	39.4	22.4	4.9	5.9	12.7	23.6	19.6	40.3	16.7	15.2	29.9	14.7	4.9	20.9	314
1/19/10	14:00	93.7	3,310	43.3	42.1	18.1	3.4	4.6	10.6	22.3	23.1	17.5	19.7	18.9	11.2	15.6	4.7	23.1	278
1/20/10	11:20	226.4	8,000	90.4	82.5	140.3	10.8	12.8	30.5	67.7	49.0	207.1	44.6	37.0	130.3	37.1	10.9	50.7	1002
1/20/10	14:00	342.4	12,100	136.8	120.1	88.1	6.7	11.4	39.0	69.9	57.6	65.8	38.2	39.9	23.9	34.9	9.9	44.0	786
1/20/10	16:00	232.1	8,200	69.1	76.0	1268.3	13.7	16.3	36.2	67.7	53.9	98.2	45.5	55.8	142.2	44.7	15.4	56.3	2059
1/26/10	13:00	20.7	732	25.2	22.3	18.3	3.1	3.8	6.3	11.7	9.9	5.8	8.5	7.4	11.3	6.6	2.7	10.1	153
2/5/10	8:10	69.3	2,450	31.6	28.3	15.3	3.1	3.1	10.7	16.0	14.1	10.5	12.3	15.9	59.3	13.8	4.5	17.4	256
2/24/10	10:30	34.0	1,200	29.9	27.5	10.7	2.9	4.3	9.3	18.1	15.7	24.9	10.4	12.8	21.8	10.4	ND	14.4	213
2/27/10	12:05	21.6	762	9.5	8.1	3.0	1.1	1.4	2.4	3.6	3.6	6.3	3.1	3.8	9.5	3.2	ND	4.6	63
3/3/10	10:30	26.8	948	22.4	20.2	22.5	1.6	3.0	4.7	11.3	10.8	6.3	8.4	6.9	16.8	5.4	ND	8.4	149
4/12/10	11:45	24.7	872	13.0	9.1	2.2	ND	1.5	2.5	5.5	4.9	5.3	7.1	4.8	14.5	4.2	ND	5.7	80
4/12/10	11:50	24.6	870	9.8	7.6	2.6	1.5	1.5	2.3	4.1	3.1	25.4	3.1	3.9	9.6	3.0	ND	5.1	83

Table 5. Summary statistics, including range, median, mean, and standard deviation (σ) of concentration, in ng/L, of low- and high- molecular weight polyaromatic hydrocarbons (PAHs) in water samples collected from the San Lorenzo River, Santa Cruz, California, in water year 2010. [ND, not detected at the specified limit of detection; CTR, California Toxics Rule, U.S. Environmental Protection Agency water-quality criteria for priority toxic pollutants for California inland surface waters, enclosed bays, and estuaries (U.S. Environmental Protection Agency, 2000).]

	Range		Median	Mean	σ	CTR
	Minimum	Maximum				
<u>Low molecular weight PAHs</u>						
Naphthalene	13	432	37	93	140	
2-Methyl Naphthalene	ND	134	ND	13	45	
1-Methyl Naphthalene	ND	145	ND	13	52	
Acenaphthylene	ND	2	ND	ND		
Acenaphthene	ND	54	ND	5	22	1,200,000
Fluorene	ND	26	4	6	8	1,300,000
Dibenzothiophene	ND	10	ND	2	3	
Phenanthrene	9	115	30	39	34	
Anthracene	ND	16	3	3	4	
2-Methyl Anthracene	ND	3	ND	ND		
4,5-Methylene Phenanthrene	ND	10	3	3	3	
1-Methyl Phenanthrene	ND	35	5	7	9	
<u>High molecular weight PAHs</u>						
Fluoranthene	9.5	137	32	42	34	300,000
Pyrene	7.6	120	28	38	31	960,000
Retene	2.2	1,268	18	116	321	
1-Methyl Pyrene	ND	14	3.2	4.1	3.6	
Benzo[b]naphtho[2,1-d]thiophene	1.4	16	3.8	5.3	4.5	
Benz[a]anthracene	2.3	39	9.3	13	12	4.4
Chrysene	3.6	70	15	24	24	4.4
Benzo[b]fluoranthene	3.1	58	16	21	18	4.4
Benzo[k]fluoranthene	5.3	207	23	42	54	4.4
Benzo[e]pyrene	3.1	45	12	17	14	
Benzo[a]pyrene	3.8	56	13	17	15	4.4
Perylene	9.5	142	15	35	43	
Indeno[1,2,3-c,d]pyrene	3.0	45	14	16	13	
Dibenz[a,h]anthracene	ND	15	4.8	4.4	4.1	
Benzo[g,h,i]perylene	4.6	56	17	21	16	
Sum of low weight PAHs	26	595	100	185	185	
Sum of high weight PAHs	63	2,059	256	415	524	
Sum of California Ocean Plan listed PAHs	49	655	175	245	217	
Sum of all PAHs	103	2,654	367	600	659	