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16. ABSTRACT
The effects of runoff from asphalt concrete pavement on stream water chemistry, and macroinvertebrate and fish communities were assessed. Concentrations of polycyclic aromatic hydrocarbons (PAHs) and selected heavy metals (Pb, Zn, Cd) were determined in water samples collected from water draining road surfaces and waters upstream and downstream from the point where water discharged from road surfaces into stream sites. Fish and invertebrate tissues were analyzed for PAHs and heavy metals to determine if bioaccumulation was occurring. The response of fish and macroinvertebrate communities to discharge waters was determined by comparing community indices from sites above and below the point where road runoff entered each stream. Concentrations of all PAH analytes in all stream and road runoff samples were below the detection limit of 0.5 μg/L (ppb).

Although detectable levels of heavy metals were present in stream and runoff waters there were no significant upstream vs. downstream differences in the concentrations of any heavy metal across all streams. Concentrations of metals were however elevated in runoff waters from the road surfaces relative to upstream samples. Concentrations of all PAH analytes in fish tissues and invertebrate tissues were below detection limit of 0.2 mg /kg (ppm). Concentrations of Pb and Cd in fish tissues were below detection limits (0.5 and 0.05 mg/kg, respectively). Concentrations of Zn in fish tissue were higher above sites where road runoff entered the streams. Concentrations of Zn and Cd in invertebrate tissues were higher than in fish tissue. Levels of Zn, but not Cd, in invertebrate tissue were higher above sites where road runoff entered the streams. Fish ad invertebrate communities did not differ significantly above and below the site where road runoff entered the stream. However the abundances of three invertebrate taxa (*Prosimulium* sp. Mites, and Chloroperlidae) were significantly lower at downstream relative to upstream locations, and the abundance of an additional taxon, the stonefly *Hesperoperla* sp. was marginally lower across all streams.

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Polycyclic Aromatic Hydrocarbons, heavy metals, streams, macroinvertebrates, fish. asphalt concrete pavement, runoff.

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The Impact Of Runoff From Asphaltic Products On Stream Communities In California

Project 65V892

Final Report
October 1996

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Table 1. Streams sampled during the project, month of last road resurfacing, dates when water and biota samples were collected and the numbers of samples collected. PAH- Polycyclic aromatic hydrocarbons. Up, down and runoff refer to location where sample was collected, up= upstream, down=downstream, road= road runoff.

STREAM	HIGHWAY	POST MILE	DATE LAST ROAD RESURFACE	DATE WATER SAMPLED	WATER						DATE BIOTA SAMPLED	FISH				INVERTEBRATES			
					PAH			METALS				PAH	PAH	METALS	METALS	PAH	PAH	METALS	METALS
					UP	ROAD	DOWN	UP	ROAD	DOWN		UP	ROAD	UP	DOWN	UP	DOWN	UP	DOWN
North Fork Mad Rv.	299	8.2	Aug-94	18-Mar-95	3	1	3	3	1	3	19-Aug-95	3	3	3	3	—	—	1	1
Little Castle	Interstate 5	67	Sep-94	18-Mar-95	3	1	3	3	1	3	17-Aug-95	3	3	3	3	—	—	1	1
Root Cr.	Interstate 5	64	Sep-94	18-Mar-95	3	1	3	3	1	3	17-Aug-95	3	3	3	3	—	—	—	—
Castle Cr.	Interstate 5	61	Sep-94	18-Mar-95	3	1	3	3	1	3	18-Aug-95	3	3	3	3	—	—	1	1
Pm 27.14	49	27.14	Sep-94	2-Jun-95	3	1	3	3	1	3	20-Jun-95	—	—	—	—	—	—	1	1
Pm 27.60	49	27.6	Sep-94	2-Jun-95	3	1	3	3	1	3	20-Jun-95	3	3	3	3	—	—	1	1
Sagehen Ck.	89	8.7	Aug-93	3-Jun-95	3	1	3	3	1	3	21-Jun-95	3	3	3	3	—	—	1	1
Prosser	89	3.4	Aug-93	3-Jun-95	3	1	3	3	1	3	21-Jun-95	3	3	3	3	1	1	1	1
San Jose	101	21.1	Jan-96	16-Jan-96	3	1	3	3	1	3	—	—	—	—	—	—	—	—	—
				1-Feb-96	3	1	3	3	1	3	—	—	—	—	—	—	—	—	—
Maria Ygnacio	101	20.7	Jan-96	16-Jan-96	3	1	3	3	1	3	—	—	—	—	—	—	—	—	—
				19-Jan-96	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—
				1-Feb-96	3	1	3	3	1	3	—	—	—	—	—	—	—	—	—
Sycamore	101	12.1	Jan-96	16-Jan-96	3	1	3	3	1	3	22-May-95	—	—	—	—	—	—	—	—
				1-Feb-96	3	1	3	3	1	3	—	—	—	—	—	—	—	—	—

Table 2. Analytes for all water and tissue samples collected.

PAH		Metals
1. Naphthalene	10. Chrysene	1. Zn
2. Methylnaphthalenes	11. Fluoranthene	2. Cd
3. Acenaphthylene	12. Benzo[b]fluoranthene	3. Pb
4. Fluorene	13. Benzo[k]fluoranthene	
5. Phenanthrene	14. Benzo[a]pyrene	
6. Anthracene	15. Benzo[ghi]pyrene	
7. Acenaphthene	16. Indeno[1,2,3-cd]pyrene	
8. Pyrene	17. Dibenzo[a,h]anthracene	
9. Benz[a]anthracene		

Table 3. Physical characteristics of the surveyed streams and the amount of precipitation associated with the rain event when water samples were collected.

STREAM	TEMP (°C) UP	TEMP (°C) DOWN	pH UP	pH Bridge	pH DOWN	STREAM DEPTH (m) UP	STREAM DEPTH (m) DOWN	STREAM WIDTH (m) UP	STREAM WIDTH (m) DOWN	CURRENT VELOCITY (m/sec) UP	CURRENT VELOCITY (m/sec) DOWN	STREAM DISCHARGE (m^3/sec) UP	STREAM DISCHARGE (m^3/sec) DOWN	AMOUNT OF PRECIPITATION (cm)
North Fork Mad Rv. (SE)	9.5	9.5	9.1	8.7	9.1	0.15 (0.01)	0.14 (0.03)	15	15	0.23 (0.11)	0.21 (0.06)	16.32	16.32	0.84
Little Castle (SE)	7.1	7.1	8.8	8.6	9	0.25 (0.05)	0.21 (0.03)	6.1	6.1	0.17 (0.07)	0.23 (0.04)	0.19	0.19	1.2
Root Cr. (SE)	15	15	8.9	8.6	8.8	0.14 (0.03)	0.12 (0.02)	10	10	0.09 (0.04)	0.22 (0.04)	1.18	1.18	1.2
Castle Cr. (SE)	7	7	8.9	9	8.9	0.28 (0.05)	0.27 (0.03)	15	15	0.37 (0.07)	0.30 (0.07)	2.45	2.45	1.2
Pm 27.14 (SE)	8.1	8.1	7.7	7.9	7.7	0.09 (0.00)	0.10 (0.01)	1.25	1.5	0.57 (0.12)	0.39 (0.10)	0.08	0.06	0.2
Pm 27.60 (SE)	8.3	8.3	7.2	7.2	7.4	0.21 (0.02)	0.14 (0.03)	1.5	3.5	0.41 (0.12)	0.65 (0.10)	0.16	0.98	0.2
Sagehen Ck. (SE)	7.1	7.1	7.4	7.5	7.4	0.28 (0.02)	0.34 (0.05)	9	12	0.68 (0.09)	0.81 (0.08)	4.14	5.57	0.28
Prosser (SE)	7.4	7.4	7.3	7.4	7.3	0.27 (0.04)	0.31 (0.02)	23	24	0.55 (0.13)	0.57 (0.09)	12.48	13.2	0.28
San Jose (SE)	14.2	14.2	7.4	7.5	7.4									0.51
Maria Ygnacio (SE)	14.3	14.3	7.6	7.7	7.6									0.51
Sycamore (SE)	14.5	14.4	7.9	8	7.9	0.05 (0.00)	0.03 (0.01)	2	1	0.21 (0.03)	0.10 (0.06)	0.01	0.01	0.51

Table 4. Mean (1SE) concentrations (ppb) of heavy metals in road runoff and stream waters upstream and downstream of the site where the road runoff entered the stream.

Location	Date	Pb			Cd			Zn		
		Upstream	Runoff	Downstream	Upstream	Runoff	Downstream	Upstream	Runoff	Downstream
North Fork Mad Rv.	18-Apr-95	0.66	0.04	0.20	0.43	0.09	0.16	251.33	39.70	102.96
(SE)		(0.20)		(0.08)	(0.09)		(0.02)	(67.72)		(19.92)
Lt Castle Cr.	18-Apr-95	0.16	2.28	0.07	0.07	0.10	0.08	7.27	69.45	7.08
(SE)		(0.04)		(0.04)	(0.02)		(0.03)	(0.71)		(1.76)
Root Cr.	18-Apr-95	0.67	8.70	0.32	0.37	0.35	0.10	6.97	17.82	6.66
(SE)		(0.14)		(0.05)	(0.26)		(0.04)	(0.84)		(0.20)
Castle Cr.	18-Apr-95	0.06	0.09	0.00	0.06	0.09	0.05	17.89	18.40	6.78
(SE)		(0.04)		(0.00)	(0.01)		(0.02)	(0.04)		(0.49)
27:14	2-Jun-95	0.00	0.00	0.00	0.01	0.00	0.00	3.91	4.15	11.79
(SE)		(0.00)		(0.00)	(0.00)		(0.00)	(0.76)		(4.27)
27:60	2-Jun-95	0.00	0.00	0.00	0.02	0.00	0.00	5.16	3.61	0.51
(SE)		(0.00)		(0.00)	(0.02)		(0.00)	(0.87)		(0.09)
Sagehen Cr.	18-Apr-95	0.00	0.00	0.00	0.02	0.11	0.02	1.58	27.90	2.18
(SE)		(0.00)		(0.00)	(0.01)		(0.01)	(0.08)		(0.25)
Prosser Cr.	18-Apr-95	0.02	0.00	0.03	0.03	0.02	0.02	2.92	4.40	0.70
(SE)		(0.02)		(0.02)	(0.01)		(0.02)	(0.56)		(0.36)
San Jose	16-Jan-96	0.25	0.50	0.26	0.00	0.03	0.00	2.82	84.50	2.80
(SE)		(0.01)		(0.02)	(0.00)		(0.00)	(0.71)		(0.19)
San Jose	1-Feb-96	0.30	0.30	0.22	0.04	0.10	0.03	5.59	16.99	4.77
(SE)		(0.06)		(0.00)	(0.01)		(0.00)	(0.71)		(1.40)
Maria Ygnacio	16-Jan-96	0.26	1.16	0.38	0.03	0.29	0.05	18.94	266.50	10.84
(SE)		(0.00)		(0.02)	(0.01)		(0.01)	(10.06)		(1.04)
Maria Ygnacio	19-Jan-96		2.09			0.13			51.95	
Maria Ygnacio	1-Feb-96	0.28	1.24	0.09	0.04	0.14	0.06	2.19	10.65	1.97
(SE)		(0.01)		(0.09)	(0.01)		(0.00)	(0.76)		(0.58)
Sycamore	16-Jan-96	0.28	0.69	0.29	0.00	0.11	0.01	6.86	53.70	7.17
(SE)		(0.01)		(0.03)	(0.00)		(0.00)	(0.89)		(1.57)
Sycamore	1-Feb-96	0.34	0.38	0.31	0.02	0.05	0.03	3.30	5.91	4.20
(SE)		(0.10)		(0.06)	(0.00)		(0.00)	(0.73)		(0.41)

Table 5. Mean (1SE) concentrations (mg/kg- ppm) of heavy metals in fish and invertebrate tissues collected upstream and downstream of the site where road runoff entered the stream.

Stream	Fish		Invertebrates			
	Zn		Zn		Cd	
	upstream	downstream	upstream	downstream	upstream	downstream
North Fork Mad Rv.	25.0	33.3	98	73	0.07	0.07
(SE)	(1.5)	(4.8)				
Castle Creek	27.7	29.0	47	48	0.06	0.07
(SE)	(0.9)	(5.0)				
Root Creek	21.0	24.3	.	.	.	.
(SE)	(3.8)	(0.9)				
Little Castle Cr.	21.7	22.7	48	55	0.09	0.05
(SE)	(1.2)	(3.2)				
27.6	20.7	21.7	35	41	0.15	0.13
(SE)	(2.3)	(2.3)				
Sagehen Cr.	26.0	38.3	43	47	0	0
(SE)	(1.7)	(6.0)				
Prosser Cr.	19.7	16.3	26	40	0	0.28
(SE)	(2.0)	(0.3)				
27.14	.	.	71	78	0.07	0.11
(SE)						

Table 6. Species abundance (n), mean standard length (SL), mass, and condition of fish surveyed upstream and downstream of the site where road runoff entered the stream. (1SE).

				UPSTREAM				DOWNSTREAM			
Stream	Highway	Postmile	Fish sp	n	SL (cm)	Mass (gms)	Condition	n	SL (cm)	Mass (gms)	Condition
North Fork Mad Rv.	299	8.2	Rainbow trout	31	6.87	4.00	0.009	26	7.18	5.38	0.009
			(SE)		(0.40)	(0.82)	(0.000)		(0.59)	(1.54)	(0.000)
Little Castle Cr	Interstate 5	67	Dace	0				5	9.12	7.80	0.009
			(SE)						(0.91)	(1.86)	(0.000)
Little Castle Cr	Interstate 5	67	Brown Trout	0				1	16.50	42.00	0.009
			(SE)								
Little Castle Cr	Interstate 5	67	Rainbow Trout	24	7.87	8.47	0.010	17	6.02	2.77	0.009
			(SE)		(0.77)	(2.79)	(0.000)		(0.48)	(1.01)	(0.000)
Little Castle Cr	Interstate 5	67	Sculpin	24	4.06	2.02	0.015	12	6.07	3.83	0.017
			(SE)		(0.53)	(0.66)	(0.001)		(0.78)	(0.74)	(0.004)
Root Creek	Interstate 5	64	Rainbow	8	8.83	9.01	0.010	13	7.41	4.98	0.010
			(SE)		(1.01)	(2.72)	(0.000)		(0.67)	(1.46)	(0.000)
Root Creek	Interstate 5	64	Sculpin	3	3.83	1.20	0.011	8	7.63	5.90	0.012
			(SE)		(1.43)	(1.05)	(0.001)		(0.48)	(1.02)	(0.000)
Castle Cr	Interstate 5	61	Rainbow Trout	29	4.29	2.20	0.019	23	5.16	1.89	0.012
			(SE)		(0.30)	(0.70)	(0.002)		(0.22)	(0.29)	(0.001)
Castle Cr	Interstate 5	61	Dace	4	7.55	6.35	0.014	4	9.28	7.28	0.009
			(SE)		(0.58)	(1.12)	(0.001)		(0.31)	(0.57)	(0.000)
Castle Cr	Interstate 5	61	Sculpins	13	6.46	5.88	0.020	4	9.30	9.70	0.011
			(SE)		(0.40)	(1.05)	(0.001)		(0.41)	(2.45)	(0.001)
27.6	49	27.6	Rainbow	8	11.00	25.93	0.016	7	10.69	26.74	0.016
			(SE)		(1.34)	(10.52)	(0.001)		(1.57)	(10.96)	(0.002)
Sagehen Ck	89	8.7	Brown	14	19.53	73.56	0.009	4	12.38	43.75	0.013
			(SE)		(2.32)	(17.25)	(0.001)		(3.98)	(35.69)	(0.001)
Sagehen Ck	89	8.7	Sculpins	6	6.87	4.20	0.013	30	6.91	4.36	0.012
			(SE)		(0.41)	(0.59)	(0.001)		(0.24)	(0.59)	(0.000)
Prosser	89	3.4	Sculpins	8	4.84	2.79	0.021	10	4.32	1.94	0.022
			(SE)		(0.35)	(0.67)	(0.001)		(0.26)	(0.33)	(0.003)

Table 7. Mean total biomass (1SE) of fish surveyed in upstream and downstream stretches of the site where road runoff entered the stream.

Stream	Highway	Postmile	UPSTREAM Mean Biomass (gms)	UPSTREAM Total # Fish	DOWNSTREAM Mean Biomass (gms)	DOWNSTREAM Total # Fish
North Fork Mad Rv.	299	8.2	4.00	31	5.38	26
(SE)			(0.82)		(1.54)	
Little Castle Cr	Interstate 5	67	5.24	48	4.97	35
(SE)			(1.50)		(1.27)	
Root Creek	Interstate 5	64	6.88	11	5.33	21
(SE)			(2.24)		(0.97)	
Castle Cr	Interstate 5	61	3.60	46	3.59	31
(SE)			(0.60)		(0.65)	
27.6	49	27.6	25.93	8	26.74	7
(SE)			(10.52)		(10.96)	
Sagehen Ck	89	8.7	52.76	20	8.99	34
(SE)			(13.99)		(4.33)	
Prosser	89	3.4	2.79	8	1.94	10
(SE)			(0.67)		(0.33)	

Table 8. Common invertebrate taxa whose abundances were analyzed statistically. Common taxa had mean abundances of at least 8 per sample in at least one stream. * In addition, these animals had mean abundances of 8 or more at all streams, both upstream and downstream.

* *Baetis*	*Optioservus*	Total Plecopteran larvae
HEPTAGENIIDAE	*Rhizelmis*	Total Trichoptera larvae
Epeorus	*Zaitsevia* Adult	Total Coleopteran larvae
Rithrogena	DIPTERAN PUPAE	* Total Dipteran larvae
EPHEMERELIDAE	SIMULIDAE Larvae	* Total larvae
Drunella	*Simulium*	Total pupae
Ephemerella	*Prosimulium*	* Total insects
Serratella	* CHIRONOMIDAE	* Total non-insects or terrestrials
Paraleptophlebia	*Bezzia*	* Total individuals
PLECOPTERA	COPEPODA	
Yoraperla	ARACHNIDA (MITES)	
NEMOURIDAE	NEMATODES	
Malenka	OLIGOCHAETES	
Zapada	OSTRACODA	
PERLIDAE	TERRESTRIALS	
Calineuria	Total Heptageniidae	
Hesperoperla	Total Ephemerelidae	
CHLOROPERLIDAE	Total Nemouridea	
Sweltsa	Total Perlidae	
TRICHOPTERA	Total Chloroperlidae	
Glossosoma	Total Glossosomatidae	
HYDROPSYCHIDAE	Total Hydropsychidae	
Ceratopsyche	Total Rhyacophilidae	
Hydropsyche	Total Lepidostomatidae larvae	
LEPIDOSTOMATIDAE	Total Uenoidae	
LEPIDOSTOMATIDAE Pupae	Total Elmidae larvae	
Lepidostoma	Total Elmidae Adults	
Farula	Total Simuliidae larvae	
ELMIDAE	Total Tipulidae	
Cleptemis	Total Ceratopogonidae	
Neoelmis	* Total Ephemeroptera larvae	

Table 9. Mean (1SE) dryweight biomass (gms) of aquatic insect taxa collected upstream and downstream of the site of road runoff influx.

Stream		Baetidae	Heptageniidae	Ephemerellidae	Leptophlebiidae	Ameletidae	Tricorythidae	Capnidae	Pteronarcyidae	Peltoperlidae	Nemouridae	Perlidae	Perlodidae	Chloroperlidae	Philopotamidae	Leptoceridae	Hydropsychidae	Brachycentridae
N. Fork Mad River		0.0041	0.0024	0.0011	0.0002			n.d.		0.0001	0.0000	0.0315		0.0000			0.0011	
(SE)		0.0007	0.0012	0.0008	0.0002						0.0000	0.0259		0.0000			0.0006	
Lt Castle Cr.		0.0033	0.0034	0.0013	0.0003						0.0003	0.0035	0.0003	0.0004			0.0001	
(SE)		0.0005	0.0019	0.0011	0.0002						0.0001	0.0027		0.0004			0.0002	
Root Cr.		0.0034	0.0010	0.0016							0.0001	0.0102	0.0014	n.d.			0.0199	
(SE)	U	0.0001	0.0007	0.0006							0.0000	0.0067	0.0002				0.0080	
Castle Cr.	P	0.0056	0.0011	0.0009	n.d.	0.0001	0.0000	n.d.			n.d.	0.0020	0.0001	0.0002		0.0001	0.0030	0.0001
(SE)	S	0.0039	0.0003	0.0006								0.0013				0.0002	0.0019	
27.14	T	0.0210	0.0042	0.0002		0.0013		0.0000	0.0579	0.0011	0.0025	0.0403		0.0010			0.0046	0.0001
(SE)	R	0.0034	0.0041							0.0007	0.0003	0.0204		0.0012			0.0025	
27.60	E	0.0187	0.0087	0.0014	0.0013	0.0029				0.0000	0.0005	0.0618		0.0046	0.0003	0.0002	n.d.	0.0004
(SE)	A	0.0030	0.0037	0.0011	0.0011	0.0029				0.0000	0.0003	0.0183		0.0007				
Sagehen Cr.	M	0.0005	0.0044	0.0029	n.d.	0.0006					n.d.	n.d.	0.0010	0.0014			0.0004	0.0003
(SE)		0.0003	0.0029	0.0036										0.0001				0.0002
Prosser Cr.		0.0000	0.0042	0.0004							n.d.	n.d.	0.0004	0.0010			0.0062	0.0022
(SE)			0.0002	0.0005										0.0004			0.0047	
Sycamore		0.0007					n.d.											
(SE)		0.0004																
N. Fork Mad River		0.0033	0.0010	0.0003	0.0003						0.0007	0.0051		n.d.		n.d.	n.d.	
(SE)		0.0016	0.0001	0.0002	0.0003						0.0005	0.0028						
Lt Castle Cr.		0.0005	0.0020	0.0010	n.d.	0.0001					n.d.	0.0018	0.0002	n.d.			n.d.	
(SE)	D	0.0003	0.0009	0.0006								0.0015	0.0002					
Root Cr.	O	0.0019	0.0002	0.0001	0.0001						0.0007	0.0036		0.0001			0.0002	
(SE)	W	0.0005	0.0001	0.0001							0.0004	0.0033					0.0002	
Castle Cr.	N	0.0014	0.0007	0.0008	n.d.							0.0012	0.0000	0.0002		0.0013	0.0010	
(SE)	S	0.0009	0.0006	0.0004								0.0006		0.0003				
27.14	T	0.0136	0.0021		0.0001			n.d.	0.0277	0.0001	0.0010	0.0140		n.d.	0.0001		0.0009	
(SE)	R	0.0029	0.0026							0.0001	0.0002	0.0018						
27.60	E	0.0176	0.0021	0.0003	0.0002			n.d.			0.0011	0.0180		0.0017	0.0002	0.0001	n.d.	0.0001
(SE)	A	0.0026	0.0016		0.0002						0.0005	0.0063		0.0009		0.0002		0.0002
Sagehen Cr.	M	0.0013	0.0039	0.0008	n.d.					0.0000		0.0223		0.0010			0.0028	0.0002
(SE)		0.0009	0.0014									0.0119		0.0004			0.0015	0.0002
Prosser Cr.		0.0022	0.0066	0.0242	0.0001						0.0001	0.0001	0.0017	0.0035			0.0270	0.0009
(SE)		0.0012	0.0024	0.0171	0.0001						0.0001		0.0002	0.0011			0.0159	
Sycamore		0.0035									n.d.						n.d.	
(SE)		0.0025																

Table 9. (continued) Mean (1se) dryweight biomass (gms) of aquatic insect taxa collected upstream and downstream of the site of road runoff influx.

Stream		Rhyacophilidae	Glossosomatidae	Lepidostomatidae	Limnephilidae	Seriocostomatida	Uenoidae	Hydroptilida	Polycentropodidae	Megaloptera	Elmidae	Hydrophilidae	Psephenidae	Dytiscidae	Chironomidae	Ceratopogonidae	Tipulidae	Empididae
N. Fork Mad River		0.0006	0.0001	n.d.	0.0135						0.0023				0.0015	0.0000	0.0002	
(SE)		0.0004	0.0001		0.0075						0.0011				0.0006		0.0001	
Lt Castle Cr.		0.0002	0.0014	0.0016	0.0042			0.0004	0.0006	0.0144	0.0029		0.0007		0.0056	0.0004	0.0009	0.0000
(SE)		0.0002	0.0009	0.0009				0.0005		0.0054	0.0018		0.0001		0.0008			0.0000
Root Cr.		0.0011	0.0005	0.0060							0.0017				0.0037	n.d.	n.d.	
(SE)	U	0.0011	0.0003	0.0027							0.0013				0.0012			
Castle Cr.	P	0.0018	0.0020	0.0034				n.d.			0.0009		n.d.		0.0069	n.d.	0.0023	
(SE)	S	0.0019	0.0025	0.0010							0.0007				0.0014		0.0010	
27.14	T	0.0073	0.0000	0.0008			0.0050				0.0007		n.d.		0.0080	0.0002	0.0002	
(SE)	R	0.0032		0.0005			0.0007				0.0002				0.0012	0.0001	0.0001	
27.60	E	0.0024		n.d.	0.0003		0.0027			0.0197	0.0005				0.0134	0.0002	0.0001	0.0008
(SE)	A	0.0013								0.0218	0.0006				0.0019	0.0001		0.0004
Sagehen Cr.	M	0.0014		0.0000	0.0011	0.0007				n.d.	0.0015				0.0007		0.0009	0.0000
(SE)		0.0018		0.0000	0.0013						0.0008				0.0001		0.0004	
Prosser Cr.		n.d.	0.0002		0.0021						n.d.				0.0019	0.0001	0.0011	n.d.
(SE)			0.0002		0.0014										0.0002	0.0001	0.0011	
Sycamore												0.0005		0.0018	0.0034			
(SE)														0.0022	0.0028			
N. Fork Mad River		0.0017	0.0001	0.0004	0.0097						0.0032		0.0015		0.0061	n.d.	n.d.	0.0003
(SE)		0.0012		0.0003	0.0015						0.0019				0.0025			
Lt Castle Cr.		n.d.	0.0018	0.0053				0.0012		0.0045	0.0003		0.0000		0.0022	n.d.	0.0015	
(SE)	D		0.0022	0.0007				0.0009			0.0001		0.0000		0.0006		0.0006	
Root Cr.	O	0.0037	0.0005	0.0014	0.0086						0.0001				0.0017	n.d.	n.d.	
(SE)	W	0.0021		0.0012	0.0077						0.0002				0.0004			
Castle Cr.	N	0.0009	0.0005	0.0030	0.0021			n.d.			0.0004				0.0004	n.d.	0.0001	
(SE)	S	0.0007	0.0007	0.0031							0.0003				0.0005			
27.14	T	0.0001		n.d.			0.0007				0.0003			0.0002	0.0029	0.0001	0.0001	
(SE)	R	0.0001					0.0006				0.0002			0.0001	0.0018	0.0001		
27.60	E	0.0047		0.0001	0.0007					0.0522	0.0003		0.0001		0.0046	0.0002	0.0000	n.d.
(SE)	A	0.0027		0.0001							0.0002				0.0011	0.0002		
Sagehen Cr.	M			n.d.	0.0002						0.0004		0.0021		0.0017	n.d.	0.0021	
(SE)					0.0002						0.0002		0.0013		0.0005		0.0008	
Prosser Cr.		0.0001		0.0399	0.0136						0.0021		n.d.		0.0033	0.0002	0.0015	n.d.
(SE)		0.0001		0.0159	0.0057						0.0008				0.0009	0.0001	0.0018	
Sycamore												0.0004		0.0014	0.0007		0.0006	
(SE)												0.0002			0.0003			

Table 9 continued. Mean (1se) dryweight biomass (gms) of aquatic insect taxa collected upstream and downstream of the site of road runoff influx.

Stream		Simulidae	Pelecorhynchidae	Stratiomyidae	Ephyridae	Psychodidae	Dixidae	Pyralidae	Oligochaetes	Miscellaneous	Total mayflies	Total Plecoptera	Total Trichoptera	Total Coleoptera	Total Diptera	Total insects	Total animals
N. Fork Mad River		0.0006					0.0003		n.d.	0.0010	0.0077	0.0316	0.0153	0.0023	0.0025	0.0595	0.0606
(SE)		0.0005					0.0003			0.0009	0.0022	0.0259	0.0094	0.0011	0.0009	0.0382	0.0391
Lt Castle Cr.		n.d.					n.d.		n.d.	0.0036	0.0082	0.0045	0.0086	0.0036	0.0070	0.0462	0.0499
(SE)										0.0014	0.0007	0.0027	0.0048	0.0019	0.0008	0.0072	0.0058
Root Cr.		0.0002								0.0015	0.0060	0.0117	0.0275	0.0017	0.0038	0.0508	0.0522
(SE)	U	0.0001								0.0001	0.0007	0.0069	0.0067	0.0013	0.0014	0.0158	0.0158
Castle Cr.	P	0.0004							n.d.	0.0032	0.0077	0.0023	0.0104	0.0009	0.0096	0.0309	0.0341
(SE)	S									0.0004	0.0041	0.0015	0.0049	0.0007	0.0007	0.0095	0.0099
27.14	T	0.0023	0.0008				0.0001	0.0080	0.0239	0.0016	0.0267	0.1028	0.0177	0.0007	0.0117	0.1676	0.1932
(SE)	R	0.0014	0.0000						0.0203	0.0005	0.0067	0.0515	0.0010	0.0002	0.0013	0.0441	0.0289
27.60	E	n.d.	0.0002				0.0001		0.0479	0.0112	0.0329	0.0669	0.0064	0.0005	0.0147	0.1412	0.2003
(SE)	A						0.0002		0.0287	0.0092	0.0040	0.0189	0.0044	0.0005	0.0012	0.0330	0.0617
Sagehen Cr.	M	0.0001							n.d.	0.0005	0.0084	0.0025	0.0039	0.0015	0.0018	0.0181	0.0187
(SE)		0.0002								0.0003	0.0067	0.0010	0.0024	0.0008	0.0006	0.0102	0.0104
Prosser Cr.		0.0010				0.0000			0.0002	0.0001	0.0046	0.0014	0.0106		0.0040	0.0206	0.0209
(SE)									0.0002	0.0001	0.0005	0.0007	0.0080		0.0010	0.0088	0.0089
Sycamore		n.d.		0.0005	0.0001				0.0097	0.0007	0.0007				0.0037	0.0045	0.0128
(SE)				0.0006					0.0041	0.0004	0.0001				0.0027	0.0030	0.0083
N. Fork Mad River		n.d.					n.d.		0.0005	0.0024	0.0049	0.0058	0.0119	0.0047	0.0064	0.0337	0.0367
(SE)									0.0001	0.0016	0.0019	0.0036	0.0062	0.0019	0.0028	0.0139	0.0156
Lt Castle Cr.		n.d.							0.0000	0.0017	0.0035	0.0019	0.0083	0.0003	0.0037	0.0223	0.0241
(SE)	D								0.0000	0.0006	0.0008	0.0014	0.0027	0.0001	0.0011	0.0048	0.0042
Root Cr.	O	n.d.							0.0001	0.0001	0.0023	0.0044	0.0144	0.0001	0.0017	0.0229	0.0231
(SE)	W								0.0002	0.0001	0.0007	0.0034	0.0095	0.0001	0.0004	0.0129	0.0129
Castle Cr.	N	0.0003					n.d.			0.0006	0.0028	0.0015	0.0089	0.0004	0.0007	0.0143	0.0150
(SE)	S									0.0003	0.0008	0.0007	0.0029	0.0003	0.0004	0.0034	0.0036
27.14	T	0.0005	0.0001						0.0484	0.0013	0.0157	0.0428	0.0018	0.0005	0.0037	0.0645	0.1142
(SE)	R	0.0004							0.0351	0.0007	0.0014	0.0292	0.0008	0.0001	0.0021	0.0303	0.0396
27.60	E	n.d.					0.0001		0.0044	0.0023	0.0203	0.0209	0.0059	0.0004	0.0050	0.1045	0.1112
(SE)	A								0.0007	0.0004	0.0031	0.0053	0.0022	0.0003	0.0010	0.0439	0.0440
Sagehen Cr.	M	n.d.							0.2887	0.0031	0.0060	0.0233	0.0032	0.0024	0.0038	0.0388	0.3306
(SE)									0.3535	0.0009	0.0023	0.0143	0.0018	0.0012	0.0014	0.0121	0.2885
Prosser Cr.		n.d.							0.0056	0.0024	0.0331	0.0055	0.0815	0.0021	0.0050	0.1272	0.1352
(SE)									0.0016	0.0007	0.0173	0.0011	0.0304	0.0008	0.0022	0.0445	0.0441
Sycamore		0.0000		0.0005					0.0093	0.0014	0.0035			0.0018	0.0019	0.0073	0.0180
(SE)				0.0002					0.0023	0.0008	0.0025			0.0016	0.0011	0.0007	0.0028

Table 10. Mean (1SE) calculated values of biotic assessment indices for aquatic insect taxa collected upstream and downstream of the site of road runoff influx. t= t-statistic, P = significance value. • = Index could not be calculated owing to absence of appropriate taxa.

Stream	ABUNDANCE												BIOMASS					
	Richness		Percent contribution dominant taxa		Ratio EPT/C		Ratio S/FC		Modified Family Biotic Index		EPT Index		Percent contribution dominant taxa		Ratio EPT/C		Ratio S/FC	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
Mad River	27.60	27.40	44.74	40.95	12.15	3.86	0.61	0.72	3.92	4.15	18.80	17.00	45.04	32.61	32.55	3.47	13.54	•
(SE)	(3.49)	(3.17)	(6.71)	(4.12)	(3.10)	(1.36)	(0.17)	(0.16)	(0.06)	(0.20)	(2.56)	(1.41)	(9.24)	(5.71)	(11.19)	(0.67)	(1.79)	•
Little Castle Cr.	29.80	30.00	37.10	33.35	2.84	6.79	0.22	0.20	4.33	3.45	18.40	18.80	33.96	30.77	3.93	7.35	15.90	•
(SE)	(3.94)	(2.07)	(2.77)	(5.91)	(0.97)	(2.88)	(0.08)	(0.06)	(0.27)	(0.41)	(2.73)	(1.32)	(9.86)	(7.37)	(1.22)	(2.73)	(0.94)	•
Root Cr.	30.00	21.80	31.44	41.91	8.31	1.33	0.13	0.32	3.69	4.56	18.40	13.40	43.15	40.60	13.60	11.54	0.47	5.00
(SE)	(2.02)	(1.56)	(4.88)	(6.34)	(2.29)	(0.30)	(0.05)	(0.04)	(0.23)	(0.18)	(0.60)	(0.93)	(5.45)	(4.58)	(2.63)	(5.88)	(0.17)	•
Castle Cr.	29.00	19.00	34.83	45.69	1.34	9.14	0.31	0.15	4.40	2.62	16.60	12.20	25.30	32.70	2.58	8.17	3.62	1.24
(SE)	(2.70)	(1.52)	(1.39)	(6.99)	(0.18)	(1.59)	(0.07)	(0.09)	(0.09)	(0.39)	(1.44)	(1.36)	(2.35)	(2.52)	(0.85)	•	(1.40)	•
pm27.14	34.40	24.40	29.52	35.73	1.82	1.37	0.24	0.27	4.29	4.33	20.40	14.00	52.47	60.97	20.78	16.01	8.03	25.20
(SE)	(3.59)	(3.67)	(2.57)	(3.42)	(0.32)	(0.19)	(0.12)	(0.13)	(0.15)	(0.07)	(2.42)	(2.40)	(8.73)	(7.92)	(8.68)	(1.68)	(5.99)	(17.80)
pm27.60	29.20	32.60	42.15	36.47	1.80	2.01	0.42	0.20	4.21	4.09	20.00	21.40	36.10	49.94	8.92	11.77	29.48	41.13
(SE)	(1.88)	(2.66)	(5.26)	(2.68)	(0.52)	(0.29)	(0.12)	(0.06)	(0.22)	(0.14)	(1.58)	(2.27)	(6.45)	(14.42)	(3.52)	(4.69)	(10.46)	(0.10)
Sagehen Cr.	20.20	23.20	33.78	26.89	1.62	1.47	0.54	0.41	3.92	4.11	12.40	13.80	31.67	65.41	4.28	18.53	10.85	4.82
(SE)	(4.72)	(1.36)	(4.52)	(2.80)	(0.44)	(0.34)	(0.19)	(0.12)	(0.25)	(0.16)	(3.14)	(0.97)	(6.27)	(20.35)	(2.35)	(4.88)	(2.84)	(2.21)
Prosser Cr.	25.40	31.20	55.37	34.84	0.48	1.12	0.49	0.33	5.01	4.24	16.20	21.40	37.51	30.50	2.63	34.89	1.03	2.01
(SE)	(3.97)	(3.81)	(9.51)	(3.38)	(0.25)	(0.17)	(0.26)	(0.08)	(0.28)	(0.08)	(3.56)	(2.80)	(5.43)	(8.30)	(0.71)	(4.45)	(0.53)	(1.03)
Sycamore Cr.	5.80	7.60	81.53	71.89	0.48	2.09	0.00	0.00	5.48	5.20	2.00	2.20	47.56	42.94	0.46	28.43	•	22.00
(SE)	(0.49)	(1.29)	(3.27)	(4.80)	(0.20)	(1.70)	(0.00)	(0.00)	(0.17)	(0.29)	(0.00)	(0.58)	(3.74)	(3.72	(0.40)	(27.29)	•	•
t=	0.77		0.74		0.11		0.85		1.1		0.304		0.8		0.92		1.2	
P=	0.46		0.44		0.91		0.42		0.31		0.77		0.45		0.38		0.28	

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Disclaimer Statement

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Introduction

The objective of this research was to determine relationships between road runoff from asphaltic concrete surfaces and (1) the concentrations of PAHs and selected metals in water and animal tissue, and (2) the species composition of aquatic communities, at selected stream sites in California.

Polycyclic aromatic hydrocarbons (PAHs) are common pollutants released into the environment as a result of incomplete combustion. They are also released directly from fossil fuels such as petroleum and coal, and from petroleum-based products, such as asphalt (Neff 1983). Road runoff has been identified as a major diffuse source of PAH input into stream systems (Evans et al. 1990). Although PAHs form a large class of petrochemical compounds which are known to adversely affect aquatic organisms, the effect of runoff from road asphalt on the species densities and composition of stream communities has not been specifically addressed.

Vehicular emissions of metals are also recognized pollutants of roadside environments. Dust and soils associated with roadways show enriched levels of metals such as lead, cadmium, copper, and zinc (Harrison and Johnston 1985, Evans et al. 1990, Münch 1992). Metals and other toxicants are flushed from road surfaces during storm runoff (Spångberg and Niemczynowiczc 1992). Metal levels in road drainage water can exceed amounts deposited on the roadside (Harrison et al. 1985). Roadways are the source of elevated metal concentrations responsible for metal poisoning in some aquatic systems (Rolfe and Jennett 1979, Van Hassel et al. 1979, 1980, Ney and Van Hassel 1983).

Despite evidence of potential toxic effects of road runoff on freshwater systems, the relationships between the concentrations of toxicants in asphalt concrete pavement runoff and their effects on aquatic community structure are not well understood. Similarly, the accumulation of PAHs and metals in invertebrate and fish tissues in streams have been rarely measured.

Background

Petroleum products and heavy metals can enter the aquatic environment by atmospheric deposition, accidental spills, chronic additions from industrial waste water, and surface runoff from paved roadways. Approximately 6.1 million metric tons per year or as much as 0.25 percent of annual crude oil production has been estimated to enter the aquatic environment from natural and anthropogenic sources (National Academy of Sciences 1975, Neff 1979).

Road runoff has been identified as a major diffuse source of toxicant input into stream systems (Evans et al. 1990). Asphalt may be as much as 75% polycyclic aromatic hydrocarbon (PAH) by weight (Neff 1979). PAH and metal concentrations adjacent to and on road surfaces may be an order of magnitude greater than background levels owing to vehicular traffic (Münch 1985). Toxicant inputs from roads into streams varies with distance to urban centers and vehicular traffic (Harrison and Johnston 1985, McElroy et al. 1989). Input pathways include atmospheric deposition from vehicular traffic emissions (Harrison and Johnston 1985) and rain derived asphaltic runoff (Spångberg and Niemczynowicz 1992).

The deleterious effects of oil on animals are caused by chemical toxicity, due mainly to the lighter fractions of the oil, by mechanical clogging of body surfaces, and by covering bottom substrates (Weiderholm 1984). The consequences of oil pollution have been less studied in freshwater than marine environments, and little is known about its effects on freshwater organisms (Parker et al. 1976, Rosenberg and Wiens 1976). Much of the research on freshwater systems has been restricted to the effects of crude oil or mixtures of oil (McCauley 1966, Bugbee and Walter 1973, Meynell 1973) and less is know about the effects of PAHs. Reports of PAH toxicity to freshwater organisms have been derived primarily from laboratory experiments (e.g. Stehly et al. 1990, Erben and Pisl 1993). Field studies assessing PAH concentrations in freshwater systems have largely investigated concentrations in

sediment and animal tissues relative to a point source and have not investigated potential changes in community structure (McElroy et al. 1989).

Sediments appear to be the major source of PAH and other hydrophobic pollutant compounds for aquatic systems. Positive relationships have been observed between PAH concentrations in tissues of organisms and concentrations in sediments (Eadie et al. 1982, Maltby et al. 1995a). Biomagnification (trophic transfer) of PAHs have not been observed in aquatic systems (McElroy 1989).

Reported values of PAH concentrations in the tissues of aquatic organisms range from undetectable quantities to values in excess of 5000μg/kg dry weight. In general, elevated concentrations of PAHs can be correlated with the proximity of organisms to areas receiving chronic hydrocarbon inputs (McElroy et al. 1989). The majority of PAH measurements have been made on the tissues of bivalve molluscs. Bivalves have the advantage of being sessile and attached, can rapidly accumulate PAHs, and have little capacity for PAH metabolism (Black et al. 1980). PAH concentrations in fish have been less well studied, but are usually low relative to bivalves inhabiting the same environment. This may be the result of their ability to rapidly metabolize PAHs (Neff 1979).

Chronic exposure to petroleum hydrocarbons can reduce both the diversity and abundance of aquatic organisms (Barton and Wallace 1979), and can impair the physiological functions of those that exist under polluted conditions (Simpson 1980). Elevated concentrations of PAHs have been associated with changes in physiology, abnormal fin development, the occurrence of hepatic lesions and tumors, cataracts, reduced reproductive output, and decreased juvenile survival in fish (Fogels and Sprague 1977, Bender, et al. 1988, Tilghman-Hall and Oris 1991, Baumann et al. 1991, Van-Veld et al. 1992, Hontela et al. 1992). Increased concentrations of PAHs have also been shown to induce high mortality rates in

insects, snails and crustaceans (Stehly et al. 1990, Erben and Pisl 1993, Maltby et al. 1995b).

The major source of metals assimilated by aquatic organisms is through sediment consumed as food (Hare et al. 1991) and/or in the water (Geisey et al. 1980, Hare 1992). When quantities of metals entering aquatic organisms exceed the processing capacity of their biochemical flushing mechanisms, toxic effects arise. To date, much of the research on toxic effects on freshwater invertebrates has been devoted to laboratory studies below the community level (Kimball and Levin 1985). These studies usually addressed the effects of short-term exposures of aquatic animals to extremely high metal concentrations in the laboratory. Elevated metal concentrations decrease egg hatching in insects and fish, as well as decrease mobility, reduce growth, delay emergence, and decrease oviposition in insects (Hare 1992, Sorensen 1991).

Field studies indicate that benthic communities affected by high metal concentrations are generally characterized by reduced invertebrate abundance, low species diversity, and shifts in the community composition from sensitive to tolerant species (Winner et al. 1980, La Point et al. 1984, Waterhouse and Farrell 1985, Wiederholm 1984, Chadwick et al. 1986, Clements 1991).

This research is a first attempt to extend research on asphalt concrete pavement runoff chemistry and the effects of PAHs and metals on aquatic organisms. This research builds on information of the effects of toxicants on individual species in the laboratory and field correlations between toxicant concentrations and community composition. Its goal is to specifically assess the impacts of runoff from asphalt concrete pavement on adjacent aquatic communities.

Here we report the results of a study investigating the effects of individual pulses of asphalt concrete pavement runoff on streams within the state of

California. The study was originally designed by the California Department of Transportation, but was modified owing to a lack of suitable sites and environmental constraints. The study consisted of a synoptic survey of the water chemistry of stream sites receiving runoff from asphalt concrete pavements during rain events followed, at a single later date, by collections of invertebrate and fish populations. The study concentrated on point sources and was designed to examine "worst case" scenarios. As a consequence, sampling stations were immediately above and below points of the road surface discharge into each stream, and we attempted to sample during the initial rains of the season or immediately following completion of road surfacing. The specific objectives of the study were to investigate the relationships between asphaltic runoff on a) stream water quality, particularly heavy metal and polycyclic aromatic hydrocarbon (PAH) concentrations; b) the bioaccumulation of PAHs and heavy metals in fish and invertebrate tissues; and c) fish and invertebrate community structure.

Materials and Methods

Sampling sites

Eleven streams adjacent to new or rehabilitated asphalt concrete pavement road surfaces were sampled as part of a pilot study examining the effects of asphaltic runoff on stream communities in California (Table 1). Asphalt concrete pavement surfaces were all within 100 feet of flowing water and were selected from a list of stream sites provided by district officials of the California Department of Transportation. Potential sites were assessed visually for suitability prior to inclusion in the study. Selected stream sites were distributed in four CALTRANS districts, including District 1: one stream; District 2: three streams; District 3: four streams; and District 10: three streams.

Sample collection

Samples were collected from two areas per site that were similar in physical characteristics. One area was located less than 100 meters upstream from the point where asphaltic runoff entered the stream whereas the other site was located less than 100 meters downstream from that point. Thus, at each stream, the upstream area served as a reference or "control" for the downstream "manipulated" area. We attempted to choose sampling locations above and below the point of influx of road runoff to minimize physical differences between paired locations, thus reducing variation in biotic attributes of these areas owing to differences in physical conditions. At the upstream and downstream sampling locations at each stream site, stream width and depth were recorded. Current velocity was determined using a Marsh-McBirney electronic current meter (Model 201D). Stream discharge was determined from depth and current velocity measurements made along cross-stream transects at both upstream and downstream sites. Water pH was determined in the field using a pHTESTER2 field pH meter. Water temperatures were also recorded. The estimated precipitation of storm events when sampling occurred were determined from the U.S. National Weather Service.

Water samples were collected from seven of the eleven sampled streams during single rain events over the period 18 March, 1995, to 22 May, 1996. The three streams in District 10 were sampled additionally during a second consecutive rain event to determine if detectable PAH signals decayed over time, and road runoff during a third consecutive rain event was collected from one of these streams. During each sampling event, three water samples were collected from each of the upstream and downstream areas and one sample was collected from the road runoff for PAH and heavy metal analyses. PAH samples were collected as whole water grab samples from the stream and road discharge in sterile 1-L glass containers and stored in coolers until they could be returned to the laboratory and refrigerated. All PAH

samples were analyzed within one week of collection. Filtered samples for trace metal analysis were obtained by passing unfiltered aliquots through Nuclepore 0.1 μM polycarbonate filters into 30 mL sample bottles. In addition, unfiltered field blanks were collected. All 30 mL Nalgene high density polyethylene sample bottles were new and had been prepared for use by leaching with 10% HCl. After a period of at least 24 hours, bottles were rinsed three times with deionized water. All bottles were rinsed with sample water prior to collection. Filtered and unfiltered samples were inoculated with 200 μL of Ultrex HNO_3 and kept in the dark until analysis.

We assessed the potential accumulation of PAHs and heavy metals in fish by collecting tissue samples at each site where fish were present (seven streams). Representative samples of fish species from upstream and downstream areas were collected and refrigerated or frozen in coolers until they could be returned to the laboratory and stored in freezers at 4.0°C. Not all individual fish collected were sufficiently large for analysis; therefore, groups of fish collected on each side of the point where road runoff entered the stream were amalgamated into three separate replicate samples. Four fish species were collected during this survey, rainbow trout (*Oncoryhnchus mykiss* Richardson), brown trout (*Salmo trutta* Linnaeus), Piute sculpin (*Cottus beldingi* Eigenmann and Eigenmann), and speckled dace (*Rhinichthys osculus* Girard). Because no fish species was present in all streams, PAH and metal concentrations in fish across all streams were determined from tissues of the three common fish species collected (rainbow trout, brown trout, and Piute sculpin).

Similarly, stream invertebrate tissues were assayed for PAHs and heavy metals at sites where the collected biomass of a single large predatory invertebrate taxon was adequate for analyses. These large predators should bioaccumulate toxins as they are long-lived and relatively sessile, and so could reflect local chemical conditions. Only Prosser Creek had an invertebrate taxon with sufficient biomass

(Corydalidae) to permit PAH analysis (12 gms). Because heavy metal analyses required less invertebrate biomass (2.0 gms), heavy metal concentrations in invertebrate tissues were assessed in Prosser Creek (Corydalidae) and in six additional streams with abundant populations of stonefly nymphs (Perlidae). Owing to the amount of tissue required for analyses and the small size of invertebrates, time constraints did not permit the collection of replicate samples. Representative individuals from above and below the site of road runoff influx were collected, composited into two samples per site (one above and one below) and refrigerated or frozen in coolers until they could be returned to the laboratory and stored in freezers at 4.0°C.

Analytical procedures

Water and tissue samples were analyzed for 17 polycyclic aromatic hydrocarbons and three heavy metal species (Table 2). PAH concentrations in water were determined using Gas Chromatography/Mass Spectrometry- Selected Ion Monitoring analysis following USEPA protocols (EPA Methods 3510/8270)(USEPA 1986). PAH concentrations in tissues were determined using the same method following a gel permeation clean-up technique for removing fatty acid matrix interferences (EPA Methods 3550/3640)(USEPA 1986). Concentrations of Pb, Zn, and Cd in water samples were analyzed using a Varian SpectrAA 400 Zeeman graphite furnace spectrophotometer. A NBS standard reference solution for trace metals was used for calibration, and all elements were consistently within 100% ± 5% of expected concentrations. Field and laboratory blanks were not subtracted from field values because trace metal concentrations in lab and field blanks were consistently below detection limits (Williams et al. 1996). Heavy metal concentrations in fish and invertebrate tissues were analyzed using EPA Methods 7131, 7421 and 6010 for Cadmium, Lead, and Zinc, respectively. Chemical analyses of PAHs (water and

tissue) and metals (tissue) were performed by Pace Environmental Laboratory (Camarillo, Ca.), and Columbia Analytical Services (Canoga Park, Ca.), both certified hazardous waste, chemical, bacteriological and bioassay laboratories with offices throughout the continental United States.

Biotic communities

At each site where fish were present, population abundance was determined and measurements of individual fish made. Although the area of stream surveyed varied across streams (25-100 m), within each stream approximately equal areas of stream were assessed upstream and downstream of the runoff source using a backpack electrofisher (Model 11-A, Smith-Root, Inc). Multiple passes of each surveyed area were performed until three passes had been made or no further fish were captured. Fish were identified to species, measured (standard length) and weighed with an Ohaus portable balance (Model 11). An index of fish "condition" was calculated for all collected individuals. Fish condition factor was calculated as $C= W/L^3$, where W is the weight of the fish in grams and L is the length of the fish in centimeters (Lagler 1975).

Invertebrate community assemblages were characterized upstream and downstream of the point where road runoff entered the stream Two streams in District 10 (San Jose and Marie Ygnacio) were temporary streams and were not sampled for invertebrates owing to a depauperate fauna. Five invertebrate samples were collected at the upstream and downstream locations using Surber samplers fitted with 250µm mesh. Substrates within the Surber sampler were disturbed to a depth of 7 cm or until sand or bedrock was reached. Collected organisms were preserved in 70% ethanol and returned to the laboratory where invertebrates in samples were identified with dissecting microscopes using standard keys (Stewart and Stark 1988, Thorp and Covich 1991, Wiggins 1996, Merrit and Cummins 1996).

Insect taxa were identified to at least genus except for chironomids which were identified to family. Individuals that were too small to be reliably identified to genus were identified to the family level. The abundance of each taxon was recorded, and the data were used to calculate species richness and biotic indices. Macroinvertebrates were assigned to functional feeding groups (FFG) using Merrit and Cummins (1996) and the relative percent abundance of relevant FFG at each sampling site was determined. Following identification, invertebrate dry mass values were obtained by separating samples into families and drying them for 24 hours at 40°C before weighing. Invertebrate dry mass was determined for six samples from each stream (three upstream and three downstream).

Indices

In order to assess the effect of runoff from asphalt concrete pavement on invertebrate stream assemblages the invertebrate data were used to calculate seven metrics per site: 1) taxon richness which is the total number of distinct taxa in the sample; 2) the Modified Family Biotic Index (FBI) (Hilsenhoff 1988) - $FBI = \sum(x_i t_i / n)$, where x_i is the number of individuals within a taxon, t_i is the tolerance value of a taxon, and n is the number of organisms in the sample. This metric was used rather than the Modified Hilsenhoff Biotic Index (HBI) because the HBI has not been adequately developed for the invertebrate genera of the western United States; 3) the ratio of scraper to filtering collector functional feeding groups (S/FC); 4) the ratio of Ephemeroptera, Plecoptera, and Trichoptera to Chironomidae abundances (EPT/C); 5) the percent contribution of the dominant taxon to total invertebrates at each site; 6) the sum of the number of discrete taxa within the Ephemeroptera, Plecoptera, and Trichoptera (EPT index); and 7) the Community Loss index which measures the loss of benthic species between paired sites- Community Loss = $(a - c)/b$, where a is the total number of taxa present in Sample

A, b is the total number of taxa present in sample B, and c is the number of taxa common to both samples. More detailed treatment of these metrics can be found in Plafkin et al. (1989) and Hannaford and Resh (1995). These metrics were used because they represent the least redundant subset of the total available metrics and are recommended in the bioassessment procedures of the U.S. Environmental Protection Agency and the California Department of Fish and Game (Plafkin et al. 1989, CDFG 1996). For each stream, the first six metrics were calculated using the mean abundances of individual invertebrate taxa from each Surber sample collected upstream and downstream of the site where road runoff entered the stream. The final metric, the Community Loss Index was determined by comparing the composited from the five Surbers collected upstream and downstream of the point where road runoff entered the stream. Additionally, the percent contribution of the dominant taxa and the EPT/C ratio were also calculated from dry mass values obtained for those groups.

Data analysis

Descriptive statistics for all taxa found at all stream sites were inspected visually. Owing to difficulties associated with performing statistical analyses on rare taxa, only taxa with abundances greater than eight individuals in at least one Surber sample were included in further analyses (Cooper and Barmuta 1993). Comparisons of most upstream and downstream chemical, biotic, and community parameters (except the community loss index) were conducted using paired t-tests treating mean upstream and downstream values from all streams as replicate values. Comparisons of metal concentrations in upstream and runoff water, and metal concentrations in fish and invertebrate tissues collected from upstream and downstream sites were performed using sign tests treating mean upstream and downstream values (or values from single runoff samples) from all streams as

replicate values. Analysis of the community loss index across all streams used the values obtained from the summed abundances of all taxa from each set of five upstream and five downstream Surber samples. Statistical significance levels were $P \leq 0.05$. Statistical analyses were performed on appropriately transformed data (log or arcsin square root) using the statistical software package, SYSTAT v 5.2 (SYSTAT 1992).

Results

Although physical characteristics differed across streams, no significant differences were evident in the physical characteristics of the upstream relative to downstream sampling areas across all streams (Table 3).

Concentrations of all PAH analytes in all stream and road runoff samples were below the detection limit of 0.5 μg/L (ppb) (Appendix A). Although detectable levels of heavy metals were present in stream and runoff waters (Appendix B) there were no significant upstream vs. downstream differences in the concentrations of any heavy metal across all streams (Pb- $t=1.4$ $P=0.2$, Cd- $t=1.5$ $P=0.2$, Zn- $t=1.1$ $P=0.5$; Table 4). Concentrations of zinc were elevated in runoff from the road surfaces relative to upstream water (sign test: $n=11$, $P=0.03$). Runoff concentrations of lead were marginally greater than upstream waters (sign test: $n=8$, $P=0.10$). The concentrations of cadmium in runoff waters were not significantly different than upstream waters (sign test: $n=11$, $P=0.22$). Separate analysis of the District 10 streams on the second sampling date (1 February 1996) indicated no significant differences in the upstream water concentrations of heavy metals relative to waters downstream of the point where road runoff entered the stream (all $ts < 2.1$, $Ps > 0.2$ $df=2$). Concentrations of all three heavy metals in road runoff on this sample date were greater than metal concentrations in upstream waters in each stream (Table 4),

however these differences were not statistically significant (sign test: all ns= 3, all Ps= 0.12) owing to the low number of stream replicates and the low power of the test.

Concentrations of all PAH analytes in fish tissues and invertebrate tissues were below the detection limit of 0.2 mg/kg (ppm) (Appendix C). Concentrations of Pb and Cd in fish tissues were below detection limits (0.5 and 0.05 mg/kg, respectively). Concentrations of Zn in fish tissue were significantly elevated at downstream relative to upstream sites (sign test: n=7, P=0.05) and ranged from 16.3 to 38 mg/kg (Table 5). Concentrations of Zn in invertebrate tissues were higher than in fish tissues, and were also significantly elevated at downstream relative to upstream sites (sign test: n=7, P=0.05), ranging from 26 to 98 mg/kg. Invertebrate tissue concentrations of Cd were independent of collection sites within streams (sign test: n=7, P=0.31) and ranged from below detectable limits to 0.28 mg/kg (Table 5).

Seven of the 11 streams contained fish although no fish taxon was collected in all seven of these streams (Table 6). Analysis of individual species indicated that there were no significant differences in the abundances, standard lengths, weights, or condition factors of fish in upstream vs. downstream areas across streams (all ts<1.9, all Ps>0.11). Across all streams there were no differences in the total numbers or mean biomass of fish collected upstream vs. downstream from the point that road runoff entered the stream (t_6=0.28, P=0.8, and t_6=1.0, P=0.4, respectively)(Table 7).

The collected invertebrates were separated into 205 taxonomic categories (Appendix D). Aquatic insects were represented by six orders, 53 families, and 153 identified genera. Of these, 14 families and 25 genera were found whose mean abundances exceeded eight individuals in at least one stream; however only the mayfly *Baetis*, the dipteran family Chironomidae, and the Order Ephemeroptera were present in mean abundances greater than eight per Surber sample in all nine sampled streams (Table 8). Across streams, the abundances of three invertebrate

taxa (*Prosimulium* sp., mites, and Chloroperlidae) were significantly lower at downstream than at upstream locations, and an additional taxon, the stonefly *Hesperoperla* sp. was marginally lower (t_8=2.2, P=0.06) at downstream vs. upstream locations.

Dry mass values were recorded for 41 insect families (Appendix E). The dry mass for individual taxa did not differ between upstream and downstream areas across streams (Table 9). Simuliidae biomass was marginally higher at sites upstream relative to downstream of where road runoff entered streams ($\bar{x}$±1SE= 0.0005 gms ± 0.0003 vs. 0.00009 gms ± 0.00006, respectively, t_8=2.1, P=0.07). The mean dry mass of total invertebrates collected upstream and downstream of the point where road runoff entered the stream was not significantly different across streams (t_8=0.44, P=0.7).

Invertebrate species richness ranged from 5.8 in Sycamore Creek to 34.4 in the creek at pm 27.14, Highway 49, but richness was not different between upstream and downstream areas across streams (Table 10). Similarly, invertebrate communities upstream and downstream of the point where road runoff entered the streams were not significantly different based on the remaining calculated indices (% contribution of the dominant taxa, EPT index, ratio of EPT/C, ratio of S/FC functional groups, and the Modified Hilsenhoff Family Biotic Index) (Table 10). Although the mean calculated Community Loss Index across all streams ($\bar{x}$±SE= 0.33 + 0.08) was significantly different from 0 (t_8=4.33, P=0.005), index values of this magnitude are not generally considered indicative of a response to perturbation (Courtemanch and Davies 1987). None of the three community indices calculated using invertebrate dry mass differed significantly between upstream and downstream locations (Table 10).

Discussion

Road runoff is an important source of potential toxins contaminants in freshwater systems (Hoffman and Quinn 1987). The most commonly detected contaminants in urban runoff in the United States and Britain include the metals copper, lead, zinc, chromium, cadmium, and nickel, and the PAHs phenanthrene, napthalene, pyrene, chrysene, and fluoranthene (Cole et al. 1984, Maltby et al. 1995a). The concentrations of PAHs in runoff waters sampled in this study were undetectable (<0.5 μg/L) even at urban stream sites within the City of Santa Barbara. Detectable concentrations of PAHs in road runoff have typically ranged from 1 to 70 μg/L depending on highway use and drainage area (MacKenzie and Hunter 1979, Stenstrom et al. 1984, McElroy et al. 1989, Maltby et al. 1995a). Recorded concentrations of heavy metals (Pb, Cd, Zn) in road runoff flowing into streams have ranged from near or below detection levels for lead and cadmium to a high of 490 μg/L for zinc (Maltby et al. 1995a). Concentrations of Pb, Cd, and Zn in road runoff in this study were within this range.

The absence of detectable levels of hydrocarbons across all stream sites is surprising. The loading of potential toxicants into aquatic systems is influenced both by proximity to urban areas and traffic patterns. Concentrations of PAHs and heavy metals in aquatic systems have generally been observed to decline as distance from urban areas increases (McElroy et al. 1989). Deposition of toxicants onto and near road surfaces has been positively associated with increased traffic densities on roadways (Harrison and Johnston 1985). Thus, roads in rural areas exposed to low traffic densities may have lower rates of toxicant deposition and discharge into streams via runoff from road surfaces relative to urban areas.

Concentrations of toxicants in road runoff and stream waters are influenced by the size of the stream and the length of the road surface drained. As the ratio of stream size to drainage input increases, dilution of toxicant concentrations in road

runoff by receiving stream waters may obscure the detection of toxicants in downstream samples. For example, Maltby et al. (1995a) reported that, despite detectable levels of aromatic hydrocarbons in waters discharging from road surfaces at three study sites, dilution by receiving waters was adequate to maintain PAH concentrations in stream water below detection limits.

A significant portion of the available toxicants on road surfaces may be flushed from the road during initial runoff events. Similar patterns in the timing and magnitude of toxicant concentrations in discharge waters are observed in other systems, e.g., snowmelt (Williams and Melack 1991). Washing toxicants from road surfaces is strongly correlated with rainfall intensity. As a general rule the concentration of toxicants in road runoff declines over successive rain events (Spångberg and Niemczynowicz 1992). We attempted to collect samples from the first precipitation events of the rainy season, or the first precipitation events following completion of repaving. Owing to distances between sites it was not always possible to sample sites during the same precipitation event. Thus, undetectable concentrations of PAHs in road runoff samples collected after the first storm-related discharge of the season, or during subsequent storms, may not accurately reflect toxicant loads in receiving streams.

Low molecular weight PAHs may be rapidly lost through volatilization and photo-oxidation processes (Landrum et al. 1984, McElroy et al. 1989) thereby reducing hydrocarbons on road surfaces available for flushing into adjacent streams. These processes may explain why PAH concentrations were below detectable limits in road runoff waters collected during the first storm following the repaving of portions of Highway 101 which discharge into Marie Ygnacio and San Jose Creeks.

Elevated concentrations of trace metals adversely affect the composition and structure of aquatic insect communities (Chadwick et al. 1986, Davis and George, 1987, Roline 1988, Leland et al. 1989, Clements 1994, Maltby et al. 1995a). For

example, elevated concentrations of Zn (≥104μg/L) altered the total densities and diversity of stream insect assemblages (Kiffney and Clements 1994). These studies have documented taxon-specific sensitivities to elevated metal concentrations in streams. In general, mayflies and stoneflies are sensitive to metal exposure, experiencing declines in density, whereas caddisflies and chironomids are relatively tolerant of exposure to metals. Although elevated concentrations of heavy metals were detected in road runoff entering streams in this study, the concentrations in downstream waters were not significantly different than concentrations in stream waters upstream of runoff sites. Thus although road runoff contributed to the toxicant load of the streams, dilution by receiving waters was sufficient to maintain metal concentrations in downstream waters below detection limits. Elevated concentrations of Zn in fish and invertebrate tissues collected below road runoff sites suggest that this metal is accumulating in these organisms. Many of the pollutants in road runoff are associated with particulate material and thus accumulate in the sediments of receiving streams (Maltby et al. 1995a). Concentrations of contaminants in sediments may reflect the loading of pollutants in to streams better than concentrations in the overlying water.

Changes in community structure in response to toxicants are often reflected in reductions in the calculated values of biotic indices, indicating a loss of pollution-sensitive species from impacted sites (Plafkin et al. 1989, Rosenberg and Resh 1993). None of the seven community metrics calculated in this study indicated a significant impact associated with road runoff. This is not surprising given the lack of detectable PAH concentrations and the absence of high heavy metal concentrations in downstream waters. There was no evidence that the discharge of road runoff into streams effected the size or condition of fish or invertebrates in this study, or that runoff altered fish or invertebrate community structure.

Despite the lack of elevated PAHs or metals in waters below vs. above road runoff sites in this study, the abundances of four taxa were reduced at locations below points where road runoff entered streams. Two of these taxa, the stonefly family Chloroperlidae, and the stonefly genus *Hesperoperla*, are known to be sensitive to elevated levels of toxicants (Leland et al. 1989). Many factors, both biotic and abiotic influence the distribution of macroinvertebrates in streams (Allan 1995); consequently differences in the abundances of these taxa may not be related to road-related toxins. Also, the use of upstream/downstream comparisons in this study means that environmental differences between sites unrelated to road runoff may produce the observed results. This is unlikely, however, since such differences would have to be consistent across streams. Previous studies have demonstrated that particulate material from roads alters substrate characteristics affecting the distribution of burrowing animals, such as chironomid larvae and tubificid worms (Extence 1978). Similarly, road structures may alter stream flows. Given the range of sizes of the streams sampled and the different structures associated with roads near or crossing these streams, it is doubtful that downstream current was altered in a consistent manner across all streams. Thus, obvious differences in substrate composition or current velocities, or other measured parameters, were not responsible for the changes in abundances of these four taxa.

Conclusions

In summary, the results of this study indicated that the quality of stream waters was not affected by runoff from repaved asphalt concrete pavement surfaces following single precipitation events. Concentrations of PAHs were below detection limits in all waters. Although concentrations of Zn were significantly higher in runoff waters, and concentrations of Pb marginally higher, relative to upstream waters, concentrations of heavy metals in downstream waters were either below

detection limits or not significantly different from concentrations upstream from the road surface. Higher concentrations of Zn in the tissues of fish and invertebrates collected below road runoff sites relative to concentrations in tissue of organisms collected from upstream sites indicate that stream organisms may accumulate toxins despite dilution by receiving waters. There was no evidence that inputs from road surfaces affected fish or invertebrate communities as measured by common bioassessment indices. There were, however, consistent reductions in the abundances of two stonefly taxa which are known to be sensitive to toxicants. The reduced abundances of these species cannot be explained by upstream/downstream differences in physical parameters measured in this study.

Implementation

Despite the accumulation of some toxins in animal tissues, the lack of evidence of community degradation as a result of runoff from asphalt concrete pavement surfaces observed here suggests that PAHs may not have significant effects on some California stream communities. However, in the absence of catastrophic inputs of pollutants, synoptic survey approaches, like the approach used in this project, may not provide the ecological resolution needed to adequately access community health. Consistent periodic sampling of runoff, receiving waters and sediment, and the associated biotic community, may provide a better indication of the magnitude and extent of toxicant loading in streams, and thus, the risk that road related toxicants present to aquatic community health.

APPENDIX A. Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
North Fork Mad Rv	18-Mar-95	1	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
North Fork Mad Rv	18-Mar-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
North Fork Mad Rv	18-Mar-95	1	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
North Fork Mad Rv	18-Mar-95	1	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
North Fork Mad Rv	18-Mar-95	1	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
North Fork Mad Rv	18-Mar-95	1	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	61.8	100	66.6	100	63.8
North Fork Mad Rv	18-Mar-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		62		67		64
North Fork Mad Rv	18-Mar-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	62.8	100	65.2	100	66.9
North Fork Mad Rv	18-Mar-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		63		65		67
North Fork Mad Rv	18-Mar-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	28.4	100	17.8	100	41.1
North Fork Mad Rv	18-Mar-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		28		18		41
North Fork Mad Rv	18-Mar-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND	10	ND	10	ND
North Fork Mad Rv	18-Mar-95	2	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Anthracene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	2	Chrysene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	2	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Fluorene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	2	Naphthalene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Pyrene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	70.8			100	67.1
North Fork Mad Rv	18-Mar-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		71				67

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
North Fork Mad Rv	18-Mar-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	78.5			100	76.9
North Fork Mad Rv	18-Mar-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		78				77
North Fork Mad Rv	18-Mar-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	65.6			100	75
North Fork Mad Rv	18-Mar-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		66				75
North Fork Mad Rv	18-Mar-95	2	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
North Fork Mad Rv	18-Mar-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND
North Fork Mad Rv	18-Mar-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	77.4			100	80.9
North Fork Mad Rv	18-Mar-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		77				81
North Fork Mad Rv	18-Mar-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	76.6			100	81.8
North Fork Mad Rv	18-Mar-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		77				82
North Fork Mad Rv	18-Mar-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	59.6			100	50.7
North Fork Mad Rv	18-Mar-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		60				51
North Fork Mad Rv	18-Mar-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	1	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Little Castle Creek	18-Mar-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
Little Castle Creek	18-Mar-95	1	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
Little Castle Creek	18-Mar-95	1	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Little Castle Creek	18-Mar-95	1	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Little Castle Creek	18-Mar-95	1	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	70	100	66.9	100	71.9
Little Castle Creek	18-Mar-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		70		67		72
Little Castle Creek	18-Mar-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	68.8	100	65.7	100	70.2
Little Castle Creek	18-Mar-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		69		66		70
Little Castle Creek	18-Mar-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	32.2	100	17.8	100	38.3
Little Castle Creek	18-Mar-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		32		18		38
Little Castle Creek	18-Mar-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND	10	ND	10	ND
Little Castle Creek	18-Mar-95	2	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Anthracene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	2	Chrysene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	2	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Fluorene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	2	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Pyrene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	73.9			100	68.4
Little Castle Creek	18-Mar-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		74				68
Little Castle Creek	18-Mar-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	79.7			100	74.6
Little Castle Creek	18-Mar-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		80				75
Little Castle Creek	18-Mar-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	50.6			100	59.8
Little Castle Creek	18-Mar-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		51				60
Little Castle Creek	18-Mar-95	2	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Little Castle Creek	18-Mar-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Little Castle Creek	18-Mar-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND
Little Castle Creek	18-Mar-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	75.4			100	69.5
Little Castle Creek	18-Mar-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		75				69
Little Castle Creek	18-Mar-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	81.6			100	70.3
Little Castle Creek	18-Mar-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		82				70
Little Castle Creek	18-Mar-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	55.8			100	40.9
Little Castle Creek	18-Mar-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		56				41
Little Castle Creek	18-Mar-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	1	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Root Creek	18-Mar-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
Root Creek	18-Mar-95	1	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
Root Creek	18-Mar-95	1	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Root Creek	18-Mar-95	1	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	1	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Root Creek	18-Mar-95	I	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	73.4	100	65.9	100	66.1
Root Creek	18-Mar-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		73		66		66
Root Creek	18-Mar-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	72.2	100	68.4	100	69.6
Root Creek	18-Mar-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		72		68		70
Root Creek	18-Mar-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	25.5	100	58.2	100	23.6
Root Creek	18-Mar-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		26		58		24
Root Creek	18-Mar-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND	10	ND	10	ND
Root Creek	18-Mar-95	2	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Anthracene	ug/L	EPA 625	5	ND			5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Root Creek	18-Mar-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	2	Chrysene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	2	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Fluorene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	2	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Pyrene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	77.4			100	72.6
Root Creek	18-Mar-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		77				73
Root Creek	18-Mar-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	78.1			100	77.6
Root Creek	18-Mar-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		78				78
Root Creek	18-Mar-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	47			100	45.1
Root Creek	18-Mar-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		47				45
Root Creek	18-Mar-95	2	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Root Creek	18-Mar-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND
Root Creek	18-Mar-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	78.1			100	77
Root Creek	18-Mar-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		78				77
Root Creek	18-Mar-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	82.9			100	77.3
Root Creek	18-Mar-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		83				77

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Root Creek	18-Mar-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	47.5			100	46.2
Root Creek	18-Mar-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		47				46
Root Creek	18-Mar-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	1	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Castle Creek	18-Mar-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
Castle Creek	18-Mar-95	1	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
Castle Creek	18-Mar-95	1	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Castle Creek	18-Mar-95	1	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Castle Creek	18-Mar-95	1	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	69.8	100	69.9	100	66.1
Castle Creek	18-Mar-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		70		70		66
Castle Creek	18-Mar-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	70.9	100	73.8	100	69.3
Castle Creek	18-Mar-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		71		74		69
Castle Creek	18-Mar-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	37.6	100	67.2	100	54.1
Castle Creek	18-Mar-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		38		67		54
Castle Creek	18-Mar-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND	10	ND	10	ND
Castle Creek	18-Mar-95	2	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Anthracene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	2	Chrysene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	2	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Fluorene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	2	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Phenanthrene	ug/L	EPA 625	5	ND			5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Castle Creek	18-Mar-95	2	Pyrene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	71.6			100	80.8
Castle Creek	18-Mar-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		72				81
Castle Creek	18-Mar-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	74.2			100	80.1
Castle Creek	18-Mar-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		74				80
Castle Creek	18-Mar-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	43.5			100	69.9
Castle Creek	18-Mar-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		43				70
Castle Creek	18-Mar-95	2	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	2		ug/L	EPA 625						
Castle Creek	18-Mar-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Castle Creek	18-Mar-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND
Castle Creek	18-Mar-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	75.6			100	75.4
Castle Creek	18-Mar-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		76				75
Castle Creek	18-Mar-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	80.9			100	72.8
Castle Creek	18-Mar-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		81				73
Castle Creek	18-Mar-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	47.4			100	53.3
Castle Creek	18-Mar-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		48				53
Castle Creek	18-Mar-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
PM 27.14	02-Jun-95	1	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	1	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
PM 27.14	02-Jun-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	1	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	1	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	1	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	63.1	100	60.9	100	48.1
PM 27.14	02-Jun-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		63		61		48
PM 27.14	02-Jun-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	68.5	100	70	100	56.1
PM 27.14	02-Jun-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		69		70		56
PM 27.14	02-Jun-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	29.8	100	68.8	100	24
PM 27.14	02-Jun-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		30		69		24
PM 27.14	02-Jun-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
PM 27.14	02-Jun-95	2	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	2	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	2	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
PM 27.14	02-Jun-95	2	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
PM 27.14	02-Jun-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	58.1	100	54.6	100	58
PM 27.14	02-Jun-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		58		55		58
PM 27.14	02-Jun-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	63.7	100	63.9	100	65.9
PM 27.14	02-Jun-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		64		64		66
PM 27.14	02-Jun-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	26.8	100	72.8	100	25.3
PM 27.14	02-Jun-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		27		73		25
PM 27.14	02-Jun-95	2	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
PM 27.14	02-Jun-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
PM 27.14	02-Jun-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.14	02-Jun-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
PM 27.14	02-Jun-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
PM 27.14	02-Jun-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.14	02-Jun-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND
PM 27.14	02-Jun-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	62.9			100	60.5
PM 27.14	02-Jun-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		63				61
PM 27.14	02-Jun-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	68.4			100	69.6
PM 27.14	02-Jun-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		68				70
PM 27.14	02-Jun-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	24.9			100	26.5
PM 27.14	02-Jun-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		25				27
PM 27.14	02-Jun-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	1	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Anthracene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	1	Chrysene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	1	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Fluorene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	1	Naphthalene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Pyrene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	1	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	60.3			100	63.8
PM 27.60	02-Jun-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		60				64
PM 27.60	02-Jun-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	70.1			100	72.2
PM 27.60	02-Jun-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		70				72
PM 27.60	02-Jun-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	33.3			100	36.1

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
PM 27.60	02-Jun-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		33				36
PM 27.60	02-Jun-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	2	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Anthracene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	2	Chrysene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	2	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Fluorene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	2	Naphthalene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Pyrene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	57.5			100	62.4
PM 27.60	02-Jun-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		58				62
PM 27.60	02-Jun-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	65.2			100	71.9
PM 27.60	02-Jun-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		65				72
PM 27.60	02-Jun-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	39			100	37.2
PM 27.60	02-Jun-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		39				37
PM 27.60	02-Jun-95	2	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
PM 27.60	02-Jun-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
PM 27.60	02-Jun-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
PM 27.60	02-Jun-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	64.9			100	61.7
PM 27.60	02-Jun-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		65				62
PM 27.60	02-Jun-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	73.9			100	72.3
PM 27.60	02-Jun-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		74				72
PM 27.60	02-Jun-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	42.5			100	38.6
PM 27.60	02-Jun-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		43				39
PM 27.60	02-Jun-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	1	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Sagehen Creek	03-Jun-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
Sagehen Creek	03-Jun-95	1	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
Sagehen Creek	03-Jun-95	1	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Sagehen Creek	03-Jun-95	1	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Sagehen Creek	03-Jun-95	1	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	70	100	69	100	3
Sagehen Creek	03-Jun-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		70		69		<10%
Sagehen Creek	03-Jun-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	71.7	100	68.3	100	3.6
Sagehen Creek	03-Jun-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		72		68		<10%
Sagehen Creek	03-Jun-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	27.9	100	49.5	100	3.1
Sagehen Creek	03-Jun-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		28		50		<10%
Sagehen Creek	03-Jun-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND	10	ND	10	ND
Sagehen Creek	03-Jun-95	2	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Anthracene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	2	Chrysene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	2	Fluoranthene	ug/L	EPA 625	5	ND			5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Sagehen Creek	03-Jun-95	2	Fluorene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	2	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Pyrene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	54.6			100	36.9
Sagehen Creek	03-Jun-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		55				37
Sagehen Creek	03-Jun-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	59.1			100	37.3
Sagehen Creek	03-Jun-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		59				37
Sagehen Creek	03-Jun-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	21.1			100	5.3
Sagehen Creek	03-Jun-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		21				<10%
Sagehen Creek	03-Jun-95	2	2-Methylnaphthalene	ug/L	EPA 625	10	ND				
Sagehen Creek	03-Jun-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Sagehen Creek	03-Jun-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND
Sagehen Creek	03-Jun-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	69.9			100	68.7
Sagehen Creek	03-Jun-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		70				69
Sagehen Creek	03-Jun-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	69			100	67.8
Sagehen Creek	03-Jun-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		69				68
Sagehen Creek	03-Jun-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	42.4			100	47.1
Sagehen Creek	03-Jun-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		42				47
Sagehen Creek	03-Jun-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	1	Acenaphthylene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Acenaphthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Benzo(a)anthracene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Prosser Creek	03-Jun-95	1	Benzo(a)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Prosser Creek	03-Jun-95	1	Benzo(ghi)perylene	ug/L	EPA 625	10	ND	10	ND	10	ND
Prosser Creek	03-Jun-95	1	Chrysene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND	10	ND	10	ND
Prosser Creek	03-Jun-95	1	Fluoranthene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Fluorene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND	10	ND	10	ND
Prosser Creek	03-Jun-95	1	Naphthalene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Phenanthrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Pyrene	ug/L	EPA 625	5	ND	5	ND	5	ND
Prosser Creek	03-Jun-95	1	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	66.5	100	66.6	100	63.4
Prosser Creek	03-Jun-95	1	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		67		67		63
Prosser Creek	03-Jun-95	1	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	67.4	100	69	100	67
Prosser Creek	03-Jun-95	1	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		67		69		67
Prosser Creek	03-Jun-95	1	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	47.6	100	54.9	100	50.6
Prosser Creek	03-Jun-95	1	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		48		55		51
Prosser Creek	03-Jun-95	1	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	2	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Anthracene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	2	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	2	Chrysene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	2	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Fluorene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	2	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Pyrene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	2	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	68.1			100	68.7
Prosser Creek	03-Jun-95	2	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		68				69
Prosser Creek	03-Jun-95	2	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	66.2			100	71.3
Prosser Creek	03-Jun-95	2	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		66				71
Prosser Creek	03-Jun-95	2	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	47.8			100	49.9
Prosser Creek	03-Jun-95	2	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		48				50
Prosser Creek	03-Jun-95	2	2-Methylnaphthalene	ug/L	EPA 625					10	ND
Prosser Creek	03-Jun-95	3	Acenaphthylene	ug/L	EPA 625	5	ND			5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Prosser Creek	03-Jun-95	3	Acenaphthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Anthracene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Benzo(a)anthracene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Benzo(b)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Benzo(k)fluoranthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Benzo(a)pyrene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	3	Benzo(ghi)perylene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	3	Chrysene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Dibenz(a,h)anthracene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	3	Fluoranthene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Fluorene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 625	10	ND			10	ND
Prosser Creek	03-Jun-95	3	Naphthalene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Phenanthrene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Pyrene	ug/L	EPA 625	5	ND			5	ND
Prosser Creek	03-Jun-95	3	Nitrobenzene-d5 spike level	ug/L	EPA 625	100	54.5			100	61.1
Prosser Creek	03-Jun-95	3	Nitrobenzene-d5 (Surrogate Recovery)	%	EPA 625		55				61
Prosser Creek	03-Jun-95	3	2-Fluorobiphenyl spike level	ug/L	EPA 625	100	56.7			100	75.6
Prosser Creek	03-Jun-95	3	2-Fluorobiphenyl (Surrogate Recovery)	%	EPA 625		57				76
Prosser Creek	03-Jun-95	3	4-Terphenyl-d14 spike level	ug/L	EPA 625	100	50			100	55.2
Prosser Creek	03-Jun-95	3	4-Terphenyl-d14 (Surrogate Recovery)	ug/L	EPA 625		50				55
Prosser Creek	03-Jun-95	3	2-Methylnaphthalene	ug/L	EPA 625	10	ND			10	ND
San Jose Cr.	16-Jan-96	1	Naphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Fluorene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Chrysene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	1	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	16-Jan-96	2	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND

Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
San Jose Cr.	16-Jan-96	2	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	2	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	16-Jan-96	3	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	1	Naphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Fluorene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
San Jose Cr.	1-Feb-96	1	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Chrysene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	1	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	2	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	2	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
San Jose Cr.	1-Feb-96	3	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND

APPENDIX A. Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
San Jose Cr.	1-Feb-96	3	Pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Chrysene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
San Jose Cr.	1-Feb-96	3	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Naphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Fluorene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Chrysene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	1	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	16-Jan-96	2	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Maria ygnacio	16-Jan-96	2	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	2	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	16-Jan-96	3	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	19-Jan-96	1	Naphthalene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	2-Methylnaphthalene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Acenaphthylene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Acenaphthene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Dibenzofuran	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Fluorene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Phenanthrene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Anthracene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Fluoranthene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Pyrene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Benz(a)anthracene	ug/L	EPA 3510/8270			0.5	ND		

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Maria ygnacio	19-Jan-96	1	Chrysene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Benzo(b)fluoranthene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Benzo(k)fluoranthene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Benzo(a)pyrene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	19-Jan-96	1	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270			0.5	ND		
Maria ygnacio	1-Feb-96	1	Naphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Fluorene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Chrysene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	1	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Maria ygnacio	1-Feb-96	2	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Maria ygnacio	1-Feb-96	2	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	2	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Maria ygnacio	1-Feb-96	3	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	1	Naphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Fluorene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Chrysene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	1	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	16-Jan-96	2	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Sycamore	16-Jan-96	2	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	2	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	16-Jan-96	3	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	1	Naphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND

APPENDIX A. (continued) Raw data. PAH concentrations in water samples						UPSTREAM		BRIDGE / RUNOFF		DOWNSTREAM	
Stream	Date	#	Analytical name	Units	Method	PQL	RESULT	PQL	RESULT	PQL	RESULT
Sycamore	1-Feb-96	1	Fluorene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Chrysene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	1	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND	0.5	ND	0.5	ND
Sycamore	1-Feb-96	2	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Benz(a)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Chrysene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Benzo(b)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Benzo(k)fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Benzo(a)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Indeno(1,2,3-cd)pyrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Dibenz(a,h)anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	2	Benzo(g,h,i)perylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Naphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	2-Methylnaphthalene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Acenaphthylene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Acenaphthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Dibenzofuran	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Fluorene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Phenanthrene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Anthracene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND
Sycamore	1-Feb-96	3	Fluoranthene	ug/L	EPA 3510/8270	0.5	ND			0.5	ND

APPENDIX B. Raw data. Metal concentrations in water samples						contamination
date	location	site	Pb ppb)	Cd (ppb)	Zn (ppb)	possible
16-Jan-96	Sycamore Ck.	Up 1	0.2629	0	5.8	
16-Jan-96	Sycamore Ck.	Up 2	0.3018	0	6.1	
16-Jan-96	Sycamore Ck.	Up 3	0.2629	0.01455	8.6	
16-Jan-96	Sycamore Ck.	Runoff	0.6908	0.10969	53.7	
16-Jan-96	Sycamore Ck.	Down 1	0.2629	0.0081	7.0	
16-Jan-96	Sycamore Ck.	Down 2	0.2629	0.01455	4.5	
16-Jan-96	Sycamore Ck.	Down 3	0.3407	0	10.0	
16-Jan-96	Lab Blank		0.224	0	1.2	
16-Jan-96	San Jose	Runoff	0.4963	0.02584	84.5	
16-Jan-96	San Jose	Up 1	0.2629	0	4.0	
16-Jan-96	San Jose	Up 2	0.224	0	3.0	
16-Jan-96	San Jose	Up 3	0.2629	0	1.5	
16-Jan-96	San Jose	Down 1	0.2629	0	2.5	
16-Jan-96	San Jose	Down 2	0.224	0	2.8	*
16-Jan-96	San Jose	Down 3	0.3018	0.01133	3.1	*
16-Jan-96	Maria Ygnacio	Runoff	1.1576	0.29029	266.5	*
16-Jan-96	Maria Ygnacio	Up 1	0.2629	0	10.4	
16-Jan-96	Maria Ygnacio	Up 2	0.2629	0.03068	7.4	*
16-Jan-96	Maria Ygnacio	Up 3	1.78	0.04519	39.0	**
16-Jan-96	Maria Ygnacio	Down 1	0.3407	0.03551	9.5	**
16-Jan-96	Maria Ygnacio	Down 2	0.4185	0.06321	12.9	**
16-Jan-96	Maria Ygnacio	Down 3	0.3796	0.04116	10.2	**
1-Feb-96	Lab Blank	2 of 3	0.224	0.00625	2.4	
1-Feb-96	Lab Blank	3 of 3	0.224	0.00625	3.3	
1-Feb-96	Lab Blank	1 of 3	0.224	0.00625	4.7	
1-Feb-96	Sycamore Ck.	Runoff	0.3796	0.05219	5.9	
1-Feb-96	Sycamore Ck.	Up 1	0.224	0.01911	2.4	
1-Feb-96	Sycamore Ck.	Up 2	0.2629	0.02646	2.8	
1-Feb-96	Sycamore Ck.	Up 3	0.5352	0.0283	4.7	
1-Feb-96	Sycamore Ck.	Down 1	0.224	0.02279	4.0	
1-Feb-96	Sycamore Ck.	Down 2	0.3018	0.03198	5.0	
1-Feb-96	Sycamore Ck.	Down 3	0.4185	0.02646	3.6	
1-Feb-96	San Jose	Runoff	0.3018	0.09629	17.0	
1-Feb-96	San Jose	Up 1	0.4185	0.05219	7.0	
1-Feb-96	San Jose	Up 2	0.2629	0.0283	4.8	
1-Feb-96	San Jose	Up 3	0.224	0.0283	5.0	
1-Feb-96	San Jose	Down 1	0.224	0.03381	3.1	
1-Feb-96	San Jose	Down 2	0.224	0.02279	7.6	
1-Feb-96	San Jose	Down 3	0.224	0.02095	3.6	
19-Jan-96	Maria Ygnacio	Runoff	2.0912	0.12569	52.0	
1-Feb-96	Maria Ygnacio	Runoff	1.2354	0.14285	10.7	
1-Feb-96	Maria Ygnacio	Up 1	0.2629	0.0323	1.7	*
1-Feb-96	Maria Ygnacio	Up 2	0.2629	0.02728	1.2	*
1-Feb-96	Maria Ygnacio	Up 3	0.3018	0.0524	3.7	*
1-Feb-96	Maria Ygnacio	Down 1	0.2629	0.05743	1.6	*
1-Feb-96	Maria Ygnacio	Down 2	0	0.05399	3.1	
1-Feb-96	Maria Ygnacio	Down 3	0	0.06923	1.2	*
4/18/95	Field Blank	Filtered	0	0	0.5	*
4/18/95	Field Blank	Filtered	0	0	0.0	
4/18/95	Blank	Unfilt.	0	0	0.8	
4/18/95	Blank	Unfilt.	0	0	0.0	
4/18/95	Lt Castle Cr.	Structure	2.2752	0.09971	69.5	
4/18/95	Lt Castle Cr.	Up 1	0.2284	0.09399	7.3	
4/18/95	Lt Castle Cr.	Up 2	0.1808	0.07113	8.5	
4/18/95	Lt Castle Cr.	Up 3	0.0856	0.03113	6.0	
4/18/95	Lt Castle Cr.	Down 1	0	0.04637	7.5	
4/18/95	Lt Castle Cr.	Down 2	0.1332	0.12638	9.9	

APPENDIX B. (continued) Raw data. Metal concentrations in water samp						contamination
date	location	site	Pb ppb)	Cd (ppb)	Zn (ppb)	possible
4/18/95	Lt Castle Cr.	Down 3	0.0856	0.05399	3.8	
4/18/95	Root Cr.	Structure	8.7012	0.34736	17.8	
4/18/95	Root Cr.	Up 1	0.8948	0.05208	5.9	
4/18/95	Root Cr.	Up 2	0.7044	0.16257	8.6	
4/18/95	Root Cr.	Up 3	0.4188	0.89028	6.3	
4/18/95	Root Cr.	Down 1	0.2284	0.0578	6.7	
4/18/95	Root Cr.	Down 2	0.4188	0.1721	6.3	
4/18/95	Root Cr.	Down 3	0.3236	0.05591	7.0	
4/18/95	Castle Cr.	Structure	0.0856	0.08655	18.4	
4/18/95	Castle Cr.	Up 1	0	0.07365	17.8	
4/18/95	Castle Cr.	Up 2	0.1332	0.06559	17.9	
4/18/95	Castle Cr.	Up 3	0.038	0.03979	17.9	
4/18/95	Castle Cr.	Down 1	0	0.00915	6.2	
4/18/95	Castle Cr.	Down 2	0	0.0543	8.2	
4/18/95	Castle Cr.	Down 3	0	0.01399	6.2	
4/18/95	Castle Cr.	Down 4	0	0.10913	6.4	
4/18/95	North Fork Mad Rv.	Structure	0.038	0.08655	39.7	
4/18/95	North Fork Mad Rv.	Up 1	1.0376	0.5961	355.1	
4/18/95	North Fork Mad Rv.	Up 2	0.5616	0.4155	274.9	
4/18/95	North Fork Mad Rv.	Up 3	0.3712	0.27844	124.1	
4/18/95	North Fork Mad Rv.	Down 1	0.3236	0.22523	106.2	
4/18/95	North Fork Mad Rv.	Down 2	0	0.11235	152.1	
4/18/95	North Fork Mad Rv.	Down 3	0.1332	0.17201	54.8	
4/18/95	North Fork Mad Rv.	Down 4	0.3236	0.1446	98.9	
4/18/95	Sagehen Cr.	Structure	0	0.11396	27.9	
4/18/95	Sagehen Cr.	Up 1	0	0.01721	1.7	
4/18/95	Sagehen Cr.	Up 2	0	0.03334	1.5	
4/18/95	Sagehen Cr.	Up 3	0	0.01883	1.5	
4/18/95	Sagehen Cr.	Down 1	0	0.03334	2.2	
4/18/95	Sagehen Cr.	Down 2	0	0.02044	1.8	
4/18/95	Sagehen Cr.	Down 3	0	0.01076	2.6	
4/18/95	Prosser Cr.	Structure	0	0.0156	4.4	
4/18/95	Prosser Cr.	Up 1	0	0.04301	3.5	
4/18/95	Prosser Cr.	Up 2	0.0681	0.03927	3.5	
4/18/95	Prosser Cr.	Up 3	0	0.01535	1.8	
4/18/95	Prosser Cr.	Down 1	0.0154	0.01535	1.3	
4/18/95	Prosser Cr.	Down 2	0.0681	0.05951	0.0	
4/18/95	Prosser Cr.	Down 3	0	0	0.8	
6/2/95	blank		0	0	1.1	
no description			0.0154	0.01903	1.5	
6/2/95	blank		0	0	0.8	
6/2/95	field blank		0	0.00615	3.5	
6/2/95	field blank		0	0.00247	2.9	
6/2/95	27:14	Road runo	0	0.00063	4.1	
6/2/95	27:60	Road runo	0	0	3.6	
6/2/95	27:14	Up 1	0	0.00247	3.0	
6/2/95	27:60	"	0	0	4.3	
6/2/95	27:14	Up 2	0	0.01351	5.4	
6/2/95	27:60	"	0	0.05965	6.9	
6/2/95	27:14	Up 3	0	0.00355	3.3	
6/2/95	27:60	"	0	0	4.3	
6/2/95	27:14	Down 1	0	0	4.4	
6/2/95	27:60	"	0	0	0.5	
6/2/95	27:14	Down 2	0	0	19.2	
6/2/95	27:60	"	0	0	0.7	
6/2/95	27:14	Down 3	0	0	11.7	
6/2/95	27:60	"	0	0	0.4	

APPENDIX C. Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH			INVERTEBRATES		
North Fork Mad River	1	8/19/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND	0.05	0.07	0.05	0.07
North Fork Mad River	1	8/19/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
North Fork Mad River	1	8/19/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND	0.5	ND	0.5	ND
North Fork Mad River	1	8/19/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	1	8/19/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.94	1	0.94				
North Fork Mad River	1	8/19/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		94		94				
North Fork Mad River	1	8/19/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.96	1	0.95				
North Fork Mad River	1	8/19/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		95		95				
North Fork Mad River	1	8/19/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	0.87	1	1.17				
North Fork Mad River	1	8/19/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		87		120				
North Fork Mad River	1	8/19/95	Zinc, Total	mg/Kg	EPA 6010	1	22	1	24	1	98	1	73
North Fork Mad River	2	8/19/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
North Fork Mad River	2	8/19/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
North Fork Mad River	2	8/19/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
North Fork Mad River	2	8/19/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
North Fork Mad River	2	8/19/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	2	8/19/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.76	1	0.87				
North Fork Mad River	2	8/19/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		76		87				
North Fork Mad River	2	8/19/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.81	1	0.91				
North Fork Mad River	2	8/19/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		81		91				
North Fork Mad River	2	8/19/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.08	1	1.15				
North Fork Mad River	2	8/19/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		110		110				
North Fork Mad River	2	8/19/95	Zinc, Total	mg/Kg	EPA 6010	1	26	1	36				
North Fork Mad River	3	8/19/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
North Fork Mad River	3	8/19/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
North Fork Mad River	3	8/19/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
North Fork Mad River	3	8/19/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
North Fork Mad River	3	8/19/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.76	1	0.85				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
North Fork Mad River	3	8/19/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		76		85				
North Fork Mad River	3	8/19/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.82	1	0.88				
North Fork Mad River	3	8/19/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		81		88				
North Fork Mad River	3	8/19/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	0.97	1	1.12				
North Fork Mad River	3	8/19/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		97		110				
North Fork Mad River	3	8/19/95	Zinc, Total	mg/Kg	EPA 6010	1	27	1	40				
Little Castle Creek	1	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND	0.05	0.09	0.05	0.05
Little Castle Creek	1	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Little Castle Creek	1	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND	0.5	ND	0.5	ND
Little Castle Creek	1	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	1	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.85	1	0.77				
Little Castle Creek	1	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		84		77				
Little Castle Creek	1	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.87	1	0.79				
Little Castle Creek	1	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		87		79				
Little Castle Creek	1	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.18	1	0.97				
Little Castle Creek	1	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		120		97				
Little Castle Creek	1	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	24	1	29	1	48	1	55
Little Castle Creek	2	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Little Castle Creek	2	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Little Castle Creek	2	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Little Castle Creek	2	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Little Castle Creek	2	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	2	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.78	1	0.77				
Little Castle Creek	2	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		78		77				
Little Castle Creek	2	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.84	1	0.83				
Little Castle Creek	2	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		84		82				
Little Castle Creek	2	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.16	1	1.22				
Little Castle Creek	2	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		120		120				
Little Castle Creek	2	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	20	1	20				
Little Castle Creek	3	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Little Castle Creek	3	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Little Castle Creek	3	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Little Castle Creek	3	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Little Castle Creek	3	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Little Castle Creek	3	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.76	1	0.8				
Little Castle Creek	3	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		76		80				
Little Castle Creek	3	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.8	1	0.85				
Little Castle Creek	3	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		80		85				
Little Castle Creek	3	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.1	1	1.35				
Little Castle Creek	3	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		110		130				
Little Castle Creek	3	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	21	1	19				
ot Creek Up Stream #	1	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
ot Creek Up Stream #	1	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
ot Creek Up Stream #	1	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
ot Creek Up Stream #	1	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	1	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.73	1	0.89				
ot Creek Up Stream #	1	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		73		89				
ot Creek Up Stream #	1	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.78	1	0.92				
ot Creek Up Stream #	1	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		78		92				
ot Creek Up Stream #	1	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	0.1	1	1.42				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
ot Creek Up Stream #	1	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		10		140				
ot Creek Up Stream #	1	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	22	1	24				
ot Creek Up Stream #	2	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
ot Creek Up Stream #	2	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
ot Creek Up Stream #	2	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
ot Creek Up Stream #	2	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	2	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.85	1	0.9				
ot Creek Up Stream #	2	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		85		90				
ot Creek Up Stream #	2	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.9	1	0.95				
ot Creek Up Stream #	2	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		90		95				
ot Creek Up Stream #	2	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	0.87	1	1.38				
ot Creek Up Stream #	2	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		87		140				
ot Creek Up Stream #	2	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	27	1	23				
ot Creek Up Stream #	3	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
ot Creek Up Stream #	3	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
ot Creek Up Stream #	3	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
ot Creek Up Stream #	3	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
ot Creek Up Stream #	3	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
ot Creek Up Stream #	3	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.9	1	0.78				
ot Creek Up Stream #	3	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		90		78				
ot Creek Up Stream #	3	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.74	1	0.81				
ot Creek Up Stream #	3	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		94		81				
ot Creek Up Stream #	3	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.15	1	1.17				
ot Creek Up Stream #	3	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		110		120				
ot Creek Up Stream #	3	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	14	1	26				
Castle Creek	1	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND	0.05	0.06	0.05	0.07
Castle Creek	1	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Castle Creek	1	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND	0.5	ND	0.5	ND
Castle Creek	1	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Castle Creek	1	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	1	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.95	1	0.69				
Castle Creek	1	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		95		69				
Castle Creek	1	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	1	1	0.78				
Castle Creek	1	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		100		77				
Castle Creek	1	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.19	1	1.07				
Castle Creek	1	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		120		110				
Castle Creek	1	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	28	1	25	1	47	1	48
Castle Creek	2	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Castle Creek	2	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Castle Creek	2	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Castle Creek	2	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	2	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.77	1	0.96				
Castle Creek	2	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		77		96				
Castle Creek	2	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.84	1	1.02				
Castle Creek	2	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		84		100				
Castle Creek	2	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.2	1	0.78				
Castle Creek	2	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		120		78				
Castle Creek	2	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	29	1	39				
Castle Creek	3	8/17/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Castle Creek	3	8/17/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Castle Creek	3	8/17/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Castle Creek	3	8/17/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Castle Creek	3	8/17/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.9	1	0.92				
Castle Creek	3	8/17/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		90		92				
Castle Creek	3	8/17/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.94	1	0.94				
Castle Creek	3	8/17/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		93		94				
Castle Creek	3	8/17/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.29	1	1.43				
Castle Creek	3	8/17/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		130		140				
Castle Creek	3	8/17/95	Zinc, Total	mg/Kg	EPA 6010	1	26	1	23				
27.14	1	8/16/95	Cadmium, Total	mg/Kg	EPA 7131					0.05	0.07	0.05	0.11
27.14	1	8/16/95	Lead, Total	mg/Kg	EPA 7421					0.5	ND	0.5	ND
27.14	1	8/16/95	Zinc, Total	mg/Kg	EPA 6010					1	71	1	78
PM 27.6	1	8/16/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND	0.05	0.15	0.05	0.13
PM 27.6	1	8/16/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
PM 27.6	1	8/16/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND	0.5	ND	0.5	ND
PM 27.6	1	8/16/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
PM 27.6	1	8/16/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	1	8/16/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.77	1	0.82				
PM 27.6	1	8/16/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		77		82				
PM 27.6	1	8/16/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.78	1	0.91				
PM 27.6	1	8/16/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		78		91				
PM 27.6	1	8/16/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.14	1	1.26				
PM 27.6	1	8/16/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		110		130				
PM 27.6	1	8/16/95	Zinc, Total	mg/Kg	EPA 6010	1	17	1	18	1	35	1	41
PM 27.6	2	8/16/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
PM 27.6	2	8/16/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
PM 27.6	2	8/16/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
PM 27.6	2	8/16/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	2	8/16/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
PM 27.6	2	8/16/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.8	1	0.68				
PM 27.6	2	8/16/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		80		68				
PM 27.6	2	8/16/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.85	1	0.73				
PM 27.6	2	8/16/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		85		73				
PM 27.6	2	8/16/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.26	1	0.83				
PM 27.6	2	8/16/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		130		83				
PM 27.6	2	8/16/95	Zinc, Total	mg/Kg	EPA 6010	1	20	1	21				
PM 27.6	3	8/16/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
PM 27.6	3	8/16/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
PM 27.6	3	8/16/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
PM 27.6	3	8/16/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
PM 27.6	3	8/16/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.81	1	0.84				
PM 27.6	3	8/16/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		81		84				
PM 27.6	3	8/16/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.93	1	0.93				
PM 27.6	3	8/16/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		93		93				
PM 27.6	3	8/16/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	0.33	1	0.24				
PM 27.6	3	8/16/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		33		24				
PM 27.6	3	8/16/95	Zinc, Total	mg/Kg	EPA 6010	1	25	1	26				
Sagehen Creek	1	8/15/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND	0.05	ND	0.05	ND
Sagehen Creek	1	8/15/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA		NA		
Sagehen Creek	1	8/15/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND	0.5	ND	0.5	ND

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Sagehen Creek	1	8/15/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	1	ND		
Sagehen Creek	1	8/15/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.78	1	0.77	5	3.52		
Sagehen Creek	1	8/15/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		78		77		70		
Sagehen Creek	1	8/15/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.82	1	0.86	5	3.82		
Sagehen Creek	1	8/15/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		82		86		76		
Sagehen Creek	1	8/15/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.2	1	1.1	5	4.24		
Sagehen Creek	1	8/15/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		120		110		85		
Sagehen Creek	1	8/15/95	Zinc, Total	mg/Kg	EPA 6010	1	29	1	50	1	43	1	47
Sagehen Creek	2	8/15/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Sagehen Creek	2	8/15/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Sagehen Creek	2	8/15/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Sagehen Creek	2	8/15/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Sagehen Creek	2	8/15/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	2	8/15/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.85	1	0.69				
Sagehen Creek	2	8/15/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		85		69				
Sagehen Creek	2	8/15/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.92	1	0.75				
Sagehen Creek	2	8/15/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		92		75				
Sagehen Creek	2	8/15/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.26	1	0.97				
Sagehen Creek	2	8/15/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		130		97				
Sagehen Creek	2	8/15/95	Zinc, Total	mg/Kg	EPA 6010	1	26	1	30				
Sagehen Creek	3	8/15/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Sagehen Creek	3	8/15/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Sagehen Creek	3	8/15/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Sagehen Creek	3	8/15/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Sagehen Creek	3	8/15/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.71	1	0.74				
Sagehen Creek	3	8/15/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		71		74				
Sagehen Creek	3	8/15/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.77	1	0.8				
Sagehen Creek	3	8/15/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		77		80				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Sagehen Creek	3	8/15/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	0.87	1	1.21				
Sagehen Creek	3	8/15/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		87		120				
Sagehen Creek	3	8/15/95	Zinc, Total	mg/Kg	EPA 6010	1	23	1	35				
Prosser Creek	1	8/15/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND	0.05	ND	0.05	0.28
Prosser Creek	1	8/15/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA		NA		NA
Prosser Creek	1	8/15/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND	0.5	ND	0.5	ND
Prosser Creek	1	8/15/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND	0.2	ND	0.2	ND
Prosser Creek	1	8/15/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.73	1	0.79	1	0.783	1	0.843
Prosser Creek	1	8/15/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		73		79		78		84
Prosser Creek	1	8/15/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.79	1	0.86	1	0.823	1	0.885
Prosser Creek	1	8/15/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		79		86		82		88
Prosser Creek	1	8/15/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.11	1	1.2	1	0.944	1	0.986
Prosser Creek	1	8/15/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		110		120		94		99
Prosser Creek	1	8/15/95	Zinc, Total	mg/Kg	EPA 6010	1	20	1	16	1	26	1	40
Prosser Creek	2	8/15/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Prosser Creek	2	8/15/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Prosser Creek	2	8/15/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Prosser Creek	2	8/15/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue Sample	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
Prosser Creek	2	8/15/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	2	8/15/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.74	1	0.8				
Prosser Creek	2	8/15/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		74		78				
Prosser Creek	2	8/15/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.81	1	0.86				
Prosser Creek	2	8/15/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		81		86				
Prosser Creek	2	8/15/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.16	1	1.16				
Prosser Creek	2	8/15/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		120		120				
Prosser Creek	2	8/15/95	Zinc, Total	mg/Kg	EPA 6010	1	16	1	17				
Prosser Creek	3	8/15/95	Cadmium, Total	mg/Kg	EPA 7131	0.05	ND	0.05	ND				
Prosser Creek	3	8/15/95	GEL PERM CHROMATOGRAPHY	mg/Kg	EPA 3640		NA		NA				
Prosser Creek	3	8/15/95	Lead, Total	mg/Kg	EPA 7421	0.5	ND	0.5	ND				
Prosser Creek	3	8/15/95	Acenaphthylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Acenaphthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Benzo(a)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Benzo(b)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Benzo(k)fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Benzo(a)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Benzo(ghi)perylene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Chrysene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Dibenz(a,h)anthracene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Fluoranthene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Fluorene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Indeno(1,2,3-cd)pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Naphthalene	mg/Kg	GC/MS	0.2	ND	0.2	ND				

APPENDIX C. (continued) Raw data of PAH and metals in fish/ invertebrate tissue.						UPSTREAM		DOWNSTRE		UPSTREAM		DOWNSTREAM	
Stream	Tissue	Date	PAH / Metals	Units	Pocedure	FISH		FISH		INVERTEBRA		INVERTEBRATES	
	Sample												
Prosser Creek	3	8/15/95	Phenanthrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Pyrene	mg/Kg	GC/MS	0.2	ND	0.2	ND				
Prosser Creek	3	8/15/95	Nitrobenzene-d5 spike level	mg/Kg	GC/MS	1	0.8	1	0.76				
Prosser Creek	3	8/15/95	Nitrobenzene-d5 (Surrogate Recovery)	%	GC/MS		80		76				
Prosser Creek	3	8/15/95	2-Fluorobiphenyl spike level	mg/Kg	GC/MS	1	0.86	1	0.8				
Prosser Creek	3	8/15/95	2-Fluorobiphenyl (Surrogate Recovery)	%	GC/MS		86		80				
Prosser Creek	3	8/15/95	4-Terphenyl-d14 spike level	mg/Kg	GC/MS	1	1.18	1	1.18				
Prosser Creek	3	8/15/95	4-Terphenyl-d14 (Surrogate Recovery)	mg/Kg	GC/MS		120		120				
Prosser Creek	3	8/15/95	Zinc, Total	mg/Kg	EPA 6010	1	23	1	16				

APPENDIX D. Invertebrates collected at sample sites.

Place	Position	EPHEMEROPTERA	*Ameletus AMELETIDAE*	*Baetis BAETIDAE*	*Callibaetis*	HEPTAGENIIDAE	*Cinygmula*	*Epeorus*	*Ironodes*	*Heptagenia*	*Rhithrogena*	EPHEMERELLIDAE	*Attenella*	*Caudatella*	*Drunella*	*Eurylophella*	*Ephemerella*	*Serratella*	LEPTOPHLEBIIDAE	*Paraleptophlebia*	*Tricorythodes TRICORYTHIDAE*
Functional Feeding Group			SC	CG	CG	SC	SC	CG	SC	SC	CG	CG	CG	CG	SC	CG	CG	CG	CG	CG	CG
Sagehen Ck.	Up 1			4			2	2													
Sagehen Ck	Up 2			4								1								1	
Sagehen Ck	Up 3			21		1	4	8				4			1		1			4	
Sagehen Ck	Up 4			3			3											1			
Sagehen Ck.	Up 5		1	17		2	10	4				3			1		2			1	
Sagehen Ck.	Down 1			6			1	7												14	
Sagehen Ck.	Down 2			9			2	8				1								1	
Sagehen Ck.	Down 3			9		1	1	2				2					1			3	
Sagehen Ck.	Down 4			4			2	6										5		1	
Sagehen Ck.	Down 5			5			2	7									1			1	
pm 27.60	Up 1			285			4		9			1								8	
pm 27.60	Up 2		1	133	6	13	2													23	
pm 27.60	Up 3			193		1		1	1				1							4	
pm 27.60	Up 4			112				8						1	2			6		3	
pm 27.60	Up 5		3	159		5	5					2					1			3	
pm 27.60	Down 1			221			1		3			1			1					4	
pm 27.60	Down 2	1		232				3												2	
pm 27.60	Down 3			162		4	1		8				4							17	
pm 27.60	Down 4			111				3			1				3					3	
pm 27.60	Down 5			136		1	1	1	1			1		1	3					4	
Prosser	Up 1			1			3	1										1		5	
Prosser	Up 2	3					4														
Prosser	Up 3		4	23		19	2	27				4	3		1		9			6	
Prosser	Up 4			2			2	1									3	2		1	
Prosser	Up 5			7		1	2	10				4			1		1				
Prosser	Down 1	23	3	9		23		36							4		5				
Prosser	Down 2			20		1	7	10			5	31	5		7		26			2	
Prosser	Down 3			8		2		21				8	1	1	9		2				
Prosser	Down 4			10			2	19							10		4	5			
Prosser	Down 5	5		10				9							3	1	5			1	
Pm 27.14	Up 1	4		502	1	2	3	2													
Pm 27.14	Up 2		2	98					2			1									
Pm 27.14	Up 3			202								1									
Pm 27.14	Up 4			226				4												3	
Pm 27.14	Up 5			319				3										3			
Pm 27.14	Down 1			123		1			1											3	
Pm 27.14	Down 2			91																	
Pm 27.14	Down 3			9																1	
Pm 27.14	Down 4			157				2	4	2										1	
Pm 27.14	Down 5	1		147					1												
Little Castle	Up 1.2		3			1				5									1	1	1
Little Castle	Up 2.2			524		13		5			1				17			13		1	
Little Castle	Up 3			230		3		2				16			6						
Little Castle	Up 4			111			6				1				2			1			
Little Castle	Up 5.1			63		16		16				2			29						
Little Castle	Down 1			11		21		7				1			4					1	

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	EPHEMEROPTERA	*Ameletus AMELETIDAE*	*Baetis BAETIDAE*	*Callibaetis*	HEPTAGENIIDAE	*Cinygmula*	*Epeorus*	*Ironodes*	*Heptagenia*	*Rhithrogena*	EPHEMERELLIDAE	*Attenella*	*Caudatella*	*Drunella*	*Eurylophella*	*Ephemerella*	*Serratella*	LEPTOPHLEBIIDAE	*Paraleptophlebia*	*Tricorythodes TRICORYTHIDAE*
Little Castle	Down 2		1	12		14		4							12						
Little Castle	Down 3			580		7		23							44		1				
Little Castle	Down 4			333			8	5			28				18			1		1	
Little Castle	Down 5		2	37		21		1					1		13			1			
Castle Cr.	Up1			58		9		11		9		11			1					1	
Castle Cr.	Up 2.1			85		20		24										2		13	
Castle Cr.	Up 3			38				10							2			4			
Castle Cr.	Up 4			153				9			10				1			3		3	
Castle Cr.	Up 5.2			193		17		8				13			3					2	
Castle Cr.	Down 1		1	67		3		5				14			5						
Castle Cr.	Down 2			38		12							1							2	
Castle Cr.	Down 3			47			27	11							4			186			
Castle Cr.	Down 4			15							17							43			
Castle Cr.	Down 5			16		8		4		3		27									
Root Cr.	Up 1			141		30						1	8				2				
Root Cr.	Up 2			67		70		10	1			71									
Root Cr.	Up 3			145		15		4			1	13	1		15			4		1	
Root Cr.	Up 4			90			13								12			11		1	
Root Cr.	Up 5			139		26		5			9	19			10			3		2	
Root Cr.	Down 1	3		52				11													
Root Cr.	Down 2	1		115		19						2								7	
Root Cr.	Down 3			37		2		2				1			3					1	
Root Cr.	Down 4			195				9			4				1					4	
Root Cr.	Down 5			34		4											1				
North Fork Mad River	Up 1			266				11			128				5					2	
North Fork Mad River	Up 2			159		5		9	3		5	2			3					1	
North Fork Mad River	Up 3			96				7			134				11			2		8	
North Fork Mad River	Up 4			258				7			27				4					2	
North Fork Mad River	Up 5			249		96		12	3		12				43					10	
North Fork Mad River	Down 1			339		86		47			6				5					21	
North Fork Mad River	Down2			169		12		10			4				1					1	
North Fork Mad River	Down3			97				7			22				5			6		3	
North Fork Mad River	Down4			219			12	9			130				6					23	
North Fork Mad River	Down 5			27		9		2				21								18	
Sycamore Ck.	Up1			3																	3
Sycamore Ck.	Up 2			10																	1
Sycamore Ck.	Up 3			52																	
Sycamore Ck.	Up 4			53																	
Sycamore Ck.	Up 5			17																	1
Sycamore Ck.	Down 1			138																	
Sycamore Ck.	Down 2			1																	
Sycamore Ck.	Down 3			22	2																1
Sycamore Ck.	Down 4			11																	
Sycamore Ck.	Down 5			21																	

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	EMERGING EPHEMEROPTERA	PLECOPTERA	CAPNIIDAE	CHLOROPERLIDAE/CAPNIIDAE	PTERONARCYIDAE	*Pteronarcys*	LEUCTRIDAE	LEUCTRIDAE/CAPNIIDAE	*Despaxia LEUCTRIDAE*	*Paraleuctra*	*Perlomyia*	*Moselia infuscata*	*Yoraperla*	*Soliperla*	*Sierraperla*	NEMOURIDAE	*Amphinemura*	*Prostoia?*	*Malenka*	*Podmosta*
Functional Feeding Group				SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH
Sagehen Ck.	Up 1																			2	
Sagehen Ck	Up 2																				
Sagehen Ck	Up 3																1			2	
Sagehen Ck	Up 4																				
Sagehen Ck.	Up 5		1																	1	
Sagehen Ck.	Down 1																			5	
Sagehen Ck.	Down 2													1			1				
Sagehen Ck.	Down 3																			1	
Sagehen Ck.	Down 4																			2	
Sagehen Ck.	Down 5																1				
pm 27.60	Up 1			1		3											19			5	
pm 27.60	Up 2															1	38				
pm 27.60	Up 3						1							1			7				
pm 27.60	Up 4						1							35						2	
pm 27.60	Up 5													2			30				
pm 27.60	Down 1		13											4			20			2	
pm 27.60	Down 2																26	1		2	
pm 27.60	Down 3						2	1	6		1			5	1		90			5	
pm 27.60	Down 4									1										6	
pm 27.60	Down 5	1	3														19	2			
Prosser	Up 1		1																		
Prosser	Up 2																				
Prosser	Up 3																5			1	
Prosser	Up 4																1				
Prosser	Up 5																1				1
Prosser	Down 1																10			6	
Prosser	Down 2		2														8				
Prosser	Down 3																3			2	
Prosser	Down 4																				
Prosser	Down 5																2			1	
Pm 27.14	Up 1		69	1				1		1				3			285				
Pm 27.14	Up 2			1								5	1				56				
Pm 27.14	Up 3							2			3		1	5			46			2	
Pm 27.14	Up 4													4			6			3	
Pm 27.14	Up 5						2							15			51			4	
Pm 27.14	Down 1						1					1		1			74			2	11
Pm 27.14	Down 2																12				
Pm 27.14	Down 3		1				1										13				
Pm 27.14	Down 4			6			2							2			2			7	
Pm 27.14	Down 5		26											1			88				
Little Castle	Up 1.2			1																	
Little Castle	Up 2.2			8																1	
Little Castle	Up 3								1								2			1	
Little Castle	Up 4																			2	
Little Castle	Up 5.1	1		1																3	
Little Castle	Down 1																			1	

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	EMERGING EPHEMEROPTERA	PLECOPTERA	CAPNIIDAE	CHLOROPERLIDAE/CAPNIIDAE	PTERONARCYIDAE	*Pteronarcys*	LEUCTRIDAE	LEUCTRIDAE/CAPNIIDAE	*Despaxia LEUCTRIDAE*	*Paraleuctra*	*Perlomyia*	*Moselia infuscata*	*Yoraperla*	*Soliperla*	*Sierraperla*	NEMOURIDAE	*Amphinemura*	*Prostoia?*	*Malenka*	*Podmosta*
Little Castle	Down 2																		1		
Little Castle	Down 3																				
Little Castle	Down 4								23												
Little Castle	Down 5			1																2	
Castle Cr.	Up1		1																	3	
Castle Cr.	Up 2.1		2														2			1	
Castle Cr.	Up 3								1											12	
Castle Cr.	Up 4								1					1						9	
Castle Cr.	Up 5.2																7			2	
Castle Cr.	Down 1																				
Castle Cr.	Down 2																				
Castle Cr.	Down 3																			1	
Castle Cr.	Down 4			3																	
Castle Cr.	Down 5					1															
Root Cr.	Up 1																			1	
Root Cr.	Up 2	1	2																	1	
Root Cr.	Up 3		4														5				
Root Cr.	Up 4																			1	
Root Cr.	Up 5																				
Root Cr.	Down 1																1			4	
Root Cr.	Down 2																13			3	
Root Cr.	Down 3																1				
Root Cr.	Down 4																			7	
Root Cr.	Down 5																				
North Fork Mad River	Up 1													1						2	
North Fork Mad River	Up 2		1		2															6	
North Fork Mad River	Up 3			3																1	
North Fork Mad River	Up 4			1																2	
North Fork Mad River	Up 5			1				1	2								1			5	
North Fork Mad River	Down 1							1									13			51	
North Fork Mad River	Down2																2			3	
North Fork Mad River	Down3																			16	
North Fork Mad River	Down4			13																6	
North Fork Mad River	Down 5																			1	
Sycamore Ck.	Up1																				
Sycamore Ck.	Up 2																				
Sycamore Ck.	Up 3																				
Sycamore Ck.	Up 4																				
Sycamore Ck.	Up 5																				
Sycamore Ck.	Down 1																			1	
Sycamore Ck.	Down 2																				
Sycamore Ck.	Down 3																				
Sycamore Ck.	Down 4																				
Sycamore Ck.	Down 5																				

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Soyedina*	*Visoka*	*Zapada*	PERLIDAE	*Claassenia*	*Neoperla*	*Calineuria*	*Doroneuria*	*Hesperoperla*	PERLODIDAE	*Isoperla*	*Kogotus nonus*	*Megarcys*	*Perlinodes*	*Osobenus yakimae*	*Skwala*	CHLOROPERLIDAE	*Haploperla*	*Bisancora?*	*Kathroperla*
Functional Feeding Group		SH	SH	SH	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	CG
Sagehen Ck.	Up 1				1													2			
Sagehen Ck	Up 2																	9			
Sagehen Ck	Up 3							1											2		
Sagehen Ck	Up 4							4													
Sagehen Ck.	Up 5				6								1					3			
Sagehen Ck.	Down 1			1				2													
Sagehen Ck.	Down 2				2			1							1			3			
Sagehen Ck.	Down 3										1	1								5	
Sagehen Ck.	Down 4				2																
Sagehen Ck.	Down 5																	1			
pm 27.60	Up 1			44	15			1	3									14			
pm 27.60	Up 2			4	17			2	1	11	5							10	7		
pm 27.60	Up 3			16	3				3	1	3							2			
pm 27.60	Up 4			117				2	1	20											
pm 27.60	Up 5			48				6	1	1								48			
pm 27.60	Down 1			45					4												
pm 27.60	Down 2			52	3				3	8		2		1				5			
pm 27.60	Down 3			95	6				5	24	14	1						6	4	3	
pm 27.60	Down 4			77				8	2	2											
pm 27.60	Down 5			5			1		2	1								20			
Prosser	Up 1																	1			
Prosser	Up 2				1													3	3		
Prosser	Up 3			1	1			1			2							1	5		
Prosser	Up 4			1												4					
Prosser	Up 5											1				1		1			
Prosser	Down 1				1											1		1			
Prosser	Down 2			1	1						3		2			1		3	2		
Prosser	Down 3											1									
Prosser	Down 4															6					
Prosser	Down 5			1												2					
Pm 27.14	Up 1	1		29	4			1	1	11								1			
Pm 27.14	Up 2			124				6		13											
Pm 27.14	Up 3			167	6				1	10								2			
Pm 27.14	Up 4			93					3	6											
Pm 27.14	Up 5			130					1	6											
Pm 27.14	Down 1			71				3	1	7								2			
Pm 27.14	Down 2			89	1					5											
Pm 27.14	Down 3			40	1					2											
Pm 27.14	Down 4			147						7											
Pm 27.14	Down 5			3	2					3	1										
Little Castle	Up 1.2																				
Little Castle	Up 2.2			8	17			1		4	2				1					1	
Little Castle	Up 3			14	6										1						
Little Castle	Up 4			1				10							1						
Little Castle	Up 5.1			16	2			2		18					1						
Little Castle	Down 1			3	2			1													

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Soyedina*	*Visoka*	*Zapada*	PERLIDAE	*Claassenia*	*Neoperla*	*Calineuria*	*Doroneuria*	*Hesperoperla*	PERLODIDAE	*Isoperla*	*Kogotus nonus*	*Megarcys*	*Perlinodes*	*Osobenus yakimae*	*Skwala*	CHLOROPERLIDAE	*Haploperla*	*Bisancora?*	*Kathroperla*
Little Castle	Down 2			1	7			1							1			2			
Little Castle	Down 3			42	1			2			1						1				
Little Castle	Down 4			32				76				3									
Little Castle	Down 5			6	7			3		2					1						
Castle Cr.	Up1			13				1										1			
Castle Cr.	Up 2.1		1	13				1													
Castle Cr.	Up 3			2				3													
Castle Cr.	Up 4			1				13													
Castle Cr.	Up 5.2			10						6								3	1		1
Castle Cr.	Down 1									1											
Castle Cr.	Down 2				2			1			1						2				
Castle Cr.	Down 3							7							1						
Castle Cr.	Down 4							3													
Castle Cr.	Down 5				2			1										4			
Root Cr.	Up 1			1	4			1		2	3				3			1			
Root Cr.	Up 2			18	3			19		4				1			3		1		
Root Cr.	Up 3					5												3			
Root Cr.	Up 4			2				2								6					
Root Cr.	Up 5				12			1	3	1								6	1		
Root Cr.	Down 1			11				1													
Root Cr.	Down 2			14	2																
Root Cr.	Down 3			1	3																
Root Cr.	Down 4			6				3													1
Root Cr.	Down 5		1	3	1																
North Fork Mad River	Up 1			2	12			6		1								1			
North Fork Mad River	Up 2			4				1		4											
North Fork Mad River	Up 3			1				13	1	1											
North Fork Mad River	Up 4			1				8		1											
North Fork Mad River	Up 5			2	9			6		9								3	1		
North Fork Mad River	Down 1			15	38			4		9											
North Fork Mad River	Down2			1																	
North Fork Mad River	Down3							6		3	2										
North Fork Mad River	Down4			8				16		4											1
North Fork Mad River	Down 5			2	5			1										1			
Sycamore Ck.	Up1																				
Sycamore Ck.	Up 2																				
Sycamore Ck.	Up 3																				
Sycamore Ck.	Up 4																				
Sycamore Ck.	Up 5																				
Sycamore Ck.	Down 1																				
Sycamore Ck.	Down 2																				
Sycamore Ck.	Down 3																				
Sycamore Ck.	Down 4																				
Sycamore Ck.	Down 5																				

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Paraperla*	*Plumiperla*	*Suwallia*	*Sweltsa*	*Triznaka*	EMERGING PLECOPTERA	ODONATA	*Zoniagrion COENAGRIONIDAE*	*Argia*	MEGALOPTERA	CORYDALIDAE	*Noehermes*	*Orohermes*	TRICHOPTERA	TRICHOPTERAN PUPAE	*Heteroplectron CALAMOCERATIDAE*	ODONTOCERIDAE	*Namamyia*	*Nerophilus*	*Parthina*
Functional Feeding Group		CG	P	P	P	P			P	P	P	P	P	P			SH	SH	CG	SH	SH
Sagehen Ck.	Up 1			8																	
Sagehen Ck	Up 2											1									
Sagehen Ck	Up 3			4																	
Sagehen Ck	Up 4			17																	
Sagehen Ck.	Up 5		1	2							1										
Sagehen Ck.	Down 1		3	6			3								1						
Sagehen Ck.	Down 2		3	3											2						
Sagehen Ck.	Down 3			5																	
Sagehen Ck.	Down 4			3																	
Sagehen Ck.	Down 5		8	2																	
pm 27.60	Up 1		2	3	24									1							
pm 27.60	Up 2	1			27									2		2					
pm 27.60	Up 3				14																
pm 27.60	Up 4				5																
pm 27.60	Up 5																				
pm 27.60	Down 1				3																
pm 27.60	Down 2		1	2	6																
pm 27.60	Down 3				27																
pm 27.60	Down 4				36									1							
pm 27.60	Down 5																				
Prosser	Up 1		5																		
Prosser	Up 2		3	1																	
Prosser	Up 3				3											7					
Prosser	Up 4				1																
Prosser	Up 5				1										2	1					
Prosser	Down 1		1		5	1															
Prosser	Down 2		1	1	4					1					3						
Prosser	Down 3															2					
Prosser	Down 4				1																
Prosser	Down 5		3		1																
Pm 27.14	Up 1	1			13										6						
Pm 27.14	Up 2	1				3									1						
Pm 27.14	Up 3				4																
Pm 27.14	Up 4				20																
Pm 27.14	Up 5															2					
Pm 27.14	Down 1				1																
Pm 27.14	Down 2														1						
Pm 27.14	Down 3				2																
Pm 27.14	Down 4				8									1							
Pm 27.14	Down 5														1						
Little Castle	Up 1.2																				
Little Castle	Up 2.2														2						
Little Castle	Up 3																				
Little Castle	Up 4																				
Little Castle	Up 5.1				1																
Little Castle	Down 1															1					

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Paraperla*	*Plumiperla*	*Suwallia*	*Sweltsa*	*Triznaka*	EMERGING PLECOPTERA	ODONATA	*Zoniagrion COENAGRIONIDAE*	*Argia*	MEGALOPTERA	CORYDALIDAE	*Noehermes*	*Orohermes*	TRICHOPTERA	TRICHOPTERAN PUPAE	*Heteroplectron CALAMOCERATIDAE*	ODONTOCERIDAE	*Namamyia*	*Nerophilus*	*Parthina*
Little Castle	Down 2												1								
Little Castle	Down 3													1							
Little Castle	Down 4													1							
Little Castle	Down 5														1	1					
Castle Cr.	Up1	2						1				1				5					
Castle Cr.	Up 2.1													2							
Castle Cr.	Up 3				1									1							
Castle Cr.	Up 4				2																
Castle Cr.	Up 5.2	2																			
Castle Cr.	Down 1																				
Castle Cr.	Down 2				10										198			4	1	1	1
Castle Cr.	Down 3				2																
Castle Cr.	Down 4																				
Castle Cr.	Down 5																				
Root Cr.	Up 1				1										441						
Root Cr.	Up 2				2										1						
Root Cr.	Up 3																				
Root Cr.	Up 4				2																
Root Cr.	Up 5																				
Root Cr.	Down 1															1					
Root Cr.	Down 2														3						
Root Cr.	Down 3																				
Root Cr.	Down 4																				
Root Cr.	Down 5				1										7						1
North Fork Mad River	Up 1		1																		
North Fork Mad River	Up 2																				
North Fork Mad River	Up 3																				
North Fork Mad River	Up 4				2																
North Fork Mad River	Up 5	4																			
North Fork Mad River	Down 1															1					
North Fork Mad River	Down2																				
North Fork Mad River	Down3																				
North Fork Mad River	Down4				1																
North Fork Mad River	Down 5		1												2		6				
Sycamore Ck.	Up1																				
Sycamore Ck.	Up 2																				
Sycamore Ck.	Up 3																				
Sycamore Ck.	Up 4																				
Sycamore Ck.	Up 5																				
Sycamore Ck.	Down 1																				
Sycamore Ck.	Down 2																				
Sycamore Ck.	Down 3																				
Sycamore Ck.	Down 4								1												
Sycamore Ck.	Down 5																				

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Dolophilodes* PHILOPOTAMIDAE	*Wormaldia* PHILOPOTAMIDAE	*Cymellus* POLYCENTROPODIDAE	*Polycentropus* POLYCENTROPODIDAE	GLOSSOSOMATIDAE	*Anagapetus*	*Agapetus*	*Glossosoma*	HYDROPSYCHIDAE	*Arctopsyche*	*Ceratopsyche*	*Cheumatopsyche*	*Hydropsyche*	*Parapsyche*	BRACHYCENTRIDAE	*Brachycentrus*	*Eobrachycentrus*	*Micrasema*	*Himalopsyche* RHYACOPHILIDAE	*Rhyacophila* RHYACOPHILIDAE
Functional Feeding Group		FC	FC	FC	P	SC	SC	SC	SC	FC	FC	FC	FC	FC	FC	FC	FC	SH	SH	P	P
Sagehen Ck.	Up 1																		1		1
Sagehen Ck	Up 2																		1		
Sagehen Ck	Up 3					1								2			1		1		2
Sagehen Ck	Up 4																				3
Sagehen Ck.	Up 5													2					1		9
Sagehen Ck.	Down 1													2							
Sagehen Ck.	Down 2													6					1	1	
Sagehen Ck.	Down 3				1														1		
Sagehen Ck.	Down 4													1			1		3		1
Sagehen Ck.	Down 5													3					1		1
pm 27.60	Up 1		1																	1	8
pm 27.60	Up 2			1	5					2											2
pm 27.60	Up 3																		2	3	2
pm 27.60	Up 4				1			1							1				22		
pm 27.60	Up 5																		2		11
pm 27.60	Down 1		2							5									2	1	5
pm 27.60	Down 2	1			4					2											3
pm 27.60	Down 3									2									2	4	14
pm 27.60	Down 4													1					2		7
pm 27.60	Down 5		4								2										3
Prosser	Up 1																				
Prosser	Up 2				1							2									1
Prosser	Up 3					2								29							5
Prosser	Up 4													14			2				
Prosser	Up 5				1				2			13					1		1		
Prosser	Down 1								3	3				17					1		3
Prosser	Down 2				1					2		34	5	1			1		1		4
Prosser	Down 3													27			2		3		3
Prosser	Down 4								1					20			3		5		5
Prosser	Down 5													5					1		1
Pm 27.14	Up 1				1					3								1	1		3
Pm 27.14	Up 2		1					2		4				1							4
Pm 27.14	Up 3		1			1				8					2				3		2
Pm 27.14	Up 4																				3
Pm 27.14	Up 5									1					2				16	1	3
Pm 27.14	Down 1						1														3
Pm 27.14	Down 2																		1		1
Pm 27.14	Down 3																				1
Pm 27.14	Down 4	1												4	4				1		1
Pm 27.14	Down 5		1		2						1										
Little Castle	Up 1.2																				
Little Castle	Up 2.2								26	64				90							8
Little Castle	Up 3		2			3		7	2	43				53							8
Little Castle	Up 4													35							1
Little Castle	Up 5.1					3	9		2	1				4						1	1
Little Castle	Down 1						1			1						1					

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Dolophilodes PHILOPOTAMIDAE*	*Wormaldia PHILOPOTAMIDAE*	*Cymellus POLYCENTROPODIDAE*	*Polycentropus POLYCENTROPODIDAE*	GLOSSOSOMATIDAE	*Anagapetus*	*Agapetus*	*Glossosoma*	HYDROPSYCHIDAE	*Arctopsyche*	*Ceratopsyche*	*Cheumatopsyche*	*Hydropsyche*	*Parapsyche*	BRACHYCENTRIDAE	*Brachycentrus*	*Eobrachycentrus*	*Micrasema*	*Himalopsyche RHYACOPHILIDAE*	*Rhyacophila RHYACOPHILIDAE*
Little Castle	Down 2					2	5	8	2					1							
Little Castle	Down 3					17		6	33	295	3			279							12
Little Castle	Down 4							13	31					298			1				27
Little Castle	Down 5						8		1	3				4							1
Castle Cr.	Up1	1			1			3						1							
Castle Cr.	Up 2.1													3							3
Castle Cr.	Up 3								1					30							2
Castle Cr.	Up 4								18					27							5
Castle Cr.	Up 5.2						3		4	48				15							6
Castle Cr.	Down 1								5	31				29							1
Castle Cr.	Down 2																		5		1
Castle Cr.	Down 3								1					36							
Castle Cr.	Down 4													5							
Castle Cr.	Down 5									1											1
Root Cr.	Up 1								1	40	1	37	21								
Root Cr.	Up 2								9	289				326							2
Root Cr.	Up 3								3	200	1			198		1	1				5
Root Cr.	Up 4								5		1			295							3
Root Cr.	Up 5								14	188	2			154							4
Root Cr.	Down 1									7											6
Root Cr.	Down 2									23	3	12		1							7
Root Cr.	Down 3							4	2	7											2
Root Cr.	Down 4		1						7					27							9
Root Cr.	Down 5							1	1	3											1
North Fork Mad River	Up 1						1		2	20				14							4
North Fork Mad River	Up 2								1	8				6							6
North Fork Mad River	Up 3								1					5							1
North Fork Mad River	Up 4													17							3
North Fork Mad River	Up 5		1			2	1		4	32				32			3				18
North Fork Mad River	Down 1				3	1				20				1		1					22
North Fork Mad River	Down2						2		2	6				1							5
North Fork Mad River	Down3								3					2							
North Fork Mad River	Down4		1											27							12
North Fork Mad River	Down 5																				6
Sycamore Ck.	Up1																				
Sycamore Ck.	Up 2																				
Sycamore Ck.	Up 3									3											
Sycamore Ck.	Up 4									1											
Sycamore Ck.	Up 5																				
Sycamore Ck.	Down 1									3											
Sycamore Ck.	Down 2																				
Sycamore Ck.	Down 3																				
Sycamore Ck.	Down 4																				
Sycamore Ck.	Down 5									1											

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Nectopschye LEPTOCERIDAE*	*Mystacides? LEPTOCERIDAE*	LEPIDOSTOMATIDAE	LEPIDOSTOMATIDAE Pupae	*Lepidostoma*	*Apatania APATANIIDAE*	*Goeracea GOERIDAE*	LIMNEPHILIDAE	*Clostoeca*	*Dicosmoecus*	*Ecclisomyia*	*Manophylax APATANIIDAE?*	*Gumaga SERICOSTOMATIDAE*	*Tinodes PSYCHOMYIIDAE*	UENOIDAE	*Farula*	*Neophylax*	*Neothremma*	HYDROPTILIDAE Pupae	HYDROPTILIDAE Larvae
Functional Feeding Group		SH	FC	SH		SH	SC	SC	SH	SH	SC	CG	SC	SH	SC	SC	SC	SC	SC		P
Sagehen Ck.	Up 1					1			1									3			
Sagehen Ck	Up 2					1															
Sagehen Ck	Up 3					1												1			
Sagehen Ck	Up 4																				
Sagehen Ck.	Up 5					2								3				1			
Sagehen Ck.	Down 1																	2			
Sagehen Ck.	Down 2			1														4			
Sagehen Ck.	Down 3										1										
Sagehen Ck.	Down 4					2															
Sagehen Ck.	Down 5			1														1			
pm 27.60	Up 1					1						1							4		
pm 27.60	Up 2					9															
pm 27.60	Up 3	1																	1		
pm 27.60	Up 4																				
pm 27.60	Up 5																				
pm 27.60	Down 1			1					1			2									
pm 27.60	Down 2					1									1						
pm 27.60	Down 3			1		2															
pm 27.60	Down 4	1																1	1		
pm 27.60	Down 5																				
Prosser	Up 1																				
Prosser	Up 2									1											
Prosser	Up 3				27	47					3							3			
Prosser	Up 4			26	1						2							3			
Prosser	Up 5					9					1		1					3			
Prosser	Down 1				30	23			1		1							10			
Prosser	Down 2					78					1			1							
Prosser	Down 3				20	8			3									6			
Prosser	Down 4					23												15			
Prosser	Down 5	1				6					1										
Pm 27.14	Up 1					1										5	7		4		
Pm 27.14	Up 2		1														21		7		
Pm 27.14	Up 3					5		1									17				
Pm 27.14	Up 4					1													7		
Pm 27.14	Up 5					5											18		4		
Pm 27.14	Down 1																7		2		
Pm 27.14	Down 2																2		1		
Pm 27.14	Down 3																1				
Pm 27.14	Down 4																		5		
Pm 27.14	Down 5								3												
Little Castle	Up 1.2	1		7		15															1
Little Castle	Up 2.2			148		1															1
Little Castle	Up 3					61			1												
Little Castle	Up 4					18															
Little Castle	Up 5.1			81		1	2														4
Little Castle	Down 1			160		6															

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Nectopschye LEPTOCERIDAE*	*Mystacides? LEPTOCERIDAE*	LEPIDOSTOMATIDAE	LEPIDOSTOMATIDAE Pupae	*Lepidostoma*	*Apatania APATANIIDAE*	*Goeracea GOERIDAE*	LIMNEPHILIDAE	*Clostoeca*	*Dicosmoecus*	*Ecclisomyia*	*Manophylax APATANIIDAE?*	*Gumaga SERICOSTOMATIDAE*	*Tinodes PSYCHOMYIIDAE*	UENOIDAE	*Farula*	*Neophylax*	*Neothremma*	HYDROPTILIDAE Pupae	HYDROPTILIDAE Larvae
Little Castle	Down 2			112			4		8											3	
Little Castle	Down 3					63															
Little Castle	Down 4					188	1														
Little Castle	Down 5			103		4														8	
Castle Cr.	Up1					2															
Castle Cr.	Up 2.1			12		10															
Castle Cr.	Up 3					5															
Castle Cr.	Up 4					11	3											1			
Castle Cr.	Up 5.2	5		25		16															
Castle Cr.	Down 1			46																	
Castle Cr.	Down 2					12															
Castle Cr.	Down 3					571												1			
Castle Cr.	Down 4					55															
Castle Cr.	Down 5			292														2			
Root Cr.	Up 1					3															
Root Cr.	Up 2			113		4															
Root Cr.	Up 3					252															
Root Cr.	Up 4					192															
Root Cr.	Up 5			95																	
Root Cr.	Down 1					2												3			
Root Cr.	Down 2																				
Root Cr.	Down 3					20												3			1
Root Cr.	Down 4					29	4											5			
Root Cr.	Down 5																			1	
North Fork Mad River	Up 1			2														1			
North Fork Mad River	Up 2					1															
North Fork Mad River	Up 3					8															
North Fork Mad River	Up 4																				
North Fork Mad River	Up 5																	3			
North Fork Mad River	Down 1			2														1			
North Fork Mad River	Down2			8																	
North Fork Mad River	Down3	2				19															
North Fork Mad River	Down4	3				1															
North Fork Mad River	Down 5		1	5		10												1			
Sycamore Ck.	Up1																				
Sycamore Ck.	Up 2																				
Sycamore Ck.	Up 3																				
Sycamore Ck.	Up 4																				
Sycamore Ck.	Up 5																				
Sycamore Ck.	Down 1																				
Sycamore Ck.	Down 2																				
Sycamore Ck.	Down 3																				
Sycamore Ck.	Down 4																				
Sycamore Ck.	Down 5																				

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Ochrotrichia*	*Hydroptila*	COLEOPTERA Adult	*Enochrus HYDROPHILIDAE*	DYTISCIDAE	*Oreodytes*	*Brachyvatus*	*Hygrotus*	*Rhantus*	PSEPHENIDAE	*Acneus*	*Eubrianax*	ELMIDAE	*Ampumixis*	*Cleptelmis*	*Heterlimnius*	*Narpus*	*Neoelmis*	*Lara*	*Optioservus*
Functional Feeding Group		PI	PI			PI				PI	SC	SC	SC	CG	CG	CG	CG	CG	CG	SH	CG
Sagehen Ck.	Up 1																				
Sagehen Ck	Up 2			1										1							
Sagehen Ck	Up 3												1	5							4
Sagehen Ck	Up 4																				10
Sagehen Ck.	Up 5																				5
Sagehen Ck.	Down 1												1								
Sagehen Ck.	Down 2																				3
Sagehen Ck.	Down 3													4							7
Sagehen Ck.	Down 4												1								3
Sagehen Ck.	Down 5												1	4		2					
pm 27.60	Up 1																	9			
pm 27.60	Up 2																				
pm 27.60	Up 3													3							
pm 27.60	Up 4																				
pm 27.60	Up 5															2					
pm 27.60	Down 1													1		2					
pm 27.60	Down 2															1					
pm 27.60	Down 3													3			2				
pm 27.60	Down 4											1						2			2
pm 27.60	Down 5													12							
Prosser	Up 1																				
Prosser	Up 2													5							2
Prosser	Up 3													18							46
Prosser	Up 4																				23
Prosser	Up 5																				7
Prosser	Down 1																				4
Prosser	Down 2													23							35
Prosser	Down 3													11							4
Prosser	Down 4																				17
Prosser	Down 5																				3
Pm 27.14	Up 1													2			10				1
Pm 27.14	Up 2																	1			
Pm 27.14	Up 3			1														5			3
Pm 27.14	Up 4																	1		3	25
Pm 27.14	Up 5											2									
Pm 27.14	Down 1									1										1	
Pm 27.14	Down 2																				
Pm 27.14	Down 3																				1
Pm 27.14	Down 4																			3	8
Pm 27.14	Down 5					1											2				
Little Castle	Up 1.2	1														1			2		
Little Castle	Up 2.2												1	4	1	2			17		
Little Castle	Up 3		3										2	3					5		
Little Castle	Up 4												2						7		4
Little Castle	Up 5.1	1	1											3					18		
Little Castle	Down 1												1						7		

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Ochrotrichia*	*Hydroptila*	COLEOPTERA Adult	*Enochrus HYDROPHILIDAE*	DYTISCIDAE	*Oreodytes*	*Brachyvatus*	*Hygrotus*	*Rhantus*	PSEPHENIDAE	*Acneus*	*Eubrianax*	ELMIDAE	*Ampumixis*	*Cleptelmis*	*Heterlimnius*	*Narpus*	*Neoelmis*	*Lara*	*Optioservus*
Little Castle	Down 2												1	1					1		
Little Castle	Down 3												1						4		8
Little Castle	Down 4														1				12		6
Little Castle	Down 5												2	1					4		
Castle Cr.	Up1										9		1	5		65					
Castle Cr.	Up 2.1												1			7					
Castle Cr.	Up 3																				4
Castle Cr.	Up 4												1		1				11		4
Castle Cr.	Up 5.2										2			3					3		
Castle Cr.	Down 1													1							
Castle Cr.	Down 2													1					6		3
Castle Cr.	Down 3		2																21		5
Castle Cr.	Down 4		2																3		1
Castle Cr.	Down 5													1		3					
Root Cr.	Up 1													1					2		
Root Cr.	Up 2			17												28					
Root Cr.	Up 3										1			3							1
Root Cr.	Up 4		1																2		
Root Cr.	Up 5													1							
Root Cr.	Down 1																				
Root Cr.	Down 2													3							
Root Cr.	Down 3																		2		
Root Cr.	Down 4												4		1				5		1
Root Cr.	Down 5													4					4		
North Fork Mad River	Up 1													1		2					
North Fork Mad River	Up 2			2										5	1						
North Fork Mad River	Up 3																		2		
North Fork Mad River	Up 4																	2			
North Fork Mad River	Up 5													9				2			
North Fork Mad River	Down 1													6		1			2		
North Fork Mad River	Down2															1			2		
North Fork Mad River	Down3																		2		
North Fork Mad River	Down4																		7		
North Fork Mad River	Down 5												4	21		2	1				4
Sycamore Ck.	Up1				2			2													
Sycamore Ck.	Up 2					1															
Sycamore Ck.	Up 3																				
Sycamore Ck.	Up 4				1																
Sycamore Ck.	Up 5																				
Sycamore Ck.	Down 1				1																
Sycamore Ck.	Down 2				4	1		1	1												
Sycamore Ck.	Down 3		5		5		2														
Sycamore Ck.	Down 4				5																
Sycamore Ck.	Down 5				2																

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Zaitsevia*	*Rhizelmis*	*Optioservus ADULT*	*Zaitsevia Adult*	*Zorobrediva adult?*	*Narpus Adult?*	*Rhizelmis Adults*	*Anchycteis PTILODACTYLIDAE*	DIPTERAN LARVAE	DIPTERAN PUPAE	Ephyridae (mangled)	BLEPHARICERIDAE	*Dixella DIXIDAE*	*Meringodixa*	*Dixa*	SIMULIDAE Larvae	SIMULIDAE Pupae	*Twinnia*	*Simulium*	*Prosimulium*
Functional Feeding Group		SC	SC	SC	SC	SC	CG	SC	SH		CG	CG	SC	CG	CG	CG	FC		FC	FC	FC
Sagehen Ck.	Up 1		18																	2	
Sagehen Ck	Up 2																				
Sagehen Ck	Up 3										3						3			2	3
Sagehen Ck	Up 4			2																	
Sagehen Ck.	Up 5		84								1										1
Sagehen Ck.	Down 1		11								4										1
Sagehen Ck.	Down 2		13								1										
Sagehen Ck.	Down 3	1		1							2						1				
Sagehen Ck.	Down 4										3									6	
Sagehen Ck.	Down 5										5						2				1
pm 27.60	Up 1										12					1			1		4
pm 27.60	Up 2										22						2				
pm 27.60	Up 3		1								5						5				7
pm 27.60	Up 4	1									2									7	16
pm 27.60	Up 5										12					1					1
pm 27.60	Down 1										9									2	4
pm 27.60	Down 2										12			1						5	7
pm 27.60	Down 3		1								18						9				14
pm 27.60	Down 4										6									2	
pm 27.60	Down 5										14						8				
Prosser	Up 1		3								1										
Prosser	Up 2										1										
Prosser	Up 3			5							4						2				1
Prosser	Up 4			3							1									2	
Prosser	Up 5										6						1	1		2	1
Prosser	Down 1		15								10										
Prosser	Down 2			1							8						1				
Prosser	Down 3			4							6						1	2		2	1
Prosser	Down 4			3														2		4	
Prosser	Down 5		6																		
Pm 27.14	Up 1										10						131			25	6
Pm 27.14	Up 2		4								8									1	5
Pm 27.14	Up 3										11			1			12			1	42
Pm 27.14	Up 4								2		6					1				11	
Pm 27.14	Up 5		1								4						44		1	4	219
Pm 27.14	Down 1		3								3						4			1	10
Pm 27.14	Down 2		3																		3
Pm 27.14	Down 3										1										8
Pm 27.14	Down 4								3		6									50	
Pm 27.14	Down 5										2			1			27			6	24
Little Castle	Up 1.2										4										
Little Castle	Up 2.2				1												19			22	34
Little Castle	Up 3			1	1						6						9			1	
Little Castle	Up 4			1							3									110	10
Little Castle	Up 5.1				2						10										
Little Castle	Down 1																1			1	

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	*Zaitsevia*	*Rhizelmis*	*Optioservus ADULT*	*Zaitsevia Adult*	*Zorobrediva adult?*	*Narpus Adult?*	*Rhizelmis Adults*	*Anchycteis PTILODACTYLIDAE*	DIPTERAN LARVAE	DIPTERAN PUPAE	Ephyridae (mangled)	BLEPHARICERIDAE	*Dixella DIXIDAE*	*Meringodixa*	*Dixa*	SIMULIDAE Larvae	SIMULIDAE Pupae	*Twinnia*	*Simulium*	*Prosimulium*
Little Castle	Down 2																				
Little Castle	Down 3	2		1							3									1792	
Little Castle	Down 4		3	2	3	2					4									61	10
Little Castle	Down 5				1						16						2			1	3
Castle Cr.	Up1		1								14						3				
Castle Cr.	Up 2.1										6			1							
Castle Cr.	Up 3	2									1									6	
Castle Cr.	Up 4			1							8										
Castle Cr.	Up 5.2		1	1							13										2
Castle Cr.	Down 1			1										1			1			2	
Castle Cr.	Down 2																1				
Castle Cr.	Down 3										1									1	
Castle Cr.	Down 4			1							1										
Castle Cr.	Down 5		1																		
Root Cr.	Up 1	1		1				2			1		2				2				
Root Cr.	Up 2		3														2			2	6
Root Cr.	Up 3			2	2												10			2	8
Root Cr.	Up 4			2	1								1							15	2
Root Cr.	Up 5			1	1												2				5
Root Cr.	Down 1																1				1
Root Cr.	Down 2										3						2				
Root Cr.	Down 3										4										1
Root Cr.	Down 4										6									24	
Root Cr.	Down 5							1			3						2				1
North Fork Mad River	Up 1		8				8							1			2				9
North Fork Mad River	Up 2		6											1			2				
North Fork Mad River	Up 3	8			6						1									4	
North Fork Mad River	Up 4	3		1	1						1									5	
North Fork Mad River	Up 5			4	15						2						13			11	17
North Fork Mad River	Down 1	4			27		1				4						11			3	13
North Fork Mad River	Down2				4									1			2				2
North Fork Mad River	Down3	3		2	1																
North Fork Mad River	Down4	23		1	31						2				3					3	
North Fork Mad River	Down 5		2	1	1					1	3			1							
Sycamore Ck.	Up1											1									
Sycamore Ck.	Up 2											1								1	
Sycamore Ck.	Up 3											1								25	
Sycamore Ck.	Up 4																				
Sycamore Ck.	Up 5																			4	
Sycamore Ck.	Down 1																				
Sycamore Ck.	Down 2																				
Sycamore Ck.	Down 3																			2	
Sycamore Ck.	Down 4									1											
Sycamore Ck.	Down 5																			1	

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	TIPULIDAE	*Tipula*	*Antocha*	*Dicranota*	*Hexatoma*	*Hesperoconopa*	*Pedicia*	CHIRONOMIDAE	CERATOPOGONIDAE	*Forcipomyiinae*	*Bezzia*	*Glutops PELECORHYNCHIDAE*	*Maruina PSYCHODIDAE*	*Pericoma PSYCHODIDAE*	EMPIDIDAE	*Chelifera*	*Clinocera*	*Hemerodromia*	TABANIDAE	THAUMALEIDAE
Functional Feeding Group		SH	SH	CG	P	P	CG	P	CG	P	CG	P	PI	SC	CG	P	P	P	P	PI	SC
Sagehen Ck.	Up 1			1					36												
Sagehen Ck	Up 2	1		3					29												
Sagehen Ck	Up 3			1			1		41			1				3					
Sagehen Ck	Up 4								11			1									
Sagehen Ck.	Up 5			2					31			1						1			
Sagehen Ck.	Down 1			4			2		43			2				1					
Sagehen Ck.	Down 2			9					37			1									
Sagehen Ck.	Down 3			16		2	1		51			27				1					
Sagehen Ck.	Down 4			1					12												
Sagehen Ck.	Down 5			1					27												
pm 27.60	Up 1								342			1	3					1	1		
pm 27.60	Up 2	1			4	1			451			3									
pm 27.60	Up 3								87									2			
pm 27.60	Up 4								110			1						1			
pm 27.60	Up 5								376			3					1	2			
pm 27.60	Down 1				5				259	9								1			
pm 27.60	Down 2	2							132			2									
pm 27.60	Down 3				7				388			3	3			2		7			
pm 27.60	Down 4				1				110		1	2						2			
pm 27.60	Down 5	1							94	9											
Prosser	Up 1	1					8		143			7			1		1				
Prosser	Up 2					22			203			2									
Prosser	Up 3					4	6		165												
Prosser	Up 4						3		181			24					2		1	1	
Prosser	Up 5								210			1									
Prosser	Down 1								129			4					1				
Prosser	Down 2				3	4			309			18									
Prosser	Down 3					1	2		152			6					1				
Prosser	Down 4						1		155			1									
Prosser	Down 5						2		46			2					1				
Pm 27.14	Up 1	2			2	3		1	902		1	9	4								
Pm 27.14	Up 2				1				289		1	21	3	1							
Pm 27.14	Up 3				2				192		1	5	11								
Pm 27.14	Up 4								146			11	4				1				
Pm 27.14	Up 5				4				361		1	2	1								
Pm 27.14	Down 1				6				265			4	1							1	
Pm 27.14	Down 2								123			1									
Pm 27.14	Down 3				2				100			3	2								
Pm 27.14	Down 4				1	2			245			28	5								
Pm 27.14	Down 5	1							155		1	2									
Little Castle	Up 1.2					2			127			4									
Little Castle	Up 2.2			4	1	3	3		205			3							1		
Little Castle	Up 3			1					95			1									
Little Castle	Up 4			3		2			52			3									
Little Castle	Up 5.1						1		374			9									
Little Castle	Down 1					1			126			2									

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	TIPULIDAE	*Tipula*	*Antocha*	*Dicranota*	*Hexatoma*	*Hesperoconopa*	*Pedicia*	CHIRONOMIDAE	CERATOPOGONIDAE	*Forcipomyiinae*	*Bezzia*	*Glutops* PELECORHYNCHIDAE	*Maruina* PSYCHODIDAE	*Pericoma* PSYCHODIDAE	EMPIDIDAE	*Chelifera*	*Clinocera*	*Hemerodromia*	TABANIDAE	THAUMALEIDAE
Little Castle	Down 2				1		2		38			1									
Little Castle	Down 3			2					80			1						2			
Little Castle	Down 4					2			152			20	1					2			
Little Castle	Down 5								102			3									
Castle Cr.	Up1				1		3		160		3	7					1				
Castle Cr.	Up 2.1			3	1				199		1	1					1				
Castle Cr.	Up 3				1				65												
Castle Cr.	Up 4			10	4				183		1	3									
Castle Cr.	Up 5.2			16	1				231								1	1			
Castle Cr.	Down 1			2					16												
Castle Cr.	Down 2								51			1									
Castle Cr.	Down 3			1		1			69												
Castle Cr.	Down 4			1					20												
Castle Cr.	Down 5								52			1									
Root Cr.	Up 1								167		1	4									
Root Cr.	Up 2					1			238			2									1
Root Cr.	Up 3						1		172			4						1			
Root Cr.	Up 4								49												
Root Cr.	Up 5								47		1	1									
Root Cr.	Down 1								222												1
Root Cr.	Down 2								104		1										
Root Cr.	Down 3			4					78		1										
Root Cr.	Down 4			4					168		8							6			
Root Cr.	Down 5			2	1				57		2										
North Fork Mad River	Up 1								24												
North Fork Mad River	Up 2					1			20									1			
North Fork Mad River	Up 3								32												
North Fork Mad River	Up 4								19												
North Fork Mad River	Up 5						3		215			1									
North Fork Mad River	Down 1						3		659			2									
North Fork Mad River	Down2								43												
North Fork Mad River	Down3								42												
North Fork Mad River	Down4								63			1									
North Fork Mad River	Down 5				1				202			2									
Sycamore Ck.	Up1								41												
Sycamore Ck.	Up 2								46												
Sycamore Ck.	Up 3								91												
Sycamore Ck.	Up 4		1						44												
Sycamore Ck.	Up 5								91												
Sycamore Ck.	Down 1								16												
Sycamore Ck.	Down 2								53												
Sycamore Ck.	Down 3		1						71			2									
Sycamore Ck.	Down 4	1	1						25												
Sycamore Ck.	Down 5		1						29			7									

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	STRATIOMYIDAE	*Euparyphus*	*Caloparyphus*	EMERGING DIPTERANS	PYRALIDAE	*Crambus*	MISCELLANEOUS	CLADOCERA	COPEPODA	MITES	NEMATODES	OLIGOCHAETES	OSTRACODA	*Gyraulus PLANORBIDAE*	*Physa PHYSIDAE*	HYDROBIIDAE	*Hydrobia*	BIVALVE	FLATWORM	TERRESTRIALS
Functional Feeding Group		CG	CG	CG		SH	SH														
Sagehen Ck.	Up 1									2			2								10
Sagehen Ck	Up 2									3	8	3	3	1					1		1
Sagehen Ck	Up 3									4	15	4	22						3		14
Sagehen Ck	Up 4									1	14	1	5		1					1	1
Sagehen Ck.	Up 5									7		1	5						2		9
Sagehen Ck.	Down 1									2		4	10	2	1				1		14
Sagehen Ck.	Down 2									1	1	4	10	1							12
Sagehen Ck.	Down 3										12	4	12	1					1	1	8
Sagehen Ck.	Down 4									1	7	3	5	1							2
Sagehen Ck.	Down 5				2					3		5			1						10
pm 27.60	Up 1				2					6		4	20	3							5
pm 27.60	Up 2									14	19	5	36	16				1	5	9	9
pm 27.60	Up 3									8	7	1	5	7						1	16
pm 27.60	Up 4				5					5	20	2	1							13	3
pm 27.60	Up 5				6					13	2	4	15	8							3
pm 27.60	Down 1				5					22		2	8	7							7
pm 27.60	Down 2									17	12		9	8						3	
pm 27.60	Down 3	1								46	17	8	14	23						3	3
pm 27.60	Down 4					1				9	10	3	9							4	
pm 27.60	Down 5				3					1		3	4	1			1				7
Prosser	Up 1								2	1	16		3								
Prosser	Up 2								1	3	12	4	1								4
Prosser	Up 3								1		96	75	96						1		
Prosser	Up 4									1	17	2	54								
Prosser	Up 5									3	10	3	18								
Prosser	Down 1	1							6	2	34	8	39								5
Prosser	Down 2								3	4	58	34	76	3					1		4
Prosser	Down 3								3	2	22	6	44	1							4
Prosser	Down 4								1	2	16	1	12	1							
Prosser	Down 5								4	3	6	9	28						1		3
Pm 27.14	Up 1									74	62	20	616	26					2	2	2
Pm 27.14	Up 2				1		1			15	7	34	33	6							2
Pm 27.14	Up 3									9	49	2	88	4						2	
Pm 27.14	Up 4									4	14	20	176	16					1		3
Pm 27.14	Up 5									31	13	2	15	2						3	1
Pm 27.14	Down 1				1					89	10	1	59	6							
Pm 27.14	Down 2									18	1		15	1							
Pm 27.14	Down 3									8	5		15	2							
Pm 27.14	Down 4	1								17	26	43	44	2						4	1
Pm 27.14	Down 5									25	9	4	17	3						2	5
Little Castle	Up 1.2				1					2	61		39	2							
Little Castle	Up 2.2				2						129		12	2							
Little Castle	Up 3										60										4
Little Castle	Up 4										2		4								
Little Castle	Up 5.1										222	1	15	2						1	2
Little Castle	Down 1										106		9	3							2

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	STRATIOMYIDAE	*Euparyphus*	*Caloparyphus*	EMERGING DIPTERANS	PYRALIDAE	*Crambus*	MISCELLANEOUS	CLADOCERA	COPEPODA	MITES	NEMATODES	OLIGOCHAETES	OSTRACODA	*Gyraulus PLANORBIDAE*	*Physa PHYSIDAE*	HYDROBIIDAE	*Hydrobia*	BIVALVE	FLATWORM	TERRESTRIALS
Little Castle	Down 2										50		9		1						1
Little Castle	Down 3	1									32		7								
Little Castle	Down 4										11		25	5							1
Little Castle	Down 5										77		71	7							
Castle Cr.	Up1									3	6		21	5						3	
Castle Cr.	Up 2.1				2					2	74		5	9						2	3
Castle Cr.	Up 3										4										3
Castle Cr.	Up 4										24		4								1
Castle Cr.	Up 5.2				3						72		3	4						2	2
Castle Cr.	Down 1										17										
Castle Cr.	Down 2										27										
Castle Cr.	Down 3										42										
Castle Cr.	Down 4										3		1								
Castle Cr.	Down 5										42		1								
Root Cr.	Up 1									1	51	1		1							3
Root Cr.	Up 2				2						53										1
Root Cr.	Up 3										16										1
Root Cr.	Up 4																				
Root Cr.	Up 5										33										2
Root Cr.	Down 1				3						3									1	
Root Cr.	Down 2							1			7		8								2
Root Cr.	Down 3										7										
Root Cr.	Down 4										30										6
Root Cr.	Down 5										19		9								4
North Fork Mad River	Up 1										25		2							1	6
North Fork Mad River	Up 2										22	9	9								2
North Fork Mad River	Up 3										28		8			1					1
North Fork Mad River	Up 4								6	1	7		22							1	1
North Fork Mad River	Up 5				3						99	1	13	2						1	7
North Fork Mad River	Down 1										125		95								3
North Fork Mad River	Down2									1	14		4								1
North Fork Mad River	Down3										26		2	1							1
North Fork Mad River	Down4										38		10	1							1
North Fork Mad River	Down 5	1			2						91		42								
Sycamore Ck.	Up1			1									289	6							
Sycamore Ck.	Up 2									6	2		423	27		1					
Sycamore Ck.	Up 3			1						9	2		412	9							
Sycamore Ck.	Up 4			2						1			782	1							
Sycamore Ck.	Up 5									1			700	14							
Sycamore Ck.	Down 1									1	2		279	3							
Sycamore Ck.	Down 2			1									557	72							
Sycamore Ck.	Down 3		1	3	1					7			359	131							
Sycamore Ck.	Down 4		1	1	1					1			289	54		1					
Sycamore Ck.	Down 5			1						6			406	18							

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	Tadpoles	Total insects	Total individuals	Insect Species richness	TOTAL SH	TOTAL P	TOTAL SC	TOTAL FC	TOTAL CG	TOTAL PI
Functional Feeding Group											
Sagehen Ck.	Up 1		85	99	16	5	12	23	2	43	0
Sagehen Ck	Up 2		53	73	12	3	10	0	0	39	0
Sagehen Ck	Up 3		131	193	32	5	13	13	11	89	0
Sagehen Ck	Up 4		55	81	10	0	25	15	0	15	0
Sagehen Ck.	Up 5		201	226	31	7	26	104	3	61	0
Sagehen Ck.	Down 1		122	156	22	6	14	15	3	80	0
Sagehen Ck.	Down 2		115	145	25	4	15	22	6	66	0
Sagehen Ck.	Down 3		149	188	27	2	43	12	1	91	0
Sagehen Ck.	Down 4		59	78	19	7	6	6	8	32	0
Sagehen Ck.	Down 5		80	99	23	3	12	4	6	53	0
pm 27.60	Up 1		835	877	35	73	78	17	6	659	0
pm 27.60	Up 2		809	923	32	53	97	16	5	636	0
pm 27.60	Up 3		371	416	28	28	33	3	12	295	0
pm 27.60	Up 4		483	527	26	177	31	4	24	242	0
pm 27.60	Up 5		731	780	25	82	73	13	1	556	0
pm 27.60	Down 1		638	684	31	75	19	5	13	499	0
pm 27.60	Down 2		524	573	31	84	40	1	15	383	0
pm 27.60	Down 3		975	1090	43	211	130	13	25	596	0
pm 27.60	Down 4		397	432	30	88	61	6	2	239	0
pm 27.60	Down 5		353	370	28	27	27	6	14	263	0
Prosser	Up 1		183	206	16	1	14	6	0	160	0
Prosser	Up 2		258	283	17	1	37	6	2	208	0
Prosser	Up 3		492	761	36	81	22	63	32	262	0
Prosser	Up 4		307	381	26	29	33	33	18	193	0
Prosser	Up 5		296	330	32	12	6	16	19	233	0
Prosser	Down 1		385	479	32	71	18	36	20	184	0
Prosser	Down 2		678	861	44	89	49	44	44	438	0
Prosser	Down 3		325	407	33	39	12	14	35	215	0
Prosser	Down 4		312	345	22	28	13	38	29	204	0
Prosser	Down 5		119	173	25	12	10	10	5	77	0
Pm 27.14	Up 1		2077	2881	46	326	120	22	165	1420	4
Pm 27.14	Up 2		692	793	35	188	49	39	13	390	3
Pm 27.14	Up 3		779	933	36	234	32	22	66	402	11
Pm 27.14	Up 4		590	824	24	112	44	32	11	381	4
Pm 27.14	Up 5		1230	1297	31	223	17	25	271	687	1
Pm 27.14	Down 1		617	783	33	162	27	15	15	391	3
Pm 27.14	Down 2		334	369	14	102	8	6	3	214	0
Pm 27.14	Down 3		189	219	18	54	12	2	8	110	2
Pm 27.14	Down 4		716	858	31	173	48	19	59	406	5
Pm 27.14	Down 5		503	568	26	96	36	1	59	306	1
Little Castle	Up 1.2		179	283	19	23	6	9	0	134	2
Little Castle	Up 2.2		1280	1423	41	166	42	58	229	780	1
Little Castle	Up 3		590	654	32	80	16	25	108	352	3
Little Castle	Up 4		386	392	23	21	17	15	155	175	0
Little Castle	Up 5.1		699	942	34	102	35	63	5	477	6
Little Castle	Down 1		361	481	23	170	6	27	4	153	0

APPENDIX D. (continued) Invertebrates collected at sample sites.

Place	Position	Tadpoles	Total insects	Total individuals	Insect Species richness	TOTAL SH	TOTAL P	TOTAL SC	TOTAL FC	TOTAL CG	TOTAL PI
Little Castle	Down 2		247	308	28	122	14	49	1	58	0
Little Castle	Down 3		3308	3347	31	105	21	119	2369	691	0
Little Castle	Down 4		1369	1411	34	243	131	87	370	533	1
Little Castle	Down 5		367	522	34	116	17	48	13	147	0
Castle Cr.	Up1		409	448	34	18	14	36	5	316	0
Castle Cr.	Up 2.1		417	513	27	39	9	22	3	334	0
Castle Cr.	Up 3		191	198	20	20	8	9	36	117	0
Castle Cr.	Up 4		498	527	29	23	27	30	27	383	0
Castle Cr.	Up 5.2		668	751	35	65	19	31	65	472	0
Castle Cr.	Down 1		232	249	19	46	2	15	63	106	0
Castle Cr.	Down 2		355	382	23	23	18	15	1	100	0
Castle Cr.	Down 3		996	1038	21	572	11	38	37	335	2
Castle Cr.	Down 4		170	174	14	58	3	2	5	99	2
Castle Cr.	Down 5		420	463	18	293	9	14	1	103	0
Root Cr.	Up 1		927	984	32	5	19	37	542	323	0
Root Cr.	Up 2		1320	1374	34	136	38	84	626	414	0
Root Cr.	Up 3		1084	1101	33	257	18	39	421	345	0
Root Cr.	Up 4		709	709	23	195	13	34	313	153	1
Root Cr.	Up 5		753	788	28	95	29	52	351	226	0
Root Cr.	Down 1		330	334	17	18	7	4	9	285	0
Root Cr.	Down 2		338	356	20	30	9	19	44	232	0
Root Cr.	Down 3		180	187	22	22	5	14	8	126	1
Root Cr.	Down 4		539	575	26	42	18	22	52	399	0
Root Cr.	Down 5		137	169	24	5	4	7	13	104	1
North Fork Mad River	Up 1		537	571	28	7	25	17	45	443	0
North Fork Mad River	Up 2		266	308	28	13	13	18	16	203	0
North Fork Mad River	Up 3		346	384	22	13	16	26	9	281	0
North Fork Mad River	Up 4		365	404	20	4	14	9	22	315	0
North Fork Mad River	Up 5		860	983	40	12	50	169	109	513	0
North Fork Mad River	Down 1		1423	1646	35	82	81	123	49	1082	0
North Fork Mad River	Down2		282	302	22	14	5	21	11	231	0
North Fork Mad River	Down3		243	274	19	37	11	14	2	179	0
North Fork Mad River	Down4		626	676	27	31	34	73	31	455	0
North Fork Mad River	Down 5		368	503	34	24	17	22	0	297	0
Sycamore Ck.	Up1		53	348	7	0	0	0	0	51	2
Sycamore Ck.	Up 2		60	519	6	0	0	0	1	58	1
Sycamore Ck.	Up 3		173	605	6	0	0	0	28	145	0
Sycamore Ck.	Up 4		102	886	6	1	0	0	1	100	0
Sycamore Ck.	Up 5	1	113	829	4	0	0	0	4	109	0
Sycamore Ck.	Down 1		159	446	5	1	0	0	3	155	0
Sycamore Ck.	Down 2		62	691	5	0	0	0	0	59	3
Sycamore Ck.	Down 3		118	615	12	1	2	0	2	105	7
Sycamore Ck.	Down 4		48	393	8	2	1	0	0	43	0
Sycamore Ck.	Down 5		63	493	8	1	7	0	2	53	0

APPENDIX E. Drymass of invertebrates collected at sample sites.

Stream	Highway	Postmile	Position	Baetidae	Heptageniidae	Ephemerellidae	Leptophlebiidae	Ameletidae	Tricorythidae	Capniidae	Pteronarcyidae	Peltoperlidae	Nemouridae
North Fork Mad River	299	8.2	Up 1	.0053	.0046	.0006	.0000					.0002	.0001
North Fork Mad River	299	8.2	Up 2	.0030	.0004	.0000							.0000
North Fork Mad River	299	8.2	Up 5	.0040	.0021	.0027	.0005			.0000			.0000
North Fork Mad River	299	8.2	Down 1	.0063	.0017	.0006	.0000						.0016
North Fork Mad River	299	8.2	Down 2	.0027		.0002	.0008						.0004
North Fork Mad River	299	8.2	Down 5	.0010	.0014	.0001	.0000						.0000
Little Castle	Interstate 5	67	Up 1	.0023	.0068	.0002	.0002						.0004
Little Castle	Interstate 5	67	Up 2	.0041	.0031	.0001	.0006						.0004
Little Castle	Interstate 5	67	Up 5	.0034	.0002	.0035							.0002
Little Castle	Interstate 5	67	Down 1	.0001	.0020	.0000	.0000						.0000
Little Castle	Interstate 5	67	Down 2	.0003	.0036	.0008							.0000
Little Castle	Interstate 5	67	Down 5	.0010	.0004	.0022		.0002					.0000
Root	Interstate 5	64	Up 1	.0034	.0001	.0012							.0001
Root	Interstate 5	64	Up 2	.0033	.0006	.0028							.0002
Root	Interstate 5	64	Up 5	.0035	.0023	.0009							
Root	Interstate 5	64	Down 1	.0016	.0005								.0008
Root	Interstate 5	64	Down 2	.0028	.0002	.0003	.0002						.0013
Root	Interstate 5	64	Down 5	.0012	.0000	.0000							.0000
Castle	Interstate 5	61	Up 1		.0014		.0000	.0003	.0001				
Castle	Interstate 5	61	Up 2	.0131	.0004	.0021				.0000			.0000
Castle	Interstate 5	61	Up 5	.0036	.0014	.0006	.0000						.0000
Castle	Interstate 5	61	Down 1	.0030	.0000	.0000							
Castle	Interstate 5	61	Down 2	.0001	.0003	.0010	.0000						
Castle	Interstate 5	61	Down 5	.0010	.0018	.0013							
PM 27.14	49	27.14	Up 1	.0269	.0123							.0008	.0030
PM 27.14	49	27.14	Up 2	.0208	.0000			.0040		.0001			.0021
PM 27.14	49	27.14	Up 5	.0152	.0003	.0006					.1736	.0025	.0025
PM 27.14	49	27.14	Down 1	.0139	.0000		.0002			.0000	.0832	.0000	.0010
PM 27.14	49	27.14	Down 2	.0185									.0013
PM 27.14	49	27.14	Down 5	.0083	.0063							.0003	.0007
PM 27.60	49	27.6	Up 1	.0240	.0159	.0005	.0000						.0010
PM 27.60	49	27.6	Up 2	.0138	.0062	.0002	.0034	.0080				.0000	.0004
PM 27.60	49	27.6	Up 5	.0182	.0039	.0035	.0004	.0008				.0001	.0000
PM 27.60	49	27.6	Down 1	.0204			.0006						.0004
PM 27.60	49	27.6	Down 2	.0201	.0051		.0000						.0010
PM 27.60	49	27.6	Down 4	.0124	.0012	.0010	.0000			.0000			.0020
Sagehen Ck.	89	8.7	Up 1	.0005	.0030								.0000
Sagehen Ck.	89	8.7	Up 2	.0000		.0000							
Sagehen Ck.	89	8.7	Up 5	.0011	.0101	.0088	.0000	.0017					.0000
Sagehen Ck.	89	8.7	Down 1	.0002	.0012								.0000
Sagehen Ck.	89	8.7	Down 2	.0030	.0053							.0001	
Sagehen Ck.	89	8.7	Down 5	.0007	.0053	.0023	.0000						
Prosser	89	3.4	Up 1		.0038	.0000							
Prosser	89	3.4	Up 2		.0045								
Prosser	89	3.4	Up 5	.0001	.0042	.0012							.0000
Prosser	89	3.4	Down 1	.0007	.0025	.0059							.0002
Prosser	89	3.4	Down 2	.0015	.0064	.0585	.0002						.0002
Prosser	89	3.4	Down 5	.0045	.0108	.0083	.0000						.0000
Sycamore	101	12.1	Up 1	.0000					.0000				
Sycamore	101	12.1	Up 2	.0010									
Sycamore	101	12.1	Up 5	.0012					.0000				
Sycamore	101	12.1	Down 1	.0083									.0000
Sycamore	101	12.1	Down 2	.0001									
Sycamore	101	12.1	Down 5	.0022									

APPENDIX E. (Continued) Drymass of invertebrates collected at sample sites.

Stream	Highway	Postmile	Position	Perlidae	Perlodidae	Chloroperlidae	Philopotamidae	Leptoceridae	Hydropsychidae	Brachycentridae	Rhyacophilidae	Glossosomatidae	Lepidostomatidae
North Fork Mad River	299		Up 1	.0102		.0001			.0013		.0001	.0000	.0000
North Fork Mad River	299		Up 2	.0011					.0000		.0004	.0002	.0000
North Fork Mad River	299		Up 5	.0831		.0000			.0020		.0014	.0000	.0000
North Fork Mad River	299		Down 1	.0111					.0000		.0012		.0001
North Fork Mad River	299		Down 2						.0000		.0000	.0002	.0000
North Fork Mad River	299		Down 5	.0042		.0000		.0000			.0040		.0010
Little Castle	Interstate 5	67	Up 1	.0002		.0011	.0000					.0032	.0000
Little Castle	Interstate 5	67	Up 2	.0015					.0000		.0000		.0016
Little Castle	Interstate 5	67	Up 5	.0088	.0010	.0000			.0004		.0006	.0010	.0031
Little Castle	Interstate 5	67	Down 1	.0003	.0000								.0042
Little Castle	Interstate 5	67	Down 2	.0002	.0005	.0000			.0000			.0000	.0067
Little Castle	Interstate 5	67	Down 5	.0048	.0000				.0000		.0000	.0055	.0051
Root	Interstate 5	64	Up 1	.0055	.0015	.0000			.0047			.0000	.0115
Root	Interstate 5	64	Up 2	.0234	.0016				.0320		.0031	.0004	.0038
Root	Interstate 5	64	Up 5	.0017	.0010	.0000			.0229		.0003	.0011	.0028
Root	Interstate 5	64	Down 1	.0102					.0000		.0072		.0038
Root	Interstate 5	64	Down 2	.0006					.0006		.0040		.0002
Root	Interstate 5	64	Down 5	.0000		.0002			.0000		.0000	.0015	.0001
Castle	Interstate 5	61	Up 1					.0000					.0019
Castle	Interstate 5	61	Up 2	.0046	.0004				.0068	.0002	.0003	.0000	.0032
Castle	Interstate 5	61	Up 5	.0013		.0005		.0004	.0021		.0050	.0061	.0052
Castle	Interstate 5	61	Down 1	.0000					.0030		.0005	.0016	.0006
Castle	Interstate 5	61	Down 2	.0014	.0001	.0007		.0039			.0023	.0000	
Castle	Interstate 5	61	Down 5	.0022		.0000					.0000		.0083
PM 27.14	49	27.14	Up 1	.0184		.0029			.0000		.0114		.0018
PM 27.14	49	27.14	Up 2	.0810		.0000			.0086		.0009	.0001	.0001
PM 27.14	49	27.14	Up 5	.0216					.0051	.0002	.0095		.0006
PM 27.14	49	27.14	Down 1	.0169		.0000					.0002		
PM 27.14	49	27.14	Down 2	.0143							.0000		.0000
PM 27.14	49	27.14	Down 5	.0107			.0004		.0026		.0000		
PM 27.60	49	27.6	Up 1	.0892		.0060	.0010				.0050		.0000
PM 27.60	49	27.6	Up 2	.0690		.0035		.0006	.0000	.0012	.0015		
PM 27.60	49	27.6	Up 5	.0271		.0044					.0008		.0000
PM 27.60	49	27.6	Down 1	.0201		.0003	.0005	.0004		.0000	.0030		.0000
PM 27.60	49	27.6	Down 2	.0277		.0014			.0000		.0099		.0003
PM 27.60	49	27.6	Down 4	.0062		.0035		.0000		.0004	.0011		
Sagehen Ck.	89	8.7	Up 1	.0000		.0017				.0002	.0000		.0000
Sagehen Ck.	89	8.7	Up 2			.0013				.0000			.0001
Sagehen Ck.	89	8.7	Up 5	.0000	.0031	.0013			.0012	.0007	.0043		
Sagehen Ck.	89	8.7	Down 1	.0481		.0014			.0004				
Sagehen Ck.	89	8.7	Down 2	.0189		.0013			.0055	.0006	.0000		
Sagehen Ck.	89	8.7	Down 5			.0002			.0026	.0001	.0000		.0000
Prosser	89	3.4	Up 1			.0003						.0005	
Prosser	89	3.4	Up 2	.0000		.0011			.0035		.0000		
Prosser	89	3.4	Up 5		.0011	.0016			.0150	.0065		.0000	
Prosser	89	3.4	Down 1	.0004	.0017	.0048			.0171		.0000		.0610
Prosser	89	3.4	Down 2		.0014	.0044			.0580	.0028	.0003		.0499
Prosser	89	3.4	Down 5		.0020	.0014			.0058		.0001		.0088
Sycamore	101		Up 1										
Sycamore	101		Up 2										
Sycamore	101		Up 5										
Sycamore	101		Down 1						.0000				
Sycamore	101		Down 2										
Sycamore	101		Down 5						.0000				

APPENDIX E. (Continued) Drymass of invertebrates collected at sample sites.

Stream	Highway	Postmile	Position	Limnephilidae	Seriocostomatidae	Uenoidae	Hydroptilidae	Polycentropodidae	Megaloptera	Elmidae	Hydrophilidae	Psephenidae	Dytiscidae
North Fork Mad River	299		Up 1	.0111						.0026			
North Fork Mad River	299		Up 2							.0003			
North Fork Mad River	299		Up 5	.0295						.0041			
North Fork Mad River	299		Down 1	.0127						.0070			
North Fork Mad River	299		Down 2							.0009			
North Fork Mad River	299		Down 5	.0164						.0017		.0045	
Little Castle	Interstate 5	67	Up 1	.0127			.0000	.0019	.0149	.0065		.0009	
Little Castle	Interstate 5	67	Up 2						.0282	.0010		.0012	
Little Castle	Interstate 5	67	Up 5				.0012			.0013			
Little Castle	Interstate 5	67	Down 1							.0005		.0000	
Little Castle	Interstate 5	67	Down 2				.0007		.0135	.0000		.0001	
Little Castle	Interstate 5	67	Down 5				.0028			.0003		.0000	
Root	Interstate 5	64	Up 1							.0003			
Root	Interstate 5	64	Up 2							.0043			
Root	Interstate 5	64	Up 5							.0005			
Root	Interstate 5	64	Down 1	.0224									
Root	Interstate 5	64	Down 2							.0000			
Root	Interstate 5	64	Down 5	.0035						.0004			
Castle	Interstate 5	61	Up 1				.0000			.0004			
Castle	Interstate 5	61	Up 2				.0000			.0023		.0000	
Castle	Interstate 5	61	Up 5							.0001			
Castle	Interstate 5	61	Down 1							.0001			
Castle	Interstate 5	61	Down 2				.0000			.0011			
Castle	Interstate 5	61	Down 5	.0064						.0001			
PM 27.14	49	27.14	Up 1			.0053				.0008			
PM 27.14	49	27.14	Up 2			.0060				.0010			
PM 27.14	49	27.14	Up 5			.0036				.0002		.0000	
PM 27.14	49	27.14	Down 1			.0020				.0002			.0002
PM 27.14	49	27.14	Down 2			.0002				.0008			
PM 27.14	49	27.14	Down 5			.0000				.0000			.0004
PM 27.60	49	27.6	Up 1	.0009		.0082			.0028	.0015			
PM 27.60	49	27.6	Up 2						.0563				
PM 27.60	49	27.6	Up 5							.0000			
PM 27.60	49	27.6	Down 1							.0001			
PM 27.60	49	27.6	Down 2							.0001			
PM 27.60	49	27.6	Down 4	.0020					.1565	.0007		.0002	
Sagehen Ck.	89	8.7	Up 1	.0032						.0019			
Sagehen Ck.	89	8.7	Up 2							.0000			
Sagehen Ck.	89	8.7	Up 5	.0001	.0020				.0000	.0027			
Sagehen Ck.	89	8.7	Down 1	.0000						.0007		.0015	
Sagehen Ck.	89	8.7	Down 2	.0005						.0004			
Sagehen Ck.	89	8.7	Down 5							.0000		.0047	
Prosser	89	3.4	Up 1							.0000			
Prosser	89	3.4	Up 2	.0014						.0000			
Prosser	89	3.4	Up 5	.0049						.0000			
Prosser	89	3.4	Down 1	.0249						.0027			
Prosser	89	3.4	Down 2	.0091						.0032		.0000	
Prosser	89	3.4	Down 5	.0068						.0005			
Sycamore	101		Up 1								.0015		.0054
Sycamore	101		Up 2										.0000
Sycamore	101		Up 5										
Sycamore	101		Down 1								.0002		
Sycamore	101		Down 2								.0009		.0042
Sycamore	101		Down 5								.0002		

APPENDIX E. (Continued) Drymass of invertebrates collected at sample sites.

Stream	Highway	Postmile	Position	Chironomidae	Ceratopogonidae	Tipulidae	Empididae	Simulidae	Pelecorhynchidae	Stratiomyidae	Ephyridae	Psychodidae	Dixidae
North Fork Mad River	299		Up 1	.0019				.0002					.0000
North Fork Mad River	299		Up 2	.0002		.0002							.0008
North Fork Mad River	299		Up 5	.0023	.0001	.0004		.0015					
North Fork Mad River	299		Down 1	.0106			.0009	.0000					.0000
North Fork Mad River	299		Down 2	.0018				.0000					.0000
North Fork Mad River	299		Down 5	.0060	.0000	.0000							.0000
Little Castle	Interstate 5	67	Up 1	.0046	.0006		.0001	.0000					
Little Castle	Interstate 5	67	Up 2	.0051		.0027	.0000						.0000
Little Castle	Interstate 5	67	Up 5	.0072	.0006								
Little Castle	Interstate 5	67	Down 1	.0029	.0000	.0030							
Little Castle	Interstate 5	67	Down 2	.0011		.0015							
Little Castle	Interstate 5	67	Down 5	.0027	.0000			.0000					
Root	Interstate 5	64	Up 1	.0015	.0000								
Root	Interstate 5	64	Up 2	.0058	.0000	.0000		.0004					
Root	Interstate 5	64	Up 5	.0037	.0000			.0001					
Root	Interstate 5	64	Down 1	.0020				.0000					
Root	Interstate 5	64	Down 2	.0021	.0000			.0000					
Root	Interstate 5	64	Down 5	.0010	.0000	.0000		.0000					
Castle	Interstate 5	61	Up 1	.0041	.0000	.0042							
Castle	Interstate 5	61	Up 2	.0086	.0000	.0008		.0013					
Castle	Interstate 5	61	Up 5	.0081		.0018							
Castle	Interstate 5	61	Down 1	.0000		.0002		.0008					.0000
Castle	Interstate 5	61	Down 2	.0012									
Castle	Interstate 5	61	Down 5		.0000								
PM 27.14	49	27.14	Up 1	.0103	.0002	.0002		.0020					.0003
PM 27.14	49	27.14	Up 2	.0073	.0005			.0000	.0013				
PM 27.14	49	27.14	Up 5	.0063	.0000	.0005		.0049	.0012				
PM 27.14	49	27.14	Down 1	.0065	.0000	.0002		.0003	.0004				
PM 27.14	49	27.14	Down 2		.0000			.0000					
PM 27.14	49	27.14	Down 5	.0021	.0002			.0013					
PM 27.60	49	27.6	Up 1	.0097	.0000		.0015	.0000	.0007				.0004
PM 27.60	49	27.6	Up 2	.0146	.0001	.0002	.0007	.0000					
PM 27.60	49	27.6	Up 5	.0158	.0004		.0001	.0000					.0000
PM 27.60	49	27.6	Down 1	.0068			.0000	.0000					
PM 27.60	49	27.6	Down 2	.0031	.0001			.0000					.0003
PM 27.60	49	27.6	Down 4	.0040	.0006	.0001	.0000	.0000					
Sagehen Ck.	89	8.7	Up 1	.0012				.0004					
Sagehen Ck.	89	8.7	Up 2	.0010		.0019							
Sagehen Ck.	89	8.7	Up 5			.0008	.0001	.0000					
Sagehen Ck.	89	8.7	Down 1	.0028	.0000	.0037		.0000					
Sagehen Ck.	89	8.7	Down 2	.0013	.0000	.0015							
Sagehen Ck.	89	8.7	Down 5	.0011		.0010		.0000					
Prosser	89	3.4	Up 1	.0026	.0002	.0003	.0000					.0001	
Prosser	89	3.4	Up 2	.0030	.0000	.0030							
Prosser	89	3.4	Up 5		.0000			.0029					
Prosser	89	3.4	Down 1	.0039	.0000								
Prosser	89	3.4	Down 2	.0044	.0003	.0045							
Prosser	89	3.4	Down 5	.0016	.0002	.0000	.0000	.0000					
Sycamore	101		Up 1	.0005						.0000	.0002		
Sycamore	101		Up 2	.0008				.0000		.0014			
Sycamore	101		Up 5	.0090				.0000					
Sycamore	101		Down 1	.0001									
Sycamore	101		Down 2	.0011						.0005			
Sycamore	101		Down 5	.0010		.0019		.0001		.0010			

APPENDIX E. (Continued) Drymass of invertebrates collected at sample sites.

Stream	Highway	Postmile	Position	Pyralidae	Oligochaetes	Tadpole	Amphipoda	Miscellaneous
North Fork Mad River	299		Up 1					.0002
North Fork Mad River	299		Up 2		.0000			.0000
North Fork Mad River	299		Up 5					.0029
North Fork Mad River	299		Down 1		.0007			.0054
North Fork Mad River	299		Down 2					.0000
North Fork Mad River	299		Down 5		.0009			.0019
Little Castle	Interstate 5	67	Up 1		.0000			.0016
Little Castle	Interstate 5	67	Up 2					.0030
Little Castle	Interstate 5	67	Up 5					.0063
Little Castle	Interstate 5	67	Down 1					.0029
Little Castle	Interstate 5	67	Down 2		.0000			.0009
Little Castle	Interstate 5	67	Down 5		.0001			.0014
Root	Interstate 5	64	Up 1					.0013
Root	Interstate 5	64	Up 2					.0015
Root	Interstate 5	64	Up 5					.0016
Root	Interstate 5	64	Down 1					.0002
Root	Interstate 5	64	Down 2		.0004			.0000
Root	Interstate 5	64	Down 5		.0000			.0000
Castle	Interstate 5	61	Up 1		.0000			.0026
Castle	Interstate 5	61	Up 2					.0039
Castle	Interstate 5	61	Up 5					.0031
Castle	Interstate 5	61	Down 1					.0000
Castle	Interstate 5	61	Down 2					.0010
Castle	Interstate 5	61	Down 5					.0009
PM 27.14	49	27.14	Up 1		.0642			.0007
PM 27.14	49	27.14	Up 2	.0241	.0076			.0016
PM 27.14	49	27.14	Up 5		.0000			.0025
PM 27.14	49	27.14	Down 1		.0285			.0021
PM 27.14	49	27.14	Down 2		.0000			.0000
PM 27.14	49	27.14	Down 5		.1166			.0019
PM 27.60	49	27.6	Up 1		.0134			.0027
PM 27.60	49	27.6	Up 2		.1050			.0296
PM 27.60	49	27.6	Up 5		.0254			.0013
PM 27.60	49	27.6	Down 1		.0035			.0026
PM 27.60	49	27.6	Down 2		.0058			.0014
PM 27.60	49	27.6	Down 4		.0040			.0028
Sagehen Ck.	89	8.7	Up 1		.0000			.0008
Sagehen Ck.	89	8.7	Up 2		.0000			.0000
Sagehen Ck.	89	8.7	Up 5		.0000			.0008
Sagehen Ck.	89	8.7	Down 1		.0000			.0049
Sagehen Ck.	89	8.7	Down 2		.8660			.0026
Sagehen Ck.	89	8.7	Down 5					.0019
Prosser	89	3.4	Up 1		.0001			.0004
Prosser	89	3.4	Up 2		.0000			.0000
Prosser	89	3.4	Up 5		.0005			.0000
Prosser	89	3.4	Down 1		.0026			.0038
Prosser	89	3.4	Down 2		.0060			.0019
Prosser	89	3.4	Down 5		.0081			.0015
Sycamore	101		Up 1		.0057			.0004
Sycamore	101		Up 2		.0055			.0014
Sycamore	101		Up 5		.0179	.0100		.0003
Sycamore	101		Down 1		.0131		.0125	.0002
Sycamore	101		Down 2		.0098			.0029
Sycamore	101		Down 5		.0051			.0011

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