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Figure S1: Map of Sydney Harbour and the position of the Hawkesbury and Georges Rivers. Circles and diamonds indicate locations sampled in the Parramatta and Lane Cover Rivers, respectively. Running east to west, the locations within the Parramatta River were: Iron Cove (33°52'14"S 151° 9'2"E), Five Dock Bay (33°51'10"S 151° 8'32"E), Hen and Chicken Bay (33°51'37"S 151° 7'7"E), Morrisons Bay (33°49'49"S 151° 6'43"E), Majors Bay (33°50'33"S 151° 6'4"E), Brays Bay (33°49'53"S 151° 5'33"E) and Duck Creek (33°49'49"S 151° 6'4"E). Running north to south, the locations within the Lane Cove river were: Field of Mars (33°49'3"S 151° 8'35"E), Boronia Park (33°49'37"S 151° 8'38"E), Tambourine Bay (33°49'43"S 151° 9'40"E) and Woodford Bay (33°49'51"S 151°10'24"E). The coordinates for the locations within the other estuaries were: Hawkesbury River (Cogra Bay 33°31'23"S 151°13'23"E; Porto Bay Bay 33°33'51"S 151°13'17"E) and Georges River (Kyle Bay 33°59'28"S 151° 6'8"E and Coronation Bay 33°59'54"S 151° 4'38"E).

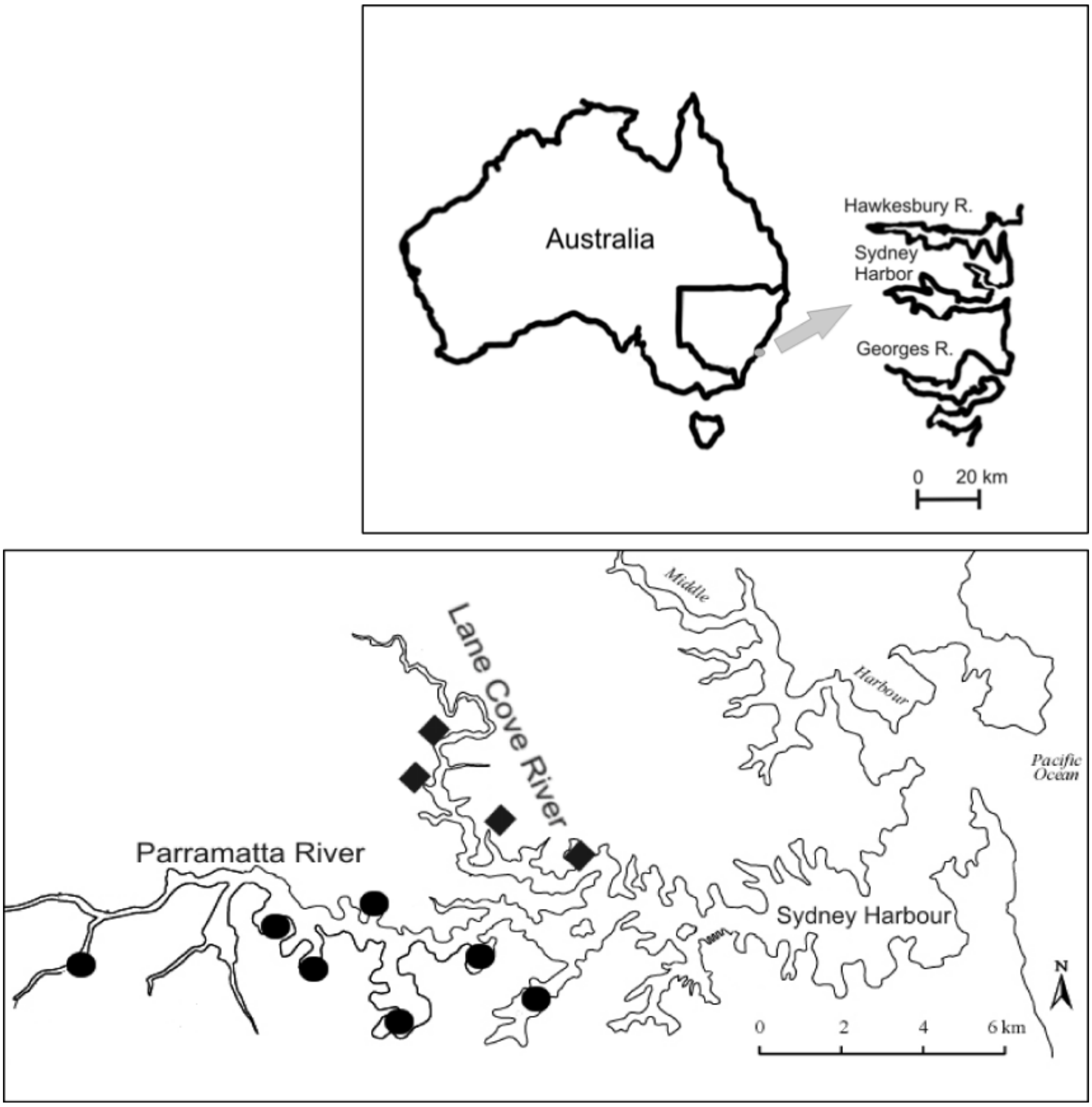

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Table S1. Organic contaminants analysed in sediments

Class	LOD, mg/kg	Method	Specific chemicals or fractions
Polycyclic aromatic hydrocarbons (PAHs)	0.01	USEPA methods 3550/8270	Naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b)-fluoranthene, benzo(k)-fluoranthene, benzo(a)pyrene, indeno(1,2,3- cd)pyrene, dibenz(ah)anthracene, and benzo(ghi)perylene).
Total petroleum hydrocarbons (TPHs)	25-100	USEPA methods 8260/8015	C6-C9, C10-C14, C15-C28, C29-C36 fractions
BTEX	0.25-0.5	USEPA methods 8260/8015	Benzene, toluene, ethyl benzene, m,p-xylene, o–xylene
Organochlorine pesticides (OCs)	0.001	USEPA methods 8081/8082	Hexachlorobenzene (HCB), heptachlor, heptachlor epoxide, aldrin, gamma-BHC (lindane), alpha-BHC, delta-BHC, delta-BHC, trans-chlordane, cis-chlordane, oxychlordane, dieldrin, pp-DDE, pp-DDD, pp-DDT, endrin, endrin-aldehyde, endrin-ketone, alpha-endosulfan, beta-endosulfan, endosulfan sulfate, methoxychlor
Organophosphate pesticides (OPs)	0.005	USEPA methods 8081/8082	Dichlorvos, demeton-s-methyl, diazinon, dimethoate, chlorpyrifos, chlorpyrifos methyl, malathion (maldison), fenthion, ethion, fenitrothion, chlorfenvinphos (e), chlorfenvinphos (z), parathion (ethyl), parathion methyl, pirimiphos methyl, pirimiphos ethyl, azinphos-methyl, azinphos ethyl
Total polychlorinated biphenyls	0.01	USEPA methods 8081/8082	PCB Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260

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Table S2. Mean abundance and summary statistics for each taxon per location for each of the four estuaries. S.E.= standard error.

taxa	Georges River mean ± 1S.E	Hawkesbury River mean ± 1S.E	Lane Cove River mean ± 1S.E	Parramatta River mean ± 1S.E
Alpheidae	<0.1 ± <0.1	0.1 ± 0.1	0.2 ± 0.2	0.1 ± 0.1
Amphipod (unidentified)	0.1 ± 0.1	<0.1 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1
Anthuridae	<0.1 ± <0.1	0.1 ± 0.1	<0.1 ± <0.1	0.1 ± 0.1
Aoridae	<0.1 ± <0.1	1.0 ± <0.1	<0.1 ± <0.1	0.1 ± 0.1
Bivalve (unidentified)	5.0 ± 1.2	0.8 ± 0.8	8.0 ± 7.4	0.2 ± 0.1
Brachyura	0.3 ± 0.3	<0.1 ± <0.1	<0.1 ± <0.1	0.1 ± 0.1
Callianassidae	<0.1 ± <0.1	0.4 ± 0.4	<0.1 ± <0.1	0.1 ± 0.1
Capitellidae	17 ± 6.8	2.8 ± 2.5	33 ± 3.0	31 ± 2.5
Caridea	<0.1 ± <0.1	<0.1 ± <0.1	0.1 ± 0.1	<0.1 ± <0.1
Cirratulidae	0.1 ± 0.1	3.8 ± 2.0	3.3 ± 3.3	0.3 ± 0.2
Cossuridae	0.1 ± 0.1	0.5 ± 0.5	0.1 ± 0.1	<0.1 ± <0.1
Diastyliidae	0.3 ± 0.3	<0.1 ± <0.1	0.3 ± 0.1	0.2 ± 0.1
Diplodontidae	<0.1 ± <0.1	13.0 ± 11.0	<0.1 ± <0.1	0.1 ± 0.1
Eunicidae	<0.1 ± <0.1	<0.1 ± <0.1	0.1 ± 0.1	0.1 ± 0.0
Galeommatidae	<0.1 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1	2.3 ± 2.3
Glyceridae	0.3 ± <0.1	<0.1 ± <0.1	0.2 ± 0.2	<0.1 ± <0.1
Gnathiidae	<0.1 ± <0.1	0.2 ± <0.1	<0.1 ± <0.1	0.5 ± <0.1
Goniadae	0.1 ± 0.1	<0.1 ± <0.1	0.3 ± 0.3	<0.1 ± <0.1
Hesionidae	<0.1 ± <0.1	<0.1 ± <0.1	0.3 ± 0.1	<0.1 ± <0.1
Liljeborgiidae	<0.1 ± <0.1	0.1 ± 0.1	<0.1 ± <0.1	<0.1 ± <0.1
Lumbrineridae	6.7 ± 1.3	10.6 ± 3.9	4.9 ± 4.4	1.2 ± 0.7
Mactriidae	<0.1 ± <0.1	1.3 ± 0.5	0.2 ± 0.2	0.5 ± 0.3
Magelonidae	5.0 ± 4.7	4.1 ± 4.1	1.8 ± 1.2	0.7 ± 0.4
Maldanidae	<0.1 ± <0.1	0.4 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1
Melitidae	<0.1 ± <0.1	0.1 ± 0.1	0.2 ± 0.2	7.2 ± 1.8
Mysidae	0.1 ± 0.1	0.1 ± 0.1	0.5 ± 0.4	0.1 ± 0.0
Nassariidae	0.3 ± 0.3	<0.1 ± <0.1	0.3 ± 0.1	<0.1 ± <0.1
Nematoda	0.7 ± 0.7	1.1 ± 0.1	0.7 ± 0.5	1.4 ± 0.9
Nemertea	1.8 ± 1.3	1.1 ± 0.4	0.9 ± 0.8	0.3 ± 0.2

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Table S2 (continued).

taxa	Georges River mean ± 1 S.E	Hawkesbury River mean ± 1 S.E	Lane Cove River mean ± 1 S.E	Parramatta River mean ± 1 S.E
Nephtyidae	7.6 ± 2.9	1.4 ± 0.1	0.8 ± 1.0	0.5 ± <0.1
Nereididae	0.6 ± 0.3	0.9 ± 0.4	1.9 ± 0.7	2.5 ± 1.3
Nuculidae	<0.1 ± <0.1	2.0 ± 0.5	<0.1 ± <0.1	0.0 ± 0.0
Oligochaeta	1.2 ± 0.6	0.4 ± 0.1	2.6 ± 1.5	5.4 ± 3.0
Opheliidae	0.9 ± 0.6	<0.1 ± <0.1	9.9 ± 6.6	22.0 ± 11.5
Orbiniidae	0.1 ± 0.1	<0.1 ± <0.1	<0.1 ± <0.1	0.0 ± 0.0
Ostracoda	0.8 ± 0.8	0.3 ± <0.1	0.5 ± 0.3	0.1 ± 0.1
Paracalliopiidae	<0.1 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1	0.2 ± 0.2
Paranthuridae	<0.1 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1	0.0 ± 0.0
Paraonidae	<0.1 ± <0.1	0.4 ± 0.4	<0.1 ± <0.1	<0.1 ± <0.1
Photidae	0.1 ± 0.1	0.1 ± 0.1	0.3 ± 0.3	4.6 ± 2.9
Phoxocephalidae	<0.1 ± <0.1	<0.1 ± <0.1	0.3 ± 0.3	0.1 ± 0.1
Phyllodocidae	<0.1 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1
Pilargidae	0.1 ± 0.1	0.9 ± 0.1	3.3 ± 1.9	0.1 ± 0.1
Polynoidae	0.1 ± 0.1	<0.1 ± <0.1	0.1 ± 0.1	<0.1 ± <0.1
Psammobiidae	0.1 ± 0.1	4.4 ± 1.6	0.9 ± 0.9	1.1 ± 0.9
Pseudotanaidae	<0.1 ± <0.1	<0.1 ± <0.1	<0.1 ± <0.1	0.0 ± 0.0
Sabellidae	10.9 ± 7.4	0.3 ± 0.3	12.5 ± 7.0	31.3 ± 16.0
Scalibregmidae	<0.1 ± <0.1	0.3 ± 0.3	<0.1 ± <0.1	<0.1 ± <0.1
Sigalionidae	<0.1 ± <0.1	0.3 ± 0.3	<0.1 ± <0.1	<0.1 ± <0.1
Spionidae	57.5 ± 19.0	20.0 ± 3.0	151 ± 97.4	161 ± 46.8
Syllidae	0.1 ± 0.1	0.5 ± 0.3	0.8 ± 0.8	0.9 ± 0.6
Tellinidae	0.7 ± 0.3	0.8 ± 0.5	0.9 ± 0.5	4.0 ± 1.4
Terebellidae	<0.1 ± <0.1	0.1 ± 0.1	0.1 ± 0.1	0.2 ± 0.1
Trichobranchidae	0.1 ± 0.1	7.9 ± 7.9	0.6 ± 0.6	0.0 ± 0.0

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Table S3. Environmental variables used in the each environmental matrix for CCA analysis. Variable selection was determined by forward-selection ($p<0.05$), all

Matrix	K	Particulate metals	Porewater variables	Organic contaminants	Grain size	Others
Basic	15	As, Cd, Co, Cr, Ni		DDT, dieldrin, heptachlor, PCBs, TPHs	gravels, fines	
TPM	21	Ag, As, Cr, Co, Cu, Zn	Cu, Cr, Ni, Zn, NH_3, HS^-	DDT, dieldrin, heptachlor, PAHs, PCBs, TPHs	gravels, fines	TOC
ASM	20	As, Cd, Co, Cu, Zn	Cu, Cr, Ni, Zn, NH_3, HS^-	DDT, dieldrin, heptachlor, PAHs, PCBs, TPHs	gravels, fines	TOC
ASM_f	21	Ag, As, Cd, Co, Cu, Ni	Cu, Cr, Ni, Zn, NH_3, HS^-	DDT, dieldrin, heptachlor, PAHs, PCBs, TPHs	gravels, fines	TOC
AVS-SEM	18	As, Cd, Co, Cr, Zn	NH_3, HS^-	DDT, dieldrin, heptachlor, PAHs, PCBs, TPHs	gravels, fines	TOC, AVS-SEM (top/bottom)
%TOC*	21	Ag, As, Co, Cr, Cu, Zn	Cu, Cr, Ni, Zn, NH_3, HS^-	DDT, dieldrin, heptachlor, PAHs, PCBs, TPHs	gravels, fines	TOC
Fe/Mn	23	Ag, As, Co, Cr, Fe, Zn	Cu, Cr, Fe, Ni, Zn, NH_3, HS^-	DDT, dieldrin, heptachlor, PAHs, PCBs, TPHs	gravels, fines	TOC

variables with a VIF > 20 were sequentially removed prior to analysis. K = number of environmental variables used in the analysis

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Table S4. Mean concentrations (mg/kg) of metals from the four estuaries extracted using three different procedures (TPM,ASM and ASM_f). Values are presented as the mean ± 1 S.E., minimum and maximum concentrations are supplied in parentheses; n= the number of replicates.

Metal	Extraction method	Parramatta River (n=28)	Lane Cove River (n=16)	Hawkesbury River (n=8)	Georges River (n=8)
Ag	TPM	1 ± 0.1 (0.3-2)	0.7 ± 0.1 (0.5-1)	0.5 ± <0.1 (0.5-0.5)	0.4 ± <0.1 (0.3-0.5)
	ASM	bdl	Bdl	bdl	bdl
	ASM_f	0.7 ± 0.1 (0.4-3)	0.6 ± 0.2 (0.4-1)	0.4 ± <0.1 (0.4-0.4)	0.4 ± <0.1(0.4-0.4)
As	TPM	23 ± 1.2 (13-32)	19 ± 3.1 (11-64)	28 ± 3.5 (21-47)	20 ± 0.92 (15-23)
	ASM	20 ± 0.4 (0.6-5)	2 ± 0.2 (1-4)	2 ± 0.2 (2-3)	3 ± 0.7 (2-8)
	ASM_f	8 ± 0.4 (4-10)	5 ± 0.1 (4-6)	5 ± 0.1 (4-5)	6 ± 0.2 (6-8)
Cd	TPM	2 ± 0.2 (0.6-4)	0.4 ± 0.1 (0.2-0.6)	0.2 ± <0.1 (0.2-0.2)	0.2 ± <0.1(0.2-0.2)
	ASM	0.8 ± 0.1 (0.2-2)	0.2 ± 0.1(0.2-0.3)	0.2 ± <0.1(0.2-0.2)	0.2 ± <0.1 (0.2-0.2)
	ASM_f	2 ± 0.2 (1-4)	0.6 ± 0.2 (0.3-0.9)	0.3 ± <0.1 (0.2-0.4)	0.4 ± <0.1 (0.3-0.6)
Co	TPM	10 ± 0.6 (5-20)	8 ± 0.5 (5-10)	20 ± 1 (10-20)	10 ± 0.8 (6-10)
	ASM	3 ± 0.2 (0.8-6)	1 ± 0.1 (0.6-2)	3 ± 0.3 (2-4)	2 ± 0.4 (1-5)
	ASM_f	9 ± 0.2 (7-10)	6 ± 0.1 (5-7)	10 ± 0.1 (10-10)	8 ± 0.4 (7-9)
Cr	TPM	150 ± 20 (30-330)	30 ± 1.9 (16-42)	19 ± 0.33 (17-20)	24 ± 1.4 (17-28)
	ASM	30 ± 4 (6-90)	4 ± 0 (1-7)	1 ± <1 (1-2)	4 ± 1 (2-9)
	ASM_f	110 ± 10 (35-240)	23 ± 1.5 (15-31)	10 ± 0.16 (10-11)	20 ± 1.0 (16-23)
Cu	TPM	250 ± 40 (70-800)	90 ± 6 (5-100)	20 ± 0.2 (10-20)	30 ± 2 (20-40)
	ASM	20 ± 4 (1-90)	10 ± 2 (20)	5 ± 0.4 (3-6)	9 ± 2 (20-40)
	ASM_f	200 ± 30 (80-700)	100 ± 5 (80-100)	10 ± <1 (10-20)	30 ± 2 (20-40)
Ni	TPM	20 ± 0.9 (5-20)	10 ± 0.7 (6-10)	10 ± 0.1 (10-10)	10 ± 0.6 (6-10)
	ASM	3 ± 0.3 (0.9-8)	2 ± 0.2 (0.6-3)	2 ± 0.1 (2-3)	2 ± 0.3 (1-4)
	ASM_f	10 ± 0.4 (9-20)	9 ± 0.3 (7-10)	8 ± 0.2 (8-9)	8 ± 0.7 (6-10)
Pb	TPM	330 ± 36 (160-770)	130 ± 8.2 (81-180)	28 ± 1.7 (22-32)	53 ± 2.1 (39-59)
	ASM	150 ± 13 (53-290)	66 ± 6.4 (27-100)	11 ± 0.3 (9-12)	33 ± 5.3 (20-62)
	ASM_f	330 ± 33 (170-720)	150 ± 6.9 (110-210)	44 ± 4.2 (30-68)	100 ± 6.9 (77-120)
Zn	TPM	130 ± 290 (390-9100)	330 ± 20 (210-420)	86 ± 3.5 (77-110)	170 ± 14 (110-220)
	ASM	530 ± 83 (180-2600)	150 ± 13 (64-220)	20± 1.4 (15-25)	82 ± 12 (47-150)
	ASM_f	1200 ± 280 (460-8100)	360 ± 10 (280-420)	60 ± 1.1 (58-66)	190 ± 15 (150-260)

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Table S5. Concentrations of organic contaminants, porewater metals, ammonia and sulfide, and sediment properties.

	Units	Parramatta River (n=28) mean ± 1S.E (min-max)	Lane Cove River (n=16) mean ± 1S.E (min-max)	Hawkesbury River (n=8) mean ±1 S.E (min-max)	Georges River (n=8) Mean ±1 S.E (min-max)
Organic contaminants					
Chlordane*	mg/kg	40 ± 4 (10-80)	60± 8 (10-120)	20 ± 5 (10-40)	10 ± 2 (10-20)
DDT*	mg/kg	40 ± 10 (10-220)	20 ± 3 (10-40)	10 ± 1 (10-20)	10 ± 3 (10-30)
Dieldrin	mg/kg	10 ± 2 (5-40)	9 ± 1 (5-10)	5 ± 0 (5-5)	5 ± 0 (5-5)
Heptachlor*	mg/kg	20 ± 1 (5-40)	30 ± 5 (5-70)	10 ± 3 (5-20)	8 ± 2 (5-10)
PAHs*	mg/kg	16700 ± 3100 (1980-56200)	9970 ± 1360 (2760-19300)	5150 ± 1400 (1730-12700)	1050 ± 127 (697-1640)
PCBs*	mg/kg	180 ± 17 (70-400)	120 ± 8 (82-190)	160 ± 35 (70-300)	140 ± 23 (70-230)
TPH*	mg/kg	900 ± 260 (140-6600)	340 ± 38 (140-650)	240 ± 69 (140-600)	140 ± 0 (140-140)
Porewater concentrations					
Cr	µg/L	2 ± 0.4 (1-8)	2 ± 0 (2-2)	2 ± 0 (2-2)	2 ± 0 (2-2)
Cu	µg/L	2 ± 0.2 (2-6)	2 ± 0 (2-2)	4 ± 0.3 (2-4)	2 ± 0 (2-2)
Ni	µg/L	5 ± 0.5 (2-10)	2 ± 0.3 (1-5)	8 ± 0.5 (6-10)	4 ± 0.2 (3-5)
Zn	µg/L	10 ± 3 (1-80)	9 ± 1 (4-10)	8 ± 1 (5-10)	4 ± 1 (2-10)
Fe	µg/L	3900 ± 450 (300-9200)	7400 ± 1000 (1800-14000)	170 ± 72 (30-660)	5800 ± 640 (3000-8600)
Mn	µg/L	190 ± 24 (20-440)	377 ± 73 (49-1120)	4600 ± 660 (2500-7100)	1900 ± 190 (1200-2700)
Total NH_3	µg/L	4600 ± 580 (1200-14000)	3500 ± 370 (1200-7500)	2300 ± 550 (660-5300)	4100 ± 440 (250-5800)
Total sulfide	µg/L	200 ± 120 (20-3400)	bdl	bdl	bdl

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Table S5 (continued).

Sediment properties	Units	Parramatta River (n=28) mean ± 1S.E (min-max)	Lane Cove River (n=16) mean ± 1S.E (min-max)	Hawkesbury River (n=8) mean ±1 S.E (min-max)	Georges River (n=8) Mean ±1 S.E (min-max)
gravel	% total	1 ± 0.3 (0-7)	0.6 ± 0.3 (0-4)	0.2 ± 0.2 (0-2)	0 ±0 (0-0.1)
sands	% total	30 ± 4 (4-70)	30 ± 5 (4-60)	20 ± 6 (0.3-40)	20 ± 4 (9-40)
fines	% total	70 ± 4 (30-100)	70 ± 5 (40-100)	80 ± 6 (60-100)	70 ± 4 (60-90)
AVS(top)	mmol/kg	10 ± 1 (0-20)	4 ± 1 (0-10)	0.4 ± 0.1 (0-1)	0.2 ± 0.1 (0-0.7)
AVS(bottom)	mmol/kg	40± 5 (0.4-100)			
SEM(top)	mmol/kg	9 ± 1 (3-40)			
SEM(bottom)	mmol/kg	10 ± 4 (3-100)			
TOC	%	4 ± 0.4 (1-10)			
Fe	mg/kg	22200 ± 1000 (10200-36300)			
Me	mg/kg	77 ± 3.7 (28-100)			
AVS(bottom)	Mmol/kg	40± 5 (0.4-100)	6 ± 2 (1-20)	0.5 ± 0.2 (0.1-1)	0.4 ± 0.2 (0.1-1)
SEM(top)	Mmol/kg	9 ± 1 (3-40)	3 ± 0.2 (1-4)	0.6 ± 0.1 (0.3-1)	2 ± 0.2 (0.9-3)
SEM(bottom)	Mmol/kg	10 ± 4 (3-100)	5 ± 0.5 (2-8)	1 ± 0.1 (0.6-0.9)	3 ± 0.3 (2-4)
TOC	%	4 ± 0.4 (1-10)	4 ± 0.4 (2-7)	4 ± 0.5 (3-6)	3 ± 0.2 (2-3)
Fe	mg/kg	22200 ± 1000 (10200-36300)	22800 ± 1300 (14300-30100)	35500 ± 200 (28900-47800)	22200 ± 1020 (16800-25300)
Mn	mg/kg	77 ± 3.7 (28-100)	47 ± 2.2 (32-60)	510 ± 28 (410-630)	120 ± 9.1 (75-160)