DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 TUCKER BOULEVARD, NORTH
ST. LOUIS, MISSOURI 63101

REPLY TO ATTENTION OF

PMF
Pre-81's.
Pine Ford
COE, MO.

LMSED-BF

20 January 1982

Big River Mine
MCD981156899
17.8
Pine Ford Proj.
1-20-82

Mr. Edward C. Vest
U. S. Environmental Protection Agency
314 East 11th Street
Kansas City, MO 64106

40111295
SUPERFUND RECORDS

Dear Mr. Vest:

For your advanced information I am inclosing tables and graphs furnished to us by representatives of the Columbia National Fisheries Research Laboratory during a briefing at our office on 22 December 1981.

Although detailed interpretations of these data are not available yet, in general terms, the testing program seems to indicate that:

1. The lead concentration in the water at normal flows is not sufficient for concern.

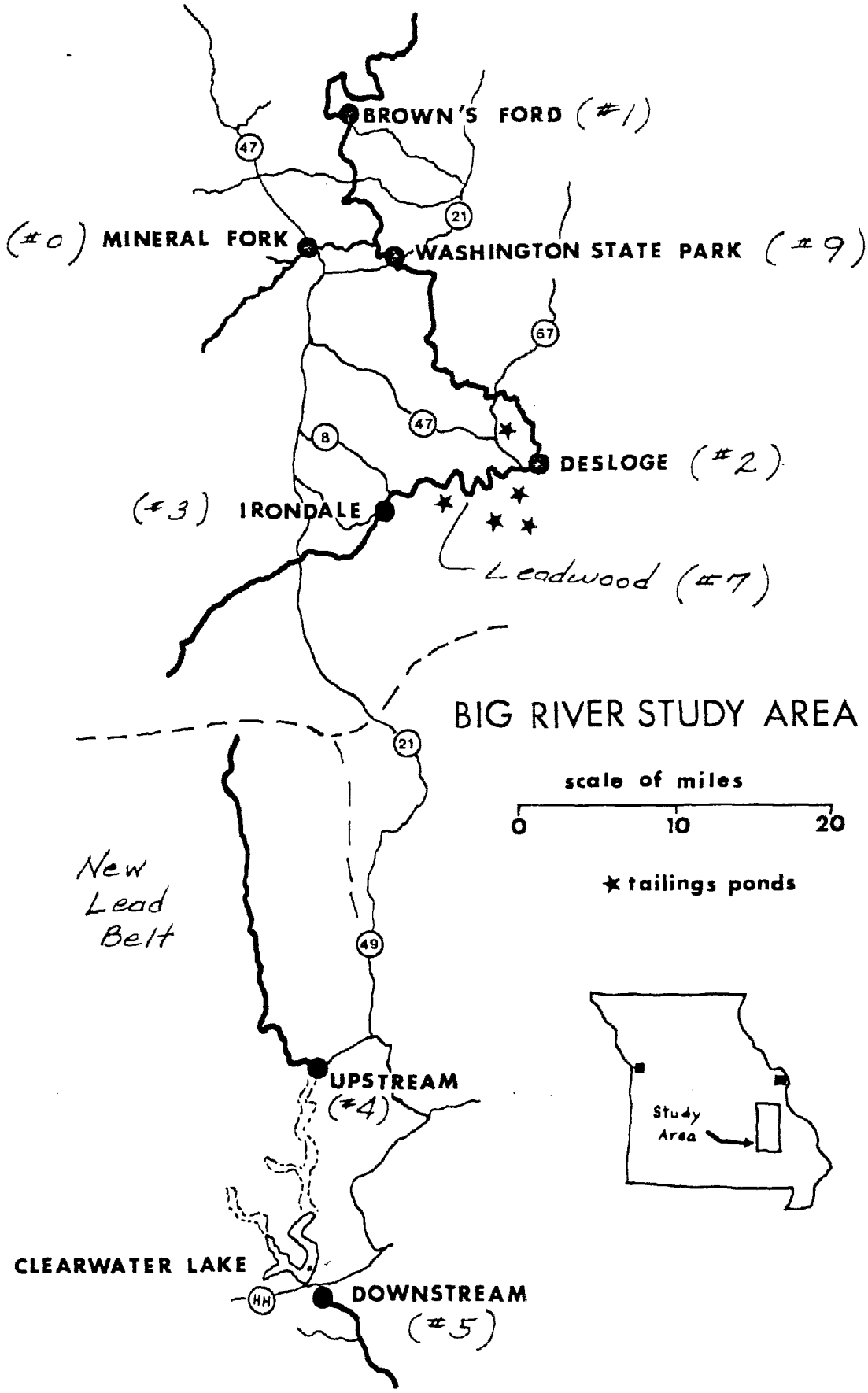
2. The total lead content in the riffle sediments decreases at successive sites downstream of Desloge as does the amount of material in a form that is most available to the biota.

3. For the smaller particle sizes represented by pool sediments, the lead content was highest at Brown's Ford as was the amount available to the biota.

4. Aquatic plant uptake of lead varies by sampling site but is highest in the vicinity of Desloge. Uptake is occuring at all the sites downstream.

5. Although there does not appear to be a consistent relationship in the concentration of lead in bass sampled at various sites, the bottom-feeding fish sampled at the site furthest downstream had the highest concentrations.

Sample Sites ( )



1 Incl.

Pocketbook Mussels (Lampsilis ventricosa) ug/g dry

SHELL

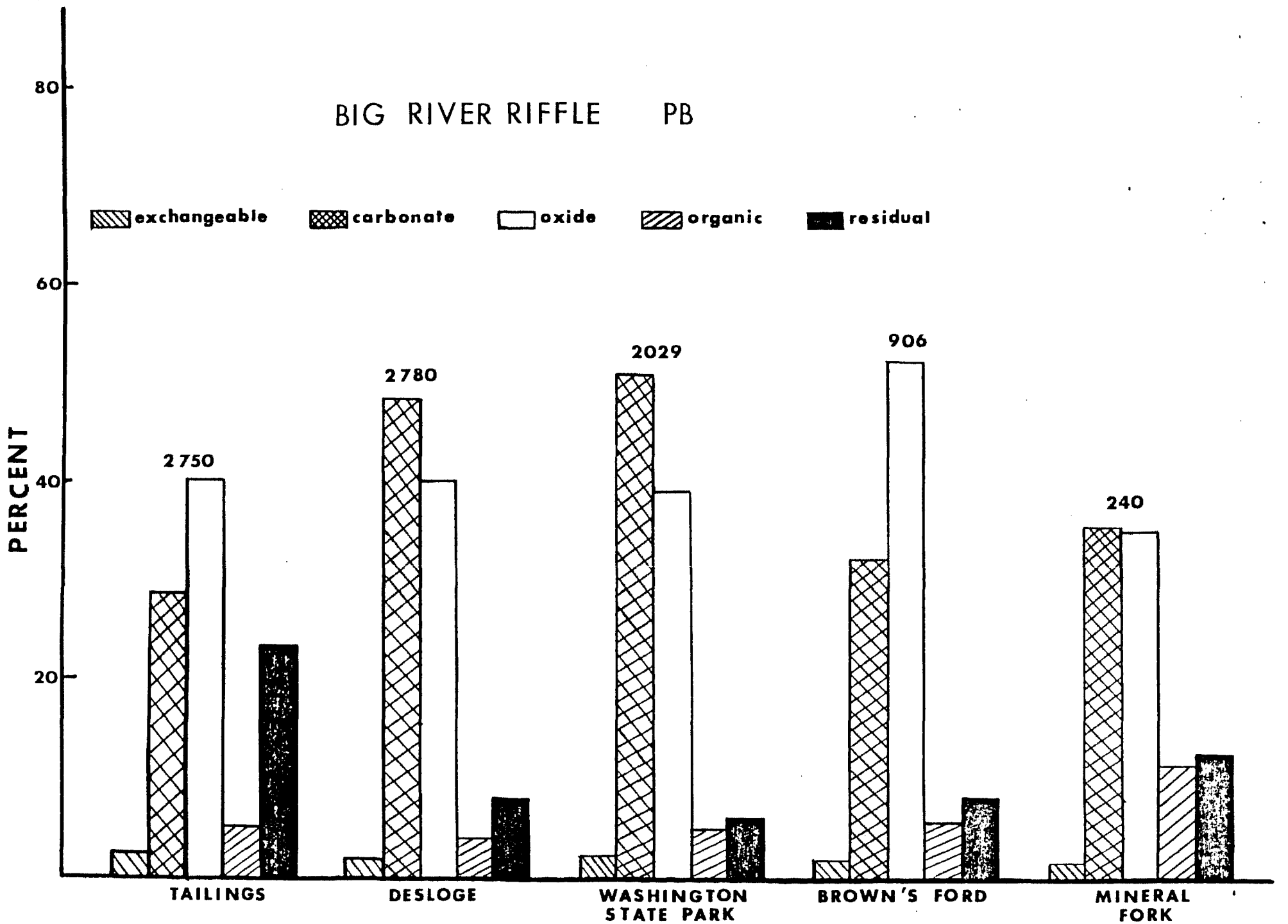
Location	Pb	Cd	Cu	Zn	Fe	Mn	Ba
MINERAL FORK (small)	1.20	0.16	2.70	8.00	49.5	115.0	480.0
BROWN'S FORD (big)	18.5	0.70	2.50	35.50	88.5	385.0	335.0
WASHINGTON STATE PARK (medium)	15.0	0.30	4.20	17.00	89.33	206.7	176.7
IRONDALE (small)	0.76	0.11	2.93	4.67	75.66	403.3	163.3
UPSTREAM CLEARWATER LAKE	0.36	0.12	1.35	5.50	125.0	195.0	84.5
DOWNSTREAM CLEARWATER LAKE (huge)	0.75	0.09	1.77	4.67	97.0	1066.7	350.0
LEADWOOD (medium)	11.6	0.51	4.10	61.50	140.0	250.0	130.0

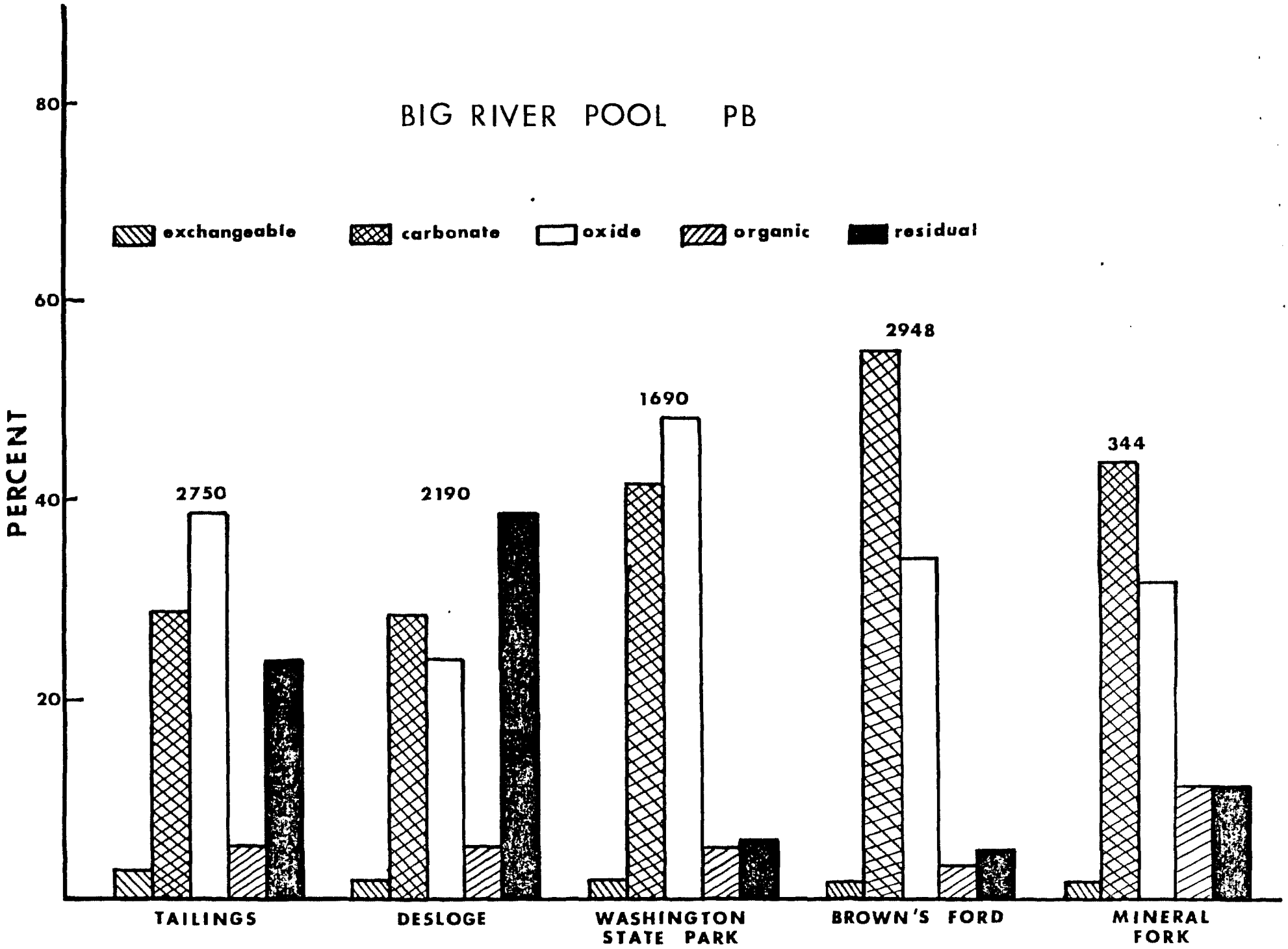
Soft Tissue

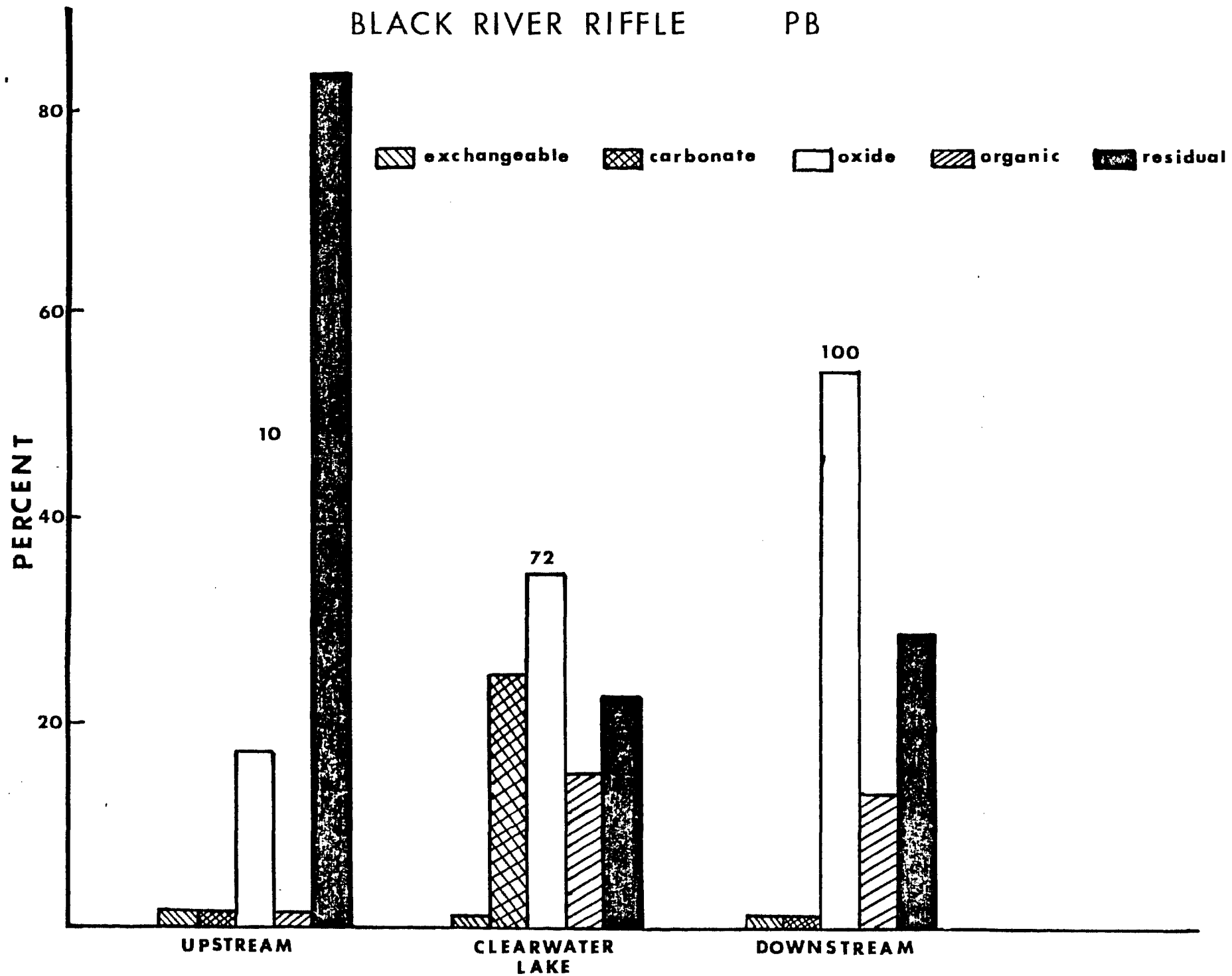
Location	Pb	Cd	Cu	Zn	Fe	Mn	Ba
MINERAL FORK	3.75	2.50	8.90	410.0	2050.0	4600.0	175.0
BROWN'S FORD	386.67	32.67	61.33	5966.7	1653.3	11366.7	193.3
WASHINGTON STATE PARK	245.00	19.67	54.83	1676.7	510.0	4066.0	320.0
IRONDALE	2.16	0.47	6.64	218.0	968.0	3520.0	448.0
UPSTREAM CLEARWATER LAKE	4.35	0.61	5.05	1100.0	3150.0	10950.0	1025.0
DOWNSTREAM CLEARWATER LAKE	1.04	1.02	7.33	326.7	1200.0	8233.0	183.3
LEADWOOD	174.50	35.50	28.50	5200.0	865.0	6950.0	460.0

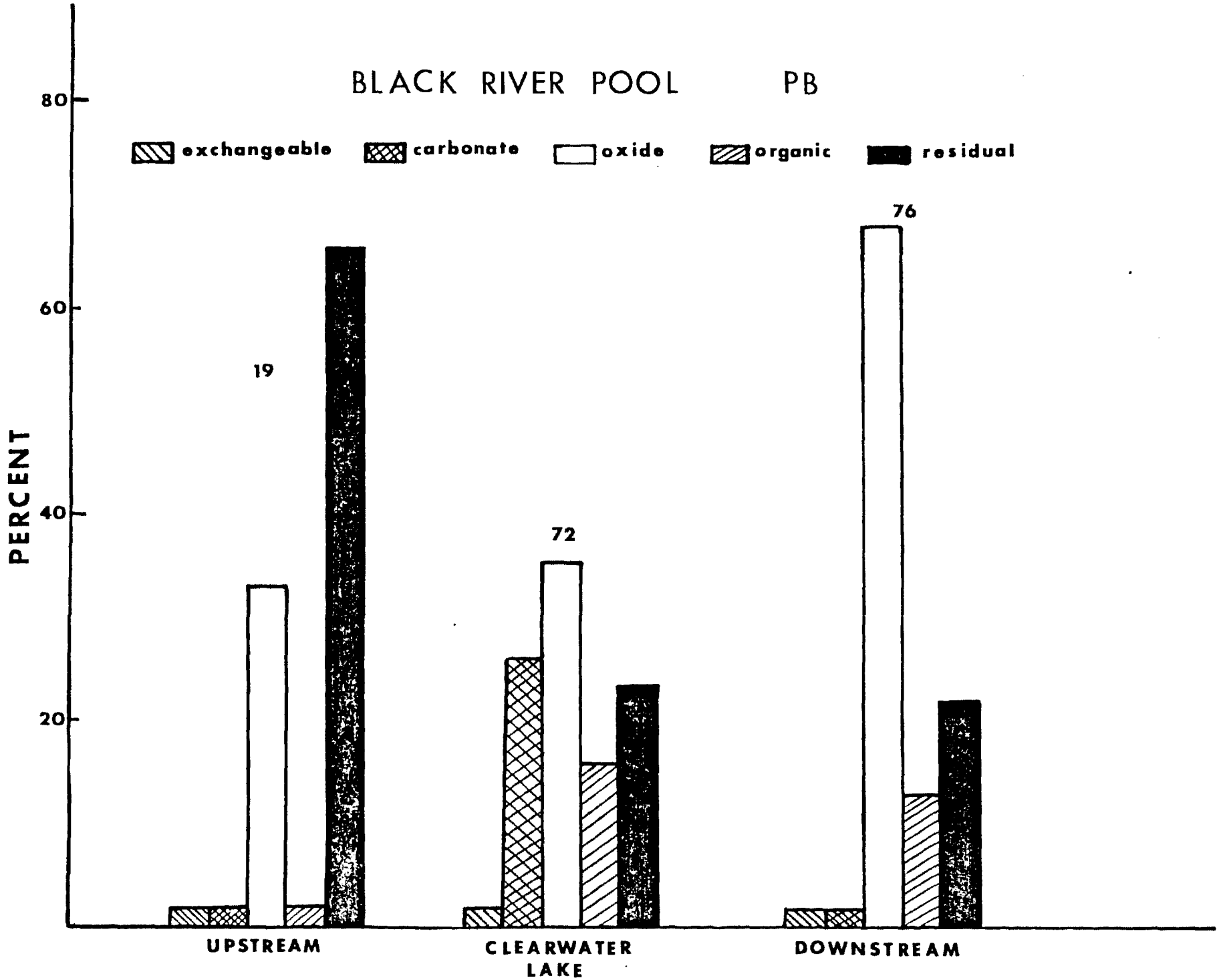
CRAYFISH (ug/g dry)

	Pb	Cd	Cu	Zn	Ag	Fe	Mn	Ba
MINERAL FORK								
Orconectes luteus	2.7	0.04	61.0	93.0	0.60	190.0	200.0	700.0
BROWN'S FORD								
Orconectes luteus	110.0	1.3	140.0	120.0	0.70	430.0	480.0	560.0
Orconectes punctimanus	84.0	1.6	190.0	120.0	0.58	580.0	260.0	590.0
WASHINGTON STATE PARK								
Orconectes luteus	130.0	1.2	150.0	130.0	0.64	460.0	520.0	400.0
DESLOGE								
Orconectes luteus	140.0	1.5	96.0	200.0	0.78	1700.0	420.0	180.0
IRONDALE								
Orconectes luteus	1.4	0.42	95.0	87.0	0.73	290.0	380.0	440.0
UPSTREAM CLEARWATER LAKE								
Orconectes luteus	1.2	0.39	94.0	95.0	0.70	200.0	110.0	230.0
DOWNSTREAM CLEARWATER LAKE								
Orconectes luteus	17.0	0.58	130.0	95.0	0.76	330.0	520.0	285.0


BIG RIVER RIFFLE PB
exchangeable
carbonate
oxide
organic
residual
PERCENT
80
60
40
20
2750
2780
2029
906
240
TAILINGS
DESLOGE
WASHINGTON STATE PARK
BROWN'S FORD
MINERAL FORK


BIG RIVER POOL PB
exchangeable
carbonate
oxide
organic
residual
PERCENT
80
60
40
20
2750
2190
1690
2948
344
TAILINGS
DESLOGE
WASHINGTON STATE PARK
BROWN'S FORD
MINERAL FORK


BLACK RIVER RIFFLE PB
exchangeable
carbonate
oxide
organic
residual
PERCENT
80
60
40
20
10
72
100
UPSTREAM
CLEARWATER LAKE
DOWNSTREAM


BLACK RIVER POOL PB
exchangeable
carbonate
oxide
organic
residual
PERCENT
80
60
40
20
19
72
76
UPSTREAM
CLEARWATER LAKE
DOWNSTREAM

River Water (ug/g)

Location Stage	Flow (cfs)	Pb D	Pb T	Cd D	Cd T	Cu D	Cu T	Zn D	Zn T	Ag D	Ag T	Fe D	Fe T	Mn D	Mn T	Ba D	Ba T
MINERAL FORK																	
Low	29.6	.005	.009	.001	.001	.005	.005	<.01	<.01	.001	.001	.01	.11	.01	.02	.59	.62
Med.	160.0	.006	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.03	.05	.01	.01	.35	.36
High	505.0	.005	.009	.001	.001	.005	.005	<.01	<.01	.001	.001	.03	.34	.01	.05	.24	.28
BROWN'S FORD																	
Low	95.6	.005	.043	.001	.001	.005	.005	.02	.03	.001	.001	.01	.27	.03	.07	.47	.49
Med.	650.0	.007	.084	.001	.001	.006	.011	.01	.03	.001	.001	.05	.61	.01	.13	.32	.38
High	11900.0	.026	.440	.001	.001	.037	.024	.05	.17	.001	.001	.14	.50	.05	.34	.10	.22
WASHINGTON STATE PARK																	
Low	70.2	.009	.091	<.001	<.001	<.005	<.005	.01	.04	<.001	<.001	.02	.38	.04	.14	.42	.45
Med.	490.0	<.005	.140	<.001	<.001	.007	.005	.01	.07	<.001	<.001	.05	.78	.02	.17	.16	.22
High	11395.0	.021	.070	<.001	<.004	<.005	.017	–	.22	<.001	<.001	.08	3.00	.04	.51	.10	.19
DESLOGE																	
Low	45.3	.020	.041	.002	.004	.005	.005	.31	.36	.001	.001	.02	.09	.07	.08	.15	.14
Med.	298.0	.001	.085	.001	.001	.005	.005	.06	.11	.001	.001	.04	.42	.03	.08	.09	.09
High	932.0	.012	.110	.002	.004	.005	.006	.10	.16	.001	.001	.05	.63	.05	.12	.07	.07
IRONDALE																	
Low	7.1	.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.02	.32	.02	.12	.15	.15
Med.	160.0	.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.02	.26	.03	.07	.08	.08
High	300.0	.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.03	.23	.02	.07	.06	.07
UPSTREAM CLEARWATER LAKE																	
Low		.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.02	.03	.01	.01	.05	.04
Med.		.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.01	.04	.01	.01	.04	.03
High		.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.02	.12	.03	.02	.03	.03
DOWNSTREAM CLEARWATER LAKE																	
Low	200.0	.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.02	.11	.21	.27	.07	.07
Med.	1040.0	.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.01	.03	.01	.03	.04	.04
High	160.0	.005	.005	.001	.001	.005	.005	<.01	<.01	.001	.001	.09	.12	.01	.03	.03	.03

Clearwater Lake Water Samples (ug/g)

Month	Pb		Cd		Cu		Zn		Ag		Fe		Mn		Ba				
Depth	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	pH	D.O.	Temp.
July 1980																			
Surface	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.01	<0.001	<0.001	0.02	0.02	0.01	0.01	0.05	0.05	8.5	8.0	27.4
5 meters	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.01	<0.001	<0.001	0.02	0.04	0.01	0.01	0.05	0.05	8.2	6.7	25.4
Bottom	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.01	<0.001	<0.001	0.13	0.45	1.68	1.73	0.07	0.07	7.4	0.2	18.1
April 1981																			
Surface	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.10	<0.001	<0.001	0.02	0.18	0.01	0.03	0.04	0.04	8.0	8.3	18.5
Bottom	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.10	<0.001	<0.001	0.02	0.18	0.01	0.03	0.04	0.04	7.7	8.4	16.7
May 1981																			
Surface	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.01	<0.001	<0.001	0.01	0.11	<0.01	<0.01	0.03	0.03	7.8	8.7	20.8
5 meters	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.01	<0.001	<0.001	0.02	0.10	<0.01	0.02	0.03	0.03	7.5	7.8	15.9
10 meters	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.01	<0.001	<0.001	0.07	0.32	0.01	0.05	0.02	0.03	7.2	7.4	14.3
Bottom	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.01	<0.01	<0.001	<0.001	0.02	0.27	0.01	0.04	0.02	0.03	7.1	7.8	13.9

Plants (ug/g, dry)

	Pb	Cd	Cu	Zn	Ag	Fe	Mn	Ba
MINERAL FORK								
Attached Algae	19.67	0.99	8.07	186.67	0.20	6100.0	1933.0	84.3
Water Willow								
roots	24.0	0.20	2.80	52.20	0.10	4300.0	440.0	400.0
stems	30.0	0.10	2.80	21.10	0.10	250.0	68.0	220.0
leaves	13.0	0.10	3.90	35.00	0.10	650.0	79.0	160.0
BROWN'S FORD								
Attached Algae	660.0	2.60	14.33	396.67	0.13	5133.0	2066.7	182.0
Water Willow								
roots	690.00	2.70	20.00	280.00	0.10	14000.0	2300.0	390.0
stems	220.0	0.90	8.70	110.00	0.10	1200.0	1100.0	210.0
leaves	180.00	0.78	8.40	110.00	0.10	1600.0	720.0	140.0
WASHINGTON STATE PARK								
Attached Algae	623.33	3.27	16.67	310.0	0.16	5333.3	1666.7	122.0
Water Willow								
roots	460.0	6.10	27.00	390.0	0.20	11000.0	2100.0	550.0
stems	290.0	2.00	14.00	80.0	0.10	1800.0	1100.0	220.0
leaves	320.0	1.90	15.00	180.0	0.10	2500.0	1100.0	200.0
DESLOGE								
Attached Algae	1210.0	2.40	18.56	758.33	0.10	8200.0	2133.3	65.3
Water Willow								
roots	1400.0	21.00	18.00	600.00	0.40	8800.0	2100.0	82.0
stems	310.0	6.40	12.00	600.00	0.10	1700.0	770.0	52.0
leaves	250.0	4.90	11.00	590.00	0.10	2800.0	580.0	52.0

Plants (cont.)

	Pb	Cd	Cu	Zn	Ag	Fe	Mn	Ba
IRONDALE								
Attached Algae	16.30	0.73	11.45	46.50	0.10	8672.5	2635.0	187.5
Water Willow								
roots	11.00	0.30	7.60	26.00	0.10	2200.0	740.0	90.0
stems	2.20	0.10	3.70	14.00	0.10	320.0	200.0	58.0
leaves	1.70	0.10	6.90	24.00	0.10	540.0	210.0	44.0
UPSTREAM CLEARWATER LAKE								
Attached Algae	24.00	1.40	8.47	34.33	0.10	6200.0	290.0	620.0
Water Willow								
roots	8.90	0.30	24.00	33.00	0.10	3500.0	200.0	140.0
stems	12.00	0.20	21.00	29.00	0.10	2000.0	110.0	280.0
leaves	5.90	0.20	19.00	36.00	0.10	1500.0	120.0	270.0
DOWNSTREAM CLEARWATER LAKE								
Attached Algae	15.33	0.42	10.27	40.67	0.10	7833.3	14033.3	396.7
Water Willow								
roots	12.00	0.47	8.60	28.00	0.10	6500.0	5600.0	200.0
stems	7.60	0.20	4.50	18.00	0.10	2600.0	2200.0	130.0
leaves	9.80	0.20	7.80	32.00	0.10	3800.0	1500.0	64.0
Ceratophyllum sp.	14.00	0.88	8.60	52.00	0.10	5500.0	1200.0	290.0

Fish Tissue (μg/g wet weight)
(Concentrations are means calculated from 2 edible portions[1], unless otherwise indicated)

	Pb	Cd	Cu	Zn	Fe	Mn	Ba
Mineral Fork							
Smallmouth bass	0.19	0.01	0.42	13.97	12.15	0.63	1.75
Yellow bullhead	0.13	0.02	0.51	5.67	6.27	0.38	1.61
Redhorse sucker	0.08	0.01	0.22	13.42	3.00	0.64	1.81
Brown's Ford							
Smallmouth bass	0.21	0.01	0.32	4.50	4.87	0.29	0.62
Flathead catfish	0.29	0.02	0.66	12.24	8.44	0.26	0.18
Redhorse sucker	0.63	0.01	0.22	11.67	2.65	0.97	1.03
Washington State Park							
Smallmouth bass	0.27	0.01	0.26	9.49	5.14	0.46	0.68
Flathead catfish[4]	12.00	0.34	0.69	23.00	10.00	4.90	3.20
Redhorse sucker	0.43	0.01	0.22	9.38	2.75	0.73	0.60
Mixed suckers[2]	0.38	-	-	-	-	-	-
Highway 67							
Smallmouth bass	0.05	0.01	0.32	11.73	3.90	0.13	0.04
Channel catfish	0.13	0.03	0.48	5.12	2.52	0.18	0.03
Redhorse sucker	0.57	0.03	0.28	16.15	2.81	0.36	0.16
Mixed suckers[2]	0.79	-	-	-	-	-	-
Irondale							
Smallmouth bass	0.01	<0.01	0.27	13.28	3.90	0.23	0.15
Flathead catfish	0.06	0.06	0.44	6.75	8.26	0.57	0.13
Redhorse sucker	0.02	0.01	0.33	9.32	3.16	0.52	0.50
Mixed suckers[2]	0.07	-	-	-	-	-	-

	Pb	Cd	Cu	Zn	Fe	Mn	Ba
Black River, upstream							
Smallmouth bass	0.04	0.01	0.32	7.46	4.36	0.11	0.03
Channel catfish	0.05	0.01	0.46	7.04	3.90	0.24	0.04
Redhorse sucker	0.03	<0.01	0.26	7.50	3.77	1.17	0.21
Black River, downstream							
Spotted bass	0.04	0.01	0.24	7.75	1.15	0.11	0.01
Channel catfish	0.04	0.01	0.21	5.73	2.30	0.26	0.01
Redhorse sucker	0.01	0.01	0.22	8.15	3.01	1.03	0.19
Leadwood							
Northern hogsucker[3]	0.44	-	-	-	-	-	-

[1]Edible portions were boneless samples of tissue and skin (without scales) for all species except catfish. Catfish tissue was analyzed without skin.

[2]Mixed suckers include northern hogsuckers and redhorse suckers. Mean concentrations are calculated from 10 samples of edible portions prepared and analyzed by the Missouri Conservation Commission.

[3]Only northern hogsuckers were available at this site.

[4]Concentration is based on 1 tissue sample.

Clean Processed Fish Tissue (μg/g wet weight)
(Concentrations are means calculated from 2 samples of skinless boneless tissue, unless otherwise indicated)

	Pb	Cd	Cu	Zn	Fe	Mn	Ba
Mineral Fork							
Smallmouth bass	0.09	<0.01	0.20	4.33	6.71	0.34	0.82
Channel catfish	0.04	0.01	0.31	4.14	2.70	0.23	0.26
Redhorse sucker	0.09	<0.01	0.21	6.49	2.10	0.63	1.26
Longear sunfish[1]	0.02	<0.01	0.29	4.59	-	-	0.11
Brown's Ford							
Smallmouth bass	0.03	<0.01	0.13	3.30	1.50	0.12	0.01
Flathead catfish	0.06	0.01	0.17	4.32	0.92	0.28	0.04
Redhorse sucker	0.85	0.01	0.17	5.09	1.00	1.35	0.90
Longear sunfish[1]	0.24	0.03	0.27	6.33	-	-	0.10
Washington State Park							
Smallmouth bass	0.06	<0.01	0.17	4.05	1.84	0.18	0.10
Redhorse sucker	0.24	0.01	0.18	4.01	2.83	0.42	0.23
Longear sunfish[1]	0.20	0.02	0.25	5.63	-	-	0.06
Highway 67							
Smallmouth bass	0.06	<0.01	0.22	4.06	1.89	0.13	0.02
Yellow bullhead	0.08	0.03	0.56	4.70	2.13	0.19	0.01
Redhorse sucker	0.52	0.01	0.16	10.46	0.69	0.38	0.13
Longear sunfish[1]	0.44	0.02	0.17	6.51	-	-	0.05
Irondale							
Smallmouth bass	0.06	<0.01	0.22	4.06	1.89	0.13	0.02
Yellow bullhead	0.06	0.05	0.28	3.83	3.85	0.60	0.11
Redhorse sucker	0.02	<0.01	0.24	4.37	1.20	1.35	0.37
Longear sunfish[1]	0.03	<0.01	0.27	5.24	-	-	0.11

	Pb	Cd	Cu	Zn	Fe	Mn	Ba
Black River, upstream							
Smallmouth bass	0.01	<0.01	0.18	4.34	1.95	0.08	0.01
Channel catfish	0.05	0.01	0.40	6.05	3.72	0.22	0.02
Redhorse sucker	0.03	<0.01	0.17	5.55	2.02	1.80	0.24
Longear sunfish[1]	0.05	<0.01	0.42	6.13	-	-	0.14
Black River, downstream							
Spotted bass	0.02	0.01	0.21	5.70	1.42	0.12	0.06
Channel catfish	0.02	<0.01	0.13	4.18	1.65	0.38	0.02
Redhorse sunfish	0.01	<0.01	0.18	4.24	2.28	1.01	0.07
Longear sunfish[1]	0.02	<0.01	0.31	5.40	-	-	0.05

[1]Mean concentrations of longear sunfish are based on tissue samples from 9 to 28 fish.

	SAND	SILT	CLAY
BROWN'S FORD			
PB			
Exchangeable	-.24	31.47	91.01
Carbonates	23.29	3603.19	3323.39
Oxides	309.25	1526.20	3236.60
Organic	51.88	213.04	-27.31
Residual	54.15	242.14	309.12
Total	166.46	4176.75	9210.73
DESLOGE			
PB			
Exchangeable	20.39	-370.46	367.21
Carbonates	580.60	16303.62	4586.87
Oxides	556.66	20549.44	-5305.47
Organics	111.23	2475.89	-2629.02
Residual	887.87	-9870.45	-6682.35
Total	1913.80	27026.26	1273.93
IRONDALE			
PB			
Exchangeable	4.0	4.0	4.0
Carbonates	5.14	74.83	308.15
Oxides	13.74	-97.86	1330.19
Organic	3.55	33.90	103.34
Residual	13.02	-121.01	582.28
Total	27.05	-29.24	1345.15
BLACK RIVER,UPSTREAM			
PB			
Exchangeable	4.0	4.0	4.0
Carbonates	4.0	4.0	4.0
Oxides	4.80	-107.80	81.50
Organic	4.0	4.0	4.0
Residual	4.22	30.58	-51.75
Total	5.21	643.73	432.00
CLEARWATER LAKE			
PB			
Exchangeable	4.0	4.0	4.0
Carbonates	18.05	36.43	-35.79
Oxides	28.55	27.35	-403.83
Organic	12.85	12.45	-131.28
Residual	27.64	37.87	-1302.67
Total	94.97	29.64	-76.92

	SAND	SILT	CLAY
BROWN'S FORD			
CD			
Exchangeable	1.59	-1.30	2.29
Carbonates	1.97	13.29	-7.61
Oxides	.48	4.51	6.12
Organic	.58	1.18	6.59
Residual	.16	-.83	7.25
Total	3.57	9.40	19.85
DESLOGE			
CD			
Exchangeable	.77	61.79	-20.13
Carbonates	6.18	122.01	-178.84
Oxides	1.89	46.83	60.62
Organic	1.26	-2.48	-.63
Residual	37.73	211.42	-933.55
Total	51.51	913.20	-1565.87
IRONDALE			
CD			
Exchangeable	.4	.4	.4
Carbonates	.4	.4	.4
Oxides	.4	.4	.4
Organic	.4	.4	.4
Residual	.02	.02	.02
Total	.11	1.47	-2.82
BLACK RIVER, UPSTREAM			
CD			
Exchangeable	.4	.4	.4
Carbonates	.4	.4	.4
Oxides	.4	.4	.4
Organic	.4	.4	.4
Residual	.02	.02	.02
Total	.09	.09	.09
CLEARWATER LAKE			
CD			
Exchangeable	.4	.4	.4
Carbonates	.4	.4	.4
Oxides	.54	-.4	-3.97
Organics	.4	.4	.4
Residual	.04	.4	-3.92
Total	.31	- .12	43.72

	SAND	SILT	CLAY
BROWN'S FORD			
ZN			
Exchangeable	5.91	7.23	7.39
Carbonates	96.16	577.37	-448.43
Oxides	125.66	481.17	130.58
Organic	26.23	-28.40	256.13
Residual	159.53	220.26	187.46
Total	316.74	182.13	2407.49
DESLOGE			
ZN			
Exchangeable	16.70	433.83	-179.47
Carbonates	202.39	19409.34	-8088.90
Oxides	193.72	7899.55	-1485.77
Organic	42.17	648.83	-466.83
Residual	1244.43	-1454.71	-7617.37
Total	48.71	453.72	-603.70
IRONDALE			
ZN			
Exchangeable	.4	.4	.4
Carbonates	.63	25.75	420.64
Oxides	7.23	-39.69	824.43
Organic	1.30	8.59	30.39
Residual	8.13	14.29	3125.08
Total	48.71	453.72	-603.70
BLACK RIVER, UPSTREAM			
ZN			
Exchangeable	.4	.4	.4
Carbonates	2.0	-58.35	86.99
Oxides	3.85	-116.80	238.60
Organic	.75	-27.64	27.36
Residual	12.70	-135.28	257.92
Total	21.44	347.83	705.01
CLEARWATER LAKE			
ZN			
Exchangeable	.4	.4	.4
Carbonates	8.38	11.97	-31.21
Oxides	19.38	17.77	-230.14
Organic	6.31	9.21	48.68
Residual	106.46	-114.10	752.51
Total	174.02	80.14	-277.42

BROWN'S FORD			
FE			
Residual	12635.93	32283.79	-14587.57
Total	8444.56	12808.16	53786.89
DESLOGE			
FE			
Residual	11714.13	524249.76	-161376.48
Total	28197.30	-399491.59	399179.65
IRONDALE			
FE			
Residual	11886.99	57847.43	143764.73
Total	10378.32	125632.14	-177655.46
BLACK RIVER, UPSTREAM			
FE			
Residual	4473.09	-122483.81	162958.86
Total	3246.39	147356.33	173466.41
CLEARWATER LAKE			
FE			
Residual	24759.94	10339.70	348790.34
Total	32747.47	42533.18	222018.44
BLACK RIVER, DOWNSTREAM			
FE			
Residual	34260.56	427706.37	-729830.23
Total	14395.15	-52019.01	53139.26

	SAND	SILT	CLAY
BROWN'S FORD			
MN			
Residual	63.48	257.50	-117.23
Total	621.53	2765.84	796.95
DESLOGE			
MN			
Residual	729.93	35400.91	-16104.55
Total	3927.85	-64077.12	72232.37
IRONDALE			
MN			
Residual	70.90	604.91	-519.92
Total	664.19	6120.76	38111.85
BLACK RIVER, UPSTREAM			
MN			
Residual	25.04	-1087.44	1017.63
Total	79.54	6728.20	9769.99
CLEARWATER LAKE			
MN			
Residual	170.26	-45.53	2545.83
Total	1989.53	3787.76	-17806.91
BLACK RIVER, DOWNSTREAM			
MN			
Residual	230.58	4230.43	5961.60
Total	9185.81	8596.31	-125909.61