

**Analysis of Polychlorinated Biphenyl (PCB) Residues
in Stoneroller Minnows Collected August 13-14, 2001
from the Bayou Creek System**

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FINAL REPORT

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INTRODUCTION

Stoneroller minnows (*Campostoma anomalum*) were collected along with other fish from Big and Little Bayou Creeks on August 13-14, 2001. Reference stations BB1A (upstream of BB1) and Massac Creek (MC) also were sampled. Whole body stoneroller minnows were analyzed for Aroclors 1248, 1254, and 1260 for all stations collected. A total of 46 fish were analyzed from which 3 fish were from Massac Creek, 34 fish were from Big Bayou Creek and 9 from Little Bayou Creek. No stonerollers were found at station BB2. Elevated water levels at BB9 precluded collecting samples.

METHODS

Fish collection

Fish were collected by use of back-pack shocker and by seining. Fish that did not meet requirements were returned to the stream. Collected fish were sorted and then wrapped in aluminum foil, tagged, bagged, and placed on ice (4 °C) for transport to the laboratory. Fish were stored in the freezer (-15 °C) until extraction.

Fish extraction

Fish were measured for length and whole body weight. PCBs were extracted and cleaned of interferences, as described by Birge and Price (2001), using standard U.S. EPA methods (Watts, 1980; U.S. EPA, 1997; Erickson, 1997).

Analysis by Gas Chromatography

Samples were analyzed for Aroclors 1248, 1254, and 1260 according to SW-846 Method 8082 (U.S. EPA, 1997), as described earlier by Birge and Price (2001).

Quality Assurance

Permanent bench records were kept of all assays and annotated as required under Good Laboratory Practices (*Federal Register*, 40 CFR, Part 160, August 17, 1989). All printouts and graphic recordings were filed and are open for inspection. These bench records will be archived within two years after the close of the project but retrievable upon request. Chain of Custody was maintained for all samples collected.

RESULTS

Fish analyzed for this study were collected from 8 stations on Big Bayou Creek; 3 stations on Little Bayou Creek; and one reference site on Massac Creek (Tables 1, 2). Length of stoneroller minnows from Big Bayou Creek ranged from 43 to 104 mm, with an average length of 70.6 ± 17.4 mm (Table 1). Minnow length ranged from 63 to 92 mm for specimens from Little Bayou Creek, with an average length of 74.9 ± 13.4 mm (Table 2). Whole body weights ranged from 0.54 to 14.00 g (Avg. 4.51 ± 3.48 g) and from 1.56 to 10.85 g (Avg. 5.84 ± 3.33 g) for Big and Little Bayou Creeks, respectively (Tables 1, 2).

No PCBs were detected in the three fish analyzed from Massac Creek (Table 1). In Big Bayou Creek, Aroclor 1248 was detected in 26 of 34 minnows collected; Aroclor 1254 was detected in 29 out of 34 specimens; and Aroclor 1260 was detected in 29 out of 34 fish (Table 1, Fig. 1). All three Aroclors were detected at downstream stations BB6, BB7, and BB8. The highest total Aroclor concentrations were from stations BB6 and BB7 at 7.99 and 4.85 $\mu\text{g/g}$ (Table 1, Fig. 2). A total of 23 out of 34 fish in Big Bayou Creek contained Total Aroclor concentrations above 1.0 $\mu\text{g/g}$, out of which values for 12 fish were above 2.0 $\mu\text{g/g}$ (Table 1, Fig. 2). These results and those for total PCB concentrations for minnows from Big Bayou Creek are further summarized in Table 3 and Figure 3. Total PCB concentrations ranged up to 2.86 $\mu\text{g/g}$ (*i.e.* BB6).

As previously reported (Birge and Price, 2001), PCBs were detected in all stoneroller minnows from Little Bayou Creek (Table 2-3, Fig. 4). The highest total PCBs were 12.45 and 10.18 $\mu\text{g/g}$ detected in the two minnows from station LB2. The stoneroller minnow has a highly localized home range and is a more accurate means of localizing sources of PCB contamination.

Table 1. PCB concentrations in wholebody stoneroller minnows from Massac Creek and Big Bayou Creek collected August 14, 2001.

Station	Date	Sample	Length (mm)	Whole Body Wt. (g)	mg fat /g tissue	Aroclor Conc. (µg/g)			
						1248	1254	1260	Total
MC	08/14/01	PSR1	80	5.023	51.17	<0.040	<0.040	<0.040	<0.040
MC	08/14/01	PSR2	68	3.262	89.67	<0.061	<0.061	<0.061	<0.061
MC	08/14/01	PSR3	70	3.155	42.90	<0.063	<0.063	<0.063	<0.063
BB1A	08/14/01	PSR1	97	9.399	73.26	0.055	0.056	0.004*	0.116
BB1A	08/14/01	PSR2	88	6.764	43.47	<0.030	<0.030	<0.030	<0.030
BB1A	08/14/01	PSR3	84	5.212	41.84	0.069	<0.038	0.024	0.093
BB1	08/14/01	PSR1	43	0.537	9.03	<0.372	<0.372	<0.372	<0.372
BB1	08/14/01	PSR2	47	0.645	8.91	<0.310	<0.310	<0.310	<0.310
BB1	08/14/01	PSR3	49	1.023	13.93	0.141	<0.196	<0.196	0.141
BB3	08/14/01	PSR1	71	3.015	45.42	<0.066	0.691	0.795	1.487
BB3	08/14/01	PSR2	62	2.537	144.26	0.882	0.405	0.224	1.511
BB3	08/14/01	PSR3	49	1.192	41.90	0.806	0.305	0.090	1.202
BB4	08/14/01	PSR1	96	10.740	57.18	<0.019	0.702	0.418	1.120
BB4	08/14/01	PSR2	67	2.607	59.11	1.142	0.587	0.493	2.223
BB4	08/14/01	PSR3	65	3.168	29.29	0.787	0.431	0.431	1.255
BB4	08/14/01	PSR4	63	2.403	43.22	0.688	0.211	0.191	1.091
BB4	08/14/01	PSR5	63	2.837	30.31	0.921	0.822	0.277	2.021

* PCB detected but the value was below Minimum Quantitation Limit (MQL).

Table 1, continued. PCB concentrations in wholebody stoneroller minnows from Massac Creek and Big Bayou Creek collected August 14, 2001.

Station	Date	Sample	Length (mm)	Whole Body Wt. (g)	mg fat /g tissue	Aroclor Conc. (µg/g)			
						1248	1254	1260	Total
BB5	08/14/01	PSR1	104	11.654	89.61	0.713	0.730	0.516	1.603
BB5	08/14/01	PSR2	96	10.782	76.00	1.095	0.779	0.455	2.329
BB5	08/14/01	PSR3	84	5.360	7.11	<0.037	0.232	0.268	0.501
BB5	08/14/01	PSR4	67	3.110	40.95	0.761	0.401	0.178	0.960
BB5	08/14/01	PSR5	70	4.111	66.92	<0.049	0.495	0.649	1.143
BB5	08/14/01	PSR6	73	4.269	70.98	<0.047	1.408	1.236	2.644
BB6	08/14/01	PSR1	103	13.954	119.58	1.629	1.203	0.665	3.497
BB6	08/14/01	PSR2	52	1.246	11.04	0.139	0.931	0.118	1.188
BB6	08/14/01	PSR3	50	1.340	50.71	1.257	6.364	0.364	7.986
BB6	08/14/01	PSR4	48	1.150	36.30	0.217	1.419	0.287	1.923
BB6	08/14/01	PSR5	53	1.383	8.32	0.120	0.327	0.044	0.492
BB6	08/14/01	PSR6	50	1.273	9.43	0.145	0.341	0.046	0.533
BB7	08/14/01	PSR1	76	5.506	104.38	1.385	0.847	0.534	2.767
BB7	08/14/01	PSR2	80	5.900	69.46	1.189	0.814	0.551	2.554
BB7	08/14/01	PSR3	90	8.256	42.98	1.160	0.745	0.483	2.389
BB7	08/14/01	PSR4	79	5.042	79.87	2.126	1.511	1.214	4.852
BB7	08/14/01	PSR5	67	3.524	28.25	1.023	0.521	0.545	1.577
BB8	08/14/01	PSR1	77	5.832	84.74	0.816	0.561	0.269	1.646
BB8	08/14/01	PSR2	73	4.689	76.82	1.075	0.747	0.464	2.286
BB8	08/14/01	PSR3	64	2.809	22.66	0.261	0.165	0.121	0.546

* PCB detected but the value was below Minimum Quantitation Limit (MQL).

Table 2. PCB concentrations in wholebody stoneroller minnows from Little Bayou Creek collected August 13, 2001.

Station	Date	Sample	Length (mm)	Whole Body Wt. (g)	mg fat /g tissue	Aroclor Conc. (µg/g)			
						1248	1254	1260	Total
LB2	08/13/01	PSR1	63	2.685	78.03	3.782	3.754	2.644	10.180
LB2	08/13/01	PSR2	75	4.397	81.94	3.376	2.924	2.335	8.635
LB2	08/13/01	PSR3	75	4.281	109.54	4.744	4.282	3.420	12.447
LB3	08/13/01	PSR1	92	7.851	71.98	3.248	2.189	1.626	7.063
LB3	08/13/01	PSR2	64	3.173	36.04	4.031	1.951	1.323	7.305
LB3	08/13/01	PSR3	53	1.562	11.24	0.985	0.312	0.276	1.435
LB4	08/13/01	PSR1	92	9.620	119.49	1.559	1.114	0.665	3.338
LB4	08/13/01	PSR2	85	8.153	94.53	1.740	1.329	0.901	3.970
LB4	08/13/01	PSR3	75	10.854	120.34	1.493	1.064	0.648	3.204

* PCB detected but the value was below Minimum Quantitation Limit (MQL).

Table 3. Mean PCB concentrations in wholebody stoneroller minnows from Massac Creek and the Bayou Creek system, collected August 13-14, 2001.

Station	Avg. Length (mm)	Avg. Whole Body Wt. (g)	Avg. mg fat /g tissue	Avg. Aroclor Conc. ($\mu\text{g/g}$)			
				1248	1254	1260	Total
MC	72.7	3.81	61.25	N.D.	N.D.	N.D.	N.D.
	6.4	1.05	24.96	---	---	---	---
BB1A	89.7	7.13	52.85	0.062	0.056	0.014	0.105
	6.7	2.12	17.69	0.010	---	0.014	0.016
BB1	46.3	0.74	10.63	0.141	N.D.	N.D.	0.141
	3.1	0.26	2.86	---	---	---	---
BB3	60.7	2.25	77.20	0.844	0.467	0.370	1.400
	11.1	0.95	58.11	0.054	0.200	0.374	0.172
BB4	70.8	4.35	43.82	0.885	0.551	0.362	1.542
	14.2	3.58	14.20	0.196	0.239	0.124	0.538
BB5	82.3	6.55	58.59	0.856	0.674	0.550	1.530
	15.1	3.70	29.83	0.208	0.414	0.376	0.827
BB6	59.3	3.39	39.23	0.585	1.764	0.254	2.603
	21.5	5.18	42.98	0.676	2.297	0.240	2.863
BB7	78.4	5.65	64.99	1.377	0.888	0.665	2.828
	8.3	1.71	30.11	0.438	0.371	0.308	1.218
BB8	71.3	4.44	61.41	0.717	0.491	0.285	1.493
	6.7	1.53	33.79	0.416	0.297	0.172	0.880
LB2	71.0	3.79	89.84	3.968	3.654	2.800	10.421
	6.9	0.96	17.18	0.703	0.685	0.559	1.917
LB3	69.7	4.20	39.75	2.755	1.484	1.075	5.268
	20.1	3.27	30.54	1.582	1.022	0.708	3.321
LB4	84.0	9.54	111.45	1.597	1.169	0.738	3.504
	8.5	1.35	14.66	0.128	0.141	0.142	0.409

Figure 1. Mean Aroclor concentrations in stoneroller minnows collected from Big Bayou Creek on August 13-14, 2001.

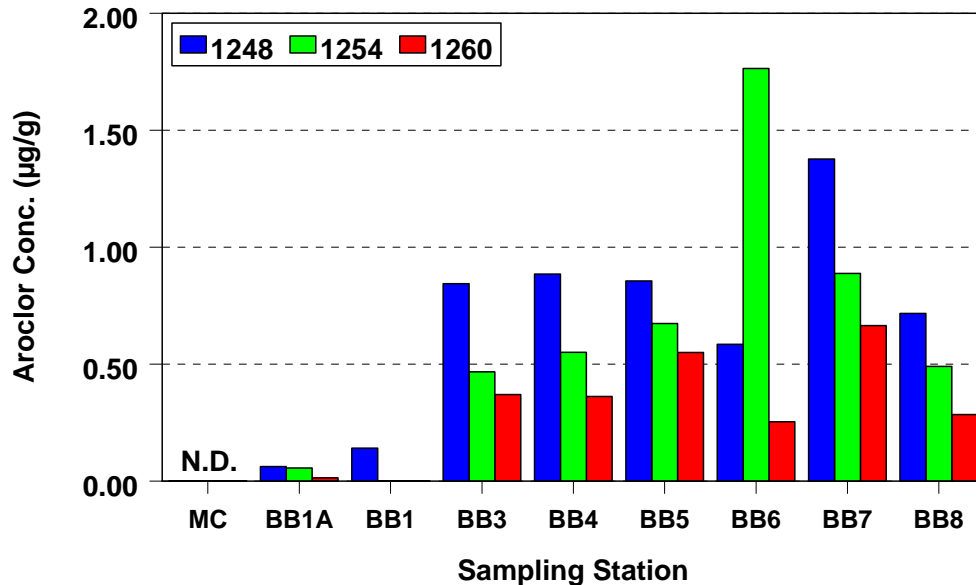


Figure 2. Mean total Aroclor concentrations in stoneroller minnows collected from Big Bayou Creek on August 13-14, 2001.

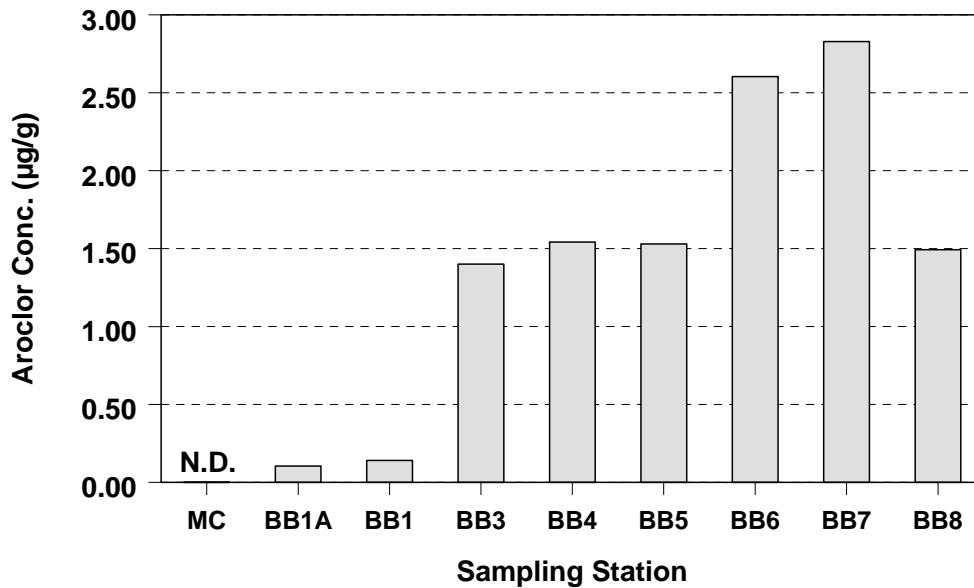


Figure 3. Summary of mean results for stoneroller minnows collected from Big Bayou Creek on August 13-14, 2001.

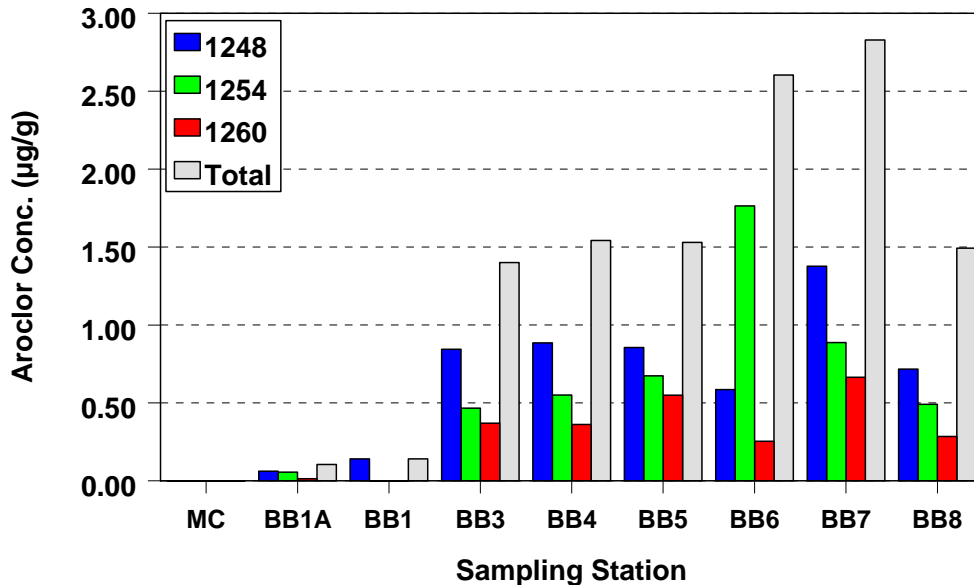
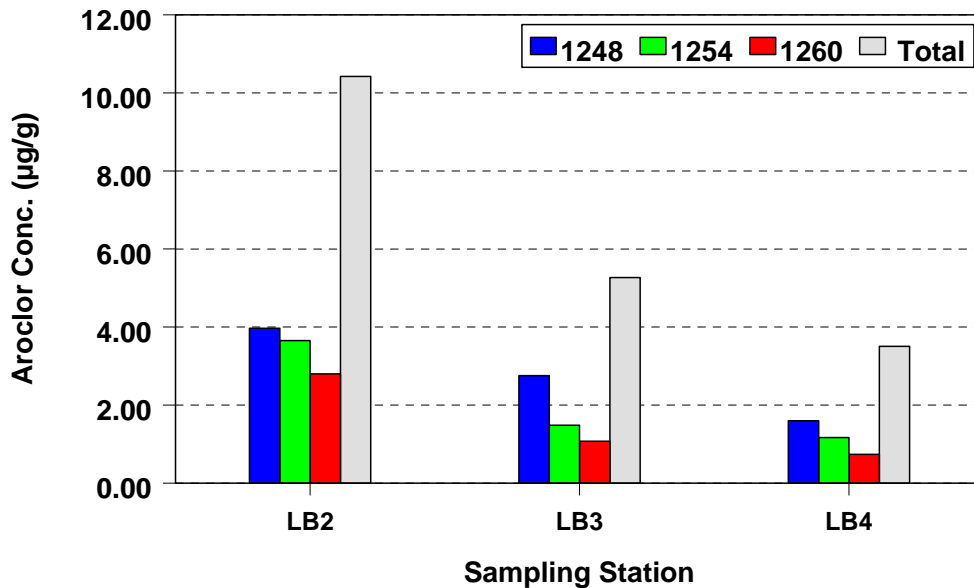


Figure 4. Mean Aroclor concentrations in stoneroller minnows collected from Little Bayou Creek on August 14, 2001.



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