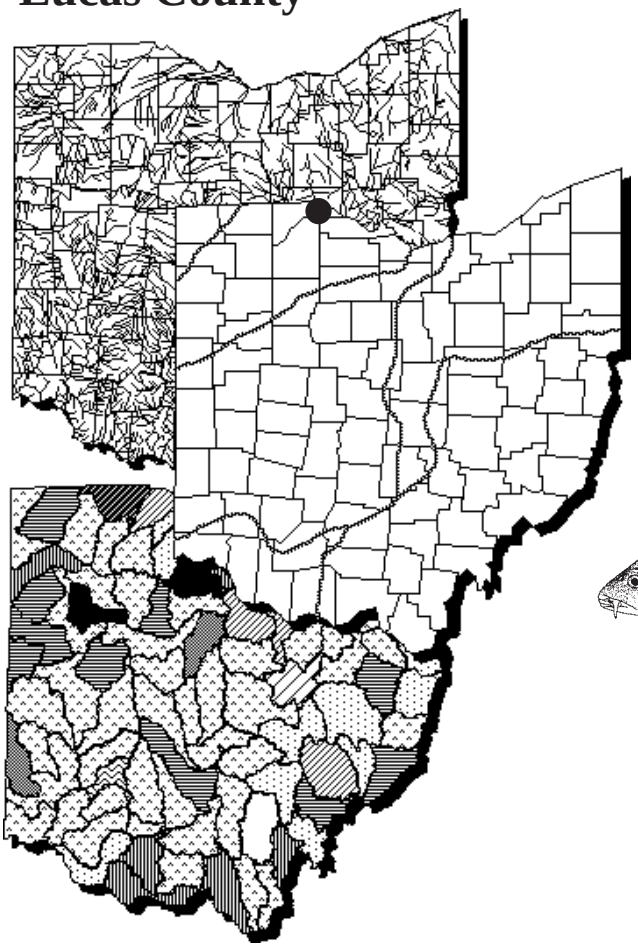
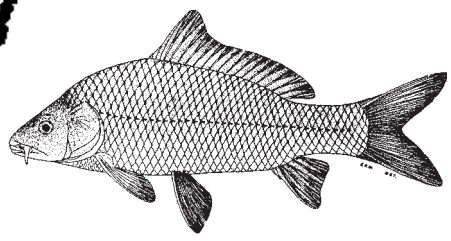
Fish Tissue Study of the Ottawa River 1999

Toledo, Ohio
Lucas County





Common Carp *(Caprodes*

February 18, 2000

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OEPA Technical Report MAS/2000-2-1

Prepared for

State of Ohio Environmental Protection Agency
Division of Emergency and Remedial Response

Prepared by

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INTRODUCTION

The Ohio Department of Health issued a primary contact and fish consumption advisory for the lower 19 miles of the Ottawa River, Toledo in 1991. All species of fish are covered by the consumption advisory and the contaminant of concern is polychlorinated biphenyls (PCBs). The fish advisory recommends that no fish be eaten from the Ottawa River within the advisory zone. The primary contact advisory was issued as a result of the bottom sediments being contaminated with PCBs. In light of landfill remediations along parts of the Ottawa River, and control of several PCB sources into the Ottawa River, current data was requested to evaluate the fish consumption health advisory for the Ottawa River. The collected fish tissue data will be used by the Ohio Department of Health to assess the current health advisory and determine if changes are needed.

The specific objective of this study was to:

1) Establish the concentration of PCBs, chlorinated pesticides, bioaccumulative metals (mercury, selenium, cadmium, arsenic and lead), and chromium in edible portions of fish from the lower 12 miles of the Ottawa River.

METHODS

All chemical, physical, and biological field, laboratory, data processing, and data analysis methodologies and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio Environmental Protection Agency 1989), and Ohio EPA Fish Tissue Guidance Manual (Ohio EPA 1994a). Fish tissue sampling locations are listed in Table 1, and shown in Figure 1. Fish tissue sample specifications (species, lengths/weights, type of sample) are listed in Table 2. Summarized results are presented in Table 3. All sample results are presented in Table 4.

Fish were collected using boat mounted pulsed DC electrofishing gear, with collections occurring on August 9 and 10, 1999. Seven sample locations were established in a ten mile stretch of the Ottawa River, from the University of Toledo to near the Ohio-Michigan state line. Fillet samples (skin-on or skin-off) were collected in the field from ten different fish species - common carp, white crappie, white sucker, largemouth bass, yellow perch, goldfish, bluegill, yellow bullhead, freshwater drum, and pumpkinseed sunfish. Fish samples were placed on dry ice, and transported back to the Ecological Assessment Unit field facility for storage in freezers. Fish tissue sampling procedures are detailed in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 1989) and the Fish Tissue Guidance Manual (Ohio EPA 1994a).

Frozen fish samples were transported to the Division of Environmental Services (DES), Ohio EPA on August 16, 1999. These samples were placed in a walk-in freezer at the DES facility. The walk-in freezer malfunctioned during the weekend of August 21, 1999 and all the fish samples were found thawed on August 23, 1999. Because each tissue sample was individually sealed within a plastic ziplock bag, DES determined that the analysis of the fillets (with all liquid material included) would meet lab quality control guidelines.

SUMMARY

Polychlorinated biphenyls (PCBs) were detected in 43 of the 47 fish tissue samples collected from the Ottawa River in 1999 (Table 3). The four samples with 'non-detected' PCBs were collected at the most upstream sampling location, RM 11.5 - University of Toledo, an area upstream from PCBs sources. Each of the seven sampling locations had at least one sample which exceeded the extremely elevated level for PCBs (>1900 ug/kg); this is a level at which fish consumption is not recommended by the Ohio Department of Health (Figure 2).

The ability of an organism to bioaccumulate lipophilic organic chemicals is assumed to be proportional to its lipid content (Ohio EPA 1994b). Furthermore, lipid content is a better general predictor of fish PCB levels than body size (Ohio EPA 1994b). Since PCBs are lipophilic and lipid content varies between fish species and between individuals, lipid normalization is necessary to characterize relative site contamination by PCBs. Figure 3 presents a site-to-site comparison of total PCBs (bottom) and lipid-normalized PCB concentrations (top). This comparison of lipid-normalized PCBs shows that fillets from fish in the Ottawa River at RM 5.9 are most contaminated by PCBs, and that the most upstream site (RM 11.5) is much lower than all other stations.

A comparison of lipid-normalized PCB concentrations from samples collected in 1999, 1996, and 1990 is presented in Figure 4. Although there is a limited dataset from 1996 and 1990 to compare with 1999, there does appear to be a downward trend in the extremely high PCB values observed between RM 3 and RM 7.5.

Total DDT (summation of DDT metabolites) as presented in Table 3, was detected in 30 of the 47 fish tissue samples. DDT is an organochlorine pesticide which was used for a wide variety of pest control situations. Although its usage has been banned, its metabolites DDD and DDE are still present and fairly persistent in the environment. The maximum total DDT concentration (296.5 ug/kg) is far below the U.S. FDA Action Level of 5,000 ug/kg.

Total chlordane (summation of alpha- and gamma-chlordanes, oxychlordane, and cis- and trans-nonachlor) as presented in Table 3, was detected in 26 of 47 fish tissue samples. Chlordane is a chlorinated pesticide which was used widely for termite and ant control and for agricultural uses such as insect control on crops. Twenty-five of the 26 detected total chlordane samples were far below the U.S. FDA Action Level of 300 ug/kg. One sample at RM 5.9 (455 ug/kg) exceeded the chlordane action level.

Dieldrin, a chlorinated pesticide broadly used prior to 1974, was detected in 8 of 47 fish tissue samples. The maximum measured concentration in a tissue sample was 67 ug/kg, far below the U.S. FDA Action Level of 300 ug/kg.

All other organic chemicals measured in fish tissue samples were below laboratory method detection limits.

Mercury, the only metal that significantly bioaccumulates, was detected in 42 of 46 samples (Table 3). Detected values ranged from 25 ug/kg to 123 ug/kg. Guidance for mercury assessment in fish tissue in Ohio has been derived by the Ohio Department of Health (Ohio EPA 1996). Mercury consumption levels are directed at quantifying human health risks. Based on this framework, 50 percent of the samples were less than 51 ug/kg and were considered not elevated, and 50 percent of the samples were between 51 ug/kg and 200 ug/kg, and were slightly elevated (Ohio EPA 1996). The U.S. Fish and Wildlife Service has found that mercury contamination levels should not exceed 100 ug/kg to protect piscivorous birds and 1,100 ug/kg to protect piscivorous mammals against bioaccumulation (Eisler 1987). Sources of mercury in surface waters are considered largely due to natural occurrence and atmospheric deposition.

Selenium, an essential nutrient at low levels, can be toxic to humans and animals at high concentrations and has been shown to act as a mutagen in animals. Selenium was detected in all samples analyzed, with values ranging between 0.2 and 0.688 mg/kg (Table 3). These values are far below the U.S. EPA (U.S. EPA 1995) recommended Screening Value of 50 mg/kg. Screening values are used to screen waterbodies where chemical contaminants in edible portions of fish exceed human consumption levels of potential concern.

Other metals measured in fish tissue included chromium, lead, arsenic, and cadmium. All chromium and lead concentrations were reported less than the method detection limit. Two samples had arsenic detected, although at levels approaching the method detection limit. One cadmium sample (0.0193 mg/kg) was minimally above the method detection limit, and far below the Screening Value of 10 mg/kg.

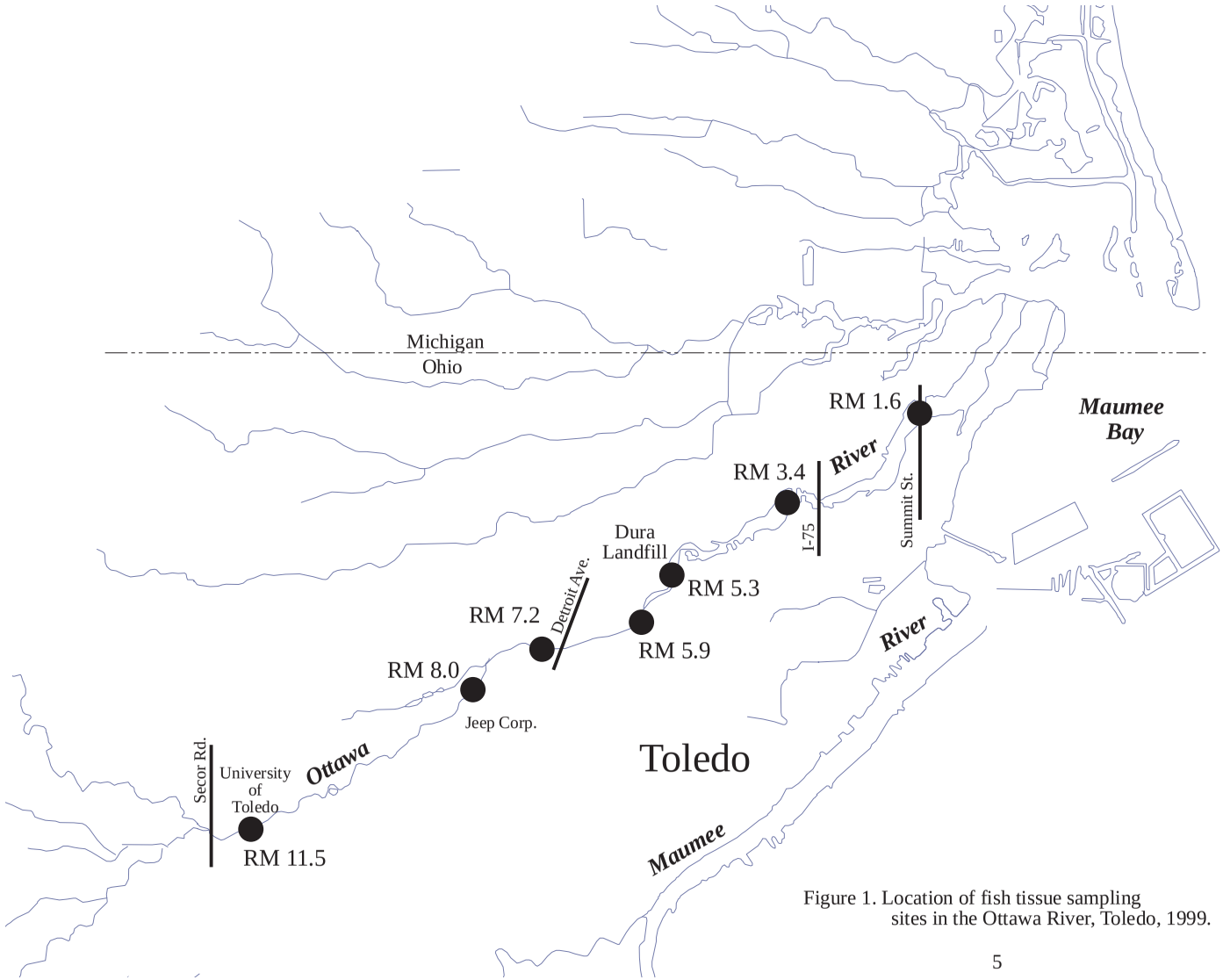

Figure 1. Location of fish tissue sampling sites in the Ottawa River, Toledo, 1999.

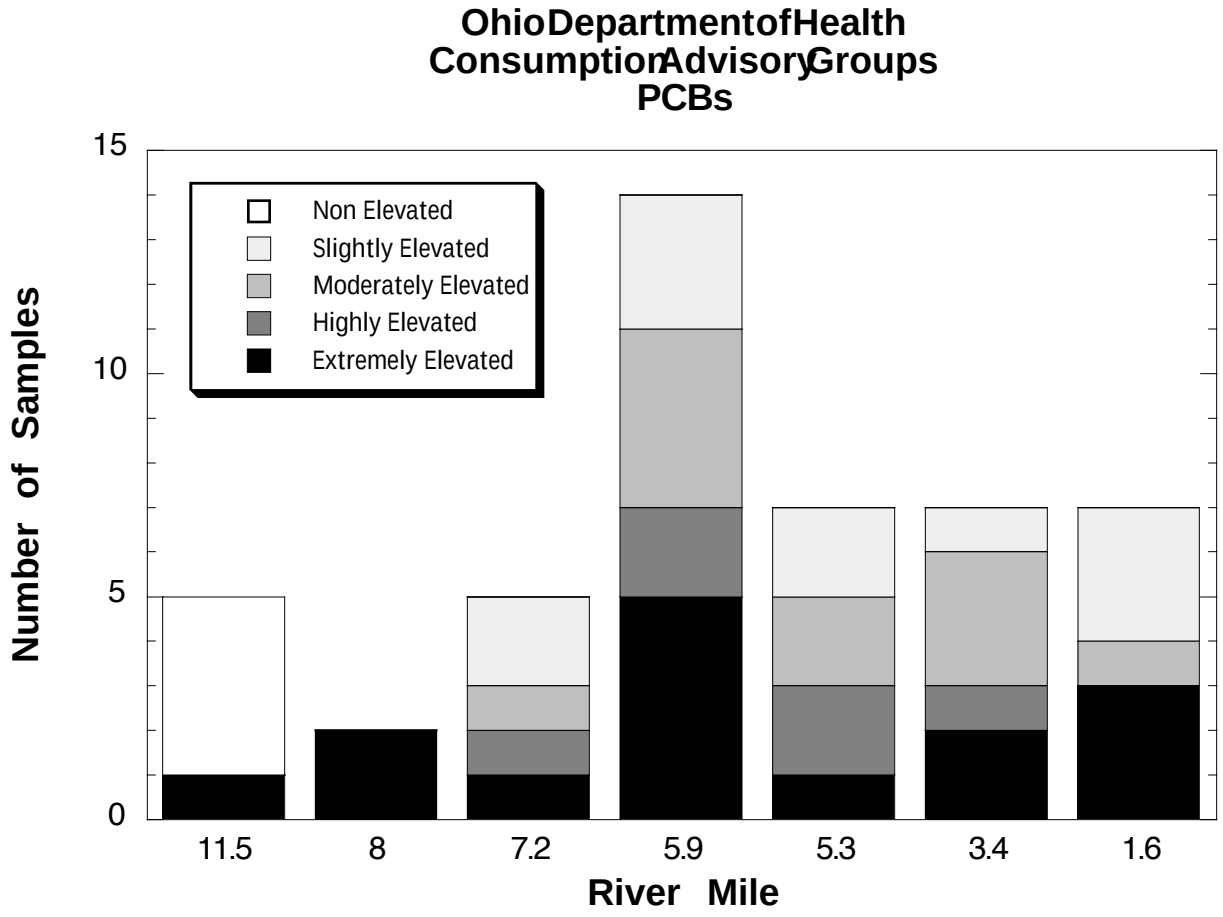

Figure 2. Consumption advisory groups based on Ohio Department of Health consumption recommendations for total PCBs.

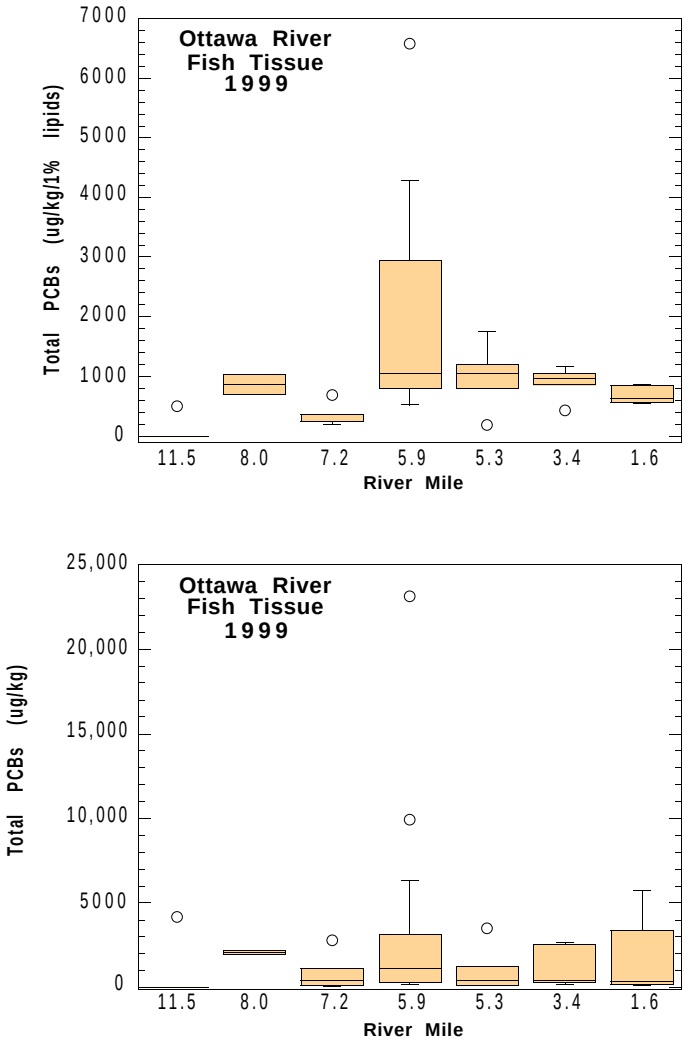

Figure 3. Lipid normalized total PCB concentrations (top) and total PCB concentrations (bottom) in fish tissue samples from the Ottawa River, Toledo, in 1999.

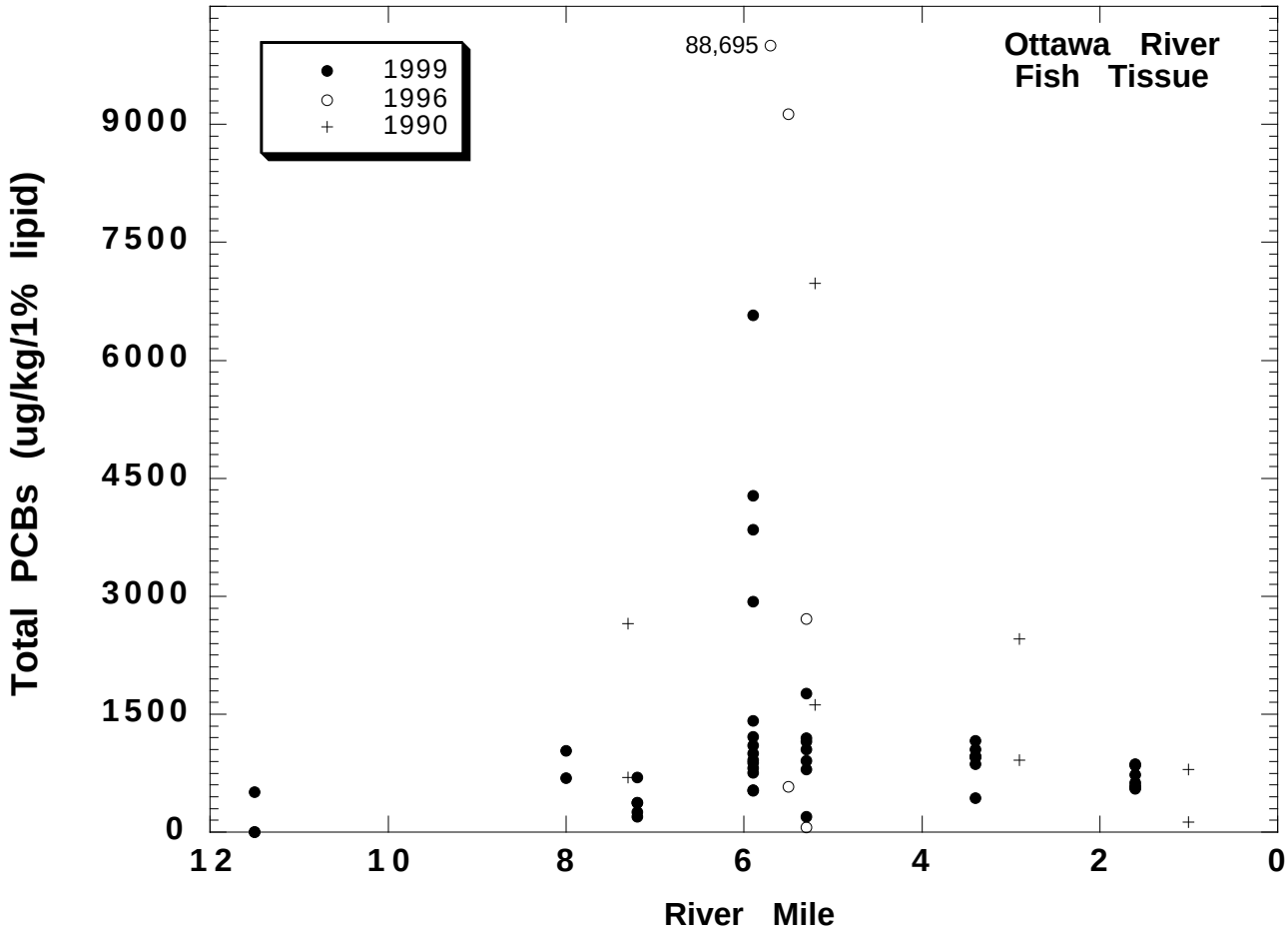

Figure 4. Scatter plot of PCB concentrations (normalized to 1% lipid) from individual samples collected during 1990, 1996, and 1999 by Ohio EPA.

Table 1. Fish tissue sampling locations in the Ottawa River, Toledo, 1999.

Sample Location River Mile	Sample Number	Latitude	Longitude	Landmark	County	USGS 7.5 min. Quad. Map
Ottawa River						
11.5	181-99 182-99 183-99 184-99 185-99	41°39.47	83°37.15	University of Toledo Law Center	Lucas	Toledo, OH
8.0	179-99 180-99	41°41.22	83°34.00	Adjacent Jeep Corp.	Lucas	Toledo, OH
7.2	174-99 175-99 176-99 177-99 178-99	41°41.26	83°33.43	Conrail RR bridge - Upstream Detroit Ave.	Lucas	Toledo, OH
5.9	160-99 161-99 162-99 163-99 164-99 165-99 166-99 167-99 168-99 169-99 170-99 171-99 172-99 173-99	41°41.47	83°32.19	Adjacent PCB remediation tributary	Lucas	Toledo, OH

Table 1. Continued.

Sample Location River Mile	Sample Number	Latitude	Longitude	Landmark	County	USGS 7.5 min. Quad. Map
Ottawa River						
5.3	153-99 154-99 155-99 156-99 157-99 158-99 159-99	41°41.82	83°31.79	Adjacent Dura Landfill	Lucas	Toledo, OH
3.4	146-99 147-99 148-99 149-99 150-99 151-99 152-99	41°42.45	83°30.17	Adjacent Hoffman Rd./ Schwartz Rd.	Lucas	Toledo, OH
1.6	139-99 140-99 141-99 142-99 143-99 144-99 145-99	41°43.38	83°28.85	Summit St.	Lucas	Oregon, OH

Table 2. Fish tissue sample information for the Ottawa River, Toledo, 1999.

Site	Sample Number	Fish Species	Sample Type	Individual Fish Measurements Total Length (mm)/ Weight (grams)
RM 11.5	181-99	white crappie	SOFC	210/138, 213/131
	182-99	common carp	SFFC	705/5500, 710/5000
	183-99	white sucker	SOFC	254/164, 268/188, 264/179
	184-99	common carp	SFFC	438/1050, 432/1050, 459/1375
	185-99	yellow perch	SOFC	199/116, 186/78, 187/89
RM 8.0	179-99	goldfish	SFFC	288/450, 261/344
	180-99	common carp	SFFC	482/1650, 475/1475, 490/1500
RM 7.2	174-99	yellow perch	SOF	179/66
	175-99	bluegill	SOF	177/95
	176-99	goldfish	SFF	301/486
	177-99	common carp	SFF	352/635
	178-99	common carp	SFFC	512/1600, 507/1875, 522/2225
RM 5.9	160-99	green sf x pumpkinseed sf	SOFC	165/128, 154/80, 140/63
	161-99	yellow bullhead	SOF	253/269
	162-99	goldfish	SFFC	248/284, 252/228
	163-99	yellow perch	SOF	184/70
	164-99	white crappie	SOFC	196/120, 208/161, 210/135, 187/107
	165-99	white crappie	SOF	242/235
	166-99	largemouth bass	SOFC	265/279, 258/315, 249/216
	167-99	largemouth bass	SOFC	302/439, 310/422
	168-99	common carp	SFF	538/2250
	169-99	common carp	SFF	522/1850
	170-99	common carp	SFF	419/1100
	171-99	common carp	SFF	514/2050
	172-99	common carp	SFF	481/1650
	173-99	common carp	SFF	474/1800
RM 5.3	153-99	goldfish	SFFC	247/289, 225/214, 228/205
	154-99	bluegill	SOF	177/118
	155-99	yellow bullhead	SOF	275/346
	156-99	white crappie	SOFC	222/149, 219/129, 200/104, 197/108
	157-99	largemouth bass	SOFC	296/360, 307/430
	158-99	common carp	SFFC	505/1800, 461/1200, 431/1100
	159-99	largemouth bass	SOFC	266/268, 240/220
RM 3.4	146-99	goldfish	SFFC	261/324, 262/301, 238/275
	147-99	white crappie	SOF	238/177
	148-99	pumpkinseed sunfish	SOF	146/68
	149-99	freshwater drum	SOFC	408/855, 397/724
	150-99	largemouth bass	SOFC	302/435, 282/327
	151-99	largemouth bass	SOFC	349/674, 315/540
	152-99	common carp	SFFC	495/1950, 540/2100, 451/1200
RM 1.6	139-99	bluegill	SOFC	168/116, 108/99, 173/120
	140-99	pumpkinseed sunfish	SOFC	166/100, 161/90, 166/101, 154/100
	141-99	freshwater drum	SOFC	433/922, 414/836
	142-99	largemouth bass	SOFC	318/500, 314/550, 312/590
	143-99	largemouth bass	SOFC	372/910, 363/822, 360/644
	144-99	common carp	SFFC	448/1400, 500/1700, 502/1900
	145-99	common carp	SFF	650/3750

SOFC - skin on fillet composite, SFFC - skin off fillet composite, SOF - skin on fillet, SFF - skin off fillet

Table 3. Fish tissue sample results for the Ottawa River, Toledo, 1999.

Site	Fish Species	Total PCBs (ug/kg)	Total DDT (ug/kg)	Total Chlordane (ug/kg)	Dieldrin (ug/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Lipids (%)
RM 11.5	white crappie	ND	ND	ND	ND	0.043	0.417	0.225
	common carp	4,190	296.5	75.9	67	0.112	0.561	8.2
	white sucker	ND	10.5	ND	ND	0.0708	0.684	0.777
	common carp	ND	75.6	11.1	10.7	0.078	0.532	2.04
	yellow perch	ND	ND	ND	ND	0.0832	0.536	0.318
RM 8.0	goldfish	1,944	141.1	60.9	23.6	0.0612	0.474	2.82
	common carp	2,177	201.1	55.7	19.6	0.0484	0.62	2.11
RM 7.2	yellow perch	64.9	ND	ND	ND	0.0494	0.481	0.257
	bluegill	112	ND	ND	ND	0.0566	0.381	0.3
	goldfish	435	85.3	51.6	13.4	0.109	0.551	2.23
	common carp	1,117	55.2	15.3	14.4	ND	0.548	2.97
	common carp	2,805	201.2	76.3	33.5	0.0519	0.6	4.03
RM 5.9	green x pumpkseed sf	495	18.6	ND	ND	0.099	0.356	0.654
	yellow bullhead	1,300	20.6	15.1	ND	0.104	0.2	0.917
	goldfish	1,361	65	27.9	ND	0.0441	0.526	1.68
	yellow perch	277	ND	ND	ND	-	-	0.228
	white crappie	217	ND	ND	ND	0.0254	0.336	0.196
	white crappie	550	12.8	ND	ND	0.0647	0.25	1.03
	largemouth bass	210	ND	ND	ND	0.0495	0.333	0.229
	largemouth bass	305	10.7	ND	ND	0.059	0.264	0.346
	common carp	23,143	180	455	ND	0.0352	0.587	5.41
	common carp	9,927	237	121	ND	0.0392	0.664	2.58
	common carp	6,300	27.3	199	ND	0.0737	0.6	0.958
	common carp	935	94.8	34.6	ND	0.0293	0.678	1.78
	common carp	3,136	220.5	72.5	ND	0.0312	0.688	3.12
	common carp	2,882	18.6	76.7	ND	0.0692	0.564	0.982
RM 5.3	goldfish	1,180	31.3	15.2	ND	0.0296	0.404	1.02
	bluegill	127	ND	ND	ND	0.0436	0.377	0.653
	yellow bullhead	1,283	65.4	19.8	ND	0.0387	0.202	1.6
	white crappie	138	ND	ND	ND	0.046	0.298	0.131
	largemouth bass	325	ND	ND	ND	0.123	0.357	0.357
	common carp	3,519	199.7	97.5	ND	0.076	0.545	2
	largemouth bass	427	ND	ND	ND	0.0704	0.395	0.357
RM 3.4	goldfish	1,175.2	57.3	24.8	ND	ND	0.413	1.24
	white crappie	214	ND	ND	ND	0.027	0.304	0.223
	pumpkinseed sunfish	353	ND	ND	ND	ND	0.322	0.41
	freshwater drum	2,708	87.4	18.5	ND	0.0854	0.336	2.58
	largemouth bass	324	ND	ND	ND	0.0491	0.333	0.336
	largemouth bass	452	20.6	10.6	ND	0.0651	0.298	0.389
	common carp	2,567	151.5	64.7	ND	0.0662	0.447	5.9
RM 1.6	bluegill	214	ND	ND	ND	0.0327	0.47	0.374
	pumpkinseed sunfish	116	ND	ND	ND	ND	0.398	0.199
	freshwater drum	2,106	126.2	52.5	ND	0.0755	0.302	2.88
	largemouth bass	232	ND	ND	ND	0.0368	0.384	0.367
	largemouth bass	361	16.3	10.7	ND	0.0701	0.294	0.423
	common carp	3,412	214.3	83.5	ND	0.0481	0.614	3.94
	common carp	5,766	242	160.3	33.1	0.0669	0.481	10.5

Table 4. Select metals, organochlorinated pesticides, PCBs, and percent lipids measured in fish tissue collected from the Ottawa River, August 9 and 10, 1999 by Ohio EPA.

Sample Location	RM 11.5	RM 11.5	RM 11.5	RM 11.5	RM 11.5	RM 8.0
Sample Number	185-99	184-99	183-99	182-99	181-99	180-99
Fish Species	Yellow perch	Common carp	White sucker	Common carp	White crappie	Common carp
Date Sampled	08/09/99	08/09/99	08/09/99	08/09/99	08/09/99	08/09/99
Chromium (mg/kg)	<2.73	<2.38	<2.63	<2.63	<2.78	<2.78
Mercury (mg/kg)	0.0832	0.078	0.0708	0.112	0.043	0.0484
Arsenic (mg/kg)	<0.182	<0.159	<0.175	<0.175	<0.185	<0.185
Cadmium (mg/kg)	<0.0182	<0.0159	<0.0175	0.0193	<0.0185	<0.0185
Lead (mg/kg)	<0.182	<0.159	<0.175	<0.175	<0.185	<0.185
Selenium (mg/kg)	0.536	0.532	0.684	0.561	0.417	0.62
Aldrin (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Alpha-BHC (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
beta-BHC (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
delta-BHC (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
gamma-BHC (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
4,4'-DDD (ug/kg)	<9.96	24.2	<9.97	95.6	<9.78	70.1
4,4'-DDE (ug/kg)	<9.96	51.4	10.5	183	<9.78	131
4,4'-DDT (ug/kg)	<9.96	<9.78	<9.97	17.9	<9.78	<9.76
Dieldrin (ug/kg)	<9.96	10.7	<9.97	67	<9.78	19.6
Endosulfan I (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Endosulfan II (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Endosulfan sulfate (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Endrin (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Heptachlor (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Heptachlor epoxide (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Methoxychlor (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Mirex (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
Hexachlorobenzene (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
alpha-Chlordane (ug/kg)	<9.96	11.1	<9.97	26.1	<9.78	30.7
gamma-Chlordane (ug/kg)	<9.96	<9.78	<9.97	37	<9.78	25
Oxychlordane (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
cis-Nonachlor (ug/kg)	<9.96	<9.78	<9.97	<9.59	<9.78	<9.76
trans-Nonachlor (ug/kg)	<9.96	<9.78	<9.97	12.8	<9.78	<9.76
Toxaphene (ug/kg)	<19.9	<19.6	<19.9	<19.2	<19.6	<19.5
PCB-1016 (ug/kg)	<49.8	<48.9	<49.8	<47.9	<48.9	<48.8
PCB-1221 (ug/kg)	<49.8	<48.9	<49.8	<47.9	<48.9	<48.8
PCB-1232 (ug/kg)	<49.8	<48.9	<49.8	<47.9	<48.9	<48.8
PCB-1242 (ug/kg)	<49.8	<48.9	<49.8	<47.9	<48.9	1730
PCB-1248 (ug/kg)	<49.8	<48.9	<49.8	<47.9	<48.9	<48.8
PCB-1254 (ug/kg)	<49.8	<48.9	<49.8	1850	<48.9	<48.8
PCB-1260 (ug/kg)	<49.8	<48.9	<49.8	2340	<48.9	447
Lipids %	0.318	2.04	0.777	8.2	0.225	2.11

Table 4. Continued.

Sample Location	RM 8.0	RM 7.2	RM 7.2	RM 7.2	RM 7.2	RM 7.2
Sample Number	179-99	178-99	177-99	176-99	175-99	174-99
Fish Species	Goldfish	Common carp	Common carp	Goldfish	Bluegill	Yellow perch
Date Sampled	08/09/99	08/09/99	08/09/99	08/09/99	08/09/99	08/09/99
Chromium (mg/kg)	<2.54	<2.73	<2.88	<2.54	<2.54	<2.83
Mercury (mg/kg)	0.0612	0.0519	<0.0216	0.109	0.0566	0.0494
Arsenic (mg/kg)	<0.169	<0.182	<0.192	<0.169	<0.169	<0.189
Cadmium (mg/kg)	<0.0169	<0.0182	<0.0192	<0.0169	<0.0169	<0.0189
Lead (mg/kg)	<0.169	<0.182	<0.192	<0.169	<0.169	<0.189
Selenium (mg/kg)	0.474	0.6	0.548	0.551	0.381	0.481
Aldrin (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Alpha-BHC (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
beta-BHC (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
delta-BHC (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
gamma-BHC (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
4,4'-DDD (ug/kg)	60.8	91.2	19.7	33	<9.99	<9.89
4,4'-DDE (ug/kg)	80.3	110	35.5	52.3	<9.99	<9.89
4,4'-DDT (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Dieldrin (ug/kg)	23.6	33.5	14.4	13.4	<9.99	<9.89
Endosulfan I (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Endosulfan II (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Endosulfan sulfate (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Endrin (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Heptachlor (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Heptachlor epoxide (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Methoxychlor (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Mirex (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
Hexachlorobenzene (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
alpha-Chlordane (ug/kg)	26.1	27.9	<9.76	27.6	<9.99	<9.89
gamma-Chlordane (ug/kg)	24.4	35	15.3	24	<9.99	<9.89
Oxychlordane (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
cis-Nonachlor (ug/kg)	<9.79	<9.86	<9.76	<9.82	<9.99	<9.89
trans-Nonachlor (ug/kg)	10.4	13.4	<9.76	<9.82	<9.99	<9.89
Toxaphene (ug/kg)	<19.6	<19.7	<19.5	<19.6	<20.0	<19.8
PCB-1016 (ug/kg)	<49.0	<49.3	<48.8	<49.1	<50.0	<49.4
PCB-1221 (ug/kg)	<49.0	<49.3	<48.8	<49.1	<50.0	<49.4
PCB-1232 (ug/kg)	<49.0	<49.3	<48.8	<49.1	<50.0	<49.4
PCB-1242 (ug/kg)	1770	2470	934	306	112	64.9
PCB-1248 (ug/kg)	<49.0	<49.3	<48.8	<49.1	<50.0	<49.4
PCB-1254 (ug/kg)	<49.0	<49.3	<48.8	<49.1	<50.0	<49.4
PCB-1260 (ug/kg)	174	335	183	129	<50.0	<49.4
Lipids %	2.82	4.03	2.97	2.23	0.3	0.257

Table 4. Continued.

Sample Location	RM 5.9	RM 5.9	RM 5.9	RM 5.9	RM 5.9	RM 5.9
Sample Number	173-99	172-99	171-99	170-99	169-99	168-99
Fish Species	Common carp	Common carp	Common carp	Common carp	Common carp	Common carp
Date Sampled	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99
Chromium (mg/kg)	<2.73	<2.68	<2.68	<2.73	<2.46	<2.38
Mercury (mg/kg)	0.0692	0.0312	0.0293	0.0737	0.0392	0.0352
Arsenic (mg/kg)	<0.182	<0.178	<0.178	<0.182	<0.164	<0.159
Cadmium (mg/kg)	<0.0182	<0.0178	<0.0178	<0.0182	<0.0164	<0.0159
Lead (mg/kg)	<0.182	<0.178	<0.178	<0.182	<0.164	<0.159
Selenium (mg/kg)	0.564	0.688	0.678	0.6	0.664	0.587
Aldrin (ug/kg)	33	<9.82	<9.75	<98.7	<47.0	<9.78
Alpha-BHC (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
beta-BHC (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
delta-BHC (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
gamma-BHC (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
4,4'-DDD (ug/kg)	18.6	67.5	37.2	27.3	62	180
4,4'-DDE (ug/kg)	<9.53	153	57.6	<9.87	175	<9.78
4,4'-DDT (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Dieldrin (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Endosulfan I (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Endosulfan II (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Endosulfan sulfate (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Endrin (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Heptachlor (ug/kg)	<9.53	<9.82	<9.75	<98.7	<9.40	<9.78
Heptachlor epoxide (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Methoxychlor (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Mirex (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Hexachlorobenzene (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
alpha-Chlordane (ug/kg)	<9.53	<9.82	11.6	<9.87	<9.40	<9.78
gamma-Chlordane (ug/kg)	76.7	72.5	23	199	121	455
Oxychlordane (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
cis-Nonachlor (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
trans-Nonachlor (ug/kg)	<9.53	<9.82	<9.75	<9.87	<9.40	<9.78
Toxaphene (ug/kg)	<19.1	<19.6	<19.5	<19.7	<18.8	<19.6
PCB-1016 (ug/kg)	<47.7	<49.1	<48.7	<49.4	<47.0	<48.9
PCB-1221 (ug/kg)	<47.7	<49.1	<48.7	<49.4	<47.0	<48.9
PCB-1232 (ug/kg)	<47.7	<49.1	<48.7	<49.4	<47.0	<48.9
PCB-1242 (ug/kg)	2680	2470	750	6020	9660	22,500
PCB-1248 (ug/kg)	<47.7	<49.1	<48.7	<49.4	<47.0	<48.9
PCB-1254 (ug/kg)	<47.7	<49.1	<48.7	<49.4	<47.0	<48.9
PCB-1260 (ug/kg)	202	666	185	280	267	643
Lipids %	0.982	3.12	1.78	0.958	2.58	5.41

Table 4. Continued.

Sample Location	RM 5.9	RM 5.9	RM 5.9	RM 5.9	RM 5.9	RM 5.9
Sample Number	167-99	166-99	165-99	164-99	163-99	162-99
Fish Species	Largemouth bass	Largemouth bass	White crappie	White crappie	Yellow perch	Goldfish
Date Sampled	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99
Chromium (mg/kg)	<2.73	<2.63	<2.50	<2.59	-	<2.63
Mercury (mg/kg)	0.059	0.0495	0.0647	0.0254	-	0.0441
Arsenic (mg/kg)	<0.182	<0.175	<0.167	<0.172	-	<0.175
Cadmium (mg/kg)	<0.0182	<0.0175	<0.0167	<0.0172	-	<0.0175
Lead (mg/kg)	<0.182	<0.175	<0.167	<0.172	-	<0.175
Selenium (mg/kg)	0.264	0.333	0.25	0.336	-	0.526
Aldrin (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Alpha-BHC (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
beta-BHC (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
delta-BHC (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
gamma-BHC (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
4,4'-DDD (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	24.2
4,4'-DDE (ug/kg)	10.7	<9.97	12.8	<9.82	<10.4	40.8
4,4'-DDT (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Dieldrin (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Endosulfan I (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Endosulfan II (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Endosulfan sulfate (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Endrin (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Heptachlor (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Heptachlor epoxide (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Methoxychlor (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Mirex (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Hexachlorobenzene (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
alpha-Chlordane (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
gamma-Chlordane (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	27.9
Oxychlordane (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
cis-Nonachlor (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
trans-Nonachlor (ug/kg)	<9.62	<9.97	<9.92	<9.82	<10.4	<9.80
Toxaphene (ug/kg)	<19.2	<19.9	<19.8	<19.6	<20.7	<19.6
PCB-1016 (ug/kg)	<48.1	<49.8	<49.6	<49.1	<51.8	<49.0
PCB-1221 (ug/kg)	<48.1	<49.8	<49.6	<49.1	<51.8	<49.0
PCB-1232 (ug/kg)	<48.1	<49.8	<49.6	<49.1	<51.8	<49.0
PCB-1242 (ug/kg)	305	210	550	217	277	1260
PCB-1248 (ug/kg)	<48.1	<49.8	<49.6	<49.1	<51.8	<49.0
PCB-1254 (ug/kg)	<48.1	<49.8	<49.6	<49.1	<51.8	<49.0
PCB-1260 (ug/kg)	<48.1	<49.8	<49.6	<49.1	<51.8	101
Lipids %	0.346	0.229	1.03	0.196	0.228	1.68

Table 4. Continued.

Sample Location	RM 5.9	RM 5.9	RM 5.3	RM 5.3	RM 5.3	RM 5.3
Sample Number	161-99	160-99	159-99	158-99	157-99	156-99
Fish Species	Yellow bullhead	Green x Pumpk	Lrgmouth bass	Common carp	Lrgmouth bass	Wh. crappie
Date Sampled	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99
Chromium (mg/kg)	<2.73	<2.88	<2.63	<2.73	<2.68	<2.63
Mercury (mg/kg)	0.104	0.099	0.0704	0.076	0.123	0.046
Arsenic (mg/kg)	<0.182	<0.192	<0.175	<0.182	<0.178	<0.175
Cadmium (mg/kg)	<0.0182	<0.0192	<0.0175	<0.0182	<0.0178	<0.0175
Lead (mg/kg)	<0.182	<0.192	<0.175	<0.182	<0.178	<0.175
Selenium (mg/kg)	0.2	0.356	0.395	0.545	0.357	0.298
Aldrin (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Alpha-BHC (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
beta-BHC (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
delta-BHC (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
gamma-BHC (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
4,4'-DDD (ug/kg)	<9.86	<9.91	<9.64	56.7	<9.66	<9.35
4,4'-DDE (ug/kg)	20.6	18.6	<9.64	143	<9.66	<9.35
4,4'-DDT (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Dieldrin (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Endosulfan I (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Endosulfan II (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Endosulfan sulfate (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Endrin (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Heptachlor (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Heptachlor epoxide (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Methoxychlor (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Mirex (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Hexachlorobenzene (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
alpha-Chlordane (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
gamma-Chlordane (ug/kg)	15.1	<9.91	<9.64	97.5	<9.66	<9.35
Oxychlordane (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
cis-Nonachlor (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
trans-Nonachlor (ug/kg)	<9.86	<9.91	<9.64	<9.40	<9.66	<9.35
Toxaphene (ug/kg)	<19.7	<19.8	<19.3	<18.8	<19.3	<18.7
PCB-1016 (ug/kg)	<49.3	<49.6	<48.2	<47.0	<48.3	<46.8
PCB-1221 (ug/kg)	<49.3	<49.6	<48.2	<47.0	<48.3	<46.8
PCB-1232 (ug/kg)	<49.3	<49.6	<48.2	<47.0	<48.3	<46.8
PCB-1242 (ug/kg)	1300	495	427	3010	325	138
PCB-1248 (ug/kg)	<49.3	<49.6	<48.2	<47.0	<48.3	<46.8
PCB-1254 (ug/kg)	<49.3	<49.6	<48.2	<47.0	<48.3	<46.8
PCB-1260 (ug/kg)	<49.3	<49.6	<48.2	509	<48.3	<46.8
Lipids %	0.917	0.654	0.357	2	0.357	0.131

Table 4. Continued.

Sample Location	RM 5.3	RM 5.3	RM 5.3	RM 3.4	RM 3.4	RM 3.4
Sample Number	155-99	154-99	153-99	152-99	151-99	150-99
Fish Species	Yellow bulllhead	Bluegill	Goldfish	Common carp	Lrgmouth bass	Lrgmouth bass
Date Sampled	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99
Chromium (mg/kg)	<2.63	<2.83	<2.63	<2.63	<2.88	<2.94
Mercury (mg/kg)	0.0387	0.0436	0.0296	0.0662	0.0651	0.0491
Arsenic (mg/kg)	<0.175	<0.189	<0.175	0.219	<0.192	<0.196
Cadmium (mg/kg)	<0.0175	<0.0189	<0.0175	<0.0175	<0.0192	<0.0196
Lead (mg/kg)	<0.175	<0.189	<0.175	<0.175	<0.192	<0.196
Selenium (mg/kg)	0.202	0.377	0.404	0.447	0.298	0.333
Aldrin (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Alpha-BHC (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
beta-BHC (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
delta-BHC (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
gamma-BHC (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
4,4'-DDD (ug/kg)	19.7	<9.75	11.3	45.5	<9.97	<9.60
4,4'-DDE (ug/kg)	45.7	<9.75	20	106	20.6	<9.60
4,4'-DDT (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Dieldrin (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Endosulfan I (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Endosulfan II (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Endosulfan sulfate (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Endrin (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Heptachlor (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Heptachlor epoxide (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Methoxychlor (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Mirex (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Hexachlorobenzene (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
alpha-Chlordane (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
gamma-Chlordane (ug/kg)	19.8	<9.75	15.2	64.7	10.6	<9.60
Oxychlordane (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
cis-Nonachlor (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
trans-Nonachlor (ug/kg)	<9.67	<9.75	<9.88	<9.67	<9.97	<9.60
Toxaphene (ug/kg)	<19.3	<19.5	<19.8	<19.3	<19.9	<19.2
PCB-1016 (ug/kg)	<48.4	<48.7	<49.4	<48.4	<49.8	<48.0
PCB-1221 (ug/kg)	<48.4	<48.7	<49.4	<48.4	<49.8	<48.0
PCB-1232 (ug/kg)	<48.4	<48.7	<49.4	<48.4	<49.8	<48.0
PCB-1242 (ug/kg)	1140	127	1180	2250	452	324
PCB-1248 (ug/kg)	<48.4	<48.7	<49.4	<48.4	<49.8	<48.0
PCB-1254 (ug/kg)	<48.4	<48.7	<49.4	<48.4	<49.8	<48.0
PCB-1260 (ug/kg)	143	<48.7	<49.4	317	<49.8	<48.0
Lipids %	1.6	0.653	1.02	5.9	0.389	0.336

Table 4. Continued.

Sample Location	RM 3.4	RM 3.4	RM 3.4	RM 3.4	RM 1.6	RM 1.6
Sample Number	149-99	148-99	147-99	146-99	145-99	144-99
Fish Species	Freshwater drum	Pumpkinseed	White crappie	Goldfish	Common carp	Common carp
Date Sampled	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99
Chromium (mg/kg)	<2.59	<2.54	<2.94	<2.88	<2.83	<2.63
Mercury (mg/kg)	0.0854	<0.0194	0.027	<0.0218	0.0669	0.0481
Arsenic (mg/kg)	<0.172	<0.169	<0.196	<0.192	0.255	<0.175
Cadmium (mg/kg)	<0.0172	<0.0169	<0.0196	<0.0192	<0.0189	<0.0175
Lead (mg/kg)	<0.172	<0.169	<0.196	<0.192	<0.189	<0.175
Selenium (mg/kg)	0.336	0.322	0.304	0.413	0.481	0.614
Aldrin (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Alpha-BHC (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
beta-BHC (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
delta-BHC (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
gamma-BHC (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
4,4'-DDD (ug/kg)	25.6	<10.0	<9.72	18.7	92	57.3
4,4'-DDE (ug/kg)	61.8	<10.0	<9.72	38.6	150	157
4,4'-DDT (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Dieldrin (ug/kg)	<9.49	<10.0	<9.72	<9.73	33.1	<9.38
Endosulfan I (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Endosulfan II (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Endosulfan sulfate (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Endrin (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Heptachlor (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Heptachlor epoxide (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Methoxychlor (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Mirex (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Hexachlorobenzene (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
alpha-Chlordane (ug/kg)	<9.49	<10.0	<9.72	<9.73	30.3	<9.38
gamma-Chlordane (ug/kg)	18.5	<10.0	<9.72	24.8	130	83.5
Oxychlordane (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
cis-Nonachlor (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
trans-Nonachlor (ug/kg)	<9.49	<10.0	<9.72	<9.73	<9.87	<9.38
Toxaphene (ug/kg)	<19.0	<20.0	<19.4	<19.4	<19.7	<18.8
PCB-1016 (ug/kg)	<47.4	<50.1	<48.6	<48.6	<49.4	<46.9
PCB-1221 (ug/kg)	<47.4	<50.1	<48.6	<48.6	<49.4	<46.9
PCB-1232 (ug/kg)	<47.4	<50.1	<48.6	<48.6	<49.4	<46.9
PCB-1242 (ug/kg)	2560	353	214	1100	5370	3040
PCB-1248 (ug/kg)	<47.4	<50.1	<48.6	<48.6	<49.4	<46.9
PCB-1254 (ug/kg)	<47.4	<50.1	<48.6	<48.6	<49.4	<46.9
PCB-1260 (ug/kg)	148	<50.1	<48.6	75.2	396	372
Lipids %	2.58	0.41	0.223	1.24	10.5	3.94

Table 4. Continued.

Sample Location	RM 1.6	RM 1.6	RM 1.6	RM 1.6	RM 1.6	
Sample Number	143-99	142-99	141-99	140-99	139-99	
Fish Species	Lrgmouth bass	Lrgmouth bass	Freshwater drum	Pumpkinseed	Bluegill	
Date Sampled	08/10/99	08/10/99	08/10/99	08/10/99	08/10/99	
Chromium (mg/kg)	<2.94	<2.68	<2.83	<2.78	<2.94	
Mercury (mg/kg)	0.0701	0.0368	0.0755	<0.0239	0.0327	
Arsenic (mg/kg)	<0.196	<0.178	<0.189	<0.185	<0.196	
Cadmium (mg/kg)	<0.0196	<0.0178	<0.0189	<0.0185	<0.0196	
Lead (mg/kg)	<0.196	<0.178	<0.189	<0.185	<0.196	
Selenium (mg/kg)	0.294	0.384	0.302	0.398	0.47	
Aldrin (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Alpha-BHC (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
beta-BHC (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
delta-BHC (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
gamma-BHC (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
4,4'-DDD (ug/kg)	<9.84	<9.93	34.9	<9.46	<9.84	
4,4'-DDE (ug/kg)	16.3	<9.93	91.3	<9.46	<9.84	
4,4'-DDT (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Dieldrin (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Endosulfan I (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Endosulfan II (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Endosulfan sulfate (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Endrin (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Heptachlor (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Heptachlor epoxide (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Methoxychlor (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Mirex (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Hexachlorobenzene (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
alpha-Chlordane (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
gamma-Chlordane (ug/kg)	10.7	<9.93	52.5	<9.46	<9.84	
Oxychlordane (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
cis-Nonachlor (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
trans-Nonachlor (ug/kg)	<9.84	<9.93	<9.51	<9.46	<9.84	
Toxaphene (ug/kg)	<19.7	<19.9	<19.0	<18.9	<19.7	
PCB-1016 (ug/kg)	<49.2	<49.6	<47.6	<47.3	<49.2	
PCB-1221 (ug/kg)	<49.2	<49.6	<47.6	<47.3	<49.2	
PCB-1232 (ug/kg)	<49.2	<49.6	<47.6	<47.3	<49.2	
PCB-1242 (ug/kg)	361	232	1760	116	214	
PCB-1248 (ug/kg)	<49.2	<49.6	<47.6	<47.3	<49.2	
PCB-1254 (ug/kg)	<49.2	<49.6	<47.6	<47.3	<49.2	
PCB-1260 (ug/kg)	<49.2	<49.6	346	<47.3	<49.2	
Lipids %	0.423	0.367	2.88	0.199	0.374	

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