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Transmitted Via First Class Mail

July 19, 2002

Mr. Thomas Short
Remedial Project Manager
USEPA Region V HSR W-6J
77 West Jackson Blvd.
Chicago, IL 60604-3590

Re: Sheboygan River and Harbor Annual IMP Report
Project #: 176.33.008 #2

Dear Tom:

Enclosed please find three copies of the Interim Monitoring Report for the Sheboygan project, which contains 2001 resident fish and caged fish data. If you have any questions, or want to discuss the information presented in the report, please contact me at your convenience.

Sincerely,

BLASLAND, BOUCK & LEE, INC.

David W. Hohreiter, Ph.D.
Principal Scientist

JEB/csc
Enclosures

cc: John N. Hanson, Esq.,/Steven M. Jawetz, Esq., Beveridge & Diamond (w/encl.)
Daryl P. McDonald, Esq., Tecumseh Products Company (w/encl.)
Kerry DeKeyser, CHMM, Tecumseh Products Company (w/encl.)
Richard Nagle, Esq., USEPA (w/encl.)
Thomas Wentland, WDNR (w/encl.)
Chip Krohn, WDNR (w/encl.)

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Tel (315) 446-9120 • Fax (315) 449-0017 • www.bbl-inc.com • offices nationwide

REPORT

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2001 Interim Monitoring Program Sheboygan River and Harbor

Prepared by BBL, Inc. on Behalf of Tecumseh Products Company

July 2002

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1. Interim Monitoring Program

1.1 General

This report presents a summary of the resident fish monitoring and the caged fish study completed as part of the Interim Monitoring Program (IMP) for the Sheboygan River and Harbor (the Site). These activities were completed in accordance with the IMP Work Plan/QAPP (BBL, 1996), which was developed in consultation with the U.S. Environmental Protection Agency (USEPA) and Wisconsin Department of Natural Resources (WDNR).

The stated objectives of the IMP are to:

1. provide data to evaluate the effectiveness of remediation;
2. generate data to allow for periodic re-evaluation of potential human exposure and associated risks; and
3. establish baseline data to be used in conjunction with the data from the long-term monitoring program that will be established following implementation of the selected remedy to evaluate the overall effectiveness of remediation.

A description of the IMP biota sampling activities completed in 2001 and a summary of the results are presented in the following sections.

2. Resident Fish Monitoring

2.1 Field Sampling Activities

Consistent with previous IMP resident fish sampling efforts, resident fish were collected in 2001 from three reaches of the Sheboygan River, specifically: 1) in the vicinity of Rochester Park, 2) between Kohler's River Bend Dam and Waelderhaus Dam, and 3) in the vicinity of Kiwanis Park. Target species for each reach were twelve smallmouth bass (*Micropterus dolomieui*) and twenty-five composite samples (n = 2 fish per composite) of juvenile white suckers (*Catostomus commersoni*). All samples were analyzed for PCBs using USEPA method 8082 (capillary column GC) which has replaced Method 8080 (packed column GC). Previous years' resident and caged fish samples had been analyzed using USEPA Method 8080. A subset of the 2001 fish samples were also analyzed using USEPA 8080 to evaluate comparability of results generated by the two analytical methods. Analytical results are presented in the attached tables.

Complete samples of adult smallmouth bass and juvenile white suckers were collected from each location using electrofishing equipment on September 10th through September12th, 2001. A summary of smallmouth bass and juvenile white sucker analytical data is presented in the following sections.

2.2 Analytical Results

Smallmouth Bass

The 2001 smallmouth bass PCB data are presented in Tables 1 and 3. The mean total PCB concentration in Rochester Park smallmouth bass (2.1 mg/kg) is lower than concentrations reported in any of the previous Alternative Specific Remedial Investigation (ASRI) or IMP sampling events, and is statistically significantly lower than concentrations reported in 1991 (10.3 mg/kg), 1995 (9.6 mg/kg) and 1998 (10.7 mg/kg) (ANOVA, Scheffe, $p < 0.05$). The mean total PCB concentration in 2001 smallmouth bass from between the Kohler dams (1.1 mg/kg) is also lower than concentrations previously reported for ASRI and IMP sampling events at this location, and is statistically significantly lower than concentrations reported in 1990 through 1996 (ANOVA, Scheffe, $p < 0.05$). The 2001 Kohler Dam smallmouth bass mean total PCB concentration is also statistically significantly lower than the mean concentration reported in 2000 (ANOVA, Scheffe, $p < 0.05$). Similarly, the 2001 Kiwanis Park smallmouth bass mean total PCB concentration (0.84 mg/kg) is lower than concentrations reported in any of the previous ASRI and IMP sampling events, and is statistically significantly lower than PCB concentrations reported in sampling events from the early 1990s (1991, 1993) (ANOVA, Scheffe, $p < 0.05$). Smallmouth bass lipid-normalized PCB data generally follow the same trend as described for total PCBs (wet-weight).

Figures 1 and 2 graphically depict temporal trends in smallmouth bass mean total PCB and mean lipid-normalized PCB concentrations, respectively. Smallmouth bass collected in the vicinity of Rochester Park show no apparent temporal trend in total PCB and lipid-normalized PCB concentrations. Figure 1 shows an apparent decreasing trend in smallmouth bass total PCB concentrations between the Kohler dams and in the vicinity of Kiwanis Park. The trend associated with lipid-normalized PCB concentrations in these two areas is less evident (Figure 2).

White Sucker

White sucker PCB data are presented in Tables 2 and 4. The mean total PCB concentration in 2001 white suckers collected from Rochester Park (18.3 mg/kg) is similar to the mean concentration reported in 1998 (18.3 mg/kg), the last year a complete set of white sucker samples were collected from this location, and statistically significantly greater than concentrations reported in years prior to 1998 (ANOVA, Scheffe, $p < 0.05$). The mean total PCB concentration in white suckers from between the Kohler dams (3.4 mg/kg) is statistically significantly lower than concentrations reported in previous years, with the exception of 1996 (ANOVA, Scheffe, $p < 0.05$). For Kiwanis Park white suckers, the 2001 mean total PCB concentration (2.1 mg/kg) is statistically significantly lower than concentrations reported during the first two years of the IMP (1994 and 1995), and is similar to concentrations reported in 2000 (ANOVA, Scheffe, $p < 0.05$). White sucker lipid-normalized PCB concentrations follow the same general trend as described for total PCBs (wet-weight).

Temporal trends in juvenile white sucker PCB concentrations are graphically presented in Figures 3 and 4. Figures 3 and 4 show no apparent trend in mean total PCB and mean lipid-normalized PCB concentrations in white suckers collected from the vicinity of Rochester Park. There may, however, be a decreasing trend in mean total PCB concentrations in white suckers collected between the Kohler dams and in the vicinity of Kiwanis Park.

3. Caged Fish Study

3.1 Field Sampling Activities

The IMP caged fish studies were conducted as described in the IMP Work Plan (BBL, 1996). The caged fish studies are designed to provide a relative indicator of PCB availability. These study results do not provide information that is directly useful for evaluating potential risks to human health.

The 2001 caged fish studies were consistent with previous IMP caged fish studies and included the following five monitoring locations.

1. A background location above Sheboygan Falls dam corresponding to water-column monitoring location W-1 (IMP Station 1).

2. Immediately downstream of sediment area 19 and near water-column monitoring location W-13B (IMP Station 2).

3. Immediately upstream of River Bend Dam near water-column monitoring location W-3, and immediately downstream of sediment areas 28 and 31 (IMP Station 3).

4. Immediately upstream of Waelderhaus Dam, near water-column monitoring location W-4, and immediately downstream of sediment aeas 45 and 46 (IMP Station 4).

5. In the vicinity of the I-43 bridge and the USGS gaging station, near water-column monitoring location W-5 (IMP Station 5).

Fish cages (two cages per location) were placed in the River on September 27, 2001. Each cage contained approximately 250 fathead minnows (*Pimephales promelas*). Prior to placing minnows into cages, two pre-exposure minnow samples were obtained and submitted to EnChem Laboratory, Madison, Wisconsin for analyses of PCB/lipid content to confirm that the study fish had non-detectable PCB concentrations.

Three-week exposure samples were obtained on October 18, 2001, and 6-week exposure samples were taken on November 7, 2001. During each sampling event, two composite samples were obtained from each cage, for a total of four samples per sampling station.

3.2 Analytical Results

The results of PCB and lipid analyses for the 2001 caged fish study are presented in Table 5. Total mean PCB concentrations at the four non-background locations (Stations 2-5) ranged from 0.37 mg/kg to 0.54 mg/kg for the 3-week samples, and mean lipid-normalized concentrations ranged from 13 to 19 mg/kg lipid. Total mean PCB concentrations at the four non-background locations for the 6-week samples ranged from 0.37 mg/kg to 0.58 mg/kg, and lipid-normalized mean concentrations ranged from 18 mg/kg to 27 mg/kg lipid.

Table 6 presents a summary of all the 6-week caged fish results, including historic ASRI data for IMP Stations 1 and 2. For all Stations (with the exception of the upstream background location, Station 1) the 2001 6-week total mean PCB concentrations are lower than concentrations reported for any of the previous ASRI and IMP

sampling events. At Station 2 (the only non-background caged fish location continually monitored since 1989), the 2001 total mean PCB concentration is significantly less than the 1989 baseline concentration (ANOVA, Scheffe, $p<0.05$). At Stations 3 and 4, mean total PCB concentrations reported in 2001 caged fish are similar to concentrations reported in 2000, but are generally statistically significantly lower than concentrations reported in years prior to 2000 (ANOVA, Scheffe, $p < 0.05$). At Station 5, the 2001 6-week caged fish total mean PCB concentration is statistically significantly lower than concentrations reported in any of the previous years (1994 through 2000) (ANOVA, Scheffe, $p<0.05$). Lipid-normalized PCB concentrations follow the same general trend as total PCBs (wet-weight).

Figures 5 and 6 graphically depict temporal trends in caged fish mean total PCB and lipid-normalized PCB concentrations. Although, there is no definite temporal trend, mean total PCB and lipid-normalized PCB concentrations reported in recent sampling events appear to be decreasing.

Tables

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TABLE 1

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

2001 SMALLMOUTH BASS MONITORING RESULTS (1)
Collection Dates: September 10-12, 2001

Sample	Length (cm)	Weight (g)	Lipid (%)	Total PCB (2) Method 8082 (mg/kg)	Total PCB (2) Method 8080 (mg/kg)	Lipid-Normalized PCB (2) (mg/kg-lipid)
ROCHESTER PARK						
FB-404	40.6	1200	0.53	3.01	NA	568
FB-405	39.2	920	1.51	0.93	0.91	62
FB-406	26.6	280	0.56	1.60	1.94	286
FB-407	32.4	500	0.58	2.48	2.67	428
FB-408	32.6	550	1.07	0.14	NA	13
FB-409	33.1	580	0.86	4.25	NA	494
FB-410	28.2	320	0.37	1.51	NA	408
FB-411	36.4	800	1.20	2.00	NA	167
FB-412	32.9	600	0.54	2.56	NA	474
FB-413	42.5	1120	0.74	3.10	3.96	419
FB-414	33.1	580	0.58	3.09	NA	533
FB-415	40.2	960	0.71	1.00	NA	141
Mean (3)	34.8	701	0.77	2.14	2.37	333
Standard Deviation	5.0	298	0.33	1.16	1.28	192
BETWEEN KOHLER DAMS						
FB-392	26.1	260	0.92	1.09	NA	118
FB-393	26.3	270	1.14	1.76	NA	154
FB-394	27.2	320	1.22	ND < 0.099	NA	4
FB-395	28.5	390	0.83	0.99	NA	119
FB-396	25.0	250	0.61	1.03	1.09	169
FB-397	38.1	880	0.90	1.15	1.15	128
FB-398	35.3	520	0.32	0.91	0.82	284
FB-399	31.9	490	0.61	1.30	NA	213
FB-400	32.9	520	0.95	0.75	NA	79
FB-401	28.8	380	0.89	1.02	NA	115
FB-402	29.6	360	0.51	1.14	NA	224
FB-403	30.1	420	0.47	1.01	1.13	215
Mean (3)	30.0	422	0.78	1.05	1.05	152
Standard Deviation	3.9	173	0.28	0.40	0.15	75
KIWANIS PARK						
FB-380	26.1	280	0.82	0.88	NA	107
FB-381	26.0	310	0.86	0.96	1.01	112
FB-382	26.8	310	0.78	0.79	NA	101
FB-383	26.9	350	1.09	0.96	NA	88
FB-384	28.4	380	1.13	0.77	NA	68
FB-385	27.0	320	0.85	0.83	NA	98
FB-386	27.9	360	0.95	0.68	NA	72
FB-387	29.4	460	0.89	0.73	0.69	82
FB-388	33.5	620	1.51	0.82	0.78	54
FB-389	29.8	410	0.69	0.49	NA	71
FB-390	28.0	350	1.09	0.91	NA	83
FB-391	37.0	900	1.59	1.29	1.35	81
Mean (3)	28.9	421	1.02	0.84	0.96	85
Standard Deviation	3.3	176	0.28	0.19	0.29	17

Notes:
(1) Smallmouth bass samples prepared as skin-on, scales-off fillet.
(2) PCB concentrations reported on a wet-weight basis.
(3) Arithmetic mean.
mg/kg= milligrams per kilogram
ND = Non-detect

TABLE 2

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

2001 WHITE SUCKER MONITORING RESULTS (1)
Collection Dates: September 10 - 12, 2001

Sample	Length #1 (cm)	Length #2 (cm)	Length #3 (cm)	Weight #1 (g)	Weight #2 (g)	Weight #3 (g)	Total Sample Weight (g)	Lipid (%)	Total PCB (2) Method 8082 (mg/kg)	Total PCB (2) Method 8080 (mg/kg)	Lipid-Normalized PCB (2) (mg/kg-lipid)
ROCHESTER PARK											
FK-316	6.3	6.8	NA	2.9	3.1	NA	6.0	1.74	15.8	NA	908
FK-317	6.8	7.0	NA	3.1	3.6	NA	6.7	1.36	12.7	NA	934
FK-318	7.4	6.9	NA	4.1	3.4	NA	7.5	1.58	13.9	NA	880
FK-319	7.5	8.5	NA	3.9	5.7	NA	9.6	1.41	11.6	NA	823
FK-320	8.5	8.5	NA	6.2	6.4	NA	12.6	1.57	13.6	NA	866
FK-321	7.5	7.5	NA	4.8	4.5	NA	9.3	1.34	15.8	NA	1179
FK-322	10.3	NA	NA	10.7	NA	NA	10.7	1.50	23.8	NA	1587
FK-375	11.9	13.0	NA	11.0	13.6	NA	24.6	1.00	9.00	9.8	900
FK-376	8.8	8.6	NA	4.5	4.6	NA	9.1	1.84	12.7	NA	690
FK-377	8.5	8.3	NA	3.6	3.8	NA	7.4	1.02	23.3	NA	2284
FK-378	8.1	8.8	NA	3.1	4.0	NA	7.1	1.05	12.2	NA	1162
FK-379	9.0	9.6	NA	4.5	5.5	NA	10.0	1.25	15.7	14.9	1256
FK-380	9.1	8.4	NA	4.1	3.5	NA	7.6	1.05	29.4	NA	2800
FK-381	8.5	7.8	NA	3.2	2.9	NA	6.1	0.99	9.40	10.8	949
FK-382	8.0	7.4	NA	3.2	2.4	NA	5.6	2.26	35.0	NA	1549
FK-383	7.4	8.2	NA	2.6	3.2	NA	5.8	1.57	9.00	NA	573
FK-384	7.3	7.6	NA	2.8	2.2	NA	5.0	0.99	20.3	NA	2042
FK-385	7.6	6.8	NA	2.7	2.1	NA	4.8	1.27	27.3	28	2150
FK-386	7.2	7.5	NA	2.0	1.9	NA	3.9	0.84	14.7	NA	1748
FK-387	6.9	6.8	NA	1.9	1.9	NA	3.8	1.95	38.0	NA	1949
FK-388	7.2	6.5	NA	2.1	1.8	NA	3.9	1.14	5.40	NA	474
FK-389	6.5	6.5	NA	1.5	1.5	NA	3.0	1.16	15.5	NA	1336
FK-390	6.0	6.5	NA	1.5	1.7	NA	3.2	1.44	11.7	NA	813
FK-391	6.3	6.1	NA	1.6	1.3	NA	2.9	1.89	20.4	20.1	1079
FK-392	8.9	9.3	NA	4.5	4.9	NA	9.4	1.19	42.4	NA	3563
Mean (3)	7.9	7.9	NA	3.8	3.7	NA	7.4	1.38	18.3	16.7	1380
Standard Deviation	1.3	1.5	NA	2.4	2.5	NA	4.4	0.36	9.6	7.5	744

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TABLE 2

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

2001 WHITE SUCKER MONITORING RESULTS (1)
Collection Dates: September 10 - 12, 2001

Sample	Length #1 (cm)	Length #2 (cm)	Length #3 (cm)	Weight #1 (g)	Weight #2 (g)	Weight #3 (g)	Total Sample Weight (g)	Lipid (%)	Total PCB (2) Method 8082 (mg/kg)	Total PCB (2) Method 8080 (mg/kg)	Lipid-Normalized PCB (2) (mg/kg-lipid)
BETWEEN KOHLER DAMS											
FK-340	10.7	9.8	NA	13.2	9.5	NA	22.7	1.65	10.1	11.0	612
FK-341	8.5	8.2	NA	6.3	5.7	NA	12.0	1.98	4.40	NA	222
FK-342	9.8	9.4	NA	9.4	9.9	NA	19.3	1.36	5.30	NA	390
FK-343	8.9	8.4	NA	7.3	5.7	NA	13.0	1.53	3.30	3.8	216
FK-344	8.0	7.8	NA	4.7	4.9	NA	9.6	1.47	4.60	NA	313
FK-345	8.4	8.2	NA	5.9	5.8	NA	11.7	1.78	7.50	NA	421
FK-346	8.1	7.9	NA	5.6	4.7	NA	10.3	1.59	2.80	NA	176
FK-347	7.1	7.0	NA	3.8	3.3	NA	7.1	2.32	2.26	NA	97
FK-348	7.0	6.7	NA	3.6	2.8	NA	6.4	1.61	1.30	NA	81
FK-349	7.3	7.2	NA	4.0	3.7	NA	7.7	2.17	9.60	NA	442
FK-350	7.2	7.5	NA	3.7	4.5	NA	8.2	1.10	4.22	5.0	384
FK-351	7.3	6.8	NA	4.0	3.3	NA	7.3	2.12	1.75	NA	83
FK-352	7.0	7.0	NA	3.1	3.3	NA	6.4	2.15	1.75	NA	81
FK-353	6.1	6.5	NA	2.3	2.6	NA	4.9	1.30	2.23	NA	172
FK-354	6.6	6.4	6.6	2.8	2.5	3.1	8.4	1.62	1.67	1.9	103
FK-355	6.5	6.5	6.8	2.5	2.7	2.3	7.5	1.17	1.65	NA	141
FK-356	6.0	6.5	5.6	2.2	2.1	1.6	5.9	0.84	1.76	NA	211
FK-357	6.5	6.6	6.0	3.0	2.5	1.6	7.1	2.00	4.10	NA	205
FK-358	5.5	5.0	5.1	1.8	1.3	1.3	4.4	1.16	1.99	1.8	172
FK-359	6.1	6.4	5.8	2.4	2.5	1.7	6.6	1.23	1.75	NA	142
FK-360	6.2	6.2	5.7	2.5	2.4	1.8	6.7	1.49	3.45	NA	232
FK-361	6.0	5.9	5.7	2.0	2.0	1.7	5.7	1.02	1.92	NA	188
FK-362	6.0	5.7	5.1	2.2	1.8	1.4	5.4	0.67	1.83	NA	274
FK-363	5.6	5.5	5.9	1.8	1.9	1.8	5.5	1.34	2.26	NA	169
FK-364	5.9	5.7	5.6	2.0	1.7	1.8	5.5	1.53	1.76	NA	115
Mean (3)	7.1	7.0	5.8	4.1	3.7	1.8	8.6	1.53	3.41	4.7	226
Standard Deviation	1.3	1.2	0.5	2.7	2.2	0.5	4.4	0.43	2.44	3.8	134

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TABLE 2

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

2001 WHITE SUCKER MONITORING RESULTS (1)
Collection Dates: September 10 - 12, 2001

Sample	Length #1 (cm)	Length #2 (cm)	Length #3 (cm)	Weight #1 (g)	Weight #2 (g)	Weight #3 (g)	Total Sample Weight (g)	Lipid (%)	Total PCB (2) Method 8082 (mg/kg)	Total PCB (2) Method 8080 (mg/kg)	Lipid-Normalized PCB (2) (mg/kg-lipid)
KIWANIS PARK											
FK-323	12.4	10.9	NA	21.7	13.9	NA	35.6	3.84	1.72	1.7	45
FK-324	10.0	9.8	NA	11.1	10.1	NA	21.2	1.89	2.04	NA	108
FK-325	9.0	9.6	NA	8.3	9.6	NA	17.9	2.15	1.09	NA	51
FK-326	9.6	8.8	NA	8.8	7.8	NA	16.6	1.59	1.76	NA	111
FK-327	9.0	8.8	NA	7.6	8.2	NA	15.8	1.94	1.60	1.93	82
FK-328	9.4	9.0	NA	8.4	7.1	NA	15.5	1.99	2.16	NA	109
FK-329	9.1	8.9	NA	8.1	7.6	NA	15.7	1.26	1.17	NA	93
FK-330	7.7	8.2	NA	5.1	5.8	NA	10.9	2.73	1.71	NA	63
FK-331	8.6	8.1	NA	6.5	5.6	NA	12.1	2.14	1.53	NA	71
FK-332	8.3	8.5	NA	6.0	5.5	NA	11.5	1.36	1.50	NA	110
FK-333	8.2	8.4	NA	5.8	6.0	NA	11.8	2.08	0.96	NA	46
FK-334	7.4	7.5	NA	4.2	4.6	NA	8.8	1.36	1.34	1.33	99
FK-335	7.8	8.2	NA	4.6	5.5	NA	10.1	1.70	1.49	NA	88
FK-336	7.7	8.0	NA	4.7	4.9	NA	9.6	1.70	2.15	NA	126
FK-337	7.0	6.8	NA	3.3	2.9	NA	6.2	1.32	1.50	1.54	114
FK-338	5.9	NA	NA	1.9	NA	NA	1.9	0.75	1.50	NA	200
FK-339	17.5	16.5	NA	49.4	52.7	NA	102.1	1.86	0.99	1.07	53
FK-365	11.6	10.2	NA	15.0	10.5	NA	25.5	2.20	2.11	NA	96
FK-366	10.3	9.8	NA	11.2	9.2	NA	20.4	2.38	3.10	NA	130
FK-367	9.8	9.2	NA	9.2	6.7	NA	15.9	1.13	2.31	NA	204
FK-368	9.0	9.5	NA	7.5	8.4	NA	15.9	1.81	3.04	NA	168
FK-369	9.3	8.9	NA	8.4	7.1	NA	15.5	1.51	3.29	NA	218
FK-370	8.4	8.6	NA	5.6	6.5	NA	12.1	2.17	2.82	NA	130
FK-371	8.8	9.1	NA	6.7	7.9	NA	14.6	1.68	3.70	NA	220
FK-372	8.6	8.5	NA	6.7	6.1	NA	12.8	1.79	2.77	NA	155
FK-373	9.0	8.5	NA	7.5	7.5	NA	15.0	1.77	3.20	NA	181
FK-374	8.4	8.1	7.8	5.8	5.1	5.0	15.9	1.87	2.78	NA	149
Mean (3)	9.2	9.1	NA	9.2	9.0	NA	18.0	1.85	2.05	1.51	119
Standard Deviation	2.1	1.7	NA	8.9	9.2	NA	17.9	0.58	0.78	0.33	53

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TABLE 2

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

2001 WHITE SUCKER MONITORING RESULTS (1)
Collection Dates: September 10 - 12, 2001

Notes:
(1) White sucker samples prepared as whole-body composites consisting of two fish per composite sample. Some composite samples consist of three individuals for the purpose of meeting minimum sample mass requirements.
(2) PCB concentrations reported on a wet-weight basis.
(3) Arithmetic mean.
cm= centimeters
g= grams
mg/kg= milligrams per kilogram
NA= Not available

TABLE 3
SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

SUMMARY OF SMALLMOUTH BASS MONITORING RESULTS (1,2,3)
(1990 - 1996, 1998-2001)

Location/Species	Year	Mean Total PCB (mg/kg) (2,4)	Mean Lipid-Normalized PCB (mg/kg-lipid) (2,4)
Rochester Park	1990	6.2 (ab)	916 (ab)
	1991	10.3 (a)	969 (ab)
	1992	6.3 (ab)	600 (ab)
	1993	4.6 (ab)	450 (ab)
	1994	7.5 (ab)	875 (ab)
	1995	9.6 (a)	854 (ab)
	1996	3.4 (ab)	341 (b)
	1998	10.7 (a)	1294 (a)
	1999	7.6 (ab)	1153 (ab)
	2000	7.1 (ab)	674 (ab)
	2001	2.1 (b)	333 (b)
Between Kohler Dams	1990	4.7 (abc)	571 (ab)
	1991	7.3 (a)	848 (a)
	1992	5.2 (ab)	417 (ab)
	1993	5.4 (ab)	562 (ab)
	1994	5.6 (ab)	523 (ab)
	1995	3.6 (abc)	335 (bc)
	1996	3.9 (abc)	361 (abc)
	1998	3.1 (bcd)	416 (ab)
	1999	2 (cd)	322 (bc)
	2000	4.2 (abc)	459 (ab)
	2001	1.1 (d)	152 (c)
Kiwanis Park	1990	2.3 (abcd)	217 (bc)
	1991	3.7 (ac)	355 (ab)
	1992	2.4 (acd)	283 (b)
	1993	3 (c)	733 (a)
	1994	2.5 (acd)	219 (bc)
	1995	2 (abcd)	163 (bc)
	1996	2.3 (acd)	249 (bc)
	1998	1.9 (abcd)	186 (bc)
	1999	2 (abcd)	248 (bc)
	2000	1.3 (bd)	146 (bc)
	2001	0.84 (d)	85 (c)

Notes:

(1) Smallmouth bass samples prepared as skin-on, scales-off fillets.

(2) Arithmetic Mean.

(3) Samples were not collected in 1997. Scientific Collectors Permit Application was not approved.

(4) PCB concentrations reported on a wet-weight basis.

2001 samples were analyzed using USEPA Method 8082 (Method 8082 replaced/superceded USEPA Method 8080).

Samples from all other years and select 2001 samples were analyzed using USEPA Method 8080.

The letters in parentheses denoting statistical differences (for each analysis) apply to the data presented in each column for each location. Within each location, means with different letters are statistically significantly different (ANOVA, Scheffe, 95% Confidence).

TABLE 4
SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING RESULTS

SUMMARY OF WHITE SUCKER MONITORING RESULTS (1)
(1994 - 1996, 1998-2001) (2)

Location	Year	Mean Total PCB (mg/kg) (3,4)	Mean Lipid-Normalized PCB (mg/kg-lipid) (3,4)
Rochester Park	1994	7.9 (b)	409 (b)
	1995	7.4 (b)	375 (b)
	1996	8.1 (b)	354 (b)
	1998	18.3 (a)	1091 (a)
	1999	NA	NA
	2000	8.4*	792*
	2001	18.3 (a)	1380 (a)
Between Kohler Dams	1994	8.7 (a)	437 (a)
	1995	6.2 (a)	330 (ab)
	1996	6.1 (ab)	242 (ab)
	1998	6.8 (a)	349 (a)
	1999	NA	NA
	2000	NA	NA
	2001	3.4 (b)	226 (b)
Kiwanis Park	1994	3.9 (a)	208 (a)
	1995	3.4 (a)	197 (a)
	1996	1.9 (b)	74 (c)
	1998	1.3 (c)	53 (c)
	1999	NA	NA
	2000	2.2 (b)	115 (b)
	2001	2.1 (b)	119 (b)

Notes:
(1) White sucker samples prepared as whole-body composites consisting of two fish per composite.
(2) Samples were not collected in 1997. Scientific Collectors Permit Application was not approved.
(3) Arithmetic Mean.
(4) PCB concentrations reported on a wet-weight basis.
* Only one composite sample collected. Sample is not included in the statistical analysis.
NA = not available. No samples collected.
2001 samples were analyzed using USEPA Method 8082 (Method 8082 replaced/superceded USEPA Method 8080).
Samples from all other years and select 2001 samples were analyzed using USEPA Method 8080.
The letters in parentheses denoting statistical differences (for each analysis) apply to the data presented in each column for each location. Within each location, means with different letters are statistically significantly different (ANOVA, Scheffe, 95% Confidence).

TABLE 5

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

2001 CAGED FISH MONITORING RESULTS (1,2)
(9/27/01-11/7/01)

Location	Cage No.	Lipid (%)	Total PCB (3) (mg/kg)	Lipid-Normalized PCB (3) (mg/kg-lipid)	Lipid (%)	Total PCB (3) (mg/kg)	Lipid-Normalized PCB (3) (mg/kg-lipid)
		3-Week Exposure			6-Week Exposure		
Station 1	1A	2.89	<0.091	2	2.13	<0.050	1
Upstream of Sheboygan Falls	1A	2.91	<0.050	1	2.38	<0.050	1
dam (W-1)	1B	2.97	<0.067	1	2.55	<0.050	1
	1B	3.14	<0.050	1	2.35	<0.050	1
Arithmetic Mean		2.98	0.032	1	2.35	< 0.025	1
Standard Deviation		0.11	0.010	0	0.17	0.00	0
Station 2	2A	2.98	0.42	14	2.52	0.52	21
Downstream of ASRI capping/armoring	2A	2.93	0.42	14	2.33	0.57	24
and removal areas (W-13B)	2B	2.98	0.43	14	2.13	0.49	23
	2B	2.50	0.44	18	2.22	0.46	21
Arithmetic Mean		2.85	0.43	15	2.30	0.51	22
Standard Deviation		0.23	0.010	2	0.17	0.048	2
Station 3	3A	2.91	0.42	14	1.67	0.28	16
Upstream of River Bend Dam (W-3)	3A	3.03	0.40	13	2.37	0.42	18
	3B	2.81	0.36	13	1.93	0.38	20
	3B	2.43	0.30	12	2.10	0.39	19
Arithmetic Mean		2.80	0.37	13	2.02	0.37	18
Standard Deviation		0.26	0.053	1	0.29	0.063	2
Station 4	4A	2.71	0.59	22	2.27	0.62	27
Upstream of Waelderhaus Dam (W-4)	4A	2.87	0.61	21	1.97	0.55	28
	4B	2.97	0.49	16	2.11	0.51	24
	4B	2.60	0.47	18	2.07	0.63	30
Arithmetic Mean		2.79	0.54	19	2.11	0.58	27
Standard Deviation		0.16	0.070	3	0.12	0.057	3
Station 5	5A	2.84	0.54	19	2.26	0.59	26
Downstream of USGS Gaging	5A	2.48	0.46	19	2.33	0.60	26
Station (W-5)	5B	2.92	0.54	18	2.05	0.50	24
	5B	2.97	0.53	18	2.50	0.61	24
Arithmetic Mean		2.80	0.52	19	2.29	0.58	25
Standard Deviation		0.22	0.039	0.6	0.19	0.051	1

Notes:

(1) Whole-body fathead minnow composite samples.

(2) Two samples of the pre-exposure minnow population were collected and analyzed for PCBs. PCBs were not detected at levels above Aroclor-specific method detection limit (0.05 mg/kg). Lipid content of the samples was 4.24 % and 4.76 %.

(3) PCB concentrations reported on a wet-weight basis.

Half the detection limit was used to calculate the arithmetic mean and standard deviation for concentrations reported below the analytical detection limit.

TABLE 6

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

SUMMARY OF CAGED FISH MONITORING RESULTS (1)
(6-Week Samples)

Location	YEAR	Mean Total PCB (mg/kg) (2,3)	Mean PCB/Lipid (mg/kg-lipid) (2,3)
Station 1 (W-1)	Phase 1(9/8/89)	< 0.02	< 1.1
Upstream of Sheboygan Falls dam	Phase 2a (12/21/89)	< 0.035	< 1.5
	Phase 2b (10/31/90)	< 0.1	< 10
	Phase 3a (9/1/92)	< 0.03	< 1.2
	Phase 3b (10/13/92)	< 0.02	< 1.3
	Phase 4 (IMP)1994	< 0.05	< 3.0
	Phase 5 (IMP) 1995	< 0.05	< 1.7
	Phase 6 (IMP) 1996	< 0.05	< 1.34
	Phase 7 (IMP)1997	0.025	1.2
	Phase 8 (IMP)1998	< 0.2	< 4.78
	Phase 9 (IMP) 1999	< 0.05	< 1.8
	Phase 10 (IMP) 2000	0.093	5
	Phase 11 (IMP) 2001	<0.050	<1
Station 2 (W-13B)	Phase 1(9/8/89)	8.4 (a)	690 (a)
Downstream of ASRI capping/armoring	Phase 2a (12/21/89)	2.0 (cdef)	104 (cd)
and removal areas	Phase 2b (10/31/90)	3.23 (abc)	300 (ab)
	Phase 3a (9/1/92)	7.55 (ab)	222 (bc)
	Phase 3b (10/13/92)	1.42 (def)	91 (cde)
	Phase 4 (IMP) 1994	1.1 (efg)	67 (cd)
	Phase 5 (IMP) 1995	2.2 (bcdef)	84 (cde)
	Phase 6 (IMP) 1996	1.8 (cdef)	94 (cde)
	Phase 7 (IMP) 1997	2.4 (bcde)	112 (cd)
	Phase 8 (IMP) 1998	2.0 (cdef)	89 (cde)
	Phase 9 (IMP) 1999	3.0 (bcd)	111 (cd)
	Phase 10 (IMP) 2000	0.92 (fg)	42 (ef)
	Phase 11 (IMP) 2001	0.51 (g)	22 (f)
Station 3 (W-3)	Phase 4 (IMP) 1994	1.4 (b)	89 (ab)
Upstream of Riverbend dam	Phase 5 (IMP) 1995	2.4 (a)	99 (ab)
	Phase 6 (IMP) 1996	1.2 (bc)	68 (bc)
	Phase 7 (IMP) 1997	1.7 (ab)	81 (bc)
	Phase 8 (IMP) 1998	2.6 (a)	121 (a)
	Phase 9 (IMP) 1999	2.5 (a)	95 (ab)
	Phase 10 (IMP) 2000	0.93 (bc)	50 (cd)
	Phase 11 (IMP) 2001	0.37 (c)	18 (d)
Station 4 (W-4)	Phase 4 (IMP)1994	1.6 (de)	103 (b)
Upstream of Waelderhaus dam	Phase 5 (IMP) 1995	2.7 (ab)	98 (bc)
	Phase 6 (IMP) 1996	1.2 (ef)	66 (bcd)
	Phase 7 (IMP)1997	2 (cd)	99 (bc)
	Phase 8 (IMP)1998	3.3 (a)	163 (a)
	Phase 9 (IMP) 1999	2.5 (bc)	94 (bc)
	Phase 10 (IMP) 2000	1.2 (ef)	60 (cd)
	Phase 11 (IMP) 2001	0.58 (f)	27 (d)
Station 5 (W-5)	Phase 4 (IMP)1994	1.6 (cd)	83 (abc)
Downstream of USGS Gaging Station	Phase 5 (IMP) 1995	2.5 (ab)	102 (a)
	Phase 6 (IMP) 1996	1.8 (cd)	85 (abc)
	Phase 7 (IMP)1997	1.3 (d)	68 (cd)
	Phase 8 (IMP)1998	3.0 (a)	97 (ab)
	Phase 9 (IMP) 1999	2.1 (bc)	80 (bc)
	Phase 10 (IMP) 2000	1.9 (bcd)	51 (d)
	Phase 11 (IMP) 2001	0.58 (e)	25 (e)

Notes:

1 Whole-body fathead minnow composite samples.

2 Arithmetic Mean

3 PCB concentrations reported on a wet-weight basis.

The letters in parentheses denoting statistical differences (for each analysis) apply to the data presented in each column for each location. Within each location, means with different letters are statistically significantly different (ANOVA, Scheffe's, 95% Confidence.)

Phase 1 = pre-Alternative Specific Remedial Investigation (ASRI) activities.

Phase 2a, 2b = during ASRI activities (upstream of Station 2).

Phase 3a, 3b = post-ASRI activities (work conducted upstream of Station 2 in November 1991).

Phase 4-9 = IMP (post-ARSI activities).

1994 6-week samples collected 10/26/94.

1995 6-week samples collected 11/1/95.

1996 6-week samples collected 11/6/96.

1997 6-week samples collected 10/30/97.

1998 6-week samples collected 11/4/98.

1999 6-week samples collected 11/4/99.

2000 6-week samples collected 11/1/00.

2001 6-week samples collected 11/07/01.

Figures

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FIGURE 1A
Vicinity of
Rochester Park

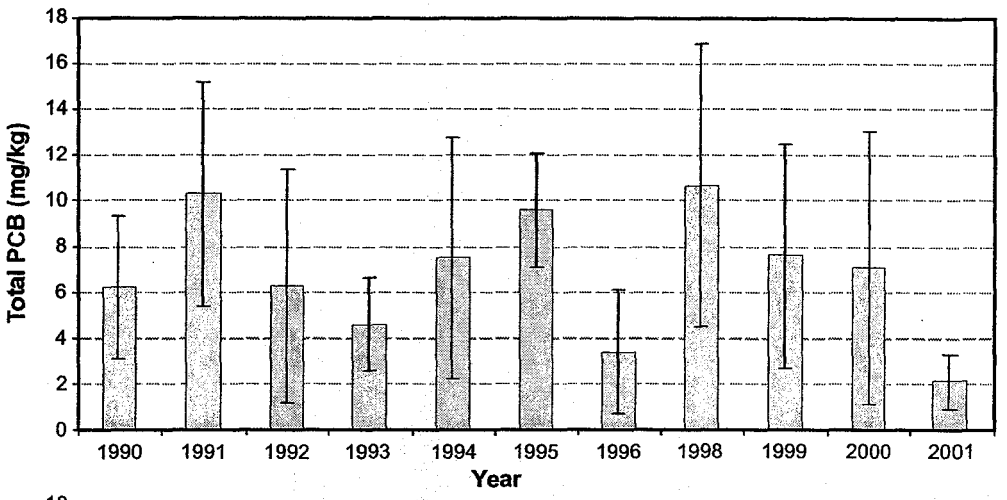


FIGURE 1B
Between the
Kohler Dams

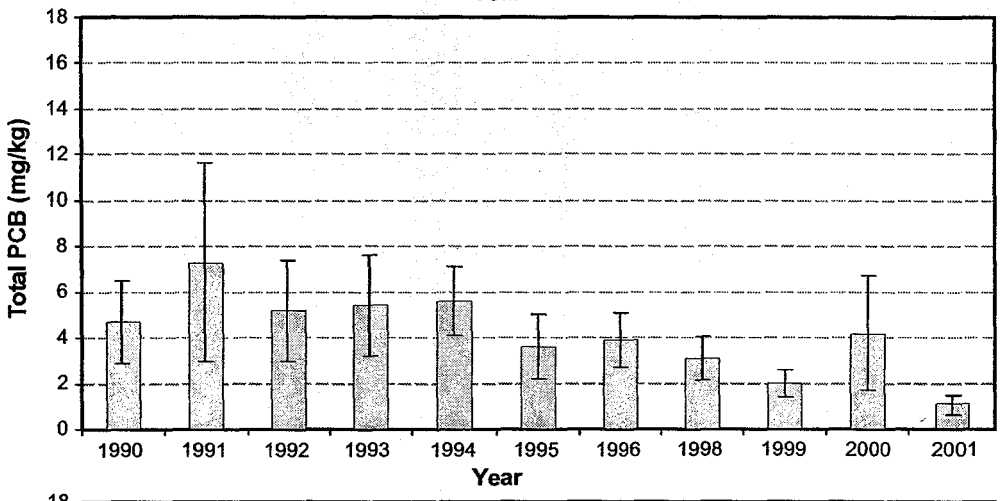
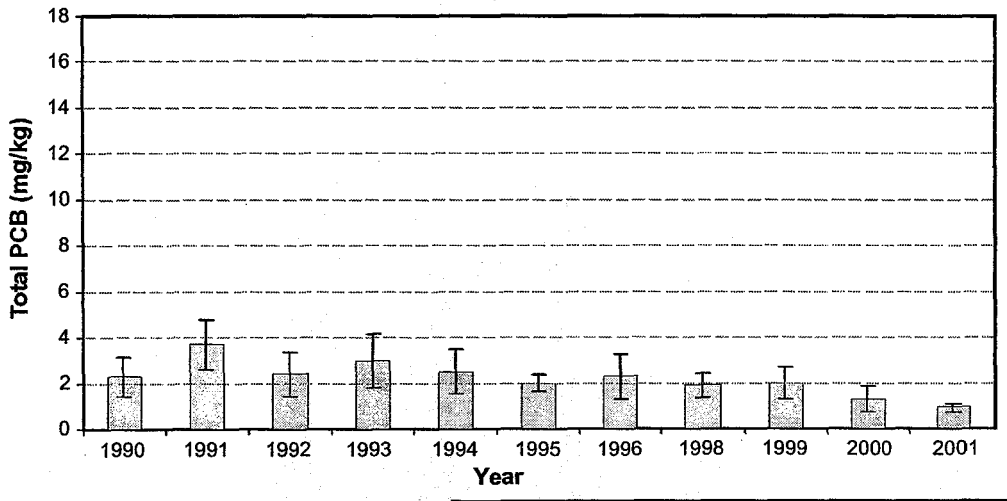


FIGURE 1C
Vicinity of
Kiwanis Park



I = Standard Deviation

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

SMALLMOUTH BASS
MEAN TOTAL PCB CONCENTRATIONS (MG/KG)
(1990-1996, 1998-2001)

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FIGURE
1

06/11/02 SYR-D54-DJH
17633008/17633n01.cdr

FIGURE 2A
Vicinity of
Rochester Park

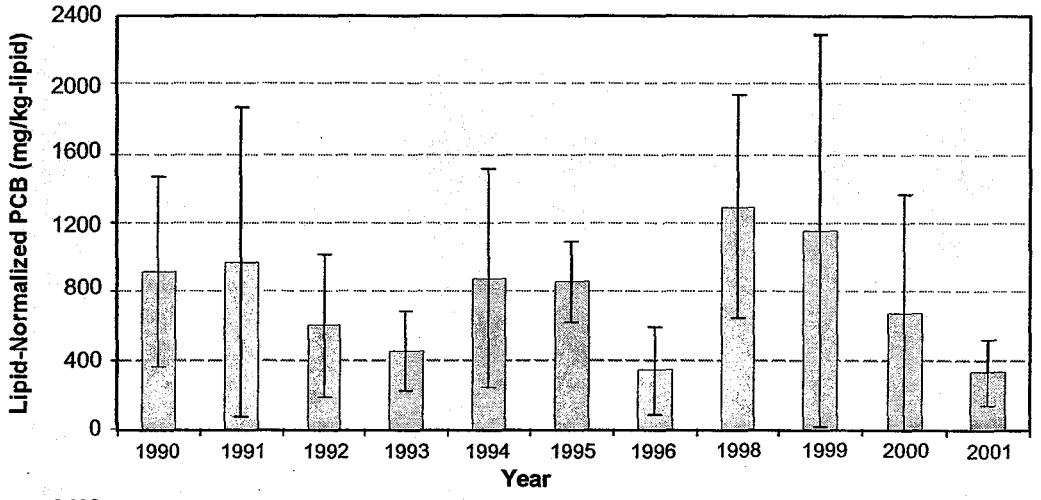


FIGURE 2B
Between the
Kohler Dams

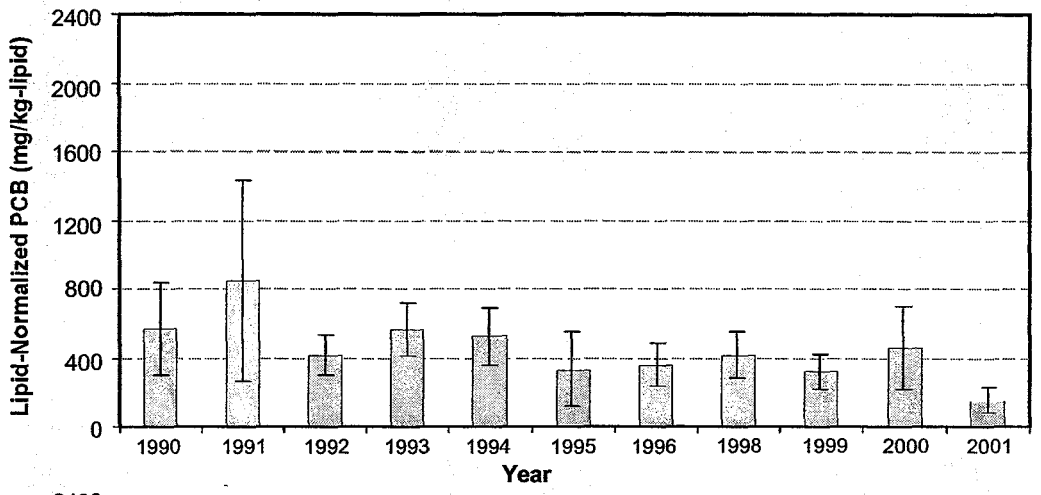
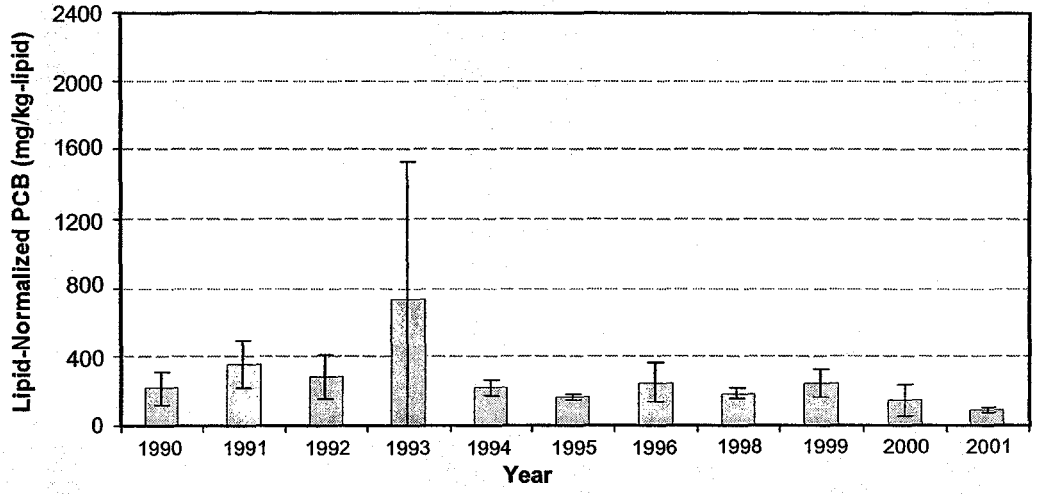


FIGURE 2C
Vicinity of
Kiwanis Park



I = Standard Deviation

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

SMALLMOUTH BASS MEAN LIPID-NORMALIZED PCB CONCENTRATIONS (MG/KG-LIPID) (1990-1996, 1998-2001)

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FIGURE
2

06/11/02 SYR-D54-DJH LBR
17633008/17633n02.cdr

FIGURE 3A
Vicinity of
Rochester Park

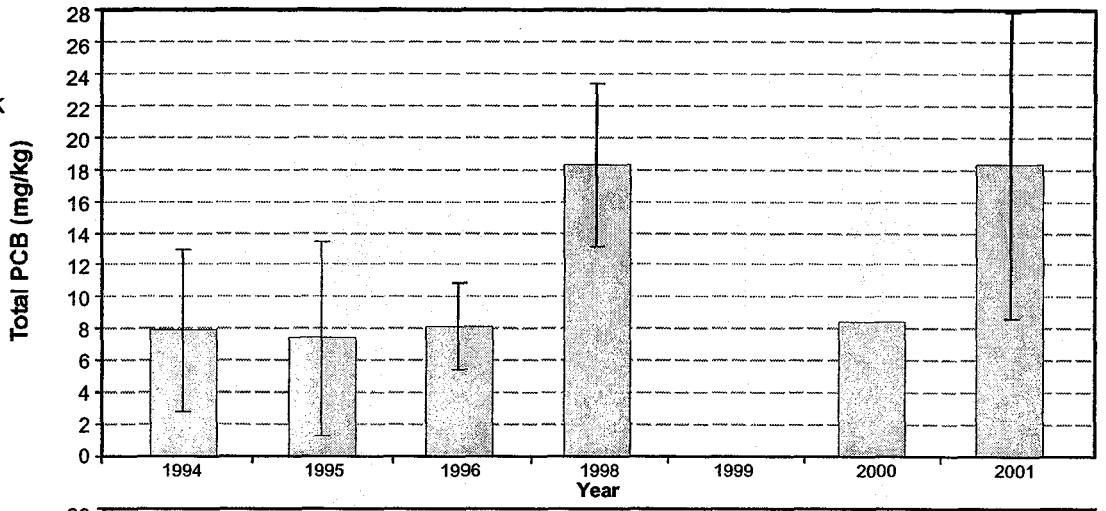


FIGURE 3B
Between the
Kohler Dams

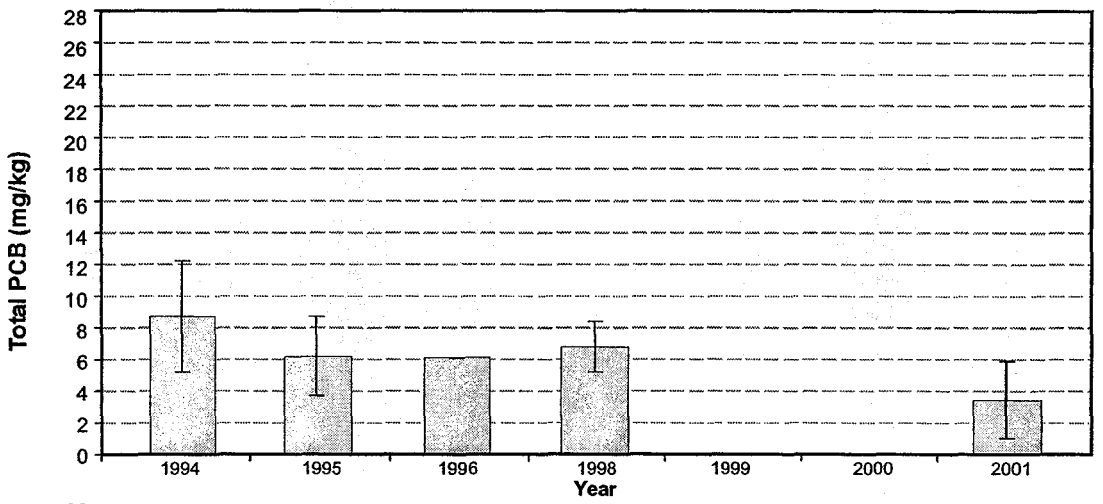
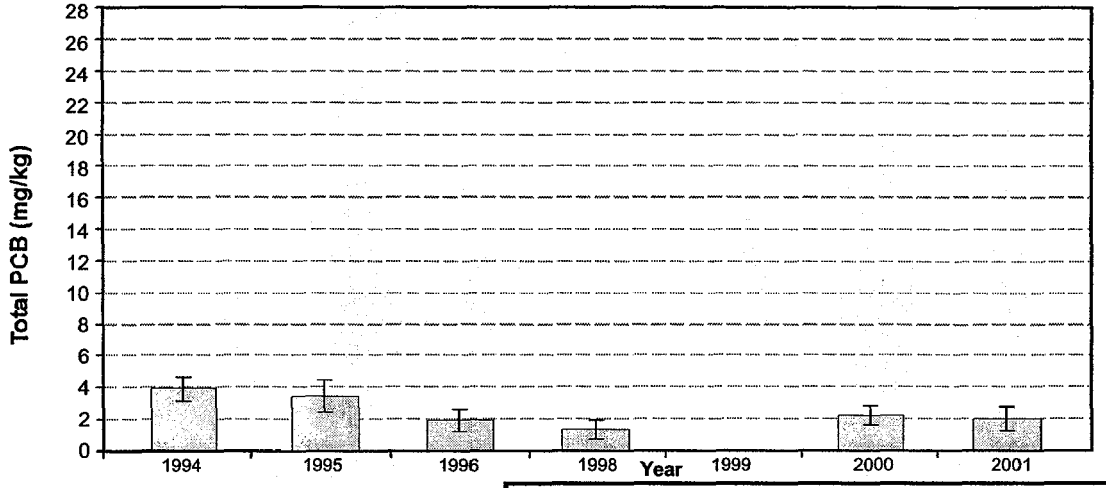


FIGURE 3C
Vicinity of
Kiwanis Park



I = Standard Deviation

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

WHITE SUCKER
MEAN TOTAL PCB CONCENTRATIONS (MG/KG)
(1994-1996, 1998, 2000 - 2001)

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FIGURE 3

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17633008/17633n03.cdr

FIGURE 4A
Vicinity of
Rochester Park

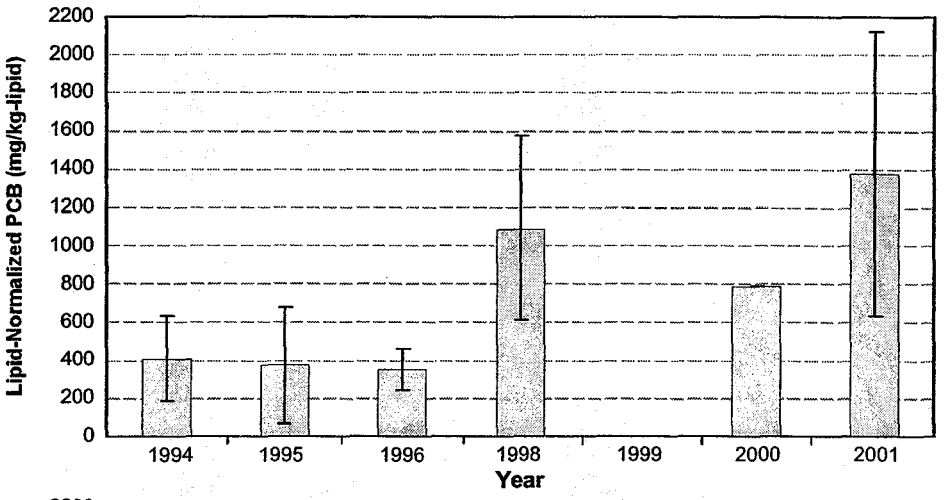


FIGURE 4B
Between the
Kohler Dams

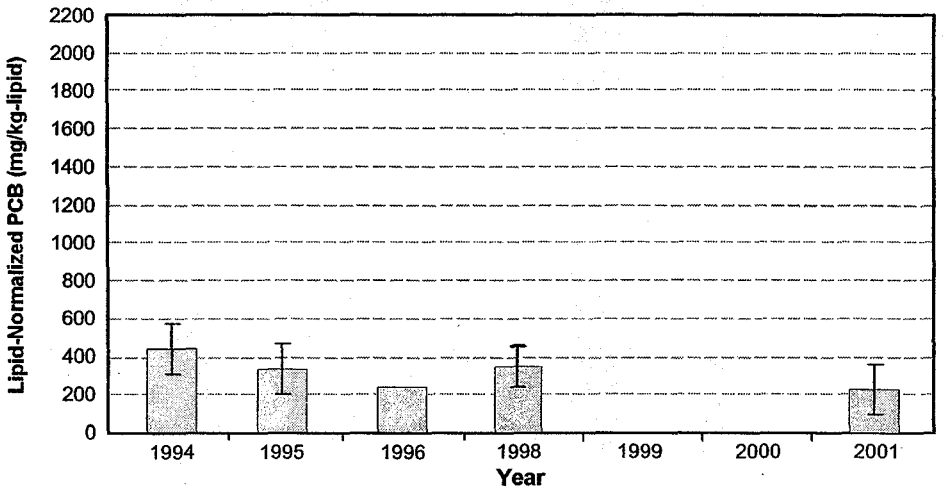
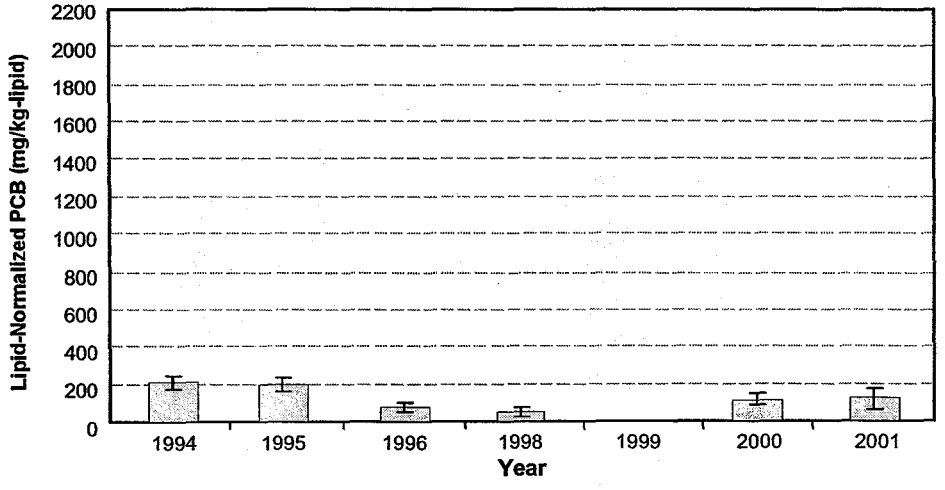


FIGURE 4C
Vicinity of
Kiwanis Park



I = Standard Deviation

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

WHITE SUCKER MEAN LIPID-NORMALIZED PCB CONCENTRATIONS (MG/KG-LIPID) (1990-1996, 1998, 2000 - 2001)

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FIGURE 4

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FIGURE 5A
Station 2 (W-13B)
Downstream of
ASRI Capped/Armoring
and Removal Areas

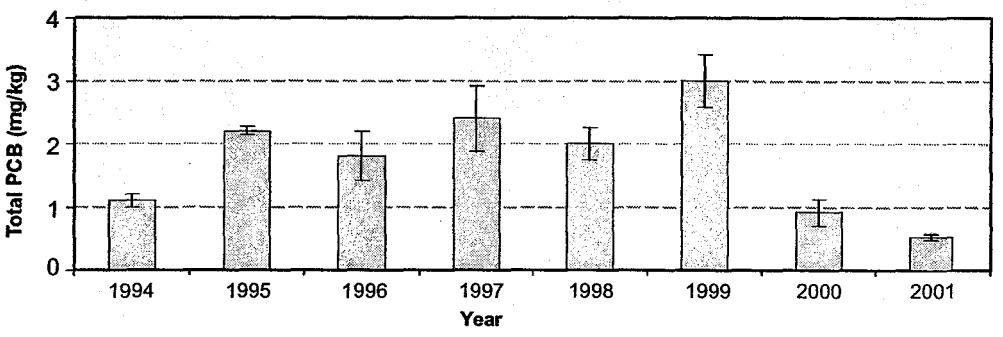


FIGURE 5B
Station 3 (W-3)
Upstream of River
Bend Dam

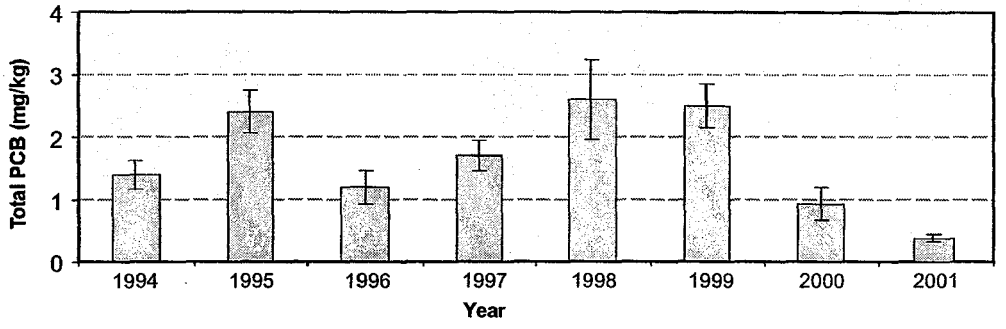


FIGURE 5C
Station 4 (W-4)
Upstream of
Waelderhaus Dam

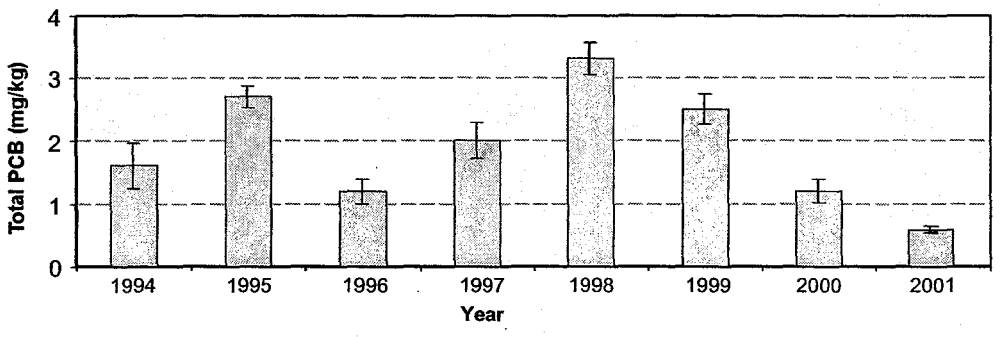
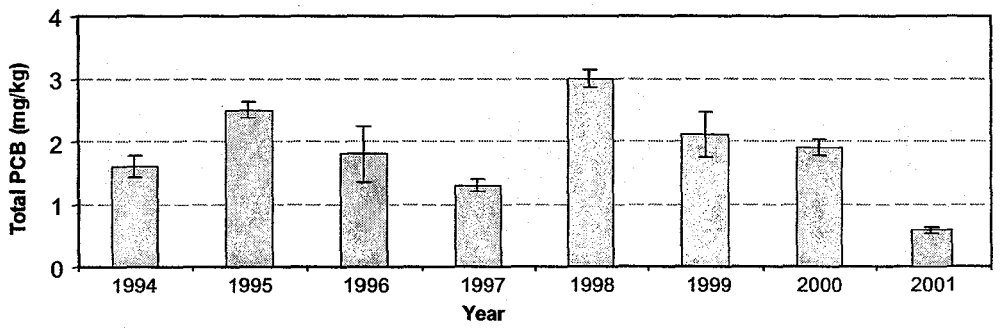


FIGURE 5D
Station 5 (W-5)
Downstream of
USGS Gaging Station



I = Standard Deviation

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

CAGED FISH MEAN TOTAL PCB CONCENTRATIONS (MG/KG) (1994 - 2001)

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FIGURE
5

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FIGURE 6A
Station 2 (W-13B)
Downstream of
ASRI Capped/Armoring
and Removal Areas

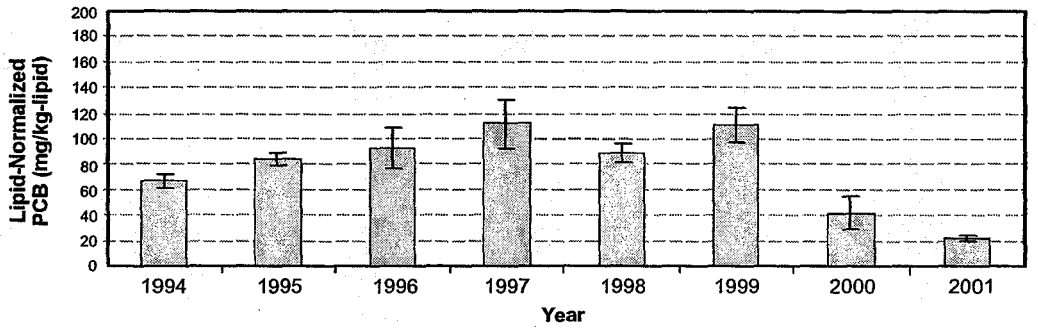


FIGURE 6B
Station 3 (W-3)
Upstream of River
Bend Dam

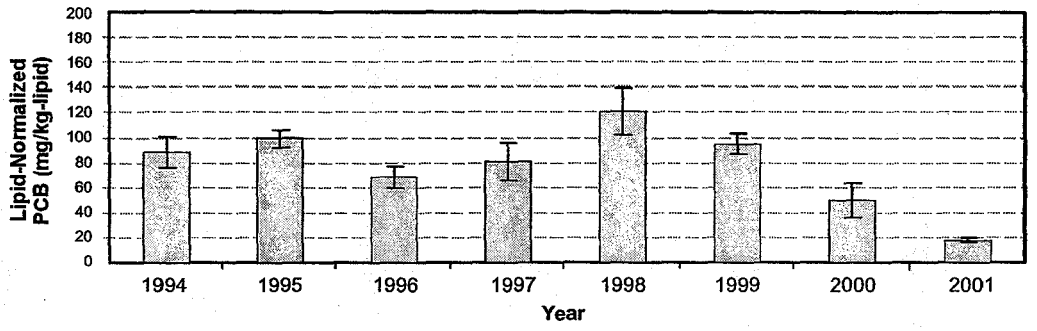


FIGURE 6C
Station 4 (W-4)
Upstream of
Waelderhaus Dam

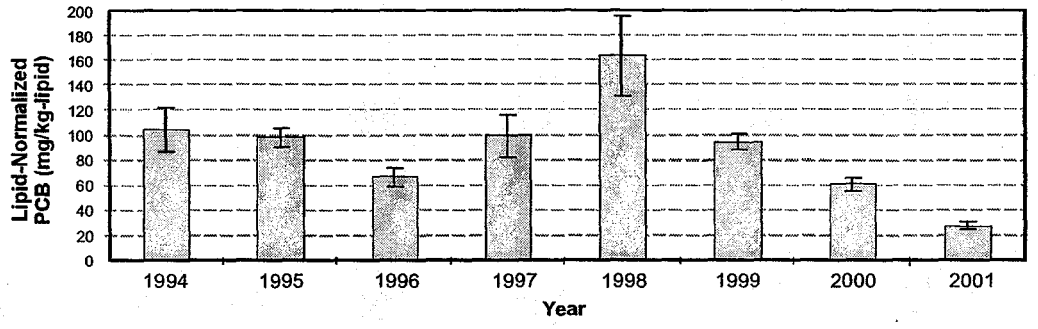
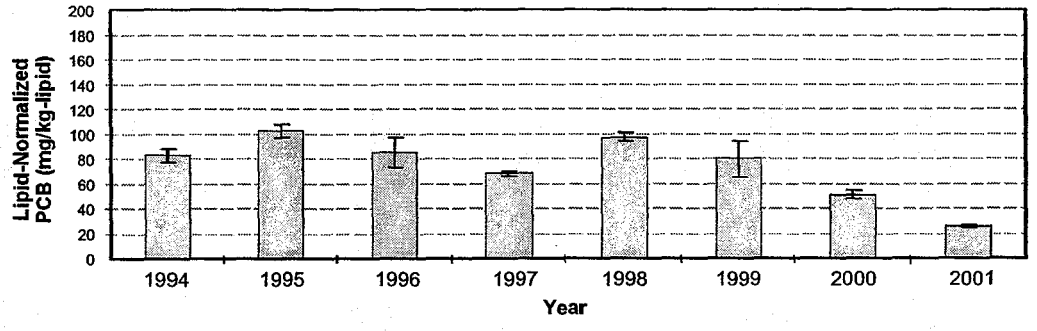


FIGURE 6D
Station 5 (W-5)
Downstream of
USGS Gaging Station



I = Standard Deviation

SHEBOYGAN RIVER AND HARBOR
INTERIM MONITORING PROGRAM

CAGED FISH MEAN
LIPID-NORMALIZED PCB CONCENTRATIONS
(MG/KG-LIPID) (1994-2001)

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FIGURE
6

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