Field Data Report

Lake Ontario Tributaries

2002 - 2004

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Background

The Lakewide Management Plan (LaMP) for Lake Ontario has identified six critical pollutants which contribute to lakewide beneficial use impairments due to their toxicity, persistence in the environment, and/or their ability to bioaccumulate. The six critical pollutants are polychlorinated byphenyls (PCBs), mercury, DDT, dieldrin, mirex, and dioxins. Approximately 80% of the freshwater flow to Lake Ontario is from the Niagara River. A long term monitoring program conducted by Environment Canada, as a component of the Niagara River Toxics Management Plan, has provided good estimates of the loadings of critical pollutants from the Niagara River and the upstream Great Lakes. However, definitive current information regarding loadings of critical pollutants from other US tributaries to Lake Ontario had been lacking. In 2002, the US Environmental Protection Agency (EPA) initiated a program to regularly monitor major U.S. tributaries for these critical pollutants. This report presents results for 2002 through 2004.

Monitoring Locations

Beginning in April 2002, ambient water samples were collected two to three times annually from stations located in the downstream portions of each of the following tributaries to Lake Ontario:

- Black River
- Salmon River
- Oswego River
- Genesee River
- Eighteen Mile Creek

The first four tributaries were selected because they are the largest American tributaries to Lake Ontario (excluding the Niagara River). These four tributaries also have US Geological Survey (USGS) gage stations, which provide measurements of flow at the time of sampling, allowing a calculation of loadings. Eighteen Mile Creek, which has no gage station, was selected for monitoring because of its history as a source of PCBs. Figure 1, on the following page, shows the location of each of these streams.

At each tributary, sampling locations were selected to be as far as possible downstream, while also being far enough upstream of the convergence with Lake Ontario to avoid the influence of the Lake, itself. Practical considerations of access for boat launching and safety also influenced site selection. Sampling locations were initially recorded with global positioning system (GPS) equipment. The GPS equipment was used to return to the same sampling locations for subsequent sampling events. There was only one exception to this normal routine. In April 2002, flows in the Black River were exceptionally high, and samples were taken at a location close to the confluence of the Black River and Black River Bay. For later sampling events, the Black River samples were collected further upstream. Appendix A includes detailed maps showing the location of the sampling point and the associated USGS gage station for each tributary.

Figure 1 - Tributaries Monitored 2002 through 2004

Sampling Procedures

Each tributary was sampled two to three times annually. Monitoring dates were varied in order to capture a variety of seasonal conditions. Samples were collected over the following dates:

April 16-18, 2002	May 6-7, 2003	May 11-12, 2004
September 17-18, 2002	July 9-10, 2003	September 28-29, 2004
	October 7-8, 2003	

Each time, samples were collected and analyzed for pH, temperature, total suspended solids (TSS), total mercury, PCBs, dieldrin, mirex, DDT, DDD, and DDE. In 2002 and 2003, samples were also analyzed for dioxins and furans.

At all sampling locations, samples were collected from a small boat anchored at mid-channel. A sonar depth finder was used to locate the deepest part of the stream crossection and to record depth. As discussed previously, GPS equipment was used to navigate to the sampling location.

A YSI Model 63 meter was used to measure pH and temperature onsite. In 2003, specific conductivity was added to the parameters measured onsite. The meter's probe was lowered to one half meter below the surface at the sample point, and readings were recorded after they had stabilized.

All samples for laboratory analysis were collected as direct grab samples. For the collection of mercury samples, a two person "clean hands/dirty hands" sampling team was required. This procedure is based upon EPA Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. One person was designated as "clean hands" and performed all operations involving direct contact with the sample and containers. The other person was "dirty hands" and was responsible for all other activities not involving direct contact with the samples. To further minimize opportunity for sample contamination, the sampling team wore disposable tyvek lab coats, an inner pair of shoulder length polyethylene gloves, and an outer layer of powder free, non-colored latex gloves. The teflon lined sample containers for mercury samples were precleaned and supplied by the laboratory performing the analyses. At each sampling location, mercury samples were always collected first. The teflon sample container was removed from its protective plastic bags, opened and quickly plunged into the current with the open end of the container facing upstream. The container was then quickly capped and resealed in plastic bags. Mercury samples were chemically preserved upon receipt by the laboratory, in order to further reduce chances for field contamination.

After collection of the mercury sample was complete, direct grab samples were collected for the remaining parameters. The containers for the parameters other than mercury were new, single use, certified precleaned containers.

Figure 2 - Sample Collection Oswego River

For each sampling event, field blanks were also collected at one sample location. Sampling procedures have been designed so that the sample containers are the only equipment which comes into direct contact with the samples. The blanks were designed to detect any trace contamination due to sampling procedures, atmospheric contamination, or deficiencies in container cleaning.

Analytical Methods

Analytical methods and the laboratories performing the analyses are summarized in Table 1. Some analytical procedures remained constant throughout the study, while adjustments were made to others, in an effort to improve the usefulness of the data obtained.

Table 1
Analytical Methods and Laboratories

Analyte	Method	Laboratory
pH	EPA 150.1	Field
Temperature	EPA 170.1	Field
Total Mercury	EPA 1631B	Battelle Marine Sciences Lab
TSS	EPA 160.2	EPA Region 2
PCBs	EPA 1668	EPA Region 2 Paradigm Analytical Laboratory
DDT, DDD, DDE	EPA 8081B	EPA Region 2
Dieldrin	EPA 8081B	EPA Region 2
Mirex	EPA 8081B	EPA Region 2
Dioxins/furans	EPA 1613	EPA Region 7

During the period 2002 through 2003, the EPA laboratory targeted 105 PCB congeners for analysis. The congener list included the majority of those congeners associated with the original eight Aroclor mixtures, a majority of the congeners identified on the NOAA Mussel Watch List, and the 13 toxic congeners identified by the World Health Organization. The EPA's target congener list is included in Appendix B.

In 2004, the target list of PCB congeners was expanded to include all 209 congeners. The samples from May 2004 were analyzed by Paradigm Analytical Laboratory, and the September 2004 samples were analyzed by the EPA Region 2 Laboratory.

Findings

The spreadsheets on the following pages summarize data for all of the tributaries. Discussion follows the spreadsheets.

Table 2
Results for Eighteen Mile Creek

EIGHTEEN MILE CREEK Latitude 43.333872 Longitude -78.716304						(NAD-83)			
DATE >>>			4/16/2002	9/17/2002	5/6/2003	7/9/2003	10/7/2003	5/11/2004	9/28/2004
Flow Estimated**	mgd		58	58	58	58	58	58	58
	cfs		90	90	90	90	90	90	90
pH	su		7.67	7.67	8.09	7.58	8.05	8.21	8.16
Temperature	^{o}C		15	20.4	12.9	25.1	11.9	14.7	17.2
TSS	mg/L		9.0	1.1	6.7	2.0	1.3	6.0	Lab Error
	kg/day		1,978	242	1,473	440	286	1,319	
DDD (o,p' + p,p')	ng/L		U (5.5)	U (5.0)	U (5.5)	U (5.5)	U (5.3)	U (5.2)	U (5.3)
	g/day								
	kg/year								
DDE (o,p' + p,p')	ng/L		U (5.5)	U (5.0)	U (5.5)	U (5.5)	U (5.3)	U (5.2)	U (5.3)
	g/day								
	kg/year								
DDT (o,p' + p,p')	ng/L		U (5.5)	U (5.0)	U (5.5)	U (5.5)	U (5.5)	U (5.5)	U (5.3)
	g/day								
	kg/year								
Total DDT	ng/L		U	U	U	U	U	U	U
	g/day								
	kg/year								
Dieldrin	ng/L		U (5.5)	U (5.0)	U (5.5)	U (5.5)	U (5.3)	U (5.2)	U (5.3)
	g/day								
	kg/year								
Mirex	ng/L		U (2.7)	U (3.0)	U (2.7)	U (2.7)	U 2.6)	U (2.6)	U (2.6)
	g/day								
Total Mercury	ng/L		12.4	0.863	4.53	1.43	1.3	4.6	1.35
	g/day		2.73	0.19	1.00	0.31	0.29	1.01	0.30
	kg/year		0.99	0.07	0.36	0.11	0.10	0.37	0.11
Total PCBs	pg/L		35,704	32,480	29,612	38,652	21,531	51,325	39,525
	g/day		7.85	7.14	6.51	8.50	4.73	11.28	8.69
	kg/year		2.86	2.61	2.38	3.10	1.73	4.12	3.17
Dioxins TEQ	pg/L		U	13.9	0.016	U	U	NA	NA
	g/day								
Mercury Field Blank	ng/L		0.259	0.225	0.304	0.266	0.359	0.543	0.275

QUALIFIERS:	U - Analyte not detected. Reporting limit is given in parentheses.
	QB- Data should not be used because concentration is indistinguishable from field blank. (ie less than three times blank concentration)
	** - There is no permanent gaging station on Eighteen Mile Creek. An approximate base flow of 90 cfs is used to calculate approximate loadings. If better flow estimates become available, loadings should be recalculated.
	NA - Not analyzed for this parameter
	Total DDT - The sum of DDD + DDE + DDT.

Table 3
Results for Genesee River

GENESEE RIVER	Latitude 43.222230		Longitude -77.615284			(NAD-83)			
DATE >>>			4/16/2002	9/17/2002	5/6/2003	7/9/2003	10/7/2003	5/11/2004	9/28/2004
Flow	mgd		5,054	710	1,202	470	1,590	2,236	3,393
	cfs		7,820	1,100	1,860	727	2,460	3,460	5,250
pH	su		8.29	7.9	8.21	8.23	8.25	8.17	8.16
Temperature	^{o}C		9	22.3	13.4	26.1	10	15.1	17.2
TSS	mg/L		200	8.5	28	11	32	27	Lab Error
	kg/day		3,830,932	22,873	127,556	19,594	192,835	228,810	
DDD (o,p' + p,p')	ng/L		U (5.5)	U (5.0)	U (5.2)	U (5.2)	U (5.1)	U (5.5)	U (5.2)
	g/day								
	kg/year								
DDE (o,p' + p,p')	ng/L		U (5.5)	U (5.0)	U (5.2)	U (5.2)	U (5.1)	U (5.5)	U (5.2)
	g/day								
	kg/year								
DDT (o,p' + p,p')	ng/L		U (5.5)	U (5.0)	U (5.2)	U (5.2)	U (5.1)	U (5.5)	U (5.2)
	g/day								
	kg/year								
Total DDT	ng/L		U	U	U	U	U	U	U
	g/day								
	kg/year								
Dieldrin	ng/L		U (5.5)	U (5.0)	U (5.2)	U (5.2)	U (5.1)	U (5.5)	U (5.2)
	g/day								
	kg/year								
Mirex	ng/L		U (2.7)	U (3.0)	U (2.6)	U (2.6)	U (2.6)	U (2.8)	U (2.6)
	g/day								
Total Mercury	ng/L		10.9	1.13	2.26	1.83	1.97	2.53	4.23
	g/day		208.79	3.04	10.30	3.26	11.87	21.44	54.40
	kg/year		76.21	1.11	3.76	1.19	4.33	7.83	19.85
Total PCBs	pg/L		157	414	U	15	256	22	149
	g/day		3.01	1.11		0.03	1.54	0.19	1.92
	kg/year		1.10	0.41		0.01	0.56	0.07	0.70
Dioxins TEQ	pg/L		0.041	U	U	U	U	NA	NA
	g/day		0.000785						
Mercury Field Blank	ng/L		0.259	0.225	0.304	0.266	0.359	0.543	0.275

QUALIFIERS:	U - Analyte not detected. Reporting limit is given in parentheses.
	QB- Data should not be used because concentration is indistinguishable from field blank. (ie less than three times blank concentration)
	NA - Not analyzed for this parameter
	Total DDT - The sum of DDD + DDE + DDT.

Table 4
Results for Oswego River

OSWEGO RIVER	Latitude 43.396881	Longitude -76.470595		(NAD-83)				
DATE >>>			4/17/2002	9/18/2002	5/7/2003	7/10/2003	10/8/2003	5/12/2004	9/29/2004
Flow	mgd		9,223	931	3,488	1,422	2,120	6,883	4,531
	cfs		14,270	1,440	5,397	2,200	3,280	10,650	7,011
pH	su		8.06	7.85	7.85	7.67	8.07	8.01	7.92
Temperature	°C		13	21.7	13.5	25.6	13.2	15.1	19.7
TSS	mg/L		9.0	2.6	2.2	3.0	1.4	1.0	Lab Error
	kg/day		314,597	9,174	29,083	16,168	11,249	26,087	
DDD (o,p' + p,p')	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
DDE (o,p' + p,p')	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
DDT (o,p' + p,p')	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
Total DDT	ng/L		U	U	U	U	U	U	U
	g/day								
	kg/year								
Dieldrin	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
Mirex	ng/L		U (2.7)	U (3.0)	U (2.6)	U (2.6)	U (2.6)	U (2.6)	U (2.6)
	g/day								
Total Mercury	ng/L		3.31	1.24	1.59	1.25	QB (<0.968)	2.2	1.3
	g/day		115.70	4.38	21.02	6.74		57.39	22.32
	kg/year		42.23	1.60	7.67	2.46		20.95	8.15
Total PCBs	pg/L		166	366	U	17	203	193	540
	g/day		5.80	1.29		0.09	1.63	5.06	9.34
	kg/year		2.12	0.47		0.03	0.60	1.85	3.41
Dioxins TEQ	pg/L		U	U	NA	NA	NA	NA	NA
	g/day								
Mercury Field Blank	ng/L		0.259	0.225	0.304	0.266	0.359	0.543	0.275

	QUALIFIERS:	U - Analyte not detected. Reporting limit is given in parentheses.
		QB- Data should not be used because concentration is indistinguishable from field blank. (ie less than three times blank concentration)
		NA - Not analyzed for this parameter
		Total DDT - The sum of DDD + DDE + DDT.

Table 5
Results for Salmon River

SALMON RIVER Latitude 43.569653 Longitude -76.185301 (NAD-83)									
DATE >>>			4/17/2002	9/18/2002	5/7/2003	7/10/2003	10/8/2003	5/12/2004	9/29/2004
Flow	mgd		2,786	142	514	164	556	323	266
	cfs		4,310	219	796	254	860	500	412
pH	su		6.83	8.63	8.1	7.67	7.93	8.84	7.79
Temperature	°C		9	18.7	11.9	25.6	12.1	13.5	16.5
TSS	mg/L		3.0	1.1	0.9	2.0	2.1	2.0	Lab Error
	kg/day		31,677	592	1,753	1,243	4,425	2,448	
DDD (o,p' + p,p')	ng/L		U (5.2)	U (5.0)	U (5.3)	U (5.5)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
DDE (o,p' + p,p')	ng/L		U (5.2)	U (5.0)	U (5.3)	U (5.5)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
DDT (o,p' + p,p')	ng/L		U (5.2)	U (5.0)	U (5.3)	U (5.5)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
Total DDT	ng/L		U	U	U	U	U	U	U
	g/day								
	kg/year								
Dieldrin	ng/L		U (5.2)	U (5.0)	U (5.3)	U (5.5)	U (5.2)	U (5.2)	U (5.2)
	g/day								
	kg/year								
Mirex	ng/L		U (2.6)	U (3.0)	U (2.6)	U (2.8)	U (2.6)	U (2.6)	U (2.6)
	g/day								
Total Mercury	ng/L		2.85	0.915	2.18	1.68	1.92	2.22	1.74
	g/day		30.09	0.49	4.25	1.04	4.05	2.72	1.75
	kg/year		10.98	0.18	1.55	0.38	1.48	0.99	0.64
Total PCBs	pg/L		300	257	U	13	149	U (19.8)	473
	g/day		3.17	0.14		0.01	0.31		0.48
	kg/year		1.16	0.05		0.00	0.11		0.17
Dioxins TEQ	pg/L		U	U	NA	NA	NA	NA	NA
	g/day								
Mercury Field Blank	ng/L		0.259	0.225	0.304	0.266	0.359	0.543	0.275

	QUALIFIERS:	U - Analyte not detected. Reporting limit is given in parentheses.
		QB- Data should not be used because concentration is indistinguishable from field blank. (ie less than three times blank concentration)
		NA - Not analyzed for this parameter.
		Total DDT - The sum of DDD + DDE + DDT.

Table 6
Results for Black River

BLACK RIVER April 2002 Latitude 43.996010 Longitude -76.062742							(NAD-83)		
All other dates Latitude 43.999690 Longitude -76.057851									
DATE >>>			4/18/2002	9/18/2002	5/7/2003	7/10/2003	10/8/2003	5/12/2004	9/29/2004
Flow	mgd		12,603	944	3,199	814	4,880	2,294	1,247
	cfs		19,500	1,460	4,950	1,260	7,550	3,550	1,930
pH	su		7.45	7.76	7.86	7.97	7.57	7.79	7.54
Temperature	^{o}C		15	21.3	13.3	24.8	9.9	16.1	18.4
TSS	mg/L		9.0	2.4	3.7	2.0	9.4	2.0	Lab Error
	kg/day		429,888	8,587	44,860	6,170	173,855	17,389	
DDD (o,p' + p,p')	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (6.3)	U (5.5)	U (5.2)
	g/day								
	kg/year								
DDE (o,p' + p,p')	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (6.3)	U (5.5)	U (5.2)
	g/day								
	kg/year								
DDT (o,p' + p,p')	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (6.3)	U (5.5)	U (5.2)
	g/day								
	kg/year								
Total DDT	ng/L		U	U	U	U	U	U	U
	g/day								
	kg/year								
Dieldrin	ng/L		U (5.3)	U (5.0)	U (5.2)	U (5.2)	U (6.3)	U (5.5)	U (5.2)
	g/day								
	kg/year								
Mirex	ng/L		U (2.6)	U (3.0)	U (2.6)	U (2.6)	U (3.1)	U (2.8)	U (2.6)
	g/day								
Total Mercury	ng/L		4.99	1.67	3.55	2.5	4.65	2.74	2.46
	g/day		238.35	5.97	43.04	7.71	86.00	23.82	11.63
	kg/year		87.00	2.18	15.71	2.82	31.39	8.70	4.24
Total PCBs	pg/L		1,849	760	425	1,174	417	1,309	19,486
	g/day		88.32	2.72	5.15	3.62	7.71	11.38	92.09
	kg/year		32.24	0.99	1.88	1.32	2.82	4.15	33.61
Dioxins TEQ	pg/L		U	U	NA	NA	NA	NA	NA
	g/day								
Mercury Field Blank	ng/L		0.259	0.225	0.304	0.266	0.359	0.543	0.275

	QUALIFIERS:	U - Analyte not detected. Reporting limit is given in parentheses.
		QB- Data should not be used because concentration is indistinguishable from field blank. (ie less than three times blank concentration)
		NA - Not analyzed for this parameter
		Total DDT - The sum of DDD + DDE + DDT.

Discussion

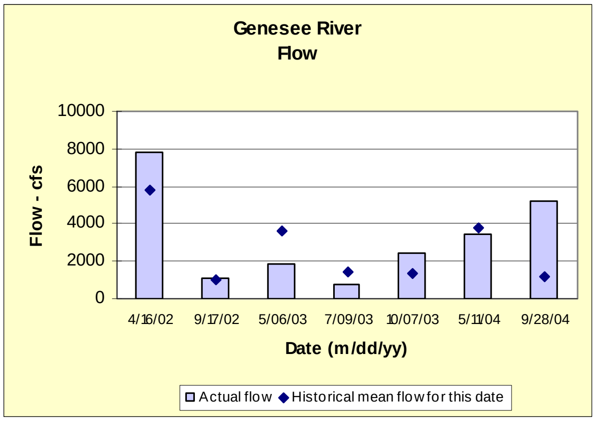
Regarding Blanks and Data Qualification:

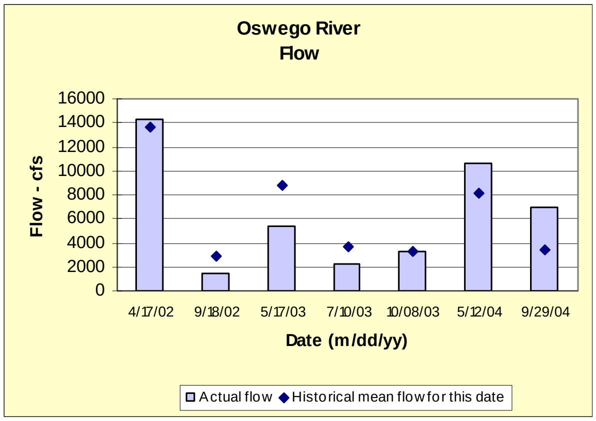
Data were reviewed and compared to quality assurance criteria contained in the laboratory SOPs for the applicable analytical methods.

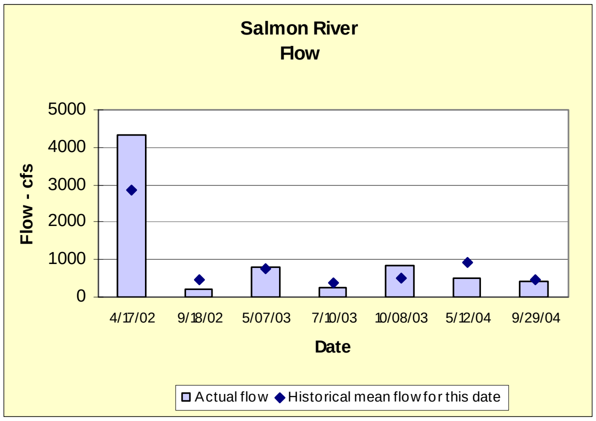
For each sampling event at least one field blank was collected by the field sampling team. The laboratory(ies) also ran laboratory method blanks with each batch of samples. Analytical data were compared with results for both field blanks and method blanks. If an analyte was detected in a sample at a concentration less than three times the concentration detected in either blank, the data was rejected, and the result was treated as a "non-detect." If the analyte was found to have a concentration more than three times the greatest concentration detected in any of the blanks, the data was used without adjustment. In other words, data were screened for blank influence, but data were not blank corrected. With PCBs and dioxin/furans, blank screenings were done for individual congeners.

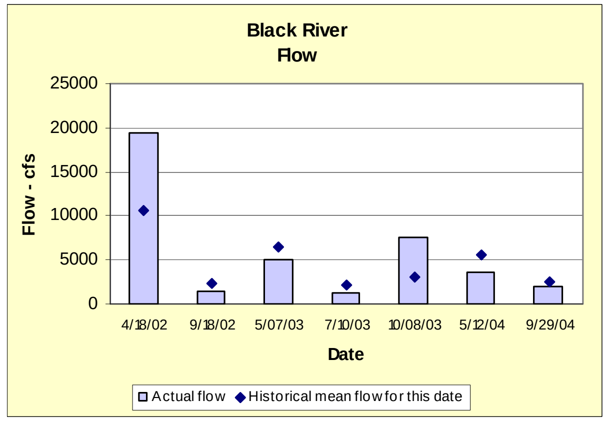
In calculating totals, such as total PCBs or total DDT, non-detects were treated as zeros.

The sampling events over the period captured a wide range of flow conditions. The bar charts which follow show actual flows encountered, as obtained from USGS gage stations, and the historical means for the same date. It should be noted that there is no gage station on Eighteen Mile Creek. In order to calculate a very rough estimate of loadings from Eighteen Mile Creek, a rough annual estimate of 90 cfs was used. The accuracy of this estimate is unknown.









Mercury

Over the three year period, the five tributaries had a combined average mercury loading of 144 grams per day (g/day). For individual tributaries, total mercury concentrations tended to follow stream flow conditions. Higher flow conditions in a tributary tended to correspond with higher total mercury concentrations.

Table 7
Mercury Results for all Tributaries

Mercury Concentrations (ng/L)							
	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Eighteen Mi Cr	12.4	0.86	4.53	1.43	1.3	4.6	1.35
Genesee R	10.9	1.13	2.26	1.83	1.97	2.53	4.23
Oswego R	3.31	1.24	1.59	1.25	<0.97	2.2	1.3
Salmon R	2.85	0.92	2.18	1.68	1.92	2.22	1.74
Black R	4.99	1.67	3.55	2.5	4.65	2.74	2.46
Mercury Load (grams/day)							
	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Eighteen Mi Cr	2.73	0.19	1.00	0.31	0.29	1.01	0.30
Genesee R	208.79	3.04	10.30	3.26	11.87	21.44	54.40
Oswego R	115.7	4.38	21.02	6.74	---	57.39	22.32
Salmon R	30.09	0.49	4.25	1.04	4.05	2.72	1.75
Black R	238.35	5.97	43.04	7.71	86.00	23.82	11.63
Total Load (g/day)	595.7	14.1	79.6	19.1	102.2	106.4	90.4

PCBs

Samples were analyzed for PCBs by EPA Method 1668, using a one liter sample size. In 2002 and 2003, the target list of congeners was 106 congeners out of 209. The target list did include the majority of those congeners associated with the eight Aroclor mixtures, a majority of the congeners identified on the NOAA Mussel Watch List, and the 13 toxic congeners defined by the World Health Organization. The samples from 2002 and 2003 were all analyzed by the EPA laboratory in Edison, NJ. In May 2004, PCB samples were analyzed by Paradigm Analytical Laboratory, and the congener target list included all 209 congeners. In September 2004, the EPA laboratory resumed PCB analyses, with the complete target list of 209 congeners. Lists of target congeners are provided in Appendix B.

In calculating total PCBs and the totals for various homolog groups, the concentrations of individual congeners (after screening for blank influence), were summed. Non detects and results rejected for excessive blank contamination were treated as zero.

Table 8
PCB Results for all Tributaries

PCB Concentrations (pg/L)							
	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Eighteen Mi Cr	35,704	32,480	29,612	38,652	21,531	51,325	39,525
Genesee R	157	414	U	15	256	22	149
Oswego R	166	366	U	17	203	194	544
Salmon R	300	257	U	13	149	U	473
Black R	1,849	760	425	1,174	417	1,309	19,486
PCB Load (grams/day)							
	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Eighteen Mi Cr	7.85	7.14	6.51	8.50	4.73	11.28	8.69
Genesee R	3.01	1.11	--	0.03	1.54	0.19	1.92
Oswego R	5.80	1.29	--	0.09	1.63	5.06	9.34
Salmon R	3.17	0.14	--	0.01	0.31	--	0.48
Black R	88.32	2.72	5.15	3.62	7.71	11.38	92.09
Total Load (g/day)	108.2	12.4	11.7	12.3	15.9	27.9	112.5

Over the three year period, the five tributaries had an average combined loading of 43 g/day. Eighteen Mile Creek always had PCB concentrations considerably higher than any other tributary. Loadings from Eighteen Mile Creek are very rough estimates because there is no gage station on this tributary. While all tributaries have fish consumption advisories due to PCBs, the advisory for Eighteen Mile Creek is broader, advising the public to eat no fish of any species. Nevertheless, Eighteen Mile Creek is a very popular fishing stream, with well developed public fishing areas.

Figure 3 - Entrance to Public Fishing Trail at Eighteen Mile Creek

Figure 4 - Fishing trail at Eighteen Mile Creek

Further examination of Table 8 indicates that the highest PCB loadings were observed in April 2002 and September 2004. In April 2002, flows were exceptionally high, and this contributed to the higher calculated loadings. In September 2004, flows were not exceptionally high, but the PCB concentration detected in the Black River was more than ten times the highest concentration previously observed for that stream. Initially, we examined congener results to see if the expanded congener list could account for the higher total PCB concentrations. Congeners which were not previously targeted accounted for approximately one third, of the total 19,486 pg/L observed. Also, in May 2004, all 209 congeners had been targeted, and results were within the range that had previously been observed in the Black River. The EPA laboratory had an archived duplicate sample available from the Black River, September 2004 sampling event. Although the holding time had expired, the laboratory performed a new analysis on the duplicate sample. The reanalysis confirmed initial results. Consultations with NYSDEC failed to identify any unusual occurrences over that time period (i.e. dredging, reported spills), which might account for the increase in PCB concentration. An examination of Table 9, below, indicates that in September 2004, pentachlorinated biphenyls accounted for 38% of the total PCBs observed. This is a change from earlier results.

Table 9
PCB Homolog Groups
Black River 2002 - 2004

	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Mono CB	82	0	0	0	0	0	0
Di CB	584	365	270	418	203	461	1,160
Tri CB	467	209	155	304	82	512	4,792
Tetra CB	469	119	0	452	0	337	5,254
Penta CB	231	36	0	0	117	0	7,482
Hexa CB	9	31	0	0	15	0	707
Hepta CB	0	0	0	0	0	0	91
Octa CB	7	0	0	0	0	0	0
Nona CB	0	0	0	0	0	0	0
Deca CB	0	0	0	0	0	0	0
Total PCB	1,849	760	425	1,174	417	1,309	19,486

Note: All units are pg/L.

Appendix D includes tables summarizing homolog group totals for all tributaries. PCB data by congener is available on Excel spreadsheets. Copies of these files may be obtained by sending an email request to coleates.richard@epa.gov.

Pesticides

At each sampling event, samples were collected for analyses of DDT, DDD, DDE, dieldrin, and mirex. None of these pesticides was detected in any of the samples collected. Detection limits ranged from 2.6 to 5.3 nanograms per liter (ng/L). Alternative analytical methods with lower detection limits have been investigated, and will be utilized in the future as resources allow.

Dioxins/Furans

Samples from April and September 2002 were analyzed for dioxins/furans by the EPA Region 7 laboratory in Kansas City, Kansas. Dioxin congeners were detected in one sample from Eighteen Mile Creek, and one sample from the Genesee River. In 2003, only samples from Eighteen Mile Creek and the Genesee River were analyzed. In 2003, dioxin was detected in a single sample from Eighteen Mile Creek. In 2004, all analyses for dioxins/furans were discontinued. Table 10 summarizes results for those samples where dioxins were detected.

Table 10
Dioxin/Furan Results

Eighteen Mile Creek			
Date	Congener	Concentration (pg/L)	TEQ[1] (pg/L)
Sept 02	2,3,7,8-TCDD	13.9	13.9
May 03	1,2,3,4,6,7,8,9-OCDD	162	0.016
Genesee River			
April 02	1,2,3,4,,6,7,8,9-OCDD	410	0.041

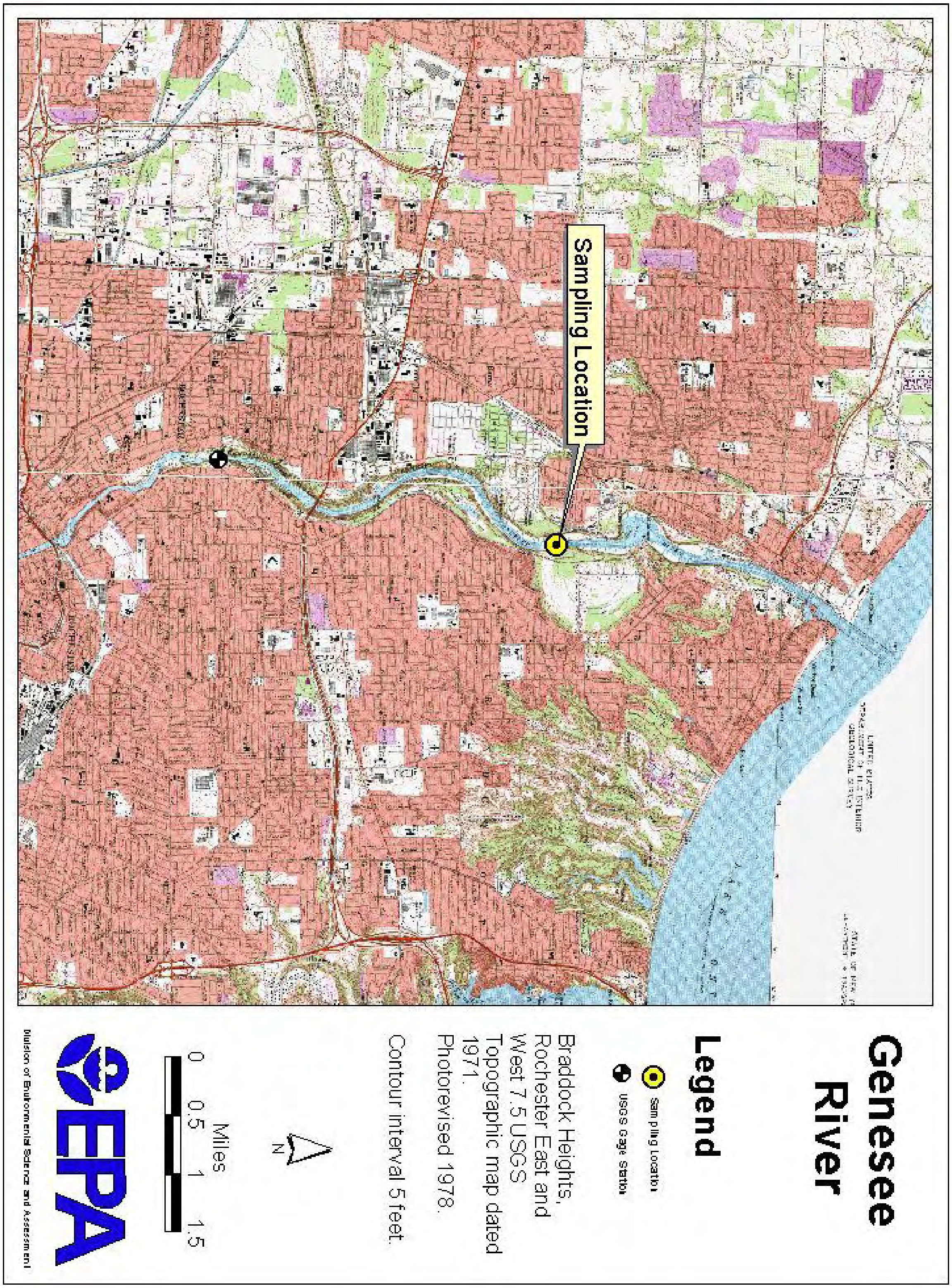
Note: 1 - Toxic equivalency factors from the World Health Organization are used to calculate 2,3,7,8-TCDD total equivalents (TEQ).

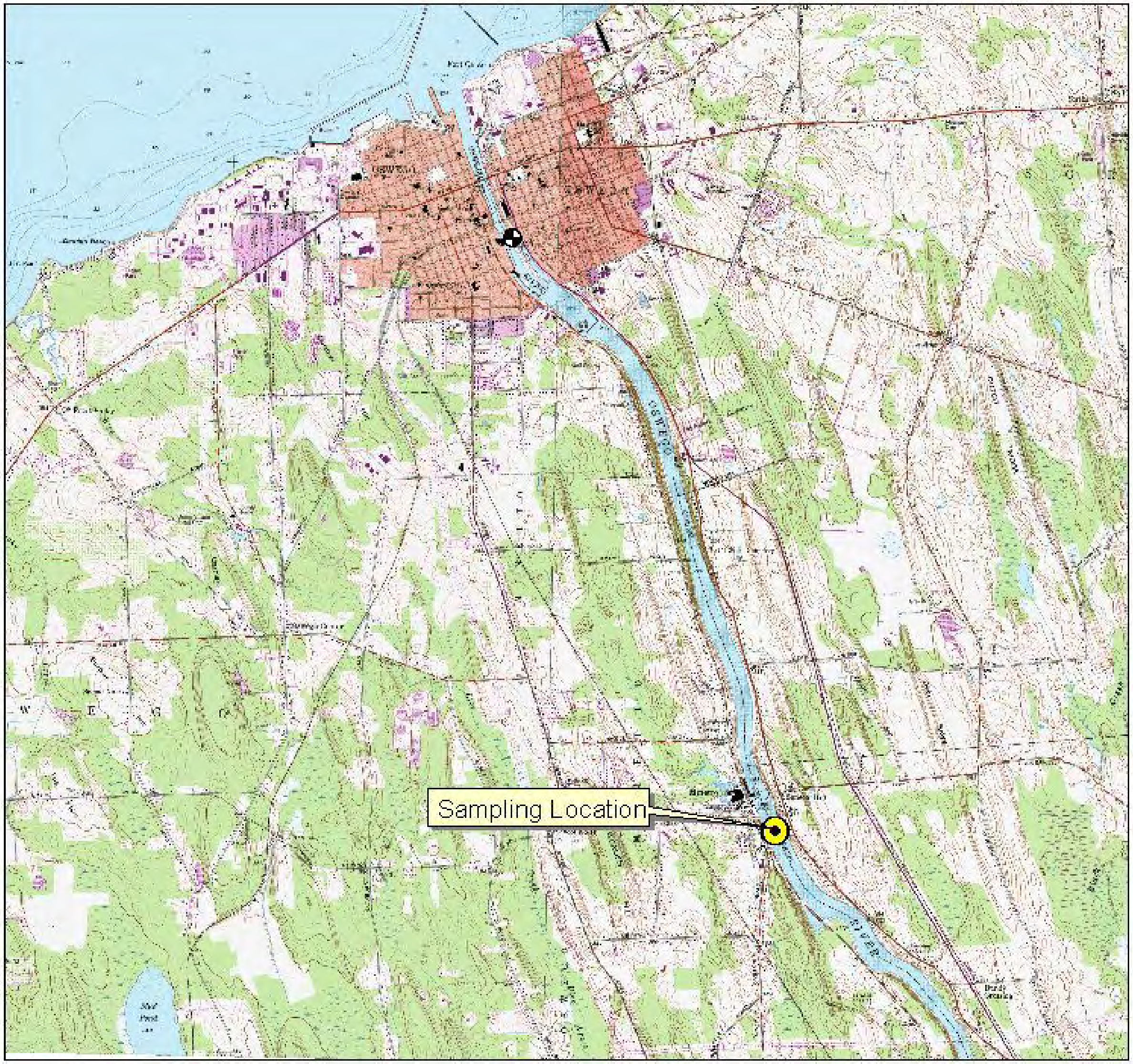
Conclusions

Results so far indicate measurable loadings of mercury and PCBs do enter Lake Ontario from these tributaries. PCBs are a significant pollutant in Eighteen Mile Creek, and to a lesser extent, the Black River. Mercury appears to be more evenly distributed, with no single tributary dominating. Mercury concentrations do seem to follow stream flow, possibly reflecting a route for atmospheric deposition through the influence of rainfall and spring runoff. We did not see a direct relationship between total suspended solids (TSS) concentrations, and pollutant concentrations. However, data so far is limited, and further analysis may lead to different conclusions.

Data are still too limited to ascertain long term trends. However, bar graphs presenting results from each tributary are included in Appendix C.


Eighteen Mile Creek
Legend
Sample Location
Newfane 7.5 USGS Topographic map dated 1978,
Contour interval 5 feet.
N
Feet
0 1000 2000 3000
Division of Environmental Science and Assessment
Sampling Location
Olcott
Burt
Palmer Airport
CONRAIL
Hopkins


Sampling Location
Genesee River
Legend
Sampling Location
USGS Gage Station
Braddock Heights, Rochester East and West 7.5 USGS Topographic map dated 1971. Photorevised 1978.
Contour interval 5 feet.
N
Miles
0 0.5 1 1.5
EPA
Division of Environmental Science and Assessment



Oswego River

Legend

Sampling Location

USGS Gage Station

Oswego East and Oswego West USGS Topographic map dated 1954. Photorevised 1978.

Contour interval 10 feet.

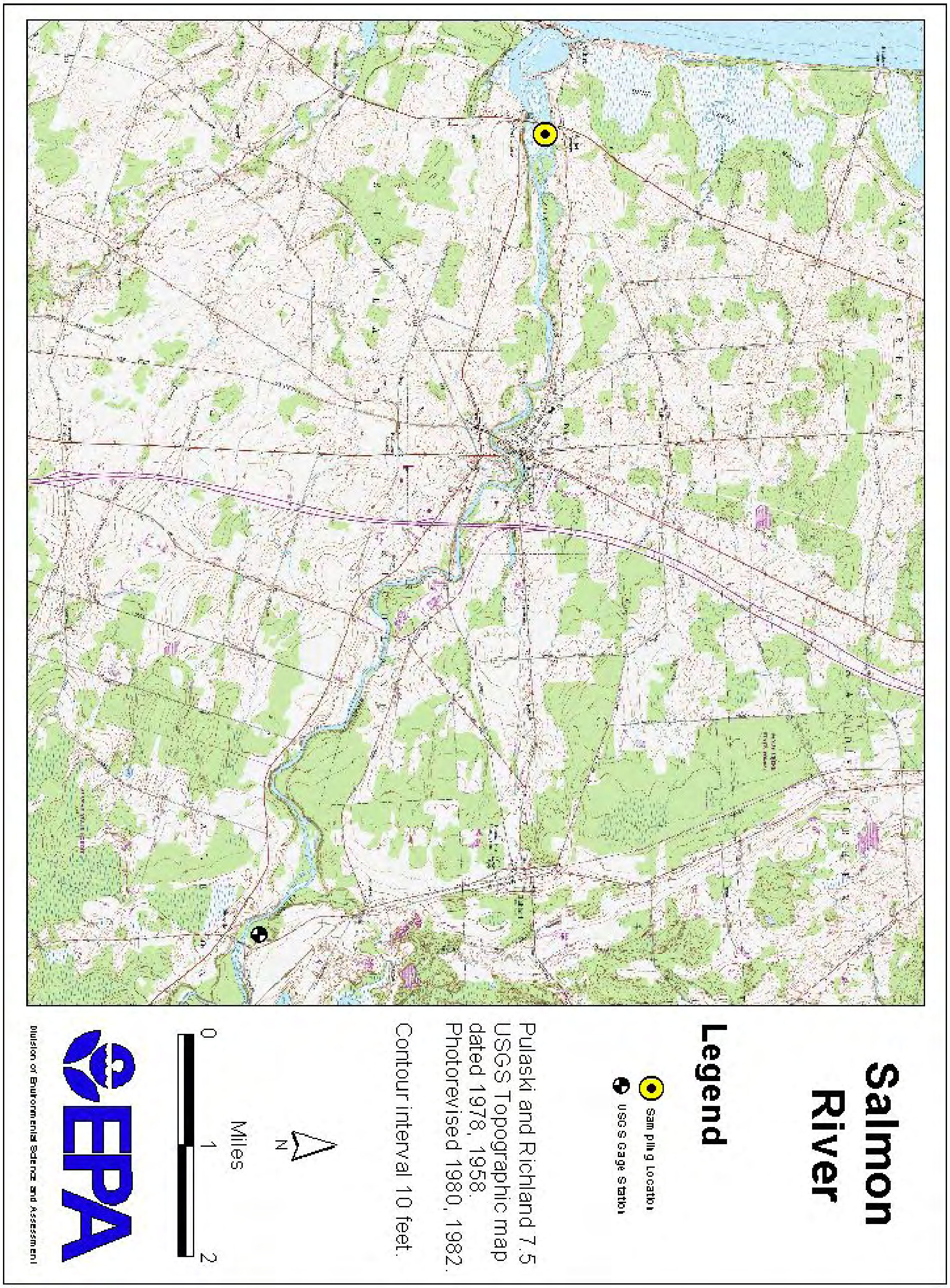
N

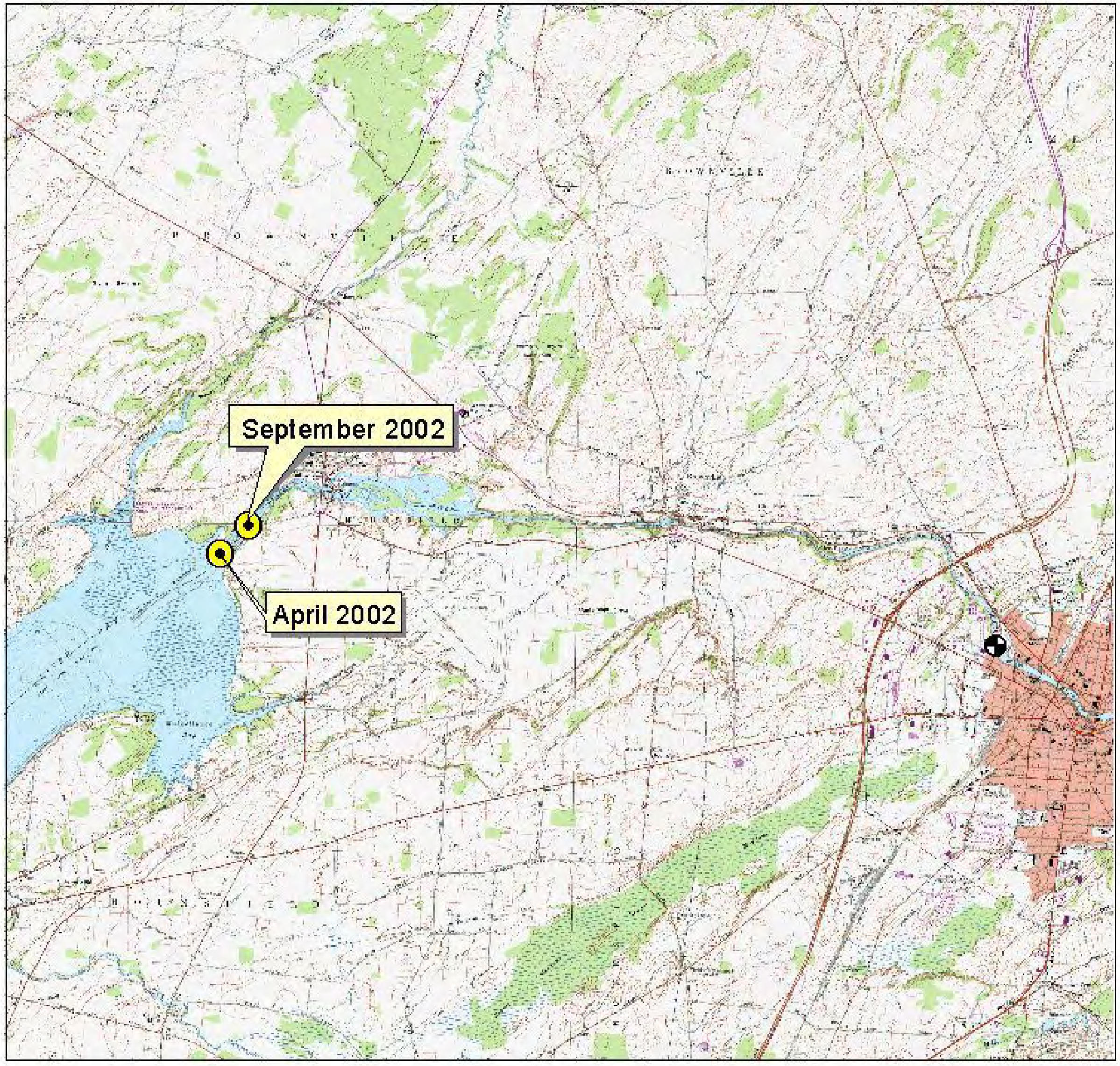
Miles

0 0.5 1 1.5

EPA

Division of Environmental Science and Assessment


Salmon River
Legend
Pulaski and Richland 7.5 USGS Topographic map dated 1978, 1958. Photorevised 1980, 1982.
Contour interval 10 feet.
N
0
1
2
Miles
Division of Environmental Science and Assessment



Black River

Legend

Sampling Location
USGS Gage Station

Brownville, Dexter, Watertown and Sackets Harbor 7.5 USGS Topographic map dated 1958, 1958, 1959, 1959. All photorevised 1982 except Sackets Harbor.

Contour interval 10 feet.

N

Miles
0 0.5 1 1.5

Division of Environmental Science and Assessment

PCB Congener	BZ #	IUPAC #	EPA Lab Target Congeners 2002 - 2003
2-Chlorobiphenyl	1	1	X
3-Chlorobiphenyl	2	2	X
4-Chlorobiphenyl	3	3	X
2,2'-Dichlorobiphenyl	4	4	X
2,3-Dichlorobiphenyl	5	5	
2,3'-Dichlorobiphenyl	6	6	X
2,4-Dichlorobiphenyl	7	7	
2,4'Dichlorobiphenyl	8	8	X
2,5-Dichlorobiphenyl	9	9	X
2,6-Dichlorobiphenyl	10	10	X
3,3'-Dichlorobiphenyl	11	11	X
3,4-Dichlorobiphenyl	12	12	
3,4'-Dichlorobiphenyl	13	13	
3,5-Dichlorobiphenyl	14	14	X
4,4'-Dichlorbiphenyl	15	15	X
2,2',3-Trichlorobiphenyl	16	16	
2,2',4-Trichlorobiphenyl	17	17	
2,2',5-Trichlorobiphenyl	18	18	
2,2',6-Trichlorobiphenyl	19	19	X
2,3,3'-Trichlorobiphenyl	20	20	
2,3,4-Trichlorobiphenyl	21	21	
2,3,4'-Trichlorobiphenyl	22	22	
2,3,5-Trichlorobiphenyl	23	23	
2,3,6-Trichlorobiphenyl	24	24	
2,3',4-Trichlorobiphenyl	25	25	
2,3',5-Trichlorobiphenyl	26	26	X
2,3',6-Trichlorobiphenyl	27	27	X
2,4,4'-Trichlorobiphenyl	28	28	
2,4,5-Trichlorobiphenyl	29	29	
2,4,6-Trichlorobiphenyl	30	30	X
2,4',5-Trichlorobiphenyl	31	31	X
2,4',6-Trichlorobiphenyl	32	32	X
2,3’,4-Trichlorobiphenyl	33	33	X
2,3’,5’-Trichlorobiphenyl	34	34	X
3,3',4-Trichlorobiphenyl	35	35	X
3,3',5-Trichlorobiphenyl	36	36	X
3,4,4'-Trichlorobiphenyl	37	37	X
3,4,5-Trichlorobiphenyl	38	38	X
3,4',5-Trichlorobiphenyl	39	39	
2,2',3,3'-Tetrachlorobiphenyl	40	40	

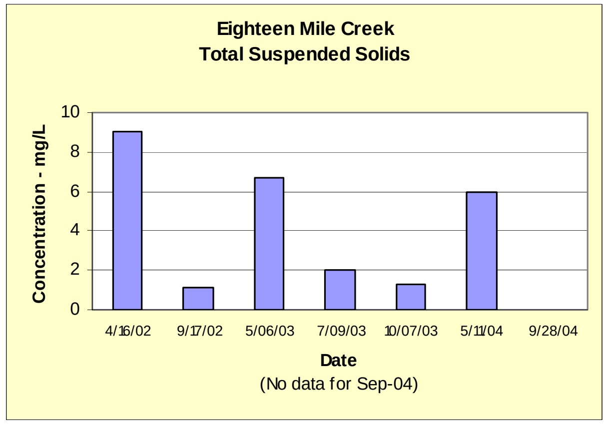
PCB Congener	BZ #	IUPAC #	EPA Lab Target Congeners 2002 - 2003
2,2',3,4-Tetrachlorobiphenyl	41	41	X
2,2',3,4'-Tetrachlorobiphenyl	42	42	
2,2',3,5-Tetrachlorobiphenyl	43	43	
2,2',3,5'-Tetrachlorobiphenyl	44	44	
2,2',3,6-Tetrachlorobiphenyl	45	45	X
2,2',3,6'-Tetrachlorobiphenyl	46	46	
2,2',4,4'-Tetrachlorobiphenyl	47	47	
2,2',4,5-Tetrachlorobiphenyl	48	48	
2,2',4,5'-Tetrachlorobiphenyl	49	49	X
2,2',4,6-Tetrachlorobiphenyl	50	50	X
2,2',4,6'-Tetrachlorobiphenyl	51	51	
2,2',5,5'-Tetrachlorobiphenyl	52	52	X
2,2',5,6'-Tetrachlorobiphenyl	53	53	
2,2',6,6'-Tetrachlorobiphenyl	54	54	X
2,3,3',4-Tetrachlorobiphenyl	55	55	
2,3,3',4'-Tetrachlorobiphenyl	56	56	
2,3,3',5-Tetrachlorobiphenyl	57	57	X
2,3,3',5'-Tetrachlorobiphenyl	58	58	
2,3,3',6-Tetrachlorobiphenyl	59	59	
2,3,4,4'-Tetrachlorobiphenyl	60	60	
2,3,4,5-Tetrachlorobiphenyl	61	61	
2,3,4,6-Tetrachlorobiphenyl	62	62	
2,3,4',5-Tetrachlorobiphenyl	63	63	X
2,3,4',6-Tetrachlorobiphenyl	64	64	
2,3,5,6-Tetrachlorobiphenyl	65	65	
2,3',4,4'-Tetrachlorobiphenyl	66	66	X
2,3',4,5-Tetrachlorobiphenyl	67	67	
2,3',4,5'-Tetrachlorobiphenyl	68	68	
2,3',4,6-Tetrachlorobiphenyl	69	69	
2,3',4',5-Tetrachlorobiphenyl	70	70	
2,3',4',6-Tetrachlorobiphenyl	71	71	
2,3',5,5'-Tetrachlorobiphenyl	72	72	X
2,3',5',6-Tetrachlorobiphenyl	73	73	
2,4,4',5-Tetrachlorobiphenyl	74	74	
2,4,4',6-Tetrachlorobiphenyl	75	75	X
2,3',4',5'-Tetrachlorobiphenyl	76	76	
3,3',4,4'-Tetrachlorobiphenyl	77	77	X
3,3',4,5-Tetrachlorobiphenyl	78	78	X
3,3',4,5'-Tetrachlorobiphenyl	79	79	X
3,3',5,5'-Tetrachlorobiphenyl	80	80	

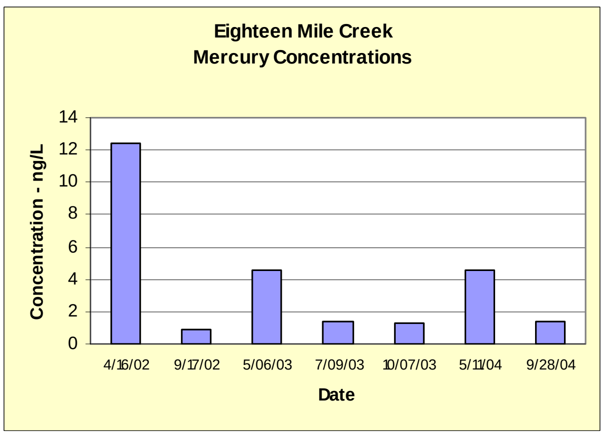
PCB Congener	BZ #	IUPAC #	EPA Lab Target Congeners 2002 - 2003
3,4,4',5-Tetrachlorobiphenyl	81	81	X
2,2',3,3',4-Pentachlorobiphenyl	82	82	X
2,2',3,3',5-Pentachlorobiphenyl	83	83	X
2,2',3,3',6-Pentachlorobiphenyl	84	84	
2,2',3,4,4'-Pentachlorobiphenyl	85	85	X
2,2',3,4,5-Pentachlorobiphenyl	86	86	
2,2',3,4,5'-Pentachlorobiphenyl	87	87	X
2,2',3,4,6-Pentachlorobiphenyl	88	88	X
2,2',3,4,6'-Pentachlorobiphenyl	89	89	X
2,2',3,4',5-Pentachlorobiphenyl	90	90	
2,2',3,4',6-Pentachlorobiphenyl	91	91	
2,2',3,5,5'-Pentachlorobiphenyl	92	92	X
2,2',3,5,6-Pentachlorobiphenyl	93	93	
2,2',3,5,6'-Pentachlorobiphenyl	94	94	
2,2',3,5',6-Pentachlorobiphenyl	95	95	X
2,2',3,6,6'-Pentachlorobiphenyl	96	96	X
2,2',3,4',5'-Pentachlorobiphenyl	97	97	
2,2',3,4',6'-Pentachlorobiphenyl	98	98	
2,2',4,4',5-Pentachlorobiphenyl	99	99	
2,2',4,4',6-Pentachlorobiphenyl	100	100	
2,2',4,5,5'-Pentachlorobiphenyl	101	101	
2,2',4,5,6'-Pentachlorobiphenyl	102	102	
2,2',4,5',6-Pentachlorobiphenyl	103	103	X
2,2',4,6,6'-Pentachlorobiphenyl	104	104	X
2,3,3',4,4'-Pentachlorobiphenyl	105	105	X
2,3,3',4,5-Pentachlorobiphenyl	106	106	X
2,3,3',4',5-Pentachlorobiphenyl	107	107	
2,3,3',4,5'-Pentachlorobiphenyl	108	108	
2,3,3',4,6-Pentachlorobiphenyl	109	109	
2,3,3',4',6-Pentachlorobiphenyl	110	110	
2,3,3',5,5'-Pentachlorobiphenyl	111	111	
2,3,3',5,6-Pentachlorobiphenyl	112	112	
2,3,3',5',6-Pentachlorobiphenyl	113	113	X
2,3,4,4',5-Pentachlorobiphenyl	114	114	X
2,3,4,4',6-Pentachlorobiphenyl	115	115	
2,3,4,5,6-Pentachlorobiphenyl	116	116	
2,3,4',5,6-Pentachlorobiphenyl	117	117	
2,3',4,4',5-Pentachlorobiphenyl	118	118	X
2,3',4,4',6-Pentachlorobiphenyl	119	119	X
2,3',4,5,5'-Pentachlorobiphenyl	120	120	X

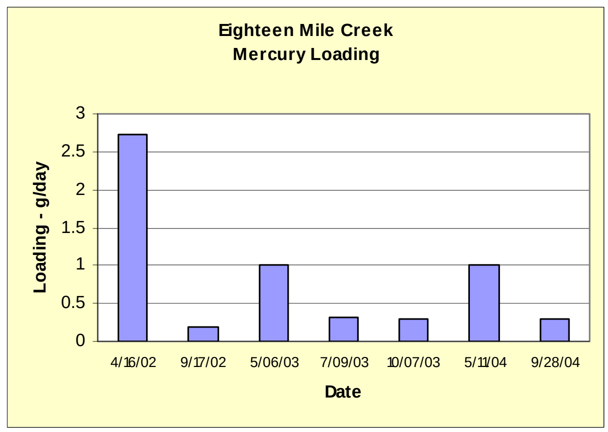
PCB Congener	BZ #	IUPAC #	EPA Lab Target Congeners 2002 - 2003
2,3',4,5',6-Pentachlorobiphenyl	121	121	
2,3,3',4',5'-Pentachlorobiphenyl	122	122	X
2,3',4,4',5'-Pentachlorobiphenyl	123	123	X
2,3',4',5,5'-Pentachlorobiphenyl	124	124	X
2,3',4',5',6-Pentachlorobiphenyl	125	125	
3,3',4,4',5-Pentachlorobiphenyl	126	126	X
3,3',4,5,5'-Pentachlorobiphenyl	127	127	X
2,2',3,3',4,4'-Hexachlorobiphenyl	128	128	
2,2',3,3',4,5-Hexachlorobiphenyl	129	129	X
2,2',3,3',4,5'-Hexachlorobiphenyl	130	130	X
2,2',3,3',4,6-Hexachlorobiphenyl	131	131	
2,2',3,3',4,6'-Hexachlorobiphenyl	132	132	
2,2',3,3',5,5'-Hexachlorobiphenyl	133	133	X
2,2',3,3',5,6-Hexachlorobiphenyl	134	134	
2,2',3,3',5,6'-Hexachlorobiphenyl	135	135	
2,2',3,3',6,6'-Hexachlorobiphenyl	136	136	X
2,2',3,4,4',5-Hexachlorobiphenyl	137	137	
2,2',3,4,4',5'-Hexachlorobiphenyl	138	138	
2,2',3,4,4',6-Hexachlorobiphenyl	139	139	
2,2',3,4,4',6'-Hexachlorobiphenyl	140	140	
2,2',3,4,5,5'-Hexachlorobiphenyl	141	141	
2,2',3,4,5,6-Hexachlorobiphenyl	142	142	X
2,2',3,4,5,6'-Hexachlorobiphenyl	143	143	X
2,2',3,4,5',6-Hexachlorobiphenyl	144	144	X
2,2',3,4,6,6'-Hexachlorobiphenyl	145	145	
2,2',3,4',5,5'-Hexachlorobiphenyl	146	146	
2,2',3,4',5,6-Hexachlorobiphenyl	147	147	
2,2',3,4',5,6'-Hexachlorobiphenyl	148	148	X
2,2',3,4',5',6-Hexachlorobiphenyl	149	149	
2,2',3,4',6,6'-Hexachlorobiphenyl	150	150	
2,2',3,5,5',6-Hexachlorobiphenyl	151	151	X
2,2',3,5,6,6'-Hexachlorobiphenyl	152	152	X
2,2',4,4',5,5'-Hexachlorobiphenyl	153	153	X
2,2',4,4',5,6'-Hexachlorobiphenyl	154	154	
2,2',4,4',6,6'-Hexachlorobiphenyl	155	155	X
2,3,3',4,4',5-Hexachlorobiphenyl	156	156	X
2,3,3',4,4',5'-Hexachlorobiphenyl	157	157	X
2,3,3',4,4',6-Hexachlorobiphenyl	158	158	
2,3,3',4,5,5'-Hexachlorobiphenyl	159	159	X
2,3,3',4,5,6-Hexachlorobiphenyl	160	160	

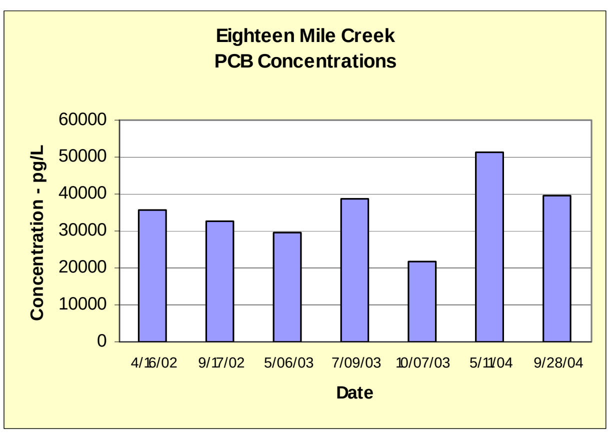
PCB Congener	BZ #	IUPAC #	EPA Lab Target Congeners 2002 - 2003
2,3,3',4,5',6-Hexachlorobiphenyl	161	161	X
2,3,3',4',5,5'-Hexachlorobiphenyl	162	162	
2,3,3',4',5,6-Hexachlorobiphenyl	163	163	
2,3,3',4',5',6-Hexachlorobiphenyl	164	164	
2,3,3',5,5',6-Hexachlorobiphenyl	165	165	
2,3,4,4',5,6-Hexachlorobiphenyl	166	166	X
2,3',4,4',5,5'-Hexachlorobiphenyl	167	167	X
2,3',4,4',5',6-Hexachlorobiphenyl	168	168	
3,3',4,4',5,5'-Hexachlorobiphenyl	169	169	X
2,2',3,3',4,4',5-Heptachlorobiphenyl	170	170	X
2,2',3,3',4,4',6-Heptachlorobiphenyl	171	171	X
2,2',3,3',4,5,5'-Heptachlorobiphenyl	172	172	X
2,2',3,3',4,5,6-Heptachlorobiphenyl	173	173	
2,2',3,3',4,5,6'-Heptachlorobiphenyl	174	174	
2,2',3,3',4,5',6-Heptachlorobiphenyl	175	175	X
2,2',3,3',4,6,6'-Heptachlorobiphenyl	176	176	X
2,2',3,3',4,5',6'-Heptachlorobiphenyl	177	177	X
2,2',3,3',5,5',6-Heptachlorobiphenyl	178	178	X
2,2',3,3',5,6,6'-Heptachlorobiphenyl	179	179	X
2,2',3,4,4',5,5'-Heptachlorobiphenyl	180	180	
2,2',3,4,4',5,6-Heptachlorobiphenyl	181	181	
2,2',3,4,4',5,6'-Heptachlorobiphenyl	182	182	
2,2',3,4,4',5',6-Heptachlorobiphenyl	183	183	X
2,2',3,4,4',6,6'-Heptachlorobiphenyl	184	184	
2,2',3,4,5,5',6-Heptachlorobiphenyl	185	185	
2,2',3,4,5,6,6'-Heptachlorobiphenyl	186	186	
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	187	
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	188	X
2,3,3',4,4',5,5'-Heptachlorobiphenyl	189	189	X
2,3,3',4,4',5,6-Heptachlorobiphenyl	190	190	X
2,3,3',4,4',5',6-Heptachlorobiphenyl	191	191	X
2,3,3',4,5,5',6-Heptachlorobiphenyl	192	192	
2,3,3',4',5,5',6-Heptachlorobiphenyl	193	193	
2,2',3,3',4,4',5,5'-Octachlorobiphenyl	194	194	X
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	195	X
2,2',3,3',4,4',5,6'-Octachlorobiphenyl	196	196	X
2,2',3,3',4,4',6,6'-Octachlorobiphenyl	197	197	
2,2',3,3',4,5,5',6-Octachlorobiphenyl	198	198	X
2,2',3,3',4,5,5',6'-Octachlorobiphenyl	201	199	
2,2',3,3',4,5,6,6'-Octachlorobiphenyl	199	200	X

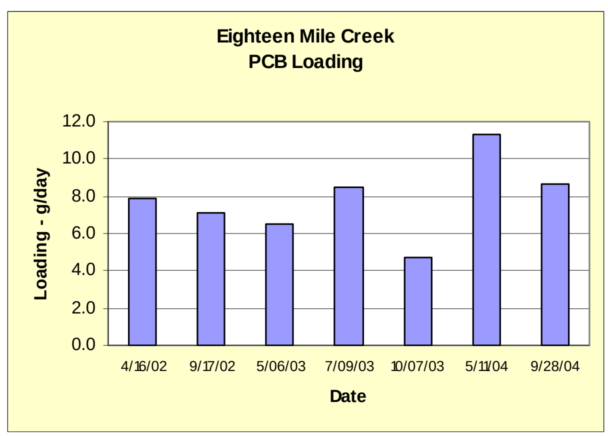
PCB Congener	BZ #	IUPAC #	EPA Lab Target Congeners 2002 - 2003
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	201	X
2,2',3,3',5,5',6,6'-Octachlorobiphenyl	202	202	X
2,2',3,4,4',5,5',6-Octachlorobiphenyl	203	203	
2,2',3,4,4',5,6,6'-Octachlorobiphenyl	204	204	X
2,3,3',4,4',5,5',6-Octachlorobiphenyl	205	205	X
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	206	206	X
2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	207	207	X
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	208	208	X
Dechachlorobiphenyl	209	209	X



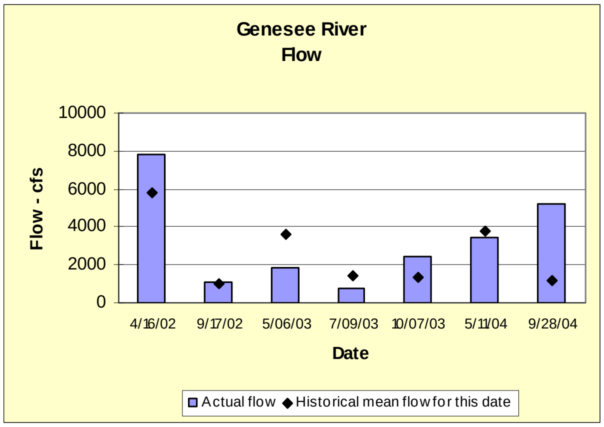


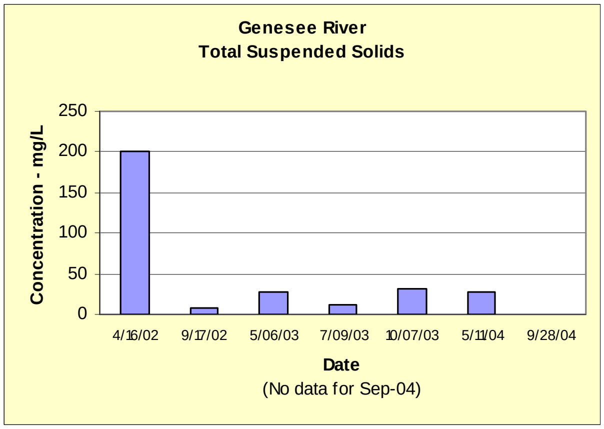


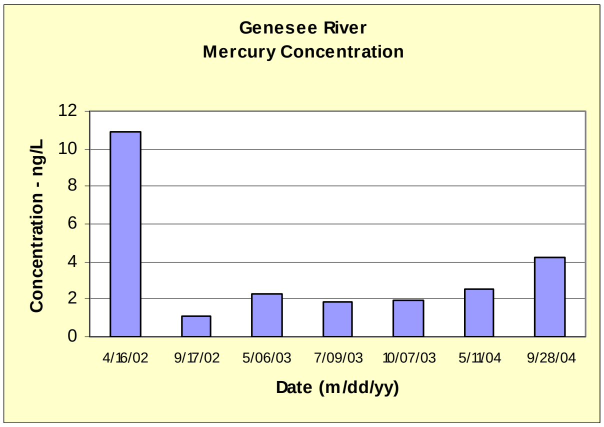


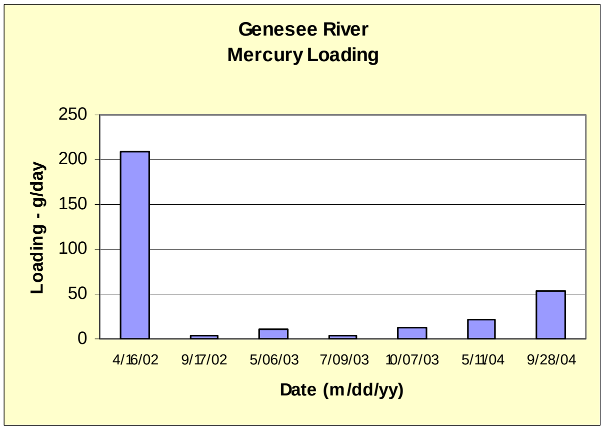


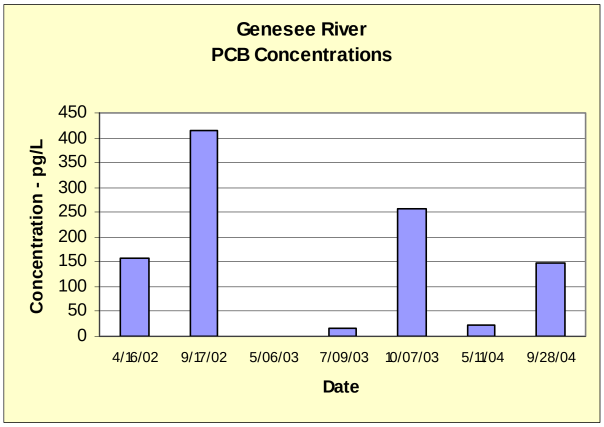
NOTE: There is no gage station on Eighteen Mile Creek. A fixed estimate of flow (90cfs) was used to calculate loadings. This causes loading bar graphs to exactly mirror concentration bar graphs.

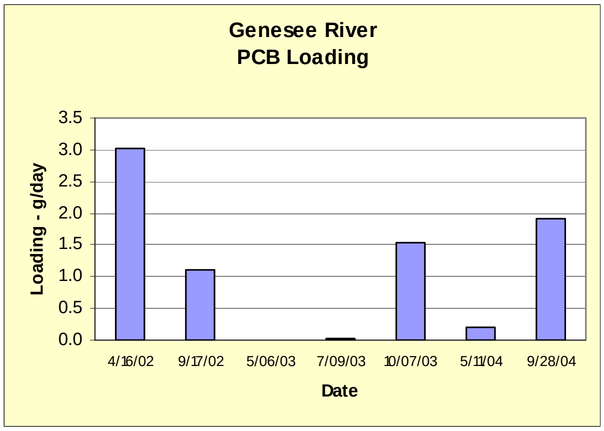

Genesee River
Flow
Flow - cfs
10000
8000
6000
4000
2000
0
4/16/02
9/17/02
5/06/03
7/09/03
10/07/03
5/11/04
9/28/04
Date
Actual flow
Historical mean flow for this date

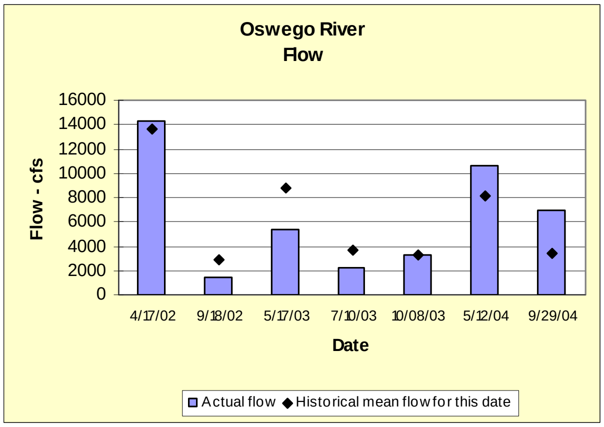

Genesee River
Total Suspended Solids
Concentration - mg/L
250
200
150
100
50
0
4/16/02
9/17/02
5/06/03
7/09/03
10/07/03
5/11/04
9/28/04
Date
(No data for Sep-04)

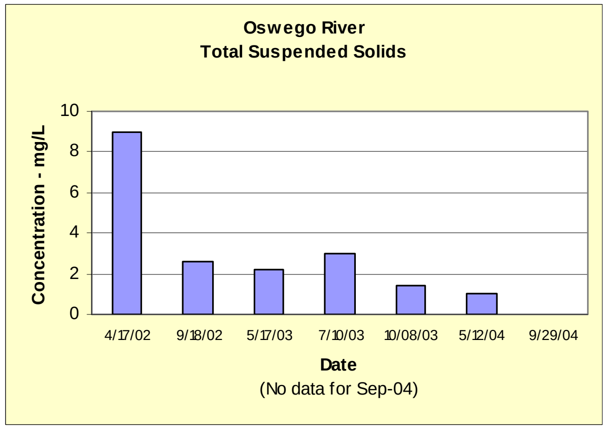

Genesee River
Mercury Concentration
Concentration - ng/L
12
10
8
6
4
2
0
4/16/02
9/17/02
5/06/03
7/09/03
10/07/03
5/11/04
9/28/04
Date (m/dd/yy)

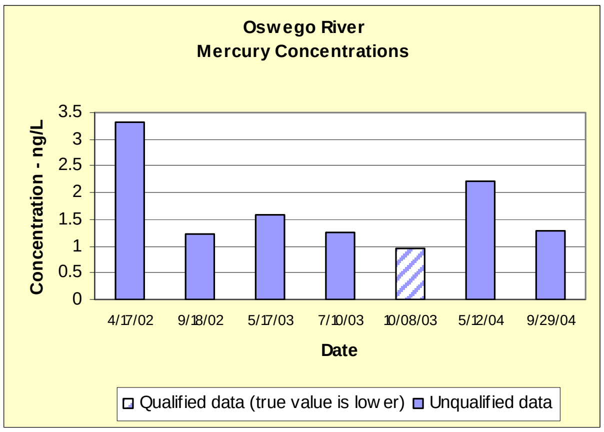

Genesee River
Mercury Loading
Loading - g/day
250
200
150
100
50
0
4/16/02
9/17/02
5/06/03
7/09/03
10/07/03
5/11/04
9/28/04
Date (m/dd/yy)

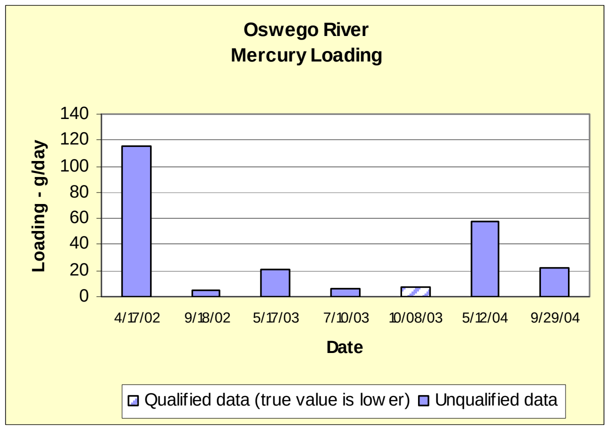

Genesee River
PCB Concentrations
Concentration - pg/L
450
400
350
300
250
200
150
100
50
0
4/16/02
9/17/02
5/06/03
7/09/03
10/07/03
5/11/04
9/28/04
Date

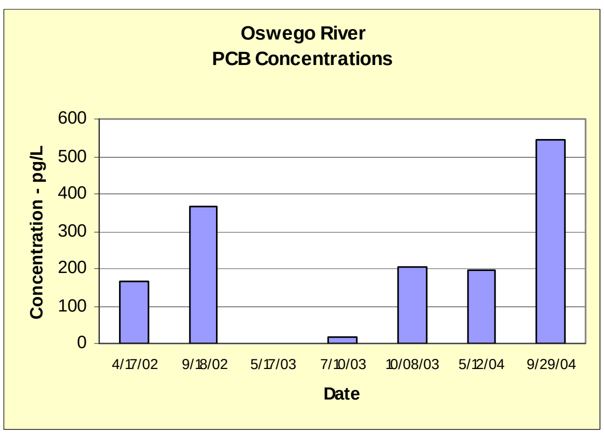

Genesee River
PCB Loading
Loading - g/day
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/16/02
9/17/02
5/06/03
7/09/03
10/07/03
5/11/04
9/28/04
Date

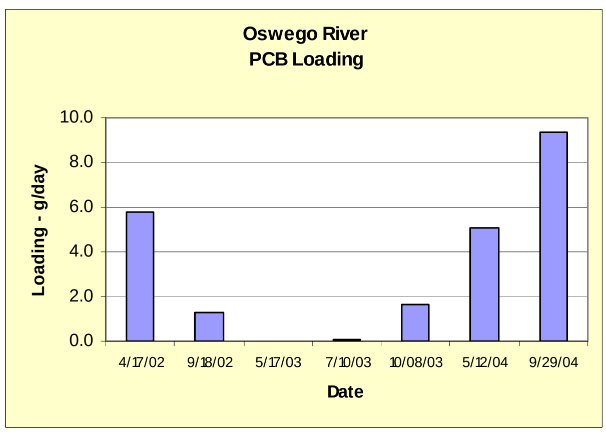

Oswego River
Flow
Flow - cfs
16000
14000
12000
10000
8000
6000
4000
2000
0
4/17/02
9/18/02
5/17/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
Actual flow
Historical mean flow for this date

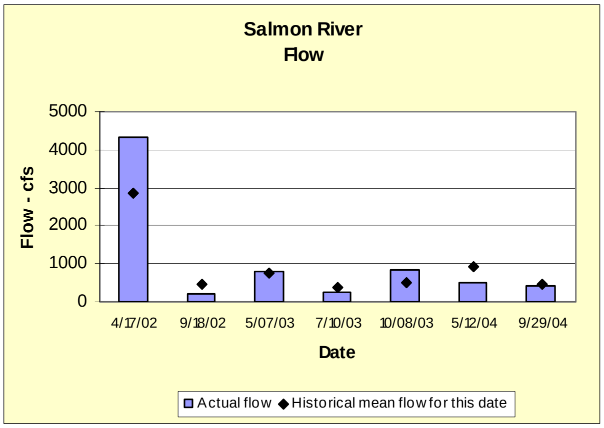

Oswego River
Total Suspended Solids
Concentration - mg/L
10
8
6
4
2
0
4/17/02
9/18/02
5/17/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
(No data for Sep-04)

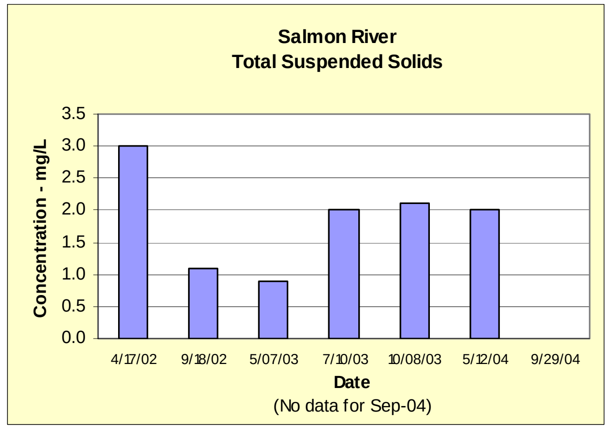

Oswego River
Mercury Concentrations
Concentration - ng/L
3.5
3
2.5
2
1.5
1
0.5
0
4/17/02
9/18/02
5/17/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
Qualified data (true value is lower)
Unqualified data

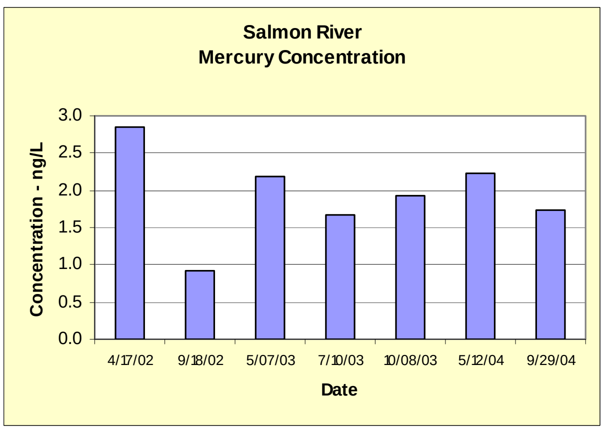

Oswego River
Mercury Loading
Loading - g/day
140
120
100
80
60
40
20
0
4/17/02
9/18/02
5/17/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
Qualified data (true value is lower)
Unqualified data

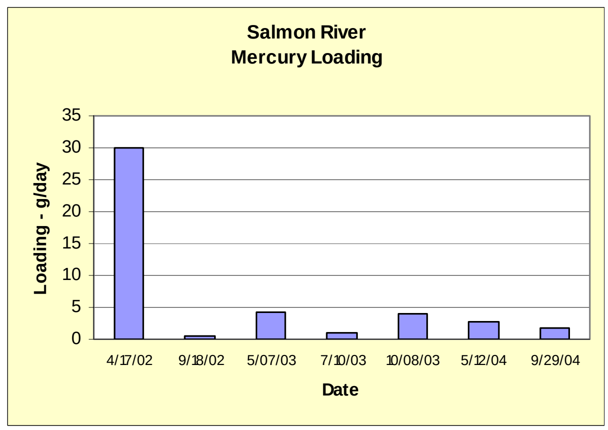

Oswego River
PCB Concentrations
Concentration - pg/L
600
500
400
300
200
100
0
4/17/02
9/18/02
5/17/03
7/10/03
10/08/03
5/12/04
9/29/04
Date

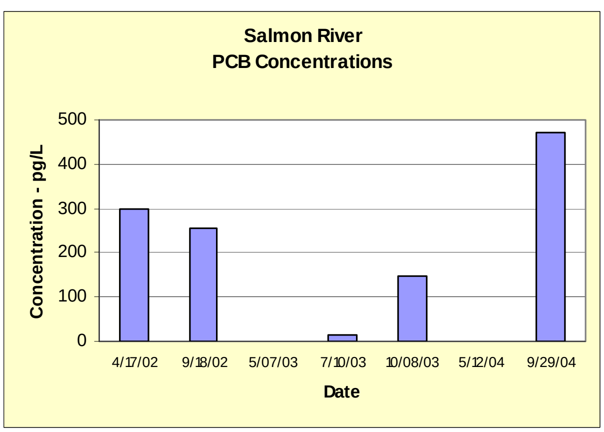

Oswego River
PCB Loading
Loading - g/day
10.0
8.0
6.0
4.0
2.0
0.0
4/17/02
9/18/02
5/17/03
7/10/03
10/08/03
5/12/04
9/29/04
Date

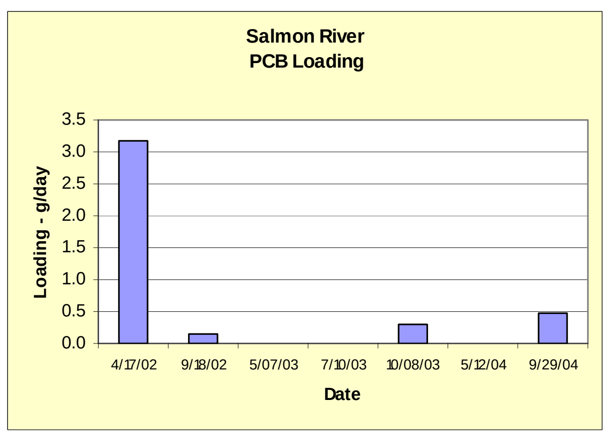

Salmon River
Flow
Flow - cfs
5000
4000
3000
2000
1000
0
4/17/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
Actual flow
Historical mean flow for this date

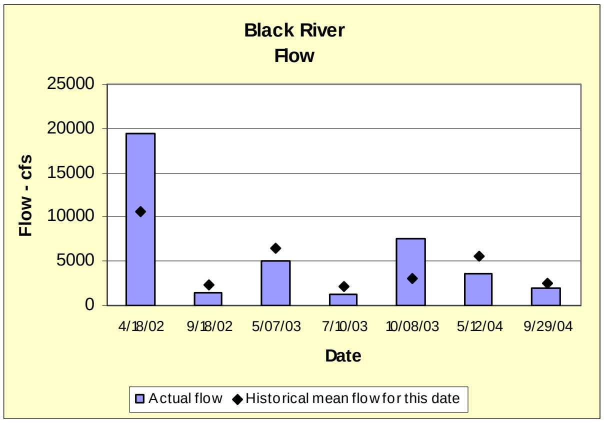

Salmon River
Total Suspended Solids
Concentration - mg/L
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/17/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
(No data for Sep-04)

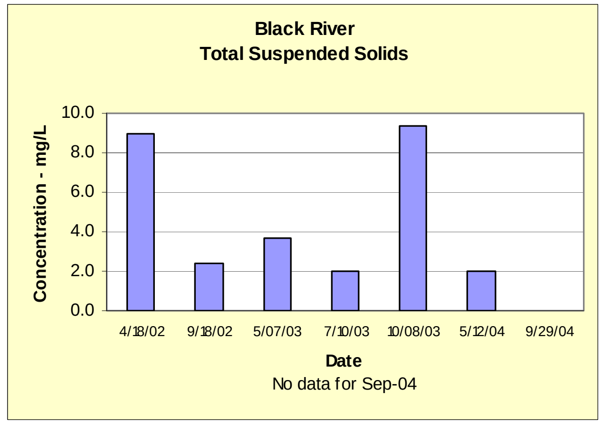

Salmon River
Mercury Concentration
Concentration - ng/L
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/17/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date

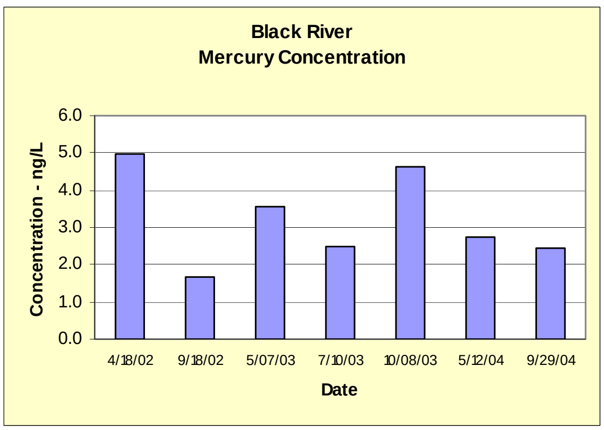

Salmon River
Mercury Loading
Loading - g/day
35
30
25
20
15
10
5
0
4/17/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date

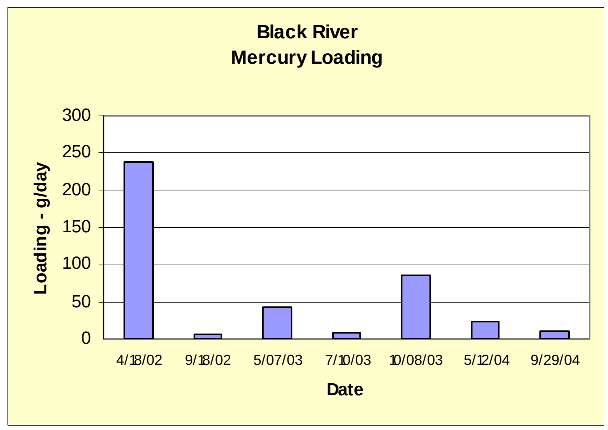

Salmon River
PCB Concentrations
Concentration - pg/L
500
400
300
200
100
0
4/17/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date

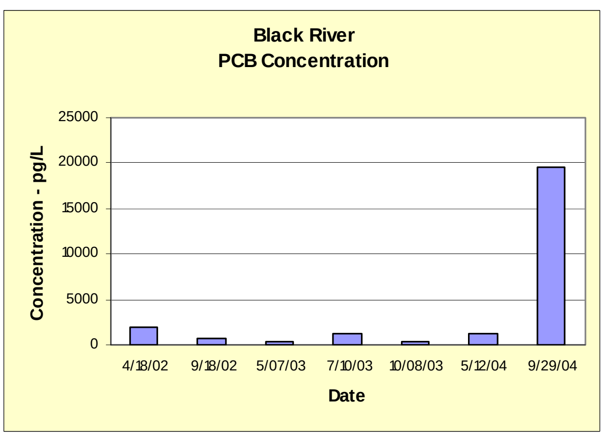

Salmon River
PCB Loading
Loading - g/day
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/17/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date

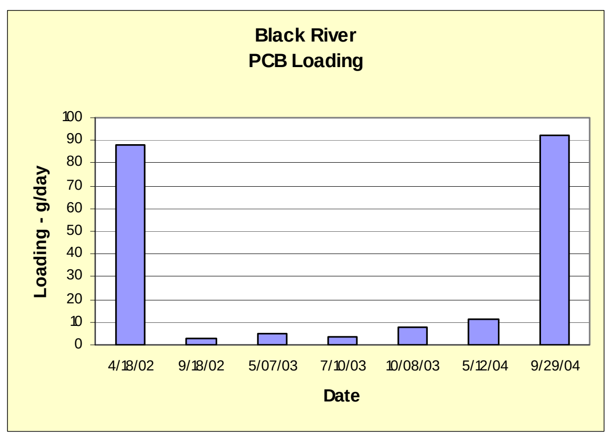

Black River
Flow
Flow - cfs
25000
20000
15000
10000
5000
0
4/18/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
Actual flow
Historical mean flow for this date


Black River
Total Suspended Solids
Concentration - mg/L
10.0
8.0
6.0
4.0
2.0
0.0
4/18/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date
No data for Sep-04


Black River
Mercury Concentration
Concentration - ng/L
6.0
5.0
4.0
3.0
2.0
1.0
0.0
4/18/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date


Black River
Mercury Loading
Loading - g/day
300
250
200
150
100
50
0
4/18/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date


Black River
PCB Concentration
Concentration - pg/L
25000
20000
15000
10000
5000
0
4/18/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date


Black River
PCB Loading
Loading - g/day
100
90
80
70
60
50
40
30
20
10
0
4/18/02
9/18/02
5/07/03
7/10/03
10/08/03
5/12/04
9/29/04
Date

PCB Homolog Groups
Eighteen Mile Creek 2002-2004

	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Mono CB	282	458	310	400	240	282	400
Di CB	5,803	8,565	1,420	10,505	6,270	8,222	9,340
Tri CB	10,104	12,297	9,670	12,890	7,770	19,059	17,080
Tetra CB	11,659	8,371	9,036	10,560	5,140	18,029	10,092
Penta CB	6,714	2,618	7,388	4,057	1,987	5,356	2,473
Hexa CB	979	81	1,370	222	72	212	98
Hepta CB	0	44	217	18	35	61	22
Octa CB	97	0	91	0	17	26	20
Nona CB	66	15	0	0	0	27	0
Deca CB	0	31	110	0	0	51	0
Total PCB	35,704	32,480	29,612	38,652	21,531	51,325	39,525

PCB Homolog Groups
Genesee River 2002-2004

	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Mono CB	0	0	0	0	0	0	0
Di CB	0	241	0	0	116	22	31
Tri CB	0	44	0	15	25	0	0
Tetra CB	0	83	0	0	0	0	0
Penta CB	110	37	0	0	115	0	95
Hexa CB	18	9	0	0	0	0	0
Hepta CB	0	0	0	0	0	0	0
Octa CB	29	0	0	0	0	0	23
Nona CB	0	0	0	0	0	0	0
Deca CB	0	0	0	0	0	0	0
Total PCB	157	414	0	15	256	22	149

PCB Homolog Groups
Oswego River 2002-2004

	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Mono CB	0	0	0	0	0	0	0
Di CB	0	0	0	0	68	0	16
Tri CB	0	35	0	17	11	110	26
Tetra CB	81	76	0	0	0	59	16
Penta CB	85	61	0	0	91	0	459
Hexa CB	0	12	0	0	15	0	23
Hepta CB	0	0	0	0	0	0	0
Octa CB	0	0	0	0	0	0	0
Nona CB	0	62	0	0	18	0	0
Deca CB	0	120	0	0	0	24	0
Total PCB	166	366	0	17	203	193	540

PCB Homolog Groups
Salmon River 2002-2004

	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Mono CB	0	0	0	0	0	0	0
Di CB	85	81	0	0	63	0	0
Tri CB	0	23	0	13	0	0	26
Tetra CB	90	61	0	0	0	0	22
Penta CB	113	54	0	0	75	0	315
Hexa CB	12	38	0	0	11	0	0
Hepta CB	0	0	0	0	0	0	0
Octa CB	0	0	0	0	0	0	0
Nona CB	0	0	0	0	0	0	0
Deca CB	0	0	0	0	0	0	110
Total PCB	300	257	0	13	149	0	473

PCB Homolog Groups
Black River 2002-2004

	Apr 02	Sep 02	May 03	Jul 03	Oct 03	May 04	Sep 04
Mono CB	82	0	0	0	0	0	0
Di CB	584	365	270	418	203	461	1,160
Tri CB	467	209	155	304	82	512	4,792
Tetra CB	469	119	0	452	0	337	5,254
Penta CB	231	36	0	0	117	0	7,482
Hexa CB	9	31	0	0	15	0	707
Hepta CB	0	0	0	0	0	0	91
Octa CB	7	0	0	0	0	0	0
Nona CB	0	0	0	0	0	0	0
Deca CB	0	0	0	0	0	0	0
Total PCB	1,849	760	425	1,174	417	1,309	19,486