Some xenobiotic chemicals in smallmouth bass (*Micropterus dolomieu*) and striped bass (*Morone saxatilus*) in the Hudson River

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ABSTRACT

Polychlorinated biphenyl (PCB) Aroclor concentrations have been extensively examined in fish taken from the Hudson River, but other xenobiotic chemicals and PCB congeners have had either limited or no assessment. This study examined concentration distributions and congener distributions of polybrominated diphenyl ethers (PBDEs), polychlornated dibenzo-*p*-dioxins and dibenzofurans (PCDD/Fs), polybrominated dibenzo-*p*-dioxins and dibenzofurans (PBDD/Fs) and PCBs in smallmouth bass in an approximate 246 km portion of the freshwater Hudson River and in striped bass from a 203 km portion of the tidal Hudson River.

In smallmouth bass, average total tri+ PBDE concentrations ranged from 2120 pg/g at a reference location to 138000 pg/g in fish from below the Federal Dam at Troy. Striped bass had average total tri+ PBDEs ranging from 34800 pg/g to 169000 pg/g although the latter contained a fish with an outlier PBDE concentration of 345000 pg/g. Of 46 PBDEs examined, BDEs 28/33, 47, 49, 66, 99, 100, 153, 154 and 155 contributed more than one percent of the total PBDE concentration, although BDE-99 was nearly absent in striped bass. Brominated dioxins and furans (i.e., PBDE combustion byproducts) were not detected in striped bass but were present in some smallmouth bass at levels approximating detection limits. PCDD/Fs were present at low concentrations (i.e., 2,3,7,8-TCDD toxic equivalents (TEQ) were generally less than 5.0 pg/g) in most fish sampled of both species, although a maximum TEQ of 84 pg/g occurred in one striped bass. The latter fish may have been exposed to 2,3,7,8-TCDD during temporary residence in the Newark Bay-Passaic River complex before migrating into the Hudson River.

Total PCB concentrations in smallmouth bass ranged from 7700 pg/g at the reference location at North River to 3920000 pg/g in the Thompson Island Pool but declined downstream to Catskill (1680000 pg/g). PCB concentrations were related to known sources in the upper river. In striped bass, total PCB concentrations declined from 1960000 pg/g below the Federal Dam at Troy to 513000 pg/g at the southern-most sampling location at Haverstraw. PCB congener and homolog composition changed from dominance by hexa- penta- and hepta- compounds at reference locations to tetra-, penta- and hexa- chlorinated PCBs downstream of the PCB sources. Dioxin-like PCBs, primarily PCB126, were the primary contributors (about 96% in smallmouth bass and 84 % in 11 of 12 striped bass) to total TCDD toxic equivalents. Average total TEQs in smallmouth bass ranged from 0.475 pg/g at North River to 27 pg/g in the Thompson Island Pool. In striped bass, two outlier fish affected the range of total TEQs. Excluding outliers of 84.9 and 86.1 pg/g, the range of average total TEQs was 9.9 pg/g at Haverstraw to 23 pg/g at Poughkeepsie and below the Federal Dam.

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INTRODUCTION

The fish of the Hudson River are well known for containing excessive concentrations of polychlorinated biphenyls (PCBs) (Nadeau and Davis 1976; Spagnoli and Skinner 1977; Horn *et al*. 1979; Brown *et al*. 1985; Armstrong and Sloan 1988; Sloan and Armstrong 1988; Sloan *et al*. 2002; Sloan *et al*. 2005). These studies examined PCBs on an Aroclor (mixtures of PCB congeners) basis. Bush *et al*. (1989) and McGroddy *et al*. (1997) examined limited sets of PCB congeners in Hudson River fish. Other analytes have been examined episodically including an array of organochlorine pesticides and mercury (Division of Fish and Wildlife 1978, 1979, 1981; Sloan *et al*. 1987), 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD or TCDD) and 2,3,7,8-tetrachlorodibenzofuran (2,3,7,8-TCDF or TCDF) (O'Keefe *et al*., 1984; Skinner *et al*. 1997). Other chlorinated dioxins and furans - collectively called PCDD/Fs - have not been examined in Hudson River fish and are one target of this study.

New chemical compounds having potentially adverse impacts to aquatic and terrestrial biota, including humans, have triggered more investigation. These chemicals include flame retardants called polybrominated diphenyl ethers (PBDEs) and their combustion by-products (polybrominated dibenzo-*p*-dioxins [PBDDs] and polybrominated dibenzofurans [PBDFs], collectively called PBDD/Fs). PBDEs have been shown to accumulate in fish from waters worldwide (Sellström *et* al. 1988; Dodder *et al*. 2002; Hale *et al*. 2001; Hites *et al*. 2004; Ikonomou *et al*. 2005; Ismail *et al*. 2009; Law *et al*. 2006; Minh *et al*. 2006; Rayne *et al*. 2003; Shaw and Kannan 2009; Tittlemier *et al*. 2004; Vigano *et al*. 2008; USEPA 2009; Vives *et al*. 2004; Xiang *et al*. 2007; Zhu and Hites 2004), including the Hudson River (Xia *et al*. 2008) and in Antarctica (Hale *et al*. 2008). They may pose a threat to human health as suggested by their presence in maternal milk (Kalantzi *et al*. 2004; Meironyté *et al*., 1999; Schechter *et al*. 2003; Schuhmacher *et al*., 2006) and in children (Lunder *et al*. 2010; Meironyté *et al*. 2003; Toms *et al*., 2009). In contrast, there is little documentation of the presence of PBDD/Fs in fish (Ashizuka *et al*. 2005 and 2008; Fernandes *et al*., 2008).

The objectives of this study were to:

- Conduct a preliminary assessment of congeners of PBDEs and PBDD/Fs in two representative fish species over the length of the Hudson River. The fish species selected were smallmouth bass and striped bass.

- Conduct a limited reassessment of PCB congeners and PCDD/Fs in the same fish samples.

- Where possible, compare concentrations of brominated compounds with their chlorinated counterparts. This is particularly applicable to PCDD/Fs and PBDD/Fs.

The fish collected for this study are representative of species sought by anglers and representative of a broad geographic range of the Hudson River, both the freshwater and tidal river. One fish species is a resident and the other a migratory species.

METHODS

Legal sized smallmouth bass (≥ 305 mm) and striped bass (≥ 457 mm) are taken annually from select sites along the Hudson River for analysis of PCBs on an Aroclor basis. For this study, a subsample of three smallmouth bass were taken at each of five sites (three sites north of the Federal Dam at Troy, NY and two south of the Federal Dam) and three striped bass were taken at each of four sites in the estuarine portion of the river (south of the Federal Dam). In addition, three smallmouth bass were collected from a reference site on the Hudson at North River. All fish were of legal sizes although there was no length limit on smallmouth bass at North River and only smaller fish were available. The specific sample information is found in Appendix A. The sampling sites are provided in Figure 1.

Chemical analyses were conducted on standard filets (skin on, scales removed) of each fish. Each sample was thoroughly ground and homogenized and a subsample was analyzed using methods as follows.

- Lipids were determined gravimetrically;
- The 209 congeners of PCBs were analyzed by Method 1668A (USEPA 1999).
- Draft Method 1614 (USEPA 2003) was used to determine concentrations of 46 of the potential 209 PBDE congeners. The PBDEs determined represent all major and minor PBDE congeners, plus many of the trace PBDE congeners, known to be available in commercial PBDE mixtures (Sjödin *et al*. 1998; Björklund *et al*. 2003; Korytár *et al*. 2005; La Guardia *et al*. 2006).
- PCDD/Fs and PBDD/Fs were analyzed by Method 1613B (USEPA 1994). Method 1613B is designed for analysis of PCDD/F but with appropriate substitution of PBDD/F standards and quality control analytes the method was equally suitable for PBDD/Fs.

All methods for chemical compounds employ high resolution gas chromatography/high resolution mass spectrometry for quantitation of each analyte. All concentrations were reported in pg/g wet weight. Routine quality assurance for these analyses included analysis of blanks, duplicates, matrix spikes, alternate and surrogate radio-labeled analytes, and extraction standards. The data were not adjusted for recovery of surrogate compounds.

The raw data contained a number of qualifiers which were handled as noted below.

Qualifier	Meaning and method of data management
U	The analyte concentration was below the specified sample detection limit. The detection limit is reported with a < sign, and a zero was assigned for statistical computations.
J	The analyte concentration was greater than the sample detection limit but less than the lower method calibration level. The concentration as reported was used for statistical computations unless other qualifiers (i.e., B or K qualifiers) affect the reported concentration value.

B The associated sample blank contains a detectable concentration of the analyte. The original sample concentration is reported in the raw data tables in the Appendices. Where the blank concentration exceeds 10 percent of the sample analyte concentration, the blank concentration was subtracted from the analyte concentration and is reported in parentheses. For some analytes, the blank analyte concentration exceeded the sample analyte concentration, therefore, the detection limit was reported. Statistical computations used the blank adjusted concentrations. The use of corrected values had no practical impact on conclusions since the analyte concentrations subject to correction were generally near detection limits.

K A peak was present but could not be confirmed because it did not meet all method required criterion; therefore the identity of the compound could not be confirmed. For these analytical peaks the laboratory reported an estimated maximum possible concentration which is included in the raw data tables with the K qualifier. Also, the sample detection limit for a K qualified analyte is included in parentheses in the sample data tables in the Appendices. Statistical analyses used the sample detection limit with the assigned value of zero for computations.

Due to the assignment of zero for data below detection limits or to K qualified data, there may be possible underestimation of sample concentrations in statistical computations where these data occur. In such cases, the computed standard deviation is likely to be in error. Employment of methods of Helsel (2005) may provide better estimates of the correct mean concentrations and standard deviations where nondetects are reported. However, the impact on data interpretation for the purposes of this report are believed to be minimal.

The sample specific chemical residue original and adjusted data are included within a series of tables in the Appendices by analyte group, fish species and location of sample collection. Additionally, the data, as adjusted according to the above conventions, is included in electronic form in companion data files.

Appendix B	Polybrominated diphenyl ethers
Appendix C	Polychlorinated dibenzo-*p*-dioxins and dibenzofurans
Appendix D	Polybrominated dibenzo-*p*-dioxins and dibenzofurans
Appendix E	Polychlorinated biphenyls

Appendix F contains quality control data for each analyte group.

For PCDD/Fs and dioxin-like PCB congeners, 2,3,7,8-TCDD toxic equivalents were computed for humans (and mammals) by methods of Van den Berg *et al*. (2006) and for fish by methods of Van den Berg *et al*. (1998). By method convention, zero is assigned to non-detect values in these computations. For fish, toxic equivalency factors (TEFs) for several dioxin-like PCB congeners are indicated as less than values by Van den Berg *et al*. (1998). For this case, two

computations were performed, one with TEFs assigned zero and the second with TEFs assigned the full value without the less than sign. The 2,3,7,8-TCDD toxic equivalency factors for PCDD/Fs and dioxin-like PCBs are included in Appendix G.

RESULTS

The findings are addressed by analyte group in summary form in the following discussion. It should be noted at the outset that one striped bass from Poughkeepsie produced concentrations of PBDEs, PCDD/Fs and PCBs that were an outlier from all remaining 11 striped bass. The results and the following discussion reflect special consideration for this specimen.

Polybrominated diphenyl ethers

Only tri+ PBDEs (PBDEs with three or more bromine atoms; also indicated as BDE_{Tri+}) are considered here. Mono-PBDEs were not reported by the laboratory and di-PBDEs contained either quality assurance concerns or were not quantified for some samples. However, di-PBDE data, where reported by the laboratory, are included in tables and Appendix B for informational purposes.

Tables 1 and 2 summarize PBDE data for smallmouth bass and striped bass, respectively, by location of sample collection and PBDE homolog group. Mean total BDE_{Tri+} concentrations in smallmouth bass ranged from 2120 pg/g at the North River reference area to 138,000 pg/g below the Federal Dam at Troy. In striped bass mean total BDE_{Tri+} ranged from 34,800 pg/g at Haverstraw to 169,000 pg/g at Poughkeepsie. However, the Poughkeepsie average is influenced by an outlier of 345,000 pg/g, over three times the next highest value; the remaining two samples at Poughkeepsie averaged 81,500 pg/g total BDE_{Tri+}. Even without the outlier, Poughkeepsie had the highest mean total BDE_{Tri+} concentration.

PBDE congeners representing at least one percent of total tri+ PBDEs (Figure 2) were generally ranked in the following order, but exceptions did occur in the rank order for smallmouth bass for the sampling station below the Federal Dam at Troy and the single outlier striped bass at Poughkeepsie.

Smallmouth bass

- general case	BDE 47>BDE 99>BDE 100>BDE 154≈BDE 153>BDE 49>BDE 66.
- below Federal Dam	BDE 47>BDE 100>BDE 99>BDE 154>BDE 49≈BDE 153>BDE 155≈BDE 28/33

Striped bass

- general case	BDE 47>>BDE 100>BDE 49≈BDE 154>BDE 155≈BDE 28/33>BDE 153
- outlier fish	BDE 47>>BDE 49>BDE 100>BDE 28/33>BDE 154>BDE 51

The low concentration of BDE 99 in striped bass in comparison with smallmouth bass is notable.

Chlorinated dibenzo-*p*-dioxins and dibenzofurans

Table 3 summarizes PCDD/F congener data for smallmouth bass by location. 2,3,7,8-TCDD, the most toxic analyte, was not detected in smallmouth bass north (upstream) of the Federal Dam at Troy but was present in four of six smallmouth bass and all striped bass downstream (south) of the Federal Dam. As with 2,3,7,8-TCDD, other detected PCDD/F analytes in smallmouth bass generally were at lower concentrations upstream of the Federal Dam than downstream. The tetra- and penta-CDFs were dominant in all smallmouth bass (Figure 3). Greatest concentrations of PCDD/Fs in smallmouth bass, as indicated by toxic equivalent concentrations, occurred at the station below the Federal Dam (1.66 ± 0.579 pg/g TEQ). All other locations were statistically equivalent ($p>0.05$, Kruskal-Wallis test) and had a mean and standard deviation of 0.288 ± 0.179 pg/g TEQ.

Excluding the outlier fish, each PCDD/F congener in striped bass (Table 4) was present in similar concentrations between locations. Therefore, the combined (n = 11) mean concentrations of each PCDD/F (excluding the outlier) in striped bass from the estuarine Hudson River were:

	Concentration (pg/g wet weight)	
PCDD/F congener	n = 11	Outlier
2,3,7,8-TCDD	2.26 ± 1.78	77.8
1,2,3,7,8-TCDD	0.452 ± 0.212	1.58
1,2,3,4,7,8-HxCDD	0.0409 ± 0.0427	0.123
1,2,3,6,7,8-HxCDD	0.207 ± 0.103	0.673
1,2,3,7,8,9-HxCDD	0.000091 ± 0.00302	0.142
1,2,3,4,6,7,8-HpCDD	0.0231 ± 0.0302	0.184
OCDD	0.000909 ± 0.00302	0.060
2,3,7,8-TCDF	5.27 ± 2.03	18.5
1,2,3,7,8-PeCDF	0.761 ± 0.358	1.98
2,3,4,7,8-PeCDF	1.77 ± 0.675	10.5
1,2,3,4,7,8-HxCDF	0.0441 ± 0.0405	2.42
1,2,3,6,7,8-HxCDF	0.0295 ± 0.0475	0.557
1,2,3,7,8,9-HxCDF	<0.0500	<0.0491
2,3,4,6,7,8-HxCDF	0.0261 ± 0.0476	0.284
1,2,3,4,6,7,8-HpCDF	0.0010 ± 0.00272	0.403
1,2,3,4,7,8,9-HpCDF	<0.0500	<0.0491
OCDF	<0.0500	<0.0491
TEQs (human)	3.83 ± 1.90	84.9
TEQs (fish)	3.86 ± 2.03	86.0

In eleven striped bass, 2,3,7,8-TCDF was dominant but 2,3,7,8-TCDD and 2,3,4,7,8-PeCDF contributed similar proportions to the overall mix of dioxins and furan analytes. As noted above, in the outlier striped bass 2,3,7,8-TCDD was dominant. Figure 3 graphically portrays the

differences in distributions of PCDD/F congener concentrations for smallmouth bass and striped bass; the outlier striped bass is presented separately.

Both striped bass and smallmouth bass were taken from below the Federal Dam. The mean 2,3,7,8-TCDD concentration in striped bass was five times the concentration in smallmouth bass taken below the Federal Dam (2.45 pg/g vs 0.49 pg/g, respectively). Similarly, at Catskill 2,3,7,8-TCDD concentrations in striped bass were nearly 30 times those in smallmouth bass (2.76 pg/g vs 0.096 pg/g, respectively). In general, other PCDD/F analytes, when detected, were at greater concentration in striped bass than in smallmouth bass taken from the same location.

Brominated dibenzo-*p*-dioxins and dibenzofurans

PBDD/Fs were either not detected or were present at concentrations near the detection limit in all samples (Table 5). No PBDD/Fs were detected in striped bass. Four smallmouth bass (two from North River, and one each from the Stillwater Pool and below the Federal Dam at Troy) had occasional detections of PBDD/F congeners although concentrations generally were less than 2.0 pg/g.

Polychlorinated biphenyls

Mean total PCBs in smallmouth bass (Table 6) range from low values (7700 pg/g) at the reference location in North River, increases to maximum concentrations (3,920,000 pg/g) in the Thompson Island Pool below Hudson Falls and Fort Edward, NY. The mean total PCB then declines downstream to Catskill (1,680,000 pg/g), the most downstream sampling location.

In striped bass (Table 7), mean total PCBs were greatest (1,960,000 pg/g) below the Federal Dam at Troy, NY and tended to decline downstream with increasing distance from the principal PCB source locations at Hudson Falls and Fort Edward. The average concentration of total PCBs at Haverstraw, the most downstream sampling location, was 513,000 pg/g. The outlier striped bass from Poughkeepsie with 6,720,000 pg/g total PCB confounds the downstream PCB trend.

PCB congener distributions in smallmouth changed with location of collection (Figure 4). At reference locations (North River and the Feeder Dam Pool), the di-CB and tri-CBs were all less than 1.0 percent of total PCB as were most of the tetra-CBs. The exceptions to the latter were peaks for PCB 52, PCB 61/70/74/76 and PCB 66. The dominant PCB homologs present were the more highly chlorinated PCBs, i.e., the penta-, hexa- and hepta-CBs. Indeed, two hexa-CB peaks (i.e., PCB 129/138/160/163 and PCB153/168) exceed 6.0 percent of total PCB. Three octa-CB peaks were also present at greater than 1.0 percent of total PCBs. In smallmouth bass from the Thompson Island Pool and the Stillwater Pool (Figure 4), the lower chlorinated PCBs comprise a greater proportion of total PCBs while representation by the higher chlorinated PCBs is smaller; indeed, the hepta- and octa-CBs seldom exceed 1.0 percent of total PCB while the hexa-CBs (PCBs 128/166 through PCB 156/157) are much less common. With the exception of one PCB peak, all PCB peaks are present at concentrations of 5.0 percent or less of total PCB;

PCB 129/138/160/163 is less than 6.0 percent. Smallmouth bass from below the Federal Dam at Troy and at Catskill are more similar to their counterparts in the Thompson Island and Stillwater Pools. However, PCB 4, PCB 56, PCB 60 and PCB 105 concentrations declined to less than 1.0 percent of total PCBs while PCB 44/47/56, PCB 49/69, PCB 52 and PCB 153/168 increased in relative abundance.

PCB congener distributions in most striped bass are similar regardless of location of collection (Figure 5). However, there are two exceptions. First, striped bass from below the Federal Dam have more of the di-, tri- and tetra-CBs (PCB4 through PCB52) than fish from downstream locations. Second, the outlier striped bass from Poughkeepsie had proportionately more of the tri- and tetra-CBs (PCBs 20/28 through PCB 66) but less of the hexa- and hepta-CBs (PCBs 129/138/160/163 through PCB 187).

Smallmouth bass and striped bass were both taken from below the Federal Dam and at Catskill (Figures 4 and 5, respectively). While general PCB congener make-up is similar for both species, the PCB congener profiles for congeners comprising one percent or more of total PCBs were in somewhat different proportions by species. Notably, smallmouth bass tended to have a greater proportions of certain lower chlorinated PCBs (e.g., PCBs 31, 44/47/65, 49/69, 52, 64 and 88/91) while striped bass tended to have greater proportions of the more highly chlorinated PCBs 105, 118, 129/138/160/163, 146, 153/168, 170, 180/193, 183/185 and 187. However, di--CB 4 ran counter to the trend with greater presence in striped bass than in smallmouth bass from the same collection location.

Certain PCB congeners having dioxin-like activity (PCB congener numbers 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169 and 189) can have their relative dioxin-like activity expressed as 2,3,7,8-TCDD toxic equivalents (TEQs). In Table 8, smallmouth bass total TEQs (based on human TEFs) were less than 1.0 pg/g at reference locations at North River and downstream in the Feeder Dam Pool, then increased to 27.4 ± 17.9 pg/g in the Thompson Island Pool, and thereafter gradually declined to 6.16 ± 4.15 pg/g at Catskill. In striped bass TEQs were more variable and did not provide a consistent spatial pattern (Table 8). Consistent with smallmouth bass, TEQs declined from below the Federal Dam (19.0 ± 5.24 pg/g) to Catskill (7.68 ± 4.35 pg/g). Thereafter, and excluding the outlier (84.0 pg/g) from Poughkeepsie, TEQs increased downstream to 17.9 pg/g at Poughkeepsie and 34.1 ± 45.1 pg/g at Haverstraw. However, at Haverstraw, one striped bass contained excessive concentrations of PCB 126 (845 pg/g, an order of magnitude greater than other measurements of PCB 126) and is an outlier for that compound. Removing the outlier, the average TEQ was 7.98 pg/g for the remaining two fish at Haverstraw.

Quality assurance/quality control results

Quality assurance data summaries are included in Appendix F. The quality control data are discussed in summaries by analyte group hereafter.

Polybrominated diphenyl ethers

Detection of PBDEs in blank samples was found for several analytes. For BDE-206, BDE-207 BDE-208, and BDE-209, the concentration detected in blank samples consistently exceeded 10% of the concentration detected in fish tissue samples (see Appendix F-1). Further, samples from the North River reference area (Appendix B-1) have especially low PBDE concentrations thereby causing additional analytes to be subject to blank adjustment. The additional analytes were BDE-17/25, BDE-37, BDE-75, BDE-126 and BDE-183. Occasionally other samples were also affected by blank concentrations. As stated in the methods, all data where blank concentrations exceeded the sample concentrations by 10 percent or more were adjusted for blank contamination. Original PBDE concentrations and blank adjusted PBDE concentrations are presented in Appendices B-1 through B-10.

Lab blanks were spiked with ^{13}C-labeled PBDEs. With the exception of one sample for BDE-209, the recoveries of ^{13}C-labeled compounds were within acceptance limits of the analytical method. However, as is characteristic of the compounds, recovery of BDE-15 and BDE-209 were lower than for other PBDEs (Appendix F-2).

Duplicate analyses were conducted on three of the 30 samples (Appendix F-3). The relative percent difference (|RPD|) for each sample and each compound were within acceptance criteria ($|RPD| \leq 30$ %) for all comparisons except for the following analytes and samples.

BDE-7	Sample 0003271; potential calibration problem; concentrations are estimated
BDE-8/11	Sample 0003271; potential calibration problem; concentrations are estimated
BDE-140	Sample 9746059
BDE-206	Sample 9746059; one sample affected by blank contamination
BDE-207	Sample 9746086; one sample affected by blank contamination
BDE-208	Sample 9746059; one sample affected by blank contamination
BDE-209	All three samples for the original data; blank contamination and elevated detection limits, therefore, the |RPD| could not be calculated.

Eleven of the 30 unknown samples were not quantified for BDE-4 through BDE-15 due to a calibration problem, i.e., calibration standards had concentrations substantially greater than the concentrations in the tissue sample.

Each fish tissue sample was spiked with eleven^{13}C-labeled PBDE compounds representing the principal PBDEs analytes within commercial mixtures of PBDEs and with BDE-139 as a clean-up standard (Appendix F-4). Recovery of these analytes was acceptable – within method performance limits - in 94.4% of the 375 comparisons. The exceptions were BDE-15 in 10 samples, BDE-47 in six samples, BDE-77 and BDE-99 in two samples each, and BDE-126 in one sample. BDE-15 displays a consistent low recovery and is a di-BDE with a potential calibration problem. All other BDEs exceeding criteria had excessive recovery of the BDE.

Blank samples were spiked with unlabeled and ^{13}C-labeled PBDE compounds to assess recovery efficiency (Appendix F-5). In all but one case, PBDE compound recoveries were well within

acceptance limits of the analytical method. The exception was ^{13}C-labeled BDE-47 on one blank sample.

In general, the data for PBDEs with three or more bromine atoms is of good quality and following blank adjustment, when necessary, were used without qualification. Since recoveries of di-BDEs may be erratic, the concentration data for di-BDEs (BDE-4 through BDE-15) may be of uncertain quality; therefore, the data, where generated, are presented for information purposes only. Mono-BDEs were not quantified in any sample.

Chlorinated dibenzo-p-dioxins and dibenzofurans

Low level detection of PCDD/Fs in blanks did occur (Appendix F-6) and corresponding PCDD/F samples were adjusted for blank concentrations where blank concentrations exceeded 10 percent of sample concentrations. Blank corrections were most often necessary for 1,2,3,6,7,8-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, and 2,3,4,7,8-PeCDF due to the generally low level detection of these compounds in tissue samples.

Recovery of spiked blanks for evaluating on-going precision and recovery was excellent (Appendix F-6). Concentrations of PCDD/Fs in duplicate samples were well within acceptance limits for the calculated |RPD| values (Appendix F-7). Recovery of ^{13}C-labeled internal standards and the clean-up standard were well within acceptance limits of the analytical method (Appendix F-8).

Overall, the PCDD/F concentration data are of high quality. Following appropriate blank adjustment for blank detections the data are used without qualification. Appendices C-1 through C-10 include original and blank adjusted PCDD/F data, as appropriate.

Brominated dibenzo-p-dioxins and dibenzofurans

Three PBDD/F peaks were detected in one of three blank samples (Appendix F-9). The two samples where concentrations in the blank exceeded 10 percent of tissue sample concentrations the tissue concentration were adjusted for blank concentrations (see Appendices D-1 and D-5).

Recovery of ^{13}C-labeled PBDD/F in blank samples (Appendix F-10) and tissue samples (Appendix F-11) were well within analytical method acceptance limits. Duplicate analyses of two samples (Appendix F-12) was acceptable; however, comparisons for 1,2,3,4,7,8-HxBDF and 1,2,3,4,6,7,8-HpBDF in one sample produced differing results, i.e., non-detection in the original sample and detection in the duplicate sample since concentrations appear to approximate the detection limit.

Recoveries of spiked unlabeled (Appendix F-13) and ^{13}C-labeled PBDD/Fs (Appendix F-14) in corn oil for assessment of on-going precision and recovery were well within method acceptance limits.

Overall, the PBDD/F data are of acceptable quality. Appropriate blank adjustment has been performed. Appendices D-1 through D-10 present original and blank adjusted data.

Polychlorinated biphenyls

Appendix F-15 presents PCB congener concentrations in seven blank samples. Frequent low level detection of PCB congeners is apparent. As noted in Methods, blank adjustment of data was conducted where blanks equal or exceed 10 percent of the sample concentration. Appendices E-1 through E-10 present original PCB congeners and blank corrected information where appropriate. Blank corrections affected 1.1 percent of the 4770 PCB congener results reported, and occurred primarily for the two reference areas where PCB congener concentrations were lowest.

Duplicate analyses (Appendix F-16) of three samples showed reproducibility of analytical results was within acceptance limits in all instances; indeed, most comparisons had a |RPD| of 20 percent or less. PCB 122 had the maximum |RPD| of 43 percent, but the results were within the factor of two (50 percent coefficient of variation) recommended by USEPA (1995) for laboratory replicates.

Recovery of ^{13}C-labeled PCB congeners in matrix (tissue) spikes (surrogate spikes) (Appendix F-17) was acceptable in most cases. In occasional samples recovery of the mono-CBs 1 and 3, and the di-CB 4 were less than desired. Reported tissue concentrations are not corrected for recovery of surrogate spikes. Recovery of clean-up standards was acceptable.

Assessment of on-going precision and recovery samples produced acceptable results for all samples and analytes (Appendix F-18).

Recovery of ^{13}C-labeled PCB congeners spiked in seven lab blanks (Appendix F-19) were generally within method acceptance limits in six samples. One sample produced recovery values for several compounds, primarily the mono-, di-, and two tri-CBs that were less than method specified acceptance limits.

Overall, the PCB congener data as adjusted, where necessary, for blank contamination are acceptable for use without further qualification.

DISCUSSION

Polybrominated diphenyl ethers

Skinner (2011) demonstrated total tri+ PBDE concentrations in smallmouth bass were positively related to human population distributions for populations upstream or adjacent to a sampling location. It was suggested PBDEs were entering the waterway primarily via wastewater treatment systems. A similar relationship for total tri+ PBDEs did not exist for striped bass. The short duration of exposure time of striped bass during their migration in the Hudson River may have prevented accumulation of PBDEs in a manner representing local sources, but an outlier striped bass suggests an exception for individual fish may occur, especially during periods of limited movement.

PBDE congener patterns in most fish samples from the Hudson River were characteristic of fish taken from other locations. The dominance of BDE-47 has been reported frequently but dominance is not consistent by species or location (Hale *et al*. 2001; Manchester-Neevsig *et* al. 2001; Rice *et al*. 2002; Vives *et al*. 2004; Xiang *et al*. 2007; Vigano *et al*., 2008; Xia *et al*. 2008; Ismail *et al*., 2009; Zhu and Hites 2009; USEPA 2009). For the Hudson River, nine PBDE congeners (BDEs-28/33, 47, 49, 66, 99, 100, 153, 154 and 155) generally contribute 97 percent or more of total tri+ PBDE concentrations. The outlier striped bass from Poughkeepsie exhibited a BDE pattern different from all other fish analyzed. That fish lacks BDEs- 99, 153, 155 and 66 at concentrations one percent or more of total tri+ BDEs but does contain BDE-51 at 1.30 % of total tri+ BDE. BDE-51 in smallmouth bass averaged 0.075 % at the four locations north of the Federal Dam and 0.24 % south of the Federal Dam, while the remaining eleven striped bass averaged 0.46 % BDE-51. The cause of the altered BDE pattern in the outlier striped bass is unknown. Typically, concentrations of only five PBDEs (BDEs- 47, 99, 100, 153 and 154) have been reported for fish by authors in literature. These five analytes are the principal components of one of the three primary commercial PBDEs formulations (i.e., Bromkal 70-5DE or DE-71) (Sjödin *et al*. 1998; Björklund *et al*. 2003; Korytár *et al*. 2005; La Guardia *et al*. 2006). The other formulations contain more highly brominated PBDE congeners but despite widespread usage of these formulations their constituent congeners have a more limited capability for accumulation in fish as inferred from a large number of studies in scientific literature.

This study suggests that the list of standard PBDE congeners to be analyzed in fish should be expanded to a minimum of nine PBDE congener peaks (i.e., BDEs- 28/33, 47, 49, 66, 99, 100, 153, 154, and 155) to be more inclusive of significant PBDE analytes and to better approximate total PBDE concentrations. Inclusion of BDE-51 is desirable for unusual situations. Optimally, a much broader screen of analytes would be analyzed and be consistent with those that occur in commercial PBDE formulations and their degradation products. The current study more closely approached that goal.

The PBDE congener pattern from the outlier striped bass from Poughkeepsie is instructive. Skinner (2011) noted that based on a different congener pattern for chlorinated dioxins and dibenzofurans (discussed below) the outlier striped bass at Poughkeepsie appears to have had a period of residency within Newark Bay, NJ. Since the Passaic River, a tributary of Newark Bay, receives wastewaters from a number of industrial facilities within its drainage basin, including a

source of PCDD/Fs, it is suggestive that this region may have had an influence on PBDE congener patterns in this fish.

Striped bass may have metabolic and/or excretory processes which favor transformation and/or excretion of specific PBDE congeners differently than smallmouth bass. For example, it has been documented that striped bass in the Hudson River (this study) and in other waters (Hale *et al*. 2001) lack significant quantities of BDE-99. Similar observations have been reported for carp (Xia *et al*. 2008, Hale *et al*. 2001; Loganathan *et al*. 1995), American eels, white perch and several species of minnows from the Hudson River (Xia *et al*. 2008). Stapleton *et al*. (2004) has demonstrated in carp that debromination of BDE-99 leads to increased proportions of BDE-47 and debromination of BDE-183 leads to production of BDE-154. Debromination of BDE-99 by striped bass could be the cause for near absence of BDE-99 and the relative enhancement of BDE-47 in comparison with smallmouth bass.

Chlorinated dibenzo-*p*-dioxins and dibenzofurans

2,3,7,8-TCDD and 2,3,7,8-TCDF were determined in four Hudson River striped bass collected in 1983 (O'Keefe *et al*. 1984). However, an outlier value for 2,3,7,8-TCDD (120 pg/g) occurred in one fish in that original study, and, further, one fish had outlier concentrations of 2,3,7,8-TCDD and 2,3,7,8-TCDF in this current study. Excluding the outlier values, there were large reductions in concentrations of these two compounds within the 20 year time frame, viz.:

Analyte	Year	n	Concentration (pg/g)	% Reduction
2,3,7,8-TCDD	1983	3	16.0 ± 16.5	
	2003	11	2.26 ± 1.78	86
2,3,7,8-TCDF	1983	4	58.5 ± 28.6	
	2003	11	5.27 ± 2.03	91

Inclusion of the outlier fish still produced declines of 79 and 89 percent for 2,3,7,8-TCDD and 2,3,7,8-TCDF, respectively.

The outlier striped bass in the current study deserves special attention due to its differing composition of PCDD/F analytes (Figure 3). In contrast to the other striped bass sampled, 2,3,7,8-TCDD in the outlier fish was the overwhelmingly dominant analyte. In the other eleven striped bass 2,3,7,8-TCDF was the most prominent PCDD/F while 2,3,7,8-TCDD and 2,3,4,7,8-PeCDF concentrations closely followed. Rappe *et al*. (1991) characterized PCDD/F analyte concentrations in striped bass from Newark Bay, NJ and found 2,3,7,8-TCDD was the predominant PCDD/F found (see Figure 3 for a comparison of PCDD/F distributions). This finding suggests that the outlier striped bass may have temporarily resided in Newark Bay prior to migrating into the Hudson River for reproductive purposes. Newark Bay received 2,3,7,8-TCDD from a known source along the Passaic River (Umbreit *et al*. 1986; USEPA 2008). Other significant sources of 2,3,7,8-TCDD or 2,3,7,8-TCDF to striped bass along the Atlantic Coast were not indicated by data from O'Keefe *et al*. (1984).

Brominated dibenzo-*p*-dioxins and dibenzofurans

This project was the first to describe concentrations of potentially important PBDD/Fs in fish from the Hudson River. Simply, the presence of PBDD/Fs in Hudson River smallmouth bass and striped bass was insignificant. The relative lack of PBDD/Fs in fish tissues is consistent with findings reported by the few investigators that have examined these compounds in fish (Ashizuka *et al*., 2005 and 2008) or shellfish (Fernandes *et al*., 2008). However, further study is recommended for fish from New York Harbor where there is a greater potential for PBDD/F exposures from combustion of materials containing PBDEs.

Polychlorinated biphenyls

PCB concentrations, on an Aroclor mixture basis, in fish from the Hudson River have been well documented since at least 1975 (Spagnoli and Skinner 1977; Horn *et al*. 1978; Sloan *et al*. 2005, among others). Changes in Aroclor concentrations associated with PCB sources at the General Electric Company facilities in Hudson Falls and Fort Edward, NY are well known. PCB congener patterns have been less well characterized (Bush *et al*. 1989; McGroddy *et al*. 1997). However, only the current study attempted to characterize concentrations of all 209 PCB congeners. Due to the complexity of data analysis for PCB congeners, grouping of data into the 10 PCB homolog groups or examining subsets of PCB congeners for selected purposes has been most commonly practiced.

Attendant with changes in PCB Aroclor concentrations in relation to PCB sources, shifts in PCB homolog groups within smallmouth bass are evident, particularly from the Thompson Island Pool downstream (Figure 6). PCB homologs in fish shifted from dominance by penta- and hexa- homologs at reference locations to tri-, tetra- and penta- homologs in the Thompson Island Pool and downstream. Indeed, the di-PCBs increased particularly with the increased incidence of PCB 4. In a more direct measure of change in PCB congener distributions, Skinner (2011) displayed the shift in PCB congener make-up between the two reference areas and four downstream locations as the difference in contributions of specific congeners to total PCB (reproduced as Figure 6). It was evident that PCB congeners in the di-, tri- and tetra- homolog groups were in greater abundance in the Thompson Island Pool and downstream than in the two reference locations. The reference locations had a greater relative abundance of hexa- and hepta- congeners in fish than fish from downstream areas.

Striped bass collected from the station below the Federal Dam, in contrast to striped bass from others locations in the tidal river, tended to have greater concentrations of di-, tri- and tetra- PCBs but smaller components of the hepta-, octa- and certain hexa- PCB congeners. All striped bass shared similar contributions of penta and most hexa- PCB congeners. The outlier fish had more of the tri- and tetra- PCBs but fewer hexa-, hepta- and octa- PCB congeners (reproduced as Figure 7 from Skinner 2011).

Brown *et al*. (1984) showed a strong relationship between PCB concentrations in the water column and PCB concentrations in yearling pumpkinseed at Stillwater. Skea *et al*. (1979) placed several species of fish in cages in the vicinity of PCB discharges and demonstrated rapid uptake of PCB by fish although uptake had not reached equilibrium with PCB (Aroclor 1016) concentrations in water in the 14 day period of exposure. These observations can help explain the continued presence of PCBs in fish throughout the river. It can be argued that PCB uptake by fish is primarily a mechanism of direct uptake from the water column or via ingestion of food organisms exposed to PCBs. However, in the context of the Hudson River, such an argument is academic, at best, and irrelevant. The long history of extensive and severe PCB contamination of the ecosystem of the river, its water (HRNRT 2008), sediments (USEPA 2002; HRNRT 2010), fish (Sloan *et al*. 2005; USDOI/NOAA/NYSDEC 2001), and wildlife (Secord and McCarty 1997; Mayack and Loukmas 2001; HRNRT 2001, 2004, 2005a, 2005b, 2005c, 2005d, 2007, 2009, 2010) has been well documented. This factual background supports the need for the on-going PCB removal actions in the upper river (USEPA 2010).

2,3,7,8-TCDD TEQs

It is evident from Table 8 that relative contributions by PCDD/Fs and dioxin-like PCBs to total 2,3,7,8-TCDD TEQs differs by location within fish species and by species. PCDD/Fs and PCBs provide nearly equal contributions to total TEQs in smallmouth bass from the reference location at North River, but PCDD/Fs became much less important downstream. PCBs contributed over 90 percent of total TEQs from the Thompson Island Pool (99 percent) south to Catskill (92 percent). As expected, the change in TEQ concentrations and the increased proportion of total TEQs contributed by PCBs is consistent with the major input of PCBs to the river in the vicinity of Hudson Falls and Fort Edward and, consequently, fish from the Thompson Island Pool and the downstream areas are impacted by these inputs (Horn *et al*. 1979; Brown *et al*. 1985; Sloan *et al*. 2005; USEPA 2002).

PCDD/F and PCB contributions to total toxic equivalents were more variable in striped bass. The 10 fish having a similar range of 2,3,7,8-TCDD TEQs (i.e., 7.1 to 27.2 pg/g TEQs) generally had ratios of PCDD/Fs : PCBs ranging from 1:2 to 1:4; PCB contributions were dominant. In contrast, the two outlier striped bass had widely differing contribution patterns. One fish from Poughkeepsie had equal contributions of the two analyte groups while in the other outlier fish - from Haverstraw – PCBs were the dominant (96 percent of total TEQs) contributor to 2,3,7,8-TCDD TEQs. This is supportive of the notion that differing chemical exposures of individual striped bass within their migratory route will have differing consequences on the accumulation of residues within their tissues. They are clues to the possible location of original chemical sources.

Human health perspective

The protection of human health is one of the primary objectives for generating data on chemical residue concentrations in fish that may be consumed by people. People want to fish waters where fish are safe to eat (Connelly *et al*. 1990) and to know whether the fish they may consume are safe to eat, or not (Connelly *et al*. 1990 and 1998). The lack of such knowledge may

contribute to an angler's dissatisfaction with their fishing experience. It is not the purpose of this paper to make pronouncements on the safety for human consumption of the fish being examined in this study. Rather, health authorities with the New York State Department of Health have previously reviewed the information here provided and have made the judgment that changes were not warranted for the Hudson River for health advisories in place at the time of this study. Therefore, the health advice in place at the time the data from this study became available, and supplemented by annual surveillance of PCBs in fish, continues to be in force (NYSDOH 2011). For smallmouth bass and striped bass, that advice is:

Smallmouth bass

• From Bakers Falls south to the Federal Dam	Catch and release fishing only per regulation
• Federal Dam to Catskill	Do not eat the fish
• South of Catskill	Eat no more than one meal per month; women of childbearing age and children under 15 years of age should not eat this species

Striped bass

• Federal Dam to Catskill	Do not eat the fish
• South of Catskill	Eat no more than one meal per month; women of childbearing age and children under 15 years of age should not eat this species

In addition to the above health advice, the commercial fishery for striped continues to be closed (6 NYCRR Parts 10 and 11). The commercial fishery for striped bass has been closed since 1976 due to unacceptable levels of PCB contamination (USDOI/NOAA/NYSDEC 2001).

For these species and waters, the over-riding chemicals of concern with regard to human health protection remain PCBs.

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Table 1: Polybrominated diphenyl ether (PBDE) homolog mean (± standard deviation) concentrations (pg/g wet weight) in smallmouth bass taken from six locations along the Hudson River; spring 2003.

Lipid or BDE homolog	Location					
	North River	Feeder Dam Pool	Thompson Island Pool	Stillwater Pool	Below Federal Dam	Catskill
Lipid (%)	1.64 ± 0.81	0.64 ± 0.13	1.05 ± 0.26	0.70 ± 0.12	1.83 ± 0.23	1.96 ± 0.57
Di-BDE	<2.25	1.30 ± 1.55	2.18 ± 1.93	1.26 ± 1.24	83.4 ± 51.8	30.8 ± 9.48
Tri-BDE	15.3 ± 4.48	36.9 ± 21.2	104 ± 13.5	122 ± 49.7	1880 ± 1040	682 ± 50.1
Tetra-BDE	1260 ± 435	3020 ± 2750	12800 ± 4150	9650 ± 1410	88600 ± 64000	36200 ±2510
Penta-BDE	653 ± 168	3320 ± 2780	15400 ± 6600	10100 ± 1350	35400 ± 18400	24400 ± 2770
Hexa-BDE	190 ± 95.3	624 ± 395	2610 ± 1330	2060 ± 293	12400 ± 6720	5920 ± 886
Hepta-BDE	2.21 ± 0.792	2.51 ± 1.31	8.60 ± 2.17	10.8 ± 5.11	26.7 ± 13.7	20.2 ± 2.76
Oct-BDE	0.078 ± 0.136	0.291 ± 0.504	1.21 ± 1.17	0.793 ± 1.37	10.2 ± 5.58	4.08 ± 4.51
Nona-BDE	<1.44	<11.0	<5.11	0.953 ± 0.690	14.5 ± 13.1	0.547 ± 0.947
Deca-BDE	<6.17	<6.87	6.67 ± 11.5	7.67 ± 8.62	0.667 ±1.15	0.333 ± 0.557
Total BDE_{Tri+}	2120 ± 690	7000 ± 5940	30900 ± 12100	22000 ± 3020	138000 ± 88100	67200 ± 3160

Table 2: Polybrominated diphenyl ether (BDE) homolog mean (± standard deviation) concentrations (pg/g wet weight) in striped bass taken from four locations along the Hudson River; spring 2003.

Lipid or BDE homolog	Location			
	Below Federal Dam	Catskill	Poughkeepsie	Haverstraw
Lipid (%)	2.80 ± 1.27	1.46 ± 0.89	4.61 ± 3.41	3.28 ± 1.44
Di-BDE	107 ± 2.00	nq[1]	342 ± 241 (342)[2]	265
Tri-BDE	1310 ± 347	730 ± 548	4140 ± 4610 (1490)	950 ± 510
Tetra-BDE	51800 ± 19400	36300 ± 27100	137000 ± 132000 (61600)	26600 ± 9400
Penta-BDE	12300 ± 3130	8270 ± 4390	19200 ± 12500 (12500)	4680 ± 1430
Hexa-BDE	6800 ± 2850	6070 ± 674	8870 ± 5230 (5850)	2490 ± 1180
Hepta-BDE	56.0 ± 57.5	169 ± 144	43.5 ± 21.4 (40.0)	27.0 ± 21.5
Oct-BDE	4.54 ± 5.19	6.99 ± 6.45	0.520 ± (0.901 (0.780)	0.630 ± 1.09
Nona-BDE	2.67 ± 4.45	3.32 ± 3.34	1.38 ± 2.40 (2.08)	2.99 ± 2.45
Deca-BDE	21.3 ± 37.0	<19.7	<22.4 (<22.4)	<34.5
Total BDE_{Tri+}	72300 ± 25000	51600 ± 31100	169000 ± 154000 (81500)	34800 ± 12000

[1] nq = not quantified; insufficient recovery of standard to permit quantification.
[2] Average BDE homolog concentration with an outlier fish excluded.

Table 3: Mean (± standard deviation) concentrations (pg/g wet weight) of polychlorinated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River; spring 2003.

PCDD/F congener	Location					
	North River[1]	Feeder Dam Pool	Thompson Island Pool	Stillwater Pool	Below Federal Dam	Catskill
2,3,7,8-TCDD	<0.0497	<0.0484	<0.0493	<0.0492	0.490 ± 0.195	0.096 ± 0.166
1,2,3,7,8-PeCDD	0.130	0.089 ± 0.035	0.098 ± 0.017	0.062 ± 0.055	0.376 ± 0.231	0.095 ± 0.082
1,2,3,4,7,8-HxCDD	0.028	<0.0484	<0.0493	0.018 ± 0.031	0.062 ± 0.056	<0.0500
1,2,3,6,7,8-HxCDD	0.064	0.033 ± 0.057	0.071 ± 0.017	0.031 ± 0.028	0.252 ± 0.148	0.059 ± 0.014
1,2,3,7,8,9-HxCDD	<0.0497	<0.0484	<0.0493	<0.0492	<0.0496	<0.0500
1,2,3,4,6,7,8-HpCDD	0.046	<0.0484	<0.0493	<0.0492	0.014 ± 0.024	<0.0500
OCDD	<0.0497	<0.0484	0.032 ± 0.055	<0.0492	<0.0496	<0.0500
2,3,7,8-TCDF	0.397	0.124 ± 0.099	0.574 ± 0.146	1.54 ± 1.37	3.55 ± 1.40	1.62 ± 0.263
1,2,3,7,8-PeCDD	0.118	<0.0484	0.029 ± 0.050	0.121 ± 0.320	0.328 ± 0.150	0.078 ± 0.067
2,3,4,7,8-PeCDF	0.208	0.038 ± 0.027	0.258 ± 0.066	0.260 ± 0.078	1.29 ± 0.439	0.505 ± 0.127
1,2,3,4,7,8-HxCDF	0.057	<0.0484	<0.0493	0.0023 ± 0.0040	0.016 ± 0.021	<0.0500
1,2,3,6,7,8-HxCDF	0.032	<0.0484	<0.0493	<0.0492	0.047 ± 0.044	<0.0500
1,2,3,7,8,9-HxCDF	<0.0497	<0.0484	<0.0493	<0.0492	<0.0496	<0.0500
2,3,4,6,7,8-HxCDF	0.046	<0.0484	<0.0493	0.023 ± 0.040	0.025 ± 0.043	<0.0500
1,2,3,4,6,7,8-HpCDF	<0.0497	0.00067 ± 0.0012	<0.0493	0.0083 ± 0.014	<0.0496	<0.0500
1,2,3,4,7,8,9-HpCDF	0.028	<0.0484	<0.0493	0.00067 ± 0.0012	<0.0496	<0.0500
OCDF	0.026	0.00033 ± 0.00058	<0.0493	<0.0492	<0.0496	<0.0500
∑2,3,7,8,-TCDD TEQs (human)	0.256	0.115 ± 0.058	0.241 ± 0.039	0.305 ± 0.224	1.66 ± 0.579	0.512 ± 0.164
∑2,3,7,8-TCDD TEQs (fish)	0.289	0.114 ± 0.054	0.258 ± 0.046	0.287 ± 0.179	1.75 ± 0.602	0.819 ± 0.391

[1] n = 2 fish for North River; all other locations had an n = 3 fish.

Table 4: Mean (± standard deviation) concentrations (pg/g wet weight) of polychlorinated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River; spring 2003.

PCDD/F congener	Location				
	Below Federal Dam	Catskill	Poughkeepsie		Haverstraw
			n = 2	n = 1[1]	
2,3,7,8-TCDD	2.45 ± 2.61	2.76 ± 2.61	3.27	77.8	0.90 ± 0.030
1,2,3,7,8-PeCDD	0.335 ± 0.311	0.487 ± 0.251	0.531	1.58	0.483 ± 0.183
1,2,3,4,7,8-HxCDD	0.017 ± 0.030	0.053 ± 0.046	0.035	0.123	0.065 ± 0.047
1,2,3,6,7,8-HxCDD	0.232 ± 0.080	0.215 ± 0.145	0.154	0.673	0.208 ± 0.145
1,2,3,7,8,9-HxCDD	<0.481	<0.0500	0.0005	0.142	<0.0499
1,2,3,4,6,7,8-HpCDD	0.043 ± 0.029	0.042 ± 0.036	<0.0500	0.184	<0.0499
OCDD	0.0033 ± 0.0058	<0.0500	<0.0500	0.060	<0.0499
2,3,7,8-TCDF	4.74 ± 1.90	5.11 ± 2.85	6.49	18.5	5.15 ± 2.60
1,2,3,7,8-PeCDD	0.724 ± 0.233	0.700 ± 0.541	0.851	1.98	0.800 ± 0.526
2,3,4,7,8-PeCDF	2.11 ± 0.547	1.43 ± 0.599	2.25	10.5	1.44 ± 0.893
1,2,3,4,7,8-HxCDF	0.080 ± 0.036	0.020 ± 0.025	0.017	2.42	0.051 ± 0.050
1,2,3,6,7,8-HxCDF	0.023 ± 0.040	0.018 ± 0.032	0.028	0.557	0.049 ± 0.084
1,2,3,7,8,9-HxCDF	<0.0481	<0.0500	<0.0500	<0.0491	<0.0499
2,3,4,6,7,8-HxCDF	<0.0481	0.026 ± 0.044	0.036	0.284	0.046 ± 0.080
1,2,3,4,6,7,8-HpCDF	0.00067 ± 0.00012	<0.0500	<0.0500	0.0403	0.0030 ± 0.0052
1,2,3,4,7,8,9-HpCDF	<0.0481	<0.0500	<0.0500	<0.0491	<0.0499
OCDF	<0.0481	<0.0500	<0.0500	<0.0491	<0.0499
∑2,3,7,8,-TCDD TEQs (human)	3.95 ± 2.99	4.24 ± 1.72	5.18	84.9	2.40 ± 0.870
∑2,3,7,8-TCDD TEQs (fish)	3.88 ± 3.35	4.28 ± 1.72	5.32	86.0	2.44 ± 0.919

[1] Outlier fish.

Table 5: Polybrominated dibenzo-*p*-dioxins and dibenzofurans in Hudson River smallmouth bass and striped bass; spring 2003.

PBDD/F congener	Concentration (pg/g wet weight)[1]					
	Smallmouth bass					Striped bass – all locations
	North River	Feeder Dam Pool	Thompson Island and Stillwater Pools	Below Federal Dam	Catskill	
n	3	3	6	3	3	12
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD/1,2,3,6,7,8-HxBDD	0.747 ± 1.29	<0.500	<0.500	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDD	<1.02	<0.500	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.19	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	0.180 ± 0.312	0.0487 ±0.0843	<0.100	0.0363 ± 0.0629	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	0.663 ± 1.15	<0.500	<0.500	0.0233 ± 0.0404	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.601	<0.500	<0.500	0.0850 ± 0.147	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	1.14 ± 1.97	<1.00	<1.00	0.430 ± 0.745	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TCDD TEQs (human)[2]	0.303 ± 0.496	0.0049 ± 0.0084	0	0.0234 ± 0.0406	0	0

[1] Mean ± standard deviation where applicable.

[2] Toxicity equivalency factors for chlorinated dibenzo-*p*-dioxins and dibenzofurans (Van den Berg *et al*., 2006) were assumed in calculating 2,3,7,8-TCDD toxic equivalents.

Table 6: Polychlorinated biphenyl homologs, total PCBs and 2,3,7,8-TCDD toxic equivalents in smallmouth bass taken from the Hudson River; spring 2003.

Parameter	Concentration (pg/g wet weight)					
	North River	Feeder Dam Pool	Thompson Island Pool	Stillwater Pool	Below Federal Dam	Catskill
Mono-PCB	22.1 ± 38.3	14.8 ± 13.3	13100 ± 12900	5560 ± 1030	2820 ± 481	789 ±1070
Di-PCB	114 ± 189	63.6 ± 37.9	66600 ± 22900	28900 ± 6770	21900 ± 6790	7770 ± 9030
Tri-PCB	429 ± 667	499 ± 258	243000 ± 64500	209000 ± 103000	251000 ± 101000	133000 ± 55300
Tetra-PCB	1020 ± 1420	4390 ± 3900	1120000 ± 423000	986000 ± 260000	971000 ± 393000	562000 ± 187000
Penta-PCB	2230 ± 2220	8330 ± 6120	1320000 ± 558000	941000 ± 196000	806000 ± 325000	485000 ± 130000
Hexa-PCB	2140 ± 774	12000 ± 8020	822000 ± 358000	658000 ± 152000	605000 ± 233000	334000 ± 72900
Hepta-PCB	1200 ± 206	8740 ± 5720	263000 ± 140000	189000 ± 51900	210000 ± 84000	124000 ± 43300
Octa-PCB	432 ± 81.3	2330 ± 1080	60400 ± 36200	45000 ± 11900	48500 ± 21300	26200 ± 10400
Nona-PCB	84.2 ± 26.7	240 ± 55.9	9630 ± 6440	8670 ± 2400	10700 ± 3980	5620 ± 1670
Deca-PCB	16.4 ± 5.34	57.6 ± 8.73	890 ± 655	766 ± 120	2330 ± 840	1150 ± 204
Total PCB	7700 ± 5620	36700 ± 25100	3920000 ± 1510000	3070000 ± 769000	2930000 ± 1170000	1680000 ± 502000
2,3,7,8-TCDD TEQs (human)	0.213 ± 0.00872	0.616 ± 0.396	27.2 ± 17.9	22.1 ± 3.90	15.4 ± 6.11	6.09 ± 4.12
2,3,7,8-TCDD TEQs (fish) (minimum)[1]	0.0107 ± 0.0006	0.0307 ± 0.0201	1.78 ± 0.753	1.30 ± 0.277	0.909 ± 0.399	0.383 ± 0.243
2,3,7,8-TCDD TEQs (fish) (maximum)[2]	0.014 ± 0.001	0.0460 ± 0.0295	3.26 ± 0.994	2.36 ± 0.442	1.57 ± 0.703	0.748 ± 0.312

[1] Mean ± standard deviation.
[2] Zero applied to toxic equivalency factors given a less than sign.
[3] Maximum value assigned to toxic equivalency factors with a less than sign.

Table 7: Polychlorinated biphenyl homologs, total PCBs and 2,3,7,8-TCDD toxic equivalents in striped bass taken from the Hudson River; spring 2003.

Parameter	Concentration (pg/g wet weight)[1]				
	Below Federal Dam	Catskill	Poughkeepsie[2]		Haverstraw
			n = 2	n = 1	
Mono-PCB	7700 ± 3230	389 ± 502	80.5, 48.3	405	324 ± 47.7
Di-PCB	37800 ± 13500	12100 ± 9760	1360, 700	12500	4230 ± 563
Tri-PCB	127000 ± 15300	35000 ± 19500	46400, 16500	480000	18200 ± 5260
Tetra-PCB	457000 ± 21500	118000 ± 56200	234000, 148000	2520000	78900 ± 30700
Penta-PCB	517000 ± 67800	214000 ± 126000	302000, 299000	1970000	144000 ± 48200
Hexa-PCB	535000 ± 38900	262000 ± 165000	274000, 379000	1150000	163000 ± 43300
Hepta-PCB	210000 ± 33400	126000 ± 81600	102000, 167000	433000	81900 ± 22200
Octa-PCB	49600 ± 11200	35300 ± 23800	26300, 34800	119000	17700 ± 8050
Nona-PCB	11500 ± 2870	12200 ± 11500	7220, 7040	25100	3530 ± 1110
Deca-PCB	3260 ± 883	4520 ± 4750	2330, 2290	7410	1070 ± 348
Total PCB	1960000 ± 119000	820000 ± 491000	995000, 1060000	6720000	513000 ± 150000
2,3,7,8-TCDD TEQs (human)	18.8 ± 5.19	7.59 ± 4.37	16.1, 19.6	84.0	34.0 ± 45.1 (7.98)[3]
2,3,7,8-TCDD TEQs (fish) (minimum)[4]	0.941 ± 0.304	0.382 ± 0.202	0.872, 0.978	4.55	1.74 ± 2.30 (0.408)[2]
2,3,7,8-TCDD TEQs (fish) (maximum)[5]	1.47 ± 0.366	0.678 ± 0.143	1.24, 1.51	6.65	1.93 ± 2.35 (0.573)[2]

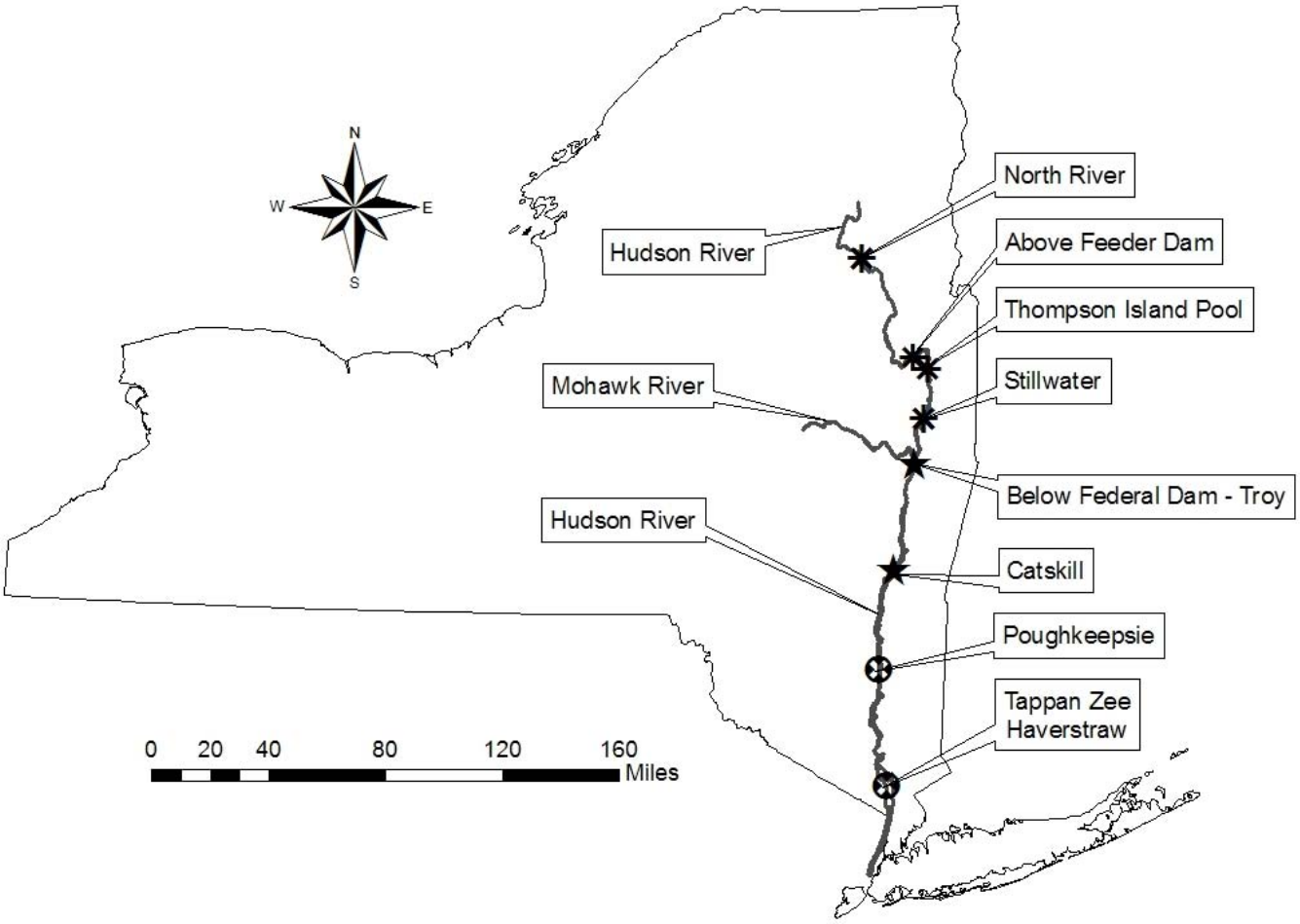
[1] Mean ± standard deviation.
[2] Concentrations for an outlier fish are given separately in the second of two columns for Poughkeepsie. Values for each of the other two fish are given in first column.
[3] At Haverstraw, the parenthetic TEQ average excludes one outlier fish having 845 pg/g of PCB 126, a dioxin-like PCB. Outlier TEQ values were 86.1 pg/g, 4.40 pg/g and 4.64 pg/g for humans, fish (minimum) and fish (maximum), respectively.
[4] Zero applied to toxic equivalency factors given a less than sign.
[5] Maximum value assigned to toxic equivalency factors with a less than sign.

Table 8: PCDD/F and PCB contributions to total 2,3,7,8-TCDD toxic equivalents for humans and mammals.

Species	Location	2,3,7,8-TCDD TEQs (pg/g wet weight)[1]		
		PCDD/Fs	PCBs	Total
Smallmouth bass	North River	0.256 (0.302, 0.215)	0.213 ± 0.00872 (0.223, 0.209)[2]	0.475[2]
	Feeder Dam Pool	0.115 ± 0.058	0.616 ± 0.396	0.732 ± 0.453
	Thompson Island Pool	0.241 ± 0.039	27.2 ± 17.9	27.4 ± 17.9
	Stillwater Pool	0.305 ± 0.224	22.1 ± 3.90	22.4 ± 4.06
	Below Federal Dam	1.66 ± 0.579	15.4 ± 6.11	17.0 ± 6.68
	Catskill	0.512 ± 0.164	6.09 ± 4.12	6.62 ± 4.08
Striped bass	Below Federal Dam	3.95 ± 2.99	18.8 ± 5.19	22.8 ± 4.90
	Catskill	4.24 ± 1.72	7.59 ± 4.37	11.8 ± 5.18
	Poughkeepsie	31.8 ± 46.0 (5.18)[3]	39.9 ± 38.2 (17.9)[3]	71.7 ± 84.2 (23.0)[3]
	Haverstraw	2.40 ± 0.870 (1.96)[4]	34.0 ± 45.1 (7.98)[4]	36.4 ± 45.9 (9.94)[4]

[1] Mean ± standard deviation.
[2] At North River, n = 2 for PCDD/Fs and n = 3 for PCBs; TEQs for PCBs for fish analyzed for PCDD/Fs are given in parenthesis. Total TEQs for North River reflect only the two fish analyzed for PCDD/Fs and PCBs.
[3] Averages excluding outlier values are in parenthesis. Outlier had TEQ values of 84.9 pg/g for PCDD/Fs and 84.0 pg/g for PCBs.
[4] Average TEQ excluding an outlier fish is in parenthesis. Outlier PCB TEQ value was 86.1 pg/g.

Figure 1: Sampling sites for fish along the Hudson River.



Locations with an asterisk are smallmouth bass only, a star indicates smallmouth bass and striped bass were collected, and a circled X is where striped bass only were sampled.

Figure 2: Distribution of PBDE congeners contributing 1.0 percent or more to total Tri+ PBDEs in smallmouth bass and striped bass taken from the Hudson River; 2003.

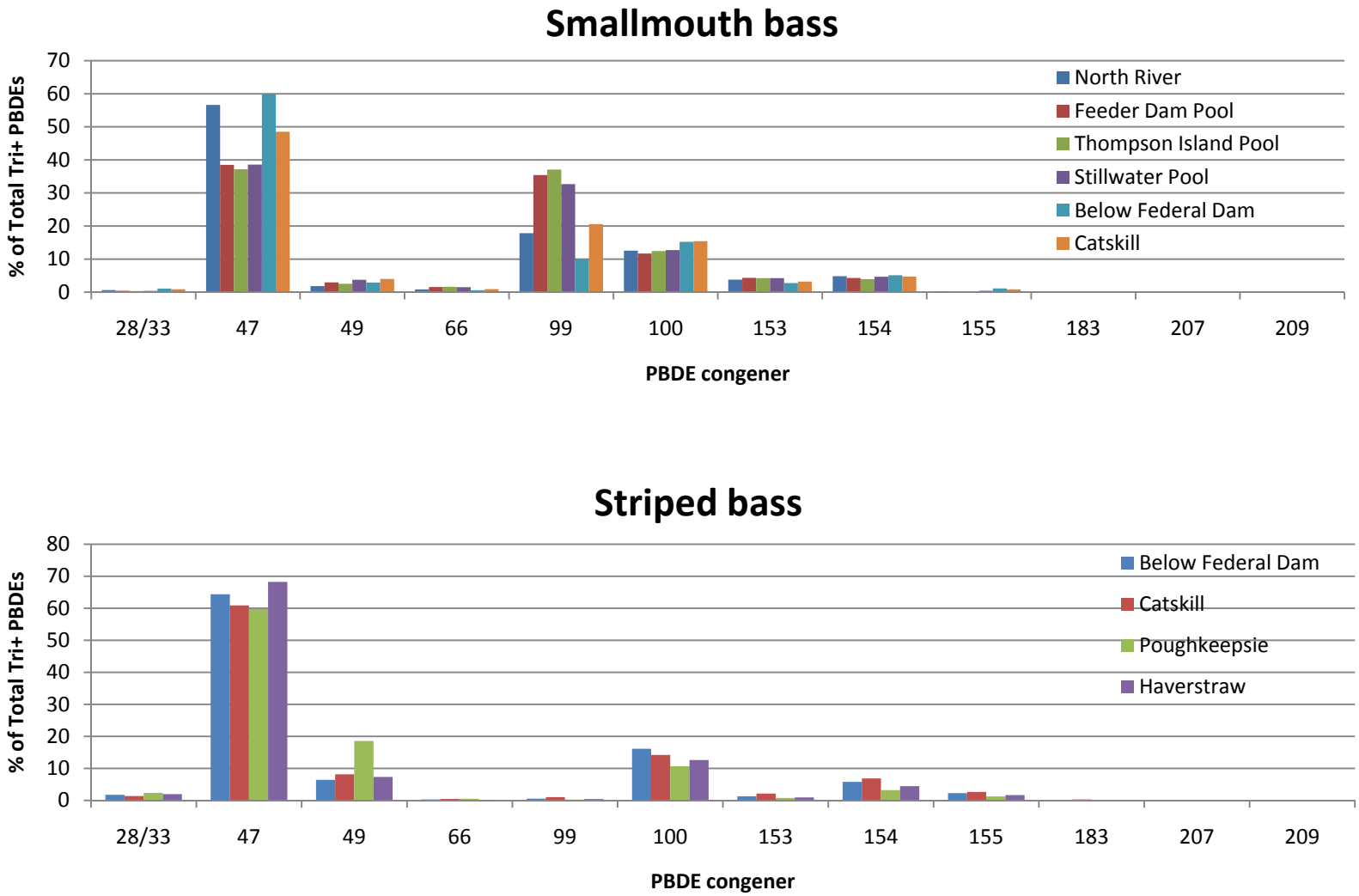


Figure 3: Distribution of 2,3,7,8-chlorine substituted dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass (SMB) and striped bass (STB) taken from the Hudson River in 2003.

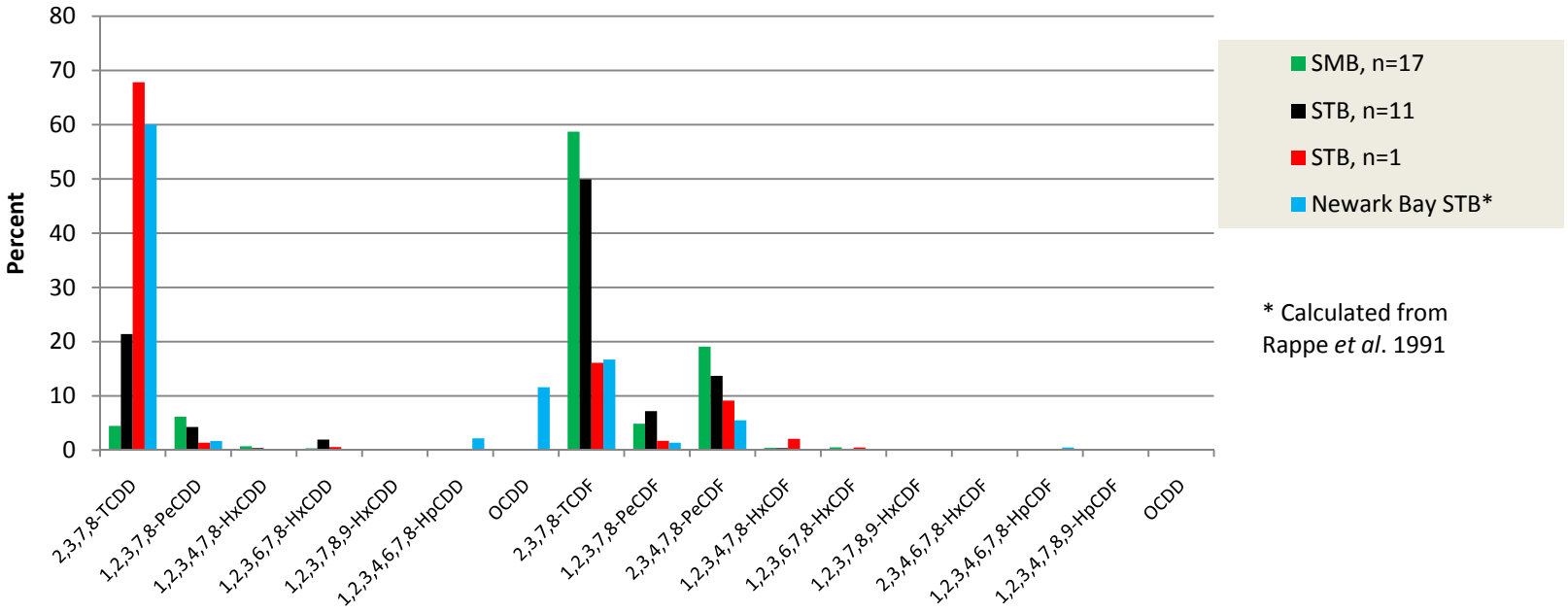


Figure 4: Distributions of polychlorinated biphenyl congeners present at 1.0 percent or more of total PCBs in smallmouth bass taken from the Hudson River; spring 2003.

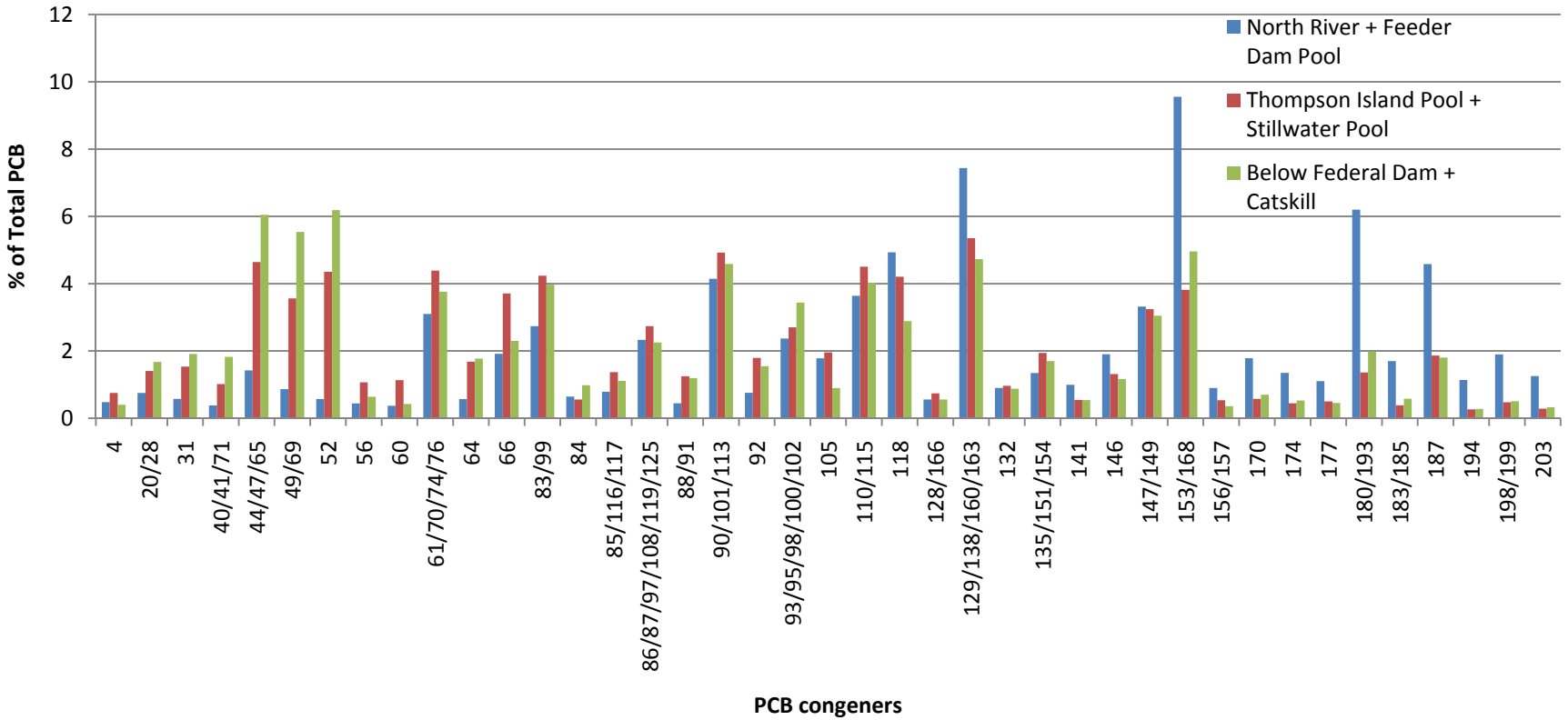


Figure 5: Distributions of polychlorinated biphenyl congeners present at 1.0 percent or more of total PCBs in striped bass taken from the tidal Hudson River; spring 2003.

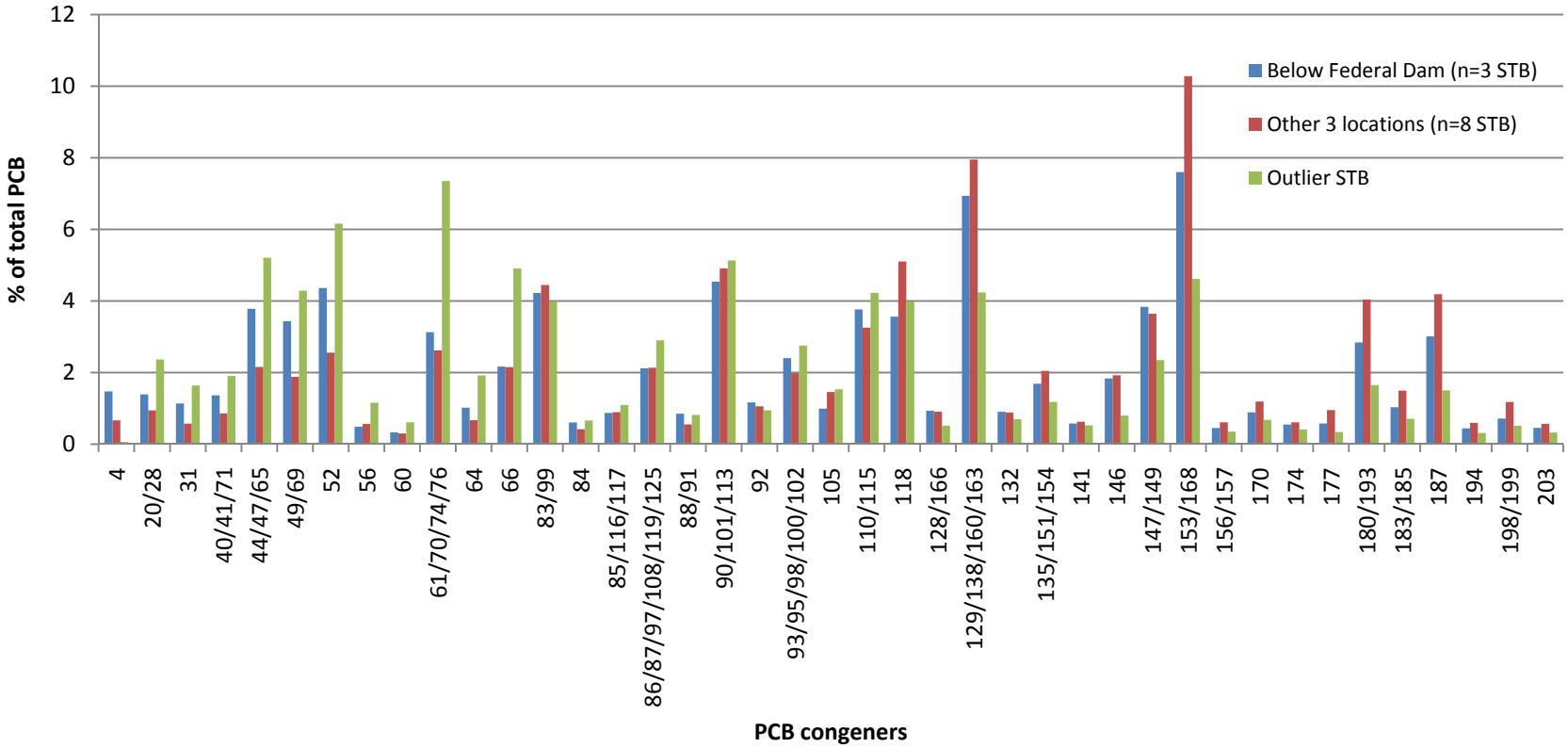


Figure 6: Differences in mean PCB congener contributions in smallmouth bass above and below two General Electric Company facilities.

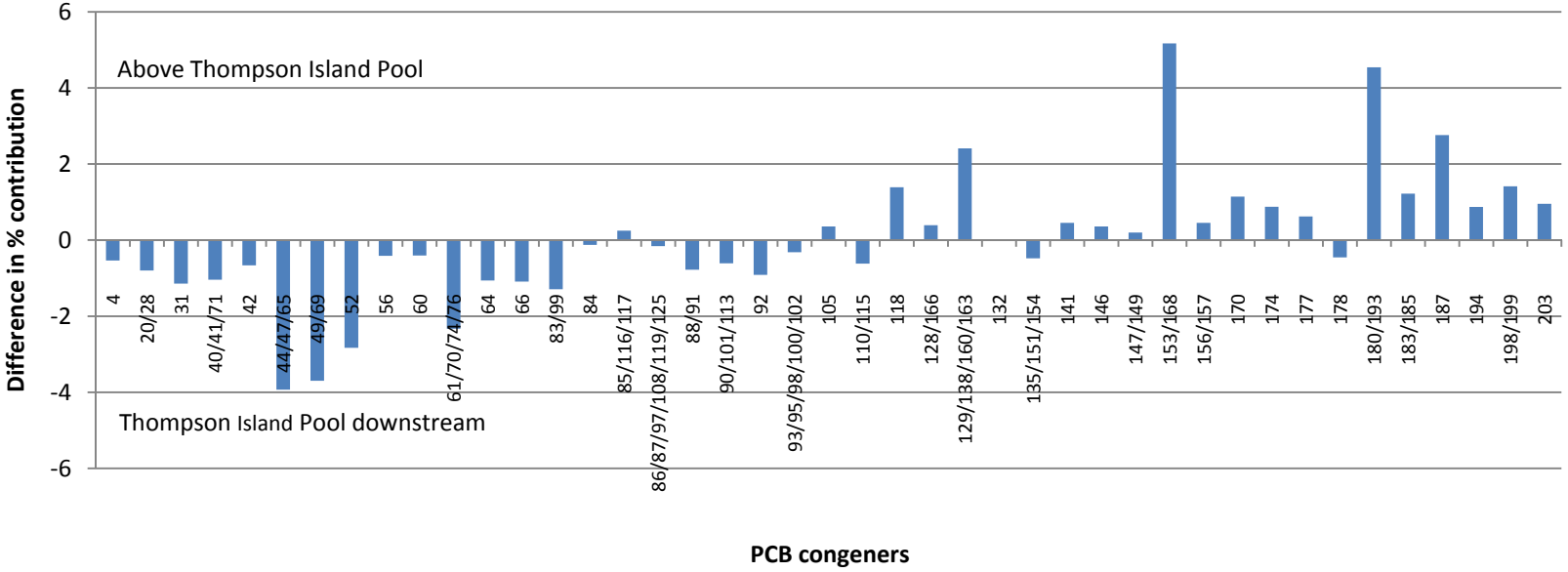
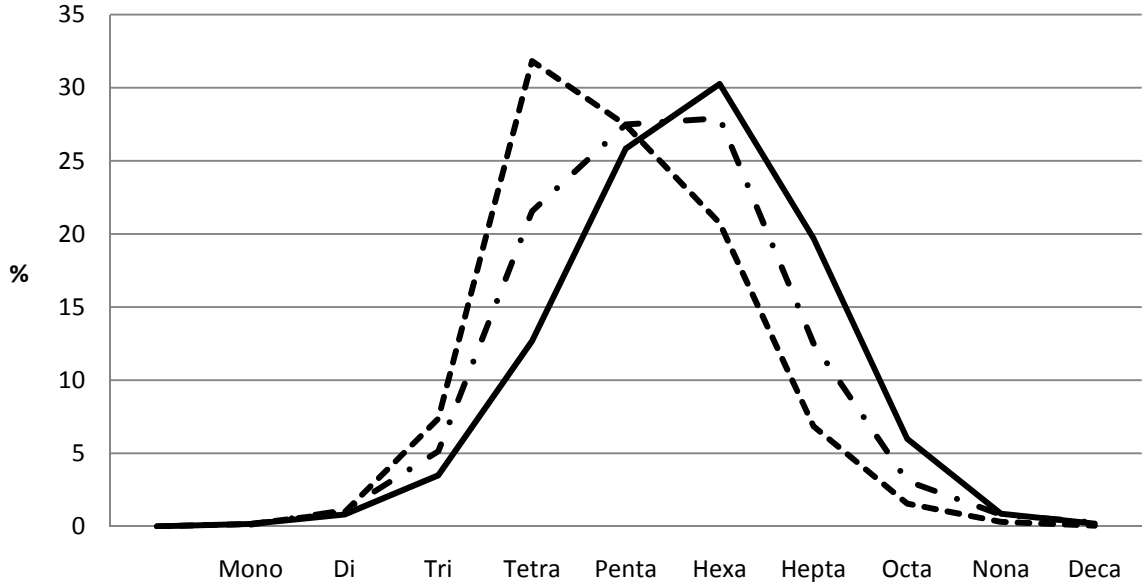


Figure 7: PCB homolog distribution in smallmouth bass (solid line = reference locations; dashed line = Thompson Island Pool downstream) and striped bass (dash-dot line) from the Hudson River.



Appendix A

Sample Characteristic Data

Appendix A-1: Sample specific data for fish collected from the Hudson River for xenobiotics chemical analysis.

Tag number	Contract Laboratory ID	Species[1]	Location of collection	Date of collection	Length (mm)	Weight (g)
0003287	L6629-13	SMB	North River	7/25/2003	232	142
0003288	L6629-14	SMB	North River	7/25/2003	211	130
0003289	L6629-15	SMB	North River	7/25/2003	239	164
0003011	L6629-4	SMB	Feeder Dam Pool	5/28/2003	410	462
0003012	L6629-5	SMB	Feeder Dam Pool	5/28/2003	348	586
0003017	L6629-6	SMB	Feeder Dam Pool	5/28/2003	322	356
0003075	L6629-7	SMB	Thompson Island Pool	5/29/2003	338	508
0003076	L6629-8	SMB	Thompson Island Pool	5/29/2003	367	604
0003077	L6629-9	SMB	Thompson Island Pool	5/29/2003	314	432
0003208	L6629-10	SMB	Stillwater Pool	6/4/2003	377	728
0003209	L6629-11	SMB	Stillwater Pool	6/4/2003	334	490
0003210	L6629-12	SMB	Stillwater Pool	6/4/2003	390	760
0003828	L6629-16	SMB	Below Federal Dam	5/27/2003	377	732
0003832	L6629-17	SMB	Below Federal Dam	5/27/2003	356	610
0003833	L6629-18	SMB	Below Federal Dam	5/27/2003	371	728
0003910	L6629-19	SMB	Catskill	5/21/2003	349	544
0003911	L6629-20	SMB	Catskill	5/21/2003	323	424
0003917	L6629-21	SMB	Catskill	5/21/2003	319	338
0003270	L6629-1	STB	Below Federal Dam	6/12/2003	522	1340
0003271	L6629-2	STB	Below Federal Dam	6/12/2003	585	2266
0003273	L6629-3	STB	Below Federal Dam	6/12/2003	576	2354
9746082	L6629-28	STB	Catskill	5/28/2003	630	2240
9746086	L6629-29	STB	Catskill	5/28/2003	630	2240
9746091	L6629-30	STB	Catskill	5/29/2003	540	1440
9746062	L6629-25	STB	Poughkeepsie	4/22/2003	617	2460
9746066	L6629-26	STB	Poughkeepsie	4/22/2003	625	2640
9746069	L6629-27	STB	Poughkeepsie	4/22/2003	600	2720
9746059	L6629-22	STB	Haverstraw	4/22/2003	610	2400
9746060	L6629-23	STB	Haverstraw	4/22/2003	553	1700
9746061	L6629-24	STB	Haverstraw	4/22/2003	563	1800

[1] SMB = smallmouth bass; STB = striped bass.

Appendix B

Polybrominated diphenyl ethers (PBDEs)

Appendix B-1: Polybrominated diphenyl ethers (PBDE) congeners in smallmouth bass taken from the Hudson River at North River, NY; July 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
Lipid (%)	0.88	2.49	1.56	1.64 ± 0.81
BDE-7	<0.538	nq[2]	nq	<0.538
BDE-8/11	<0.416	nq	nq	<0.416
BDE-10	<0.658	nq	nq	<0.658
BDE-12/13	<0.342	nq	nq	<0.342
BDE-15	0.487B (<0.295)	nq	nq	<0.295
BDE-17/25	2.31B (1.84)	2.92B (2.45)	1.73B (1.26)	1.85 ± 0.595
BDE-28/33	16.5	13.7	8.70	13.0 ± 3.95
BDE-30	<0.179	<0.189	<0.187	<0.189
BDE-32	<0.138	<0.145	<0.144	<0.145
BDE-35	0.135	0.165[k] (<0.108)	<0.107	0.0450 ± 0.0779
BDE-37	0.723B (0.434)	0.988B (0.699)	0.596B (0.307)	0.480 ± 0.200
BDE-47	1660	1070	875	1200 ± 409
BDE-49	60.3	31.9	24.8	39.0 ± 18.8
BDE-51	2.19	1.73B (1.54)	1.29B (1.10)	1.61 ± 0.548
BDE-66	20.5	19.0	12.5	17.3 ± 4.25
BDE-71	<0.0940	<0.0972	<0.0960	<0.0972
BDE-75	2.22	1.23B (1.06)	0.954B (0.785)	1.36 ± 0.762
BDE-77	0.775[k] (<0.0940)	0.768B (0.606)	0.660B (0.498)	0.368 ± 0.323
BDE-79	<0.0940	<0.0972	<0.0960	<0.0972
BDE-85	<0.397	<1.02	<2.49	<2.49
BDE-99	406	440	291	379 ± 78.1
BDE-100	399	215	187	267 ± 115
BDE-105	<0.475	<1.21	<2.98	<2.98
BDE-116	<0.633	<1.62	<3.98	<3.98
BDE-119/120	11.6	6.37	4.48B (4.03)	7.33 ± 3.88
BDE-126	0.539B (0.391)	<0.543	<1.41	0.130 ± 0.226
BDE-128	1.01[k] (<0.387)	0.841[k] (<0.423)	0.789[k] (<0.456)	<0.456
BDE-138/166	<0.200	0.431	<0.223	0.144 ± 0.249
BDE-140	1.16	0.844	0.493	0.832 ± 0.334
BDE-153	114	70.3	55.9	80.1 ± 30.3
BDE-154	173	71.1	64.3	103 ± 60.9
BDE-155	10.6	3.71	3.37	5.89 ± 4.08
BDE-181	<0.183	<0.343	<0.354	<0.354
BDE-183	2.08B (1.55)	3.62B (3.09)	2.53B (2.00)	2.21 ± 0.792

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
BDE-190	<0.254	<0.477	<0.493	<0.493
BDE-203	0.362[k] (<0.191)	0.627B (0.235)	0.514B (<0.222)	0.119 ± 0.118
BDE-206	4.48B (<0.373)	4.88B (<0.584)	1.98B (<0.423)	<0.584
BDE-207	4.39B (<0.228)	6.23B (<0.357)	2.34[k] (<0.258)	<0.357
BDE-208	3.54[k] (<0.317)	4.53B (<0.496)	2.03[k] (<0.359)	<0.496
BDE-209	112B (<5.64)	91.7B (<6.17)	39.0B (<4.39)	<6.17
Di-BDE	<2.25	nq	nq	<2.25
Tri-BDE	18.9	16.8	10.3	15.3 ± 4.48
Tetra-BDE	1750	1120	915	1260 ± 435
Penta-BDE	817	661	482	653 ± 168
Hexa-BDE	299	146	124	190 ± 95.3
Hepta-BDE	1.55	3.09	2.00	2.21 ± 0.792
Octa-BDE	<0.191	0.235	<0.222	0.078 ± 0.136
Nona-BDE	<0.918	<1.44	<1.04	<1.44
Deca-BDE	<5.64	<6.17	<4.39	<6.17
Total BDE_{Tri+}	2880	1950	1530	2120 ± 690

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix B-2: Polybrominated diphenyl ethers (PBDE) congeners in smallmouth bass taken from the Hudson River in the Feeder Dam Pool, Corinth, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6 R2	
Lipid (%)	0.78	0.62	0.52	0.64 ± 0.13
BDE-7	<1.84	<2.75	<0.489	<2.75
BDE-8/11	<1.47	<2.20	<0.467	<2.20
BDE-10	<1.99	<2.97	<0.596	<2.97
BDE-12/13	3.14[k] (<1.26)	<1.88	<0.467	<1.88
BDE-15	3.02	<1.74	0.881	1.30 ± 1.55
BDE-17/25	21.7[k] (<0.762)	6.39[k] (<0.328)	13.2	4.40 ± 7.62
BDE-28/33	57.3	16.8	18.7	30.9 ± 22.9
BDE-30	<0.784	<0.338	<0.725	<0.784
BDE-32	<0.635	<0.274	<0.561	<0.635
BDE-35	<0.537	<0.231	<0.467	<0.537
BDE-37	2.35	0.865	1.40	15.4 ± 0.752
BDE-47	5590	1300	1200	2700 ± 2510
BDE-49	411	105	104	207 ± 177
BDE-51	9.81	2.94	5.16	5.97 ± 3.51
BDE-66	175	64.2	86.4	109 ± 58.6
BDE-71	<0.153	<0.135	6.72	2.24 ± 3.88
BDE-75	6.27	2.10	2.33	3.57 ± 2.34
BDE-77	1.73	0.553[k] (<0.110)	0.897[k] (<0.523)	0.577 ± 0.999
BDE-79	<0.138	<0.121	2.15[k] (<0.684)	<0.684
BDE-85	<2.89	<1.82	<1.40	<2.89
BDE-99	4880	1200	1360	2480 ± 2080
BDE-100	1620	424	413	819 ± 694
BDE-105	<3.33	<2.10	<1.79	<3.33
BDE-116	<4.13	<2.60	<2.48	<4.13
BDE-119/120	26.6	11.7	9.82	16.0 ± 9.19
BDE-126	2.20	<1.15	<0.785	0.733 ± 1.27
BDE-128	2.27[k] (<0.869)	1.06[k] (<0.613)	<2.45	<2.45
BDE-138/166	0.420[k] (<0.251)	0.349B (<0.179)	<1.02	<1.02
BDE-140	6.54	2.51B (2.24)	2.36B (2.09)	3.62 ± 2.53
BDE-153	518	182	212	304 ± 186
BDE-154	523	181	195	300 ± 194
BDE-155	29.9	10.4	8.77	16.4 ± 11.8
BDE-181	<0.299	<0.224	<1.51	<0.299
BDE-183	3.84B (2.58)	2.42B (1.16)	3.79	2.51 ± 1.31

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6 R2	
BDE-190	<0.445	<0.334	<2.10	<2.10
BDE-203	0.873	0.700[k] (<0.214)	<0.467	0.291 ± 0.504
BDE-206	7.73B (<0.942)	3.02[k] (<0.804	<5.17	<0.942
BDE-207	9.74B (<0.473)	2.70[k] (<0.404)	<2.17	<2.17
BDE-208	6.68B (<0.653)	2.27B (<0.557)	<3.60	<3.60
BDE-209	108B (<6.87)	38.9B (<6.41)	nq[2]	<6.87
Di-BDE	3.02	<11.6	0.881	1.30 ± 1.55
Tri-BDE	59.7	17.7	33.3	36.9 ± 21.2
Tetra-BDE	6190	1470	1400	3020 ± 2750
Penta-BDE	6530	1640	1780	3320 ± 2780
Hexa-BDE	1080	376	418	624 ± 395
Hepta-BDE	2.58	1.16	3.79	2.51 ± 1.31
Octa-BDE	0.873	<0.214	<0.476	0.291 ± 0.504
Nona-BDE	<2.07	<1.77	<11.0	<11.0
Deca-BDE	<6.87	<6.41	nq	<6.87
Total BDE_{Tri+}	13900	3500	3640	7000 ± 5940

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix B-3: Polybrominated diphenyl ethers (PBDE) congeners in smallmouth bass taken from the Hudson River in the Thompson Island Pool, Fort Edward, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
Lipid (%)	1.10	0.76	1.28	1.05 ± 0.26
BDE-7	<5.38	<6.65	<3.35	<6.65
BDE-8/11	15.4[k] (<4.24)	6.93[k] (<5.24)	4.17[k] (<2.64)	<5.24
BDE-10	<6.56	<8.11	<4.08	<8.11
BDE-12/13	3400[k] (<3.48)	983[k] (<4.31)	678[k] (<2.17)	<4.31
BDE-15	3.65	<3.76	2.90	2.18 ± 1.93
BDE-17/25	35.4[k] (<2.57)	32.9[k] (<2.79)	25.5[k] (<1.39)	<2.79
BDE-28/33	114	99.2	87.7	100 ± 13.2
BDE-30	<2.83	<3.07	<1.54	<3.07
BDE-32	9.14[k] (<2.24)	10.0[k] (<2.44)	5.89[k] (<1.22)	<2.44
BDE-35	10.4[k] (<1.67)	5.42[k] (<1.82)	3.84[k] (<0.909)	<1.82
BDE-37	4.93	3.91	3.28	4.04 ± 0.83
BDE-47	13000	14000	7420	11500 ± 3550
BDE-49	936	1080	343	786 ± 391
BDE-51	18.2	17.5	11.3	15.7 ± 3.80
BDE-66	529	715	265	503 ± 26
BDE-71	<0.455	<0.536	<0.675	<0.675
BDE-75	15.7	19.4	8.70	14.6 ± 5.43
BDE-77	3.49	3.43	1.73[k] (<0.400)	2.31 ± 2.00
BDE-79	<0.319	<0.376	<0.474	<0.474
BDE-85	<7.05	<4.46	<4.83	<7.05
BDE-99	12900	15100	6320	11400 ± 4570
BDE-100	4130	5670	1700	3830 ± 2000
BDE-105	<8.63	<5.46	<5.92	<8.63
BDE-116	<11.5	<7.28	<7.89	<11.5
BDE-119/120	51.9	81.2	26.0	53.0 ± 27.6
BDE-126	<5.04	3.38	<3.25	1.13 ± 1.95
BDE-128	2.75[k] (<1.06)	2.32[k] (<0.900)	1.49[k] (<0.927)	<1.06
BDE-138/166	0.931[k] (<0.673)	0.566[k] (<0.518)	1.31[k] (<0.482)	<0.673
BDE-140	15.0	14.6	8.99	12.8 ± 3.36
BDE-153	1440	1830	666	1310 ± 592
BDE-154	1290	1900	485	1230 ± 710
BDE-155	66.6	74.5	30.3	57.1 ± 23.6
BDE-181	<0.881	<0.527	<0.587	<0.881
BDE-183	12.3B (11.0)	8.04B (6.78)	9.28B (8.02)	8.60 ± 2.17

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
BDE-190	<1.24	<0.739	<0.823	<1.24
BDE-203	1.31	2.33	1.31[k] (<0.786)	1.21 ± 1.17
BDE-206	3.57B (<1.81)	15.7[k] (<2.37)	8.00B (<1.72)	<2.37
BDE-207	3.12B (<0.792)	10.4B (<1.04)	6.01[k] (<0.751)	<1.04
BDE-208	3.15[k] (<1.30)	10.4[k] (<1.70)	4.42B (<1.23)	<1.70
BDE-209	<101	227B (20.0)	101[k] (<90.4)	<101
Di-BDE	3.65	<28.1	2.90	2.18 ± 1.93
Tri-BDE	118	103	91.0	104 ± 13.5
Tetra-BDE	14500	15800	8050	12800 ± 4150
Penta-BDE	17100	20900	8050	15400 ± 6600
Hexa-BDE	2810	3820	1190	2610 ± 1330
Hepta-BDE	11.0	6.78	8.02	8.60 ± 2.17
Oct-BDE	1.31	2.33	<0.786	1.21 ± 1.17
Nona-BDE	<3.91	<5.11	<3.71	<5.11
Deca-BDE	<101	20.0	<90.4	6.67 ± 11.5
Total BDE_{Tri+}	34500	40600	17400	30900 ± 12100

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix B-4: Polybrominated diphenyl ethers (PBDE) congeners in smallmouth bass taken from the Hudson River in the Stillwater Pool, Stillwater, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003208	0003209	0003210	Mean ± SD
	L6629-10	L6629-11	L6629-12	
Lipid (%)	0.83	0.60	0.66	0.70 ± 0.12
BDE-7	<1.21	nq[2]	<0.657	<0.657
BDE-8/11	<0.954	nq	2.28[k] (<0.518)	<0.954
BDE-10	<1.47	nq	<0.805	<1.47
BDE-12/13	181[k] (<0.797)	nq	326[k] (<0.428)	<0.797
BDE-15	2.48	nq	2.59B (1.31)	1.26 ± 1.24
BDE-17/25	63.3	18.2	28.5	36.7 ±23.6
BDE-28/33	106	60.5	81.7	82.7 ± 22.8
BDE-30	<2.96	<3.67	<4.01	<4.01
BDE-32	<2.29	4.03[k] (<2.86)	5.44[k] (<3.06)	<3.06
BDE-35	6.31[k] (<1.80)	4.08[k] (<2.19)	6.37[k] (<2.47)	<2.47
BDE-37	6.23	5.55[k] (<2.04)	9.75[k] (<2.29)	2.08 ± 3.60
BDE-47	9560	7400	8450	8470 ± 1080
BDE-49	1120	579	758	819 ± 276
BDE-51	29.3	7.53	14.0	16.9 ± 11.2
BDE-66	368	297	338	334 ± 29.1
BDE-71	28.4	<0.367	<0.238	9.47 ± 16.4
BDE-75	15.8	11.3	13.3	13.5 ± 2.25
BDE-77	2.72	2.72[k] (<0.266)	2.91[k] (<0.156)	0.907 ± 1.57
BDE-79	10.3[k] (<0.749)	<0.277	<0.175	<0.749
BDE-85	<1.56	<7.64	<8.64	<8.64
BDE-99	8200	6320	7000	7170 ± 952
BDE-100	3130	2280	2980	2800 ± 454
BDE-105	<2.00	<9.56	<10.5	<10.5
BDE-116	<2.77	<12.5	<14.7	<14.7
BDE-119/120	84.1	102	133	106 ± 24.7
BDE-126	4.22	5.48	8.31	6.00 ± 2.09
BDE-128	4.62[k] (<1.09)	6.35[k] (<1.40)	5.91[k] (<1.63)	<1.63
BDE-138/166	0.820[k] (<0.385)	<0.321	0.413	0.138 ± 0.238
BDE-140	11.9	9.93	9.19	10.3 ± 1.40
BDE-153	956	801	1040	932 ± 121
BDE-154	1050	874	1160	1030 ± 144
BDE-155	94.4	62.7	120	92.4 ± 28.7
BDE-181	1.24	<0.887	<0.980	0.413 ± 0.716
BDE-183	15.5	7.51	8.22	10.4 ± 4.42

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003208	0003209	0003210	Mean ± SD
	L6629-10	L6629-11	L6629-12	
BDE-190	<0.914	<1.26	<1.40	<1.40
BDE-203	2.38	1.41[k] (<0.588)	2.20[k] (<0.730)	0.793 ± 1.37
BDE-206	2.11[k] (<1.04)	5.26[k] (<2.15)	6.17[k] (<2.46)	<2.46
BDE-207	3.45B (0.58)	4.55[k] (<1.14)	8.43B (0.59)	0.390 ± 0.338
BDE-208	4.06[k] (<0.723)	5.78B (0.53)	6.41B (1.16)	0.563 ± 0.581
BDE-209	52.6B (17.0)	<55.3	120B (6.00)	7.67 ± 8.62
Di-BDE	2.48	nq	1.31	1.26 ± 1.24
Tri-BDE	176	78.7	110	122 ± 49.7
Tetra-BDE	11100	8290	9570	9650 ± 1410
Penta-BDE	11400	8710	10100	10100 ± 1350
Hexa-BDE	2110	1750	2330	2060 ± 293
Hepta-BDE	16.7	7.51	8.22	10.8 ± 5.11
Oct-BDE	2.38	<0.588	<0.730	0.793 ± 1.37
Nona-BDE	0.58	0.53	1.75	0.953 ± 0.690
Deca-BDE	17.0	<55.3	6.00	7.67 ± 8.62
Total BDE_{Tri+}	24900	18800	22200	22000 ± 3060

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentrations and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix B-5: Polybrominated diphenyl ethers (PBDE) congeners in smallmouth bass taken from the Hudson River below the Federal Dam at Troy, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003828	0003832	0003833	Mean ± SD
	L6629-16	L6629-17	L6629-18	
Lipid (%)	1.57	1.92	2.01	1.83 ± 0.23
BDE-7	8.47B (7.38)	nq[2]	23.1	15.2 ± 11.1
BDE-8/11	10.0B (7.61)	nq	29.6[k] (<3.92)	3.81 ± 5.38
BDE-10	<4.76	nq	<5.68	<5.68
BDE-12/13	371[k] (<2.55)	nq	1360[k] (<3.21)	<3.21
BDE-15	31.7	nq	96.8	64.3 ± 46.0
BDE-17/25	261	287	563	370 ± 167
BDE-28/33	767	1240	2470	1490 ± 879
BDE-30	<9.63	<16.3	<19.2	<19.2
BDE-32	<7.48	<12.7	<15.4	<15.4
BDE-35	6.20[k] (<5.73)	<9.70	<12.2	<12.2
BDE-37	8.43	22.3	19.1	16.6 ± 7.26
BDE-47	41400	53200	154000	82900 ± 61900
BDE-49	2390	4450	5310	4050 ± 1500
BDE-51	207	293	402	301 ± 97.7
BDE-66	248	1040	1230	839 ± 521
BDE-71	<0.154	181	167	116 ± 101
BDE-75	32.8	47.9	122	67.6 ± 47.7
BDE-77	<0.132	13.5	<2.97	4.50 ± 7.79
BDE-79	<0.116	200	395	198 ± 198
BDE-85	<8.81	<29.0	<17.4	<29.0
BDE-99	2920	19800	19200	14000 ± 9580
BDE-100	12600	17900	32600	21000 ± 10400
BDE-105	<11.0	<36.3	<20.7	<36.3
BDE-116	<14.4	<47.4	<27.5	<47.5
BDE-119/120	180	205	448	278 ± 148
BDE-126	60.7	105	138	101 ± 38.8
BDE-128	6.32[k] (<1.47)	25.5[k] (<2.17)	23.6[k] (<2.11)	<2.17
BDE-138/166	<0.298	<0.367	<0.504	<0.504
BDE-140	14.8	39.2	49.5	34.5 ± 17.8
BDE-153	1560	4210	5660	3810 ± 2080
BDE-154	4260	5340	11600	7070 ± 3960
BDE-155	799	1350	2500	1550 ± 868
BDE-181	<1.17	<2.19	<2.18	<2.19
BDE-183	11.0	32.9	36.3	26.7 ± 13.7

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003828	0003832	0003833	Mean ± SD
	L6629-16	L6629-17	L6629-18	
BDE-190	<1.67	<3.12	<3.18	<3.18
BDE-203	4.87	16.0	9.75	10.1 ± 5.58
BDE-206	4.38[k] (<1.87)	8.15B (2.06)	3.84[k] (<1.42)	<2.18
BDE-207	5.12B (<0.991)	14.8[k] (<1.16)	9.23B (1.39)	0.463 ± 0.803
BDE-208	6.76[k] (<1.53)	28.6B (23.4)	21.9B (16.7)	13.4 ± 12.1
BDE-209	110[k] (<50.7)	109B (2.00)	67.3B (<41.4)	0.667 ± 1.15
Di-BDE	46.7	nq	120	83.4 ± 51.8
Tri-BDE	1040	1550	3050	1880 ± 1040
Tetra-BDE	44300	59400	162000	88600 ± 64000
Penta-BDE	15800	38000	52400	35400 ± 18400
Hexa-BDE	6630	10900	19800	12400 ± 6720
Hepta-BDE	11.0	32.9	36.3	26.7 ± 13.7
Octa-BDE	4.87	16.0	9.75	10.2 ± 5.58
Nona-BDE	<4.40	25.5	18.1	14.5 ± 13.1
Deca-BDE	<50.7	2.00	<41.4	0.667 ± 1.15
Total BDE_{Tri+}	67700	110000	237000	138000 ± 88100

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with greater than 10 percent of sample concentration. Blank corrected values, in parenthesis, were used for computations.

Appendix B-6: Polybrominated diphenyl ethers (PBDE) congeners in smallmouth bass taken from the Hudson River at Catskill, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003910	0003911	0003917	Mean ± SD
	L6629-19	L6629-20	L6629-21R	
Lipid (%)	2.57	1.43	1.89	1.96 ± 0.57
BDE-7	10.3B (9.21)	2.65B (1.56)	nq[2]	5.39 ± 5.41
BDE-8/11	8.37B (5.98)	2.16B (<1.04)	nq	2.99 ± 4.23
BDE-10	<3.90	<1.52	nq	<3.90
BDE-12/13	494[k] (<2.21)	128[k] (<0.856)	nq	<2.21
BDE-15	22.3	22.5	nq	22.9 ± 0.566
BDE-17/25	121	120	203[k] (<4.25)	80.3 ± 69.6
BDE-28/33	494	548	718	587 ± 117
BDE-30	<10.4	<8.24	<4.86	<10.4
BDE-32	<8.34	<6.61	<3.73	<8.34
BDE-35	<6.60	<5.23	3.28[k] (<2.93)	<6.60
BDE-37	16.4	16.5	12.7	15.2 ± 2.17
BDE-47	33500	30000	34300	32600 ± 2290
BDE-49	2720	2450	2890	2690 ± 222
BDE-51	167	155	138	153 ± 14.6
BDE-66	786	618	444	616 ± 171
BDE-71	<0.117	<0.199	79.7	26.6 ± 46.0
BDE-75	36.6	35.1	49.5	40.4 ± 7.92
BDE-77	5.71	5.51	6.86	6.03 ± 0.729
BDE-79	<0.101	<0.171	94.1	31.4 ± 54.3
BDE-85	<17.0	<29.9	<1.40	<29.9
BDE-99	16100	15900	9520	13800 ± 3740
BDE-100	10700	8730	11700	10400 ± 1510
BDE-105	<19.8	<35.0	<1.73	<35.0
BDE-116	<24.7	<43.5	<2.42	<43.5
BDE-119/120	151	123	197	157 ± 37.4
BDE-126	20.8	27.4	79.7	42.6 ± 32.3
BDE-128	7.81[k] (<1.84)	11.0[k] (<1.43)	11.0[k] (<1.40)	<1.84
BDE-138/166	2.67[k] (<0.307)	1.09	1.58[k] (<0.392)	0.363 ± 0.629
BDE-140	35.7	35.5	23.3	31.5 ± 7.10
BDE-153	2170	2090	2220	2160 ± 65.6
BDE-154	3010	2750	3750	3170 ± 519
BDE-155	311	413	937	554 ± 336
BDE-181	<1.06	<1.01	<0.937	<1.06
BDE-183	17.0	21.4	22.1	20.2 ± 2.76

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003910	0003911	0003917	Mean ± SD
	L6629-19	L6629-20	L6629-21R	
BDE-190	<1.54	<1.47	<1.32	<1.54
BDE-203	3.71B (3.32)	3.81[k] (<0.508)	8.92	4.08 ± 4.51
BDE-206	5.23[k] (<0.872)	3.08B (<1.60)	6.88B (<1.29)	<1.60
BDE-207	6.65[k] (<0.469)	5.24B (<0.862)	8.40[k] (<0.649)	<0.862
BDE-208	9.05[k] (<0.692)	6.89B (1.64)	10.7[k] (<1.01)	0.547 ± 0.947
BDE-209	115 B (1.00)	80.4B (<45.3)	156B (<19.5)	0.333 ± 0.557
Di-BDE	37.5	24.1	nq	30.8 ± 9.48
Tri-BDE	631	685	731	682 ± 50.1
Tetra-BDE	37200	33300	38000	36200 ± 2510
Penta-BDE	27000	24800	21500	24400 ± 2770
Hexa-BDE	5530	5290	6930	5920 ± 886
Hepta-BDE	17.0	21.4	22.1	20.2 ± 2.76
Octa-BDE	3.32	<0.508	8.92	4.08 ± 4.51
Nona-BDE	<2.04	1.64	<2.95	0.547 ± 0.947
Deca-BDE	1.00	<45.3	<19.5	0.333 ± 0.557
Total BDE_{Tri+}	70400	64000	67200	67200 ± 3160

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix B-7: Polybrominated diphenyl ethers (PBDE) congeners in striped bass taken from the Hudson River below the Federal Dam, Troy, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
Lipid (%)	2.17	1.97	4.27	2.80 ± 1.27
BDE-7	25.4	12.8	23.1	20.4 ± 6.71
BDE-8/11	41.6	28.1	29.2	33.0 ± 7.50
BDE-10	<2.92	<1.05	<2.39	<2.92
BDE-12/13	264[k] (<1.55)	105[k] (<0.556)	213[k] (<1.27)	<1.55
BDE-15	38.1	68.0	55.2	53.8 ± 15.0
BDE-17/25	646[k] (<8.33)	1300[k] (<11.2)	551[k] (<4.78)	<11.2
BDE-28/33	899	1520	1470	1300 ± 345
BDE-30	<9.18	<12.3	<5.27	<12.3
BDE-32	12.1	17.5	8.77	12.8 ± 4.41
BDE-35	<5.43	<7.30	<3.12	<7.30
BDE-37	<5.01	<6.74	3.72[k] (<2.88)	<6.74
BDE-47	39500	68400	31800	46600 ± 19300
BDE-49	3150	4940	5950	4680 ± 1420
BDE-51	291	347	271	303 ± 39.4
BDE-66	150	292	214	219 ± 71.1
BDE-71	<0.407	<0.504	<0.716	<0.716
BDE-75	28.6	41.9	23.7	31.4 ± 9.42
BDE-77	1.39	1.76	1.19	1.45 ± 0.29
BDE-79	<0.286	<0.354	<0.503	<0.503
BDE-85	<3.41	<3.59	<3.48	<3.59
BDE-99	320	178	768	422 ± 308
BDE-100	10900	15300	8790	11700 ± 3320
BDE-105	<4.18	<4.40	<4.27	<4.40
BDE-116	<5.56	<5.86	<5.69	<5.68
BDE-119/120	198	225	107	177 ± 61.8
BDE-126	79.8	88.4	33.2	67.1 ± 29.7
BDE-128	8.25[k] (<1.69)	2.89[k] (<1.06)	4.00[k] (<1.03)	<1.69
BDE-138/166	<0.545	<0.492	<0.401	<0.545
BDE-140	9.27	2.83	3.37	5.16 ± 3.57
BDE-153	1080	1030	714	941 ± 198
BDE-154	4510	5930	2150	4200 ± 1910
BDE-155	1970	2230	779	1660 ± 774
BDE-181	<1.35	<1.14	<0.687	<1.35
BDE-183	122	28.8	17.2	56.0 ± 57.5

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
BDE-190	<1.89	<1.60	<0.964	<1.89
BDE-203	10.2	1.67[k] (<0.719)	3.42	4.54 ± 5.19
BDE-206	19.2[k] (<2.50)	7.10B (<2.09)	9.89B (<2.18)	<2.50
BDE-207	16.4[k] (<1.09)	4.26[k] (<0.916)	9.38[k] (<0.954)	<1.09
BDE-208	18.1B (7.80)	5.17[k] (<1.50)	10.5B (<1.57)	2.67 ± 4.45
BDE-209	271B (64.0)	108B (<96.2)	139[k] (<122)	21.3 ± 37.0
Di-BDE	105	109	107	107 ± 2.00
Tri-BDE	911	1540	1480	1310 ± 347
Tetra-BDE	43100	74000	38300	51800 ± 19400
Penta-BDE	11500	15800	9700	12300 ± 3130
Hexa-BDE	7570	9190	3640	6800 ± 2850
Hepta-BDE	122	28.8	17.2	56.0 ± 57.5
Octa-BDE	10.2	<0.719	3.42	4.54 ± 5.19
Nona-BDE	7.80	<4.51	<4.71	2.67 ± 4.45
Deca-BDE	64.0	<96.2	<122	21.3 ± 37.0
Total BDE_{Tri+}	63300	101000	53100	72300 ± 25000

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix B-8: Polybrominated diphenyl ethers (PBDE) congeners in striped bass taken from the Hudson River at Catskill, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746082	9746086	9746091	Mean ± SD
	L6629-28R	L6629-29R	L6629-30R	
Lipid (%)	0.52	1.57	2.29	1.46 ± 0.890
BDE-7	nq[2]	nq	nq	nq
BDE-8/11	nq	nq	nq	nq
BDE-10	nq	nq	nq	nq
BDE-12/13	nq	nq	nq	nq
BDE-15	nq	nq	nq	nq
BDE-17/25	769[k] (<4.03)	257[k] (<2.19)	1690[k] (<3.44)	<4.03
BDE-28/33	628	213	1290	710 ± 543
BDE-30	<4.61	<2.41	<3.94	<4.61
BDE-32	9.69	4.94	18.4	11.0 ± 6.83
BDE-35	<2.78	2.41[k] (<1.46)	3.52	1.17 ± 2.03
BDE-37	17.3	3.51	5.43[k] (<2.21)	6.94 ± 9.14
BDE-47	28100	10400	55700	31400 ± 22800
BDE-49	3040	963	8600	4200 ± 3950
BDE-51	226	94.5	488	270 ± 200
BDE-66	400	125	225	250 ± 139
BDE-71	83.5	34.1	162	93.2 ± 64.5
BDE-75	24.3	17.2	39.6	27.0 ± 11.4
BDE-77	4.26	2.39	2.23	2.96 ± 1.13
BDE-79	69.1	36.7	94.2	66.7 ± 28.8
BDE-85	<1.19	<2.28	<0.606	<2.28
BDE-99	847	514	267	543 ± 291
BDE-100	7670	2620	11700	7330 ± 4550
BDE-105	<1.47	<2.86	<0.747	<2.86
BDE-116	<2.06	<3.59	<1.05	<3.59
BDE-119/120	288	342	216	282 ± 63.2
BDE-126	115	127	74.9	105 ± 27.5
BDE-128	7.46[k] (<0.993)	26.1[k] (<2.11)	4.92[k] (<1.13)	<2.11
BDE-138/166	3.23	3.92	0.942[k] (<0.286)	2.38 ± 2.09
BDE-140	19.6	33.6	5.40	19.5 ± 14.1
BDE-153	1350	1240	777	1120 ± 304
BDE-154	3520	3580	3550	3550 ± 30.0
BDE-155	1650	1520	970	1380 ± 361
BDE-181	<1.04	1.61	<0.804	0.537 ± 0.930
BDE-183	140	321	42.3	168 ± 141

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746082	9746086	9746091	Mean ± SD
	L6629-28R	L6629-29R	L6629-30R	
BDE-190	<1.46	2.94	<1.13	0.980 ± 1.79
BDE-203	5.02	14.2	1.76	6.99 ± 6.45
BDE-206	5.66B (<1.15)	3.62[k] (<1.21)	3.35B (<1.02)	<1.21
BDE-207	8.33B (3.30)	11.7B (6.67)	2.92[k] (<0.514)	3.32 ± 3.34
BDE-208	7.16[k] (<0.898)	8.10B (<0.869)	3.53B (<0.796)	<0.898
BDE-209	131B (<19.7)	60.7B (<13.4)	77.0B (<10.8)	<19.7
Di-BDE	nq	nq	nq	nq
Tri-BDE	655	221	1310	730 ± 548
Tetra-BDE	31900	11700	65300	36300 ± 27100
Penta-BDE	8920	3600	12300	8270 ± 4390
Hexa-BDE	6540	6380	5300	6070 ± 674
Hepta-BDE	140	326	42.3	169 ± 144
Octa-BDE	5.02	14.2	1.76	6.99 ± 6.45
Nona-BDE	3.30	6.67	<2.33	3.32 ± 3.34
Deca-BDE	<19.7	<13.4	<10.8	<19.7
Total BDE_{Tri+}	48200	22200	84200	51600 ± 31100

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limits given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix B-9: Polybrominated diphenyl ethers (PBDE) congeners in striped bass taken from the Hudson River at Poughkeepsie, NY, May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746062	9746066	9746069	Mean ± SD[2]
	L6629-25R	L6629-26R	L6629-27R	
Lipid (%)	8.05	4.55	1.23	4.61 ± 3.41 (2.89)
BDE-7	nq[3]	216	65.6	141 ± 106 (141)
BDE-8/11	nq	208	69.5	139 ± 92.9 (139)
BDE-10	nq	<1.38	<2.47	<2.47 (<2.47)
BDE-12/13	nq	113[k] (<0.810)	127[k] (<1.45)	<1.45 (<1.45)
BDE-15	nq	88.3	35.5	61.9 ± 37.3 (61.9)
BDE-17/25	8370[k] (<38.7)	1840[k] (<4.22)	1220[k] (<1.69)	<38.7 (<4.22)
BDE-28/33	9190	1370	1560	4040 ± 4460 (1470)
BDE-30	<45.5	<4.64	<1.86	<45.5 (<4.64)
BDE-32	150	24.6	7.29	60.6 ± 77.9 (15.9)
BDE-35	57.5	6.06[k] (<2.82)	4.26	20.6 ± 32.0 (2.13)
BDE-37	66.1	6.29	2.59[k] (<1.04)	24.1 ± 36.5 (3.15)
BDE-47	192000	36600	74700	101000 ± 81000 (55650)
BDE-49	83800	4810	5630	31400 ± 45400 (5220)
BDE-51	4490	331	252	1690 ± 2420 (292)
BDE-66	2470	156	116	914 ± 1350 (136)
BDE-71	2940	144	146	1080 ± 1610 (145)
BDE-75	513	34.9	49.8	199 ± 272 (42.4)
BDE-77	<2.03	2.42	3.55	1.99 ± 1.81 (2.99)
BDE-79	1450	62.5	163	559 ± 774 (113)
BDE-85	<15.6	<1.60	<0.821	<15.6 (<1.60)
BDE-99	1090	197	47.3B (39.6)	442 ± 567 (118)
BDE-100	30400	7250	16700	18100 ± 11600 (12000)
BDE-105	<19.1	<2.01	<1.03	<19.1 (<2.01)
BDE-116	<26.0	<2.52	<1.29	<26.0 (<2.52)
BDE-119/120	849	244	290	461 ± 337 (267)
BDE-126	220	108	105	144 ± 65.5 (107)
BDE-128	16.8[k] (<6.78)	5.74[k] (<1.04)	2.55[k] (<1.38)	<6.78 (<1.38)
BDE-138/166	8.43	0.970[k] (<0.336)	0.715	3.05 ± 4.67 (0.358)
BDE-140	15.3	6.32	2.19	7.94 ± 6.70 (4.26)
BDE-153	2870	682	417	1320 ± 1350 (550)
BDE-154	8730	3190	4450	5460 ± 2900 (3820)
BDE-155	3320	1670	1290	2090 ± 1080 (1480)
BDE-181	<3.89	<0.588	<0.612	<3.89 (<0.612)
BDE-183	50.4	60.5	19.5	43.5 ± 21.4 (40.0)

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746062	9746066	9746069	Mean ± SD[2]
	L6629-25R	L6629-26R	L6629-27R	
BDE-190	<5.57	<0.867	<0.903	<5.57 (<0.903)
BDE-203	8.56[k] (<3.62)	2.57[k] (<0.340)	1.56	0.520 ± 0.901 (0.78)
BDE-206	19.2[k] (<17.0)	5.10[k] (<1.27)	8.09B (<1.85)	<17.0 (<1.85)
BDE-207	15.9[k] (<7.06)	4.31[k] (<0.641)	9.18B (4.15)	1.38 ± 2.40 (2.08)
BDE-208	<12.2	3.68[k] (<0.914)	7.67[k] (<1.32)	<12.2 (<1.32)
BDE-209	165B (<14.2)	56.4B (<13.6)	132B (<22.4)	<22.4 (<22.4)
Di-BDE	nq	512	171	342 ± 241 (342)
Tri-BDE	9460	1400	1570	4140 ± 4610 (1490)
Tetra-BDE	288000	42100	81100	137000 ± 132000 (61600)
Penta-BDE	32600	7800	17100	19200 ± 12500 (12500)
Hexa-BDE	14900	5550	6160	8870 ± 5230 (5850)
Hepta-BDE	50.4	60.5	19.5	43.5 ± 21.4 (40.0)
Octa-BDE	<3.62	<0.340	1.56	0.520 ± 0.901 (0.780)
Nona-BDE	<36.3	<2.83	4.15	1.38 ± 2.40 (2.08)
Deca-BDE	<14.2	<13.6	<22.4	<22.4 (<22.4)
Total BDE_{Tri+}	345000	56900	106000	169000 ± 154000 (81500)

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] Parenthetic value is the average concentration in the absence of L6629-25R which contains outliers.
[3] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank with a value greater than 10 percent of sample concentration. Blank corrected concentrations were used in computations.

Appendix B-10: Polybrominated diphenyl ethers (PBDE) congeners in striped bass taken from the Hudson River at Haverstraw, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746059	9746060	9746061	Mean ± SD
	L6629-22R	L6629-23R	L6629-24R	
Lipid (%)	1.89	3.18	4.77	3.28 ± 1.44
BDE-7	138	nq[2]	nq	138
BDE-8/11	99.7	nq	nq	99.7
BDE-10	<2.40	nq	nq	<2.41
BDE-12/13	48.6[k] (<1.26)	nq	nq	<1.26
BDE-15	27.5	nq	nq	27.5
BDE-17/25	747	483[k] (<1.83)	893[k] (<2.81)	249 ± 431
BDE-28/33	753	498	816	689 ± 168
BDE-30	<3.73	<2.02	<3.09	<3.73
BDE-32	6.23	10.1	8.33	8.22 ± 1.94
BDE-35	<2.15	1.68	2.19[k] (<1.87)	0.56 ± 0.97
BDE-37	2.81B (2.52)	2.12	2.41	2.35 ± 0.207
BDE-47	30100	13500	27600	23700 ± 8950
BDE-49	2540	1980	3170	2560 ± 595
BDE-51	135	157	168	153 ± 16.8
BDE-66	118	78.9	58.4	85.1 ± 30.3
BDE-71	<0.147	66.4	69.4	45.3 ± 39.2
BDE-75	19.6	15.3	17.0	17.3 ± 2.17
BDE-77	1.23[k] (<0.111)	1.27	1.33	0.900 ± 0.780
BDE-79	<0.110	42.8	49.7	30.8 ± 26.9
BDE-85	<1.64	<1.11	1.82[k] (<0.763)	<1.64
BDE-99	254	159	71.0B (63.3)	159 ± 95.4
BDE-100	5030	2730	5400	4390 ± 1450
BDE-105	<1.94	<1.40	<0.958	<1.94
BDE-116	<2.66	1.76	<1.20	<2.66
BDE-119/120	135	109	82.3	109 ± 26.4
BDE-126	57.2	36.7	25.5	39.8 ± 16.1
BDE-128	2.80[k] (<0.639)	5.70[k] (<1.12)	1.56[k] (<0.879)	<1.12
BDE-138/166	0.442[k] (<0.261)	0.851[k] (<0.305)	0.611	0.204 ± 0.353
BDE-140	3.99	4.06	0.835	2.96 ± 1.84
BDE-153	495	278	226	333 ± 143
BDE-154	2330	1080	1280	1560 ± 671
BDE-155	1020	424	327	590 ± 375
BDE-181	<0.533	<0.748	<0.354	<0.748
BDE-183	36.1	42.4	3.72B (2.39)	27.0 ± 21.5

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746059	9746060	9746061	Mean ± SD
	L6629-22R	L6629-23R	L6629-24R	
BDE-190	<0.769	<1.10	<0.522	<1.10
BDE-203	1.89	2.65[k] (<0.478)	0.762[k] (<0.373)	0.630 ± 1.09
BDE-206	7.46B (1.37)	8.92B (<1.06)	6.85B (<1.03)	0.457 ± 0.791
BDE-207	6.86B (<0.292)	10.1B (5.07)	5.32B (0.29)	1.79 ± 2.85
BDE-208	7.50B (2.25)	9.10B (<0.763)	5.30B (<0.741)	0.750 ± 1.30
BDE-209	112B (<34.5)	130B (<14.9)	104B (<12.6)	<34.5
Di-BDE	265	nq	nq	265
Tri-BDE	1510	512	827	950 ± 510
Tetra-BDE	32900	15800	31100	26600 ± 9400
Penta-BDE	5480	3030	5520	4680 ± 1430
Hexa-BDE	3850	1790	1830	2490 ± 1180
Hepta-BDE	36.1	42.4	2.39	27.0 ± 21.5
Octa-BDE	1.89	<0.478	<0.373	0.630 ± 1.09
Nona-BDE	3.62	5.07	0.29	2.99 ± 2.45
Deca-BDE	<34.5	<14.9	<12.6	<34.5
Total BDE_{Tri+}	43800	21200	39400	34800 ± 12000

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[k] = Peak present but did not meet quantification criteria; estimated maximum possible concentration and detection limit given. Unconfirmed concentration treated as zero for statistical computations.
B = At least one blank value was greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.

Appendix C

Polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/Fs)

Appendix C-1: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at North River, NY; July 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]		
	0003288	0003289	Mean[2]
	L6629-14	L6629-15	
Lipid (%)	2.03	1.56	1.80
2,3,7,8-TCDD	0.080[k] (<0.0497)	0.074[k] (<0.0495)	<0.0497
1,2,3,7,8-PeCDD	0.142	0.117	0.130
1,2,3,4,7,8-HxCDD	0.055	0.057[k] (<0.0495)	0.028
1,2,3,6,7,8-HxCDD	0.085	0.096B[3] (0.043)	0.064
1,2,3,7,8,9-HxCDD	0.060[k] (<0.0497)	0.050[k] (<0.0495)	<0.0497
1,2,3,4,6,7,8-HpCDD	0.091	0.105B (<0.0495)	0.046
OCDD	0.210B (<0.0497)	0.153B (<0.0495)	<0.0497
2,3,7,8-TCDF	0.373	0.421	0.397
1,2,3,7,8-PeCDF	0.139	0.096	0.118
2,3,4,7,8-PeCDF	0.306B (0.255)	0.219B (0.161)	0.208
1,2,3,4,7,8-HxCDF	0.114	<0.0495	0.057
1,2,3,6,7,8-HxCDF	0.064	<0.0495	0.032
1,2,3,7,8,9-HxCDF	<0.0497	<0.0495	<0.0497
2,3,4,6,7,8-HxCDF	0.091	0.053[k] (<0.0495)	0.046
1,2,3,4,6,7,8-HpCDF	0.073[k] (<0.0497)	0.055B (<0.0495)	<0.0497
1,2,3,4,7,8,9-HpCDF	0.055	<0.0495	0.028
OCDF	0.052	0.082B (<0.0495)	0.026
∑2,3,7,8-TCDD TEQs[2] (human)	0.302	0.215	0.256
∑2,3,7,8-TCDD TEQs[2] (fish)	0.351	0.228	0.289
∑TCDDs	0.535	0.316	0.426
∑PeCDDs	0.142	0.117	0.130
∑HxCDDs	0.140	0.096B (0.043)	0.092
∑HpCDDs	0.091	0.105B (<0.0495)	0.046
∑TCDFs	0.736	0.567	0.652
∑PeCDFs	0.857	0.541B (0.483)	0.670
∑HxCDFs	0.372	<0.0495	0.186
∑HpCDFs	0.055	0.055B (<0.0495)	0.028

[1] Sample identifications are the tag number and contract laboratory identification number, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-2: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at the Feeder Dam Pool, Corinth, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6	
Lipid (%)	0.78	0.62	0.52	0.64 ± 0.13
2,3,7,8-TCDD	0.062[k] (<0.0464)	0.055[k] (<0.0481)	0.055[k] (<0.0484)	<0.0484
1,2,3,7,8-PeCDD	0.119	0.097	0.051	0.089 ± 0.035
1,2,3,4,7,8-HxCDD	<0.0464	<0.0481	<0.0484	<0.0484
1,2,3,6,7,8-HxCDD	0.099	0.058[k] (<0.0481)	0.053[k] (<0.0484)	0.033 ± 0.057
1,2,3,7,8,9-HxCDD	<0.0464	<0.0481	<0.0484	<0.0484
1,2,3,4,6,7,8-HpCDD	0.117B[3] (<0.0464)	0.070[k] (<0.0481)	0.097B (<0.0484)	<0.0484
OCDD	0.211B (<0.0464)	0.178B (<0.0481)	0.252B (<0.0484)	<0.0484
2,3,7,8-TCDF	0.223	0.124	<0.0484	0.124 ± 0.099
1,2,3,7,8-PeCDF	<0.0464	<0.0481	<0.0484	<0.0484
2,3,4,7,8-PeCDF	0.119B (0.067)	0.086B (0.034)	0.066B (0.014)	0.038 ± 0.027
1,2,3,4,7,8-HxCDF	<0.0464	<0.0481	<0.0484	<0.0484
1,2,3,6,7,8-HxCDF	<0.0464	<0.0481	<0.0484	<0.0484
1,2,3,7,8,9-HxCDF	<0.0464	<0.0481	<0.0484	<0.0484
2,3,4,6,7,8-HxCDF	<0.0464	<0.0481	<0.0484	<0.0484
1,2,3,4,6,7,8-HpCDF	<0.0464	<0.0481	0.062B (0.002)	0.00067 ± 0.0012
1,2,3,4,7,8,9-HpCDF	<0.0464	<0.0481	<0.0484	<0.0484
OCDF	<0.0464	<0.0481	0.124B (0.001)	0.00033 ± 0.00058
∑2,3,7,8-TCDD TEQs[2] (human)	0.171	0.120	0.0552	0.115 ± 0.058
∑2,3,7,8-TCDD TEQs[2] (fish)	0.165	0.120	0.058	0.114 ± 0.054
∑TCDDs	<0.0464	<0.0481	<0.0484	<0.0484
∑PeCDDs	0.119	0.097	0.051	0.089 ± 0.035
∑HxCDDs	0.099	<0.0481	<0.0484	0.033 ± 0.057
∑HpCDDs	0.117B (<0.0464)	<0.0481	0.160B (0.037)	0.012 ± 0.021
∑TCDFs	0.221	0.156	0.059	0.145 ± 0.082
∑PeCDFs	0.119B (0.067)	0.086B (0.034)	0.066B (0.014)	0.038 ± 0.027
∑HxCDFs	<0.0464	<0.0481	<0.0484	<0.0484
∑HpCDFs	<0.0464	<0.0481	0.062B (<0.0484)	<0.0484

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-3: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at the Thompson Island Pool, Fort Edward, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
Lipid (%)	1.10	0.76	1.28	1.05 ± 0.26
2,3,7,8-TCDD	0.112[k] (<0.0493)	0.101[k] (<0.0461)	0.079[k] (<0.0481)	<0.0493
1,2,3,7,8-PeCDD	0.114	0.101	0.080	0.098 ± 0.017
1,2,3,4,7,8-HxCDD	<0.0493	<0.0461	<0.0481	<0.0493
1,2,3,6,7,8-HxCDD	0.090	0.066	0.058	0.071 ± 0.017
1,2,3,7,8,9-HxCDD	<0.0493	<0.0461	<0.0481	<0.0493
1,2,3,4,6,7,8-HpCDD	0.116B[3](<0.0493)	0.101B (<0.0461)	0.094B (<0.0481)	<0.0493
OCDD	0.501B (0.095)	0.168B (<0.0461)	0.194B (<0.0481)	0.032 ± 0.055
2,3,7,8-TCDF	0.620	0.411	0.692	0.574 ± 0.146
1,2,3,7,8-PeCDF	0.095[k] (<0.0493)	0.069[k] (<0.0461)	0.087	0.029 ± 0.050
2,3,4,7,8-PeCDF	0.378B (0.326)	0.247B (0.195)	0.306B (0.254)	0.258 ± 0.066
1,2,3,4,7,8-HxCDF	<0.0493	<0.0461	<0.0481	<0.0493
1,2,3,6,7,8-HxCDF	<0.0493	<0.0461	<0.0481	<0.0493
1,2,3,7,8,9-HxCDF	<0.0493	<0.0461	<0.0481	<0.0493
2,3,4,6,7,8-HxCDF	<0.0493	<0.0461	<0.0481	<0.0493
1,2,3,4,6,7,8-HpCDF	<0.0493	<0.0461	<0.0481	<0.0493
1,2,3,4,7,8,9-HpCDF	<0.0493	<0.0461	<0.0481	<0.0493
OCDF	0.071B (<0.0493)	<0.0461	<0.0481	<0.0493
∑2,3,7,8-TCDD TEQs[2] (human)	0.283	0.207	0.234	0.241 ± 0.039
∑2,3,7,8-TCDD TEQs[2] (fish)	0.309	0.220	0.247	0.258 ± 0.046
∑TCDDs	<0.0493	<0.0461	<0.0481	<0.0493
∑PeCDDs	0.114	0.101	0.080	0.098 ± 0.017
∑HxCDDs	0.090	0.066	0.058	0.071 ± 0.017
∑HpCDDs	0.178B (0.055)	0.101B (<0.0461)	0.094B (<0.0481)	0.018 ± 0.032
∑TCDFs	0.788	0.550	0.960	0.766 ± 0.206
∑PeCDFs	0.378B (0.326)	0.247B (0.195)	0.469B (0.417)	0.313 ± 0.112
∑HxCDFs	<0.0493	<0.0461	<0.0481	<0.0493
∑HpCDFs	<0.0493	<0.0461	<0.0481	<0.0493

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-4: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at the Stillwater Pool, Stillwater, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	0003208	0003209	0003210	Mean ± SD
	L6629-10	L6629-11	L6629-12	
Lipid (%)	0.83	0.60	0.66	0.70 ± 0.12
2,3,7,8-TCDD	0.090[k] (<0.0462)	0.079[k] (<0.0492)	0.100[k] (<0.0489)	<0.0492
1,2,3,7,8-PeCDD	0.079	0.076[k] (<0.0492)	0.106	0.062 ± 0.055
1,2,3,4,7,8-HxCDD	<0.0462	<0.0492	0.054	0.018 ± 0.031
1,2,3,6,7,8-HxCDD	0.052	0.066[k] (<0.0492)	0.095B (0.042)	0.031 ± 0.028
1,2,3,7,8,9-HxCDD	<0.0462	0.056[k] (<0.0492)	0.072[k] (<0.0489)	<0.0492
1,2,3,4,6,7,8-HpCDD	0.093B (<0.0462)	0.128B (<0.0492)	0.173B (<0.0489)	<0.0492
OCDD	0.186B (<0.0462)	0.315B (<0.0492)	0.442B (<0.0489)	<0.0492
2,3,7,8-TCDF	2.00	0.899[k] (<0.0492)	2.62	1.54 ± 1.37
1,2,3,7,8-PeCDF	0.127	0.086	0.150	0.121 ± 0.320
2,3,4,7,8-PeCDF	0.330B (0.278)	0.233B (0.175)	0.385B (0.327)	0.260 ± 0.078
1,2,3,4,7,8-HxCDF	<0.0462	<0.0492	0.057B (0.007)	0.0023 ± 0.0040
1,2,3,6,7,8-HxCDF	<0.0462	<0.0492	0.053[k] (<0.0489)	<0.0492
1,2,3,7,8,9-HxCDF	<0.0462	<0.0492	0.071[k] (<0.0489)	<0.0492
2,3,4,6,7,8-HxCDF	<0.0462	<0.0492	0.069	0.023 ± 0.040
1,2,3,4,6,7,8-HpCDF	<0.0462	0.052B (<0.0492)	0.107B (0.025)	0.0083 ± 0.014
1,2,3,4,7,8,9-HpCDF	<0.0462	<0.0492	0.084B (0.002)	0.00067 ± 0.0012
OCDF	<0.0462	0.106B (<0.0492)	0.160B (<0.0489)	<0.0492
∑2,3,7,8-TCDD TEQs[2] (human)	0.371	0.0551	0.488	0.305 ± 0.224
∑2,3,7,8-TCDD TEQs[2] (fish)	0.325	0.092	0.443	0.287 ± 0.179
∑TCDDs	<0.0462	<0.0492	<0.0489	<0.0492
∑PeCDDs	0.079	<0.0492	0.106	0.062 ± 0.055
∑HxCDDs	0.052	<0.0492	0.149B (0.096)	0.049 ± 0.048
∑HpCDDs	0.093B (<0.0462)	0.181B (<0.0492)	0.263B (0.001)	0.00033 ± 0.00058
∑TCDFs	2.60	0.912	2.89	2.13 ± 1.07
∑PeCDFs	0.567B (0.509)	0.389B (0.331)	0.644B (0.586)	0.475 ± 0.131
∑HxCDFs	<0.0462	<0.0492	0.126B (<0.0489)	<0.0492
∑HpCDFs	<0.0462	0.052B (<0.0492)	0.191B (0.048)	0.016 ± 0.028

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-5: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River below the Federal Dam, Troy, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	0003828	0003832	0003833	Mean ± SD
	L6629-16	L6629-17	L6629-18	
Lipid (%)	1.57	1.92	2.01	1.83 ± 0.23
2,3,7,8-TCDD	0.279	0.664	0.528	0.490 ± 0.195
1,2,3,7,8-PeCDD	0.267	0.219	0.642	0.376 ± 0.231
1,2,3,4,7,8-HxCDD	0.076	<0.0491	0.110	0.062 ± 0.056
1,2,3,6,7,8-HxCDD	0.268B[3] (0.215)	0.180B (0.127)	0.468B (0.415)	0.252 ± 0.148
1,2,3,7,8,9-HxCDD	<0.0496	<0.0491	0.089[k] (<0.0495)	<0.0496
1,2,3,4,6,7,8-HpCDD	0.135B (<0.0496)	0.176B (<0.0491)	0.224B (0.042)	0.014 ± 0.024
OCDD	0.200B (<0.0496)	0.340B (<0.0491)	0.357B (<0.0495)	<0.0496
2,3,7,8-TCDF	2.98	2.52	5.14	3.55 ± 1.40
1,2,3,7,8-PeCDF	0.263	0.221	0.500	0.328 ± 0.150
2,3,4,7,8-PeCDF	1.04	1.04	1.80	1.29 ± 0.439
1,2,3,4,7,8-HxCDF	0.058 B (0.008)	<0.0491	0.090B (0.040)	0.016 ± 0.021
1,2,3,6,7,8-HxCDF	0.054	<0.0491	0.087	0.047 ± 0.044
1,2,3,7,8,9-HxCDF	<0.0496	<0.0491	<0.0495	<0.0496
2,3,4,6,7,8-HxCDF	0.051B (<0.0496)	0.060[k] (<0.0491)	0.075	0.025 ± 0.043
1,2,3,4,6,7,8-HpCDF	<0.0496	0.054B (<0.0491)	0.052B (<0.0495)	<0.0496
1,2,3,4,7,8,9-HpCDF	<0.0496	<0.0491	<0.0495	<0.0496
OCDF	<0.0496	0.050B (<0.0491)	<0.0495	<0.0496
∑2,3,7,8-TCDD TEQs[2] (human)	1.20	1.47	2.31	1.66 ± 0.579
∑2,3,7,8-TCDD TEQs[2] (fish)	1.27	1.54	2.42	1.75 ± 0.602
∑TCDDs	0.279	0.664	0.528	0.490 ± 0.195
∑PeCDDs	0.267	0.219	0.642	0.376 ± 0.232
∑HxCDDs	0.344B (0.291)	0.180B (0.127)	0.578B (0.525)	0.314 ± 0.200
∑HpCDDs	0.135B (<0.0496)	0.176B (<0.0491)	0.224B (<0.0495)	<0.0496
∑TCDFs	3.44	2.87	6.03	4.11 ± 1.68
∑PeCDFs	1.57	1.48	2.85	1.97 ± 0.766
∑HxCDFs	0.249B (0.132)	0.056B (<0.0491)	0.422B (0.305)	0.146 ± 0.153
∑HpCDFs	<0.0496	0.054B (<0.0491)	0.052B (<0.0495)	<0.0496

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-6: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at Catskill, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	0003910	0003911	0003917	Mean ± SD
	L6629-19	L6629-20	L6629-21	
Lipid (%)	2.57	1.43	1.89	1.96 ± 0.57
2,3,7,8-TCDD	0.197[k] (<0.0498)	0.287	0.232[k] (<0.0498)	0.096 ± 0.166
1,2,3,7,8-PeCDD	0.135	0.149	0.161[k] (<0.0498)	0.095 ± 0.082
1,2,3,4,7,8-HxCDD	<0.0498	<0.0500	<0.0498	<0.0500
1,2,3,6,7,8-HxCDD	0.110B[3] (0.057)	0.100B (0.047)	0.127B (0.074)	0.059 ± 0.014
1,2,3,7,8,9-HxCDD	<0.0498	<0.0500	<0.0498	<0.0500
1,2,3,4,6,7,8-HpCDD	0.116B (<0.0498)	0.094B (<0.0500)	0.153B (<0.0498)	<0.0500
OCDD	0.232B (<0.0498)	0.193B (<0.0500)	0.402B (<0.0498)	<0.0500
2,3,7,8-TCDF	1.71	1.32	1.82	1.62 ± 0.263
1,2,3,7,8-PeCDF	0.116	0.117	0.129[k] (<0.0498)	0.078 ± 0.067
2,3,4,7,8-PeCDF	0.522B (0.464)	0.461B (0.403)	0.647	0.505 ± 0.127
1,2,3,4,7,8-HxCDF	<0.0498	<0.0500	<0.0498	<0.0500
1,2,3,6,7,8-HxCDF	<0.0498	<0.0500	<0.0498	<0.0500
1,2,3,7,8,9-HxCDF	<0.0498	<0.0500	<0.0498	<0.0500
2,3,4,6,7,8-HxCDF	<0.0498	<0.0500	<0.0498	<0.0500
1,2,3,4,6,7,8-HpCDF	<0.0498	<0.0500	0.050B (<0.0498)	<0.0500
1,2,3,4,7,8,9-HpCDF	<0.0498	<0.0500	<0.0498	<0.0500
OCDF	<0.0498	<0.0500	0.121B (<0.0498)	<0.0500
∑2,3,7,8-TCDD TEQs[2] (human)	0.454	0.697	0.384	0.512 ± 0.164
∑2,3,7,8-TCDD TEQs[2] (fish)	0.459	0.762	1.23	0.819 ± 0.391
∑TCDDs	<0.0498	0.287	<0.0498	0.096 ± 0.166
∑PeCDDs	0.135	0.149	<0.0498	0.095 ± 0.082
∑HxCDDs	0.110B (0.057)	0.100B (0.047)	0.127B (0.074)	0.059 ± 0.014
∑HpCDDs	0.116B (<0.0498)	0.094B (<0.0500)	0.153B (<0.0498)	<0.0500
∑TCDFs	1.80	1.50	2.07	1.79 ± 0.285
∑PeCDFs	0.736	0.659	0.743	0.713 ± 0.047
∑HxCDFs	<0.0498	<0.0500	<0.0498	<0.0500
∑HpCDFs	<0.0498	<0.0500	0.050B (<0.0498)	<0.0500

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-7: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River below the Federal Dam, Troy, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	0003270	0003271	0003273	Mean ± SD
	L6629-1 (A)	L6629-2	L6629-3	
Lipid (%)	2.17	1.97	4.27	2.80 ± 1.27
2,3,7,8-TCDD	0.727	5.46	1.17	2.45 ± 2.61
1,2,3,7,8-PeCDD	0.389	0.615	0.519[k] (<0.0446)	0.335 ± 0.311
1,2,3,4,7,8-HxCDD	0.063[k] (<0.0481)	0.075[k] (<0.0445)	0.052	0.017 ± 0.030
1,2,3,6,7,8-HxCDD	0.174	0.324	0.199	0.232 ± 0.080
1,2,3,7,8,9-HxCDD	<0.0481	0.089[k] (<0.0445)	<0.0446	<0.0481
1,2,3,4,6,7,8-HpCDD	0.157B[3] (0.034)	0.198B (0.075)	0.143B (0.020)	0.043 ± 0.029
OCDD	0.322B (<0.0481)	0.416B (0.010)	0.373B (<0.0446)	0.0033 ± 0.0058
2,3,7,8-TCDF	6.84	4.27	3.12	4.74 ± 1.90
1,2,3,7,8-PeCDF	0.933	0.767	0.473	0.724 ± 0.233
2,3,4,7,8-PeCDF	1.73	2.74	1.87	2.11 ± 0.547
1,2,3,4,7,8-HxCDF	0.065	0.121	0.055	0.080 ± 0.036
1,2,3,6,7,8-HxCDF	<0.0481	0.069	0.054[k] (<0.0446)	0.023 ± 0.040
1,2,3,7,8,9-HxCDF	<0.0481	<0.0445	<0.0446	<0.0481
2,3,4,6,7,8-HxCDF	0.051B (<0.0481)	0.050B (<0.0445)	0.051[k] (<0.0446)	<0.0481
1,2,3,4,6,7,8-HpCDF	0.058B (<0.0481)	0.062B (0.002)	<0.0446	0.00067 ± 0.00012
1,2,3,4,7,8,9-HpCDF	<0.0481	<0.0445	<0.0446	<0.0481
OCDF	0.071B (<0.0481)	0.048B (<0.0445)	<0.0446	<0.0481
∑2,3,7,8-TCDD TEQs[2] (human)	2.37	7.41	2.09	3.95 ± 2.99
∑2,3,7,8-TCDD TEQs[2] (fish)	1.60	7.72	2.32	3.88 ± 3.35
∑TCDDs	0.727	5.45	1.17	2.45 ± 2.61
∑PeCDDs	0.389	0.615	<0.0446	0.335 ± 0.311
∑HxCDDS	0.174	0.324	0.251	0.250 ± 0.075
∑HpCDDs	0.157B (0.034)	0.249B (0.126)	0.143B (0.020)	0.060 ± 0.058
∑TCDFs	8.95	5.60	4.26	6.27 ± 2.42
∑PeCDFs	3.20	4.33	2.91	3.48 ± 0.75
∑HxCDFs	0.065B (<0.0481)	0.450B (0.345)	0.055B (0.0446)	0.115 ± 0.199
∑HpCDFs	0.058B (<0.0481)	0.062B (<0.0445)	<0.0446	<0.0481

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-8: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River at Catskill, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	9746082	9746086	9746091	Mean ± SD
	L6629-28	L6629-29	L6629-30	
Lipid (%)	0.52	1.57	2.29	1.46 ± 0.89
2,3,7,8-TCDD	5.14	1.17	1.96	2.76 ± 2.61
1,2,3,7,8-PeCDD	0.230	0.500	0.732	0.487 ± 0.251
1,2,3,4,7,8-HxCDD	<0.0500	0.084	0.074	0.053 ± 0.046
1,2,3,6,7,8-HxCDD	0.115B (0.062)	0.286B (0.233)	0.404B (0.351)	0.215 ± 0.145
1,2,3,7,8,9-HxCDD	<0.0500	0.064[k] (<0.0496)	0.059[k] (<0.0493)	<0.0500
1,2,3,4,6,7,8-HpCDD	0.102B (<0.0500)	0.246B (0.064)	0.243B (0.061)	0.042 ± 0.036
OCDD	0.208B (<0.0500)	0.465B (<0.0496)	0.313B (<0.0493)	<0.0500
2,3,7,8-TCDF	2.77	4.28	8.28	5.11 ± 2.85
1,2,3,7,8-PeCDF	0.321	0.459	1.32	0.700 ± 0.541
2,3,4,7,8-PeCDF	0.957	1.22	2.10	1.43 ± 0.599
1,2,3,4,7,8-HxCDF	0.052B (0.002)	0.059B (0.009)	0.098B (0.048)	0.020 ± 0.025
1,2,3,6,7,8-HxCDF	<0.0500	0.055	0.085[k] (<0.0493)	0.018 ± 0.032
1,2,3,7,8,9-HxCDF	<0.0500	<0.0496	<0.0493	<0.0500
2,3,4,6,7,8-HxCDF	<0.0500	<0.0496	0.077	0.026 ± 0.044
1,2,3,4,6,7,8-HpCDF	<0.0500	0.062B (<0.0496)	0.073B (<0.0493)	<0.0500
1,2,3,4,7,8,9-HpCDF	<0.0500	<0.0496	<0.0493	<0.0500
OCDF	<0.0500	<0.0496	<0.0493	<0.0500
∑2,3,7,8-TCDD TEQs[2] (human)	5.95	2.52	4.25	4.24 ± 1.72
∑2,3,7,8-TCDD TEQs[2] (fish)	6.00	2.57	4.27	4.28 ± 1.72
∑TCDDs	5.14	1.17	1.96	2.76 ± 2.10
∑PeCDDs	0.230	0.500	0.732	0.487 ± 0.251
∑HxCDDs	0.115B (0.062)	0.370B (0.317)	0.478B (0.425)	0.268 ± 0.186
∑HpCDDs	0.102B (<0.0500)	0.246B (<0.0496)	0.243B (<0.0493)	<0.0500
∑TCDFs	2.99	5.02	9.25	5.75 ± 3.19
∑PeCDFs	1.58	2.39	4.61	2.86 ± 1.57
∑HxCDFs	0.052B (<0.0500)	0.185B (0.068)	0.451B (0.334)	0.134 ± 0.177
∑HpCDFs	<0.0500	0.062B (<0.0496)	0.073B (<0.0493)	<0.0500

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-9: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River at Poughkeepsie, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	9746062	9746066	9746069	Mean ± SD
	L6629-25	L6629-26	L6629-27	
Lipid (%)	8.05	4.55	1.23	4.61 ± 3.41 (2.89)
2,3,7,8-TCDD	77.8	3.75	2.79	28.1 ± 43.0 (3.27)
1,2,3,7,8-PeCDD	1.58	0.509	0.553	0.881 ± 0.606 (0.531)
1,2,3,4,7,8-HxCDD	0.123	0.069	<0.0484	0.064 ± 0.062 (0.035)
1,2,3,6,7,8-HxCDD	0.673	0.231B[3] (0.178)	0.182B (0.129)	0.327 ± 0.301 (0.154)
1,2,3,7,8,9-HxCDD	0.142	0.060B (0.001)	<0.0484	0.048 ± 0.082 (0.0005)
1,2,3,4,6,7,8-HpCDD	0.366B (0.184)	0.178[k] (<0.0500)	0.100B (<0.0484)	0.061 ± 0.106 (<0.0500)
OCDD	0.608B (0.060)	0.334[k] (<0.0500)	0.234B (<0.0484)	0.020 ± 0.035 (<0.0500)
2,3,7,8-TCDF	18.5	6.92	6.06	10.5 ± 6.95 (6.49)
1,2,3,7,8-PeCDF	1.98	0.866	0.836	1.23 ± 0.652 (0.851)
2,3,4,7,8-PeCDF	10.5	1.99	2.51	5.00 ± 4.77 (2.25)
1,2,3,4,7,8-HxCDF	2.42	0.079B (0.029)	0.054B (0.004)	0.818 ± 1.39 (0.017)
1,2,3,6,7,8-HxCDF	0.557	0.055	<0.0484	0.204 ± 0.307 (0.028)
1,2,3,7,8,9-HxCDF	0.050[k] (<0.0491)	<0.0500	<0.0484	<0.0500
2,3,4,6,7,8-HxCDF	0.284	0.072	0.051[k] (<0.0484)	0.119 ± 0.148 (0.036)
1,2,3,4,6,7,8-HpCDF	0.485B (0.403)	0.056[k] (<0.0500)	<0.0484	0.134 ± 0.233 (<0.0500)
1,2,3,4,7,8,9-HpCDF	0.062B (<0.0491)	<0.0500	<0.0484	<0.0500
OCDF	0.165[k] (<0.0491)	0.060[k] (<0.0500)	<0.0484	<0.0500
∑2,3,7,8-TCDD TEQs[2] (human)	84.9	5.61	4.74	31.8 ± 46.0 (5.18)
∑2,3,7,8-TCDD TEQs[2] (fish)	86.0	5.69	4.94	32.2 ± 46.6 (5.32)
∑TCDDs	78.0	3.75	2.79	28.2 ± 43.1 (3.27)
∑PeCDDs	1.58	0.509	0.553	0.881 ± 0.606 (0.531)
∑HxCDDs	1.00	0.360B (0.307)	0.182B (0.129)	0.479 ± 0.460

				(0.218)
∑HpCDDs	0.480B (0. 218)	0.071B (<0.0500)	0.100B (<0.0484)	0.073 ± 0.126 (<0.0500)
∑TCDFs	22.4	7.80	6.45	12.2 ± 8.84 (7.13)
∑PeCDFs	16.3	3.80	4.02	8.04 ± 7.15 (3.91)
∑HxCDFs	4.16	0.287B (0.170)	0.160B (0.043)	1.46 ± 2.34 (0.107)
∑HpCDFs	0.547B (0.396)	<0.0500	<0.0484	0.132 ± 0.229 (<0.0500)

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix C-10: Chlorinated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River at Haverstraw, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]			
	9746059	9746060	9746061	Mean ± SD
	L6629-22 (A)	L6629-23	L6629-24	
Lipid (%)	2.74	3.18	4.77	3.56 ± 1.07
2,3,7,8-TCDD	1.19	0.585	0.931	0.090 ± 0.030
1,2,3,7,8-PeCDD	0.335	0.425	0.688	0.483 ± 0.183
1,2,3,4,7,8-HxCDD	<0.0499	0.054	0.117	0.065 ± 0.047
1,2,3,6,7,8-HxCDD	0.174B[3] (0.121)	0.181B (0.128)	0.429B (0.376)	0.208 ± 0.145
1,2,3,7,8,9-HxCDD	<0.0499	<0.0494	0.118[k] (<0.0488)	<0.0499
1,2,3,4,6,7,8-HpCDD	0.168B (<0.0499)	0.166B (<0.0494)	0.224B (<0.0488)	<0.0499
OCDD	0.354B (<0.0499)	0.344B (<0.0494)	0.288B (<0.0488)	<0.0499
2,3,7,8-TCDF	4.81	2.74	7.90	5.15 ± 2.60
1,2,3,7,8-PeCDF	0.813	0.268	1.32	0.800 ± 0.526
2,3,4,7,8-PeCDF	1.14	0.787B (0.729)	2.44	1.44 ± 0.893
1,2,3,4,7,8-HxCDF	0.053	<0.0494	0.149B (0.099)	0.051 ± 0.050
1,2,3,6,7,8-HxCDF	<0.0499	<0.0494	0.146	0.049 ± 0.084
1,2,3,7,8,9-HxCDF	<0.0499	<0.0494	<0.0488	<0.0499
2,3,4,6,7,8-HxCDF	<0.0499	<0.0494	0.138	0.046 ± 0.080
1,2,3,4,6,7,8-HpCDF	<0.0499	0.056B (<0.0494)	0.091B (0.009)	0.0030 ± 0.0052
1,2,3,4,7,8,9-HpCDF	<0.0499	<0.0494	<0.0488	<0.0499
OCDF	<0.0499	0.065B (<0.0494)	<0.0488	<0.0499
∑2,3,7,8-TCDD TEQs[2] (human)	2.39	1.53	3.27	2.40 ± 0.870
∑2,3,7,8-TCDD TEQs[2] (fish)	2.38	1.55	3.39	2.44 ± 0.919
∑TCDDs	1.19	0.585	0.931	0.902 ± 0.304
∑PeCDDs	0.335	0.425	0.688	0.483 ± 0.183
∑HxCDDs	0.174B (0.121)	0.235B (0.182)	0.666B (0.613)	0.305 ± 0.268
∑HpCDDs	0.221B (<0.0499)	0.223B (<0.0494)	0.294B (0.032)	0.0107 ± 0.0185
∑TCDFs	5.34	3.26	10.6	6.40 ± 3.78
∑PeCDFs	2.74	1.31	6.78	3.61 ± 2.84
∑HxCDFs	0.119B (0.002)	<0.0494	0.834B (0.717)	0.240 ± 0.413
∑HpCDFs	<0.0499	0.056B (<0.0494)	0.091B (<0.0488)	<0.0499

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals (Van den Berg *et al*., 2006) and for fish (Van den Berg *et al*., 1998) were used in computations of toxic equivalents (TEQs). Computations equate values below the detection limit to zero.
[3] B = At least one blank with value greater than 10 percent of sample concentration. Blank corrected concentrations, in parenthesis, were used for computations.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations.

Appendix D

Polybrominated dibenzo-*p*-dioxins and furans (PBDD/Fs)

Appendix D-1: Brominated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at North River, NY; July 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	2.24	<0.916	<0.500	0.747 ± 1.29
1,2,3,7,8,9-HxBDD	0.750[k] (<0.500)	<1.02	<0.500	<1.02
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	0.540	<0.107	<0.100	0.180 ± 0.312
1,2,3,7,8-PeBDF	1.77[k] (<0.500)	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	1.99	<0.500	<0.500	0.663 ± 1.15
1,2,3,4,7,8-HxBDF	1.61[k] (<0.500)	<0.601	0.524B (<0.500)	<0.601
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	3.41	1.14 ± 1.97
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is not included in statistical computations.
B = Blank contamination exceeds 10 % of concentration. The blank adjusted concentration is in parenthesis.

Appendix D-2: Brominated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at the Feeder Dam Pool, Corinth, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.19	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	0.146	0.0487 ± 0.0843
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.500	0.652[k] (<0.500)	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is not included in statistical computations.

Appendix D-3: Brominated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at the Thompson Island Pool, Fort Edward, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	0.599[k] (<0.500)	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is not included in statistical computations.

Appendix D-4: Brominated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at the Stillwater Pool, Stillwater, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003208	0003209	0003210	Mean ± SD
	L6629-10	L6629-11	L6629-12	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.

Appendix D-5: Brominated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River below the Federal Dam, Troy, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003828	0003832	0003833	Mean ± SD
	L6629-16	L6629-17	L6629-18	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	0.612[k] (<0.500)	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	0.109	<0.100	0.0363 ± 0.0629
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	0.655B (0.070)	<0.500	0.0233 ± 0.0404
1,2,3,4,7,8-HxBDF	<0.500	0.811B (0.255)	<0.500	0.0850 ± 0.147
1,2,3,4,6,7,8-HpBDF	<1.00	1.29	<1.00	0.430 ± 0.745
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.
[k] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is not included in statistical computations.
B = Blank contamination exceeds 10 % of concentration. The blank adjusted concentration is in parenthesis.

Appendix D-6: Brominated dibenzo-*p*-dioxins and dibenzofurans in smallmouth bass taken from the Hudson River at Catskill, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003910	0003911	0003917	Mean ± SD
	L6629-19	L6629-20	L6629-21	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.

Appendix D-7: Brominated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River below the Federal Dam, Troy, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.

Appendix D-8: Brominated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River at Catskill, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746082	9746086	9746091	Mean ± SD
	L6629-28	L6629-29	L6629-30	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.

Appendix D-9: Brominated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River at Poughkeepsie, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746062	9746066	9746069	Mean ± SD
	L6629-25	L6629-26	L6629-27	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.

Appendix D-10: Brominated dibenzo-*p*-dioxins and dibenzofurans in striped bass taken from the Hudson River at Haverstraw, NY; May 2003.

Parameter	Concentration (pg/g wet weight) in standard fillet[1]:			
	9746059	9746060	9746061	Mean ± SD
	L6629-22(A)	L6629-23	L6629-24	
2,3,7,8-TBDD	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDD + 1,2,3,6,7,8-HxBDD	<0.500	<0.500	<0.500	<0.500
1,2,3,7,8,9-HxBDD	<0.500	<0.500	<0.500	<0.500
OBDD	<2.00	<2.00	<2.00	<2.00
2,3,7,8-TBDF	<0.100	<0.100	<0.100	<0.100
1,2,3,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
2,3,4,7,8-PeBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,7,8-HxBDF	<0.500	<0.500	<0.500	<0.500
1,2,3,4,6,7,8-HpBDF	<1.00	<1.00	<1.00	<1.00
OBDF	<2.00	<2.00	<2.00	<2.00

[1] Sample identifications are the tag number and contract laboratory identification, respectively.

Appendix E

Polychlorinated biphenyls (PCBs)

Appendix E-1: Polychlorinated biphenyl (PCB) congeners in smallmouth bass taken from the Hudson River at North River, NY; July 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
Lipid (%)	0.51	2.03	1.40	1.31 ± 0.764
1	22.0	0.978[k] (<0.190)	0.753[k] (<0.200)	7.33 ± 12.7
2	8.86	1.38[k] (<0.221)	0.896[k] (<0.207)	2.99 ± 5.17
3	35.5	1.94[k] (<0.235)	1.28[k] (<0.203)	11.8 ± 20.5
4	44.8	1.41	1.41[k] (<0.721)	15.4 ± 25.5
5	4.85	<0.461	<0.382	1.62 ± 2.80
6	37.1	0.809 B (0.451)	0.637 B (0.279)	12.6 ± 21.2
7	19.9	0.905 B (0.065)	3.43 B (2.59)	7.52 ± 10.8
8	166	3.74 B (2.25)	2.75 B (1.26)	57.4 ± 94.0
9	12.6	<0.402	<0.334	4.20 ± 7.27
10	<0.415	<0.412	<0.342	<0.415
11	5.42 B (1.54)	3.45 B (<0.443)	3.60 B (<0.365)	0.513 ± 0.889
12/13	8.34	<0.443	<0.368	2.78 ± 4.82
14	<0.429	<0.426	<0.354	<0.429
15	38.1	1.67 B (0.961)	1.41 B (0.701)	13.3 ± 21.5
16	87.3	2.27 B (1.82)	1.68 B (1.23)	30.1 ± 49.5
17	112	3.21 B (2.60)	2.11 B (1.50)	38.7 ± 63.5
18/30	222	6.01 B (4.69)	4.13 B (2.81)	76.5 ± 126
19	23.0	0.807	0.415	8.07 ± 12.9
20/28	194	20.3	13.5 B (11.6)	75.9 ± 102
21/33	139	4.46 B (3.36)	3.30 B (2.20)	48.2± 78.6
22	71.9	4.16 B (3.50)	2.83 B (2.17)	25.9 ± 39.9
23	0.457	<0.121	<0.0677	0.152 ± 0.263
24	4.32	0.147[k] (<0.111)	0.112 B (0.043)	1.45 ± 2.48
25	16.2	0.872[k] (<0.105)	0.654	5.62 ± 9.17
26/29	41.3	2.15[k] (<0.116)	1.26	14.2 ± 23.5
27	15.7	0.638	0.376	5.57 ± 8.77
31	182	11.1	7.22	66.8 ± 99.8
32	63.0	1.81	1.15	22.0 ± 35.5
34	0.866	<0.122	<0.0685	0.289 ± 0.500
35	0.348[k] (<0.163)	<0.112	0.109[k] (<0.0631)	<0.163
36	<0.157	<0.108	<0.0606	<0.157
37	25.6	3.34	2.40	10.4 ± 13.1
38	<0.161	<0.111	<0.0623	<0.161
39	<0.164	<0.112	<0.0632	<0.164
40/41/71	96.9	5.68	4.58 B (4.03)	35.5 ± 53.1

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
42	42.5	4.46	3.22	16.7 ± 22.3
43	8.19	0.621	0.471[k] (<0.121)	2.94 ± 4.56
44/47/65	392	22.8	15.5	143 ± 215
45/51	32.8	2.15 B (1.70)	1.70	12.1 ± 18.0
46	10.2	0.477	0.379	3.69 ± 5.64
48	41.6	2.93	2.46	15.7 ± 22.5
49/69	183	15.6	10.6	69.7 ± 98.1
50/53	30.7	1.69 B (1.41)	1.25 B (0.967)	11.0 ± 17.0
52	813	32.7	22.5 B (19.8)	289 ± 454
54	0.267	<0.0829	<0.0869	0.0890 ± 0.154
55	2.90	<0.433	<0.240	0.967 ± 1.67
56	61.3	6.73	4.51	24.2 ± 32.2
57	0.443[k] (<0.148)	<0.419	<0.232	<0.419
58	0.630	<0.432	<0.239	0.210 ± 0.364
59/62/75	13.1	1.89	1.27 B (1.12)	5.37 ± 6.71
60	34.2	10.4	7.93	17.5 ± 14.5
61/70/74/76	594	61.5	46.0	234 ± 312
63	8.68	2.71	2.12	4.50 ± 3.63
64	111	9.80	6.63	42.5 ± 59.4
66	167	45.5	36.1	82.9 ± 73.0
67	3.45	0.652	0.452	1.52 ± 1.68
68	2.56	1.54	1.25	1.78 ± 0.688
72	1.09	0.815[k] (<0.406)	0.668	0.586 ± 0.550
73	<0.116	<0.0842	<0.0871	<0.116
77	6.98	7.85	6.64	7.16 ± 0.624
78	<0.148	<0.418	<0.231	<0.418
79	4.51	1.01	0.841[k] (<0.196)	1.84 ± 2.37
80	<0.135	<0.381	<0.211	<0.381
81	0.889	0.637	0.416	0.647 ± 0.237
82	53.5	9.22	7.42	23.4 ± 26.1
83/99	460	109	89.9	220 ± 208
84	221	8.22	6.56	78.6 ± 123
85/116/117	119	33.3	26.6	59.6 ± 51.5
86/87/97/108/ 119/125	485	63.6	53.6	201 ± 246
88/91	112	9.25	6.97	42.7 ± 60.0
89	5.56	0.233[k] (<0.153)	<0.224	1.85 ± 3.21
90/101/113	853	128	108	363 ± 424
92	151	22.1	18.8	64.0 ± 75.4

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
93/95/98/100/102	775	40.8	30.9	282 ± 427
94	3.21	0.236[k] (<0.155)	<0.226	1.07 ± 1.85
96	4.39	0.194	0.084[k] (<0.0694)	1.53 ± 2.48
103	3.93	0.455	0.419	1.60 ± 2.02
104	<0.0610	<0.0586	<0.0577	<0.0610
105	183	117	106	135 ± 41.6
106	<0.134	<0.267	<0.249	<0.267
107/124	19.6	7.90	6.96	11.5 ± 7.04
109	41.6	24.7	22.8	29.7 ± 10.3
110/115	720	120	91.5	311 ± 355
111	0.400	0.776	0.792	0.656 ± 0.222
112	<0.168	<0.107	<0.156	<0.168
114	11.6	7.03	6.03	8.22 ± 2.97
118	556	309	270	378 ± 155
120	2.44	2.78	2.60	2.61 ± 0.170
121	0.379	0.351[k] (<0.111)	0.392	0.257 ± 0.223
122	3.98	1.19	1.08	2.08 ± 1.64
123	11.1	7.79	7.64	8.84 ± 1.96
126	1.80	2.06	1.94	1.93 ± 0.130
127	1.03	0.739	0.608	0.792 ± 0.216
128/166	92.6	66.9	63.4	74.3 ± 15.9
129/138/160/163	724	393	379	499 ± 195
130	41.7	30.7	31.3	34.6 ± 6.18
131	6.35	1.73	1.53	3.20 ± 2.73
132	112	33.8	32.0	59.3 ± 45.7
133	15.9	10.8	10.7	12.5 ± 2.97
134/143	22.0	5.11	4.22	10.4 ± 10.0
135/151/154	144	48.2	44.9	79.0 ± 56.3
136	51.1	4.32	3.77	19.7 ± 27.2
137	46.9	23.4	24.0	31.4 ± 13.4
139/140	12.4	3.26	3.08	6.25 ± 5.33
141	95.0	39.5	40.8	58.4 ± 31.7
142	<0.604	<0.256	<0.501	<0.604
144	17.5	7.00	5.37	9.96 ± 6.58
145	0.243	<0.0610	<0.0506	0.0810 ± 0.140
146	143	109	105	119 ± 20.9
147/149	350	107	94.5	184 ± 144
148	1.04	0.660	0.826	0.842 ± 0.191

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
150	0.661	0.122	0.135	0.306 ± 0.308
152	0.555	<0.0522	0.083[k] (<0.0506)	0.185 ± 0.320
153/168	927	672	656	752 ± 152
155	0.403	0.168	0.161	0.244 ± 0.138
156/157	89.6	72.3	71.8	77.9 ± 10.1
158	60.7	35.4	34.1	43.4 ± 15.0
159	3.94	2.68	2.44	3.02 ± 0.806
161	<0.423	<0.179	<0.351	<0.423
162	4.55	4.28	4.56	4.46 ± 0.159
164	29.5	14.8	13.7	19.3 ± 8.82
165	0.883	0.712	0.487	0.694 ± 0.199
167	40.8	37.3	36.7	38.3 ± 2.21
169	<1.23	<1.19	<0.146	<1.23
170	147	105	104	119 ± 24.5
171/173	31.0	16.4	16.9	21.4 ± 8.29
172	49.8	41.5	41.4	44.2 ± 4.82
174	77.7	43.7	39.7	53.7 ± 20.9
175	6.81	5.57	5.89	6.09 ± 0.644
176	7.27	2.76	2.40	4.14 ± 2.71
177	62.6	58.3	54.8	58.6 ± 3.91
178	48.1	38.4	39.3	41.9 ± 5.36
179	23.0	8.30	7.48	12.9 ± 8.73
180/193	494	397	376	422 ± 62.9
181	1.77	1.56	1.47	1.60 ± 0.154
182	2.73	1.34	1.46	1.84 ± 0.770
183/185	128	83.2	82.8	98.0 ± 26.0
184	0.912	0.250	0.319[k] (<0.0538)	0.387 ± 0.471
186	<0.0958	<0.0497	<0.0580	<0.0958
187	301	251	250	267 ± 29.2
188	0.932	0.651	0.677	0.753 ± 0.155
189	11.1	9.76	9.24	10.0 ± 0.960
190	38.0	33.4	32.6	34.7 ± 2.91
191	6.88	5.35	5.58	5.94 ± 0.825
192	0.230	0.212[k] (<0.0530)	<0.0646	0.0767 ± 0.133
194	97.3	77.0	74.2	82.8 ± 12.6
195	24.9	18.1	17.1	20.0 ± 4.24
196	48.4	32.1	31.6	37.4 ± 9.56
197/200	9.52	4.52	3.82	5.95 ± 3.11

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003287	0003288	0003289	Mean ± SD
	L6629-13	L6629-14	L6629-15	
198/199	169	131	129	143 ± 22.5
201	13.3	9.64	9.44	10.8 ± 2.17
202	34.1	26.4	24.4	28.3 ± 5.12
203	122	87.3	86.1	98.5 ± 20.4
204	0.468	0.198	0.168[k] (<0.0506)	0.222 ± 0.235
205	6.63	4.43	4.06	5.04 ± 1.39
206	77.4	46.5	46.7	56.9 ± 17.8
207	11.2	5.26	5.37	7.28 ± 3.40
208	25.9	17.3	16.3	19.8 ± 5.28
209	22.6	13.5	13.2	16.4 ± 5.34
Mono-PCB	66.4	<0.235	<0.207	22.1 ± 38.3
Di-PCB	333	5.14	4.83	114 ± 189
Tri-PCB	1200	54.0	35.0	429 ± 667
Tetra-PCB	2660	239	172	1020 ± 1420
Penta-PCB	4800	1030	868	2230 ± 2220
Hexa-PCB	3030	1720	1660	2140 ± 774
Hepta-PCB	1440	1100	1070	1200 ± 206
Octa-PCB	526	391	380	432 ± 81.3
Nona-PCB	115	69.1	68.4	84.2 ± 26.7
Deca-PCB	22.6	13.5	13.2	16.4 ± 5.34
Total PCB	14200	4620	4280	7700 ± 5630
TEQ – human[2]	0.207	0.223	0.209	0.213 ± 0.00872
TEQ – fish (TEF = 0)[3]	0.010	0.011	0.011	0.0107 ± 0.0006
TEQ - fish (TEF = value)[3]	0.015	0.014	0.013	0.0140 ± 0.0010

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank was greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-2: Polychlorinated biphenyl (PCB) congeners in smallmouth bass taken from the Hudson River at the Feeder Dam Pool, Corinth, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6	
Lipid (%)	0.78	0.62	0.52	0.640 ± 0.131
1	14.5 B (12.7)	1.43	28.2	14.1 ± 13.4
2	0.350 B (0.166)	0.259 B (0.155)	0.181 B (<0.138)	0.107 ± 0.093
3	1.09 B (0.706)	0.517	0.811 B (0.427)	0.550 ± 0.142
4	37.4	7.68	62.1	35.7 ± 27.2
5	<0.775	<0.299	<0.149	<0.775
6	2.45	1.48	1.92	1.95 ± 0.486
7	20.4	0.601	5.35	8.78 ± 10.3
8	8.86	5.22	8.73	7.60 ± 2.07
9	<0.727	0.402[k] (<0.285)	0.620	0.207 ± 0.358
10	6.91	1.10	9.09	5.70 ± 4.13
11	1.73 B (0.589)	1.87	1.80 B (0.650)	1.04 ± 0.723
12/13	<0.767	0.292[k] (<0.288)	0.619	0.206 ± 0.357
14	<0.753	<0.293	<0.146	<0.753
15	2.50	2.41	2.16	2.17 ± 0.269
16	6.13	6.84	3.23	5.40 ± 1.91
17	19.4	16.7	11.7	15.9 ± 3.91
18/30	22.5	25.3	12.1	20.0 ± 6.96
19	20.1	8.53	31.7	20.1 ± 11.6
20/28	343	149	79.9	191 ± 136
21/33	23.7	17.2	10.2	17.0 ± 6.75
22	71.5	33.5	22.4	42.5 ± 25.7
23	0.318	0.162[k] (<0.0555)	0.189	0.169 ± 0.160
24	0.942	0.681	0.547	0.723 ± 0.201
25	20.0	9.70	8.22	12.6 ± 6.42
26/29	43.5	22.6	24.4	30.2 ± 11.6
27	11.1	5.78	11.6	9.49 ± 3.23
31	160	82.8	61.7	102 ± 51.7
32	22.5	13.9	16.6	17.7 ± 4.40
34	3.25	0.904	1.16	1.77 ± 1.29
35	<0.216	<0.0505	<0.173	<0.216
36	<0.172	<0.0495	<0.148	<0.172
37	20.4	8.84	5.52	11.6 ± 7.81
38	1.33	0.098[k] (<0.0533)	0.350	0.560 ± 0.689
39	2.14	0.746	0.986	1.29 ± 0.745
40/41/71	202	73.0	52.9	109 ± 80.9

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6	
42	180	55.7	41.3	92.3 ± 76.3
43	22.2	7.91	5.87	12.0 ± 8.90
44/47/65	630	253	199	361 ± 235
45/51	31.4	18.0	16.2	21.9 ± 8.31
46	4.51	3.29	2.29	3.36 ± 1.11
48	43.7	26.1	14.0	27.9 ± 14.9
49/69	538	217	153	303 ± 206
50/53	19.8	17.2	17.1	18.0 ± 1.53
52	726	316	212	418 ± 272
54	0.974	0.529	1.63	1.04 ± 0.554
55	33.5	<0.414	5.08	12.9 ± 18.1
56	429	109	83.4	207 ± 193
57	10.4	3.46	4.76	6.21 ± 3.69
58	45.7	2.11	1.21	16.3 ± 25.4
59/62/75	77.5	27.6	21.0	42.0 ± 30.9
60	407	83.0	75.4	188 ± 189
61/70/74/76	2490	620	383	1160 ± 1150
63	120	33.7	31.9	61.9 ± 50.4
64	428	124	90.7	214 ± 186
66	2260	455	321	1010 ± 1080
67	26.5	11.8	8.52	15.6 ± 9.58
68	18.1	6.80	9.72	11.5 ± 5.87
72	24.6	9.74	15.6	16.6 ± 7.49
73	9.32	<0.0481	1.77	3.70 ± 4.95
77	55.4	27.5	17.1	33.3 ± 19.8
78	<3.28	<0.395	<0.403	<3.28
79	33.5	5.63	5.35	14.8 ± 16.2
80	<3.01	<0.369	<0.353	<3.01
81	6.11	1.14 B (0.733)	1.19	2.68 ± 2.98
82	231	58.5	53.6	114 ± 101
83/99	1800	669	412	960 ± 738
84	185	61.5	47.8	98.1 ± 75.6
85/116/117	521	201	156	293 ± 199
86/87/97/108/ 119/125	1450	469	337	752 ± 608
88/91	224	75.2	63.0	121 ± 89.6
89	6.66	2.38	2.32	3.79 ± 2.49

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6	
90/101/113	2450	927	563	1310 ± 1000
92	422	190	139	250 ± 151
93/95/98/100/102	680	307	201	396± 252
94	4.09	1.99	2.50	2.86 ± 1.10
96	2.79	1.15	1.69	1.88 ± 0.836
103	15.0	8.20	6.01	9.74 ± 4.69
104	0.220	0.066[k] (<0.0481)	<0.237	0.0733 ± 0.127
105	1190	477	325	664 ± 462
106	<6.92	<2.16	<1.64	<6.92
107/124	99.4	36.1	30.6	55.4 ± 38.2
109	300	109	79.5	163 ± 120
110/115	2320	729	518	1190 ± 985
111	4.32	2.12	1.80	2.75 ± 1.37
112	<0.823	<0.0725	<0.288	<0.823
114	88.1	35.1	27.2	50.1 ± 33.1
118	3200	1400	867	1820 ± 1220
120	17.4	8.39	6.10	10.6 ± 5.97
121	<0.762	0.616	0.293	0.303 ± 0.308
122	22.8	9.81	9.22	13.9 ± 7.68
123	61.1	27.5	19.1	35.9 ± 22.2
126	8.70	5.07	1.97	5.08 ± 3.39
127	<7.36	<2.23	1.75	0.583 ± 1.01
128/166	762	253	208	408 ± 308
129/138/160/163	5340	2270	1630	3080 ± 1980
130	270	128	100	166 ± 91.1
131	10.9	8.00	5.99	8.30 ± 2.47
132	672	253	210	378 ± 255
133	94.3	54.4	38.4	62.4 ± 28.8
134/143	101	44.4	34.9	60.1 ± 35.7
135/151/154	1040	475	309	608 ± 383
136	177	63.4	46.8	95.7 ± 70.9
137	191	88.5	60.0	113 ± 68.9
139/140	67.3	30.4	20.3	39.3 ± 24.7
141	790	324	241	452 ± 296
142	23.2	<1.10	<1.11	7.73 ± 13.4
144	136	52.5	30.6	73.0 ± 55.6
145	0.785	0.134	0.172	0.364 ± 0.365
146	1030	468	305	601 ± 380

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6	
147/149	2910	1070	695	1560 ± 1190
148	8.66	3.77	2.49	4.97 ± 3.26
150	2.13	0.976	0.832	1.31 ± 0.711
152	1.11	0.478	0.581	0.723 ± 0.339
153/168	6080	2620	1590	3430 ± 2350
155	0.583	0.314 B (0.094)	0.463	0.380 ± 0.25
156/157	444	256	165	288 ± 142
158	419	182	122	241 ± 157
159	71.3	16.8	16.7	34.9 ± 31.5
161	<2.01	<0.762	<0.806	<2.01
162	19.1	11.3	7.74	12.7 ± 5.81
164	256	119	83.1	153 ± 91.2
165	15.5	1.84	2.14	6.49 ± 7.80
167	167	97.6	63.3	109 ± 52.8
169	<6.12	<1.70	<2.42	<6.12
170	1190	538	499	742 ± 388
171/173	378	152	127	219 ± 138
172	306	150	130	195 ± 96.4
174	1370	451	383	735 ± 551
175	66.2	24.2	16.0	35.5 ± 26.9
176	149	43.8	31.9	74.9 ± 64.4
177	900	375	311	529 ± 323
178	460	207	134	267 ± 171
179	471	150	112	244 ± 197
180/193	4380	1770	1460	2540 ± 1600
181	10.7	5.45	4.38	6.84 ± 3.38
182	15.6	8.86	6.42	10.3 ± 4.75
183/185	1460	538	337	778 ± 599
184	1.60	1.35	0.672	1.21 ± 0.480
186	0.241	<0.0481	<0.114	0.0803 ± 0.139
187	3710	1530	1020	2090 ± 1430
188	2.66	1.35 B (0.981)	1.34	1.66 ± 0.884
189	38.4	28.3	20.9	29.2 ± 8.78
190	329	159	143	210 ± 103
191	51.5	24.1	18.3	31.3 ± 17.7
192	<0.0479	<0.0481	<0.142	<0.142
194	589	347	378	438 ± 132
195	277	132	147	185 ± 79.7

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003011	0003012	0003017	Mean ± SD
	L6629-4	L6629-5	L6629-6	
196	367	163	136	222 ± 126
197/200	116	40.9	34.6	63.8 ± 45.3
198/199	1100	558	475	711 ± 339
201	137	50.5	34.2	73.9 ± 55.3
202	269	102	107	159 ± 95.0
203	685	357	305	449 ± 206
204	0.566	0.408	0.310	0.428 ± 0.129
205	33.0	21.4	18.1	24.2 ± 7.83
206	182	128	146	152 ± 27.5
207	31.6	17.4	18.3	22.4 ± 7.95
208	89.2	52.0	54.9	65.4 ± 20.7
209	66.9	49.6	56.2	57.6 ± 8.73
Mono-PCB	13.6	2.10	28.6	14.8 ± 13.3
Di-PCB	79.1	20.4	91.2	63.6 ± 37.9
Tri-PCB	792	403	303	499 ± 258
Tetra-PCB	8870	2510	1790	4390 ± 3900
Penta-PCB	15300	5810	3870	8330 ± 6120
Hexa-PCB	21100	8890	5990	12000 ± 8020
Hepta-PCB	15300	6160	4760	8740 ± 5720
Octa-PCB	3570	1770	1640	2330 ± 1080
Nona-PCB	303	197	219	240 ± 55.9
Deca-PCB	66.9	49.6	56.2	57.6 ± 8.73
Total PCB	65400	25800	18700	36700 ± 25100
TEQ - human[2]	1.03	0.577	0.241	0.616 ± 0.396
TEQ – fish (TEF = 0)[3]	0.052	0.028	0.012	0.0307 ± 0.0201
TEQ – fish (TEF = value)[3]	0.078	0.040	0.020	0.0460 ± 0.0295

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-3: Polychlorinated biphenyl (PCB) congeners in smallmouth bass taken from the Hudson River at the Thompson Island Pool, Fort Edward, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
Lipid (%)	1.10	0.76	1.28	1.05 ± 0.264
1	nq[2]	12400	25700	19050
2	nq	12.3	30.7	21.5
3	466	204	468	379 ± 152
4	64100	30600	61300	52000 ± 18600
5	12.8	9.60	12.3[k] (<2.68)	7.47 ± 6.66
6	1470	821	1240	1180 ± 329
7	71.2	106	65.4	80.9 ± 22.0
8	6140	3490	5200	4940 ± 1340
9	540	296	481	439 ± 127
10	7580	4330	8850	6920 ± 2330
11	22.0	7.24 B (6.09)	23.4	17.5 ± 8.95
12/13	410	194	334	313 ± 110
14	4.48	<1.52	2.91	2.46 ± 2.27
15	817	369	777	654 ± 248
16	1180	1080	1050	1100 ± 68.1
17	12700	7660	9790	10100 ± 2530
18/30	9100	6170	7890	7720 ± 1470
19	35300	18100	27200	26900 ± 8600
20/28	66400	41000	54300	53900 ± 12700
21/33	4830	5570	4810	5070 ± 433
22	12100	8590	9940	10200 ± 1770
23	263	<243	<254	87.7 ± 152
24	715	441	615	590 ± 139
25	10600	5600	7560	7920 ± 2520
26/29	34600	18800	25900	26400 ± 7910
27	19100	9430	13800	14100 ± 4840
31	74200	40200	58500	57600 ± 17000
32	21000	12500	17400	17000 ± 4270
34	2090	957	1300	1450 ± 581
35	<68.2	<280	<293	<293
36	<62.1	<241	<252	<252
37	2570	1890	2500	2320 ± 374
38	441	300	274	338 ± 89.9
39	730	431	498	553 ± 157
40/41/71	48600	31700	31600	37300 ± 9790

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
42	41500	26000	25400	31000 ± 9130
43	9200	3830	4170	5730 ± 3010
44/47/65	280000	124000	120000	175000 ± 91200
45/51	25200	12700	15800	17900 ± 6510
46	2290	1480	1800	1860 ± 408
48	12500	8260	7900	9550 ± 2560
49/69	197000	90500	89300	126000 ± 61800
50/53	31600	14500	21700	22600 ± 8590
52	246000	109000	111000	155000 ± 78500
54	2220	1150	1460	1610 ± 551
55	2400	1180	1150	1580 ± 713
56	52400	38200	34900	41800 ± 9300
57	9010	3670	3250	5310 ± 3210
58	7760	676	523	3000 ± 4130
59/62/75	29500	14700	15700	20000 ± 8270
60	58200	46100	40500	48300 ± 9050
61/70/74/76	197000	156000	111000	155000 ± 43000
63	52700	22100	21900	32200 ± 17700
64	76800	53600	58200	62900 ± 12300
66	147000	128000	87400	121000 ± 30400
67	9020	5710	4750	6490 ± 2240
68	23700	7890	7990	13200 ± 9100
72	36300	12900	12600	20600 ± 13600
73	4250	1660	1750	2550 ± 1470
77	8540	5450	5650	6550 ± 1730
78	<113	<140	<100	<140
79	2980	1110	641	1580 ± 1240
80	<101	<127	<90.5	<127
81	534	502	397	478 ± 71.7
82	22300	18300	9450	16700 ± 6580
83/99	223000	189000	97300	170000 ± 65000
84	34400	18900	14900	22700 ± 10300
85/116/117	50700	61800	37100	49900 ± 12400
86/87/97/108/ 119/125	153000	139000	59800	117000 ± 50300
88/91	80000	43800	32000	51900 ± 25000
89	1410	887	652	983 ± 388
90/101/113	276000	212000	103000	197000 ± 87500
92	133000	57500	39600	76700 ± 49600

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
93/95/98/100/102	193000	81900	65500	113000 ± 69400
94	4010	1490	1640	2380 ± 1410
96	2690	982	1090	1590 ± 956
103	8430	3430	2510	4790 ± 3190
104	458	163	166	262 ± 169
105	104000	100000	47600	83900 ± 31500
106	<411	318	<187	106 ± 184
107/124	7610	6790	3420	5940 ± 2220
109	27600	20400	11200	19700 ± 8220
110/115	255000	200000	102000	186000 ± 77500
111	1770	739	597	1040 ± 640
112	10500	4860	3100	6150 ± 3870
114	11600	11200	5010	9270 ± 3690
118	224000	199000	85800	170000 ± 73600
120	3320	1550	1120	2000 ± 1170
121	568	317	224	370 ± 178
122	2850	2430	1410	2230 ± 741
123	6450	6350	2560	5120 ± 2220
126	<327	360	172	177 ± 180
127	<406	400	<199	133 ± 231
128/166	43000	36300	15500	31600 ± 14300
129/138/160/163	269000	186000	127000	194000 ± 71300
130	22200	16100	7460	15300 ± 7410
131	1590	742	<74.3	777 ± 796
132	63400	44500	17700	41900 ± 23000
133	28200	11800	7020	15700 ± 11100
134/143	14400	8370	4870	9210 ± 4820
135/151/154	132000	72700	37800	80800 ± 47600
136	32400	14400	7670	18200 ± 12800
137	13400	13800	5660	11000 ± 4590
139/140	6200	5070	1990	4420 ± 2180
141	28000	26500	10500	21700 ± 9700
142	<351	1570	514	695 ± 800
144	3950	4630	1600	3390 ± 1590
145	120	<0.352	<0.495	40.0 ± 69.3
146	90700	54900	28200	57900 ± 31400
147/149	170000	149000	65300	128000 ± 55400
148	1870	1240	584	1230 ± 643

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
150	973	471	260	568 ± 366
152	753	550	324	542 ± 215
153/168	170000	123000	86500	127000 ± 41900
155	489	195	115	266 ± 197
156/157	26900	25200	10600	20900 ± 8960
158	21800	20900	7700	16800 ± 7890
159	984	1080	439	834 ± 346
161	<255	<195	<103	<255
162	821	799	372	664 ± 253
164	10100	10100	4510	8240 ± 3230
165	3850	2150	1250	2420 ± 1320
167	8490	7610	3340	6480 ± 2760
169	<280	<161	<82.8	<280
170	32100	23900	11000	22300 ± 10600
171/173	10200	8340	2900	7150 ± 3790
172	9000	5150	2730	5630 ± 3160
174	28600	19900	8440	19000 ± 10100
175	1310	1100	391	934 ± 482
176	4470	2670	1070	2740 ± 1700
177	36900	20400	10100	22500 ± 13500
178	38800	18100	9470	22100 ± 15100
179	23700	8950	4550	12400 ± 10000
180/193	76900	52800	26400	52000 ± 25300
181	940	665	284	630 ± 329
182	1210	646	346	734 ± 439
183/185	24200	18000	6600	16300 ± 8930
184	179	160	51.5	130 ± 68.8
186	18.6	11.0	4.64	11.4 ± 6.99
187	103000	76700	35100	71600 ± 34200
188	469	202	110	260 ± 186
189	1520	1000	547	1020 ± 487
190	7310	5730	2790	5280 ± 2290
191	1170	892	387	816 ± 397
192	5.54	3.01	4.54	4.36 ± 1.27
194	17200	8360	5100	10200 ± 6260
195	7110	4100	1820	4340 ± 2650
196	7120	4820	2130	4690 ± 2500
197/200	2830	1520	681	1680 ± 1080

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003075	0003076	0003077	Mean ± SD
	L6629-7	L6629-8	L6629-9	
198/199	30500	17900	8410	18900 ± 11100
201	3320	2110	823	2080 ± 1250
202	13400	5750	3140	7430 ± 5330
203	16700	10100	4840	10500 ± 5940
204	21.2	11.9	6.35	13.2 ± 7.50
205	818	477	236	510 ± 292
206	10100	5080	2590	5920 ± 3830
207	1240	645	314	733 ± 469
208	5380	2350	1200	2980 ± 2160
209	1630	659	382	890 ± 655
Mono-PCB	466	12600	26200	13100 ± 12900
Di-PCB	81200	40200	78300	66600 ± 22900
Tri-PCB	308000	179000	243000	243000 ± 64500
Tetra-PCB	1610000	923000	838000	1120000 ± 423000
Penta-PCB	1840000	1380000	729000	1320000 ± 558000
Hexa-PCB	1170000	840000	455000	822000 ± 358000
Hepta-PCB	402000	265000	123000	263000 ± 140000
Octa-PCB	99000	55100	27200	60400 ± 36200
Nona-PCB	16700	8080	4100	9630 ± 6440
Deca-PCB	1630	659	382	890 ± 655
Total PCB	5530000	3710000	2520000	3920000 ± 1510000
TEQ - human[3]	12.2	47.0	22.4	27.2 ± 17.9
TEQ – fish (TEF = 0)[4]	1.12	2.60	1.62	1.78 ± 0.753
TEQ – fish (TEF = value)[4]	3.04	4.35	2.40	3.26 ± 0.994

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] Data not quantifiable.
[3] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[4] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-4: Polychlorinated biphenyl (PCB) congeners in smallmouth bass taken from the Hudson River at Stillwater, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003208	0003209	0003210	Mean ± SD
	L6629-10	L6629-11R	L6629-12R	
Lipid (%)	0.83	0.60	0.66	0.700 ± 0.119
1	6300	4340	5620	5420 ± 995
2	10.2	7.28	9.91	9.13 ± 1.61
3	157	105	142	134 ± 28.4
4	20600	14000	21400	18700 ± 4060
5	10.5	<5.83	<16.5	3.50 ± 6.06
6	875	490	878	748 ± 223
7	78.4	24.9	41.1	48.1 ± 27.4
8	3960	2130	4060	3380 ± 1090
9	297	177	320	265 ± 76.8
10	4120	3840	6920	4960 ± 1700
11	24.9	22.3[k] (<5.83)	24.6 B (17.0)	14.0 ± 12.7
12/13	363	118	278[k] (<16.7)	160 ± 185
14	3.06	<5.58	<15.8	1.02 ± 1.77
15	799	483	682	655 ± 160
16	1140	400	943	828 ± 383
17	14300	4600	12000	10300 ± 5070
18/30	10300	3390	9130	7610 ± 3700
19	25600	10200	23900	19900 ± 8440
20/28	66200	21300	44800	44100 ± 22500
21/33	5360	1250	3240	3280 ± 2060
22	14800	4740	10800	10100 ± 5070
23	<282	56.8[k] (<4.96)	129	43.0 ± 74.5
24	688	300	762	583 ± 248
25	9670	3250	7660	6860 ± 3280
26/29	32300	10600	25500	22800 ± 11100
27	17300	5440	14900	12500 ± 6270
31	72500	21700	53300	49200 ± 25700
32	23600	7910	18100	16500 ± 7960
34	1580	384	1330	1100 ± 631
35	<325	<5.55	<15.5	<325
36	<280	<4.97	<13.9	<280
37	3550	1400	3170	2710 ± 1150
38	359	120	180	220 ± 124
39	597	150[k] (<4.85)	343	313 ± 300
40/41/71	49400	17500	32700	33200 ± 16000

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003208	0003208	0003210	Mean ± SD
	L6629-10	L6629-11R	L6629-12R	
42	34000	16800	26800	25900 ± 8640
43	<6.05	2560	4650	2400 ± 2330
44/47/65	169000	110000	166000	148000 ± 33200
45/51	19800	8230	15300	14400 ± 5830
46	2000	811	1540	1450 ± 600
48	9410	4710	8750	7620 ± 2540
49/69	129000	87100	144000	120000 ± 29500
50/53	24200	9500	19800	17800 ± 7540
52	165000	102000	171000	146000 ± 38200
54	1520	465	1250	1080 ± 548
55	2180	1410	2620	2070 ± 612
56	44200	20200	34100	32800 ± 12100
57	4010	2230	3270	3170 ± 894
58	<492	388	481	290 ± 255
59/62/75	19400	10700	16400	15500 ± 4420
60	43300	20500	30900	31600 ± 11400
61/70/74/76	150000	116000	178000	148000 ± 31000
63	23900	13500	18900	18800 ± 5200
64	71700	34800	55400	54000 ± 18500
66	180000	87500	132000	133000 ± 46300
67	5660[k] (<470)	3150	4880	2680 ± 2470
68	8100	5400	7950	7150 ± 1520
72	12800	8440	12100	11100 ± 2340
73	3730	1240	2320	2430 ± 1250
77	5860	2620	4490	4320 ± 1630
78	<523	189	308	166 ± 155
79	2260	891	1240	1460 ± 711
80	<479	<42.7	<64.4	<479
81	<423	190	393	194 ± 197
82	13500	9110	13100	11900 ± 2430
83/99	144000	96200	141000	127000 ± 26800
84	19600	12700	17300	16500 ± 3510
85/116/117	49000	35500	50100	44900 ± 8130
86/87/97/108/ 119/125	87100	58800	83100	76300 ± 15300
88/91	41700	27500	38500	35900 ± 7450
89	823	449	664	645 ± 188
90/101/113	182000	107000	156000	148000 ± 38100
92	53500	40100	56700	50100 ± 8810

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003208	0003208	0003210	Mean ± SD
	L6629-10	L6629-11R	L6629-12R	
93/95/98/100/102	86600	59800	85700	77400 ± 15200
94	1910	1120	1820	1620 ± 432
96	1190	690	1060	980 ± 259
103	3560	3370	4810	3910 ± 782
104	201	72.7	148	141 ± 64.5
105	61600	41100	60400	54400 ± 11500
106	<231	<22.2	<24.7	<231
107/124	5130	3480	5140	4580 ± 956
109	15400	10500	15700	13900 ± 2920
110/115	166000	92600	135000	131000 ± 36800
111	611	607	843	687 ± 135
112	4100	2560	3160	3270 ± 776
114	6840	4420	6220	5830 ± 1260
118	115000	103000	157000	125000 ± 28400
120	1350	1190	1740	1430 ± 283
121	300	299	429	343 ± 74.8
122	1870	1200	1780	1620 ± 364
123	3490	3130	4060	3560 ± 469
126	194	131	139	155 ± 34.3
127	338	238	333	303 ± 56.3
128/166	24900	13900	22700	20500 ± 5820
129/138/160/163	208000	126000	198000	177000 ± 44700
130	9610	7790	11800	9730 ± 2010
131	911	656	937	835 ± 155
132	30500	20700	27300	26200 ± 5000
133	7780	6950	10800	8510 ± 2030
134/143	6930	5110	7240	6430 ± 1150
135/151/154	60400	44200	63200	55900 ± 10300
136	9670	7680	10100	9150 ± 1290
137	8130	6300	9510	7980 ± 1610
139/140	3230	2640	3960	3280 ± 661
141	18200	11900	19500	16500 ± 4060
142	<18.3	<11.9	<115	<115
144	2790	2740	4050	3190 ± 742
145	45.3	41.5	50.3	45.7 ± 4.41
146	39400	25900	40700	35300 ± 8200
147/149	113000	73400	110000	98800 ± 22000
148	966	1040	1470	1160 ± 272

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003208	0003208	0003210	Mean ± SD
	L6629-10	L6629-11R	L6629-12R	
150	439	471	651	520 ± 114
152	290	216	273	260 ± 38.8
153/168	147000	93900	163000	135000 ± 36200
155	142	102	137	127 ± 21.8
156/157	17300	12100	20000	16500 ± 4020
158	13100	8350	12700	11400 ± 2630
159	539	539	780	619 ± 139
161	<12.1	<8.35	<80.7	<80.7
162	525	333	635	498 ± 153
164	6620	4940	7280	6280 ± 1210
165	1160	1080	1620	1290 ± 291
167	5070	3840	6760	5220 ± 1470
169	<33.6	<66.1	<116	<116
170	17200	12700	23200	17700 ± 5270
171/173	4570	3110	5030	4240 ± 1000
172	3810	2640	4760	3740 ± 1060
174	14600	8800	13600	12300 ± 3100
175	616	358	581	518 ± 140
176	1680	943	1450	1360 ± 377
177	14800	9660	15000	13200 ± 3030
178	13800	8060	12900	11600 ± 3090
179	8210	3870	5760	5950 ± 2180
180/193	38600	30300	59200	42700 ± 14900
181	500	303	520	441 ± 120
182	528	355	559	481 ± 110
183/185	11800	7220	13100	10700 ± 3090
184	76.2	43.9	64.6	61.6 ± 16.4
186	7.02	2.92	4.50	4.81 ± 2.07
187	59800	41100	73900	58300 ± 16500
188	200	163	267	210 ± 52.7
189	772	511	962	748 ± 226
190	4320	3260	5480	4350 ± 1110
191	534	378	605	506 ± 116
192	3.12	<0.253	2.14[k] (<0.728)	1.04 ± 1.80
194	6260	6370	11700	8110 ± 3110
195	2650	2110	3500	2750 ± 701
196	2850	1970	3430	2750 ± 735
197/200	1080	670	964	905 ± 211

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003208	0003208	0003210	Mean ± SD
	L6629-10	L6629-11R	L6629-12R	
198/199	14500	10700	17600	14300 ± 3460
201	1370	873	1270	1170 ± 263
202	5160	4480	6760	5470 ± 1170
203	8850	6730	11900	9160 ± 2600
204	13.1	8.58	12.9	11.5 ± 2.55
205	336	288	507	377 ± 115
206	4090	5070	7870	5680 ± 1960
207	481	481	667	543 ± 107
208	2320	2180	2870	2460 ± 365
209	673	724	902	766 ± 120
Mono-PCB	6470	4450	5770	5560 ± 1030
Di-PCB	31100	21300	34300	28900 ± 6770
Tri-PCB	300000	97000	230000	209000 ± 103000
Tetra-PCB	1170000	688000	1100000	986000 ± 260000
Penta-PCB	1070000	717000	1040000	941000 ± 196000
Hexa-PCB	737000	483000	755000	658000 ± 152000
Hepta-PCB	196000	134000	237000	189000 ± 51900
Octa-PCB	43100	34200	57700	45000 ± 11900
Nona-PCB	6890	7730	11400	8670 ± 2400
Deca-PCB	673	724	902	766 ± 120
Total PCB	3560000	2190000	3470000	3070000 ± 769000
TEQ - human[2]	26.1	18.3	21.9	22.1 ± 3.90
TEQ – fish (TEF = 0)[3]	1.56	1.01	1.34	1.30 ± 0.277
TEQ – fish (TEF = value)[3]	2.61	1.85	2.62	2.36 ± 0.442

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank is greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-5: Polychlorinated biphenyl (PCB) congeners in smallmouth bass taken from the Hudson River below the Federal Dam at Troy, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003828	0003832	0003833	Mean ± SD
	L6629-16R	L6629-17R	L6629-18R	
Lipid (%)	1.57	1.92	2.01	1.83 ± 0.232
1	2480	2490	3280	2750 ± 459
2	6.06	6.76	10.6	7.81 ± 2.44
3	50.7	59.8	88.2	66.3 ± 19.6
4	11400	12500	17900	13900 ± 3480
5	<13.4	<19.8	<16.3	<19.8
6	538	725	1430	898 ± 470
7	21.8	38.5	63.8	41.4 ± 21.1
8	1540	2090	4760	2800 ± 1720
9	103	164	307	191 ± 105
10	2840	3030	3930	3270 ± 582
11	<13.4	<22.9	<18.8	<22.9
12/13	170	201	499	290 ± 182
14	<12.8	<21.0	<17.3	<21.0
15	325	342	698	455 ± 211
16	2110	2080	3090	2430 ± 575
17	18400	19800	31000	23100 ± 6910
18/30	15300	18200	23700	19100 ± 4270
19	11600	13000	26200	16900 ± 8060
20/28	33200	35400	69600	46100 ± 20400
21/33	1820	2270	5010	3030 ± 1730
22	3930	4110	10800	6280 ± 3920
23	27.6	42.6	110	60.1 ± 43.9
24	362	366	955	561 ± 341
25	5770	7540	13500	8940 ± 4050
26/29	18600	24000	41000	27900 ± 11700
27	9730	11200	22300	14400 ± 6870
31	38300	49200	82200	56600 ± 22900
32	16200	19200	31200	22200 ± 7940
34	721	784	1800	1100 ± 606
35	<10.2	<22.4	<21.3	<22.4
36	<9.14	<20.1	<19.1	<20.1
37	1680	1680	3180	2180 ± 866
38	150	149[k] (<20.3)	238[k] (<19.3)	50.0 ± 86.7
39	211	207[k] (<19.6)	396	202 ± 198
40/41/71	48800	46800	80700	58800 ± 19000

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003828	0003832	0003833	Mean ± SD
	L6629-16R	L6629-17R	L6629-18R	
42	20300	23600	41200	28400 ± 11200
43	5200	4460	9670	6440 ± 2820
44/47/65	124000	145000	250000	173000 ± 67500
45/51	15500	16200	31000	20900 ± 8750
46	3250	2720	5000	3660 ± 1190
48	7770	8300	14900	10300 ± 3970
49/69	112000	135000	215000	154000 ± 54100
50/53	18600	20500	40000	26400 ± 11800
52	122000	143000	263000	176000 ± 76100
54	573	544	1390	836 ± 480
55	879	1270	2510	1550 ± 852
56	13200	15600	30800	19900 ± 9540
57	1460	1600	2950	2000 ± 823
58	485	536	784	602 ± 160
59/62/75	12000	13900	24400	16800 ± 6680
60	7580	8660	21800	12700 ± 7920
61/70/74/76	75000	93200	159000	109000 ± 44200
63	8110	10100	17300	11800 ± 4830
64	35800	40600	73900	50100 ± 20800
66	43400	56200	105000	68200 ± 32500
67	1890	2480	3740	2700 ± 945
68	2470	2960	5590	3670 ± 1680
72	4220	5030	9170	6140 ± 2660
73	1970	1610	3160	2250 ± 811
77	1610	1810	3830	2420 ± 1230
78	150	181	360	230 ± 113
79	689	865	1720	1090 ± 552
80	<41.8	<66.1	<63.8	<63.8
81	151	108	364	208 ± 137
82	6580	6470	13700	8920 ± 4140
83/99	83500	90300	159000	111000 ± 41800
84	23000	21600	40500	28400 ± 10500
85/116/117	22600	23800	45900	30800 ± 13100
86/87/97/108/ 119/125	45800	52300	95400	64500 ± 27000
88/91	26000	27300	49100	34100 ± 13000
89	730	518	1330	859 ± 421
90/101/113	93500	108000	184000	129000 ± 48600
92	31900	33900	64200	43300 ± 18100

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003828	0003832	0003833	Mean ± SD
	L6629-16R	L6629-17R	L6629-18R	
93/95/98/100/102	78300	80000	148000	102000 ± 39800
94	2300	1590	4150	2680 ± 1320
96	998	722	2100	1270 ± 729
103	2330	2780	4490	3200 ± 1140
104	79.6	65.1	177	107 ± 60.9
105	18100	20300	41600	26700 ± 13000
106	<15.3	<38.1	<26.5	<38.1
107/124	1870	2040	3780	2560 ± 1060
109	7730	8400	14800	10300 ± 3900
110/115	83200	89000	165000	112000 ± 45600
111	307	314	634	418 ± 187
112	1340	1560	3070	1990 ± 942
114	1800	1930	4330	2690 ± 1420
118	59100	68300	130000	85800 ± 38600
120	903	967	1720	1200 ± 454
121	168	196	344	236 ± 94.6
122	693	769	1540	1000 ± 469
123	1060	1350	2490	1630 ± 756
126	85.8	91.1	160	112 ± 41.4
127	173	165	348	229 ± 103
128/166	12600	11300	23600	15800 ± 6760
129/138/160/163	106000	111000	206000	141000 ± 56300
130	6350	7340	11700	8460 ± 2850
131	595	734	1210	846 ± 323
132	19200	20400	37200	25600 ± 10100
133	4320	4450	8230	5670 ± 2220
134/143	4880	5070	9420	6460 ± 2570
135/151/154	38900	40200	76200	51800 ± 21200
136	8600	8280	16300	11100 ± 4540
137	4290	4930	9360	6190 ± 2760
139/140	2120	2380	4290	2930 ± 1180
141	11900	12900	24300	16400 ± 6890
142	<11.9	<44.3	<15.5	<44.3
144	3170	3700	6480	4450 ± 1780
145	41.4	28.9[k] (<0.997)	68.6	36.7 ± 34.5
146	27200	27700	49000	34600 ± 12400
147/149	67700	77000	127000	90600 ± 31900
148	736	779	1490	1000 ± 423

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003828	0003832	0003833	Mean ± SD
	L6629-16R	L6629-17R	L6629-18R	
150	312	382	594	429 ± 147
152	202	151	405	253 ± 134
153/168	113000	121000	210000	148000 ± 53800
155	135	150	251	179 ± 63.1
156/157	7820	8010	16800	10900 ± 5130
158	6980	7670	14600	9750 ± 4210
159	579	682	1070	777 ± 259
161	<8.34	<31.0	<10.9	<31.0
162	315	326	662	434 ± 197
164	5060	5120	9430	6540 ± 2510
165	391	456	845	564 ± 246
167	3050	3290	5810	4050 ± 1530
169	<58.1	<47.6	<85.2	<85.2
170	13700	15000	33700	20800 ± 11200
171/173	3850	4400	9070	5770 ± 2870
172	2950	3330	6190	4160 ± 1770
174	9080	12700	23300	15000 ± 7390
175	579	711	1290	860 ± 378
176	907	1470	2400	1590 ± 754
177	7070	11000	16800	11600 ± 4890
178	6210	7320	13600	9040 ± 4000
179	4790	6340	12700	7940 ± 4190
180/193	45800	51500	79400	58900 ± 18000
181	194	212	444	283 ± 139
182	248	324	571	381 ± 169
183/185	11500	14700	24800	17000 ± 6940
184	53.8	78.4	146	92.7 ± 47.7
186	2.57	<1.62	<1.72	0.866 ± 1.48
187	41500	37600	73400	50800 ± 19600
188	151	170	300	207 ± 81.1
189	515	510	1010	678 ± 287
190	2860	3040	6200	4030 ± 1880
191	495	572	969	679 ± 254
192	<0.437	<1.77	<1.88	<1.88
194	7290	6350	12600	8750 ± 3370
195	2220	2200	4450	2960 ± 1290
196	2970	3570	6630	4390 ± 1960
197/200	585	800	1170	852 ± 296

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003828	0003832	0003833	Mean ± SD
	L6629-16R	L6629-17R	L6629-18R	
198/199	9840	11700	23100	14900 ± 7180
201	925	1140	1980	1350 ± 558
202	4220	3820	6990	5010 ± 1730
203	6830	7320	15600	9920 ± 4930
204	11.4[k] (<0.159)	10.4	21.0	10.5 ± 10.5
205	281	303	528	371 ± 137
206	5540	5440	10300	7090 ± 2780
207	532	527	1010	690 ± 277
208	2250	2520	3980	2920 ± 931
209	1860	1830	3300	2330 ± 840
Mono-PCB	2540	2560	3380	2820 ± 481
Di-PCB	16900	19100	29600	21900 ± 6790
Tri-PCB	178000	209000	366000	251000 ± 101000
Tetra-PCB	689000	803000	1420000	971000 ± 393000
Penta-PCB	594000	645000	1180000	806000 ± 325000
Hexa-PCB	456000	485000	873000	605000 ± 233000
Hepta-PCB	152000	171000	306000	210000 ± 84000
Octa-PCB	35200	37200	73100	48500 ± 21300
Nona-PCB	8320	8490	15300	10700 ± 3980
Deca-PCB	1860	1830	3300	2330 ± 840
Total PCB	2140000	2380000	4270000	2930000 ± 1170000
TEQ - human[2]	11.4	12.3	22.4	15.4 ± 6.11
TEQ – fish (TEF = 0)[3]	0.666	0.691	1.37	0.909 ± 0.399
TEQ – fish (TEF = value)[3]	1.12	1.21	2.38	1.57 ± 0.703

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank is greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-6: Polychlorinated biphenyl (PCB) congeners in smallmouth bass taken from the Hudson River at Catskill, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003910	0003911	0003917	Mean ± SD
	L6629-19R	L6629-20R	L6629-21	
Lipid (%)	2.57	1.43	1.89	1.96 ± 0.57
1	145	189	1970	768 ± 1040
2	<2.16	1.77[k] (<1.45)	11.2	3.73 ± 6.47
3	5.60 B (3.93)	5.24 B (3.57)	43.3	16.9 ± 22.8
4	2120	1020	13300	5480 ± 6790
5	<9.37	<9.58	<6.82	<9.58
6	178	64.3	523	255 ± 239
7	9.25	<8.82	30.6	13.3 ± 15.7
8	549	264	1560	791 ± 681
9	25.6	15.1	117	52.6 ± 56.0
10	372	242	2250	955 ± 1120
11	<10.8	<11.0	<6.93	<11.0
12/13	71.1	55.4	133	86.5 ± 41.0
14	<9.91	<10.1	<6.63	<10.1
15	102	72.2	239	138 ± 90.0
16	1130	764	2040	1310 ± 657
17	11300	9440	17700	12800 ± 4330
18/30	10000	8100	15400	11200 ± 3790
19	4190	2590	13500	6760 ± 5890
20/28	24100	21700	43700	29800 ± 12100
21/33	1320	933	1790	1350 ± 429
22	2370	1940	4440	2920 ± 1340
23	<22.5	<10.4	<31.8	<31.8
24	171	140	484	265 ± 190
25	3290	3350	6310	4320 ± 1730
26/29	11100	10600	23400	15000 ± 7250
27	3640	2990	7660	4760 ± 2530
31	24300	23900	47000	31700 ± 13200
32	8540	8550	12100	9730 ± 2050
34	304	192	660	385 ± 244
35	<25.1	<11.6	<34.6	<34.6
36	<22.5	<10.4	108[k] (<31.7)	<31.7
37	954	1030	1070	1020 ± 58.9
38	82.8[k] (<22.8)	88.9	70.5[k] (<32.2)	29.6 ± 51.3
39	111[k] (<22.0)	121	123[k] (<31.0)	40.3 ± 69.9
40/41/71	28500	24500	29900	27600 ± 2800

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003910	0003911	0003917	Mean ± SD
	L6629-19R	L6629-20R	L6629-21	
42	13900	13000	23200	16700 ± 5650
43	3300	2450	4740	3500 ± 1160
44/47/65	89900	77200	144000	104000 ± 35500
45/51	8150	8300	11700	9380 ± 2010
46	1810	1410	2100	1770 ± 346
48	4820	4220	5680	4910 ± 734
49/69	81800	72600	139000	97800 ± 36000
50/53	7470	8940	10600	9000 ± 1570
52	80600	78300	162000	107000 ± 47800
54	279	237	524	347 ± 155
55	477	356[k] (<63.6)	<34.3	159 ± 275
56	8880	8630	12800	10100 ± 2340
57	934	817	1630	1130 ± 440
58	400	277	595	424 ± 160
59/62/75	8400	7630	13700	9910 ± 3300
60	6010	5220	9520	6920 ± 2290
61/70/74/76	55700	51900	84200	63900 ± 17700
63	6620	5700	10500	7610 ± 2550
64	24700	22600	45100	30800 ± 12400
66	37200	29800	47600	38200 ± 8940
67	1280	1320	1890	1500 ± 341
68	1910	1730	3450	2360 ± 945
72	2990	2870	5390	3750 ± 1420
73	1240	917	3440	1870 ± 1370
77	1040	1020	1780	1280 ± 433
78	122	105	<35.7	75.7 ± 66.1
79	611	576	774	654 ± 106
80	<26.8	<59.7	<31.6	<59.7
81	94.5	131	165	130 ± 35.3
82	5120	4370	7140	5540 ± 1430
83/99	67300	53700	88100	69700 ± 17300
84	16500	12700	21000	16700 ± 4150
85/116/117	18500	14300	26300	19700 ± 6090
86/87/97/108/ 119/125	36600	29600	49900	38700 ± 10300
88/91	19500	15500	26600	20500 ± 5620
89	380	40.8[k] (<25.8)	267	216 ± 195
90/101/113	75600	60000	105000	80200 ± 22800
92	25600	19700	36200	27200 ± 8360

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003910	0003911	0003917	Mean ± SD
	L6629-19R	L6629-20R	L6629-21	
93/95/98/100/102	53900	44500	72600	57000 ± 14300
94	997	794	789	860 ± 119
96	577	450	503	510 ± 63.8
103	1940	1530	2530	2000 ± 503
104	52.9	42.2	63.6	52.9 ± 10.7
105	13900	10900	19200	14700 ± 4200
106	<34.6	<24.9	<25.4	<34.6
107/124	1320	1160	1850	1440 ± 361
109	6070	4740	7830	6210 ± 1550
110/115	66100	54100	92100	70800 ± 19400
111	226	165	332	241 ± 84.5
112	742	858	1570	1060 ± 448
114	1240	988	2010	1410 ± 532
118	46300	37200	59900	47800 ± 11400
120	772	512	1030	771 ± 259
121	126	62.6	191	127 ± 64.2
122	526	403	594	508 ± 96.8
123	864	538	1330	911 ± 398
126	<40.6	39.3	74.9	38.1 ± 37.5
127	111	81.2	117	103 ± 19.2
128/166	9920	7080	11800	9600 ± 2380
129/138/160/163	80100	58700	95100	78000 ± 18300
130	5410	3920	6830	5390 ± 1460
131	478	360	453	430 ± 62.2
132	15600	12100	16300	14700 ± 2250
133	3130	2280	3880	3100 ± 801
134/143	3730	2690	3900	3440 ± 655
135/151/154	28300	21800	31900	27300 ± 5120
136	5640	4740	6430	5600 ± 846
137	3160	2360	4280	3270 ± 964
139/140	1600	1200	1700	1500 ± 265
141	9100	6810	10500	8800 ± 1860
142	<8.46	<14.3	<33.2	<33.2
144	2030	1830	2140	2000 ± 157
145	21.4	9.69[k] (<0.697)	17.9	13.1 ± 11.5
146	19800	14700	23700	19400 ± 4510
147/149	53300	40000	58300	50500 ± 9460
148	575	424	601	533 ± 95.6

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003910	0003911	0003917	Mean ± SD
	L6629-19R	L6629-20R	L6629-21	
150	243	190	226	220 ± 27.1
152	117	80.6	87.2	94.9 ± 19.4
153/168	81900	62400	101000	81800 ± 19300
155	88.1	94.0	121	101 ± 17.5
156/157	5530	4140	7520	5730 ± 1700
158	5230	3860	6400	5160 ± 1270
159	438	336	464	413 ± 67.7
161	<5.92	<10.0	<23.8	<23.8
162	200	186	311	232 ± 68.5
164	3760	2910	4430	3700 ± 762
165	296	229	336	287 ± 54.1
167	2190	1640	2990	2270 ± 679
169	<49.9	<24.4	<46.7	<49.9
170	10000	7410	17300	11600 ± 5130
171/173	2770	2090	4620	3160 ± 1310
172	2030	1530	4180	2580 ± 1410
174	7950	6340	12800	9030 ± 3360
175	440	365	763	523 ± 211
176	920	757	1380	1020 ± 323
177	9270	5540	11100	8640 ± 2830
178	4660	3640	6920	5070 ± 1680
179	4000	3540	5810	4450 ± 1200
180/193	29600	21300	47900	32900 ± 13600
181	157	110	252	173 ± 72.3
182	224	201	340	255 ± 74.5
183/185	8390	6880	13600	9620 ± 3530
184	46.5	41.3	69.1	52.3 ± 14.8
186	<0.415	<0.427	<1.80	<1.80
187	31700	23800	38800	31400 ± 7500
188	101	96.2	143	113 ± 25.7
189	330	239	498	356 ± 131
190	2130	1530	3690	2450 ± 1110
191	329	266	690	428 ± 229
192	<0.455	<0.467	<2.26	<2.26
194	3880	2860	5760	4170 ± 1470
195	1430	1070	2010	1500 ± 474
196	2160	1590	3730	2490 ± 1110
197/200	460	373	965	599 ± 320

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003910	0003911	0003917	Mean ± SD
	L6629-19R	L6629-20R	L6629-21	
198/199	7350	5520	12200	8360 ± 3450
201	623	553	1200	792 ± 355
202	2310	1950	3850	2700 ± 1010
203	4750	3570	7810	5380 ± 2190
204	4.84	6.88[K] (<0.135)	12.8	5.88 ± 6.46
205	198	133	268	200 ± 67.5
206	3410	2610	4690	3570 ± 1050
207	333	260	521	371 ± 135
208	1590	1240	2200	1680 ± 486
209	1120	965	1370	1150 ± 204
Mono-PCB	150	193	2020	789 ± 1070
Di-PCB	3430	1730	18200	7770 ± 9030
Tri-PCB	107000	96400	197000	133000 ± 55300
Tetra-PCB	479000	432000	776000	562000 ± 187000
Penta-PCB	461000	369000	625000	485000 ± 130000
Hexa-PCB	342000	257000	402000	334000 ± 72900
Hepta-PCB	115000	85700	171000	124000 ± 43300
Octa-PCB	23200	17600	37800	26200 ± 10400
Nona-PCB	5330	4110	7410	5620 ± 1670
Deca-PCB	1120	965	1370	1150 ± 204
Total PCB	1540000	1270000	2240000	1680000 ± 502000
TEQ - human[2]	2.18	5.69	10.4	6.09 ± 4.12
TEQ – fish (TEF = 0)[3]	0.151	0.364	0.635	0.383 ± 0.243
TEQ – fish (TEF = value)[3]	0.503	0.642	1.10	0.748 ± 0.312

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank is greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-7: Polychlorinated biphenyl (PCB) congeners in striped bass taken from the Hudson River below the Federal Dam at Troy, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
Lipid (%)	2.17	1.97	4.27	2.80 ± 1.27
1	6120	5380	11200	7570 ± 3170
2	10.6	7.63	20.1	12.8 ± 6.51
3	99.6	78.5	166	115 ± 45.7
4	25400	20500	40700	28900 ± 10500
5	7.14	4.49	11.3	7.64 ± 3.43
6	873	612	1230	905 ± 310
7	33.7	24.5	46.3	34.8 ± 10.9
8	2570	1720	3610	2630 ± 947
9	202	132	286	207 ± 77.1
10	4010	3090	5780	4290 ± 1370
11	40.2	22.4	102	54.9 ± 41.8
12/13	210	150	250	203 ± 50.3
14	<1.67	<1.59	2.32	0.773 ± 1.34
15	549	399	855	601 ± 232
16	1500	1540	1590	1540 ± 45.1
17	9610	8440	10500	9520 ± 1030
18/30	9430	8740	10600	9590 ± 940
19	16300	11300	18900	15500 ± 3860
20/28	26600	27700	27300	27200 ± 557
21/33	2020	1820	2350	2060 ± 268
22	3870	3600	4370	3950 ± 391
23	<32.9	<25.0	<36.4	<36.4
24	305	261	400	322 ± 71.0
25	4750	3150	4160	4020 ± 809
26/29	12900	8780	11000	10900 ± 2060
27	9030	6770	8880	8230 ± 1260
31	24100	17800	25100	22300 ± 3960
32	10400	8920	12000	10400 ± 1540
34	633	502	662	599 ± 85.2
35	<37.2	<28.3	<41.1	<41.1
36	<33.9	<25.8	<37.5	<37.5
37	873	727	946	849 ± 112
38	75.6	92.1	71.9	79.9 ± 10.8
39	198	203	224	208 ± 13.8

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
40/41/71	23700	26600	29700	26700 ± 3000
42	10800	12100	13700	12200 ± 1450
43	2610	3030	3260	2970 ± 330
44/47/65	68600	77400	76200	74100 ± 4770
45/51	7420	7680	8000	7700 ± 291
46	1540	1460	1550	1520 ± 49.3
48	4170	5440	5080	4900 ± 655
49/69	66000	65200	70600	67300 ± 2910
50/53	9620	9010	8800	9140 ± 426
52	81900	87700	86900	85500 ± 3140
54	375	271	351	332 ± 54.5
55	891	1020	961	957 ± 64.6
56	8990	10000	9770	9590 ± 529
57	826	601	657	695 ± 117
58	2860	2250	2570	2560 ± 1510
59/62/75	5920	6750	6580	6420 ± 438
60	5820	7490	5850	6390 ± 956
61/70/74/76	59000	66200	58800	61300 ± 4220
63	4490	4880	4430	4600 ± 244
64	18400	20700	20900	20000 ± 1390
66	38800	50200	38500	42500 ± 6670
67	1810	1140	1180	1380 ± 376
68	1940	1550	1570	1690 ± 220
72	2940	2430	2430	2600 ± 294
73	1020	1290	1500	1270 ± 241
77	1460	1520	995	1330 ± 287
78	<178	<352	<174	<352
79	1140	972	983	1030 ± 94.0
80	<159	<315	<155	<315
81	163	<295	<142	54.3 ± 94.1
82	4260	4620	4630	4500 ± 211
83/99	92200	86200	70100	82800 ± 11400
84	11700	12300	11700	11900 ± 346
85/116/117	16700	19200	15300	17100 ± 1980
86/87/97/108/ 119/125	42100	45100	37200	41500 ± 3990
88/91	17600	17100	15500	16700 ± 1100
89	322	352	286	320 ± 33.0
90/101/113	104000	94300	68800	89000 ± 18200

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
92	23200	24300	21200	22900 ± 1570
93/95/98/100/102	47300	51300	42800	47100 ± 4250
94	775	774	433	661 ± 197
96	367	444	318	376 ± 63.5
103	1550	1610	1570	1580 ± 30.6
104	50.3	60.3	36.8	49.1 ± 11.8
105	20300	22800	15500	19500 ± 3710
106	<184	<94.3	<125	<184
107/124	2290	1900	1570	1920 ± 360
109	11000	8900	7560	9150 ± 1730
110/115	82100	78000	61200	73800 ± 11100
111	286	210	268	255 ± 39.7
112	1250	1400	1050	1230 ± 176
114	1440	1960	1220	1540 ± 380
118	77300	73900	58100	69800 ± 10200
120	1500	884	1140	1170 ± 309
121	84.4	87.0	97.7	89.7 ± 7.05
122	501	546	363	470 ± 95.4
123	1510	1390	988	1300 ± 273
126	213	128	128	156 ± 49.1
127	<181	145	<124	48.3 ± 83.7
128/166	22400	16500	16000	18300 ± 3560
129/138/160/163	125000	156000	126000	136000 ± 17600
130	7670	6470	7050	7060 ± 600
131	692	624	551	622 ± 70.5
132	19600	16600	16800	17700 ± 1680
133	3720	3510	3320	3520 ± 200
134/143	3840	3580	3240	3550 ± 301
135/151/154	32800	36800	29600	33100 ± 3610
136	6470	6900	6190	6520 ± 358
137	4580	4970	4120	4560 ± 425
139/140	2290	2180	1920	2130 ± 190
141	10300	13000	10600	11300 ± 1480
142	<55.7	<71.5	<120	<120
144	2550	3150	2410	2700 ± 393
145	15.1	17.2	20.7	17.7 ± 2.83
146	40500	36100	31500	36000 ± 4500
147/149	83800	78200	63600	75200 ± 10400

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
148	623	628	624	625 ± 2.65
150	324	299	278	300 ± 23.0
152	81.5	104	68.1	84.5 ± 18.1
153/168	153000	149000	145000	149000 ± 4000
155	276	374	377	342 ± 57.5
156/157	9910	9970	6490	8790 ± 1990
158	9290	8770	7060	8370 ± 1170
159	417	479	503	466 ± 44.4
161	<40.5	<52.0	<73.6	<73.6
162	562	458	455	492 ± 60.9
164	5100	4730	4050	4630 ± 533
165	295	285	368	316 ± 45.3
167	5300	4510	3210	4340 ± 1060
169	<59.8	<68.4	<65.3	<68.4
170	17400	20600	14200	17400 ± 3200
171/173	5810	7170	5650	6210 ± 835
172	3920	4600	3410	3980 ± 597
174	10600	11100	10400	10700 ± 361
175	1070	1310	997	1130 ± 164
176	1590	1850	1600	1680 ± 147
177	11300	11400	11100	11300 ± 153
178	8690	8840	8140	8560 ± 369
179	7350	8710	7340	7800 ± 788
180/193	53000	69800	44400	55700 ± 12900
181	263	276	184	241 ± 49.8
182	377	392	344	371 ± 24.6
183/185	19100	24400	17200	20200 ± 3730
184	129	171	128	143 ± 24.5
186	<0.544	<0.760	<0.606	<0.760
187	58000	68200	50800	59000 ± 8740
188	321	294	270	295 ± 25.5
189	705	807	505	672 ± 154
190	3520	4730	3020	3760 ± 879
191	716	926	589	744 ± 170
192	<0.691	<0.948	<0.756	<0.948
194	8660	11100	6310	8690 ± 2395
195	2870	3640	2170	2890 ± 735
196	5030	6050	4130	5070 ± 961

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	0003270	0003271	0003273	Mean ± SD
	L6629-1(A)	L6629-2	L6629-3	
197/200	1000	1160	850	1000 ± 155
198/199	14500	16100	11400	14000 ± 2390
201	2030	2490	1670	2060 ± 411
202	6800	7900	5200	6630 ± 1360
203	8650	11700	6250	8870 ± 2730
204	21.1	20.1	16.3	19.2 ± 2.53
205	370	459	283	371 ± 88.0
206	7790	8030	4760	6860 ± 1820
207	1090	1100	742	977 ± 204
208	4120	4140	2680	3650 ± 837
209	3520	3990	2280	3260 ± 883
Mono-PCB	6230	5470	11400	7700 ± 3230
Di-PCB	33900	26700	52900	37800 ± 13500
Tri-PCB	133000	110000	139000	127000 ± 15300
Tetra-PCB	433000	475000	462000	457000 ± 21500
Penta-PCB	562000	550000	439000	517000 ± 67800
Hexa-PCB	551000	564000	491000	535000 ± 38900
Hepta-PCB	204000	246000	180000	210000 ± 33400
Octa-PCB	49900	60600	38300	49600 ± 11200
Nona-PCB	13000	13300	8180	11500 ± 2870
Deca-PCB	3520	3990	2280	3260 ± 883
Total PCB	1990000	2050000	1820000	1960000 ± 119000
TEQ (ND = 0)[2]	24.8	16.3	15.4	18.8 ± 5.19
TEQ – fish (TEF = 0)[3]	1.29	0.792	0.740	0.941 ± 0.304
TEQ – fish (TEF = value)[3]	1.88	1.37	1.17	1.47 ± 0.366

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank is greater than 10 % of concentration. Blank corrected value in parenthesis used for computations.

Appendix E-8: Polychlorinated biphenyl (PCB) congeners in striped bass taken from the Hudson River at Catskill, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[l]			
	9746082	9746086	9746091	Mean ± SD
	L6629-28	L6629-29(A)	L6629-30	
Lipid (%)	0.52	1.57	2.29	1.46 ± 0.890
1	37.7	160	946	381 ± 493
2	1.93[k] (<1.81)	2.50[k] (<1.66)	3.29 B (2.53)	0.843 ± 1.46
3	3.83[k] (<1.76)	6.50 B (5.78)	16.2	7.33 ± 8.21
4	2760	7430	17400	9200 ± 7480
5	<3.89	<3.56	2.85[k] (<1.27)	<3.89
6	79.4	132	411	207 ± 178
7	3.83[k] (<3.74)	8.44	20.2	9.55 ± 10.1
8	188	310	1090	529 ± 489
9	11.6	23.6	74.3	36.5 ± 33.3
10	518	1310	3020	1620 ± 1280
11	9.76 B (8.30)	47.7	38.9	32.1 ± 19.9
12/13	32.3	72.9	114	73.1 ± 40.9
14	<3.80	<3.48	<1.27	<3.80
15	134	353	594	360 ± 230
16	476	436	1190	701 ± 424
17	2150	2680	5900	3580 ± 2030
18/30	2360	2660	6340	3790 ± 2220
19	1910	3790	9210	4970 ± 3790
20/28	6590	3500	9700	6600 ± 3100
21/33	414	266	1060	580 ± 422
22	893	480	1600	991 ± 566
23	2.79[k] (<1.92)	4.43	10.5	4.98 ± 5.27
24	45.0	55.1	133	77.7 ± 48.2
25	589	526	1180	765 ± 361
26/29	1540	1590	3350	2160 ± 1030
27	1030	1640	3690	2120 ± 1390
31	3830	3380	8330	5180 ± 2740
32	1880	2360	5140	3130 ± 1760
34	63.5	82.8	165	104 ± 53.9
35	<2.00	<2.18	<6.13	<6.13
36	<1.81	<1.98	<5.41	<5.41
37	163	144	433	247 ± 162
38	28.4	13.2	13.1[k] (<5.67)	13.9 ± 14.2
39	53.6[k] (<1.79)	31.2	71.9	34.4 ± 36.1
40/41/71	7150	3830	9050	6680 ± 2640

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746082	9746086	9746091	Mean ± SD
	L6629-28	L6629-29(A)	L6629-30	
42	3960	1700	4630	3430 ± 1540
43	515	328	787	543 ± 231
44/47/65	18000	8160	21100	15800 ± 6760
45/51	1680	1490	3150	2110 ± 909
46	364	359	780	501 ± 242
48	1740	706	2340	1600 ± 827
49/69	15600	7700	19700	14300 ± 6100
50/53	1760	1800	3740	2430 ± 1130
52	21500	10200	30100	20600 ± 9980
54	50.5	89.3	173	104 ± 62.6
55	117	36.2	279	144 ± 124
56	3570	1080	4210	2950 ± 1650
57	165	81.7	181	143 ± 53.3
58	104	45.5	129	92.8 ± 42.9
59/62/75	1790	835	1890	1510 ± 582
60	2270	795	3560	2210 ± 1380
61/70/74/76	21000	7580	30300	19600 ± 11400
63	1160	507	1390	1020 ± 458
64	5680	2610	6920	5070 ± 2220
66	17500	6580	20700	14900 ± 7400
67	445	168	540	384 ± 193
68	416	215	462	364 ± 131
72	610	314	739	554 ± 218
73	89.4	100	185	125 ± 52.4
77	692	319	1350	787 ± 522
78	<9.91	<9.51	<18.6	<18.6
79	305	139	415	286 ± 139
80	<8.84	<8.48	<16.7	<16.7
81	61.7[k] (<9.58)	22.7	51.6	24.8 ± 25.9
82	1850	575	2950	1790 ± 1190
83/99	32400	14800	51200	32800 ± 18200
84	3150	1190	5440	3260 ± 2130
85/116/117	6860	3000	9670	6510 ± 3350
86/87/97/108/ 119/125	17400	6130	27600	17000 ± 10700
88/91	4870	1690	6470	4340 ± 2430
89	141	53.7	185	127 ± 66.8
90/101/113	41400	14800	65600	40600 ± 25400
92	8530	3210	12800	8180 ± 4800

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746082	9746086	9746091	Mean ± SD
	L6629-28	L6629-29(A)	L6629-30	
93/95/98/100/102	15600	5680	26600	16000 ± 10500
94	100	75.4	180	118 ± 54.7
96	116	72.7	150	113 ± 38.7
103	659	273	891	608 ± 312
104	18.5	6.53	11.7	12.2 ± 6.00
105	11000	4770	18300	11400 ± 6770
106	<13.3	<12.6	<34.2	<34.2
107/124	986	323	1540	950 ± 609
109	3410	1950	5900	3750 ± 2000
110/115	25300	9470	42600	25800 ± 16600
111	80.8	69.6	110	86.8 ± 20.9
112	<2.80	<3.28	<13.4	<13.4
114	735	208	1020	654 ± 412
118	37100	18900	60300	38800 ± 20800
120	406	341	684	477 ± 182
121	32.5	16.6	37.9	29.0 ± 11.1
122	228	56.4	276	187 ± 115
123	754	303	967	675 ± 339
126	97.4	77.2	168[k] (<41.2)	58.2 ± 51.4
127	112	62.6	105[k] (<36.2)	58.2 ± 56.1
128/166	5920	3520	11600	7010 ± 4150
129/138/160/163	55400	29700	109000	64700 ± 40500
130	2860	1720	5330	3300 ± 1850
131	275	76.6	493	282 ± 208
132	6560	2730	13800	7700 ± 5620
133	1300	857	2110	1420 ± 635
134/143	1090	472	2360	1310 ± 963
135/151/154	15300	6350	29000	16900 ± 11400
136	2660	802	4990	2820 ± 2100
137	1800	708	3110	1870 ± 1200
139/140	899	446	1360	902 ± 457
141	4440	1490	9260	5060 ± 3920
142	<18.2	<8.42	<28.1	<28.1
144	1780	543	2380	1570 ± 937
145	6.58	2.84[k] (<1.07)	5.88	4.15 ± 3.61
146	13500	8510	23300	15100 ± 7520
147/149	29100	12300	56200	32500 ± 22200
148	251	173	410	278 ± 121

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746082	9746086	9746091	Mean ± SD
	L6629-28	L6629-29(A)	L6629-30	
150	164	78.1	261	168 ± 91.5
152	36.7	14.4	44.0	31.7 ± 15.4
153/168	73800	38900	142000	84900 ± 52400
155	300	111	293	235 ± 107
156/157	4520	1920	7900	4780 ± 3000
158	4010	1560	6940	4170 ± 2690
159	190	91.5	411	231 ± 164
161	<11.9	<5.49	<18.5	<18.5
162	245	172	420	279 ± 127
164	1530	838	3360	1910 ± 1300
165	93.8	75.4	104	91.1 ± 14.5
167	2230	1260	4290	2590 ± 1550
169	<39.6	<21.1	<35.6	<39.6
170	7760	3810	16300	9290 ± 6380
171/173	3480	1650	6120	3750 ± 2250
172	1800	907	3700	2140 ± 1430
174	3870	1770	10200	5280 ± 4390
175	756	356	1370	827 ± 511
176	1120	426	1960	1170 ± 768
177	6300	3900	13600	7930 ± 5050
178	4450	2840	8140	5140 ± 2720
179	4330	1670	8610	4870 ± 3500
180/193	29300	11300	59300	33300 ± 24200
181	99.1	35.5[k] (<0.0499)	113	70.7 ± 61.6
182	113	95.7	279	163 ± 101
183/185	12200	4700	20500	12500 ± 7900
184	133	64.0	145	114 ± 43.7
186	<0.0500	<0.0499	<0.567	<0.567
187	30900	18300	58400	35900 ± 20500
188	154	181	505	280 ± 195
189	360	162	567	363 ± 203
190	2030	686	3130	1950 ± 1220
191	428	196	795	473 ± 302
192	<0.0500	<0.0499	<0.755	<0.755
194	4940	2230	9730	5630 ± 3800
195	1510	679	2490	1560 ± 907
196	2910	1600	5840	3450 ± 2170
197/200	691	432	1310	811 ± 451

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746082	9746086	9746091	Mean ± SD
	L6629-28	L6629-29(A)	L6629-30	
198/199	6970	4050	17700	9570 ± 7190
201	1700	1110	2920	1910 ± 923
202	4960	2990	12800	6920 ± 5190
203	5250	1940	8280	5160 ± 3170
204	12.9	14.8	41.2	23.0 ± 15.8
205	255	91.2	400	249 ± 154
206	4560	2180	14300	7010 ± 6420
207	573	427	1640	880 ± 662
208	2080	1520	9440	4350 ± 4420
209	2050	1520	10000	4520 ± 4750
Mono-PCB	37.7	166	965	389 ± 502
Di-PCB	3730	9690	22800	12100 ± 9760
Tri-PCB	24000	23600	57500	35000 ± 19500
Tetra-PCB	128000	57800	169000	118000 ± 56200
Penta-PCB	213000	88100	341000	214000 ± 126000
Hexa-PCB	230000	115000	441000	262000 ± 165000
Hepta-PCB	110000	53000	214000	126000 ± 81600
Octa-PCB	29200	15100	61500	35300 ± 23800
Nona-PCB	7210	4130	25400	12200 ± 11500
Deca-PCB	2050	1520	10000	4520 ± 4750
Total PCB	748000	369000	1340000	820000 ± 491000
TEQ - human[2]	11.4	8.55	2.82	7.59 ± 4.37
TEQ – fish (TEF = 0)[3]	0.556	0.429	0.161	0.382 ± 0.202
TEQ – fish (TEF = value)[3]	0.840	0.567	0.628	0.678 ± 0.143

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank is greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-9: Polychlorinated biphenyl (PCB) congeners in striped bass taken from the Hudson River at Poughkeepsie, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]				
	9746062	9746066	9746069	Mean ± SD	Average w/o L6629-25
	L6629-25	L6629-26	L6629-27		
Lipid (%)	8.05	4.55	1.23	4.61 ± 3.41	2.89
1	316	69.9	48.3	145 ± 149	59.1
2	43.3	5.55 B (4.79)	1.22[k] (<0.668)	16.0 ± 23.7	2.40
3	45.9	6.54 B (5.82)	2.70[k] (<0.653)	17.2 ± 25.0	2.91
4	4200	676	475	1780 ± 2100	576
5	67.6	<3.87	<1.29	22.5 ± 39.0	<3.87
6	2000	70.8	24.3	698 ± 1130	47.6
7	133	8.62[k] (<3.72)	1.95	45.0 ± 76.2	0.975
8	3390	227	66.5	1230 ± 1870	147
9	285	11.4	3.73	100 ± 160	7.57
10	343	89.4	62.5	165 ± 155	76.0
11	899	198	34.9	377 ± 459	116
12/13	229	30.1[k] (<3.92)	6.94	78.6 ± 130	3.47
14	<4.21	<3.78	<1.29	<4.21	<3.78
15	911	87.7	24.6	341 ± 495	56.2
16	10800	1140	236	4060 ± 5860	688
17	26900	3330	1020	10400 ± 14300	2180
18/30	42500	4090	1120	15900 ± 23100	2610
19	4560	660	270	1830 ± 2370	465
20/28	159000	17300	7080	61100 ± 84900	12200
21/33	13900	945	310	5050 ± 7670	628
22	23700	2220	725	8880 ± 12900	1470
23	60.7	3.18[k] (<2.72)	<1.54	20.2 ± 35.0	<2.72
24	404	59.4	13.2	159 ± 214	36.3
25	22000	1270	423	7900 ± 12200	847
26/29	34800	2430	946	12700 ± 19100	1690
27	5630	939	293	2290 ± 2910	616
31	110000	8510	2950	40500 ± 60300	5730
32	21200	2790	858	8280 ± 11200	1820
34	1120	87.7	34.5	414 ± 612	61.1
35	<7.99	<2.84	<1.71	<7.99	<2.84
36	<7.24	<2.57	<1.51	<7.24	<2.57
37	2470	609	205	1090 ± 1210	407
38	334	48.6[k] (<2.58)	16.5	117 ± 188	8.25
39	1070	104[k] (<2.54)	43.6[k] (<1.49)	357 ± 618	<2.54
40/41/71	128000	14200	6240	49500 ± 68100	10200

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]				
	9746062	9746066	9746069	Mean ± SD	Average w/o L6629-25
	L6629-25	L6629-26	L6629-27		
42	84400	8080	3750	32100 ± 45400	5630
43	8530	1040	487	3350 ± 4490	764
44/47/65	350000	33900	21500	135000 ± 186000	27700
45/51	31900	3280	1380	12200 ± 17100	2330
46	6030	715	193	2310 ± 3230	454
48	36500	3400	1740	13900 ± 19600	2570
49/69	288000	29900	16400	111000 ± 153000	23200
50/53	26800	3150	1140	10400 ± 14300	2150
52	414000	36900	22100	158000 ± 222000	29500
54	442	36.1	10.5	163 ± 242	23.3
55	<208	148	264	137 ± 132	206
56	77700	6940	3230	29300 ± 42000	5090
57	1700	277	149	709 ± 861	213
58	1480	203	101	595 ± 768	152
59/62/75	25000	3190	2000	10100 ± 12900	2600
60	40900	3920	3680	16200 ± 21400	3800
61/70/74/76	494000	37100	27400	186000 ± 267000	32300
63	15000	1730	1350	6030 ± 7770	1540
64	129000	10900	5710	48500 ± 69700	8310
66	330000	30200	26300	129000 ± 174000	28300
67	6910	726	421	2690 ± 3660	574
68	3420	662	445	1510 ± 1660	554
72	5280	978	673	2310 ± 2580	826
73	926	145	159	410 ± 447	152
77	7400	1400	1290	3360 ± 3500	1350
78	<214	<26.5	<14.7	<214	<26.5
79	3650	475	283	1470 ± 1890	379
80	<191	<23.6	<13.1	<191	<23.6
81	549	84.2	58.7	231 ± 276	71.5
82	26200	2830	1890	10300 ± 13800	2360
83/99	268000	47300	55100	123000 ± 125000	51200
84	44400	5890	2590	17600 ± 23200	4240
85/116/117	73500	9820	11000	31400 ± 36400	10400
86/87/97/108/ 119/125	195000	25100	19900	80000 ± 99600	22500
88/91	54800	7490	4880	22400 ± 28100	6190
89	2410	235	77.3	907 ± 1300	156
90/101/113	345000	55100	46400	149000 ± 170000	50800
92	63700	11900	10200	28600 ± 30400	11100

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]				
	9746062	9746066	9746069	Mean ± SD	Average w/o L6629-25
	L6629-25	L6629-26	L6629-27		
93/95/98/100/102	185000	25400	16100	75500 ± 94900	20800
94	1070	193	38.5	434 ± 556	116
96	1590	196	95.8	627 ± 835	146
103	5280	976	707	2320 ± 2570	842
104	224	19.8	14.8	86.2 ± 119	17.3
105	103000	14600	21200	46300 ± 49200	17900
106	<49.0	<16.8	<39.5	<49.0	<39.5
107/124	8950	1260	1120	3780 ± 4480	1190
109	23600	4750	5080	11100 ± 10800	4920
110/115	284000	36700	31600	117000 ± 144000	34200
111	305	121	126	184 ± 105	124
112	<10.9	<5.43	<1.39	<10.9	<5.43
114	6810	827	1530	3060 ± 3270	1180
118	268000	49600	66800	128000 ± 121000	58200
120	1670	583	710	988 ± 594	647
121	186	45.3	49.3	93.5 ± 80.1	47.3
122	1960	304	215	826 ± 983	260
123	6540	945	1410	2970 ± 3100	1180
126	708	138	164	337 ± 322	151
127	653	140	113	302 ± 304	127
128/166	34900	7200	11900	18000 ± 14800	9550
129/138/160/163	285000	65000	106000	152000 ± 117000	85500
130	14000	3640	3270	6970 ± 6090	3460
131	2000	335	274	870 ± 979	305
132	46900	9290	6100	20800 ± 22700	7700
133	4740	1610	1930	2760 ± 1720	1770
134/143	6610	1690	874	3060 ± 3100	1280
135/151/154	79100	18800	19800	39200 ± 34500	19300
136	18100	3730	2330	8050 ± 8730	3030
137	11600	2190	3890	5890 ± 5010	3040
139/140	5170	1050	1450	2560 ± 2270	1250
141	35400	5530	6510	15800 ± 17000	6020
142	<137	<12.8	<17.3	<137	<17.3
144	10600	2000	1640	4750 ± 5070	1820
145	35.5	5.91	5.55	15.7 ± 17.2	5.73
146	53700	16500	21400	30500 ± 20200	19000
147/149	158000	36600	29600	74700 ± 72200	33100
148	938	334	365	546 ± 340	350

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]				
	9746062	9746066	9746069	Mean ± SD	Average w/o L6629-25
	L6629-25	L6629-26	L6629-27		
150	829	198	135	387 ± 384	167
152	223	39.8	27.1	96.6 ± 110	33.5
153/168	310000	83600	137000	177000 ± 118000	110000
155	2420	252	228	967 ± 1260	240
156/157	23500	4880	9890	12800 ± 9640	7390
158	24500	4260	7680	12100 ± 10800	5970
159	1210	269	144	541 ± 583	207
161	<89.5	<8.35	<11.4	<89.5	<11.4
162	1290[k] (<91.6)	256	381	212 ± 194	319
164	11600	1970	1740	5100 ± 5630	1860
165	206	121	134	154 ± 45.8	128
167	10300	2460	4810	5860 ± 4020	3640
169	<107	<40.9	<27.8	<107	<40.9
170	45600	7910	13900	22500 ± 20300	10900
171/173	15300	2990	5490	7930 ± 6510	4240
172	9340	1750	2480	4520 ± 4190	2120
174	27700	4710	3300	11900 ± 13700	4010
175	2820	720	956	1500 ± 1150	838
176	4110	1080	808	2000 ± 1830	944
177	22600	6930	6050	11900 ± 9310	6490
178	14100	4390	5710	8070 ± 5270	5050
179	16900	4520	3750	8390 ± 7380	4140
180/193	111000	25200	56900	64400 ± 43400	41100
181	486	82.5	127	232 ± 221	105
182	450	138	159	249 ± 174	149
183/185	47600	10100	19700	25800 ± 19500	14900
184	828	90.6	93.5	337 ± 425	92.1
186	<2.37	<1.67	<0.294	<2.37	<0.294
187	101000	28200	42500	57200 ± 38600	35400
188	386	194	198	259 ± 110	196
189	1470	327	574	790 ± 601	451
190	9660	1840	3330	4940 ± 4150	2590
191	2080	360	767	1070 ± 899	564
192	26.2	<1.93	<0.392	8.73 ± 15.1	<0.392
194	20800	4210	6780	10600 ± 8930	5500
195	7510	1310	1950	3590 ± 3410	1630
196	14400	2620	3620	6880 ± 6530	3120
197/200	2690	661	635	1330 ± 1180	648

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]				
	9746062	9746066	9746069	Mean ± SD	Average w/o L6629-25
	L6629-25	L6629-26	L6629-27		
198/199	34400	7140	7750	16400 ± 15600	7450
201	4880	1500	1660	2680 ± 1910	1580
202	11200	4340	5470	7000 ± 3680	4910
203	21800	4280	6650	10900 ± 9510	5470
204	58.0	16.1	10.6	28.2 ± 25.9	13.4
205	1000	211	268	493 ± 440	240
206	15900	4270	4430	8200 ± 6670	4350
207	2130	570	512	1070 ± 918	541
208	7040	2380	2100	3840 ± 2770	2240
209	7410	2330	2290	4010 ± 2940	2310
Mono-PCB	405	80.5	48.3	178 ± 197	64.4
Di-PCB	12500	1360	700	4850 ± 6630	1030
Tri-PCB	480000	46400	16500	181000 ± 259000	31500
Tetra-PCB	2520000	234000	148000	967000 ± 1350000	191000
Penta-PCB	1970000	302000	299000	857000 ± 964000	301000
Hexa-PCB	1150000	274000	379000	602000 ± 479000	327000
Hepta-PCB	433000	102000	167000	234000 ± 175000	135000
Octa-PCB	119000	26300	34800	60000 ± 51200	30600
Nona-PCB	25100	7220	7040	13100 ± 10400	7130
Deca-PCB	7410	2330	2290	4010 ± 2940	2310
Total PCB	6720000	995000	1060000	2920000 ± 3290000	1030000
TEQ - human[2]	84.0	16.1	19.6	39.9 ± 38.2	17.9
TEQ – fish (TEF = 0)[3]	4.55	0.872	0.978	2.13 ± 2.09	0.925
TEQ – fish (TEF = value)[3]	6.65	1.24	1.51	3.13 ± 3.05	1.38

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank is greater than 10 % of concentration. Blank corrected value in parenthesis was used for computations.

Appendix E-10: Polychlorinated biphenyl (PCB) congeners in striped bass taken from the Hudson River at Haverstraw, NY; May 2003.

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[l]			
	9746059	9746060	9746061	Mean ± SD
	L6629-22(A)	L6629-23	L6629-24	
Lipid (%)	1.89	3.18	4.77	3.56 ± 1.07
1	266	325	355	315 ± 45.3
2	2.61	9.52	4.64 B (3.88)	5.34 ± 3.68
3	5.47 B (3.80)	8.34[k] (<1.66)	7.39	3.73 ± 3.70
4	2740	3360	3360	3150 ± 358
5	<7.56	<4.12	5.86[k] (<3.82)	<7.56
6	109	129	195	144 ± 45.0
7	<6.96	7.80[k] (<3.91)	23.3	7.77 ± 13.5
8	247	301	450	333 ± 105
9	17.7	21.8	27.1	22.2 ± 4.71
10	397	404	468	423 ± 39.1
11	58.3 B (50.7)	15.7	94.4	53.6 ± 39.4
12/13	18.4	17.5[k] (<4.07)	28.4	15.6 ± 14.4
14	<8.00	<4.00	<3.71	<8.00
15	71.1	42.3	128	80.5 ± 43.6
16	286	389	671	449 ± 199
17	1330	1820	2270	1810 ± 470
18/30	1530	2060	2970	2190 ± 728
19	1050	1230	1260	1180 ± 114
20/28	3710	3860	6570	4710 ± 1610
21/33	296	468	1080	615 ± 412
22	477	555	913	648 ± 233
23	<5.37	<5.85	<8.57	<8.57
24	29.9	29.8	48.2	36.0 ± 10.6
25	345	469	660	491 ± 159
26/29	841	1090	1500	1140 ± 333
27	490	655	752	632 ± 132
31	2040	2630	3420	2700 ± 692
32	1210	1320	1560	1360 ± 179
34	42.8	53.6	67.2	54.5 ± 12.2
35	<7.05	<6.37	<9.32	<9.32
36	<6.01	7.02	13.4[k] (<8.56)	2.34 ± 4.05
37	176	109	291	192 ± 92.0
38	6.84[k] (<5.82)	<5.94	<8.69	<8.69
39	27.0[k] (<5.99)	22.9[k] (<5.72)	34.2	11.4 ± 19.7
40/41/71	3210	3720	5670	4200 ± 1300

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746059	9746060	9746061	Mean ± SD
	L6629-22(A)	L6629-23	L6629-24	
42	1620	1960	3340	2310 ± 911
43	297	459	681	479 ± 193
44/47/65	8170	8260	14700	10400 ± 3740
45/51	784	874	1240	966 ± 242
46	189	259	350	266 ± 80.7
48	703	957	1580	1080 ± 451
49/69	7010	7390	12900	9100 ± 3300
50/53	834	919	1310	1020 ± 254
52	10000	10100	16700	12300 ± 3840
54	22.5	24.2	26.4	24.4 ± 1.95
55	<8.96	<58.7	<157	<157
56	1510	1720	9340	4190 ± 4460
57	70.8	59.6	1100	410 ± 597
58	52.2	<54.4	547	200 ± 302
59/62/75	726	841	1500	1020 ± 418
60	1130	1290	1840	1420 ± 372
61/70/74/76	10100	10600	17700	12800 ± 4250
63	550	526	801	626 ± 152
64	2310	2800	4580	3230 ± 1190
66	9410	7960	14800	10700 ± 3600
67	188	186	335	236 ± 85.5
68	182	179	411	257 ± 133
72	270	296	557	374 ± 159
73	109	<0.625	<0.903	36.3 ± 62.9
77	541	497	1710	916 ± 688
78	<9.41	<61.0	<163	<163
79	208	180	331	240 ± 80.3
80	<8.26	<54.0	267	89.0 ± 154
81	30.8	<57.4	44.3[k] (<28.5)	10.3 ± 17.8
82	882	1330	1850	1350 ± 484
83/99	17200	18800	34000	23300 ± 9270
84	1470	2100	3140	2240 ± 843
85/116/117	3490	3980	6570	4680 ± 1660
86/87/97/108/ 119/125	7900	10100	15400	11100 ± 3860
88/91	1910	2370	4080	2790 ± 1140
89	48.3	80.3	94.0	74.2 ± 23.5
90/101/113	20600	21200	32900	24900 ± 6930
92	4170	4720	8030	5640 ± 2090

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746059	9746060	9746061	Mean ± SD
	L6629-22(A)	L6629-23	L6629-24	
93/95/98/100/102	7650	8950	13900	10200 ± 3300
94	51.0	75.2	88.6	71.6 ± 19.1
96	55.4	52.5	77.8	61.9 ± 13.8
103	283	347	673	434 ± 209
104	6.00	5.32[k] (<0.446)	38.1	14.7 ± 20.5
105	6100	6040	8470	6870 ± 1390
106	<12.4	<39.3	<47.6	<47.6
107/124	431	501	721	551 ± 151
109	2180	2320	7750	4080 ± 3180
110/115	12400	15700	22800	17000 ± 5310
111	58.0	65.1	463	195 ± 232
112	83.2	<9.49	<5.56	27.7 ± 48.0
114	298	333	538	390 ± 130
118	23200	21000	34300	26200 ± 7130
120	279	341	656	425 ± 202
121	17.1[k] (<4.61)	19.0[k] (<9.06)	243	81.0 ± 140
122	104	138	732	325 ± 353
123	331	312	574	406 ± 146
126	70.1	69.2	845	328 ± 448
127	38.8	<42.5	409	149 ± 226
128/166	4020	4100	6280	4800 ± 1280
129/138/160/163	42900	29100	47800	39900 ± 9700
130	1880	1850	2730	2150 ± 500
131	114	140	198	151 ± 43.0
132	4310	4070	5830	4740 ± 954
133	844	702	1520	1020 ± 437
134/143	669	820	1210	900 ± 279
135/151/154	10100	8090	14700	11000 ± 3390
136	1610	1300	2160	1690 ± 436
137	750	898	1490	1050 ± 392
139/140	408	408	785	534 ± 218
141	4330	2190	3670	3400 ± 1100
142	<12.3	<13.3	<29.9	<29.9
144	1460	819	1200	1160 ± 322
145	3.78[k] (<0.547)	4.16	7.41[k] (<0.383)	1.39 ± 2.40
146	9690	7200	14800	10600 ± 3870
147/149	19000	14800	21800	18500 ± 3520
148	154	137	373	221 ± 132

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746059	9746060	9746061	Mean ± SD
	L6629-22(A)	L6629-23	L6629-24	
150	71.0	70.3	146	95.8 ± 43.5
152	14.3	10.4	<0.359	8.23 ± 7.39
153/168	57500	33800	61600	51000 ± 15000
155	113	122	4260	1500 ± 2390
156/157	2890	2380	3360	2880 ± 490
158	2750	1850	2990	2530 ± 601
159	192	107	172	157 ± 44.4
161	<8.58	<9.51	<21.4	<21.4
162	135	154	856	382 ± 411
164	1300	852	1400	1180 ± 292
165	66.4[k] (<9.50)	55.5	205	86.8 ± 106
167	1580	1270	1880	1580 ± 305
169	<29.0	<16.6	<148	<148
170	7570	4720	8250	6850 ± 1870
171/173	2500	1920	2930	2450 ± 507
172	1210	1110	2080	1470 ± 534
174	3230	3520	4340	3700 ± 576
175	437	361	637	478 ± 143
176	686	556	821	679 ± 133
177	5280	4790	7640	5900 ± 1520
178	2980	2450	5250	3560 ± 1490
179	2720	2080	4020	2940 ± 989
180/193	23300	14000	25200	20800 ± 5990
181	45.1	39.2	62.7[k] (<1.53)	28.1 ± 24.5
182	111	113	198	141 ± 49.7
183/185	8070	5960	8950	7660 ± 1540
184	52.5	39.9	470	187 ± 245
186	<0.999	<0.757	<1.10	<1.10
187	23700	15700	29900	23100 ± 7120
188	95.6	139	178	138 ± 41.2
189	253	155	259	222 ± 58.4
190	1510	938	1570	1340 ± 351
191	309	218	350	292 ± 67.6
192	<1.09	<0.948	<1.37	<1.37
194	2870	1620	3810	2770 ± 1100
195	959	467	1080	835 ± 325
196	1610	1330	2850	1930 ± 809
197/200	295	327	626	416 ± 183

PCB Congener (IUPAC #)	Concentration (pg/g wet weight) in standard fillet[1]			
	9746059	9746060	9746061	Mean ± SD
	L6629-22(A)	L6629-23	L6629-24	
198/199	3620	3530	8490	5210 ± 2840
201	637	687	1480	935 ± 473
202	2060	2000	4230	2760 ± 1270
203	2290	1760	4120	2720 ± 1240
204	4.65[k] (<0.116)	8.59	11.3	6.63 ± 5.90
205	132	79.7	160	124 ± 40.8
206	1540	1880	2750	2060 ± 624
207	216	282	426	308 ± 107
208	816	1120	1570	1170 ± 379
209	725	1050	1420	1070 ± 348
Mono-PCB	272	335	366	324 ± 47.7
Di-PCB	3650	4270	4770	4230 ± 563
Tri-PCB	13900	16700	24100	18200 ± 5260
Tetra-PCB	60200	62100	114000	78900 ± 30700
Penta-PCB	111000	121000	199000	144000 ± 48200
Hexa-PCB	169000	117000	203000	163000 ± 43300
Hepta-PCB	84100	58800	103000	81900 ± 22200
Octa-PCB	14500	11800	26900	17700 ± 8050
Nona-PCB	2570	3280	4750	3530 ± 1110
Deca-PCB	725	1050	1420	1070 ± 348
Total PCB	460000	397000	682000	513000 ± 150000
TEQ - human[2]	8.07	7.88	86.1	34.0 ± 45.1 (7.98)
TEQ – fish (TEF = 0)[3]	0.420	0.396	4.40	1.74 ± 2.30 (0.408)
TEQ – fish (TEF = value)[3]	0.593	0.553	4.64	1.93 ± 2.35 (0.573)

[1] Sample identifications are the tag number and laboratory identification, respectively.
[2] World Health Organization toxicity equivalency factors for humans and mammals are used in computations (Van den Berg *et al*., 2006). Computations equate detection limits (denoted by < sign) to zero.
[3] Toxicity equivalency factors (TEF) for fish were from Van den Berg *et al*. (1998). Where a TEF value was indicated with a less than sign (<), the TEQs were calculated with TEF either zero or the value excluding the < sign.
[K] Peak detected but did not meet quantification criteria; unconfirmed concentration. The value shown is the estimated maximum possible concentration, however, the value is equated to zero in statistical computations. The detection limit is in parenthesis.
B = Blank is greater than 10 % of concentration. Blank corrected value in parenthesis was used in computations.

Appendix F

Quality Control Summaries

Appendix F-1: Polybrominated diphenyl ether (BDE) concentrations in blank samples (corn oil).

BDE IUPAC #	Concentration in blank sample number WG-:											
	11969-101	11969-102	11969-103	14244-101	14244-102	14224-103	16045-101	16045-102	16045-103	16457-101	16457-102	16457-103
7	<0.126	<0.277	1.09	<0.235	<0.725	<0.950	nq*	nq	nq	<0.100	<0.100	<0.100
8/11	<0.100	<0.214	2.39	0.184[k]	<0.570	<0.747	nq	nq	nq	<0.100	<0.100	<0.100
10	<0.154	<0.339	1.14	<0.281	<0.857	<1.12	nq	nq	nq	<0.108	<0.101	<0.118
12/13	0.299[k]	0.755[k]	3.70[k]	<0.149	<0.480	<0.628	nq	nq	nq	<0.100	<0.100	<0.100
15	0.168[k]	0.184	1.28	0.223	<0.413	<0.541	nq	nq	nq	<0.100	<0.100	<0.100
17/25	0.149[k]	0.112	0.472	0.213[k]	<0.289	<0.309	12.3[k]	0.306[k]	<0.198	<0.127	<0.133	<0.106
28/33	0.406[k]	0.340	0.676[k]	0.768	0.423[k]	0.592	8.48	0.254	0.179[k]	0.111[k]	0.177[k]	0.116[k]
30	<0.100	<0.100	<0.100	<0.159	<0.307	<0.329	<0.600	<0.307	<0.209	<0.143	<0.150	<0.119
32	<0.100	<0.100	0.187	<0.124	<0.246	<0.263	<0.475	<0.243	<0.165	<0.108	<0.113	<0.100
35	0.116[k]	0.105[k]	0.231[k]	<0.100	<0.194	<0.207	<0.383	<0.196	<0.133	<0.100	<0.100	<0.100
37	0.130[k]	0.121[k]	0.289	<0.100	<0.177	<0.190	<0.357	<0.183	<0.124	<0.100	<0.100	<0.100
47	7.63	6.70	8.65	26.1	9.71	17.3	273	8.10	3.79	2.59	4.24	3.03
49	0.202	0.157	0.368	0.750	<0.737	<0.632	32.0	0.610	<0.334	<0.238	<0.276	<0.200
51	<0.100	<0.100	0.188	0.119[k]	<0.550	<0.472	2.41	<0.243	<0.218	<0.177	<0.205	<0.148
66	0.105[k]	0.172	0.360	0.728[k]	<0.847	<0.726	1.83	<0.404	<0.361	<0.273	<0.317	<0.229
71	<0.100	<0.100	0.182[k]	0.214	<0.769	<0.659	1.70	<0.354	<0.316	<0.257	<0.298	<0.216
75	<0.100	<0.100	0.169	<0.101	<0.675	<0.579	<0.467	<0.338	<0.302	<0.203	<0.236	<0.171
77	<0.100	<0.100	0.162	<0.100	<0.471	<0.408	<0.353	<0.256	<0.226	<0.161	<0.182	<0.134
79	<0.100	<0.100	0.210	<0.100	<0.597	<0.512	2.08	<0.302	<0.270	<0.199	<0.230	<0.167
85	0.450	0.160[k]	0.652	1.19[k]	<0.934	<0.957	<1.06	<0.775	<0.631	<0.530	<0.732	<0.426
99	5.86	5.08	8.14	21.3	8.31	12.0	7.66	4.87	2.86	2.00	3.27	2.60
100	1.27	1.10	1.85	4.79	1.91	2.93	44.0	1.67	0.897[k]	0.543	0.738	0.605
105	<0.294	<0.192	<0.182	<0.248	<1.12	<1.15	<1.25	<0.916	<0.746	<0.669	<0.924	<0.538
116	<0.392	<0.256	<0.243	<0.319	<1.47	<1.50	<1.73	<1.27	<1.03	<0.895	<1.24	<0.720

BDE IUPAC #	Concentration in blank sample number WG-:											
	11969-101	11969-102	11969-103	14244-101	14244-102	14224-103	16045-101	16045-102	16045-103	16457-101	16457-102	16457-103
119/120	<0.268	<0.175	0.450	0.212[k]	<1.02	<1.05	1.93	<0.813	<0.662	<0.592	<0.818	0.476
126	<0.150	<0.106	0.148	<0.121	<0.535	<0.500	0.918[k]	<0.406	<0.347	<0.342	<0.465	<0.275
128	<1.00	<0.828	<0.612	<0.725	<0.604	<0.651	<0.875	<0.630	<0.512	<0.473	<0.648	<0.486
138/166	<0.439	<0.346	0.324[k]	0.377	<0.529	<0.566	<0.541	<0.319	<0.315	<0.247	<0.338	<0.276
140	<0.316	<0.249	<0.185	0.268	<0.397	<0.424	<0.374	<0.221	<0.218	<0.178	<0.243	<0.200
153	0.678	0.720	1.15	2.44	1.02	1.40	4.69	0.853	0.557	0.344[k]	0.436	0.345
154	0.504[k]	0.419[k]	0.825	1.97	0.880[k]	1.13	18.6	0.540	0.342	0.189[k]	0.276[k]	0.242[k]
155	<0.238	<0.187	0.392[k]	0.181	<0.286	<0.305	9.23	<0.158	<0.155	<0.125	<0.170	<0.140
181	<0.394	<0.301	<0.313	<0.472	<0.676	<0.635	<0.569	<0.414	<0.252	<0.188	<0.273	<0.278
183	0.315[k]	0.281	0.535	1.26	0.663[k]	0.625[k]	1.33	0.411	0.397	0.101[k]	0.458[k]	0.275[k]
190	<0.547	<0.418	<0.436	<0.675	<0.938	<0.881	<0.798	<0.580	<0.353	<0.257	<0.374	<0.381
203	<0.340	0.227	0.392	1.35[k]	<0.491	<0.559	3.16[k]	0.677[k]	0.549[k]	0.409[k]	0.760[k]	0.464[k]
206	5.15	2.45	6.09	11.4	4.17[k]	5.02[k]	19.6	4.79	3.41	1.50[k]	3.17[k]	2.17[k]
207	5.07	3.54	7.84	12.2	2.52	4.15[k]	24.9[k]	4.72	50.3	2.58	3.05[k]	2.87
208	3.94	2.56	5.25	10.3	3.46	4.36[k]	19.9	4.45	4.42[k]	2.49[k]	1.65[k]	2.39[k]
209	114	53.2	107	207	<81.1	<81.1	420	79.9	77.2	29.1[k]	<21.6	35.6

[@] Blanks WG11696-101, -102 and -103 are associated with samples L6629-11 through -20, and -22.
[#] Blanks WG14224-101, -102 and -103 are associated with samples L6629-1 through 5, and -7 through -9.
[&] Blanks WG16045-101, -102 and -103 are associated with samples L6629-21, and -23 through -30.
[$] Blanks WG16457-101, -102 and -103 are associated with samples L6629-6 and -10.
[K] Peak detected but did not meet quantification criteria; result reported represents the estimated maximum possible concentration since the analyte identity and/or quantity could not be verified.
* nq = Data not quantifiable.

Appendix F-2: Spiked ^{13}C radio-labeled brominated diphenyl ethers in corn oil lab blanks and a clean-up standard (BDE-139).

Blank sample number WG-	Recovery (%) of BDE congener number											
	15	28	47	77	99	100	126	153	154	183	209	139
11969-101	42.5	130	125	116	118	114	94.2	120	99.1	95.4	37.2	105
11969-102	15.7	129	133	118	112	115	80.9	112	87.6	83.7	27.5	97.7
11969-103	14.6	137	146	135	122	119	95.3	121	87.5	88.1	38.8	104
14244-101LW	59.5	96.4	91.1	120	99.6	95.0	101	97.2	84.8	82.7	20.1	93.7
14244-102W	40.2	107	103	115	99.5	93.2	104	98.9	103	92.6	26.7	100
14244-103W	30.8	96.7	103	110	101	93.3	111	98.9	101	94.2	26.1	99.3
16045-101	nq[1]	63.9	55.7	59.9	57.1	54.0	60.0	63.5	78.8	65.3	15.4[v]	68.4
16045-102	nq	96.6	91.9	101	92.6	88.6	105	107	129	110	31.0	117
16045-103	nq	104	98.6	107	98.7	93.1	110	112	133	116	28.5	122
16457-101	91.9	109	103	86.5	96.2	91.0	103	114	122	123	51.5	105
16457-102	86.7	107	103	89.3	90.3	84.7	95.9	102	111	109	44.2	88.5
16457-103	101	122	122	104	102	96.9	107	112	124	117	53.0	101
N	9	12	12	12	12	12	12	12	12	12	12	12
Mean	43.6	108	106	105	99.1	94.8	97.3	105	105	98.1	33.3	100
Std. Dev.	30.3	19.8	23.3	19.5	16.4	17.0	14.4	15.3	18.6	17.1	11.8	13.5

[1] nq = not quantified.
[V] Surrogate recovery is not within method/contract control limits.
[@] Blanks WG11696-101, -102 and -103 are associated with samples L6629-11 through -20, and -22.
[#] Blanks WG14224-101, -102 and -103 are associated with samples L6629-1 through 5, and -7 through -9.
[&] Blanks WG16045-101, -102 and -103 are associated with samples L6629-21, and -23 through -30.
[$] Blanks WG16457-101, -102 and -103 are associated with samples L6629-6 and -10.

Appendix F-3: Polybrominated diphenyl ether duplicate analyses and calculated relative percent differences |RPD|.

Parameter	Concentration (pg/g wet weight) and relative percent difference (|RPD|) in standard fillet[1]:								
	9746059			0003271			9746086		
	Original L6629-22(A)	Duplicate L6629-22(A)	|RPD|	Original L6629-2 (A)	Duplicate L6629-2	|RPD|	Original L6629-29R(A)	Duplicate L6629-29	|RPD|
BDE-7	138	122	12.3	12.8	24.3	62.0	nq[2]	nq	--
BDE-8/11	99.7	93.9	5.99	28.1	60.7	73.4	nq	nq	--
BDE-10	<2.40	<0.897	nc[3]	<1.05	<6.69	nc	nq	nq	--
BDE-12/13	48.6[k]	44.3[k]	nc	105[k]	445[k]	nc	nq	nq	--
BDE-15	27.5	28.4	3.22	68.0	75.3	10.2	nq	nq	--
BDE-17/25	747	832	10.8	1300[k]	1280[k]	nc	257[k]	244[k]	nc
BDE-28/33	753	760	0.93	1520	1570	3.24	213	185	14.1
BDE-30	<3.73	<4.04	nc	<12.3	<11.6	nc	<2.41	<2.23	nc
BDE-32	6.23	7.03	12.1	17.5	16.4	6.49	4.94	5.29	6.84
BDE-35	<2.15	<2.32	nc	<7.30	<6.84	nc	2.41[k]	1.75[k]	nc
BDE-37	2.81B (2.52)	3.08	20.0	<6.74	<6.31	nc	3.51	3.54	0.92
BDE-47	30100	30000	0.33	68400	65200	4.79	10400	9490	9.15
BDE-49	2540	2800	9.74	4940	4790	0.31	963	862	11.1
BDE-51	135	151	11.2	347	312	10.6	94.5	87.5	7.69
BDE-66	118	134	12.7	292	261	11.2	125	125	0.00
BDE-71	<0.147	<0.0833	nc	<0.504	<3.17	nc	34.1	41.7	20.1
BDE-75	19.6	19	3.11	41.9	39.3	6.40	17.2	15.1	13.0
BDE-77	1.23[k]	1.25	nc	1.76	1.34[k]	nc	2.39	2.62[k]	nc
BDE-79	<0.110	<0.0833	nc	<0.354	<2.55	nc	36.7	41.3	11.8
BDE-85	1.64	<1.40	nc	<3.59	<4.37	nc	<2.28	2.03[k]	nc
BDE-99	254	210	19.0	178	202	12.6	514	463	10.4
BDE-100	5030	5200	3.32	15300	16500	7.55	2620	2420	7.94

Parameter	Concentration (pg/g wet weight) and relative percent difference (|RPD|) in standard fillet[1]:								
	9746059			0003271			9746086		
	Original L6629-22(A)	Duplicate L6629-22(A)	|RPD|	Original L6629-2 (A)	Duplicate L6629-2	|RPD|	Original L6629-29R(A)	Duplicate L6629-29	|RPD|
BDE-105	<1.94	<1.66	nc	<4.40	<5.35	nc	<2.86	<2.03	nc
BDE-116	<2.66	<2.28	nc	<5.86	<7.13	nc	<3.59	<2.55	nc
BDE-119/120	135	131	3.01	225	246	8.92	342	311	9.49
BDE-126	57.2	59.4	3.78	88.4	90.4	2.24	127	125	1.59
BDE-128	2.80[k]	2.36[k]	nc	2.89[k]	4.05[k]	nc	26.1[k]	28.0[k]	nc
BDE-138/166	0.442[k]	<2.01	nc	<0.492	<0.695	nc	3.92	3.57[k]	nc
BDE-140	3.99	2.37	50.9	2.83	3.28	14.7	33.6	33.4	0.60
BDE-153	495	487	1.63	1030	1070	3.81	1240	1160	6.67
BDE-154	2330	2390	2.54	5930	6340	6.68	3580	3300	8.14
BDE-155	1020	1010	0.99	2230	2290	2.65	1520	1470	3.34
BDE-181	<0.533	<0.466	nc	<1.14	<1.19	nc	1.61	1.28	22.8
BDE-183	36.1	36.9	2.19	28.8	30	4.08	321	297	7.77
BDE-190	<0.769	<0.672	nc	<1.60	<1.67	nc	2.94	2.33	23.1
BDE-203	1.89	1.67	12.4	1.67[k]	2.56	nc	14.2	15.6	9.40
BDE-206	7.46B (1.37)	6.41	130	7.10B (<2.09)	20.3[k]	nc	3.62[k]	14.6	nc
BDE-207	6.86B (<0.292)	5.93	nc	4.26[k]	11.3[k]	nc	11.7B (6.67)	21.4	105
BDE-208	7.50B (2.25)	5.82	88.5	5.17[k]	10.3	nc	8.10B (<0.869)	16.3	nc
BDE-209	112B (<34.5)	64.6	nc	108B (<96.2)	208	nc	60.7B (<13.4)	299	nc

[1] Sample identifications are the tag number and contract laboratory number.
[2] nq = not quantified; insufficient recovery of standard to permit quantification.
[3] nc = not computed.
[4] |RPD| based on blank corrected concentrations.
[k] = Peak present but did not meet quantification criteria; unconfirmed concentration. |RPD| computation not possible.

Appendix F-4: Spiked ^{13}C-labeled brominated diphenyl ethers (BDEs) in fish tissues, including the clean-up standard (BDE139).

Sample ID L6629-	Recovery (percent) of BDE number:											
	15	28	47	77	99	100	126	153	154	183	209	139
1W	19.9[v]	113	158[v]	108	98.7	113	86.1	97.6	106	90.1	24.4	102
2W(A)	57.7	109	nq[1]	102	105	124	88.1	104	115	90.9	22.6	103
2 dup	2.4[v]	109	nq	103	101	116	87.8	101	110	88.2	24.5	101
3W	15.7[v]	113	160[v]	105	95.5	105	80.4	93.6	97.1	85.3	19.7[v]	100
4	16.1[v]	82.2	105	119	115	98.9	90.7	92.3	91.6	77.1	63.3	107
5	12.4[v]	85.6	102	118	102	100	94.9	92.8	96.0	78.2	59.6	98.2
6R	90.9	119	121	121	89.4	80.8	96.2	104	105	98.7	nq	109
7W	13.3[v]	115	135	110	124	107	89.3	107	104	96.8	24.2	109
8W	19.5[v]	117	135	111	137	112	90.9	111	106	95.4	24.5	110
9W	20.5[v]	109	115	99.7	107	96.4	82.0	94.0	95.2	86.0	23.5	99.0
10R	69.1	84.7	97.8	85.1	95.4	76.0	78.4	83.7	85.5	85.1	28.9	98.1
11W	nq	114	117	95.1	96.7	87.5	83.1	89.4	83.0	92.2	23.4	98.4
12LW	60.7	119	142	92.2	117	99.6	86.2	115	110	99.9	38.9	119
13	40.5	116	123	105	116	108	98.4	118	114	101	26.8	126
14	nq	108	113	103	89.2	82.3	70.0	96.5	89.9	68.0	20.8	98.1
15	nq	117	124	108	103	96.1	79.7	108	104	73.9	24.7	104
16W	24.3	127	199[v]	117	108	115	96.8	101	102	96.4	25.2	106
17W	nq	136	nq	126	156[v]	132	104	119	113	109	28.1	122
18W	20.4	150	nq	nq	nq	nq	154[v]	138	143	127	40.2	138
19W	16.1	142	199[v]	168[v]	152[v]	123	136	117	112	112	35.6	117

Sample ID L6629-	Recovery (percent) of BDE number:											
	15	28	47	77	99	100	126	153	154	183	209	139
20W	52.7	134	180[v]	155[v]	137	112	122	107	100	99.6	30.2	111
21R	nq	99.6	137	87.1	108	102	76.8	81.7	96.5	77.4	29.8	87.1
22(A)	10.4[v]	93.4	117	76.4	92.7	95.7	82.3	89.9	93.6	72.9	21.7	90.0
22 dup	14.7	121	148	117	124	120	107	131	131	82.8	50.0	118
23R	nq	113	131	98.2	93.3	92.6	98.4	90.6	113	95.4	50.3	101
24R	nq	121	160[v]	107	93.4	104	103	98.1	115	104	54.9	106
25RW	nq	71.4	21.7	84.5	85.6	120	65.4	67.5	85.5	71.7	54.9	74.4
26R	17.0	92.1	129	81.2	74.8	84.6	87.0	79.4	96.4	82.1	45.0	83.6
27R	11.8[v]	80.9	23.8	71.5	65.1	84.8	74.4	72.4	91.5	73.7	31.2	80.9
28R	nq	94.5	120	79.4	76.2	87.1	73.3	70.6	85.8	69.3	28.8	77.7
29R(A)	nq	102	112	83.8	89.7	90.1	98.2	101	127	99.6	52.2	107
29 dup	nq	110	116	95.0	92.0	92.7	97.0	94.8	119	104	55.0	101
30R	nq	106	nq	90.6	90.8	112	84.4	84.3	101	81.8	39.4	91.4
n	21	33	28	32	32	32	33	33	33	33	32	33
Mean	29.3	110	126	104	104	102	92.2	98.5	104	89.9	35.1	103
SD	23.0	17.8	39.4	20.7	20.9	14.3	18.0	16.1	13.8	13.7	13.3	13.7

[v] = Surrogate recovery is not within method/contract control limits.
[1] nq = not quantified; insufficient recovery of calibration standard.

Appendix F-5: Recovery of polybrominated diphenyl ethers (BDE) spiked in corn oil for assessment of on-going precision and recovery, including the clean-up standard (BDE-139).

Sample number (WG-)	Recovery (percent) of BDE congener number:								
	28	47	99	100	153	154	183	209	139
Unlabeled BDE									
11969-104[@]	81.3	108	107	95.4	91.3	92.6	89.3	103	--
14244-104[#]	90.9	118	112	106	104	103	107	123	--
16045-104[&]	83.6	108	110	101	95.2	96.4	101	97.9	--
16457-104[$]	78.3	94.7	97.0	91.7	85.4	89.9	95.6	85.6	--
Mean ± SD	83.5 ± 0.537	107 ± 9.56	107 ± 6.66	98.5 ± 6.28	94.0 ± 7.80	95.5 ± 5.68	98.2 ± 7.56	102 ± 15.6	--
^{13}C-labeled BDE									
11969-104[@]	133	145[v]	129	126	138	115	124	66.5	122
14244-104[#]	81.5	83.9	94.5	90.5	100	112	95.1	26.9	96.9
16045-104[&]	96.0	88.3	85.0	85.3	96.1	126	100	36.8	107
16457-104[$]	124	118	104	96.9	119	133	137	59.4	106
Mean ± SD	109 ± 24.0	109 ± 28.5	103 ± 18.9	99.7 ± 18.2	113 ± 19.3	122 ± 9.75	114 ± 19.9	47.4 ± 18.6	108 ± 10.4

[v] Surrogate recovery is not within method/contract control limits.
[@] WG11696-104 is associated with samples L6629-11 through -20, and -22.
[#] WG14224-104 is associated with samples L6629-1 through 5, and -7 through -9.
[&] WG16045-104 is associated with samples L6629-21, and -23 through -30.
[$] WG16457-104 is associated with samples L6629-6 and -10.

Appendix F-6: Blank and on-going precision and recovery (OPR) sample results for chlorinated dibenzo-*p*-dioxins and dibenzofurans.

Analyte	Blanks (pg/g)			OPR (% recovery)			
	WG11978-101[1]	WG11979-101[2]	WG17093-101[3]	WG11978-102[1]	WG11979-102[2]	WG17093-102[3]	Mean ± Std. dev.
2,3,7,8-TCDD	<0.0500	<0.0500	<0.0500	101	105	104	103 ± 2.08
1,2,3,7,8-PeCDD	<0.0500	<0.0500	<0.0500	100	104	104	103 ± 2.31
1,2,3,4,7,8-HxCDD	<0.0500	<0.0500	<0.0500	103	100	102	102 ± 1.53
1,2,3,6,7,8-HxCDD	<0.0500	0.053	<0.0500	101	104	105	103 ± 2.08
1.2.3.7.8.9-HxCDD	<0.0500	0.059	<0.0500	104	104	108	105 ± 2.31
1,2,3,4,6,7,8-HpCDD	0.123	0.182	0.103[k]	99.9	101	103	101 ± 1.57
OCDD	0.406	0.548	0.339	99.1	100	106	102 ± 3.75
2,3,7,8-TCDF	<0.0500	<0.0500	<0.0500	106	104	106	105 ± 1.15
1,2,3,7,8-PeCDF	<0.0500	<0.0500	<0.0500	103	102	103	103 ± 0.58
2,3,4,7,8-PeCDF	0.052	0.058	0.051	103	103	105	104 ± 1.15
1,2,3,4,7,8-HxCDF	<0.0500	0.050	<0.0500	100	101	103	101 ± 1.53
1,2,3,6,7,8-HxCDF	<0.0500	<0.0500	<0.0500	103	103	104	103 ± 0.58
1,2,3,7,8,9-HxCDF	0.052	0.067	<0.0500	101	102	105	103 ± 2.08
2,3,4,6,7,8-HxCDF	0.053	<0.0500	<0.0500	99.5	102	101	101 ± 1.26
1,2,3,4,6,7,8-HpCDF	0.060	0.082	<0.0500	100	102	104	102 ± 2.00
1,2,3,4,7,8,9-HpCDF	0.057	0.069	<0.0500	101	101	101	101 ± 0.00
OCDF	0.123	0.183	<0.0500	102	95.0	107	101 ± 6.03

[1] Associated with samples L6629-1 through L6629-10.
[2] Associated with samples L6629-11, L6629-12, and L6629-15 through L6629-30.
[3] Associated with sample L6629-14.
[k] Peak present but did not meet quantification criteria; unconfirmed concentration. Value treated as less than detection limit of 0.0500 pg/g.

Appendix F-7: Duplicate sample concentrations for polychlorinated dibenzo-*p*-dioxins and dibenzofurans and calculated relative percent differences (|RPD|).

Analyte	Sample[1] concentration (pg/g) and |RPD|					
	0003270/L6629-1A			9746059/L6629-22A		
	Original	Duplicate	|RPD|	Original	Duplicate	|RPD|
2,3,7,8-TCDD	0.727	0.744	2.31	1.19	1.11	6.96
1,2,3,7,8-PeCDD	0.389	0.384	1.29	0.335	0.325	3.03
1,2,3,4,7,8-HxCDD	0.063[k] (<0.0481)	<0.0490	nc[2]	<0.0499	0.051	nc
1,2,3,6,7,8-HxCDD	0.174	0.183	5.04	0.174B (0.121)	0.157B (0.104)	10.3 (15.1)
1,2,3,7,8,9-HxCDD	<0.0481	<0.0490	nc	<0.0499	0.050[k] (<0.0494)	nc
1,2,3,4,6,7,8-HpCDD	0.157B (0.034)	0.130B (0.007)	18.8 (132)	0.168B (<0.0499)	0.180B (<0.0494)	6.90 (nc)
OCDD	0.322B (<0.0481)	0.292[k] (<0.0490)	nc	0.354B (<0.0499)	0.344B (<0.0494)	2.87 (nc)
2,3,7,8-TCDF	6.84	7.18	4.85	4.81	4.30	11.2
1,2,3,7,8-PeCDF	0.933	0.912	2.28	0.813	0.719	12.3
2,3,4,7,8-PeCDF	1.73	1.71	1.16	1.14B (0.056)	1.08B (0.050)	5.40 (11.3)
1,2,3,4,7,8-HxCDF	0.065	0.051	24.1	0.053	0.067[k] (<0.0494)	nc
1,2,3,6,7,8-HxCDF	<0.0481	0.052	nc	<0.0499	<0.0494	nc
1,2,3,7,8,9-HxCDF	<0.0481	<0.0490	nc	<0.0499	<0.0494	nc
2,3,4,6,7,8-HxCDF	0.051[k] (<0.0481)	<0.0490	nc	<0.0499	<0.0494	nc
1,2,3,4,6,7,8-HpCDF	0.058B (<0.0481)	0.051[k] (<0.0490)	nc	<0.0499	0.091[k] (<0.0494)	nc
1,2,3,4,7,8,9-HpCDF	<0.0481	<0.0490	nc	<0.0499	<0.0494	nc
OCDF	0.071B (<0.0481)	<0.0490	nc	<0.0499	0.060B (<0.0494)	nc

[1] Sample tag number /lab identification number given.
[2] nc = not calculated.
[k] Peak present but did not meet quantification criteria; unconfirmed concentration. |RPD| computation not possible.

Appendix F-8: Recovery of the ^{13}C radio-labeled internal standards and the ^{37}C radio-labeled clean-up standard for chlorinated dibenzo-*p*-dioxins and dibenzofurans.

Analyte	Recovery (%)[1]		
	Mean ± SD	Minimum	Maximum
^{13}C-2,3,7,8-TCDD	75.0 ± 8.46	50.2	94.6
^{13}C-1,2,3,7,8-PeCDD	83.7 ± 9.94	56.9	112
^{13}C-1,2,3,4,7,8-HxCDD	74.4 ± 8.73	49.1	91.5
^{13}C-1,2,3,6,7,8-HxCDD	73.7 ± 7.78	51.9	86.7
^{13}C-1,2,3,4,6,7,8-HpCDD	80.5 ± 8.70	52.8	97.1
^{13}C-OCDD	74.7 ± 9.21	46.6	92.9
^{13}C-2,3,7,8-TCDF	78.9 ± 9.93	52.1	99.3
^{13}C-1,2,3,7,8-PeCDF	82.6 ± 9.99	54.6	104
^{13}C-2,3,4,7,8-PeCDF	81.3 ± 9.33	55.2	101
^{13}C-1,2,3,4,7,8-HxCDF	76.5 ± 10.4	48.4	97.7
^{13}C-1,2,3,6,7,8-HxCDF	75.9 ± 9.68	50.3	92.9
^{13}C-1,2,3,7,8,9-HxCDF	77.6 ± 9.75	50.7	98.0
^{13}C-2.3.4.6.7.8-HxCDF	75.6 ± 9.91	49.2	95.2
^{13}C-1,2,3,4,6,7,8-HpCDF	78.0 ± 10.1	48.9	99.3
^{13}C-1,2,3,4,7,8,9-HpCDF	80.4 ± 9.68	50.9	102
^{37}C-2,3,7,8-TCDD	84.4 ± 9.28	60.3	107

[1] n = 37; includes duplicates, blanks and on-going precision and recovery samples but excludes duplicates.

Appendix F-9: Polybrominated dibenzo-*p*-dioxins and dibenzofurans in blank samples.

Analyte	Concentration (pg/g in corn oil):		
	WG17093-101	WG11978-101	WG11979-101
2,3,7,8-TBDD	<0.1	<0.1	<0.1
1,2,3,7,8-PeBDD	<0.5	<0.5	<0.5
1,2,3,4,7,8- and 1,2,3,6,7,8-HxBDD	<0.5	0.586	0.576[k] (<0.5)
1,2,3,7,8,9-HxBDD	<0.5	<0.5	<0.5
OBDD	<2.0	<2.0	<2.87
2,3,7,8-TBDF	<0.1	<0.1	<0.1
1,2,3,7,8-PeBDF	<0.5	<0.5	<0.5
2,3,4,7,8-PeBDF	<0.5	0.585	<0.5
1,2,3,4,7,8-HxBDF	<0.5	0.556	0.648[k] (<0.5)
1,2,3,4,6,7,8-HpBDF	<1.0	<1.0	<1.0
OBDF	<2.0	<2.0	<2.89

WG17093-101 is associated with samples L6629-13 and L6629-14. The remaining 28 samples are associated with the remaining two blank samples.

Appendix F-10: Recovery (%) of spiked ^{13}C-labeled polybrominated dibenzo-*p*-dioxins and dibenzofurans in blank samples.

Analyte	Blank sample ID no. (WG-)			Mean ± Std. dev.
	17093-101	11978-101	11979-101	
^{13}C-2,3,7,8-TBDD	77.5	86.8	113	92.4 ± 18.4
^{13}C-1,2,3,7,8-PeBDD	75.4	65.5	71.9	70.9 ± 5.02
^{13}C-1,2,3,4,7,8-HxBDD	57.6	40.7	26.6	41.6 ± 15.5
^{13}C-2,3,7,8-TBDF	72.6	79.5	97.7	83.3 ± 13.0
^{13}C-2,3,4,7,8-PeBDF	63.4	55.4	55.1	58.0 ± 4.71

Appendix F-11: Recovery (%) of ^{13}C-labeled polybrominated dibenzo-*p*-dioxins and dibenzofurans from spiked tissue samples (n = 32).

Analyte	Mean	Std. Dev.	Minimum	Maximum
^{13}C-2,3,7,8-TBDD	79.6	11.8	53.3	97.2
^{13}C-1,2,3,7,8-PeBDD	67.2	11.6	40.7	92.4
^{13}C-1,2,3,4,7,8-HxBDD	47.0	12.5	28.3	79.2
^{13}C-2,3,7,8-TBDF	74.0	9.92	49.7	87.5
^{13}C-2,3,4,7,8-PeBDF	60.1	11.8	35.1	85.6

Appendix F-12: Polybrominated dibenzo-*p*-dioxins and dibenzofurans in duplicate samples.

Analyte	Concentration (pg/g wet weight) in sample[1]:			
	0003270 (L6629-1)		9746059 (L6629-22)	
	Original	Duplicate	Original	Duplicate
2,3,7,8-TBDD	<0.1	<0.1	<0.1	<0.1
1,2,3,7,8-PeBDD	<0.5	<0.5	<0.5	<0.5
1,2,3,4,7,8- and 1,2,3,6,7,8-HxBDD	<0.5	<0.5	<0.5	<0.5
1,2,3,7,8,9-HxBDD	<0.5	<0.5	<0.5	<0.5
OBDD	<2.0	<2.0	<2.0	<2.0
2,3,7,8-TBDF	<0.1	<0.1	<0.1	<0.1
1,2,3,7,8-PeBDF	<0.5	<0.5	<0.5	<0.5
2,3,4,7,8-PeBDF	<0.5	<0.5	<0.5	<0.5
1,2,3,4,7,8-HxBDF	<0.5	0.651	<0.5	<0.5
1,2,3,4,6,7,8-HpBDF	<1.0	3.09	<1.0	<1.0
OBDF	<2.0	<2.0	<2.0	<2.0

[1] Sample identification number (lab identification number).

Appendix F-13: Polybrominated dibenzo-*p*-dioxins and dibenzofurans in on-going precision and recovery samples.

Analyte	Recovery (%) of spiked analytes in corn oil			Mean ± Std. dev.
	WG17093-102	WG11978-102	WG11979-102	
2,3,7,8-TBDD	137	110	92.2	113 ± 22.6
1,2,3,7,8-PeBDD	140	117	102	120 ± 19.1
1,2,3,4,7,8- and 1,2,3,6,7,8-HxBDD	103	93.3	84.5	93.6 ± 9.25
1,2,3,7,8,9-HxBDD	96.8	89.5	81.6	89.3 ± 7.60
OBDD	11.5	4.76	7.71	7.99 ± 3.38
2,3,7,8-TBDF	138	115	94.6	116 ± 21.7
1,2,3,7,8-PeBDF	120	98.1	88.6	102 ± 16.1
2,3,4,7,8-PeBDF	104	95.5	88.0	95.8 ± 8.01
1,2,3,4,7,8-HxBDF	122	94.5	92.1	103 ± 16.6
1,2,3,4,6,7,8-HpBDF	47.7	72.5	60.5	60.2 ± 12.4

Appendix F-14: Recovery (%) of spiked ^{13}C-labeled polybrominated dibenzo-*p*-dioxins and dibenzofurans from on-going precision and recovery (OPR) samples.

Analyte	OPR sample ID no. (WG-)			Mean ± Std. dev.
	17093-102	11978-102	11979-102	
^{13}C-2,3,7,8-TBDD	70.7	83.3	90.2	81.4 ± 9.89
^{13}C-1,2,3,7,8-PeBDD	75.6	75.8	68.9	73.4 ± 3.93
^{13}C-1,2,3,4,7,8-HxBDD	78.7	63.3	49.3	63.8 ± 14.7
^{13}C-2,3,7,8-TBDF	69.2	79.2	84.5	77.6 ± 7.77
^{13}C-2,3,4,7,8-PeBDF	71.7	69.9	69.3	70.3 ± 1.25

Appendix F-15: Polychlorinated biphenyl congener concentrations (pg/g wet weight) in blank (corn oil) samples.

PCB congener (IUPAC No.)/ homolog	Blank sample identification number[1]						
	WG11968-101	WG16501-101	WG15895-101	WG17093-101	WG11970-101	WG11970-102	WG11970-103
1	1.81	0.104	1.96[k] (<0.596)	0.470	0.226	0.266	0.370
2	0.184	0.104	0.704[k] (<0.604)	0.842[k] (<0.188)	0.518	0.765	0.544
3	0.384	0.204[k] (<0.0500)	1.67	0.991[k] (<0.201)	0.544	0.718	0.578[k] (<0.0668)
4	3.71	<0.673	2.35[k] (<1.24)	<0.609	0.675[k] (<0.610)	0.454	1.25
5	<0.158	<0.419	<0.848	<0.369	<0.367	<0.114	<0.103
6	0.205	<0.399	<0.787	0.358	0.376[k] (<0.339)	0.221	0.207
7	0.147	<0.392	<0.782	0.840	<0.337	<0.108	<0.0975
8	0.617	<0.369	1.72[k] (<0.756)	1.49	0.990[k] (<0.313)	0.861	0.777
9	<0.146	<0.400	<0.770	<0.332	<0.340	0.147	0.127[k] (<0.0981)
10	0.653	<0.405	<0.808	<0.330	<0.357	<0.112	0.123[k] (<0.101)
11	1.15	<0.413	7.58	3.88	1.24	1.46	1.32
12/13	<0.168	<0.404	<0.857	<0.355	<0.335	0.220[k] (<0.113)	0.206[k] (<0.102)
14	<0.158	<0.411	<0.813	<0.342	<0.334	<0.111	<0.0999
15	0.278	<0.561	1.39[k] (<0.956)	0.709	0.424[k] (<0.339)	0.334[k] (<0.109)	0.381
16	0.225	0.113[k] (<0.0500)	1.04	0.446	0.316	0.285[k] (<0.0500)	0.282
17	0.568	0.122	1.59[k] (<0.478)	0.609	0.519	0.332	0.391
18/30	0.664	0.224	2.30	1.32	0.978	0.597	0.722
19	1,31	<0.0500	1.96	0.251[k] (<0.0856)	0.171[k] (<0.0500)	0.120	0.271[k] (<0.0500)
20/28	1.49	0.354	5.29	1.92	1.62	1.03	1.10
21/33	0.314	0.134	1.21	1.10	0.628	0.552	0.593
22	0.352	0.112	1.01	0.660	0.400	0.360	0.402
23	<0.0998	<0.0500	<0.578	<0.0909	<0.0500	<0.0500	<0.0500
24	<0.0733	<0.0500	<0.364	0.079	<0.0500	<0.0500	<0.0500
25	0.191	<0.0500	0.579[k] (<0.511)	0.143[k] (<0.0788)	0.154	0.081[k] (<0.0500)	0.095[k] (<0.0500)
26/29	0.651	<0.0500	2.12	0.385[k] (<0.0872)	0.340	0.214	0.258
27	0.332	<0.0500	1.25	0.093[k] (<0.0532)	0.118[k] <0.0500)	0.059	0.105[k] (<0.0500)
31	1.35	0.236	5.89	1.47[k] (<0.0819)	1.14	0.782	0.876
32	0.495	0.068[k] (<0.0500)	1.69	0.460[k] (<0.0862)	0.352	0.221[k] (<0.0500)	0.225
34	<0.0994	<0.0500	<0.566	<0.0920	<0.0500	<0.0500	<0.0500
35	<0.118	<0.0500	<0.653	<0.0847	<0.0500	<0.0500	0.058
36	0.100[k] (<0.0952)	<0.0500	<0.570	<0.0813	<0.0500	<0.0500	<0.0500
37	0.216	0.301	1.13[k] (<0.657)	0.392[k] (<0.0940)	0.212	0.225	0.299
38	<0.104	<0.0500	<0.601	<0.0836	<0.0500	<0.0500	<0.0500

39	<0.101	<0.0500	<0.563	<0.0848	<0.0500	<0.0500	<0.0500
40/41/71	0.585	0.191	2.35	0.534	0.553	0.343	0.365
42	0.363	<0.0500	1.30[k] (<0.396)	0.162	0.260	0.132	0.153[k] (<0.0500)
43	0.053	<0.0500	<0.440	<0.0873	0.055[k] (<0.0500)	<0.0511	<0.0500
44/47/65	1.98	0.350	8.50[k] (<0.348)	1.47	1.48	0.750	0.858
45/51	0.243	0.072	1.39	0.447[k] (<0.0808)	0.279[k] (<0.0500)	0.130[k] (<0.0500)	0.192
46	0.067	<0.0500	<0.445	<0.0914	0.062	0.058	0.056[k] (<0.0500)
48	0.117	<0.0500	0.759[k] (<0.371)	0.299[k] (<0.0784)	0.238	0.160[k] (<0.0500)	0.167
49/69	1.70	0.182[k] (<0.0500)	7.35	0.788	1.12	0.450	0.581
50/53	0.315	<0.0500	1.90	0.283	0.205	0.123[k] (<0.0500)	0.176[k] (<0.0500)
52	2.18	0.339	11.1	2.71	1.99	1.38	1.64
54	<0.0500	<0.0500	0.377[k] (<0.288)	<0.0600	<0.0500	<0.0500	<0.0500
55	<0.0500	<0.0500	<0.535	<0.196	<0.0500	<0.0726	<0.0655
56	0.328	0.320	1.23[k] (<0.528)	0.230[k] (<0.196)	0.248	0.219	0.229
57	<0.0500	<0.0500	<0.532	<0.189	<0.0500	<0.0692	<0.0625
58	<0.0500	<0.0500	<0.528	<0.195	<0.0500	<0.0672	<0.0607
59/62/75	0.225	<0.0500	0.674[k] (<0.292)	0.148	0.157[k] (<0.0500)	0.069[k] (<0.0500)	0.073
60	0.327	0.067	1.08	<0.197	0.198	0.153[k] (<0.0715)	0.186
61/70/74/76	2.15	0.283	8.21	1.30	1.46	0.892	1.00
63	0.226	<0.0500	0.653[k] (<0.506)	<0.179	0.071	<0.0657	<0.0593
64	0.664	0.085[k](<0.0500)	2.85	0.507	0.430	0.253	0.309
66	1.38	0.307	4.19	0.584[k] (<0.186)	0.898	0.445	0.631
67	0.082	<0.0500	<0.495	<0.165	<0.0500	<0.0610	<0.0550
68	0.105	<0.0500	<0.493	<0.186	<0.0500	<0.0628	<0.0567
72	0.141	<0.0500	0.584[k] (<0.504)	<0.184	<0.0500	<0.0663	<0.0599
73	<0.0500	<0.0500	<0.277	<0.0627	<0.0500	<0.0500	<0.0500
77	0.164	0.459	1.43[k] (<0.587)	<0.215	0.087[k] (<0.0500)	<0.0711	0.091[k] (<0.0639)
78	<0.0500	<0.0500	<0.576	<0.189	<0.0500	<0.0754	<0.0681
79	<0.0500	<0.0500	<0.486	<0.160	<0.0500	<0.0611	<0.0551
80	<0.0500	<0.0500	<0.496	<0.172	<0.0500	<0.0667	<0.0603
81	<0.0500	0.407	<0.583	<0.216	<0.0500	<0.0685	<0.0637
82	0.135	<0.0500	<1.07	<0.123	0.065[k] (<0.0500)	0.075[k] (<0.0500)	0.091[k] (<0.0500)
83/99	1.44	0.365	3.20	0.588	0.737	0.379[k] (<0.0500)	0.500
84	0.243	0.063[k] (<0.0500)	<1.07	0.271[k] (<0.122)	0.191	0.121	0.138[k] (<0.0500)
85/116/117	0.398	<0.0500	1.29[k] (<0.802)	0.245[k] (<0.0942)	0.198	0.116[k] (<0.0500)	0.143
86/87/97/108/119/125	0.957	0.419	3.00	0.687	0.608	0.391	0.427
88/91	0.398	<0.0500	1.01[k] (<0.913)	0.166[k] (<0.111)	0.165[k] (<0.0500)	0.087[k] (<0.0500)	0.103
89	<0.0641	<0.0500	<0.978	<0.118	<0.0500	<0.0500	<0.0500

90/101/113	1.75	0.438	4.50	0.870	1.04	0.589	0.638
92	0.464	0.055[k] (<0.0500)	1.42	0.214[k] (<0.113)	0.209	0.114	0.133
93/95/98/100/102	1.23	0.375[k] (<0.0500)	4.25	1.11	0.779	0.460	0.622
94	<0.0614	<0.0500	<0.961	<0.119	<0.0500	<0.0500	<0.0500
96	<0.0500	<0.0500	<0.454	<0.0654	<0.0500	<0.0500	<0.0500
103	<0.0530	<0.0500	<0.834	<0.0993	<0.0500	<0.0500	<0.0500
104	<0.0656	0.095	<0.464	<0.0530	<0.0500	<0.0500	<0.0500
105	0.722	0.637	2.10[k] (<0.683)	0.271	0.335	0.294	0.284
106	<0.0860	<0.0500	<0.645	<0.119	<0.0500	<0.0500	<0.0500
107/124	<0.0850	<0.0500	<0.648	<0.126	<0.0500	<0.0500	<0.0500
109	0.205	<0.0500	<0.606	<0.119	0.089[k] (<0.0500)	0.071	0.066[k] (<0.0500)
110/115	1.43	0.538	3.28	0.762	0.746	0.531	0.584
111	<0.0500	<0.0500	<0.700	<0.0854	<0.0500	<0.0500	<0.0500
112	<0.0500	<0.0500	<0.752	<0.0823	<0.0500	<0.0500	<0.0500
114	0.092	0.483	1.25[k] (<0.662)	<0.130	0.052	0.059	0.062[k] (<0.0500)
118	2.03	0.777	3.67	0.804	0.801	0.585	0.652
120	<0.0500	<0.0500	<0.698	<0.0798	<0.0500	<0.0500	<0.0500
121	<0.0500	<0.0500	<0.696	<0.0851	<0.0500	<0.0500	<0.0500
122	<0.0918	<0.0500	<0.700	<0.131	<0.0500	<0.0525	<0.0500
123	<0.0915	0.413	<0.705	<0.131	<0.0500	<0.0500	<0.0500
126	<0.0786	0.496	<0.726	<0.147	<0.0500	<0.0536	<0.0500
127	<0.0892	<0.0500	<0.675	<0.123	<0.0500	<0.0500	<0.0500
128/166	0.442	0.131[k] (<0.0500)	0.724	0.169[k] (<0.0832)	0.160[k] (<0.0500)	0.137	0.156[k] (<0.0500)
129/138/160/163	2.31	0.811	3.23	0.794[k] (<0.0852)	1.04	0.765	0.672
130	0.147	0.054[k] (<0.0500)	<0.799	<0.106	0.067[k] (<0.0500)	<0.0500	0.069[k] (<0.0500)
131	<0.0500	<0.0500	<0.711	<0.103	<0.0500	<0.0500	<0.0500
132	0.383	0.088[k] (<0.0500)	<0.736	0.210	0.196	0.185[k] (<0.0500)	0.130
133	0.063	<0.0500	<0.716	<0.0982	<0.0500	<0.0500	<0.0500
134/143	0.054	<0.0500	<0.721	<0.102	<0.0500	<0.0500	<0.0500
135/151/154	0.578	0.336[k] (<0.0500)	1.79	0.298[k] (<0.0526)	0.312	0.150	0.183
136	0.164	<0.0500	0.405	0.096[k] (<0.0500)	0.099[k] (<0.0500)	<0.0500	0.062[k] (<0.0500)
137	0.103	<0.0500	<0.755	<0.108	0.067[k] (<0.0500)	0.076[k] (<0.0500)	<0.0500
139/140	<0.0500	<0.0500	<0.654	<0.0912	<0.0500	<0.0500	<0.0500
141	0.291	0.084[k] (<0.0500)	<0.700	<0.0917	0.147	0.132[k](<0.0500)	0.131
142	<0.0500	<0.0500	<0.7[45]	<0.101	<0.0500	<0.0500	<0.0500
144	0.062	<0.0500	<0.492	<0.0537	0.050	<0.0500	<0.0500
145	<0.0500	<0.0500	<0.372	<0.0500	<0.0500	<0.0500	<0.0500
146	0.367	0.056[k] (<0.0500)	0.710[k] (<0.655)	0.130	0.158	0.106	0.111

147/149	0.993	0.442	2.44[k] (<0.646)	0.451	0.522	0.316	0.337[k] (<0.0500)
148	<0.0500	<0.0500	<0.491	<0.0548	<0.0500	<0.0500	<0.0500
150	<0.0500	<0.0500	<0.353	<0.0500	<0.0500	<0.0500	<0.0500
152	<0.0500	<0.0500	<0.350	<0.0500	<0.0500	<0.0500	<0.0500
153/168	1.72	0.634	3.15	0.936	0.909	0.587	0.550[k] (<0.0500)
155	0.073	0.220	0.431	<0.0500	<0.0500	<0.0500	<0.0500
156/157	0.497	0.991	1.38[k] (<0.735)	0.198[k] (<0.0891)	0.215	0.203[k] (<0.0500)	0.211[k] (<0.0500)
158	0.184	<0.0500	<0.521	0.078[k] (<0.0663)	0.126[k] (<0.0500)	0.112	0.095[k] (<0.0500)
159	<0.0500	<0.0500	<0.558	<0.0690	<0.0500	<0.0500	<0.0500
161	<0.0500	<0.0500	<0.549	<0.0705	<0.0500	<0.0500	<0.0500
162	<0.0500	<0.0500	<0.567	<0.0702	<0.0500	<0.0500	<0.0500
164	0.110	<0.0500	<0.577	<0.0686	<0.0500	<0.0500	0.070
165	<0.0500	<0.0500	<0.571	<0.0807	<0.0500	<0.0500	<0.0500
167	0.174	0.485	0.599	<0.0737	0.068[k] (<0.0500)	0.064[k] (<0.0500)	<0.0500
169	<0.0500	0.473	<0.588	<0.0844	<0.0500	<0.0500	<0.0500
170	0.544	0.557	1.26[k] (<0.518)	0.164[k] (<0.0724)	0.187	0.253	0.191
171/173	0.149	<0.0500	<0.486	0.088[k] (<0.0661)	0.055[k](<0.0500)	0.066[k] (<0.0500)	0.095
172	0.116	<0.0500	<0.500	<0.0696	<0.0500	<0.0500	<0.0500
174	0.313	0.059[k] (<0.0500)	0.797	0.151[k] (<0.0593)	0.151[k] (<0.0500)	0.119	0.182
175	<0.0500	<0.0500	<0.421	<0.0607	<0.0500	<0.0500	<0.0500
176	<0.0500	<0.0500	<0.320	<0.0500	<0.0500	<0.0500	<0.0500
177	0.306	<0.0500	<0.475	0.077[k] (<0.0638)	0.105	0.096[k] (<0.0500)	0.144[k] (<0.0500)
178	0.141	<0.0500	<0.440	<0.0648	<0.0500	<0.0500	0.061[k] (<0.0500)
179	0.155	<0.0500	<0.309	0.066	0.073	<0.0500	<0.0500
180/193	1.08	0.589	2.32	0.390	0.408[k] (<0.0500)	0.413	0.501
181	<0.0500	<0.0500	<0.441	<0.0639	<0.0500	<0.0500	<0.0500
182	<0.0500	0.459	0.610[k] (<0.433)	<0.0598	<0.0500	<0.0500	<0.0500
183/185	0.279	0.424	<0.423	<0.0622	0.136	0.118	0.186
184	<0.0500	<0.0500	<0.296	<0.0500	<0.0500	<0.0500	<0.0500
186	<0.0500	<0.0500	<0.322	<0.0502	<0.0500	<0.0500	<0.0500
187	0.681	0.498	1.50[k] (<0.395)	0.257[k] (<0.0587)	0.291[k] (<0.0500)	0.199	0.266
188	<0.0500	0.369	<0.341	<0.0500	<0.0500	<0.0500	<0.0500
189	0.061	0.506[k] (<0.0500)	0.408[k] (<0.370)	<0.0860	<0.0500	<0.0500	<0.0500
190	0.252	<0.0500	<0.394	<0.0528	0.057[k] (<0.0500)	<0.0500	0.055[k] (<0.0500)
191	0.080	<0.0500	<0.377	<0.0511	<0.0500	<0.0500	<0.0500
192	0.081	<0.0500	<0.393	<0.0559	<0.0500	<0.0500	<0.0500
194	<0.0500	0.432	<0.566	<0.119	0.104[k] (<0.0500)	0.083	0.072
195	0.195	<0.0500	<0.598	<0.127	<0.0500	<0.0500	<0.0500

196	<0.0500	0.349	<0.700	0.117[k] (<0.0614)	0.063[k] (<0.0500)	0.057[k] (<0.0500)	0.051[k] (<0.0500)
197/200	0.111	<0.0500	<0.483	<0.0500	0.050	<0.0500	<0.0500
198/199	0.165	<0.0500	<0.691	0.098[k] (<0.0656)	0.154[k] (<0.0500)	0.123	0.142[k] (<0.0500)
201	<0.0500	<0.0500	<0.481	<0.0500	<0.0500	<0.0500	<0.0500
202	<0.0500	0.336	0.967[k] (<0.629)	0.076[k] (<0.0500)	<0.0500	<0.0500	<0.0500
203	0.161	<0.0500	<0.659	0.079	0.068	0.087[k] (<0.0500)	0.065[k] (<0.0500)
204	<0.0500	<0.0500	<0.494	<0.0500	<0.0500	<0.0500	<0.0500
205	0.062	0.433	<0.469	<0.115	<0.0500	<0.0500	<0.0500
206	0.086	0.451[k] (<0.0500)	<1.00	<0.700	0.080[k] (<0.0500)	<0.133	<0.119
207	<0.0500	<0.0500	<0.770	<0.484	<0.0500	<0.108	<0.0954
208	0.062	0.431	<0.833	<0.522	0.070	<0.121	<0.105
209	0.086	0.480	1.52[k] (<0.527)	<0.144	0.089 (<0.0500)	0.111	0.112
Mono-	2.38	0.208	1.67	0.470	1.29	1.75	0.914
Di-	6.76	<0.673	7.58	7.28	1.24	3.14	3.94
Tri-	8.16	1.48	23.7	6.13	6.66	4.27	5.21
Tetra-	13.4	2.51	40.4	7.90	9.21	4.92	6.23
Penta-	11.5	4.66	23.3	5.09	5.70	3.22	4.09
Hexa-	8.71	4.06	10.3	1.73	3.55	2.17	1.30
Hepta-	3.92	2.90	3.12	0.456	0.501	1.10	1.42
Octa-	0.884	1.55	<0.700	<0.127	0.118	0.083	0.072
Nona-	0.223	0.431	<1.00	<0.700	0.070	<0.362	<0.319
Deca-	0.086	0.480	<0.527	<0.144	<0.0500	0.111	0.112
Total PCB	56.0	18.3	110	29.1	28.3	20.8	23.3

[1] Associated fish sample numbers were:
WG11968-101 with fish samples numbered 0003270 and its duplicate sample, 0003271, 0003273, 0003011, 0003017, 0003075, 0003076, 00003077 and 0003208;
WG16501-101 with sample number 0003012;
WG15895-101 with sample numbers 0003209, 0003210, 0003828, 0003832, 0003833, 0003910, 0003911, and 9746059 and its duplicate;
WG17093-101 with sample numbers 0003287, 0003288 and 003289; and
WG11970-101, WG11970-102 and WG11970-103 are associated with samples 0003917, 9746060, 9746061, 9746062, 9746066, 9746069, 9746082, 9746086 and its duplicate, and 9746091.

[k] Peak present but did not meet quantification criteria; unconfirmed identity and concentration. Value treated as zero.

Appendix F-16: Polychlorinated biphenyl congener concentrations (pg/g wet weight) in duplicate samples and their relative percent differences (|RPD|).

PCB congener (IUPAC No.)/ homolog	Sample number/Original lab number								
	0003270			9746059			9746086		
	L6629-1(A)	Duplicate	|RPD|	L6629-22(A)	Duplicate	|RPD|	L6629-29W	Duplicate	|RPD|
Lipid (%)	2.17	2.18	0.460	1.89	nm[1]	nc[2]	1.57	nm	nc
1	6120	6130	0.163	266	306	14.0	160	145	9.84
2	10.6	9.87	7.13	2.61	3.32	23.9	<1.66	<2.88	nc
3	99.6	102	2.38	5.47B (3.80)	6.38B (4.71)	21.4[3]	5.78	7.32	23.5
4	25400	27300	7.21	2740	3120	13.0	7430	7280	2.04
5	7.14	6.62	7.56	<7.56	<6.55	nc	<3.56	<5.09	nc
6	873	920	5.24	109	123	12.1	132	128	3.08
7	33.7	38.0	12.0	<6.96	8.08	nc	8.44	<4.89	nc
8	2570	2570	0.0	247	287	15.0	310	308	0.647
9	202	209	3.41	17.7	21.3	18.5	23.6	21.8	7.93
10	4010	4440	10.2	397	432	8.44	1310	1090	18.3
11	40.2	39.7	1.25	58.3B (50.7)	64.7B (57.1)	11.9[3]	47.7	52.6	9.77
12/13	210	205	2.41	18.4	19.4	5.29	72.9	79.5	8.66
14	<1.67	<1.97	nc	<8.00	<6.93	nc	<3.48	<4.96	nc
15	549	546	0.548	71.1	76.4	7.19	353	364	3.07
16	1500	1590	5.83	286	323	12.2	436	372	15.8
17	9610	10100	4.97	1330	1520	13.3	2680	2340	13.5
18/30	9430	9990	5.77	1530	1740	12.8	2660	2310	14.1
19	16300	16700	2.42	1050	1120	6.45	3790	3790	0.0
20/28	26600	27200	2.23	3710	4070	9.25	3500	3340	4.68
21/33	2020	2180	7.62	296	278	6.27	266	249	6.60
22	3870	4040	4.30	477	477	0.0	480	476	0.837
23	<32.9	37.4	nc	<5.37	<5.70	nc	4.43	<2.13	nc
24	305	325	6.35	29.9	23.9	22.3	55.1	55.1	0.0
25	4750	5020	5.53	345	359	3.98	526	491	6.88

26/29	12900	13100	1.54	841	946	11.8	1590	1530	3.85
27	9030	9500	5.07	490	550	11.5	1640	1460	11.6
31	24100	24300	0.826	2040	2260	10.2	3380	3240	4.23
32	10400	10900	4.69	1210	1350	10.9	2360	2060	13.6
34	633	670	5.68	42.8	44.8	4.57	82.8	94.8	13.5
35	<37.2	<30.0	nc	<7.05	<7.48	nc	<2.18	<2.22	nc
36	<33.9	<27.3	nc	<6.01	<6.37	nc	<1.98	<2.01	nc
37	873	917	4.92	176	199	12.3	144	151	4.75
38	75.6	84.2	10.8	<5.82	7.67	nc	13.2	13.8	4.44
39	198	194	2.04	<5.99	31.1	nc	31.2	<1.99	nc
40/41/71	23700	24400	2.91	3210	3480	8.07	3830	3660	4.54
42	10800	11300	4.52	1620	1720	5.99	1700	1590	6.69
43	2610	2790	6.67	297	297	0.0	328	321	2.16
44/47/65	68600	69200	0.871	8170	8750	6.86	8160	7560	7.63
45/51	7420	7870	5.89	784	877	11.2	1490	1310	12.9
46	1540	1630	5.68	189	203	7.14	359	324	10.2
48	4170	4550	8.72	703	749	6.34	706	672	4.94
49/69	66000	67100	1.65	7010	7710	9.51	7700	6950	10.2
50/53	9620	10200	5.85	834	945	12.5	1800	1520	16.9
52	81900	83800	2.29	10000	11000	9.52	10200	8900	13.6
54	375	420	11.3	22.5	24.5	8.51	89.3	88.1	1.35
55	891	921	3.31	<8.96	<1.17	nc	36.2	22.4	47.1
56	8990	9200	2.31	1510	1580	4.53	1080	1120	3.64
57	826	846	2.39	70.8	81.7	14.3	81.7	87.9	7.31
58	2860	3020	5.44	52.2	54.0	3.39	45.5	52.2	13.7
59/62/75	5920	6250	5.42	726	765	5.23	835	783	6.43
60	5820	5990	2.88	1130	1200	6.01	795	842	5.74
61/70/74/76	59000	59500	0.844	10100	11000	8.53	7580	7750	2.22
63	4490	4650	3.50	550	615	11.2	507	539	6.12
64	18400	19000	3.21	2310	2530	9.09	2610	2380	9.22
66	38800	39400	1.53	9410	10100	7.07	6580	6770	2.85

67	1810	1920	5.90	188	192	2.11	168	178	5.78
68	1940	2050	5.51	182	191	4.83	215	242	11.8
72	2940	3000	2.02	270	297	9.52	314	339	7.66
73	1020	1290	23.4	109	104	4.69	100	<0.646	nc
77	1460	1480	1.36	541	605	11.2	319	322	0.936
78	<178	<130	nc	<9.41	<1.22	nc	<9.51	<8.40	nc
79	1140	1160	1.74	208	197	5.43	139	133	4.41
80	<159	<116	nc	<8.26	<1.07	nc	<8.48	<7.49	nc
81	163	<104	nc	30.8	24.7	22.0	22.7	26.8	16.6
82	4260	4490	5.26	882	940	6.37	575	595	3.42
83/99	92200	93000	0.864	17200	18600	7.82	14800	15200	2.67
84	11700	11900	1.69	1470	1680	13.3	1190	1140	4.29
85/116/117	16700	16900	1.19	3490	3930	11.9	3000	2960	1.34
86/87/97/108/119/125	42100	42600	1.18	7900	8860	11.5	6130	6160	0.488
88/91	17600	17400	1.14	1910	2100	9.48	1690	1590	6.10
89	322	329	2.15	48.3	62.0	24.8	53.7	54.7	1.85
90/101/113	104000	106000	1.90	20600	23000	11.0	14800	15900	7.17
92	23200	23300	0.430	4170	4710	12.2	3210	3360	4.57
93/95/98/100/102	47300	47500	0.422	7650	8840	14.4	5680	5430	4.50
94	775	813	4.79	51.0	61.8	19.1	75.4	73.6	2.42
96	367	389	5.82	55.4	70.6	24.1	72.7	64.3	12.3
103	1550	1610	3.80	283	338	17.7	273	284	3.95
104	50.3	46.7	7.42	6.00	6.81	12.6	6.53	6.56	0.458
105	20300	19800	2.49	6100	7440	19.8	4770	4570	4.28
106	<184	<196	nc	<12.4	<11.9	nc	<12.6	<12.2	nc
107/124	2290	2360	3.01	431	459	6.29	323	352	8.59
109	11000	11000	0.0	2180	2750	23.1	1950	2140	9.29
110/115	82100	83100	1.21	12400	13500	8.49	9470	9690	2.30
111	286	231	21.3	58.0	62.9	8.11	69.6	72.6	4.22
112	1250	1380	9.89	83.2	<10.5	nc	<3.28	<2.47	nc

114	1440	1470	2.06	298	422	34.4	208	223	6.96
118	77300	91800	17.1	23200	27900	18.4	18900	19200	1.57
120	1500	1290	15.1	279	329	16.4	341	355	4.02
121	84.4	60.7	32.7	<4.61	<10.5	nc	16.6	18.0	8.09
122	501	523	4.30	104	161	43.0	56.4	55.4	1.79
123	1510	1420	6.14	331	339	2.39	303	249	19.6
126	213	175	19.6	70.1	83.9	17.9	77.2	88.7	13.9
127	<181	<194	nc	38.8	44.4	13.5	62.6	65.0	3.76
128/166	22400	23100	3.08	4020	5300	27.4	3520	3640	3.35
129/138/160/163	125000	140000	11.3	42900	46700	8.48	29700	31000	4.28
130	7670	8300	7.89	1880	2130	12.5	1720	1830	6.20
131	692	740	6.70	114	156	31.1	76.6	80.5	4.96
132	19600	20000	2.20	4310	4830	11.4	2730	2910	6.38
133	3720	3690	0.810	844	959	12.8	857	918	6.87
134/143	3840	4100	6.55	669	841	22.8	472	485	2.72
135/151/154	32800	33200	1.21	10100	11300	11.2	6350	6630	4.31
136	6470	7140	9.85	1610	1840	13.3	802	820	2.22
137	4580	5100	10.7	750	956	24.2	708	668	5.81
139/140	2290	2420	5.52	408	483	16.8	446	466	4.39
141	10300	11200	8.37	4330	4700	8.19	1490	1550	3.95
142	<55.7	<64.4	nc	<12.3	<23.9	nc	<8.42	<17.9	nc
144	2550	2830	10.4	1460	1210	18.7	543	580	6.59
145	15.1	12.3	20.4	<0.547	<0.568	nc	<1.07	<0.364	nc
146	40500	39600	2.25	9690	10700	9.91	8510	9130	7.03
147/149	83800	86500	3.17	19000	21600	12.8	12300	12500	1.61
148	623	553	11.9	154	175	12.8	173	184	6.16
150	324	355	9.13	71.0	84.5	17.4	78.1	81.8	4.63
152	81.5	92.4	12.5	14.3	<0.539	nc	14.4	12.8	11.8
153/168	153000	169000	9.94	57500	61400	6.56	38900	41100	5.50
155	276	279	1.08	113	121	6.84	111	115	3.54
156/157	9910	10200	2.88	2890	3250	11.7	1920	2010	4.58

158	9290	9730	4.63	2750	3030	9.69	1560	1620	3.77
159	417	434	4.00	192	211	9.43	91.5	103	11.8
161	<40.5	<46.9	nc	<8.58	<17.0	nc	<5.49	<11.7	nc
162	562	600	6.54	135	155	13.8	172	180	4.55
164	5100	5300	3.85	1300	1430	9.52	838	919	9.22
165	295	296	0.338	<9.50	78.2	nc	75.4	81.1	7.28
167	5300	5450	2.79	1580	1790	12.5	1260	1390	9.81
169	<59.8	<51.3	nc	<29.0	<41.0	nc	<21.1	<20.3	nc
170	17400	19600	11.9	7570	8700	13.9	3810	3750	1.59
171/173	5810	6710	14.4	2500	2750	9.52	1650	1660	0.604
172	3920	4480	13.3	1210	1440	17.4	907	891	1.78
174	10600	11800	10.7	3230	3420	5.71	1770	1710	3.45
175	1070	1200	11.5	437	437	0.0	356	369	3.59
176	1590	1780	11.3	686	624	9.47	426	438	2.78
177	11300	12600	10.9	5280	5740	8.35	3900	3800	2.60
178	8690	9550	9.43	2980	2960	0.673	2840	2800	1.42
179	7350	8260	11.7	2720	2600	4.51	1670	1690	1.19
180/193	53000	59500	11.6	23300	27000	14.7	11300	10900	3.60
181	263	319	19.2	45.1	<1.47	nc	<1.31	35.3	nc
182	377	410	8.39	111	91.0	19.8	95.7	95.3	0.419
183/185	19100	21200	10.4	8070	8710	7.63	4700	4750	1.06
184	129	120	7.23	52.5	47.4	10.2	64.0	66.1	3.23
186	<0.544	<0.717	nc	<0.999	<1.17	nc	<0.0499	<0.403	nc
187	58000	64000	9.83	23700	23800	0.421	18300	17800	2.77
188	321	328	2.16	95.6	104	8.42	181	187	3.26
189	705	710	0.707	253	284	11.5	162	170	4.82
190	3520	4010	13.0	1510	1750	14.7	686	698	1.73
191	716	829	14.6	309	386	22.2	196	189	3.64
192	<0.691	<0.894	nc	<1.09	<1.29	nc	<0.0499	<0.465	nc
194	8660	9140	5.39	2870	3190	10.6	2230	2250	0.893
195	2870	2960	3.09	959	1090	12.8	679	671	1.19

196	5030	5360	6.35	1610	1800	11.1	1600	1510	5.79
197/200	1000	1060	5.83	295	342	14.8	432	415	4.01
198/199	14500	14900	2.72	3620	4080	11.9	4050	3950	2.50
201	2030	2130	4.81	637	667	4.60	1110	1060	4.61
202	6800	7010	3.04	2060	2270	9.70	2990	3150	5.21
203	8650	8770	1.38	2290	2560	11.1	1940	1920	1.04
204	21.1	16.8	22.7	<0.116	<0.0962	nc	14.8	15.3	3.32
205	370	385	3.98	132	144	8.70	91.2	89.3	2.11
206	7790	9020	14.6	1540	1670	8.10	2180	2250	3.16
207	1090	1110	1.82	216	218	0.922	427	438	2.54
208	4120	4330	4.97	816	896	9.35	1520	1480	2.67
209	3520	3630	3.08	725	800	9.84	1520	1620	6.37
Total PCB	1990000	2100000	5.38	460000	508000	9.92	369000	370000	0.271
Mono-	6230	6240	0.160	274	316	14.2	167	152	9.40
Di-	33900	36300	6.84	3660	4150	12.5	9690	9320	3.89
Tri-	133000	137000	2.96	13800	15300	10.3	23600	22000	7.02
Tetra-	433000	443000	2.28	60300	65300	7.96	57800	54500	5.88
Penta-	562000	581000	3.32	111000	127000	13.4	88100	89900	2.02
Hexa-	551000	599000	8.35	169000	185000	9.04	115000	1321000	5.08
Hepta-	204000	227000	10.7	84100	90800	7.66	53000	52000	1.90
Octa-	49900	51700	3.54	14500	16100	10.5	15100	15000	0.664
Nona-	13000	14500	10.9	2570	2790	8.21	4130	4170	0.964
Deca-	3520	3630	3.08	725	800	9.84	1520	1620	6.37

[1] nm = not measured.
[2] nc = not calculated.
[3] |RPD| computation based on blank corrected values.

Appendix F-17: Recovery of polychlorinated biphenyl congeners in ^{13}C-labeled matrix (tissue) spike samples.

PCB congener (IUPAC No.)	n	Recovery (%)		
		Mean ± Standard Deviation	Minimum	Maximum
Matrix spikes				
1	31	30.3 ± 11.5	12.2	52.1
3	30	33.8 ± 9.49	18.8	50.6
4	38	36.3 ± 12.2	18.3	58.9
15	31	54.0 ± 17.2	31.9	106
19	33	45.2 ± 13.5	26.9	81.0
37	33	67.3 ± 14.6	38.5	86.2
54	34	49.4 ± 10.5	29.9	63.1
77	34	79.2 ± 15.3	43.2	103
81	34	80.8 ± 13.6	49.5	101
104	34	64.5 ± 15.0	37.3	83.1
105	34	83.8 ± 10.8	60.9	101
114	36	78.8 ± 12.9	52.8	97.8
118	34	86.6 ± 11.5	63.6	106
123	37	81.7 ± 13.7	52.4	103
126	38	82.4 ± 13.2	53.5	107
155	37	63.9 ± 18.7	24.9	92.1
156/157	37	75.4 ± 7.13	58.7	89.0
167	37	76.4 ± 8.72	53.6	91.8
169	37	75.7 ± 7.36	60.9	90.9
170	30	86.4 ± 13.1	58.1	122
180	30	94.2 ± 14.4	70.7	129
188	38	65.9 ± 19.2	40.4	112
189	38	81.1 ± 13.4	55.7	104
202	38	76.5 ± 20.0	46.1	135
205	38	80.4 ± 6.70	60.2	91.9
206	32	83.9 ± 10.6	67.5	111
208	35	77.5 ± 15.2	46.8	107
209	30	75.4 ± 15.5	40.5	111
Clean-up Standards				
28	32	70.4 ± 26.4	33.4	146
111	30	78.3 ± 18.0	55.5	163
178	30	94.1 ± 25.7	53.5	177

Appendix F-18: Polychlorinated biphenyl congener concentrations in on-going precision and recovery samples (corn oil).

PCB congener (IUPAC No.)	Recovery (%; mean ± standard deviation)	
	Unlabeled	^{13}C-labeled
1	100 ± 6.44	34.3 ± 16.5
3	101 ± 7.26	35.2 ± 16.4
4	104 ± 8.10	41.3 ± 22.5
15	102 ± 6.75	52.8 ± 30.9
19	103 ± 8.79	47.1 ± 28.6
37	103 ± 6.32	63.3 ± 23.2
54	100 ± 4.32	47.6 ± 25.4
77	101 ± 6.21	83.0 ± 21.8
81	103 ± 5.53	80.5 ± 23.4
104	98.3 ± 14.3	62.1 ± 32.3
105	104 ± 2.22	84.9 ± 20.8
114	103 ± 3.91	82.4 ± 25.9
118	106 ± 0.957	83.2 ± 25.9
123	105 ± 2.99	83.2 ± 27.1
126	102 ± 3.54	90.3 ± 20.6
155	97.7 ± 12.1	62.3 ± 32.7
156/157	101 ± 3.61	106 ± 47.2
167	101 ± 5.36	85.5 ± 27.1
169	100 ± 3.75	88.5 ± 21.2
170	na[2]	na
180	na	na
188	100 ± 9.00	63.8 ± 26.0
189	103 ± 4.82	90.9 ± 23.3
202	97.2 ± 12.7	85.9 ± 38.7
205	104 ± 1.26	80.1 ± 23.3
206	101 ± 5.13	76.4 ± 27.0
208	101 ± 7.32	77.2 ± 33.1
209	97.6 ± 8.33	71.7 ± 29.9
Clean-up Standards		
28	na	57.7 ± 35.2
111	na	68.8 ± 28.7
178	na	76.0 ± 31.7

[1] n = 4 for all analytes.
[2] na = not analyzed.

Appendix F-19: Polychlorinated biphenyl congener concentrations in ^{13}C-labeled spiked lab blanks (corn oil).

PCB congener (IUPAC No.)	Recovery (%)				
	All samples (n = 7)			Excluding non-compliant sample[1] (n = 6)	
	Mean ± Std. Dev.	Minimum	Maximum	Mean ± Std. Dev.	Adjusted minimum
1	29.6 ± 14.8	12.2	51.6	32.5 ± 13.8	16.7
3	32.5 ± 17.8	14.4	59.1	35.6 ± 17.4	16.5
4	38.6 ± 18.8	14.8	65.1	42.6 ± 17.0	25.0
15	56.6 ± 22.6	20.8	87.9	62.6 ± 17.7	47.2
19	47.9 ± 22.1	15.2	80.0	53.3 ± 18.3	36.7
37	73.2 ± 21.0	37.2	109	79.2 ± 15.0	69.2
54	48.6 ± 20.2	24.0	86.3	52.8 ± 18.6	39.2
77	91.1 ± 20.2	55.3	123	97.1 ± 13.8	85.6
81	89.7 ± 20.6	50.4	120	96.3 ± 12.1	87.6
104	63.8 ± 24.1	22.1	99.3	70.8 ± 17.0	54.9
105	91.6 ± 19.5	61.9	127	96.5 ± 15.8	81.9
114	86.3 ± 20.5	51.7	121	92.1 ± 15.0	78.6
118	88.1 ± 20.7	51.5	122	94.2 ± 14.2	81.5
123	89.6 ± 21.2	50.3	121	96.2 ± 13.3	84.8
126	96.8 ± 22.5	63.5	138	102 ± 18.7	87.5
155	69.4 ± 23.1	20.6	94.1	77.6 ± 9.24	69.4
156/157	86.3 ± 19.6	63.7	127	90.1 ± 18.4	78.0
167	88.4 ± 19.1	62.3	126	92.7 ± 16.8	80.0
169	89.0 ± 22.1	67.1	136	92.7 ± 21.8	80.5
170	93.4 ± 11.9	74.5	108	96.6 ± 9.30	84.9
180	92.0 ± 11.8	69.9	103	95.7 ± 7.30	88.2
188	75.5 ± 20.8	31.6	95.3	82.9 ± 8.36	70.1
189	96.3 ± 16.2	69.5	121	101 ± 12.2	87.8
202	89.9 ± 28.1	37.7	131	98.6 ± 17.8	77.2
205	87.0 ± 16.7	59.7	116	91.6 ± 12.7	82.3
206	82.8 ± 19.1	50.9	115	88.2 ± 14.1	73.6
208	89.6 ± 25.2	37.3	116	98.3 ± 11.1	85.2
209	81.6 ± 22.0	38.2	102	88.8 ± 11.8	68.0
Clean-up Standards					
28	57.9 ± 21.0	20.4	89.7	64.2 ± 14.2	52.5
111	77.6 ± 21.3	32.3	94.7	85.2 ± 8.23	69.9
178	81.1 ± 23.4	37.2	113	88.4 ± 14.5	74.2

[1] Excludes sample number WG11968-101. Associated tissue samples were reanalyzed where sufficient tissue mass was available.

Appendix G

2,3,7,8-TCDD Toxic Equivalency Factors for PCDD/F and PCBs

Appendix G-1: World Health Organization 2,3,7,8-TCDD toxic equivalency factors (TEFs) for humans, mammals, fish and birds.

	TEF		
Congener[1]	Humans/mammals[2]	Fish[3]	Birds[3]
2,3,7,8-TetraCDD	1	1	1
1,2,3,7,8-PentaCDD	1	1	1
1,2,3,4,7,8-HexaCDD	0.1	0.5	0.05
1,2,3,6,7,8-HexaCDD	0.1	0.01	0.01
1,2,3,7,8,9-HexaCDD	0.1	0.01	0.1
1,2,3,4,6,7,8-HeptaCDD	0.01	0.001	<0.001
OctaCDD	0.0003	<0.0001	0.0001
2,3,7,8-TetraCDF	0.1	0.05	1
1,2,3,7,8-PentaCDF	0.03	0.05	0.1
2,3,4,7,8-PentaCDF	0.3	0.5	1
1,2,3,4,7,8-HexaCDF	0.1	0.1	0.1
1,2,3,6,7,8-HexaCDF	0.1	0.1	0.1
1,2,3,7,8,9-HexaCDF	0.1	0.1	0.1
2,3,4,6,7,8-HexaCDF	0.1	0.1	0.1
1,2,3,4,6,7,8-HeptaCDF	0.01	0.01	0.01
1,2,3,4,7,8,9-HeptaCDF	0.01	0.01	0.01
OctaCDF	0.0003	<0.0001	0.0001
3,4,4'5-TetraCB (81)	0.0001	0.0005	0.1
3,3'4,4'-TetraCB(77)	0.0003	0.0001	0.05
3,3'4,4'5-PentaCB(126)	0.1	0.005	0.1
3,3',4,4',5,5'-HexaCB(169)	0.03	0.00005	0.001
2,3,3',4,4'-PentaCB(105)	0.00003	<0.000005	0.0001
2,3,4,4',5-PentaCB(114)	0.00003	<0.000005	0.0001
2,3',4,4',5-PentaCB(118)	0.00003	<0.000005	0.00001
2',3,4,4',5-PentaCB(123)	0.00003	<0.000005	0.00001
2,3,3'4,4',5-HexaCB(156)	0.00003	<0.000005	0.0001
2,3,3',4,4',5'-HexaCB(157)	0.00003	<0.000005	0.0001
2,3',4,4',5,5'-HeptaCB(167)	0.00003	<0.000005	0.00001
2,3,3',4,4',5,5'-HeptaCB(189)	0.00003	<0.000005	0.00001

[1] CDD = chlorinated dibenzo-*p*-dioxin; CDF = chlorinated dibenzofuran; CB = chlorinated biphenyl.
[2] Source: Van den Berg *et al*. (2006).
[3] Source: Van den Berg *et al*. (1998).