Routine Monitoring of Toxics in New Jersey Fish

Third Year (2006) of Routine Monitoring Program

FINAL REPORT

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Division of Science, Research and Technology

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INTRODUCTION

Background

In 1994, research on freshwater fish found mercury concentrations exceeding the risk-based health criteria established by the State. The Department of Health and Senior Services (DHSS) and the New Jersey Department of Environmental Protection (NJDEP) issued statewide, regional and lake-specific fish consumption advisories for two species, largemouth bass and chain pickerel. Additional data were developed and reported in ANSP (1999), Ashley and Horwitz (2000), Horwitz et al. (2004) and Horwitz et al. (2006). These data have been used to develop water quality assessments for specific waterways (see NJDEP 2008 for most current list). The state's 303d list of impaired sites (derived from the Clean Water Act) drives the development of Total Maximum Daily Limits (TMDL) and other contaminant control strategies. The results of this Routine Monitoring Program will be used to enhance waterbody assessments, to amend existing advisories or, if necessary, develop new advisories, to assist the NJDEP in evaluating trends in contaminant concentrations of these selected species, and to determine necessary, additional research and monitoring studies. The monitoring program described here builds upon NJDEP's Division of Science, Research and Technology (DSRT) fish contamination research that identified widespread mercury contamination in the fresh waters of the state, chlordane, polychlorinated biphenyl (PCB) and dioxin contamination in site specific locations, and PCB contamination predominantly in several estuarine and marine fish species.

In July 2002, the Academy of Natural Sciences of Philadelphia (ANSP) began a Routine Monitoring Program for Toxics in Fish for NJDEP. There has been a clear need for a continuous monitoring program for toxic chemicals in fish to regularly assess the status and trends of fish contamination and related consumption advisories in New Jersey waters, in order to provide current data on a variety of species and sites. Due to the large number of water bodies in the state, the sampling program is based on a rotating assessment of contamination of five regions of the state on a 5-year cycle:

1. Passaic River Region;
2. Marine/Estuarine Coastal Region;
3. Raritan River Region;
4. Atlantic Coastal Inland Waterways Region; and
5. Upper and Lower Delaware River Region.

Sampling in the Passaic Region was conducted in 2002-2003 and the Marine/Estuarine Region in 2004-06, and the results were reported in Horwitz, et al. (2004 and 2006). This document reports findings of the third year of the cycle, the Raritan River Region, which involved freshwater fish and blue crabs (Task I) and marine fish (Task II) sampled in 2006-2007.

The main objectives of this program are to provide current and more comprehensive data to the State of New Jersey on concentrations of toxic contaminants in finfish and shellfish. This program consists of two tasks. Task I of this study is the third year of the monitoring program. The objective of Task I is to provide data relevant to updating consumption advisories. Task I

targeted species of recreational and commercial importance in areas under current state advisory and/or in selected areas with little or no current information. Task II focused on species important to recreational anglers in the Raritan estuaries and adjacent oceanic waters and two southern New Jersey coastal bays.

Study Design

Task I. Raritan River drainage Routine Monitoring Freshwater Component

Stations were selected to sample previously-sampled sites and investigate sites of particular importance to anglers and/or of higher probability of having higher contaminant levels. Species were selected to include predatory species present in a number of sites, allowing comparison among sites. Some of these species are either under consumption advisories on a statewide, regional and waterway specific basis for mercury (Hg), PCB and/or dioxin contamination or are regularly consumed by recreational anglers within the state. Additional species were selected at specific sites on the basis of their importance in the fishery at that site. Twenty species of freshwater fish (lake trout, brown trout, largemouth bass, smallmouth bass, white catfish, channel catfish, brown bullhead, yellow bullhead, white perch, American eel, common carp, chain pickerel, northern pike, hybrid striped bass, walleye, redbreast sunfish, bluegill, black crappie, yellow perch, and rock bass) were sampled at 33 stations. Scientific names of species are presented in Table 1. Additionally, blue crab specimens were analyzed from the Raritan and South Rivers. Separate analyses of muscle and hepatopancreas tissue were done for all blue crab samples (thus, the total number of analyses of blue crabs is twice the number of samples). Each crab sample was a composite of 5-6 individual crabs in order to achieve sufficient material for analysis. Some of the originally designated species from a few locations were not collected, and NJDEP and ANSP project managers reapportioned the missing samples and modified the Task I sampling plan. Individual filets from all fish species sampled were analyzed for various analytes under Task I, and that list is presented in Table 2. In addition to the chemical analytes listed, lipid content was also measured for each sample analyzed.

Task II. Supplemental Analysis of Marine Fishes

Two species (summer flounder and weakfish) were collected and analyzed from six stations. Filets from the fish species were analyzed either as individual samples (weakfish and most summer flounder) or composited samples (combining five equally sized specimens of summer flounder). When the full set of designated specimens were not obtained from certain locations, the sample analyses were reapportioned to stations where extra samples were collected (Raritan Bay complex), based on agreement by ANSP and NJDEP. The list of chemical analytes for Task II are the same as for Task I (Table 2). In addition, lipid content was measured for each sample.

Analytes

Total mercury was measured on all samples (434 total samples). Lipid content was measured for each sample. PCBs and selected Organo-chlorine pesticides (OCPs) were measured on 261 of the samples, selected to include taxa most likely to show bioaccumulation of these substances

and species important in recreational fisheries. These include predatory fish, benthic fish and fish with high lipid content. Polybrominated diphenyl ethers (PBDEs) were measured on 54 samples. Dioxins and furans were analyzed on 36 of the samples analyzed for PCBs and OCPs. The specific chemicals analyzed are described in the methods section.

SAMPLING PROCEDURES

Field

Specimens were collected by standard fisheries methods and/or by legal angling methods, using an applicable State of New Jersey Freshwater or Marine Scientific Collecting Permit. Extra specimens and species of opportunity collected were retained frozen for possible future analyses.

Fish were collected by a variety of techniques as appropriate to the access of waterbody, location, water levels and species needed. The primary techniques used were boat electrofishing (most ponds, lakes, larger rivers and the Delaware & Raritan Canal) and angling (especially for weakfish and summer flounder). Sample collection was supplemented by tow-barge electrofishing (e.g., in small rivers) and backpack electrofishing (base of dam at Bound Brook @ New Market Pond). Limited gill netting was used by ANSP at Devoe Lake and by the New Jersey Division of Fish and Wildlife (NJFW) to collect lake trout at Round Valley Reservoir and hybrid striped bass at Spruce Run Reservoir. Crab traps were used to collect blue crabs, as well as white catfish and white perch from the South and Raritan Rivers. Specimens were collected by staff of ANSP, NJDEP and NJFW. All information on specimens collected in the field was kept on data sheets for each station. Field chain-of-custody forms were completed for each collection trip and were used to track transfers of specimens from other collection groups to ANSP fisheries personnel and within ANSP to track laboratory transfers internally and to outside laboratory facilities.

All specimens were placed on ice as soon after capture as practical. Specimens were held in stainless steel containers (pre-cleaned with Micro cleaning solution and rinsed with ambient water at each individual station) until processing. Within 24 hours of capture (usually less), specimens selected for dioxin, PCB and pesticide analysis were wrapped in muffled aluminum foil sealed with freezer tape, labeled and placed in freezers. The specimens selected for mercury analysis only were frozen in Ziploc-type (plastic) or kitchen bags. Specimens for both planar PCB and mercury analysis were wrapped in muffled aluminum foil. All specimens were labeled with both internal and external tags and held frozen until thawed for sample preparation. Samples were maintained with complete sample documentation (chain-of-custody forms, etc.) consistent with the QA/QC Plan.

In order to ensure uncontaminated samples, cleaning of the sampling gear, coolers, stainless pans and appropriate sample containers (muffled aluminum foil wrap) was done between sampling events. The procedures for cleaning sampling gear and wrapping specimens were consistent with ANSP standard operating procedures.

Laboratory

All samples were stored frozen (0°C) until processing in the ANSP laboratory. All transfers of samples were properly documented throughout transport and analysis (internal laboratory chain-of-custody). All laboratory equipment was properly calibrated as per each method completed. Careful cleaning of all laboratory equipment and instruments using the appropriate soaps, solvents, acids, and double deionized water (DDW) was done throughout the program.

Tissue preparation of fish followed common preparation methods for consumption. The selected fish specimens were fileted using clean methods for both trace metals and organic contaminants as outlined in EPA (1995; ANSP SOP-14-12r4). The samples were fileted with skin off for American eel and catfish species, with skin and scales on for lake and brown trout and with skin on and scales removed for all other species using stainless steel utensils on glass plates. All fish samples were individual filets, typically the left side filet, with the remains (right side, remaining carcass and head) retained for archival material. The archived sample material (including the extra sample homogenate not analyzed) will be retained by ANSP for a period of one year following project final report submission.

Tissue preparation of shellfish (blue crab) included extractions of separate muscle and hepatopancreas tissue. Muscle tissue included claw and backfin tissue. Hepatopancreas material was extracted and analyzed separately. To avoid laboratory contamination and cross-tissue contamination, handling methods, holding methods, and tool use and cleaning were done analogously to that for fish tissue. Shellfish samples consisted of composite tissue from 5 or 6 specimens. Individual lengths and weights (total and tissue) were recorded for each member of the composite. Sample material destined for the same composite sample from a location were handled using the same utensils and plates without cleanup between specimen samples.

Chemical Analyses

Each tissue sample was fileted and homogenized and placed into pre-cleaned jars (e.g., ICHEM) for trace metals and organic analysis. Chemical analyses were performed by ANSP using modified U.S. EPA and NOAA Status and Trends approved methods (ANSP SOPs P-16-84r4, P-16-111, P-16-109r1, and P-16-108). Chemical contaminants and ancillary parameters are listed in Table 2.

As part of quality assurance and quality control (QA/QC), a Standard Reference Material (SRM) was analyzed as part of the QA/QC procedure. The SRM was obtained from the National Institute of Standards and Technology (NIST) or equivalent agency (see Cantillo, 1993; 1995) and consisted of SRM 1946 (Lake Superior Fish Tissue) for both Mercury and PCB/OCP analyses. Also, additional duplicate (PCB/OCP and Mercury) and triplicate (PCB/OCP) fish tissue samples were analyzed to help assess laboratory variations and provide critical information for the assessment of both geographical and temporal trends.

All glassware and materials coming into contact with the fish was pre-cleaned with the appropriate cleaning agent (e.g., micro soap, acids, deionized water, solvents, etc.) pertaining to the specific parameter or group of parameters. Cleaning and analytical methods are outlined it the QAQC documentation for this project (ANSP Ref# 464; January 2007).

Mercury

Extractions and Analyses:
Strong acid digestions were performed using 10 ml nitric acid on approximately 0.5 g homogenized wet fish material in a CEM MDS 2100 microwave digestion system. Mercury quantitation was subsequently accomplished using a Perkin Elmer Fimms 400 Cold Vapor AA. Calibration blanks, intercalibration verification samples, and instrument duplicates were analyzed to insure instrument performance and accuracy. The QA samples were analyzed at 10% to 15% frequency throughout the study.

Detection Limits and Qualified Data:
The method detection limit (MDL) based on the analysis of 13 replicate samples of a low mercury standard (0.5 µg/L) has a value of 0.03 µg/g wet weight. The instrument detection limit (IDL) is based on the repeated analysis of 65 digestion blanks and has a value of 0.02 µg/L. Total mercury values ranged from 0.002 µg/g to1.413 µg/g wet weight. The relative percent difference (RPD) for sample duplicates ranged from 0 to 42. The highest RPD was usually for samples with low concentrations.

Polychlorinated Biphenyls, Co-Planar PCBs, Organochlorine Pesticides and Polybrominated Diphenyl Ethers

Extractions and Analyses:
All methods employed were similar to those used in previous monitoring studies for the State of New Jersey and the Delaware River Basin Commission. Homogenized fish samples were stored frozen until extraction. For extraction, samples were thawed and 2 g of the homogenate were sub-sampled using a Teflon coated spatula. Approximately 30 g of Na_2SO_4 (previously baked at 450 degrees C for 4 hours) was added to the sub-sample to eliminate water. The dried sample was then placed in a glass Soxhlet extractor with ca. 200 ml dichloromethane (DCM) for a minimum of 18 h. For PCBs, co-planars and PBDEs the following surrogates were used respectively: PCB 14, 65 and 166 (35 ng), PCB 77 (21 ng) and PCB 103 (100 ng). The extracts were then sub-sampled for gravimetric lipid determination. For this, a known volume of extract was transferred to a pre-weighed aluminum pan. The solvent was allowed to evaporate under the fume hood for 6-8 hrs. The residue remaining (lipid) was weighed and percent lipid calculated. Lipids were removed from sample extracts by gel permeation chromatography (GPC) using DCM as the mobile phase. The collected fraction containing analytes was concentrated by roto-evaporation and a N2 stream. Solid-liquid chromatography using Florisil was performed as an additional clean-up step. Using this technique, PCBs (as well as heptachlor, nonachlors, and DDEs) were eluted from the chromatographic column containing florisil using petroleum ether (F1 fraction). The remaining organochlorine pesticides were eluted using 50:50 petroleum ether and dichloromethane (F2 fraction).

Congener-specific PCBs and organochlorine pesticides were analyzed using an Agilent 6890 gas chromatograph equipped with a ^{63}Ni electron capture detector and a 5% phenylmethyl silicon capillary column. The identification and quantification of PCB congeners follows the '610 Method' (Swackhamer, 1987) in which the identities and concentrations of each congener in a mixed Aroclor standard (25:18:18 mixture of Aroclors 1232, 1248 and 1262) were determined by calibration with individual PCB congener standards. Congener identities in the sample extracts were based on their chromatographic retention times relative to the internal standards added (PCBs 30 and 204). In cases where two or more congeners could not be chromatographically resolved, the combined concentrations were reported.

In conjunction with the Geochemical and Environmental Research Group (GERG) at Texas A&M University (contact: Dr. Terry Wade), four of the dominant co-planar PCBs (PCB 81, 77, 126 and 169) were also measured**.** All samples were extracted and spiked with surrogate PCB 77 (21ng) by ANSP. Samples were shipped overnight to GERG to be separated on charcoal: silica gel columns and run using high resolution gas chromatography/low resolution mass spectrometry (HRGC/LRMS).

Finally, a subset of extracts from the PCB analyses was used to quantify polybrominated diphenyl ethers (PBDEs), which are components of flame retardants. Thirty eight conformations of PBDEs (Table 2) were analyzed in extracts using gas chromatograph (Hewlett Packard 5890A, or equivalent). A 0.25 mm x 30 m fused silica capillary column coated with a 5% phenyl methylpolysiloxane column (DB-5MS; 0.25 µm film thickness) is inserted directly into the ion

source of the mass spectrometer. One column injection was employed in the gas chromatograph (GC) and the injection port was set to track the oven temperature. The oven temperature program was: 130°C for 1 min followed by a temperature ramp of 12°C/min to 140°C and followed by a temperature ramp of 5°C/min to a final temperature of 300°C which was held for an additional 5 min. The auxiliary temperature and transfer line were maintained at 280°C. For all brominated flame retardant analytes (PBDEs), ions 79 and 81 (bromide ions) were monitored as quantitative and qualitative ions. Analysis of PBDEs was performed by Dr. Terry L. Wade of the Geochemical and Environmental Research Group.

All methods were similar to previous monitoring studies for the State of New Jersey and the Delaware River Basin Commission. Organochlorine pesticides (OCPs) were identified and quantified based on comparisons (retention times and peak areas) with a known calibration standard prepared from individual compounds.

Quality assurance and control measures were included at a frequency of 10% of the total number of samples. These measures included: evaluation of surrogate recoveries, calculation of blank-based detection limits, use of NIST standard reference materials and involvement in NIST's annual inter-laboratory comparison to assess ANSP's accuracy and precision in quantifying PCBs and OCPs, duplicate analysis, and spike recoveries.

All data and information obtained during the course of this project were kept by the laboratory in either computerized or handwritten form (i.e., notebooks and field sheets) and are available for inspection on request. Field data sheets were used throughout this project. All data were kept on IBM type computers (both hard drives and backed up on fixed media, such as nightly backup from the ANSP server). The format was on an Microsoft EXCEL-type spreadsheet or Microsoft ACCESS database. Reporting of the data was done at specific points during the study.

All data submitted to and generated by ANSP were rigorously documented and will undergo external quality assurance by the QA Officer and staff.

Selected samples for Dioxin/Furans were sent to the Texas A&M University, Geochemical and Environmental Research Group (GERG), for full extraction and analysis. Three samples had low recovery of surrogates. These three samples were re-extracted and analyses were done on the new extracts. One of these samples had low surrogate recovery on the second analysis, and the reported value (0 pg/g) is considered unreliable. Another sample also had low surrogate recovery, and the reported value is considered unreliable.

Detection Limits and Qualified Data: Organic Contaminants:
Detection limits for PCBs and OCPs were defined by the mean plus three times the standard deviation divided by the average extraction mass of measured concentrations in blanks. Measured sample concentrations were qualified as non-detect (ND) or below-detection-limit (BDL) based on these detection limits, and these qualifiers are contained in the final data package. For data summaries (e.g. mean concentrations among groups of samples) values were uncensored. ND concentrations were treated as zero and the measured concentrations of all other samples were used, even where BDL. While these measured BDL concentrations are not

meaningful for interpretation of individual samples, use of the measured concentration reduces potential biases in forming group means. The same approach was used in calculating total concentrations of groups of compounds (e.g, total PCBs, total DDX [DDT, DDE, and DDD], total chlordanes, and total chlorobenzenes). Congeners which are BDL typically contribute relatively little to the sum of compounds within a class, so the difference in treatment of the BDL data has little effect on total concentrations in most cases.

All samples analyzed for total PCBs, DDXs, and chlordanes exhibited concentrations that were mostly above the detection limit. There were relatively high proportions of BDL or ND samples for BHCs and co-planar PCBs and PBDEs reported by GERG.

RESULTS

Overview

Data from individual samples for both tasks are presented in Appendix I (mercury, PCBs, co-planar PCBs, PBDEs, DDX, chlordanes, and BHCs and lindane), Appendix II (dieldrin, aldrin, endrin, and endosulfans) and Appendix III (furans and dioxins). Averages and maxima of mercury, total PCBs (excluding co-planar congeners), total co-planar PCBs, total DDX, total chlordanes (including heptachlor and heptachlor epoxide), and total BHCs & lindane for each station and species combination are presented in Tables 3 and 4. Tables 3-4 and Appendix 1 use the sum of uncensored concentrations for constituents of each group. These include some concentrations which are below detection limit (BDL). Non-detect concentrations (ND) are treated as zero. The total concentration was below detection limit (i.e., every constituent ND or BDL) mainly for some samples of co-planar PCBs, PBDEs, BHC & lindane, aldrin, dieldrin, endosulfan I, and endosulfan II. These samples are shown in Appendices I and II in italics. A number of samples had ND for the co-planar congeners. Inclusion of the BDL numbers in totals has little effect on the totals, except for low concentrations (Figures 1-5) of BHCs and PBDEs. The totals with and without the quantitated BDL concentrations are nearly identical for total PCB concentrations or total DDX concentrations greater than about 50-100 ng/g (Figures 1 and 2), at total chlordane concentrations greater than about 2 ng/g (Figure 3), total PBDE concentrations greater than about 50 ng/g, and concentrations of BHC and lindane greater than about 0.8 ng/g. The greater contribution of BDL values at low total concentrations presumably results from contribution of noise to quantitated BDL concentrations. Where duplicate or triplicate samples were analyzed, the tables show the average of the multiple values of toxic contaminants for each sample. The lipid percentage is for the first analysis only.

Concentrations of several contaminants were correlated among samples (Table 5). PCBs were moderately highly correlated with BHCs and lindane ($r^2 = 0.73$ based on pairwise correlations) and chlordanes $r^2 = 0.62$), and moderately correlated with DDX ($r^2 = 0.36$). Concentrations of co-planar PCBs were not very highly correlated with total PCBs, but were moderately highly correlated with PBDEs ($r^2 = 0.46$). The correlations of PCBs with chlordane and DDX were strengthened by high concentrations of all three contaminants in American eel and common carp

from New Market Pond, downstream of New Market Pond, and Rahway River at Milton Lake. However, several of the other species with high PCB concentrations at New Market Pond had relatively low concentrations of chlordane and DDX. The highest co-planar PCB concentrations were in blue crab hepatopancreas samples. These samples also had high concentrations of PBDEs, PCBs and DDX. However, many of the samples with high PCB concentrations (e.g., carp and eels from New Market Pond or downstream of New Market Pond) had ND or intermediate concentrations of co-planar PCBs and moderate concentrations of PBDEs. Total mercury was weakly correlated (some positive and some negative) with the organic contaminants.

The highest PCB concentrations were seen in American eel specimens from New Market Pond and downstream of New Market Pond and common carp from New Market Pond; these had average concentrations between 2900 and 3700 ng/g wet weight. Concentrations in other species (e.g., bluegill, largemouth bass, and brown bullhead) from New Market Pond were also relatively high compared to other sites. As in past studies, concentrations of OCPs in blue crabs were much higher in hepatopancreas tissue than muscle tissue, consistent with the higher lipid content of the hepatopancreas.

Total furans and dioxins were analyzed from blue crabs and selected estuarine fish (Table 6, Appendix III). For blue crabs from the South River, concentrations of both contaminants were greater in hepatopancreas samples than in muscle samples, consistent with differences in lipid between the tissues and results for other OCPs. Analyses of furans and dioxins in muscle tissue of crabs from Raritan Bay were not done, because of the typical low concentrations of OCPs in crab muscle tissue. Concentrations of both furans and dioxins were higher in the South River blue crab samples than in the Raritan River blue crab samples. Furans and dioxins were analyzed from New Market Pond (which had high PCB concentrations), Rahway River and Raritan River. The Raritan River carp had much higher lipid concentrations than carp from the other stations. These Raritan River carp had higher dioxin concentrations, as well, but did not have higher furan concentrations. Summer flounder from four areas had low or non-detectable concentrations of furans. Concentrations of dioxins were also low or non-detectable, except for flounders from Sandy Hook Bay (Table 6. Concentrations of furans and dioxins in white perch from Raritan River and South River were somewhat higher than those of carp from Rahway and Raritan Rivers (Table 6).

Toxic equivalents (TEQs) are calculated from dioxin and furan concentrations (Appendix III). The TEQ is a weighted total of dioxin and furan concentrations, where the weighting factors (TEFs) are based on toxicity relative to the two most toxic dioxin congeners (2,3,7,8-TCDD and 1,2,3,7,8-PeCDD). The TEFs are 1.0 for these congeners, and <1 for other congeners. TEFs (Appendix IV) for OCDD and OCDF were taken from van den Berg, et al. (2006), and all other TEFs were taken from van den Berg, et al. (1998). For most samples, the TEQs were much less than the dioxin and furan concentrations, indicating that the sample contained mainly less toxic congeners. However, for several samples, TEQs were high relative to the dioxin and furan concentrations, since the samples contained the most toxic dioxin congeners: 1,2,3,7,8-PeCDD in one of the Raritan Bay summer flounders, 2,3,7,8-TCDD in one of the Atlantic Ocean summer flounders, two of the South River blue crab hepatopancreas samples, and one of the Raritan

River white perch, and both congeners in two of the Raritan River carp, one of the South River blue crab hepatopancreas samples, and one of the Raritan River white perch.

Individual data on muscle and hepatopancreas weight of individual blue crabs (Table 7) can be used to link consumption of contaminants to typical numbers of crabs per meal. Individual data on lengths and weights of the summer flounder used in composites are presented in Table 8).

Risk Assessment Based on Exceedances of FDA Action Levels

The FDA nationally promulgates guidelines for the consumption of fish and fishery products by issuing action limits. The primary purpose of these limits is to represent the point at or above which the administration will take legal action to remove products from the market. While fish caught by recreational anglers do not fall under FDA purview, the FDA limits are often used as a benchmark for the concentrations above which ingestion is not recommended. The US EPA and individual states, including New Jersey, have promulgated other action limits. These are often based on risk assessments, may vary with target population and may recommend frequency of consumption rather than setting a single "do not eat" level. These US EPA and state action levels are often lower than those of FDA. US EPA (2004) defines screening values as "concentrations of target analytes in fish or shellfish tissue that are of potential public health concern and that are used as threshold values against which levels of contamination in similar tissue collected from the ambient environment can be compared." For comparison, screening values (SV) for recreational fishermen (SVrf) are used below (Table 5-4 in USEPA 2004). SV for different groups depend on the balance between different consumption rates and lower body weights of children. For noncarcinogens, relationships between SV for different groups are more complex, since reference doses (e.g., related to developmental or reproductive effects) differ among groups as well.

Mercury

The FDA action limit for total mercury in fish tissue is 1 µg/g on a wet weight basis (or 1 ppm). One fish, a 49 cm largemouth bass from Farrington Lake had a concentration of 1.4 µg/g. Four largemouth bass (2 from Farrington Lake and 2 from Rahway River at Milton) had concentrations between 0.8 and 1.0. Seventeen samples had concentrations between 0.5 and 0.7. These were mostly large predatory fish (largemouth bass, smallmouth bass, walleye, and chain pickerel), but one white perch from the Raritan River at the Route 1 Bridge had a concentration of 0.6 µg/g. Twenty specimens, including specimens of largemouth bass, smallmouth bass, American eel, hybrid striped bass, channel catfish, white catfish, chain pickerel, Northern pike, yellow perch, and white perch) had concentrations between 0.4-0.5.

PCBs

The US FDA "do not eat" limit is 2,000 ng/g for total PCBs. For this project, this limit is exceeded by eight samples, including American eel and common carp from New Market Pond and American eel from downstream of New Market Pond. Many states and organizations recognize that this limit may be too high and use lower limits. Four additional samples (one

American eel from New Market Pond, one common carp from Spring Lake, and hepatopancreas from two of the three blue crab samples from the South River at Keansburg) exceeded one-half of the FDA action limit (1,000 ng/g).

The NJDEP and NJDHSS have developed a set of risk-based consumption advisories for total PCBs (Post, et al. 2001). Consumption advisories are based on cancer risk levels, non-cancer risks, and distinct advisories are issued for different groups at risk.

Chlordane

The US FDA has set an action limit of 300 ng/g wet weight (or 0.3 ppm) for chlordane (cis and trans forms, equivalent to alpha and gamma forms) in fish. Seven samples exceeded this limit. Four of these were American eel from New Market Pond or downstream of New Market Pond; these samples also had high PCB concentrations. The other three samples were common carp from the Rahway River at Milton Lake. The SVrf for total chlordanes is 114 ng/g wet weight (based on carcinogenic effects). A number of additional samples exceeded this limit.

DDXs

Because of its bioaccumulative nature and toxicity, the US FDA has set an action limit for DDXs (sum of DDTs, DDEs, and DDDs) at 5.0 ppm (5000 ng/g). None of the 2006 samples exceeded this limit. The SVrf for total DDXs is 117 ng/g, based on carcinogenic effects. Thirty-eight samples exceeded this limit.

Dieldrin, Aldrin, heptachlor and heptachlor epoxide

The US FDA's action limit for aldrin and dieldrin in fish is 0.3 ppm (300 ng/g). None of the samples in this study exceeded this limit for dieldrin and aldrin. The SVrf for dieldrin is 2.5 ng/g based on carcinogenic effects, which was exceeded by 121 samples.

Comparison with previous studies

Most of the sites sampled in this round had not been previously sampled. A few sites which had consumption advisories from previous sampling in 1992 or 1996 were re-sampled. Only mercury was analyzed in the previous sampling, so the data from 2006 provide new information on organic contaminants for the sites.

In general, where the same species in comparable size ranges was sampled across two surveys, concentrations in 2006 were similar to those in the earlier sampling (Figures 6-11). The only clear exception is northern pike from Spruce Run Reservoir (Figure 7), where concentrations in 2006 were lower than in 1992, even though larger fish were analyzed in 2006. However, without more specimens and more detailed comparison of fish in the two surveys, the difference cannot be attributed to changes in mercury availability. Concentrations of mercury in largemouth bass at Carnegie Lake (Figure 9) also tended to be lower in 2006 than in 1992, although there is much variability in the mercury-length regressions. In 1992, one individual bass (51.3 cm total length)

had a relatively high mercury concentration (1.07 mg/kg). The highest concentration seen in 2006 was 0.52 mg/kg, in a 49.6 cm fish.

Additional Data

Some samples were collected for the Year 2 Routine Monitoring Study, but the data from these samples were not available at the time of preparation of the report on that study (Horwitz, et al. 2005). These data included twelve individual white perch from the Passaic River at Kearny collected in April, 2006, and two composites of blue crab from the Barnegat Bay near Toms River collected in September-October, 2004. These data are summarized in Table 9. Data on tissue weights of the blue crab samples are presented in Table 10.

CONCLUSIONS

This study includes (as Task I) the third portion of the 5-year rotating routine monitoring program. The study provides relevant data for assessment of potential consumption risks and trends in contaminants. The study included a number of groups of fish that typically bioaccumulate certain organic contaminants. This is because of high trophic position (e.g., largemouth bass and chain pickerel), lipid content (especially American eel), longevity (e.g., American eel) and/or association with sediment (American eel, white catfish and channel catfish). The study also investigated patterns of bioaccumulation of other size or taxa which are likely to be consumed, such as summer flounder and weakfish. These data are relevant to risk assessment, since they include sizes and species that are targeted by fishermen. Several conclusions can be drawn from the study.

1) In general, few of the samples exceeded high action levels (e.g., FDA action levels for mercury, PCBs, DDX, and chlordane). However, a number of samples exceeded various risk-based thresholds. In many cases, the same specimens exceeded thresholds for several contaminants.

2) Some sites, notably New Market Pond and Bound Brook downstream of New Market Pond, had high concentrations of several contaminants. Concentrations of the contaminants were considerably lower in fish from further downstream in Bound Brook (at Shepard Road).

3) Blue crab hepatopancreas samples from Raritan Bay and South River had high lipid concentrations and high concentrations of several contaminants. Muscle tissue from the same specimens had low concentrations.

4) Where individuals of comparable sizes of the same species from the same site were analyzed in the 1992 or 2006 program, mercury concentrations were generally similar between the two years. However, lower concentrations were seen in northern pike from Spruce Run Reservoir in 2006 than in 1992. Concentrations of mercury in largemouth bass from Carnegie Lake may also have been lower in 2006 than in 1992.

5) Low concentrations of contaminants were found in samples of summer flounder from Sandy Hook Bay and weakfish from Manahawkin Bay.

6) Patterns of contaminant concentrations in fish reflect individual fish characteristics such as size (typically higher in larger, older fish), trophic level and lipid content (for organic contaminants), site differences indicative of current or past point sources (e.g., New Market Pond) and regional differences which affect contaminant biogeochemistry. The Routine Monitoring Program is designed to address these different scales of variation by sampling a range of size of several species, by sampling new sites in each round to identify previously-unknown hotspots, by re-sampling selected sites to analyze temporal trends, and by rotating among regions to investigate broad, regional patterns in fish contamination.

7) The New Jersey Department of Environmental Protection (NJDEP) and the New Jersey Department of Health and Senior Services (DHSS) use risk-based health criteria for establishing consumption advisories for mercury, PCBs, dioxins, and OCPs. These criteria are typically lower than FDA thresholds for advisories for commercial fish. The data from this study and other portions of the routine monitoring program are used by NJDEP and DHSS to develop consumption advisories for New Jersey fish.

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TABLES

Table 1. Scientific and common names of fishes and shellfishes analyzed in the NJ routine monitoring program of toxics for the Raritan River region.

Scientific Name	Common Name
Ambloplites rupestris	rock bass
Ameiurus catus	white catfish
Ameiurus natalis	yellow bullhead
Ameiurus nebulosus	brown bullhead
Anguilla rostrata	American eel
Callinectes sapidus	blue crab
Cynoscion regalis	weakfish
Cyprinus carpio	common carp
Esox lucius	northern pike
Esox niger	chain pickerel
Ictalurus punctatus	channel catfish
Lepomis auritus	redbreast sunfish
Lepomis macrochirus	bluegill
Micropterus dolomieu	smallmouth bass
Micropterus salmoides	largemouth bass
Morone americana	white perch
Morone saxatilis x chrysops	striped x white bass hybrid
Paralichthys dentatus	summer flounder
Perca flavescens	yellow perch
Pomoxis nigromaculatus	black crappie
Salmo trutta	brown trout
Salvelinus namaycush	lake trout
Sander vitreum	walleye

Table 2. List of Analytes for Routine Monitoring of Toxics in New Jersey Fish program.

POLYCHLORINATED BIPHENYLS (PCBs)		ORGANOCHLORINE PESTICIDES	POLYBROMINATED DIPHENYL ETHERS (PBDEs)	FURANS
1	136	opDDE	BDE1 (2-MonoBDE)	OCDF
3	77+110	ppDDE	BDE2 (3-MonoBDE)	2,3,7,8-TCDF
4+10	82	op ddt	BDE3 (4-MonoBDE)	1,2,3,7,8-PeCDF
7	151	pp ddt	BDE7 (2,4-DiBDE)	2,3,4,7,8-PeCDF
6	135+144	op ddd	BDE8/11 (2,4'-DiBDE8,3'-DiBDE)	1,2,3,4,7,8-HxCDF
8+5	107	pp ddd	BDE10 (2,6-DiBDE)	1,2,3,6,7,8-HxCDF
19	149		BDE12 (3,4-DiBDE)	2,3,4,6,7,8-HxCDF
12+13	118	alpha BHC	BDE13 (3,4'-DiBDE)	1,2,3,7,8,9-HxCDF
18	134	beta BHC	BDE15 (4,4'-DiBDE)	1,2,3,4,6,7,8-HpCDF
17	131	delta BHC	BDE17 (2,2',4-TriBDE)	1,2,3,4,7,8,9-HpCDF
24+27	146	lindane	BDE25 (2,3',4-TriBDE)	
16+32	153+132+105		BDE28 (2,4,4'-TriBDE)	DIOXINS
29	141	heptachlor	BDE30 (2,4,6-TriBDE)	OCDD
26	137+176	heptachlor epoxide	BDE32 (2,4',6-TriBDE)	2,3,7,8-TCDD
25	163+138	oxychlordane	BDE33 (2',3,4-TriBDE)	1,2,3,7,8-PeCDD
31+28	158	gamma chlordane	BDE35 (3,3',4-TriBDE)	1,2,3,4,7,8-HxCDD
53+33+21	129+178	alpha chlordane	BDE37 (3,4,4'-TriBDE)	1,2,3,6,7,8-HxCDD
22	187+182	cis nonachlor	BDE47 (2,2',4,4'-TetraBDE)	1,2,3,7,8,9-HxCDD
45	183	trans nonachlor	BDE49 (2,2',4,5'-TetraBDE)	1,2,3,4,6,7,8-HpCDD
46	128		BDE66 (2,3',4,4'-TetraBDE)	
52	185	dieldrin	BDE71 (2,3',4',6-TetraBDE)	
49	174	endrin	BDE75 (2,4,4',6-TetraBDE)	
47	177	aldrin	BDE77 (3,3',4,4'-TetraBDE)	
48	202+171	endosulfan I	BDE85 (2,2',3,4,4'-PentaBDE)	
44	157+200	endosulfan II	BDE99 (2,2',4,4',5-PentaBDE)	
37+42	172+197		BDE100 (2,2',4,4',6-PentaBDE)	
41+71	180	**TOTAL MERCURY**	BDE116 (2,3,4,5,6-PentaBDE)	
64	193		BDE118 (2,3',4,4',5-PentaBDE)	
40	191	**CO-PLANAR PCBs**	BDE119 (2,3',4,4',6-PentaBDE)	
100	199	PCB 81	BDE126 (3,3',4,4',5-PentaBDE)	
63	170+190	PCB 77	BDE138 (2,2',3,4,4',5'-HexaBDE)	
74	198	PCB 126	BDE153 (2,2',4,4',5,5'-HexaBDE)	
70+76	201	PCB 169	BDE154 (2,2',4,4',5,6'-HexaBDE)	
66+95	203+196		BDE155 (2,2',4,4',6,6'-HexaBDE)	
91	189		BDE166 (2,3,4,4',5,6-HexaBDE)	
56+60	208+195		BDE181 (2,2',3,4,4',5,6-HeptaBDE)	
101	207		BDE183 (2,2',3,4,4',5',6-HeptaBDE)	
99	194		BDE190 (2,3,3',4,4',5,6-HeptaBDE)	
83	205			
97	206			
87+81	209			
85				

Table 3. Average concentrations of mercury, PCBs, PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Ave. Total Hg	Ave. Total PCBs	Ave. Total Planar PCBs	Ave. Total PBDEs	Ave. Total DDXs	Ave. Total BHCs + Lindane	Ave. Total Chlordanes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Atlantic Ocean North												
	summer flounder	3	47.2	1070.8	1.33	0.087	34	0.000	0.25	6	0.174	1.3
Atlantic Ocean, Sea Isle City to Cape May												
	weakfish	5	33.4	399.9	6.28	0.155	99	0.000		22	0.451	3.7
Bound Brook below New Market Pond												
	American eel	3	65.9	611.4	12.70	0.097	3672	0.000	16.34	299	9.297	395.2
Bound Brook at Shepard Rd.												
	American eel	3	55.6	331.2	7.48	0.126	629	0.032		88	2.147	142.6
Budd Lake												
	northern pike	3	77.8	3123.4	1.69	0.322	96	0.000		23	0.237	5.1
	largemouth bass	5	39.9	1077.2	1.47	0.408	71	0.000		14	0.151	2.4
	white catfish	3	37.3	780.3	2.49	0.226	120	0.000		23	0.159	4.9
	brown bullhead	3	28.1	290.5		0.018						
	bluegill	3	18.3	131.5		0.128						
Carnegie Lake												
	largemouth bass	5	42.0	1239.5		0.312						
	white perch	3	20.9	109.6		0.179						
	bluegill	3	17.9	110.3		0.074						
Davidson Mill Pond												
	American eel	2	77.1	972.5	23.14	0.201	216	0.000		176	0.963	27.8
	chain pickerel	3	45.2	577.6		0.290						
	largemouth bass	3	39.8	973.2		0.527						
	bluegill	3	19.1	149.9		0.128						
Delaware-Raritan Canal at Griggstown												
	chain pickerel	3	48.5	879.6		0.276						
	American eel	3	46.6	205.9	18.18	0.123	442	0.057		249	0.547	64.1
	channel catfish	3	45.5	980.0	6.49	0.068	248	0.000		111	0.283	26.4
	largemouth bass	5	34.2	640.0	1.10	0.356	87	0.000		24	0.112	4.4
	brown bullhead	3	32.5	535.4		0.087						
	smallmouth bass	3	30.3	680.6		0.229						
	bluegill	3	19.2	160.8		0.116						
Delaware-Raritan Canal at Lambertville												
	common carp	3	55.2	2745.1	3.58	0.168	125	0.000		38	0.450	11.1
	American eel	3	31.6	64.2	23.94	0.146	295	0.000		220	0.738	39.9
	largemouth bass	3	28.6	344.8	0.71	0.242	44	0.000		16	0.148	3.1
	bluegill	3	18.8	137.9		0.102						
Delaware-Raritan Canal at Port Mercer												
	common carp	3	59.7	3107.1	5.09	0.195	530	0.333		203	0.436	49.8
	American eel	3	48.5	216.4	19.34	0.112	422	0.000		145	0.625	72.0
	largemouth bass	3	37.3	904.4	0.83	0.447	51	0.000		33	0.117	5.0
	chain pickerel	3	35.0	230.3		0.156						
	bluegill	3	19.3	148.8		0.107						
Delaware-Raritan Canal at South Bound												
	common carp	3	64.8	4464.6	7.48	0.129	593	0.000		210	0.583	82.2
	channel catfish	3	45.9	1070.9	4.53	0.087	332	0.000		114	0.422	39.5
	largemouth bass	3	40.4	1075.7		0.370						
	yellow perch	3	29.6	303.8		0.232						
	bluegill	3	20.7	183.3		0.111						
Delaware-Raritan Canal at West Trenton												
	American eel	3	63.5	554.7	13.01	0.230	168	0.000		60	0.428	11.8
	common carp	3	59.8	3616.4	3.87	0.167	235	0.000		110	0.220	28.4
	channel catfish	3	59.1	2383.9	3.21	0.291	448	0.210		177	0.151	53.9
	walleye	3	45.2	1015.1	1.37	0.293	266	0.203		92	0.102	16.8
	smallmouth bass	3	34.3	457.4		0.497						
	largemouth bass	3	31.8	451.8		0.229						
	bluegill	3	17.3	105.6		0.112						
DeVoe Lake												
	chain pickerel	3	48.8	664.2		0.386						
	brown bullhead	3	33.0	505.7	1.37	0.121	28	0.000		16	0.251	8.0
Duhernal Lake												
	largemouth bass	3	37.4	833.5	0.70	0.216	35	0.000		21	0.197	6.3
	brown bullhead	3	33.2	515.2	0.43	0.089	46	0.000		23	0.122	8.4
	bluegill	3	20.3	202.6		0.093						

Table 3 (cont.). Average concentrations of mercury, PCBs, PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Ave. Total Hg	Ave. Total PCBs	Ave. Total Planar PCBs	Ave. Total PBDEs	Ave. Total DDXs	Ave. Total BHCs + Lindane	Ave. Total Chlor-danes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Farrington Lake												
	chain pickerel	3	45.9	705.1		0.292						
	largemouth bass	5	43.7	1223.3	0.97	0.870	78	0.000		19	0.149	5.8
	brown bullhead	3	33.7	504.8	0.73	0.030	64	0.000		23	0.181	17.7
	yellow perch	3	22.3	120.2		0.271						
	bluegill	3	17.9	115.7		0.123						
Green Brook at Madison Ave. Bridge												
	American eel	3	48.9	254.4	11.05	0.148	460	0.000		130	1.099	153.2
Lamington River at Lamington												
	American eel	3	59.0	427.7	13.52	0.276	62	0.000		38	0.342	23.3
	brown trout	2	24.9	156.3		0.082						
	smallmouth bass	3	20.4	118.7		0.149						
	redbreast sunfish	3	16.2	84.6		0.148						
Manahawkin Bay												
	weakfish	4	33.2	337.2	5.59	0.096	105	0.000	2.14	28	0.384	7.8
Manalapan Lake												
	American eel	3	54.2	303.5	11.96	0.126	215	0.100		218	0.625	19.0
	largemouth bass	3	39.3	1062.2	0.72	0.324	19	0.000		23	0.118	1.5
	black crappie	3	21.7	154.8		0.116						
	bluegill	3	18.5	154.2		0.056						
Millstone River at Manville												
	common carp	3	60.3	3416.8	6.17	0.218	527	0.623	45.32	192	1.137	66.1
	largemouth bass	3	35.9	734.6	1.37	0.446	81	0.000		41	0.211	13.2
	bluegill	3	17.6	129.9		0.126						
North Branch Raritan River at Branchburg												
	American eel	3	58.6	448.9	11.77	0.130	96	0.000		46	0.438	25.2
	smallmouth bass	3	25.5	227.1		0.186						
	yellow bullhead	3	19.9	113.2	1.92	0.137	60	0.000		14	0.293	11.0
	redbreast sunfish	3	16.6	102.5		0.104						
New Market Pond												
	common carp	3	52.1	2458.7	3.22	0.045	2879	1.495	17.57	153	2.641	155.6
	American eel	3	43.0	156.6	14.62	0.058	3235	0.313		274	12.013	388.0
	largemouth bass	3	38.0	861.3	0.69	0.170	535	0.487		23	0.349	29.7
	brown bullhead	3	33.8	511.3	0.90	0.009	609	0.757		31	0.667	32.3
	black crappie	3	22.4	171.4	0.56	0.066	217	0.280		13	0.333	13.5
	bluegill	3	16.9	84.2	0.61	0.074	713	0.497		26	0.271	29.1
Rahway River at Milton Lake												
	common carp	3	64.1	4598.4	12.14	0.127	697	0.615	30.04	287	2.638	439.3
	largemouth bass	3	46.8	1729.5	0.85	0.608	57	0.000		24	0.249	32.7
	brown bullhead	3	34.8	603.9	0.99	0.037	63	0.000		31	0.258	42.2
	bluegill	3	17.5	106.1	0.70	0.116	59	0.000		19	0.155	33.1
Rahway River at Valley Road Pond												
	common carp	3	60.2	3680.6	2.83	0.063	451	0.277	11.80	225	1.248	142.7
	largemouth bass	3	35.0	738.2	0.96	0.275	102	0.000		33	0.181	32.4
	brown bullhead	3	28.9	338.3	2.22	0.066	196	0.000		104	0.528	95.4
Raritan Bay at Keansburg												
	summer flounder	3	45.4	1075.9	1.49	0.091	50	0.000	0.61	15	0.199	28
	blue crab	3	Hepatopancreas		10.27	0.057	926	2.518	38.73	316	1.926	147.1
	blue crab	3	Muscle		0.90	0.086	44	0.000	0.81	26	0.212	4.8
Raritan Bay: Lower Bay												
	summer flounder	3	42.8	832.4	0.92	0.095	37	0.000	0.30	7	0.213	1.4

Table 3 (cont.). Average concentrations of mercury, PCBs, PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Ave. Total Hg	Ave. Total PCBs	Ave. Total Planar PCBs	Ave. Total PBDEs	Ave. Total DDXs	Ave. Total BHCs + Lindane	Ave. Total Chlordanes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Raritan River at Millstone River												
	American eel	3	66.4	747.4	13.14	0.215	379	0.080		116	0.439	45.3
	common carp	3	61.2	3568.6	9.64	0.094	394	0.773		158	0.728	71.2
	channel catfish	3	55.1	945.1	2.70	0.231	303	0.000		101	0.295	40.7
	largemouth bass	3	37.5	700.6	0.77	0.424	61	0.000		12	0.089	3.7
	white catfish	3	36.1	646.8		0.219						
	smallmouth bass	3	33.1	451.8		0.299						
	redbreast sunfish	3	18.6	130.0		0.135						
Raritan River at Route 1 Bridge												
	white catfish	3	46.5	1454.0	2.16	0.402	694	0.247	28.70	200	0.360	62.0
	white perch	3	27.0	322.0	3.02	0.351	228	0.740	10.29	53	0.386	25.9
Rosedale Lake in Pennington												
	common carp	3	64.4	3421.3	5.34	0.109	79	0.000		26	0.200	4.3
	largemouth bass	3	45.1	1372.7		0.260						
	black crappie	3	26.9	288.0		0.115						
	bluegill	3	19.1	140.6		0.074						
Round Valley Reservoir												
	channel catfish	3	56.9	2209.8	3.82	0.214	176	0.000		43	0.233	9.9
	lake trout	5	54.2	1696.9	4.06	0.143	136	0.141		47	0.267	11.1
	largemouth bass	3	39.2	1051.5	0.92	0.293	25	0.000		8	0.146	1.7
	white catfish	2	38.4	759.5		0.091						
	bluegill	3	21.8	230.1		0.108						
South Branch Raritan River at Long												
	brown trout	5	26.2	204.7		0.087						
South Branch Raritan River at Flemington												
	American eel	3	63.3	646.3	17.32	0.144	295	0.000		169	0.437	49.5
	smallmouth bass	3	28.3	287.2	0.55	0.181	31	0.000		15	0.196	1.9
	brown trout	3	23.9	135.1		0.079						
	yellow bullhead	3	21.9	155.5	1.60	0.160	65	0.000		24	0.162	4.5
	redbreast sunfish	3	18.0	131.8		0.087						
South Branch Raritan River at High Bridge												
	American eel	3	51.7	314.8	16.77	0.135	431	0.000		50	0.418	105.8
	redbreast sunfish	3	15.8	76.9		0.127						
South Branch Raritan River at Neshanic Station												
	American eel	3	68.5	668.5	18.80	0.258	252	0.000		122	0.267	39.9
	common carp	3	42.0	1165.1	2.52	0.052	52	0.000		16	0.132	5.6
	smallmouth bass	3	42.0	1034.3		0.363						
	largemouth bass	3	22.7	167.3	0.90	0.168	30	0.000		9	0.150	1.6
	rock bass	3	20.7	179.3		0.206						
	redbreast sunfish	3	17.5	111.8		0.106						

Table 3 (cont.). Average concentrations of mercury, PCBs, PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Ave. Total Hg	Ave. Total PCBs	Ave. Total Planar PCBs	Ave. Total PBDEs	Ave. Total DDXs	Ave. Total BHCs + Lindane	Ave. Total Chlor-danes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Sandy Hook Bay												
	summer flounder	3	52.1	1538.9	1.37	0.100	55	0.000	0.61	14	0.195	2.5
South River at Sayreville												
	white catfish	3	31.1	407.2	2.64	0.233	426	0.000	10.93	138	0.481	30.4
	white perch	3	25.7	298.9	3.79	0.264	431	0.343	11.35	137	0.582	32.3
	blue crab	5	Hepatopancreas		7.84	0.065	718	3.851	59.16	190	1.629	99.4
	blue crab	5	Muscle		0.60	0.077	44	0.084	1.04	24	0.399	5.4
Spring Lake												
	common carp	3	55.8	2901.5	2.34	0.042	614	0.333		65	0.558	85.3
Spruce Run Reservoir												
	northern pike	3	70.3	2270.8		0.258						
	common carp	3	58.1	3106.5	2.53	0.128	93	0.000		28	0.092	5.2
	channel catfish	3	51.0	1143.2	2.06	0.204	107	0.000		33	0.179	7.7
	hybrid striper	5	49.5	1787.0	5.40	0.295	154	0.000		60	0.291	13.7
	largemouth bass	5	38.9	983.1	0.81	0.366	47	0.000		15	0.111	3.4
Weston Mill Pond												
	American eel	3	51.7	302.8	18.65	0.118	372	0.000		224	1.610	145.9
	chain pickerel	3	44.3	482.1		0.310						
	largemouth bass	3	38.5	834.1	0.71	0.467	79	0.000		7	0.150	4.6
	brown bullhead	3	30.3	387.5	1.72	0.031	72	0.000		47	0.197	35.9
	yellow perch	3	27.0	249.3		0.273						
	black crappie	3	26.5	288.4		0.237						
	bluegill	3	18.4	143.8		0.133						

Table 4. Maximum concentrations of mercury, PCBs, PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Max. Total Hg	Max. Total PCBs	Max. Total Planar PCBs	Max. Total PBDEs	Max. Total DDXs	Max. Total BHCs + Lindane	Max Total Chlor-danes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Atlantic Ocean North												
	summer flounder	3	48.1	1152.1	1.77	0.092	48	0.000	0.36	8	0.223	1.8
Atlantic Ocean, Sea Isle City to Cape May												
	weakfish	5	35.6	509.0	7.91	0.201	132	0.000		28	0.576	5.0
Bound Brook below New Market Pond Dam												
	American eel	3	69.9	767.0	15.83	0.114	4870	0.000	21.32	347	11.092	482.9
Bound Brook at Shepard Rd.												
	American eel	3	61.3	410.7	12.20	0.202	909	0.095		117	3.322	210.9
Budd Lake												
	northern pike	3	81.0	3700.0	1.96	0.459	122	0.000		27	0.312	6.4
	largemouth bass	5	47.6	1785.6	1.90	0.536	99	0.000		20	0.196	3.4
	white catfish	3	42.1	1255.8	3.06	0.279	155	0.000		32	0.185	6.7
	brown bullhead	3	31.5	403.2		0.023						
	bluegill	3	18.8	133.3		0.156						
Carnegie Lake												
	largemouth bass	5	49.6	2181.2		0.520						
	white perch	3	21.0	116.5		0.234						
	bluegill	3	19.0	124.0		0.101						
Davidson Mill Pond												
	American eel	2	79.0	1072.1	23.78	0.201	220	0.000		182	1.005	28.3
	chain pickerel	3	48.3	628.3		0.353						
	largemouth bass	3	41.3	1221.4		0.569						
	bluegill	3	20.3	174.7		0.183						
Delaware-Raritan Canal at Griggstown												
	chain pickerel	3	57.8	1426.4		0.382						
	channel catfish	3	51.1	1391.0	8.49	0.089	346	0.000		139	0.378	31.6
	American eel	3	47.6	248.6	19.29	0.129	569	0.170		302	0.798	80.5
	smallmouth bass	3	46.7	1759.4		0.361						
	largemouth bass	5	39.1	970.4	1.37	0.444	117	0.000		35	0.144	6.5
	brown bullhead	3	33.6	565.5		0.105						
	bluegill	3	19.5	170.4		0.151						
Delaware-Raritan Canal at Lambertville												
	common carp	3	56.7	2991.7	5.04	0.195	159	0.000		49	0.554	15.3
	American eel	3	33.6	88.4	27.50	0.189	421	0.000		364	1.076	48.8
	largemouth bass	3	28.8	355.6	0.75	0.292	53	0.000		27	0.169	3.9
	bluegill	3	19.3	145.2		0.126						
Delaware-Raritan Canal at Port Mercer												
	common carp	3	60.6	3300.0	6.99	0.224	726	1.000		253	0.530	64.8
	American eel	3	49.5	224.9	22.25	0.136	530	0.000		185	0.687	96.5
	largemouth bass	3	39.8	1106.5	1.06	0.516	59	0.000		64	0.129	6.9
	chain pickerel	3	38.2	314.3		0.178						
	bluegill	3	19.9	170.4		0.132						
Delaware-Raritan Canal at South Bound Brook												
	common carp	3	69.4	5400.0	9.79	0.151	655	0.000		232	0.634	91.0
	channel catfish	3	56.5	2069.7	7.05	0.098	618	0.000		204	0.556	60.2
	largemouth bass	3	44.2	1408.3		0.425						
	yellow perch	3	31.5	345.0		0.397						
	bluegill	3	21.5	213.2		0.144						
Delaware-Raritan Canal at West Trenton												
	American eel	3	68.6	747.2	20.76	0.445	253	0.000		90	0.734	18.4
	channel catfish	3	65.6	3502.1	4.72	0.362	574	0.510		233	0.175	70.6
	walleye	3	64.0	2231.7	1.83	0.536	521	0.610		174	0.115	29.3
	common carp	3	60.5	4786.7	4.76	0.211	242	0.000		138	0.250	39.5
	smallmouth bass	3	35.5	563.9		0.527						
	largemouth bass	3	32.1	479.6		0.272						
	bluegill	3	18.1	121.1		0.131						
DeVoe Lake												
	chain pickerel	3	50.5	728.7		0.507						
	brown bullhead	3	35.7	727.4	2.51	0.161	49	0.000		32	0.452	18.2
Duhernal Lake												
	largemouth bass	3	39.2	870.9	0.89	0.280	38	0.000		25	0.231	7.7
	brown bullhead	3	34.5	597.8	0.53	0.055	67	0.000		33	0.174	12.2
	bluegill	3	22.3	248.5		0.160						

Table 4 (cont.). Maximum concentrations of mercury, PCBs, PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length	Ave. Total Weight	Ave. Total Lipids	Max. Total Hg	Max. Total PCBs	Max. Total Planar PCBs	Max. Total PBDEs	Max. Total DDXs	Max. Total BHCs + Chlordanes	Max Total Chlordanes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Farrington Lake												
	largemouth bass	5	49.0	1831.9	1.06	1.413	101	0.000		32	0.196	10.0
	chain pickerel	3	48.8	1002.6		0.481						
	brown bullhead	3	36.5	626.1	1.06	0.040	77	0.000		39	0.281	36.4
	yellow perch	3	25.7	157.9		0.411						
	bluegill	3	18.7	134.2		0.151						
Green Brook at Madison Ave. Bridge												
	American eel	3	57.2	425.5	13.44	0.206	487	0.000		169	1.348	166.2
Lamington River at Lamington												
	American eel	3	63.2	474.2	18.08	0.394	83	0.000		42	0.516	26.7
	brown trout	2	26.1	186.0		0.089						
	smallmouth bass	3	22.0	145.7		0.185						
	redbreast sunfish	3	16.6	88.2		0.167						
Manahawkin Bay												
	weakfish	4	34.1	358.4	6.93	0.144	117	0.000	3.29	34	0.684	14.5
Manalapan Lake												
	American eel	3	59.7	422.5	16.30	0.176	330	0.300		303	1.365	29.0
	largemouth bass	3	40.8	1293.2	1.14	0.409	28	0.000		36	0.125	2.6
	black crappie	3	22.8	182.5		0.144						
	bluegill	3	18.6	157.9		0.071						
Millstone River at Manville												
	common carp	3	63.5	4000.0	10.23	0.279	907	1.360	63.59	299	1.495	104.0
	largemouth bass	3	36.2	801.9	1.72	0.645	126	0.000		60	0.285	20.2
	bluegill	3	18.0	134.2		0.146						
N Branch Raritan River at Branchburg												
	American eel	3	65.5	672.2	13.22	0.152	109	0.000		48	0.478	26.6
	smallmouth bass	3	27.6	285.5		0.204						
	yellow bullhead	3	20.4	120.2	3.50	0.149	134	0.000		23	0.561	24.0
	redbreast sunfish	3	17.1	108.4		0.135						
New Market Pond												
	common carp	3	53.0	2748.0	4.47	0.054	3057	1.850	19.28	172	3.644	179.9
	American eel	3	48.5	227.7	23.40	0.107	4117	0.940		369	17.278	507.6
	largemouth bass	3	41.4	1084.7	0.92	0.263	649	0.590		28	0.439	34.5
	brown bullhead	3	34.5	537.0	1.70	0.024	877	1.000		41	1.213	45.2
	black crappie	3	24.1	209.2	0.62	0.090	380	0.510		19	0.423	22.8
	bluegill	3	17.3	88.9	0.80	0.089	912	0.600		29	0.304	34.6
Rahway River at Milton Lake												
	common carp	3	66.6	5550.0	14.99	0.145	936	0.980	37.54	355	3.721	497.0
	largemouth bass	3	49.5	2005.4	1.10	0.719	71	0.000		38	0.381	43.8
	brown bullhead	3	35.9	650.3	1.34	0.047	72	0.000		34	0.280	52.5
	bluegill	3	17.8	116.6	0.75	0.162	72	0.000		21	0.198	38.0
Rahway River at Valley Road Pond												
	common carp	3	63.4	4071.7	4.70	0.113	614	0.730	19.51	291	1.687	231.3
	largemouth bass	3	37.0	899.9	1.24	0.359	159	0.000		55	0.255	47.2
	brown bullhead	3	32.5	481.8	3.29	0.121	263	0.000		164	0.788	140.7
Raritan Bay at Keansburg												
	summer flounder	3	46.6	1240.1	1.75	0.113	54	0.000	0.69	18	0.217	3.3
	blue crab	3	Hepatopancreas		11.09	0.076	1062	3.095	43.90	346	2.345	168.5
	blue crab	3	Muscle		1.10	0.102	52	0.000	0.93	30	0.315	5.3
Raritan Bay: Lower Bay												
	summer flounder	3	46.7	1047.4	1.65	0.119	64	0.000	0.62	12	0.289	2.8

Table 4 (cont.). Maximum concentrations of mercury, PCBs ,PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Max. Total Hg	Max. Total PCBs	Max, Total Planar PCBs	Max. Total PBDEs	Max Total DDXs	Max Total BHCs + Lindane	Max Total Chlordanes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Raritan River at Millstone River												
	American eel	3	71.0	908.7	16.81	0.292	497	0.240		121	0.536	50.3
	common carp	3	65.9	3787.9	11.25	0.150	528	0.950		258	0.941	84.2
	channel catfish	3	63.7	2421.9	2.91	0.359	484	0.000		145	0.353	53.4
	largemouth bass	3	43.0	1394.3	0.99	0.690	72	0.000		19	0.094	5.7
	white catfish	3	40.1	859.0		0.239						
	smallmouth bass	3	37.3	715.6		0.334						
	redbreast sunfish	3	19.3	145.6		0.163						
Raritan River at Route 1 Bridge												
	white catfish	3	47.4	1514.4	2.66	0.490	711	0.740	32.60	236	0.443	72.7
	white perch	3	31.0	444.4	3.72	0.596	273	1.010	19.24	63	0.409	41.9
Rosedale Lake in Pennington												
	common carp	3	66.8	4000.0	6.66	0.117	110	0.000		34	0.215	5.1
	largemouth bass	3	47.7	1577.4		0.330						
	black crappie	3	30.8	429.2		0.123						
	bluegill	3	20.2	155.5		0.108						
Round Valley Reservoir												
	lake trout	5	66.5	3700.0	7.13	0.206	209	0.310		71	0.373	17.0
	channel catfish	3	61.8	2678.9	5.61	0.460	238	0.000		69	0.371	15.7
	largemouth bass	3	45.1	1465.7	1.18	0.385	33	0.000		10	0.170	2.5
	white catfish	2	40.0	896.8		0.099						
	bluegill	3	22.0	246.7		0.120						

Table 4 (cont.). Maximum concentrations of mercury, PCBs, PBDEs, and selected OCPs in samples from the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Max. Total Hg	Max. Total PCBs	Max. Total Planar PCBs	Max. Total PBDEs	Max. Total DDXs	Max. Total BHCs + Lindane	Max Total Chlordanes
			cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
South Branch Raritan River at Long Valley/Clairmont												
	brown trout	5	30.8	348.0		0.133						
South Branch Raritan River at Flemington												
	American eel	3	68.0	807.8	19.45	0.164	460	0.000		283	0.509	68.8
	smallmouth bass	3	32.1	409.0	0.74	0.241	32	0.000		15	0.291	2.3
	brown trout	3	27.2	196.1		0.084						
	yellow bullhead	3	23.7	202.0	2.32	0.207	83	0.000		31	0.195	5.7
	redbreast sunfish	3	18.2	141.6		0.101						
South Branch Raritan River at High Bridge												
	American eel	3	53.1	339.8	20.66	0.145	456	0.000		58	0.519	122.2
	redbreast sunfish	3	16.7	88.2		0.250						
South Branch Raritan River at Neshanic Station												
	American eel	3	72.5	747.6	19.09	0.291	303	0.000		146	0.311	46.3
	smallmouth bass	3	49.9	1782.8		0.395						
	common carp	3	46.1	1339.7	2.58	0.057	63	0.000		18	0.152	7.4
	largemouth bass	3	26.9	274.0	1.11	0.190	36	0.000		10	0.215	2.1
	rock bass	3	21.1	197.0		0.245						
	redbreast sunfish	3	17.9	120.9		0.121						
Sandy Hook Bay												
	summer flounder	3	53.3	1632.2	1.80	0.118	66	0.000	0.86	17	0.233	2.7
South River at Sayreville												
	white catfish	3	37.7	721.2	3.05	0.380	487	0.000	19.68	205	0.603	33.3
	white perch	3	30.5	477.7	4.29	0.432	455	1.030	13.86	176	0.721	35.3
	blue crab	5	Hepatopancreas		10.39	0.069	1135	5.190	105.59	310	2.225	193.4
	blue crab	5	Muscle		0.80	0.105	66	0.200	2.35	35	0.615	7.8
Spring Lake												
	common carp	3	64.6	4200.0	4.09	0.080	1315	1.000		96	0.837	127.2
Spruce Run Reservoir												
	northern pike	3	76.8	3042.1		0.314						
	common carp	3	58.3	4298.9	4.57	0.134	144	0.000		44	0.105	7.8
	channel catfish	3	56.3	1538.0	2.19	0.325	140	0.000		42	0.192	10.2
	hybrid striper	5	54.3	2878.1	6.87	0.517	270	0.000		108	0.428	21.2
	largemouth bass	5	47.3	1672.2	1.45	0.605	78	0.000		27	0.120	5.5
Weston Mill Pond												
	American eel	3	55.1	366.3	20.85	0.137	417	0.000		228	1.828	159.5
	chain pickerel	3	48.0	566.2		0.480						
	largemouth bass	3	39.5	912.2	0.80	0.521	179	0.000		10	0.186	4.8
	brown bullhead	3	35.7	597.5	3.28	0.053	122	0.000		99	0.329	74.6
	yellow perch	3	29.3	272.2		0.399						
	black crappie	3	26.9	311.1		0.283						
	bluegill	3	18.9	149.1		0.220						

Table 5. Correlations among toxic contaminants in the 2006 NJ Routine Monitoring program for Raritan Region. The entries above the diagonal are pairwise, i.e., include all values where values are found for each pair of contaminants. The entries below the diagonal are casewise, i.e., taken over the samples in which analyses were done on all contaminants. Entries in bold are significant at $p < 0.05$ (uncorrected for multiple comparison).

Contaminant	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDX's	Total BHCs + Lindane	Total Chlordanes
Total Hg	1.00	**-0.18**	**-0.15**	**0.17**	**-0.16**	**-0.17**	**-0.21**
Total PCBs	-0.12	1.00	**0.30**	**0.30**	**0.60**	**0.86**	**0.79**
Total Planar PCBs	-0.15	0.21	1.00	**0.67**	**0.37**	**0.17**	**0.26**
Total PBDEs	0.17	**0.30**	**0.67**	1.00	**0.74**	**0.26**	**0.44**
Total DDX's	0.05	**0.58**	**0.45**	**0.74**	1.00	**0.53**	**0.70**
Total BHCs + Lindane	-0.16	**0.88**	**0.12**	0.26	**0.61**	1.00	**0.81**
Total Chlordanes	-0.12	**0.69**	**0.20**	**0.44**	**0.77**	**0.80**	1.00

Table 6. Average concentrations (pg/g wet weight) of total furans and dioxins in samples from the 2006 Routine monitoring of contaminants in NJ fish program. For calculation of averages, ND is treated as 0. Two samples which were not reliably quantitated are not included in the averages.

Station Name	Tissue	n	Average % Lipid	Average total furans	Average total dioxins
Blue crab (*Callinectes sapidus)*					
Raritan Bay @ Keansburg	hepato	2	24.8	20.78	11.82
South River @ Sayreville	hepato	3	25.8	41.64	38.64
South River @ Sayreville	muscle	3	2.1	0.72	1.45
Common carp (*Cyprinus carpio*)					
New Market Pond	muscle	3	9.6	9.12	2.06
Rahway River @ Valley Rd. Pond	muscle	3	8.0	2.78	7.29
Raritan River @ Millstone River	muscle	3	28.1	8.08	26.48
Summer flounder (*Paralichthys dentatus*)					
Atlantic Ocean North	muscle	2	2.9	0.11	0.09
Lower Bay	muscle	3	1.2	ND	ND
Raritan Bay @ Keansburg	muscle	3	2.5	ND	0.06
Sandy Hook Bay	muscle	3	2.0	ND	1.38
White perch (*Morone americana*)					
Raritan River @ Rt 1 Bridge	muscle	3	7.9	4.23	2.35
South River @ Sayreville	muscle	3	11.0	5.15	2.71

Table 7. Data on size and tissue weights of blue crabs analyzed as composite samples in the 2006 NJ Routine Monitoring program for the Raritan Region

Station	Analytical Number	Carapace width (lab)	Total Weight (lab)	Tissue (Muscle) Weight	Hepato-pancreas Weight	Sex
		cm	g	g	g	
Raritan Bay at Kearsburg						
	F-3598a	11.6	97.01	13.82	4.19	M
	F-3598b	14.1	138.20	9.73	10.33	M
	F-3598c	11.3	87.41	9.83	2.66	M
	F-3598d	13.9	128.69	10.51	9.77	M
	F-3598e	12.5	104.41	10.48	6.77	M
	F-3598f	10.5	86.14	11.37	6.73	M
	F-3599a	12.7	108.08	12.60	3.76	M
	F-3599b	13.7	146.90	17.39	10.64	M
	F-3599c	10.8	96.96	12.15	4.11	M
	F-3599d	12.1	105.55	12.10	7.63	M
	F-3599e	13.0	102.65	10.81	8.06	M
	F-3599f	13.1	97.29	11.71	8.67	M
	F-3600a	10.0	55.40	7.94	2.93	M
	F-3600b	10.2	81.53	18.16	6.14	M
	F-3600c	12.0	89.33	11.15	8.81	F
	F-3600d	14.1	106.53	14.86	2.34	F
	F-3600e	12.9	87.89	9.90	4.73	F
South River at Sayreville						
	F-1785e	15.0	156.09	30.43	4.69	M
	F-1785c	13.5	72.48	8.46	12.77	M
	F-1785b	14.5	188.38	37.01	12.10	M
	F-1785d	13.1	103.28	17.67	7.01	M
	F-1785f	13.5	136.70	25.27	5.97	M
	F-1785a	12.4	116.36	23.29	5.06	M
	F-1786e	14.7	138.70	21.37	7.55	F
	F-1786d	13.8	99.75	17.88	4.85	F
	F-1786a	14.0	88.08	14.46	3.70	F
	F-1786f	13.3	90.48	9.04	5.00	F
	F-1786c	14.2	111.46	16.76	6.23	F
	F-1786b	16.1	112.33	18.60	5.38	F
	F-1802d	13.0	127.14	24.85	3.58	M
	F-1802a	13.1	88.07	21.21	10.47	M
	F-1802c	14.3	162.76	33.96	6.77	M
	F-1802b	12.8	67.56	10.09	4.55	M
	F-1802e	12.3	117.71	24.04	5.54	M
	F-1802f	12.5	115.63	20.02	9.09	M
	F-1803d	12.7	113.81	22.84	6.45	M
	F-1803c	13.5	128.21	26.52	10.97	M
	F-1803b	14.5	149.16	34.98	8.01	M
	F-1803a	14.0	138.76	26.06	8.42	M
	F-1803e	14.5	129.30	13.02	4.54	M
	F-1803f	12.6	107.61	13.62	6.13	M
	F-1804a	11.5	72.84	14.30	3.47	F
	F-1804d	12.5	75.83	13.72	5.12	F
	F-1804e	12.8	96.44	13.08	6.75	F
	F-1804b	13.0	69.89	11.58	2.72	F
	F-1804c	12.7	76.09	10.33	2.48	F
	F-1804f	13.3	89.22	12.79	4.57	F

Table 8. Length and weight of summer flounder specimens analyzed as parts of composite samples in the 2006 NJ Routine Monitoring program for the Raritan Region.

Station	Analytical Number	Total length (lab)	Total weight (lab)	Sex
		cm	g	
Atlantic Ocean, Sandy Hook				
	F-3612a	46.4	962.4	F
	F-3612b	46.2	1041.4	F
	F-3612c	42.9	927.7	M
	F-3612d	42.7	904.3	F
	F-3612e	43.5	839.9	F
Sandy Hook Bay at Atlantic Highlands				
	F-3606a	48.7	1308.0	F
	F-3606b	41.3	709.9	F
	F-3606c	43.0	865.5	M
	F-3606d	44.2	956.5	F
	F-3606e	42.9	1002.9	F

Table 9. Average and maximum concentrations of mercury, PCBs and selected OCPs in selected samples from the 2004 NJ Routine Monitoring program.

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Ave. Total Hg	Max Total Hg	Ave. Total PCBs	Max. Total PCBs	Ave. Total Planar PCBs	Max. Total Planar PCBs
			cm	g	%	ug/g wet	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Barnegat Bay near Toms River											
	blue crab	5 comp. of 5	Hepatopancreas		24.0	0.09	0.11	330	402	3.86	6.03
	blue crab	5 comp. of 5	Muscle		0.9	0.19	0.26	19	34	0.04	0.07
Upper Tidal Passaic River at Kearny											
	white perch	12	18.9	119.2	8.2	0.21	0.93	1710	3086	3.62	7.43

Station	Common Name	Number of Samples	Ave. Total Length (lab)	Ave. Total Weight (lab)	Ave. Total Lipids	Ave. Total DDXs	Max Total DDXs	Ave. Total BHCs + Lindane	Max. Total BHCs + Lindane	Ave. Total Chlor-danes	Max Total Chlor-danes
			cm	g	%	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Barnegat Bay near Toms River											
	blue crab	5 comp. of 5	Hepatopancreas		24.0	56	70	1.67	1.97	91.7	109.0
	blue crab	5 comp. of 5	Muscle		0.9	3	5	0.20	0.26	2.2	2.9
Upper Tidal Passaic River at Kearny											
	white perch	12	18.9	119.2	8.2	2.56	498	1.18	2.42	142.2	208.4

Table 10. Size and tissue weights of blue crabs from Barnegat Bay near Toms River which were analyzed as composite samples in the NJ 2004 Routine Monitoring program

Analytical Number	Carapace width (lab)	Total Weight (lab)	Tissue (Muscle) Weight	Hepato-pancreas Weight	Sex
	cm	g	g	g	
F-1635a	13.1	137.87	25.04	7.39	M
F-1635b	13.6	163.85	37.44	3.83	M
F-1635c	13.4	141.41	26.78	5.39	M
F-1635d	14.0	139.72	26.61	6.12	M
F-1635e	13.1	128.12	19.62	4.51	M
F-1636a	13.3	131.36	23.72	4.67	M
F-1636b	13.2	154.69	28.79	6.23	M
F-1636c	13.3	117.73	17.62	3.60	M
F-1636d	13.2	110.69	20.70	3.86	M
F-1636e	12.0	103.68	19.07	6.98	M
F-1637a	11.7	94.65	23.54	5.52	M
F-1637b	12.8	81.02	12.94	2.71	M
F-1637c	12.1	95.22	18.36	7.42	M
F-1637d	11.5	82.69	17.96	6.65	M
F-1637e	12.1	85.65	17.73	3.87	M
F-1638a	12.0	83.48	16.65	3.77	M
F-1638b	13.2	128.67	28.96	9.30	M
F-1638c	12.5	112.94	27.06	3.67	M
F-1638d	12.2	116.43	20.09	3.49	M
F-1638e	12.7	112.43	21.90	2.45	M
F-1639a	12.6	98.59	18.14	6.27	M
F-1639b	12.0	94.38	21.11	6.63	M
F-1639c	12.3	110.58	21.49	9.75	M
F-1639d	12.9	128.78	23.98	4.17	M
F-1639e	13.7	113.16	17.55	7.91	M

Figures

Figure 1. Relationship between total PCB estimates based on uncensored concentrations of congeners (x-axis) and censored concentrations (i.e., excluding congeners with concentrations below detection limit). The line shows the curve where the two estimates are equal.

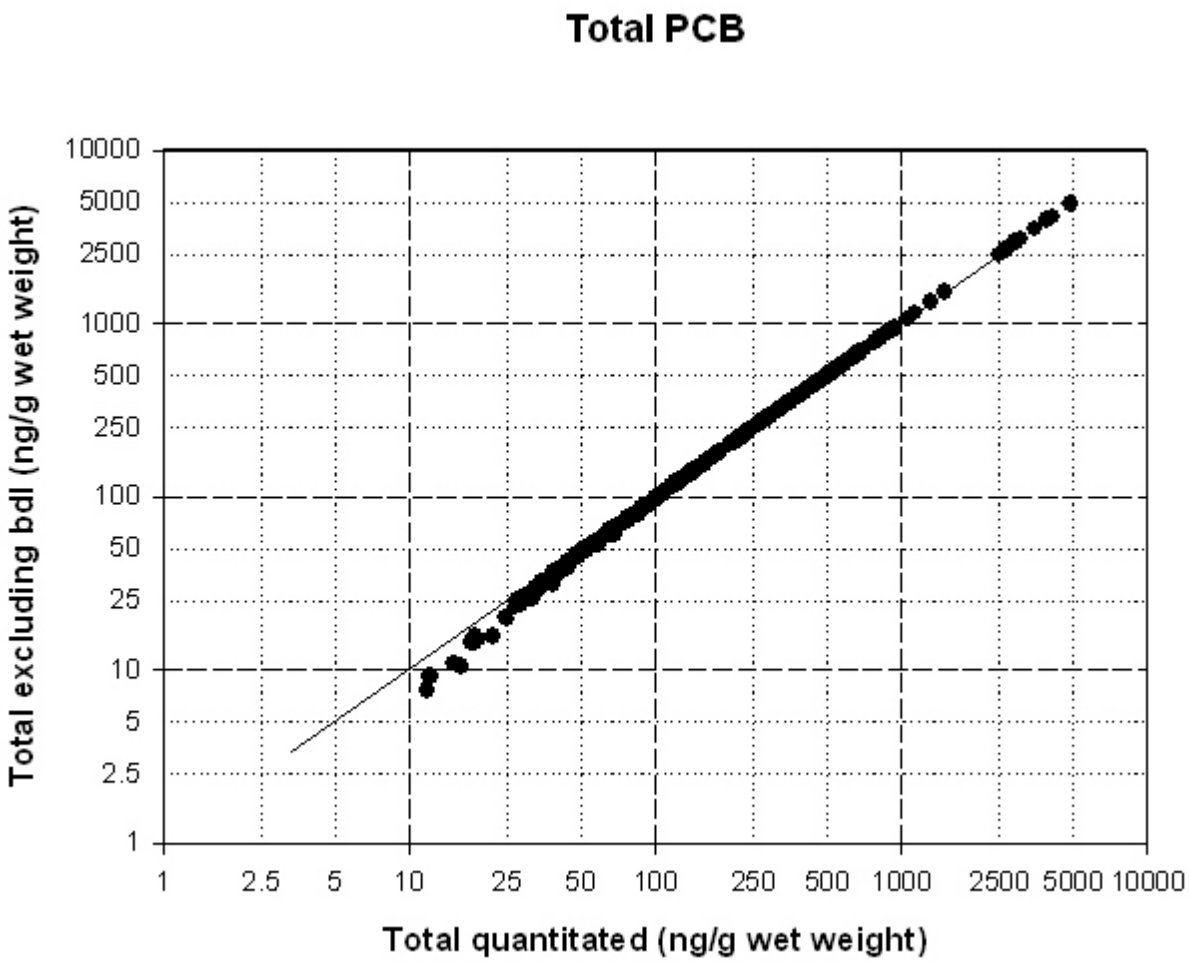


Figure 2. Relationship between total DDX estimates based on uncensored concentrations of congeners (x-axis) and censored concentrations (i.e., excluding congeners with concentrations below detection limit). The line shows the curve where the two estimates are equal.

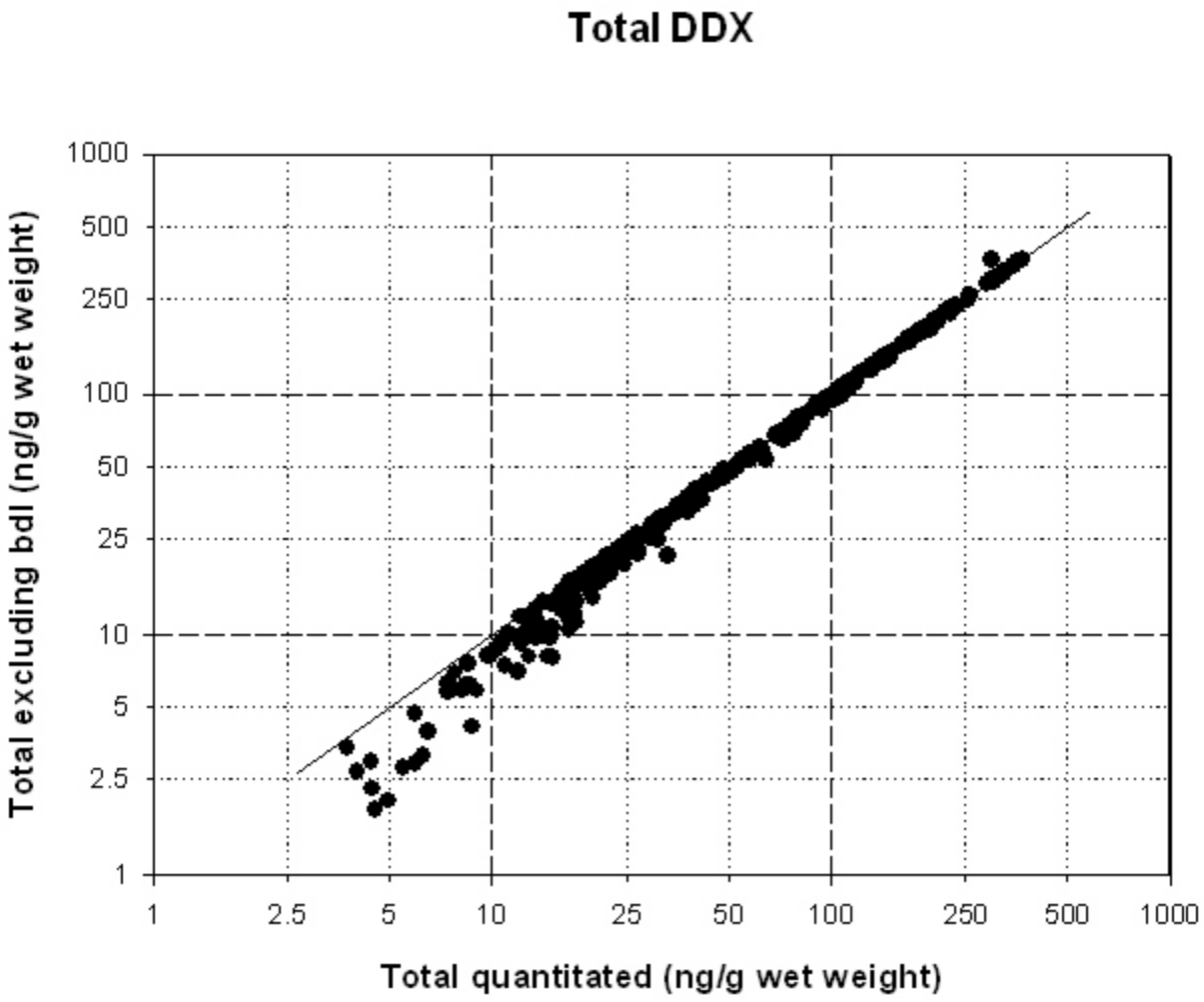


Figure 3. Relationship between total total chlordane estimates based on uncensored concentrations of congeners (x-axis) and censored concentrations (i.e., excluding congeners with concentrations below detection limit). The line shows the curve where the two estimates are equal.

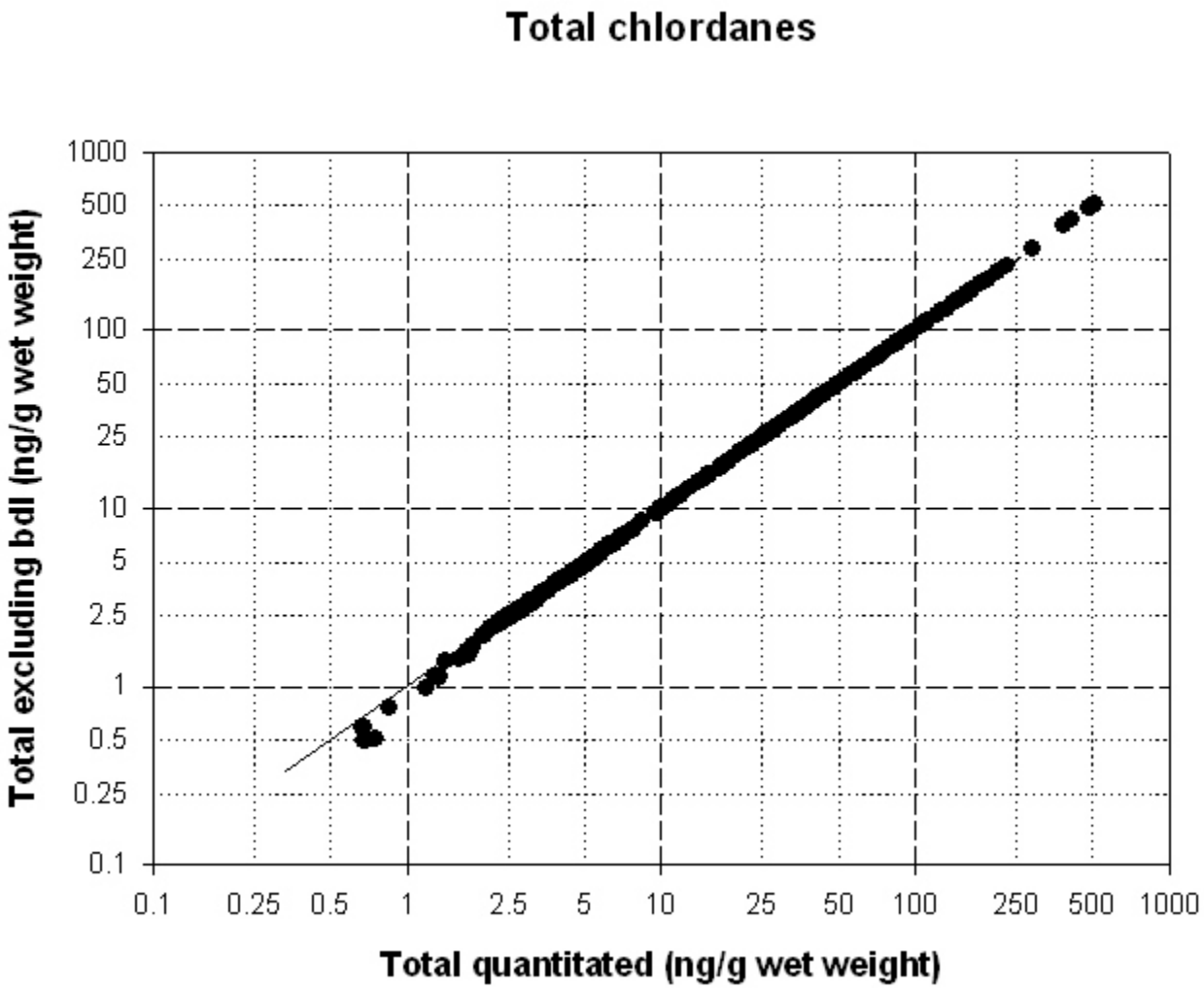


Figure 4. Relationship between total PBDE estimates based on uncensored concentrations of congeners (x-axis) and censored concentrations (i.e., excluding congeners with concentrations below detection limit). The line shows the curve where the two estimates are equal.

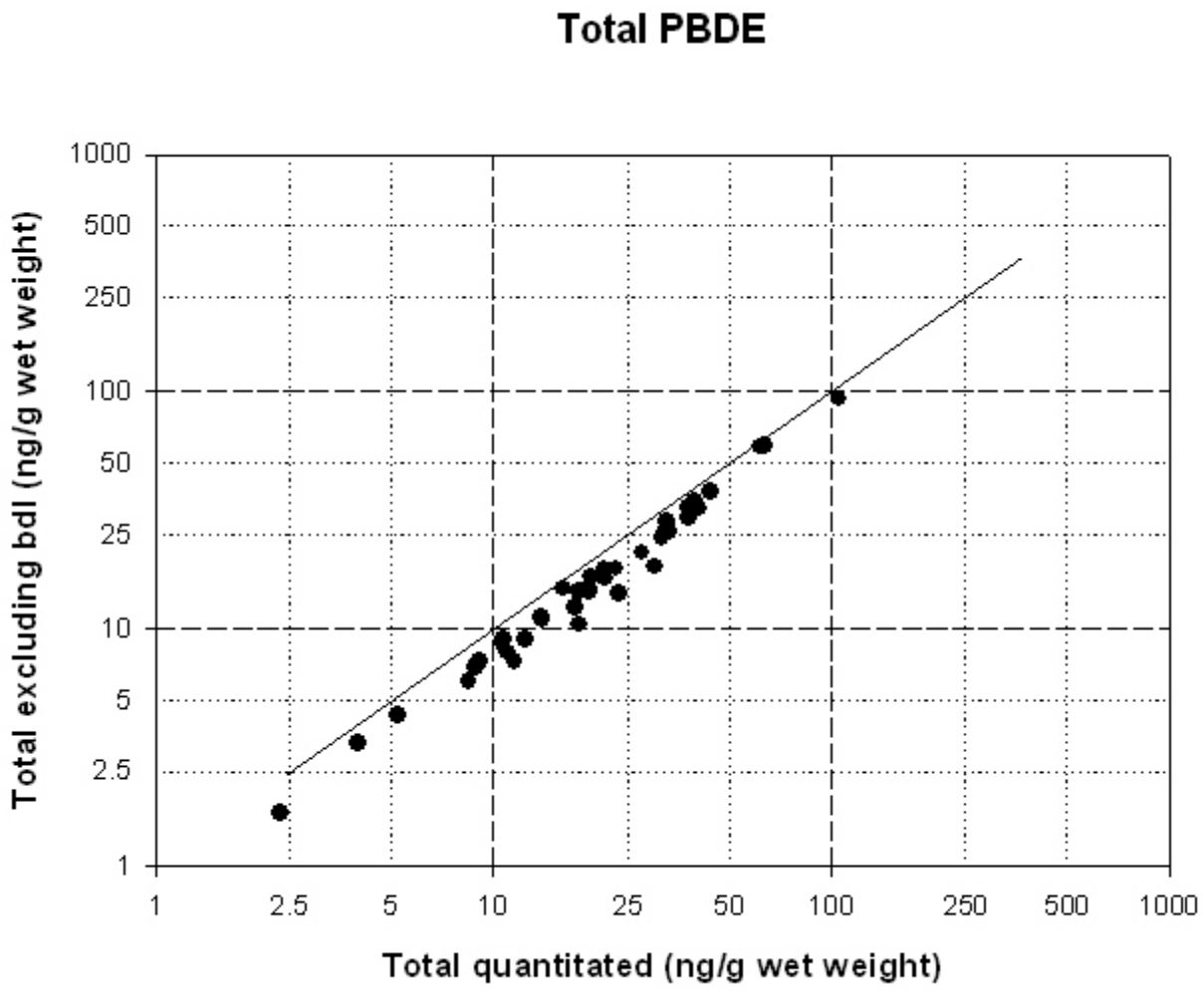
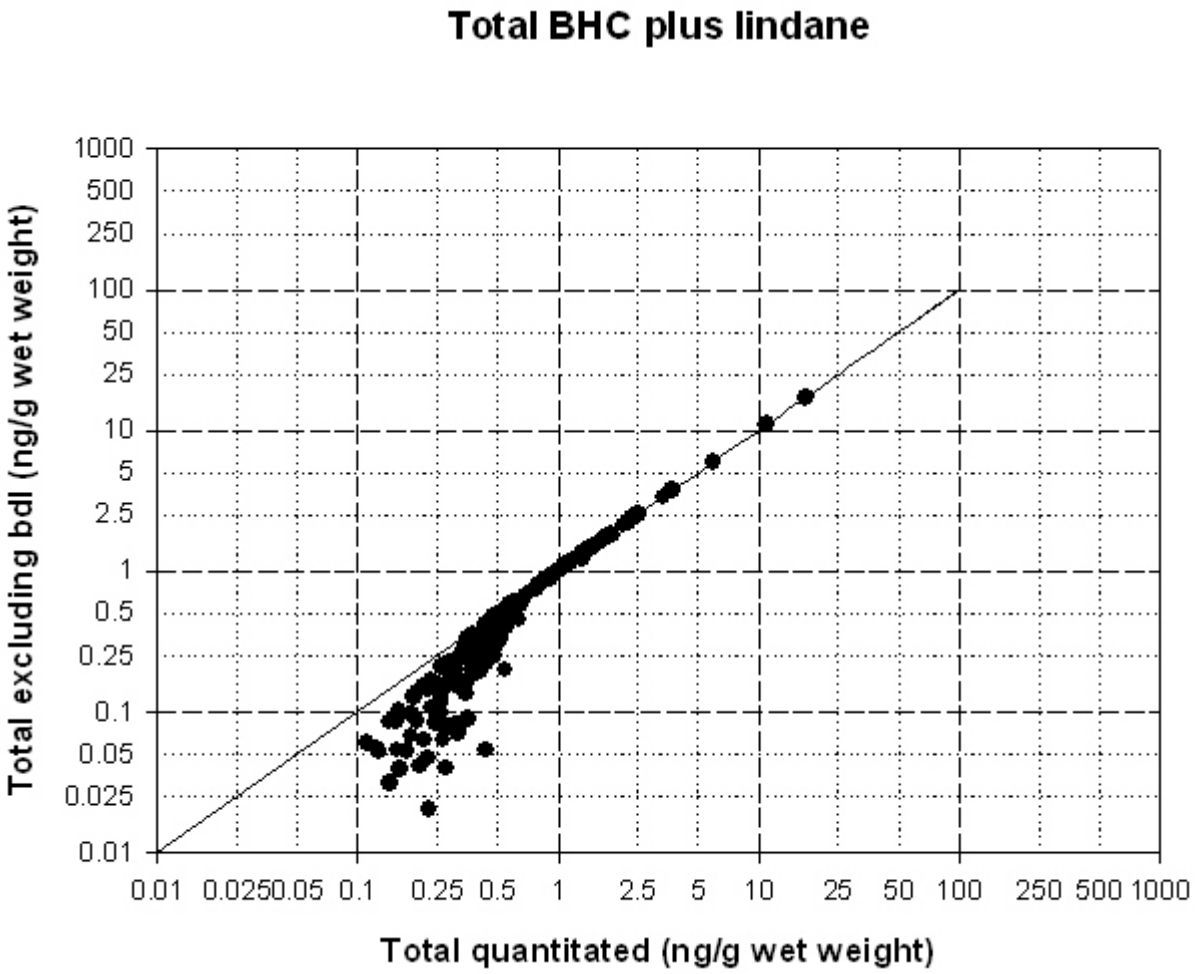


Figure 5. Relationship between total BHCs and lindane estimates based on uncensored concentrations of congeners (x-axis) and censored concentrations (i.e., excluding congeners with concentrations below detection limit). The line shows the curve where the two estimates are equal.



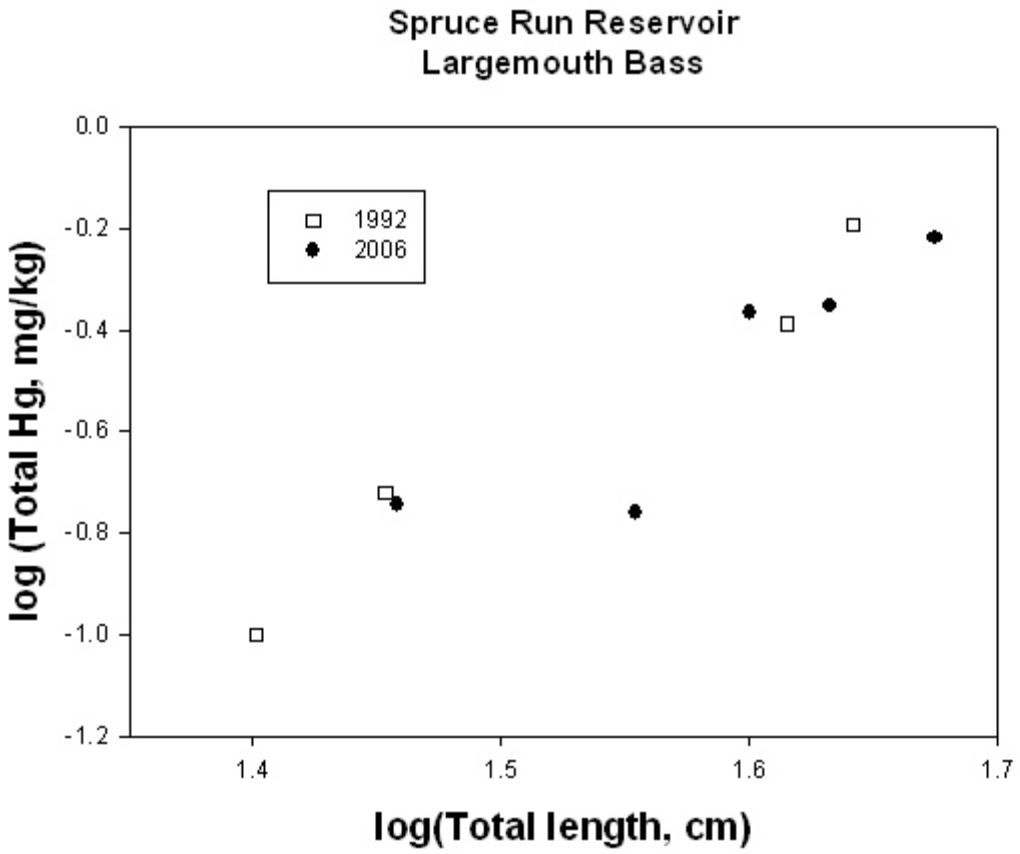


Figure 6. Comparison between mercury concentrations in largemouth bass from Spruce Run Reservoir in 1992 and 2006.

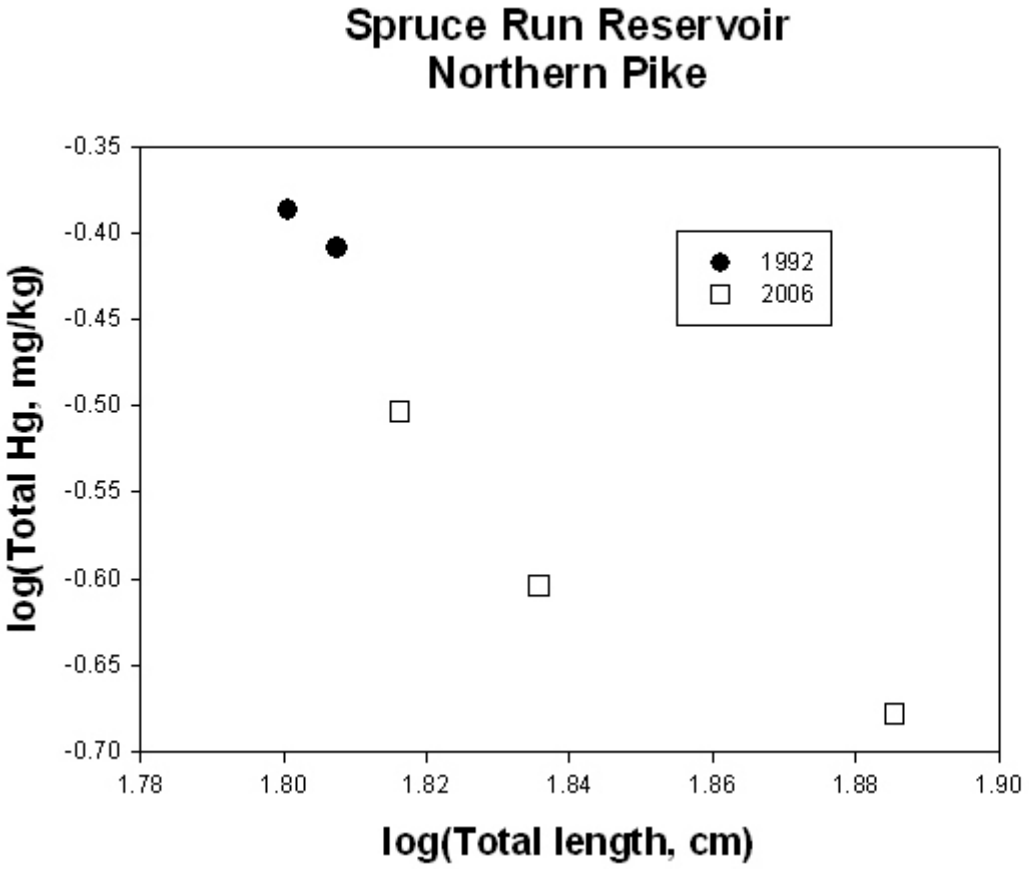


Figure 7. Comparison of mercury concentrations in northern pike from Spruce Run Reservoir in 1992 and 2006.

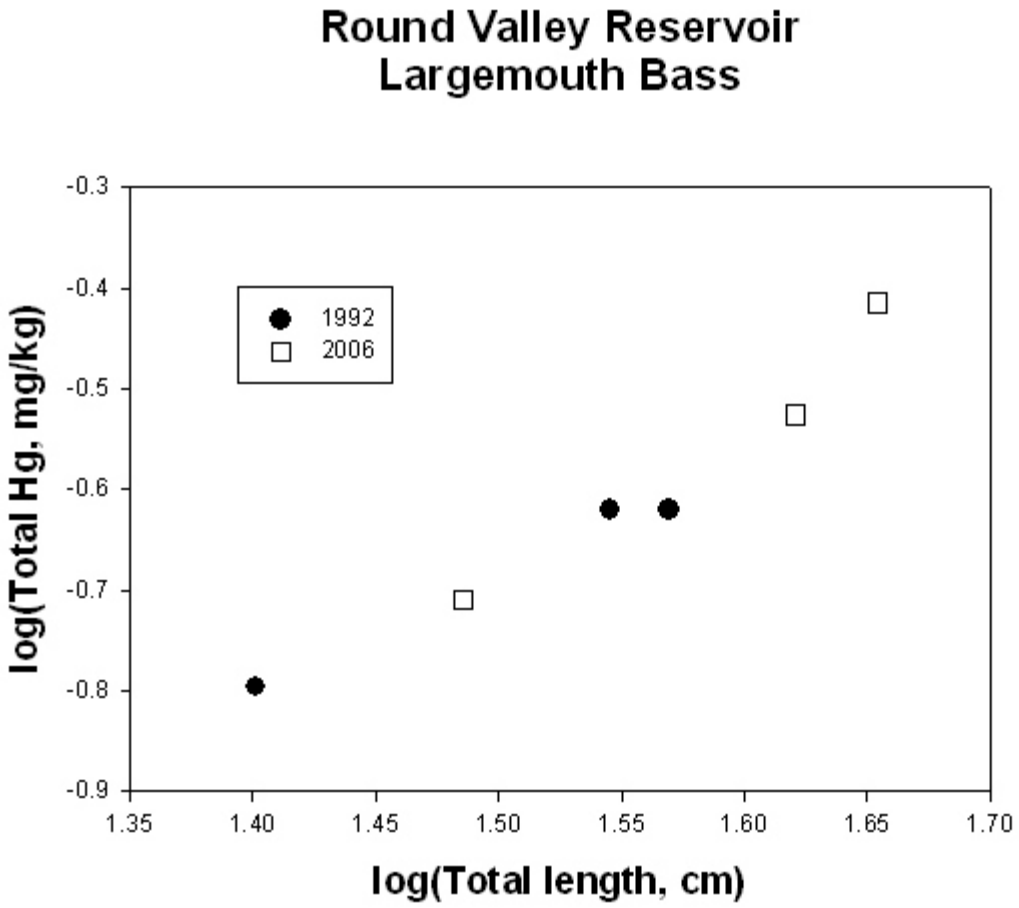


Figure 8. Comparison between mercury concentrations in largemouth bass from Round Valley Reservoir in 1992 and 2006.

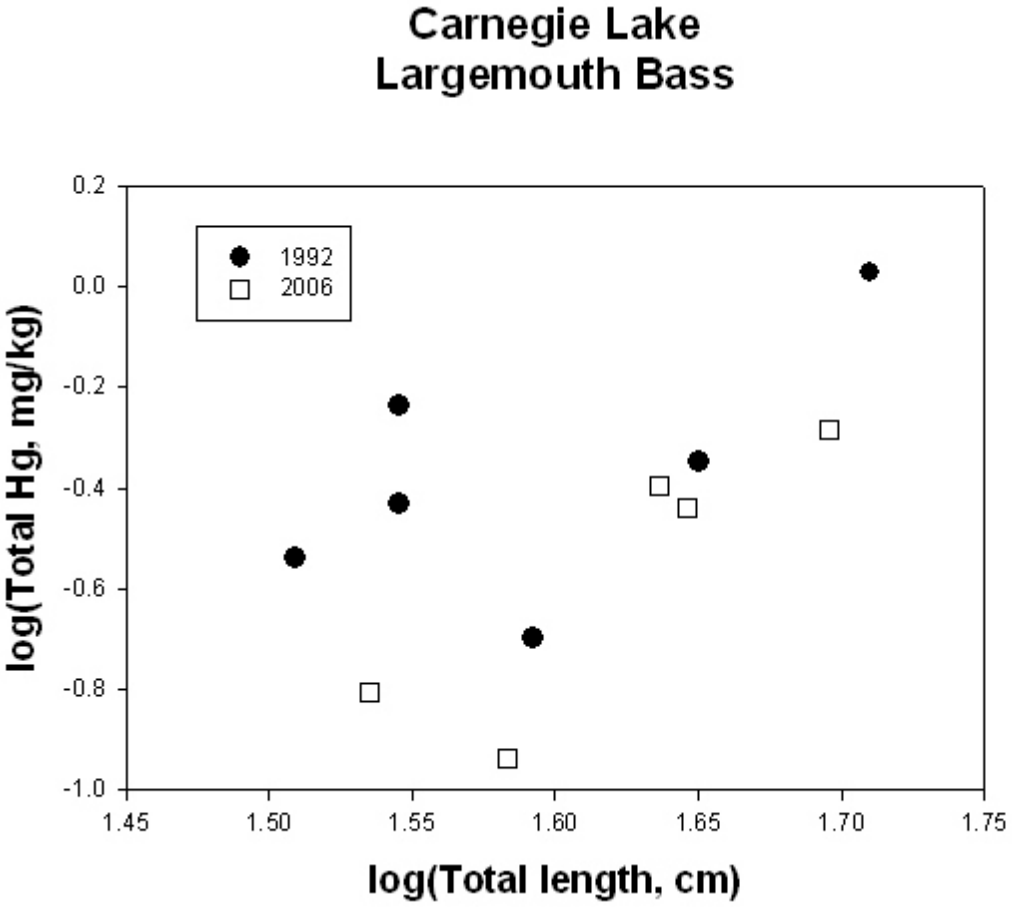


Figure 9. Comparison between mercury concentrations in largemouth bass from Carnegie Lake in 1992 and 2006.

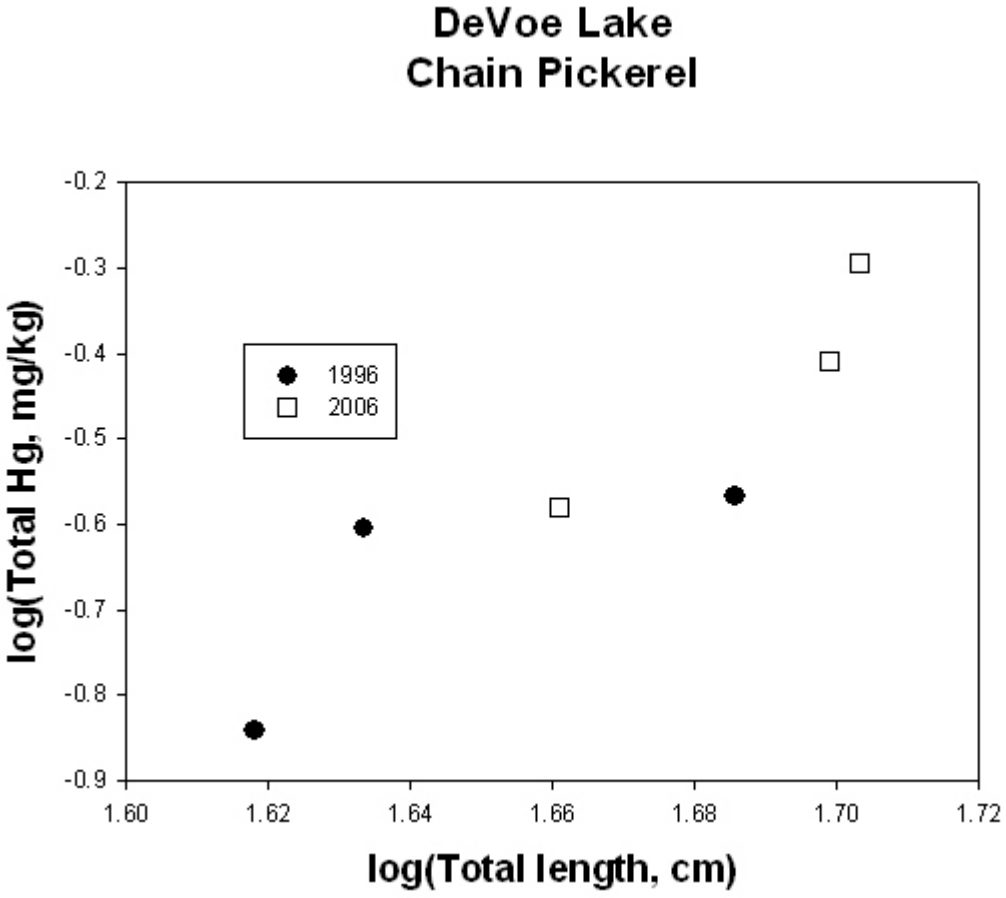


Figure 10. Comparison between mercury concentrations in chain pickerel from DeVoe Lake in 1996 and 2006.

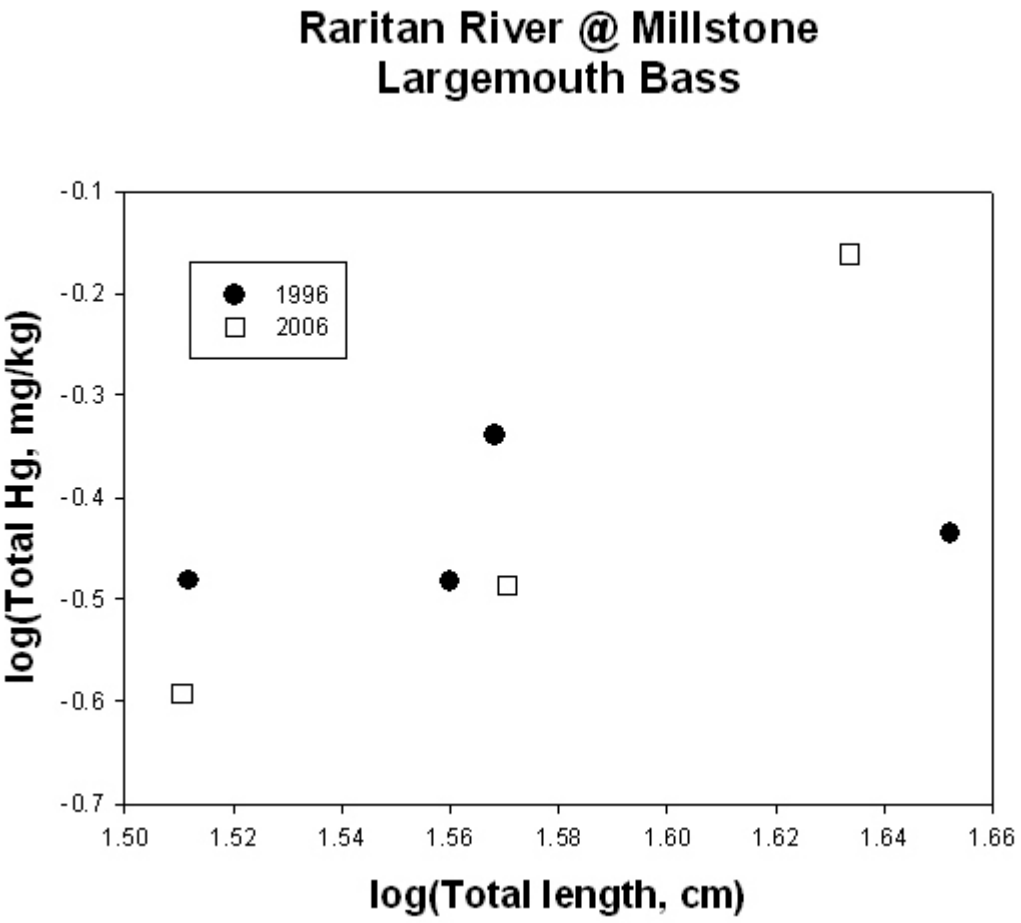


Figure 11. Comparison between mercury concentrations in largemouth bass from the Raritan River at the Millstone River in 1996 and 2006.

Appendix I.

Data for Individual Samples for PCBs, DDX, BHCs and Lindane, PBDEs and Chlordanes

Appendix 1. Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analytical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlordanes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
Atlantic Ocean North														
	summerflounder	F-3610	Filet	48.1	1152	1.10	0.092	18	ND	*0.08*	4	0.2	0.6	Ind.
	summerflounder	F-3611	Filet	46.3	990	1.77	0.079	48	ND	*0.36*	8	*0.1*	1.8	Ind.
	summerflounder	F-3612a-e	Filet			1.12	0.091	37	ND	*0.31*	7	*0.2*	1.3	Comp. of 5
Atlantic Ocean Sea Isle City- Cape May														
	weakfish	F-3577	Filet	35.6	509	7.91	0.087	130	ND		24	0.6	5.0	Ind.
	weakfish	F-3574	Filet	35.6	482	4.77	0.156	68	ND		17	0.4	2.7	Ind.
	weakfish	F-3573	Filet	33.4	378	4.16	0.155	49	ND		15	0.3	2.0	Ind.
	weakfish	F-3575	Filet	31.6	310	6.70	0.201	114	ND		26	0.5	4.2	Ind.
	weakfish	F-3576	Filet	30.6	321	7.88	0.175	132	ND		28	0.5	4.8	Ind.
Bound Brook below New Market Pond Dam														
	American eel	F-1790	Filet	69.9	767	15.83	0.114	3499	ND	16.18	324	10.9	414.4	Ind.
	American eel	F-1791	Filet	68.2	573	14.49	0.087	4870	ND	21.32	347	11.1	482.9	Ind.
	American eel	F-1792	Filet	59.5	495	7.77	0.091	2646	ND	11.52	224	5.9	288.3	Ind.
Bound Brook @ Shepard Rd.														
	American eel	F-1788	Filet	61.3	411	2.60	0.202	386	ND		46	0.9	79.1	Ind.
	American eel	F-1787	Filet	54.3	291	12.20	0.089	909	ND		117	3.3	210.9	Ind.
	American eel	F-1789	Filet	51.3	292	7.64	0.086	593	0.095		99	2.3	138.0	Ind.
Budd Lake														
	white catfish	F-3580	Filet	42.1	1256	3.06	0.279	155	ND		32	*0.2*	6.7	Ind.
	white catfish	F-3579	Filet	35.6	561	1.48	0.218	98	ND		17	*0.2*	3.6	Ind.
	white catfish	F-3578	Filet	34.3	524	2.94	0.181	107	ND		20	*0.1*	4.5	Ind.
	brown bullhead	F-3436	Filet	31.5	403		0.010							Ind.
	brown bullhead	F-3435	Filet	27.2	242		0.019							Ind.
	brown bullhead	F-3434	Filet	25.6	226		0.023							Ind.
	northern pike	F-3487	Filet	81.0	3700	1.73	0.199	66	ND		18	0.2	3.9	Ind.
	northern pike	F-3488	Filet	78.4	3256	1.96	0.459	122	ND		27	*0.2*	6.4	Ind.
	northern pike	F-3486	Filet	74.1	2414	1.38	0.307	100	ND		25	0.3	4.9	Ind.
	bluegill	F-3431	Filet	18.8	133		0.127							Ind.
	bluegill	F-3433	Filet	18.2	130		0.156							Ind.
	bluegill	F-3432	Filet	17.8	132		0.099							Ind.
	largemouth bass	F-3473	Filet	47.6	1786	1.90	0.418	89	ND		20	*0.2*	3.4	Ind.
	largemouth bass	F-3472	Filet	43.1	1367	0.77	0.486	24	ND		4	*0.1*	0.7	Ind.
	largemouth bass	F-3471	Filet	36.9	847	1.73	0.536	99	ND		19	*0.1*	3.2	Ind.
	largemouth bass	F-3469	Filet	36.4	631		0.431							Ind.
	largemouth bass	F-3470	Filet	35.7	756		0.170							Ind.
Carnegie Lake														
	bluegill	F-2018	Filet	19.0	124		0.101							Ind.
	bluegill	F-2020	Filet	17.9	121		0.057							Ind.
	bluegill	F-2019	Filet	16.7	86		0.063							Ind.
	largemouth bass	F-2025	Filet	49.6	2181		0.520							Ind.
	largemouth bass	F-2024	Filet	44.3	1438		0.365							Ind.
	largemouth bass	F-2023	Filet	43.3	1166		0.402							Ind.
	largemouth bass	F-2022	Filet	38.3	851		0.116							Ind.
	largemouth bass	F-2021	Filet	34.3	561		0.156							Ind.
	white perch	F-2030	Filet	21.0	117		0.162							Ind.
	white perch	F-2031	Filet	20.8	105		0.142							Ind.
	white perch	F-2029	Filet	20.8	107		0.234							Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analytical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlordanes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
Davidson Mill Pond														
	American eel	F-3363	Fillet	79.0	873	23.78	0.200	220	ND		182	0.9	27.3	Ind.
	American eel	F-3362	Fillet	75.2	1072	22.51	0.201	212	ND		171	1.0	28.3	Ind.
	chain pickerel	F-3355	Fillet	48.3	623		0.353							Ind.
	chain pickerel	F-3353	Fillet	43.9	559		0.244							Ind.
	chain pickerel	F-3354	Fillet	43.5	551		0.272							Ind.
	bluegill	F-2033	Fillet	20.3	175		0.149							Ind.
	bluegill	F-2032	Fillet	19.0	149		0.050							Ind.
	bluegill	F-2034	Fillet	18.1	126		0.183							Ind.
	largemouth bass	F-3337	Fillet	41.3	1221		0.569							Ind.
	largemouth bass	F-3336	Fillet	40.4	915		0.502							Ind.
	largemouth bass	F-2035	Fillet	37.7	783		0.509							Ind.
Delaware-Raritan Canal at Griggstown														
	brown bullhead	F-3419	Fillet	33.6	565		0.105							Ind.
	brown bullhead	F-3418	Fillet	33.3	566		0.077							Ind.
	brown bullhead	F-3417	Fillet	30.6	476		0.078							Ind.
	American eel	F-3428	Fillet	47.6	249	17.83	0.110	379	0.17		226	0.5	57.9	Ind.
	American eel	F-3430	Fillet	47.3	194	17.42	0.129	569	ND		302	0.8	80.5	Ind.
	American eel	F-3429	Fillet	45.0	175	19.29	0.129	378	ND		219	0.4	53.9	Ind.
	chain pickerel	F-3410	Fillet	*57.8*	1426		0.382							Ind.
	chain pickerel	F-3409	Fillet	51.6	970		0.283							Ind.
	chain pickerel	F-3408	Fillet	36.0	242		0.164							Ind.
	channel catfish	F-3438	Fillet	51.1	1391	3.79	0.059	123	ND		62	0.2	17.3	Ind.
	channel catfish	F-3439	Fillet	43.9	867	8.49	0.056	274	ND		132	0.4	31.6	Ind.
	channel catfish	F-3437	Fillet	41.6	682	7.19	0.089	346	ND		139	0.3	30.4	Ind.
	bluegill	F-3414	Fillet	19.5	158		0.140							Ind.
	bluegill	F-3415	Fillet	19.2	170		0.151							Ind.
	bluegill	F-3416	Fillet	19.0	154		0.056							Ind.
	smallmouth bass	F-3427	Fillet	46.7	1759		0.361							Ind.
	smallmouth bass	F-3425	Fillet	22.2	150		0.182							Ind.
	smallmouth bass	F-3426	Fillet	21.9	133		0.144							Ind.
	largemouth bass	F-3421	Fillet	39.1	919	0.95	0.444	44	ND		18	*0.1*	2.6	Ind.
	largemouth bass	F-3424	Fillet	38.9	970	1.37	0.384	101	ND		35	0.1	6.5	Ind.
	largemouth bass	F-3423	Fillet	34.5	599	0.99	0.326	117	ND		18	*0.1*	4.0	Ind.
	largemouth bass	F-3422	Fillet	30.1	396		0.288							Ind.
	largemouth bass	F-3420	Fillet	28.5	316		0.338							Ind.
Delaware-Raritan Canal at Lambertville														
	American eel	F-3592	Fillet	33.6	83	27.50	0.189	421	ND		364	0.5	43.1	Ind.
	American eel	F-3593	Fillet	31.0	57	21.56	0.128	264	ND		169	1.1	48.8	Ind.
	American eel	F-3591	Fillet	30.3	52	22.76	0.120	199	ND		125	0.6	27.8	Ind.
	common carp	F-1938	Fillet	*56.7*	2992	*2.57*	0.131	85	ND		*25*	0.3	6.2	Ind.
	common carp	F-1937	Fillet	*56.4*	2855	*5.04*	0.177	159	ND		49	0.5	15.3	Ind.
	common carp	F-1936	Fillet	*52.5*	2388	3.12	0.195	130	ND		39	0.6	11.9	Ind.
	bluegill	F-1982	Fillet	19.3	142		0.100							Ind.
	bluegill	F-1981	Fillet	18.6	145		0.082							Ind.
	bluegill	F-1983	Fillet	18.5	127		0.126							Ind.
	largemouth bass	F-1996	Fillet	28.8	325	0.66	0.274	47	ND		14	*0.1*	3.0	Ind.
	largemouth bass	F-1998	Fillet	28.7	354	0.73	0.292	33	ND		9	*0.2*	2.3	Ind.
	largemouth bass	F-1997	Fillet	28.4	356	0.75	0.160	53	ND		27	*0.1*	3.9	Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analy-tical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlor-danes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
Delaware-Raritan Canal at Port Mercer														
	American eel	F-3343	Filet	49.5	225	19.40	0.136	467	ND		185	0.6	96.5	Ind.
	American eel	F-3342	Filet	48.6	224	16.36	0.112	270	ND		105	0.6	47.0	Ind.
	American eel	F-3341	Filet	47.3	201	22.25	0.087	530	ND		144	0.7	72.5	Ind.
	common carp	F-3345	Filet	60.6	2986	6.47	0.181	583	ND		253	0.5	52.4	Ind.
	common carp	F-3344	Filet	59.6	3300	6.99	0.182	726	1		209	0.5	64.8	Ind.
	common carp	F-3346	Filet	59.0	3035	1.80	0.224	281	ND		147	0.3	32.3	Ind.
	chain pickerel	F-3339	Filet	38.2	314		0.162							Ind.
	chain pickerel	F-3340	Filet	35.6	206		0.178							Ind.
	chain pickerel	F-3338	Filet	31.2	170		0.126							Ind.
	bluegill	F-2016	Filet	19.9	149		0.132							Ind.
	bluegill	F-2015	Filet	19.6	170		0.108							Ind.
	bluegill	F-2017	Filet	18.5	127		0.080							Ind.
	largemouth bass	F-2028	Filet	39.8	1107	1.06	0.516	52	ND		23	*0.1*	5.0	Ind.
	largemouth bass	F-2027	Filet	37.0	845	0.67	0.390	43	ND		12	*0.1*	3.1	Ind.
	largemouth bass	F-2026	Filet	35.1	762	0.76	0.436	59	ND		64	*0.1*	6.9	Ind.
Delaware-Raritan Canal at South Bound Brook														
	common carp	F-3572	Filet	69.4	5400	6.54	0.118	573	ND		204	0.6	73.2	Ind.
	common carp	F-3571	Filet	66.5	4000	6.10	0.151	655	ND		232	0.6	82.2	Ind.
	common carp	F-3568	Filet	58.5	3994	9.79	0.117	552	ND		195	0.6	91.0	Ind.
	channelcatfish	F-3555	Filet	56.5	2070	3.53	0.095	211	ND		90	0.4	31.7	Ind.
	channelcatfish	F-3564	Filet	40.7	526	3.03	0.067	167	ND		47	0.3	26.6	Ind.
	channelcatfish	F-3563	Filet	40.6	617	7.05	0.098	618	ND		204	0.6	60.2	Ind.
	bluegill	F-3522	Filet	21.5	213		0.077							Ind.
	bluegill	F-3521	Filet	20.7	180		0.111							Ind.
	bluegill	F-3520	Filet	19.9	157		0.144							Ind.
	largemouth bass	F-3554	Filet	44.2	1408		0.348							Ind.
	largemouth bass	F-3553	Filet	39.9	1012		0.425							Ind.
	largemouth bass	F-3552	Filet	37.1	806		0.336							Ind.
	yellow perch	F-3525	Filet	31.5	345		0.397							Ind.
	yellow perch	F-3524	Filet	29.5	315		0.151							Ind.
	yellow perch	F-3523	Filet	27.8	251		0.148							Ind.
Delaware-Raritan Canal at West Trenton														
	American eel	F-3557	Filet	68.6	747	20.76	0.445	253	ND		90	0.4	18.4	Ind.
	American eel	F-3558	Filet	63.4	536	1.79	0.119	44	ND		16	*0.1*	7.1	Ind.
	American eel	F-3562	Filet	58.4	381	16.47	0.127	207	ND		73	0.7	10.0	Ind.
	common carp	F-3556	Filet	60.5	2974	4.76	0.131	242	ND		108	*0.2*	27.2	Ind.
	common carp	F-3569	Filet	60.5	4787	3.35	0.211	242	ND		85	0.2	18.5	Ind.
	common carp	F-3570	Filet	58.4	3088	3.50	0.159	221	ND		138	0.2	39.5	Ind.
	channelcatfish	F-3567	Filet	65.6	3502	4.72	0.362	574	0.51		200	0.2	70.6	Ind.
	channelcatfish	F-3565	Filet	56.0	1965	2.82	0.174	218	ND		97	*0.1*	40.5	Ind.
	channelcatfish	F-3566	Filet	55.7	1684	2.10	0.339	552	0.12		233	*0.1*	50.6	Ind.
	bluegill	F-3511	Filet	18.1	121		0.120							Ind.
	bluegill	F-3513	Filet	17.2	109		0.084							Ind.
	bluegill	F-3512	Filet	16.6	86		0.131							Ind.
	smallmouth bass	F-3542	Filet	35.5	438		0.527							Ind.
	smallmouth bass	F-3543	Filet	34.5	564		0.502							Ind.
	smallmouth bass	F-3544	Filet	32.8	370		0.463							Ind.
	largemouth bass	F-3561	Filet	32.1	480		0.272							Ind.
	largemouth bass	F-3559	Filet	31.8	453		0.197							Ind.
	largemouth bass	F-3560	Filet	31.4	423		0.218							Ind.
	walleye	F-3547	Filet	64.0	2232	1.83	0.536	521	0.61		174	*0.1*	29.3	Ind.
	walleye	F-3546	Filet	38.7	537	1.68	0.177	228	ND		82	*0.1*	15.3	Ind.
	walleye	F-3545	Filet	32.8	277	0.59	0.168	48	ND		18	*0.1*	5.8	Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analytical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlordanes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
De Voe Lake														
	brown bullhead	F-1799	Filet	35.7	727	1.04	0.161	18	ND		12	*0.1*	4.0	Ind.
	brown bullhead	F-1801	Filet	32.5	372	0.56	0.127	16	ND		4	*0.2*	2.0	Ind.
	brown bullhead	F-1800	Filet	30.9	418	2.51	0.077	49	ND		32	0.5	18.2	Ind.
	chain pickerel	F-1797	Filet	50.5	708		0.507							Ind.
	chain pickerel	F-1798	Filet	50.0	729		0.389							Ind.
	chain pickerel	F-1796	Filet	45.8	556		0.263							Ind.
Duhernal Lake														
	brown bullhead	F-3372	Filet	34.5	476	0.28	0.055	15	ND		6	*0.1*	1.2	Ind.
	brown bullhead	F-3370	Filet	33.5	598	0.53	0.026	55	ND		33	*0.2*	12.2	Ind.
	brown bullhead	F-3371	Filet	31.6	472	0.47	0.037	67	ND		30	0.1	11.7	Ind.
	bluegill	F-3349	Filet	22.3	249		0.160							Ind.
	bluegill	F-3348	Filet	20.2	187		0.078							Ind.
	bluegill	F-3347	Filet	18.4	172		0.040							Ind.
	largemouth bass	F-3375	Filet	39.2	871	0.34	0.280	33	ND		14	*0.2*	4.2	Ind.
	largemouth bass	F-3373	Filet	36.5	803	0.88	0.171	34	ND		24	*0.1*	7.1	Ind.
	largemouth bass	F-3374	Filet	36.4	827	0.89	0.196	38	ND		25	*0.2*	7.7	Ind.
Farrington Lake														
	brown bullhead	F-3381	Filet	36.5	626	0.73	0.017	46	ND		39	0.3	36.4	Ind.
	brown bullhead	F-3380	Filet	34.7	563	1.06	0.040	77	ND		19	*0.2*	11.1	Ind.
	brown bullhead	F-3379	Filet	29.8	325	0.38	0.034	68	ND		11	*0.1*	5.8	Ind.
	chain pickerel	F-3378	Filet	48.8	1003		0.481							Ind.
	chain pickerel	F-3377	Filet	45.8	617		0.204							Ind.
	chain pickerel	F-3376	Filet	43.2	496		0.191							Ind.
	bluegill	F-3368	Filet	18.7	134		0.120							Ind.
	bluegill	F-3369	Filet	17.8	110		0.151							Ind.
	bluegill	F-3367	Filet	17.2	103		0.098							Ind.
	largemouth bass	F-3384	Filet	49.0	1832	0.93	0.973	44	ND		11	*0.2*	3.4	Ind.
	largemouth bass	F-3383	Filet	46.3	1146	1.06	1.413	89	ND		15	*0.2*	4.2	Ind.
	largemouth bass	F-3385	Filet	42.3	1111	0.93	0.938	101	ND		32	*0.1*	10.0	Ind.
	largemouth bass	F-3386	Filet	41.0	1147		0.508							Ind.
	largemouth bass	F-3382	Filet	39.8	881		0.517							Ind.
	yellow perch	F-3389	Filet	25.7	158		0.411							Ind.
	yellow perch	F-3388	Filet	20.7	106		0.222							Ind.
	yellow perch	F-3387	Filet	20.6	96		0.180							Ind.
Green Brook @ Madison Ave. Bridge														
	American eel	F-1793	Filet	57.2	426	9.71	0.206	472	ND		100	0.8	145.5	Ind.
	American eel	F-1794	Filet	45.1	181	10.01	0.089	423	ND		169	1.3	147.9	Ind.
	American eel	F-1795	Filet	44.4	156	13.44	0.147	487	ND		121	1.1	166.2	Ind.
Lamington River @ Lamington														
	American eel	F-1994	Filet	63.2	474	8.97	0.247	47	ND		33	0.3	20.8	Ind.
	American eel	F-1993	Filet	60.2	449	18.08	0.394	83	ND		42	0.5	26.7	Ind.
	American eel	F-1995	Filet	53.7	360	13.51	0.188	57	ND		40	*0.3*	22.5	Ind.
	redbreast sunfish	F-1992	Filet	16.6	88		0.149							Ind.
	redbreast sunfish	F-1991	Filet	16.1	83		0.167							Ind.
	redbreast sunfish	F-1990	Filet	15.8	83		0.127							Ind.
	smallmouth bass	F-2002	Filet	22.0	146		0.125							Ind.
	smallmouth bass	F-2001	Filet	20.6	123		0.185							Ind.
	smallmouth bass	F-2003	Filet	18.6	87		0.136							Ind.
	brown trout	F-2000	Filet	26.1	186		0.089							Ind.
	brown trout	F-1999	Filet	23.7	127		0.075							Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analy-tical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlor-danes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
Manahawkin Bay														
	weakfish	F-3594	Filet	34.1	358	5.07	0.093	113	ND	*2.1*	32	0.3	5.2	Ind.
	weakfish	F-3596	Filet	33.4	348	6.93	0.081	117	ND	*3.29*	24	0.4	5.2	Ind.
	weakfish	F-3595	Filet	33.1	315	3.70	0.067	72	ND	*1.03*	23	0.2	6.4	Ind.
	weakfish	F-3597	Filet	32.0	327	6.65	0.144	117	ND		34	0.7	14.5	Ind.
Manalapan Lake														
	American eel	F-3359	Filet	59.7	423	15.52	0.176	330	0.3		303	0.2	21.7	Ind.
	American eel	F-3361	Filet	53.4	261	4.07	0.125	96	ND		51	0.3	6.2	Ind.
	American eel	F-3360	Filet	49.5	228	16.30	0.077	220	ND		301	1.4	29.0	Ind.
	bluegill	F-3350	Filet	18.6	156		0.049							Ind.
	bluegill	F-3351	Filet	18.4	149		0.048							Ind.
	bluegill	F-3352	Filet	18.4	158		0.071							Ind.
	largemouth bass	F-3366	Filet	40.8	1293	1.14	0.409	28	ND		36	*0.1*	2.6	Ind.
	largemouth bass	F-3365	Filet	39.1	993	0.54	0.330	18	ND		22	*0.1*	1.4	Ind.
	largemouth bass	F-3364	Filet	38.0	901	0.49	0.233	12	ND		11	*0.1*	0.7	Ind.
	black crappie	F-3356	Filet	22.8	183		0.144							Ind.
	black crappie	F-3358	Filet	21.4	147		0.107							Ind.
	black crappie	F-3357	Filet	21.0	135		0.098							Ind.
Millstone River at Manville														
	common carp	F-3497	Filet	63.5	4000	10.23	0.274	907	1.36	63.59	258	1.5	104.0	Ind.
	common carp	F-3498	Filet	62.7	3900	7.13	0.279	585	0.51	61.75	299	1.4	84.7	Ind.
	common carp	F-3496	Filet	54.6	2350	1.17	0.102	87	ND	10.63	18	0.5	9.6	Ind.
	bluegill	F-3500	Filet	18.0	134		0.140							Ind.
	bluegill	F-3499	Filet	17.6	127		0.146							Ind.
	bluegill	F-3501	Filet	17.3	128		0.093							Ind.
	largemouth bass	F-3502	Filet	36.2	680	1.09	0.645	76	ND		40	*0.2*	9.4	Ind.
	largemouth bass	F-3504	Filet	36.0	802	1.72	0.372	126	ND		60	0.3	20.2	Ind.
	largemouth bass	F-3503	Filet	35.6	722	1.30	0.322	41	ND		23	*0.2*	10.0	Ind.
North Branch Raritan River at Branchburg														
	yellow bullhead	F-3453	Filet	20.4	120	0.87	0.149	18	ND		6	*0.1*	3.5	Ind.
	yellow bullhead	F-3452	Filet	20.0	119	3.50	0.133	134	ND		23	0.6	24.0	Ind.
	yellow bullhead	F-3451	Filet	19.3	100	1.40	0.131	27	ND		12	0.2	5.5	Ind.
	American eel	F-2006	Filet	65.5	672	12.59	0.152	77	ND		48	0.4	26.0	Ind.
	American eel	F-2005	Filet	57.9	382	9.49	0.139	101	ND		43	0.4	23.0	Ind.
	American eel	F-2004	Filet	52.5	293	13.22	0.098	109	ND		47	0.5	26.6	Ind.
	redbreast sunfish	F-3449	Filet	17.1	107		0.135							Ind.
	redbreast sunfish	F-3450	Filet	16.5	108		0.070							Ind.
	redbreast sunfish	F-3448	Filet	16.2	92		0.105							Ind.
	smallmouth bass	F-3445	Filet	27.6	286		0.204							Ind.
	smallmouth bass	F-3446	Filet	25.5	222		0.188							Ind.
	smallmouth bass	F-3447	Filet	23.3	173		0.166							Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

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				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
New Market Pond														
	brown bullhead	F-1942	Filet	34.5	517	0.70	0.004	277	1		13	0.4	12.8	Ind.
	brown bullhead	F-1943	Filet	33.5	537	0.29	0.001	877	0.7		41	0.4	38.8	Ind.
	brown bullhead	F-1944	Filet	33.3	480	1.70	0.024	671	0.57		38	1.2	45.2	Ind.
	American eel	F-1939	Filet	48.5	164	1.53	0.107	1676	ND		108	1.7	169.1	Ind.
	American eel	F-1940	Filet	46.6	228	23.40	0.040	3911	0.94		369	17.1	507.6	Ind.
	American eel	F-1941	Filet	34.0	79	18.94	0.028	4117	ND		346	17.3	487.4	Ind.
	common carp	F-1779	Filet	53.0	2518	2.43	0.033	2661	1.275	16.01	133	1.8	128.8	Ind.
	common carp	F-1776	Filet	52.7	2748	4.47	0.054	2920	1.85	19.28	152	3.6	158.1	Ind.
	common carp	F-1778	Filet	50.7	2110	2.75	0.048	3057	1.36	17.43	172	2.5	179.9	Ind.
	bluegill	F-1979	Filet	17.3	89	0.59	0.089	486	0.4		21	0.2	19.4	Ind.
	bluegill	F-1980	Filet	17.0	83	0.80	0.065	912	0.6		29	0.3	34.6	Ind.
	bluegill	F-1978	Filet	16.5	81	0.45	0.067	740	0.49		28	0.3	33.5	Ind.
	largemouth bass	F-1989	Filet	41.4	1085	0.69	0.263	649	0.59		25	0.3	34.5	Ind.
	largemouth bass	F-1988	Filet	36.8	741	0.47	0.109	323	0.28		16	0.3	20.2	Ind.
	largemouth bass	F-1987	Filet	35.9	758	0.92	0.137	634	0.59		28	0.4	34.5	Ind.
	black crappie	F-1984	Filet	24.1	209	0.62	0.052	380	0.51		19	0.4	22.8	Ind.
	black crappie	F-1986	Filet	22.5	165	0.48	0.090	131	ND		9	0.3	8.4	Ind.
	black crappie	F-1985	Filet	20.6	140	0.58	0.056	140	0.33		10	0.3	9.4	Ind.
Rahway River at Milton Lake														
	brown bullhead	F-3531	Filet	35.9	650	1.34	0.039	52	ND		27	0.2	31.4	Ind.
	brown bullhead	F-3530	Filet	34.7	591	0.88	0.047	66	ND		31	0.3	42.7	Ind.
	brown bullhead	F-3529	Filet	33.9	570	0.74	0.025	72	ND		34	0.3	52.5	Ind.
	common carp	F-3549	Filet	66.6	5550	14.99	0.133	936	0.98	37.54	355	3.7	497.0	Ind.
	common carp	F-3551	Filet	65.6	4950	12.37	0.104	658	0.865	29.51	281	2.3	435.6	Ind.
	common carp	F-3550	Filet	60.2	3295	9.07	0.145	496	ND	23.07	225	1.9	385.4	Ind.
	bluegill	F-3528	Filet	17.8	108	0.64	0.162	52	ND		16	0.2	26.3	Ind.
	bluegill	F-3526	Filet	17.7	117	0.72	0.122	72	ND		21	0.1	35.0	Ind.
	bluegill	F-3527	Filet	17.0	93	0.75	0.063	54	ND		20	0.2	38.0	Ind.
	largemouth bass	F-3534	Filet	49.5	2005	1.10	0.549	71	ND		38	0.4	43.8	Ind.
	largemouth bass	F-3533	Filet	47.5	1949	0.85	0.556	55	ND		22	0.2	31.4	Ind.
	largemouth bass	F-3532	Filet	43.3	1234	0.62	0.719	46	ND		14	0.1	22.9	Ind.
Rahway River at Valley Road Pond														
	brown bullhead	F-3516	Filet	32.5	482	1.54	0.121	116	ND		58	0.3	53.3	Ind.
	brown bullhead	F-3514	Filet	27.3	278	1.82	0.034	208	ND		91	0.5	92.2	Ind.
	brown bullhead	F-3515	Filet	27.0	255	3.29	0.041	263	ND		164	0.8	140.7	Ind.
	common carp	F-1781	Filet	63.4	4072	2.43	0.073	449	0.1	10.68	161	1.6	121.5	Ind.
	common carp	F-1783	Filet	60.4	3945	4.70	0.004	614	0.73	19.51	222	1.7	231.3	Ind.
	common carp	F-1780	Filet	56.9	3025	1.36	0.113	291	ND	5.21	291	0.5	75.4	Ind.
	largemouth bass	F-3519	Filet	37.0	900	0.90	0.255	75	ND		23	0.2	24.6	Ind.
	largemouth bass	F-3517	Filet	34.1	662	1.24	0.212	159	ND		55	0.3	47.2	Ind.
	largemouth bass	F-3518	Filet	34.0	653	0.73	0.359	72	ND		22	0.1	25.5	Ind.
Raritan Bay: Lower Bay														
	summer flounder	F-3607	Filet	46.7	1047	0.58	0.097	19	ND	*0.08*	5	*0.2*	0.7	Ind.
	summer flounder	F-3609	Filet	43.5	913	1.65	0.069	64	ND	*0.62*	12	*0.3*	2.8	Ind.
	summer flounder	F-3608	Filet	38.1	537	0.53	0.119	27	ND	*0.21*	5	*0.1*	0.9	Ind.
Raritan Bay at Keansburg														
	blue crab	F-3598	Hepatopancreas			9.50	0.076	779	2.54	33.03	288	1.8	109.4	Comp. of 6
	blue crab	F-3598	Muscle			1.10	0.095	52	ND	*0.93*	30	0.3	4.6	Comp. of 6
	blue crab	F-3600	Hepatopancreas			11.09	0.037	937	3.095	39.26	346	1.7	163.5	Comp. of 5
	blue crab	F-3599	Muscle			0.75	0.102	40	ND	*0.91*	23	*0.3*	4.5	Comp. of 6
	blue crab	F-3599	Hepatopancreas			10.23	0.058	1062	1.92	43.9	313	2.3	168.5	Comp. of 6
	blue crab	F-3600	Muscle			0.85	0.060	40	ND	*0.59*	24	*0.1*	5.3	Comp. of 5
	summer flounder	F-3603	Filet	46.6	1240	1.23	0.078	50	ND	*0.53*	18	*0.2*	3.3	Ind.
	summer flounder	F-3605	Filet	44.8	1111	1.75	0.083	54	ND	*0.69*	14	*0.2*	2.7	Ind.
	summer flounder	F-3604	Filet	44.7	876	1.48	0.113	47	ND	*0.62*	13	*0.2*	2.4	Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analytical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlordanes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
Raritan River at Millstone River														
	white catfish	F-3459	Filet	40.1	859		0.239							Ind.
	white catfish	F-3457	Filet	35.7	605		0.214							Ind.
	white catfish	F-3458	Filet	32.6	476		0.203							Ind.
	American eel	F-3491	Filet	71.0	909	9.82	0.292	497	0.24		114	0.3	50.3	Ind.
	American eel	F-3490	Filet	70.6	898	12.79	0.243	457	ND		121	0.5	49.2	Ind.
	American eel	F-3489	Filet	57.6	436	16.81	0.109	181	ND		114	0.5	36.5	Ind.
	common carp	F-1784	Filet	65.9	3788	8.78	0.004	528	0.81		258	0.5	84.2	Ind.
	common carp	F-1777	Filet	59.7	3620	11.25	0.150	449	0.95		147	0.8	76.6	Ind.
	common carp	F-1782	Filet	57.9	3298	8.90	0.127	205	0.56		69	0.9	52.9	Ind.
	channel catfish	F-3479	Filet	63.7	2422	2.91	0.164	264	ND		78	0.3	37.2	Ind.
	channel catfish	F-3478	Filet	53.0	242	2.74	0.171	162	ND		79	0.4	31.5	Ind.
	channel catfish	F-3477	Filet	48.7	172	2.46	0.359	484	ND		145	0.3	53.4	Ind.
	redbreast sunfish	F-3460	Filet	19.3	146		0.107							Ind.
	redbreast sunfish	F-3462	Filet	18.2	106		0.163							Ind.
	redbreast sunfish	F-3461	Filet	18.2	138		0.134							Ind.
	smallmouth bass	F-3456	Filet	37.3	716		0.269							Ind.
	smallmouth bass	F-3454	Filet	31.0	321		0.334							Ind.
	smallmouth bass	F-3455	Filet	30.9	319		0.293							Ind.
	largemouth bass	F-3476	Filet	43.0	1394	0.54	0.690	40	ND		8	*0.1*	2.3	Ind.
	largemouth bass	F-3475	Filet	37.2	143	0.99	0.326	70	ND		7	*0.1*	3.1	Ind.
	largemouth bass	F-3474	Filet	32.4	564	0.80	0.256	72	ND		19	*0.1*	5.7	Ind.
Raritan River at Route 1 Bridge														
	white catfish	F-3540	Filet	47.4	1514	2.35	0.490	711	ND	32.6	236	0.4	72.7	Ind.
	white catfish	F-3541	Filet	46.9	1494	1.46	0.289	666	ND	23.53	195	*0.2*	57.9	Ind.
	white catfish	F-3548	Filet	45.3	1353	2.66	0.425	706	0.74	29.98	170	0.4	55.4	Ind.
	white perch	F-3539	Filet	31.0	444	3.72	0.596	273	0.68	19.24	63	0.4	41.9	Ind.
	white perch	F-3538	Filet	29.0	375	2.88	0.398	185	0.53	8.85	58	0.4	25.9	Ind.
	white perch	F-3537	Filet	21.0	147	2.45	0.059	226	1.01	*2.78*	39	0.4	9.9	Ind.
Rosedale Lake in Pennington														
	common carp	F-1956	Filet	66.8	4000	6.52	0.103	110	ND		34	*0.2*	5.0	Ind.
	common carp	F-1955	Filet	64.1	3300	6.66	0.107	77	ND		27	*0.2*	5.1	Ind.
	common carp	F-1954	Filet	62.2	2964	2.83	0.117	49	ND		18	*0.2*	2.9	Ind.
	bluegill	F-1953	Filet	20.2	156		0.108							Ind.
	bluegill	F-1951	Filet	18.7	138		0.064							Ind.
	bluegill	F-1952	Filet	18.4	128		0.051							Ind.
	largemouth bass	F-1973	Filet	47.7	1577		0.330							Ind.
	largemouth bass	F-1972	Filet	47.6	1520		0.230							Ind.
	largemouth bass	F-1976	Filet	40.0	1021		0.221							Ind.
	black crappie	F-1950	Filet	30.8	429		0.123							Ind.
	black crappie	F-1949	Filet	25.7	232		0.119							Ind.
	black crappie	F-1948	Filet	24.1	203		0.102							Ind.
Round Valley Reservoir														
	white catfish	F-1823	Filet	40.0	897		0.099							Ind.
	white catfish	F-1822	Filet	36.8	622		0.082							Ind.
	channel catfish	F-1825	Filet	61.8	2679	2.27	0.068	155	ND		31	*0.1*	6.9	Ind.
	channel catfish	F-1826	Filet	58.7	2530	3.56	0.460	135	ND		29	*0.2*	7.2	Ind.
	channel catfish	F-1824	Filet	50.2	1421	5.61	0.115	238	ND		69	0.4	15.7	Ind.
	bluegill	F-1820	Filet	22.0	247		0.095							Ind.
	bluegill	F-1819	Filet	21.9	233		0.120							Ind.
	bluegill	F-1821	Filet	21.5	211		0.110							Ind.
	largemouth bass	F-1971	Filet	45.1	1466	0.80	0.385	30	ND		8	*0.2*	1.8	Ind.
	largemouth bass	F-1970	Filet	41.8	1252	1.18	0.298	33	ND		10	*0.2*	2.5	Ind.
	largemouth bass	F-1967	Filet	30.6	437	0.77	0.195	12	ND		4	*0.1*	0.8	Ind.
	lake trout	F-1818	Filet	66.5	3700	7.13	0.189	209	0.31		71	0.4	17.0	Ind.
	lake trout	F-1816	Filet	54.9	1599	4.70	0.127	155	0.195		49	*0.2*	11.4	Ind.
	lake trout	F-1815	Filet	53.7	1059	1.58	0.206	135	ND		43	*0.2*	9.9	Ind.
	lake trout	F-1817	Filet	52.2	1405	3.25	0.104	99	0.2		39	0.3	10.9	Ind.
	lake trout	F-1814	Filet	43.9	722	3.62	0.088	82	ND		30	0.3	6.3	Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analytical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlordanes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
South Branch Raritan River at Long Valley/Clairmont														
	brown trout	F-3444	Filet	30.8	348		0.082							Ind.
	brown trout	F-3443	Filet	28.5	220		0.133							Ind.
	brown trout	F-3442	Filet	25.9	172		0.080							Ind.
	brown trout	F-3441	Filet	23.6	157		0.075							Ind.
	brown trout	F-3440	Filet	22.0	127		0.067							Ind.
South Branch Raritan River at Flemington														
	yellow bullhead	F-1945	Filet	23.7	202	2.32	0.207	83	ND		31	*0.1*	5.7	Ind.
	yellow bullhead	F-1947	Filet	21.0	137	0.92	0.124	44	ND		21	*0.2*	3.2	Ind.
	yellow bullhead	F-1946	Filet	20.9	128	1.56	0.148	68	ND		20	*0.2*	4.6	Ind.
	American eel	F-1835	Filet	68.0	808	15.60	0.164	460	ND		283	0.5	48.1	Ind.
	American eel	F-1834	Filet	65.0	678	16.91	0.117	147	ND		78	0.4	68.8	Ind.
	American eel	F-1833	Filet	56.9	453	19.45	0.151	279	ND		146	0.4	31.6	Ind.
	redbreast sunfish	F-1959	Filet	18.2	125		0.079							Ind.
	redbreast sunfish	F-1957	Filet	18.1	142		0.101							Ind.
	redbreast sunfish	F-1958	Filet	17.6	129		0.081							Ind.
	smallmouth bass	F-1965	Filet	32.1	409	0.74	0.241	31	ND		15	*0.1*	2.3	Ind.
	smallmouth bass	F-1963	Filet	26.7	243	0.48	0.154	32	ND		15	*0.2*	1.7	Ind.
	smallmouth bass	F-1964	Filet	26.1	210	0.44	0.148	30	ND		15	*0.3*	1.6	Ind.
	brown trout	F-1960	Filet	27.2	196		0.072							Ind.
	brown trout	F-1962	Filet	23.5	123		0.084							Ind.
	brown trout	F-1961	Filet	21.1	87		0.082							Ind.
South Branch Raritan River at High Bridge														
	American eel	F-1807	Filet	53.1	300	20.66	0.124	405	ND		58	0.4	82.4	Ind.
	American eel	F-1805	Filet	53.1	305	16.74	0.138	456	ND		53	0.4	112.7	Ind.
	American eel	F-1806	Filet	48.9	340	12.92	0.145	432	ND		41	0.5	122.2	Ind.
	redbreast sunfish	F-1809	Filet	16.7	88		0.250							Ind.
	redbreast sunfish	F-1808	Filet	15.8	82		0.059							Ind.
	redbreast sunfish	F-1810	Filet	14.8	60		0.073							Ind.
South Branch Raritan River at Neshanic Station														
	rock bass	F-3468	Filet	21.1	197		0.206							Ind.
	rock bass	F-3467	Filet	20.6	167		0.166							Ind.
	rock bass	F-3466	Filet	20.4	174		0.245							Ind.
	American eel	F-3510	Filet	72.5	748	18.76	0.255	220	ND		102	0.3	32.5	Ind.
	American eel	F-3508	Filet	69.9	722	19.09	0.227	234	ND		118	0.2	40.9	Ind.
	American eel	F-3509	Filet	63.0	536	18.56	0.291	303	ND		146	0.2	46.3	Ind.
	common carp	F-3485	Filet	46.1	1340	2.58	0.045	41	ND		14	*0.1*	3.8	Ind.
	common carp	F-3484	Filet	42.7	1099	2.46	0.057	63	ND		18	*0.2*	7.4	Ind.
	common carp	F-3483	Filet	37.2	1056		0.053							Ind.
	redbreast sunfish	F-3463	Filet	17.9	121		0.121							Ind.
	redbreast sunfish	F-3465	Filet	17.7	108		0.093							Ind.
	redbreast sunfish	F-3464	Filet	16.9	106		0.104							Ind.
	smallmouth bass	F-3507	Filet	49.9	1783		0.395							Ind.
	smallmouth bass	F-3506	Filet	41.1	834		0.380							Ind.
	smallmouth bass	F-3505	Filet	34.9	486		0.315							Ind.
	largemouth bass	F-3482	Filet	26.9	274	1.11	0.138	36	ND		10	*0.1*	2.1	Ind.
	largemouth bass	F-3481	Filet	21.3	128	0.80	0.177	22	ND		9	*0.1*	1.3	Ind.
	largemouth bass	F-3480	Filet	20.0	100	0.79	0.190	33	ND		8	*0.2*	1.4	Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analytical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlordanes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
Sandy Hook Bay														
	summerflounder	F-3601	Filet	53.3	1632	1.80	0.118	66	ND	*0.86*	15	*0.2*	2.5	Ind.
	summerflounder	F-3602	Filet	50.8	1446	0.95	0.081	44	ND	*0.34*	17	*0.2*	2.7	Ind.
	summerflounder	F-3606a-e	Filet			1.37	0.101	56	ND	*0.63*	11	*0.2*	2.2	Comp. of 5
South River at Sayreville														
	white catfish	F-3536	Filet	37.7	721	3.05	0.380	487	ND	19.68	100	0.5	33.3	Ind.
	white catfish	F-3495	Filet	28.1	272	1.95	0.187	319	ND	3.98	107	0.4	24.9	Ind.
	white catfish	F-3494	Filet	27.5	228	2.92	0.132	473	ND	9.12	206	0.6	33.1	Ind.
	blue crab	F-1803	Hepatopancreas			10.39	0.069	890	5.19	*39.6*	201	1.7	97.1	Comp. of 6
	blue crab	F-1803	Muscle			0.78	0.094	38	ND	*0.33*	25	0.6	4.2	Comp. of 6
	blue crab	F-1802	Hepatopancreas			8.49	0.068	1135	4.23	105.59	310	2.2	193.4	Comp. of 6
	blue crab	F-1802	Muscle			0.80	0.105	66	0.2	2.35	35	0.4	7.8	Comp. of 6
	blue crab	F-1786	Hepatopancreas			*5.63*	0.058	409	2.415		121	1.4	52.1	Comp. of 6
	blue crab	F-1786	Muscle			0.27	0.054	36	ND		13	0.3	5.1	Comp. of 6
	blue crab	F-1785	Hepatopancreas			4.60	0.068	523	3.12		142	1.3	69.0	Comp. of 6
	blue crab	F-1785	Muscle			0.49	0.055	40	0.06		28	0.5	5.4	Comp. of 6
	blue crab	F-1804	Hepatopancreas			10.10	0.065	631	4.3	32.28	175	1.5	85.6	Comp. of 6
	blue crab	F-1804	Muscle			0.63	0.078	40	0.16	*0.44*	20	0.2	4.4	Comp. of 6
	white perch	F-3493	Filet	30.5	478	3.82	0.432	441	1.03	13.86	103	0.6	33.6	Ind.
	white perch	F-3492	Filet	26.5	288	4.29	0.209	455	ND	11.74	176	0.7	35.3	Ind.
	white perch	F-3535	Filet	20.0	131	3.25	0.151	398	ND	8.45	132	0.5	28.0	Ind.
Spring Lake														
	common carp	F-1813	Filet	64.6	4200	2.04	0.080	1315	1		76	0.6	92.9	Ind.
	common carp	F-1812	Filet	54.5	2605	4.09	0.002	375	ND		96	0.8	127.2	Ind.
	common carp	F-1811	Filet	48.3	1900	0.89	0.044	151	ND		24	0.3	35.7	Ind.
Spruce Run Reservoir														
	common carp	F-1829	Filet	58.3	4299	4.57	0.134	144	ND		44	*0.1*	7.8	Ind.
	common carp	F-1827	Filet	58.1	2547	0.98	0.124	33	ND		8	*0.1*	2.5	Ind.
	common carp	F-1828	Filet	*57.8*	2474	2.05	0.126	101	ND		31	*0.1*	5.4	Ind.
	northern pike	F-2012	Filet	76.8	3042		0.210							Ind.
	northern pike	F-2014	Filet	68.5	2071		0.249							Ind.
	northern pike	F-2013	Filet	65.5	1699		0.314							Ind.
	channel catfish	F-1832	Filet	56.3	1538	1.79	0.325	140	ND		42	0.2	10.2	Ind.
	channel catfish	F-1831	Filet	55.6	1335	2.19	0.226	124	ND		41	*0.2*	9.8	Ind.
	channel catfish	F-1830	Filet	41.0	557	2.19	0.061	57	ND		17	*0.2*	3.2	Ind.
	largemouth bass	F-1974	Filet	47.3	1672	0.20	0.605	41	ND		12	*0.1*	1.8	Ind.
	largemouth bass	F-1977	Filet	42.9	1349	0.77	0.443	21	ND		6	*0.1*	3.0	Ind.
	largemouth bass	F-1975	Filet	39.8	878	1.45	0.430	78	ND		27	*0.1*	5.5	Ind.
	largemouth bass	F-1969	Filet	35.8	713		0.174							Ind.
	largemouth bass	F-1968	Filet	28.7	303		0.180							Ind.
	hybrid striper	F-2011	Filet	54.3	2878	6.87	0.517	270	ND		108	0.3	21.2	Ind.
	hybrid striper	F-2010	Filet	53.6	2051	5.67	0.399	138	ND		53	0.2	12.9	Ind.
	hybrid striper	F-2009	Filet	49.2	1720	6.41	0.229	148	ND		58	0.3	14.0	Ind.
	hybrid striper	F-2008	Filet	48.0	1470	5.70	0.185	135	ND		54	0.2	13.4	Ind.
	hybrid striper	F-2007	Filet	42.4	816	2.37	0.143	78	ND		28	0.4	6.9	Ind.

Appendix 1 (continued). Specimen characteristics and contaminant concentrations for samples of the 2006 NJ Routine Monitoring Program for the Raritan Region. Entries in italics are below detection limit.

Station	Common Name	Analytical Number	Tissue Type	Total Length (lab)	Total Weight (lab)	Total Lipids	Total Hg	Total PCBs	Total Planar PCBs	Total PBDEs	Total DDXs	Total BHCs + Lindane	Total Chlordanes	Sample Type
				cm	g	%	ug/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet	
Weston Mill Pond														
	brown bullhead	F-3398	Fillet	357	598	084	0.026	60	ND		20	*0.1*	15.5	Ind.
	brown bullhead	F-3397	Fillet	282	320	328	0.053	122	ND		99	0 3	74.6	Ind.
	brown bullhead	F-3396	Fillet	271	245	103	0.016	35	ND		22	*0.1*	17.7	Ind.
	American eel	F-3413	Fillet	551	366	2085	0.137	352	ND		226	1 8	127.7	Ind.
	American eel	F-3412	Fillet	502	257	1738	0.113	417	ND		228	1 7	159.5	Ind.
	American eel	F-3411	Fillet	498	285	1774	0.103	347	ND		217	1 3	150.4	Ind.
	chain pickerel	F-3399	Fillet	480	566		0.480							Ind.
	chain pickerel	F-3400	Fillet	459	542		0.289							Ind.
	chain pickerel	F-3401	Fillet	389	338		0.162							Ind.
	bluegill	F-3406	Fillet	189	149		0.220							Ind.
	bluegill	F-3407	Fillet	186	143		0.113							Ind.
	bluegill	F-3405	Fillet	177	139		0.068							Ind.
	largemouth bass	F-3403	Fillet	395	912	072	0.468	32	ND		10	*0.1*	4.8	Ind.
	largemouth bass	F-3402	Fillet	381	857	080	0.412	25	ND		7	*0.1*	4.7	Ind.
	largemouth bass	F-3404	Fillet	380	734	062	0.521	179	ND		4	0 2	4.3	Ind.
	yellow perch	F-3393	Fillet	293	272		0.399							Ind.
	yellow perch	F-3394	Fillet	263	250		0.145							Ind.
	yellow perch	F-3395	Fillet	253	226		0.274							Ind.
	black crappie	F-3390	Fillet	269	274		0.283							Ind.
	black crappie	F-3392	Fillet	269	311		0.228							Ind.
	black crappie	F-3391	Fillet	258	280		0.199							Ind.

Appendix II.

Data for Individual Samples for Dieldrin, Endrin, Aldrin, and Endosulfans

Appendix II. Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Atlantic Ocean North												
	summer flounder	F-3611	10034	1.8	46.3	Ind	990	0.36	*0.24*	*0.02*	*0.02*	*0.03*
	summer flounder	F-3610	10033	1.1	48.1	Ind	1152	0.18	*0.37*	*0.02*	*0.02*	*0.02*
	summer flounder	F-3612a-e	10035	1.1		Comp. of 5		0.27	*0.24*	*0.03*	*0.01*	*0.03*
Atlantic Ocean Sea Isle City - Cape May												
	weakfish	F-3576	8166	7.9	30.6	Ind	321	0.81	*0.50*	*0.11*	0.05	0.09
	weakfish	F-3575	8165	6.7	31.6	Ind	310	0.91	*0.49*	*0.09*	0.05	0.09
	weakfish	F-3573	8163	4.2	33.4	Ind	378	0.53	*0.49*	*0.07*	*0.04*	0.04
	weakfish	F-3574	8164	4.8	35.6	Ind	482	0.59	*0.21*	*0.09*	*0.04*	0.05
	weakfish	F-3577	8167	7.9	35.6	Ind	509	1.21	*0.49*	*0.16*	0.05	0.08
Bound Brook below New Market Pond Dam												
	American eel	F-1792	7609	7.8	59.5	Ind	495	33.16	3.62	1.81	0.00	0.67
	American eel	F-1791	7608	14.5	68.2	Ind	573	84.68	5.68	5.15	0.62	1.04
	American eel	F-1790	7607	15.8	69.9	Ind	767	60.80	4.74	3.96	0.44	0.67
Bound Brook @ Shepard Rd.												
	American eel	F-1789	7606	7.6	51.3	Ind	292	46.82	1.06	2.82	0.08	*0.02*
	American eel	F-1787	7604	12.2	54.3	Ind	291	71.11	2.31	5.49	0.12	0.74
	American eel	F-1788	7605	2.6	61.3	Ind	411	28.88	0.64	2.30	0.00	0.52
Budd Lake												
	bluegill	F-3432	7898		17.8	Ind	132					
	bluegill	F-3433	7899		18.2	Ind	130					
	bluegill	F-3431	7897		18.8	Ind	133					
	brown bullhead	F-3434	7900		25.6	Ind	226					
	brown bullhead	F-3435	7901		27.2	Ind	242					
	brown bullhead	F-3436	7902		31.5	Ind	403					
	largemouth bass	F-3470	7993		*35.7*	Ind	*756*					
	largemouth bass	F-3469	7992		36.4	Ind	631					
	largemouth bass	F-3471	7994	1.7	36.9	Ind	847	0.25	*0.14*	*0.04*	*0.01*	*0.02*
	largemouth bass	F-3472	7995	0.8	43.1	Ind	1367	0.07	*0.16*	*0.01*	*0.02*	*0.02*
	largemouth bass	F-3473	7996	1.9	47.6	Ind	1786	0.40	*0.44*	*0.04*	*0.03*	0.07
	northern pike	F-3486	8015	1.4	74.1	Ind	2414	0.63	*0.60*	*0.08*	*0.04*	0.07
	northern pike	F-3488	8017	2.0	78.4	Ind	3256	*0.57*	0.66	*0.07*	0.05	0.15
	northern pike	F-3487	8016	1.7	81.0	Ind	3700	0.71	*0.51*	*0.10*	*0.02*	0.07
	white catfish	F-3578	8168	2.9	34.3	Ind	*524*	0.41	*0.31*	*0.05*	*0.03*	0.06
	white catfish	F-3579	8169	1.5	35.6	Ind	561	0.16	*0.32*	*0.03*	*0.02*	0.06
	white catfish	F-3580	8170	3.1	42.1	Ind	1256	0.50	*0.18*	*0.07*	*0.03*	0.06
Carnegie Lake												
	bluegill	F-2019	7778		16.7	Ind	86					
	bluegill	F-2020	7779		17.9	Ind	121					
	bluegill	F-2018	7777		19.0	Ind	124					
	largemouth bass	F-2021	7780		34.3	Ind	561					
	largemouth bass	F-2022	7781		38.3	Ind	851					
	largemouth bass	F-2023	7782		43.3	Ind	1166					
	largemouth bass	F-2024	7783		44.3	Ind	1438					
	largemouth bass	F-2025	7784		49.6	Ind	2181					
	white perch	F-2029	7788		20.8	Ind	107					
	white perch	F-2031	7790		20.8	Ind	105					
	white perch	F-2030	7789		21.0	Ind	117					
Davidson Mill Pond												
	American eel	F-3362	7821	22.5	75.2	Ind	1072	17.62	0.95	1.27	*0.03*	0.15
	American eel	F-3363	7822	23.8	79.0	Ind	873	19.35	1.18	1.56	0.11	0.18
	bluegill	F-2034	7793		18.1	Ind	126					
	bluegill	F-2032	7791		19.0	Ind	149					
	bluegill	F-2033	7792		20.3	Ind	175					
	chain pickerel	F-3354	7813		43.5	Ind	551					
	chain pickerel	F-3353	7812		43.9	Ind	559					
	chain pickerel	F-3355	7814		48.3	Ind	623					
	largemouth bass	F-2035	7794		37.7	Ind	783					
	largemouth bass	F-3336	7795		40.4	Ind	915					
	largemouth bass	F-3337	7796		41.3	Ind	1221					

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Delaware-Raritan Canal at Griggstown												
	American eel	F-3429	7895	19.3	45.0	Ind	175	23.30	1.03	0.95	0.07	0.08
	American eel	F-3430	7896	17.4	47.3	Ind	194	33.35	*0.21*	1.21	0.04	0.24
	American eel	F-3428	7894	17.8	47.6	Ind	249	26.90	1.89	0.88	0.05	0.17
	bluegill	F-3416	7882		19.0	Ind	154					
	bluegill	F-3415	7881		19.2	Ind	170					
	bluegill	F-3414	7880		19.5	Ind	158					
	brown bullhead	F-3417	7883		30.6	Ind	476					
	brown bullhead	F-3418	7884		33.3	Ind	*566*					
	brown bullhead	F-3419	7885		33.6	Ind	*565*					
	chain pickerel	F-3408	7874		36.0	Ind	242					
	chain pickerel	F-3409	7875		51.6	Ind	970					
	chain pickerel	F-3410	7876		57.8	Ind	1426					
	channel catfish	F-3437	7903	7.2	41.6	Ind	682	8.01	*0.21*	0.30	0.22	0.13
	channel catfish	F-3439	7905	8.5	43.9	Ind	867	9.33	*0.15*	0.39	0.13	0.19
	channel catfish	F-3438	7904	3.8	51.1	Ind	1391	4.09	*0.20*	*0.15*	0.06	0.05
	largemouth bass	F-3420	7886		28.5	Ind	316					
	largemouth bass	F-3422	7888		30.1	Ind	396					
	largemouth bass	F-3423	7889	1.0	34.5	Ind	*599*	0.66	*0.09*	*0.03*	*0.01*	*0.01*
	largemouth bass	F-3424	7890	1.4	38.9	Ind	970	1.52	*0.25*	*0.08*	*0.02*	*0.01*
	largemouth bass	F-3421	7887	1.0	39.1	Ind	919	0.83	*0.15*	*0.03*	*0.01*	*0.02*
	smallmouth bass	F-3426	7892		21.9	Ind	133					
	smallmouth bass	F-3425	7891		22.2	Ind	150					
	smallmouth bass	F-3427	7893		46.7	Ind	1759					
Delaware-Raritan Canal at Lambertville												
	American eel	F-3591	9908	22.8	30.3	Ind	52	8.88	0.90	0.74	0.10	1.48
	American eel	F-3593	9909	21.6	31	Ind	57	13.30	1.27	1.27	0.13	3.10
	American eel	F-3592	9907	27.5	33.6	Ind	83	9.64	0.41	0.25	0.14	1.66
	bluegill	F-1983	7715		18.5	Ind	127					
	bluegill	F-1981	7713		18.6	Ind	145					
	bluegill	F-1982	7714		19.3	Ind	142					
	common carp	F-1936	7655	3.1	52.5	Ind	2388	0.96	*0.16*	*0.09*	0.16	0.07
	common carp	F-1937	7656	5.0	56.4	Ind	2855	1.77	*0.32*	*0.06*	0.33	0.11
	common carp	F-1938	7657	2.6	56.7	Ind	2992	0.47	*0.12*	*0.05*	0.11	0.06
	largemouth bass	F-1997	7729	0.7	28.4	Ind	356	0.35	*0.19*	*0.03*	*0.01*	*0.02*
	largemouth bass	F-1998	7730	0.7	28.7	Ind	354	0.31	*0.15*	*0.03*	*0.01*	*0.02*
	largemouth bass	F-1996	7728	0.7	28.8	Ind	325	0.34	*0.29*	*0.04*	*0.02*	*0.01*
Delaware-Raritan Canal at Port Mercer												
	American eel	F-3341	7800	22.2	47.3	Ind	201	27.78	2.25	1.63	0.39	0.24
	American eel	F-3342	7801	16.4	48.6	Ind	224	19.77	2.88	0.89	0.09	0.23
	American eel	F-3343	7802	19.4	49.5	Ind	225	28.72	1.18	1.29	0.27	0.24
	bluegill	F-2017	7776		18.5	Ind	127					
	bluegill	F-2015	7774		19.6	Ind	170					
	bluegill	F-2016	7775		19.9	Ind	149					
	chain pickerel	F-3338	7797		31.2	Ind	170					
	chain pickerel	F-3340	7799		35.6	Ind	206					
	chain pickerel	F-3339	7798		38.2	Ind	314					
	common carp	F-3346	7805	1.8	59.0	Ind	3035	2.52	*0.15*	0.35	0.06	0.05
	common carp	F-3344	7803	7.0	59.6	Ind	3300	6.91	2.98	0.71	0.21	0.12
	common carp	F-3345	7804	6.5	60.6	Ind	2986	4.25	1.58	0.82	0.08	0.13
	largemouth bass	F-2026	7785	0.8	35.1	Ind	762	2.09	*0.32*	0.18	*0.02*	*0.03*
	largemouth bass	F-2027	7786	0.7	37.0	Ind	845	0.69	*0.25*	0.07	*0.01*	*0.01*
	largemouth bass	F-2028	7787	1.1	39.8	Ind	1107	1.77	*0.32*	0.17	*0.01*	*0.02*

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Delaware-Raritan Canal at South Bound Brook												
	bluegill	F-3520	8074		19.9	Ind	157					
	bluegill	F-3521	8075		20.7	Ind	180					
	bluegill	F-3522	8076		21.5	Ind	213					
	channel catfish	F-3563	8152	7.0	40.6	Ind	617	10.51	*0.59*	1.20	0.15	0.39
	channel catfish	F-3564	8153	3.0	40.7	Ind	526	3.89	0.67	0.49	0.10	0.15
	channel catfish	F-3555	8109	3.5	56.5	Ind	2070	4.95	0.67	0.58	0.11	0.40
	common carp	F-3568	8157	9.8	58.5	Ind	3994	13.55	1.70	1.51	0.27	0.40
	common carp	F-3571	8160	6.1	66.5	Ind	4000	8.90	2.52	1.01	0.23	0.45
	common carp	F-3572	8161	6.5	69.4	Ind	5400	9.57	2.25	1.09	0.12	0.43
	largemouth bass	F-3552	8106		37.1	Ind	806					
	largemouth bass	F-3553	8107		39.9	Ind	1012					
	largemouth bass	F-3554	8108		44.2	Ind	1408					
	yellow perch	F-3523	8077		27.8	Ind	251					
	yellow perch	F-3524	8078		29.5	Ind	315					
	yellow perch	F-3525	8079		31.5	Ind	345					
Delaware-Raritan Canal at West Trenton												
	American eel	F-3562	8151	16.5	58.4	Ind	381	3.93	*0.46*	0.24	0.14	0.47
	American eel	F-3558	8112	1.8	63.4	Ind	536	1.00		*0.14*	*0.02*	0.30
	American eel	F-3557	8111	20.8	68.6	Ind	747	5.38	0.70	0.51	0.09	0.90
	bluegill	F-3512	8066		16.6	Ind	86					
	bluegill	F-3513	8067		17.2	Ind	109					
	bluegill	F-3511	8065		18.1	Ind	121					
	channel catfish	F-3566	8155		55.7	Ind	1684	1.154	0.744	*0.055*	0.055	0.193
	channel catfish	F-3565	8154		56.0	Ind	1965	1.844	0.700	*0.116*	0.100	0.203
	channel catfish	F-3567	8156		65.6	Ind	3502	2.726	1.304	*0.127*	0.161	0.306
	common carp	F-3570	8159	3.5	58.4	Ind	3088	2.11	*0.55*	0.21	0.11	0.32
	common carp	F-3556	8110	4.8	60.5	Ind	2974	2.02	*0.00*	*0.25*	*0.00*	*0.25*
	common carp	F-3569	8158	3.4	60.5	Ind	4787	1.72	*0.43*	*0.19*	0.09	0.16
	largemouth bass	F-3560	8149		31.4	Ind	423					
	largemouth bass	F-3559	8148		31.8	Ind	453					
	largemouth bass	F-3561	8150		32.1	Ind	480					
	smallmouth bass	F-3544	8098		32.8	Ind	370					
	smallmouth bass	F-3543	8097		34.5	Ind	564					
	smallmouth bass	F-3542	8096		35.5	Ind	438	0.349	*0.316*	*0.022*	*0.023*	0.061
	walleye	F-3545	8099		32.8	Ind	277					
	walleye	F-3546	8100		38.7	Ind	537	1.748	*0.336*	*0.067*	*0.043*	0.034
	walleye	F-3547	8101		64.0	Ind	2232	2.803	0.631	*0.118*	0.063	0.287
DeVoe Lake												
	brown bullhead	F-1800	7617	2.5	30.9	Ind	418	2.22	1.94	*0.19*	0.10	0.47
	brown bullhead	F-1801	7618	0.6	32.5	Ind	372	0.37	*0.20*	*0.05*	*0.02*	*0.02*
	brown bullhead	F-1799	7616	1.0	35.7	Ind	727	0.83	*0.33*	*0.08*	*0.02*	*0.02*
	chain pickerel	F-1796	7613		45.8	Ind	556					
	chain pickerel	F-1798	7615		50.0	Ind	729					
	chain pickerel	F-1797	7614		50.5	Ind	708					
Duhernal Lake												
	bluegill	F-3347	7806		18.4	Ind	172					
	bluegill	F-3348	7807		20.2	Ind	187					
	bluegill	F-3349	7808		22.3	Ind	249					
	brown bullhead	F-3371	7830	0.5	31.6	Ind	472	0.81	*0.41*	*0.10*	*0.04*	0.05
	brown bullhead	F-3370	7829	0.5	33.5	Ind	598	1.06	*0.28*	*0.11*	*0.03*	0.07
	brown bullhead	F-3372	7831	0.3	34.5	Ind	476	0.23	*0.12*	*0.03*	*0.01*	*0.01*
	largemouth bass	F-3374	7833	0.9	36.4	Ind	827	1.28	*0.37*	*0.09*	*0.04*	0.04
	largemouth bass	F-3373	7832	0.9	36.5	Ind	803	0.98	*0.38*	*0.11*	*0.02*	0.06
	largemouth bass	F-3375	7834	0.3	39.2	Ind	871	0.33	*0.47*	*0.04*	*0.02*	*0.03*

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Farrington Lake												
	bluegill	F-3367	7826		17.2	Ind	103					
	bluegill	F-3369	7828		17.8	Ind	110					
	bluegill	F-3368	7827		18.7	Ind	134					
	brown bullhead	F-3379	7838	0.4	29.8	Ind	325					
	brown bullhead	F-3380	7839	1.1	34.7	Ind	563	1.68	*0.16*	*0.12*	0.07	0.07
	brown bullhead	F-3381	7840	0.7	36.5	Ind	626	3.67	*0.17*	*0.18*	0.11	0.13
	chain pickerel	F-3376	7835		43.2	Ind	496	0.45	*0.10*	*0.03*	*0.04*	*0.02*
	chain pickerel	F-3377	7836		45.8	Ind	617					
	chain pickerel	F-3378	7837		48.8	Ind	1003					
	largemouth bass	F-3382	7841		39.8	Ind	881					
	largemouth bass	F-3386	7845		41.0	Ind	1147					
	largemouth bass	F-3385	7844	0.9	42.3	Ind	1111	0.94	*0.11*	*0.05*	*0.02*	0.07
	largemouth bass	F-3383	7842	1.1	46.3	Ind	1146	0.39	*0.40*	*0.01*	*0.02*	*0.02*
	largemouth bass	F-3384	7843	0.9	49.0	Ind	1832	0.29	*0.17*	*0.02*	*0.02*	*0.02*
	yellow perch	F-3387	7846		20.6	Ind	96					
	yellow perch	F-3388	7847		20.7	Ind	106					
	yellow perch	F-3389	7848		25.7	Ind	158					
Green Brook at Madison Ave. Bridge												
	American eel	F-1795	7612	13.4	44.4	Ind	156	41.01	2.38	2.34	0.45	1.15
	American eel	F-1794	7611	10.0	45.1	Ind	181	32.62	1.42	4.71	0.13	7.72
	American eel	F-1793	7610	9.7	57.2	Ind	426	31.21	1.40	2.10	0.17	0.33
Lamington River at Lamington												
	American eel	F-1995	7727	13.5	53.7	Ind	360	6.78	*0.53*	0.40	0.06	0.05
	American eel	F-1993	7725	18.1	60.2	Ind	449	8.53	1.48	0.50	0.00	1.41
	American eel	F-1994	7726	9.0	63.2	Ind	474	5.17	*0.36*	0.26	*0.03*	*0.03*
	brown trout	F-1999	7731		23.7	Ind	127					
	brown trout	F-2000	7732		26.1	Ind	186					
	redbreast sunfish	F-1990	7722		15.8	Ind	83					
	redbreast sunfish	F-1991	7723		16.1	Ind	83					
	redbreast sunfish	F-1992	7724		16.6	Ind	88					
	smallmouth bass	F-2003	7735		18.6	Ind	87					
	smallmouth bass	F-2001	7733		20.6	Ind	123					
	smallmouth bass	F-2002	7734		22.0	Ind	146					
Manahawkin Bay												
	weakfish	F-3597	9913	6.7	32	Ind	327	1.93	3.70	0.21	0.07	0.17
	weakfish	F-3595	9911	3.7	33.1	Ind	315	0.92	*0.32*	*0.11*	0.05	0.00
	weakfish	F-3596	9912	6.9	33.4	Ind	348	1.95	2.90	*0.07*	*0.03*	0.07
	weakfish	F-3594	9910	5.1	34.1	Ind	358	1.16	1.52	*0.13*	0.05	0.07
Manalapan Lake												
	American eel	F-3360	7819	16.3	49.5	Ind	228	20.20	19.67	1.48	0.14	0.21
	American eel	F-3361	7820	4.1	53.4	Ind	261	2.15	1.55	0.24	*0.02*	0.04
	American eel	F-3359	7818	15.5	59.7	Ind	423	0.99	*0.27*	*0.10*	*0.03*	0.03
	black crappie	F-3357	7816		21.0	Ind	135					
	black crappie	F-3358	7817		21.4	Ind	147					
	black crappie	F-3356	7815		22.8	Ind	183					
	bluegill	F-3351	7810		18.4	Ind	149					
	bluegill	F-3352	7811		18.4	Ind	158					
	bluegill	F-3350	7809		18.6	Ind	156					
	largemouth bass	F-3364	7823	0.5	38.0	Ind	901	0.28	*0.35*	*0.03*	*0.01*	*0.01*
	largemouth bass	F-3365	7824	0.5	39.1	Ind	993	0.35	*0.53*	*0.04*	*0.01*	*0.02*
	largemouth bass	F-3366	7825	1.1	40.8	Ind	1293	1.01	1.25	*0.13*	*0.01*	*0.02*

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Millstone River at Manville												
	bluegill	F-3501	8030		17.3	Ind	128					
	bluegill	F-3499	8028		17.6	Ind	127					
	bluegill	F-3500	8029		18.0	Ind	134					
	common carp	F-3496	8025	1.2	54.6	Ind	2350	2.35	*0.13*	*0.20*	0.05	0.05
	common carp	F-3498	8027	7.1	62.7	Ind	3900	14.73	1.50	1.32	0.09	0.46
	common carp	F-3497	8026	10.2	63.5	Ind	4000	20.24	*0.30*	1.25	0.13	0.08
	largemouth bass	F-3503	8032		35.6	Ind	722	2.089	1.803	*0.093*	*0.012*	0.053
	largemouth bass	F-3504	8033		36.0	Ind	802	3.552	4.097	*0.168*	*0.013*	0.246
	largemouth bass	F-3502	8031		36.2	Ind	680	1.505	1.619	*0.077*	*0.016*	0.000
North Branch Raritan River at Branchburg												
	American eel	F-2004	7736	13.2	52.5	Ind	293	6.89	0.70	0.62	0.05	0.06
	American eel	F-2005	7737	9.5	57.9	Ind	382	6.62	0.88	0.57	*0.02*	0.09
	American eel	F-2006	7738	12.6	65.5	Ind	672	4.75	*0.54*	0.45	*0.04*	0.06
	redbreast sunfish	F-3448	7914		16.2	Ind	92					
	redbreast sunfish	F-3450	7916		16.5	Ind	108					
	redbreast sunfish	F-3449	7915		17.1	Ind	107					
	smallmouth bass	F-3447	7913		23.3	Ind	173					
	smallmouth bass	F-3446	7912		25.5	Ind	222					
	smallmouth bass	F-3445	7911		27.6	Ind	286					
	yellow bullhead	F-3451	7917	1.4	19.3	Ind	100	0.67	*0.24*	*0.04*	*0.02*	*0.02*
	yellow bullhead	F-3452	7918	3.5	20.0	Ind	119	2.11	0.73	*0.18*	0.13	0.27
	yellow bullhead	F-3453	7919	0.9	20.4	Ind	120	0.28	*0.16*	*0.02*	*0.02*	*0.01*
New Market Pond												
	American eel	F-1941	7662	18.9	34.0	Ind	79	83.67	12.61	2.66	1.97	32.69
	American eel	F-1940	7658	23.4	46.6	Ind	228	90.33	11.59	3.70	0.33	33.42
	American eel	F-1939	7663	1.5	48.5	Ind	164	10.83	0.84	0.49	0.32	7.56
	black crappie	F-1985	7717	0.6	20.6	Ind	140	1.81	*0.31*	0.15	*0.02*	0.05
	black crappie	F-1986	7718	0.5	22.5	Ind	165	1.08	*0.29*	*0.11*	*0.03*	0.04
	black crappie	F-1984	7716	0.6	24.1	Ind	209	2.25	*0.29*	0.22	*0.03*	0.16
	bluegill	F-1978	7710	0.4	16.5	Ind	81	2.47	*0.46*	0.26	*0.02*	0.53
	bluegill	F-1980	7712	0.8	17.0	Ind	83	1.31	*0.30*	*0.12*	*0.02*	0.11
	bluegill	F-1979	7711	0.6	17.3	Ind	89	1.76	*0.28*	*0.19*	*0.01*	0.24
	brown bullhead	F-1944	7661	1.7	33.3	Ind	480	5.21	*0.52*	0.33	0.34	0.27
	brown bullhead	F-1943	7660	0.3	33.5	Ind	537	1.37	*0.21*	*0.07*	0.10	0.60
	brown bullhead	F-1942	7659	0.7	34.5	Ind	517	1.35	*0.12*	*0.08*	0.11	0.04
	common carp	F-1778	7576	2.8	50.7	Ind	2110	10.02	1.12	0.95	0.10	0.83
	common carp	F-1776	7574	4.5	52.7	Ind	2748	11.64	2.23	0.56	0.38	0.92
	common carp	F-1779	7577	2.4	53.0	Ind	2518	3.35	0.67	*0.20*	*0.02*	0.18
	largemouth bass	F-1987	7719	0.9	35.9	Ind	758	2.48	*0.58*	0.25	*0.01*	0.08
	largemouth bass	F-1988	7720	0.5	36.8	Ind	741	2.00	*0.41*	*0.18*	*0.02*	0.08
	largemouth bass	F-1989	7721	0.7	41.4	Ind	1085	3.52	*0.39*	0.38	*0.02*	0.12
Rahway River at Milton Lake												
	bluegill	F-3527	8081	0.7	17.0	Ind	93	3.45	*0.35*	0.56	*0.02*	0.12
	bluegill	F-3526	8080	0.7	17.7	Ind	117	2.52	*0.16*	0.33	*0.01*	0.12
	bluegill	F-3528	8082	0.6	17.8	Ind	108	4.88	*0.16*	0.77	*0.02*	0.08
	brown bullhead	F-3529	8083	0.7	33.9	Ind	570	2.30	0.07	0.29	0.03	0.09
	brown bullhead	F-3530	8084	0.9	34.7	Ind	591	9.58	0.90	1.18	*0.04*	0.04
	brown bullhead	F-3531	8085	1.3	35.9	Ind	650	3.33	*0.45*	0.40	0.05	0.04
	common carp	F-3550	8104	9.1	60.2	Ind	3295	16.48	0.85	1.75	0.67	0.71
	common carp	F-3551	8105	12.4	65.6	Ind	4950	3.62	*0.07*	0.56	*0.03*	0.15
	common carp	F-3549	8103	15.0	66.6	Ind	5550	26.55	0.63	2.56	0.44	0.62
	largemouth bass	F-3532	8086	0.6	43.3	Ind	1234	1.80	*0.09*	0.23	*0.01*	0.09
	largemouth bass	F-3533	8087	0.8	47.5	Ind	1949	2.47	*0.20*	0.34	*0.02*	0.75
	largemouth bass	F-3534	8088	1.1	49.5	Ind	2005	3.58	0.98	0.48	0.05	1.04

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Rahway River at Valley Road Pond												
	brown bullhead	F-3515	8069	3.3	27.0	Ind	255	18.76	0.87	2.01	0.15	0.26
	brown bullhead	F-3514	8068	1.8	27.3	Ind	278	11.31	*0.27*	1.32	0.05	0.17
	brown bullhead	F-3516	8070	1.5	32.5	Ind	482	8.93	*0.58*	1.12	0.05	0.12
	common carp	F-1780	7578	1.4	56.9	Ind	3025	6.81	*0.20*	0.59	0.00	0.33
	common carp	F-1783	7581	4.7	60.4	Ind	3945	22.83	*0.62*	2.15	*0.05*	0.88
	common carp	F-1781	7579	2.4	63.4	Ind	4072	9.41	1.10	1.31	0.07	0.24
	largemouth bass	F-3518	8072	0.7	34.0	Ind	653	4.84	*0.20*	0.57	*0.02*	0.05
	largemouth bass	F-3517	8071	1.2	34.1	Ind	662	7.02	*0.26*	0.87	*0.05*	0.11
	largemouth bass	F-3519	8073	0.9	37.0	Ind	900	3.72	*0.19*	0.59	*0.01*	0.07
Raritan Bay at Keansburg												
	blue crab	F-3598	9914H	9.5		Comp. of 6		19.69	6.78	1.93	0.58	6.45
	blue crab	F-3598	9914M	1.1		Comp. of 6		0.88	*0.39*	*0.11*	*0.02*	0.13
	blue crab	F-3599	9915H	10.2		Comp. of 6		28.71	18.20	2.83	1.45	10.30
	blue crab	F-3599	9915M	0.8		Comp. of 6		1.47	*0.50*	0.13	*0.01*	0.12
	blue crab	F-3600	9916H	11.1		Comp. of 5		28.53	2.24	1.97	0.39	9.22
	blue crab	F-3600	9916M	0.9		Comp. of 5		1.16	*0.12*	*0.06*	0.41	0.09
	summer flounder	F-3604	10027	1.5	44.7	Ind	876	0.53	*0.22*	*0.03*	*0.02*	0.05
	summer flounder	F-3605	10028	1.8	44.8	Ind	1111	0.78	*0.45*	*0.05*	*0.03*	0.06
	summer flounder	F-3603	10026	1.2	46.6	Ind	1240	0.84	*0.47*	*0.05*	*0.03*	0.06
Raritan Bay: Lower Bay												
	summer flounder	F-3608	10031	0.5	38.1	Ind	537	0.14	*0.18*	*0.02*	*0.02*	*0.02*
	summer flounder	F-3609	10032	1.7	43.5	Ind	913	0.58	0.65	*0.04*	*0.03*	0.08
	summer flounder	F-3607	10030	0.6	46.7	Ind	1047	0.18	*0.27*	*0.03*	*0.02*	*0.02*
Raritan River at Millstone River												
	American eel	F-3489	8018	16.8	57.6	Ind	436	15.04	1.07	1.79	0.10	0.93
	American eel	F-3490	8019	12.8	70.6	Ind	898	10.05	1.42	0.89	0.08	2.19
	American eel	F-3491	8020	9.8	71.0	Ind	909	9.28	*0.11*	0.84	0.05	0.18
	channel catfish	F-3477	8000	2.5	48.7	Ind	172	4.24	*0.32*	*0.14*	0.14	0.33
	channel catfish	F-3478	8001	2.7	53.0	Ind	242	5.03	*0.55*	0.63	0.12	0.25
	channel catfish	F-3479	8002	2.9	63.7	Ind	2422	4.85	*0.62*	0.57	0.13	0.20
	common carp	F-1782	7580	8.9	57.9	Ind	3298	13.11	*0.40*	0.67	0.47	0.49
	common carp	F-1777	7575	11.2	59.7	Ind	3620	18.08	0.81	0.86	0.54	0.38
	common carp	F-1784	7582	8.8	65.9	Ind	3788	8.50	0.63	0.70	*0.02*	0.25
	largemouth bass	F-3474	7997	0.8	32.4	Ind	564	1.05	*0.22*	*0.07*	*0.02*	*0.02*
	largemouth bass	F-3475	7998	1.0	37.2	Ind	143	0.80	*0.23*	*0.04*	*0.01*	0.06
	largemouth bass	F-3476	7999	0.5	43.0	Ind	1394	0.44	*0.19*	*0.03*	*0.01*	0.04
	redbreast sunfish	F-3461	7927		18.2	Ind	138					
	redbreast sunfish	F-3462	7928		18.2	Ind	106					
	redbreast sunfish	F-3460	7926		19.3	Ind	146					
	smallmouth bass	F-3455	7921		30.9	Ind	319					
	smallmouth bass	F-3454	7920		31.0	Ind	321					
	smallmouth bass	F-3456	7922		37.3	Ind	716					
	white catfish	F-3458	7924		32.6	Ind	476					
	white catfish	F-3457	7923		35.7	Ind	605					
	white catfish	F-3459	7925		40.1	Ind	859					
Raritan River at Route 1 Bridge												
	white catfish	F-3548	8102	2.7	45.3	Ind	1353	5.56	*0.09*	0.46	0.06	0.35
	white catfish	F-3541	8095	1.5	46.9	Ind	1494	2.71	*0.21*	*0.08*	*0.04*	0.88
	white catfish	F-3540	8094	2.4	47.4	Ind	1514	3.68	*0.23*	*0.12*	0.12	0.32
	white perch	F-3537	8091	2.4	21.0	Ind	147	2.75	*0.23*	*0.20*	0.00	0.20
	white perch	F-3538	8092	2.9	29.0	Ind	375	5.69	*0.17*	0.51	*0.03*	0.61
	white perch	F-3539	8093	3.7	31.0	Ind	444	7.90	*0.10*	0.73	*0.02*	1.11

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Rosedale Lake in Pennington												
	black crappie	F-1948	7667		24.1	Ind	203	0.59	*0.41*	0.30	0.05	0.05
	black crappie	F-1949	7668		25.7	Ind	232					
	black crappie	F-1950	7672		30.8	Ind	429					
	bluegill	F-1952	7673		18.4	Ind	128					
	bluegill	F-1951	7674		18.7	Ind	138					
	bluegill	F-1953	7675		20.2	Ind	156					
	common carp	F-1954	7671	2.8	62.2	Ind	2964	0.24	*0.33*	*0.06*	*0.04*	*0.02*
	common carp	F-1955	7669	6.7	64.1	Ind	3300					
	common carp	F-1956	7670	6.5	66.8	Ind	4000	0.59	*0.16*	*0.10*	*0.03*	0.06
	largemouth bass	F-1976	7708		40.0	Ind	1021					
	largemouth bass	F-1972	7704		47.6	Ind	1520					
	largemouth bass	F-1973	7705		47.7	Ind	1577					
Round Valley Reservoir												
	bluegill	F-1821	7639		21.5	Ind	211					
	bluegill	F-1819	7637		21.9	Ind	233					
	bluegill	F-1820	7638		22.0	Ind	247					
	channel catfish	F-1824	7643	5.6	50.2	Ind	1421	0.91	*0.17*	*0.03*	0.08	0.35
	channel catfish	F-1826	7645	3.6	58.7	Ind	2530	0.47	*0.06*	*0.01*	*0.04*	0.08
	channel catfish	F-1825	7644	2.3	61.8	Ind	2679	0.35	*0.08*	*0.02*	0.05	0.09
	lake trout	F-1814	7633	3.6	43.9	Ind	722	0.81	*0.08*	*0.06*	*0.04*	0.31
	lake trout	F-1817	7636		52.2	Ind	1405	2.36	*0.14*	*0.09*	*0.02*	0.13
	lake trout	F-1815	7634	1.6	53.7	Ind	1059	0.42	*0.07*	*0.02*	0.05	0.29
	lake trout	F-1816	7635	4.7	54.9	Ind	1599	0.37	*0.04*	*0.02*	*0.02*	0.17
	lake trout	F-1818	7640	7.1	66.5	Ind	3700	1.28	*0.06*	*0.04*	0.05	0.18
	largemouth bass	F-1967	7699		30.6	Ind	437	0.127	*0.246*	*0.017*	*0.017*	0.041
	largemouth bass	F-1970	7702		41.8	Ind	1252	0.321	*0.195*	*0.013*	*0.013*	*0.010*
	largemouth bass	F-1971	7703		45.1	Ind	1466	0.195	*0.311*	*0.021*	*0.010*	*0.017*
	white catfish	F-1822	7641		36.8	Ind	622					
	white catfish	F-1823	7642		40.0	Ind	897					
South Branch Raritan River at Long Valley/Clairmont												
	brown trout	F-3440	7906		22.0	Ind	127					
	brown trout	F-3441	7907		23.6	Ind	157					
	brown trout	F-3442	7908		25.9	Ind	172					
	brown trout	F-3443	7909		28.5	Ind	220					
	brown trout	F-3444	7910		30.8	Ind	348					
South Branch Raritan River at Flemington												
	American eel	F-1833	7652	19.5	56.9	Ind	453	7.43	*0.57*	0.23	0.08	2.10
	American eel	F-1834	7653	16.9	65.0	Ind	678	8.04	*0.33*	0.28	0.19	4.12
	American eel	F-1835	7654	15.6	68.0	Ind	808	7.39	*0.45*	0.26	0.08	2.07
	brown trout	F-1961	7693		21.1	Ind	87					
	brown trout	F-1962	7695		23.5	Ind	123					
	brown trout	F-1960	7692		27.2	Ind	196					
	redbreast sunfish	F-1958	7690		17.6	Ind	129					
	redbreast sunfish	F-1957	7689		18.1	Ind	142					
	redbreast sunfish	F-1959	7691		18.2	Ind	125					
	smallmouth bass	F-1964	7697	0.4	26.1	Ind	210	0.27	*0.32*	*0.04*	*0.01*	*0.02*
	smallmouth bass	F-1963	7696	0.5	26.7	Ind	243	0.30	*0.53*	*0.04*	*0.02*	*0.02*
	smallmouth bass	F-1965	7698	0.7	32.1	Ind	409	0.52	*0.31*	*0.07*	*0.01*	*0.02*
	yellow bullhead	F-1946	7665	1.6	20.9	Ind	128	0.93	*0.23*	*0.11*	0.05	0.10
	yellow bullhead	F-1947	7666	0.9	21.0	Ind	137	0.54	*0.23*	*0.06*	0.06	*0.02*
	yellow bullhead	F-1945	7664	2.3	23.7	Ind	202	1.16	*0.33*	*0.15*	0.08	0.04
South Branch Raritan River at High Bridge												
	American eel	F-1806	7625	12.9	48.9	Ind	340	11.28	*0.43*	0.73	0.10	9.72
	American eel	F-1805	7624	16.7	53.1	Ind	305	13.41	*0.56*	0.87	*0.04*	8.20
	American eel	F-1807	7626	20.7	53.1	Ind	300	15.68	*0.58*	0.65	0.09	6.99
	redbreast sunfish	F-1810	7631		14.8	Ind	60					
	redbreast sunfish	F-1808	7628		15.8	Ind	82					
	redbreast sunfish	F-1809	7630		16.7	Ind	88					

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
South Branch Raritan River at Neshanic Station												
	American eel	F-3509	8038	18.6	63.0	Ind	536	11.06	*0.10*	1.13	*0.04*	0.11
	American eel	F-3508	8037	19.1	69.9	Ind	722	13.66	*0.40*	1.34	*0.03*	0.13
	American eel	F-3510	8039	18.8	72.5	Ind	748	11.59	*0.14*	1.18	*0.01*	1.20
	common carp	F-3483	8012		37.2	Ind	1056					
	common carp	F-3484	8013		42.7	Ind	1099	1.216	*0.177*	*0.065*	*0.024*	0.037
	common carp	F-3485	8014		46.1	Ind	1340	0.740	*0.317*	*0.030*	*0.014*	*0.009*
	largemouth bass	F-3480	8009	0.8	20.0	Ind	100	0.28	*0.52*	*0.05*	*0.03*	*0.02*
	largemouth bass	F-3481	8010	0.8	21.3	Ind	128	0.31	*0.26*	*0.05*	*0.02*	*0.02*
	largemouth bass	F-3482	8011	1.1	26.9	Ind	274	0.77	*0.52*	*0.11*	*0.01*	*0.02*
	redbreast sunfish	F-3464	7930		16.9	Ind	106					
	redbreast sunfish	F-3465	7931		17.7	Ind	108					
	redbreast sunfish	F-3463	7929		17.9	Ind	121					
	rock bass	F-3466	7932		20.4	Ind	174					
	rock bass	F-3467	7933		20.6	Ind	167					
	rock bass	F-3468	7934		21.1	Ind	197					
	smallmouth bass	F-3505	8034		34.9	Ind	486					
	smallmouth bass	F-3506	8035		41.1	Ind	834					
	smallmouth bass	F-3507	8036		49.9	Ind	1783					
Sandy Hook Bay												
	summer flounder	F-3602	10025	0.9	50.8	Ind	1446	0.51	*0.35*	*0.04*	*0.02*	0.08
	summer flounder	F-3601	10024	1.8	53.3	Ind	1632	0.54	*0.36*	*0.02*	*0.03*	0.03
	summer flounder	F-3606a-e	10029	1.4		Comp. of 5		0.43	*0.35*	*0.04*	*0.02*	0.05
South River at Sayreville												
	blue crab	F-1803	7619H	10.4		Comp. of 6		20.64	1.42	2.12	0.16	0.90
	blue crab	F-1803	7619M	0.8		Comp. of 6		1.48	*0.09*	*0.17*	*0.01*	*0.03*
	blue crab	F-1804	7620H	10.1		Comp. of 6		15.76	*0.56*	1.92	0.46	3.37
	blue crab	F-1804	7620M	0.6		Comp. of 6		1.11	*0.04*	*0.15*	*0.01*	*0.03*
	blue crab	F-1785	7621H	4.6		Comp. of 6		16.82	0.70	1.24	0.86	5.64
	blue crab	F-1785	7621M	0.5		Comp. of 6		3.08	*0.05*	0.28	0.06	0.04
	blue crab	F-1786	7622H	5.6		Comp. of 6		13.70	0.83	1.86	0.46	2.95
	blue crab	F-1786	7622M	0.3		Comp. of 6		1.64	*0.09*	*0.13*	*0.04*	*0.03*
	blue crab	F-1802	7623H	8.5		Comp. of 6		42.37	3.75	3.00	0.78	1.10
	blue crab	F-1802	7623M	0.8		Comp. of 6		2.39	*0.15*	*0.17*	*0.04*	0.04
	white catfish	F-3494	8023	2.9	27.5	Ind	228	5.04	*0.66*	*0.13*	0.00	0.19
	white catfish	F-3495	8024	2.0	28.1	Ind	272	3.93	*0.18*	0.36	0.08	0.10
	white catfish	F-3536	8090	3.1	37.7	Ind	721	5.81	*0.38*	0.32	0.00	*0.02*
	white perch	F-3535	8089	3.3	20.0	Ind	131	6.12	*0.14*	0.58	*0.03*	0.43
	white perch	F-3492	8021	4.3	26.5	Ind	288	8.90	*0.35*	0.69	*0.03*	0.68
	white perch	F-3493	8022	3.8	30.5	Ind	478	7.52	*0.38*	0.38	0.00	0.10
Spring Lake												
	common carp	F-1811	7627	0.9	48.3	Ind	1900	4.06	*0.11*	*0.16*	0.10	0.11
	common carp	F-1812	7629	4.1	54.5	Ind	2605	14.29	*0.33*	0.65	0.13	0.33
	common carp	F-1813	7632	2.0	64.6	Ind	4200	7.68	*0.56*	0.33	0.12	0.26

Appendix II. (cont.) Concentrations of dieldrin, endrin, aldrin, and endosulfans in samples from the 2006 NJ Routine Monitoring Program for the Raritan Region. Numbers in italics are BDL. ND samples are entered as 0.

Station Name	Common Name	Analytical Number	CHEM ID	Total Lipids	Lab Total Length	Sample Type	Total Weight	dieldrin	endrin	aldrin	endo-sulfan I	endo-sulfan II
				%	cm		g	ng/g wet	ng/g wet	ng/g wet	ng/g wet	ng/g wet
Spruce Run Reservoir												
	channel catfish	F-1830	7649	2.2	41.0	Ind	557	0.19	*0.07*	*0.02*	0.07	*0.03*
	channel catfish	F-1831	7650	2.2	*55.6*	Ind	1335	0.81	*0.10*	*0.02*	0.10	0.06
	channel catfish	F-1832	7651	1.8	*56.3*	Ind	1538	0.78	*0.20*	*0.04*	0.09	0.26
	common carp	F-1828	7647		*57.8*	Ind	2474	0.370	*0.258*	*0.030*	*0.013*	*0.019*
	common carp	F-1827	7646		*58.1*	Ind	2547	0.212	*0.167*	*0.019*	*0.012*	*0.014*
	common carp	F-1829	7648		*58.3*	Ind	4299	0.763	*0.524*	*0.038*	*0.029*	*0.019*
	largemouth bass	F-1968	7700		*28.7*	Ind	303					
	largemouth bass	F-1969	7701		*35.8*	Ind	713					
	largemouth bass	F-1975	7707		*39.8*	Ind	878	0.487	*0.165*	0.444	*0.004*	*0.023*
	largemouth bass	F-1977	7709		*42.9*	Ind	1349	0.109	*0.184*	0.494	*0.008*	*0.005*
	largemouth bass	F-1974	7706		*47.3*	Ind	1672	0.076	*0.350*	*0.013*	*0.012*	*0.022*
	northern pike	F-2013	7772		*65.5*	Ind	1699					
	northern pike	F-2014	7773		*68.5*	Ind	2071					
	northern pike	F-2012	7771		*76.8*	Ind	3042					
	bass hybrid	F-2007	7766	2.4	*42.4*	Ind	816	1.19	*0.42*	*0.14*	*0.03*	0.04
	bass hybrid	F-2008	7767	*5.7*	*48.0*	Ind	1470	2.62	*0.36*	0.28	*0.02*	0.04
	bass hybrid	F-2009	7768	*6.4*	*49.2*	Ind	1720	3.07	*0.28*	0.28	*0.02*	0.04
	bass hybrid	F-2010	7769	*5.7*	*53.6*	Ind	2051	2.48	*0.31*	0.23	*0.01*	0.07
	bass hybrid	F-2011	7770	*6.9*	*54.3*	Ind	2878	3.33	*0.26*	0.34	*0.01*	0.11
Weston Mill Pond												
	American eel	F-3411	7877	17.7	*49.8*	Ind	285	50.26	2.12	1.84	0.14	10.82
	American eel	F-3412	7878	17.4	*50.2*	Ind	257	49.28	2.28	1.41	0.13	0.14
	American eel	F-3413	7879	20.8	*55.1*	Ind	366	51.22	3.81	1.82	0.19	0.37
	black crappie	F-3391	7850		*25.8*	Ind	280					
	black crappie	F-3390	7849		*26.9*	Ind	274					
	black crappie	F-3392	7851		*26.9*	Ind	311					
	bluegill	F-3405	7871		*17.7*	Ind	139					
	bluegill	F-3407	7873		*18.6*	Ind	143					
	bluegill	F-3406	7872		*18.9*	Ind	149					
	brown bullhead	F-3396	7855		*27.1*	Ind	245	2.133	*0.173*	0.642	0.077	0.765
	brown bullhead	F-3397	7856		*28.2*	Ind	320	9.202	*0.326*	0.419	0.215	2.130
	brown bullhead	F-3398	7857		*35.7*	Ind	598	1.212	*0.260*	*0.060*	*0.027*	0.333
	chain pickerel	F-3401	7860		*38.9*	Ind	338					
	chain pickerel	F-3400	7859		*45.9*	Ind	542					
	chain pickerel	F-3399	7858		*48.0*	Ind	566					
	largemouth bass	F-3404	7863	0.6	*38.0*	Ind	734	0.48	*0.12*	*0.03*	*0.01*	*0.01*
	largemouth bass	F-3402	7861	0.8	*38.1*	Ind	857	1.26	*0.21*	*0.07*	*0.03*	*0.03*
	largemouth bass	F-3403	7862	0.7	*39.5*	Ind	912	1.18	*0.14*	*0.05*	*0.01*	*0.01*
	yellow perch	F-3395	7854		*25.3*	Ind	226					
	yellow perch	F-3394	7853		*26.3*	Ind	250					
	yellow perch	F-3393	7852		*29.3*	Ind	272					

Appendix III.

Data for Individual Samples for Total Furan and Total Dioxin

Appendix III. Total furans and dioxins in samples from the 2006 routine monitoring in fish program. TEQs are toxic equivalents based on relative toxicities (TEFs) of different furan and dioxin congeners. TEQs are calculated from furan and dioxin data only and do not include any PCB congeners.

	Station Name	Lab TL (cm) or Number in composite	Tissue	% solid	% Lipid	Total Furans	Total Dioxins	TEQ	CHEM ID	Fish Identifier	GERG ID
Blue crab (*Callinectes sapidus*)											
	Raritan Bay at Keansburg	comp. of 6	hepato	23.9	24.4	6.90	0.00	0.21	9914H	F-3598	C58473
	Raritan Bay at Keansburg	comp. of 6	hepato	27.8	25.3	34.66	23.65	0.37	9915H	F-3599	C58474 **
	Raritan Bay at Keansburg	comp. of 5	hepato	25.9	23.9	0*	0*	0*	9916H	F-3600	C58475
	South River at Sayreville	comp. of 6	hepato	20.5	22.5	41.55	42.27	10.63	7623H	F-1802 a-f H	C57798
	South River at Sayreville	comp. of 6	muscle	17.0	1.5	0.00	0.67	0.67	7623M	F-1802 a-f M	C57799
	South River at Sayreville	comp. of 6	hepato	23.8	29.7	47.64	22.81	4.81	7619H	F-1803 a-f H	C57800
	South River at Sayreville	comp. of 6	muscle	17.8	2.2	2.16	3.69	0.87	7619M	F-1803 a-f M	C57801
	South River at Sayreville	comp. of 6	hepato	23.7	25.2	35.73	50.85	3.68	7620H	F-1804 a-f H	C57802
	South River at Sayreville	comp. of 6	muscle	19.1	2.7	0.00	0.00	0.00	7620M	F-1804 a-f M	C57803
Common carp (*Cyprinus carpio*)											
	New Market Pond	52.7	filet	24.5	12.3	11.81	0.00	1.75	7574	F-1776	C57789
	New Market Pond	50.7	filet	22.8	7.2	7.46	3.07	1.06	7576	F-1778	C57791
	New Market Pond	53.0	filet	24.1	9.4	8.08	3.11	1.39	7577	F-1779	C57792
	Rahway River at Valley Rd. Pond	56.9	filet	22.4	3.7	2.16	1.30	0.12	7578	F-1780	C57793
	Rahway River at Valley Rd. Pond	63.4	filet	22.2	6.9	1.14	13.72	0.41	7579	F-1781	C57794
	Rahway River at Valley Rd. Pond	60.4	filet	25.2	13.3	5.04	6.85	0.88	7581	F-1783	C57796
	Raritan River at Millstone River	59.7	filet	30.0	29.5	8.62	23.44	3.53	7575	F-1777	C57790
	Raritan River at Millstone River	57.9	filet	28.7	29.1	8.24	24.14	1.47	7580	F-1782	C57795
	Raritan River at Millstone River	65.9	filet	30.8	25.7	7.40	31.86	3.69	7582	F-1784	C57797
Summer flounder (*Paralichthys dentatus*)											
	Atlantic Ocean North	48.1	filet	23.5	3.0	0.21	0.18	0.18	10033H	F-3610	C58485 **
	Atlantic Ocean North	46.3	filet	22.4	2.9	0.00	0.00	0.00	10034	F-3611	C58486
	Atlantic Ocean North	comp. of 5	filet	19.9	1.6	0*	0*	0*	10035	F-3612a-e	C58487 **
	Lower Bay	46.7	filet	21.7	0.7	0.00	0.00	0.00	10030	F-3607	C58482
	Lower Bay	38.1	filet	21.6	0.6	0.00	0.00	0.00	10031	F-3608	C58483
	Lower Bay	43.5	filet	22.0	2.2	0.00	0.00	0.00	10032	F-3609	C58484
	Raritan Bay at Keansburg	46.6	filet	23.6	2.2	0.00	0.19	0.19	10026	F-3603	C58478
	Raritan Bay at Keansburg	44.7	filet	24.4	2.8	0.00	0.00	0.00	10027	F-3604	C58479
	Raritan Bay at Keansburg	44.8	filet	22.5	2.5	0.00	0.00	0.00	10028	F-3605	C58480
	Sandy Hook Bay	53.3	filet	24.6	2.7	0.00	0.00	0.00	10024	F-3601	C58476
	Sandy Hook Bay	50.8	filet	22.6	1.1	0.00	0.00	0.00	10025	F-3602	C58477
	Sandy Hook Bay	comp. of 5	filet	21.8	2.1	0.00	4.14	0.00	10029	F-3606a-e	C58481
White perch (*Morone americana*)											
	Raritan River at Rt 1 Bridge	21.0	filet	25.9	5.3	4.12	1.20	0.27	8091	F-3537	C57807
	Raritan River at Rt 1 Bridge	29.0	filet	25.6	7.8	2.55	1.79	1.69	8092	F-3538	C57808
	Raritan River at Rt 1 Bridge	31.0	filet	24.9	10.7	6.02	4.05	0.61	8093	F-3539	C57809
	South River at Sayreville	26.5	filet	24.0	15.1	3.81	5.43	0.39	8021	F-3492	C57804
	South River at Sayreville	30.5	filet	25.0	13.2	11.64	2.71	4.29	8022	F-3493	C57805
	South River at Sayreville	20.0	filet	21.2	4.8	0.00	0.00	0.00	8089	F-3535	C57806

*Poor surrogate recovery; value unrelible
**Sample extracted twice;

Appendix IV.

Toxic Equivalence Factors for Individual Furan and Dioxin Congeners

Appendix IV. Toxic equivalance factors (TEF) for individual furan and dioxin congeners, used in calculation of total toxic equivalency (TEQ). TEFs are from van den Berg, et al. (1998), except for values marked with an *, which are taken from van den Berg, et al. (2006).

Congener		TEF [1, 2, 3]
Polychlorinated Dibenzodioxins	2,3,7,8-TCDD	1
	1,2,3,7,8-PeCDD	1
	1,2,3,4,7,8-HxCDD	0.1
	1,2,3,6,7,8-HxCDD	0.1
	1,2,3,7,8,9-HxCDD	0.1
	1,2,3,4,6,7,8-HpCDD	0.01
	OCDD	0.0003*
Polychlorinated Dibenzofurans	2,3,7,8-TCDF	0.1
	1,2,3,7,8-PeCDF	0.03*
	2,3,4,7,8-PeCDF	0.3*
	1,2,3,4,7,8-HxCDF	0.1
	1,2,3,6,7,8-HxCDF	0.1
	1,2,3,7,8,9-HxCDF	0.1
	2,3,4,6,7,8-HxCDF	0.1
	1,2,3,4,6,7,8-HpCDF	0.01
	1,2,3,4,7,8,9-HpCDF	0.01
	OCDF	0.0003*