In cooperation with the U.S. Air Force

Distribution and Sources of Polychlorinated Biphenyls in Woods Inlet, Lake Worth, Fort Worth, Texas, 2003

Scientific Investigations Report 2005–5064

U.S. Department of the Interior
U.S. Geological Survey

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By Richard E. Besse, Peter C. Van Metre, and Jennifer T. Wilson

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Distribution and Sources of Polychlorinated Biphenyls in Woods Inlet, Lake Worth, Fort Worth, Texas, 2003

By Richard E. Besse, Peter C. Van Metre, and Jennifer T. Wilson

Abstract

Woods Inlet is a flooded stream channel on the southern shore of Lake Worth along the western boundary of Air Force Plant 4 in Fort Worth, Texas, where elevated polychlorinated biphenyl (PCB) concentrations in sediment were detected in a previous study. In response, the U.S. Geological Survey, in cooperation with the U.S. Air Force, conducted a study in 2003 to map the extent of elevated PCB concentrations in Woods Inlet and to identify possible sources (or more specifically, source areas) of PCBs in the watershed of Woods Inlet. Three gravity cores (penetration to pre-reservoir sediment at three sites) and 17 box cores (surficial bottom sediment samples) were collected in Woods Inlet. Suspended sediment in stormwater runoff and streambed sediment were sampled in tributaries to Woods Inlet following storms. Assemblages of PCB congeners in surficial inlet sediments and suspended and streambed sediments were analyzed to indicate sources of PCBs in the inlet sediments on the basis of chemical signatures of PCBs. Woods Inlet receives runoff primarily from three tributaries: (1) Gruggs Park Creek, (2) the small unnamed creek that drains a Texas National Guard maintenance facility, called TNG Creek for this report, and (3) Meandering Road Creek. Twenty-seven of 209 possible PCB congeners were analyzed. The sum of the congeners was used as a measure of total PCB. The spatial distribution of total PCB concentrations in the inlet indicates that most PCBs are originating in the Meandering Road Creek watershed. Peak total PCB concentrations in the three gravity cores occurred at depths corresponding to sediment deposition dates of about 1960 for two of the cores and about 1980 for the third core. The magnitudes of peak total PCB concentrations in the gravity cores followed a spatial distribution generally similar to that of surficial bottom sediment concentrations. Total PCB concentrations in suspended and streambed sediment varied greatly between sites and indicated a likely source of PCBs associated with a sampling site that receives runoff from Air Force Plant 4. Three approaches to the analyses of congener assemblages indicate that PCBs in surficial bottom sediment of Woods Inlet primarily enter Lake Worth from Meandering Road Creek and that runoff from Air Force Plant 4 is a source of the PCBs in Meandering Road Creek. Although current (2003) transport of PCBs from Air Force Plant 4 to the creek is occurring, large decreases in PCB concentrations with decreasing age in two cores indicate that PCB loading to the inlet has decreased greatly since the 1960s. Because runoff entering Meandering Road Creek from some parts of Air Force Plant 4 was not measured or sampled in this study, it cannot be said with certainty that the Air Force Plant 4 site sampled is the only source of PCBs to Meandering Road Creek.

Introduction

Lake Worth is a reservoir on the West Fork Trinity River on the western edge of Fort Worth, Tex. (fig. 1). Air Force Plant 4 (AFP4) and Naval Air Station-Joint Reserve Base Carswell Field (NAS–JRB) are on the southern shore of Lake Worth. In spring 2000, following fish sampling by the U.S. Geological Survey (USGS) (Moring, 2002), the Texas Department of Health (TDH) issued a fish-consumption advisory because high levels of polychlorinated biphenyls (PCBs) detected in fish samples posed a “significant health risk” (Texas Department of Health, 2004). The occurrence of PCBs in fish prompted an investigation by the USGS, in cooperation with the U.S. Air Force (USAF), to sample and analyze Lake Worth bottom sediment for sediment-bound contaminants, including PCBs. The findings of that study (Harwell and others, 2003) reported elevated PCB concentrations in surficial sediment in Woods Inlet relative to those in surficial sediment in other parts of the lake (fig. 1). This finding indicated that a source of PCBs likely was in the watershed of Woods Inlet. Woods Inlet is on the southern shore of Lake Worth along the western boundary of AFP4 and downstream from urban development in the cities of Fort Worth

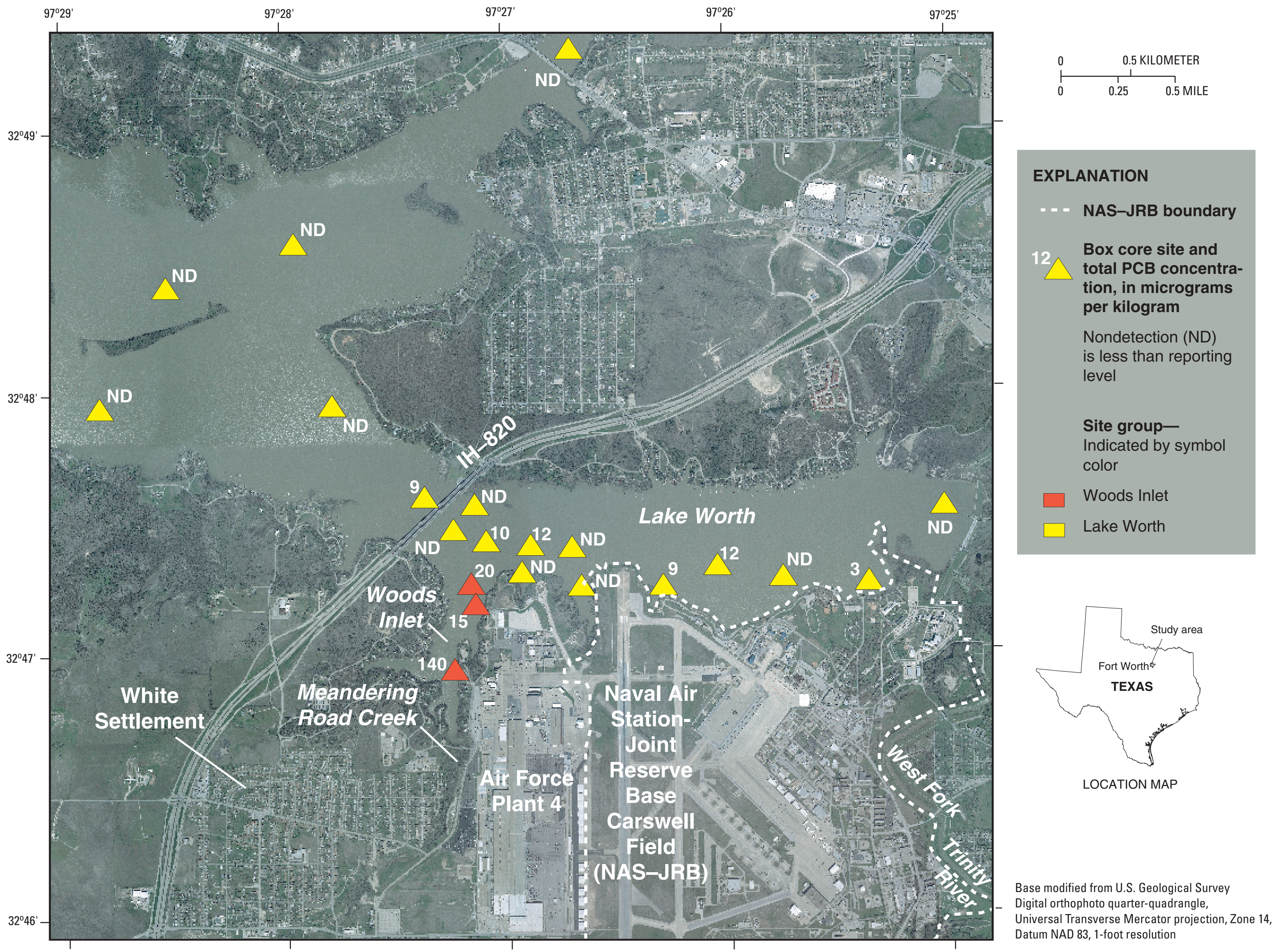


Figure 1. Location of study area and polychlorinated biphenyl (PCB) concentrations in surficial bottom sediment, Lake Worth, Fort Worth, Texas, 2000–2001 (modified from Harwell and others, 2003, fig. 10).

and White Settlement. Harwell and others (2003) also detected higher concentrations of selected trace elements (metals) and polycyclic aromatic hydrocarbons (PAHs) in Woods Inlet than in other parts of the lake.

In response to the elevated PCB concentrations in sediment in Woods Inlet, the USGS, again in cooperation with the USAF, conducted a study in 2003 to map the distribution of elevated PCB concentrations in Woods Inlet and to identify possible sources (or more specifically, source areas) of PCBs in the watershed of Woods Inlet. This report describes the methods and findings of that study. Gravity cores and surficial inlet bottom sediment samples were collected and analyzed to map the distribution of PCB concentrations in Woods Inlet. Suspended sediment in stormwater runoff and streambed sediment in tributaries to Woods Inlet were sampled following storms to identify current (2003) sources of PCBs. Assemblages of PCB congeners (groups of individual PCB compounds) in bottom sediments and suspended and streambed sediments were analyzed to indicate sources of PCBs in the bottom sediments in the inlet on the basis of chemical signatures of PCBs. Sediment samples also were analyzed for major and trace elements, selected PAHs, and selected organochlorine pesticides. Although those results are insufficient to describe distribution in Woods Inlet or to identify potential sources of trace elements, PAHs, and pesticides, those data are included in an appendix of this report.

The authors thank NAS–JRB and Lockheed Martin Corporation for access to the inlet and tributary sampling sites and for providing maps of watersheds on AFP4. Also, the authors thank the cities of Fort Worth and White Settlement for allowing the USGS to install suspended sediment samplers on streams.

Approach

The distribution of PCBs in Woods Inlet was determined using a combination of surficial bottom sediment samples (top 5 centimeters [cm] at 20 sites) and bottom sediments from gravity cores that penetrated the lacustrine sediment sequence that was deposited since 1914, when Lake Worth was constructed (three sites) (fig. 2; table 1). Sources of PCBs in current (2003) storm runoff were investigated by sampling suspended sediment at five sites on tributary streams (fig. 2) during three storms and by sampling streambed sediment at four of those five sites after each of the three storms. Historical and present-day sources of PCBs also were investigated by evaluating the relative distributions of PCB congeners in the stream and inlet sediment samples. Congener assemblages can be indicative of different PCB sources (Cacela and others, 2002; Colman, 2000; Johnson and others, 2000).

Table 1. Sampling site descriptive information, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003.

[--, not recorded]

Site identifier (fig. 2)	Latitude (degrees, minutes)	Longitude (degrees, minutes)	Sample date	Water depth (meters)
Surficial bottom sediment				
B1	97°27.551'	32°46.968'	04/22/03	1.5
B2	97°27.498'	32°46.962'	04/22/03	2.5
B3	97°27.377'	32°46.941'	04/22/03	3.6
B4	97°27.354'	32°46.783'	04/22/03	1.2
B5	97°27.319'	32°46.822'	04/22/03	2.7
B6	97°27.255'	32°46.721'	04/22/03	.9
B7	97°27.268'	32°46.772'	04/22/03	1.5
B8	97°27.271'	32°46.859'	04/22/03	3.3
B9	97°27.273'	32°46.895'	04/22/03	3.4
B10	97°27.266'	32°46.980'	04/22/03	3.8
B11	97°27.288'	32°46.999'	04/22/03	4.2
B12	97°27.322'	32°47.006'	04/22/03	4.3
B13	97°27.240'	32°47.058'	04/22/03	4.6
B14	97°27.273'	32°47.074'	04/22/03	4.4
B15	97°27.282'	32°47.088'	04/22/03	4.0
B16	97°27.156'	32°47.055'	04/22/03	4.0
B17	97°27.201'	32°47.150'	04/22/03	4.8
Core sediment				
WWD1	97°27.309'	32°46.950'	04/21/03	3.8
WWD2	97°27.422'	32°46.967'	04/21/03	3.4
WWD3	97°27.267'	32°46.811'	04/21/03	2.7
Suspended and streambed sediment				
GRUGGS	97°27.877'	32°46.732'	Multiple	--
TNG	97°27.424'	32°46.679'	Multiple	--
LMRC	97°27.212'	32°46.637'	Multiple	--
OF4	97°27.215'	32°46.572'	Multiple	--
UMRC	97°27.809'	32°46.003'	Multiple	--

Watershed Characteristics

Woods Inlet receives runoff primarily from three tributaries: (1) Gruggs Park Creek, (2) the small unnamed creek that drains a Texas National Guard maintenance facility (hereinafter, TNG Creek), and (3) Meandering Road Creek (fig. 2). Suspended and streambed sampling sites were established on each of these three creeks. One site near the mouth of Gruggs Park Creek (GRUGGS) receives runoff from urban and agricultural areas and from an interstate highway, but it does not receive runoff from AFP4. A second site near the mouth of TNG Creek (TNG) receives runoff from the Texas National Guard maintenance facility and urban areas but not from AFP4. A third site near the mouth of Meandering Road Creek (LMRC) receives runoff from three stormwater outfalls that drain areas of AFP4,

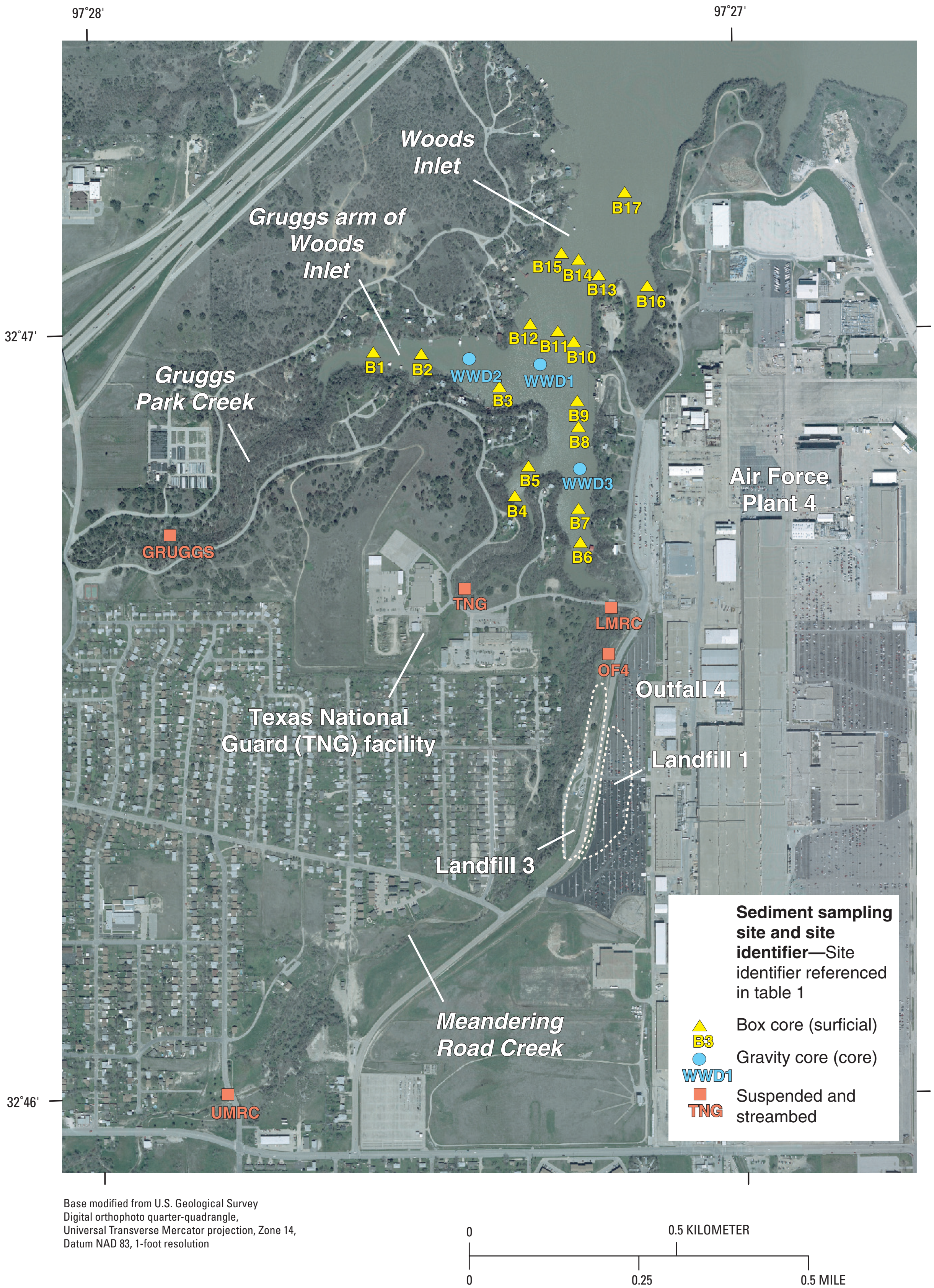


Figure 2. Sediment sampling sites for this study in Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas.

from two historical landfills (1 and 3) on AFP4, and from urban areas south and west of AFP4. A fourth site at outfall 4 about 200 meters (m) upstream from LMRC on Meandering Road Creek (OF4) receives runoff from buildings, parking areas, and one historical landfill on AFP4. A fifth site on Meandering Road Creek upstream from AFP4 (UMRC) receives runoff from urban areas but not from AFP4. GRUGGS and UMRC are considered urban reference sites because the sites receive runoff from urban areas but not from AFP4 or the Texas National Guard facility. The watershed areas (fig. 3) upstream from LMRC (4.1 square kilometers [km^2]), GRUGGS (2.0 km^2), and TNG (0.4 km^2) are 46, 55 and 71 percent urban (including industrial and transportation categories), respectively. The watershed area upstream from LMRC includes the watershed areas upstream from UMRC (2.8 km^2) and OF4 (0.2 km^2), which are 38 and 96 percent urban, respectively.

Suspended sediment samples were collected during three storms at each of the five sites. Streambed sediment samples were collected at all of the sites except OF4 following each of the three storms in which suspended sediment samples were collected.

Collection and Processing of Bottom Sediment Samples

Of the 20 sediment sampling sites in Woods Inlet, 17 were sampled for surficial bottom sediment only (fig. 2) using a 14- by 14- by 20-cm Wildco box corer. The box-core samples (top 5 cm) were removed from the box by vertical extrusion and sectioning following the methods of Van Metre and others (2004). Each sample was homogenized and split. A subsample for analysis of organic compounds was transferred to a baked-glass jar and chilled pending shipment to the USGS National Water Quality Laboratory (NWQL) in Denver, Colo. A subsample for analysis of major and trace elements (selected sites only), organic carbon, and grain size was transferred to a polypropylene jar, chilled, and returned to the USGS office in Austin, Tex. There, samples for analysis of major and trace elements and organic carbon were frozen, freeze-dried, and ground to a fine powder before shipment to the NWQL. Samples for analysis of grain size were stored in jars and shipped wet to the NWQL.

At three sampling sites, gravity cores were collected to investigate historical trends of sediment-associated contaminants in bottom sediment (fig. 2) following the sampling methods of Van Metre and others (2004). These sites were selected to represent historical trends in contaminants in the main body of Woods Inlet (WWD1) and in the two tributary arms, Gruggs Park Creek arm (WWD2) and Meandering Road Creek arm (WWD3). The cores were collected using a Benthos gravity corer with a diameter of 6.3 cm, a barrel length of as much as 3.1 m, and a polycarbonate core liner. Cores were subsampled on site by vertical extrusion of the sediment in measured increments using a piston fit into the bottom of the liner. All three gravity cores were subsampled at 5-cm intervals from the top of the core to a depth of 10 cm (two samples) and thereafter in 10-cm intervals to the bottom of the core. Each subsample was homogenized and split. Samples for analysis of organic compounds were transferred to a baked-glass jar, and samples for analysis of major and trace elements (one sample only), cesium-137 (^{137}Cs) for age-dating, and grain size were transferred to a polypropylene jar. Samples were chilled pending shipment to the NWQL or freeze-drying. Sampling tools were washed between each sample using phosphate-free detergent and native water.

Collection and Processing of Suspended Sediment Samples

Suspended sediment samples were collected at five sites during three storms using passive samplers (fig. 4). A passive sampler consists of a 36-cm diameter, capped steel pipe holding a 25-liter (L) Nalgene carboy with a water intake that is submerged during stormflow and an air exhaust tube. The sampler will obtain a 25-L sample of runoff from the “first flush” (initial rise in flow) during a storm. The streams are ephemeral and only flow in response to precipitation. During a storm, the water level rises above the level of the intake and fills the carboy. The air exhaust is constructed to block the flow of air or water once the carboy is filled, which prevents continual circulation through the sampler. Additional stormwater samples were collected during storms at some sites to provide a sufficient mass of suspended sediment for chemical analyses. The 25-L carboys were retrieved after the water level had fallen below the intakes of the samplers after a storm and transported to the USGS office in Fort Worth. The water was stored on ice until processing. Processing each sample took several hours, so processing all of the samples from a storm typically took from 1 to 2 days after the storm. In all, 15 environmental samples and one environmental duplicate sample were obtained for analysis.

Sediment was isolated from the water samples by in-line filtration following the methods of Mahler and Van Metre (2003). The 25-L carboy was agitated to suspend the sediment in the water column and immediately poured into a 25-L churn. The churn has a paddle that, with steady motion, keeps the sediment suspended and the sample well mixed during processing. As the original 25 L was filtered, additional water was poured into the churn from other bottles if available. Sediment for the inorganic analyses (major and trace elements) was collected on a 142-millimeter (mm) diameter, 0.45-micron (µm) pore size polytetrafluoroethylene (PTFE) filter in an acrylic filter holder. Sediment for the analysis of organic compounds was collected on a 293-mm diameter, 0.45-µm pore size PTFE filter in a stainless steel filter holder. Water was pumped from the churn with a peristaltic pump through the filter until the filter was clogged. The volume of water that was passed though the filter was noted. The filter was removed from the holder and placed in a locking plastic bag with 10 to 20 milliliters (mL) of deionized water. The filter was gently massaged in the bag to release the sediment from the filter. This process was repeated, usually three to six times, until enough sediment was collected for

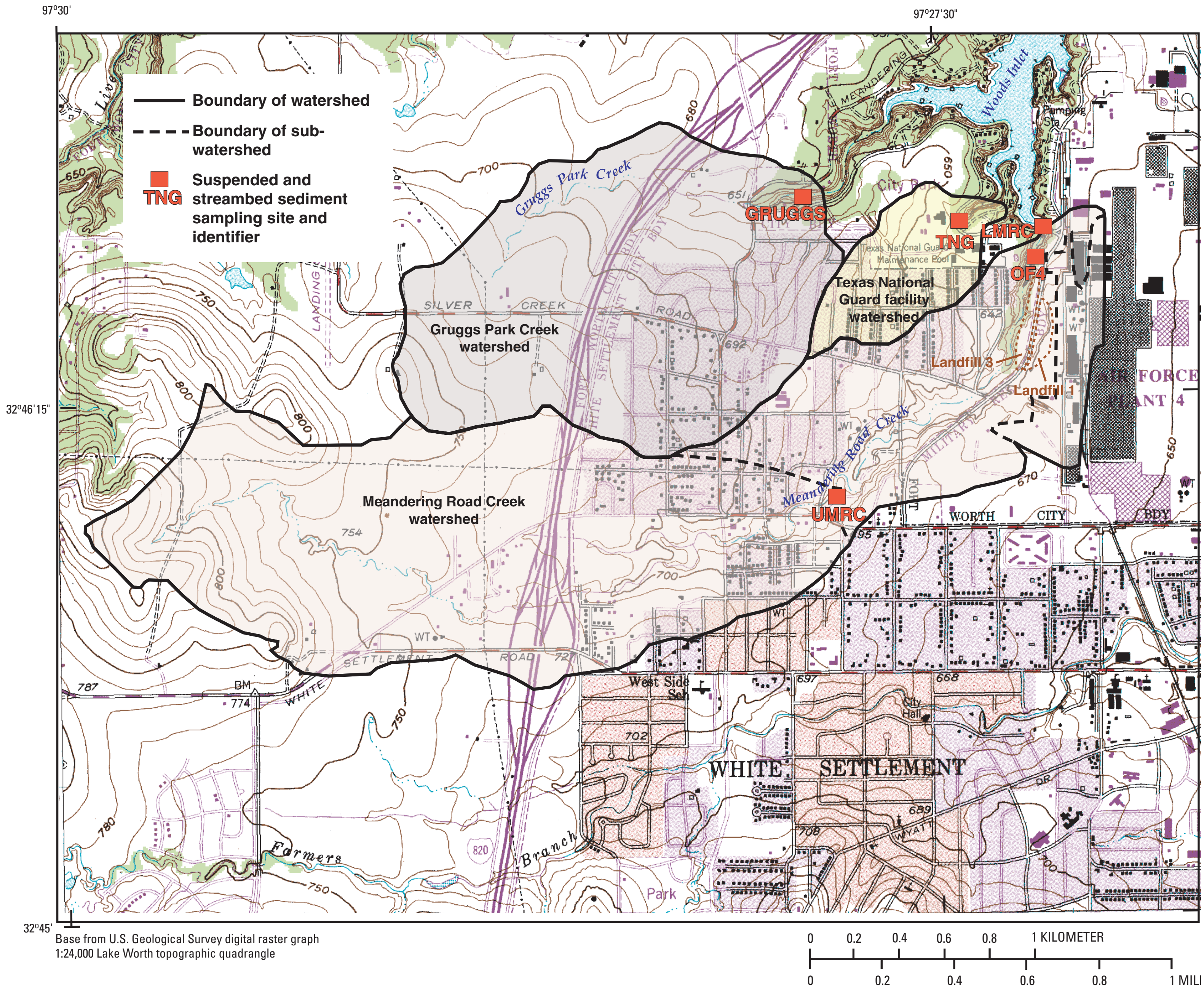


Figure 3. Watersheds of tributary streams to Woods Inlet, Lake Worth, Fort Worth, Texas.

Figure 4. Passive suspended sediment sampler, Gruggs Park Creek (a tributary to Woods Inlet), Lake Worth, Fort Worth, Texas, 2003.

analysis. The sediment slurry was then poured into a 125-mL glass or 125-mL Nalgene jar for organic and inorganic analysis, respectively. The samples for organic analysis were allowed to settle for approximately 4 days under refrigeration at which point the overlying water was decanted with a sterile glass pipette, and the samples were sent chilled to the NWQL. The samples for inorganic analysis were freeze-dried at the USGS office in Austin and then sent to the NWQL.

Collection and Processing of Streambed Sediment Samples

Streambed sediment samples were collected within 5 days of each storm runoff at four of the five sampling sites. No streambed sediment samples were collected at OF4 because the passive sampler is located at the end of a cement culvert, and therefore no streambed is upstream from the sampler. Twelve environmental samples and three environmental duplicate samples were collected. The environmental duplicates were collected independently by a second sampling team on the same day as the environmental samples were taken for each site. The objective in doing environmental duplicates this way was to test the repeatability of the streambed sediment sampling protocol, including environmental variability, sampling variability, and analytical uncertainty. Three laboratory duplicates (a single environmental sample split at the laboratory) of streambed sediment also were analyzed.

Streambed sediment samples were collected using a pre-cleaned nylon spoon to scoop 10 subsamples from the streambed in depositional areas with relatively fine-grained sediment, upstream from each of the four passive samplers (Shelton and Capel, 1994). The 10 subsamples from each site were put into wide-mouth glass jars to make a composite sample and taken to the USGS laboratory in Fort Worth for processing. Two liters of native water was collected from each site for sieving the samples. In the laboratory, the sediment from each site was poured into a large pre-cleaned Pyrex mixing bowl and homogenized with a Teflon spatula. Approximately one-half of the material was passed through a 2-mm mesh stainless steel sieve and the fraction less than 2 mm was collected in a 250-mL baked-glass jar for analysis of organic compounds. This sample was then put in a refrigerator and allowed to settle. The other half of the sample was processed for analysis of inorganic elements. Approximately 400 mL of native water was poured into a 1,000-mL glass beaker. An aliquot (two to three tablespoons) of the composite sample was placed into the center of a 63-µm nylon sieve cloth. The corners of the cloth were then drawn up to form a bag. This bag was dipped repeatedly into the beaker containing the native water separating out the particles of less than 63–µm diameter. This process was repeated until all of the composite sample was sieved, after which the slurry in the 1,000-mL beaker was transferred to a 500-mL plastic bottle and stored in a refrigerator and allowed to settle. After settling, the overlying liquid was decanted with a sterile glass pipette. Samples for analysis of organic compounds were shipped chilled to the NWQL. Samples for elemental analysis were freeze-dried, ground to a fine powder, and shipped to the NWQL.

Analytical Methods

Samples for analysis of major and trace elements were completely digested using a mixture of hydrochloric-nitric-perchloric-hydrofluoric acids and analyzed by inductively coupled plasma/mass spectrometry (ICP/MS) (Briggs and Meier, 2003). Mercury was analyzed by cold vapor atomic absorption spectrometry (Arbogast, 1996). ^{137}Cs activity was measured by counting freeze-dried sediments in fixed-geometry containers with a high-resolution, intrinsic germanium detector gamma-spectrometer (Robbins and Edgington, 1976).

Organochlorine pesticides, PCBs, PAHs, and alkyl-substituted PAHs (alkyl-PAHs) were extracted, isolated, and analyzed using the procedures of Noriega and others (2003) and Olson and others (2004). Briefly, wet bottom sediment was extracted overnight with dichloromethane in a Soxhlet apparatus. The extract was reduced in volume and filtered. Two

Table 2. Polychlorinated biphenyl congeners analyzed for this report.

Congener number	International Union of Pure and Applied Chemistry (IUPAC) name	Congener number	International Union of Pure and Applied Chemistry (IUPAC) name
8	*2,4′*-Dichlorobiphenyl	118	*2,3′,4,4′,5*-Pentachlorobiphenyl
18	*2,2′,5*-Trichlorobiphenyl	138	*2,2′,3,4,4′,5′*-Hexachlorobiphenyl
22	*2,3,4′*-Trichlorobiphenyl	146	*2,2′,3,4′,5,5′*-Hexachlorobiphenyl
26	*2,3′,5*-Trichlorobiphenyl	149	*2,2′,3,4’,5′,6*-Hexachlorobiphenyl
28	*2,4,4′*-Trichlorobiphenyl	151	*2,2′,3,5,5′,6*-Hexachlorobiphenyl
31	*2,4′,5*-Trichlorobiphenyl	170	*2,2′,3,3′,4,4′,5*-Heptachlorobiphenyl
33	*2,3′,4′*-Trichlorobiphenyl	174	*2,2′,3,3′,4,5,6′*-Heptachlorobiphenyl
44	*2,2′,3,5′*-Tetrachlorobiphenyl	177	*2,2′,3,3′,4,5′,6′*-Heptachlorobiphenyl
49	*2,2′,4,5′*-Tetrachlorobiphenyl	180	*2,2′,3,4,4′,5,5′*-Heptachlorobiphenyl
52	*2,2′,5,5′*-Tetrachlorobiphenyl	183	*2,2′,3,4,4′,5′,6*-Heptachlorobiphenyl
70	*2,3′,4′,5*-Tetrachlorobiphenyl	187	*2,2′,3,4′,5,5′,6*-Heptachlorobiphenyl
95	*2,2′,3,5′,6*-Pentachlorobiphenyl	194	*2,2′,3,3′,4,4′,5,5′*-Octachlorobiphenyl
101	*2,2′,4,5,5′*-Pentachlorobiphenyl	206	*2,2′,3,3′,4,4′,5,5′,6*-Nonochlorobiphenyl
110	*2,3,3′,4′,6*-Pentachlorobiphenyl		

aliquots of the sample extract were quantitatively injected into a polystyrene-divinylbenzene gel permeation column (GPC) and eluted with dichloromethane to remove sulfur and partially isolate the target analytes from coextracted high-molecular-weight interferents such as humic substances. The first aliquot was passed through a silica column cleanup step and then analyzed for PAHs and alkyl-PAHs by capillary-column gas chromatography (GC) with detection by mass spectrometry (MS). Parent PAHs were identified and quantified by comparison to authentic standards. Individual alkyl-PAHs were quantified when authentic alkyl-substituted standards were available. When authentic alkyl-substituted standards were unavailable, a parent PAH was used as the standard for quantitation. The multiple isomeric alkyl-PAHs were quantified from mass chromatograms as the sum of all isomers at each alkylation level (C1-naphthalenes, C2-naphthalenes, and so forth). Nineteen parent PAHs, 10 specific alkyl-PAHs, and the homologous series of alkyl-PAHs were determined. The second aliquot was further split into two fractions by combined alumina/silica adsorption chromatography followed by a micro Florisil column cleanup step prior to determination of the organochlorine pesticides and PCBs by dual capillary-column gas chromatography with electron capture detection (GC-ECD) (Olson and others, 2004). The organochlorine pesticides were reported as individual compounds. Technical chlordane was estimated from *trans*-nonachlor, *cis*-chlordane, and *trans*-chlordane concentrations. PCBs were reported as individual Aroclor (1016/1242, 1254, or 1260) equivalents (Noriega and others, 2003).

For this study, Fraction 1 (PCB fraction) of the organic-compound analysis was analyzed for 27 (of 209 possible) selected PCB congeners (table 2) along with the other Fraction 1 analytes during GC–ECD analysis. The congeners chosen for this analysis were some of the more dominant congeners in the most widely used Aroclors (1016, 1242, 1254, and 1260). In addition to the dominance of these congeners, potential co-elution issues and signal response for this analytical method were considered. A series of dilutions of a custom mixture containing the 27 selected PCB congeners was used to make the calibration standards. Calibration standards were prepared at four levels, and a minimum of three points were used for the calibration curves. An additional congener solution, prepared at a concentration that was mid-range on the curve, was used as a check standard to verify the calibration curve.

The laboratory reporting level for PCB Aroclors was 5 micrograms per kilogram (μg/kg); however, variations in sample mass, sample matrix, and analytical interferences raised reporting levels for some environmental samples to 20 μg/kg or more. A laboratory reporting level has not been established for individual congeners because the method is relatively new (W.T. Foreman, U.S. Geological Survey, written commun., 2001); however, it is believed to be conservatively about 1 μg/kg (M.C. Noriega, U.S. Geological Survey, oral commun., 2003). Concentrations well below that level were reported when the analyst was confident in the detection; those values were identified in the data tables in appendix 1.2 as estimated (E). Because the quantification of individual congeners is believed to be more precise than the Aroclor equivalents, the sum of the congeners was used as a measure of total PCB rather than the sum of the Aroclors. A comparison of all suspended, streambed, and bottom sediment samples indicated that the sum of the congeners accounted for 57 percent (mean, ± 6 percent [one standard deviation]) of the sum of the Aroclors.

Quality Control

Quality control for organic compound (PCB, PAH, organochlorine pesticide) analyses consisted of analyzing an

Table 3. Summary of median relative percent differences (RPDs) of duplicate samples from this study and other coring and suspended sediment studies done by the U.S. Geological Survey (USGS) in Texas.

[Number of samples in parentheses; PCBs, polychlorinated biphenyls; PAHs, polycyclic aromatic hydrocarbons]

Constituent	Core sediment samples	Surficial bottom sediment samples	Suspended sediment samples	Streambed sediment samples
Median RPDs from this study				
PCBs				
Aroclors	12.2 (4)	27.5 (1)	74.8 (1)	13.0 (6)
Congeners	12.0 (4)	21.2 (1)	35.5 (1)	25.0 (6)
Major and trace elements	No duplicate	2.0 (1)	1.6 (3)	2.1 (11)
PAHs	No duplicate	19.3 (1)	30.4 (1)	29.0 (6)
Organochlorine pesticides	No duplicate	16.3 (1)	No detections (1)	40.3 (6)
Median RPDs from other USGS studies using the same methods (Van Metre and others, 2004)				
PCBs				
Aroclors	11.2 (57)	8.3 (5)	24.7 (5)	No duplicate
Congeners	15.1 (1)	No duplicate	No duplicate	No duplicate
Major and trace elements	2.3 (66)	2.6 (4)	2.2 (49)	4.4 (6)
PAHs	11.2 (63)	14.9 (8)	19.8 (5)	6.6 (2)
Organochlorine pesticides	15.6 (57)	7.7 (5)	18.6 (5)	No duplicate

analytical blank sample, a spiked sample, a certified reference material (CRM), and a duplicate, and monitoring recovery of surrogate compounds with each set of 12 environmental samples (Noriega and others, 2003; Olson and others, 2004). PCB and organochlorine pesticide blank samples had no detections. PAH blank samples had detections for eight of the 11 compounds, with concentrations ranging from an estimated 0.18 to 1.4 µg/kg. The typical minimum reporting level for PAH compounds is 5 µg/kg. Median spike recoveries were 68 percent for PCBs and organochlorine pesticides and 69 percent for PAHs. PCB and organochlorine pesticide spike recoveries were within control limits for 93 percent of the spike results. No spike recovery control limits for the PAHs were established by the NWQL. CRM concentrations were within acceptable concentration ranges for 94 percent of the PCB and organochlorine pesticide CRM results and 88 percent of the PAH CRM results. All CRM concentrations that were outside an acceptable range were lower than the minimum value of the range. Recovery corrections were not applied. Quality control for major and trace element analyses consisted of analyzing several standard reference materials (SRMs) and one or more duplicates with each batch of as many as 20 samples. Median relative percent difference (RPD) for all elements for all SRMs was 4.2 percent.

Analytical results from two types of duplicate samples are included in this report—environmental duplicates and laboratory duplicates (appendixes 1 and 2). An environmental duplicate is a sample that is split into two jars at the time of collection; both jars are submitted to the laboratory for analysis. A laboratory duplicate is a single sample that is split by the laboratory during preparation and analyzed in duplicate. Although the analytical methods of PCB analysis were the same for core, surficial, suspended, and streambed sediment, sample mass was small enough for suspended sediment samples that reporting levels and precision were affected, and the number of duplicates analyzed was limited. Twelve duplicate samples were analyzed for PCBs (table 3). The median RPD of the duplicate PCB analyses ranged from 12.0 to 74.8 percent. Fifteen duplicate samples were analyzed for major and trace elements. The median RPD of the duplicate major and trace element analyses ranged from 1.6 to 2.1. Eight duplicate samples were analyzed for PAHs. The median RPD of the duplicate PAH analyses ranged from 19.3 to 30.4 percent. Eight duplicate samples were analyzed for organochlorine pesticides. The median RPD of the duplicate organochlorine pesticide analyses ranged from 16.3 to 40.3 percent. Generally, the median RPDs for PCBs were greater for the suspended and streambed sediment samples than for the core and surficial sediment samples.

In addition to the median RPDs of duplicate samples for this report, table 3 shows the median RPDs of duplicate samples from other USGS sediment coring studies using the same collection and analytical methods. Generally, the median RPDs of organic compounds for the suspended and streambed sediment samples in this report are greater than the median RPDs for the suspended and streambed sediment samples in other sediment coring studies. Few duplicate samples have been analyzed for PCB congeners in other sediment coring studies because the analytical method used by the NWQL is relatively new (W.T. Foreman, U.S. Geological Survey, written commun., 2001). Median RPDs for core sediment samples analyzed for PCBs and for all types of sediment samples analyzed for major and trace elements for this report are similar in magnitude to median RPDs for those constituents from other sediment coring studies.

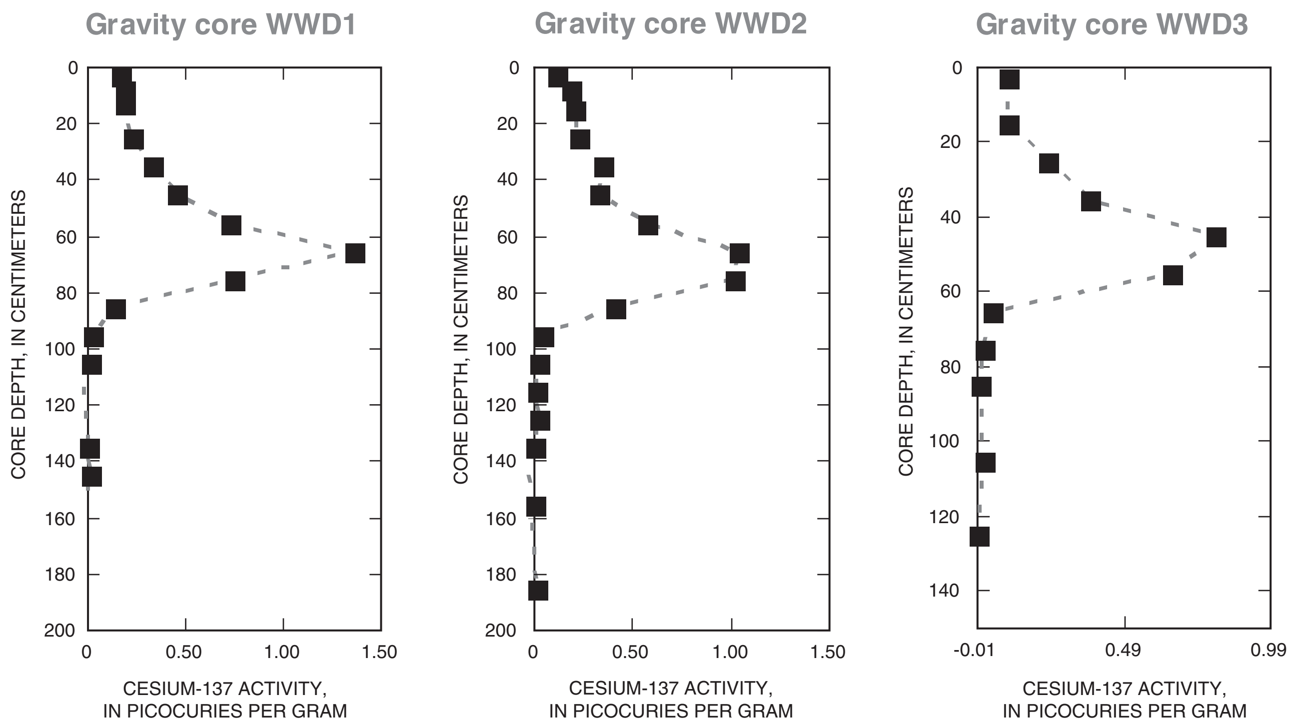


Figure 5. Cesium-137 profiles in gravity cores used for age-dating, Woods Inlet, Lake Worth, Texas, 2003.

Age-Dating Cores

The methods for age-dating reservoir and inlet cores used in this study are described in Harwell and others (2003) and Van Metre and others (2004). Briefly, a sediment core from an undisturbed depositional zone in a reservoir penetrates through layers of sediment deposited over the history of the reservoir. Several date markers are recorded in the core that allow for estimation of deposition dates for the core, usually assuming a constant sediment mass accumulation rate (MAR, in grams per centimeter squared per year) between the markers. Three date markers were used in cores from Lake Worth: the pre-reservoir land surface (the boundary between soil and lacustrine bottom sediment in the core) dated as 1914, the year construction of the dam was completed; the peak in ^{137}Cs, dated as 1964, when ^{137}Cs fallout from atmospheric testing of nuclear weapons peaked; and the top of the core matched with the sampling date (fig. 5). Between each of these depth-date markers, MARs were used to assign dates on the basis of the mass of each sample and of the cumulative mass between the mid-point of the sample and a date marker. Mass was estimated by accurately weighing measured volumes of wet and dry sediment to determine bulk density and density of solids, each in grams per cubic centimeter.

Sedimentation rates in reservoirs commonly decrease over time as the shoreline gradually stabilizes. Callender and Robbins (1993) found that an exponentially decreasing model of MAR fit the pattern of decreasing sedimentation rates in 48 of 83 reservoirs they studied. Sedimentation rates in all three Woods Inlet gravity cores decreased over time as indicated by comparison of MAR before and after the ^{137}Cs peak in 1964. An exponential model was applied to these three cores to assign deposition dates to samples following the approach of Van Metre and others (2004). Porosity, activity of ^{137}Cs, MAR, and deposition dates are listed in appendix 1.1.

Distribution and Sources of Polychlorinated Biphenyls in Woods Inlet

Detection frequencies for the 27 PCB congeners varied by the degree of chlorination and by sample type. In general, detection frequency increased with increasing degree of chlorination and was higher in surficial bottom sediment than in suspended and streambed sediment (fig. 6). Detection frequencies for PCB 8, for example, with two chlorine atoms, were 20 and 8 percent for inlet and stream sediments, respectively. Average detection frequency for the heptachlorobiphenyls (seven chlorine atoms) were 100 and 78 percent for surficial bottom sediments and suspended and streambed sediments, respectively.

Polychlorinated Biphenyls in Bottom Sediment

Total PCB concentrations in 20 samples of surficial bottom sediment from Woods Inlet ranged from 4.75 to 73.8 μg/kg (fig. 7; appendix 1.2). Total PCB concentrations were highest near the mouth of Meandering Road Creek and decreased

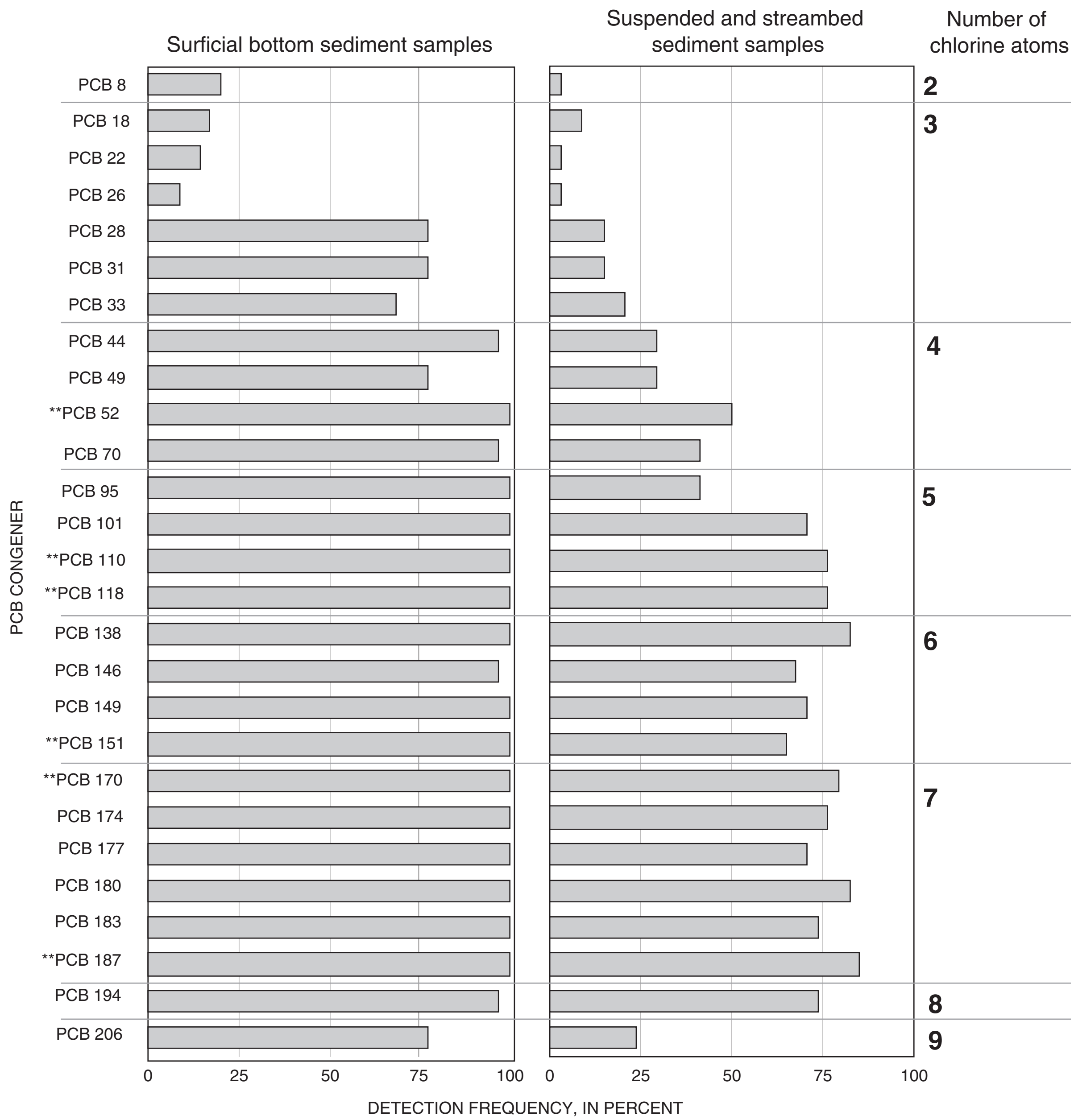


Figure 6. Detection frequency by polychlorinated biphenyl (PCB) congener and sample type, Woods Inlet, Lake Worth, Fort Worth, Texas, 2003 (**PCB used in graphical and cluster analysis).

consistently toward the main lake. Total PCB concentrations at the mouth of the other two tributary streams, Gruggs Park Creek and TNG Creek, were lower than at the mouth of Meandering Road Creek and were similar to the surficial bottom sediment concentrations in the middle of Woods Inlet. The spatial distribution of surficial total PCB concentrations indicates that PCBs are originating in the Meandering Road Creek watershed.

Peak total PCB concentrations occurred in the 70–80-cm sample at WWD1, the 30–40-cm sample at WWD2, and the 50–60-cm sample at WWD3 (fig. 8; appendix 1.2). These peak total PCB concentration depths correspond to about 1960 for WWD1 and WWD3 and about 1980 for WWD2. PCB concentrations increased greatly from those of the early 1940s to the peaks in the three gravity cores. The magnitudes of peak total PCB concentrations in the gravity cores followed a spatial distribution generally similar to that of surficial bottom sediment concentrations (fig. 7). The highest concentration at WWD3 (349 μg/kg) was near the mouth of Meandering Road Creek (and at the mouth of TNG Creek), the next highest at WWD1 (128 μg/kg), near the confluence of the three tributary creeks, and the lowest peak concentration at WWD2 (47.6 μg/kg), near the mouth of Gruggs Park Creek. The 1960 peaks at WWD1 and WWD3 are

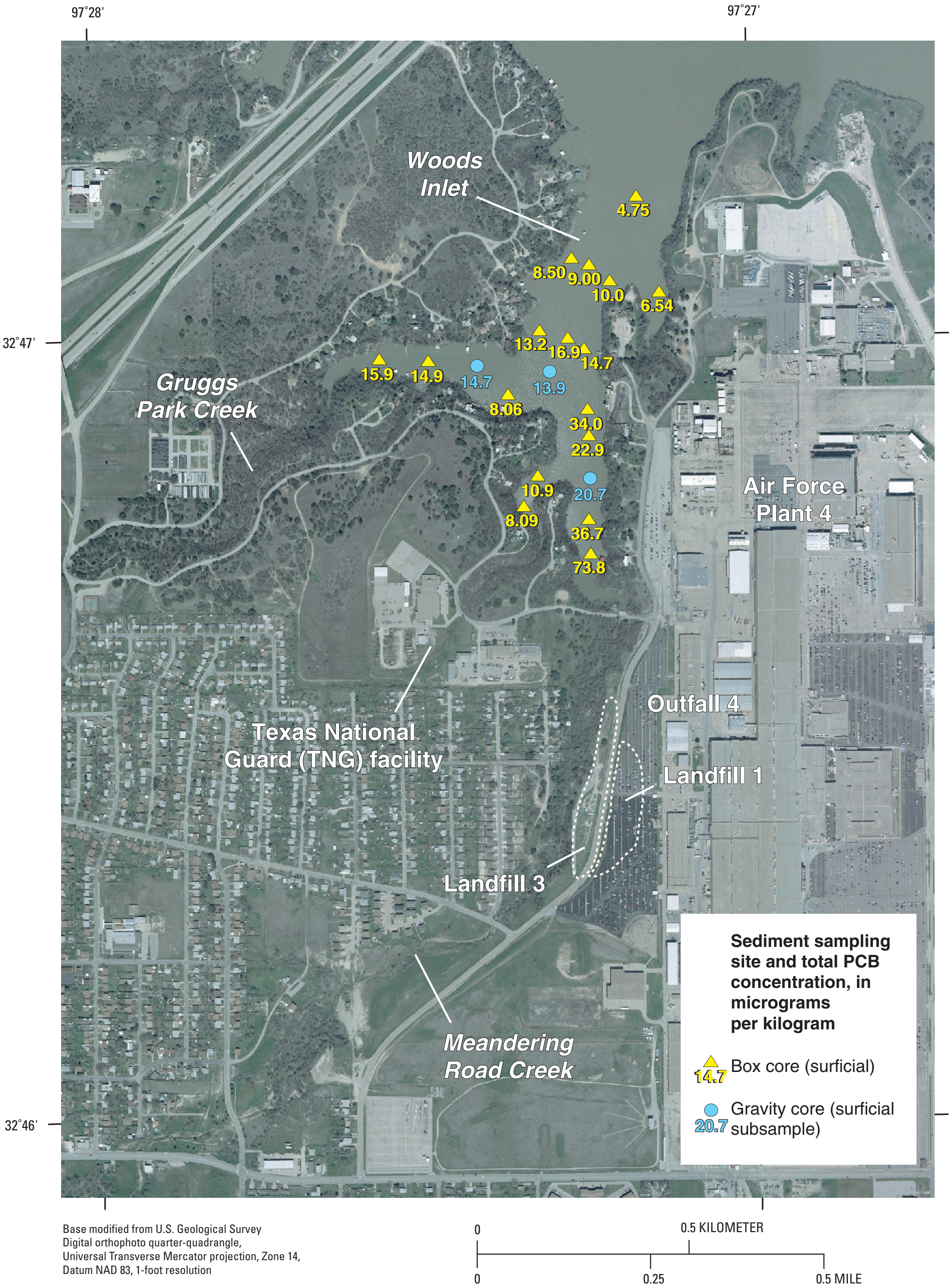


Figure 7. Total polychlorinated biphenyl (PCB) concentrations (sum of PCB congeners) in surficial bottom sediment, Woods Inlet, Fort Worth, Texas, 2003.

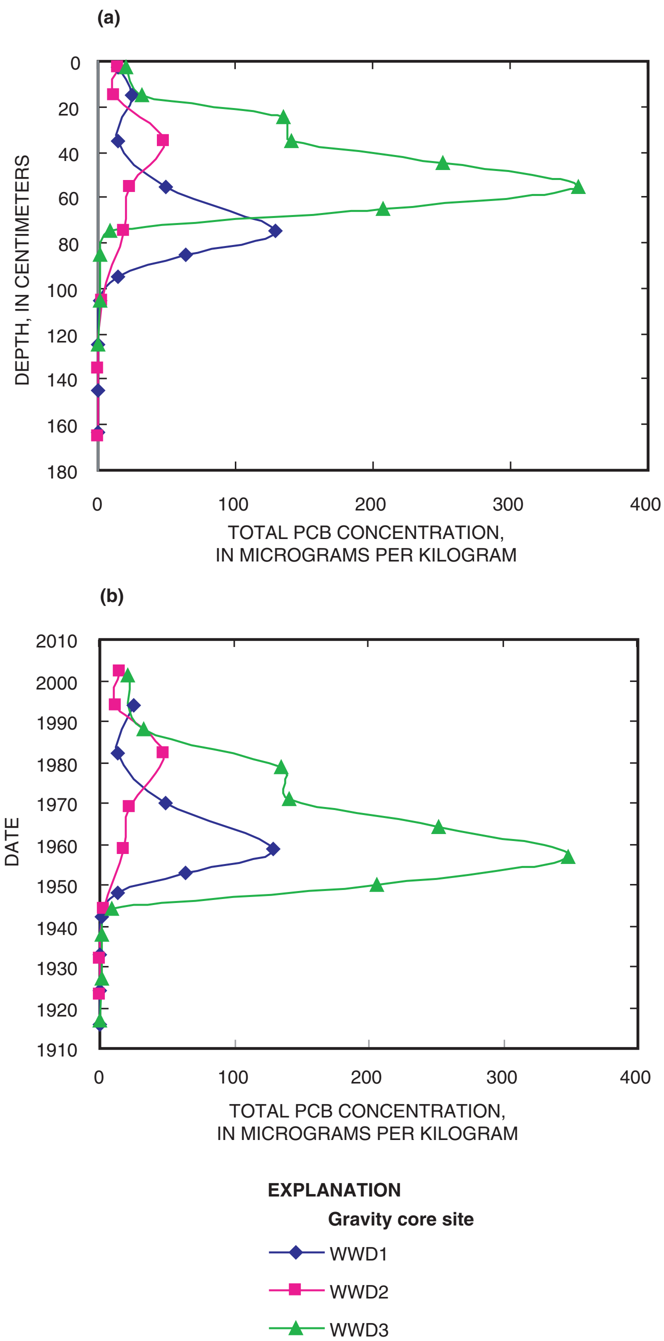


Figure 8. Trends in total polychlorinated biphenyl (PCB) concentrations (sum of PCBcongeners) in sediment cores relative to (a) sediment depth and (b) date of sediment deposition, Woods Inlet, Lake Worth, Fort Worth, Texas, 2003.

consistent in age with the peak in a gravity core from near the mouth of Woods Inlet collected in 2002 (Harwell and others, 2003).

PCB concentrations in surficial bottom sediment were much lower than peak concentrations. The surficial bottom sediment concentration of total PCB at WWD1, for example, is 13.9 µg/kg, about one-ninth the peak concentration. Van Metre and others (1998) reported that PCB concentrations in reservoir sediment cores tended to follow an exponential decrease after they were banned, with a half-life of about 10 years. The half-life for total PCB (number of years to degrade to one-half the peak concentration) in the two cores with pronounced 1960 peaks, estimated from a regression line fit to the natural logarithms of total PCB concentrations, was 10.2 years at WWD3 and 14 years at WWD1. These rates were consistent with those in PCB concentrations in sediment cores nationally (Van Metre and others, 1998).

PCBs were not detected in sediment deposited before the 1940s from two of the three Woods Inlet cores (WWD1 and WWD2); however, some PCB congeners were detected at low (estimated) concentrations near the bottom of core WWD3 (appendix 1.2). Commercial manufacturing of PCBs, which have no natural sources, began in 1929, and PCBs usually are not detected in cores of lake sediment deposited before the 1940s (Van Metre and others, 1998). The bottom two samples from core WWD3, dated as 1917 and 1927, predate use of PCBs, which indicates either sample contamination or mixing of sediment containing PCBs in the core. Large, relatively narrow peaks in ^{137}Cs activity and PCB concentrations and a high sedimentation rate in Lake Worth indicate that mixing extensive enough to move PCBs 30 to 50 cm down core is unlikely. Cross-contamination of samples is possible during collection and subsampling of a core by smearing of sediment along the inside walls of the core liner. Total PCB concentrations in the bottom three samples from core WWD3 (80–130 cm, 1938 and earlier) ranged from 0.77 to 1.91 µg/kg, about 200 times smaller than the peak concentration of 349 µg/kg dated as 1957 (fig. 8; appendix 1.2). Cross-contamination of the samples during subsampling was the likely cause of these low-level detections. This low-level contamination does not affect interpretations of the PCB data in the core.

Polychlorinated Biphenyls in Suspended and Streambed Sediment

PCBs could reach Woods Inlet from several sources and by several pathways. Potential sources of PCBs include one of the historical landfills or historically contaminated soils on AFP4 and point or nonpoint sources in the surrounding urban area. Because PCBs are very hydrophobic, the primary pathway for them to enter urban creeks and lakes is erosion and fluvial transport attached to sediment. The most likely pathway for them to enter Woods Inlet is attached to suspended sediment transported by runoff during storms.

Total PCB concentrations in suspended and streambed sediment varied greatly among sites and indicated a likely source of PCBs associated with site OF4, which receives runoff from AFP4 (fig. 9; appendix 1.2). The three sites not influenced by AFP4 (GRUGGS, TNG, and UMRC) had five samples in which no PCB congeners were detected and 13 samples in which one or more congeners were detected; total PCB for those 13 samples ranged from 0.54 to 14.8 µg/kg. In contrast, the

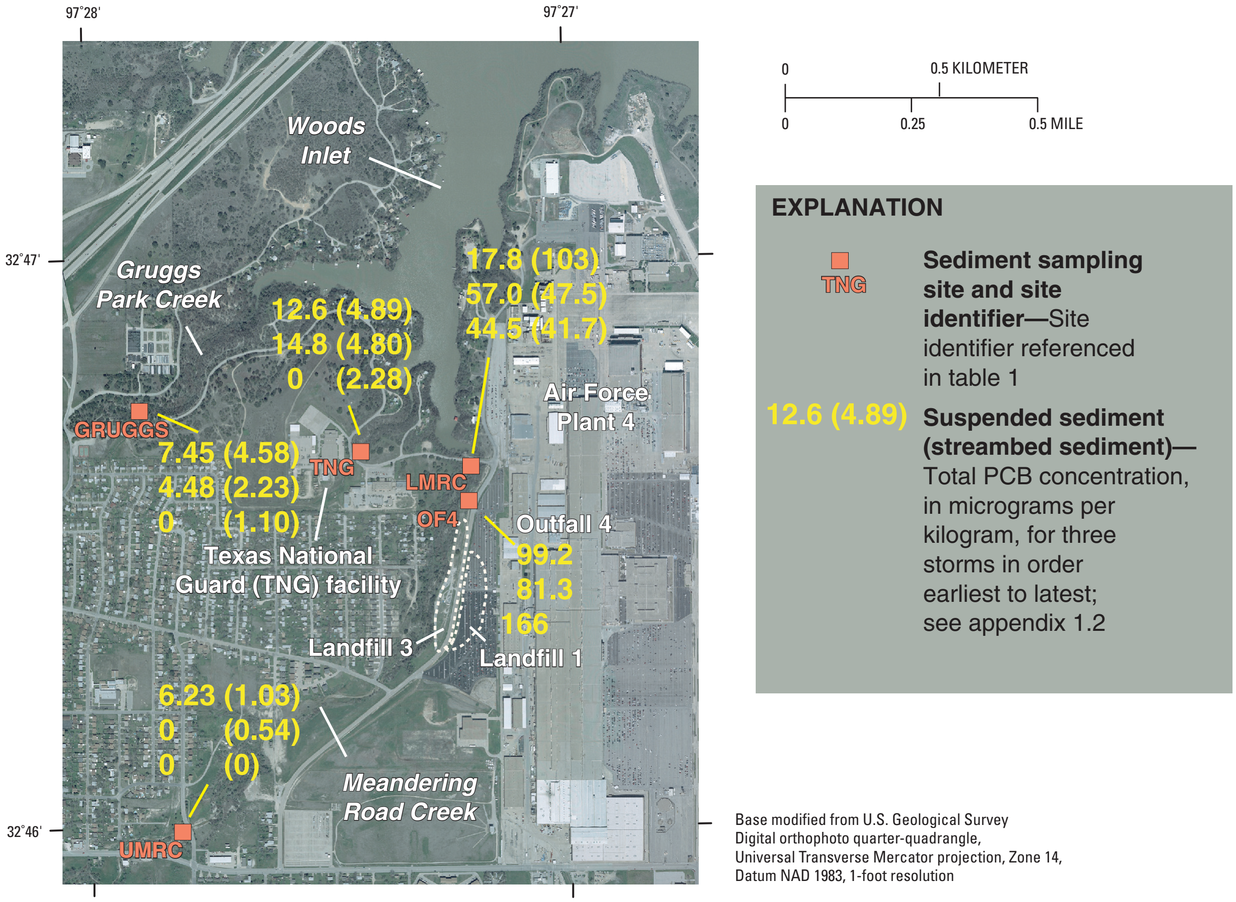


Figure 9. Total polychlorinated biphenyl (PCB) concentrations (sum of PCB congeners) in suspended and streambed sediment from tributary streams to Woods Inlet, Lake Worth, Fort Worth, Texas, 2003.

three suspended sediment samples from OF4 contained total PCB concentrations of 81.3, 99.2, and 166 µg/kg, with a mean of 116 µg/kg. The six samples from LMRC, influenced by flow at UMRC (no AFP4 runoff) and OF4 (AFP4 runoff), reflected intermediate concentrations that ranged from 17.8 to 103 µg/kg.

One or more PCB congeners were detected in both media in eight of the 12 paired suspended and streambed sediment samples (fig. 9). Total PCB was greater for suspended sediment in seven of the eight pairs and the ratio of suspended to streambed sediment concentration ranged from 1.1 to 6.0, with a median of 2.0. Large concentrations in suspended sediment compared to those in streambed sediments could reflect finer grain size or higher organic carbon concentrations, or both.

The one sample where streambed sediment concentration was greater than suspended sediment concentration was the LMRC sample from August 30, 2003. Total PCB concentration was much less in the August 30 suspended sediment sample than in the two subsequent suspended sediment samples from this site. Differences in major element concentrations between this sample and the two subsequent samples, including higher calcium, lower organic carbon, and slightly lower aluminum and iron, indicate a different source of sediment for the August 30 sample than the two subsequent samples. Grain size was not analyzed for the August 30 sample, but the differences in major element and contaminant concentrations could indicate a coarser, sandier material, possibly material mobilized from the bed of Meandering Road Creek.

Source Identification Using Polychlorinated Biphenyl Congener Assemblages

Three approaches were applied to identify sources of PCBs in surficial bottom sediment using congener assemblages: (1) graphical comparisons, (2) a simple measure of differences among congener patterns, and (3) cluster analysis. All samples deeper than 5 cm in the gravity cores, and suspended and streambed sediment samples with frequent nondetections were excluded from these analyses. Concentrations were first normalized by dividing by total PCB to convert each congener concentration to a fraction of total PCBs. The assumption in these analyses is that the relative concentrations of congeners in a sediment sample in the inlet are not changed appreciably during transport and deposition from distinct sources, except by mixing, This assumption implies that processes such as degradation and desorption of selected congeners do not greatly alter relative concentrations. Source areas of PCBs that potentially could be identified through interpretation of data collected in this study are urban areas west of AFP4, the Texas National Guard facility, the part of AFP4 that contributes runoff to OF4, and AFP4 (by comparison of UMRC and LMRC results).

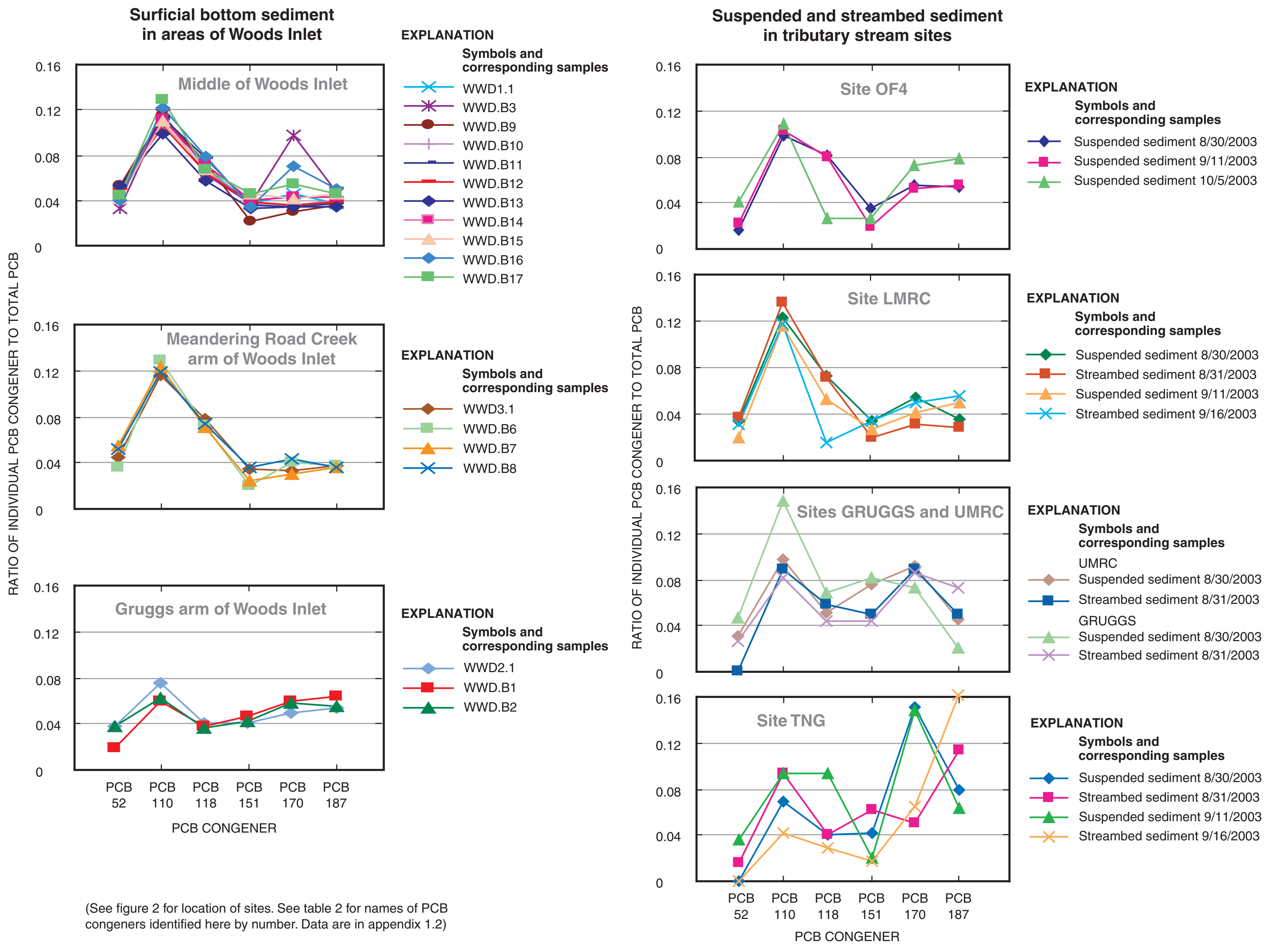
The first approach to identify sources of PCBs to Woods Inlet involved graphical analysis of normalized concentrations of six selected congeners. Six congeners were selected that were detected frequently, covered a range in the level of chlorination, were at relatively high concentrations, and varied between samples from different sites. The lines representing normalized sample concentrations of the six congeners from areas of Woods Inlet and from tributary stream sites (fig. 10) generally form similar patterns within sample groups (within graphs). Some patterns on suspended and streambed sediment graphs (column 2 in fig. 10), which represent potential sources, are similar to patterns on surficial bottom sediment graphs (column 1 in fig. 10). Normalized congener concentration patterns for suspended and streambed sediment samples from LMRC are similar to patterns for surficial sediment in the Meandering Road Creek arm of Woods Inlet and the middle of Woods Inlet. Patterns for two of the three samples from OF4 also are similar to those for samples from the Meandering Road Creek arm and middle of Woods Inlet. The TNG sample patterns are variable and distinctly different from any of the patterns of the surficial sediment samples in the inlet, with roughly increasing proportions of congeners with increasing chlorination. The GRUGGS and UMRC (urban reference) sample patterns also are variable and show some similarity to sample patterns of the Gruggs arm of Woods Inlet and to some sample patterns from the middle of Woods Inlet. The clearest visual match between a potential source, as indicated by suspended and streambed sediment graphs, and PCBs in Woods Inlet, as indicated by surficial bottom sediment graphs, is that between site LMRC and the Meandering Road Creek arm of Woods Inlet. A close second in terms of visual match is that between LMRC and the middle of Woods Inlet and that between OF4 (two of four samples) and the Meandering Road Creek arm and middle of Woods Inlet.

The second approach to identify sources using congener assemblages, the measure of differences among congener patterns, was the root mean squared difference (RMSD) between normalized concentrations of the 17 most frequently detected congeners. Normalized concentrations of each of the suspended and streambed sediment samples (representing potential sources) were compared to the mean of all surficial bottom sediment sample concentrations (representing the end-point of interest). The RMSD is computed as the square root of the sum of squared differences between the normalized concentrations; the smaller it is, the more similar the data are. The LMRC suspended and streambed sediment samples, and two of the three OF4 samples, are more similar to the Woods Inlet surficial bottom sediment samples than samples from the other tributary sites (table 4), possibly indicating a common source.

The third approach to source identification, cluster analysis (Davis, 2002), was carried out using the six congeners that were used for the graphical analysis. Cluster analysis involves grouping samples on the basis of similarity of a response variable or variables, which, as in the graphical analysis (fig. 10), was the ratio of individual PCB congeners to total PCB. Six clusters were indicated on the basis of interpretation of the data, the distribution of which is shown in figure 11. Cluster 1 contains middle of Woods Inlet and Meandering Road Creek arm samples (most surficial bottom sediment), three of four samples from LMRC, and two of three samples from OF4. None of the other tributary samples were grouped in this cluster. Cluster 2 comprises three samples from Woods Inlet that were not in the probable path of discharge from Meandering Road Creek and two samples from the urban reference sites GRUGGS and UMRC. Cluster 3 accounts for the Gruggs arm of Woods Inlet samples, along with one sample each from the urban reference

Table 4. Root mean squared difference (RMSD), from smallest to largest, between normalized concentrations of 17 polychlorinated biphenyl congeners in suspended and streambed sediment samples in tributaries and mean of all surficial bottom sediment sample concentrations of those congeners in Woods Inlet, Lake Worth, Fort Worth, Texas, 2003.

Suspended or streambed sediment site (fig. 2)	Sample date	Sample type	RMSD
LMRC	8/30/2003	Suspended	0.046
LMRC	8/31/2003	Streambed	.065
OF4	9/11/2003	Suspended	.073
OF4	8/30/2003	Suspended	.076
LMRC	9/16/2003	Streambed	.095
LMRC	10/6/2003	Streambed	.098
GRUGGS	8/31/2003	Streambed	.110
UMRC	8/30/2003	Suspended	.125
OF4	10/5/2003	Suspended	.131
UMRC	8/31/2003	Streambed	.140
TNG	8/31/2003	Streambed	.141
GRUGGS	8/30/2003	Suspended	.145
TNG	9/11/2003	Suspended	.170
TNG	8/30/2003	Suspended	.200
TNG	9/16/2003	Streambed	.236



(See figure 2 for location of sites. See table 2 for names of PCB congeners identified here by number. Data are in appendix 1.2)

Figure 10. Selected polychlorinated biphenyl (PCB) congener assemblages normalized (divided) by total PCB (sum of PCB congeners) for surficial bottom sediment in areas of Woods inlet and suspended and streambed sediment in tributary streams to Woods Inlet, Lake Worth, Texas, 2003.

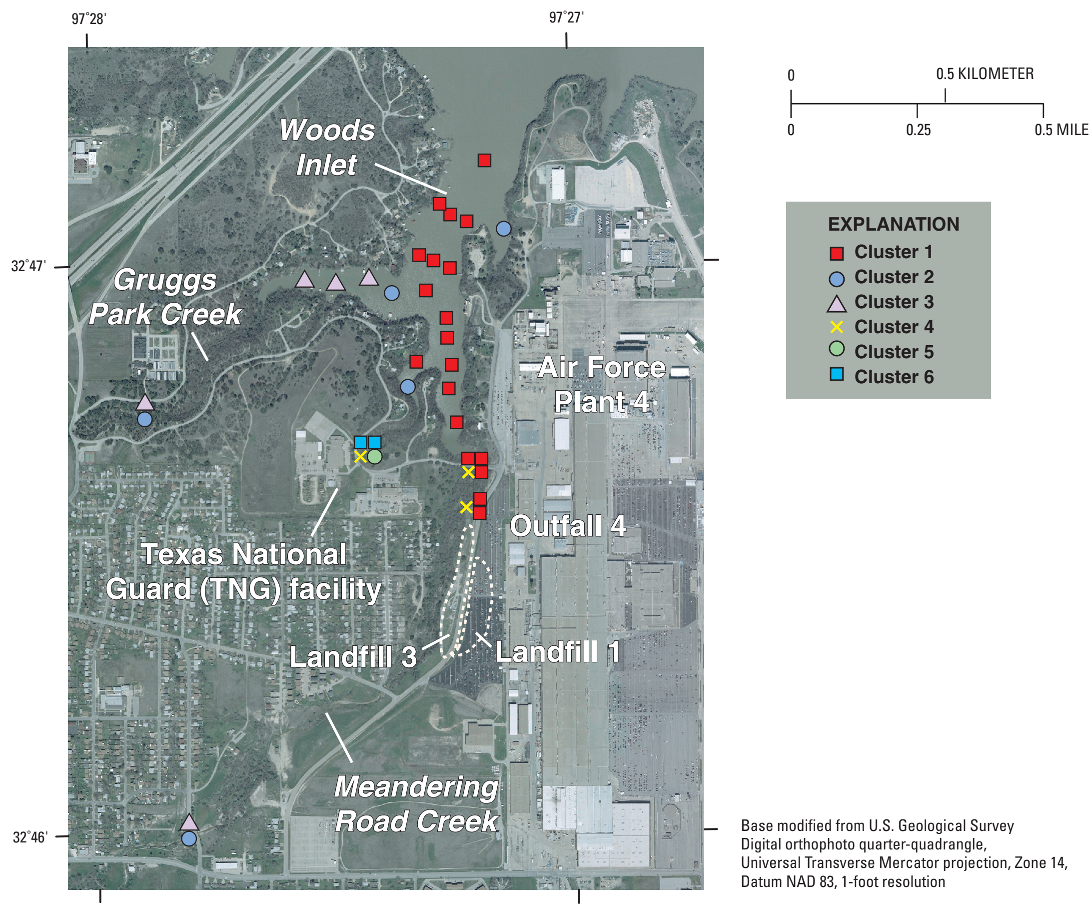


Figure 11. Results of cluster analysis using selected polychlorinated biphenyl (PCB) congeners, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003.

sites GRUGGS and UMRC. Cluster 4 contains no inlet samples, only one sample each from OF4, LMRC, and TNG. Cluster 5 consists of a single TNG sample, and cluster 6 comprises two TNG samples. The four samples from site TNG are in three different clusters, which indicates the most variability among tributary sites and inlet areas.

The three approaches to the analyses of congener assemblages indicate that PCBs in surficial bottom sediment of Woods Inlet primarily enter Lake Worth from Meandering Road Creek and that runoff from AFP4 is a source of the PCBs in Meandering Road Creek. Although current (2003) transport of PCBs from AFP4 to the creek is occurring, as OF4 sample analyses indicate, the large decreases in PCB concentrations with decreasing depth in cores WWD1 and WWD3 (fig. 8) are evidence that PCB loading to the inlet has decreased greatly since the 1960s. Because runoff entering Meandering Road Creek from some parts of AFP4 was not measured or sampled in this study, it cannot be said with certainty that site OF4 is the only source of PCBs to Meandering Road Creek.

Summary

In response to the finding in a previous study of elevated polychlorinated biphenyl (PCB) concentrations in sediment in Woods Inlet, a feature on the southern shore of Lake Worth along the western boundary of Air Force Plant 4 (AFP4) in Fort Worth, Tex., the U.S. Geological Survey, in cooperation with the U.S. Air Force, conducted a study in 2003 to map the distribution of elevated PCB concentrations in Woods Inlet and to identify possible sources (or more specifically, source areas) of PCBs in the watershed of Woods Inlet. Gravity cores (penetration to pre-reservoir sediment at three sites) and surficial bottom sediment samples (top 5 cm at 20 sites) were collected and analyzed to map the distribution of PCB concentrations in Woods Inlet. Suspended sediment in stormwater runoff and streambed sediment were sampled in tributaries to Woods Inlet following storms to identify possible current (2003) sources of PCBs. In addition, assemblages of PCB congeners in surficial bottom sediments and suspended and streambed sediments were analyzed to indicate sources of PCBs in the surficial bottom

sediments on the basis of chemical signatures of PCBs. Sediment samples also were analyzed for major and trace elements, selected PAHs, and selected organochlorine pesticides.

Woods Inlet receives runoff primarily from three tributaries: (1) Gruggs Park Creek, (2) the small unnamed creek that drains a Texas National Guard maintenance facility, called TNG Creek for this report, and (3) Meandering Road Creek. Three stormwater sampling sites were established near the mouths of each of these three creeks (GRUGGS, TNG, LMRC, respectively). GRUGGS and TNG receive urban runoff but not runoff from AFP4; LMRC receives urban runoff from AFP4 and other areas. A fourth site (OF4) along Meandering Road Creek upstream from LMRC receives runoff exclusively from AFP4. A fifth site (UMRC) is on Meandering Road Creek upstream from AFP4 but downstream from urban areas; thus it receives urban runoff but none from AFP4. Suspended sediment samples were collected during three storms at each of the five sites. Streambed sediment samples were collected at all of the sites except OF4 following each of the three storms in which suspended sediment samples were collected.

Twenty-seven of 209 possible PCB congeners were analyzed. The sum of the congeners was used as a measure of total PCB. Total PCB concentrations in 20 samples of surficial sediment from Woods Inlet ranged from 4.75 to 73.8 µg/kg. Total PCB concentrations were highest near the mouth of Meandering Road Creek and decreased consistently toward Lake Worth. Total PCB concentrations at the mouth of the other two tributary streams, Gruggs Park Creek and TNG Creek, were lower than at the mouth of Meandering Road Creek and were similar to the surficial bottom sediment concentrations in the middle of Woods Inlet. The spatial distribution of surficial total PCB concentrations indicates that PCBs are originating in the Meandering Road Creek watershed.

Peak total PCB concentrations in the three gravity cores occurred at depths corresponding to sediment deposition dates of about 1960 for two of the cores and about 1980 for the third core. The magnitudes of peak total PCB concentrations in the gravity cores followed a spatial distribution generally similar to that of surficial sediment concentrations. The highest concentration at WWD3 (349 µg/kg) was near the mouth of Meandering Road Creek (and at the mouth of TNG Creek), the next highest at WWD1 (128 µg/kg), near the confluence of the three tributary creeks, and the lowest peak concentration at WWD2 (47.6 µg/kg), near the mouth of Gruggs Park Creek.

Total PCB concentrations in suspended and streambed sediment varied greatly among sites and indicated a likely source of PCBs associated with site OF4, which receives runoff from AFP4. The three sites not influenced by AFP4 (GRUGGS, TNG, and UMRC) had five samples in which no PCB congeners were detected and 13 samples in which one or more congeners were detected; total PCB concentration for those 13 samples ranged from 0.54 to 14.8 µg/kg. In contrast, the three suspended sediment samples from OF4 contained total PCB concentrations of 81.3, 99.2, and 166 µg/kg, with a mean of 116 µg/kg. The six samples from LMRC, influenced by flow at UMRC (no AFP4 runoff) and OF4 and other stormwater outfalls from AFP4 (AFP4 runoff), reflected intermediate concentrations that ranged from 17.8 to 103 µg/kg.

Three approaches to the analyses of congener assemblages—graphical comparisons of normalized congener concentrations for pattern similarity, a simple measure of difference among congener patterns (root mean squared difference between normalized congener concentrations), and cluster analysis—indicate that PCBs in surficial sediment of Woods Inlet primarily enter Lake Worth from Meandering Road Creek and that runoff from AFP4 is a source of the PCBs in Meandering Road Creek. Although current (2003) transport of PCBs from AFP4 to the creek is occurring as OF4 sample analyses indicate, large decreases in PCB concentrations with decreasing depth in cores WWD3 and WWD1 are evidence that PCB loading to the inlet has decreased greatly since the 1960s. Because runoff entering Meandering Road Creek from some parts of AFP4 was not measured or sampled in this study, it cannot be said with certainty that site OF4 is the only source of PCBs to Meandering Road Creek.

Trace element, PAH, and organochlorine pesticide concentration data from this study are included in the report. However, the data are insufficient to describe the distribution and sources of those constituents in Woods Inlet sediment.

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Appendix 1—Core-Specific and Analytical Polychlorinated Biphenyl Data From Core, Surficial Bottom, Suspended, and Streambed Sediment Samples, Woods Inlet and Tributaries, Lake Worth, Fort Worth, Texas

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Appendix 1.1. Porosity, cesium-137 (^{137}Cs) activity, mass accumulation rate (MAR), and deposition dates for gravity core samples, Woods Inlet, Lake Worth, Fort Worth, Texas, 2003.

[cm, centimeter; pCi/g, picocurries per gram; --, not analyzed]

Core site and depth interval (cm)	Mid-depth (cm)	Thickness (cm)	Porosity	^{137}Cs activity (pCi/g)	MAR	Deposition date (year)	Comments
WWD1 (0–5)	2.5	5	0.87	0.16	0.62	2002	
WWD1(5–10)	7.5	5	.79	.19	.64	1999	
WWD1 (10–20)	12.5	10	.81	.19	.68	1994	
WWD1 (20–30)	25	10	.80	.22	.72	1988	
WWD1 (30–40)	35	10	.79	.33	.76	1982	
WWD1 (40–50)	45	10	.77	.45	.81	1976	
WWD1 (50–60)	55	10	.77	.73	.86	1970	
WWD1 (60–70)	65	10	.78	1.36	.92	1964	^{137}Cs peak
WWD1 (70–80)	75	10	.76	.74	.97	1959	
WWD1 (80–90)	85	10	.75	.13	1.03	1953	
WWD1 (90–100)	95	10	.75	.02	1.08	1948	
WWD1 (100–110)	105	10	.73	.01	1.15	1942	
WWD1 (110–120)	115	10	.75	-.02	1.21	1937	
WWD1 (120–130)	125	10	.76	-.01	1.26	1933	
WWD1 (130–140)	135	10	.77	0	1.33	1928	
WWD1 (140–150)	145	10	.79	.01	1.38	1924	
WWD1 (150–160)	155	10	.75	-.01	1.44	1920	
WWD1 (160–166)	163	6	.63	--	1.50	1916	Pre-reservoir surface at 160 cm (1914)
WWD2 (0–5)	2.5	5	.79	.12	.74	2002	
WWD2 (5–10)	7.5	5	.80	.18	.77	1999	
WWD2 (10–20)	15	10	.80	.20	.82	1994	
WWD2 (20–30)	25	10	.75	.23	.88	1988	
WWD2 (30–40)	35	10	.75	.34	.95	1982	
WWD2 (40–50)	45	10	.71	.32	1.03	1976	
WWD2 (50–60)	55	10	.73	.57	1.12	1969	
WWD2 (60–70)	65	10	.74	1.04	1.19	1964	^{137}Cs peak
WWD2 (70–80)	75	10	.73	1.01	1.27	1959	
WWD2 (80–90)	85	10	.70	.41	1.35	1954	
WWD2 (90–100)	95	10	.72	.04	1.43	1949	
WWD2 (100–110)	105	10	.71	.02	1.53	1944	
WWD2 (110–120)	115	10	.74	.01	1.60	1940	
WWD2 (120–130)	125	10	.71	.02	1.69	1936	
WWD2 (130–140)	135	10	.71	0	1.77	1932	
WWD2 (140–150)	145	10	.75	-.03	1.84	1929	
WWD2 (150–160)	155	10	.75	0	1.91	1926	
WWD2 (160–170)	165	10	.74	-.01	1.98	1923	
WWD2 170–180)	175	10	.76	--	2.08	1919	
WWD2 (180–190)	185	10	.70	.01	2.13	1917	Did not penetrate to pre-reservoir surface (1914)
WWD3 (0–5)	2.5	5	.76	.09	.67	2001	
WWD3 (5–10)	7.5	5	.65	--	.71	1996	
WWD3 (10–20)	15	10	.70	.09	.76	1988	
WWD3 (20–30)	25	10	.71	.23	.83	1979	
WWD3 (30–40)	35	10	.71	.37	.90	1971	
WWD3 (40–50)	45	10	.69	.80	.97	1964	^{137}Cs peak
WWD3 (50–60)	55	10	.68	.65	1.03	1957	
WWD3 (60–70)	65	10	.73	.04	1.11	1950	
WWD3 (70–80)	75	10	.69	.01	1.17	1944	
WWD3 (80–90)	85	10	.68	-.01	1.25	1938	
WWD3 (90–100)	95	10	.70	--	1.32	1932	
WWD3 (100–110)	105	10	.69	.01	1.39	1927	
WWD3 (110–120)	115	10	.75	--	1.46	1922	
WWD3 (120–130)	125	10	.61	-.01	1.53	1917	Possible pre-reservoir surface at 124 cm

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003.

[Concentrations in micrograms per kilogram; cm, centimeters; <, nondetection at indicated concentration; E, estimated; dup, duplicate; na, not applicable; env dup, environmental duplicate; lab dup, laboratory duplicate]

Sample identifier and depth interval (cm)	Sample type	Minimum depth (cm)	Maximum depth (cm)	Mid-depth (cm)	Sample date	Sample used in cluster analysis	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCB Aroclors
Gravity cores										
WWD1 (0–5)	core (surficial)	0	5	2.5	4/21/2003	Yes	<15	E13	E9.2	E22
WWD1 (10–20)	core	10	20	15	4/21/2003		E5.9	E24	17	E47
WWD1 (30–40)	core	30	40	35	4/21/2003		E4.4	E13	E10	E27
WWD1 (50–60)	core	50	60	55	4/21/2003		22	E45	21	E88
WWD1 (70–80)	core	70	80	75	4/21/2003		E6.4	E110	E110	E226
WWD1 (80–90)	core	80	90	85	4/21/2003		<5.0	E64	29	E93
WWD1 (90–100)	core	90	100	95	4/21/2003		<5.0	E20	E3.3	E23
WWD1 (100–110)	core	100	110	105	4/21/2003		<5.0	<5.0	<5.0	<15
WWD1 (120–130)	core	120	130	125	4/21/2003		<5.0	<5.0	<5.0	<15
WWD1 (140–150)	core	140	150	145	4/21/2003		<5.0	<5.0	<5.0	<15
WWD1 (160–166)	core	160	166	163	4/21/2003		<5.0	<5.0	<5.0	<15
WWD1 (160–166) dup	core	160	166	163	4/21/2003		<5.0	<5.0	<5.0	<15
WWD2 (0–5)	core (surficial)	0	5	2.5	4/21/2003	Yes	<5.0	E8.0	E14	E22
WWD2 (10–20)	core	10	20	15.0	4/21/2003		<5.0	E7.0	E13	E20
WWD2 (30–40)	core	30	40	35.0	4/21/2003		E11	E22	52	E85
WWD2 (50–60)	core	50	60	55.0	4/21/2003		<11	18	17	E35
WWD2 (70–80)	core	70	80	75.0	4/21/2003		<5.0	E12	19	E31
WWD2 (70–80) dup	core	70	80	75.0	4/21/2003		<5.0	E12	17	E29
WWD2 (100–110)	core	100	110	105.0	4/21/2003		<5.0	E2.8	E1.6	E4.4
WWD2 (100–110) dup	core	100	110	105.0	4/21/2003		<5.0	E3.3	E1.4	E4.7
WWD2 (130–140)	core	130	140	135.0	4/21/2003		<5.0	<5.0	<5.0	<15
WWD2 (160–170)	core	160	170	165.0	4/21/2003		<5.0	<5.0	<5.0	<15
WWD3 (0–5)	core (surficial)	0	5	2.5	4/21/2003	Yes	<5.0	E20	13	E33
WWD3 (10–20)	core	10	20	15.0	4/21/2003		E4.6	E28	23	E56
WWD3 (20–30)	core	20	30	25.0	4/21/2003		18	E110	54	E182
WWD3 (30–40)	core	30	40	35.0	4/21/2003		42	E110	54	E206
WWD3 (40–50)	core	40	50	45.0	4/21/2003		83	260	130	473
WWD3 (50–60)	core	50	60	55.0	4/21/2003		13	380	260	653
WWD3 (60–70)	core	60	70	65.0	4/21/2003		E5.6	290	83	E379
WWD3 (70–80)	core	70	80	75.0	4/21/2003		<5.0	E7.5	E3.9	E11
WWD3 (80–90)	core	80	90	85.0	4/21/2003		<5.0	E2.2	E1.6	E3.8
WWD3 (100–110)	core	100	110	105.0	4/21/2003		<5.0	<5.0	<5.0	<15
WWD3 (120–130)	core	120	130	125.0	4/21/2003		<5.0	<5.0	<5.0	<15
WWD3 (120–130) dup	core	120	130	125.0	4/21/2003		<5.0	<5.0	<5.0	<15
Box cores										
WWD.B1 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	E4.1	E7.9	18	E30
WWD.B2 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	E4.3	E7.2	12	E24
WWD.B2 (0–5) dup	surficial	0	5	2.5	4/22/2003		E5.6	E9.5	16	E31
WWD.B3 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<15	E6.1	E7.9	E14
WWD.B4 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<10	E6.8	E9.5	E16
WWD.B5 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<10	E11	E8.9	E20
WWD.B6 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	E7.4	E60	49	E116
WWD.B7 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	E8.0	34	23	E65
WWD.B8 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<10	21	E15	E36

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	Sample type	Minimum depth (cm)	Maximum depth (cm)	Mid-depth (cm)	Sample date	Sample used in cluster analysis	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCB Aroclors
WWD.B9 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	E6.2	32	21	E59
WWD.B10 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<5.0	13	10	E23
WWD.B11 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<10	E15	E12	E27
WWD.B12 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<5.0	E12	E9.3	E21
WWD.B13 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<10	E8.0	E5.9	E14
WWD.B14 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<5.0	E8.7	E6.7	E15
WWD.B15 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<5.0	E7.7	E7.4	E15
WWD.B16 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<10	E6.3	E6.4	E13
WWD.B17 (0–5)	surficial	0	5	2.5	4/22/2003	Yes	<5.0	E4.6	E4.4	E9.0
Suspended and streambed sediment										
UMRC	suspended	na	na	na	8/30/2003	Yes	<40	<40	<40	<120
UMRC	streambed	na	na	na	8/31/2003	Yes	<5.0	<5.0	<5.0	<15
UMRC	suspended	na	na	na	9/11/2003		<105	<105	<105	<315
UMRC	streambed	na	na	na	9/16/2003		<5.0	<5.0	<5.0	<15
UMRC env dup	streambed	na	na	na	9/16/2003		<5.0	<5.0	<5.0	<15
UMRC	suspended	na	na	na	10/5/2003		<25	<25	<25	<75
UMRC	streambed	na	na	na	10/6/2003		<5.0	<5.0	<5.0	<15
GRUGGS	suspended	na	na	na	8/30/2003	Yes	<70	<70	<70	<210
GRUGGS	streambed	na	na	na	8/31/2003	Yes	<5.0	<5.0	E5.4	E5.4
GRUGGS lab dup	streambed	na	na	na	8/31/2003		<5.0	<5.0	E5.3	E5.3
GRUGGS	suspended	na	na	na	9/11/2003		<40	<40	E17	E17
GRUGGS	streambed	na	na	na	9/16/2003		<10	<10	<10	<30
GRUGGS env dup	streambed	na	na	na	9/16/2003		<5.0	<5.0	E6.4	E6.4
GRUGGS	suspended	na	na	na	10/5/2003		<25	<25	<25	<75
GRUGGS	streambed	na	na	na	10/6/2003		<5.0	<5.0	E3.2	E3.2
TNG	suspended	na	na	na	8/30/2003	Yes	<50	<50	E20	E20
TNG	streambed	na	na	na	8/31/2003	Yes	<5.0	E3.0	E7.6	E10.6
TNG	suspended	na	na	na	9/11/2003	Yes	<60	<60	E17	E17
TNG	streambed	na	na	na	9/16/2003	Yes	<5.0	<5.0	E10	E10
TNG	suspended	na	na	na	10/5/2003		<65	<65	<65	<195
TNG	streambed	na	na	na	10/6/2003		<5.0	E2.4	7.7	E10.1
OF4	suspended	na	na	na	8/30/2003	Yes	<45	88	92	E180
OF4	suspended	na	na	na	9/11/2003	Yes	<20	E77	E77	E154
OF4	suspended	na	na	na	10/5/2003	Yes	<75	216	280	E496
LMRC	suspended	na	na	na	8/30/2003	Yes	<20	E18	E11	E29
LMRC	streambed	na	na	na	8/31/2003	Yes	E4.3	92	50	E146
LMRC lab dup	streambed	na	na	na	8/31/2003		E1.7	45	35	E81.7
LMRC	suspended	na	na	na	9/11/2003		E57	E81	E170	E308
LMRC	streambed	na	na	na	9/16/2003	Yes	<5.0	40	39	E79
LMRC env dup	streambed	na	na	na	9/16/2003		<5.0	45	45	E90
LMRC	suspended	na	na	na	10/5/2003		<25	47.8	38.6	E86.4
LMRC env dup	suspended	na	na	na	10/5/2003		<50	99	90	E189
LMRC	streambed	na	na	na	10/6/2003	Yes	<20	52	33	E85
LMRC lab dup	streambed	na	na	na	10/6/2003		<10	52	34	E86

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	Date	Sample used in cluster analysis	PCB 8	PCB 18	PCB 22	PCB 26	PCB 28	PCB 31	PCB 33	PCB 44
Gravity cores										
WWD1 (0–5)	4/21/2003	Yes	<3.0	<3.0	<3.0	<3.0	E0.18	E0.23	E0.21	E0.19
WWD1 (10–20)	4/21/2003		E.075	E.19	E.090	E.078	E.46	E.36	E.33	E.43
WWD1 (30–40)	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.20	E.15	E.39	E.20
WWD1 (50–60)	4/21/2003		E.47	E.91	E.11	<1.0	1.4	1.3	1.5	1.5
WWD1 (70–80)	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.23	E.47	E.61	1.2
WWD1 (80–90)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.55	E.94
WWD1 (90–100)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.25	E.30
WWD1 (100–110)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD1 (120–130)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD1 (140–150)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD1 (160–166)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD1 (160–166) dup	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD2 (0–5)	4/21/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.31	E.32	E.14	E.26
WWD2 (10–20)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.14
WWD2 (30–40)	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.34	E.17	<1.0	E.40
WWD2 (50–60)	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.40	E.33	E.62	E.46
WWD2 (70–80)	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.11	E.10	E.021	E.16
WWD2 (70–80) dup	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.90	E.11	E.0068	E.14
WWD2 (100–110)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	E.16	E.015	E.033
WWD2 (100–110) dup	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	E.18	E.015	E.039
WWD2 (130–140)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD2 (160–170)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD3 (0–5)	4/21/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.23	E.18	<1.0	E.25
WWD3 (10–20)	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.30	E.28	E.71	E.44
WWD3 (20–30)	4/21/2003		E.74	E1.4	E.63	E.35	1.9	2.0	1.8	2.7
WWD3 (30–40)	4/21/2003		E.73	E1.8	E.75	<1.0	3.3	2.4	1.8	3.3
WWD3 (40–50)	4/21/2003		1.2	E5.3	2.2	E.99	7.0	7.0	E3.8	7.1
WWD3 (50–60)	4/21/2003		<1.0	<1.0	<1.0	<1.0	E.68	1.3	E.90	3.6
WWD3 (60–70)	4/21/2003		<1.0	<1.0	E.92	<1.0	<1.0	1.2	<1.0	2.8
WWD3 (70–80)	4/21/2003		<1.0	<1.0	E.17	<1.0	<1.0	E2.0	<1.0	E.099
WWD3 (80–90)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD3 (100–110)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD3 (120–130)	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.031
WWD3 (120–130) dup	4/21/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.024
Box cores										
WWD.B1 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.33	E.23	<1.0	E.15
WWD.B2 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.34	E.29	E.23	E.68
WWD.B2 (0–5) dup	4/22/2003		<1.0	<1.0	<1.0	<1.0	E.44	E.37	E.32	E.33
WWD.B3 (0–5)	4/22/2003	Yes	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	E.055
WWD.B4 (0–5)	4/22/2003	Yes	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WWD.B5 (0–5)	4/22/2003	Yes	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	E.14
WWD.B6 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.55	E.52	E.66	1.0
WWD.B7 (0–5)	4/22/2003	Yes	E1.1	<2.0	<2.0	<2.0	E.34	E.38	E.43	E.64
WWD.B8 (0–5)	4/22/2003	Yes	<2.0	<2.0	<2.0	<2.0	E.29	E.36	E.23	E.43

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	Date	Sample used in cluster analysis	PCB 8	PCB 18	PCB 22	PCB 26	PCB 28	PCB 31	PCB 33	PCB 44
WWD.B9 (0–5)	4/22/2003	Yes	E0.21	E0.92	<1.0	<1.0	E0.59	E0.61	E0.30	E0.69
WWD.B10 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.20	E.25	E.21	E.30
WWD.B11 (0–5)	4/22/2003	Yes	<2.0	<2.0	<2.0	<2.0	E.25	E.30	E.22	E.35
WWD.B12 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.28	E.28	E.077	E.27
WWD.B13 (0–5)	4/22/2003	Yes	<2.0	<2.0	<2.0	<2.0	E.28	E.33	E.32	E.28
WWD.B14 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.22
WWD.B15 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.13
WWD.B16 (0–5)	4/22/2003	Yes	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	E.019
WWD.B17 (0–5)	4/22/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.071
Suspended and streambed sediment										
UMRC	8/30/2003	Yes	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
UMRC	8/31/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
UMRC	9/11/2003		<21	<21	<21	<21	<21	<21	<21	<21
UMRC	9/16/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
UMRC env dup	9/16/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
UMRC	10/5/2003		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
UMRC	10/6/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GRUGGS	8/30/2003	Yes	<14	<14	<14	<14	<14	<14	<14	<14
GRUGGS	8/31/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GRUGGS lab dup	8/31/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GRUGGS	9/11/2003		<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
GRUGGS	9/16/2003		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
GRUGGS env dup	9/16/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GRUGGS	10/5/2003		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
GRUGGS	10/6/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TNG	8/30/2003	Yes	<10	<10	<10	<10	<10	<10	<10	<10
TNG	8/31/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.02
TNG	9/11/2003	Yes	<12	<12	<12	<12	<12	<12	<12	E.29
TNG	9/16/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TNG	10/5/2003		<13	<13	<13	<13	<13	<13	<13	<13
TNG	10/6/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
OF4	8/30/2003	Yes	<9.0	<9.0	<9.0	<9.0	<9.0	<9.0	E1.4	E1.3
OF4	9/11/2003	Yes	<4.0	E.23	<4.0	<4.0	E.58	E.76	E.60	E1.1
OF4	10/5/2003	Yes	<11	<11	<11	<11	<11	<11	<11	<11
LMRC	8/30/2003	Yes	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	E.32
LMRC	8/31/2003	Yes	E.82	E.19	<1.0	<1.0	E.26	E.48	E.30	1.5
LMRC lab dup	8/31/2003		<1.0	E.11	<1.0	<1.0	E.13	E.20	E.10	E.39
LMRC	9/11/2003		<10	<10	E1.3	E.48	<10	<10	E.48	<10
LMRC	9/16/2003	Yes	<1.0	<1.0	<1.0	<1.0	E.12	E.20	E.10	E.36
LMRC env dup	9/16/2003		<1.0	<1.0	<1.0	<1.0	E.17	E.19	E.13	E.40
LMRC	10/5/2003		<10	<10	<10	<10	<10	<10	<10	<10
LMRC env dup	10/5/2003		<10	<10	<10	<10	<10	<10	<10	<10
LMRC	10/6/2003	Yes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
LMRC lab dup	10/6/2003		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.33

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	PCB 49	PCB 52	PCB 70	PCB 95	PCB 101	PCB 110	PCB 118	PCB 138	PCB 146	PCB 149
Gravity cores										
WWD1 (0–5)	<3.0	E0.70	E0.75	E0.80	E1.2	E1.6	E0.95	E1.8	E0.30	E1.4
WWD1 (10–20)	E.45	E.90	1.1	1.0	1.4	2.5	2.7	3.2	E.47	1.9
WWD1 (30–40)	E.67	E.58	E.54	E.72	1.0	1.5	E.89	1.5	E.26	1.4
WWD1 (50–60)	2	3.0	2.9	3.0	3.6	6.8	3.3	5.6	E.71	3.4
WWD1 (70–80)	2.1	3.5	3.9	5.4	9.3	14	E14	17	2.4	12
WWD1 (80–90)	1.4	3.0	2.3	3.5	8.3	9.6	E6.6	8.8	1.0	7.4
WWD1 (90–100)	E.72	1.1	E.80	E1.0	1.7	2.1	1.6	1.6	E.15	1.2
WWD1 (100–110)	E.036	E.061	E.11	E.064	E.17	E.23	E.12	E.14	E.035	E.082
WWD1 (120–130)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD1 (140–150)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD1 (160–166)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD1 (160–166) dup	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD2 (0–5)	E.20	E.54	E.71	E.69	1.1	1.1	E.59	1.8	E.16	1.4
WWD2 (10–20)	E.14	E.32	E.38	E.44	E.88	E.89	E.55	1.6	E.16	1.1
WWD2 (30–40)	E.74	1.1	E.85	1.6	2.9	2.8	1.6	7.0	1.0	7.2
WWD2 (50–60)	E.62	1.1	1.1	1.2	1.6	2.2	1.2	2.7	E.45	2.2
WWD2 (70–80)	E.31	E.51	E.62	E.78	1.1	1.7	E.74	2.3	E.47	2.1
WWD2 (70–80) dup	E.26	E.49	E.55	E.70	1.2	1.6	E.64	2.1	E.42	1.9
WWD2 (100–110)	E.15	E.16	E.23	E.18	E.30	E.37	E.17	E.37	E.070	E.26
WWD2 (100–110) dup	E.11	E.17	E.21	E.19	E.28	E.44	E.18	E.40	E.074	E.27
WWD2 (130–140)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD2 (160–170)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WWD3 (0–5)	E.55	E.93	E.74	1.0	1.6	2.4	1.6	3.3	E.36	2.1
WWD3 (10–20)	E.72	1.4	1.0	1.6	2.3	3.8	2.1	4.7	E.58	3.3
WWD3 (20–30)	3.4	8.7	E6.7	8.5	14	17	E12	16	1.8	13
WWD3 (30–40)	4.1	9.5	7.6	9.6	12	18	12	18	1.9	12
WWD3 (40–50)	7.4	16	E14	15	22	28	E19	27	3.4	21
WWD3 (50–60)	3.9	16	E12	18	32	42	29	50	6.6	39
WWD3 (60–70)	3.2	13	E9.4	14	24	32	E23	30	3.1	22
WWD3 (70–80)	E.21	E.44	E.32	E.42	E.78	E.86	E.61	E.75	E.034	E.60
WWD3 (80–90)	<1.0	E.097	E.085	E.065	E.22	E.27	E.17	E.31	<1.0	E.16
WWD3 (100–110)	<1.0	E.048	<1.0	E.025	E.16	E.20	E.10	E.18	<1.0	E.12
WWD3 (120–130)	E.030	E.26	<1.0	E.080	E.15	E.19	<1.0	<1.0	<1.0	E.025
WWD3 (120–130) dup	E.029	E.21	<1.0	E.060	E.12	E.16	<1.0	<1.0	<1.0	E.021
Box cores										
WWD.B1 (0–5)	E.43	E.30	E.58	E.61	E.73	E.94	E.60	2.4	E.24	1.6
WWD.B2 (0–5)	E.48	E.56	E.58	E.89	E.89	E.92	E.54	1.8	E.072	1.2
WWD.B2 (0–5) dup	E1.0	E.75	E.72	E.82	E.90	1.3	E.69	2.2	E.14	1.5
WWD.B3 (0–5)	<3.0	E.26	E.42	E.21	E.64	E.93	E.51	E1.2	E.23	E1.0
WWD.B4 (0–5)	<2.0	E.24	<2.0	E.2	E.55	E1.1	E.48	E1.2	<2.0	E.95
WWD.B5 (0–5)	<2.0	E.48	E.55	E.62	E.90	E1.3	E.71	E1.6	E.087	E1.0
WWD.B6 (0–5)	1.1	2.7	2.0	3.3	5.6	9.5	5.3	12	1.3	7.4
WWD.B7 (0–5)	E.97	2.0	E1.4	E1.4	2.6	4.5	2.6	E5.6	E.63	3.3
WWD.B8 (0–5)	E.30	E1.2	E1.0	E1.3	E1.9	2.7	E1.7	3.2	E.25	2.2

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	PCB 49	PCB 52	PCB 70	PCB 95	PCB 101	PCB 110	PCB 118	PCB 138	PCB 146	PCB 149
WWD.B9 (0–5)	E0.72	1.8	1.4	1.9	2.7	3.9	2.5	E4.5	E0.59	2.9
WWD.B10 (0–5)	E.26	E.69	E.60	E.69	1.1	1.6	E.99	2.0	E.25	1.5
WWD.B11 (0–5)	E.33	E.85	E.74	E.80	E1.2	E1.9	E1.3	2.2	E.30	E1.6
WWD.B12 (0–5)	E.23	E.66	E.62	E.71	1.0	1.4	E.86	1.7	E.24	1.3
WWD.B13 (0–5)	E.20	E.53	E.63	E.50	E.79	E.99	E.58	E1.1	E.14	E.79
WWD.B14 (0–5)	<1.0	E.40	E.44	E.45	E.92	1.0	E.64	1.2	E.16	E.96
WWD.B15 (0–5)	<1.0	E.35	E.36	E.34	E.79	E.94	E.57	1.2	E.16	E.91
WWD.B16 (0–5)	<2.0	E.26	E.41	E.27	E.49	E.79	E.51	E.75	E.032	E.66
WWD.B17 (0–5)	<1.0	E.21	E.24	E.16	E.47	E.61	E.32	.72	E.062	E.55
Suspended and streambed sediment										
UMRC	<8.0	E.19	E.73	E.31	E.14	E.60	E.31	E.82	<8.0	E.62
UMRC	<1.0	<1.0	E.13	E.04	E.01	E.09	E.06	E.16	<1.0	E.08
UMRC	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21
UMRC	<1.0	<1.0	<1.0	<1.0	E.09	E.07	E.23	<1.0	E.10	<1.0
UMRC env dup	<1.0	<1.0	<1.0	<1.0	<1.0	E.07	E.06	E.10	<1.0	E.06
UMRC	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
UMRC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GRUGGS	<14	E.34	E.92	E.47	E.10	E1.1	E.50	E.91	<14	E.60
GRUGGS	<1.0	E.12	<1.0	E.20	E.21	E.37	E.20	E.66	E.06	E.44
GRUGGS lab dup	<1.0	E.10	<1.0	E.20	E.14	E.33	E.17	E.63	E.08	E.42
GRUGGS	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	E.78	E.53	E.70
GRUGGS	<2.0	<2.0	<2.0	<2.0	E.02	E.16	E.12	E.63	E.05	E.17
GRUGGS env dup	<1.0	<1.0	<1.0	<1.0	E.07	E.33	E.22	E.91	E.12	E.43
GRUGGS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
GRUGGS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.24	E.16	<1.0
TNG	<10	<10	E.69	E.34	E.15	E.86	E.50	E1.1	E.14	E.78
TNG	<1.0	E.08	<1.0	E.20	E.30	E.46	E.20	E.46	E.08	E.34
TNG	<12	E.53	<12	<12	E.30	E1.4	E1.4	E1.6	E.08	E1.5
TNG	<1.0	<1.0	<1.0	<1.0	E.04	E.20	E.14	E.59	E.10	E.38
TNG	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
TNG	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.34	<1.0	<1.0
OF4	E.75	E1.6	E2.6	E3.8	E5.1	9.7	E8.0	17	E2.4	E8.4
OF4	E.60	E1.8	E2.3	E3.5	E4.5	E8.3	E6.4	E13	E2.1	E7.1
OF4	<11	E6.6	<11	<11	14	18	E4.4	28	E3.4	14
LMRC	E.16	E.60	E.76	E1.2	E1.2	E2.2	E1.3	E2.8	E.36	E1.6
LMRC	1.0	3.8	2.8	E7.9	E9.6	E14	E7.3	E16	2.2	E12
LMRC lab dup	E.33	1.1	E.70	2.4	3.2	6.0	3.0	E10	1.1	4.9
LMRC	E.21	E1.8	E1.8	<10	<10	E3.6	E.38	E12	<10	E.16
LMRC	E.30	E.97	E.62	2.2	2.6	5.5	2.5	E10	1.3	5.0
LMRC env dup	E.34	1.1	E.77	2.4	2.9	6.4	2.9	E12	1.4	6.0
LMRC	<10	<10	<10	<10	E3.9	E9.2	E1.9	E14	E.26	<10
LMRC env dup	<10	<10	<10	<10	E3.9	E9.2	E1.9	E14	E.26	<10
LMRC	E.18	1.3	2.8	<1.0	3.2	4.9	E.67	E7.9	1.2	4.4
LMRC lab dup	E.19	E.48	1.0	<1.0	1.1	5.0	1.0	E8.2	1.2	4.9

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	PCB 151	PCB 170	PCB 174	PCB 177	PCB 180	PCB 183	PCB 187	PCB 194	PCB 206	Total PCB congeners
Gravity cores										
WWD1 (0–5)	E0.51	E0.63	E0.59	E0.13	E0.67	E0.22	E0.52	E0.31	<0.12	13.9
WWD1 (10–20)	E.40	1.3	E.63	E.37	1.5	E.47	E.79	E.97	E.51	24.6
WWD1 (30–40)	E.43	E.73	E.44	E.22	E.73	E.22	E.69	E.33	<.19	13.8
WWD1 (50–60)	E.68	E.95	1.0	E.55	1.6	E.66	1.3	E.62	E.38	49.2
WWD1 (70–80)	2.5	E7.2	4.5	2.4	E9.5	2.4	5.4	E6.5	E1.9	128
WWD1 (80–90)	1.3	1.4	1.5	E.85	2.3	E.96	1.7	E.64	E.32	64.4
WWD1 (90–100)	E.40	E.25	E.16	E.048	E.24	E.10	E.24	E.084	<.11	14.0
WWD1 (100–110)	E.087	E.16	E.028	<1.0	E.092	<1.0	E.088	<1.0	<.12	1.50
WWD1 (120–130)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0
WWD1 (140–150)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<.21	0
WWD1 (160–166)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<.18	0
WWD1 (160–166) dup	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<.12	0
WWD2 (0–5)	E.60	E.72	E.79	E.31	1.1	E.35	E.79	E.48	E.23	14.7
WWD2 (10–20)	E.51	E.65	E.67	E.39	E.97	E.38	E.81	E.37	<.19	11.4
WWD2 (30–40)	1.8	3.0	2.9	E.78	4.8	1.6	3.3	1.4	E.34	47.6
WWD2 (50–60)	E.95	E.76	E.83	E.47	1.2	E.53	1.1	E.56	E.32	22.9
WWD2 (70–80)	E.74	E.82	E.98	E.56	1.5	E.49	1.3	E.63	E.39	18.4
WWD2 (70–80) dup	E.64	E.69	E.82	E.36	1.3	E.51	1.1	E.64	E.33	17.4
WWD2 (100–110)	E.12	E.095	E.078	E.026	E.078	E.024	E.017	E.053	<.14	2.96
WWD2 (100–110) dup	E.15	E.085	E.076	E.0058	E.069	E.024	E.033	E.050	<.12	3.05
WWD2 (130–140)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<.047	0
WWD2 (160–170)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<.0021	0
WWD3 (0–5)	E.71	E.68	E.68	E.34	1.1	E.42	E.78	E.53	E.26	20.7
WWD3 (10–20)	E.71	1.1	1.1	E.63	1.8	E.75	1.4	E.74	E1.0	32.5
WWD3 (20–30)	2.1	3.0	2.9	1.5	5.5	1.7	3.3	1.5	E.67	135
WWD3 (30–40)	2.1	3.0	3.0	1.6	4.6	1.8	3.5	1.6	E1.0	141
WWD3 (40–50)	3.7	5.7	5.9	2.8	10	3.7	7.5	3.1	E1.6	251
WWD3 (50–60)	8.9	12	13	6.8	21	7.6	15	7.5	E1.8	349
WWD3 (60–70)	3.4	4	3.9	1.8	6.5	3.2	3.7	1.1	E.44	207
WWD3 (70–80)	E.23	E.27	E.17	E.041	E.23	E.10	E.20	E.17	E.28	8.98
WWD3 (80–90)	E.084	E.11	E.053	E.045	E.088	<1.0	E.10	E.054	<.098	1.91
WWD3 (100–110)	E.064	E.089	<1.0	<1.0	E.087	<1.0	<1.0	E.021	<.0090	1.09
WWD3 (120–130)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<.012	.77
WWD3 (120–130) dup	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	.62
Box cores										
WWD.B1 (0–5)	E.73	E.93	E.87	E.52	1.5	E.47	1.0	E.51	E.26	15.9
WWD.B2 (0–5)	E.62	E.85	E.69	E.39	1.0	E.43	E.81	E.36	E.26	14.9
WWD.B2 (0–5) dup	E.73	E.73	E.77	E.47	1.2	E.53	E.96	E.36	<.15	17.2
WWD.B3 (0–5)	E.30	E.78	E.33	E.18	E.46	E.17	E.38	<3.0	<3.0	8.06
WWD.B4 (0–5)	E.32	E.62	E.42	E.17	E.67	E.17	E.52	E.28	E.20	8.09
WWD.B5 (0–5)	E.42	E.58	E.41	E.15	E.23	E.63	E.49	E.30	E.27	10.9
WWD.B6 (0–5)	1.5	3.0	2.6	1.3	5.4	1.6	2.8	1.9	E.74	73.8
WWD.B7 (0–5)	E.91	E1.1	E1.2	E.64	E1.8	E.83	E1.3	E.63	E.31	36.7
WWD.B8 (0–5)	E.82	E1.0	E.79	E.32	E1.1	E.52	E.82	E.48	<.20	22.9

Appendix 1.2. Selected polychlorinated biphenyl (PCB) Aroclor and PCB congener concentrations in core, surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	PCB 151	PCB 170	PCB 174	PCB 177	PCB 180	PCB 183	PCB 187	PCB 194	PCB 206	Total PCB congeners
WWD.B9 (0–5)	E0.71	1.0	1.0	E0.53	1.6	E0.67	1.2	E0.73	E0.32	34.0
WWD.B10 (0–5)	E.54	E.53	E.53	E.22	E.78	E.28	E.58	E.33	E.22	14.7
WWD.B11 (0–5)	E.60	E.59	E.65	E.25	E.92	E.32	E.64	E.38	E.24	16.9
WWD.B12 (0–5)	E.52	E.47	E.46	E.21	E.69	E.26	E.52	E.30	E.20	13.2
WWD.B13 (0–5)	E.33	E.35	E.40	E.099	E.42	E.15	E.34	E.26	E.23	10.0
WWD.B14 (0–5)	E.36	E.38	E.42	E.12	E.50	E.17	E.38	E.28	<.15	9.00
WWD.B15 (0–5)	E.39	E.35	E.32	E.12	E.61	E.17	E.39	E.18	E.22	8.50
WWD.B16 (0–5)	E.22	E.46	E.25	E.087	E.46	E.12	E.33	E.23	E.19	6.54
WWD.B17 (0–5)	E.22	E.26	E.20	E.072	E.10	E.097	E.22	E.17	<.090	4.75
Suspended and streambed sediment										
UMRC	E.47	E.57	E.17	E.34	E.50	E.18	E.28	<8.0	<.18	6.23
UMRC	E.05	E.09	E.04	E.05	E.09	E.03	E.05	E.06	<.03	1.03
UMRC	<21	<21	<21	<21	<21	<21	<21	<21	<21	0
UMRC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	E.05	<1.0	<1.0	.54
UMRC env dup	E.05	E.07	E.02	<1.0	E.08	E.02	E.03	E.04	<.03	.60
UMRC	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	0
UMRC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0
GRUGGS	E.60	E.54	E.03	E.50	E.52	E.17	E.15	<14	<.25	7.45
GRUGGS	E.20	E.39	E.24	E.21	E.51	E.16	E.33	E.28	<.05	4.58
GRUGGS lab dup	E.19	E.41	E.22	E.23	E.53	E.14	E.31	E.20	<.05	4.30
GRUGGS	<8.0	E.55	<8.0	<8.0	E.83	<8.0	E.62	E.47	<8.0	4.48
GRUGGS	E.08	E.25	E.09	E.04	E.33	E.11	E.18	<2.0	<2.0	2.23
GRUGGS env dup	E.02	E.55	E.26	E.19	E.66	E.16	E.35	E.27	<.12	4.54
GRUGGS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	0
GRUGGS	<1.0	<1.0	<1.0	<1.0	E.24	<1.0	E.13	E.33	<1.0	1.10
TNG	E.53	E1.9	E.50	E.53	E1.5	E.44	E1.0	E1.6	<1.4	12.6
TNG	E.30	E.25	E.33	E.19	E.61	E.19	E.56	E.32	<.44	4.89
TNG	E.30	E2.2	E.38	E.19	E1.9	E.62	E.95	E1.2	<1.6	14.8
TNG	E.08	E.31	E.44	E.20	E.89	E.25	E.78	E.40	<.56	4.80
TNG	<13	<13	<13	<13	<13	<13	<13	<13	<13	0
TNG	<1.0	E.17	E.10	<1.0	E.54	<1.0	E.46	E.27	E.40	2.28
OF4	E3.5	E5.4	E4.5	E2.4	9.9	E3.4	E5.3	E2.8	<.16	99.2
OF4	E1.5	E4.2	E3.2	E2.0	E8.8	E2.2	E4.4	E2.1	<1.0	81.3
OF4	E4.4	12	E10	E5.4	24	E5.0	13	E3.4	<11	166
LMRC	E.62	E.96	E.44	E.42	E1.2	E.38	E.63	E.66	<.21	17.8
LMRC	2.1	3.2	2.7	1.6	E6.2	1.8	3.0	1.2	E.68	103
LMRC lab dup	1.2	1.9	1.7	1.0	4.0	1.1	2.2	E.85	E.48	48.1
LMRC	<10	E8.7	E5.5	E2.8	E1.8	E1.6	E8.8	E4.9	E.69	57.0
LMRC	1.3	2.0	1.8	1.1	4.3	1.2	2.4	E.94	E.69	47.5
LMRC env dup	1.5	2.4	2.2	1.3	4.9	1.4	2.8	1.0	E.64	55.2
LMRC	<10	E2.8	E1.9	E.53	E5.5	E.51	E3.2	E.78	<10	44.5
LMRC env dup	<10	E2.8	E1.9	E.53	E5.5	E.51	E3.2	E.78	<10	44.5
LMRC	1.4	2.1	1.7	1.1	3.8	1.2	2.3	1.0	E.50	41.7
LMRC lab dup	1.8	2.2	1.9	1.1	3.9	1.2	2.4	1.2	E.53	39.6

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Appendix 2—Analytical Data for Major and Trace Elements, Selected Polycyclic Aromatic Hydrocarbons, and Selected Organochlorine Pesticides From Core, Surficial Bottom, Suspended, and Streambed Sediment Samples, Woods Inlet and Tributaries, Lake Worth, Fort Worth, Texas

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The trace element, polycyclic aromatic hydrocarbon (PAH), and organochlorine pesticide data reported here expand and complement the data of Harwell and others (2003). However, the combined data (this study and Harwell and others [2003]) are insufficient to describe the distribution and sources of trace elements, PAHs, and organochlorine pesticides in Woods Inlet.

Appendix 2.1. Selected major and trace element concentrations in surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003.

[Concentrations in micrograms per gram except organic carbon, which is in weight percent; cm, centimeters; dup, duplicate; --, not analyzed; na, not applicable; env dup, environmental duplicate; lab dup, laboratory duplicate]

Sample identifier and depth interval (cm)	Sample type	Minimum depth (cm)	Maximum depth (cm)	Mid-depth (cm)	Sample date	Organic carbon	Aluminum	Calcium	Iron	Potassium	Magnesium	Sodium	Phosphorus	Titanium	Arsenic	Barium
Gravity cores																
WWD1 (0–5)	core (surficial)	0	5	2.5	04/21/03	2.44	48,200	99,400	21,000	7,700	5,770	521	517	4,460	7.53	246
Box cores																
WWD.B2 (0–5)	surficial	0	5	2.5	04/22/03	2.66	18,100	61,400	9,180	3,930	2,400	724	332	4,720	4.80	209
WWD.B3 (0–5)	surficial	0	5	2.5	04/22/03	2.76	55,100	97,600	24,200	8,970	6,120	702	615	4,380	8.72	288
WWD.B3 (0–5) dup	surficial	0	5	2.5	04/22/03	--	56,500	98,500	24,700	9,050	6,170	698	631	4,320	8.32	294
WWD.B5 (0–5)	surficial	0	5	2.5	04/22/03	2.32	32,200	79,200	14,400	5,940	3,710	912	384	4,590	6.08	241
WWD.B7 (0–5)	surficial	0	5	2.5	04/22/03	2.88	37,700	130,000	17,000	6,040	4,360	746	464	4,560	6.20	232
WWD.B8 (0–5)	surficial	0	5	2.5	04/22/03	2.25	44,600	109,000	20,100	6,840	4,970	582	488	4,520	6.63	245
Suspended and streambed sediment																
UMRC	suspended	na	na	na	8/30/2003	2.62	40,200	198,000	17,200	6,150	5,100	784	617	2,100	6.4	171
UMRC	streambed	na	na	na	8/31/2003	.87	38,400	135,000	18,000	6,900	5,420	1,490	530	2,000	5.6	175
UMRC	suspended	na	na	na	9/11/2003	4.58	52,000	170,000	22,000	8,020	6,560	740	830	2,600	6.7	208
UMRC	streambed	na	na	na	9/16/2003	1.03	48,100	182,000	20,000	7,290	5,550	716	320	2,400	6.9	154
UMRC env dup	streambed	na	na	na	9/16/2003	1.03	48,000	196,000	20,000	7,300	5,560	702	330	2,300	6.6	148
UMRC	suspended	na	na	na	10/5/2003	3.19	45,000	166,000	20,000	6,640	5,520	764	590	2,500	7.0	196
UMRC	streambed	na	na	na	10/6/2003	.95	46,500	201,000	19,000	6,810	5,740	684	290	2,100	5.9	141
GRUGGS	suspended	na	na	na	8/30/2003	5.20	39,200	161,000	17,800	7,060	5,710	999	894	2,120	6.8	206
GRUGGS	streambed	na	na	na	8/31/2003	2.12	45,700	204,000	18,000	7,100	6,050	796	310	2,100	5.5	140
GRUGGS	suspended	na	na	na	9/11/2003	4.40	44,500	183,000	20,000	7,680	6,070	845	770	2,200	6.4	201
GRUGGS	streambed	na	na	na	9/16/2003	1.90	40,400	94,400	20,000	7,160	4,670	1,700	510	2,500	7.2	189
GRUGGS env dup	streambed	na	na	na	9/16/2003	2.20	42,400	127,000	21,000	7,230	5,240	1,400	650	2,600	8.6	195
GRUGGS	suspended	na	na	na	10/5/2003	3.78	58,300	146,000	24,000	7,690	7,280	681	650	3,100	7.3	215
GRUGGS	streambed				10/6/2003	2.63	41,400	159,000	20,000	7,250	5,460	1,220	670	2,200	7.7	183
TNG	suspended	na	na	na	8/30/2003	3.85	28,600	178,000	15,600	5,700	4,370	1,150	583	1,590	6.2	268
TNG	streambed	na	na	na	8/31/2003	1.91	26,200	184,000	15,000	4,180	3,730	686	380	1,300	6.2	133
TNG lab dup	streambed	na	na	na	8/31/2003	na	26,500	188,000	15,000	4,250	3,840	707	390	1,300	6.2	135
TNG lab dup	streambed	na	na	na	8/31/2003	na	25,800	185,000	14,000	4,080	3,730	688	360	1,300	5.4	129
TNG	suspended	na	na	na	9/11/2003	7.37	37,700	183,000	20,000	6,480	5,260	985	920	2,100	6.6	253
TNG	streambed	na	na	na	9/16/2003	2.64	40,700	187,000	19,000	6,420	5,030	979	560	2,200	6.8	187
TNG lab dup	streambed	na	na	na	9/16/2003	--	--	--	--	--	--	--	--	--	--	--
TNG lab dup	streambed	na	na	na	9/16/2003	--	--	--	--	--	--	--	--	--	--	--
TNG	suspended	na	na	na	10/5/2003	7.04	34,100	169,000	21,000	5,790	4,620	885	810	2,100	6.6	211
TNG	streambed	na	na	na	10/6/2003	2.84	40,900	179,000	19,000	6,720	5,130	1,020	550	2,100	7.3	192
OF4	suspended	na	na	na	8/30/2003	6.89	28,800	162,000	21,800	5,020	5,180	922	798	2,340	7.4	301
LMRC	suspended	na	na	na	8/30/2003	2.19	7,040	25,100	2,430	1,010	792	99	121	316	1.4	27.2
LMRC lab dup	suspended	na	na	na	8/30/2003	na	44,000	183,000	18,800	6,930	5,350	711	542	2,170	6.41	170
LMRC	streambed	na	na	na	8/31/2003	1.37	44,300	155,000	20,000	7,440	5,460	1,040	420	2,400	6.4	184
LMRC lab dup	streambed	na	na	na	8/31/2003	--	43,700	152,000	20,000	7,330	5,540	1,060	410	2,000	6.0	185
LMRC lab dup	streambed	na	na	na	8/31/2003	--	43,800	152,000	20,000	7,330	5,610	1,090	420	2,300	6.4	185
LMRC	suspended	na	na	na	9/11/2003	4.08	59,300	128,000	27,000	8,320	7,130	684	680	3,200	7.0	213
LMRC lab dup	suspended	na	na	na	9/11/2003	--	--	--	--	--	--	--	--	--	--	--
LMRC	streambed	na	na	na	9/16/2003	1.66	42,900	155,000	19,000	6,950	4,930	1,010	430	2,300	6.1	186
LMRC env dup	streambed	na	na	na	9/16/2003	1.84	43,400	162,000	19,000	7,020	4,830	995	440	2,500	5.7	193
LMRC	suspended	na	na	na	10/5/2003	4.17	46,700	150,000	22,000	7,460	5,460	874	620	2,600	6.2	215
LMRC env dup	suspended	na	na	na	10/5/2003	4.24	45,800	150,000	21,000	7,340	5,470	924	630	2,500	6.3	210
LMRC	streambed	na	na	na	10/6/2003	1.63	46,800	156,000	20,000	7,400	5,380	960	390	2,300	6.3	192
LMRC lab dup	streambed	na	na	na	10/6/2003	--	47,100	153,000	20,000	7,410	5,290	962	390	2,400	6.0	186
LMRC lab dup	streambed	na	na	na	10/6/2003	--	48,100	157,000	21,000	7,530	5,330	955	400	2,400	6.0	191

Appendix 2.1. Selected major and trace element concentrations in surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	Beryl-lium	Cad-mium	Cobalt	Chro-mium	Copper	Mer-cury	Lith-ium	Man-ganese	Nickel	Lead	Scan-dium	Stron-tium	Vana-dium	Zinc
Gravity cores														
WWD1 (0–5)	1.48	0.585	6.25	46.2	21.0	0.05	29.9	557	21.3	24.0	8.32	170	67.3	73.2
Box cores														
WWD.B2 (0–5)	.399	.454	4.73	21.3	12.5	.03	11.5	256	12.4	24.6	3.85	121	33.5	47.5
WWD.B3 (0–5)	1.42	.584	7.49	51.4	23.3	.05	32.8	670	24.4	30.7	8.81	194	75.2	79.7
WWD.B3 (0–5) dup	1.38	.581	7.21	51.9	24.9	na	32.5	647	24.5	30.7	9.08	198	76.6	82.3
WWD.B5 (0–5)	.867	.606	5.62	35.2	17.7	.04	19.8	367	16.9	27.0	5.70	144	48.3	61.0
WWD.B7 (0–5)	.880	1.08	5.62	48.6	21.4	.06	24.9	359	22.0	35.0	6.65	215	56.2	98.4
WWD.B8 (0–5)	1.21	.780	5.95	47.8	20.5	.05	27.5	569	21.5	29.7	7.52	188	61.7	83.8
Suspended and streambed sediment														
UMRC	1.1	.50	5.5	43.6	14.6	.04	26.4	478	23.9	30.7	6.6	298	56.8	122
UMRC	1.5	.35	6.2	43.3	15.8	.02	26.0	318	12.6	54.9	6.4	202	60.5	77.1
UMRC	1.6	.68	7.0	54.5	22.2	.05	32.8	640	17.7	37.9	8.6	278	73.2	184
UMRC	1.4	.16	5.9	50.5	9.9	.04	35.7	254	15.0	17.9	8.7	281	69.9	43.6
UMRC env dup	1.4	.15	5.8	51.4	9.2	.04	34.6	277	13.1	15.4	8.4	289	70.7	44.5
UMRC	1.4	.42	5.9	48.6	16.7	.04	32.1	542	14.0	31.6	8.0	266	67.6	107
UMRC	1.4	.14	5.1	48.3	8.7	.02	33.2	245	12.4	14.5	8.3	285	66.1	37.2
GRUGGS	1.1	.73	6.0	43.9	27.5	.08	24.2	408	25.9	50.8	6.2	262	60.6	207
GRUGGS	1.4	.18	5.0	50.3	8.6	.04	36.5	257	10.9	17.3	7.8	293	67.1	44.5
GRUGGS	1.5	.69	6.1	52.3	19.2	.05	29.2	375	17.9	48.8	7.5	268	76.8	134
GRUGGS	1.6	.33	7.4	40.8	14.4	.04	21.0	306	14.2	34.1	7.2	153	62.1	67.1
GRUGGS env dup	1.4	.41	8.0	44.5	15.8	.08	23.6	450	15.2	43.8	7.4	188	68.8	83.8
GRUGGS	1.8	.76	7.2	59.3	17.6	.05	35.7	354	20.1	34.9	9.6	217	89.3	112
GRUGGS	1.5	.30	6.6	44.9	14.4	.05	24.5	486	15.4	41.1	7.0	219	67.4	77.7
TNG	.9	7.5	9.2	89.5	23.6	.15	17.7	557	25.4	73.6	5.0	321	48.0	369
TNG	.93	1.1	4.2	36.2	11.0	.05	17.2	216	14.9	45.4	5.1	248	47.6	68.8
TNG lab dup	1.1	1.1	4.3	33.7	10.8	na	17.5	220	15.2	44.8	5.2	249	48.0	70.8
TNG lab dup	.88	1.1	4.2	33.3	11.2	na	16.5	216	14.5	43.8	4.8	248	41.0	67.9
TNG	1.2	8.7	10.5	88.4	28.1	.16	22.6	610	19.0	108	6.5	336	65.3	412
TNG	1.4	2.2	6.0	52.1	18.8	.06	25.3	351	15.9	54.2	7.0	237	67.6	130
TNG lab dup	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TNG lab dup	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TNG	1.1	5.7	6.5	54.8	23.8	.10	21.6	508	16.0	59.7	6.4	276	57.0	306
TNG	1.3	2.2	6.0	51.4	15.4	.06	25.2	349	16.4	43.8	7.2	232	64.5	126
OF4	.9	12.6	9.6	125	110	.29	16.1	604	60.4	203	4.8	441	48.7	1,990
LMRC	.2	.11	.90	5.8	1.7	.05	4.54	51.0	4.66	6.34	.936	34.3	9.41	15.0
LMRC lab dup	1.45	.718	5.81	53.8	17.8	na	32.2	414	13.7	34.3	7.52	263	65.9	100
LMRC	1.5	3.6	6.0	100	35.3	.16	32.9	242	17.0	85.8	7.5	202	66.2	211
LMRC lab dup	1.4	3.5	6.0	94.5	34.8	--	32.3	241	16.5	85.5	7.2	200	65.0	205
LMRC lab dup	1.4	3.6	5.9	98.2	34.9	--	32.5	239	16.4	87.6	7.3	202	65.2	206
LMRC	1.8	4.2	13.1	79.0	36.4	.13	31.4	450	23.3	80.2	10.1	214	79.5	570
LMRC lab dup	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LMRC	1.4	2.4	5.7	69.1	26.9	.10	28.6	229	16.3	57.0	7.3	211	61.3	155
LMRC env dup	1.3	2.5	5.6	71.5	26.2	.11	28.7	210	16.0	58.5	7.6	230	62.2	168
LMRC	1.4	3.1	7.1	74.0	36.0	.11	31.7	387	20.7	71.7	8.2	231	71.8	283
LMRC env dup	1.5	3.3	7.0	72.8	35.9	.10	31.0	383	21.1	72.8	8.1	230	70.7	296
LMRC	1.5	2.3	5.8	81.2	26.6	.10	31.7	226	16.1	59.7	8.0	200	66.6	142
LMRC lab dup	1.5	2.1	5.8	83.3	26.6	--	31.0	220	17.8	59.5	8.4	195	64.2	141
LMRC lab dup	1.5	2.2	6.0	82.9	26.8	--	31.5	225	16.8	57.6	8.2	199	66.7	142

Appendix 2.2. Selected polycyclic aromatic hydrocarbon concentrations in surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003.

[Concentrations in micrograms per kilogram; cm, centimeter; E, estimated; lab dup, laboratory duplicate; na, not applicable; env dup, environmental duplicate; <, nondetection at indicated concentration]

Sample identifier and depth interval (cm)	Sample type	Minimum depth (cm)	Maximum depth (cm)	Mid-depth (cm)	Sample date	Naphthalene	9H-Fluorene	Phenanthrene	Anthracene	Fluoranthene
Gravity cores										
WWD1 (0–5)	core (surficial)	0	5	2.5	4/21/2003	E8.0	21.2	220	55.7	520
Box cores										
WWD.B2 (0–5)	surficial	0	5	2.5	4/22/2003	E7.1	E8.1	67.6	22.8	198
WWD.B2 (0–5) lab dup	surficial	0	5	2.5	4/22/2003	E6.9	11.2	104	28.9	276
WWD.B3 (0–5)	surficial	0	5	2.5	4/22/2003	E9.9	E15.4	123	33.6	263
WWD.B5 (0–5)	surficial	0	5	2.5	4/22/2003	E5.3	16.4	200	46.5	633
WWD.B7 (0–5)	surficial	0	5	2.5	4/22/2003	14.0	27.1	312	70.3	653
WWD.B8 (0–5)	surficial	0	5	2.5	4/22/2003	E7.6	25.6	240	61.7	568
Suspended and streambed sediment										
UMRC	suspended	na	na	na	8/30/2003	E26.5	80.7	1,070	149	2,490
UMRC	streambed	na	na	na	8/31/2003	E2.9	17.2	217	47.6	453
UMRC	suspended	na	na	na	9/11/2003	E30.4	E38.4	576	E88.0	1,540
UMRC	streambed	na	na	na	9/16/2003	E5.5	E26.4	E323	E64.3	E820
UMRC env dup	streambed	na	na	na	9/16/2003	E5.3	27.8	358	52.5	887
UMRC	suspended	na	na	na	10/5/2003	E15.7	E27.2	414	68.4	1,160
UMRC	streambed	na	na	na	10/6/2003	E4.5	25.1	369	48.7	746
GRUGGS	suspended	na	na	na	8/30/2003	E26.9	E28.2	569	82.2	1,530
GRUGGS	streambed	na	na	na	8/31/2003	E2.6	E4.5	47.7	10.2	133
GRUGGS lab dup	streambed	na	na	na	8/31/2003	E2.7	E4.2	48.9	11.0	124
GRUGGS	suspended	na	na	na	9/11/2003	E14.9	E13.3	150	36.1	503
GRUGGS env dup	streambed	na	na	na	9/16/2003	E1.9	E4.5	37.8	E10.4	128
GRUGGS	streambed	na	na	na	9/16/2003	E3.7	E4.5	E60.2	E14.2	E180
GRUGGS	suspended	na	na	na	10/5/2003	E25.6	E28.5	E105	E51.7	332
GRUGGS	streambed	na	na	na	10/6/2003	E2.3	E3.8	36.7	11.1	116
TNG	suspended	na	na	na	8/30/2003	E25.1	E34.6	1,040	123	3,380
TNG	streambed	na	na	na	8/31/2003	E3.0	7.8	231	41.6	808
TNG	suspended	na	na	na	9/11/2003	E42.1	E64.4	E1,580	E224	E5,210
TNG	streambed	na	na	na	9/16/2003	E4.3	9.4	216	42.4	796
TNG	suspended	na	na	na	10/5/2003	E34.7	E51.8	735	E125	1,010
TNG	streambed	na	na	na	10/6/2003	E3.8	7.6	163	27.2	492
OF4	suspended	na	na	na	8/30/2003	369	316	2,510	518	4,360
OF4	suspended	na	na	na	9/11/2003	E190	E300	E2,860	E648	E6,380
OF4	suspended	na	na	na	10/5/2003	85.9	155	3,120	424	8,200
LMRC	suspended	na	na	na	8/30/2003	E6.7	E12.2	213	36.6	460
LMRC	streambed	na	na	na	8/31/2003	59.1	101	856	201	1,290
LMRC lab dup	streambed	na	na	na	8/31/2003	E5.4	19.9	186	46.4	450
LMRC	suspended	na	na	na	9/11/2003	E21.0	E30.1	294	E107	859
LMRC	streambed	na	na	na	9/16/2003	10.4	27.6	302	76.7	776
LMRC env dup	streambed	na	na	na	9/16/2003	13.4	35.9	489	90.6	1,190
LMRC env dup	suspended	na	na	na	10/5/2003	E21.4	E42.0	484	121	1,100
LMRC	suspended	na	na	na	10/5/2003	E19.1	26.3	373	74.4	928
LMRC	streambed	na	na	na	10/6/2003	158	222	1,460	346	1,740
LMRC lab dup	streambed	na	na	na	10/6/2003	32.8	56.7	467	120	822

Appendix 2.2. Selected polycyclic aromatic hydrocarbon concentrations in surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003—Continued.

Sample identifier and depth interval (cm)	Pyrene	Benz(a) anthra-cene	Chrysene	Benzo(a) pyrene	Dibenzo (a,h) anthra-cene	Coronene	Total PAH	Combus-tion PAH	(2+3)/ Combus-tion PAH
Gravity cores									
WWD1 (0–5)	409	225	227	209	41.4	E14.7	4,270	2,518	0.37
Box cores									
WWD.B2 (0–5)	153	80.9	104	97	<10	E10.7	1,990	1,042	.54
WWD.B2 (0–5) lab dup	207	109	125	110	<10	E10.7	2,474	1,295	.52
WWD.B3 (0–5)	211	116	131	118	25.9	E11.6	2,494	1,389	.50
WWD.B5 (0–5)	502	267	286	281	57.5	E23.1	4,931	3,232	.25
WWD.B7 (0–5)	492	265	290	259	67.0	E30.6	5,032	3,117	.33
WWD.B8 (0–5)	431	240	254	230	54.3	E28.5	4,725	2,726	.34
Suspended and streambed sediment									
UMRC	1,840	555	1,090	687	138	E120	16,101	10,631	.27
UMRC	360	143	191	155	30.9	E18.6	3,019	2,002	.24
UMRC	1,180	431	876	631	114	E96.9	11,875	8,071	.25
UMRC	E650	E296	E310	E328	E57.7	na	5,672	3,715	.23
UMRC env dup	698	312	332	348	54.9	na	5,870	3,937	.23
UMRC	907	413	584	730	73.2	E39.8	9,938	6,963	.22
UMRC	588	261	317	451	36.9	E18.8	5,803	4,223	.19
GRUGGS	1,080	497	931	563	131	E116	11,818	7,907	.22
GRUGGS	103	51.7	78.7	53.4	11.6	E8.5	1,204	712	.37
GRUGGS lab dup	97.0	53.1	83.6	60.1	13.5	E9.2	1,269	736	.37
GRUGGS	397	169	273	237	45.3	E39.4	4,264	2,819	.32
GRUGGS env dup	99.4	43.7	59.9	55.9	E12.7	na	1,102	674	.29
GRUGGS	E143	E67.8	E102	E86.1	E17.4	E21.2	1,429	1,035	.22
GRUGGS	266	E120	206	166	E56.6	E40.9	3,546	2,021	.55
GRUGGS	91.4	40.6	62.0	51.5	8.4	E5.9	896	622	.28
TNG	2,590	816	1,690	1,210	261	E198	22,740	16,536	.15
TNG	602	336	351	340	66.7	na	5,360	3,886	.14
TNG	E3,960	E1,420	E2,380	E1,950	E512	E368	33,634	24,170	.15
TNG	618	316	354	351	64	na	5,593	3,698	.18
TNG	1,750	671	983	901	E180	E101	13,408	9,459	.26
TNG	373	192	245	329	37.0	E16.1	4,404	3,203	.13
OF4	3,330	1,570	2,630	1,720	408	E509	38,177	23,060	.37
OF4	E5,460	E2,580	E3,250	E2,760	E443	E279	49,723	31,850	.27
OF4	6,600	3,210	4,720	5,650	493	E203	79,622	56,660	.14
LMRC	324	153	252	157	33.1	E38.9	3,580	2,213	.33
LMRC	991	613	540	509	96.7	na	9,912	5,904	.37
LMRC lab dup	345	191	188	192	41.8	na	3,391	2,146	.25
LMRC	684	338	536	424	E88.8	E69.1	8,156	4,999	.39
LMRC	604	342	342	314	66.5	na	5,838	3,718	.25
LMRC env dup	914	456	466	467	88.6	na	8,394	5,521	.24
LMRC env dup	869	437	588	496	83.4	E46.4	9,229	5,934	.28
LMRC	732	518	752	556	62.2	E31.6	8,389	5,722	.23
LMRC	1,240	892	858	1,130	168	E34.5	16,379	10,094	.37
LMRC lab dup	642	389	396	560	50.4	E15.7	7,166	5,202	.21

Appendix 2.3. Selected organochlorine pesticide concentrations in surficial bottom, suspended, and streambed sediment samples, Woods Inlet and tributaries, Lake Worth, Fort Worth, Texas, 2003.

[Concentrations in micrograms per kilogram; cm, centimeter; g, grams; --, not analyzed; E, estimated; <, nondetection at indicated value; dup, duplicate; env dup, environmental duplicate; lab dup, laboratory duplicate]

Sample identifier and depth interval (cm)	Sample type	Minimum depth (cm)	Maximum depth (cm)	Mid-depth (cm)	Sample date	Sediment mass (g)	Technical chlordane	Dieldrin	DDE	DDD	DDT
Gravity cores											
WWD1 (0–5)	core (surficial)	0	5	2.5	4/21/2003	--	E3.2	<1.5	E0.86	<1.5	<1.5
Box cores											
WWD.B2 (0–5)	surficial	0	5	2.5	4/22/2003	--	22	E.56	1.1	E.46	<.5
WWD.B2 (0–5) dup	surficial	0	5	2.5	4/22/2003	--	24	E.38	1.4	E.44	E.32
WWD.B3 (0–5)	surficial	0	5	2.5	4/22/2003	--	E4.4	<1.5	E.69	<1.5	<1.5
WWD.B5 (0–5)	surficial	0	5	2.5	4/22/2003	--	E3.1	<1.0	E.89	<1.0	<1.0
WWD.B7 (0–5)	surficial	0	5	2.5	4/22/2003	--	E8.4	<1.0	1.4	<1.0	E.14
WWD.B8 (0–5)	surficial	0	5	2.5	4/22/2003	--	E5.0	<1.0	E.9	<1.0	<1.0
Suspended and streambed sediment											
UMRC	suspended	--	--	--	8/30/2003	2.848	E34	<4.0	E1.6	<4	<4.0
UMRC	streambed	--	--	--	8/31/2003	20.665	E3.4	<.5	E.24	<.5	<.5
UMRC	suspended	--	--	--	9/11/2003	1.17	<105	<11	<11	<11	<11
UMRC	streambed	--	--	--	9/16/2003	17.998	5	<.5	E.19	<.5	<.5
UMRC env. dup.	streambed	--	--	--	9/16/2003	19.958	E2.3	<.5	E.15	<.5	<.5
UMRC	suspended	--	--	--	10/5/2003	4.203	<25	<2.5	E1.1	E1.6	<5.0
UMRC	streambed	--	--	--	10/6/2003	21.652	<5.0	<.5	<.5	<.5	<.5
GRUGGS	suspended	--	--	--	8/30/2003	1.757	90	<7	E3.0	<7.0	<7.0
GRUGGS	streambed	--	--	--	8/31/2003	16.694	30	1.1	.86	<.5	<.5
GRUGGS lab dup.	streambed	--	--	--	8/31/2003	16.805	30	1.1	.82	<.5	<.5
GRUGGS	suspended	--	--	--	9/11/2003	2.91	<40	<4.0	1.2	E2.5	<4.0
GRUGGS	streambed	--	--	--	9/16/2003	8.753	16	E.75	E.43	1.1	<1.0
GRUGGS env. dup.	streambed	--	--	--	9/16/2003	12.587	E34	E1.5	E.75	E2.3	E.66
GRUGGS	suspended	--	--	--	10/5/2003	4.780	<25	<2.5	E1.7	E2.0	E.4
GRUGGS	streambed	--	--	--	10/6/2003	19.59	<5.0	<.5	.57	1.1	E.25
TNG	suspended	--	--	--	8/30/2003	2.418	E17	<5.0	E1.6	<5.0	<5.0
TNG	streambed	--	--	--	8/31/2003	18.774	7.2	<.5	E.3	<.5	<.5
TNG	suspended	--	--	--	9/11/2003	1.997	E24	<6.0	E3.7	<6.0	<6.0
TNG	streambed	--	--	--	9/16/2003	14.806	9.8	E.6	.51	.44	E.43
TNG	suspended	--	--	--	10/5/2003	1.801	<65	<6.5	E1.1	<6.5	6.9
TNG	streambed	--	--	--	10/6/2003	20.729	<5.0	<.5	.51	E.24	<.5
OF4	suspended	--	--	--	8/30/2003	2.578	E26	<4.5	E4.3	<4.5	<4.5
OF4	suspended	--	--	--	9/11/2003	5.653	E25	<2.0	E3.2	<2.0	<3.0
OF4	suspended	--	--	--	10/5/2003	2.146	<55	<5.5	E2.4	<5.5	<5.5
LMRC	suspended	--	--	--	8/30/2003	5.294	E12	<2.0	E1.3	<2.0	<2.0
LMRC	streambed	--	--	--	8/31/2003	22.928	5.1	<.5	E1.4	<.5	<.5
LMRC lab dup	streambed	--	--	--	8/31/2003	23.708	E3.3	<.5	E.93	<.5	<.5
LMRC	suspended	--	--	--	9/11/2003	1.201	<100	<10	E2.5	E1.3	<10
LMRC	streambed	--	--	--	9/16/2003	15.093	5.5	<.54	E1.0	<.5	<.5
LMRC env dup	streambed	--	--	--	9/16/2003	14.806	7.4	E	E1.3	<.5	<.5
LMRC	suspended	--	--	--	10/5/2003	4.938	E10.10	<2.5	<2.5	<2.5	<2.5
LMRC env dup	suspended	--	--	--	10/5/2003	2.275	<50	<5.0	<5.0	<5.0	<5.0
LMRC	streambed	--	--	--	10/6/2003	23.005	<5.0	<.5	<.5	<.5	<.5
LMRC lab dup	streambed	--	--	--	10/6/2003	2.146	<5.0	<.5	1.3	<.5	<.5

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