

Perfluorochemicals in Mississippi River Pool 2: 2012 Update

Fish, benthic invertebrates, water, and sediment were tested for PFCs in 2012. Results are summarized and compared to previous results from Pool 2.



Minnesota Pollution Control Agency

May 2013

Authors

Bruce Monson

Contributors / acknowledgements

Paul Hoff

Phil Monson

Joel Stiras

Harold Wiegner

The MPCA is reducing printing and mailing costs by using the Internet to distribute reports and information to wider audience. Visit our website for more information.

MPCA reports are printed on 100 percent post-consumer recycled content paper manufactured without chlorine or chlorine derivatives.

Editing and Graphic Design

Cover photo: Upper Midwest Environmental Sciences Center.

http://www.umesc.usgs.gov/aerial_photos/s/s31g1_1997ob.html

Minnesota Pollution Control Agency

520 Lafayette Road North | Saint Paul, MN 55155-4194 | www.pca.state.mn.us | 651-296-6300

Toll free 800-657-3864 | TTY 651-282-5332

This report is available in alternative formats upon request, and online at www.pca.state.mn.us

Document number: c-pfc1-21

Table of Contents

Abbreviations glossary	i
Executive summary	E-1
Introduction	1
<i>What are PFCs and why are they an environmental contaminant?</i>	1
<i>Mississippi River Pool 2</i>	1
<i>Why this study?</i>	2
Methods	3
<i>Fish collection</i>	3
<i>Water collection</i>	3
<i>Sediment and benthic macroinvertebrate collection</i>	4
<i>Laboratory analysis</i>	4
<i>Quality assurance</i>	4
Results and discussion	5
<i>Surface water</i>	5
<i>Fish</i>	5
<i>Bioaccumulation factors and site-specific water quality criterion</i>	6
<i>Sediments</i>	7
<i>Benthic invertebrates</i>	8
<i>Conclusions</i>	9
<i>References</i>	9
Tables	11
Figures	14
Appendix A: Fish and Water Data	23
Appendix B: Benthic Macroinvertebrate and Sediment Data	55

Tables

Table 1. PFOS concentrations (ng/L) in water samples collected at the same twelve stations in 2009 and 2012; A, B, and C refer to consecutive grab samples collected at each station; in 2012 two samples from Stations 1 and 5 were used for laboratory matrix spikes.	11
Table 2. Descriptive statistics for PFOS (ng/g -ww) in the five target fish species; combined results for 2004-2012	11
Table 3. PFOS concentrations (ng/g -ww) for each fish species and year from all of Pool 2 (left) and only Lower Pool 2—Section 4 (right); the top row of each species is for all years; results from the study in 2011 used lower Reach 9 and Reach 10 to represent the Lower Pool 2; in 2004-2008 all fish were collected in the Lower Pool 2.....	12
Table 4. Summary statistics for sediment and invertebrate measurements	13
Table 5. Replicates of sediment PFOS concentrations with matching invertebrate PFOS concentrations and BSAF	13

Figures

Figure ES-1. Locations of Sections and Stations and summary tables of mean PFOS concentrations in fish and water ES-3

Figure ES-2. PFOS concentrations in sediment and benthic invertebrates in Pool 2 from 2011-2012 ... ES-4

Figure 1. Pool 2 showing river miles between Lock & Dam No. 1 at river mile 847.6 to Lock & Dam No. 2 at river mile 815.6 (~32.5 miles); shows four sections and PFC water stations for 2009 and 2012..... 14

Figure 2. Water levels at Mississippi River South St. Paul: (a) record between 1 July 2009 and 1 October 2012; (b) hourly water levels on sampling days (<http://www.mvp-wc.usace.army.mil/dcp/SSPM5.html>)..... 15

Figure 3. Fish-collection runs in Pool 2: a. entire Pool 2 showing reaches and runs; b. runs in Section 4..... 16

Figure 4. Box-whisker plots of PFOS concentrations in Lower Pool 2 by year for (a) smallmouth bass, (b) carp, and (c) freshwater drum..... 17

Figure 5. Species-Section matrix showing distributions of PFOS in 2009 (red) and 2012 (blue); horizontal mid-line is the median; vertical lines are PFOS thresholds of 40 ng/g and 200 ng/g..... 18

Figure 6. PFOS concentrations by fish-collection runs in Section 4 (2012) 19

Figure 7. PFOS concentrations (dry weight) in surface sediments collected between November 2011 and November 2012; concentrations are color coded and insert map shows measured concentrations in Section 4 of Pool 2 20

Figure 8. PFOS concentrations in sediment (ng/g dry weight) and benthic macroinvertebrates (ng/g wet weight)..... 21

Figure 9. Relationship between invertebrate and sediment PFOS concentrations (both wet weight and log-scale) 22

Abbreviations glossary

Groups

PFCs – perfluorochemicals or perfluorinated compounds

PASs – perfluoroalkyl surfactants

PFCAs – perfluorocarboxylic acid

PFASs – polyfluorinated alkyl substances

FTOH – fluorotelomer alcohols

PFAAs – perfluoroalkyl acids

Individual

PFBA – perfluorobutanoic acid (C4 Acid)

PFBS – perfluorobutane sulfonate (C4 Sulfonate)

PFPeA – perfluoropentanoic acid (C5 Acid)

PFHxA – perfluorohexanoic acid (C6 Acid)

PFHxS – perfluorohexane sulfonate (C6 Sulfonate)

PFHpA – perfluoroheptanoic acid (C7 Acid)

PFOA – perfluorooctanoic acid (C8 Acid)

PFOS – perfluorooctane sulfonate (C8 Sulfonate)

PFOSA – perfluorooctane sulfonamide (C8 Sulfonamide, branched)

PFNA – perfluorononanoic acid (C9 Acid)

PFDA – perfluorodecanoic acid (C10 Acid)

PFUnA – perfluoroundecanoic acid (C11 Acid)

PFDoA – perfluorododecanoic acid (C12 Acid)

Other abbreviations

AFFF – aqueous fire-fighting foam

ECF – electrochemical fluorination

FCA – fish consumption advisory

MDH – Minnesota Department of Health

MDNR – Minnesota Department of Natural Resources

MPCA – Minnesota Pollution Control Agency

WWTP – wastewater treatment plant

Executive summary

Mississippi River Pool 2 is the 32.5 mile reach between Lock & Dam No. 1 (Ford Dam) and Lock & Dam No. 2 (Hastings Dam), dissecting Minneapolis, St. Paul, and communities south of St. Paul to Hastings.

Perfluorochemicals (PFCs) were produced by 3M between the 1950s and 2002 at its manufacturing plant on the river in Cottage Grove, Minnesota. The Minnesota Pollution Control Agency (MPCA) began testing fish from Pool 2 for PFCs in 2004. Results showed high levels of one PFC, perfluorooctane sulfonate (PFOS), in the fish. Since 2004, fish from many lakes and rivers in Minnesota have been tested for PFCs. Several lakes in Twin Cities Metropolitan Area had high PFOS concentrations in the fish that led to fish consumption advisories from the Minnesota Department of Health (MDH) and impairment classifications by the MPCA.



The MDH developed a reference dose for PFOS that is used as the basis for fish consumption advice. Mean PFOS concentrations in fish greater than 40 parts per billion (ppb or nanogram per gram, ng/g) to 200 ppb are assigned meal advice of one meal per week; greater than 200 to 800 ppb, the advice is one meal per month, and above 800 ppb, do not eat. In 2009, freshwater drum from Pool 2 had the highest PFOS concentrations among the five species tested and drum were assigned a consumption advisory of one meal per month, based on a mean PFOS concentration of 229 ppb. Smallmouth bass exceeded the threshold for a meal per month with a mean PFOS concentration of 209 ppb when data from 2004 to 2009 are combined; however, meal advice was not given for this species in Pool 2 because only catch-and-release fishing is allowed (<http://www.health.state.mn.us/divs/eh/fish/>). Pool 2 had been listed as impaired for PFOS in fish tissue in 2008 because of a meal per month advisory for bluegill sunfish. It stayed on the impaired waters list in 2010 because of the freshwater drum.

This report presents the results of an intensive monitoring of PFCs in fish, benthic macroinvertebrates (sediment-dwelling insects), water, and sediments in 2012, which was a follow-up to the first intensive study in 2009 (MPCA 2010) and a second study conducted by 3M in 2011 (Cardno-Entrix 2011). The sampling protocols for fish and water in 2012 were identical to the 2009 sampling protocols, with the exception that in 2012 the fish-collection runs were georeferenced. Split sampling of water and fish, which occurred in 2009 with 3M, was not repeated in 2012. The sampling protocol by 3M's contractor, Cardno-Entrix, for the 2011 study differed from the 2009 MPCA study in site locations for water samples, number of fish, and species collected. All three studies collected bluegill sunfish, freshwater drum, smallmouth bass, and white bass. Common carp were collected in 2009 and 2012. Drum had not been sampled prior to 2009, because it was not considered a typical sport fish. Based on the Minnesota Department of Natural Resources' (MDNR) observation that drum have been harvested in Pool 2 for human consumption, it was included as a target species in 2009 and subsequent years.

To characterize possible differences within Pool 2, it was divided into four sections for the monitoring in 2009 and 2012 (Figure ES-1). Three water stations in each section were sampled in triplicate in 2009 and 2012, for a total of 12 stations. The 3M study in 2011 divided Pool 2 into ten reaches; three water stations in 10 reaches gave a total of 30 stations in 2011.

Sediment and benthic macroinvertebrates had not been collected in 2009 or 2011. Testing of sediment and invertebrates were added in 2012 to better understand the extent of PFC contamination in the Pool 2 food web, and to further characterize any differences among sampling stations. Fish can potentially swim throughout Pool 2, whereas sediment and the insect nymphs in the sediments are stationary.

The results of fish and water PFOS concentrations are summarized for 2009 and 2012 in Figure ES-1. PFOS was detected in all but two of the 296 fish collected in 2012 from Pool 2. Pool-wide means decreased substantially between 2009 and 2012 for four of the five fish species. Only carp showed an increase in the mean PFOS concentration. The means for each of the four sections in the river indicate the higher pool-wide PFOS concentration for carp in 2012 was caused by an increase in Section 4 despite drops in the mean in the other sections.

The highest PFOS concentrations in fish coincided with the location of the highest water concentrations in Section 4. Of the five targeted fish species in Pool 2, freshwater drum had the highest average PFOS concentration in 2009, while carp had the highest concentration in 2012.

In the water samples from 2012, perfluorobutanoic acid (PFBA) was detected at all 12 water-collection stations. Perfluorooctanoic acid (PFOA) and perfluorohexanoic acid (PFHxA) were detected in Sections 2, 3, and 4. The highest water concentrations of PFCs were found in Section 4 (lower Pool 2). Three other PFCs were detected in Section 4: perfluoropentanoic acid (PFPeA), perfluorobutane sulfonate (PFBS), and perfluorohexane sulfonate (PFHxS).

In 2012, PFOS concentrations in water continued to show a similar geographic pattern to 2009 results. PFOS concentrations in water were generally below the detection limit in the upper 10 sampling stations. Stations 6, 7, and 8, had detectable PFOS concentrations in 2009, but were below detection in 2012 (except for one of the samples at Station 8). PFOS concentrations in water were relatively high at the lower two stations, 11 and 12. Station 11 was immediately downstream of the 3M Cottage Grove Center and Station 12 was farther downstream. PFOS concentrations at the two downstream stations were higher in 2012 than in 2009. In both years, the PFOS concentrations at these two downstream stations were well above the site-specific water quality criteria, 7 ng/L, established in 2009. The reason for the higher concentrations in 2012 is not known, but a comparison of PFOS concentrations and river water levels for 2009, 2011, and 2012 indicated the higher level in 2012 was *not* because of lower flows and less dilution from point source discharges.

Site-specific water quality criteria to protect fish tissue for human consumption are calculated when a water concentration is needed for regulatory purposes. To calculate the water quality criterion, the needed site-specific information is the ratio of fish tissue concentration to water concentration, referred to as the bioaccumulation factor (BAF). BAFs were calculated for PFOS using the water and fish data in 2009 and updated in 2012. Species-specific mean BAFs for PFOS based on the 2012 data ranged from 2700 L/kg to 4600 L/kg; compared to the range of 4000 to 6000 L/Kg from the 2009 data. Lower average BAFs in 2012 compared to 2009 resulted in the site-specific water quality criterion for PFOS in Pool 2 increasing from 7 ng/L to 14 ng/L.

Sediment and benthic invertebrate PFOS concentrations were detectable but relatively low for sites upstream of the 3M Cottage Grove Center (Figure ES-2). The high PFOS concentrations in sediment and invertebrates near Station 11 reinforce the results from fish and water.

In summary, PFOS concentrations in fish have declined in Pool 2; however, PFOS concentrations remain high in fish, invertebrates, sediments, and water from the lower section of Pool 2.

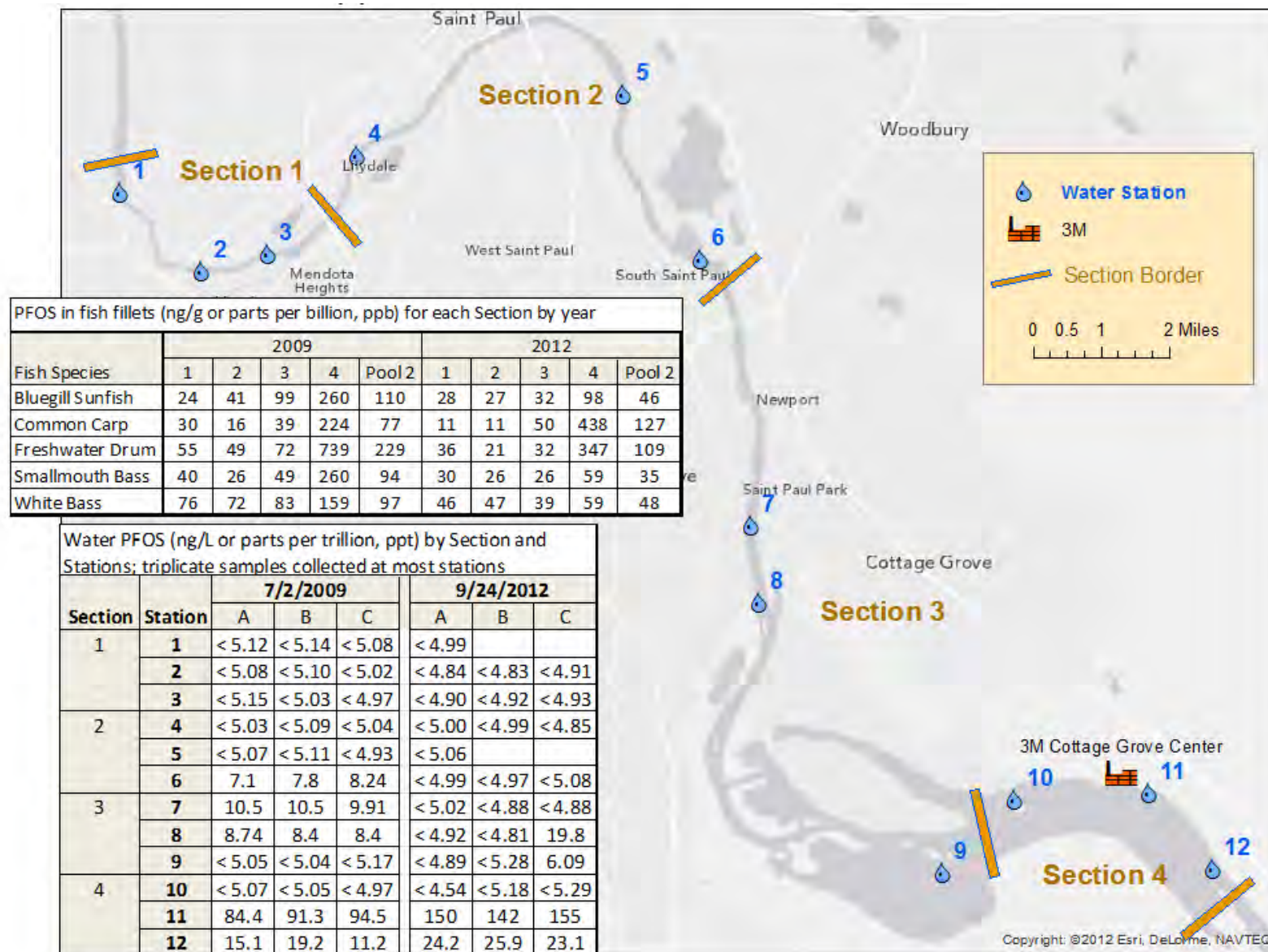


Figure ES-1. Locations of Sections and Stations and summary tables of mean PFOS concentrations in fish and water

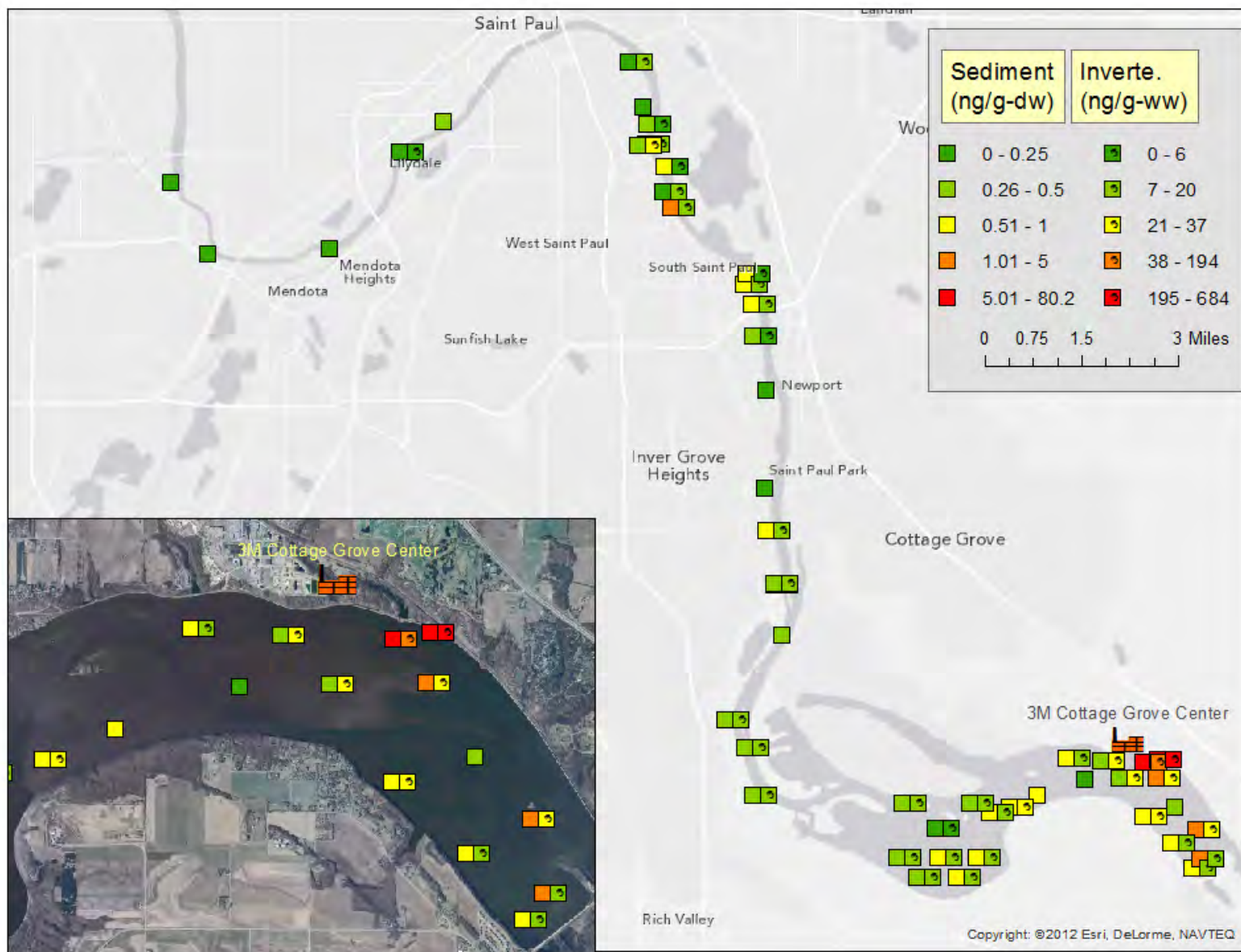


Figure ES-2. PFOS concentrations in sediment and benthic invertebrates in Pool 2 from 2011-2012

Introduction

What are PFCs and why are they an environmental contaminant?

Perfluorochemicals (PFCs)—also known as perfluorinated compounds—are composed of a carbon chain saturated with fluorine atoms, with a functional group at the end of the chain. The functional groups are typically a sulfonate ($-\text{SO}_3$) or a carboxylic acid group ($-\text{COOH}$). The functional group makes the PFC soluble in water (hydrophilic), whereas the carbon chain makes the PFC molecule soluble in lipids (lipophilic) and resistant to water (hydrophobic). The unique properties of PFCs have been exploited for numerous consumer products, most notably fire-fighting foam, stain protection, and non-stick surfaces.

PFCs emerged as a global pollutant in 2001 when scientists reported perfluorooctane sulfonate (PFOS) in wildlife throughout the world (Giesy and Kannan, 2001). Subsequently, PFCs were described as “globally distributed, environmentally persistent, bioaccumulative, and potentially harmful” (Giesy and Kannan, 2002). PFOS was shown to be the predominant PFC in most fish (Houde et al., 2006). Detection limits for PFCs generally range from 2.5 to 5 nanograms per gram (ng/g), or parts per billion (ppb). Although there are naturally occurring fluorinated organic compounds that contain one fluorine atom, all PFCs in the environment are anthropogenic (Giesy and Kannan, 2002).

Rather than being lipophilic like many other persistent organic pollutants (POPs), several studies have suggested that PFCs are proteinophilic (Conder et al., 2008). PFOS behaves very differently from other POPs, having differences in intrinsic factors, such as surface activity, water solubility, non-measurable octanol/water coefficient values, and relatively low bioaccumulation potential.

Fish from contaminated areas may be a significant source of dietary PFOS exposure (Berger et al., 2009). Various toxic endpoints have been measured in laboratory studies of PFCs. Observed effects of low doses of PFOS include decreased high density lipoprotein cholesterol (HDL) and changes in thyroid hormone levels in some animals. Recent studies have reported direct hormonal effects in fish exposed to PFCs in water. In addition to demonstrated direct toxic effects, PFCs might enhance cell membrane permeability of other pollutants (Wang et al., 2009).

Mississippi River Pool 2

Mississippi River Pool 2 (Figure 1) extends from Lock & Dam No. 2 at Hastings, Minnesota, upstream 32.5 miles to Lock & Dam No. 1 (Ford Dam). The Mississippi confluence with the Minnesota River is at the upper reach of Pool 2 and the confluence with the St. Croix River is just below Lock & Dam No. 2. Within Pool 2, average annual flow is about 15,000 cubic feet per second (cfs). Pool 2 is a receiving-water for the largest publically-owned wastewater treatment plant (WWTP) in Minnesota, the Metropolitan WWTP, with an average discharge of 185 million gallons per day (286 cfs). The Eagles Point WWTP, with an average discharge of 4.2 mgd, is next to the 3M Company Cottage Grove facility at the lower end of Pool 2. The 3M facility discharges industrial process water and cooling water to the Mississippi River, with a combined flow of 8 mgd.

3M Company's Cottage Grove facility was a major manufacturer of PFOS from the 1950's to 2002. Although the facility discontinued production of PFOS, wastewater discharge from the facility continues to contain measurable PFOS concentrations. Discharge from the Metropolitan WWTP also has measureable PFCs because these chemicals have been included in a wide range of consumer and industrial products that have been disposed of in municipal and industrial wastewater systems.

This report characterizes the levels of PFCs in Pool 2 and does not evaluate possible sources of PFCs to Pool 2.

Why this study?

The MPCA is the state agency responsible for assessing and listing impaired waters for Minnesota, subject to federal U.S. Environmental Protection Agency (EPA) approval. MPCA rules specify that the MPCA shall list waters as impaired if the fish consumption advisory for a lake or river is more restrictive than a meal per week (Minn. R. 7050.0150, subp. 7). Pool 2 had been listed as impaired for mercury and PCBs in fish. Impairment caused by PFOS in fish was added in 2008, based on a one meal per month advisory for bluegill sunfish in 2007. Freshwater drum, first sampled in 2009, also had PFOS levels that warranted a meal per month advisory.

The 2012 sample collection was a follow-up to the 2009 intensive study by the MPCA and the 2011 study by Cardno-Entrix for 3M. The MPCA and the Minnesota Department of Natural Resources (MDNR), with participation of the Minnesota Department of Health (MDH), have analyzed fish and river water for PFCs from Pool 2 since 2004. The 2009 study—which was designed together by 3M, MPCA, MDNR, and MDH—was the first year when the entire 32.5 mile reach of Pool 2 was sampled for PFCs in fish and water. Earlier collections focused on the lower five miles of Pool 2. Of the 367 fish analyzed from 2004 to 2009, 297 (81 percent) were collected in 2009.

To characterize the spatial distribution of PFCs in 2009, Pool 2 was divided into four sections, with Section 1 at the most upstream end and Section 4 above the Hastings Dam (Figure 1). That same monitoring plan was followed in 2012.

The 2011 study conducted by 3M was similar to the 2009 study design except that Pool 2 was divided into ten reaches (instead of four), three water samples were collected in each reach but not at the same location. Carp were not collected in 2011, but the other four species tested in 2009 were collected. Ten fish of each species were collected in each reach, for a total of 400 fish. Compared to the 2009 study, the 2011 sampling design collected 100 of each species instead of 60 of each species and reduced the percentage of fish collected in the lower reach (Section 4) from 25 percent (15/60 per species) to 18 percent (18/100 per species). The report by Cardno-Entrix and a second report by Exponent in November 2011 comparing the 2009 and 2011 results showed PFOS concentrations had declined from 2009 in the four tested fish species. Because of lower PFOS concentrations in 2011, the average PFOS concentration for the combined years dropped below the meal per month advisory threshold to an advisory level of one meal per week.

MPCA did not delist Pool 2 as impaired for PFOS in fish based on the 2011 study because it was not sufficient to indicate a permanent downward trend in the PFOS concentrations and the sampling design in 2011 differed from the 2009 sampling design. Consequently, MPCA conducted the 2012 study, following the same sample design as 2009, to determine if the PFOS concentrations had indeed dropped to lower levels throughout Pool 2.

In addition to collection of fish and water in 2012, the MPCA collected sediments and benthic macroinvertebrates in 2011 and 2012 to better understand the extent of the PFC contamination in Pool 2 and the possible direct source of PFOS in the fish. Unlike fish and water, sediments and insect nymphs living in the sediments are stationary and better represent the specific locations within the river. Freshwater drum and common carp, which had the highest PFOS concentrations in 2009, feed on sediments and benthic invertebrates more so than the other tested fish species.

Methods

Fish collection

Because of the long length of Pool 2, it was divided into four sections in the 2009 and 2012 studies for fish and water sampling (Figure 1). Average PFOS concentrations were then compared among sections as well as for all of Pool 2. Description of the four Pool 2 Sections:

- Section 1:* Approximately four river miles from Lock & Dam No. 1 (Ford Dam) to confluence with the Minnesota River.
- Section 2:* Ten river miles from the Minnesota River confluence to the lower channel to Hog Lake and Pig's Eye Lake, but not including Hog and Pig's Eye lakes; Metropolitan (Metro) wastewater treatment plant and Holman Field airport are in this section.
- Section 3:* Approximately 13.5 river miles include Hog Lake and Pig's Eye Lake as well as River, Baldwin, Mooers, and Spring lakes and Lower Grey Cloud Slough.
- Section 4:* The lower five river miles to Lock & Dam No. 2 in Hastings, which includes Spring Lake; Eagles Point wastewater treatment plant and 3M Cottage Grove facility are in this section.

As in the 2009 study, the five target fish species in 2012 were bluegill sunfish (BGS), common carp (C), freshwater drum (FWD), smallmouth bass (SMB), and white bass (WHB).

MDNR collected fish from the entire length of Pool 2 using electroshocking equipment. Collections occurred between July 30, 2012 and September 14, 2012. The beginning and end of each fish-collection run was geo-referenced (latitude and longitude). Each fish was identified by the section and run in which it was collected. Fish were wrapped in aluminum foil and immediately frozen. The frozen fish were labeled with a unique sample ID before shipping overnight to AXYS laboratory.

Water collection

Water samples were collected at 12 stations—3 stations per section—on September 24, 2012. Three samples at each station were collected as consecutive grab samples in 2 liter polyethylene bottles provided by AXYS. The bottle cap was removed after the bottle was completely immersed below the water surface and allowed to fill completely. The description of 12 water sample stations is as follows:

Section	Water Station	Description
1	1	Main channel at river mile 847
	2	Old Minnesota River channel, near river mile 845.4
	3	Main channel upstream of confluence with Minnesota River at river mile 844
2	4	Main channel near boat launch at river mile 842
	5	Main channel adjacent to Holman Field at river mile 837
	6	Bay south of Pigs Eye Lake near river mile 834
3	7	Main channel near boat launch; downstream from St. Paul Park Refinery at river mile 829.5
	8	Main channel upstream of Island 112 at river mile 827.5
	9	Near Spring Lake at river mile 821
4	10	Main channel, downstream of Grey Cloud Slough at river mile 819
	11	Near shoreline, downstream of 3M Cottage Grove discharge, near river mile 817.5
	12	Main channel, upstream of Lock & Dam No. 2 at river mile 816

Sediment and benthic macroinvertebrate collection

Sediment samples were collected with a modified Hongve surface-sediment drop corer, with a rubber ball valve at the top (modification by Harold Wiegner, MPCA). Before each collection the corer and stainless steel spatula were washed with methanol (tested and provided by AXYS lab). The top 5 cm of sediment were collected and dispensed into 250 mL polyethylene jars (provided by AXYS lab). Jars were labeled with Site ID, date, and time. The sediment sample was stirred with the spatula and a sub-sample was placed in a 250 mL glass jar (provided by Pace Laboratories) for total organic carbon. All samples were kept on ice in a cooler.

Benthic macroinvertebrates (invertebrates) were collected with a Petite Ponar sampler, which grabs a sediment sample with an area of 6 x 6 inches (152 x 152 mm). The Ponar was dropped from the bow of the boat multiple times as needed to collect a sufficient mass of invertebrates. The sediment sample was deposited into a stainless-steel wash screen (356 x 598 x 192 mm; 500 µm mesh) and rinsed with river water as needed to expose invertebrates. All benthic invertebrates known to live in the sediments (excluding species that lived on or near sediment surface such as amphipods) were removed from the sediments with stainless-steel forceps and placed in a polyethylene 250 mL jar (provided by AXYS lab). The number of Ponar grabs and general description of invertebrates were noted in the field notebook. Invertebrate samples were kept on ice in a cooler. At the end of a sample day, all sediment and invertebrate samples were placed in a freezer until they were shipped to the laboratory.

Laboratory analysis

AXYS Analytical Services Ltd analyzed all samples for PFCs. Empty coolers were shipped by AXYS to the MPCA for fish samples and coolers with bottles were shipped for other samples. The whole fish shipped to AXYS were measured for length and weight; also, gender and age were recorded. AXYS homogenized fish fillets, with scales off and skin on, which is the protocol used for fish contaminant analysis when results are used for fish consumption advisories.

The USEPA has not yet approved analytical methods for PFCs in matrices (except for drinking water); however, all laboratories conducting PFC analysis on environmental samples use a method of liquid chromatography-electrospray tandem mass spectrometry (LC-MS/MS). Sample homogenization, extraction, and clean-up steps can vary among laboratories. AXYS describes their aqueous method as, *AXYS Method MLA-060: Analytical Procedure for the Analysis of Perfluorinated Organic Compounds in Aqueous Samples by LC-MS/MS* and their tissue method as, *AXYS Method MLA-043: Analytical Procedure for the Analysis of Perfluorinated Organic Compounds in Tissue Samples by LC-MS/MS*.

The reporting level is the limit of quantitation (LOQ), defined as the lowest non-zero calibration standard having accuracy of 100 ±30 percent.

Quality assurance

In addition to the multiple level quality assurance protocol at AXYS, William Scruton, Quality Assurance Coordinator for MPCA's Environmental Analysis and Outcomes Division, reviewed all data packages from AXYS and identified any results needing to be qualified as an estimate if all QA requirements were not met. Laboratory blank and matrix spike results for each batch (Work Group) and the qualified analytes are tabulated, along with all PFC results, in Appendix A (fish and water) and Appendix B (sediment and benthic macroinvertebrates).

In the 2009 study of PFCs in fish and water from Pool 2 (MPCA 2010), water samples from all 12 stations and 30 randomly-selected fish samples were analyzed by 3M Environmental Laboratory. The 3M-sponsored study in 2011 also split samples of water and fish with AXYS. The high degree of data correlation between the two labs provided confidence in the quality of the results. Because of the positive results from 2009 and 2011, split samples with the 3M Environmental Laboratory were not included in the 2012 study.

Results and discussion

PFOS concentrations in water, fish, sediment, and benthic macroinvertebrates are presented in this section. Laboratory results for all 13 analyzed PFCs are tabulated in Appendix A for fish and water and Appendix B for sediment and benthic macroinvertebrates.

Surface water

PFOS concentrations in water were similar in 2009 and 2012 (Table 1). Reporting limits were approximately 5 ng/L in both years. PFOS concentrations were consistently below the detection limit in the upper Stations, 1 to 5. In 2009, measureable PFOS levels at Stations 6, 7, and 8 averaged 7.7, 10.3, and 8.5 ng/L. In 2012, PFOS levels at the three Stations were below the reporting limit, with the exception of one sample at Station 8 (19.8 ng/L). Stations 9 and 10 were below the reporting limit in both years, with the exception of a detectable PFOS concentration in one sample from Station 9 in 2012 (6.09 ng/L).

The most noteworthy results were in Stations 11 and 12. Station 11 is immediately downstream of the 3M Cottage Grove Center and the East Cove, which had been dredged in late 2011 to remove PFC-contaminated sediments. Station 12 is farther downstream (Figure 1). PFOS concentrations were similar among the replicates at each Station within each year. The coefficients of variation (standard deviation/mean) were 5.7 percent and 4.4 percent for Station 11 in 2009 and 2012, and 26.4 percent and 5.8 percent for Station 12 in 2009 and 2012. The mean PFOS concentrations increased from 2009 to 2012, from 90.1 ng/L to 149 ng/L at Station 11 and 15.2 ng/L to 24.4 ng/L at Station 12. These were increases of 65 percent and 61 percent, respectively. The 2011 study results for PFOS in water concur with the results from 2012. The most downstream station in the 2011 study was at approximately the same location as Station 11. The water sample, collected on 11 August 2011 had a PFOS concentration of 136 ng/L. Results from all years indicate substantially higher PFOS concentrations in water downstream of the 3M facility compared to upstream.

The increased PFOS concentrations in 2011 and 2012 could have been caused by greater inputs to Pool 2 or inputs could have remained the same, but there was less dilution because of lower water volume (i.e., low river flows). To test the possibility of change in dilution, the water levels at the time of sampling were compared. The closest water level gaging station is U.S. Army Corp of Engineer's CP2 station at South St. Paul. Water level at CP2 was actually very similar on July 2, 2009 and September 24, 2012, but higher on August 11, 2011 (Figure 2). The 24-hour average water levels for the three sample days were 287.2 ft. in 2009, 289.5 ft. in 2011, and 287.1 ft. in 2012. Water level in 2011 was over two feet higher than in 2009 and 2012. Therefore, the water level results do not support an argument that dilution was the reason for differences among years.

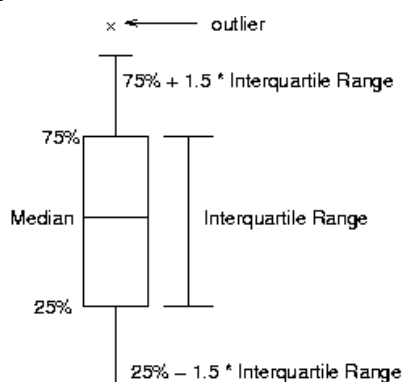
Fish

The goal was to collect 15 of each species in each section, for a total of 60 per species. That goal was met for all but the white bass. In Sections 1 and 4, 13 white bass were collected. Fish-collection runs are shown in Figure 3. Appendix A lists the georeferenced start and stop of each run and the number of fish in each species captured in each run. All results, from 2004 to 2012, were combined for the initial descriptive statistics for the five target species (Table 2). Four of the species have over 200 individual fish measurements. Common carp was the exception with 125 fish tested, mostly because that species was not included in the 2011 study by 3M. Of the 296 fish analyzed for PFCs in 2012, only four fish had PFOS concentrations less than the reporting limit (1.0 ng/g). The highest PFOS concentration, 6,160 ng/g, was measured in a carp from Section 4 in 2012. The next highest, 5,150 ng/g, was measured in a smallmouth bass in 2006. The similarity of the median with the geometric mean rather than the

arithmetic mean indicates the distributions of PFOS concentrations are log-normally distributed. White bass had the lowest maximum PFOS concentration, but they had a median concentration approximately double the median of the other four species.

Descriptive statistics by species and year are summarized in Table 3 on page 12. The statistics for all years are presented at the top row for each species. The left side of the table shows values for all of Pool 2, while the right side shows values for the Lower Pool 2. Lower Pool 2 is Section 4 in 2009 and 2012, and Reaches 9 and 10 in 2011. Prior to 2009 all fish were collected in the Lower Pool 2; therefore, the statistics for years 2004-2008 are the same in both sides of the table. Consequently, comparisons among years within a species are best done only for the Lower Pool 2. Smallmouth bass (SMB) had the longest period of record—seven years—followed by bluegill sunfish (BGS), six years, and white bass (WHB), five years. Freshwater drum (FWD) were first collected in 2009. Comparing annual medians in the Lower Pool 2 for each species shows a general decline over time, especially in the most recent two years. Freshwater Drum shows a striking drop from 401 ng/g in 2009 to 22 ng/g and 23 ng/g in 2011 and 2012. Common carp (C) had the lowest median, 15 ng/g, in 2012 and the highest maximum PFOS concentration, 6,160 ng/g.

The distributions of PFOS concentration within species over time are illustrated in box-whisker plots (see diagram at right), which show the median, the interquartile range and outliers (Figure 4, page 17). PFOS concentrations are on a log-10 scale to improve the symmetry of the distributions. Smallmouth bass did not show a trend between 2004 and 2009, but with the addition of 2011 and 2012 there appears to be a downward trend in the PFOS concentrations (Figure 4a). The three years of PFOS in common carp (2005, 2009, and 2012) show a downward trend as well (Figure 4b). The downward trend is not as clear for freshwater drum (Figure 4c); there is a big drop in median PFOS concentration from 2009 to 2011 and 2012, but the ranges of PFOS concentrations in FWD remain similar among the three years.



Comparing the distributions of PFOS by species and section for 2009 and 2012, there was a general shift to the left to lower PFOS concentrations in 2012 (Figure 5). The shifts to the left increased from Section 1 to Section 4 for all species (quantile plots from top to bottom). The exception to this pattern is carp, which shows a large decline in PFOS concentrations in Section 1 and less of a shift in Sections 2 and 3. There was less of a difference among Sections for any given species in 2012 than in 2009, when Section 4 PFOS concentrations were sharply higher than in the three upstream sections. Despite the shift to lower concentrations, all species show the higher PFOS concentrations in Section 4. Bluegill sunfish, carp, and freshwater drum continued to have a few high PFOS concentrations in Section 4.

Looking at the specific fish-collection runs in Section 4 from 2012 shows the high PFOS concentrations (> 400 ng/g) for carp and freshwater drum were in Run 2, located downstream of the 3M Cottage Grove Center (Figure 6; see Figure 3b for a map of the runs in Section 4). The high outlier for bluegill sunfish was in Run 1 (1,020 ng/g), immediately upstream of the 3M center.

Bioaccumulation factors and site-specific water quality criterion

The MPCA followed EPA guidance and Minnesota rules in calculating bioaccumulation factors (BAFs) and site-specific water quality criterion for PFOS. Water was sampled in each river section at three stations, which were averaged to calculate the PFOS water concentration for that section. Fish were collected from multiple sites within each river section. BAFs for PFOS were calculated for each fish fillet using the PFOS tissue concentration from that fillet divided by the average PFOS water concentration reported from the river section where the fish was captured. PFOS water concentrations in the upper 3 Sections of Pool 2 were predominantly less than the reporting level. For water concentrations below the

reporting level, the reporting level was used. The individual BAFs were then combined as a geometric mean (geomean) for each species. (A geometric mean is the n^{th} root (where n is the count of numbers) of the product of the numbers or is alternatively defined as the antilog of the average of log-transformed values.) The final BAF is a geomean of all species geomeans. The BAFs are applied to the equation for calculating a fish consumption criterion (fCC), which is the site-specific water criterion. The equation is

$$fCC = \frac{RfD + BW + K}{IW + (CR \times BAF)}$$

where,

RfD = reference dose, 0.00008 mg/kg/d

BW = body weight, 70 kg

K = exposure fraction attributed to water and fish consumption, 0.2

IW = incidental ingestion of water, 0.01 L/d

CR = fish consumption rate, 0.030 Kg/d

This calculation had been done in previous years. An fCC for PFOS in Pool 2 was calculated as 6 ng/L in 2007 using a small dataset (STS Consultants, 2007). Calculations from the 2009 study resulted in an fCC of 7 ng/L. Lower fish tissue concentrations in 2012, while water concentrations remained about the same as in 2009, resulted in lower BAFs and subsequently a higher calculated fCC of 14 ng/L.

Sediments

Sediment sampling began in late November 2011. The top 5 cm of surface sediments were collected at 50 sites in Pool 2 for PFCs analysis (Figure 7). Another round of sampling occurred in May 2012. A third and final round was completed in October 2012.

PFOS concentrations in sediment were measured in dry samples. AXYS provided percent moisture content of the samples, allowing for calculation of wet weight concentrations. Total organic carbon was measured in the sediment samples by PACE Laboratories and presented as fraction organic carbon (f_{OC}).

Moisture content of sediment samples ranged from 21 percent to 62 percent, with a median of 37.5 percent (Table 4). The ranges of moisture content were very similar among the three periods of sample collection and were not significantly different (Kruskal-Wallis One-way ANOVA test statistic: 0.016; $p = 0.992$). The same was true for fraction organic carbon (Kruskal-Wallis test statistic: 1.594; $p = 0.451$). The median f_{OC} for the combined samples was 1.0 percent. f_{OC} was less than 2.6 percent in all but one sample; the site on the left bank of river mile 836 in Section 2 (upstream of the Metro WWTP) had an f_{OC} of 12.8 percent.

Sediment PFOS concentrations ranged from less than the reporting limit (< 0.188 ng/g-dw) to 80.2 ng/g-dw, with a median of 0.5 ng/g-dw. One-half the reporting limit was substituted for the eight sediment samples that had dry weight PFOS concentrations less than the reporting limit to calculate the arithmetic and geometric means of dry weight concentrations, but were not used to calculate wet weight concentrations.

Field replicates were collected at five sites; three had duplicate sediment samples and two had triplicate samples (Table 5). The relative standard deviation ($RSD = \text{Std. Dev} \times 100 / \text{Average}$) is shown for the measurements in each set of replicates. RSD was reduced when dry weight PFOS concentrations were converted to wet weight. RSD was reduced in four of the five replicate sets when PFOS was converted to per unit organic carbon (ng/g – OC). The exception was the set of triplicate samples from the Metro WWTP discharge channel (MC_1, MC_2, and MC_3). The f_{OC} were sufficiently different among the replicates in the channel to cause an increase in the RSD when PFOS was converted to ng/g-OC.

One site at river mile 828 (Saint Paul Park area) was sampled in November 2011 and in May 2012. The dry weight PFOS concentrations in sediment were 0.33 ng/g and 0.53 ng/g. Percent moisture for the respective samples was 39 percent and 62 percent, resulting in wet weight PFOS concentrations of 0.198 and 0.200 ng/g. The fraction of organic carbon (f_{oc}) was 1.17 percent and 2.03 percent, giving PFOS per OC of 27.9 and 25.9 ng/g. The similarity of the PFOS concentrations provided added confidence in the results for sediments.

The highest sediment and invertebrate PFOS concentrations were in samples collected downstream of the 3M Cottage Grove Center, near the East Cove. In November 2011, three sediment samples (Site ID: 517Sed) were collected in that area and another set of duplicate samples were collected in October 2012 (Site ID: K Sed) (Table 5). One of the triplicate samples in 2011 was 80 ng/g-dw, while the other two were 33 ng/g-dw and 41 ng/g-dw. The high concentration also had the highest organic carbon content (f_{oc}). Consequently, weighted by organic carbon, the three PFOS concentrations were more similar. The following fall sampling, in October 2012, found much lower sediment PFOS concentrations (8.6 and 6.4 ng/g-dw), although still much higher than seen at any other station in Pool 2. The sediment and invertebrate samples in 2012 were collected in the same vicinity as collections in 2011 but not precisely in the same location as the previous fall, which may explain the differences in PFOS concentrations between sampling events.

The other triplicate set of samples was collected in May 2012 in the Metro WWTP discharge channel. The dry weight PFOS concentrations were 0.581, 0.672, and 0.905 ng/g. Most of the PFOS concentrations in the main channel of Pool 2, upstream and downstream of the discharge, were slightly below those sediment concentrations. Two stations immediately downstream of the Metro Channel had somewhat higher concentrations: 1.58 and 2.07 ng/g-dw in the sediment. A station across the channel from the first downstream station had sediment concentration of less than 0.195 ng/g-dw.

Benthic invertebrates

Benthic invertebrates were sufficiently abundant at 39 of the 50 sediment stations for PFC analysis. Sediments in the upper half of Pool 2 were sandy and had few invertebrates. The collected invertebrates were primarily larvae of Chironomids (non-biting midges) and Hexagenia (mayflies). PFOS concentrations ranged from 1.7 ng/g-ww to 684 ng/g-ww, with a median of 11.9 ng/g-ww (Table 4). Only two samples had PFOS concentrations greater than 50 ng/g-ww (194 ng/g and 684 ng/g) and they were both collected immediately downstream of the 3M Cottage Grove Center. When PFOS concentrations in benthic invertebrates are compared alongside the PFOS concentrations in sediments, they both show the highest concentrations in the lower section of Pool 2, downstream of the 3M Cottage Grove Center (Figure 8). The invertebrate PFOS concentration at this site in 2011 was the highest measurement among all benthic macroinvertebrate samples. Similar to the relative PFOS concentrations in sediments at these sites, the invertebrate PFOS concentration was lower in 2012 than was measured in 2011, but much higher than any other station in Pool 2. As noted above, different sample locations could explain slight differences between sampling.

The relationship between invertebrate and sediment PFOS concentrations is a significant positive correlation when the relatively high concentrations downstream of 3M are included (Figure 9; log-transformed slope: $p < 0.000$). Excluding the sediment PFOS concentrations greater than 5 ng/g, there appears to be a positive relationship, but a least square regression indicates the slope is not significantly different from zero whether linear or log-transformed (linear: $p = 0.77$; log-log: $p = 0.121$). PFOS concentrations in invertebrates appeared to be higher at low organic carbon content of sediments, but they were not significantly correlated (Pearson $r = 0.082$ or $r = -0.387$ when outliers excluded).

Conclusions

Compared to 2009 PFOS concentrations in the targeted fish species declined in the last two years (2011 and 2012) of monitoring in Pool 2. PFOS concentrations in water from the Lower Pool 2 did not decline. Consequently, the calculated bioaccumulation factors were lower, which led to a higher site-specific water quality criterion for PFOS: from 7 ng/L calculated from 2009 results to 14 ng/L calculated from 2012 results.

Despite the average decline for all of Pool 2, PFOS concentrations in all tested media—fish, benthic macroinvertebrates, sediment, and water—remain high in the Lower Pool 2, downstream of the 3M Cottage Grove Center.

References

- Berger U., Glynn A., Holmstrom K.E., Berglund M., Ankarberg E.H., Tornkvist A. (2009) Fish consumption as a source of human exposure to perfluorinated alkyl substances in Sweden - Analysis of edible fish from Lake Vattern and the Baltic Sea. *Chemosphere* 76:799-804. DOI: 10.1016/j.chemosphere.2009.04.044.
- Cardno-Entrix (2011) Mississippi River Pool 2 PFOS Assessment – Fish Tissues and Water – Summer 2011. Prepared for 3M Company. November 2011. Project No. 70784004.
- Conder J.M., Hoke R.A., De Wolf W., Russell M.H., Buck R.C. (2008) Are PFCAs bioaccumulative? A critical review and comparison with regulatory lipophilic compounds. *Environmental Science & Technology* 42:995-1003. DOI: 10.1021/es070895g.
- Exponent (2011) Review and Evaluation of 2011 Report on Mississippi River Pool 2 PFOS Assessment of Fish and Water. Prepared for 3M Company. November 2011.
- Giesy J.P., Kannan K. (2001) Global distribution of perfluorooctane sulfonate in wildlife. *Environmental Science & Technology* 35:1339-1342. DOI: 10.1021/es001834k.
- Giesy J.P., Kannan K. (2002) Perfluorochemical surfactants in the environment. *Environmental Science & Technology* 36:146A-152A.
- Houde M., Martin J.W., Letcher R.J., Solomon K.R., Muir D.C.G. (2006) Biological monitoring of polyfluoroalkyl substances: A review. *Environmental Science & Technology* 40:3463-3473. DOI: 10.1021/es052580b.
- MPCA. (2010) Mississippi River Pool 2 Intensive Study of Perfluorochemicals in Fish and Water: 2009. 8 March 2010.
- STS Consultants. (2007) Surface Water Quality Criterion for Perfluorooctane Sulfonic Acid Minnesota Pollution Control Agency.
- Wang T., Wang Y.W., Liao C.Y., Cai Y.Q., Jiang G.B. (2009) Perspectives on the Inclusion of Perfluorooctane Sulfonate into the Stockholm Convention on Persistent Organic Pollutants. *Environmental Science & Technology* 43:5171-5175. DOI: 10.1021/es900464a.

For more information on this report contact:

Bruce Monson
Research Scientist
Minnesota Pollution Control Agency
520 Lafayette Road N
St. Paul, MN 55155
Phone: 651-757-2579

Minnesota Pollution Control Agency PFCs
<http://www.pca.state.mn.us/cleanup/pfc/index.html>

Minnesota Department of Health PFCs
<http://www.health.state.mn.us/divs/eh/hazardous/topics/pfcs/index.html>

Minnesota Department of Health Fish Consumption Guidelines
<http://www.health.state.mn.us/divs/eh/fish/index.html>

Tables

Table 1. PFOS concentrations (ng/L) in water samples collected at the same twelve stations in 2009 and 2012; A, B, and C refer to consecutive grab samples collected at each station; in 2012 two samples from Stations 1 and 5 were used for laboratory matrix spikes.

Station	2 July 2009				24 September 2012			
	A	B	C	Mean	A	B	C	Mean
1	< 5.12	< 5.14	< 5.08	< DL	< 4.99			< DL
2	< 5.08	< 5.10	< 5.02	< DL	< 4.84	< 4.83	< 4.91	< DL
3	< 5.15	< 5.03	< 4.97	< DL	< 4.90	< 4.92	< 4.93	< DL
4	< 5.03	< 5.09	< 5.04	< DL	< 5.00	< 4.99	< 4.85	< DL
5	< 5.07	< 5.11	< 4.93	< DL	< 5.06			< DL
6	7.1	7.8	8.24	7.7	< 4.99	< 4.97	< 5.08	< DL
7	10.5	10.5	9.91	10.3	< 5.02	< 4.88	< 4.88	< DL
8	8.74	8.4	8.4	8.5	< 4.92	< 4.81	19.8	< DL?
9	< 5.05	< 5.04	< 5.17	< DL	< 4.89	< 5.28	6.09	< DL?
10	< 5.07	< 5.05	< 4.97	< DL	< 4.54	< 5.18	< 5.29	< DL
11	84.4	91.3	94.5	90.1	150	142	155	149
12	15.1	19.2	11.2	15.2	24.2	25.9	23.1	24.4

Table 2. Descriptive statistics for PFOS (ng/g -ww) in the five target fish species; combined results for 2004-2012

Species	Statistic					
	N	Minimum	Maximum	Arithmetic Mean	Geometric Mean	Median
Bluegill Sunfish (BGS)	230	3.57	2097	83.0	31.4	28.6
Common Carp (C)	125	0.995	6160	107.0	21.2	23.6
Freshwater Drum (FWD)	220	3.17	3580	113.1	36.9	34.1
Smallmouth Bass (SMB)	246	2.37	5150	99.7	40.4	32.8
White Bass (WHB)	219	13.0	1860	80.9	62.5	59.7

Table 3. PFOS concentrations (ng/g -ww) for each fish species and year from all of Pool 2 (left) and only Lower Pool 2—Section 4 (right); the top row of each species is for all years; results from the study in 2011 used lower Reach 9 and Reach 10 to represent the Lower Pool 2; in 2004-2008 all fish were collected in the Lower Pool 2.

Species- Year	Mississippi Pool 2 (all reaches)					Lower Pool 2 (Section 4)				
	N	Min	Max	Arith. Mean	Median	N	Min	Max	Arith. Mean	Median
BGS	230	3.6	2097	83	29	61	4.5	2097	204	46
2006	6	30	709	249	195	6	30	709	249	195
2007	2	2001	2097	2049	2049	2	2001	2097	2049	2049
2008	5	102	317	173	157	5	102	317	173	157
2009	57	8.3	1350	110	45	15	32	1350	260	53
2011	100	3.6	392	36	18	18	4.5	305	63	26
2012	60	6.8	1020	46	26	15	11	1020	98	28
C	125	1.00	6160	107	24	35	6.0	6160	315	56
2005	5	66	420	216	175	5	66	420	216	175
2009	60	4.7	1340	77	28	15	8.7	1340	224	87
2012	60	1.00	6160	127	11	15	6.0	6160	438	15
FWD	220	3.2	3580	113	34	48	4.8	3580	356	33
2009	60	4.8	3580	229	63	15	24	3580	739	401
2011	100	3.2	607	46	30	18	4.8	607	81	22
2012	60	3.9	1580	109	25	15	6.0	1580	347	23
SMB	246	2.4	5150	100	33	69	7.3	5150	252	83
2004	4	92	985	528	517	4	92	985	528	517
2005	6	122	336	201	163	6	122	336	201	163
2006	11	19	5150	793	178	11	19	5150	793	178
2008	5	49	380	162	120	5	49	380	162	120
2009	60	13	612	94	41	15	42	612	260	210
2011	100	4.9	757	39	30	13	9.5	757	109	44
2012	60	2.4	192	35	28	15	8.1	192	59	47
WHB	219	13	1860	81	60	50	27	1860	144	78
2004	2	137	139	138	138	2	137	139	138	138
2005	5	84	1860	559	240	5	84	1860	559	240
2009	60	38	764	97	75	15	44	764	159	88
2011	96	13	394	64	58	15	41	394	92	71
2012	56	20	153	48	42	13	27	153	59	46

Table 4. Summary statistics for sediment and invertebrate measurements

Measurement	N	Statistic				
		Minimum	Maximum	Arithmetic Mean	Geometric Mean	Median
Percent Moisture	58	20.8	61.9	38.95	37.57	37.5
Fraction Organic Carbon, f _{OC} (%)	58	0.10	12.8	1.30	0.90	1.00
Sediment PFOS dry wt. (ng/g)	58	<0.188	80.2	3.405	0.548	0.497
Sediment PFOS wet wt. (ng/g)*	50	0.072	32.6	1.848	0.423	0.310
Sediment PFOS per OC. (ng/g)*	50	2.3	2,823	235.3	66.5	56.1
Invertebrate PFOS wet wt. (ng/g)	39	1.65	684	35.71	13.41	11.9

*Eight dry weight sediment PFOS concentrations were less than the reporting limit, precluding calculation of wet weight concentrations for those eight.

Table 5. Replicates of sediment PFOS concentrations with matching invertebrate PFOS concentrations and BSAF

Date	Sample ID_Sed	Sed_PFOS_ ng/g_dw	sed_% Moisture	Sed_PFOS ng/g_ww	f _{oc}	Sed_PFOS ng/g_OC
11/23/11 15:00	517 SED1	80.2	59.3	32.64	2.84%	2,824
11/23/11 15:10	517 SED2	33.3	51.1	16.28	1.75%	1,903
11/23/11 15:18	517 SED3	41.1	52.9	19.36	1.62%	2,537
	RSD	48.8	7.9	38.2	32.4	19.5
10/16/12 15:06	K SED	8.58	45.8	4.65	0.98%	874.2
10/16/12 15:10	K SED FD	6.38	43.5	3.60	0.70%	916.7
	RSD	20.8	3.6	17.9	24.1	3.4
10/16/12 11:20	G SED	0.601	40.6	0.357	0.95%	63.0
10/16/12 11:25	G SED FD	0.860	45.9	0.465	1.13%	76.1
	RSD	25.1	8.7	18.6	11.9	13.4
10/16/12 13:55	M SED	0.203	25.9	0.150	0.36%	56.2
10/16/12 13:58	M SED FD	0.366	28.6	0.261	0.66%	55.8
	RSD	40.5	7.0	38.1	41.1	0.6
05/22/12 14:00	MC_1_SED	0.905	44.6	0.501	2.17%	41.8
05/22/12 14:05	MC_2_SED	0.672	32.2	0.456	1.67%	40.2
05/22/12 14:15	MC_3_SED	0.581	26.8	0.425	0.59%	98.6
	RSD	23.2	26.4	8.3	54.6	55.2
05/23/12 13:55	P2_525_SED	0.525	61.9	0.200	2.03%	25.9
11/30/11 13:10	525 SED	0.330	39.2	0.198	1.17%	27.9
	RSD	33.1	31.8	0.6	37.8	5.1

Figures

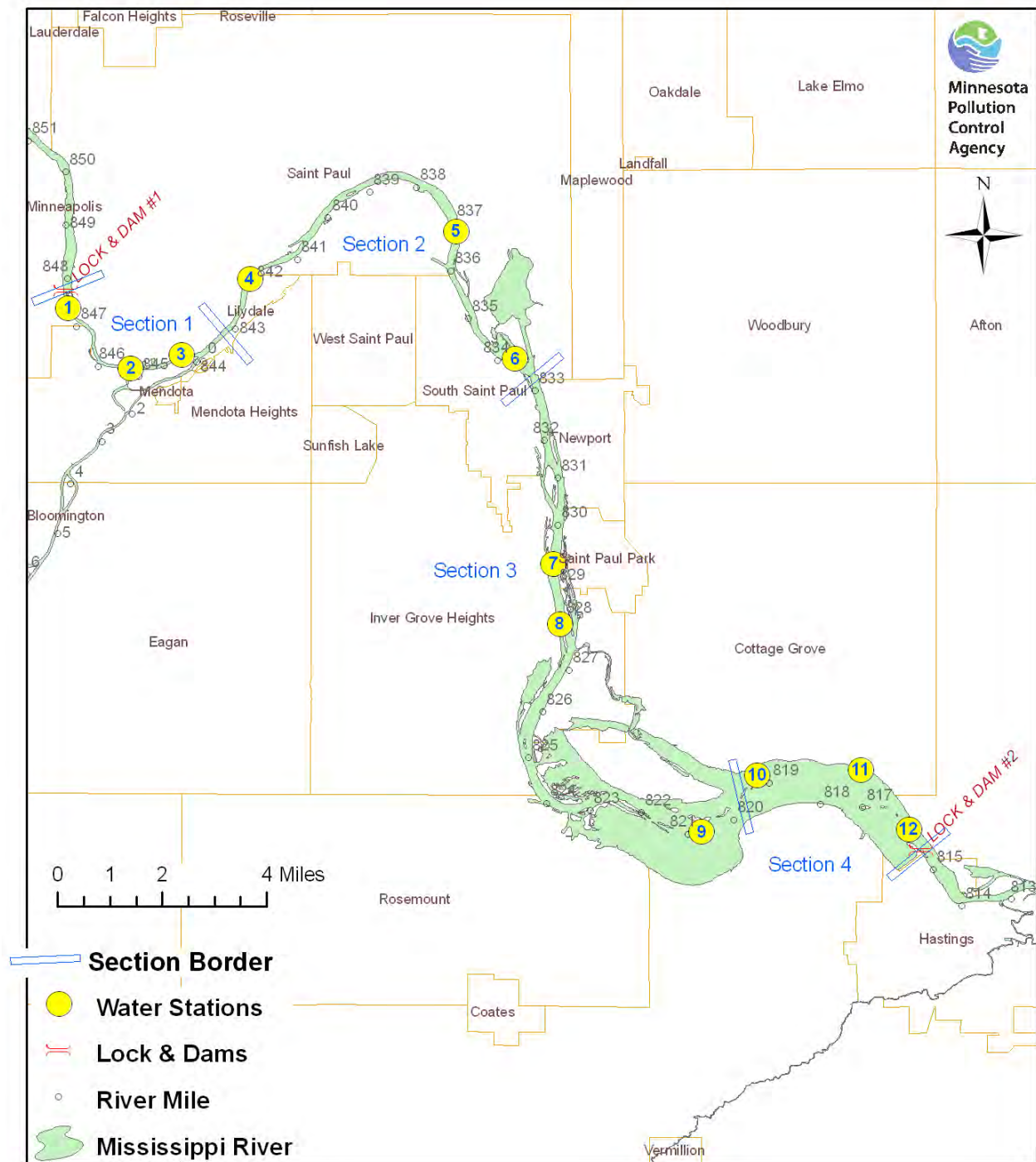


Figure 1. Pool 2 showing river miles between Lock & Dam No. 1 at river mile 847.6 to Lock & Dam No. 2 at river mile 815.6 (~32.5 miles); shows four sections and PFC water stations for 2009 and 2012

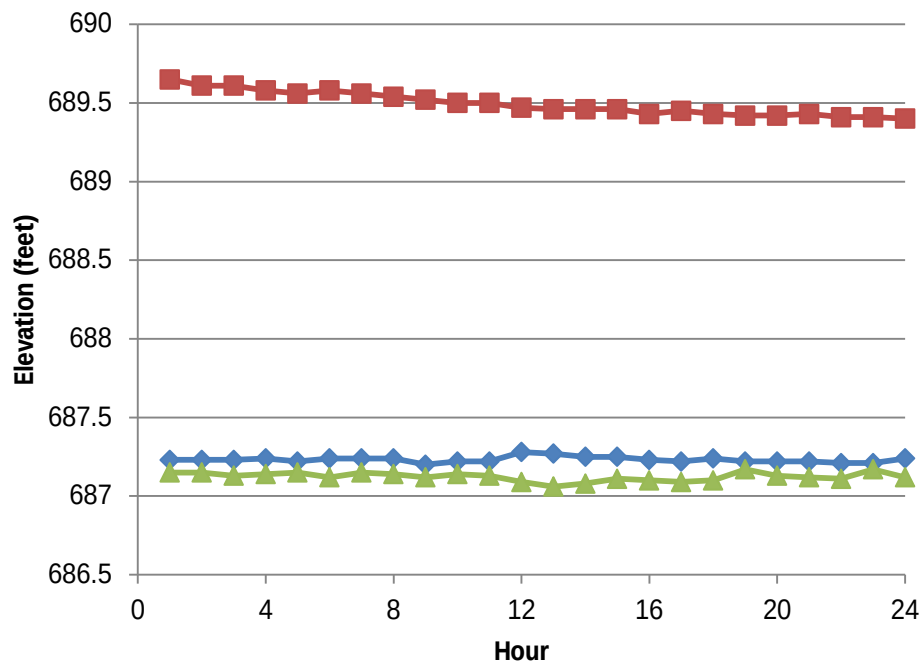
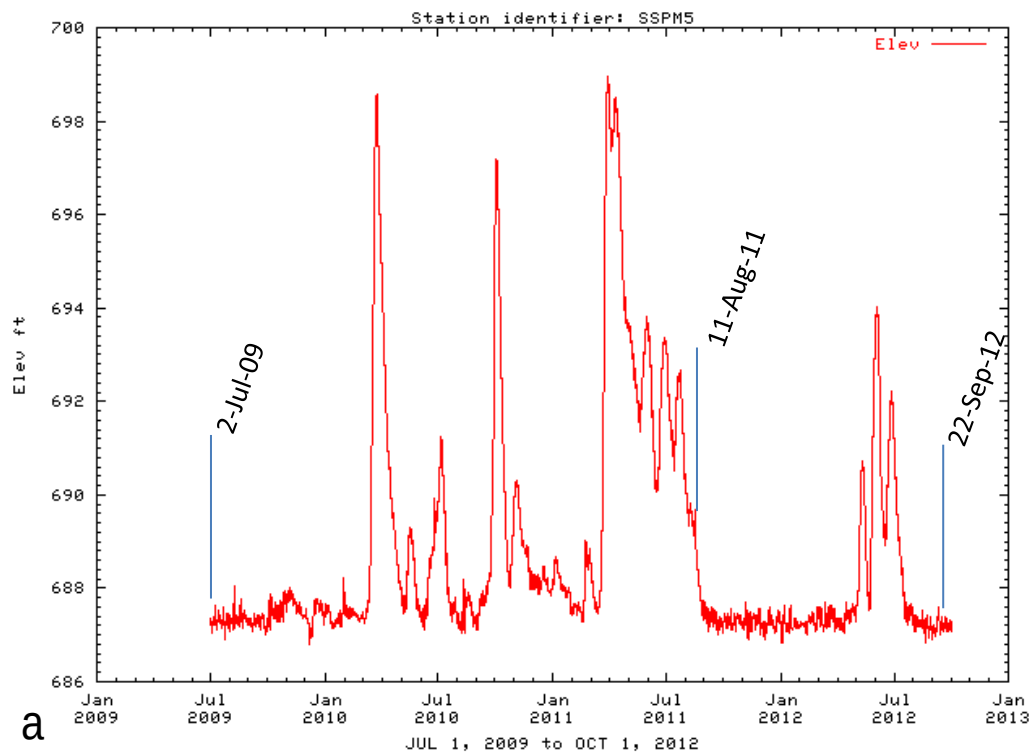


Figure 2. Water levels at Mississippi River South St. Paul: (a) record between 1 July 2009 and 1 October 2012; (b) hourly water levels on sampling days (<http://www.mvp-wc.usace.army.mil/dcp/SSPM5.html>)

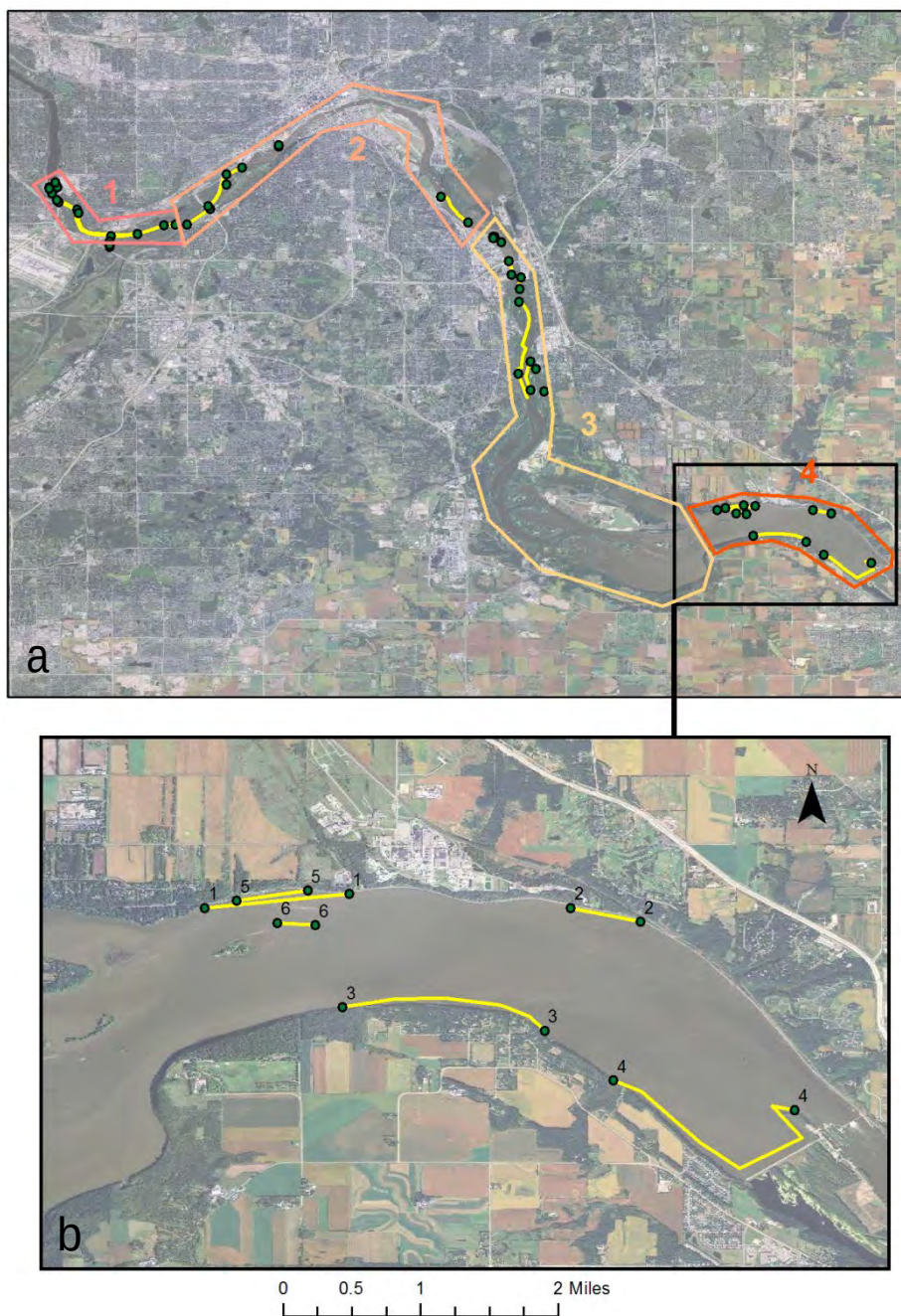


Figure 3. Fish-collection runs in Pool 2: a. entire Pool 2 showing reaches and runs; b. runs in Section 4

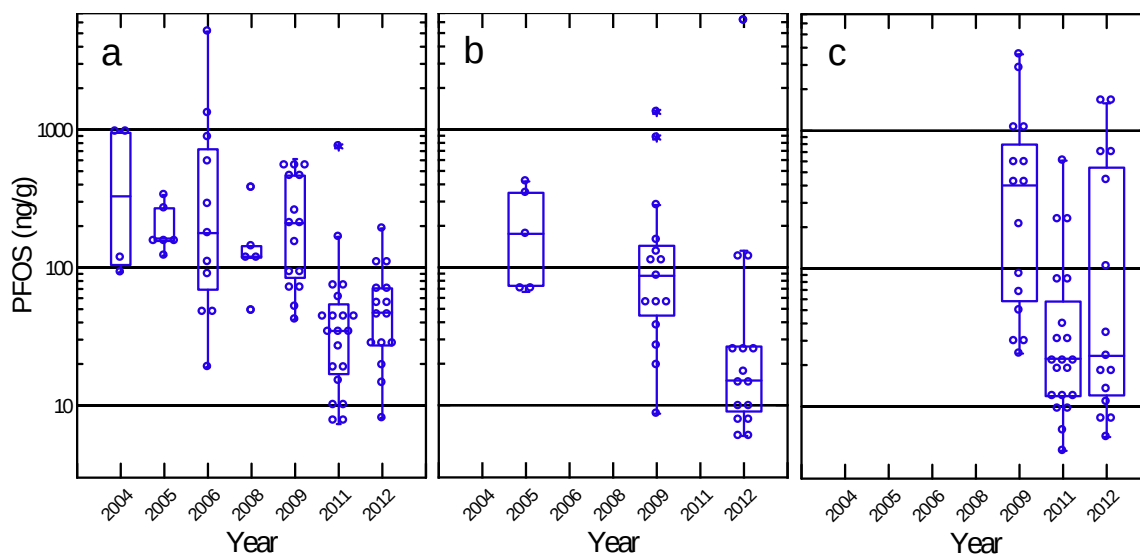


Figure 4. Box-whisker plots of PFOS concentrations in Lower Pool 2 by year for (a) smallmouth bass, (b) carp, and (c) freshwater drum

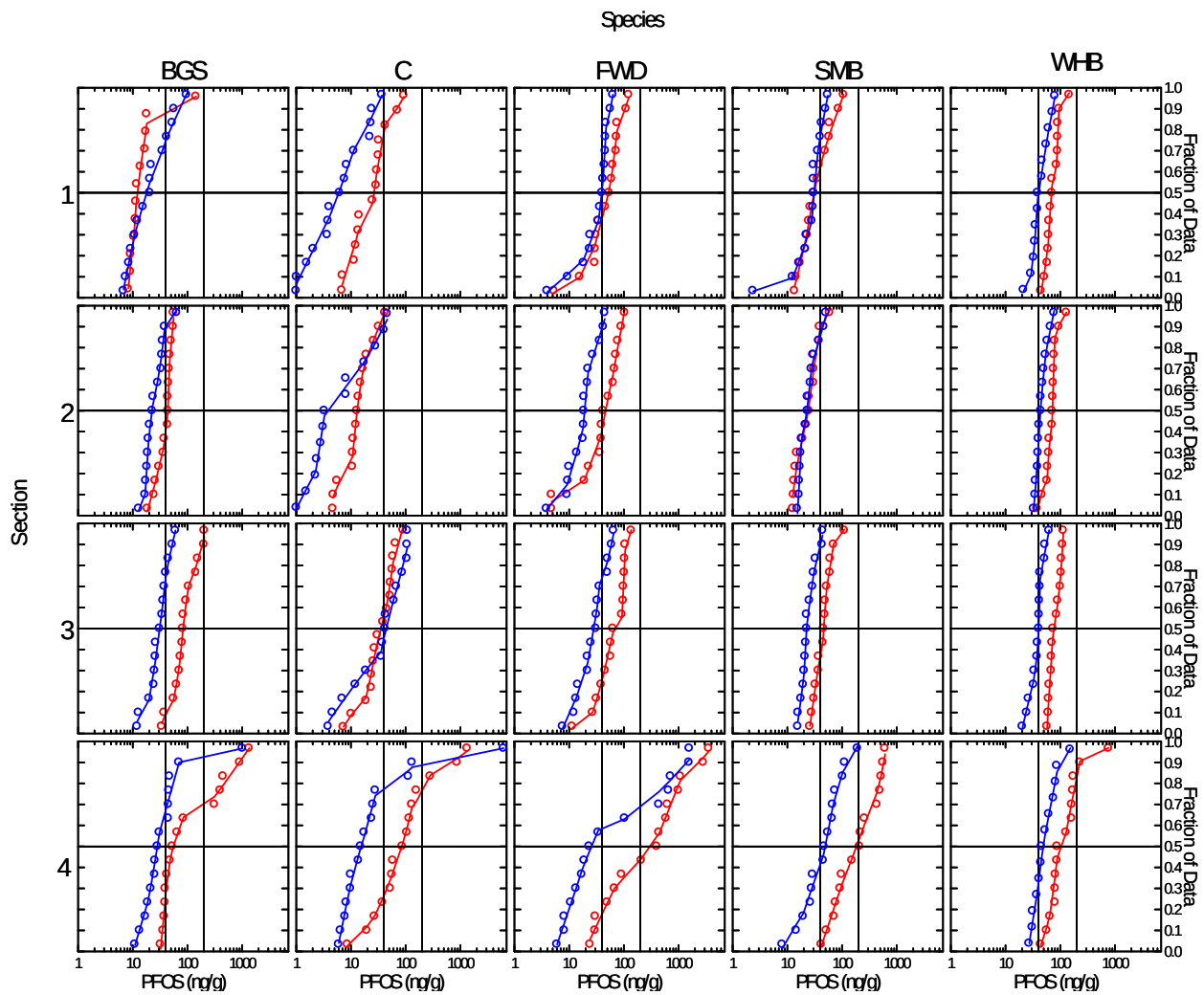


Figure 5. Species-Section matrix showing distributions of PFOS in 2009 (red) and 2012 (blue); horizontal mid-line is the median; vertical lines are PFOS thresholds of 40 ng/g and 200 ng/g



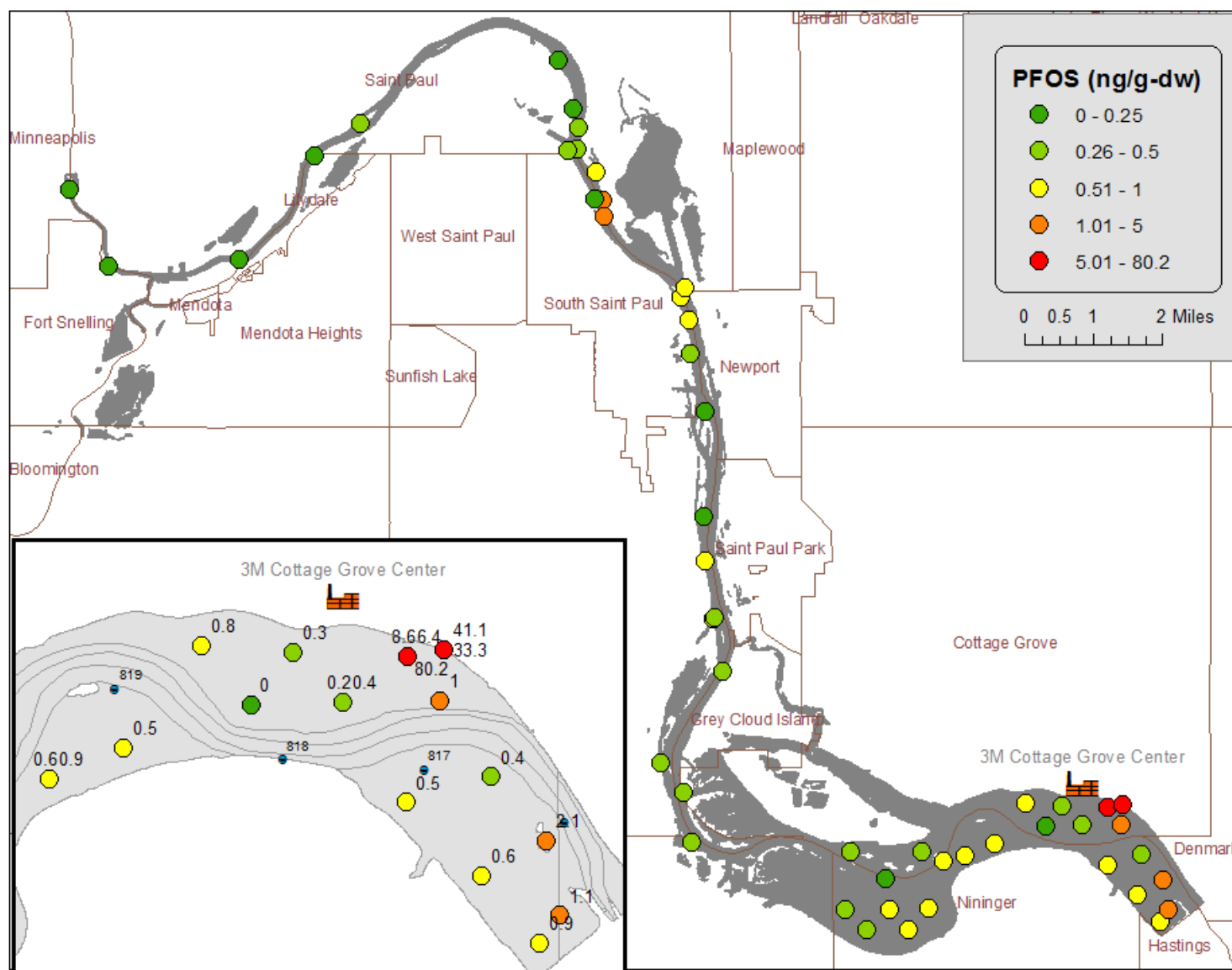


Figure 7. PFOS concentrations (dry weight) in surface sediments collected between November 2011 and November 2012; concentrations are color coded and insert map shows measured concentrations in Section 4 of Pool 2

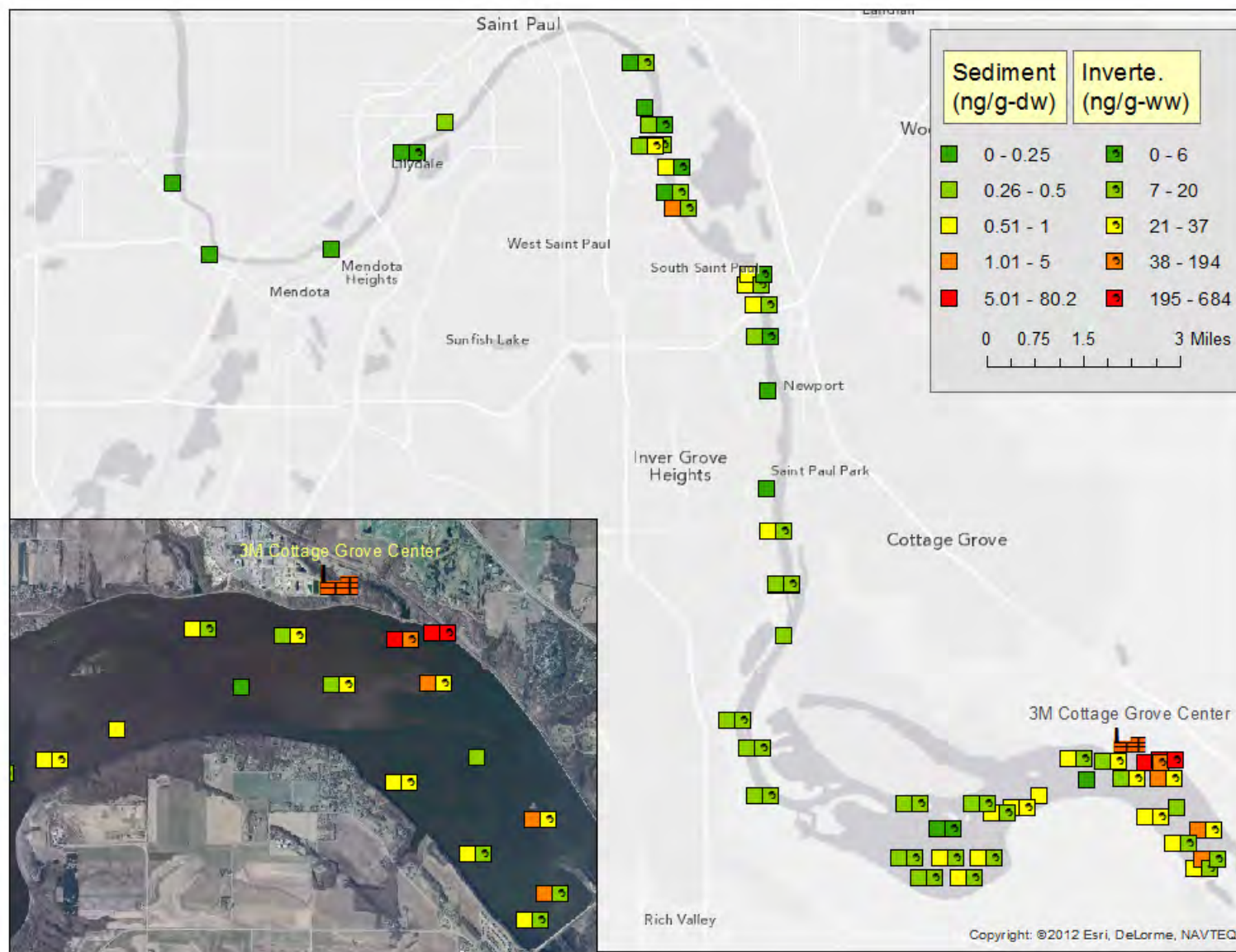


Figure 8. PFOS concentrations in sediment (ng/g dry weight) and benthic macroinvertebrates (ng/g wet weight)

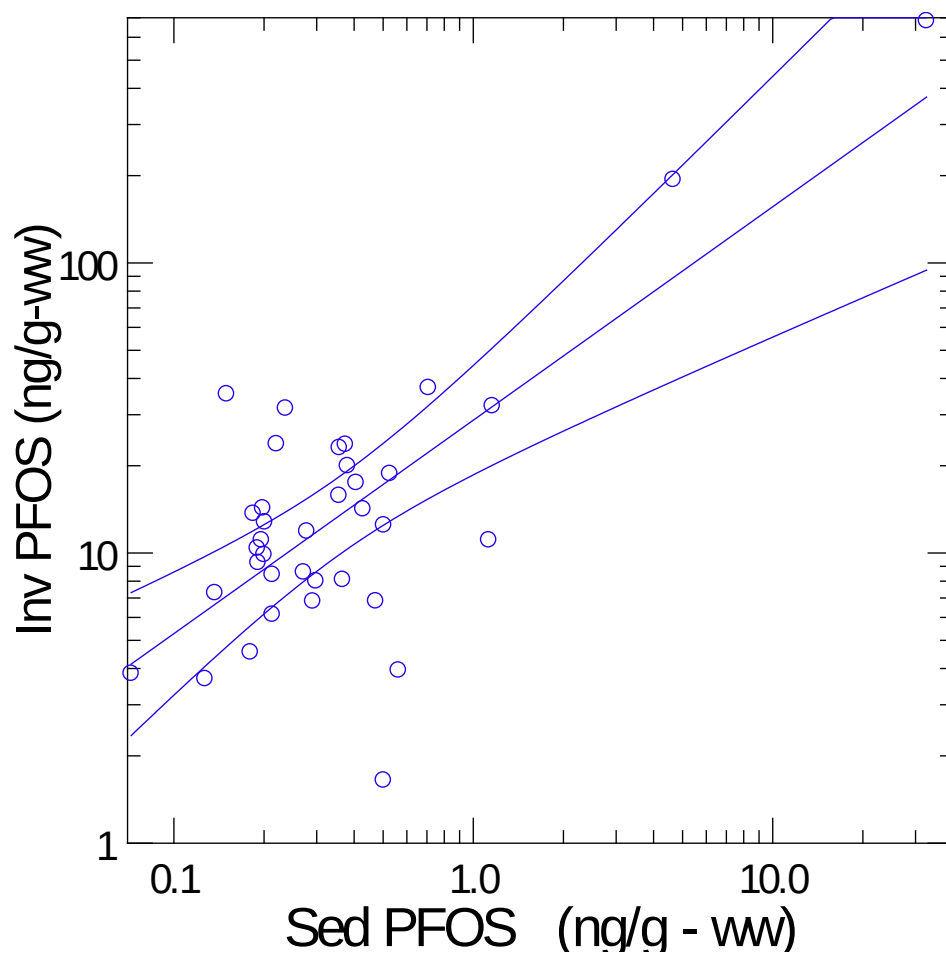


Figure 9. Relationship between invertebrate and sediment PFOS concentrations (both wet weight and log-scale)

Appendix A: Fish and Water Data

Appendix A-1. PFCs results for fish (ng/g – wet weight).....	24
Appendix A-2. PFCs results for water (ng/L)	34
Appendix A-3. QA Results for Fish Samples: lab blanks and matrix spikes by work group	36
Appendix A-4. QA Results for Water Samples: lab blanks and matrix spikes by work group.....	39
Appendix A-5. Fish sample identification	40
Appendix A-6. Georeferences for fish-collection runs.....	51
Appendix A-7. Georeferences for water sample stations.....	54

Appendix A-1. PFCs results for fish (ng/g – wet weight)

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123076	WG40901	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600	9/26/2012	
123077	WG40901	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.976	< 0.976	1.02	< 0.585	9/26/2012	
123078	WG40901	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	0.587	< 0.488	< 0.488	< 0.976	< 0.976	4.01	< 0.585	9/26/2012	
123079	WG40901	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.985	< 0.985	7.67	< 0.591	9/26/2012	
123080	WG40901	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.564	< 0.980	< 0.980	6.24	< 0.588	9/26/2012	
123081	WG40901	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	3.84	< 0.600	9/26/2012	
123082	WG40901	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	8.38	< 0.600	9/26/2012	
123083	WG40901	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	3.2	1.48	1.64	< 0.995	< 0.995	55	< 0.597	9/26/2012	
123084	WG40901	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	2.37	1.32	1.73	< 0.976	< 0.976	40.2	< 0.585	9/26/2012	
123085	WG40901	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.980	< 0.980	2.37	< 0.588	9/26/2012	
123086	WG40901	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.46	0.603	0.983	< 1.00	< 1.00	16.4	< 0.600	9/26/2012	
123087	WG40901	2.07	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	1.85	0.724	0.666	< 0.966	< 0.966	21.4	< 0.580	9/26/2012	
123088	WG40901	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.53	0.735	1.43	< 1.00	< 1.00	12.5	< 0.600	9/26/2012	
123089	WG40901	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.73	0.835	1.42	< 0.976	< 0.976	28.2	< 0.585	9/26/2012	
123090	WG40901	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	2.45	1.42	1.83	< 0.980	< 0.980	30.2	< 0.588	9/26/2012	
123091	WG40901	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	2.23	0.905	1.62	< 0.976	< 0.976	30.1	< 0.585	9/26/2012	
123092	WG40901	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	4.1	2.3	3.91	< 0.990	< 0.990	50.5	0.626	9/26/2012	
123093	WG40901	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.83	1.14	1.73	< 0.976	< 0.976	22.3	< 0.585	9/26/2012	
123094	WG40901	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.935	< 0.498	< 0.498	< 0.995	< 0.995	18.4	< 0.597	9/26/2012	
123095	WG40902	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.615	< 0.495	< 0.495	< 0.990	< 0.990	23.8	< 0.594	9/26/2012	
123096	WG40902	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.586	< 0.498	< 0.498	< 0.995	< 0.995	9.46	< 0.597	9/26/2012	PFOS, PFDA
123097	WG40902	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.2	0.548	< 0.493	< 0.985	< 0.985	44.4	< 0.591	9/26/2012	
123098	WG40902	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.781	2.2	0.829	0.727	< 0.980	< 0.980	36.6	< 0.588	9/26/2012	
123099	WG40902	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.567	0.639	1.57	< 0.995	< 0.995	3.99	< 0.597	9/26/2012	
123100	WG40902	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.715	1.53	0.85	0.753	< 1.00	< 1.00	63.3	< 0.600	9/26/2012	
123101	WG40902	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.717	0.669	< 0.493	< 0.493	< 0.985	< 0.985	24.3	< 0.591	9/26/2012	
123102	WG40902	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.44	0.898	1.52	< 1.00	< 1.00	46.4	< 0.600	9/26/2012	
123103	WG40902	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	0.671	1.26	0.5	< 0.488	< 0.976	< 0.976	46.1	< 0.585	9/26/2012	
123104	WG40902	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.75	0.866	1.23	< 0.976	< 0.976	56.9	< 0.585	9/26/2012	
123105	WG40902	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.77	0.851	1.13	< 0.995	< 0.995	47.4	< 0.597	9/26/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123106	WG40902	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.25	0.77	1.01	< 0.985	< 0.985	56.8	< 0.591	9/26/2012	
123107	WG40902	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.8	0.959	0.621	< 0.990	< 0.990	8.51	< 0.594	9/26/2012	
123108	WG40902	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.11	< 0.493	< 0.493	< 0.985	< 0.985	20.7	< 0.591	9/26/2012	
123109	WG40902	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.957	< 0.495	< 0.495	< 0.990	< 0.990	7.46	< 0.594	9/26/2012	
123110	WG40902	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.903	< 0.495	< 0.495	< 0.990	< 0.990	34.9	< 0.594	9/26/2012	
123111	WG40902	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.849	< 0.503	< 0.503	< 1.01	< 1.01	21.8	< 0.603	9/26/2012	
123112	WG40902	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	2.67	1.61	0.68	< 0.990	< 0.990	6.8	< 0.594	9/26/2012	
123113	WG40902	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.25	0.558	0.673	< 1.01	< 1.01	9.29	< 0.603	9/26/2012	
123114	WG40903	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.892	< 0.493	0.572	< 0.985	< 0.985	20.6	< 0.591	9/27/2012	
123115	WG40903	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.84	0.905	0.952	< 1.01	< 1.01	53.1	< 0.606	9/27/2012	
123116	WG40903	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.55	0.553	< 0.503	< 1.01	< 1.01	15.5	< 0.603	9/27/2012	
123117	WG40903	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.84	0.676	0.528	< 1.00	< 1.00	12.2	< 0.600	9/27/2012	
123118	WG40903	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.08	0.81	0.725	< 1.01	< 1.01	41.8	< 0.606	9/27/2012	
123119	WG40903	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.78	< 0.500	0.617	< 1.00	< 1.00	10.9	< 0.600	9/27/2012	
123120	WG40903	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	2.0	0.934	1.14	< 1.01	< 1.01	96.8	< 0.603	9/27/2012	
123121	WG40903	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	0.982	0.553	0.591	< 0.971	< 0.971	24.2	< 0.583	9/27/2012	PFDoA
123122	WG40903	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.707	< 0.495	< 0.495	< 0.990	< 0.990	22.3	< 0.594	9/27/2012	
123123	WG40903	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.36	0.977	< 0.498	< 0.995	< 0.995	41.8	< 0.597	9/27/2012	
123124	WG40898	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	1.2	< 0.485	< 0.485	< 0.971	< 0.971	40	< 0.485	9/26/2012	
123125	WG40898	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.773	0.511	0.584	< 1.01	< 1.01	34.6	< 0.503	9/26/2012	
123126	WG40898	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 1.01	< 1.01	3.71	< 0.503	9/26/2012	
123127	WG40898	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.991	< 0.498	< 0.498	< 0.995	< 0.995	37	< 0.498	9/26/2012	
123128	WG40898	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 1.01	< 1.01	11.3	< 0.503	9/26/2012	
123129	WG40898	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.980	< 0.980	1.56	< 0.490	9/26/2012	
123130	WG40898	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.89	0.789	1.02	< 0.976	< 0.976	36.2	< 0.488	9/26/2012	
123131	WG40898	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	2.53	1.26	1.05	< 0.985	< 0.985	42.5	< 0.493	9/26/2012	
123132	WG40898	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.54	0.718	0.837	< 0.990	< 0.990	30	< 0.495	9/26/2012	
123133	WG40898	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	1.0	2.82	1.36	< 0.971	< 0.971	38.7	0.698	9/26/2012	PFOSA
123134	WG40911	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 1.01	< 1.01	2.06	< 0.606	10/4/2012	
123135	WG40911	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	0.654	< 0.485	< 0.485	< 0.971	< 0.971	23.3	< 0.583	10/4/2012	
123136	WG40911	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	0.668	3.62	1.54	1.22	< 0.971	< 0.971	80.3	< 0.583	10/4/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123137	WG40911	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.865	3.01	1.6	1.84	< 0.980	< 0.980	55.7	3.25	10/4/2012	
123138	WG40911	2.09	< 0.478	< 0.478	< 0.478	< 0.478	< 0.478	< 0.478	1.76	1.09	1.47	< 0.957	< 0.957	29.6	< 0.574	10/4/2012	
123139	WG40911	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	0.608	2.6	1.38	1.45	< 0.971	< 0.971	35.4	< 0.583	10/4/2012	
123140	WG40911	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 1.01	< 1.01	3.12	< 0.606	10/4/2012	
123141	WG40911	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.1	0.629	< 0.500	< 1.00	< 1.00	17.5	< 0.600	10/4/2012	
123142	WG40911	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.548	< 0.503	< 0.503	< 1.01	< 1.01	28.4	< 0.603	10/4/2012	
123143	WG40911	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.990	< 0.990	2.38	< 0.594	10/4/2012	
123144	WG40911	1.96	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	< 1.02	< 1.02	2.82	< 0.612	10/4/2012	
123145	WG40911	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.506	< 0.498	< 0.498	< 0.995	< 0.995	8.14	< 0.597	10/4/2012	
123146	WG40911	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	1.2	5.44	2.69	2.49	< 0.971	< 0.971	66.8	0.718	10/4/2012	PFOSA
123147	WG40898	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.792	4.12	2.06	1.68	< 0.995	< 0.995	44.4	0.669	9/26/2012	
123148	WG40898	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.568	3.28	1.56	1.25	< 0.990	< 0.990	41.3	< 0.495	9/26/2012	
123149	WG40898	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	0.57	2.37	1.44	1.4	< 0.976	< 0.976	35	< 0.488	9/26/2012	
123150	WG40898	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	0.701	2.84	1.54	1.21	< 0.976	< 0.976	44.5	0.793	9/26/2012	
123151	WG40898	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.865	4.0	1.91	1.74	< 1.01	< 1.01	58.3	1.22	9/26/2012	PFOSA
123152	WG40898	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.717	4.23	2.0	2.16	< 1.00	< 1.00	77.5	0.570	9/26/2012	PFOSA
123153	WG40898	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	2.53	1.12	1.08	< 0.995	< 0.995	40.1	1.18	9/26/2012	
123154	WG41155	1.97	< 2.54	< 2.54	< 2.54	< 2.54	< 2.54	< 2.54	3.27	< 2.54	< 2.54	< 5.08	< 5.08	47.9	< 2.54	10/15/2012	
123155	WG40898	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	2.15	0.964	0.725	< 0.976	< 0.976	39.5	< 0.488	9/26/2012	
123156	WG40898	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.707	3.43	2.13	1.86	< 0.995	< 0.995	38.8	0.555	9/26/2012	PFOSA
123157	WG40903	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.06	2.68	0.993	1.21	< 0.985	< 0.985	35.5	< 0.591	9/27/2012	
123158	WG40903	2.15	< 0.465	< 0.465	< 0.465	< 0.465	< 0.465	0.787	2.65	1.21	1.19	< 0.930	< 0.930	54	0.866	9/27/2012	
123159	WG40903	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.03	3.51	1.66	1.43	< 0.985	< 0.985	50.3	0.653	9/27/2012	
123160	WG40903	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.755	3.24	1.49	1.44	< 1.00	< 1.00	32.8	< 0.600	9/27/2012	
123161	WG40903	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	1.23	0.498	0.636	< 0.962	< 0.962	18.5	< 0.577	9/27/2012	
123162	WG40903	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.55	0.878	1.45	< 0.995	< 0.995	18.6	< 0.597	9/27/2012	PFDaA
123163	WG40903	2.11	< 0.474	< 0.474	< 0.474	< 0.474	< 0.474	< 0.474	0.725	< 0.474	1.26	< 0.948	< 0.948	9.22	< 0.569	9/27/2012	PFDaA
123164	WG40903	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	0.935	< 0.488	0.997	< 0.976	< 0.976	9.53	< 0.585	9/27/2012	
123165	WG40903	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	0.599	< 0.505	< 0.505	< 1.01	< 1.01	13.9	< 0.606	9/27/2012	
123166	WG40904	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.785	< 0.503	0.514	< 1.01	< 1.01	38.4	< 0.603	9/27/2012	
123167	WG40904	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.995	< 0.995	13.8	< 0.597	9/27/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123168	WG40904	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.985	< 0.985	15.1	< 0.591	9/27/2012	PFDoA, PFOSA
123169	WG40904	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	9.95	< 0.600	9/27/2012	
123170	WG40904	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.3	0.76	1.75	< 0.995	< 0.995	113	0.774	9/27/2012	
123171	WG40904	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.995	< 0.995	6.47	< 0.597	9/27/2012	
123172	WG40904	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 1.01	< 1.01	17.5	< 0.603	9/27/2012	
123173	WG40904	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	24	< 0.600	9/27/2012	
123174	WG40904	2.00	0.689	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	7.84	< 0.600	9/27/2012	
123175	WG40904	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.990	< 0.990	9.87	< 0.594	9/27/2012	
123176	WG40904	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.64	1.79	0.688	< 0.503	< 1.01	< 1.01	34.2	< 0.603	9/27/2012	
123177	WG40904	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	4.37	4.4	5.19	< 0.990	< 0.990	17.1	< 0.594	9/27/2012	PFOS
123178	WG40904	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.925	< 0.500	< 0.500	< 1.00	< 1.00	13.4	< 0.600	9/27/2012	
123179	WG41230	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.692	0.567	0.569	< 0.990	< 0.990	19	< 0.594	10/5/2012	
123180	WG41230	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.68	1.79	1.73	< 0.985	< 0.985	6.01	< 0.591	10/5/2012	
123181	WG41230	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.27	0.927	1.01	< 0.976	< 0.976	23.3	< 0.585	10/5/2012	
123182	WG41230	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.46	0.647	0.914	< 0.985	< 0.985	104	1.92	10/5/2012	
123183	WG41230	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.53	1.4	1.66	< 1.01	< 1.01	8.17	< 0.603	10/5/2012	
123184	WG41230	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.74	1.6	1.52	< 1.01	< 1.01	8.17	< 0.606	10/5/2012	
123185	WG41230	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	2.16	1.11	0.999	< 1.00	< 1.00	37.5	< 0.600	10/5/2012	
123186	WG41230	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.38	4.55	2.2	2.09	< 1.01	< 1.01	153	2.28	10/5/2012	PFOS
123187	WG40910	2.12	< 0.472	< 0.472	< 0.472	< 0.472	< 0.472	0.777	1.43	0.707	0.602	< 0.943	< 0.943	27.1	0.675	9/27/2012	
123188	WG40910	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.694	2.67	1.47	1.18	< 0.985	< 0.985	61.9	0.943	9/27/2012	
123189	WG40910	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.27	2.91	1.49	1.26	< 0.995	< 0.995	41.3	0.944	9/27/2012	
123190	WG40910	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.53	1.82	2.07	< 1.01	< 1.01	47.1	0.798	9/27/2012	
123191	WG40910	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.74	2.15	2.43	< 1.01	< 1.01	67.5	2.52	9/27/2012	
123192	WG40910	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.25	1.28	1.63	< 0.995	< 0.995	66.4	< 0.597	9/27/2012	
123193	WG40910	2.28	< 0.439	< 0.439	< 0.439	< 0.439	< 0.439	< 0.439	1.59	1.08	1.49	< 0.877	< 0.877	74	1.14	9/27/2012	
123194	WG40910	2.22	< 0.450	< 0.450	< 0.450	< 0.450	< 0.450	< 0.450	0.807	1.05	1.38	< 0.901	< 0.901	8.11	1.02	9/27/2012	
123195	WG40910	2.07	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	1.33	1.5	1.86	< 0.966	< 0.966	45.7	1.23	9/27/2012	PFOS
123196	WG40910	2.14	< 0.467	< 0.467	< 0.467	< 0.467	< 0.467	< 0.467	1.35	1.42	1.45	< 0.935	< 0.935	26.6	0.811	9/27/2012	
123197	WG40910	2.22	< 0.450	< 0.450	< 0.450	< 0.450	< 0.450	< 0.450	1.36	2.17	5.22	< 0.901	< 0.901	103	2.89	9/27/2012	
123198	WG40910	2.17	< 0.461	< 0.461	< 0.461	< 0.461	< 0.461	< 0.461	1.45	1.15	1.04	< 0.922	< 0.922	30.8	< 0.553	9/27/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123199	WG40910	2.23	< 0.448	< 0.448	< 0.448	< 0.448	< 0.448	< 0.448	1.08	0.985	0.82	< 0.897	< 0.897	44.8	< 0.538	9/27/2012	
123200	WG40910	2.13	1.18	< 0.469	< 0.469	< 0.469	0.887	< 0.469	1.93	1.04	1.17	1.3	< 0.939	28.4	< 0.563	9/27/2012	
123201	WG40910	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	2.49	3.74	4.61	< 0.995	< 0.995	1020	6.21	9/27/2012	
123202	WG40910	2.31	< 0.433	< 0.433	< 0.433	< 0.433	< 0.433	< 0.433	1.61	1.11	1.18	< 0.866	< 0.866	47.4	< 0.519	9/27/2012	
123203	WG40910	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	1.04	0.823	0.751	< 0.962	< 0.962	46	< 0.577	9/27/2012	
123204	WG40910	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.689	0.534	0.687	< 0.980	< 0.980	11	< 0.588	9/27/2012	
123205	WG40907	1.99	24.8	0.732	< 0.503	< 0.503	8.89	0.505	11.5	3.41	4.6	< 1.01	13.2	6160	19.5	10/4/2012	PFDaA
123206	WG40907	2.01	9.08	< 1.49	< 1.49	< 1.49	1.32	< 0.498	< 0.498	< 0.498	< 0.498	< 0.995	< 0.995	25.4	4.53	10/4/2012	
123207	WG40907	2.01	11.6	0.544	< 0.498	< 0.498	1.29	< 0.498	< 0.498	< 0.498	0.847	< 0.995	1.52	28	8.74	10/4/2012	PFPeA, PFDaA, PFOSA, PFOS
123208	WG40907	2.02	5.96	< 0.495	< 0.495	< 0.495	0.67	< 0.495	0.788	< 0.495	0.673	< 0.990	< 0.990	132	4.61	10/4/2012	
123209	WG40907	1.97	2.44	< 0.508	< 0.508	< 0.508	1.61	< 0.508	6.16	4.89	26.3	< 1.02	1.49	440	34.7	10/4/2012	
123210	WG40907	2.00	3.96	< 0.500	< 0.500	< 0.500	1.13	< 0.500	8.62	6.79	30.3	< 1.00	< 1.00	661	51.6	10/4/2012	
123211	WG40907	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	7.78	6.14	18.1	< 0.990	< 0.990	718	17.1	10/4/2012	
123212	WG40907	1.98	0.875	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	7.02	3.01	8.85	< 1.01	< 1.01	1580	31.3	10/4/2012	
123213	WG40907	2.02	0.845	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	9.64	4.59	9.62	< 0.990	< 0.990	1560	23.8	10/4/2012	
123214	WG40907	2.00	1.37	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	2.05	1.75	8.59	< 1.00	< 1.00	192	46.9	10/4/2012	PFDaA
123215	WG40908	1.96	0.958	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	0.729	< 0.510	< 0.510	< 1.02	< 1.02	8.24	< 0.612	9/27/2012	PFDA
123216	WG40908	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.654	< 0.503	< 0.503	< 1.01	< 1.01	5.99	< 0.603	9/27/2012	
123217	WG40908	2.14	< 0.467	< 0.467	< 0.467	< 0.467	< 0.467	0.539	1.27	0.754	0.939	< 0.935	< 0.935	10.8	< 0.561	9/27/2012	
123218	WG40908	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	1.46	1.14	1.27	< 0.962	< 0.962	19.6	0.713	9/27/2012	
123219	WG40908	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	2.66	2.8	3.65	< 0.995	< 0.995	55.4	2.14	9/27/2012	
123220	WG40908	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.71	1.13	2.02	< 1.00	< 1.00	112	3.45	9/27/2012	
123221	WG40908	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.59	0.67	0.656	< 1.00	< 1.00	29.1	0.603	9/27/2012	
123222	WG40908	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.22	1.53	2.0	< 1.01	< 1.01	14.6	< 0.603	9/27/2012	
123223	WG40908	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.49	1.07	1.36	< 1.01	< 1.01	27.9	0.631	9/27/2012	
123224	WG40908	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.92	4.28	2.0	1.46	< 0.995	< 0.995	87	1.17	9/27/2012	
123225	WG40908	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.983	2.63	0.854	0.89	< 0.995	< 0.995	53.2	1.1	9/27/2012	
123226	WG40908	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.06	3.0	1.42	1.36	< 1.00	< 1.00	45.5	1.26	9/27/2012	
123227	WG40908	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.26	2.32	0.876	0.745	< 0.995	< 0.995	44.5	1.6	9/27/2012	
123228	WG40908	2.09	< 0.478	< 0.478	< 0.478	< 0.478	< 0.478	1.2	2.11	0.973	0.743	< 0.957	< 0.957	31.1	0.834	9/27/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123229	WG40908	2.09	< 0.478	< 0.478	< 0.478	< 0.478	< 0.478	0.684	8.52	3.48	2.68	< 0.957	< 0.957	82.6	< 0.574	9/27/2012	
123230	WG40908	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.54	0.626	0.595	< 1.01	< 1.01	18.9	< 0.603	9/27/2012	
123231	WG40908	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.07	0.626	< 0.493	< 0.985	< 0.985	17.1	< 0.591	9/27/2012	
123232	WG40908	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.72	< 0.500	< 0.500	< 1.00	< 1.00	13.4	< 0.600	9/27/2012	PFBA
123233	WG40908	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.33	1.08	0.879	< 0.995	< 0.995	25.4	< 0.597	9/27/2012	PFBA, PFDA
123237	WG40909	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.98	1.33	1.28	< 0.976	< 0.976	45.2	0.982	9/27/2012	
123238	WG40904	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.734	2.03	0.872	1.09	< 1.01	< 1.01	41.2	< 0.603	9/27/2012	PFDoA
123239	WG40904	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.15	2.58	1.03	0.932	< 1.00	< 1.00	52.2	0.801	9/27/2012	
123240	WG40904	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.546	< 0.493	< 0.493	< 0.985	< 0.985	12.1	< 0.591	9/27/2012	
123241	WG40904	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.811	0.562	< 0.503	< 1.01	< 1.01	26.5	< 0.603	9/27/2012	
123242	WG40904	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.931	0.625	0.963	< 0.995	< 0.995	40.4	< 0.597	9/27/2012	
123243	WG40904	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.75	1.02	0.97	< 0.990	< 0.990	53	< 0.594	9/27/2012	
123244	WG40905	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.08	0.573	0.615	< 1.01	< 1.01	44.9	< 0.606	9/27/2012	
123245	WG40905	1.99	1.77	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.943	< 0.503	< 0.503	< 1.01	< 1.01	34.5	< 0.603	9/27/2012	
123246	WG40905	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.64	0.561	< 0.500	< 1.00	< 1.00	24.5	< 0.600	9/27/2012	
123247	WG40905	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.629	0.779	0.71	< 0.995	< 0.995	36.2	< 0.597	9/27/2012	
123248	WG40905	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	0.976	0.94	0.934	< 0.962	< 0.962	60.4	< 0.577	9/27/2012	
123249	WG40905	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.493	< 0.490	< 0.490	< 0.980	< 0.980	19.9	< 0.588	9/27/2012	
123250	WG40905	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.34	0.722	0.629	< 1.01	< 1.01	37.9	< 0.606	9/27/2012	
123251	WG40905	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	0.596	< 0.508	< 0.508	< 1.02	< 1.02	26.1	< 0.609	9/27/2012	
123252	WG40905	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.956	0.556	0.593	< 0.995	< 0.995	31.1	< 0.597	9/27/2012	
123253	WG40905	1.97	1.14	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	0.705	0.627	0.52	< 1.02	< 1.02	25.2	< 0.609	9/27/2012	
123254	WG40905	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	12.8	< 0.600	9/27/2012	
123255	WG40905	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.01	0.835	1.87	< 0.990	< 0.990	40.5	< 0.594	9/27/2012	
123256	WG40905	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.535	< 0.503	< 0.503	< 1.01	< 1.01	8.13	< 0.603	9/27/2012	
123257	WG40905	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.995	< 0.995	< 0.995	< 0.597	9/27/2012	
123258	WG40905	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 1.01	< 1.01	2.26	< 0.606	9/27/2012	
123259	WG40905	2.07	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	< 0.966	< 0.966	1.52	< 0.580	9/27/2012	
123260	WG40905	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.995	< 0.995	< 0.995	< 0.597	9/27/2012	
123261	WG40905	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	1.99	1.51	3.05	< 0.971	< 0.971	12.9	< 0.583	9/27/2012	
123262	WG40905	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	1.02	< 0.490	< 0.490	< 0.980	< 0.980	18.3	< 0.588	9/27/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123263	WG40906	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 1.02	< 1.02	33.2	< 0.609	9/27/2012	
123264	WG40906	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.98	< 0.503	< 0.503	< 1.01	< 1.01	17.4	< 0.603	9/27/2012	
123265	WG40906	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	1.23	0.733	0.921	< 1.02	< 1.02	19.4	< 0.609	9/27/2012	
123266	WG40906	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.92	0.743	0.744	< 1.01	< 1.01	22.9	< 0.606	9/27/2012	
123267	WG40906	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.552	< 0.493	< 0.493	< 0.985	< 0.985	3.88	< 0.591	9/27/2012	
123268	WG40906	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.56	1.49	0.555	1.21	< 0.985	< 0.985	36.3	< 0.591	9/27/2012	
123269	WG40906	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.29	0.707	1.25	< 0.990	< 0.990	18.8	< 0.594	9/27/2012	
123270	WG40906	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.859	0.609	0.563	< 1.01	< 1.01	9.99	< 0.603	9/27/2012	
123271	WG40906	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.772	1.31	0.63	< 0.495	< 0.990	< 0.990	44.8	< 0.594	9/27/2012	
123272	WG40906	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	0.965	2.51	1.09	0.822	< 1.02	< 1.02	42.5	< 0.609	9/27/2012	
123273	WG40906	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.36	0.624	0.639	< 1.01	< 1.01	17.6	< 0.606	9/27/2012	
123274	WG40906	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	1.44	0.664	0.71	< 1.02	< 1.02	17.1	< 0.609	9/27/2012	
123275	WG40906	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.21	0.509	0.573	< 1.01	< 1.01	15.3	< 0.606	9/27/2012	
123276	WG40906	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.12	0.625	< 0.500	< 1.00	< 1.00	16.7	< 0.600	9/27/2012	
123277	WG40906	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.21	1.2	1.07	< 1.00	< 1.00	46.7	< 0.600	9/27/2012	
123278	WG40906	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.990	< 0.990	3.27	< 0.594	9/27/2012	
123279	WG40906	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	0.809	< 0.508	< 0.508	< 1.02	< 1.02	46.1	< 0.609	9/27/2012	
123280	WG40906	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 1.01	< 1.01	< 1.01	< 0.603	9/27/2012	
123281	WG40906	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.551	1.05	0.549	0.854	< 0.985	< 0.985	21.7	< 0.591	9/27/2012	
123282	WG40907	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.28	0.546	0.73	< 0.976	< 0.976	29.5	< 0.585	10/4/2012	
123283	WG40907	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	0.677	< 0.508	0.542	< 1.02	< 1.02	28.9	1.01	10/4/2012	
123284	WG40907	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.638	< 0.495	0.51	< 0.990	< 0.990	34.4	1.36	10/4/2012	
123285	WG40907	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 1.02	< 1.02	20.5	< 0.609	10/4/2012	
123286	WG40907	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.995	< 0.995	23.8	< 0.597	10/4/2012	
123287	WG40907	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 1.02	< 1.02	18.9	< 0.609	10/4/2012	
123288	WG40907	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 1.01	< 1.01	16.9	< 0.603	10/4/2012	
123289	WG40907	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.548	< 0.500	< 1.00	< 1.00	35.3	< 0.600	10/4/2012	
123290	WG40907	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	2.15	1.58	2.23	< 1.02	< 1.02	63.8	< 0.609	10/4/2012	
123291	WG40909	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	1.26	0.859	1.48	< 0.980	< 0.980	18	< 0.588	9/27/2012	
123292	WG40909	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.939	0.51	0.603	< 1.01	< 1.01	27.2	< 0.603	9/27/2012	
123293	WG40909	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.63	1.25	2.26	< 0.976	< 0.976	22.3	< 0.585	9/27/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123294	WG40909	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	2.74	1.5	1.33	< 0.990	< 0.990	50.9	< 0.594	9/27/2012	
123295	WG40909	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	1.07	0.635	0.536	< 0.980	< 0.980	16.4	< 0.588	9/27/2012	
123296	WG40909	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.33	0.748	< 0.500	< 1.00	< 1.00	26.6	< 0.600	9/27/2012	
123297	WG40909	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.26	0.672	0.66	< 1.01	< 1.01	21.5	< 0.606	9/27/2012	
123298	WG40909	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.24	< 0.488	0.614	< 0.976	< 0.976	27.6	0.97	9/27/2012	
123299	WG41230	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.666	< 0.500	< 0.500	< 1.00	< 1.00	18.8	< 0.600	10/5/2012	
123300	WG41230	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.972	0.554	< 0.493	< 0.985	< 0.985	42.2	< 0.591	10/5/2012	
123301	WG41230	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	3.56	2.1	3.76	< 0.990	< 0.990	107	0.754	10/5/2012	
123302	WG41230	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	0.902	< 0.488	< 0.488	< 0.976	< 0.976	12.1	< 0.585	10/5/2012	
123303	WG40910	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	5.5	3.73	2.43	< 0.995	< 0.995	106	< 0.597	9/27/2012	
123304	WG40909	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.53	< 0.495	< 0.495	< 0.990	< 0.990	4.62	< 0.594	9/27/2012	
123305	WG41230	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.9	1.19	1.3	< 0.995	< 0.995	43.2	< 0.597	10/5/2012	
123306	WG41077	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.21	0.91	0.959	< 0.990	< 0.990	35.9	< 0.594	10/11/2012	PFDaA
123307	WG41077	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	0.615	< 0.481	0.76	< 0.962	< 0.962	3.85	< 0.577	10/11/2012	PFDaA
123308	WG41077	2.03	< 0.493	< 0.493	< 0.493	< 0.493	0.5	< 0.493	2.85	1.44	0.946	< 0.985	< 0.985	68.1	0.769	10/11/2012	PFDaA, PFOSA
123309	WG41077	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	2.25	0.856	1.53	< 1.00	< 1.00	108	0.848	10/11/2012	PFDaA
123310	WG41077	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.980	< 0.980	6.97	< 0.588	10/11/2012	PFDaA
123311	WG41077	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	2.1	1.03	1.96	< 0.985	< 0.985	61.6	< 0.591	10/11/2012	PFDaA
123312	WG41077	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.42	0.569	0.763	< 0.985	< 0.985	37.7	< 0.591	10/11/2012	PFDaA
123313	WG41077	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.47	0.683	1.31	< 0.990	< 0.990	87.5	< 0.594	10/11/2012	PFDaA
123314	WG41078	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.85	0.919	1.47	< 1.00	< 1.00	50.7	< 0.600	10/19/2012	
123315	WG41078	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.8	1.37	2.1	< 1.00	< 1.00	13.4	< 0.600	10/19/2012	
123316	WG41078	1.98	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	< 0.505	1.58	1.07	0.624	< 1.01	< 1.01	38.6	1.16	10/19/2012	
123317	WG41078	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.75	0.975	0.738	< 1.00	< 1.00	32.8	1.41	10/19/2012	
123318	WG41079	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.86	0.915	0.711	< 1.01	< 1.01	40.7	1.63	10/19/2012	
123319	WG41079	1.96	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	0.612	2.08	1.0	0.761	< 1.02	< 1.02	42.9	1.46	10/19/2012	
123320	WG41079	1.94	< 0.515	< 0.515	< 0.515	< 0.515	< 0.515	< 0.515	2.23	1.34	1.34	< 1.03	< 1.03	41.9	1.46	10/19/2012	
123321	WG41079	1.96	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	0.774	1.42	0.615	< 0.510	< 1.02	< 1.02	33.5	1.85	10/19/2012	
123322	WG41079	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	1.94	1.15	0.699	< 0.980	< 0.980	26.4	0.728	10/19/2012	PFDaA
123323	WG41079	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.851	0.511	< 0.490	< 0.980	< 0.980	15.8	< 0.588	10/19/2012	
123324	WG41079	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	1.16	0.576	< 0.493	< 0.985	< 0.985	15.6	< 0.591	10/19/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123325	WG41079	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	1.06	0.847	0.83	< 1.02	< 1.02	20.4	< 0.609	10/19/2012	
123326	WG41079	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.94	1.32	0.865	< 0.976	< 0.976	44.2	< 0.585	10/19/2012	
123327	WG41079	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.853	2.47	< 0.498	< 0.995	< 0.995	50.4	< 0.597	10/19/2012	
123328	WG41079	1.97	< 0.508	< 0.508	< 0.508	< 0.508	< 0.508	0.742	1.3	0.609	< 0.508	< 1.02	< 1.02	32.8	< 0.609	10/19/2012	
123329	WG41079	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.3	0.799	0.554	< 1.01	< 1.01	37.9	1.62	10/19/2012	PFDaA
123330	WG41079	1.95	< 0.513	< 0.513	< 0.513	< 0.513	< 0.513	< 0.513	1.5	0.928	0.885	< 1.03	< 1.03	24.5	< 0.615	10/19/2012	
123331	WG41079	1.96	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	0.574	1.79	1.11	0.676	< 1.02	< 1.02	20.4	0.826	10/19/2012	
123332	WG41079	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.802	3.77	2.19	1.86	< 1.00	< 1.00	62.7	< 0.600	10/19/2012	
123333	WG41079	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.16	2.89	1.74	1.4	< 0.990	< 0.990	42.8	0.668	10/19/2012	
123334	WG41079	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	2.31	1.23	0.949	< 0.985	< 0.985	52.8	1.31	10/19/2012	
123335	WG41079	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	1.01	0.625	< 0.485	< 0.971	< 0.971	17.9	< 0.583	10/19/2012	
123336	WG41079	1.96	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	< 0.510	1.03	0.649	< 0.510	< 1.02	< 1.02	22.7	< 0.612	10/19/2012	
123337	WG41079	1.95	< 0.513	< 0.513	< 0.513	< 0.513	< 0.513	< 0.513	1.69	1.27	0.875	< 1.03	< 1.03	29.1	< 0.615	10/19/2012	
123338	WG41077	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.518	4.35	1.61	9.5	< 0.995	< 0.995	32.8	1.29	10/11/2012	PFDaA
123339	WG41077	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	0.557	3.7	1.3	2.27	< 0.995	< 0.995	71.9	< 0.597	10/11/2012	PFDaA
123340	WG41077	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.971	4.37	1.64	1.95	< 0.990	< 0.990	61	1.46	10/11/2012	PFDaA
123341	WG41077	2.07	< 0.483	< 0.483	< 0.483	< 0.483	< 0.483	0.643	3.09	1.29	2.11	< 0.966	< 0.966	46.8	0.908	10/11/2012	PFDaA
123342	WG41077	2.03	< 0.493	< 0.493	< 0.493	< 0.493	< 0.493	0.653	2.44	0.783	1.19	< 0.985	< 0.985	29.2	< 0.591	10/11/2012	
123343	WG41077	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.95	1.14	1.37	< 1.00	< 1.00	37.8	< 0.600	10/11/2012	PFDaA
123344	WG41077	2.01	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	< 0.498	1.85	0.961	1.26	< 0.995	< 0.995	23.3	< 0.597	10/11/2012	PFDaA
123345	WG41077	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	1.2	0.693	0.836	< 0.980	< 0.980	18.3	< 0.588	10/11/2012	
123346	WG41077	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.7	0.814	0.999	< 1.01	< 1.01	23.4	< 0.603	10/11/2012	
123347	WG41077	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.76	1.43	0.573	0.753	< 1.01	< 1.01	21.8	< 0.603	10/11/2012	
123348	WG41077	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	1.2	2.57	1.07	1.86	< 0.976	< 0.976	60.1	< 0.585	10/11/2012	
123349	WG41077	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.29	0.655	1.0	< 0.990	< 0.990	25.1	< 0.594	10/11/2012	
123350	WG41078	1.95	< 0.513	< 0.513	< 0.513	< 0.513	< 0.513	0.625	2.57	1.38	1.12	< 1.03	< 1.03	65	< 0.615	10/19/2012	
123351	WG41078	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.595	1.69	0.997	1.27	< 1.00	< 1.00	31.8	< 0.600	10/19/2012	
123352	WG41078	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.842	1.14	0.565	< 0.495	< 0.990	< 0.990	14.5	< 0.594	10/19/2012	
123353	WG41078	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.49	1.26	2.12	< 1.00	< 1.00	35.9	< 0.600	10/19/2012	
123354	WG41078	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	1.0	0.804	1.37	< 0.962	< 0.962	7.62	< 0.577	10/19/2012	
123355	WG41078	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.91	1.85	2.7	< 0.990	< 0.990	12.3	< 0.594	10/19/2012	

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
123356	WG41078	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	1.02	0.672	0.765	< 0.980	< 0.980	31	< 0.588	10/19/2012	
123357	WG41078	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	1.08	0.716	1.08	< 0.971	< 0.971	21.8	< 0.583	10/19/2012	
123358	WG41078	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.44	1.34	1.43	< 1.01	< 1.01	25.5	< 0.603	10/19/2012	
123359	WG41078	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	1.15	1.02	1.0	< 0.990	< 0.990	21.2	< 0.594	10/19/2012	
123360	WG41078	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.48	0.907	0.845	< 1.00	< 1.00	32.8	< 0.600	10/19/2012	
123361	WG41078	2.05	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	< 0.488	0.713	< 0.488	< 0.488	< 0.976	< 0.976	19.7	< 0.585	10/19/2012	
123362	WG41078	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	2.03	1.55	1.43	< 0.962	< 0.962	43.5	< 0.577	10/19/2012	
123363	WG41078	2.06	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	< 0.485	0.997	0.807	0.744	< 0.971	< 0.971	22.7	< 0.583	10/19/2012	
123364	WG41078	2.09	< 0.478	< 0.478	< 0.478	< 0.478	< 0.478	< 0.478	1.73	1.49	1.39	< 0.957	< 0.957	30.3	< 0.574	10/19/2012	
123365	WG41078	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.785	0.885	0.759	< 0.980	< 0.980	21.9	< 0.588	10/19/2012	
123366	WG41790	2.08	< 0.481	< 0.481	< 0.481	< 0.481	< 0.481	1.0	3.56	1.66	1.48	< 0.962	< 0.962	38.7	< 0.577	12/3/2012	
123367	WG41790	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	3	1.57	1.17	< 0.990	< 0.990	34.5	< 0.594	12/3/2012	
123368	WG41790	2.04	< 0.490	< 0.490	< 0.490	< 0.490	< 0.490	0.656	2.29	0.877	0.861	< 0.980	< 0.980	46.4	0.715	12/3/2012	
123369	WG41790	2.02	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	0.631	1.6	0.716	0.585	< 0.990	< 0.990	21.4	< 0.594	12/3/2012	
123370	WG41790	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	0.812	0.874	0.524	< 1.00	< 1.00	21.5	< 0.600	12/3/2012	
123371	WG41790	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.15	0.816	0.548	< 1.00	< 1.00	25.7	< 0.600	12/3/2012	
123372	WG41790	2.00	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	1.04	1.1	0.797	< 1.00	< 1.00	70.4	< 0.600	12/3/2012	
123373	WG41790	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	0.523	2.67	1.19	0.665	< 1.01	< 1.01	31.5	< 0.603	12/3/2012	
123374	WG41790	1.99	< 0.503	< 0.503	< 0.503	< 0.503	< 0.503	1.14	4.28	1.92	1.39	< 1.01	< 1.01	75.6	1.04	12/3/2012	

Appendix A-2. PFCs results for water (ng/L)

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
1A	WG41442	0.501 L	9.78	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 4.99	< 4.99	< 4.99	< 2.50	11/7/2012	PFBA
2A	WG41443	0.517 L	10.9	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 4.84	< 4.84	< 4.84	< 2.42	11/7/2012	PFBA
2B	WG41443	0.518 L	9.21	< 2.41	< 2.41	< 2.41	< 2.41	< 2.41	< 2.41	< 2.41	< 2.41	< 4.83	< 4.83	< 4.83	< 2.41	11/7/2012	PFBA
2C	WG41442	0.509 L	10.5	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 4.91	< 4.91	< 4.91	< 2.46	11/7/2012	PFBA
3A	WG41442	0.511 L	10.8	< 2.45	< 2.45	< 2.45	< 2.45	< 2.45	< 2.45	< 2.45	< 2.45	< 4.90	< 4.90	< 4.90	< 2.45	11/7/2012	PFBA
3B	WG41442	0.508 L	10.4	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 4.92	< 4.92	< 4.92	< 2.46	11/7/2012	PFBA
3C	WG41442	0.508 L	9.66	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 2.46	< 4.93	< 4.93	< 4.93	< 2.46	11/7/2012	PFBA
4A	WG41442	0.500 L	9.08	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 5.00	< 5.00	< 5.00	< 2.50	11/7/2012	PFBA
4B	WG41442	0.501 L	10.4	< 2.49	< 2.49	< 2.49	< 2.49	< 2.49	< 2.49	< 2.49	< 2.49	< 4.99	< 4.99	< 4.99	< 2.49	11/7/2012	PFBA
4C	WG41442	0.516 L	9.81	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 2.42	< 4.85	< 4.85	< 4.85	< 2.42	11/7/2012	PFBA
5A	WG41443	0.494 L	13.6	< 2.53	< 2.53	< 2.53	3.58	< 2.53	< 2.53	< 2.53	< 2.53	< 5.06	< 5.06	< 5.06	< 2.53	11/7/2012	PFBA
6A	WG41442	0.501 L	21.3	2.85	4.35	< 2.49	5.02	< 2.49	< 2.49	< 2.49	< 2.49	< 4.99	< 4.99	< 4.99	< 2.49	11/7/2012	PFBA
6B	WG41442	0.503 L	19.4	< 2.49	4.22	2.64	5.23	< 2.49	< 2.49	< 2.49	< 2.49	< 4.97	< 4.97	< 4.97	< 2.49	11/7/2012	PFBA
6C	WG41442	0.492 L	19.7	< 2.54	4.47	< 2.54	5.29	< 2.54	< 2.54	< 2.54	< 2.54	< 5.08	< 5.08	< 5.08	< 2.54	11/7/2012	PFBA
7A	WG41443	0.498 L	30	< 2.51	4.74	< 2.51	7.69	< 2.51	< 2.51	< 2.51	< 2.51	< 5.02	< 5.02	< 5.02	< 2.51	11/7/2012	PFBA
7B	WG41442	0.513 L	29.5	2.89	4.21	< 2.44	7.59	< 2.44	< 2.44	< 2.44	< 2.44	< 4.88	< 4.88	< 4.88	< 2.44	11/7/2012	PFBA
7C	WG41442	0.512 L	26.4	2.52	4.05	< 2.44	7.55	< 2.44	< 2.44	< 2.44	< 2.44	< 4.88	< 4.88	< 4.88	< 2.44	11/7/2012	PFBA
8A	WG41443	0.508 L	37.8	3.55	5.08	2.76	8.29	< 2.46	< 2.46	< 2.46	< 2.46	< 4.92	< 4.92	< 4.92	< 2.46	11/7/2012	PFBA, PFPeA, PFHxA, PFHpA, PFHxA
8B	WG41443	0.520 L	34.9	3.11	5.02	< 2.40	8.3	< 2.40	< 2.40	< 2.40	< 2.40	< 4.81	< 4.81	< 4.81	< 2.40	11/7/2012	PFBA
8C	WG41443	0.510 L	36	3.37	5.29	3.1	8.39	3.55	15.7	60.2	117	< 4.90	< 4.90	19.8	208	11/7/2012	PFBA, PFUnA, PFDoA
9A	WG41443	0.512 L	42.8	4.24	5.93	4.34	8.26	< 2.44	< 2.44	< 2.44	< 2.44	< 4.89	< 4.89	< 4.89	< 2.44	11/7/2012	PFBA, PFPeA, PFHxA, PFHpA, PFHxA
9B	WG41443	0.473 L	44.7	4.05	6.54	3.98	8.03	< 2.64	< 2.64	< 2.64	< 2.64	< 5.28	< 5.28	< 5.28	< 2.64	11/7/2012	PFBA
9C	WG41443	0.492 L	40.9	4.13	6.83	4.94	8.45	< 2.54	< 2.54	< 2.54	< 2.54	< 5.08	< 5.08	6.09	< 2.54	11/7/2012	PFBA
10A	WG41443	0.551 L	47.8	4.05	6.33	4.8	8.89	< 2.27	< 2.27	< 2.27	< 2.27	< 4.54	< 4.54	< 4.54	< 2.27	11/7/2012	PFBA
10B	WG41443	0.483 L	48.3	4.56	6.01	5.56	8.76	< 2.59	< 2.59	< 2.59	< 2.59	< 5.18	< 5.18	< 5.18	< 2.59	11/7/2012	PFBA, PFPeA, PFHxA, PFHpA, PFHxA
10C	WG41443	0.472 L	50.7	4.34	6.56	3.96	8.51	< 2.65	< 2.65	< 2.65	< 2.65	< 5.29	< 5.29	< 5.29	< 2.65	11/7/2012	PFBA
11A	WG41443	0.490 L	300	25.3	32.8	15.5	210	< 2.55	< 2.55	< 2.55	< 2.55	31	25.7	150	< 2.55	11/7/2012	PFBA

CLIENT ID	WORK GROUP	Sample (g - wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	QA	
																Review Date	Qualified Analytes
11B	WG41443	0.458 L	309	23.4	31.4	15.1	202	< 2.73	< 2.73	< 2.73	< 2.73	33.4	24.2	142	< 2.73	11/7/2012	PFBA
11C	WG41443	0.490 L	326	26.7	34.2	17.4	220	< 2.55	< 2.55	< 2.55	< 2.55	30.3	26.4	155	< 2.55	11/7/2012	PFBA
12A	WG41443	0.517 L	187	12.1	12.6	5.34	37.1	< 2.42	< 2.42	< 2.42	< 2.42	13	13.9	24.2	< 2.42	11/7/2012	PFBA
12B	WG41443	0.512 L	187	12.5	12.5	5.09	37.8	< 2.44	< 2.44	< 2.44	< 2.44	13.6	14.4	25.9	< 2.44	11/7/2012	PFBA
12C	WG41443	0.489 L	183	9.78	11.8	5.87	34.9	< 2.56	< 2.56	< 2.56	< 2.56	13.4	14	23.1	< 2.56	11/7/2012	PFBA

Appendix A-3. QA Results for Fish Samples: lab blanks and matrix spikes by work group

WORK GROUP	CLIENT ID	Sample (g – wet)	UNITS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA
WG40905	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40905	Spiked Matrix		% Recov	95.2	96.8	105	100	97.7	91.3	104	78.3	104	101	96.5	92.8	95.9
WG40905	123255 (MS)	2.01	% Recov	94.5	108	101	95.3	101	99.4	106	79.4	98.6	90.3	98.6	83.1	103
WG40905	123255 (MSD)	1.99	% Recov	97.4	131	97.6	107	95.4	96.1	103	84.1	97.5	70.3	95.6	85.2	110
WG40904	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40904	Spiked Matrix		% Recov	107	95	104	97	101	96.2	116	104	105	107	100	91.9	98.5
WG40904	123172 (MS)	2.00	% Recov	99.1	146	107	120	109	96.7	117	79.8	106	65.4	95	98.8	113
WG40904	123172 (MSD)	2.00	% Recov	99.4	162	112	129	109	105	118	88	108	68.8	101	88.8	115
WG40903	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40903	Spiked Matrix		% Recov	123	107	124	117	122	122	128	113	124	114	111	120	125
WG40903	123121 (MS)	2.00	% Recov	115	111	125	118	128	116	134	100	129	122	114	126	143
WG40903	123121 (MSD)	2.05	% Recov	118	113	127	115	122	117	132	105	127	126	118	116	131
WG40901	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40901	Spiked Matrix		% Recov	113	99.6	112	105	106	111	126	110	110	122	105	108	109
WG40901	123077 (MS)	2.00	ng ww	22	23.3	23	24.2	22	22	22.2	15.7	22.7	38.3	41.3	46.6	27.1
WG40901	123077 (MS)	2.00	% Recov	110	116	115	121	110	110	111	78.3	113	95.8	103	114	135
WG40901	123077 (MSD)	2.00	ng ww	22.2	23.6	22.9	22.9	23	21.1	26.1	21.1	22.3	37.7	43.2	42.3	25.9
WG40901	123077 (MSD)	2.00	% Recov	111	118	114	115	115	106	131	106	111	94.2	108	103	129
WG40902	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40902	Spiked Matrix		% Recov	101	94.3	106	98.4	102	99.3	114	105	101	118	95.9	94	102
WG40902	123105 (MS)	2.04	ng/g ww	19.6	17.1	20.7	16.6	20.4	20.3	24	21.4	21.9	43.5	39.1	90.2	22.2
WG40902	123105 (MSD)	2.02	ng/g ww	20.7	17.6	21.2	18.5	21.2	20.1	22.5	20.1	22.7	43.1	37.6	83.8	21.4
WG40898	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.500
WG40898	Spiked Matrix		% Recov	102	96.1	108	102	106	105	114	112	113	106	99.1	101	111
WG40898	123152 (MS)	1.99	ng/g ww	22.7	21.2	24.1	21.4	23.1	22.9	28.9	24.1	26.2	45	42.2	120	23.4
WG40898	123152 (MSD)	2.00	ng/g ww	22.6	21	23.6	20.6	22.3	23.7	29.6	27.2	26.8	46.6	42.4	115	24
WG40906	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40906	Spiked Matrix		% Recov	97.3	96.5	104	96.4	101	104	105	92.5	104	101	100	98.2	104
WG40906	123278 (MS)	2.04	% Recov	93.9	119	104	105	103	96.2	116	97.9	106	78.7	97	108	108
WG40906	123278 (MSD)	1.98	% Recov	92	128	102	107	99.8	105	108	99.5	101	72.5	94.6	101	107

WORK GROUP	CLIENT ID	Sample (g - wet)	UNITS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA
WG40910	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40910	Spiked Matrix		% Recov	110	111	120	113	121	118	129	113	121	121	119	99.5	118
WG40910	123190 (MS)	2.07	ng ww	21	40.5	23.8	22.5	23.2	23.6	24.4	20.7	25.1	27.2	38.8	104	22.4
WG40910	123190 (MSD)	2.04	ng ww	19	39.4	24.7	25.5	22.5	21.4	28.3	22.5	26.2	32.9	48	108	23.3
WG40910	123190 (MSD)	2.04	% Recov	96.9	201	126	130	115	109	137	105	123	84	122	154	115
WG40910	123190 (MS)	2.07	% Recov	109	209	123	116	120	122	118	97.7	119	70.3	100	148	112
WG40909	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40909	Spiked Matrix		% Recov	113	123	126	108	129	119	123	108	130	133	125	119	116
WG40909	123291 (MS)	2.09	ng ww	23.3	31.6	23.1	23.1	24.4	22.2	26.5	20.7	26.1	33.8	44.4	62.1	23.3
WG40909	123291 (MSD)	2.05	ng ww	21.8	33.8	26.4	26.3	24.7	22.9	26.6	21.4	24.8	42.5	53.2	69.1	26
WG40909	123291 (MSD)	2.05	% Recov	112	173	135	135	127	117	130	105	120	109	136	131	133
WG40909	123291 (MS)	2.09	% Recov	122	165	121	121	128	116	132	103	128	88.4	116	115	122
WG40908	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40908	Spiked Matrix		% Recov	115	129	127	119	127	120	137	116	126	120	112	111	112
WG40908	123229 (MS)	1.99	ng ww	22.9	45.7	25.6	23.3	26.8	24.7	36.1	24.9	26.9	38.7	49.7	134	25
WG40908	123229 (MSD)	2.03	ng ww	22.4	46.5	24.2	23.2	23.5	23.1	36	22.7	27.1	37.1	52.3	141	25
WG40908	123229 (MSD)	2.03	% Recov	114	236	123	118	119	114	139	97.3	124	94.1	133	148	127
WG40908	123229 (MS)	1.99	% Recov	114	227	128	116	133	120	137	107	121	96.3	124	128	124
WG40907	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40907	Spiked Matrix		% Recov	95.3	103	98.4	82	97.1	91.1	110	98.7	98.2	99.8	96	110	103
WG40907	123205 (MS)	2.00	ng/g ww	41.2	26.8	21.3	20.8	30.3	19.3	30.9	19.1	26.5	22	49.4	5730	43.4
WG40907	123205 (MSD)	1.98	ng/g ww	46.8	24.5	21.7	22.5	28.9	18.1	31.5	22.9	25.3	38.6	64	5460	43.6
WG40907	123205 (MSD)	1.98	% Recov	109	118	107	111	98.9	87	99.1	96.4	102	95.6	126		119
WG40907	123205 (MS)	2.00	% Recov	82.3	130	107	104	107	94.1	96.8	78.5	109	55.1	90.4		120
WG40911	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG40911	Spiked Matrix		% Recov	96.2	104	104	100	99.1	99.2	98.8	95.5	109	85.2	84.1	94.9	97
WG40911	123142 (MS)	2.04	ng ww	18.9	27.3	19.6	19.6	20	18.5	22.6	17.4	21.6	25.3	34.4	60.4	23.7
WG40911	123142 (MSD)	1.99	ng ww	17.3	28.2	21.2	20.8	21	19.6	21.6	16.5	22	25.9	36.3	65.3	22.2
WG40911	123142 (MSD)	1.99	% Recov	86.2	140	106	104	104	97.3	105	82	109	64.3	90.3	92	111
WG40911	123142 (MS)	2.04	% Recov	96.4	139	100	100	102	94.3	113	89	110	64.5	87.6	81.8	121
WG41230	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600

WORK GROUP	CLIENT ID	Sample (g – wet)	UNITS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA
WG41230	Spiked Matrix		% Recov	107	111	109	107	99.5	102	114	108	112	106	103	105	95.9
WG41230	123300 (MS)	1.99	ng/g ww	20.6	29.1	20.6	22.3	22.9	22	23.3	16.9	22.9	28.7	39.1	84.9	25.5
WG41230	123300 (MS)	1.99	% Recov	103	145	103	111	114	109	111	81.4	114	71.4	97.2	106	127
WG41230	123300 (MSD)	2.06	ng/g ww	18.8	29.1	19.8	22	21	20.1	23.6	19	22.4	21.8	33.3	78.6	21.5
WG41230	123300 (MSD)	2.06	% Recov	97	150	102	113	108	103	116	95.2	115	56.1	85.9	93.6	110
WG41077	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG41077	Spiked Matrix		% Recov	95.4	115	106	98.3	111	106	124	89.5	113	124	110	95.1	121
WG41077	123306 (MS)	2.02	ng ww	20.3	32.6	20.3	22	23.6	21.8	24.7	17.7	24.6	31.3	39.7	84.8	27.1
WG41077	123306 (MSD)	2.01	ng ww	21.3	34.4	21.4	22.7	22.6	21.4	25.7	17.9	23.5	33.9	47.5	80.6	28.6
WG41155	Lab Blank	2.00	ng/g	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 5.00	< 5.00	< 5.00	< 2.50
WG41155	Spiked Matrix		% Recov	94.2	92.2	97	93.4	104	94.6	80.8	102	103	98.3	91.5	89.9	98.1
WG41079	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG41079	Spiked Matrix		% Recov	88.3	81.9	96.2	85.5	93.7	87	103	103	103	91.2	90.4	89.5	91.1
WG41079	123334 (MS)	2.04	% Recov	93.2	93	96.6	66.9	93	92.8	103	107	104	94.5	95.8	118	88.8
WG41079	123334 (MSD)	2.03	% Recov	97.1	84.3	94.5	72.7	87.9	94.3	102	110	103	99.2	93.9	91.6	81.7
WG41790	Lab Blank	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600
WG41790	Spiked Matrix		% Recov	112	94	112	106	107	107	121	116	115	111	112	118	109
WG41790	123368 (MS)	2.00	% Recov	112	99.4	118	103	109	110	135	109	115	111	111	98.3	113
WG41790	123368 (MSD)	2.09	% Recov	109	87.8	106	90.5	101	95	116	110	104	99.2	99.3	86.1	94.8

Appendix A-4. QA Results for Water Samples: lab blanks and matrix spikes by work group

WORK GROUP	CLIENT ID	Sample Size (L)	UNITS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDaA	PFBS	PFHxS	PFOS	PFOSA
WG41443	Lab Blank	0.500	ng/L	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 5.00	< 5.00	< 5.00	< 2.50
WG41443	Spiked Matrix		% Recov	123	105	120	114	113	113	116	122	123	115	117	106	119
WG41443	5A (MS)	0.504	% Recov	113	79.9	105	130	105	105	100	107	104	92.9	109	108	119
WG41443	5A (MSD)	0.539	% Recov	130	93.2	124	154	116	116	113	120	112	97.6	120	120	130
WG41442	Lab Blank	0.500	ng/L	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 5.00	< 5.00	< 5.00	< 2.50
WG41442	Spiked Matrix		% Recov	97.6	90.8	108	97.6	102	102	104	109	106	91.3	84.3	107	113
WG41442	1A (MS)	0.509	ng/L	492	377	503	623	483	468	470	473	481	788	905	935	496
WG41442	1A (MSD)	0.500	ng/L	527	417	541	690	497	502	517	512	525	844	983	1010	557

Appendix A-5. Fish sample identification

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3076	1	1	7/30/2012	Common Carp	m	8	65	3500	L18329-1	8-Aug-12	WG40901
12 3077	1	1	7/30/2012	Common Carp	m	8	62	3950	L18329-2 (A)	8-Aug-12	WG40901
12 3078	1	1	7/30/2012	Common Carp	m	8	62	1275	L18329-3	8-Aug-12	WG40901
12 3079	1	1	7/30/2012	Common Carp	ind	5	45	1300	L18329-4	8-Aug-12	WG40901
12 3080	1	1	7/30/2012	Common Carp	f	6	52	2500	L18329-5	8-Aug-12	WG40901
12 3081	1	1	7/30/2012	Common Carp	f	7	57.5	2750	L18329-6	8-Aug-12	WG40901
12 3082	1	1	7/30/2012	Common Carp	f	8	60.5	2600	L18329-7	8-Aug-12	WG40901
12 3083	1	1	7/30/2012	Smallmouth Bass	m	7	37	956	L18330-1	7-Aug-12	WG40901
12 3084	1	1	7/30/2012	Smallmouth Bass	m	6	34	832	L18330-2	7-Aug-12	WG40901
12 3085	1	1	7/30/2012	Smallmouth Bass	m	6	32	451	L18330-3	7-Aug-12	WG40901
12 3086	1	1	7/30/2012	Smallmouth Bass	ind	5	33.5	572	L18330-4	7-Aug-12	WG40901
12 3087	1	1	7/30/2012	Smallmouth Bass	f	6	34.5	716	L18330-5	7-Aug-12	WG40901
12 3088	1	1	7/30/2012	Smallmouth Bass	m	7	38	950	L18330-6	7-Aug-12	WG40901
12 3089	1	1	7/30/2012	Smallmouth Bass	f	4	29	377	L18330-7	7-Aug-12	WG40901
12 3090	1	1	7/30/2012	Smallmouth Bass	m	7	34	684	L18330-8	7-Aug-12	WG40901
12 3091	1	1	7/30/2012	Smallmouth Bass	f	4	30.5	432	L18330-9	7-Aug-12	WG40901
12 3092	1	1	7/30/2012	Smallmouth Bass	f	3	29	402	L18330-10	7-Aug-12	WG40901
12 3093	1	1	7/30/2012	Smallmouth Bass	j	3	23.3	205	L18330-11	7-Aug-12	WG40901
12 3094	1	1	7/30/2012	Freshwater Drum	f	5	34	483	L18330-12	7-Aug-12	WG40901
12 3095	1	1	7/30/2012	Freshwater Drum	m	6	37	719	L18330-13	7-Aug-12	WG40902
12 3096	1	1	7/30/2012	Freshwater Drum	m	8	42	862	L18330-14	7-Aug-12	WG40902
12 3097	1	1	7/30/2012	Freshwater Drum	f	5	34	413	L18330-15	7-Aug-12	WG40902
12 3098	1	1	7/30/2012	Freshwater Drum	m	4	29.5	308	L18330-16	7-Aug-12	WG40902
12 3099	1	1	7/30/2012	Freshwater Drum	m	8	39.5	671	L18330-17	7-Aug-12	WG40902
12 3100	1	1	7/30/2012	Freshwater Drum	m	3	31.5	348	L18330-18	7-Aug-12	WG40902
12 3101	1	1	7/30/2012	Freshwater Drum	m	3	29	284	L18330-19	7-Aug-12	WG40902
12 3102	1	1	7/30/2012	Freshwater Drum	m	7	38.5	617	L18330-20	7-Aug-12	WG40902

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3103	1	1	7/30/2012	Freshwater Drum	ind	4	33	372	L18330-21	7-Aug-12	WG40902
12 3104	1	1	7/30/2012	Freshwater Drum	f	4	31	258	L18330-22	7-Aug-12	WG40902
12 3105	1	1	7/30/2012	Freshwater Drum	f	5	34	422	L18330-23 (A)	7-Aug-12	WG40902
12 3106	1	1	7/30/2012	Bluegill Sunfish	m	5	15.5	98	L18330-24	7-Aug-12	WG40902
12 3107	1	1	7/30/2012	Bluegill Sunfish	ind	5	15.5	115	L18330-25	7-Aug-12	WG40902
12 3108	1	1	7/30/2012	Bluegill Sunfish	j	2	10	20.62	L18330-26	7-Aug-12	WG40902
12 3109	1	1	7/30/2012	Bluegill Sunfish	f	5	15	87	L18330-27	7-Aug-12	WG40902
12 3110	1	1	7/30/2012	Bluegill Sunfish	ind	5	15	74	L18330-28	7-Aug-12	WG40902
12 3111	1	1	7/30/2012	Bluegill Sunfish	j	3	13.5	56	L18330-29	7-Aug-12	WG40902
12 3112	1	1	7/30/2012	Bluegill Sunfish	j	3	12.5	45	L18330-30	7-Aug-12	WG40902
12 3113	1	1	7/30/2012	Bluegill Sunfish	f	7	18.5	69	L18330-31	7-Aug-12	WG40902
12 3114	1	1	7/30/2012	Bluegill Sunfish	m	4	14.5	175	L18330-32	7-Aug-12	WG40903
12 3115	1	1	7/30/2012	Bluegill Sunfish	m	4	14	88	L18330-33	7-Aug-12	WG40903
12 3116	1	1	7/30/2012	Bluegill Sunfish	m	4	14	64	L18330-34	7-Aug-12	WG40903
12 3117	1	1	7/30/2012	Bluegill Sunfish	1nd	4	14	59.14	L18330-35	7-Aug-12	WG40903
12 3118	1	1	7/30/2012	Bluegill Sunfish	j	2	10.5	27.77	L18330-36	7-Aug-12	WG40903
12 3119	1	1	7/30/2012	Bluegill Sunfish	f	2	12	56.34	L18330-37	7-Aug-12	WG40903
12 3120	1	1	7/30/2012	Bluegill Sunfish	m	5	15.5	55.66	L18330-38	7-Aug-12	WG40903
12 3121	1	2	7/30/2012	Common Carp	m	7	53.5	2643	L18330-39 (A)	7-Aug-12	WG40903
12 3122	1	2	7/30/2012	Common Carp	m	7	55	3072	L18330-40	7-Aug-12	WG40903
12 3123	1	2	7/30/2012	Freshwater Drum	m	4	35	540	L18330-41	7-Aug-12	WG40903
12 3124	1	2	7/30/2012	Freshwater Drum	m	8	39.5	559	L18328-1	7-Aug-12	WG40898
12 3125	1	2	7/30/2012	Freshwater Drum	f	5	33	433	L18328-2	7-Aug-12	WG40898
12 3126	1	3	7/30/2012	Common Carp	f	8	59	3700	L18328-3	7-Aug-12	WG40898
12 3127	1	3	7/30/2012	Common Carp	f	8	58.6	2900	L18328-4	7-Aug-12	WG40898
12 3128	1	3	7/30/2012	Common Carp	f	8	57	2640	L18328-5	7-Aug-12	WG40898
12 3129	1	3	7/30/2012	Common Carp	m	8	62	3500	L18328-6	7-Aug-12	WG40898
12 3130	1	3	7/30/2012	Smallmouth Bass	m	3	24.5	205	L18328-7	7-Aug-12	WG40898

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3131	1	3	7/30/2012	Smallmouth Bass	m	6	34	778	L18328-8	7-Aug-12	WG40898
12 3132	1	3	7/30/2012	Smallmouth Bass	m	2	22	167	L18328-9	7-Aug-12	WG40898
12 3133	1	3	7/30/2012	White Bass	f	1	20	131	L18328-10	7-Aug-12	WG40898
12 3134	1	4	7/30/2012	Common Carp	m	7	57.5	2900	L18336-1	8-Aug-12	WG40911
12 3135	1	4	7/30/2012	Common Carp	m	7	53	2500	L18336-2	8-Aug-12	WG40911
12 3136	1	4	7/30/2012	White Bass	m	3	31	493	L18336-3	8-Aug-12	WG40911
12 3137	1	4	7/30/2012	White Bass	f	2	23	225	L18336-4	8-Aug-12	WG40911
12 3138	1	4	7/30/2012	Smallmouth Bass	f	8	36	721	L18336-5	8-Aug-12	WG40911
12 3139	1	5	7/30/2012	White Bass	f	5	36	815	L18336-6	8-Aug-12	WG40911
12 3140	2	1	7/30/2012	Common Carp	f	7	54	2700	L18336-7	8-Aug-12	WG40911
12 3141	2	1	7/30/2012	Common Carp	m	7	53	2500	L18336-8	8-Aug-12	WG40911
12 3142	2	1	7/30/2012	Common Carp	m	7	55	3100	L18336-9 (A)	8-Aug-12	WG40911
12 3143	2	1	7/30/2012	Common Carp	j	3	32.5	624	L18336-10	8-Aug-12	WG40911
12 3144	2	1	7/30/2012	Common Carp	j	3	33	684	L18336-11	8-Aug-12	WG40911
12 3145	2	1	7/30/2012	Common Carp	f	5	36	2100	L18336-12	8-Aug-12	WG40911
12 3146	2	1	7/30/2012	White Bass	f	6	50	820	L18336-13	8-Aug-12	WG40911
12 3147	2	1	7/30/2012	White Bass	m	4	35	792	L18328-11	7-Aug-12	WG40898
12 3148	2	1	7/30/2012	White Bass	f	4	33.5	686	L18328-12	7-Aug-12	WG40898
12 3149	2	1	7/30/2012	White Bass	f	5	36	809	L18328-13	7-Aug-12	WG40898
12 3150	2	1	7/30/2012	White Bass	m	2	29	417	L18328-14	7-Aug-12	WG40898
12 3151	2	1	7/30/2012	White Bass	f	4	35	727	L18328-15	7-Aug-12	WG40898
12 3152	2	1	7/30/2012	White Bass	m	3	31	494	L18328-16 (A)	7-Aug-12	WG40898
12 3153	2	1	7/30/2012	White Bass	ind	3	29.5	416	L18328-17	7-Aug-12	WG40898
12 3154	2	1	7/30/2012	White Bass	f	2	27.5	346	L18328-18	7-Aug-12	WG41155
12 3155	2	1	7/30/2012	White Bass	m	4	35	714	L18328-19	7-Aug-12	WG40898
12 3156	2	1	7/30/2012	White Bass	f	3	29.5	437	L18328-20	7-Aug-12	WG40898
12 3157	2	1	7/30/2012	White Bass	j	1	20	141.82	L18331-1	8-Aug-12	WG40903
12 3158	2	1	7/30/2012	White Bass	j	1	19	113.28	L18331-2	8-Aug-12	WG40903

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3159	2	1	7/30/2012	White Bass	j	1	21	143	L18331-3	8-Aug-12	WG40903
12 3160	2	1	7/30/2012	White Bass	j	1	19	131	L18331-4	8-Aug-12	WG40903
12 3161	2	1	7/30/2012	Freshwater Drum	m	4	30	303	L18331-5	8-Aug-12	WG40903
12 3162	2	1	7/30/2012	Freshwater Drum	f	7	38	635	L18331-6	8-Aug-12	WG40903
12 3163	2	1	7/30/2012	Freshwater Drum	m	9	43	1056	L18331-7	8-Aug-12	WG40903
12 3164	2	1	7/30/2012	Freshwater Drum	m	6	36	523	L18331-8	8-Aug-12	WG40903
12 3165	2	1	7/30/2012	Freshwater Drum	m	5	33	435	L18331-9	8-Aug-12	WG40903
12 3166	2	1	7/30/2012	Bluegill Sunfish	m	5	15	71.56	L18331-10	8-Aug-12	WG40904
12 3167	4	1	7/31/2012	Common Carp	m	6	49.5	1876	L18331-11	8-Aug-12	WG40904
12 3168	4	1	7/31/2012	Common Carp	f	7	56	2350	L18331-12	8-Aug-12	WG40904
12 3169	4	1	7/31/2012	Common Carp	m	3	34	682	L18331-13	8-Aug-12	WG40904
12 3170	4	1	7/31/2012	Common Carp	m	5	43	1424	L18331-14	8-Aug-12	WG40904
12 3171	4	1	7/31/2012	Common Carp	m	4	40	1004	L18331-15	8-Aug-12	WG40904
12 3172	4	1	7/31/2012	Common Carp	m	6	52	2260	L18331-16 (A)	8-Aug-12	WG40904
12 3173	4	1	7/31/2012	Common Carp	m	3	34	710	L18331-17	8-Aug-12	WG40904
12 3174	4	1	7/31/2012	Common Carp	f	3	30	497	L18331-18	8-Aug-12	WG40904
12 3175	4	1	7/31/2012	Common Carp	m	6	50	2072	L18331-19	8-Aug-12	WG40904
12 3176	4	1	7/31/2012	Freshwater Drum	m	6	36	540	L18331-20	8-Aug-12	WG40904
12 3177	4	1	7/31/2012	Freshwater Drum	m	12	51.5	1590	L18331-21	8-Aug-12	WG40904
12 3178	4	1	7/31/2012	Freshwater Drum	m	5	33.5	425	L18331-22	8-Aug-12	WG40904
12 3179	4	1	7/31/2012	Freshwater Drum	f	11	49	1430	L18335-1	8-Aug-12	WG41230
12 3180	4	1	7/31/2012	Freshwater Drum	m	8	40	831	L18335-2	8-Aug-12	WG41230
12 3181	4	1	7/31/2012	Freshwater Drum	m	5	34	439	L18335-3	8-Aug-12	WG41230
12 3182	4	1	7/31/2012	Freshwater Drum	m	4	32	463	L18335-4	8-Aug-12	WG41230
12 3183	4	1	7/31/2012	Freshwater Drum	f	8	40	794	L18335-5	8-Aug-12	WG41230
12 3184	4	1	7/31/2012	Freshwater Drum	f	9	43	908	L18335-6	8-Aug-12	WG41230
12 3185	4	1	7/31/2012	White Bass	f	7	39	956	L18335-7	8-Aug-12	WG41230
12 3186	4	1	7/31/2012	White Bass	f	4	33	604	L18335-8	8-Aug-12	WG41230

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3187	4	1	7/31/2012	White Bass	j	1	20	127	L18335-9	8-Aug-12	WG40910
12 3188	4	1	7/31/2012	White Bass	m	4	35	731	L18335-10	8-Aug-12	WG40910
12 3189	4	1	7/31/2012	White Bass	j	1	19.5	112	L18335-11	8-Aug-12	WG40910
12 3190	4	1	7/31/2012	Smallmouth Bass	ind	5	31	522	L18335-12 (A)	8-Aug-12	WG40910
12 3191	4	1	7/31/2012	Smallmouth Bass	ind	4	29	417	L18335-13	8-Aug-12	WG40910
12 3192	4	1	7/31/2012	Smallmouth Bass	m	4	28	376	L18335-14	8-Aug-12	WG40910
12 3193	4	1	7/31/2012	Smallmouth Bass	j	2	17	330	L18335-15	8-Aug-12	WG40910
12 3194	4	1	7/31/2012	Smallmouth Bass	j	2	16	283	L18335-16	8-Aug-12	WG40910
12 3195	4	1	7/31/2012	Smallmouth Bass	j	1	12.5	171	L18335-17	8-Aug-12	WG40910
12 3196	4	1	7/31/2012	Smallmouth Bass	f	5	32	490	L18335-18	8-Aug-12	WG40910
12 3197	4	1	7/31/2012	Smallmouth Bass	j	2	22.5	485	L18335-19	8-Aug-12	WG40910
12 3198	4	1	7/31/2012	Bluegill Sunfish	j	5	15	91.9	L18335-20	8-Aug-12	WG40910
12 3199	4	1	7/31/2012	Bluegill Sunfish	j	4	14	85.1	L18335-21	8-Aug-12	WG40910
12 3200	4	1	7/31/2012	Bluegill Sunfish	f	2	12	45.88	L18335-22	8-Aug-12	WG40910
12 3201	4	1	7/31/2012	Bluegill Sunfish	f	2	12	46.92	L18335-23	8-Aug-12	WG40910
12 3202	4	1	7/31/2012	Bluegill Sunfish	f	5	15.5	101	L18335-24	8-Aug-12	WG40910
12 3203	4	1	7/31/2012	Bluegill Sunfish	f	4	14	86.09	L18335-25	8-Aug-12	WG40910
12 3204	4	1	7/31/2012	Bluegill Sunfish	j	2	11	29.15	L18335-26	8-Aug-12	WG40910
12 3205	4	2	7/31/2012	Common Carp	m	7	53.5	2800	L18333-1 (A)	8-Aug-12	WG40907
12 3206	4	2	7/31/2012	Common Carp	m	7	53	2100	L18333-2	8-Aug-12	WG40907
12 3207	4	2	7/31/2012	Common Carp	m	7	56	2300	L18333-3	8-Aug-12	WG40907
12 3208	4	2	7/31/2012	Common Carp	m	3	35	735	L18333-4	8-Aug-12	WG40907
12 3209	4	2	7/31/2012	Freshwater Drum	m	8	42	932	L18333-5	8-Aug-12	WG40907
12 3210	4	2	7/31/2012	Freshwater Drum	f	7	38	708	L18333-6	8-Aug-12	WG40907
12 3211	4	2	7/31/2012	Freshwater Drum	m	7	38	718	L18333-7	8-Aug-12	WG40907
12 3212	4	2	7/31/2012	Freshwater Drum	m	4	32	407	L18333-8	8-Aug-12	WG40907
12 3213	4	2	7/31/2012	Freshwater Drum	m	5	33	476	L18333-9	8-Aug-12	WG40907
12 3214	4	2	7/31/2012	Smallmouth Bass	m	3	26	288	L18333-10	8-Aug-12	WG40907

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3215	4	3	7/31/2012	Common Carp	j	2	26	339	L18333-11	8-Aug-12	WG40908
12 3216	4	3	7/31/2012	Common Carp	m	2	26	301	L18333-12	8-Aug-12	WG40908
12 3217	4	3	7/31/2012	Freshwater Drum	m	8	40	888	L18333-13	8-Aug-12	WG40908
12 3218	4	3	7/31/2012	Smallmouth Bass	f	3	26	236	L18333-14	8-Aug-12	WG40908
12 3219	4	3	7/31/2012	Smallmouth Bass	m	5	33	628	L18333-15	8-Aug-12	WG40908
12 3220	4	3	7/31/2012	Smallmouth Bass	j	2	17	62.4	L18333-16	8-Aug-12	WG40908
12 3221	4	3	7/31/2012	Smallmouth Bass	j	2	16	65.04	L18333-17	8-Aug-12	WG40908
12 3222	4	3	7/31/2012	Smallmouth Bass	j	3	23	198	L18333-18	8-Aug-12	WG40908
12 3223	4	3	7/31/2012	Smallmouth Bass	m	2	21	168	L18333-19	8-Aug-12	WG40908
12 3224	4	3	7/31/2012	White Bass	m	2	27	338	L18333-20	8-Aug-12	WG40908
12 3225	4	3	7/31/2012	White Bass	j	1	19.6	123.88	L18333-21	8-Aug-12	WG40908
12 3226	4	4	7/31/2012	White Bass	j	1	19.5	112.24	L18333-22	8-Aug-12	WG40908
12 3227	4	4	7/31/2012	White Bass	j	1	18	99.32	L18333-23	8-Aug-12	WG40908
12 3228	4	4	7/31/2012	White Bass	m	1	19	117.95	L18333-24	8-Aug-12	WG40908
12 3229	4	4	7/31/2012	White Bass	m	5	35.5	705	L18333-25 (A)	8-Aug-12	WG40908
12 3230	4	4	7/31/2012	Bluegill Sunfish	j	1	9	15.64	L18333-26	8-Aug-12	WG40908
12 3231	4	4	7/31/2012	Bluegill Sunfish	j	1	9	16.21	L18333-27	8-Aug-12	WG40908
12 3232	4	4	7/31/2012	Bluegill Sunfish	m	5	15	94.27	L18333-28	8-Aug-12	WG40908
12 3233	4	4	7/31/2012	Bluegill Sunfish	m	5	15	99.2	L18333-29	8-Aug-12	WG40908
12 3237	4	4	7/31/2012	Bluegill Sunfish	j	1	8	11.61	L18333-33	8-Aug-12	WG40909
12 3238	3	1	8/1/2012	White Bass	m	6	37	815	L18332-1	7-Aug-12	WG40904
12 3239	3	1	8/1/2012	White Bass	m	2	28	367	L18332-2	7-Aug-12	WG40904
12 3240	3	1	8/1/2012	Bluegill Sunfish	f	6	17.5	137	L18332-3	7-Aug-12	WG40904
12 3241	3	1	8/1/2012	Bluegill Sunfish	f	6	17.5	115	L18332-4	7-Aug-12	WG40904
12 3242	3	1	8/1/2012	Bluegill Sunfish	m	6	17.5	144	L18332-5	7-Aug-12	WG40904
12 3243	3	1	8/1/2012	Bluegill Sunfish	f	6	17.5	113	L18332-6	7-Aug-12	WG40904
12 3244	3	1	8/1/2012	Bluegill Sunfish	f	7	18.5	274	L18332-7	7-Aug-12	WG40905
12 3245	3	1	8/1/2012	Bluegill Sunfish	m	7	18.5	160.18	L18332-8	7-Aug-12	WG40905

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3246	3	1	8/1/2012	Bluegill Sunfish	m	6	17	123.56	L18332-9	7-Aug-12	WG40905
12 3247	3	1	8/1/2012	Bluegill Sunfish	m	5	15	93	L18332-10	7-Aug-12	WG40905
12 3248	3	1	8/1/2012	Bluegill Sunfish	m	6	16.5	119	L18332-11	7-Aug-12	WG40905
12 3249	3	1	8/1/2012	Bluegill Sunfish	m	6	17	116	L18332-12	7-Aug-12	WG40905
12 3250	3	1	8/1/2012	Bluegill Sunfish	m	6	17.5	110	L18332-13	7-Aug-12	WG40905
12 3251	3	1	8/1/2012	Bluegill Sunfish	f	4	14.5	66.36	L18332-14	7-Aug-12	WG40905
12 3252	3	1	8/1/2012	Bluegill Sunfish	ind	8	19.5	173	L18332-15	7-Aug-12	WG40905
12 3253	3	1	8/1/2012	Bluegill Sunfish	m	5	16.5	129	L18332-16	7-Aug-12	WG40905
12 3254	3	1	8/1/2012	Bluegill Sunfish	f	6	17	121	L18332-17	7-Aug-12	WG40905
12 3255	2	2	8/1/2012	Common Carp	m	6	51	2300	L18332-18 (A)	7-Aug-12	WG40905
12 3256	2	2	8/2/2012	Common Carp	m	7	52	2500	L18332-19	7-Aug-12	WG40905
12 3257	2	2	8/2/2012	Common Carp	m	3	33	528	L18332-20	7-Aug-12	WG40905
12 3258	2	2	8/2/2012	Common Carp	j	3	31	508	L18332-21	7-Aug-12	WG40905
12 3259	2	2	8/2/2012	Common Carp	j	2	30	414	L18332-22	7-Aug-12	WG40905
12 3260	2	2	8/2/2012	Common Carp	m	3	35	646	L18332-23	7-Aug-12	WG40905
12 3261	2	2	8/2/2012	Bluegill Sunfish	j	5	15	68	L18332-24	7-Aug-12	WG40905
12 3262	2	2	8/2/2012	Bluegill Sunfish	j	2	10	35	L18332-25	7-Aug-12	WG40905
12 3263	2	2	8/2/2012	Bluegill Sunfish	j	2	10	19	L18332-26	7-Aug-12	WG40906
12 3264	2	2	8/2/2012	Bluegill Sunfish	j	1	8.5	12	L18332-27	7-Aug-12	WG40906
12 3265	2	2	8/2/2012	Bluegill Sunfish	j	2	11	30	L18332-28	7-Aug-12	WG40906
12 3266	2	2	8/2/2012	Bluegill Sunfish	j	1	9.5	19	L18332-29	7-Aug-12	WG40906
12 3267	2	2	8/2/2012	Freshwater Drum	m	9	43	880	L18332-30	7-Aug-12	WG40906
12 3268	2	2	8/2/2012	Freshwater Drum	m	5	33	506	L18332-31	7-Aug-12	WG40906
12 3269	2	2	8/2/2012	Freshwater Drum	m	6	36	596	L18332-32	7-Aug-12	WG40906
12 3270	2	2	8/2/2012	Freshwater Drum	m	6	37	603	L18332-33	7-Aug-12	WG40906
12 3271	2	2	8/2/2012	Freshwater Drum	m	5	35	498	L18332-34	7-Aug-12	WG40906
12 3272	2	2	8/2/2012	Freshwater Drum	m	4	32.5	422	L18332-35	7-Aug-12	WG40906
12 3273	2	2	8/2/2012	Smallmouth Bass	j	2	15	43	L18332-36	7-Aug-12	WG40906

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3274	2	2	8/2/2012	Smallmouth Bass	j	2	16	61	L18332-37	7-Aug-12	WG40906
12 3275	2	2	8/2/2012	Smallmouth Bass	j	2	16.5	64	L18332-38	7-Aug-12	WG40906
12 3276	2	2	8/2/2012	Smallmouth Bass	m	2	19.5	117	L18332-39	7-Aug-12	WG40906
12 3277	2	2	8/2/2012	Smallmouth Bass	m	2	21	127	L18332-40	7-Aug-12	WG40906
12 3278	2	3	8/2/2012	Common Carp	m	3	37	815	L18332-41 (A)	7-Aug-12	WG40906
12 3279	2	3	8/2/2012	Common Carp	m	3	34	725	L18332-42	7-Aug-12	WG40906
12 3280	2	3	8/2/2012	Common Carp	m	3	35	729	L18332-43	7-Aug-12	WG40906
12 3281	2	3	8/2/2012	Freshwater Drum	m	5	33	452	L18332-44	7-Aug-12	WG40906
12 3282	2	3	8/2/2012	Smallmouth Bass	m	2	22	157	L18332-45	7-Aug-12	WG40907
12 3283	2	3	8/2/2012	Bluegill Sunfish	j	2	11	30.22	L18332-46	7-Aug-12	WG40907
12 3284	2	3	8/2/2012	Bluegill Sunfish	f	4	14.5	56	L18332-47	7-Aug-12	WG40907
12 3285	2	3	8/2/2012	Bluegill Sunfish	m	3	14	64	L18332-48	7-Aug-12	WG40907
12 3286	2	3	8/2/2012	Bluegill Sunfish	f	5	16	105	L18332-49	7-Aug-12	WG40907
12 3287	2	3	8/2/2012	Bluegill Sunfish	f	2	11	31	L18332-50	7-Aug-12	WG40907
12 3288	2	3	8/2/2012	Bluegill Sunfish	m	4	15	74	L18332-51	7-Aug-12	WG40907
12 3289	2	3	8/2/2012	Bluegill Sunfish	m	2	11	30.75	L18332-52	7-Aug-12	WG40907
12 3290	2	3	8/2/2012	Bluegill Sunfish	m	6	17	124	L18332-53	7-Aug-12	WG40907
12 3291	2	4	8/2/2012	Freshwater Drum	m	9	44	1106	L18334-1 (A)	7-Aug-12	WG40909
12 3292	2	4	8/2/2012	Freshwater Drum	m	6	37	765	L18334-2	7-Aug-12	WG40909
12 3293	2	4	8/2/2012	Freshwater Drum	m	10	46	1353	L18334-3	7-Aug-12	WG40909
12 3294	2	4	8/2/2012	Smallmouth Bass	m	6	33.5	596	L18334-4	7-Aug-12	WG40909
12 3295	2	4	8/2/2012	Smallmouth Bass	f	1	15	44.8	L18334-5	7-Aug-12	WG40909
12 3296	2	4	8/2/2012	Smallmouth Bass	m	3	24	204	L18334-6	7-Aug-12	WG40909
12 3297	2	4	8/2/2012	Smallmouth Bass	j	2	21	114	L18334-7	7-Aug-12	WG40909
12 3298	2	4	8/2/2012	Smallmouth Bass	j	2	16	62	L18334-8	7-Aug-12	WG40909
12 3299	3	2	8/2/2012	Common Carp	m	7	56.5	3200	L18334-9	7-Aug-12	WG41230
12 3300	3	2	8/2/2012	Common Carp	m	7	55	3800	L18334-10 (A)	7-Aug-12	WG41230
12 3301	3	2	8/2/2012	Common Carp	m	4	39.5	1184	L18334-11	7-Aug-12	WG41230

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3302	3	2	8/2/2012	Common Carp	m	5	47	1722	L18334-12	7-Aug-12	WG41230
12 3303	3	2	8/2/2012	Common Carp	f	4	43	1248	L18334-13	7-Aug-12	WG40910
12 3304	3	2	8/2/2012	Common Carp	m	3	37.5	934	L18334-14	7-Aug-12	WG40909
12 3305	3	2	8/2/2012	Common Carp	m	6	51.5	2500	L18334-15	7-Aug-12	WG41230
12 3306	3	2	8/2/2012	Common Carp	m	7	52.5	2300	L18425-1 (A)	22-Aug-12	WG41077
12 3307	3	2	8/2/2012	Common Carp	m	3	36.5	839	L18425-2	22-Aug-12	WG41077
12 3308	3	2	8/2/2012	Common Carp	m	4	43	1617	L18425-3	22-Aug-12	WG41077
12 3309	3	2	8/2/2012	Common Carp	j	4	41	1256	L18425-4	22-Aug-12	WG41077
12 3310	3	2	8/2/2012	Common Carp	f	3	34.5	604	L18425-5	22-Aug-12	WG41077
12 3311	3	2	8/2/2012	Common Carp	f	7	56	3000	L18425-6	22-Aug-12	WG41077
12 3312	3	2	8/2/2012	Common Carp	f	7	56	3300	L18425-7	22-Aug-12	WG41077
12 3313	3	2	8/2/2012	Common Carp	f	7	55.5	3200	L18425-8	22-Aug-12	WG41077
12 3314	3	2	8/2/2012	Freshwater Drum	f	6	37.0	736	L18427-1	22-Aug-12	WG41078
12 3315	3	2	8/2/2012	Freshwater Drum	m	6	36.0	1264	L18427-2	22-Aug-12	WG41078
12 3316	3	2	8/2/2012	White Bass	m	5	36.5	849	L18427-3	22-Aug-12	WG41078
12 3317	3	2	8/2/2012	White Bass	f	5	36.0	721	L18427-4 (A)	22-Aug-12	WG41078
12 3318	3	2	8/2/2012	White Bass	f	3	31.0	566	L18427-5	22-Aug-12	WG41079
12 3319	3	2	8/2/2012	White Bass	m	3	31.5	500	L18427-6	22-Aug-12	WG41079
12 3320	3	2	8/2/2012	White Bass	f	3	31.5	592	L18427-7	22-Aug-12	WG41079
12 3321	3	2	8/2/2012	White Bass	f	3	31.0	541	L18427-8	22-Aug-12	WG41079
12 3322	3	2	8/2/2012	White Bass	m	2	28.0	379	L18427-9	22-Aug-12	WG41079
12 3323	3	2	8/2/2012	Smallmouth Bass	j	2	16.5	65	L18427-10	22-Aug-12	WG41079
12 3324	3	2	8/2/2012	Smallmouth Bass	j	2	16.0	69	L18427-11	22-Aug-12	WG41079
12 3325	3	2	8/2/2012	Smallmouth Bass	j	2	22.0	168	L18427-12	22-Aug-12	WG41079
12 3326	3	2	8/2/2012	Smallmouth Bass	f	6	35.5	698	L18427-13	22-Aug-12	WG41079
12 3327	3	3	8/2/2012	Freshwater Drum	f	8	40.5	938	L18427-14	22-Aug-12	WG41079
12 3328	3	3	8/2/2012	Freshwater Drum	f	5	33.0	494	L18427-15	22-Aug-12	WG41079
12 3329	3	3	8/2/2012	White Bass	j	3	33.0	636	L18427-16	22-Aug-12	WG41079

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3330	3	3	8/2/2012	White Bass	f	5	36.0	870	L18427-17	22-Aug-12	WG41079
12 3331	3	3	8/2/2012	White Bass	f	6	37.5	985	L18427-18	22-Aug-12	WG41079
12 3332	3	3	8/2/2012	White Bass	ind	4	33.0	605	L18427-19	22-Aug-12	WG41079
12 3333	3	3	8/2/2012	White Bass	m	4	34.0	728	L18427-20	22-Aug-12	WG41079
12 3334	3	3	8/2/2012	White Bass	f	4	35.0	780	L18427-21 (A)	22-Aug-12	WG41079
12 3335	3	3	8/2/2012	Smallmouth Bass	j	1	15.5	52	L18427-22	22-Aug-12	WG41079
12 3336	3	3	8/2/2012	Smallmouth Bass	j	1	14.0	48	L18427-23	22-Aug-12	WG41079
12 3337	3	3	8/2/2012	Smallmouth Bass	j	2	24.5	267	L18427-24	22-Aug-12	WG41079
12 3338	1	6	8/3/2012	White Bass	m	3	32.5	621	L18426-1	22-Aug-12	WG41077
12 3339	1	7	8/3/2012	White Bass	j	4	34.0	582	L18426-2	22-Aug-12	WG41077
12 3340	1	7	8/3/2012	White Bass	f	3	32.5	621	L18426-3	22-Aug-12	WG41077
12 3341	1	7	8/3/2012	White Bass	f	4	34.0	619	L18426-4	22-Aug-12	WG41077
12 3342	1	7	8/3/2012	White Bass	j	1	18.5	101	L18426-5	22-Aug-12	WG41077
12 3343	2	5	8/3/2012	Smallmouth Bass	m	7	39.5	1121	L18426-6	22-Aug-12	WG41077
12 3344	2	5	8/3/2012	Smallmouth Bass	m	4	30.0	514	L18426-7	22-Aug-12	WG41077
12 3345	2	5	8/3/2012	Smallmouth Bass	j	1	20.5	129	L18426-8	22-Aug-12	WG41077
12 3346	2	5	8/3/2012	Smallmouth Bass	j	0	13.5	41	L18426-9	22-Aug-12	WG41077
12 3347	3	5	8/7/2012	Freshwater Drum	f	3	28.0	309	L18426-10	22-Aug-12	WG41077
12 3348	3	5	8/7/2012	Freshwater Drum	m	4	31.5	407	L18426-11	22-Aug-12	WG41077
12 3349	3	5	8/7/2012	Freshwater Drum	m	5	33.5	523	L18426-12	22-Aug-12	WG41077
12 3350	3	5	8/7/2012	Freshwater Drum	m	5	33.5	397	L18426-13	22-Aug-12	WG41078
12 3351	3	5	8/7/2012	Freshwater Drum	f	5	34.0	497	L18426-14	22-Aug-12	WG41078
12 3352	3	5	8/7/2012	Freshwater Drum	j	3	26.5	260	L18426-15	22-Aug-12	WG41078
12 3353	3	6	8/7/2012	Freshwater Drum	m	5	34.5	530	L18426-16	22-Aug-12	WG41078
12 3354	3	6	8/7/2012	Freshwater Drum	f	11	48.0	1280	L18426-17	22-Aug-12	WG41078
12 3355	3	6	8/7/2012	Freshwater Drum	f	7	37.5	654	L18426-18	22-Aug-12	WG41078
12 3356	3	5	8/7/2012	Freshwater Drum	ind	5	34.0	432	L18426-19	22-Aug-12	WG41078
12 3357	3	5	8/7/2012	Freshwater Drum	f	7	38.5	828	L18426-20	22-Aug-12	WG41078

MPCA ID	Section	Run	Sample Date	Species	Sex	Age	Length (cm)	Weight (g)	AXYS ID	Sample Received	Work Group
12 3358	3	4	8/6/2012	Smallmouth Bass	ind	6	34.5	755	L18426-21	22-Aug-12	WG41078
12 3359	3	4	8/6/2012	Smallmouth Bass	j	2	22.5	172	L18426-22	22-Aug-12	WG41078
12 3360	3	4	8/6/2012	Smallmouth Bass	j	2	23.5	215	L18426-23	22-Aug-12	WG41078
12 3361	3	4	8/6/2012	Smallmouth Bass	f	3	25.0	195	L18426-24	22-Aug-12	WG41078
12 3362	3	4	8/6/2012	Smallmouth Bass	j	3	26.0	309	L18426-25	22-Aug-12	WG41078
12 3363	3	4	8/6/2012	Smallmouth Bass	j	2	22.5	161	L18426-26	22-Aug-12	WG41078
12 3364	3	4	8/6/2012	Smallmouth Bass	j	3	25.5	266	L18426-27	22-Aug-12	WG41078
12 3365	3	4	8/6/2012	Smallmouth Bass	j	2	21.5	168	L18426-28	22-Aug-12	WG41078
12 3366	1	8	8/23/2012	White Bass	M	2	27.5	357	L18746-1	25-Oct-12	WG41790
12 3367	1	9	8/23/2012	White Bass	M	3	29.5	453	L18746-2	25-Oct-12	WG41790
12 3368	1	9	8/23/2012	White Bass	F	3	29.0	457	L18746-3 (A)	25-Oct-12	WG41790
12 3369	1	10	9/14/2012	White Bass	M	1	22.5	205	L18746-4	25-Oct-12	WG41790
12 3370	4	5	9/14/2012	Bluegill Sunfish	F	5	16.5	126	L18746-5	25-Oct-12	WG41790
12 3371	4	5	9/14/2012	Bluegill Sunfish	M	4	15.0	101	L18746-6	25-Oct-12	WG41790
12 3372	4	5	9/14/2012	Bluegill Sunfish	M	4	14.5	79	L18746-7	25-Oct-12	WG41790
12 3373	4	6	9/14/2012	White Bass	F	2	23.5	198	L18746-8	25-Oct-12	WG41790
12 3374	4	6	9/14/2012	White Bass	M	2	27.5	403	L18746-9	25-Oct-12	WG41790

Appendix A-6. Georeferences for fish-collection runs

SEC-TION	RUN	SHOCKER START/STOP POINT	WAY POINT	DATE	LAT	LONG	BLUEGILL	COMMON CARP	FRESHWATER DRUM	SMALLMOUTH BASS	WHITE BASS
1	1	START	A11	7/30/2012	44.91298500	-93.20236500	15	7	12	11	
1	1	STOP	A12		44.90704600	-93.19834200					
1	2	START	A13	7/30/2012	44.91334400	-93.19959200		2	3		
1	2	STOP	A14		44.91065300	-93.20110100					
1	3	START	A15	7/30/2012	44.91300200	-93.19911400		4		3	1
1	3	STOP	A16		44.90414000	-93.19102000					
1	4	START	A17	7/30/2012	44.90265100	-93.19044600		2		1	2
1	4	STOP	A18		44.89440400	-93.16683400					
1	5	START	A19	7/30/2012	44.89791100	-93.15615200					1
1	5	STOP	A20		44.89823200	-93.15167100					
1	6	START	A21	8/3/2012	44.89339600	-93.17746200					1
1	6	STOP	A22		44.88920600	-93.17806300					
1	7	START	A23	8/3/2012	44.91494900	-93.19989300					4
1	7	STOP	A24		44.89812900	-93.15141900					
1	8	START/STOP	A25	8/23/2012	44.90580000	-93.19552100					1
1	9	START	A26	8/23/2012	44.89131000	-93.17790600					2
1	9	STOP	A27		44.89001500	-93.17793300					
1	10	START	A28	9/14/2012	44.91268800	-93.20227600					1
1	10	STOP	A29		44.90779800	-93.19938700					
2	1	START	B11	7/30/2012	44.89816700	-93.14680100	1	6	5		15
2	1	STOP	B12		44.90448800	-93.13751200					
2	2	START	B13	8/2/2012	44.91427600	-93.13118100	6	6	6	5	
2	2	STOP	B14		44.92089800	-93.12492400					

SEC- TION	RUN	SHOCKER START/STOP POINT	WAY POINT	DATE	LAT	LONG	BLUEGILL	COMMON CARP	FRESHWATER DRUM	SMALLMOUTH BASS	WHITE BASS
2	3	START	B15	8/2/2012	44.92934000	-93.11015700	8	3	1	1	
2	3	STOP	B16		44.92989700	-93.11013000					
2	4	START	B17	8/2/2012	44.90931400	-93.04486800			3	5	
2	4	STOP	B18		44.89890800	-93.03396000					
2	5	START	B19	8/3/2012	44.90548900	-93.13855700				4	
2	5	STOP	B20		44.91835700	-93.13107800					
3	1	START	C11	8/1/2012	44.83996700	-93.00670700	15				2
3	1	STOP	C12		44.83113900	-93.00342900					
3	2	START	C13	8/2/2012	44.89320800	-93.02393300		15	2	4	7
3	2	STOP	C14		44.89088900	-93.02063400					
3	3	START	C15	8/2/2012	44.87685700	-93.01267000			2	3	6
3	3	STOP	C16		44.87221900	-93.01331900					
3	4	START	C17	8/6/2012	44.84301000	-93.00897500				8	
3	4	STOP	C18		44.83152500	-93.00890000					
3	5	START	C19	8/6/2012	44.86691200	-93.01354400			6		
3	5	STOP	C20		44.83817400	-93.01379000					
3	6	START	C21	8/7/2012	44.88340400	-93.01758800			3		
3	6	STOP	C22		44.87792600	-93.01650200					
3	7	START	C23	8/7/2012	44.89320800	-93.02355800			2		
3	7	STOP	C24		44.89265500	-93.02391300					
4	1	START	D11	7/31/2012	44.78347500	-92.93407500	7	9	9	8	5
4	1	STOP	D12		44.78496000	-92.91887800					
4	2	START	D13	7/31/2012	44.78348100	-92.89555300		4	5	1	
4	2	STOP	D14		44.78201300	-92.88821700					

SEC-TION	RUN	SHOCKER START/STOP POINT	WAY POINT	DATE	LAT	LONG	BLUEGILL	COMMON CARP	FRESHWATER DRUM	SMALLMOUTH BASS	WHITE BASS
4	3	START	D15	7/31/2012	44.77302400	-92.91954700		2	1	6	2
4	3	STOP	D16		44.77055200	-92.89832600					
4	4	START	D17	7/31/2012	44.76532300	-92.89108600	8				4
4	4	STOP	D18		44.76219200	-92.87201600					
4	5	START	D19	9/14/2012	44.78423600	-92.93068700	3				
4	5	STOP	D20		44.78530800	-92.92324300					
4	6	START	D21	9/14/2012	44.78191000	-92.92643200					2
4	6	STOP	D22		44.78166100	-92.92239600					

Appendix A-7. Georeferences for water sample stations

Water Stations	Section	Description	Lat(DD)	Long (DD)
1	1	main channel at river mile 847	44.9103	93.2009
2	1	old Minnesota River channel, near river mile 845.4	44.8936	93.1765
3	1	main channel upstream of confluence with Minnesota River at river mile 844	44.8974	93.1568
4	2	main channel near boat launch at river mile 842	44.9186	93.1300
5	2	main channel adjacent to Holman Field at river mile 837	44.9317	93.0497
6	2	bay south of Pigs Eye Lake near river mile 834	44.8964	93.0266
7	3	main channel near boat launch and downstream from St. Paul Park Refinery at river mile 829.5	44.8395	93.0116
8	3	main channel upstream of Island 112 at river mile 827.5	44.8229	93.0092
9	3	Spring Lake, near river mile 821	44.7653	92.9540
10	4	main channel, downstream of Grey Cloud Slough at river mile 819	44.7810	92.9324
11	4	near shoreline, downstream of 3M Cottage Grove discharge, near river mile 817.5	44.7823	92.8923
12	4	main channel, upstream of Lock & Dam No. 2 at river mile 816	44.7663	92.8731

Appendix B: Benthic Macroinvertebrate and Sediment Data

Appendix B-1. PFCs in Sediment samples from Pool 2	56
Appendix B-2. PFCs for Benthic Macroinvertebrate samples from Pool 2	58
Appendix B-3. Combined sediment and invertebrate PFOS concentrations, sediment organic carbon, and georeferences	61
Appendix B-4. QA results for sediment and invertebrate work groups	64

Appendix B-1. PFCs in Sediment samples from Pool 2

CLIENT ID	WORK GROUP	Sample (g-dry)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	Mois- ture (%)	QA Review Date	Qualified Analytes
P2_837_SED	40114	5.00	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.200	<0.200	<0.200	<0.100	25.4	7/24/2012	NONE
MC_3_SED	40114	5.05	<0.0991	<0.0991	<0.0991	<0.0991	<0.0991	<0.0991	<0.0991	<0.0991	<0.0991	<0.198	<0.198	0.581	<0.0991	26.8	7/24/2012	NONE
P2_833_R_SED	40114	4.97	<0.101	<0.101	<0.101	<0.101	<0.101	0.113	0.126	<0.101	<0.101	<0.201	<0.201	0.681	<0.101	57.2	7/24/2012	NONE
P2_835_L_SED	40114	5.10	<0.0980	<0.0980	<0.0980	<0.0980	<0.0980	<0.0980	<0.0980	<0.0980	<0.0980	<0.196	<0.196	1.58	<0.0980	40.9	7/24/2012	NONE
P2_835_R_SED	40114	5.13	<0.0975	<0.0975	<0.0975	<0.0975	<0.0975	<0.0975	<0.0975	<0.0975	<0.0975	<0.195	<0.195	<0.195	<0.0975	33.2	7/24/2012	NONE
P2_836_L_SED	40114	5.01	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.200	<0.200	0.292	<0.0998	53.0	7/24/2012	NONE
P2_836_R_SED	40114	5.16	<0.0970	<0.0970	<0.0970	<0.0970	<0.0970	<0.0970	<0.0970	<0.0970	<0.0970	<0.194	<0.194	0.49	<0.0970	55.1	7/24/2012	NONE
P2_525_SED	40114	5.02	<0.0995	<0.0995	<0.0995	<0.0995	<0.0995	<0.0995	0.101	<0.0995	<0.0995	<0.199	<0.199	0.525	<0.0995	61.9	7/24/2012	NONE
P2_829.5_SED	40114	4.96	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.202	<0.202	<0.202	<0.101	33.5	7/24/2012	NONE
P2_831_SED	40114	5.23	<0.0956	<0.0956	<0.0956	<0.0956	<0.0956	<0.0956	<0.0956	<0.0956	<0.0956	<0.191	<0.191	0.195	<0.0956	45.1	7/24/2012	NONE
P2_832.5_R_SED	40114	5.02	<0.0996	<0.0996	<0.0996	<0.0996	<0.0996	<0.0996	<0.0996	<0.0996	<0.0996	<0.199	<0.199	0.594	<0.0996	38.3	7/24/2012	NONE
P2_838_SED	40114	5.32	<0.0941	<0.0941	<0.0941	<0.0941	<0.0941	<0.0941	<0.0941	<0.0941	<0.0941	<0.188	<0.188	<0.188	<0.0941	36.7	7/24/2012	NONE
P2_832_SED	40114	5.16	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.194	<0.194	0.299	<0.0969	28.6	7/24/2012	NONE
P2_841_SED	40114	5.26	<0.0950	<0.0950	<0.0950	<0.0950	<0.0950	<0.0950	<0.0950	<0.0950	<0.0950	<0.190	<0.190	0.252	<0.0950	45.6	7/24/2012	NONE
P2_842_SED	40114	5.03	<0.0995	<0.0995	<0.0995	<0.0995	<0.0995	<0.0995	<0.0995	<0.0995	<0.0995	<0.199	<0.199	0.222	<0.0995	42.9	7/24/2012	NONE
P2_844_SED	40114	5.21	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.192	<0.192	<0.192	<0.0959	32.8	7/24/2012	NONE
P2_846_SED	40114	5.27	<0.0948	<0.0948	<0.0948	<0.0948	<0.0948	<0.0948	<0.0948	<0.0948	<0.0948	<0.190	<0.190	<0.190	<0.0948	20.8	7/24/2012	NONE
P2_847_SED	40114	5.05	<0.0990	<0.0990	<0.0990	<0.0990	<0.0990	<0.0990	<0.0990	<0.0990	<0.0990	<0.198	<0.198	<0.198	<0.0990	22.2	7/24/2012	NONE
MC_1_SED	40114	4.98	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	0.198	0.124	<0.201	<0.201	0.905	0.28	44.6	7/24/2012	NONE
MC_2_SED	40114	5.25	<0.0952	<0.0952	<0.0952	<0.0952	<0.0952	<0.0952	<0.0952	<0.0952	<0.0952	<0.190	<0.190	0.672	0.344	32.2	7/24/2012	NONE
A SED	41757	5.16	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.0969	<0.194	<0.194	0.299	<0.0969	36.0	11/19/2012	NONE
S SED	41757	5.15	0.148	<0.0971	<0.0971	<0.0971	0.142	<0.0971	0.108	<0.0971	<0.0971	<0.194	<0.194	0.943	<0.0971	56.9	11/19/2012	NONE
T SED	41757	5.03	0.176	<0.0994	<0.0994	<0.0994	0.147	<0.0994	0.101	<0.0994	<0.0994	<0.199	<0.199	1.10	<0.0994	54.4	11/19/2012	NONE
F SED	41757	5.09	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.197	<0.197	0.282	<0.0983	28.6	11/19/2012	NONE
B SED	41757	5.14	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.195	<0.195	0.566	<0.0973	47.4	11/19/2012	NONE
C SED	41757	4.98	0.124	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.201	<0.201	0.723	<0.100	50.8	11/19/2012	NONE
D SED	41757	4.99	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.200	<0.200	0.473	<0.100	42.7	11/19/2012	NONE
E SED	41757	5.00	0.118	<0.100	<0.100	<0.100	<0.100	<0.100	0.105	<0.100	<0.100	<0.200	<0.200	0.586	<0.100	52.6	11/19/2012	NONE
O SED	41757	5.01	<0.0999	<0.0999	<0.0999	<0.0999	<0.0999	<0.0999	<0.0999	<0.0999	<0.0999	<0.200	<0.200	0.537	<0.0999	30.4	11/19/2012	NONE
P SED	41757	5.15	<0.0971	<0.0971	<0.0971	<0.0971	<0.0971	<0.0971	<0.0971	<0.0971	<0.0971	<0.194	<0.194	0.435	<0.0971	26.3	11/19/2012	NONE
Q SED	41757	5.72	0.095	<0.0874	<0.0874	<0.0874	<0.0874	<0.0874	<0.0874	<0.0874	<0.0874	<0.175	<0.175	0.647	<0.0874	33.8	11/19/2012	NONE
R SED	41757	5.06	0.119	<0.0987	<0.0987	<0.0987	0.180	<0.0987	0.131	<0.0987	<0.0987	<0.197	<0.197	2.10	<0.0987	44.9	11/19/2012	NONE

CLIENT ID	WORK GROUP	Sample (g-dry)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	Mois- ture (%)	QA Review Date	Qualified Analytes
G SED	41758	5.34	<0.0937	<0.0937	<0.0937	<0.0937	<0.0937	<0.0937	<0.0937	<0.0937	<0.0937	<0.187	<0.187	0.601	<0.0937	40.6	12/3/2012	NONE
G SED FD	41758	5.09	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.0983	<0.197	<0.197	0.86	<0.0983	45.9	12/3/2012	NONE
H SED	41758	5.10	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.196	<0.196	0.504	<0.0981	42.8	12/3/2012	NONE
I SED	41758	5.14	0.102	<0.0972	<0.0972	<0.0972	<0.0972	<0.0972	<0.0972	<0.0972	<0.0972	<0.194	<0.194	0.825	<0.0972	36.3	12/3/2012	NONE
J SED	41758	5.33	2.720	0.506	0.263	<0.0938	0.097	<0.0938	<0.0938	<0.0938	<0.0938	<0.188	<0.188	0.335	<0.0938	29.6	12/3/2012	PFHxA, PFOA
K SED	41758	5.01	0.702	<0.0997	<0.0997	<0.0997	0.719	<0.0997	0.178	<0.0997	<0.0997	<0.199	<0.199	8.58	0.319	45.8	12/3/2012	PFDA, PFOA
K SED FD	41758	4.64	0.672	<0.108	<0.108	<0.108	0.594	<0.108	0.134	<0.108	<0.108	<0.216	<0.216	6.38	0.323	43.5	12/3/2012	PFDA, PFOA
L SED	41758	5.09	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.0981	<0.196	<0.196	<0.196	<0.0981	25.2	12/3/2012	NONE
M SED	41758	4.98	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.201	<0.201	0.203	<0.100	25.9	12/3/2012	NONE
M SED FD	41758	5.14	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.0973	<0.195	<0.195	0.366	<0.0973	28.6	12/3/2012	NONE
N SED	41758	5.18	0.252	<0.0965	<0.0965	<0.0965	0.099	<0.0965	<0.0965	<0.0965	<0.0965	<0.193	<0.193	1.02	<0.0965	30.6	12/3/2012	PFOA
517 SED1	38714	5.3	1.950	0.229	0.287	0.152	3.920	0.136	0.553	0.134	0.329	0.455	0.646	80.20	2.51	59.3	2/8/2012	PFDoA
517 SED2	38714	5.38	1.170	0.154	0.185	0.112	3.01	0.096	0.365	<0.0930	0.247	0.298	0.428	33.30	1.39	51.1	2/8/2012	PFDoA
517 SED3	38714	5.19	1.360	0.253	0.301	0.149	5.460	0.124	0.380	<0.0964	0.224	0.329	0.632	41.10	1.67	52.9	2/8/2012	PFDoA
518 SED	38714	5.22	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.0959	<0.192	<0.192	0.655	<0.0959	4.2	2/8/2012	NONE
519 SED	38714	5.3	<0.0943	<0.0943	<0.0943	<0.0943	<0.0943	<0.0943	<0.0943	<0.0943	<0.0943	<0.189	<0.189	<0.189	<0.0943	23.7	2/8/2012	NONE
520 SED	38714	5.52	<0.0906	<0.0906	<0.0906	<0.0906	<0.0906	<0.0906	<0.0906	<0.0906	<0.0906	<0.181	<0.181	0.309	<0.0906	31.1	2/8/2012	NONE
521 SED	38714	5.4	<0.0926	<0.0926	<0.0926	<0.0926	<0.0926	<0.0926	<0.0926	<0.0926	<0.0926	<0.185	<0.185	0.280	<0.0926	32.3	2/8/2012	NONE
522 SED	38714	5.44	<0.0920	<0.0920	<0.0920	<0.0920	<0.0920	<0.0920	<0.0920	<0.0920	<0.0920	<0.184	<0.184	0.288	<0.0920	32.1	2/8/2012	NONE
523 SED	38714	5.06	<0.0988	<0.0988	<0.0988	<0.0988	<0.0988	<0.0988	<0.0988	<0.0988	<0.0988	<0.198	<0.198	0.290	<0.0988	36.7	2/8/2012	NONE
524 SED	38714	5.56	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.180	<0.180	0.257	<0.0900	25.9	2/8/2012	NONE
525 SED	38714	5.48	0.103	<0.0912	<0.0912	<0.0912	<0.0912	<0.0912	<0.0912	<0.0912	<0.0912	<0.182	<0.182	0.326	<0.0912	39.2	2/8/2012	NONE
526 SED	38714	5.63	0.127	<0.0888	<0.0888	<0.0888	0.092	<0.0888	<0.0888	<0.0888	<0.0888	<0.178	<0.178	0.713	<0.0888	33.8	2/8/2012	NONE
530 SED	38714	5.38	<0.0930	<0.0930	<0.0930	<0.0930	<0.0930	<0.0930	<0.0930	<0.0930	<0.0930	<0.186	<0.186	0.882	<0.0930	36.3	2/8/2012	NONE
532 SED	38714	5.45	<0.0918	<0.0918	<0.0918	<0.0918	<0.0918	<0.0918	0.190	<0.0918	<0.0918	<0.184	<0.184	2.070	<0.0918	45.6	2/8/2012	NONE
533 SED	38714	5.33	<0.0938	<0.0938	<0.0938	<0.0938	<0.0938	<0.0938	<0.0938	<0.0938	<0.0938	<0.188	<0.188	0.303	<0.0938	40.7	2/8/2012	NONE

Appendix B-2. PFCs for Benthic Macroinvertebrate samples from Pool 2

CLIENT ID	WORK GROUP	Sample (g-wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
J INV	41820	0.26	2.54	< 1.92	< 1.92	< 1.92	< 1.92	< 1.92	< 1.92	< 1.92	< 1.92	< 3.85	< 3.85	31.6	< 2.69	12/27/2012	NONE
M INV	41820	0.13	< 3.85	< 3.85	< 3.85	< 3.85	< 3.85	< 3.85	< 3.85	< 3.85	< 3.85	< 7.69	< 7.69	35.4	< 5.38	12/27/2012	NONE
A INV	41756	2.02	< 0.495	< 0.495	< 0.495	< 0.495	0.65	1.53	0.522	1.26	< 0.495	< 0.990	< 0.990	9.28	< 0.594	12/27/2012	PFNA, PFDA, PFUnA, PFDoA, PFOSA
B INV	41756	1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 2.00	< 2.00	8.02	< 1.20	12/27/2012	NONE
C INV	41756	2.01	< 0.498	< 0.498	< 0.498	< 0.536	0.976	2.05	0.726	1.61	< 0.498	< 0.995	< 0.995	15.8	< 0.597	12/27/2012	PFDoA, PFOS, PFOSA, PFUnA
D INV	41756	2.01	< 0.498	< 1.22	< 0.797	< 0.498	< 0.498	1.07	< 0.498	< 0.498	< 0.498	< 0.995	< 0.995	8.6	< 0.597	12/27/2012	PFBA, PFDA, PFUnA, PFDoA, PFBS, PFHxS, PFOS, PFOSA
E INV	41756	1.41	< 0.709	< 0.709	< 0.709	< 0.709	0.944	1.37	< 0.709	0.96	< 0.709	< 1.42	< 1.42	11.9	< 0.851	12/27/2012	PFBA, PFDoA, PFOS, PFOSA, PFUnA
F INV	41756	0.96	< 1.04	< 1.04	< 1.04	< 1.04	< 1.04	< 1.04	< 1.04	1.1	< 1.04	< 2.08	< 2.08	12.8	< 1.25	12/27/2012	PFDoA, PFUnA
G INV	41756	1.30	< 0.769	< 0.769	< 0.769	< 0.769	1.03	2.45	1.07	1.61	< 0.769	< 1.54	< 1.54	23.1	< 0.923	12/27/2012	PFNA, PFDoA, PFUnA
I INV	41756	0.60	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 3.33	< 3.33	18.8	< 2.00	12/27/2012	NONE
K INV	41756	0.96	1.84	< 1.04	< 1.04	< 1.04	6.1	< 1.04	1.33	< 1.04	< 1.04	< 2.08	3.47	194	4.18	12/27/2012	PFBA, PFDoA, PFOS, PFOSA
N INV	41756	1.85	< 0.541	< 0.541	< 0.541	< 0.541	1.21	0.976	< 0.541	< 0.541	< 0.541	< 1.08	< 1.08	37.2	< 0.649	12/27/2012	PFNA
O INV	41756	0.47	< 2.13	< 2.13	< 2.13	< 2.13	< 2.13	< 2.13	< 2.13	< 2.13	< 2.13	< 4.26	< 4.26	23.7	< 2.55	12/27/2012	PFDoA
Q INV	41756	2.03	< 0.493	2.76	< 0.493	< 0.493	0.87	1.48	0.604	0.724	< 0.493	< 0.985	< 0.985	14.2	< 0.591	12/27/2012	PFPeA, PFDoA, PFBS, PFHxS, PFOS, PFOSA, PFUnA
R INV	41756	1.31	< 0.763	1.03	< 0.763	< 0.763	1.75	1.93	< 0.763	1.02	< 0.763	< 1.53	< 1.53	32.2	< 0.916	12/27/2012	PFPeA, PFBA, PFDoA, PFBS, PFHxS, PFOS, PFOSA, PFUnA

CLIENT ID	WORK GROUP	Sample (g-wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
S INV	41756	1.54	< 0.649	< 0.780	< 0.729	< 0.649	1.81	2.23	< 0.649	< 0.649	< 0.649	< 1.30	< 1.30	17.5	< 0.779	12/27/2012	PFBA, PFPeA, PFHxA, PFHpA, PFNA, PFDA, PFUnA, PFDoA, PFBS, PFHxS, PFOS, PFOSA
T INV	41756	1.73	< 0.578	< 1.01	< 0.578	0.872	1.11	1.33	< 0.578	< 0.578	< 0.578	< 1.16	< 1.16	12.5	< 0.694	12/27/2012	PFBA, PFPeA, PFHxA, PFHpA, PFNA, PFDA, PFUnA, PFDoA, PFBS, PFHxS, PFOS, PFOSA
P2_838_INV	40110	0.46	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 2.17	< 5.43	8.09	< 1.52	7/30/2012	PFDoA, PFOSA
P2_836_R_INV	40110	0.38	2.8	< 1.32	< 1.32	< 1.32	4.3	1.53	< 1.32	< 1.32	< 1.32	< 2.63	< 6.58	23.8	< 1.84	7/30/2012	PFOS, PFNA, PFDoA
P2_525_INV	40110	0.36	< 1.39	< 1.39	< 1.39	< 1.39	< 1.39	< 1.39	< 1.39	< 1.39	< 1.39	< 2.78	< 6.94	9.89	< 1.94	7/30/2012	PFDoA, PFOSA
P2_831_INV	40110	0.68	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 1.47	< 3.68	< 1.47	< 1.03	7/30/2012	PFDoA, PFOSA
P2_832.5_R_INV	40110	0.46	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 1.09	< 2.17	< 5.43	8.11	< 1.52	7/30/2012	PFDoA, PFOSA
P2_832_INV	40110	0.53	< 0.943	< 0.943	< 0.943	< 0.943	< 0.943	< 0.943	< 0.943	< 0.943	< 0.943	< 1.89	< 4.72	6.15	< 1.32	7/30/2012	PFDoA, PFOSA
P2_841_INV	40110	0.30		< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 1.67	< 3.33	< 8.33	< 3.33	< 2.33	7/30/2012	PFDoA, PFOSA
P2_842_INV	40110	0.68	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 1.47	< 3.68	3.69	< 1.03	7/30/2012	PFDoA, PFOSA
P2_844_INV	40110	0.33	< 1.52	< 1.52	< 1.52	< 1.52	< 1.52	< 1.52	< 1.52	< 1.52	< 1.52	< 3.03	< 7.58	< 3.03	< 2.12	7/30/2012	PFDoA, PFOSA
MC_1_INV	40110	0.69	< 0.725	< 0.725	< 0.725	< 0.725	< 0.725	< 0.725	< 0.725	< 0.725	< 0.725	< 1.45	< 3.62	1.65	1.76	7/30/2012	PFDoA
P2_833_R_INV	40110	0.38	< 1.32	< 1.32	< 1.32	< 1.32	< 1.32	< 1.32	< 1.32	< 1.32	< 1.32	< 2.63	< 6.58	6.83	< 1.84	7/30/2012	PFDoA, PFOSA
P2_835_L_INV	40110	0.24	< 2.08	< 2.08	< 2.08	< 2.08	< 2.08	< 2.08	< 2.08	< 2.08	< 2.08	< 4.17	< 10.4	< 4.17	< 2.92	7/30/2012	PFDoA, PFOSA
P2_835_R_INV	40110	0.75	< 0.667	< 0.667	< 0.667	< 0.667	< 0.667	< 1.33	< 0.667	< 0.667	< 0.667	< 1.33	< 3.33	18.5	1.42	7/30/2012	PFDoA
P2_836_L_INV	40110	0.71	< 0.704	< 0.704	< 0.704	< 0.704	0.743	< 0.704	< 0.704	< 0.704	< 0.704	< 1.41	< 3.52	7.3	< 0.986	7/30/2012	PFOS, PFDoA, PFOSA
517 INV	38738	1.98	6.10	D 0.847	< 0.758	< 0.758	13.6	0.366	1.83	1.45	D 0.956	< 0.505	6.28	D 6.84	D 18.3	2/24/2012	PFNA
526 INV	38738	2.04	< 0.245	< 0.245	< 0.245	< 0.245	< 0.245	< 0.245	< 0.245	< 0.245	< 0.245	< 0.490	< 0.490	D 6.84	< 0.343	2/24/2012	NONE
527 INV	38738	0.68	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 0.735	< 1.47	< 1.47	D 24.9	< 1.03	2/24/2012	NONE
530 INV	38738	2.07	< 0.242	< 0.242	< 0.242	< 0.242	< 0.242	< 0.242	< 0.242	< 0.242	< 0.242	< 0.483	< 0.483	D 3.95	0.622	2/24/2012	NONE
532 INV	38738	1.99	< 0.251	< 0.251	0.327	< 0.251	< 0.251	< 0.251	0.435	0.503	< 0.251	< 0.503	< 0.503	D 11.1	< 0.352	2/24/2012	NONE
533 INV	38738	2.04	< 0.245	< 0.245	0.287	< 0.245	< 0.245	< 0.245	< 0.245	< 0.245	< 0.735	< 0.490	< 0.490	D 4.56	< 0.343	2/24/2012	NONE
518 INV	38738	2.04	< 0.245	< 0.245	< 0.245	< 0.245	< 0.245	1.07	0.775	0.533	< 0.735	< 0.490	< 0.490	D 20.0	< 1.03	2/24/2012	PFNA
519 INV	38738	2.00	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 1.50	< 1.50	D 3.85	< 0.350	2/24/2012	NONE
520 INV	38738	2.05	< 0.244	< 0.244	< 0.244	< 0.244	< 0.244	0.646	0.279	< 0.244	< 0.244	< 0.488	< 0.488	D 8.44	< 0.341	2/24/2012	PFNA
521 INV	38738	2.03	< 0.332	0.258	0.562	< 0.246	0.36	1.29	0.698	0.386	< 0.739	< 0.493	< 0.493	D 10.4	< 0.345	2/24/2012	NONE
522 INV	38738	1.01	< 0.495	< 0.495	0.678	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.495	< 0.990	< 0.990	D 11.1	< 0.693	2/24/2012	NONE
523 INV	38738	1.98	< 0.253	1.53	< 0.253	0.272	0.529	1.41	0.713	0.697	< 0.758	< 0.505	< 0.505	D 13.7	< 1.06	2/24/2012	PFNA, PFPeA, PFHpA

CLIENT ID	WORK GROUP	Sample (g-wet)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	QA Review Date	Qualified Analytes
524 INV	38738	2.01	< 0.249	< 0.249	< 0.249	< 0.249	< 0.249	< 0.249	< 0.249	< 0.249	< 0.249	< 0.498	< 0.498	< 1.49	< 0.348	2/24/2012	NONE
525 INV	38738	1.99	< 0.251	D 1.18	< 0.754	< 0.754	0.435	1.22	0.585	0.752	< 0.754	< 0.503	< 0.503	D 14.3	< 0.352	2/24/2012	PFNA, PFPeA

Appendix B-3. Combined sediment and invertebrate PFOS concentrations, sediment organic carbon, and georeferences

Site	LAT (DD)	LONG (DD)	Date Collected	Sediment Sample ID	Sediment PFOS (ng/g-dw)	Sediment Moisture (%)	Sediment PFOS (ng/g-ww)	Fraction Organic Carbon (f _{oc})	Sediment PFOS (ng/g OC)	Invertebrate Sample ID	Invertebrate PFOS (ng/g-ww)
A	44.76008	-92.97092	10/10/12 15:00	A SED	0.299	36.0	0.191	0.97%	30.7	A INV	9.28
B	44.75987	-92.95783	10/10/12 14:40	B SED	0.566	47.4	0.298	2.34%	24.2	B INV	8.02
C	44.76015	-92.94590	10/10/12 14:45	C SED	0.723	50.8	0.356	1.91%	38.0	C INV	15.8
D	44.75560	-92.96452	10/10/12 15:25	D SED	0.473	42.7	0.271	1.63%	29.0	D INV	8.6
E	44.75565	-92.95207	10/10/12 15:45	E SED	0.586	52.6	0.278	1.80%	32.6	E INV	11.9
F	44.77228	-92.94797	10/16/12 10:40	F SED	0.282	28.6	0.201	0.48%	59.2	F INV	12.8
G	44.77130	-92.93517	10/16/12 11:20	G SED	0.601	40.6	0.357	0.95%	63.0	G INV	23.1
G-FD	44.77130	-92.93517	10/16/12 11:25	G SED FD	0.86	45.9	0.465	1.13%	76.1		
H	44.77388	-92.92642	10/16/12 11:42	H SED	0.504	42.8	0.288	1.06%	47.8		
I	44.78248	-92.91725	10/16/12 11:36	I SED	0.825	36.3	0.526	0.61%	135.6	I INV	18.8
J	44.78188	-92.90643	10/16/12 13:10	J SED	0.335	29.6	0.236	0.62%	54.2	J INV	31.6
K	44.78153	-92.89293	10/16/12 15:06	K SED	8.58	45.8	4.650	0.98%	874.2	K INV	194
K-FD	44.78153	-92.89293	10/16/12 15:10	K SED FD	6.38	43.5	3.605	0.70%	916.7		
L	44.77753	-92.91138	10/16/12 13:25	L SED	< 0.196	25.2		0.51%			
M	44.77775	-92.90055	10/16/12 13:55	M SED	0.203	25.9	0.150	0.36%	56.2	M INV	35.4
M-FD	44.77775	-92.90055	10/16/12 13:58	M SED FD	0.366	28.6	0.261	0.66%	55.8		
N	44.77783	-92.88902	10/16/12 14:16	N SED	1.02	30.6	0.708	0.63%	161.8	N INV	37.2
O	44.76930	-92.89307	10/10/12 13:11	O SED	0.537	30.4	0.374	0.73%	73.9	O INV	23.7
P	44.77142	-92.88312	10/10/12 13:47	P SED	0.435	26.3	0.321	0.55%	78.7		
Q	44.76315	-92.88422	10/10/12 12:45	Q SED	0.647	33.8	0.428	0.83%	77.7	Q INV	14.2
R	44.76607	-92.87648	10/10/12 12:05	R SED	2.1	44.9	1.157	0.99%	212.2	R INV	32.2
S	44.75747	-92.87737	10/10/12 11:00	S SED	0.943	56.9	0.406	1.38%	68.3	S INV	17.5
T	44.75977	-92.87493	10/10/12 11:40	T SED	1.1	54.4	0.502	1.19%	92.4	T INV	12.5
P2_525	44.82145	-93.00985	05/23/12 13:55	P2_525_SED	0.525	61.9	0.200	2.03%	25.9	P2_525_INV	9.89
P2_829.5	44.84305	-93.01288	05/23/12 14:30	P2_829.5_SED	< 0.202	33.5		0.80%			
P2_831	44.86515	-93.01217	05/23/12 13:05	P2_831_SED	0.195	45.1	0.107	0.95%	20.5	P2_831_INV	< 1.47
P2_832.5	44.88443	-93.01708	05/23/12 11:20	P2_832.5_R_SED	0.594	38.3	0.366	0.99%	59.9	P2_832.5_R_INV	8.11
P2_832	44.87737	-93.01652	05/23/12 10:45	P2_832_SED	0.299	28.6	0.213	1.36%	22.0	P2_832_INV	6.15

Site	LAT (DD)	LONG (DD)	Date Collected	Sediment Sample ID	Sediment PFOS (ng/g-dw)	Sediment Moisture (%)	Sediment PFOS (ng/g-ww)	Fraction Organic Carbon (f _{oc})	Sediment PFOS (ng/g OC)	Invertebrate Sample ID	Invertebrate PFOS (ng/g-ww)
MC_1	44.91560	-93.04452	05/22/12 14:00	MC_1_SED	0.905	44.6	0.501	2.17%	41.8	MC_1_INV	1.65
MC_2	44.91560	-93.04452	05/22/12 14:05	MC_2_SED	0.672	32.2	0.456	1.67%	40.2		
MC_3	44.91560	-93.04452	05/22/12 14:15	MC_3_SED	0.581	26.8	0.425	0.59%	98.6		
P2_833_R	44.88912	-93.01937	05/22/12 15:05	P2_833_R_SED	0.681	57.2	0.291	1.92%	35.5	P2_833_R_INV	6.83
P2_835_L	44.90982	-93.04267	05/22/12 12:55	P2_835_L_SED	1.58	40.9	0.934	1.32%	119.7	P2_835_L_INV	< 4.17
P2_835_R	44.91002	-93.04515	05/22/12 11:55	P2_835_R_SED	< 0.195	33.2		0.58%		P2_835_R_INV	18.5
P2_836_L	44.92053	-93.05037	05/22/12 11:13	P2_836_L_SED	0.292	53	0.137	12.75%	2.3	P2_836_L_INV	7.3
P2_836_R	44.92035	-93.05315	05/22/12 10:30	P2_836_R_SED	0.49	55.1	0.220	1.61%	30.4	P2_836_R_INV	23.8
P2_837_R	44.92900	-93.05142	05/16/12 16:40	P2_837_R_SED	< 0.200	25.4		0.14%			
P2_838	44.93913	-93.05597	05/16/12 16:00	P2_838_SED	< 0.188	36.7		1.33%		P2_838_INV	8.09
P2_841	44.92575	-93.11460	05/16/12 15:05	P2_841_SED	0.252	45.6	0.137	2.52%	10.0	P2_841_INV	< 3.33
P2_842	44.91890	-93.12847	05/16/12 14:20	P2_842_SED	0.222	42.9	0.127	1.54%	14.4	P2_842_INV	3.69
P2_844	44.89698	-93.15080	05/16/12 13:10	P2_844_SED	< 0.192	32.8		0.79%		P2_844_INV	< 3.03
P2_846	44.89567	-93.18923	05/16/12 11:48	P2_846_SED	< 0.190	20.8		0.05%			
P2_847	44.91193	-93.20093	05/16/12 11:19	P2_847_SED	< 0.198	22.2		0.06%			
517 SED1	44.78210	-92.88855	11/23/11 15:00	517 SED1	80.20	59.3	32.641	2.84%	2823.9	517 INV	684
517 SED2	44.78210	-92.88855	11/23/11 15:10	517 SED2	33.30	51.1	16.284	1.75%	1902.9		
517 SED3	44.78210	-92.88855	11/23/11 15:18	517 SED3	41.10	52.9	19.358	1.62%	2537.0		
518 SED	44.77012	-92.94168	11/23/11 13:00	518 SED	0.66	42.0	0.380	1.17%	56.0	518 INV	20
519 SED	44.76645	-92.95885	11/23/11 13:30	519 SED	0.09	23.7	0.072	0.16%	57.6	519 INV	3.85
520 SED	44.77222	-92.96918	11/23/11 12:30	520 SED	0.31	31.1	0.213	0.63%	48.8	520 INV	8.44
521 SED	44.77407	-93.01647	11/30/11 15:45	521 SED	0.28	32.3	0.190	1.02%	27.5	521 INV	10.4
522 SED	44.78468	-93.01883	11/18/11 15:30	522 SED	0.29	32.1	0.196	0.64%	44.7	522 INV	11.1
523 SED	44.79105	-93.02527	11/18/11 14:00	523 SED	0.29	36.7	0.184	1.16%	25.0	523 INV	13.7
524 SED	44.81015	-93.00707	11/30/11 14:30	524 SED	0.26	25.9	0.190	0.25%	104.0	524 INV	< 1.49
525 SED	44.82175	-93.00955	11/30/11 13:10	525 SED	0.33	39.2	0.198	1.17%	27.9	525 INV	14.3
526 SED	44.83353	-93.01233	11/30/11 12:00	526 SED	0.71	33.8	0.472	0.95%	74.7	526 INV	6.84
530 SED	44.89130	-93.01835	11/28/11 12:30	530 SED	0.88	36.3	0.562	0.89%	98.7	530 INV	3.95
532 SED	44.90618	-93.04245	11/28/11 14:00	532 SED	2.07	45.6	1.126	1.52%	136.2	532 INV	11.1

Site	LAT (DD)	LONG (DD)	Date Collected	Sediment Sample ID	Sediment PFOS (ng/g- dw)	Sediment Moisture (%)	Sediment PFOS (ng/g- ww)	Fraction Organic Carbon (f _{oc})	Sediment PFOS (ng/g OC)	Invertebrate Sample ID	Invertebrate PFOS (ng/g- ww)
533 SED	44.92512	-93.05007	11/28/11 15:30	533 SED	0.30	40.7	0.180	1.33%	22.8	533 INV	4.56

Appendix B-4. QA results for sediment and invertebrate work groups

WORK GROUP	CLIENT ID	AXYS ID	Sample (g)	UNITS														Mois- ture (%)
40114	Lab Blank	WG40114-101	5.00	ng/g	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.200	< 0.200	< 0.200	< 0.100	
40114	Spiked Matrix	WG40114-102		% Recov	90	87.5	94.7	87.5	93.8	92.7	104	60.1	90.8	94	88.5	85.5	64.1	
40114	P2_846_SED (MS)	WG40114-103	5.33	ng/g (dry wt)	42.3	46	43.4	45.6	41.9	40.3	44.2	33.6	38.2	86.2	87	82.5	43.1	20.7
40114	P2_846_SED (MSD)	WG40114-104	5.25	ng/g (dry wt)	41.5	47.6	45.8	46.4	46.2	44.3	46.1	28.4	40	88.2	91.3	82	37.1	21.8
41757	Lab Blank	WG41757-101	5.00	ng/g	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.200	< 0.200	< 0.200	< 0.100	
41757	Spiked Matrix	WG41757-102		% Recov	125	113	128	109	117	119	127	103	128	121	121	113	103	
41757	F SED (MS)	WG41757-103	5.18	ng/g	55.5	58	60.2	60.8	58.3	55.5	57	51.5	52	112	117	125	60.6	28.7
41757	F SED (MSD)	WG41757-104	5.25	ng/g	57.9	55.9	60	56.8	57.5	56.4	57.9	47	50.6	112	120	113	55.2	28.4
41758	Lab Blank	WG41758-101	5.00	ng/g	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.200	< 0.200	< 0.200	< 0.100	
41758	Spiked Matrix	WG41758-102		% Recov	130	117	141	114	131	139	155	105	130	129	129	125	105	
41758	M SED (MS)	WG41758-103	5.21	% Recov	123	127	124	129	122	123	126	106	113	116	119	128	132	25
41758	M SED (MSD)	WG41758-104	5.15	% Recov	129	131	125	131	120	129	121	115	108	105	111	127	131	25.3
38714	Lab Blank	WG38714-101	5.00	ng/g	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.200	< 0.200	< 0.200	< 0.100	
38714	Spiked Matrix	WG38714-102		% Recov	87.3	84.7	89	94.2	83.8	70	106	75.8	94.7	90.6	87.9	91.7	64.5	
38714	530 SED (MS)	WG38714-103	5.36	% Recov	94.2	94.6	88.2	97.8	98.8	89.7	94.3	57.3	84.8	96.8	92.3	101	62.2	37
38714	530 SED (MSD)	WG38714-104	5.38	% Recov	95.3	102	94.1	106	101	93.9	93.3	53.7	85.9	87.8	85.5	96.4	57.2	36.4
41820	Lab Blank	WG41820-101	0.500	ng/g	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 2.00	< 2.00	< 2.00	< 1.40	
41820	Spiked Matrix	WG41820-102		% Recov	106	107	115	107	105	105	120	109	120	118	113	106	104	
41756	Lab Blank	WG41756-	2.00	ng/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1.00	< 1.00	< 1.00	< 0.600	

WORK GROUP	CLIENT ID	AXYS ID	UNITS		Sample (g)	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	PFOSA	Mois- ture (%)
41756	Spiked Matrix	WG41756-101		% Recov		106	93.7	105	96	109	106	125	98.2	113	112	116	108	104	
41756	E INV (MS)	WG41756-102	1.34	% Recov		113	466	116	228	106	109	130	435	115	50.6	108	94.5	116	
41756	E INV (MSD)	WG41756-103	1.33	% Recov		113	489	111	228	108	106	124	429	115	50.6	121	95.8	118	
38738	Lab Blank	WG38738-101	2.00	ng/g		< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.500	< 0.500	< 0.500	< 0.350	
38738	Spiked Matrix	WG38738-102		% Recov		94.7	99.8	108	103	105	94.6	123	110	107	107	105	105	97.9	
38738	524 INV (MS)	WG38738-103	2.00	ng/g (wet wt)		10.7	8.07	11.3	12.1	11.2	9.75	11.9	12.9	11.1	21.7	21.3	D 20.1	9.54	
38738	524 INV (MS)	WG38738-103	2.00	% Recov		107	80.7	113	121	112	97.5	119	129	111	108	107	101	95.4	
38738	524 INV (MSD)	WG38738-104	2.04	ng/g (wet wt)		10.2	8.21	10.5	11.5	11	9.89	11.4	12.7	10.9	19.4	20.8	D 22.8	9.84	
38738	524 INV (MSD)	WG38738-104	2.04	% Recov		104	83.8	107	117	112	101	116	129	111	99.1	106	116	100	
40110	Lab Blank	WG40110-101	0.500	ng/g		< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 2.00	< 5.00	< 2.00	< 1.40	
40110	Spiked Matrix	WG40110-102		% Recov		101	79.5	103	97.7	109	105	104	104	100	112	106	95.1	102	
40110	P2_525_INV (MS)	WG40110-103	0.370	ng/g (wet wt)		53	D 94.8	D 48.1	D 54.2	55.7	53.6	54.3	75	54.7	D 50.1	105	111	49.7	
40110	P2_525_INV (MSD)	WG40110-104	0.390	ng/g (wet wt)		53.3	D 98.0	D 52.5	D 57.6	53.3	57.9	56.8	88.4	53.7	D 50.8	116	114	49.5	