Sheboygan River and Harbor Superfund Site
Lower River

2011 Annual
Fish Monitoring Report

Prepared for
United States Environmental Protection Agency
Region 5

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2011 Annual Fish Monitoring Report
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1.0 Introduction

Monitoring of post-remedial fish tissue concentrations with polychlorinated biphenyls (PCBs) is being conducted on the Sheboygan River in accordance with the *Post-Remediation Monitoring Plan* (PMP). As stated in the PMP, the monitoring is being conducted in three phases consisting of the following:

- Baseline monitoring after remediation of the Upper River and prior to remediation of the Lower River reaches to determine the mean PCB concentration of each fish species of interest and establish a comparison point for future sampling,[1]
- Phase 1 annual monitoring following remediation of each reach to determine if the PCB concentration of each fish species is changing compared to prior annual sampling and track the progress of the fish in meeting the remedial goals, and
- Phase 2 confirmational sampling to verify the fish have reached the remedial goals.

The *Baseline Upper and Lower River Fish Monitoring Report* documented the post-remediation monitoring performed in 2008, specifically the collection of fish to establish baseline concentrations of several different fish species downstream of the portion of the river known as the Upper River. Baseline fish monitoring for the Upper River is considered the first annual sampling event following remediation documenting post-remedial conditions. This *2011 Fish Monitoring Report* documents the Phase 1 fish monitoring performed in 2011 on the Upper and Middle River reaches. The Middle River reach fish monitoring was performed as data from the 2009 Pre-Design Investigation indicated remediation would not be performed and with approval from the United States Environmental Protection Agency (USEPA) and Wisconsin Department of Natural Resources (WDNR) hereafter known as the agencies. Remediation of the other reaches (i.e. Lower River and Inner Harbor) has begun but not completed and as such, Phase 1 monitoring was not performed for those reaches.

The data obtained during the Phase 1 annual monitoring will allow post-remedial fish tissue concentrations to be compared to prior annual results to monitor remedial progress. Fish tissue results in the Upper and Middle River will be compared to 2010 annual results.

Post-remedial monitoring will occur until fish consumption advisories are lifted by the Wisconsin Department of Health, fish fillet concentrations of PCBs decrease to the target levels specified on page 32 of the *Record of Decision* (ROD), or for 30 years, whichever comes first.

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[1] The Upper River has already been remediated. The first annual event will be used as the baseline event.

1.1 Site Description

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County (Figure 1). The Site includes the former Tecumseh Manufacturing site and the lower fourteen miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner Harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the Remedial Investigations (RI), the river was segmented in separate sections, known as reaches, based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four miles to the Waelderhaus Dam in Kohler. The Middle River extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. Both of these reaches are the subject of the 2011 fish monitoring.

The Lower River extends two miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls. Figure 2 provides an overview of each river reach.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work for the Upper River included the Tecumseh plant soils, groundwater, and adjoining riverbank soils. Phase II RA work for the Upper River included addressing the Near-Shore Sediments, Armored Areas, and Soft Sediment deposits. The Upper River floodplains have not been addressed due to access limitations, however, is anticipated to be performed in 2012. Phase III RA work for the Lower River included removing 52,000 cubic yards of Soft Sediment from the Lower River and Inner Harbor.

1.2 Site History

Much of the following information was obtained from the ROD. The Sheboygan Harbor was constructed at the mouth of the Sheboygan River in the early 1920's. In 1954, the lower Sheboygan River, namely the channel upstream of the 8th Street Bridge, was added as a part of the United States Army Corps of Engineers (USACE) maintenance dredging. Between 1956 and 1969, a total of 404,000 cubic yards of sediment were removed downstream of the 8th Street. The portion of the river above the 8th Street Bridge has not been dredged since 1956.

Prior to 1969, the USACE disposed of the sediment from the Harbor in an authorized deep water disposal area in Lake Michigan. However, there has been no dredging in the Sheboygan Harbor since the USEPA and WDNR determined that the sediment was unsuitable for open-water disposal. Sediment sampling and analysis performed by the USACE in 1979 detected what was reported as moderate to high levels of lead, zinc, PCBs, and chromium. According to the ROD, the USACE last dredged the Harbor mouth in 1991 however; in 1982 a policy to discontinue maintenance dredging was promulgated due to the discovery of PCBs in the sediments.

Between 1979 and 1982, the USACE collected 22 cores and 98 sediment sample profiles from the Harbor area. The analytical results revealed greater PCB and metal levels in the sediment of the Inner Harbor than in sediment of the Outer Harbor and an increase in PCB concentrations with the distance upstream from the Harbor and with the depth of sediment. The results also indicated the presence of PCBs in the surface sediment of the Harbor. The possibility that this sediment may be classified as regulated material was reason for discontinuing maintenance dredging.

Tecumseh Products Company (Tecumseh) was located adjacent to the Sheboygan River in Sheboygan Falls and operated from 1966 to 2003. Tecumseh was considered a Potentially Responsible Party (PRP) when PCBs were discovered in coolant fluids disposed to sewer lines that discharged to the Upper River reach of the Sheboygan River. The contamination level was high in the sediment adjacent to the Tecumseh Plant, but decreased in concentration downstream. Tecumseh discontinued use of PCB impregnated coolant fluids in the early 1970's.

In 1978, the WDNR conducted a survey and found numerous industries that discharged contaminants to the Sheboygan River. Some discharges to the river contained PCBs and others had heavy metals in their discharge. In 1985, the outfall from Thomas Industries, located along the Inner Harbor, contained PCBs when analyzed by the WDNR on two different dates. A sample collected on June 13, 1985, from the storm sewer outfall had a concentration of 125 parts per billion (ppb) PCBs. A second sample collected on August 19, 1978, had a PCB concentration of 88 ppb. The Kohler Company, downstream of Sheboygan Falls and adjacent to the Middle River, was found to have heavy metal discharges to the river above the permit limits in the 1970s. In addition, the Kohler Landfill Superfund Site is located on the banks of the river.

The USEPA placed the Sheboygan River and Harbor Site on the National Priorities List (NPL) in 1986. Remedial work performed since that time included source removal at the former Tecumseh property in 2004 and removal of 94.1% of the impacted PCB mass in the Upper River in 2006 and 2007. The Lower River and Inner Harbor sediment removal began in 2011 and will be completed in 2012.

1.3 River Characteristics

1.3.1 Upper River

The Upper River consists of discrete Soft Sediment deposits and non-Soft Sediment areas which include a mix of Soft Sediment, rocks, cobbles, and bare river bottom. The sediment contamination in the Upper River acts as a partial source of PCB-contaminated sediment for the rest of the river system during high river conditions in addition to the other sources identified in the Middle River, Lower River, and Inner Harbor. The contribution to the reaches below the Waelderhaus dam is thought to be insignificant compared to other sources in the lower reaches. PCB sampling results in 1989 and 1990 showed concentrations from 1.4 to 4,500 ppm. PCB-contaminated sediment was removed near the former Tecumseh facility in 1990 and 1991. Subsequent sampling of the same area showed concentrations ranging from non-detect to as high as 840 ppm. The concentrations of PCBs in the sediment vary due to the dynamic nature of this river reach.

During the 2006/2007 seasons, sediment was removed from nine (9) Armored Area Remedial Management Units (RMUs) and 122 Soft Sediment RMUs. The Soft Sediment RMUs and Armored Areas removed in 2006/2007 contained the majority of the PCB mass within the Upper River. The Upper River remedial action conducted in 2006 and 2007 removed 20,728 cubic yards of sediment and 552 pounds of PCBs for a total mass removal percentage of 94.1% exceeding the PCB mass reduction objective of 88%. The Upper River SWAC was reduced from 5.2 ppm to 1.96 ppm and based on the mass removed, should reach a SWAC of 0.5 ppm over time.

1.3.2 Middle River

The Middle River consists of Soft and non-Soft Sediment areas similar to the Upper River, but due to the hydrodynamics of this reach, the areas of Soft Sediment are shallower and more widely scattered. The Waelderhaus dam, which marks the end of the Upper River, prevents most of the Upper River sediments from migrating downstream. As such, the Middle River sediments act as a source of PCB-contamination for the rest of the Lower River system in addition to the sources in the Lower River and Inner Harbor reaches. Information collected during the Remedial Investigation (RI) indicated PCB concentrations ranging from non-detect to 8.8 parts per million (ppm). Samples obtained during the Pre-Design Investigation in 2009 indicated PCB surface concentrations ranging from 0.10 ppm to 14.20 ppm. Like the Upper River, sediment in the Middle River is likely to vary due to the dynamic nature of this river reach. The 2010 Design indicated remediation would not be performed with approval from the agencies.

1.3.3 Lower River

The flow rate in the Lower River decreases leading to a more continuous layer of Soft Sediment throughout the reach. Based on the hydrodynamics of this reach, the Lower River is where much of the sediment released in the Middle River is deposited. During the RI, sample results showed PCB concentrations as high as 67 ppm adjacent to the WPSC Camp Marina MGP site, a site undergoing investigation and remediation under the oversight of the USEPA. The 2009 Pre-Design Investigation detected concentrations of PCBs up to 180 ppm in surface sediments adjacent and downstream of the WPSC Camp Marina MGP site. The 2010 Design indicated remediation would be performed by removing 16,000 cubic yards of PCB impacted soft sediment from the Lower River (Kiwanis Park to Pennsylvania Avenue Bridge). Remediation of the Lower River began in 2011 and will be completed in 2012.

1.3.4 Inner Harbor

The Inner Harbor is generally the river reach where upstream Soft Sediment is deposited. However, while the Inner Harbor is generally depositional, deposition occurs primarily between the 8th Street Bridge and the harbor mouth. The area between the Pennsylvania Bridge and 8th Street Bridge has little deposition and shows evidence of scour. RI sampling indicated PCB concentrations as high as 220 ppm in the Inner Harbor; however these levels were detected in 1979 and exist many feet below the surface. The 2009 Pre-Design Investigation has detected PCBs in near surface sediments up to 111 ppm near the Thomas Industries outfall. As a general rule, PCB concentrations increase with depth between the 8th Street bridge and harbor mouth. This is not the case for certain areas between the Pennsylvania Avenue Bridge and 8th Street Bridge. The 2010 Design indicated remediation would be performed by removing 36,000 cubic yards of PCB impacted soft sediment from the Inner Harbor (Pennsylvania Avenue Bridge to 200 feet past the 8th Street Bridge). The 2010 Design indicated that sediment removal would not be performed from approximately 200 feet past the 8th Street Bridge to the river mouth. Remediation of the Inner Harbor began in 2011 and will be completed in 2012.

1.4 Summary of Previous Fish Species Evaluation

The intent of this section is to demonstrate how the United States Environmental Protection Agency (USEPA) determined sediment PCB cleanup goals based on fish tissue PCB results determined to be safe. In addition, the 2010 fish tissue PCB concentration results are summarized for comparison to the 2011 results.

1.4.1 Pre-Remediation Evaluation

The consumption of the fish is the primary exposure route for human receptors of the PCBs in the river sediments. The PCBs in the river sediments bioaccumulate in the fish from contact with impacted sediment, surface water, or by ingesting prey that are impacted. An understanding of the process in developing the sediment PCB cleanup goals based on allowable fish PCB concentrations is important in the evaluation of long-term assessment of remedial success.

There is considerable seasonal fishing in the Middle River, Lower River, and Inner Harbor.[2] Fishing is more limited in the Upper River. According to WDNR surveys, most fishing occurs during spring and fall salmon and trout runs. Resident fish taken from the Sheboygan River between the Sheboygan Falls dam and the mouth of the river fall into the "do not eat" consumption advisory category. Migrating trout and salmon are subject to Lake Michigan advisories as they obtain most of their PCB body burden from Lake Michigan. One objective of the sediment removal is to reduce the concentrations of PCBs in the fish over time so all the consumption advisories are lifted.

There are several possible pathways of exposure to the contamination in the sediment: dermal contact, ingestion of contaminated surface water or sediment, and consumption of fish contaminated by sediment. However, the human health analysis assumed that for this Site, the pathway presenting the majority of the risk and likely to yield the most protective assessment of risks is consumption of contaminated fish and not dermal contact. This does not imply that no

[2] Much of the information presented in this section was obtained from the ROD.

other exposure pathways are occurring at this Site, only that there is a focus on the pathway which contributes the majority of risk, the fish ingestion pathway.

Tecumseh collected fish tissue samples between 1990 and 1998 that showed smallmouth bass and white sucker PCB concentrations ranging from 1.3 ppm to 23.1 ppm. Carp had PCB levels ranging from 10.5 to 200 ppm. In general, the highest fish tissue PCB concentrations were found nearest the Tecumseh plant and tended to decrease downstream. The most recent studies by WDNR found that carp and smallmouth bass had the following mean concentrations, respectively:[3]

- Upper River 16.43 and 0.44 ppm
- Middle River 12.5 and 2.73 ppm
- Lower River 2.32 and 1.35 ppm, and
- Inner Harbor 1.45 and 2.0 ppm.

An Interim Monitoring Program (IMP) was performed by Blasland, Bouck, and Lee, Inc. (BBL) that consisted of the collection of smallmouth bass and white suckers at Rochester Park in the Upper River reach and between the dams in the Upper River reach.[4] During the baseline and subsequent post-remedial monitoring, these areas are known as Upper River 1 and Upper River 2 Sites. These fish were also collected near Kiwanis Park or in the Lower River reach. The range of smallmouth bass PCB concentrations detected is as follows:

- Upper River 1 2.1 to 10.3 ppm
- Upper River 2 1.1 to 7.3 ppm, and
- Lower River 0.82 to 3.7 ppm.

The PCB concentration decreased between 1994 and 2002. The results for smallmouth bass in the Upper River Site 1 show a general decreasing trend and the regression shows a decrease with a moderate correlation. For Upper River Site 2, the decrease has a very strong correlation for the regression. The range of white sucker concentrations detected is as follows:

- Upper River 1 2.7 to 18.3 ppm
- Upper River 2 1.9 to 8.7 ppm, and
- Lower River 1.4 to 3.9 ppm.

In 1996, the USEPA performed a baseline risk assessment for the Site, relying on data available from WDNR on fish tissue concentrations from 1994. The USEPA assessed sport fishing and subsistence fishing. The sport fishing scenario was developed to represent a mid-point or central tendency estimate of risk, and the subsistence fishing scenario was developed to represent an upper-bound estimate of risk. The USEPA used Great Lakes specific fish consumption information, available from an assessment of Michigan anglers assuming only half of the fish

[3] Most recent WNDR data available was used. This ranged from 1990 (Inner Harbor) 2000 to 2004 (others), depending on species and reach.
[4] Conducted in 1994, 1995, 1996, 1998, 1999, 2000, 2001, and 2002.

came from the Sheboygan River. Through this risk assessment, USEPA determined the following risks:

- Average $1x10^{-4}$ to $1x10^{-5}$
- Subsistence $1x10^{-2}$ to $1x10^{-4}$

In order to address unacceptable risks at the Site, USEPA calculated sediment cleanup goals, protective of human health. The USEPA made a conscious decision to model and be protective of the more contaminated resident fish species of smallmouth bass and carp at the Site. By selecting a cleanup goal protective of bass (or carp), the cleanup will be protective of the lesser contaminated species such as walleye, trout, salmon, and steelhead.

To calculate a sediment cleanup goal or surface goal, target fish tissue levels were placed into a Biota to Sediment Accumulation Factor (BSAF) equation to estimate the sediment concentrations that would meet these fish targets. The term "surface goal" is more appropriate for sediment at the Sheboygan Site because what is calculated is a surface that the fish can be exposed and it is necessary to calculate what the residual concentration is after dredging certain levels. In the case of the Sheboygan Site, it's the target Surface Weighted Average Concentration, or SWAC, of the river after remediation.

The BSAF methodology is the same as used in the *Ecological Risk Assessment* and is similar to what was used in the *Remedial Investigation/Feasibility Study (RI/FS)*, except USEPA risk assessments include total organic carbon (TOC) and lipids in the calculation. The analysis begins by calculating a site-specific BSAF using PCBs in sediment, TOC, PCBs in fish, and lipid data. The site-specific BSAFs are derived from the following values: RI/FS total river bed SWAC, and NOAA Risk Assessment TOC, and 1994 fish data. Using the BSAFs, the USEPA determined the sediment cleanup goals as follows:

Sediment Cleanup Goal = (TOC x Conc. Fish) / (site specific BSAF x % lipid)

As can be seen, the sediment cleanup goal is entirely dependent on the accuracy of the BSAF. Therefore, the concentrations of PCBs in the fish may reach the target levels although the sediment contains more than the sediment cleanup goal. Conversely, the sediment cleanup goal may be reached before the fish actually reach the target levels. We have noted that prior to remediation; the PCB levels in the most recent fish collected in the Upper River as compared to the characterization sediment results have less PCBs than predicted by the BSAF. Therefore, the fish target levels may be reached before the sediment cleanup goals.

Target fish tissue levels corresponding to the SWAC Sediment Cleanup Goal include the following:

- Smallmouth Bass 0.31 ppm (skin on fillet)
- Walleye 0.63 ppm (skin on fillet)
- Trout 0.09 ppm (skin on fillet)[5]

[5] This is a migratory fish species and most PCB burden is from Lake Michigan.

- Carp 2.58 ppm (skin on fillet)
- Catfish 2.53 ppm (skin off fillet)

Using the BASF and these goals, the USEPA determined that the sediment cleanup goal SWAC is 0.5 ppm. The USEPA model predicts that once the SWAC reaches 0.5 ppm, the fish target levels will be met.[6] However, as the sediment cleanup goal was determined by modeling, the fish could reach the goals before the SWAC is 0.5 ppm. Conversely, the SWAC could reach 0.5 ppm and the fish do not reach the goal.

1.4.2 2010 Phase 1 Evaluation

The mean fish tissue PCB results for the 2010 Phase 1 sampling event are provided below.

Fish Species	Fish Tissue Mean PCB Results Per River Reach (mg/Kg)			
	Upper (Site 1)	**Upper (Site 2)**	**Middle (Site 1)**	**Middle (Site 2)**
Smallmouth Bass	4.74	4.32	3.78	2.38
Adult Carp	13.89	7.03	25.81	5.88
Adult Suckers	16.23	5.11	4.16	2.77
Juvenile Suckers	9.87	1.97	2.87	2.31
Rock Bass	2.85	1.63	1.26	1.11
Longnose Dace	N/A	N/A	N/A	N/A
Walleye	N/A	N/A	6.63	N/A
Catfish	N/A	N/A	N/A	5.97
N/A – Not Applicable, insufficient data				

Adult carp and white suckers tended to have the highest mean PCB concentrations of the fish species. As such, the results are not unexpected compared to the sport fish.

[6] There could be a lag period as older fish may have PCB concentrations reflective of when the sediment was more impacted.

2.0 Sampling and Analysis

2.1 Summary of Sampling Plan

The 2011 Phase 1 sampling and analysis of fish species was conducted consistent with the *Post Remedial Monitoring Plan* (PMP) and the *Quality Assurance Project Plan* (QAPP). These plans were conditionally approved with comment on August 13, 2008. The *2010 Annual Fish Monitoring* Report determined the number of fish to collect at the two sites within the Upper River and Middle River reaches.

Smallmouth bass, carp, walleye, and catfish were selected as they have assigned target goals in the *Record of Decision* (ROD). According to the ROD, smallmouth bass and carp are the more contaminated resident fish species and the USEPA selected these fish to determine cleanup goals believing that if these fish met the goals, the lesser contaminated species such as walleye, trout, salmon, and steelhead would be protected. Therefore the monitoring included these fish as well as walleye and catfish. Walleye and smallmouth bass will also help evaluate risk reduction for sport fisherman while carp and catfish for sustenance fisherman.

Rock bass and longnose dace were added because catfish and walleye are rarely caught according to WDNR. White suckers were added at the suggestion of the WDNR. The following table outlines the final fish species collection requirements.[7]

Fish Species	Number of Samples Per River Reach				
	Upper (Site 1)	Upper (Site 2)	Middle (Site 1)	Middle (Site 2)	Size Range
Smallmouth Bass	12	12	8	8	10-17 inches
Adult Carp	12	12	8	8	15-25 inches
Adult Suckers	12	12	8	8	8-16 inches
Juvenile Suckers	12	12	8	8	3-8 inches
Rock Bass	12	12	8	8	5-9 inches
Longnose Dace	8	8	8	8	1-4 inches
Walleye	0	0	8	8	12-22 inches
Catfish	0	0	8	8	12-22 inches

The WDNR requested that the Upper and Middle River be divided into two sites per reach. The rational was stated as "Sampling stations should include the following number of sites per reach in order to represent the amount of contaminated sediment that will be removed and the variability expected. Specimens may be collected at different locations within a reach and collections sites within a reach can vary in exact location and length of river sampled (distance and location data should be reported in annual reports)." The 2011 Phase 1 collection included two sites in the Upper River – one from the former Tecumseh facility to Riverbend reach and another from the Riverbend to Waelderhaus Dam in Kohler. In addition, the 2011 Phase 1

[7] Prior to the 2010 fish collection event, the agencies approved dropping the requirement to collect juvenile carp, walleye, and catfish in the Upper River as a result of two years with unsuccessful collection but required that the number of each fish species be increased from 8 to 12 fish.

collection included two sites in the Middle River – one from the Waelderhaus Dam in Kohler to the Kohler Landfill and another from the Kohler Landfill to the C&NW Railroad Bridge in Sheboygan.

The fish collection would target the habitats most conducive for each species. Table 1 presents a summary of the fish species, known habitat, and range. This information was primarily obtained from *Fishes in Wisconsin* (1983) and is intended to provide a summary of the characteristics of the target species and their typical habitat and is not intended to describe the habitats where the target species were actually encountered in the Sheboygan River. The habitats where fish were collected in 2011 are shown in Figures 3 and 4.

2.2 Sampling Procedures

After receipt of the Scientific Collectors permit on February 22, 2011, collection began in the Upper River reach and continued to the Middle River reach. Due to an inability to initially collect all species, the Upper and Middle River reaches were sampled more than once. The fish collection occurred between June 13 2011, and June 22, 2011. Table 2 provides a summary of the daily fish collection. Figure 3 and 4 show the locations where fish were collected in each site of the Upper River and Middle River.

All fish were collected using electro-fishing equipment. The electro-fishing equipment used to collect fish, a Smith Root, Inc. Model 2.5 GPP, was either a boat-mounted array set-up or a hand held wand, depending on the location and species to collect. Electro-fishing was performed by selecting the appropriate pulsed DC power setting to stun-fish. The appropriate DC pulse setting (30 or 60) was made based on what set-up was used (30 for the wand, 60 for the arrays). At that point the percentage of output power was adjusted from 0-100 to stun the fish size needed without stunning more fish than needed or killing the fish. This percentage was determined by trial and error. Current was then applied to the river water by closure of the operating switch (i.e. foot pedal) while the generator and control equipment were operative. Once fish were stunned, the fish were collected with dip nets. The fish collected in the dip nets were identified for targeted species, measured to confirm they met size requirement, and were either retained in a live well or on ice in an insulated cooler until collection was completed.

Seining was not performed as the river conditions during the collection period (i.e. high river flow and depth) presented an unsafe environment.

All fish samples were processed and packaged in accordance with the procedures described in the *WDNR's Division of Environmental Standards Field Procedures Manual* in addition to the PMP. During and after collection, samples were held in a live well or on ice in an insulated cooler. Samples remained whole and ungutted. Each fish was numbered and the following recorded in field log book:

- Length,
- Species[8],

[8] Species was determined by SOP #10, *Fish Identification.*

- Sex (if possible),
- Age (if possible),
- Sample location,
- Other distinguishing features,
- Sampler(s), and
- Any unusual skin lesions, tumors, or other irregularities should also be noted.

The individual fish were wrapped in aluminum foil, then in freezer paper, and finally taped securely so that the package did not open during shipment. All samples were frozen as soon as possible after collection. No composite samples were created or analyzed.

For shipment to the laboratory, all fish samples were placed in a Ziploc bag or industrial grade trash bag, a label affixed and placed into second Ziploc bag, and then into a cooler with double bagged ice on the bottom of the cooler. The cooler was filled with fish samples, leaving enough room for double bagged ice on top of samples. A chain-of-custody form was placed in a sealable plastic bag and taped to the inside of cooler lid. The coolers were collected by the laboratory and as such custody seals were not used.

The laboratory prepared and analyzed the samples in accordance with the analytical method USEPA SW846-8082 Modified and Laboratory Standard Operating Procedures (SOPs) developed in accordance with method 8082 including the following:

- GB-L-001, Rev .0 – Tissue Preparation
- GB-L-003, Rev. 0 – Lipids
- GB-O-031, Rev. 1 – Extraction
- GB-O-034, Rev. 1 – Sulfuric Acid Cleanup
- GB-O-036, Rev. 1 – Florosil Cleanup
- GB-O-026, Rev. 2 – PCB Analysis

The analysis to be performed on fish included total PCBs (Aroclor basis), percent lipids, and gender. The PCB method detection limit was 0.019 mg/kg. Laboratory QA/QC samples consisted of a matrix spike and matrix spike duplicate. A minimum of one matrix spike/matrix spike duplicate analysis was performed with every batch of fish being analyzed for PCBs. Batch size was limited to no more than 20 samples. For analysis of PCBs in tissues, the QA procedures in USEPA's *Statement of Work for Organic Analysis* (Feb 1988) was used, including laboratory blanks consistent with required detection limits, and initial and continuing calibration to verify recoveries.

2.3 Deviation from Plan

Table 3 provides a summary of the success of the collection process. No longnose dace (dace) were collected from the Upper and Middle River reaches as the river conditions during the collection period (i.e. high river flow and depth) presented an unsafe environment for seining. No walleye were collected from Site 2 of the Middle River consistent with the subsequent sampling events. No channel catfish were collected from Site 1 or Site 2 of the Middle River.

The inability to collect the target number of fish for some of the species can increase the chances of a Type II error. That is, believing the fish tissue PCB results are less than the action level when they are not. Reducing the number of samples reduces the confidence in the decision. For this collection effort, the chance of a Type II error does not significantly affect decision making for the following reasons:

- The adult species not meeting the target goal is longnose dace, walleye, and catfish, all surrogates, who results will not be used to make decisions concerning the action level, and
- No decisions are being made at this time.

There were no deviations from the laboratory method in order to analyze or report the fish tissue results.

3.0 Sampling Results

3.1 Fish Tissue Results

A summary of the results and statistics is provided in Appendix 1 while copies of the analytical reports are provided in Appendix 2 as a compact disc. All fish samples that were analyzed were skin on fillets.[9]

The age of the fish was determined by EA Engineering, Science, and Technology, Inc. All of the adult fish were of the age where they should have been sexually mature. None of the fish collected appeared to be of an age that exceeded the usual published longevity period. The majority of the fish collected were males.

3.2 Data Quality

The laboratory performs a validation of the analytical procedure using the quality control sample results, as applicable. This validation is discussed in the Narrative and QC section of each of the twelve lab reports generated by this sampling and analysis event. The laboratory reported the following:

- All samples were extracted and analyzed within the allowable holding time,
- There were no problems with the initial or continuing calibrations,
- All laboratory control spikes were within the allowable range, and
- PCBs were not detected in the method blanks.

There were problems with the surrogate recoveries in 42% of the samples. The problem was that the surrogates could not be evaluated against the control limits due to sample dilution. This should not affect the data as there were no problems for the other 58% of the samples as well as the method blank and laboratory control samples that could be compared. Additionally, the failure in meeting surrogate recovery requirements could lead to a false negative and Type II error. High PCB concentrations necessitated the sample dilution and all samples had elevated concentrations of PCBs. As such, this QA failure did not lead to false negatives. A Type II error did not occur as no decision was made about remedial effectiveness.

In three of the sample batches, where MS/MSD was performed, the laboratory identified problems with the matrix spike (MS) or the matrix spike duplicate (MSD) results. The purpose of MS and MSD is to identify method accuracy and precision. Matrix spikes are generated by the addition of a known amount of target analyte to a sub-sample. Unless the added target analyte is infused within a similar matrix, the ability of the matrix spike to represent method performance is limited; rather, matrix spikes often assist in the identification on chemical interferences inherent in the matrix. The efficiency of any method to dissolute an aqueous standard solution will always be significantly greater than a real world sample.

[9] Catfish samples are analyzed as skin off fillets.

Eight of the twelve samples had no recovery (0%) of the matrix spike or matrix spike duplicate due to sample dilution. The recoveries were within the criteria in the method blank and laboratory control indicating there were no problems attributed to the laboratory. As such, this lack of recovery does not affect the data. None of the MS/MSD problems or potential problems appears to affect the data or conclusions drawn from the data for the same reasons as stated for the surrogate recoveries.

Differences in the matrix between fish are more marked than in other environmental media such as soil or groundwater and could be due to the large differences in lipid content. However, according to the laboratory, the matrix spike problem is not attributed to this difference in lipid content. According to Mr. Todd Noltemeyer, Project Manager at PACE Analytical, "The analysis of fish is typically more of a challenge than waters and soils, but our methods and cleanups take care of that. The MS/MSD recoveries here are affected by the relatively high concentrations of PCBs in the samples, not by the matrix itself. Bottom line is most MS/MSD samples required dilutions which negated the ability to appropriately measure the spike recoveries." The data validation performed by an independent data validator supports this statement.

4.0 Data Analysis

4.1 Summary Statistics

Summary statistics are provided with the data in Appendix 1. Coefficient of variations in the Upper River ranged from 0.35 to 0.98 with an average of 0.63. The highest coefficient of variation was observed in adult carp from Upper River, Site 1. Coefficient of variation in the Middle River ranged from 0.34 to 0.80 with an average of 0.53. The highest coefficient of variation was observed in adult white sucker from Middle River, Site 2.

4.2 Comparison to 2010 Data

The 2011 Upper and Middle River data was compared to the 2010 data to determine if the remediation of the sediment is leading to a reduction in fish tissue PCB concentrations.

Mean PCB concentrations were lower in 2011 compared to 2010 for adult suckers, juvenile suckers, and smallmouth bass in Upper River 1; for adult suckers, juvenile suckers, and smallmouth bass in Upper River 2. Mean PCB concentrations were lower in 2011 compared to 2010 for carp, adult suckers, juvenile suckers, smallmouth bass, and walleye in Middle River 1; for adult suckers, juvenile suckers, and smallmouth bass in Middle River 2.

5.0 Future Phase 1 Monitoring

The table below provides the number of fish to collect in the Upper and Middle River reach sites for the 2012 post remedial annual monitoring event.

Fish Species	Number of Samples Per River Reach				
	Upper (Site 1)	Upper (Site 2)	Middle (Site 1)	Middle (Site 2)	Size Range
Smallmouth Bass	12	12	8	8	10-17 inches
Adult Carp	12	8	8	8	15-25 inches
Juvenile Carp	0	0	0	0	3-8 inches
Adult Suckers	12	12	8	8	8-16 inches
Juvenile Suckers	12	12	8	8	3-8 inches
Rock Bass	12	12	8	8	5-9 inches
Longnose Dace	8	8	8	8	1-4 inches
Walleye	0	0	8	0	12-22 inches
Catfish	0	0	0	8	12-22 inches

6.0 References

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Table 1
Summary of Targeted Fish Species

Fish Species	Characteristics	Habitat Targeted for Collection *	
		Upper – Lower River	Inner Harbor
Smallmouth bass	Occurs in all three drainage basins in Wisconsin. A non-migratory fish, they retreat to pools, undercut banks, or fairly deep water to avoid sunlight. Spawn in May through June when the water reaches 55-75°F. The average length of young-of year in Wisconsin is 2.7 inches by the end of September. The fish begin to reach sexual maturity at the ages of 3-4 depending on sex. The usual longevity is 5-7 years.	Area of little soft sediment. Sandy or gravel bottom best. Area of stumps or downed trees.	Near structures offering protection. Bridge abutments, docks, etc.
Carp	Occurs in all drainage basins in Wisconsin. It is found in a wide variety of habitats but prefer warm turbid water. Spawn in April to August when the water reaches 65-75°F. The average length of young-of year in Wisconsin is 3.7 inches by the end of September. In Wisconsin, carp mature between the ages of 2 and 3 depending on the sex. The usual longevity is 9-15 years. They can have a fairly extensive range and can jump small dams.	Areas with vegetation	
White suckers	Occurs in all drainage basins in Wisconsin and is probably the most widespread of all fish in Wisconsin. It is found in warm shallows of estuaries and bays and can tolerate all stream gradients and a wide range of environmental conditions and pollution. Spawn in April to May when the water reaches about 45°F. The typical length of young-of year in Wisconsin is 2.6 inches by the end of September. The usual longevity is 5 years after maturing between the ages of 2 and 3. They move about extensively.	Areas with vegetation	
Rock Bass	Occurs in all three drainage basins in Wisconsin. It is found in clear water over a gravel or rocky bottom and is often found near breakwaters and stone-armored shorelines. Often found with other sunfish such as smallmouth bass. Spawn in spring when the water reaches 60-70°F. The average length of young-of year in Wisconsin is 1.7 inches by the end of September. They reach maturity between ages 2 and 3. The usual longevity is 6-8 years. They have a limited range.	Prefers clear, rocky, and vegetated stream pools.	
Longnose Dace	Occurs in all drainage basins in Wisconsin. Occurs in riffles or torrential water over a bottom of boulder and gravel; it generally avoids pools and quiet runs. Spawn in late April to mid-June at an average water temperature of 63°F. The average length of young-of year in Wisconsin is 1.7 inches by the end of September. The usual longevity is 3-4 years after reaching maturity at age 2. No information on their range of migration was found.	Area of little soft sediment. Sandy, gravel or cobble bottom that have some vegetation for cover are best.	
Walleye	Present throughout Wisconsin. During the day, hovers in shadows of submerged objects or in shadows of deep water. At dusk, emerge to feed over shallow weed beds or rocky shoals. Spawn in mid-April to mid-May when water reaches 42-50°F. The average length of young-of year in Wisconsin is 3 inches by the end of July. Maturity occurs between the ages of 2 to 5 for males and 5 to 7 for females. The usual longevity is 6-7 years. They have a fairly extensive range and can jump small dams.	Area of little soft sediment. Sandy or gravel bottom best. Area of rough water.	
Catfish	Occurs in all three drainage basins in Wisconsin. It is found in a wide variety of habitats but prefer warm water. Spawn in May or June when the water reaches 75°F. The average length of young-of year catfish in Wisconsin is 3.4 inches by the end of September. Sexual maturity varies by body of water but it appears both sexes begin maturing by the age of 5. Few catfish live beyond 8 years. They can have a fairly extensive range.	Prefers some current and deep water with sand, gravel or rubble bottoms. Areas near bank overhangs or downed trees or stumps	

* - General tips on fish locations: outside bends of river, downstream of rocks, area where fast water meets slower water, area of merging currents (streams, brooks, rivers et.) current edges, areas with overhanging trees or branches, drop offs, undercuts, below dams or falls, above springs, riparian zones

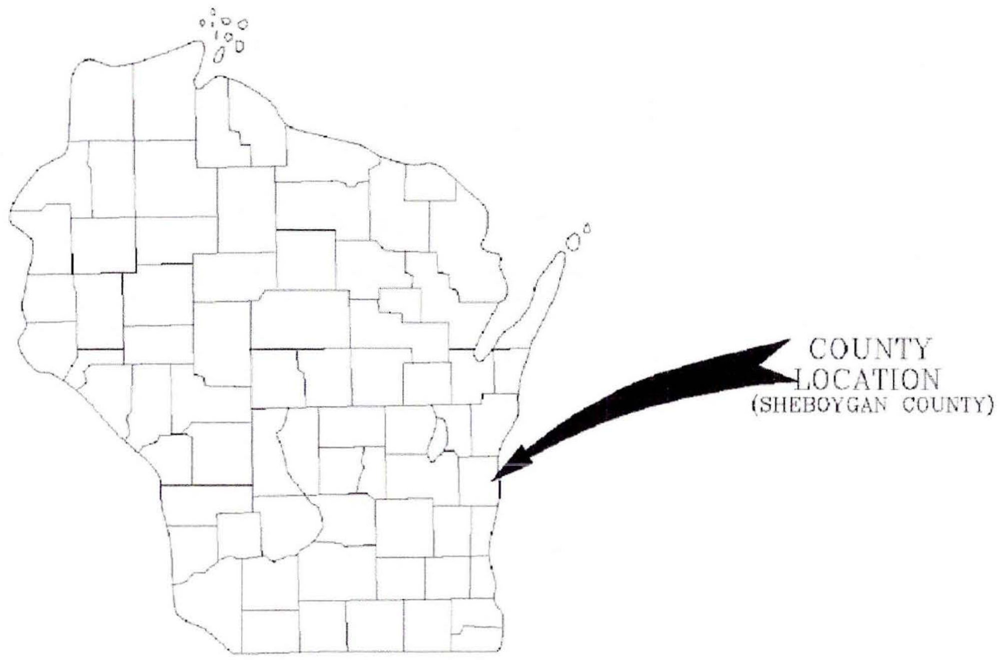
Table 2
2011 Phase 1 Daily Fish Collection Summary

Date	River Reach	Adult Carp	Adult White Suckers	Juvenile White Suckers	Small Mouth Bass	Rock Bass	Longnose Dace	Walleye	Channel Catfish
6/13/2011	UR1	3		2					
6/14/2011	UR1	9	12	4	9	9			
6/15/2011	UR1				3				
6/16/2011	UR1					3			
6/17/2011	UR2	3	12	6	12	8			
6/18/2011	UR2	5		6		4			
6/20/2011	MR1	8	8	8	8	8		8	
6/21/2011	MR2	8	8	8	8	8			
6/22/2011	UR1			6					
TOTAL		36	40	40	40	40	0	8	0

UR1 – Upper River from former Tecumseh Site to Riverbend Dam
UR2 – Upper River from Riverbend Dam to Waelderhaus Dam
MR1 - Middle River from Waelderhaus Dam to Kohler Landfill
MR2 - Kohler Landfill to C&NW Railroad Bridge

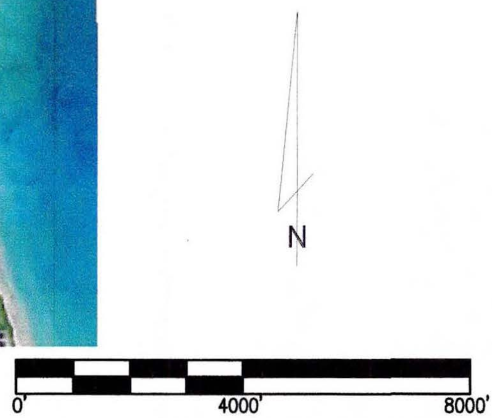
Table 3 2011 Phase 1 Fish Collection Summary								
Species	**UR1**	**UR1**	**UR2**	**UR2**	**MR1**	**MR1**	**MR2**	**MR2**
	Target	**Collected**	**Target**	**Collected**	**Target**	**Collected**	**Target**	**Collected**
Adult Carp	12	12	8	8	8	8	8	8
Adult White Sucker	12	12	12	12	8	8	8	8
Juvenile White Sucker	12	12	12	12	8	8	8	8
Smallmouth Bass	12	12	12	12	8	8	8	8
Rock Bass	12	12	12	12	8	8	8	8
Longnose Dace	8	0	8	0	8	0	8	0
Walleye	0	0	0	0	8	8	8	0
Channel Catfish	0	0	0	0	8	0	8	0
Total	68	60	64	56	64	48	64	40

UR1 – Upper River from former Tecumseh Site to Riverbend Dam
UR2 - Upper River from Riverbend Dam to Waelderhaus Dam
MR1 - Middle River from Waelderhaus Dam to Kohler Landfill
MR2 - Middle River from Kohler Landfill to C&NW Railroad Bridge



COUNTY LOCATION MAP

NOT TO SCALE



NO.	REVISIONS BY	DATE
△		
△		
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SIGNATURES	BY	DATE
APPROVED		
REVIEWED		
DESIGNED		

FILE NAME:
DRAWN BY: KDA DATE: JANUARY 2009

Pollution Risk Services
7870 East Kemper Road, Suite 240
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Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
2009 PHASE 1 UPPER RIVER FISH MONITORING REPORT
SHEBOYGAN FALLS, WISCONSIN

SHEBOYGAN RIVER LOCATION MAP

Scale: SHOWN

FIGURE NO. 1

FIGURE NO. 2	Scale: SHOWN	SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE 2009 PHASE 1 UPPER RIVER FISH MONITORING REPORT SHEBOYGAN FALLS, WISCONSIN RIVER REACHES	PRS Pollution Risk Services 7870 East Kemper Road, Suite 240 Cincinnati, Ohio 45249 Phone: 513-489-2793 Fax: 513-489-2794	FILE NAME: DRAWN BY: KDA DATE: JULY 2009

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
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			APPROVED	
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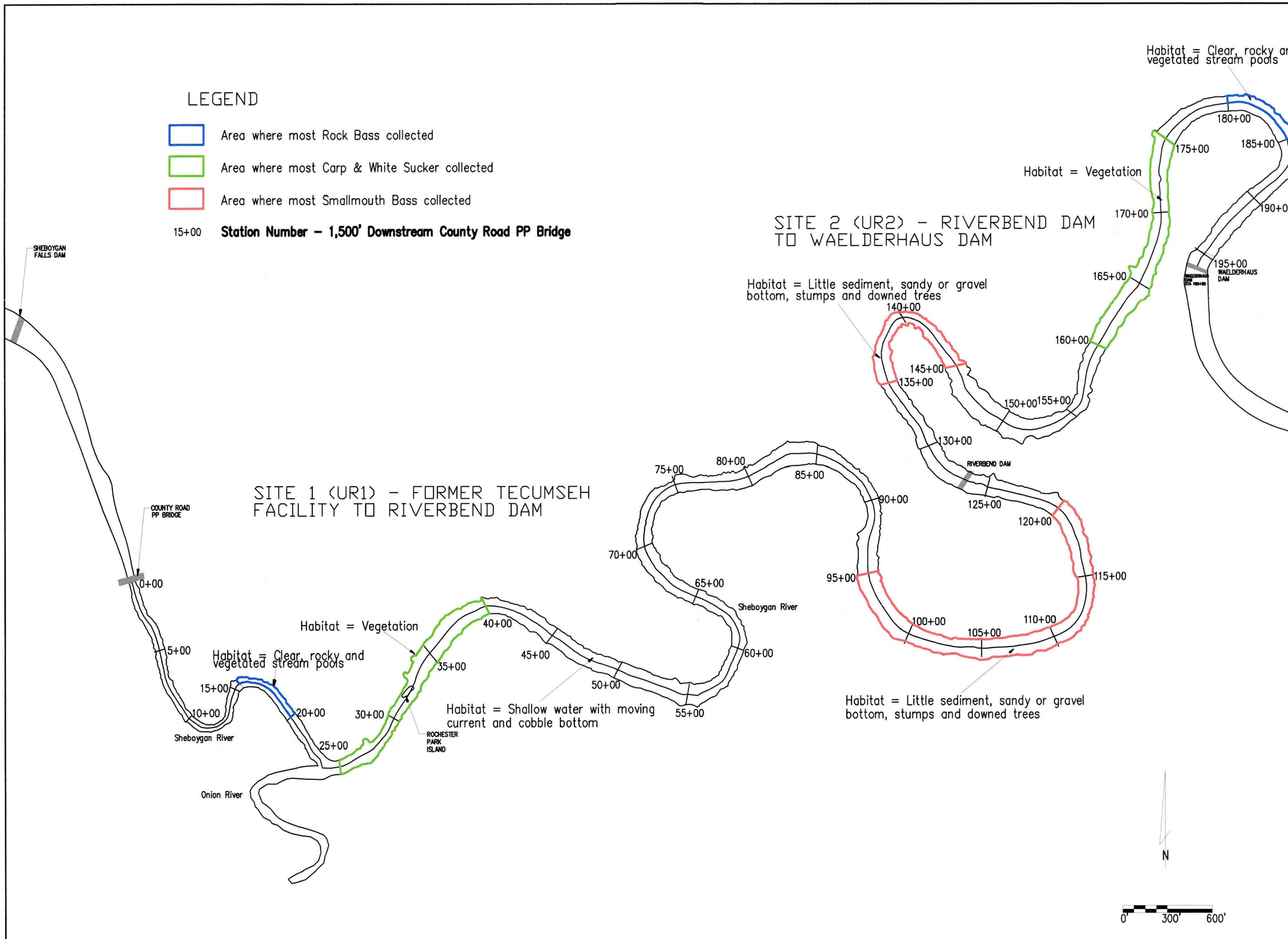

FILE NAME:	
DRAWN BY: KDA	DATE: JANUARY 2009

SIGNATURES: BY / DATE — APPROVED / REVIEWED / DESIGNED

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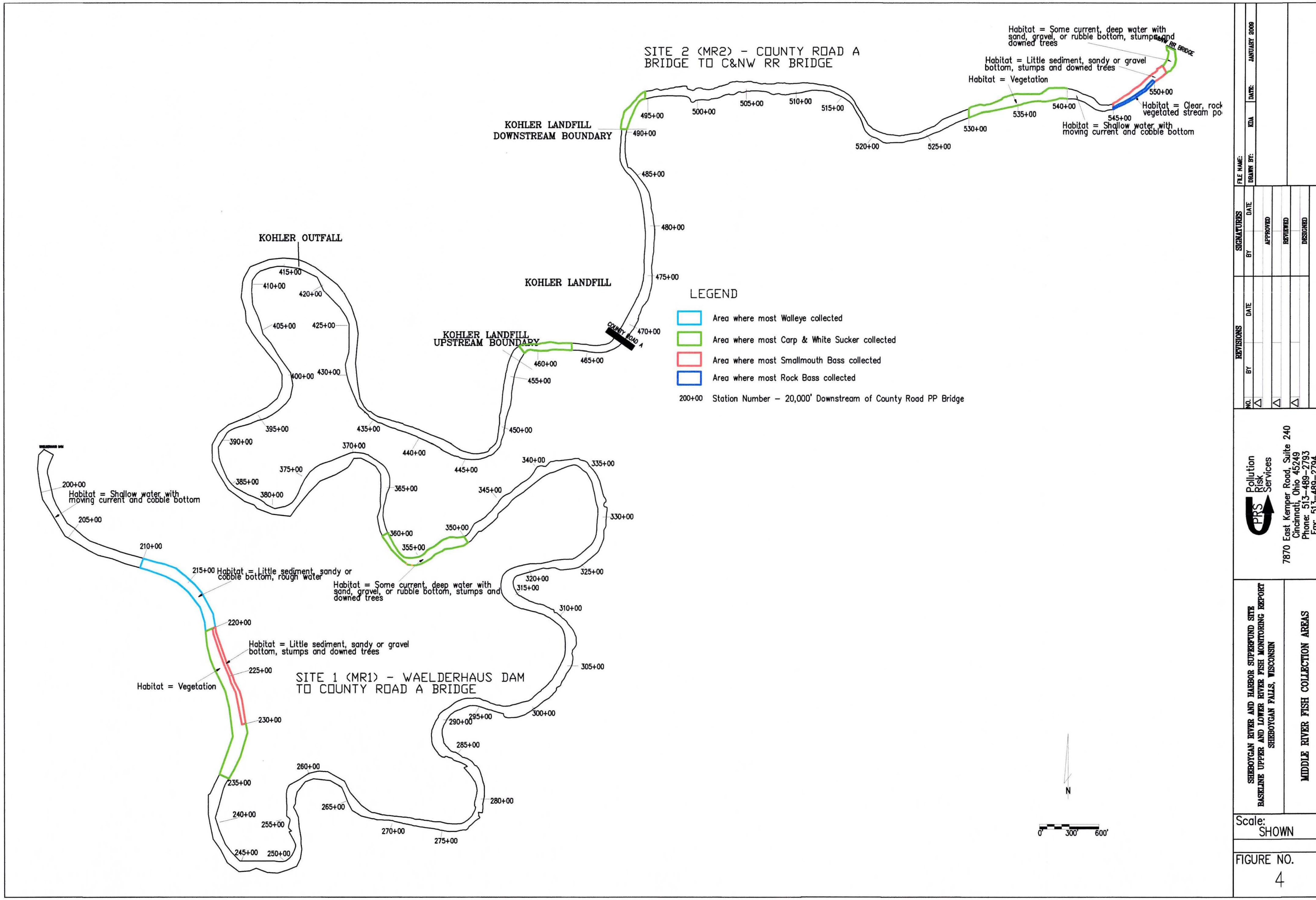
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
BASELINE UPPER AND LOWER RIVER FISH MONITORING REPORT
SHEBOYGAN FALLS, WISCONSIN

UPPER RIVER FISH COLLECTION AREAS

SCALE: SHOWN

FIGURE NO. 3



SITE 2 (MR2) - COUNTY ROAD A BRIDGE TO C&NW RR BRIDGE
SITE 1 (MR1) - WAELDERHAUS DAM TO COUNTY ROAD A BRIDGE
KOHLER LANDFILL DOWNSTREAM BOUNDARY
KOHLER LANDFILL
KOHLER LANDFILL UPSTREAM BOUNDARY
KOHLER OUTFALL
COUNTY ROAD A
C&NW RR BRIDGE
Habitat = Some current, deep water with sand, gravel, or rubble bottom, stumps and downed trees
Habitat = Little sediment, sandy or gravel bottom, stumps and downed trees
Habitat = Vegetation
Habitat = Clear, rock vegetated stream po
Habitat = Shallow water with moving current and cobble bottom
Habitat = Little sediment, sandy or cobble bottom, rough water
LEGEND
Area where most Walleye collected
Area where most Carp & White Sucker collected
Area where most Smallmouth Bass collected
Area where most Rock Bass collected
200+00 Station Number – 20,000' Downstream of County Road PP Bridge
200+00
205+00
210+00
215+00
220+00
225+00
230+00
235+00
240+00
245+00
250+00
255+00
260+00
265+00
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DRAWN BY: KDA
DATE: JANUARY 2009
REVISIONS
NO. BY DATE
SIGNATURES
BY DATE
APPROVED
REVIEWED
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PRS Pollution Risk Services
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SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
BASELINE UPPER AND LOWER RIVER FISH MONITORING REPORT
SHEBOYGAN FALLS, WISCONSIN
MIDDLE RIVER FISH COLLECTION AREAS
Scale: SHOWN
FIGURE NO. 4

Appendix 1

Summary of 2011 Phase 1 Fish Tissue Results

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 1 (UR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR1-AC1-G, 6/14/11	Adult Carp	SO	25.00	63.50	115.00	3260.19	M	8.00	4.50%	12.70
PH1-PRM-UR1-AC2-G, 6/14/11			26.00	66.04	144.00	4082.33	F	8.50	3.90%	5.66
PH1-PRM-UR1-AC3-G, 6/14/11			26.00	66.04	120.00	3401.94	M	8.50	4.60%	24.10
PH1-PRM-UR1-AC4-G, 6/14/11			25.00	63.50	139.00	3940.58	F	8.00	1.00%	3.61
PH1-PRM-UR1-AC5-G, 6/14/11			20.00	50.80	80.00	2267.96	M	5.50	2.20%	6.28
PH1-PRM-UR1-AC6-G, 6/13/11			26.00	66.04	176.00	4989.51	F	8.50	5.10%	44.70
PH1-PRM-UR1-AC7-G, 6/13/11			17.00	43.18	68.00	1927.77	F	4.00	0.82%	13.40
PH1-PRM-UR1-AC8-G, 6/14/11			16.00	40.64	40.00	1133.98	M	3.50	0.86%	1.87
PH1-PRM-UR1-AC9-G, 6/14/11			18.50	46.99	56.00	1587.57	F	5.00	7.20%	17.20
PH1-PRM-UR1-AC10-G, 6/14/11			21.00	53.34	100.00	2834.95	F	6.00	2.30%	5.93
PH1-PRM-UR1-AC11-G, 6/14/11			18.50	46.99	64.00	1814.37	F	5.00	4.80%	20.00
PH1-PRM-UR1-AC12-G, 6/13/11			20.00	50.80	71.00	2012.81	M	5.50	5.40%	58.90
Mean Result for Adult Carp			21.58	54.82	97.75	2771.16	NA	6.33	3.56%	17.86
Minimum Results for Adult Carp			16.00	40.64	40.00	1133.98	NA	3.50	0.82%	1.87
Maximum Results for Adult Carp			26.00	66.04	176.00	4989.51	NA	8.50	7.20%	58.90
Standard Deviation for Adult Carp			3.79	9.64	41.44	1174.94	NA	1.86	2.08%	17.53
Coefficient of Variation for Adult Carp			0.18	0.18	0.42	0.42	NA	0.29	0.58	0.98
Upper 95% UCL for Adult Carp			23.73	60.28	121.20	3435.93	NA	7.39	4.73%	18.42

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 1 (UR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR1-AWS1-G, 6/14/11	Adult White Sucker	SO	15.00	38.10	21.00	595.34	M	4.00	1.80%	5.52
PH1-PRM-UR1-AWS2-G, 6/14/11			15.00	38.10	32.00	907.18	M	4.00	2.90%	16.50
PH1-PRM-UR1-AWS3-G, 6/14/11			14.50	36.83	24.30	688.89	M	4.00	1.10%	1.67
PH1-PRM-UR1-AWS4-G, 6/14/11			16.00	40.64	41.90	1187.84	M	5.00	0.97%	3.69
PH1-PRM-UR1-AWS5-G, 6/14/11			14.00	35.56	22.50	637.86	M	4.00	1.70%	5.08
PH1-PRM-UR1-AWS6-G, 6/14/11			16.00	40.64	28.10	796.62	M	4.00	1.40%	4.97
PH1-PRM-UR1-AWS7-G, 6/14/11			14.00	35.56	23.00	652.04	M	4.00	2.00%	5.05
PH1-PRM-UR1-AWS8-G, 6/14/11			16.00	40.64	28.50	807.96	M	5.00	0.75%	3.24
PH1-PRM-UR1-AWS9-G, 6/14/11			14.00	35.56	22.10	626.52	M	5.00	1.60%	3.00
PH1-PRM-UR1-AWS10-G, 6/14/11			13.00	33.02	50.10	1420.31	M	3.00	0.99%	2.45
PH1-PRM-UR1-AWS11-G, 6/14/11			16.00	40.64	27.50	779.61	M	5.00	1.00%	2.74
PH1-PRM-UR1-AWS12-G, 6/14/11			16.00	40.64	29.50	836.31	M	3.00	0.90%	2.57
Mean Result for Adult White Sucker			14.96	37.99	29.21	828.04	NA	4.17	1.43%	4.71
Minimum Results for Adult White Sucker			13.00	33.02	21.00	595.34	NA	3.00	0.75%	1.67
Maximum Results for Adult White Sucker			16.00	40.64	50.10	1420.31	NA	5.00	2.90%	16.50
Standard Deviation for Adult White Sucker			1.05	2.68	8.72	247.09	NA	0.72	0.62%	3.92
Coefficient of Variation for Adult White Sucker			0.07	0.07	0.30	0.30	NA	0.17	0.43	0.83
Upper 95% UCL for Adult White Sucker			15.55	39.51	34.14	967.84	NA	4.57	1.77%	22.96

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 1 (UR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR1-JWS1-G, 6/14/11	Juvenile White Sucker	SO	7.00	17.78	2.70	76.54	M	1.00	0.86%	3.45
PH1-PRM-UR1-JWS2-G, 6/14/11			8.00	20.32	5.10	144.58	M	1.00	1.50%	1.37
PH1-PRM-UR1-JWS3-G, 6/14/11			6.50	16.51	1.80	51.03	M	1.00	0.94%	1.02
PH1-PRM-UR1-JWS4-G, 6/14/11			7.00	17.78	1.90	53.86	M	1.00	0.78%	1.82
PH1-PRM-UR1-JWS5-G, 6/13/11			8.00	20.32	3.80	107.73	M	1.00	1.70%	5.36
PH1-PRM-UR1-JWS6-G, 6/13/11			6.00	15.24	2.00	56.70	M	1.00	1.60%	5.02
PH1-PRM-UR1-JWS7-G, 6/22/11			8.00	20.32	5.40	153.09	M	1.00	1.40%	4.24
PH1-PRM-UR1-JWS8-G, 6/22/11			7.00	17.78	2.80	79.38	M	1.00	1.30%	1.30
PH1-PRM-UR1-JWS9-G, 6/22/11			6.50	16.51	2.20	62.37	M	1.00	1.60%	1.60
PH1-PRM-UR1-JWS10-G, 6/22/11			8.00	20.32	4.00	113.40	M	1.00	0.90%	0.44
PH1-PRM-UR1-JWS11-G, 6/22/11			8.00	20.32	3.90	110.56	M	1.00	2.20%	1.38
PH1-PRM-UR1-JWS12-G, 6/22/11			8.00	20.32	5.20	147.42	M	1.00	1.90%	0.89
Mean Result for Juvenile White Sucker			7.33	18.63	3.40	96.39	NA	1.00	1.39%	2.32
Minimum Results for Juvenile White Sucker			6.00	15.24	1.80	51.03	NA	1.00	0.78%	0.44
Maximum Results for Juvenile White Sucker			8.00	20.32	5.40	153.09	NA	1.00	2.20%	5.36
Standard Deviation for Juvenile White Sucker			0.75	1.90	1.35	38.19	NA	0.00	0.45%	1.71
Coefficient of Variation for Juvenile White Sucker			0.10	0.10	0.40	0.40	NA	0.00	0.32	0.74
Upper 95% UCL for Juvenile White Sucker			8.00	19.70	4.16	117.99	NA	NA	1.64%	12.08

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 1 (UR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR1-SB1-G, 6/14/11	Smallmouth Bass	SO	11.00	27.94	14.00	396.89	M	4.00	0.46%	1.55
PH1-PRM-UR1-SB2-G, 6/14/11			12.50	31.75	17.60	498.95	M	4.00	0.42%	3.45
PH1-PRM-UR1-SB3-G, 6/14/11			13.50	34.29	27.00	765.44	F	5.00	0.38%	1.06
PH1-PRM-UR1-SB4-G, 6/14/11			10.00	25.40	6.60	187.11	M	3.00	0.70%	1.98
PH1-PRM-UR1-SB5-G, 6/14/11			12.00	30.48	16.40	464.93	F	4.00	0.77%	4.62
PH1-PRM-UR1-SB6-G, 6/14/11			10.00	25.40	9.00	255.15	M	3.00	0.62%	4.07
PH1-PRM-UR1-SB7-G, 6/14/11			11.00	27.94	12.70	360.04	M	4.00	0.39%	3.37
PH1-PRM-UR1-SB8-G, 6/14/11			12.00	30.48	12.20	345.86	M	4.00	0.26%	4.77
PH1-PRM-UR1-SB9-G, 6/14/11			11.00	27.94	13.10	371.38	F	4.00	0.34%	0.69
PH1-PRM-UR1-SB10-G, 6/15/11			10.00	25.40	5.90	167.26	M	3.00	0.86%	3.92
PH1-PRM-UR1-SB11-G, 6/15/11			11.00	27.94	8.90	252.31	M	4.00	0.32%	4.74
PH1-PRM-UR1-SB12-G, 6/15/11			12.00	30.48	13.70	388.39	M	4.00	0.41%	4.44
Mean Result for Smallmouth Bass			11.33	28.79	13.09	371.14	NA	3.83	0.49%	3.22
Minimum Results for Smallmouth Bass			10.00	25.40	5.90	167.26	NA	3.00	0.26%	0.69
Maximum Results for Smallmouth Bass			13.50	34.29	27.00	765.44	NA	5.00	0.86%	4.77
Standard Deviation for Smallmouth Bass			1.09	2.78	5.68	161.06	NA	0.58	0.19%	1.50
Coefficient of Variation for Smallmouth Bass			0.10	0.10	0.43	0.43	NA	0.15	0.39	0.47
Upper 95% UCL for Smallmouth Bass			11.95	30.36	16.31	462.27	NA	4.16	0.60%	5.79

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 1 (UR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR1-RB1-G, 6/14/11	Rock Bass	SO	5.00	12.70	4.60	130.41	M	2.00	0.77%	4.56
PH1-PRM-UR1-RB2-G, 6/14/11			5.00	12.70	1.40	39.69	M	2.00	0.91%	2.15
PH1-PRM-UR1-RB3-G, 6/14/11			9.00	22.86	9.70	274.99	M	6.00	0.32%	3.50
PH1-PRM-UR1-RB4-G, 6/14/11			7.00	17.78	5.50	155.92	M	3.00	0.35%	4.21
PH1-PRM-UR1-RB5-G, 6/14/11			6.00	15.24	3.20	90.72	M	3.00	0.26%	4.18
PH1-PRM-UR1-RB6-G, 6/14/11			7.00	17.78	5.50	155.92	M	3.00	0.26%	4.20
PH1-PRM-UR1-RB7-G, 6/14/11			5.00	12.70	1.60	45.36	M	2.00	0.73%	2.60
PH1-PRM-UR1-RB8-G, 6/14/11			6.00	15.24	2.70	76.54	M	3.00	0.52%	2.40
PH1-PRM-UR1-RB9-G, 6/14/11			7.00	17.78	3.60	102.06	F	4.00	0.33%	0.41
PH1-PRM-UR1-RB10-G, 6/16/11			6.00	15.24	1.90	53.86	F	3.00	0.92%	12.00
PH1-PRM-UR1-RB11-G, 6/16/11			8.00	20.32	5.00	141.75	M	4.00	0.35%	2.84
PH1-PRM-UR1-RB12-G, 6/16/11			9.00	22.86	8.50	240.97	F	5.50	0.36%	0.91
Mean Result for Rock Bass			6.67	16.93	4.43	125.68	NA	3.38	0.51%	3.66
Minimum Results for Rock Bass			5.00	12.70	1.40	39.69	NA	2.00	0.26%	0.41
Maximum Results for Rock Bass			9.00	22.86	9.70	274.99	NA	6.00	0.92%	12.00
Standard Deviation for Rock Bass			1.44	3.65	2.62	74.40	NA	1.30	0.25%	2.94
Coefficient of Variation for Rock Bass			0.22	0.22	0.59	0.59	NA	0.38	0.50	0.80
Upper 95% UCL for Rock Bass			7.48	19.00	5.92	167.78	NA	4.11	0.65%	3.88

NA - Not applicable
TS - Too small to gender/age
SO - Scale off, skin on fillet
SOF - Skin off fillet
W - Whole fish

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 2 (UR2)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR2-AC1-G, 6/18/11	Adult Carp	SO	23.50	59.69	132.20	3747.80	F	7.00	9.60%	19.70
PH1-PRM-UR2-AC2-G, 6/18/11			22.00	55.88	96.20	2727.22	F	6.00	4.10%	9.25
PH1-PRM-UR2-AC3-G, 6/18/11			26.00	66.04	126.10	3574.87	M	8.50	1.70%	3.96
PH1-PRM-UR2-AC4-G, 6/18/11			22.00	55.88	78.80	2233.94	M	6.00	6.80%	10.90
PH1-PRM-UR2-AC5-G, 6/18/11			24.00	60.96	114.50	3246.02	M	7.50	1.00%	3.72
PH1-PRM-UR2-AC6-G, 6/17/11			20.00	50.80	98.80	2800.93	F	5.50	3.40%	8.45
PH1-PRM-UR2-AC7-G, 6/17/11			23.00	58.42	136.80	3878.21	F	6.50	1.60%	2.44
PH1-PRM-UR2-AC8-G, 6/17/11			23.00	58.42	101.00	2863.30	M	6.50	1.50%	12.30
Mean Result for Adult Carp			22.94	58.26	110.55	3134.04	NA	6.69	3.71%	8.84
Minimum Results for Adult Carp			20.00	50.80	78.80	2233.94	NA	5.50	1.00%	2.44
Maximum Results for Adult Carp			26.00	66.04	136.80	3878.21	NA	8.50	9.60%	19.70
Standard Deviation for Adult Carp			1.74	4.42	20.21	572.88	NA	0.96	3.05%	5.68
Coefficient of Variation for Adult Carp			0.08	0.08	0.18	0.18	NA	0.14	0.82	0.64
Upper 95% UCL for Adult Carp			24.14	61.33	124.55	3531.01	NA	7.35	5.83%	24.54

PH1-PRM-UR2-AWS1-G, 6/17/11	Adult White Sucker	SO	16.00	40.64	28.60	810.80	M	5.00	1.80%	3.89
PH1-PRM-UR2-AWS2-G, 6/17/11			15.00	38.10	21.30	603.84	M	4.00	2.60%	7.69
PH1-PRM-UR2-AWS3-G, 6/17/11			13.50	34.29	17.70	501.79	M	3.00	1.90%	3.43
PH1-PRM-UR2-AWS4-G, 6/17/11			15.00	38.10	21.80	618.02	M	3.00	1.40%	2.87
PH1-PRM-UR2-AWS5-G, 6/17/11			14.50	36.83	20.20	572.66	M	4.00	1.50%	4.10
PH1-PRM-UR2-AWS6-G, 6/17/11			15.50	39.37	28.70	813.63	M	4.00	1.50%	6.25
PH1-PRM-UR2-AWS7-G, 6/17/11			15.50	39.37	24.90	705.90	M	4.00	2.40%	5.87
PH1-PRM-UR2-AWS8-G, 6/17/11			15.00	38.10	23.50	666.21	M	4.50	1.10%	2.58
PH1-PRM-UR2-AWS9-G, 6/17/11			14.00	35.56	19.60	555.65	M	4.50	1.30%	3.06
PH1-PRM-UR2-AWS10-G, 6/17/11			15.25	38.74	24.40	691.73	M	4.00	2.60%	4.53
PH1-PRM-UR2-AWS11-G, 6/17/11			13.00	33.02	15.80	447.92	M	3.00	3.20%	5.07
PH1-PRM-UR2-AWS12-G, 6/17/11			11.50	29.21	9.90	280.66	M	2.00	1.30%	2.36
Mean Result for Adult White Sucker			14.48	36.78	21.37	605.73	NA	3.75	1.88%	4.31
Minimum Results for Adult White Sucker			11.50	29.21	9.90	280.66	NA	2.00	1.10%	2.36
Maximum Results for Adult White Sucker			16.00	40.64	28.70	813.63	NA	5.00	3.20%	7.69
Standard Deviation for Adult White Sucker			1.28	3.25	5.33	151.21	NA	0.84	0.66%	1.64
Coefficient of Variation for Adult White Sucker			0.09	0.09	0.25	0.25	NA	0.22	0.35	0.38
Upper 95% UCL for Adult White Sucker			15.20	38.62	24.38	691.29	NA	4.22	2.26%	6.44

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 2 (UR2)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR2-JWS1-G, 6/18/11	Juvenile White Sucker	SO	8.00	20.32	4.20	119.07	M	1.00	1.20%	1.16
PH1-PRM-UR2-JWS2-G, 6/18/11			8.00	20.32	4.30	121.90	M	1.00	1.60%	2.25
PH1-PRM-UR2-JWS3-G, 6/18/11			8.00	20.32	4.70	133.24	M	1.00	0.75%	1.43
PH1-PRM-UR2-JWS4-G, 6/18/11			5.50	13.97	1.10	31.18	M	1.00	1.10%	1.39
PH1-PRM-UR2-JWS5-G, 6/18/11			6.50	16.51	1.80	51.03	M	1.00	0.80%	1.28
PH1-PRM-UR2-JWS6-G, 6/18/11			5.25	13.34	0.90	25.51	M	1.00	0.76%	2.41
PH1-PRM-UR2-JWS7-G, 6/17/11			8.00	20.32	3.60	102.06	M	1.00	1.40%	1.18
PH1-PRM-UR2-JWS8-G, 6/17/11			7.75	19.69	3.40	96.39	M	1.00	0.94%	1.17
PH1-PRM-UR2-JWS9-G, 6/17/11			7.25	18.42	2.70	76.54	M	1.00	0.81%	1.05
PH1-PRM-UR2-JWS10-G, 6/17/11			7.50	19.05	3.20	90.72	M	1.00	0.82%	1.48
PH1-PRM-UR2-JWS11-G, 6/17/11			6.75	17.15	2.20	62.37	M	1.00	0.74%	0.87
PH1-PRM-UR2-JWS12-G, 6/17/11			5.00	12.70	0.90	25.51	M	1.00	0.82%	2.32
Mean Result for Juvenile White Sucker			6.96	17.67	2.75	77.96	NA	1.00	0.98%	1.50
Minimum Results for Juvenile White Sucker			5.00	12.70	0.90	25.51	NA	1.00	0.74%	0.87
Maximum Results for Juvenile White Sucker			8.00	20.32	4.70	133.24	NA	1.00	1.60%	2.41
Standard Deviation for Juvenile White Sucker			1.15	2.91	1.36	38.64	NA	0.00	0.29%	0.53
Coefficient of Variation for Juvenile White Sucker			0.16	0.16	0.50	0.50	NA	0.00	0.29	0.35
Upper 95% UCL for Juvenile White Sucker			7.61	19.32	3.52	99.82	NA	NA	1.14%	2.49
PH1-PRM-UR2-SB1-G, 6/17/11	Smallmouth Bass	SO	12.00	30.48	16.00	453.59	F	4.00	0.62%	1.28
PH1-PRM-UR2-SB2-G, 6/17/11			11.00	27.94	12.40	351.53	M	4.00	0.58%	4.11
PH1-PRM-UR2-SB3-G, 6/17/11			11.25	28.58	11.70	331.69	M	4.00	0.54%	2.28
PH1-PRM-UR2-SB4-G, 6/17/11			11.00	27.94	13.50	382.72	F	4.00	0.54%	0.70
PH1-PRM-UR2-SB5-G, 6/17/11			9.50	24.13	7.30	206.95	M	3.50	0.34%	2.56
PH1-PRM-UR2-SB6-G, 6/17/11			10.50	26.67	11.30	320.35	F	4.00	0.38%	0.91
PH1-PRM-UR2-SB7-G, 6/17/11			10.50	26.67	11.50	326.02	M	4.00	0.46%	2.92
PH1-PRM-UR2-SB8-G, 6/17/11			11.00	27.94	11.40	323.18	M	4.00	0.26%	2.94
PH1-PRM-UR2-SB9-G, 6/17/11			12.00	30.48	17.40	493.28	F	4.00	0.56%	1.53
PH1-PRM-UR2-SB10-G, 6/17/11			11.25	28.58	14.30	405.40	F	4.00	0.76%	1.05
PH1-PRM-UR2-SB11-G, 6/17/11			12.00	30.48	14.20	402.56	M	4.00	0.34%	3.26
PH1-PRM-UR2-SB12-G, 6/17/11			11.25	28.58	11.70	331.69	M	4.00	0.00%	3.84
Mean Result for Smallmouth Bass			11.10	28.20	12.73	360.75	NA	3.96	0.45%	2.28
Minimum Results for Smallmouth Bass			9.50	24.13	7.30	206.95	NA	3.50	0.00%	0.70
Maximum Results for Smallmouth Bass			12.00	30.48	17.40	493.28	NA	4.00	0.76%	4.11
Standard Deviation for Smallmouth Bass			0.73	1.85	2.61	73.91	NA	0.14	0.20%	1.17
Coefficient of Variation for Smallmouth Bass			0.07	0.07	0.20	0.20	NA	0.04	0.45	0.51
Upper 95% UCL for Smallmouth Bass			11.52	29.25	14.20	402.56	NA	4.04	0.56%	5.32

2011 FISH SAMPLE RESULTS - UPPER RIVER SITE 2 (UR2)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-UR2-RB1-G, 6/18/11	Rock Bass	SO	4.00	10.16	0.80	22.68	M	2.00	1.00%	3.52
PH1-PRM-UR2-RB2-G, 6/18/11			4.25	10.80	1.00	28.35	M	2.00	0.60%	1.45
PH1-PRM-UR2-RB3-G, 6/18/11			4.75	12.07	1.40	39.69	F	2.00	0.51%	1.68
PH1-PRM-UR2-RB4-G, 6/18/11			4.25	10.80	0.90	25.51	M	2.00	0.88%	2.98
PH1-PRM-UR2-RB5-G, 6/17/11			9.50	24.13	12.10	343.03	M	5.50	0.21%	2.46
PH1-PRM-UR2-RB6-G, 6/17/11			7.00	17.78	4.60	130.41	M	3.50	0.22%	0.46
PH1-PRM-UR2-RB7-G, 6/17/11			6.50	16.51	3.90	110.56	M	3.00	0.30%	1.35
PH1-PRM-UR2-RB8-G, 6/17/11			6.50	16.51	3.40	96.39	F	3.00	0.38%	0.88
PH1-PRM-UR2-RB9-G, 6/17/11			9.00	22.86	1.60	45.36	M	3.50	1.20%	4.80
PH1-PRM-UR2-RB10-G, 6/17/11			4.50	11.43	1.30	36.85	M	2.00	0.54%	1.70
PH1-PRM-UR2-RB11-G, 6/17/11			4.25	10.80	1.00	28.35	M	2.00	1.10%	2.51
PH1-PRM-UR2-RB12-G, 6/17/11			4.25	10.80	1.00	28.35	M	2.00	0.65%	2.58
Mean Result for Rock Bass			5.73	14.55	2.75	77.96	NA	2.71	0.63%	2.20
Minimum Results for Rock Bass			4.00	10.16	0.80	22.68	NA	2.00	0.21%	0.46
Maximum Results for Rock Bass			9.50	24.13	12.10	343.03	NA	5.50	1.20%	4.80
Standard Deviation for Rock Bass			1.95	4.96	3.22	91.36	NA	1.08	0.34%	1.21
Coefficient of Variation for Rock Bass			0.34	0.34	1.17	1.17	NA	0.40	0.54	0.55
Upper 95% UCL for Rock Bass			6.83	17.36	4.57	129.65	NA	3.32	0.83%	2.12

NA - Not applicable
SO - Scale off, skin on fillet
SOF - Skin off fillet
W - Whole fish

2011 FISH SAMPLE RESULTS - MIDDLE RIVER SITE 1 (MR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-MR1-AC1-G, 6/20/11	Adult Carp	SO	26.00	66.04	165.40	4689.01	F	7.50	10.40%	21.90
PH1-PRM-MR1-AC2-G, 6/20/11			26.00	66.04	158.70	4499.07	F	7.50	4.00%	7.80
PH1-PRM-MR1-AC3-G, 6/20/11			25.50	64.77	149.00	4224.08	M	7.50	17.40%	19.20
PH1-PRM-MR1-AC4-G, 6/20/11			26.00	66.04	159.80	4530.25	M	8.50	6.20%	11.40
PH1-PRM-MR1-AC5-G, 6/20/11			25.00	63.50	128.30	3637.24	M	7.50	6.20%	13.70
PH1-PRM-MR1-AC6-G, 6/20/11			26.00	66.04	157.50	4465.05	M	8.50	8.40%	16.60
PH1-PRM-MR1-AC7-G, 6/20/11			26.00	66.04	184.70	5236.15	F	8.50	19.40%	25.00
PH1-PRM-MR1-AC8-G, 6/20/11			23.00	58.42	96.40	2732.89	M	6.50	5.00%	20.50
Mean Result for Adult Carp			25.44	64.61	149.98	4251.72	NA	7.75	9.63%	17.01
Minimum Results for Adult Carp			23.00	58.42	96.40	2732.89	NA	6.50	4.00%	7.80
Maximum Results for Adult Carp			26.00	66.04	184.70	5236.15	NA	8.50	19.40%	25.00
Standard Deviation for Adult Carp			1.05	2.67	26.76	758.74	NA	0.71	5.79%	5.76
Coefficient of Variation for Adult Carp			0.04	0.04	0.18	0.18	NA	0.09	0.60	0.34
Upper 95% UCL for Adult Carp			26.17	66.46	168.52	4777.49	NA	8.24	13.64%	66.05

2011 FISH SAMPLE RESULTS - MIDDLE RIVER SITE 1 (MR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-MR1-AWS1-G, 6/20/11	Adult White Sucker	SO	17.00	43.18	30.10	853.32	M	4.00	1.50%	3.43
PH1-PRM-MR1-AWS2-G, 6/20/11			15.00	38.10	26.10	739.92	F	3.00	1.20%	0.42
PH1-PRM-MR1-AWS3-G, 6/20/11			15.00	38.10	24.40	691.73	M	3.00	0.78%	1.36
PH1-PRM-MR1-AWS4-G, 6/20/11			17.50	44.45	31.20	884.50	M	5.00	1.90%	4.28
PH1-PRM-MR1-AWS5-G, 6/20/11			16.00	40.64	27.20	771.11	M	4.00	1.80%	5.94
PH1-PRM-MR1-AWS6-G, 6/20/11			17.50	44.45	33.70	955.38	M	5.00	2.20%	4.26
PH1-PRM-MR1-AWS7-G, 6/20/11			16.00	40.64	24.30	688.89	M	4.00	1.60%	3.37
PH1-PRM-MR1-AWS8-G, 6/20/11			16.00	40.64	24.40	691.73	M	4.00	1.80%	3.39
Mean Result for Adult White Sucker			16.25	41.28	27.68	784.57	NA	4.00	1.60%	3.31
Minimum Results for Adult White Sucker			15.00	38.10	24.30	688.89	NA	3.00	0.78%	0.42
Maximum Results for Adult White Sucker			17.50	44.45	33.70	955.38	NA	5.00	2.20%	5.94
Standard Deviation for Adult White Sucker			1.00	2.54	3.59	101.74	NA	0.76	0.44%	1.73
Coefficient of Variation for Adult White Sucker			0.06	0.06	0.13	0.13	NA	0.19	0.28	0.52
Upper 95% UCL for Adult White Sucker			16.94	43.04	30.16	855.07	NA	4.52	1.90%	5.79
PH1-PRM-MR1-JWS1-G, 6/20/11	Juvenile White Sucker	SO	8.00	20.32	6.30	178.60	M	1.00	1.60%	0.89
PH1-PRM-MR1-JWS2-G, 6/20/11			8.00	20.32	6.50	184.27	M	1.00	0.98%	1.04
PH1-PRM-MR1-JWS3-G, 6/20/11			8.00	20.32	2.50	70.87	M	1.00	1.30%	1.41
PH1-PRM-MR1-JWS4-G, 6/20/11			8.00	20.32	5.40	153.09	M	1.00	0.98%	0.63
PH1-PRM-MR1-JWS5-G, 6/20/11			8.00	20.32	4.40	124.74	M	1.00	1.10%	0.77
PH1-PRM-MR1-JWS6-G, 6/20/11			8.00	20.32	6.20	175.77	M	1.00	1.50%	1.18
PH1-PRM-MR1-JWS7-G, 6/20/11			8.00	20.32	6.60	187.11	M	1.00	2.40%	1.84
PH1-PRM-MR1-JWS8-G, 6/20/11			8.00	20.32	5.90	167.26	M	1.00	1.70%	1.25
Mean Result for Juvenile White Sucker			8.00	20.32	5.48	155.21	NA	1.00	1.45%	1.12
Minimum Results for Juvenile White Sucker			8.00	20.32	2.50	70.87	NA	1.00	0.98%	0.63
Maximum Results for Juvenile White Sucker			8.00	20.32	6.60	187.11	NA	1.00	2.40%	1.84
Standard Deviation for Juvenile White Sucker			0.00	0.00	1.40	39.68	NA	0.00	0.47%	0.39
Coefficient of Variation for Juvenile White Sucker			0.00	0.00	0.26	0.26	NA	0.00	0.33	0.34
Upper 95% UCL for Juvenile White Sucker			8.00	20.32	6.44	182.71	NA	NA	1.77%	3.31

2011 FISH SAMPLE RESULTS - MIDDLE RIVER SITE 1 (MR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-MR1-SB1-G, 6/20/11	Smallmouth Bass	SO	14.50	36.83	25.90	734.25	M	5.00	0.90%	8.25
PH1-PRM-MR1-SB2-G, 6/20/11			15.00	38.10	27.30	773.94	M	5.00	0.34%	3.03
PH1-PRM-MR1-SB3-G, 6/20/11			13.00	33.02	14.70	416.74	M	5.00	0.55%	2.03
PH1-PRM-MR1-SB4-G, 6/20/11			14.00	35.56	22.70	643.53	M	5.00	0.78%	4.71
PH1-PRM-MR1-SB5-G, 6/20/11			15.00	38.10	26.50	751.26	M	6.00	0.39%	3.89
PH1-PRM-MR1-SB6-G, 6/20/11			14.00	35.56	25.60	725.75	M	5.00	0.59%	3.41
PH1-PRM-MR1-SB7-G, 6/20/11			13.50	34.29	21.70	615.18	F	5.00	0.32%	0.19
PH1-PRM-MR1-SB8-G, 6/20/11			13.00	33.02	15.90	450.76	F	4.00	0.38%	0.78
Mean Result for Smallmouth Bass			14.00	35.56	22.54	638.93	NA	5.00	0.53%	3.29
Minimum Results for Smallmouth Bass			13.00	33.02	14.70	416.74	NA	4.00	0.32%	0.19
Maximum Results for Smallmouth Bass			15.00	38.10	27.30	773.94	NA	6.00	0.90%	8.25
Standard Deviation for Smallmouth Bass			0.80	2.04	4.86	137.75	NA	0.53	0.22%	2.52
Coefficient of Variation for Smallmouth Bass			0.06	0.06	0.22	0.22	NA	0.11	0.41	0.77
Upper 95% UCL for Smallmouth Bass			14.56	36.97	25.90	734.38	NA	5.37	0.68%	5.65

PH1-PRM-MR1-RB1-G, 6/20/11	Rock Bass	SO	4.00	10.16	0.60	17.01	M	2.00	0.99%	2.47
PH1-PRM-MR1-RB2-G, 6/20/11			6.50	16.51	3.70	104.89	F	3.00	0.28%	0.41
PH1-PRM-MR1-RB3-G, 6/20/11			4.00	10.16	0.70	19.84	M	2.00	0.48%	1.68
PH1-PRM-MR1-RB4-G, 6/20/11			4.00	10.16	0.90	25.51	M	2.00	0.80%	1.10
PH1-PRM-MR1-RB5-G, 6/20/11			4.00	10.16	0.60	17.01	M	2.00	1.20%	2.58
PH1-PRM-MR1-RB6-G, 6/20/11			3.50	8.89	0.50	14.17	M	2.00	1.00%	2.83
PH1-PRM-MR1-RB7-G, 6/20/11			3.50	8.89	0.60	17.01	M	2.00	0.90%	1.32
PH1-PRM-MR1-RB8-G, 6/20/11			3.50	8.89	0.40	11.34	M	2.00	0.63%	1.47
Mean Result for Rock Bass			4.13	10.48	1.00	28.35	NA	2.13	0.79%	1.73
Minimum Results for Rock Bass			3.50	8.89	0.40	11.34	NA	2.00	0.28%	0.41
Maximum Results for Rock Bass			6.50	16.51	3.70	104.89	NA	3.00	1.20%	2.83
Standard Deviation for Rock Bass			0.99	2.52	1.10	31.20	NA	0.35	0.30%	0.83
Coefficient of Variation for Rock Bass			0.24	0.24	1.10	1.10	NA	0.17	0.39	0.48
Upper 95% UCL for Rock Bass			4.81	12.22	1.76	49.97	NA	2.37	1.00%	1.42

2011 FISH SAMPLE RESULTS - MIDDLE RIVER SITE 1 (MR1)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-MR1-W1-G, 6/20/11	Walleye	SO	20.00	50.80	52.20	1479.84	M	5.00	1.40%	2.97
PH1-PRM-MR1-W2-G, 6/20/11			22.50	57.15	78.10	2214.10	M	6.50	1.40%	6.93
PH1-PRM-MR1-W3-G, 6/20/11			22.50	57.15	93.60	2653.51	M	6.00	1.20%	2.11
PH1-PRM-MR1-W4-G, 6/20/11			21.00	53.34	58.60	1661.28	M	5.50	1.10%	6.54
PH1-PRM-MR1-W5-G, 6/20/11			22.00	55.88	77.20	2188.58	M	7.00	1.80%	4.32
PH1-PRM-MR1-W6-G, 6/20/11			16.00	40.64	29.20	827.81	M	4.00	0.63%	0.17
PH1-PRM-MR1-W7-G, 6/20/11			21.00	53.34	55.40	1570.56	M	5.00	1.00%	3.15
PH1-PRM-MR1-W8-G, 6/20/11			19.00	48.26	42.70	1210.52	M	5.00	0.90%	4.89
Mean Result for Walleye			20.50	52.07	60.88	1725.78	NA	5.50	1.18%	3.89
Minimum Results for Walleye			16.00	40.64	29.20	827.81	NA	4.00	0.63%	0.17
Maximum Results for Walleye			22.50	57.15	93.60	2653.51	NA	7.00	1.80%	6.93
Standard Deviation for Walleye			2.19	5.56	20.97	594.49	NA	0.96	0.36%	2.26
Coefficient of Variation for Walleye			0.11	0.11	0.34	0.34	NA	0.18	0.30	0.58
Upper 95% UCL for Walleye			3.00	7.62	75.41	2137.73	NA	6.17	1.43%	8.24

NA - Not applicable
TS - Too small to gender/age
SO - Scale off, skin on fillet
SOF - Skin off fillet
W - Whole fish

2011 FISH SAMPLE RESULTS - MIDDLE RIVER SITE 2 (MR2)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-MR2-AC1-G, 6/21/11	Adult Carp	SO	19.00	48.26	67.70	1919.26	M	5.00	2.20%	3.14
PH1-PRM-MR2-AC2-G, 6/21/11			20.00	50.80	80.60	2284.97	F	5.50	11.30%	10.00
PH1-PRM-MR2-AC3-G, 6/21/11			22.50	57.15	81.60	2313.32	M	6.50	6.30%	11.00
PH1-PRM-MR2-AC4-G, 6/21/11			22.00	55.88	97.70	2769.75	M	6.00	13.50%	9.89
PH1-PRM-MR2-AC5-G, 6/21/11			25.00	63.50	144.20	4088.00	M	8.00	9.10%	20.50
PH1-PRM-MR2-AC6-G, 6/21/11			23.00	58.42	114.10	3234.68	M	6.50	10.30%	17.60
PH1-PRM-MR2-AC7-G, 6/21/11			22.00	55.88	83.50	2367.18	M	6.00	7.50%	1.83
PH1-PRM-MR2-AC8-G, 6/21/11			23.50	59.69	105.10	2979.53	M	7.00	7.50%	4.67
Mean Result for Adult Carp			22.13	56.20	96.81	2744.59	NA	6.31	8.46%	9.83
Minimum Results for Adult Carp			19.00	48.26	67.70	1919.26	NA	5.00	2.20%	1.83
Maximum Results for Adult Carp			25.00	63.50	144.20	4088.00	NA	8.00	13.50%	20.50
Standard Deviation for Adult Carp			1.90	4.84	24.30	688.85	NA	0.92	3.44%	6.67
Coefficient of Variation for Adult Carp			0.09	0.09	0.25	0.25	NA	0.15	0.41	0.68
Upper 95% UCL for Adult Carp			23.44	59.55	113.65	3221.93	NA	6.95	10.85%	8.10

PH1-PRM-MR2-AWS1-G, 6/21/11	Adult White Sucker	SO	18.00	45.72	42.90	1216.19	M	6.00	1.30%	1.20
PH1-PRM-MR2-AWS2-G, 6/21/11			14.50	36.83	17.40	493.28	M	3.00	1.30%	2.98
PH1-PRM-MR2-AWS3-G, 6/21/11			17.00	43.18	28.10	796.62	M	4.50	2.90%	5.91
PH1-PRM-MR2-AWS4-G, 6/21/11			17.00	43.18	30.80	873.16	M	5.00	1.70%	2.99
PH1-PRM-MR2-AWS5-G, 6/21/11			14.00	35.56	18.10	513.13	F	3.00	2.50%	2.09
PH1-PRM-MR2-AWS6-G, 6/21/11			15.00	38.10	14.70	416.74	M	4.00	1.60%	0.89
PH1-PRM-MR2-AWS7-G, 6/21/11			15.00	38.10	20.70	586.83	M	3.00	3.10%	0.92
PH1-PRM-MR2-AWS8-G, 6/21/11			15.00	38.10	23.40	663.38	M	3.00	1.60%	0.70
Mean Result for Adult White Sucker			15.69	39.85	24.51	694.92	NA	3.94	2.00%	2.21
Minimum Results for Adult White Sucker			14.00	35.56	14.70	416.74	NA	3.00	1.30%	0.70
Maximum Results for Adult White Sucker			18.00	45.72	42.90	1216.19	NA	6.00	3.10%	5.91
Standard Deviation for Adult White Sucker			1.44	3.65	9.21	261.21	NA	1.15	0.72%	1.76
Coefficient of Variation for Adult White Sucker			0.09	0.09	0.38	0.38	NA	0.29	0.36	0.80
Upper 95% UCL for Adult White Sucker			16.68	42.38	30.90	875.92	NA	4.73	2.50%	3.49

2011 FISH SAMPLE RESULTS - MIDDLE RIVER SITE 2 (MR2)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-MR2-JWS1-G, 6/21/11	Juvenile White Sucker	SO	8.00	20.32	3.30	93.55	M	1.00	1.60%	0.92
PH1-PRM-MR2-JWS2-G, 6/21/11			8.00	20.32	9.40	266.49	M	1.00	2.30%	1.10
PH1-PRM-MR2-JWS3-G, 6/21/11			8.00	20.32	3.70	104.89	M	1.00	2.00%	1.07
PH1-PRM-MR2-JWS4-G, 6/21/11			8.00	20.32	3.40	96.39	M	1.00	1.20%	0.69
PH1-PRM-MR2-JWS5-G, 6/21/11			8.00	20.32	6.30	178.60	M	1.00	1.90%	1.26
PH1-PRM-MR2-JWS6-G, 6/21/11			8.00	20.32	6.10	172.93	M	1.00	1.50%	1.25
PH1-PRM-MR2-JWS7-G, 6/21/11			6.00	15.24	1.30	36.85	M	1.00	1.60%	1.28
PH1-PRM-MR2-JWS8-G, 6/21/11			6.00	15.24	1.30	36.85	M	3.00	2.20%	0.03
Mean Result for Juvenile White Sucker			7.50	19.05	4.35	123.32	NA	1.25	1.79%	0.95
Minimum Results for Juvenile White Sucker			6.00	15.24	1.30	36.85	NA	1.00	1.20%	0.03
Maximum Results for Juvenile White Sucker			8.00	20.32	9.40	266.49	NA	3.00	2.30%	1.28
Standard Deviation for Juvenile White Sucker			0.93	2.35	2.76	78.30	NA	0.71	0.38%	0.42
Coefficient of Variation for Juvenile White Sucker			0.12	0.12	0.63	0.63	NA	0.57	0.21	0.44
Upper 95% UCL for Juvenile White Sucker			8.14	20.68	6.26	177.58	NA	NA	2.05%	2.89
PH1-PRM-MR2-SB1-G, 6/21/11	Smallmouth Bass	SO	12.00	30.48	13.70	388.39	M	4.00	0.70%	0.85
PH1-PRM-MR2-SB2-G, 6/21/11			14.00	35.56	21.70	615.18	M	4.50	0.72%	1.81
PH1-PRM-MR2-SB3-G, 6/21/11			8.00	20.32	5.00	141.75	M	2.00	1.00%	1.11
PH1-PRM-MR2-SB4-G, 6/21/11			8.00	20.32	3.50	99.22	M	2.00	0.84%	1.07
PH1-PRM-MR2-SB5-G, 6/21/11			9.50	24.13	7.00	198.45	M	3.00	0.41%	1.15
PH1-PRM-MR2-SB6-G, 6/21/11			13.00	33.02	20.30	575.49	M	3.50	0.88%	2.60
PH1-PRM-MR2-SB7-G, 6/21/11			17.00	43.18	40.70	1153.82	F	6.50	0.82%	0.96
PH1-PRM-MR2-SB8-G, 6/21/11			13.50	34.29	23.80	674.72	F	5.00	1.10%	1.18
Mean Result for Smallmouth Bass			11.88	30.16	16.96	480.88	NA	3.81	0.81%	1.34
Minimum Results for Smallmouth Bass			8.00	20.32	3.50	99.22	NA	2.00	0.41%	0.85
Maximum Results for Smallmouth Bass			17.00	43.18	40.70	1153.82	NA	6.50	1.10%	2.60
Standard Deviation for Smallmouth Bass			3.17	8.05	12.41	351.81	NA	1.53	0.21%	0.58
Coefficient of Variation for Smallmouth Bass			0.27	0.27	0.73	0.73	NA	0.40	0.26	0.44
Upper 95% UCL for Smallmouth Bass			14.07	35.74	25.56	724.67	NA	4.88	0.95%	3.39

2011 FISH SAMPLE RESULTS - MIDDLE RIVER SITE 2 (MR2)

Sample ID, Collection Date	*Sample Type*	*Sample Form*	*Length (in)*	*Length (cm)*	*Weight (ounces)*	*Weight (grams)*	*Gender (M/F)*	*Age (Yr)*	*Fat (%)*	*PCB (mg/kg)*
PH1-PRM-MR2-RB1-G, 6/21/11	Rock Bass	SO	4.00	10.16	0.70	19.84	M	2.00	0.77%	1.78
PH1-PRM-MR2-RB2-G, 6/21/11			4.00	10.16	1.00	28.35	M	2.00	1.50%	1.70
PH1-PRM-MR2-RB3-G, 6/21/11			8.50	21.59	7.50	212.62	M	4.00	0.70%	1.75
PH1-PRM-MR2-RB4-G, 6/21/11			7.00	17.78	4.00	113.40	F	2.00	0.37%	0.41
PH1-PRM-MR2-RB5-G, 6/21/11			7.00	17.78	4.20	119.07	M	3.00	0.54%	2.38
PH1-PRM-MR2-RB6-G, 6/21/11			3.50	8.89	0.40	11.34	M	3.00	1.00%	1.62
PH1-PRM-MR2-RB7-G, 6/21/11			4.50	11.43	1.10	31.18	M	2.00	0.69%	0.92
PH1-PRM-MR2-RB8-G, 6/21/11			3.50	8.89	0.50	14.17	M	2.00	1.40%	3.16
Mean Result for Rock Bass			5.25	13.34	2.43	68.75	NA	4.31	0.87%	1.71
Minimum Results for Rock Bass			3.50	8.89	0.40	11.34	NA	4.00	0.37%	0.41
Maximum Results for Rock Bass			8.50	21.59	7.50	212.62	NA	5.00	1.50%	3.16
Standard Deviation for Rock Bass			1.95	4.94	2.56	72.64	NA	0.46	0.40%	0.84
Coefficient of Variation for Rock Bass			0.37	0.37	1.06	1.06	NA	0.11	0.46	0.49
Upper 95% UCL for Rock Bass			6.60	16.76	4.20	119.08	NA	4.63	1.15%	1.52

NA - Not applicable
SO - Scale off, skin on fillet
SOF - Skin off fillet
W - Whole fish

Appendix 2

Laboratory Analytical Reports (See Disc Provided)