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AMBIENT WATER QUALITY MONITORING IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS: A SUMMARY OF BIOLOGICAL, HABITAT, AND SEDIMENT QUALITY DURING 2006

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AMBIENT WATER QUALITY MONITORING IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS: A SUMMARY OF BIOLOGICAL, HABITAT, AND SEDIMENT QUALITY DURING 2006

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DISCLAIMER

Mention of proprietary equipment and chemicals in this report does not constitute endorsement by the Metropolitan Water Reclamation District of Greater Chicago.

SUMMARY AND CONCLUSIONS

During 2006, biological and habitat monitoring focused on the southern portion of the Chicago River System, as well as the 15 annual Ambient Water Quality Monitoring (AWQM) Program stations located throughout the Chicago, Calumet, and Des Plaines River Systems. Sediment chemistry and toxicity analyses were also performed on samples from the southern Chicago River System. Chlorophyll samples were collected at each of the 59 AWQM stations monthly.

Chlorophyll

Chlorophyll *a* concentrations decreased directly downstream of water treatment plants due to dilution of the waterway with effluent. In the Chicago River System, chlorophyll *a* means ranged from 1 µg/L at Lake Shore Drive on the Chicago River to 33 µg/L at Frontage Road on the Skokie River. The maximum recorded chlorophyll *a* concentration in the Chicago River System during 2006 was at Oakton Street on the North Shore Channel (190 µg/L).

Mean chlorophyll *a* values in the Calumet River System ranged from 1 µg/L (Ewing Avenue, Calumet River) to 27 µg/L (Burnham Avenue, Grand Calumet River). The maximum concentration measured was 134 µg/L at Indiana Avenue on the Little Calumet River.

The range of mean chlorophyll *a* concentrations in the Des Plaines River System was 3 µg/L (Wille Road, Higgins Creek) to 34 µg/L (Higgins Road, Salt Creek). The maximum concentration measured in this system was 78 µg/L at Material Services Road on the Des Plaines River.

Habitat

Habitat is a major limiting factor for aquatic life in the southern Chicago River System since it is entirely man-made or man-altered. The southern Chicago River System consists of deep, wide, and entirely channelized waterways with low sinuosity. The riparian land use is predominantly urban, industrial and commercial with minimal canopy cover. Man-made structures are prevalent throughout the system and contribute some instream cover for fish. The presence of fine sediment deposits and the lack of heterogeneous substrate in this system provides inadequate habitat for a balanced benthic invertebrate community.

Fish

Forty species of fish, including 16 game fish species, were collected from Chicago area waterways during 2006. The most abundant species in the catch from the deep-draft waterways of the Chicago and Calumet River Systems included gizzard shad, pumpkinseed sunfish, and common carp. Green sunfish, bluntnose minnows, and spotfin shiners were the most abundant

species in the Des Plaines River System. In general, all three waterways would be considered fair in terms of their biological integrity as measured by the Index of Biotic Integrity (IBI).

Benthic Invertebrates

Benthic invertebrates were collected from side and center locations using two methods at 23 AWQM stations during 2006. Total species richness for ponar and Hester Dendy samplers combined was 110 species, while total Ephemeroptera, Plecoptera, and Trichoptera (EPT) richness was 16 species (EPT taxa are considered relatively sensitive to pollution). Comprehensive benthic invertebrate data from 2006 will be catalogued in a separate report.

Sediment Chemistry

During 2006, sediment samples were collected from the side and center of the waterway at 9 stations. Sediment samples were analyzed for 8 general chemistry constituents, 11 trace metals, and a total of 111 total organic priority pollutants. In addition, a contracted laboratory performed acid volatile sulfide/simultaneously extracted metals (AVS/SEM) and particle size determinations. Total organic carbon (TOC) analysis was not done due to an equipment malfunction.

Sediment Toxicity

Ten-day *Chironomus tentans* toxicity testing was performed using sediment from side and center locations at 9 stations. One out of the 18 samples elicited a percent survival rate that was significantly less than the control sites indicating that the sediment was unsuitable for *Chironomus* survival. Four additional sites sampled showed ash-free dried weights that were significantly less than control sites, indicating that these sediments were unsuitable for optimal *Chironomus* growth.

INTRODUCTION

The Metropolitan Water Reclamation District of Greater Chicago (District) began monitoring the biological component of the AWQM Program at 59 sampling stations on 21 waterways in 2001. While water samples were collected monthly at these stations to assess water quality, this report focuses on the biological, habitat, and sediment quality during 2006. The biological monitoring portion of the AWQM Program operates on a 4-year cycle, with a primary focus each year on a different river system in the Chicago area. Fifteen of the 59 stations located across all of the waterways are monitored annually, based on their proximity to District water reclamation plants (WRPs) or municipal boundaries. During 2006, biological monitoring focused on the southern portion of the Chicago River System, including the Chicago River, South Branch of the Chicago River, Bubbly Creek, and the Chicago Sanitary and Ship Canal.

Characterization of physical habitat, fish, and benthic invertebrate populations, along with sediment toxicity and chemistry, are among the most crucial components for a comprehensive evaluation of a waterway. Each parameter represents a piece of the overall picture that is necessary to identify problem areas, make regulatory decisions, and determine plausible attainable uses for a waterway.

In addition to analyzing the AWQM Program data in order to assess and manage the impact of the District's WRPs, our data are often shared with other government agencies, non-governmental organizations (NGOs), and academic institutions. For instance, the AWQM Program data are shared with the Illinois Environmental Protection Agency (IEPA) to support their efforts to make regulatory decisions, prepare the 305 (b) report in accordance with the Clean Water Act, and perform Use Attainability Analyses (UAA).

DESCRIPTION OF THE STUDY AREA

Chicago, Calumet, and Des Plaines River Systems

The Chicago area waterways consist of man-made canals as well as natural streams which have been altered to varying degrees. Some natural waterways have been modified by being deepened, straightened, and/or widened to such an extent that reversion to their natural state would be impossible. The waterways serve the Chicago area by draining urban storm water runoff and treated municipal wastewater effluent and allowing commercial navigation in the deep-draft portions.

The primary man-made waterways are the Chicago River System, including the North Shore Channel (NSC) connecting Lake Michigan at Wilmette to the North Branch Chicago River (NBCR); the Chicago Sanitary and Ship Canal (CSSC) extending from Damen Avenue to the Lockport Powerhouse; and the Calumet-Sag Channel (CSC) connecting the Little Calumet River (LCR) with the CSSC. The primary natural waterways include the wadeable branches of the NBCR flowing south from Lake County into the NSC and continuing as the deep-draft portion of the NBCR, which joins the Chicago River and becomes the South Branch Chicago River (SBCR); the Des Plaines River System flowing south from Lake County and joining with the discharge from the CSSC downstream of the Lockport Powerhouse; and the Calumet River System which flows south and west into the CSSC.

Sampling Stations

The sampling stations for the AWQM Program are located on natural and man-made waterways throughout the District's service area. A map of the Chicago area waterways including the 59 sampling stations and the District's WRPs is shown in Figure 1. Stations were primarily selected such that there was at least one monitoring station on the lower end of an IEPA 303 (d) impaired waterway segment. Secondary criteria for selecting sampling locations included: (1) above and below District WRPs, (2) below Lake Michigan diversion points, (3) above junction of two major waterways, (4) below county municipal boundaries, and (5) in areas of environmental concern. Fifteen of the 59 stations were chosen for annual biological monitoring.

In addition to the 15 annual stations, biological sampling was focused in the southern portion of the Chicago River System during 2006, including the Chicago River, SBCR, South Fork South Branch Chicago River (Bubbly Creek), and the CSSC. Table 1 displays the 2006 field monitoring schedule for biological, physical habitat, and sediment quality assessments.

FIGURE 1: AMBIENT WATER QUALITY MONITORING PROGRAM
SAMPLE STATIONS

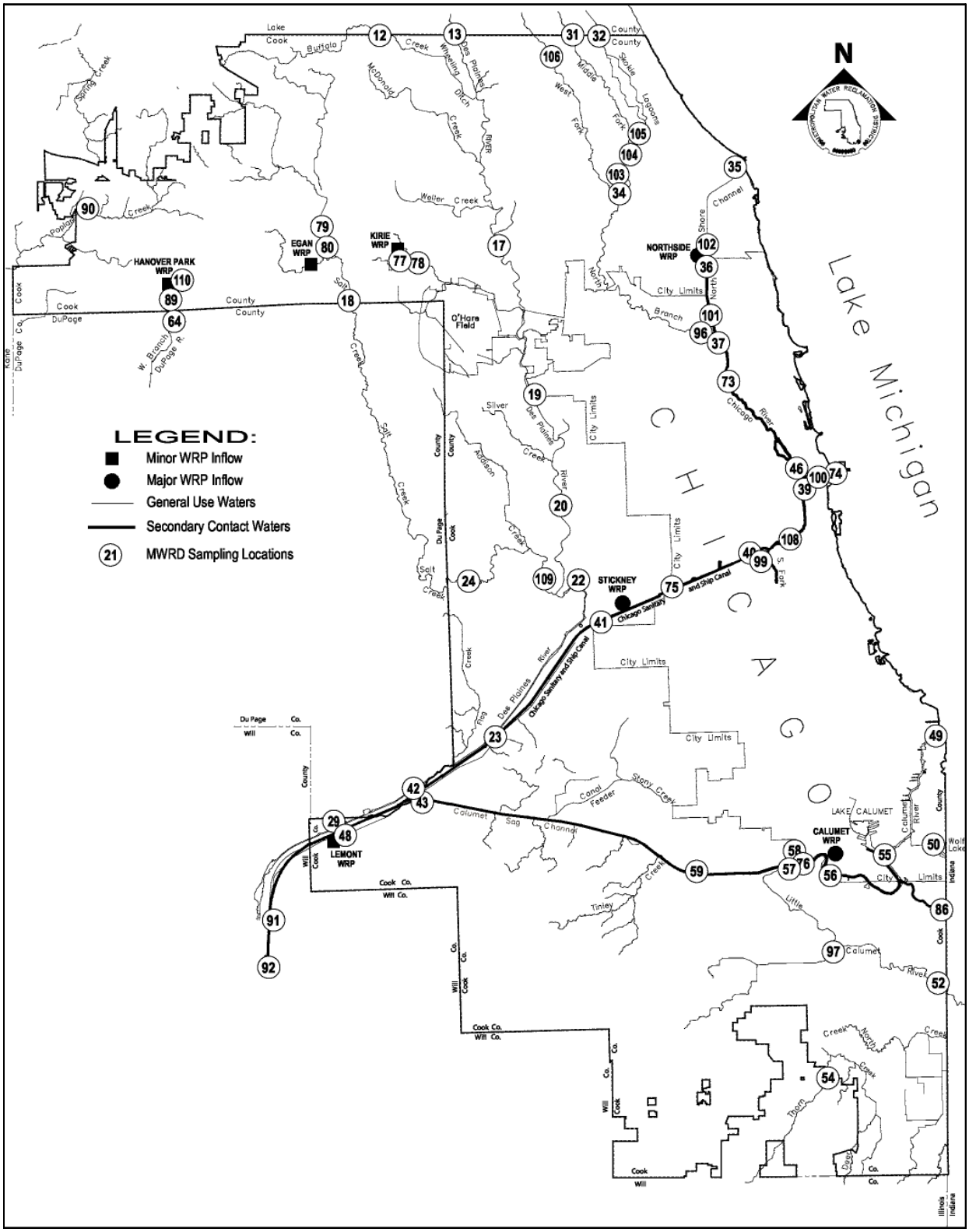

TABLE 1: DATES THAT AMBIENT WATER QUALITY MONITORING PROGRAM STATIONS WERE SAMPLED DURING 2006

Station No.	Sampling Station	Waterway	Date Sampled
		Chicago River System	
96	Albany Avenue*	North Branch Chicago River	7/18/06
36	Touhy Avenue*	North Shore Channel	7/10/06
46	Grand Avenue*	North Branch Chicago River	7/11/06
74	Lake Shore Drive	Chicago River	7/26/06
100	Wells Street	Chicago River	7/27/06
39	Madison Street	South Branch Chicago River	7/28/06
108	Loomis Street	South Branch Chicago River	8/2/06[a], 9/12/06[b]
99	Archer Avenue	Bubbly Creek	8/2/06[a], 9/5/06[b]
40	Damen Avenue	Chicago Sanitary & Ship Canal	8/2/06[a], 8/30/06[b]
75	Cicero Avenue*	Chicago Sanitary & Ship Canal	8/4/06[a], 8/29/06[b]
41	Harlem Avenue*	Chicago Sanitary & Ship Canal	8/4/06[a], 8/21/06[b]
42	Route 83	Chicago Sanitary & Ship Canal	8/28/06[a], 8/31/06[b]
48	Stephen Street	Chicago Sanitary & Ship Canal	8/28/06
92	Lockport*	Chicago Sanitary & Ship Canal	7/25/06
		Calumet River System	
55	130th Street*	Calumet River	6/29/06
76	Halsted Street*	Little Calumet River	7/21/06
59	Cicero Avenue*	Calumet-Sag Channel	7/24/06
		Des Plaines River System	
78	Wille Road*	Higgins Creek	6/13/06
18	Devon Avenue*	Salt Creek	6/15/06
64	Lake Street*	West Branch DuPage River	6/14/06
13	Lake-Cook Road*	Des Plaines River	6/20/06
22	Ogden Avenue*	Des Plaines River	6/22/06
91	Material Service Rd.*	Des Plaines River	7/13/06

*Annual sampling station.
[a]Sediment chemistry and invertebrate sampling only on this date.
[b]Electrofishing and habitat assessment conducted on this date.

MATERIALS AND METHODS

Chlorophyll

Water samples for chlorophyll analysis were collected monthly at each AWQM station along with the water samples for various chemical analyses.

Sample Collection. Surface water grab samples for chlorophyll analysis were collected using a stainless-steel bucket. The bucket was lowered into the waterway generally from the upstream side of the bridge at the most central location. The bucket was submerged, filled, and then raised to the top of the bridge. An aliquot was poured into an amber, plastic one-liter sample bottle containing 1-mg magnesium carbonate as preservative, and a 1/2-inch airspace was left at the top of the bottle. Samples were then placed in a cooler with ice and returned to the lab for processing.

Laboratory Analysis. *Filtration.* Prior to filtering samples, water was mixed by rapidly inverting sample bottles 25 times before the first pour. Samples were filtered through Whatman type GF/F glass-fiber filters (0.7 micrometers) using Millipore filtration equipment and vacuum pressure. Water samples were filtered until the rate of flow decreased but before it became clogged. Following filtration, sample filters were folded and wrapped with aluminum foil and extracted the following day.

Extraction. Filters were placed in glass extraction tubes with 5 mL of 90 percent aqueous acetone solution. Using a motorized tissue grinder set at 500 rpm and a pestle, the top layer of the filter was separated. Samples were then transferred to centrifuge tubes and additional acetone was added until the total volume equaled 10 mL. These tubes were inverted 5 times and then placed at 4°C for approximately 24 hours to steep.

Spectrophotometric Analysis. After removing samples from refrigeration, they were centrifuged for 20 minutes at 2,500 rpm. Three mL of the supernatant was transferred into a spectrophotometric cell and the absorbance read at 750, 664, 647, and 630 nm. To correct for the degradation product, pheophyton, 0.1 mL of 1 percent hydrochloric acid was added and after one minute, absorbance was read again at 750 and 665 nm. The spectrophotometer was programmed to calculate corrected chlorophyll *a, b,* and *c* values based on the volumes filtered and used to extract samples.

Quality Control. A reagent blank of 90 percent acetone was placed in the spectrophotometer every tenth sample and read between -0.1 and 0.1 ug/L. A method blank of distilled water was prepared for each group of samples and run through the entire laboratory procedure. One duplicate sample was chosen randomly for each group of samples and would have to be within 20 relative percent difference of the original sample. Chlorophyll *a* and *b* standards from spinach were also analyzed every 20 samples and displayed at least a 90 percent recovery.

Habitat

Data Collection. Physical habitat assessment data sheets (Figure 2) were completed by a staff biologist in the field at each station. Assessments made in the field included weather conditions, channel morphology, bank erosion, shore cover, aquatic vegetation, man-made structures, floatable materials, riparian land-use, sediment composition, sediment color and odor, depth of fine sediments (fines), and presence of oil in sediment. Channel width was determined using a Yardage Pro 800 rangefinder in the non-wadeable waterways. A fiberglass telescoping leveling rod was used to measure water depth and depth of fines (in sediment). The smallest extension of the round leveling rod (1" diameter) was pushed into the sediment with reasonable force as far as possible to determine depth of fines in feet. A 6- X 6-inch petite Ponar grab sampler was used to collect sediment for analysis. Staff biologists estimated the percent composition of plant debris, clay, inorganic silt, organic sludge, sand (0.06-2 mm diameter), gravel (<2-64 mm diameter), cobble (>64-256 mm diameter), boulder (>256 mm diameter), or bedrock/concrete in the sediment. Sediment color and odor were recorded, as well as the appearance of oil in the sample.

Assessment Locations. Physical habitat was evaluated at the beginning and end of the fishing range in the center and on one side of the waterway at each station. The range was 40 meters for wadeable sites, 100 meters for sites in which the small boat electrofisher was employed, and 400 meters for deep-draft waterways.

Fish

Boatable Stream Sampling. Fish were collected at each sampling station using a boat-mounted electrofisher. The electrofisher was powered by a direct current (DC) generator. Stunned fish were picked out of the water with long-handled dip nets by either of two netters who were positioned on the bow of the boat.

In most cases, the section of canal sampled extended for 400 meters. Whenever possible, both sides of this canal section were electrofished.

Wadeable Stream Sampling. Fish were collected at each sampling station using a backpack electrofisher and a bag seine. Conductivity and temperature (°C) were recorded before each sample collection. A DC backpack electrofisher was employed to electrify the water with 0.7 to 1.0 amps of current, stunning the fish. In most instances, two 40-meter long backpack electrofisher collections were conducted at each station. A 40-meter reach of the creek was electrified by moving upstream parallel to the bank. Additional personnel followed the electrofisher collecting the stunned fish with dip nets. Following the first collection, a second 40-meter electrofishing survey was conducted on the opposite bank. If the creek was less than five meters wide, electrofishing occurred only once along a 40-meter reach. The total electrofishing time during each 40-meter collection was noted.

FIGURE 2: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO PHYSICAL HABITAT ASSESSMENT

Date _____ **Time** _____ **Station Number** _____

Station Name _____ **Latitude** _____

Waterbody _____ **Longitude** _____

Assessment Observer (s) _____

Weather Conditions SUNNY CLOUDY RAIN (circle one)

Stream Order _____ **Assessment Location** BEGINNING END (circle one)

Assessment Location Facing Upstream LEFT CENTER RIGHT (circle one)

Channel Habitat POOL RUN RIFFLE (circle one)

Water Depth (ft) _____ **Channel Width** (ft) _____

Water Level LOW NORMAL HIGH FLOODED (circle one)

Man-made Structures DAM RIPRAP BRIDGE LEVEE ISLAND OUTFALL SHEET PILING OTHER _____ (circle all applicable)
(Specify)

Channelization YES NO (circle one)

Bank Erosion NONE SLIGHT MODERATE SEVERE (circle one)

Floatable Materials YES NO (circle one)

If YES, characterize (circle all applicable)

STREET LITTER SANITARY SEWAGE VEGETATIVE MATERIAL

Aquatic Vegetation YES NO (circle one)

If YES, is vegetation (circle all applicable)

ROOTED EMERGENT ROOTED SUBMERGENT ROOTED FLOATING
ATTACHED ALGAE FLOATING ALGAE OTHER _____
(Specify)

Instream Cover for Fish (circle all applicable)

AQUATIC VEGETATION BOULDERS BRUSH-DEBRIS JAMS LOGS
SUBMERGED TREE ROOTS SUBMERGED TERRESTRIAL VEGETATION
UNDER CUT BANK ROCK LEDGE OTHER _____
(Specify)

Canopy Cover OPEN PARTLY SHADED SHADED (circle one)

Immediate Shore Cover		**Riparian Land Use**	
DENUDED	_____ %	GRASSLAND	_____ %
GRASSES	_____ %	URBAN RESIDENTIAL	_____ %
SHRUBS	_____ %	URBAN COMMERCIAL/INDUSTRIAL	_____ %
TREES	_____ %	WETLAND	_____ %
OTHER (Specify)		FOREST	_____ %
_____	_____ %	ROW CROPS	_____ %
		OTHER_____ (Specify)	_____ %

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Page 1

FIGURE 2 (Continued): METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO PHYSICAL HABITAT ASSESSMENT

Station Number _____

Sediment Composition			
	Plant Debris	_____	%
	Clay	_____	%
	Inorganic Silt	_____	%
	Organic Sludge	_____	%
	Sand (0.06 mm to 2 mm diameter)	_____	%
	Gravel (>2 mm to 64 mm diameter)	_____	%
	Cobble (>64 mm to 256 mm diameter)	_____	%
	Boulder (>256 mm diameter)	_____	%
	Bedrock or Concrete	_____	%

Sediment Color _____ **Sediment Odor** _____

Oil in Sediment NONE LIGHT MODERATE HEAVY (circle one)

Embeddedness NONE NORMAL MODERATE EXTENSIVE (circle one)

Sinuosity NONE LOW MODERATE HIGH (circle one)

Depth of Fines (In feet using 1 inch diameter probe) _____

Photo Numbers Looking Upstream _____ Looking Downstream _____

Site Location/Map (Draw a map of the site and indicate the area assessed)

Additional Remarks _____

(Complete both sides of page) Page 2

A 15-foot bag seine with 3/16-inch mesh was also used to collect fish. Staff pulled the seine for 40 meters traveling upstream parallel to the bank. In most instances, a separate 40-meter seine collection occurred along each bank.

Fish Processing. In the field, most fish were identified to species, weighed to the nearest gram or nearest 0.1 gram (depending on size), measured for standard and total length to the nearest millimeter, and examined for the incidence of disease, parasites, or other anomalies. Following processing, these fish were returned live to the river. Minnows and other small fish that were difficult to identify were preserved in 10 percent (v/v) formalin and returned to the laboratory for further analysis. These fish were processed in a similar manner to the field-measured fish, except that they were weighed to the nearest 0.01 gram.

Index of Biotic Integrity. Biological integrity of aquatic ecosystems has been defined as the ability to support and maintain a balanced, integrated, and adaptive community having a species composition, diversity, and a functional organization comparable to that of a natural habitat (Karr et al., 1986). Karr's 1986 Index of Biotic Integrity (IBI) was used to analyze fish data from 2006.

The limitations of using this tool, which was meant to apply to wadeable streams, for some of the man-made, channelized waterways in the Chicago area should be recognized.

Karr's IBI integrates information from 12 fish community metrics that fall into three major categories: (1) species richness and composition, (2) trophic composition, and (3) fish abundance and condition. Each metric is scored as a 1, 3, or 5 based on whether its evaluation deviates strongly, deviates somewhat, or approximates expectations, respectively, as compared to an undisturbed site located in a similar geographical region and on a stream of comparable size. Individual metrics are added to calculate a total IBI score. A high IBI indicates high biological integrity or health and low disturbance or lack of perturbations. A low IBI indicates low biological integrity and high disturbance or degradation. Separate IBI metric scores were determined based on the relative abundance of fish collected with each fishing gear. IBI categories of good (IBI 41-60), fair (IBI 21-40) or poor (IBI <21), as derived by the IEPA (IEPA, 1996), were determined and reported.

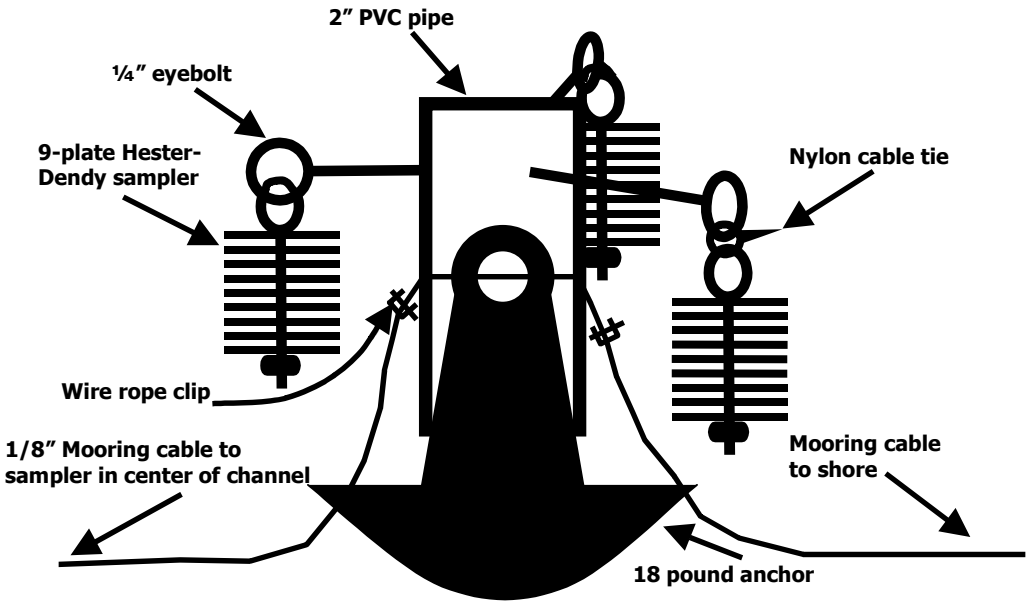
Benthic Invertebrates

Ponar Sediment Sampling. Triplicate sediment samples were collected with a petite Ponar Grab (0.023 m^2) from the center and one side of the deep-draft and wadeable waterway stations. Grab samples were taken at locations upstream from any prior sampling disturbance, such as Hester Dendy retrievals (see description in next section), to avoid collecting disturbed sediment. An appropriate area for ponar sampling was chosen by a staff biologist to avoid any obvious obstructions such as large rocks or plants. The sediment samples were sieved in the field using a field sieving bucket with 250 micrometer (µm) openings. The sieved material was poured into one-gallon plastic containers, preserved to 10 percent formalin concentration, and brought back to the laboratory for analysis. All samples were stored at 4°C until processed.

Artificial Substrate Sampling. Hester Dendy artificial substrate samplers were deployed at each station between May and early June of 2006. Figure 3 shows a diagram of the plate configuration that was assembled prior to deployment in the waterways. In all, 27, 3- X 3-inch sampling plates were attached to 2, 18-pound river anchors, connected to an object on shore (usually a tree) by a cable, and then placed on the bottom of the waterway in the center and on one side. These substrates were left in the waterway between 6 and 14 weeks and then retrieved concurrent to other biological sampling. Hester Dendy set-ups were located and the anchors were lifted out of the waterway with a 250 micron mesh plankton net underneath to avoid organism loss. Then, plates were cut from the anchors and placed into a one-gallon bucket with a secure leak-proof lid. Invertebrates from the plankton net reservoir were also rinsed into the buckets, which were then filled with river water and brought to a 10 percent final concentration of formalin.

Benthic Invertebrate Processing. In the laboratory, the ponar sediment samples were gently washed and screened through a U.S. Standard number 60 mesh sieve (250 µm openings). The formalin mixture in which the Hester Dendy plates were immersed was also sieved through a number 60 mesh sieve, and then the sampling bucket was filled with tap water to cover the plates. Each plate was removed from the sampler and gently brushed with a paintbrush on both sides while under a slow stream of running water in order to rinse the attached invertebrates into the sieve. Rinsings from both ponar and Hester Dendy sampling containers were thoroughly sieved. The sieved material was examined in small batches under a compound microscope in a 100- X 50-mm glass crystallizing dish filled about 1 cm high. Laboratory technicians then counted oligochaete worms and removed all other invertebrates from the finer residual material. In situations where large numbers of any one taxon (usually worms) were encountered (>3000), estimates of their abundance were made by using a sub-sampling device. Invertebrates other than worms were sent to a consultant (EA Engineering) for identification to genus or species when possible.

FIGURE 3: CONFIGURATION OF HESTER DENDY LARVAL PLATE SAMPLER



Sediment Chemistry

Sample Collection. Prior to sample collection the Ponar grab sampler and the metal and plastic pans and scoops were cleaned with hot water and lab detergent, rinsed with de-ionized water, and allowed to air dry. The ponar and metal pans and scoops were then rinsed with acetone, allowed to air dry, and dried in an oven at 105°C for one hour. When dry and cool, each set was placed in a plastic bag and sealed to prevent contamination until ready for use. Sediment samples were collected from the center and side of the waterway using separate cleaned 6- X 6-inch Ponar grab samplers. The sediment samples were either transferred into plastic or metal pans and then put into the appropriate container using plastic or metal scoops. The constituents analyzed in sediment, sample containers used, and preservation methods are summarized in Table 2. Metal scoops and pans were used for samples collected in glass containers, whereas plastic scoops and pans were used for sediment collected in plastic containers. After being filled, sample containers were placed on ice until they could be refrigerated.

Sample Analyses. The sediment samples were analyzed for total solids (TS), total volatile solids (TVS), ammonia nitrogen (NH3-N), nitrate plus nitrite nitrogen (NO2+NO3), total Kjeldahl nitrogen (TKN), total phosphorus (TP), total cyanide (TCN), phenols, total metals (including arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, and zinc), and Organic Priority Pollutants (OPPs) (listed in Table 3) by the District's Analytical Laboratory Division (ALD). Sediment samples were sent on ice to a contract laboratory for AVS/SEM, TOC, and particle size. In the laboratory, all constituents were analyzed using procedures established by the United States Environmental Protection Agency (USEPA) or described in Standard Methods for the Examination of Water and Wastewater (19^{th} edition, 1998).

Sediment Toxicity

Sediment samples were collected using a 6- X 6-inch Ponar grab sampler from the center and side of the waterways and scooped into 1-gallon plastic buckets (at least ½ full). Buckets were kept on ice until they could be refrigerated. These samples were sent in coolers on ice to a contractor for ten-day *Chironomus tentans* toxicity testing (USEPA, Test Method 100.2, 2000). Tests were performed within 14 days of sediment collection.

TABLE 2: CONSTITUENTS ANALYZED, SAMPLE CONTAINERS, AND PRESERVATION METHODS FOR SEDIMENT SAMPLES COLLECTED FOR THE AMBIENT WATER QUALITY MONITORING PROGRAM

Constituents	Units of Measure[1]	Sample Container	Preservative
Total Solids	percent	Glass	Cool, 4°C
Total Volatile Solids	percent	Glass	Cool, 4°C
Un-ionized Ammonia	mg/kg	Glass	Cool, 4°C
Nitrite plus Nitrate Nitrogen	mg/kg	Glass	Cool, 4°C
Total Kjeldahl Nitrogen	mg/kg	Glass	Cool, 4°C
Total Phosphorus	mg/kg	Glass	Cool, 4°C
Phenols	mg/kg	Glass	Cool, 4°C
Total Cyanide	mg/kg	Glass	Cool, 4°C
Acid Volatile Sulfide	µmoles/g	Plastic	Cool, 4°C
Simultaneously Extracted Metal	µmoles/g	Plastic	Cool, 4°C
Total Organic Carbon	mg/kg	Glass	Cool, 4°C
Particle Size	percent	Plastic	Cool, 4°C
Toxicity (survival)	percent	Plastic	Cool, 4°C
Toxicity (growth)	mg/org[2]	Plastic	Cool, 4°C
Total Metals (Arsenic, Cadmium, Chromium Copper, Iron, Lead, Manganese, Mercury, Nickel, Silver, and Zinc)	mg/kg	Glass	Cool, 4°C
Organic Priority Pollutants (Volatile Organic Compounds, Polynuclear Aromatic Hydrocarbons, Polychlorinated Biphenyls, Pesticides)	µg/kg	Glass	Cool, 4°C

[1]Expressed on a dry weight basis.
[2]Org = organism.

TABLE 3: LIST OF ORGANIC PRIORITY POLLUTANTS ANALYZED IN SEDIMENT SAMPLES COLLECTED FOR THE AMBIENT WATER QUALITY MONITORING PROGRAM DURING 2006

Volatile Organic Compounds	Acid Extractables	Base/Neutral Extractables	Pesticides and PCBs
Acrolein	2-Chlorophenol	Acenaphthene	Aldrin
Acrylonitrile	2,4-Dichlorophenol	Acenaphthylene	a-BHC-alpha
Benzene	2,4-Dimethylphenol	Anthracene	b-BHC-beta
Bromoform	4,6-Dinitro-o-cresol	Benzidine	BHC-gamma
Carbon tetrachloride	2,4-Dinitrophenol	Benzo(a)anthracene	BHC-delta
Chlorobenzene	2-Nitrophenol	Benzo(a)pyrene	Chlordane
Chlorodibromomethane	4-Nitrophenol	3,4-Benzofluoranthene	4,4'-DDT
Chloroethane	Parachlorometacresol	Benzo(ghi)perylene	4,4'-DDE
2-Chloroethylvinyl ether	Pentachlorophenol	Benzo(k)fluoranthene	4,4'-DDD
Chloroform	Phenol	Bis(2-chloroethoxy)methane	Dieldrin
Dichlorobromomethane	2,4,6-Trichlorophenol	Bis(2-chloroethyl)ether	a-Endosulfan-alpha
1,1-Dichloroethane		Bis(2-chloroisopropyl)ether	b-Endosulfan-beta
1,2-Dichloroethane		Bis(2-ethylhexyl)phthalate	Endosulfan sulfate
1,1-Dichloroethylene		4-Bromophenyl phenyl ether	Endrin
1,2-Dichloropropane		Butylbenzyl phthalate	Endrin aldehyde
1,3-Dichloropropene		2-Chloronaphthalene	Heptachlor
Ethyl benzene		4-Chlorophenyl phenyl ether	Heptachlor epoxide
Methyl bromide		Chrysene	PCB-1242
Methyl chloride		Dibenzo(a,h)anthracene	PCB-1254
Methylene chloride		1,2-Dichlorobenzene	PCB-1221
1,1,2,2-Tetrachloroethane		1,3-Dichlorobenzene	PCB-1232
Tetrachloroethylene		1,4-Dichlorobenzene	PCB-1248
Toluene		3,3-Dichlorobenzidine	PCB-1260

TABLE 3 (Continued): LIST OF ORGANIC PRIORITY POLLUTANTS ANALYZED IN SEDIMENT SAMPLES COLLECTED FOR THE AMBIENT WATER QUALITY MONITORING PROGRAM DURING 2006

Volatile Organic Compounds	Acid Extractables	Base/Neutral Extractables	Pesticides and PCBs
1,2-trans-Dichloroethylene		Diethyl phthalate	PCB-1016
1,1,1-Trichloroethane		Dimethyl phthalate	Toxaphene
1,1,2-Trichloroethane		Di-n-butyl phthalate	
Trichloroethylene		2,4-Dinitrotoluene	
Vinyl chloride		2,6-Dinitrotoluene	
Trichlorofluoromethane		Di-n-octyl phthalate	
		1,2-Diphenylhydrazine	
		Fluoranthene	
		Fluorene	
		Hexachlorobenzene	
		Hexachlorobutadiene	
		Hexachlorocyclopentadiene	
		Hexachloroethane	
		Indeno(1,2,3-cd)pyrene	
		Isophorone	
		Naphthalene	
		Nitrobenzene	
		N-Nitrosodimethylamine	
		N-Nitrosodi-n-propylamine	
		N-Nitrosodiphenylamine	
		Phenanthrene	
		Pyrene	
		1,2,4-Trichlorobenzene	

RESULTS AND DISCUSSION

Chlorophyll

As a photosynthetic component of all algae cells, the determination of chlorophyll *a* is an accepted way of quantifying algal biomass in lakes and streams. Chlorophyll *a* values are of interest to regulatory agencies since it is also widely accepted that high algae concentrations may indicate nutrient impairment. The IEPA is cooperating with other state and local agencies to develop regional water quality criteria for nutrients and possibly chlorophyll. In light of this consideration, the District began monitoring chlorophyll on a monthly basis in August 2001 as part of the AWQM Program. Results from 2006 are shown in Table 4.

During 2006, the highest mean chlorophyll *a* values in the Chicago area waterways were at Higgins Road on Salt Creek (34 µg/L) and Frontage Road on the Skokie River (33 µg/L). The lowest mean chlorophyll *a* concentrations throughout the system were 1 µg/L at Ewing Avenue on the Calumet River and at Lake Shore Drive on the Chicago River.

Habitat

Habitat is one of the most crucial factors limiting aquatic life in urban environments. Channelization, limited instream and canopy cover, siltation, and lack of adequate flood plain area are some of the physical characteristics that challenge waterways in the Chicago area. Tables 5-8 display some of the observed and measured characteristics of sampling stations located on the Chicago River System. The displayed habitat characteristics are a compilation of all the assessments made at each station in 2006.

The water depth in the Chicago River System ranged from 3-24 feet. Lockport on the CSSC was the deepest and had the largest range of depth. Man-made structures like sheet pilings and riprap were prevalent throughout the system. Floatable materials were observed at most stations, with floating vegetative material being ubiquitous throughout the system. Boulders were the predominant source of instream habitat for fish in this system. In most cases, the boulders were a remnant of the bedrock that was removed to excavate the channels. Canopy cover was limited because the riparian habitat was dominated by commercial and industrial land use. Route 83 and Stephen Street on the CSSC were the only two stations where riparian areas were forested.

Silt was the predominant component in most sediment samples, and oil was found in light amounts at almost all sampling stations on the Chicago River System. The greatest depth of fines measured (9 feet) was at Damen Avenue on the CSSC where silt and organic sludge were the predominant substrates. Depths of fines measurements were not possible at certain center locations on the Chicago River and South Branch Chicago River (SBCR) due to very deep water in these waterways. Scoured bedrock was the preponderant substrate in the three southernmost stations on the CSSC, limiting most of the depth of fines measurements to less than 0.1 feet.

TABLE 4: RANGE AND MEAN CHLOROPHYLL *a* VALUES IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2006

Station No.	Station Name	Waterway	N*	Mean µg/L	Minimum µg/L	Maximum µg/L	Standard Deviation µg/L
106	Dundee Road	W Fork N Branch Chicago River[1]	5	11	4	21	7
103	Golf Road	W Fork N Branch Chicago River[1]	12	13	4	32	9
31	Lake-Cook Road	M Fork N Branch Chicago River[2]	11	12	1	27	9
32	Lake-Cook Road	Skokie River	12	7	1	14	3
105	Frontage Road	Skokie River	12	33	5	91	26
104	Glenview Road	North Branch Chicago River	12	20	4	45	12
34	Dempster Street	North Branch Chicago River	12	17	4	44	11
96	Albany Avenue	North Branch Chicago River	12	14	3	49	13
35	Central Street	North Shore Channel	9	5	1	30	10
102	Oakton Street	North Shore Channel	12	23	< 1	190	55
36	Touhy Avenue	North Shore Channel	12	2	< 1	9	2
101	Foster Avenue	North Shore Channel	12	2	< 1	8	2
37	Wilson Avenue	North Branch Chicago River	12	5	1	12	4
73	Diversey Avenue	North Branch Chicago River	12	4	1	10	3
46	Grand Avenue	North Branch Chicago River	12	6	2	19	5
74	Lake Shore Drive	Chicago River	11	1	1	5	1
100	Wells Street	Chicago River	12	3	1	12	3
39	Madison Street	South Branch Chicago River	12	4	1	15	4
108	Loomis Street	South Branch Chicago River	12	6	1	29	7
99	Archer Avenue	Bubbly Creek	7	6	2	12	3
40	Damen Avenue	Chicago Sanitary and Ship Canal	12	5	< 1	28	7
75	Cicero Avenue	Chicago Sanitary and Ship Canal	12	5	1	12	3
41	Harlem Avenue	Chicago Sanitary and Ship Canal	12	3	< 1	10	2
42	Route 83	Chicago Sanitary and Ship Canal	12	4	< 1	12	4
48	Stephen Street	Chicago Sanitary and Ship Canal	12	4	< 1	10	3
92	Lockport	Chicago Sanitary and Ship Canal	51	4	1	13	3

TABLE 4 (Continued): RANGE AND MEAN CHLOROPHYLL *a* VALUES IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2006

Station No.	Station Name	Waterway	N*	Mean µg/L	Minimum µg/L	Maximum µg/L	Standard Deviation µg/L
49	Ewing Avenue	Calumet River	11	1	1	4	1
55	130th Street	Calumet River	11	3	1	9	2
50	Burnham Avenue	Wolf Lake	11	5	1	21	6
86	Burnham Avenue	Grand Calumet River	8	27	2	91	36
56	Indiana Avenue	Little Calumet River	11	26	2	134	38
76	Halsted Street	Little Calumet River	11	9	< 1	28	8
52	Wentworth Avenue	Little Calumet River	11	4	1	10	3
54	Joe Orr Road	Thorn Creek	9	4	2	11	3
97	170th Street	Thorn Creek	11	5	4	10	2
57	Ashland Avenue	Little Calumet River	11	5	1	10	2
58	Ashland Avenue	Calumet-Sag Channel	11	10	1	32	9
59	Cicero Avenue	Calumet-Sag Channel	11	9	2	34	9
43	Route 83	Calumet-Sag Channel	11	6	2	18	5
90	Route 19	Poplar Creek	12	14	3	27	8
110	Springinsguth Road	West Branch DuPage River	11	15	4	43	13
89	Walnut Lane	West Branch DuPage River	12	5	1	13	5
64	Lake Street	West Branch DuPage River	12	20	5	54	15
79	Higgins Road	Salt Creek	9	34	15	69	17
80	Arlington Heights Road	Salt Creek	12	16	4	45	11
18	Devon Avenue	Salt Creek	12	18	5	47	12
24	Wolf Road	Salt Creek	12	12	3	26	8
109	Brookfield Avenue	Salt Creek	12	16	2	67	19
77	Elmhurst Road	Higgins Creek	7	12	4	19	6
78	Wille Road	Higgins Creek	11	3	1	6	2
12	Lake-Cook Road	Buffalo Creek	9	20	7	33	9

TABLE 4 (Continued): RANGE AND MEAN CHLOROPHYLL *a* VALUES IN THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2006

Station No.	Station Name	Waterway	N*	Mean µg/L	Minimum µg/L	Maximum µg/L	Standard Deviation µg/L
13	Lake-Cook Road	Des Plaines River	12	17	6	32	7
17	Oakton Street	Des Plaines River	12	13	2	32	9
19	Belmont Avenue	Des Plaines River	12	12	1	28	9
20	Roosevelt Road	Des Plaines River	12	11	1	29	8
22	Ogden Avenue	Des Plaines River	12	15	2	50	15
23	Willow Springs Road	Des Plaines River	12	14	2	35	10
29	Stephen Street	Des Plaines River	11	17	5	39	11
91	Material Services Road	Des Plaines River	12	24	7	78	19

*N = Number of Observations.
[1]West Fork North Branch Chicago River.
[2]Middle Fork North Branch Chicago River.

TABLE 5: SUMMARY OF HABITAT OBSERVATIONS FOR STATIONS ON THE CHICAGO RIVER DURING 2006

Observation	Chicago River	
	Station #74 Lake Shore Drive	Station #100 Wells Street
Depth Range (ft)	17–23	7–21
Man-Made Structure Present	Sheet Piling	Sheet and Wood Pilings
Floatable Materials	Street Litter, Vegetative Material	Street Litter, Vegetative Material
Instream Cover for Fish (Side)	None	Under Cut Bank, Boulders, Logs
Canopy Cover	Open to Partly Shaded	Open
Immediate Shore Cover	Wall	Grasses, Shrubs
Riparian Land Use	Urban Residential/Commercial	Urban Commercial/Industrial
Sediment Composition (Descending Percentage)	Silt, Sand, Clay, Gravel	Silt, Organic Sludge, Mussel Shells, Sand, Gravel, Plant Debris
Amount of Oil in Sediment	None to Light	None to Moderate
Depth of Fines Range (ft.)	1.3[a]	1.2-5.0[b]

[a]Only one measurement due to deep water
[b]Side measurements only

TABLE 6: SUMMARY OF HABITAT OBSERVATIONS FOR STATIONS ON THE SOUTH BRANCH CHICAGO RIVER DURING 2006

Observation	South Branch Chicago River	
	Station #39 Madison St.	Station #108 Loomis St.
Depth Range (ft)	12-23	10-21
Man-Made Structure Present	Concrete Wall, Wood Dock, Bridge	Sheet Piling, Riprap
Floatable Materials	None	None
Instream Cover for Fish (Side)	Pilings, Boat Dock	Concrete, Brush-Debris Jams, Logs
Canopy Cover	Open to Shaded	Open
Immediate Shore Cover	None	Shrubs, Concrete, Stones
Riparian Land Use	Urban Commercial/Industrial	Urban Commercial/Industrial
Sediment Composition (Descending Percentage)	Silt, Zebra Mussel Shells, Sand	Bedrock, Silt, Sand, Organic Sludge
Amount of Oil in Sediment	Light to Moderate	None to Light
Depth of Fines Range (ft.)	1.0-1.3[a]	<0.1->5

[a]Side measurements only

TABLE 7: SUMMARY OF HABITAT OBSERVATIONS FOR
THE ARCHER AVENUE STATION ON BUBBLY CREEK DURING 2006

Observation	Bubbly Creek Station #99 Archer Ave.
Depth Range (ft)	5-12
Man-Made Structure Present	Sheet and Wooden Pilings, Bridge
Floatable Materials	Sanitary Sewage
Instream Cover for Fish (Side)	Brush-Debris Jams, Logs
Canopy Cover	Open to Partly Shaded
Immediate Shore Cover	Shrubs, Trees
Riparian Land Use	Urban Commercial/Industrial
Sediment Composition (Descending Percentage)	Gravel, Organic Sludge, Silt, Sand, Coal Chunks, Plant Debris
Amount of Oil in Sediment	None to Light
Depth of Fines Range (ft.)	<0.1 – 4.5

TABLE 8: SUMMARY OF HABITAT OBSERVATIONS FOR STATIONS ON THE CHICAGO SANITARY AND SHIP CANAL DURING 2006

Observation	Chicago Sanitary and Ship Canal	
	Station #40 Damen Ave.	Station #75 Cicero Ave.
Depth Range (ft)	4-19	9-19
Man-Made Structure Present	Riprap, Bridge, Sheet Piling	Riprap, Bridge, Limestone Wall
Floatable Materials	None	Street Litter, Sanitary Sewage
Instream Cover for Fish (Side)	Boulders, Logs	Boulders, Submerged Terrestrial Vegetation
Canopy Cover	Open	Open to Partly Shaded
Immediate Shore Cover	Grasses, Shrubs	Grasses, Shrubs, Trees
Riparian Land Use	Urban Commercial/Industrial	Urban Commercial/Industrial
Sediment Composition (Descending Percentage)	Silt, Organic Sludge, Cobble, Boulder	Silt, Organic Sludge, Sand, Clay
Amount of Oil in Sediment	None to Moderate	Light to Moderate
Depth of Fines Range (ft.)	0.2-9.0	0.5-4.2

TABLE 8 (continued): SUMMARY OF HABITAT OBSERVATIONS FOR STATIONS ON THE CHICAGO SANITARY AND SHIP CANAL DURING 2006

Observation	Chicago Sanitary and Ship Canal	
	Station #41 Harlem Ave.	Station #42 Route 83
Depth Range (ft)	3-21	19-23
Man-Made Structure Present	Riprap, Bridge	None
Floatable Materials	Vegetative Material	Vegetative Material
Instream Cover for Fish (Side)	Boulders	Boulders, Rock Ledge
Canopy Cover	Open to Partly Shaded	Open
Immediate Shore Cover	Shrubs, Trees, Riprap	Grasses, Shrubs, Trees
Riparian Land Use	Urban Commercial/Industrial	Forest
Sediment Composition (Descending Percentage)	Silt, Sand, Gravel, Cobble, Clay, Plant Debris, Organic Sludge	Bedrock, Silt
Amount of Oil in Sediment	None to Light	None to Light
Depth of Fines Range (ft.)	0.1-1.2	<0.1[a]

TABLE 8 (continued) SUMMARY OF HABITAT OBSERVATIONS FOR STATIONS ON THE CHICAGO SANITARY AND SHIP CANAL DURING 2006

Observation	Chicago Sanitary and Ship Canal	
	Station #48 Stephen St.	Station #92 Lockport
Depth Range (ft)	18-22	3-24
Man-Made Structure Present	None	None
Floatable Materials	Vegetative Material	Vegetative Material
Instream Cover for Fish (Side)	Boulders Rock Ledge	Boulders, Rock Ledge
Canopy Cover	Open	Open
Immediate Shore Cover	Grasses, Shrubs, Trees	Grasses, Shrubs, Trees, Riprap
Riparian Land Use	Forest	Urban Commercial/Industrial
Sediment Composition (Descending Percentage)	Bedrock	Bedrock, Boulder, Silt, Sand, Plant Debris
Amount of Oil in Sediment	None to Light	None
Depth of Fines Range (ft.)	<0.1[a]	<0.1-3.4

[a]All measurements <0.1 ft.

Fish

Table 9 lists the common and scientific names of the fish species collected during 2006 and indicates the particular river system from which each species was collected. The number of individuals, total species and game species collected, and weight of total catch at each station are shown in Table 10. During 2006, 4,644 fish composed of 40 fish species, including 16 game species, and 4 hybrids, were collected from Chicago area waterways. This total included 3,639 fish composed of 36 species, which were collected from 23 AWQM Program sample stations, and 1,005 fish which were collected from 7 supplemental stations. Numbers of fish collected from each AWQM and supplemental station are shown in Appendix Tables A-1 – A-4. Gizzard shad, pumpkinseed sunfish, and common carp were the most abundant species in the deep-draft waterways. Green sunfish, bluntnose minnows, and spotfin shiners were the most abundant species at the wadeable streams stations.

IBI scores calculated for each AWQM station and collection method are shown in Table 11. Most of the stations were rated as "fair" in terms of biological integrity. Two collections were rated as poor, including Stephen street on the deep-draft Chicago Sanitary and Ship Canal and the wadeable backpack fish collection at Ogden Avenue on the Des Plaines River.

Benthic Invertebrates

Table 12 contains a list of benthic invertebrate taxa collected by each of the two sampling methods. A report focusing on detailed benthic invertebrate data from 2006 is forthcoming. Total species richness for ponar and Hester Dendy samplers combined was 110 species, while total EPT richness was 16 species. The total species richness was higher than the 2002 collection at the same stations, which yielded 90 total species. The total EPT richness was the same as 2002.

Chicago River System. *North Shore Channel and North Branch Chicago River*. Benthic samples were collected from one station on the NSC and two stations on the NBCR. Albany Avenue on the NBCR had the highest total taxa richness among Hester Dendy (33 taxa) and petite ponar (20 taxa) samples. Albany Avenue was also the only station on this system that had any EPT taxa in Hester Dendy and petite ponar samples (6 and 2, respectively). Total taxa richness from ponar samples at Touhy Avenue (NSC) and Grand Avenue (NBCR) numbered less than half the taxa at Albany Avenue. Oligochaeta were the dominant taxa in all samples except for the Albany Avenue Hester Dendy where *Gammarus* was the dominant taxon. Head capsule deformities in Chironomidae specimens were found in 1 Hester Dendy sample at Grand Avenue, accounting for less than 3 percent of the midges that were examined. Head capsule deformities in Chironomidae specimens were also found in all ponar samples in the NBCR System ranging from 5.9 percent (Albany Avenue, NBCR) to 16.7 percent (Grand Avenue, NBCR).

TABLE 9: COMMON AND SCIENTIFIC NAMES OF FISHES COLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2006

Common Name	Scientific Name	River System		
		Chicago	Calumet	Des Plaines
HERRING FAMILY	CLUPEIDAE			
Alewife	*Alosa pseudoharengus*	X		
Gizzard shad	*Dorosoma cepedianum*	X	X	
SALMON AND TROUT FAMILY	SALMONIDAE			
Chinook salmon[1]	*Oncorhynchus tshawytscha*		X	
MINNOW FAMILY	CYPRINIDAE			
Goldfish	*Carassius auratus*	X	X	
Grass carp	*Ctenopharyngodon idella*		X[2]	
Common carp	*Cyprinus carpio*	X	X	X
Carp x Goldfish Hybrid	*Cyprinus carpio x Carrassius auratus*	X		
Spotfin shiner	*Cyprinella spiloptera*	X	X	X
Golden shiner	*Notemigonus crysoleucas*	X	X	X
Emerald shiner	*Notropis atherinoides*	X	X	X
Bigmouth shiner	*Notropis dorsalis*			X
Sand shiner	*Notropis stramineus*	X	X[2]	X
Bluntnose minnow	*Pimephales notatus*	X	X	X
Fathead minnow	*Pimephales promelas*	X		X
Creek chub	*Semotilus atromaculatus*		X	X
SUCKER FAMILY	CATOSTOMIDAE			
Quilback	*Carpiodes cyprinus*		X	
White sucker	*Catostomus commersonii*	X	X	X
Black buffalo	*Ictiobus niger*		X	
Spotted sucker	*Minytrema melanops*			X
CATFISH FAMILY	ICTALURIDAE			
Yellow bullhead[1]	*Ameiurus natalis*	X	X	X
Brown bullhead[1]	*Ameiurus nebulosus*		X	
Channel catfish[1]	*Ictalurus punctatus*	X		
Tadpole madtom	*Noturus gyrinus*			X
KILLIFISH FAMILY	*FUNDULIDAE*			
Blackstripe topminnow	*Fundulus notatus*	X[3]		X
LIVEBEARER FAMILY	POECILIIDAE			
Western mosquitofish	*Gambusia affinis*	X		X

TABLE 9 (Continued): COMMON AND SCIENTIFIC NAMES OF FISHES COLLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2006

Common Name	Scientific Name	River System		
		Chicago	Calumet	Des Plaines
SILVERSIDES FAMILY	ATHERINOPSIDAE			
Brook silverside	*Labidesthes sicculus*		X	
TEMPERATE BASS FAMILY	MORONIDAE			
White perch[1]	*Morone Americana*	X	X	
Yellow bass[1]	*Morone mississippiensis*	X	X	
GOBY FAMILY	GOBIIDAE			
Round goby	*Neogobius melanostomus*	X	X	
SUNFISH FAMILY	*CENTRARCHIDAE*			
Rock bass[1]	*Ambloplites rupestris*	X	X	X
Green sunfish[1]	*Lepomis cyanellus*	X	X	X
Pumpkinseed[1]	*Lepomis gibbosus*	X	X	X
Orangespotted sunfish[1]	*Lepomis humilis*		X[2]	X
Bluegill[1]	*Lepomis macrochirus*	X	X	X
Green sunfish x Longear sunfish Hybrid	*L. cyanellus x L.megalotis*		X	
Green sunfish x Bluegill Hybrid	*L. cyanellus x L.macrochirus*	X		X
Pumpkinseed x Bluegill Hybrid	*L. gibbosus x L. macrochirus*			X
Smallmouth bass[1]	*Micropterus dolomieu*	X	X	
Largemouth bass[1]	*Micropterus salmoides*	X	X	X
White crappie[1]	*Pomoxis annularis*	X	X	
Black crappie[1]	*Pomoxis nigromaculatus*	X	X	X
PERCH FAMILY	*PERCIDAE*			
Johnny darter	*Etheostoma nigrum*			X
Yellow perch[1]	*Perca flavescens*		X	
DRUM FAMILY	*SCIAENIDAE*			
Freshwater drum	*Aplodinotus grunniens*	X	X	
	Total Number of Species	27	31	23
	Total Number of Hybrids	2	1	2

[1]Game fish species
[2]SEPA station only
[3]Wadeable station only

TABLE 10: NUMBER, WEIGHT, AND NUMBER OF SPECIES FOR FISH COLLECTED FROM THE CHICAGO, CALUMET,AND DES PLAINES RIVER SYSTEMS DURING 2006

Station No.	Location	Waterway	Sample Gear	Number of Fish	Weight (grams)	Number of Species		Most Abundant Species
						Total	Game	
96	Albany Avenue*	North Branch Chicago River	BP/Seine	24	34	4	1	White sucker
36	Touhy Avenue*	North Shore Channel	Large EF Boat	496	119,546	15	7	Gizzard shad
46	Grand Avenue*	North Branch Chicago River	Large EF Boat	158	27,264	10	5	Gizzard shad
74	Lake Shore Drive	Chicago River	Large EF Boat	83	26,878	7	5	Gizzard shad
100	Wells Street	Chicago River	Large EF Boat	250	59,319	10	7	Gizzard shad
39	Madison Street	South Branch Chicago River	Large EF Boat	99	10,821	6	3	Spotfin shiner
108	Loomis Street	South Branch Chicago River	Large EF Boat	143	84,492	11	6	Carp
99	Archer Avenue*	South Fork South Branch	Large EF Boat	156	10,625	13	7	Gizzard shad
40	Damen Avenue	Chicago Sanitary & Ship Canal	Large EF Boat	164	95,545	12	6	Gizzard shad
75	Cicero Avenue*	Chicago Sanitary & Ship Canal	Large EF Boat	205	30,445	11	5	Pumpkinseed
41	Harlem Avenue*	Chicago Sanitary & Ship Canal	Large EF Boat	388	42,178	15	7	Pumpkinseed
42	Route 83	Chicago Sanitary & Ship Canal	Large EF Boat	10	307	5	1	Pumpkinseed
48	Stephen Street	Chicago Sanitary & Ship Canal	Large EF Boat	24	1,392	5	0	Gizzard shad
92	Lockport*	Chicago Sanitary & Ship Canal	Large EF Boat	64	46,285	8	5	Gizzard shad
55	130th Street*	Calumet River	Large EF Boat	233	95,359	14	6	Gizzard shad
76	Halsted Street*	Little Calumet River	Large EF Boat	405	113,563	22	12	Carp
59	Cicero Avenue*	Calumet-Sag Channel	Large EF Boat	215	36,491	14	6	Gizzard shad
78	Wille Road*	Higgins Creek	BP	73	345	6	1	Fathead minnow
18	Devon Avenue*	Salt Creek	BP/Seine	64	7,428	8	4	Green sunfish
64	Lake Street*	West Branch DuPage River	BP/Seine	181	2,368	9	4	Green sunfish

TABLE 10 (Continued): NUMBER, WEIGHT, AND NUMBER OF SPECIES FOR FISH COLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2006

Station No.	Location	Waterway	Sample Gear	Number of Fish	Weight (grams)	Number of Species		Most Abundant Species
						Total	Game	
13	Lake-Cook Road*	Des Plaines River	BP/Seine	124	3,826	12	6	Spotfin shiner
22	Ogden Avenue*	Des Plaines River	BP/Seine	44	266	8	4	Bluntnose minnow
91	Material Service Road*	Des Plaines River	BP/Seine	36	365	11	3	Blackstripe topminnow
		TOTAL		3,639	815 kg	36	15	

*Annual sampling station.

TABLE 11: INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY BY STATION DURING 2006

Station No.	Location	Waterway	Sample Gear	IBI* Score	IBI* Category
96	Albany Avenue	North Branch Chicago River	BP	28	Fair
96	Albany Avenue	North Branch Chicago River	Seine	28	Fair
36	Touhy Avenue	North Shore Channel	Large EF Boat	34	Fair
46	Grand Avenue	North Branch Chicago River	Large EF Boat	28	Fair
74	Lake Shore Drive	Chicago River	Large EF Boat	36	Fair
100	Wells Street	Chicago River	Large EF Boat	34	Fair
39	Madison Street	South Branch Chicago River	Large EF Boat	34	Fair
108	Loomis Street	South Branch Chicago River	Large EF Boat	26	Fair
99	Archer Avenue	Bubbly Creek	Large EF Boat	32	Fair
40	Damen Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	32	Fair
75	Cicero Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	28	Fair
41	Harlem Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	34	Fair
42	Route 83	Chicago Sanitary and Ship Canal	Large EF Boat	26	Fair
48	Stephen Street	Chicago Sanitary and Ship Canal	Large EF Boat	20	Poor
92	Lockport	Chicago Sanitary and Ship Canal	Large EF Boat	26	Fair
55	130th Street	Calumet River	Large EF Boat	36	Fair
76	Halsted Street	Little Calumet River	Large EF Boat	36	Fair
59	Cicero Avenue	Calumet-Sag Channel	Large EF Boat	30	Fair
78	Wille Road	Higgins Creek	BP	26	Fair
78	Wille Road	Higgins Creek	Seine	ND	ND
18	Devon Avenue	Salt Creek	BP	24	Fair
18	Devon Avenue	Salt Creek	Seine	28	Fair
64	Lake Street	West Branch DuPage River	BP	28	Fair
64	Lake Street	West Branch DuPage River	Seine	30	Fair
13	Lake-Cook Road	Des Plaines River	BP	30	Fair
13	Lake-Cook Road	Des Plaines River	Seine	36	Fair

TABLE 11 (Continued): INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY BY STATION DURING 2006

Station No.	Location	Waterway	Sample Gear	IBI* Score	IBI* Category
22	Ogden Avenue	Des Plaines River	BP	18	Poor
22	Ogden Avenue	Des Plaines River	Seine	32	Fair
91	Material Services Road	Des Plaines River	BP	30	Fair
91	Material Services Road	Des Plaines River	Seine	28	Fair

*IBI = Index of Biotic Integrity.
ND = No fish were caught in the seine or conditions were unfavorable for seining.

TABLE 12: BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER DENDY SAMPLERS DURING 2006

Taxa	Hester Dendy	Petite Ponar
COELENTERATA (Hydroids)		
Hydra	X	X
PLATYHELMINTHES (Flat worms)		
Turbellaria	X	X
ECTOPROCTA (Bryozoans)		
Plumatella	X	
NEMERTEA (Ribbon Worms)	X	
ANNELLIDA		
Oligochaeta (Aquatic Worms)	X	X
Hirudinea (Leeches)		
Glossiphoniidae[1]		
Desserobdella phalera	X	
Helobdella[1]	X[1]	X[1]
Helobdella stagnalis	X	X
Helobdella triserialis	X	
Mooreobdella microstoma	X	X
CRUSTACEA		
Ostracoda (Seed Shrimps)	X	
Isopoda (Sow Bugs)		
Caecidotea	X	X
Amphipoda (Side Swimmers)		
Echinogammarus ischusa	X	X
Gammarus	X	X
Hyalella azteca	X	
Decapoda (Crayfish)		
Orconectes[1]	X[1]	X
Orconectes immunis	X	
ARACHNOIDEA		
Hydracarina (Water Mites)	X	

TABLE 12 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER DENDY SAMPLERS DURING 2006

Taxa	Hester Dendy	Petite Ponar
INSECTA		
Ephemeroptera (Mayflies)		
Baetis intercalaris	X	X
Leucrocuta	X	
Maccaffertium integrum	X	
Stenacron	X	X
Caenis	X	X
Tricorythodes	X	X
Ephoron		X
Odonata (Damselflies and Dragonflies)		
Boyeria vinosa	X	
Argia	X	X
Enallagma	X	X
Stylurus		X
Trichoptera (Caddisflies)		
Cyrnellus fraternus	X	
Ceratopsyche morosa	X	
Cheumatopsyche	X	X
Hydropsyche[1]	X[1]	
Hydropsyche betteni	X	
Hydropsyche bidens	X	
Hydropsyche orris	X	
Hydropsyche simulans	X	X
Hydroptila	X	X
Nectopsyche diarina	X	
Coleoptera (Beetles)		
Dubiraphia	X	X
Macronychus glabratus	X	X
Stenelmis[1]	X[1]	X
Stenelmis crenata grp.	X	
Diptera (True Flies)		
Ceratopogonidae	X	X
Hemerodromia	X	

TABLE 12 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER DENDY SAMPLERS DURING 2006

Taxa	Hester Dendy	Petite Ponar
INSECTA		
Diptera (True Flies) (Continued)		
Simulium	X	
Chironimidae (Midges)[1]		
Alotanypus	X	
Procladius	X	X
Coelotanypus		X
Ablabesmyia annulata		X
Ablabesmyia janta	X	X
Ablabesmyia mallochi	X	X
Thienemannimyia grp.	X	X
Corynoneura	X	
Cricotopus bicinctus grp.	X	X
Cricotopus sylvestris grp.	X	X
Cricotopus tremulus grp.	X	X
Cricotopus trifascia grp.		X
Heterotrissocladius	X	
Nanocladius crassicornus/rectinervis	X	X
Nanocladius distinctus	X	X
Rheocricotopus robacki	X	X
Thienemanniella lobapodema	X	X
Thienemanniella similis	X	X
Thienemanniella xena	X	X
Chironomus	X	X
Cladopelma	X	X
Cryptochironomus	X	X
Cryptotendipes	X	
Dicrotendipes fumidus	X	X
Dicrotendipes lucifer	X	X
Dicrotendipes modestus	X	X
Dicrotendipes neomodestus	X	X
Dicrotendipes simpsoni	X	X
Endochironomus nigricans	X	X

TABLE 12 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER DENDY SAMPLERS DURING 2006

Taxa	Hester Dendy	Petite Ponar
INSECTA		
Diptera (True Flies) (Continued)		
Glyptotendipes	X	X
Harnischia	X	X
Microchironomus	X	
Microtendipes	X	X
Parachironomus	X	X
Paratendipes	X	X
Phaenopsectra obediens grp.	X	X
Phaenopsectra punctipes	X	
Polypedilum fallax grp.	X	
Polypedilum flavum	X	X
Polypedilum halterale grp.	X	X
Polypedilum illinoense	X	X
Polypedilum scalaenum grp.	X	X
Pseudochironomus	X	X
Stenochironomus	X	
Stictochironomus	X	X
Tribelos jucundum	X	
Cladotanytarsus mancus grp.		X
Cladotanytarsus vanderwulpi grp.	X	X
Paratanytarsus	X	X
Rheotanytarsus	X	X
Tanytarsus[1]	X[1]	X
Tanytarsus glabrescens grp.	X	
Tanytarsus spp.	X	
Xenochironomus xenolabis	X	
GASTROPODA (Snails)		
Ferrissia	X	X
Amnicola		X
Physa	X	X

TABLE 12 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER DENDY SAMPLERS DURING 2006

Taxa	Hester Dendy	Petite Ponar
GASTROPODA (Snails) (Continued)		
Helisoma	X	X
Menetus		X
Pleurocera	X	X
PELECYPODA (Mussels and Clams)[1]		
Corbicula fluminea	X	X
Dreissena polymorpha	X	X
Dreissena rostriformis	X	X
Eupera cubensis	X	
Musculium	X	X
Pisidium	X	X
TOTAL SPECIES RICHNESS BY SAMPLE TYPE	99	77
EPT[2] SPECIES RICHNESS BY SAMPLE TYPE	15	8
TOTAL SPECIES RICHNESS FOR 2006	110	
EPT[2] SPECIES RICHNESS FOR 2006	16	

[1]Not counted as a discreet taxon.
[2]Ephemeroptera, Plecoptera, and Tricoptera are considered relatively sensitive taxa.

Chicago River, South Branch Chicago River, Bubbly Creek, and Chicago Sanitary and Ship Canal. In 2006, biological sampling focused on the Chicago River, SBCR and CSSC. Benthic invertebrate samples were collected at 10 stations therein. Stephen Street on the CSSC was not sampled for benthic invertebrates because Hester Dendy samplers were lost, and the scoured riverbed prohibited ponar samples. Total and EPT taxa richness varied minimally between samples throughout the system. No ponar samples had any EPT taxa. Hester Dendy samples had EPT richness values that ranged from 0 at Madison Street (SBCR), Loomis Street (SBCR), Archer Avenue (Bubbly Creek) and Cicero Avenue (CSSC), to 2 at Damen Avenue (CSSC), Route 83 (CSSC), and Lockport (CSSC). The highest total taxa richness occurred in the Hester Dendy sample from Lake Shore Drive on the Chicago River (30 taxa), while the lowest (9 taxa) was found at Archer Avenue on Bubbly Creek. Oligochaeta was the dominant taxa at all stations for both Hester Dendy and ponar samples besides Lake Shore Drive (Quagga mussels), Archer Avenue (Chironomidae), and Lockport (Hydra and Turbellaria) Hester Dendy samples. Head capsule deformities in Chironomidae specimens occurred at 8 of the 10 stations. Stations that did not have chironomids with head capsule deformities were Cicero Avenue and Lockport in the CSSC. Stations having Chironomidae with head capsule deformities in Hester Dendy samples accounted for a maximum of 7 percent (Harlem, CSSC) and a minimum of 1 percent (Loomis, SBCR and Wells, Chicago River) of the specimens that were examined. Head capsule deformities occurred at much higher rates in ponar samples, but the number of Chironomidae examined was significantly less.

Calumet River System. Benthic samples were collected from single stations on the Calumet River, LCR, and CSC during 2006. The CSC station's Hester Dendy sample exhibited the highest total taxa richness, and the ponar sample had the lowest total taxa richness (21 and 8 taxa, respectively). EPT taxa were found in Hester Dendy samples on the LCR and CSC (2 and 1, respectively). Quagga mussels represented 74 percent of the total density in the Hester Dendy sample from the Calumet River. Oligochaeta dominated all of the ponar samples from the Calumet River System. Chironomids with head capsule deformities were absent from samples, except on the LCR, where they were rare.

Des Plaines River System. Benthic invertebrate samples were collected from eight AWQM stations on the Des Plaines River System during 2006. There was substantial spatial variability throughout the watershed, as well as within individual waterways. The highest total and EPT taxa richness in the Des Plaines River System occurred at the furthest upstream station on the Des Plaines River (Lake Cook Road). The Hester Dendy and ponar samples from this station had a combined taxa richness of 58 and an EPT taxa richness of 10. Both of these richness metrics decreased in the downstream direction. The incidence of chironomid deformities was low among stations on this system.

Sediment Chemistry

Sediment quality can considerably impact overlying water quality, benthic community structure, food chain dynamics, and other elements of freshwater ecosystems. Since sediment acts as a reservoir for persistent or bioaccumulative contaminants, sediment data reflects a long-term record of quality. It should be noted that grab sample sediment data can be difficult to

interpret, as samples may reflect a "hot spot," or an area with an unusually high concentration of a specific pollutant. This can be caused by an accidental release or spill of a contaminant that sinks down through the water column and resides in the sediment. Similarly, sediment chemistry can vary widely between side and center samples from the same station.

General Chemistry. The concentrations of the eight general chemistry constituents measured in sediment from the side and center at each of the 9 sample stations are presented in Table 13. Sediment samples from the side channel at Madison Street (SBCR) and the center at Lockport (CSSC) exhibited high concentrations of phenols (1.213 and 1.069 mg/kg, respectively). The same sample from the side channel at Madison Street (SBCR) also had the highest total phosphorus concentration (19,994 mg/kg). The sediment taken from the side channel at Loomis Street (SBCR) contained the highest concentration of total cyanide (15.585 mg/kg).

Trace Metals. The 11 measured trace metal concentrations for these same stations are presented in Table 14. Sediment samples taken from the side and center channel at Madison Street (SBCR) exhibited elevated levels of almost all of the trace metals measured. Madison Street (SBCR) had the highest concentrations of cadmium in samples taken from the side and center channel (17 and 20 mg/kg, respectively). Sediment samples taken from the center channel also had the highest concentration of mercury (5.546 mg/kg). Side channel sediment samples from Madison Street (SBCR) had a concentration of silver (35 mg/kg) that was almost six times the next highest concentration. Notably, sediment taken from the side channel at Wells Street (Chicago River) had the highest concentration of lead (1255 mg/kg).

Acid Volatile Sulfide, Simultaneously Extracted Metals, Total Organic Carbon, and Particle Size. Table 15 presents the AVS, SEM, TOC, and particle size data for 9 sampled sites. The ratio of SEM to AVS can affect the bioavailability of divalent metals, for which sulfide ions have a high affinity. For instance, if AVS is greater than SEM concentration, it is less likely that metals are available for biological uptake, thus rendering them less toxic to organisms. However, the only case where AVS was greater than SEM in sediment samples from the Chicago River System in 2006 was at the side channel at Loomis Street (SBCR). As a measure of oxidizable organic material, the TOC concentration in sediment affects nonionic organic chemical, as well as metal bioavailability. TOC data was not available in 2006 because of an equipment malfunction. Particle size is a useful analysis since it influences chemical reactions that take place in the sediment and the type of invertebrate taxa able to colonize the substrate (USEPA, 2001).

Organic Priority Pollutants. There were 111 total OPPs analyzed for each sample collected (listed in Table 3). Tables 16-18 present the concentrations of 30 OPPs that were detected in sediment samples during 2006. The station with the highest number of OPPs detected in 2006 was Archer Avenue on Bubbly Creek with 24. Sediment from the side and center of the SBCR at Madison Street had the highest values of OPPs compared to other sampling stations.

TABLE 13: CHEMICAL CHARACTERISTICS OF SEDIMENT COLLECTED FROM THE CHICAGO RIVER SYSTEM DURING 2006

WATERWAY	SITE#	LOCATION		Constituents (Expressed on a dry weight basis)							
				TS (%)	TVS (%)	NH_3-N (mg/kg)	$NO_2 + NO_3$ (mg/kg)	TKN (mg/kg)	TP (mg/kg)	Phenols (mg/kg)	TCN (mg/kg)
Chicago River	74	Lake Shore Dr.	Side	44	8	30	7	1,328	760	0.229	0.135
Chicago River	74	Lake Shore Dr.	Center	39	8	56	11	2,818	2,172	0.276	0.452
Chicago River	100	Wells St.	Side	45	7	32	9	1,520	2,011	0.227	0.204
Chicago River	100	Wells St.	Center	31	13	161	19	4,200	4,069	0.390	1.186
South Branch Chicago River	39	Madison St.	Side	8	23	227	<1	5,407	19,994	1.213	2.745
South Branch Chicago River	39	Madison St.	Center	44	11	60	<1	1,213	7,173	0.239	8.839
South Branch Chicago River	108	Loomis St.	Side	60	5	33	<1	1,352	494	0.144	15.585
South Branch Chicago River	108	Loomis St.	Center	54	14	60	<1	1,414	1,689	0.188	1.871
Bubbly Creek	99	Archer Ave.	Side	34	17	343	<1	3,808	3,420	0.367	0.805
Bubbly Creek	99	Archer Ave.	Center	40	25	187	<1	2,196	1,756	0.286	0.986
Chicago Sanitary and Ship Canal	40	Damen Ave.	Side	33	14	139	<1	4,165	4,607	0.495	1.135
Chicago Sanitary and Ship Canal	40	Damen Ave.	Center	28	16	259	<1	5,739	5,471	0.482	1.206
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Side	56	7	76	<1	1,203	1,292	0.200	0.483
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Center	47	12	65	<1	1,788	2,047	0.193	0.545
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Side	65	5	52	<1	797	803	0.167	3.968
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Center	54	10	92	<1	1,438	1,811	0.141	0.477
Chicago Sanitary and Ship Canal	92	Lockport	Side	56	13	19	2	851	1,435	0.311	0.580
Chicago Sanitary and Ship Canal	92	Lockport	Center	26	16	210	10	4,146	4,760	1.069	8.442

TABLE 14: TRACE METALS IN SEDIMENT COLLECTED FROM THE CHICAGO RIVER SYSTEM DURING 2006

WATERWAY	SITE NO.	LOCATION		As	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Ni	Ag	Zn
				(mg/kg dry weight)										
Chicago River	74	Lake Shore Dr.	Side	< 25	<2	34	51	21,520	67	329.7	0.673	23	< 1	184
Chicago River	74	Lake Shore Dr.	Center	< 25	4	65	137	19,489	210	344.2	3.738	27	1	408
Chicago River	100	Wells St.	Side	< 25	2	61	103	26,776	1,255	356.8	0.512	16	< 1	417
Chicago River	100	Wells St.	Center	< 25	8	102	237	23,916	272	347.6	2.034	35	6	691
South Branch Chicago River	39	Madison St.	Side	< 25	17	161	319	24,816	740	332.7	1.414	67	35	706
South Branch Chicago River	39	Madison St.	Center	< 25	20	149	384	25,728	674	395.1	5.546	63	5	958
South Branch Chicago River	108	Loomis St.	Side	< 25	<2	18	28	17,944	24	445.8	0.443	22	< 1	77
South Branch Chicago River	108	Loomis St.	Center	< 25	2	40	61	15,242	102	264.1	0.778	25	< 1	246
Bubbly Creek	99	Archer Ave.	Side	< 25	4	60	147	16,289	356	267.1	1.229	28	4	622
Bubbly Creek	99	Archer Ave.	Center	< 25	3	64	119	17,206	223	232.3	4.362	35	4	395
Chicago Sanitary and Ship Canal	40	Damen Ave.	Side	< 25	10	112	255	19,759	394	323.6	2.209	38	6	846
Chicago Sanitary and Ship Canal	40	Damen Ave.	Center	< 25	9	115	221	21,465	390	324.7	1.619	43	5	758
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Side	< 25	8	131	189	20,999	231	310.4	0.876	56	< 1	513
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Center	< 25	10	162	190	22,339	219	285.5	1.212	80	2	566
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Side	< 25	10	104	125	19,196	265	219.9	0.929	83	< 1	510
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Center	< 25	6	70	223	19,538	138	218.2	0.749	71	< 1	530
Chicago Sanitary and Ship Canal	92	Lockport	Side	< 25	<2	27	35	12,714	76	307.3	0.750	23	< 1	216
Chicago Sanitary and Ship Canal	92	Lockport	Center	< 25	10	129	144	21,000	174	342.5	3.963	45	< 1	615

TABLE 15: ACID VOLATILE SULFIDE, SIMULTANEOUSLY EXTRACTED METALS, TOTAL ORGANIC CARBON, AND PARTICLE SIZE SEDIMENT DATA FROM THE CHICAGO RIVER SYSTEM DURING 2006

WATERWAY	SITE NO.	LOCATION		AVS	SEM	SEM/AVS	TOC	(Particle Size) GRAVEL	SAND	SILT	CLAY
				(µmoles/g)			(mg/kg)	(%)	(%)	(%)	(%)
Chicago River	74	Lake Shore Dr.	Side	24.6	204.0	8.3	ND	2.0	91.5	3.4	3.1
Chicago River	74	Lake Shore Dr.	Center	ND	69.2	ND	ND	0.0	66.5	27.8	5.7
Chicago River	100	Wells St.	Side	51.8	395.0	7.6	ND	0.7	91.4	5.4	2.5
Chicago River	100	Wells St.	Center	8.3	62.1	7.5	ND	0.0	73.0	19.3	7.7
South Branch Chicago River	39	Madison St.	Side	11.6	1,030.0	88.9	ND	4.9	79.4	11.5	4.2
South Branch Chicago River	39	Madison St.	Center	68.9	850.0	12.3	ND	2.8	85.3	7.1	4.8
South Branch Chicago River	108	Loomis St.	Side	4.3	2.87	0.7	ND	1.6	66.1	25.9	6.4
South Branch Chicago River	108	Loomis St.	Center	1.8	10.2	5.8	ND	14.1	69.5	13.7	2.7
Bubbly Creek	99	Archer Ave.	Side	8.3	29.3	3.5	ND	4.9	73.5	17.8	3.8
Bubbly Creek	99	Archer Ave.	Center	4.6	65.7	14.3	ND	14.8	77.1	5.9	2.2
Chicago Sanitary and Ship Canal	40	Damen Ave.	Side	1.2	25.3	21.0	ND	0.0	53.1	42.4	4.5
Chicago Sanitary and Ship Canal	40	Damen Ave.	Center	3.8	33.3	8.8	ND	0.6	65.4	30.0	4.0
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Side	3.6	19.2	5.3	ND	0.8	82.2	15.2	1.8
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Center	6.7	29.9	4.5	ND	0.1	70.6	23.5	5.8
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Side	4.0	22.6	5.6	ND	0.8	90.3	7.2	1.7
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Center	8.4	29.8	3.5	ND	2.0	91.7	4.3	2.0
Chicago Sanitary and Ship Canal	92	Lockport	Side	18.2	110.0	6.1	ND	1.9	92.2	3.8	2.1
Chicago Sanitary and Ship Canal	92	Lockport	Center	5.6	141.0	25.4	ND	0.3	81.0	15.1	3.6

ND=No Data

TABLE 16: ORGANIC PRIORITY POLLUTANTS DETECTED IN SEDIMENT COLLECTED FROM THE CHICAGO RIVER DURING 2006

Compound[1]	Chicago River			
	74 side	74 center	100 side	100 center
Benzene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Acenaphthene	1,060	ND	ND	1,890
Acenaphthylene	ND	ND	ND	ND
Anthracene	1,610	ND	479	4,980
Benzo(a)anthracene	1,690	ND	973	8,930
Benzo(a)pyrene	1,580	4,100	898	8,260
3,4-Benzofluoranthene	2,010	4,650	782	8,500
Benzo(ghi)perylene	644	ND	ND	2,630
Benzo(k)fluoranthene	1,880	4,670	881	8,500
Bis(2-ethylhexyl)phthalate	5,110	ND	ND	13,300
Butylbenzyl phthalate	ND	ND	ND	ND
Chrysene	3,050	4,640	1,080	9,360
Dibenzo(a,h)anthracene	ND	ND	ND	739
Di-n-butyl phthalate	ND	ND	ND	ND
Di-n-octyl phthalate	ND	ND	ND	ND
Fluoranthene	9,810	9,390	2,440	22,100
Fluorene	1,730	ND	ND	2,230
Indeno(1,2,3-cd)pyrene	757	ND	350	3,070
Naphthalene	ND	ND	ND	ND
Phenanthrene	8,330	3,980	1,980	16,200
Pyrene	6,890	8,660	2,550	19,000
Alpha-BHC	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND
4,4'-DDE	ND	35.1	ND	75.7
4,4'-DDD	8.7	50.3	15.6	94.0
PCB-1254	ND	ND	2,200	ND
PCB-1248	ND	ND	ND	ND
PCB-1260	ND	245	ND	745
PCB-1016	ND	499	ND	974

[1]Concentrations expressed as µg/kg dry weight.
ND = Not Detectable.

TABLE 17: ORGANIC PRIORITY POLLUTANTS DETECTED IN SEDIMENT COLLECTED FROM THE SOUTH BRANCH CHICAGO RIVER AND BUBBLY CREEK DURING 2006

Compound[1]	South Branch Chicago River				Bubbly Creek	
	39 side	39 center	108 side	108 center	99 side	99 center
Benzene	ND	ND	44.7	ND	ND	ND
Toluene	ND	ND	ND	ND	50.9	ND
Acenaphthene	21,100	11,700	2,230	ND	ND	2,850
Acenaphthylene	ND	ND	1,080	1,240	ND	ND
Anthracene	37,800	16,100	3,080	1,120	1,480	7,350
Benzo(a)anthracene	63,800	34,600	5,360	4,740	6,440	19,200
Benzo(a)pyrene	54,800	33,200	5,200	5,430	5,590	18,200
3,4-Benzofluoranthene	59,100	36,100	4,740	4,790	6,170	21,500
Benzo(ghi)perylene	14,800	8,830	1,860	1,950	2,490	10,500
Benzo(k)fluoranthene	60,000	35,000	5,390	5,580	7,100	18,200
Bis(2-ethylhexyl)phthalate	ND	36,500	5,460	13,300	16,900	23,800
Butylbenzyl phthalate	ND	ND	ND	ND	ND	4,280
Chrysene	64,700	38,100	5,530	5,860	7,890	22,300
Dibenzo(a,h)anthracene	4,300	2,980	420	600	ND	2,260
Di-n-butyl phthalate	ND	ND	ND	ND	ND	9,210
Di-n-octyl phthalate	ND	ND	ND	ND	ND	6,720
Fluoranthene	164,000	93,900	11,400	7,740	16,500	45,200
Fluorene	20,900	11,700	1,750	ND	ND	3,530
Indeno(1,2,3-cd)pyrene	17,700	10,600	1,940	2,030	2,580	10,600
Naphthalene	10,000	6,410	2,980	ND	ND	ND
Phenanthrene	133,000	76,900	7,450	3,620	10,800	34,300
Pyrene	134,000	79,000	12,600	8,240	16,000	34,000
Alpha-BHC	12.3	ND	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	14.0	48.8	32.7
4,4'-DDE	146	81.5	17.4	76.5	44.3	47.4
4,4'-DDD	160	217	44.5	103	76.4	82.8
PCB-1254	ND	ND	ND	ND	ND	ND
PCB-1248	ND	ND	ND	1,510	690	528
PCB-1260	1,930	ND	ND	645	1,030	2,000
PCB-1016	3,200	1,680	ND	ND	ND	ND

[1]Concentrations expressed as µg/kg dry weight.
ND = Not Detectable.

TABLE 18: ORGANIC PRIORITY POLLUTANTS DETECTED IN SEDIMENT COLLECTED FROM THE CHICAGO SANITARY AND SHIP CANAL DURING 2006

Compound[1]	Chicago Sanitary and Ship Canal			
	40 side	40 center	75 side	75 center
Benzene	ND	ND	ND	ND
Toluene	ND	224	ND	ND
Acenaphthene	ND	1,380	1,220	3,260
Acenaphthylene	ND	ND	ND	ND
Anthracene	1,520	1,330	2,610	6,110
Benzo(a)anthracene	6,030	7,590	9,470	26,900
Benzo(a)pyrene	6,470	8,650	8,430	20,700
3,4-Benzofluoranthene	7,860	9,300	8,980	17,500
Benzo(ghi)perylene	3,260	5,070	3,740	10,900
Benzo(k)fluoranthene	7,510	9,460	8,560	15,700
Bis(2-ethylhexyl)phthalate	29,300	30,000	20,000	16,900
Butylbenzyl phthalate	ND	ND	ND	ND
Chrysene	7,680	8,730	11,800	40,900
Dibenzo(a,h)anthracene	886	1,020	881	3,100
Di-n-butyl phthalate	ND	ND	ND	ND
Di-n-octyl phthalate	ND	ND	ND	ND
Fluoranthene	14,500	11,800	17,800	58,700
Fluorene	ND	1,400	1,570	4,020
Indeno(1,2,3-cd)pyrene	3,210	5,060	3,720	9,470
Naphthalene	ND	ND	ND	1,050
Phenanthrene	6,890	6,960	11,000	31,900
Pyrene	13,300	10,600	16,100	27,200
Alpha-BHC	ND	ND	ND	ND
4,4'-DDT	52.8	103	22.0	32.4
4,4'-DDE	102	57.6	71.6	83.5
4,4'-DDD	117	74.0	86.3	113
PCB-1254	ND	ND	1,780	2,470
PCB-1248	1,480	951	4,140	7,730
PCB-1260	2,080	1,140	915	1,040
PCB-1016	ND	ND	ND	ND

TABLE 18 (Continued): ORGANIC PRIORITY POLLUTANTS DETECTED IN SEDIMENT COLLECTED FROM THE CHICAGO SANITARY AND SHIP CANAL DURING 2006

Compound[1]	Chicago Sanitary and Ship Canal			
	41 side	41 center	92 side	92 center
Benzene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Acenaphthene	1,040	2,380	ND	ND
Acenaphthylene	ND	959	ND	ND
Anthracene	2,080	5,800	1,530	ND
Benzo(a)anthracene	3,310	15,700	940	ND
Benzo(a)pyrene	2,730	13,500	1,090	2,980
3,4-Benzofluoranthene	2,740	13,600	1,030	2,980
Benzo(ghi)perylene	790	3,720	359	ND
Benzo(k)fluoranthene	3,240	13,600	1,110	3,140
Bis(2-ethylhexyl)phthalate	4,230	3,810	ND	ND
Butylbenzyl phthalate	ND	ND	ND	ND
Chrysene	3,790	17,300	1,410	2,960
Dibenzo(a,h)anthracene	ND	1,250	ND	ND
Di-n-butyl phthalate	ND	ND	ND	ND
Di-n-octyl phthalate	ND	ND	ND	ND
Fluoranthene	10,200	36,100	1,780	4,860
Fluorene	1,360	2,790	ND	ND
Indeno(1,2,3-cd)pyrene	963	4,240	387	ND
Naphthalene	ND	ND	ND	ND
Phenanthrene	6,660	18,500	982	ND
Pyrene	8,650	26,100	2,170	5,930
Alpha-BHC	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND
4,4'-DDE	101	59.7	9.0	36.8
4,4'-DDD	42.3	53.4	9.6	22.4
PCB-1254	1,090	1,100	ND	ND
PCB-1248	3,390	3,110	ND	ND
PCB-1260	287	312	ND	335
PCB-1016	ND	ND	184	ND

[1]Concentrations expressed as µg/kg dry weight.
ND = Not Detectable.

Sediment Toxicity

The toxicity data resulting from the *Chironomus tentans* 10-day toxicity tests for each sediment sample collected are presented in Table 19. A significant difference in *Chironomus* survival compared to the control sediment indicates that the collected sediment constitutes an unsuitable habitat for *Chironomus* survival. A significant difference in *Chironomus* dried weight and or *Chironomus* ash-free dried weight compared to the control sediment indicates that the collected sediment constitutes an unsuitable habitat for optimal *Chironomus* growth.

The center location at the Lockport station was the only sample out of 18 (9 stations, side and center) that had a percent survival rate that was significantly different than that of the control sites, indicating that the sediment was unsuitable for *Chironomus* survival. Survival rates were comparable between side and center samples at most stations except for Lockport which had a decrease of more than 30 percent from side to center. Four of the sites sampled showed an ash-free dried weight that was significantly different than control sites, indicating that these sediments were unsuitable for optimal *Chironomus* growth. Notably, samples from the side and center at Archer Avenue on Bubbly Creek had ash-free dried weights that were significantly different from control results.

Sediment chemistry analyses revealed that the center sample from Lockport contained very elevated concentrations of cyanide and phenols (8.442 mg/kg and 1.069mg/kg respectively), which likely contributed to its toxicity. Archer Avenue had the highest number of OPPs, possibly leading to decreased *Chironomus* growth. None of the other sediments which elicited growth inhibition in *Chironomus* showed any unusual chemical characteristics.

TABLE 19: TOXICITY DATA FOR SEDIMENT COLLECTED FROM THE CHICAGO RIVER SYSTEM DURING 2006

WATERWAY	SITE NO.	LOCATION		(*Chironumus tentans* 10-Day Test Data) Survival (%)	Ash-free Dried Weight (mg/org)
Chicago River	74	Lake Shore Dr.	Side	ND	ND
Chicago River	74	Lake Shore Dr.	Center	98	0.92
Chicago River	100	Wells St.	Side	98	1.54
Chicago River	100	Wells St.	Center	88	1.46
South Branch Chicago River	39	Madison St.	Side	80	0.65
South Branch Chicago River	39	Madison St.	Center	90	1.06
South Branch Chicago River	108	Loomis St.	Side	95	0.88
South Branch Chicago River	108	Loomis St.	Center	98	1.22
Bubbly Creek	99	Archer Ave.	Side	75	0.54*
Bubbly Creek	99	Archer Ave.	Center	66	0.52*
Chicago Sanitary and Ship Canal	40	Damen Ave.	Side	88	0.61
Chicago Sanitary and Ship Canal	40	Damen Ave.	Center	85	0.79
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Side	94	0.63*
Chicago Sanitary and Ship Canal	75	Cicero Ave.	Center	98	0.70
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Side	90	0.48*
Chicago Sanitary and Ship Canal	41	Harlem Ave.	Center	93	0.95
Chicago Sanitary and Ship Canal	92	Lockport	Side	93	1.41
Chicago Sanitary and Ship Canal	92	Lockport	Center	63*	0.65

*Significantly different than the West Bearskin Lake control results.

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APPENDIX A

NUMBER OF FISH COLLECTED FROM EACH STATION

TABLE A-1: NUMBER OF FISH COLLECTED FROM EACH STATION ON THE NORTH SHORE CHANNEL, THE DEEP-DRAFT PORTION OF THE NORTH BRANCH CHICAGO RIVER, CHICAGO RIVER, SOUTH BRANCH CHICAGO RIVER, AND BUBBLY CREEK DURING 2006

Fish Species or Hybrid (x)	North Shore Channel	North Branch Chicago River	Chicago River		South Branch Chicago River		Bubbly Creek
	Station #36 Touhy Avenue	Station # 46 Grand Avenue	Station #74 Lake Shore Drive	Station #100 Wells Street	Station #39 Madison Street	Station #108 Loomis Street	Station #99 Archer Avenue
Alewife	3	0	0	0	0	0	0
Gizzard shad	336	101	54	191	22	8	107
Goldfish	1	0	0	0	0	1	0
Common carp	30	10	7	18	6	46	5
Golden shiner	47	11	0	0	0	1	0
Spotfin shiner	8	5	0	0	60	0	8
Bluntnose minnow	1	0	0	0	0	0	1
Emerald shiner	0	0	0	0	0	0	2
White sucker	1	1	0	0	0	0	0
Channel catfish	1	0	0	0	0	0	1
Yellow bullhead	2	2	0	2	0	3	1
Mosquitofish	0	0	0	0	0	0	1
White perch	0	6	0	0	0	0	1
White crappie	0	0	0	0	0	1	0
Rock bass	1	0	1	1	0	0	0
Largemouth bass	16	7	7	17	2	24	3
Smallmouth bass	0	0	7	2	0	0	0
Green sunfish	2	0	0	2	0	10	1
Bluegill	5	3	5	3	5	38	6
Pumpkinseed	41	12	2	13	4	8	19

TABLE A-1 (Continued): NUMBER OF FISH COLLECTED FROM EACH STATION ON THE NORTH SHORE CHANNEL, THE DEEP-DRAFT PORTION OF THE NORTH BRANCH CHICAGO RIVER, CHICAGO RIVER, SOUTH BRANCH CHICAGO RIVER, AND BUBBLY CREEK DURING 2006

Fish Species or Hybrid (x)	North Shore Channel	North Branch Chicago River	Chicago River		South Branch Chicago River		Bubbly Creek
	Station #36 Touhy Avenue	Station # 46 Grand Avenue	Station #74 Lake Shore Drive	Station #100 Wells Street	Station #39 Madison Street	Station #108 Loomis Street	Station #99 Archer Avenue
Freshwater drum	0	0	0	0	0	1	0
Round goby	0	0	0	1	0	0	0
Carp x goldfish	1	0	0	0	0	1	0
Green sunfish x bluegill	0	0	0	0	0	1	0
Total Number of Fish	496	158	83	250	99	143	156

TABLE A-2: NUMBER OF FISH COLLECTED FROM EACH STATION ON THE CHICAGO SANITARY AND SHIP CANAL DURING 2006

Fish Species	Chicago Sanitary and Ship Canal						
	Station #40 Damen Avenue	Station #75 Cicero Avenue	Station #41 Harlem Avenue	Station #42 Route 83	SEPA 5*	Station #48 Stephen Street	Station #92 Lockport (16th Street)
Gizzard shad	51	30	103	2	4	20	38
Goldfish	0	4	1	0	0	0	0
Common carp	38	20	11	0	3	1	13
Golden shiner	1	3	48	0	0	0	0
Spotfin shiner	3	3	4	1	0	0	0
Fathead minnow	0	0	1	0	0	0	0
Bluntnose minnow	3	8	39	1	0	1	0
Emerald shiner	1	0	37	0	5	1	0
Channel catfish	0	0	0	0	0	0	1
Yellow bullhead	1	4	7	0	2	0	3
Mosquitofish	0	0	0	1	0	0	0
Yellow bass	0	0	1	0	0	0	0
White perch	0	0	2	0	0	0	0
Black crappie	1	0	0	0	0	0	0
Largemouth bass	18	2	4	0	7	0	1
Green sunfish	5	8	2	0	0	0	2
Bluegill	29	38	3	0	8	0	0
Pumpkinseed	13	85	125	5	4	0	3
Freshwater drum	0	0	0	0	0	1	3
Round goby	0	0	0	0	1	0	0
Total Number of Fish	164	205	388	10	34	24	64

* Sidestream Elevated Pool Aeration Station #5 located at the junction of the Chicago Sanitary and Ship Canal with the Calumet-Sag Channel. Supplemental fish collection 10/17/06 from the side of SEPA 5 that flows into the Chicago Sanitary and Ship Canal.

TABLE A-3: NUMBER OF FISH COLLECTED FROM THE CALUMET RIVER, DEEP-DRAFT PORTION OF THE LITTLE CALUMET RIVER, AND CALUMET-SAG CHANNEL DURING 2006

Fish Species or Hybrid (x)	Calumet River		Little Calumet River		Calumet-Sag Channel		
	SEPA 1[a]	Station #55 130th Street	SEPA 2[b]	Station #76 Halsted Street	Station #59 Cicero Avenue	SEPA 4[c]	SEPA 5[d]
Gizzard shad	42	88	86	25	110	13	7
Grass carp	2	0	0	0	0	0	0
Goldfish	0	0	0	67	1	2	0
Common carp	3	11	3	95	27	21	0
Golden shiner	2	0	0	8	10	0	0
Creek chub	0	0	2	0	0	0	0
Spotfin shiner	1	0	0	1	1	0	0
Bluntnose minnow	249	45	0	11	24	2	24
Emerald shiner	194	0	105	8	10	30	0
Sand shiner	0	0	0	0	0	1	0
Black buffalo	1	2	0	0	0	0	0
Quillback	0	6	0	0	0	0	0
White sucker	2	12	8	9	0	0	0
Yellow bullhead	0	0	1	11	0	0	0
Brown bullhead	0	0	0	2	0	0	0
Brook silverside	4	0	0	0	0	0	0
Yellow bass	0	4	0	1	1	0	0
White perch	0	0	0	1	3	0	1
Black crappie	0	0	0	2	0	0	0
White crappie	0	0	0	1	0	0	0
Rock bass	0	11	0	0	0	0	0
Largemouth bass	21	17	5	30	12	6	1
Smallmouth bass	5	13	0	1	0	2	0
Green sunfish	12	1	1	1	3	0	2
Bluegill	3	19	2	35	6	0	1
Pumpkinseed	2	0	3	89	3	0	0

TABLE A-3 (Continued): NUMBER OF FISH COLLECTED FROM THE CALUMET RIVER, DEEP-DRAFT PORTION OF THE LITTLE CALUMET RIVER, AND CALUMET-SAG CHANNEL DURING 2006

Fish Species or Hybrid (x)	Calumet River		Little Calumet River		Calumet-Sag Channel		
	SEPA 1[a]	Station #55 130th Street	SEPA 2[b]	Station #76 Halsted Street	Station #59 Cicero Avenue	SEPA 4[c]	SEPA 5[d]
Orangespotted sunfish	0	0	0	0	0	0	1
Yellow perch	0	0	0	2	0	0	0
Freshwater drum	0	1	0	1	3	0	0
Round goby	0	3	1	4	0	2	0
Chinook salmon	0	0	1	0	0	0	0
Green sunfish x longear hybrid	0	0	0	0	1	0	0
Total Number of Fish	543	233	218	405	215	79	37

[a]Sidestream Elevated Pool Aeration Station #1 located downstream of Torrence Avenue. Supplemental fish collection on 10/25/06.
[b]Sidestream Elevated Pool Aeration Station #2 located downstream of Calumet Water Reclamation Plant effluent outfall. Supplemental fish collection on 10/20/06.
[c]Sidestream Elevated Pool Aeration Station #4 located upstream from Harlem Avenue. Supplemental fish collection on 10/30/06.
[d]Sidestream Elevated Pool Aeration Station #5 located at the junction of the Calumet-Sag Channel with the Chicago Sanitary and Ship Canal. Supplemental fish collection 10/17/06 from the side of SEPA 5 that flows into the Calumet-Sag Channel.

TABLE A-4: NUMBER OF FISH COLLECTED FROM EACH STATION ON THE WADEABLE STREAMS OF THE DES PLAINES RIVER SYSTEM DURING 2006

Fish Species or Hybrid (x)	North Branch Chicago River	Des Plaines River			Higgins Creek	Salt Creek				West Branch DuPage River
	Station #96 Albany Avenue	Station #13 Lake-Cook Road	Station #22 Ogden Avenue	Station #91 Material Service Road	Station #78 Wille Road	Busse Dam[1]	JFK Blvd.[2]	Station #18 Devon Avenue	Thorndale Avenue[3]	Station #64 Lake Street
Common carp	2	1	0	0	1	1	0	5	0	0
Golden shiner	0	0	0	0	0	0	0	1	0	1
Creek chub	0	0	1	0	2	0	0	0	0	0
Spotfin shiner	0	49	9	1	0	0	15	0	0	7
Fathead minnow	0	0	0	0	39	0	0	0	0	0
Bluntnose minnow	0	1	22	9	18	0	20	16	0	1
Emerald shiner	0	0	0	1	0	0	0	0	0	0
Bigmouth shiner	0	0	0	0	0	0	1	0	0	0
Sand shiner	0	2	1	0	0	0	0	0	0	1
White sucker	15	0	0	1	0	0	1	0	0	3
Spotted sucker	0	1	0	0	0	0	0	0	0	0
Yellow bullhead	0	3	3	6	0	0	4	5	0	4
Tadpole madtom	0	0	0	4	0	0	0	0	0	0
Blackstripe topminnow	6	21	0	10	0	0	19	1	7	0
Mosquitofish	0	0	0	1	0	0	0	0	0	0
Black crappie	0	2	0	0	0	0	0	2	0	0
Rock bass	0	1	0	0	0	0	0	0	0	0
Largemouth bass	0	1	0	0	0	2	4	0	0	1
Green sunfish	1	27	3	1	6	3	61	18	0	156

TABLE A-4 (Continued): NUMBER OF FISH COLLECTED FROM EACH STATION ON THE WADEABLE STREAMS OF THE DES PLAINES RIVER SYSTEM DURING 2006

Fish Species or Hybrid (x)	North Branch Chicago River	Des Plaines River			Higgins Creek	Salt Creek				West Branch DuPage River
	Station #96 Albany Avenue	Station #13 Lake-Cook Road	Station #22 Ogden Avenue	Station #91 Material Service Road	Station #78 Wille Road	Station #18 Busse Dam[1]	JFK Blvd.[2]	Devon Avenue	Thorndale Avenue[3]	Station #64 Lake Street
Bluegill	0	13	2	1	0	21	29	15	0	6
Pumpkinseed	0	0	1	0	0	3	0	0	0	0
Orangespotted sunfish	0	0	1	0	0	4	13	0	0	0
Johnny darter	0	0	0	1	7	0	0	0	0	0
Green sunfish x bluegill	0	2	0	0	0	0	2	1	0	1
Pumpkinseed x bluegill	0	0	1	0	0	0	0	0	0	0
Total Number of Fish	24	124	44	36	73	34	169	64	7	181

[1]Supplemental fish collection on 6/28/06.
[2]Supplemental fish collection on 7/16/06.
[3]Supplemental fish collection on 7/5/06.