MONITORING AND RESEARCH DEPARTMENT

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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 2010

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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 2010

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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 2010, biological and habitat monitoring focused on 11 stations in the southern portion of the Chicago River System (SPCRS), as well as 12 annual Ambient Water Quality Monitoring (AWQM) Program stations located throughout the Chicago, Des Plaines, and Calumet River Systems. Unlike previous years, sediment samples were not taken for chemistry and toxicity analyses during 2010.

Habitat

Qualitative Habitat Evaluation Index (QHEI) scores were calculated for wadeable annual AWQM program stations. The QHEI was designed to evaluate small wadeable streams, and the maximum score possible is 100. The SPCRS does not contain wadeable portions. Six of the stations monitored annually were located in the DPRS, and one was located on the wadeable portion of the North Branch of the Chicago River (NBCR). The QHEI scores for the seven stations ranged from very poor (<30) to good (60-74). Wille Road on Higgins Creek had the lowest score (19), and Material Service Road on the DPR had the highest calculated score (72).

Fish

Forty-two species of fish, including 17 game fish species, were collected from Chicago area waterways during 2010. The most abundant species in the catch from the deep-draft waterways of the Chicago and Calumet River Systems included gizzard shad, western mosquitofish, common carp, largemouth bass, and spotfin shiner. Fathead minnow, green sunfish, yellow bullhead, largemouth bass, and central mudminnow were the most abundant species at stations in the wadeable portions of the NBCR, and DPRS. In general, all three waterway systems 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 stations in 13 different waterways during 2010. Total species richness for Ponar and Hester-Dendy samplers combined was 103 species, while total Ephemeroptera, Plecoptera, and Trichoptera (EPT) richness was 15 species. EPT taxa are considered relatively sensitive to pollution. Chironomidae was the most taxa rich group, with 48 taxa, followed by Trichoptera and Pelecypoda, each 8 taxa. Comprehensive benthic invertebrate data from 2010 are catalogued in a separate report published at mwrd.org (MWRD 2010 Chicago Waterways Benthic Report).

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. This report focuses on the biological, habitat, and sediment quality during 2010. The biological monitoring portion of the AWQM Program operates on a four-year cycle, with a primary focus on a different river system in the service area each year. The four river systems monitored are the northern portion of the Chicago River System (NPCRS), the SPCRS, the Calumet River System, and the DPRS. 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. Of the remaining 44 sampling stations, 12 are on the NPCRS, 8 are on the SPCRS, 10 are on the Calumet River System, 13 are on the DPRS, and 1 station is on the Fox River System. During 2010, biological monitoring focused on the SPCRS, including the Chicago River, South Branch Chicago River (SBCR), South Fork South Branch Chicago River (Bubbly Creek), and Chicago Sanitary and Ship Canal (CSSC).

Characterization of physical habitat, fish, and benthic invertebrate populations, are crucial components for the 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 to assess and manage the impact of the District's WRPs, our data are often shared with other government agencies, non-governmental organizations, 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.

DESCRIPTION OF THE STUDY AREA

Chicago, Calumet, and Des Plaines River Systems

The District Service 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 stormwater runoff and treated municipal wastewater effluent and allowing commercial navigation in the deep-draft portions.

The primary man-made waterways are in the Chicago Area Waterway System (CAWS), including the NSC, connecting Lake Michigan at Wilmette to the NBCR; the CSSC, extending from Damen Avenue to the Lockport Powerhouse; and the Cal-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 confluence with the NSC and continuing as the deep-draft portion of the NBCR, which joins the Chicago River and becomes the SBCR; the DPR, 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 CSC.

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 District service area waterways, including the 59 sampling stations and the District's WRPs, is shown in Figure 1. Stations were primarily selected so that there was at least one monitoring station on the lower end of an IEPA 303(d)-impaired waterway segment in 1998. 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 on 8 stations in the SPCRS during 2010, including the Chicago River, SBCR, Bubbly Creek, and CSSC. Table 1 displays the 2010 field monitoring schedule for biological sampling, and physical habitat assessments.

FIGURE 1: AMBIENT WATER QUALITY MONITORING PROGRAM
SAMPLING STATIONS

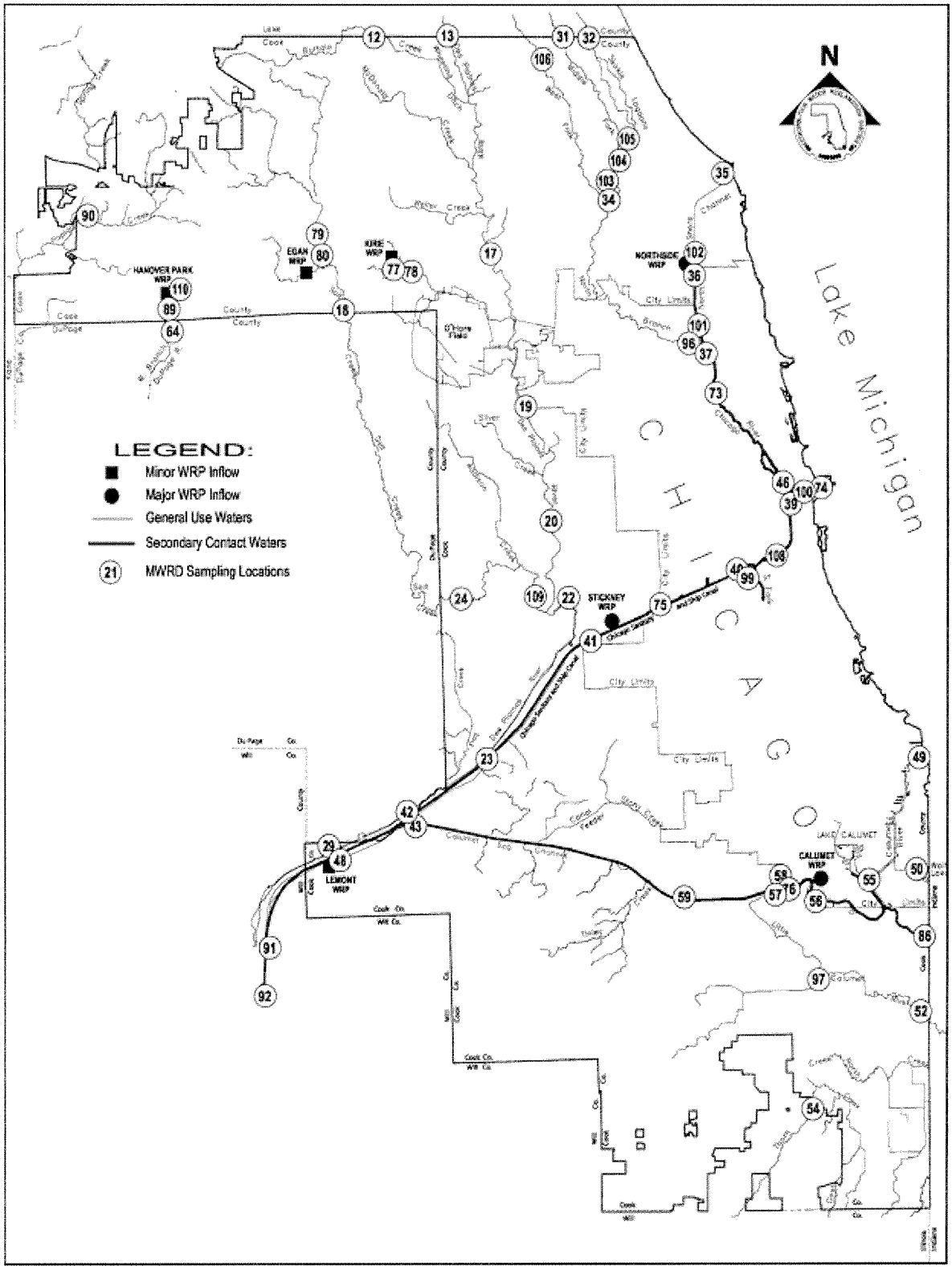


TABLE 1: DATES THAT AMBIENT WATER QUALITY MONITORING PROGRAM STATIONS WERE SAMPLED DURING 2010

Station No.	Sampling Station	Waterway	Date Sampled
		CHICAGO RIVER SYSTEM	
96	Albany Avenue[1]	North Branch Chicago River	8/10/10[2],8/17/10[3]
36	Touhy Avenue[1]	North Shore Channel	7/29/10
46	Grand Avenue[1]	North Branch Chicago River	7/28/10[2], 9/23/10[4]
74	Lake Shore Drive	Chicago River	8/09/10[2], 9/23/10[4]
100	Wells Street	Chicago River	7/28/10
39	Madison Street	South Branch Chicago River	8/09/10[2], 9/23/10[4]
108	Loomis Street	South Branch Chicago River	7/09/10[2], 7/26/10[4]
99	Archer Avenue	Bubbly Creek	7/09/10[2], 7/26/10[4]
40	Damen Avenue	Chicago Sanitary & Ship Canal	7/09/10[2], 7/26/10[4]
75	Cicero Avenue[1]	Chicago Sanitary & Ship Canal	8/20/10
41	Harlem Avenue[1]	Chicago Sanitary & Ship Canal	8/16/10
42	Route 83	Chicago Sanitary & Ship Canal	9/07/10
48	Stephen Street	Chicago Sanitary & Ship Canal	9/07/10[2], 9/24/10[4]
92	Lockport[1]	Chicago Sanitary & Ship Canal	7/23/10
		CALUMET RIVER SYSTEM	
55	130th Street[1]	Calumet River	8/11/10
76	Halsted Street[1]	Little Calumet River	8/19/10
59	Cicero Avenue[1]	Calumet-Sag Channel	8/13/10
		DES PLAINES RIVER SYSTEM	
78	Wille Road[1]	Higgins Creek	7/06/10
18	Devon Avenue[1]	Salt Creek	7/07/10
64	Lake Street[1]	West Branch DuPage River	6/24/10
13	Lake-Cook Road[1]	Des Plaines River	7/22/10
22	Ogden Avenue[1]	Des Plaines River	7/20/10
91	Material Service Rd.[1]	Des Plaines River	7/21/10

[1]Annual sampling station.
[2]Invertebrate sampling only on this date.
[3]Fish sampling and habitat assessment conducted on this date.
[4]Fish sampling only on this date.

MATERIALS AND METHODS

Habitat

Calculating Qualitative Habitat Evaluation Index Scores. The QHEI was created by the Ohio Environmental Protection Agency (OEPA) to determine the suitability of a stretch of waterway to fish and macroinvertebrates based on physical habitat characteristics (Rankin, 1989). The index was developed to assess wadeable streams, not deep-draft channels such as those prevalent in the CAWS. Therefore, only wadeable stations were assessed using the QHEI. Habitat scores were calculated using the Ohio QHEI procedures for assessing the quality of substrates, instream cover, channel morphology, riparian zone/erosion, pool and riffle/run development, and stream gradient. The QHEI field data sheet is shown in Appendix A. Sites were then classified as excellent, good, fair, poor, or very poor based on their ability to support aquatic life in reference to habitat (Rankin, 2004). The classification ranges were as follows:

<=75	Excellent
60-74	Good
46-59	Fair
30-45	Poor
<30	Very Poor

Fish

Boatable Stream Sampling. Fish were collected at each sampling station using a boat-mounted electrofisher powered by a direct current (DC) generator. Stunned fish were picked out of the water with long-handled dip nets. For deep-draft sites, the section of canal sampled extended for 400 meters. Whenever possible, both sides of the waterways were electrofished.

Wadeable Stream Sampling. Fish were collected at each sampling station using a DC backpack electrofisher and a bag seine. Conductivity and temperature (°C) were recorded before each sample collection. 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.

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 was done 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 a 10 percent formalin solution 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 functional organization comparable to that of a natural habitat (Karr et al., 1986). Karr's 1986 IBI was used to analyze fish data from 2010.

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

Benthic Invertebrates

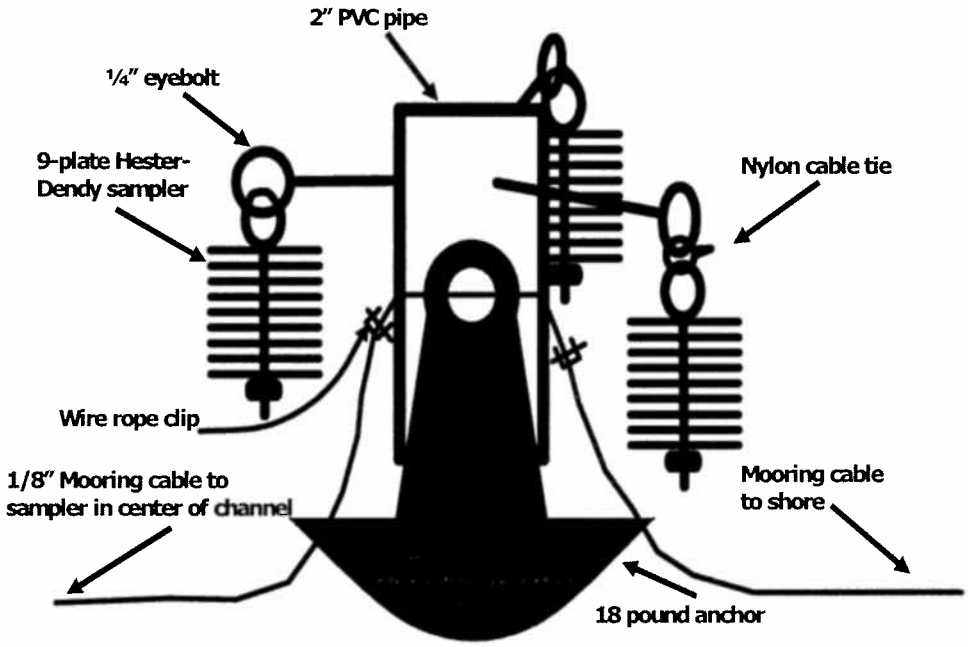
Ponar Sediment Sampling. Triplicate sediment samples were collected with a petite Ponar grab (0.023 m^2) from the center and one side of the deep-draft and wadeable waterway stations. Grab samples were taken at locations upstream from any prior sampling disturbance, such as Hester-Dendy retrievals (see description in next section), to avoid collecting disturbed sediment. An appropriate area for Ponar sampling was chosen by a staff biologist to avoid 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 in a 10 percent formalin solution, 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 2010. Figure 2 shows a diagram of the plate configuration that was assembled prior to deployment in the waterways. A total of 27, 3- x 3-inch sampling plates were attached to two 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 for an average of seven weeks and then retrieved at the time of 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 at the water surface. The plates were then 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. These samples are then brought back to the laboratory and stored at 4°C until processed.

Benthic Invertebrate Processing. Samples were fixed in formalin for thirty days. Next, the Ponar sediment samples were gently washed with water and screened through a United States Standard number 60 mesh sieve (250 μm openings) and transferred to a 70 percent ethanol solution. Each Hester-Dendy 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. The formalin solution remaining in the Hester-Dendy sample container was rinsed into the sieve in order to capture any invertebrates that fell from the Hester-Dendy plates. The contents of this sieve were then rinsed back into the bucket with a 70 percent ethanol solution. The Ponar and Hester-Dendy samples were then stored at 4°C until processed. Before processing, the samples were sieved to remove the ethanol solution. The sieved material was then examined in small batches under a compound microscope in a 100- x 50-mm glass crystallizing dish filled about 1 cm high. Oligochaete worms were counted and all other invertebrates were removed 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, besides worms, were sent to a consultant (EA Engineering) for identification to genus or species when possible.

FIGURE 2: CONFIGURATION OF HESTER-DENDY LARVAL PLATE SAMPLER



RESULTS AND DISCUSSION

Habitat

Habitat is one of the most crucial factors limiting aquatic life in urban environments. Channelization, limited instream and canopy cover, siltation, erosion, and lack of adequate flood plain area are some of the physical characteristics that may limit aquatic life in waterways in the District service area. The QHEI was developed by OEPA as a method to quantify and assess wadeable aquatic habitats for their ability to support aquatic life. Metrics include: substrate, instream cover, channel quality, riparian zone/erosion, pool and riffle/run quality, and stream gradient. Narrative designations were assigned to QHEI score ranges so that waterway reaches could be categorized as excellent, good, fair, poor, or very poor based on the ability of the habitat to support aquatic life. Of 15 annual AWQM program stations, seven in wadeable streams were assessed for the QHEI in 2010. Table 2 displays the QHEI score and rating for each of the stations assessed in 2010.

The lowest habitat rating was calculated at Wille Road on Higgins Creek. Downstream of the John C. Kirie WRP, this section of the waterway consists of a concrete conveyance for treated effluent and scored poorly in the substrate, instream cover and pool riffle/run quality categories. The station with the highest QHEI score was Material Service Road on the DPR. The channel quality in this reach was good, with well defined riffle/run and pool habitats and ample instream cover. Lake-Cook Road on the DPR and Devon Avenue on Salt Creek also garnered good ratings because these sampling stations had ample amounts of instream cover and good substrate types. Overall, QHEI scores for the remaining locations were limited by poor substrate types and poor channel development and quality.

TABLE 2: SUMMARY OF QUALITATIVE HABITAT EVALUATION INDEX SCORES FOR WADEABLE SAMPLING STATIONS DURING 2010

Station No.	Station Name	Waterway	QHEI[1] Score	Habitat Rating
96	Albany Avenue	North Branch Chicago River	36	Poor
64	Lake Street	West Branch DuPage River	50	Fair
18	Devon Avenue	Salt Creek	60	Good
78	Wille Road	Higgins Creek	19	Very Poor
13	Lake-Cook Road	Des Plaines River	61	Good
22	Ogden Avenue	Des Plaines River	56	Fair
91	Material Service Rd.	Des Plaines River	72	Good

[1]QHEI=Qualitative Habitat Evaluation Index.

Fish

The fish species collected in each of the river systems during 2010 are shown in Table 3. The number of individuals, total species and game species collected, and weight of total catch at each station are shown in Table 4. During 2010, 4,845 fish comprised of 42 species, including 17 game species and three hybrids, were collected from Chicago area waterways. The numbers of fish collected from each AWQM station are shown in Appendix Tables B-1 through B-4. Gizzard shad, western mosquitofish, and common carp were the most abundant species in the deep-draft waterways. Fathead minnow, green sunfish, and yellow bullhead were the most abundant species at the wadeable streams stations.

IBI scores calculated for each AWQM station and collection method are shown in Table 5. All of the stations except for 130th Street on the Calumet River were rated as "fair" in terms of biological integrity. The 130th Street station was rated as "good" with a score of 42.

Benthic Invertebrates

The benthic invertebrate taxa collected by two sampling methods are presented in Table 6. A report focusing on detailed benthic invertebrate data from 2010 is available at mwrd.org (MWRD 2010 Chicago Waterways Benthic Report). Total species richness for Ponar and Hester-Dendy samplers combined was 103 species, while total EPT richness was 15 species.

Northern Portion of the Chicago River System. Sampling was conducted at three stations in this watershed during 2010: One station in the NSC and two stations on the NBCR. The Hester-Dendy samplers at Albany Avenue on the NBCR were deployed upstream of the previous location because the tree that was used to secure the Hester-Dendy to the shore was removed during 2009 stream maintenance. The Hester-Dendy and Ponar samples from Touhy Avenue on the NSC yielded 22 total taxa and one EPT taxon. Oligochaeta was the dominant taxon in both the Hester-Dendy and Ponar samples at Touhy Avenue. Total taxa richness at Albany Avenue and Grand Avenue, on the NBCR, was 25 and 18 taxa, respectively. No EPT taxa were observed in Ponar or Hester-Dendy samples from stations on the NBCR during 2010. Organisms from Touhy Avenue Ponar samples exhibited the highest rate of Chironomid head capsule deformities (6.4 percent) with a sample size of 110.

Southern Portion of the Chicago River System. In 2010, biological sampling focused on the Chicago River, SBCR, Bubbly Creek and the CSSC. Benthic samples were collected from 11 stations therein. Ponar samples were not collected at Stephen Street on the CSSC because this station lacked adequate sediment. Heavy barge traffic likely scoured the bottom of this constructed limestone channel. The highest taxa richness (23 taxa) in the SPCRS was observed in Hester-Dendy samples at Madison Street on the SBCR. The Hester-Dendy samples from Lake Shore Drive on the Chicago River were predominantly comprised of *Dreissena bugensis* (quagga mussel) (76 percent of total density), due to the station's proximity to Lake Michigan. The mottled fingernail clam (*Eupera cubensis*) was found in Hester-Dendy samples from Cicero Avenue, Route 83, and Stephen Street stations on the CSSC. *E. cubensis* is native to the southern United States coastal plain and has been found at Harlem Avenue, Route 83, and Lockport in the CSSC, in 2006 (EA, 2010).

TABLE 3: COMMON AND SCIENTIFIC NAMES OF FISHES COLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2010

Common Name	Scientific Name	River System		
		Chicago	Calumet	Des Plaines
HERRING FAMILY	CLUPEIDAE			
Gizzard shad	*Dorosoma cepedianum*	X	X	X
Alewife	*Alosa pseudoharengus*	X		
MUDMINNOW FAMILY	UMBRIIDAE			
Central mudminnow	*Umbra limi*	X	X	
PIKES FAMILY	ESOCIDAE			
Grass pickerel*	*Esox american*		X	
MINNOW FAMILY	CYPRINIDAE			
Spottail shiner	*Notropis hudsonius*	X		
Goldfish	*Carassius auratus*	X	X	X
Common carp	*Cyprinus carpio*	X	X	X
Common carp x Goldfish	*C. carpio x C. auratus*	X	X	
Spotfin shiner	*Cyprinella spiloptera*	X	X	X
Hornyhead chub	*Nocomis biguttatus*			X
Golden shiner	*Notemigonus crysoleucas*	X	X	
Emerald shiner	*Notropis atherinoides*	X	X	
Bluntnose minnow	*Pimephales notatus*	X	X	X
Fathead minnow	*Pimephales promelas*	X	X	X
Creek chub	*Semotilus atromaculatus*			X
SUCKER FAMILY	CATOSTOMIDAE			
White sucker	*Catostomus commersonii*	X	X	X
Smallmouth buffalo	*Ictiobus bubalus*		X	
Black buffalo	*Ictiobus niger*		X	
CATFISH FAMILY	ICTALURIDAE			
Yellow bullhead*	*Ameiurus natalis*	X	X	X
Channel catfish*	*Ictalurus punctatus*	X	X	X
Black bullhead*	*Ameiurus melas*		X	
KILLIFISH FAMILY	FUNDULIDAE			
Blackstripe topminnow	*Fundulus notatus*			X

TABLE 3 (Continued): COMMON AND SCIENTIFIC NAMES OF FISHES COLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2010

Common Name	Scientific Name	River System		
		Chicago	Calumet	Des Plaines
LIVEBEARER FAMILY	POECILIIDAE			
Western mosquitofish	*Gambusia affinis*	X		X
SILVERSIDES FAMILY	ATHERINOPSIDAE			
Brook silverside	*Labidesthes sicculus*	X	X	
TEMPERATE BASS FAMILY	MORONIDAE			
White perch*	*Morone Americana*	X	X	
Yellow bass*	*Morone mississippiensis*	X	X	
SUNFISH FAMILY	*CENTRARCHIDAE*			
Rock bass*	*Ambloplites rupestris*	X	X	X
Green sunfish*	*Lepomis cyanellus*	X	X	X
Pumpkinseed*	*Lepomis gibbosus*	X	X	
Warmouth*	*Lepomis gulosus*			X
Orangespotted sunfish*	*Lepomis humilis*	X		X
Bluegill*	*Lepomis macrochirus*	X	X	X
Green sunfish x Bluegill	*L. cyanellus x L. macrochirus*	X		X
Pumpkinseed x Bluegill	*L. gibbosus x L. macrochirus*	X		X
Smallmouth bass*	*Micropterus dolomieu*		X	
Largemouth bass*	*Micropterus salmoides*	X	X	X
White crappie*	*Pomoxis annularis*	X	X	
Black crappie*	*Pomoxis nigromaculatus*	X	X	X
PERCH FAMILY	PERCIDAE			
Iowa darter[t]	*Etheostoma exile*			X
Johnny darter	*Etheostoma nigrum*			X
Yellow perch*	*Perca flavescens*	X	X	
Blackside darter	*Percina maculata*			X

TABLE 3 (Continued): COMMON AND SCIENTIFIC NAMES OF FISHES COLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2010

Common Name	Scientific Name	River System		
		Chicago	Calumet	Des Plaines
DRUM FAMILY	SCIAENIDAE			
Freshwater drum	*Aplodinotus grunniens*	X	X	
GOBY FAMILY	GOBIIDAE			
Round goby	*Neogobius melanostomus*		X	X
LOACH FAMILY	COBITIDAE			
Oriental weatherfish	*Misgurnus anguillicaudatus*	X		
	Total Number of Species	29	30	24
	Total Number of Hybrids	3	1	2

*Game fish species.
[t]Threatened species in Illinois.

TABLE 1: DATES THAT AMBIENT WATER QUALITY MONITORING PROGRAM STATIONS WERE SAMPLED DURING 2010

Station No.	Sampling Station	Waterway	Date Sampled
		CHICAGO RIVER SYSTEM	
96	Albany Avenue[1]	North Branch Chicago River	8/10/10[2],8/17/10[3]
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41	Harlem Avenue[1]	Chicago Sanitary & Ship Canal	8/16/10
42	Route 83	Chicago Sanitary & Ship Canal	9/07/10
48	Stephen Street	Chicago Sanitary & Ship Canal	9/07/10[2], 9/24/10[4]
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		DES PLAINES RIVER SYSTEM	
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18	Devon Avenue[1]	Salt Creek	7/07/10
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91	Material Service Rd.[1]	Des Plaines River	7/21/10

[1]Annual sampling station.
[2]Invertebrate sampling only on this date.
[3]Fish sampling and habitat assessment conducted on this date.
[4]Fish sampling only on this date.

TABLE 4: NUMBER, WEIGHT, AND NUMBER OF SPECIES OF FISH COLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2010

Station No.	Location	Waterway	Sample Gear	Number of Fish	Weight (grams)	Number of Species		Most Abundant Species
						Total	Game	
96	Albany Avenue[1]	North Branch Chicago River	BP/Seine	73	231	5	2	Green sunfish
36	Touhy Avenue[1]	North Shore Channel	Large EF Boat	118	56,344	13	4	Spotfin shiner
46	Grand Avenue[1]	North Branch Chicago River	Large EF Boat	365	33,387	13	5	Gizzard shad
74	Lake Shore Drive	Chicago River	Large EF Boat	168	19,885	12	7	Gizzard shad
100	Wells Street	Chicago River	Large EF Boat	136	63,601	14	7	Gizzard shad
39	Madison Street	South Branch Chicago River	Large EF Boat	176	23,093	9	4	Spotfin shiner
108	Loomis Street	South Branch Chicago River	Large EF Boat	117	96,087	8	4	Bluegill
99	Archer Avenue	South Branch Chicago River[2]	Large EF Boat	29	3,041	5	3	Gizzard shad
40	Damen Avenue	Chicago Sanitary & Ship Canal	Large EF Boat	136	115,877	12	6	Bluegill
75	Cicero Avenue[1]	Chicago Sanitary & Ship Canal	Large EF Boat	589	61,432	14	6	Western mosquitofish
41	Harlem Avenue[1]	Chicago Sanitary & Ship Canal	Large EF Boat	1103	19,414	15	7	Western mosquitofish
42	Route 83	Chicago Sanitary & Ship Canal	Large EF Boat	14	218	3	1	Gizzard shad
48	Stephen Street	Chicago Sanitary & Ship Canal	Large EF Boat	169	1,737	5	1	Gizzard shad
92	Lockport[1]	Chicago Sanitary & Ship Canal	Large EF Boat	103	2,778	3	2	Gizzard shad
55	130th Street[1]	Calumet River	Large EF Boat	320	57,398	18	8	Smallmouth bass
76	Halsted Street[1]	Little Calumet River	Large EF Boat	538	101,768	19	11	Gizzard shad
59	Cicero Avenue[1]	Calumet-Sag Channel	Large EF Boat	181	65,057	15	7	Gizzard shad
78	Wille Road[1]	Higgins Creek	BP/Seine	235	152	3	0	Fathead minnow
18	Devon Avenue[1]	Salt Creek	BP/Seine	31	281	7	4	Largemouth bass
64	Lake Street[1]	West Branch DuPage River	BP/Seine	31	5,745	6	5	Green sunfish

TABLE 4 (Continued): NUMBER, WEIGHT, AND NUMBER OF SPECIES OF FISH COLLECTED FROM THE CHICAGO, CALUMET, AND DES PLAINES RIVER SYSTEMS DURING 2010

Station No.	Location	Waterway	Sample Gear	Number of Fish	Weight (grams)	Number of Species		Most Abundant Species
						Total	Game	
13	Lake-Cook Road[1]	Des Plaines River	BP/Seine	122	817	11	6	Spotfin shiner
22	Ogden Avenue[1]	Des Plaines River	BP/Seine	61	473	16	6	Green sunfish
91	Material Service Road[1]	Des Plaines River	BP/Seine	30	172	10	4	Yellow bullhead
		TOTAL		4,845	729 kg.	42	17	

[1]Annual sampling station.
[2]South Fork South Branch Chicago River.

TABLE 5: INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY BY STATION DURING 2010

Station No.	Location	Waterway	Sample Gear	IBI[1] Score	IBI[1] Category
96	Albany Avenue	North Branch Chicago River	BP	22	Fair
96	Albany Avenue	North Branch Chicago River	Seine	24	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	32	Fair
100	Wells Street	Chicago River	Large EF Boat	34	Fair
39	Madison Street	South Branch Chicago River	Large EF Boat	38	Fair
108	Loomis Street	South Branch Chicago River	Large EF Boat	26	Fair
99	Archer Avenue	Bubbly Creek[2]	Large EF Boat	28	Fair
40	Damen Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	30	Fair
75	Cicero Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	34	Fair
41	Harlem Avenue	Chicago Sanitary and Ship Canal	Large EF Boat	38	Fair
42	Route 83	Chicago Sanitary and Ship Canal	Large EF Boat	24	Fair
48	Stephen Street	Chicago Sanitary and Ship Canal	Large EF Boat	26	Fair
92	Lockport	Chicago Sanitary and Ship Canal	Large EF Boat	22	Fair
55	130th Street	Calumet River	Large EF Boat	42	Good
76	Halsted Street	Little Calumet River	Large EF Boat	36	Fair
59	Cicero Avenue	Calumet-Sag Channel	Large EF Boat	32	Fair
78	Wille Road	Higgins Creek	BP	24	Fair
78	Wille Road	Higgins Creek	Seine	28	Fair
18	Devon Avenue	Salt Creek	BP	26	Fair
18	Devon Avenue	Salt Creek	Seine	34	Fair
64	Lake Street	West Branch DuPage River	BP	30	Fair
64	Lake Street	West Branch DuPage River	Seine	ND	ND
13	Lake-Cook Road	Des Plaines River	BP	30	Fair
13	Lake-Cook Road	Des Plaines River	Seine	28	Fair

TABLE 5 (Continued): INDEX OF BIOTIC INTEGRITY SCORE AND CATEGORY BY STATION DURING 2010

Station No.	Location	Waterway	Sample Gear	IBI[1] Score	IBI[1] Category
22	Ogden Avenue	Des Plaines River	BP	22	Fair
22	Ogden Avenue	Des Plaines River	Seine	32	Fair
91	Material Service Road	Des Plaines River	BP	32	Fair
91	Material Service Road	Des Plaines River	Seine	30	Fair

[1]IBI = Index of Biotic Integrity.
[2]Bubbly Creek = South Fork South Branch Chicago River
ND = No fish were caught in the seine or conditions were unfavorable for seining.

TABLE 6: BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER-DENDY SAMPLERS DURING 2010

Taxa	Hester Dendy	Petite Ponar
COELENTERATA (Hydroids)		
Hydra	X	X
PLATYHELMINTHES (Flat worms)		
Turbellaria	X	X
ANNELLIDA		
Oligochaeta (Aquatic Worms)	X	X
Hirudinea (Leeches)		
Desserobdella phalera	X	
Helobdella[1]	X[1]	X[1]
Helobdella stagnalis	X	X
Placobdella nuchalis	X	
Haemopis	X	X
Erpobdella punctata punctata	X	X
Erpobdella microstoma	X	X
CRUSTACEA		
Isopoda (Sow Bugs)		
Caecidotea	X	X
Amphipoda (Side Swimmers)		
Hyalella azteca	X	X
Gammarus	X	X
Echinogammarus ischusa	X	X
DECAPODA (Crayfish)		
Orconectes	X	
Procambarus	X	

TABLE 6 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER-DENDY SAMPLERS DURING 2010

Taxa	Hester Dendy	Petite Ponar
ARACHNOIDEA		
Hydracarina (Water Mites)	X	
INSECTA		
Ephemeroptera (Mayflies)		
Baetis intercalaris	X	X
Maccaffertium integrum	X	
Maccaffertium terminatum	X	X
Stenacron	X	
Tricorythodes	X	X
Anthopotamus myops grp.		X
Ephoron album		X
Odonata (Damselflies and Dragonflies)		
Argia	X	
Enallagma	X	X
Aeshna	X	
Trichoptera (Caddisflies)		
Cyrnellus fraternus	X	
Ceratopsyche morosa	X	
Cheumatopsyche	X	X
Hydropsyche bidens	X	
Hydropsyche simulans	X	
Potamyia flava		X
Nectopsyche	X	X
Oecetis		X

TABLE 6 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER-DENDY SAMPLERS DURING 2010

Taxa	Hester Dendy	Petite Ponar
Coleoptera (Beetles)		
Peltodytes	X	
Dubiraphia		X
Macronychus glabratus	X	X
Stenelmis	X	X
Diptera (True Flies)		
Ceratopogonidae	X	X
Pericoma	X	X
Simulium	X	
Tipula		X
Chironimidae (Midges)		
Clinotanypus		X
Procladius	X	X
Tanypus		X
Ablabesmyia janta	X	
Ablabesmyia mallochi	X	X
Labrundinia	X	
Thienemannimyia grp	X	X
Corynoneura lobata	X	
Cricotopus bicinctus grp.	X	X
Cricotopus sylvestris grp.	X	X
Cricotopus tremulus grp.	X	
Mesosmittia	X	X
Nanocladius crassicornus/rectinervis	X	
Nanocladius distinctus	X	X
Parakiefferiella		X
Rheocricotopus robacki	X	
Thienemanniella similis	X	X
Thienemanniella xena	X	X
Chironomus	X	X
Cladopelma	X	X
Cryptotendipes		X
Cryptochironomus	X	X

TABLE 6 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER-DENDY SAMPLERS DURING 2010

Taxa	Hester Dendy	Petite Ponar
Chironimidae (Midges) (Continued)		
Dicrotendipes fumidus	X	X
Dicrotendipes lucifer	X	X
Dicrotendipes neomodestus	X	X
Dicrotendipes simpsoni	X	X
Endochironomus nigricans	X	
Glyptotendipes	X	X
Microtendipes		X
Parachironomus	X	X
Paracladopelma	X	X
Paralauterborniella nigrohalteralis		X
Paratendipes	X	X
Phaenopsectra obediens	X	X
Polypedilum fallax grp.	X	
Polypedilum flavum	X	X
Polypedilum halterale grp.	X	X
Polypedilum illinoense	X	X
Polypedilum scalaenum grp.	X	X
Stenochironomus	X	
Stictochironomus		X
Xenochironomus xenolabis	X	
Cladotanytarsus mancus grp	X	X
Cladotanytarsus vanderwulpi grp.	X	X
Paratanytarsus	X	X
Rheotanytarsus	X	X
Tanytarsus	X	X
Tanytarsus glabrescens grp.	X	

TABLE 6 (Continued): BENTHIC INVERTEBRATE TAXA COLLECTED BY PONAR AND HESTER-DENDY SAMPLERS DURING 2010

Taxa		Hester Dendy	Petite Ponar
GASTROPODA (Snails)			
	Ferrissia	X	X
	Amnicola	X	X
	Physa	X	X
	Menetus	X	
	Pleurocera		X
PELECYPODA (Mussels and Clams)			
	Corbicula fluminea	X	X
	Dreissena bugensis	X	X
	Dreissena polymorpha	X	X
	Eupera cubensis	X	
	Sphaerium		X
	Musculium		X
	Pisidium		X
	Leptodea fragilis		X
TOTAL SPECIES RICHNESS BY SAMPLE TYPE		85	75
EPT[2] SPECIES RICHNESS BY SAMPLE TYPE		11	9
TOTAL SPECIES RICHNESS FOR 2010		103	
EPT[2] SPECIES RICHNESS FOR 2010		15	

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

This is the first occurrence of *E.cubensis* at Cicero Avenue and Stephen Street on the CSSC. Lockport station on the CSSC exhibited the highest Ponar taxa richness with 14 taxa. Hester-Dendy samples from Lockport also exhibited the highest EPT taxa richness (4 taxa). None of the Ponar samples collected in the SPCRS contained EPT taxa. Organisms from the Harlem Avenue Hester-Dendy samples exhibited the highest total number of Chironomid head capsule deformities of all the samples taken during 2010, exhibiting deformities in 13.6 percent of 118 specimens.

Calumet River System. This watershed includes the Calumet River, LCR, and the CSC. Benthic invertebrate samples were collected in each waterway. The 130th Street station on the Calumet River was dominated by Quagga mussels (*Dreissena bugensis*): over 90 and 45 percent of the total density in the Hester-Dendy and Ponar samples, respectively. Although introduced to the Great Lakes in 1993 (Nalepa et al. 2001) they have more recently colonized Lake Michigan. By the 2006 sampling season, quagga mussels had largely replaced zebra mussels (*Dreissena polymorpha*), which had been the dominant species at this station in previous years. Hester-Dendy samples at Cicero Avenue on the CSC were the only samples that contained EPT taxa in the CRS. Organisms from the Cicero Avenue Ponar samples also exhibited the highest percentage of Chironomid head capsule deformities in the Calumet River System (12.5 percent of 72 specimens).

Des Plaines River System. Benthic invertebrate samples were collected from six AWQM stations on the DPR, WBDR, Salt Creek, and Higgins Creek during 2010. The station at Lake Cook Road on the DPR exhibited the highest taxa richness of all the stations sampled in 2010. The total taxa richness for Lake Cook Road was 34 and 29 for Hester-Dendy and Ponar samples, respectively. Hester-Dendy and Ponar samples each yielded nine EPT taxa at Lake Cook Road. Lake Street on the WBDPR also exhibited relatively high taxa richness. Hester-Dendy and Ponar total richness was 34 and 23, respectively. Willie Road on Higgins Creek exhibited the lowest taxa richness of all the 2010 Hester-Dendy samples. The Hester-Dendy and Ponar samples yielded five and seven total taxa, respectively. Chironomid head capsule deformities were only observed in Ponar samples within the DPRS and incidences varied among stations.

REFERENCES

American Public Health Association, American Water Works Association, and Water Environment Federation (publishers). *Standard Methods for the Examination of Water and Wastewater*, 19th ed., 1998.

EA Engineering, Science, & Technology, Inc. (EA). "A study of the benthic macroinvertebrate community in selected Chicago Metropolitan Area waterways during 2006-2008." Deerfield, Illinois, 2010.

Illinois Environmental Protection Agency, "Illinois Water Quality Report 1994-1995, Volume I," Illinois Environmental Protection Agency Report No. IEPA/BOW/96-060a, September 1996.

Karr, J. R., K. D. Faush, P. L. Angermeier, P. R. Yant, and I. J. Schlosser, "Assessing Biological Integrity in Running Waters, A Method and Its Rationale." Special Publication 5, Illinois Natural History Survey, Champaign, Illinois, 1986.

Nalepa, T. F., D. W. Schloesser, S. A. Pothoven, D. W. Hondorp, D. L. Fanslow, M. L. Tuchman, and G. W. Fleischer. 2001. "First finding of the amphipod *Echinogammarus ischnus* and the mussel *Dreissena bugensis* in Lake Michigan." Journal of Great Lakes Research 27(3): 384-391.

Rankin, E. T. "Analysis of Physical Habitat Quality and Limitations to Waterways in the Chicago Area." Prepared for USEPA Region V, 2004.

Rankin, E. T. "The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application." Ohio Environmental Protection Agency – Division of Water Quality Monitoring and Assessment, Surface Water Section, Columbus, Ohio, 1989.

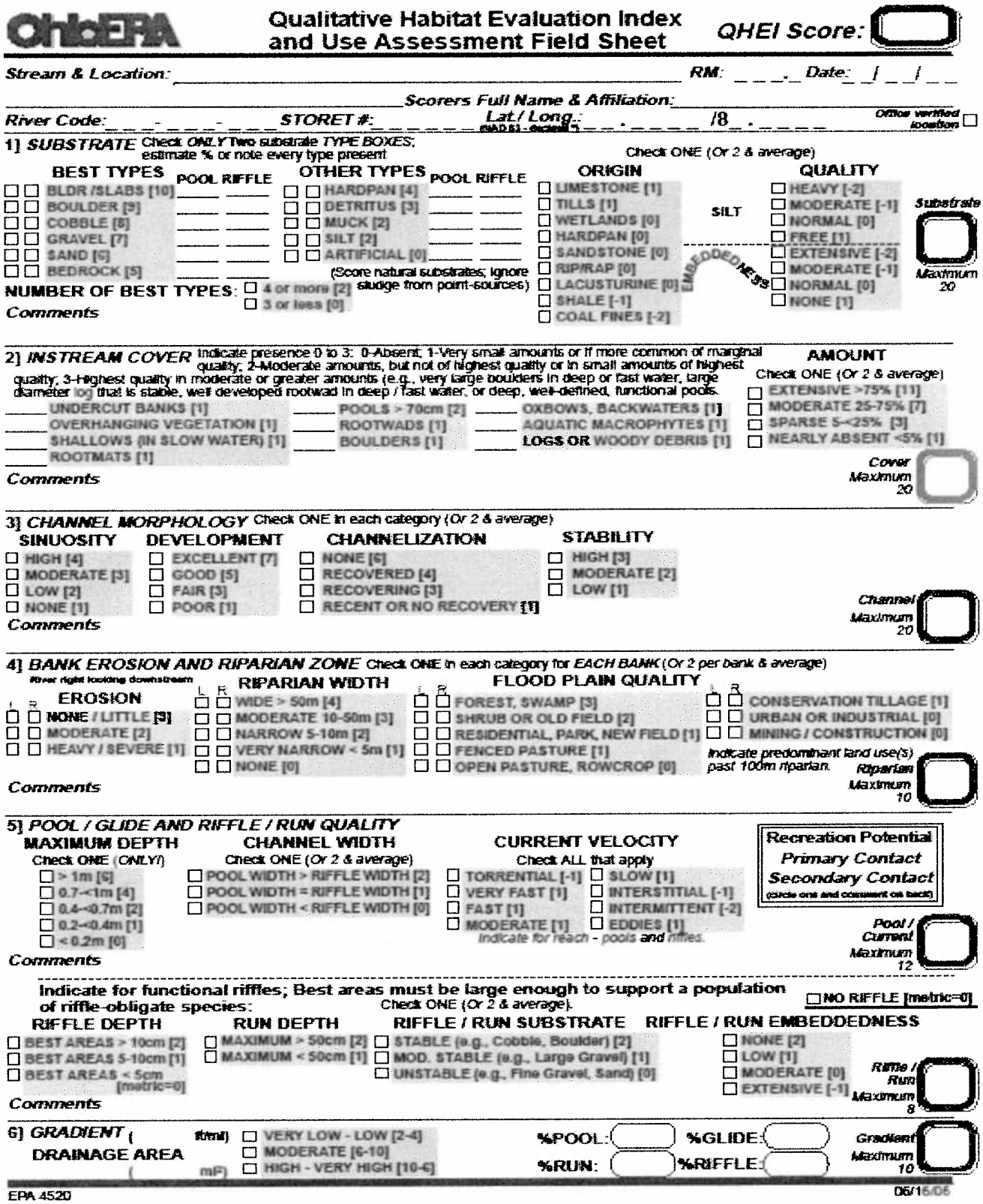
USEPA Report No. EPA-600-R-99-064, "Methods for Measuring the Toxicity and Bioaccumulation of Sediment – Associated Contaminants with Freshwater Invertebrates," Second Ed. Office of Research and Development, March 2000.

USEPA Report No. EPA-823-B-01-002, "Methods for Collection, Storage, and Manipulation of Sediments for Chemical and Toxicological Analyses," October, 2001.

APPENDIX A

QUALITATIVE HABITAT EVALUATION INDEX AND USE ASSESSMENT FIELD SHEET

FIGURE A-1: QUALITATIVE HABITAT EVALUATION INDEX AND USE ASSESSMENT FIELD SHEET



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet — QHEI Score: ____

Stream & Location: _____ RM: ___.__ Date: __/__/__

Scorers Full Name & Affiliation: _____

River Code: ___-___-___ STORET #: _____ Lat./ Long.: ___.____ /8 ___.____ Office verified location ☐

1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present. Check ONE (Or 2 & average)

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]	____	____	☐☐ HARDPAN [4]	____	____
☐☐ BOULDER [9]	____	____	☐☐ DETRITUS [3]	____	____
☐☐ COBBLE [8]	____	____	☐☐ MUCK [2]	____	____
☐☐ GRAVEL [7]	____	____	☐☐ SILT [2]	____	____
☐☐ SAND [6]	____	____	☐☐ ARTIFICIAL [0]	____	____
☐☐ BEDROCK [5]	____	____	(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

ORIGIN: ☐ LIMESTONE [1] ☐ TILLS [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

QUALITY — SILT: ☐ HEAVY [-2] ☐ MODERATE [-1] ☐ NORMAL [0] ☐ FREE [1]; EMBEDDEDNESS: ☐ EXTENSIVE [-2] ☐ MODERATE [-1] ☐ NORMAL [0] ☐ NONE [1]

Substrate ____ Maximum 20

Comments

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

____ UNDERCUT BANKS [1]	____ POOLS > 70cm [2]	____ OXBOWS, BACKWATERS [1]
____ OVERHANGING VEGETATION [1]	____ ROOTWADS [1]	____ AQUATIC MACROPHYTES [1]
____ SHALLOWS (IN SLOW WATER) [1]	____ BOULDERS [1]	____ LOGS OR WOODY DEBRIS [1]
____ ROOTMATS [1]		

AMOUNT — Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11] ☐ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Comments — Cover Maximum 20 ____

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments — Channel Maximum 20 ____

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average). River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)	
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☐☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments — Riparian Maximum 10 ____

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH — Check ONE (ONLY!)
☐ > 1m [6] ☐ 0.7-<1m [4] ☐ 0.4-<0.7m [2] ☐ 0.2-<0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH — Check ONE (Or 2 & average)
☐ POOL WIDTH > RIFFLE WIDTH [2] ☐ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY — Check ALL that apply
☐ TORRENTIAL [-1] ☐ VERY FAST [1] ☐ FAST [1] ☐ MODERATE [1] ☐ SLOW [1] ☐ INTERSTITIAL [-1] ☐ INTERMITTENT [-2] ☐ EDDIES [1]
Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments — Pool / Current Maximum 12 ____

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☐ MAXIMUM > 50cm [2]	☐ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☐ BEST AREAS 5-10cm [1]	☐ MAXIMUM < 50cm [1]	☐ MOD. STABLE (e.g., Large Gravel) [1]	☐ LOW [1]
☐ BEST AREAS < 5cm [metric=0]		☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0] ☐ EXTENSIVE [-1]

Comments — Riffle / Run Maximum 8 ____

6] GRADIENT (ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

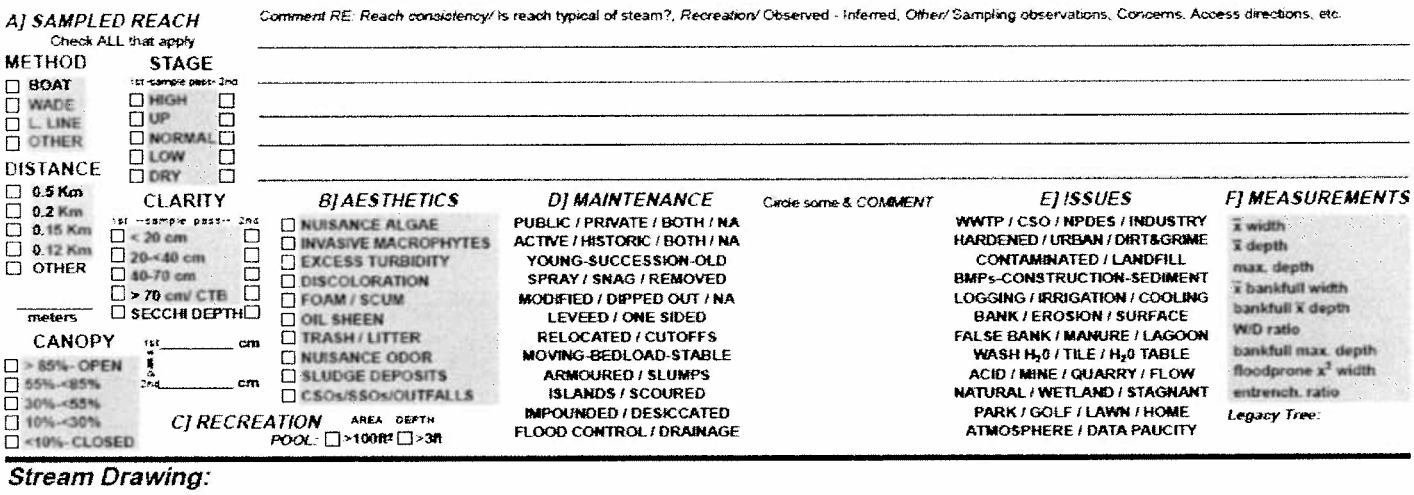
DRAINAGE AREA (mi²)

%POOL: ____ %GLIDE: ____ %RUN: ____ %RIFFLE: ____

Gradient Maximum 10 ____

EPA 4520 06/16/06

FIGURE A-1: (Continued): QUALITATIVE HABITAT EVALUATION INDEX AND USE ASSESSMENT FIELD SHEET



APPENDIX B

NUMBER OF FISH COLLECTED FROM EACH STATION

TABLE B-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 2010

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	1	0	0	0	0	0	0
Gizzard shad	28	298	101	62	9	11	25
Common carp	14	8	2	13	8	32	1
Golden shiner	7	7	0	1	10	0	0
Spottail shiner	2	0	0	0	0	0	0
Spotfin shiner	29	15	22	15	138	1	0
Bluntnose minnow	3	1	2	6	0	0	0
Fathead minnow	2	0	0	0	0	0	0
Emerald shiner	0	2	0	0	7	0	0
White sucker	2	1	0	0	0	0	0
Channel catfish	1	0	0	0	0	0	0
Yellow bullhead	0	1	0	0	0	0	0
Brook silverside	0	0	3	1	0	0	0
White perch	0	0	0	3	1	0	0
Yellow bass	0	1	0	1	0	0	0
Black crappie	0	0	0	0	1	0	0
Rock bass	0	0	3	2	0	0	0
Largemouth bass	15	10	2	13	1	9	0
Green sunfish	0	5	2	2	0	6	1
Orangespotted sunfish	0	0	2	0	0	0	1
Bluegill	3	15	18	12	1	35	0
Pumpkinseed	11	0	4	4	0	20	1

TABLE B-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 2010

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	1	0	0	0
Carp x Goldfish	0	1	0	0	0	1	0
Green sunfish x Bluegill	0	0	0	0	0	1	0
Pumpkinseed x Bluegill	0	0	2	0	0	1	0
Yellow perch	0	0	5	0	0	0	0
Total Number of Fish	118	365	168	136	176	117	29

TABLE B-2: NUMBER OF FISH COLLECTED FROM EACH STATION ON THE CHICAGO SANITARY AND SHIP CANAL DURING 2010

Fish Species	Chicago Sanitary and Ship Canal					
	Station 40 Damen Avenue	Station 75 Cicero Avenue	Station 41 Harlem Avenue	Station 42 Route 83	Station 48 Stephen Street	Station 92 Lockport (16th Street)
Gizzard shad	5	157	51	12	149	96
Goldfish	0	10	16	0	0	0
Common carp	31	85	29	0	0	0
Golden shiner	3	7	42	0	0	0
Spotfin shiner	12	3	23	0	0	0
Fathead minnow	0	0	0	0	3	0
Bluntnose minnow	5	29	128	0	8	0
Emerald shiner	0	0	14	0	8	0
Oriental weatherfish	1	1	0	0	0	0
Channel catfish	1	0	4	0	0	0
Yellow bullhead	5	10	23	0	0	0
Mosquitofish	0	234	661	1	0	0
Yellow bass	0	8	0	0	0	0
White perch	0	4	0	0	0	0
White crappie	0	0	1	0	0	0
Black crappie	0	0	0	0	0	0
Largemouth bass	4	0	12	0	0	1
Green sunfish	1	4	10	0	0	6
Bluegill	49	21	11	1	1	0
Pumpkinseed	19	16	78	0	0	0
Freshwater drum	0	0	0	0	0	0
Round goby	0	0	0	0	0	0
Total Number of Fish	136	589	1,103	14	169	103

TABLE B-3: NUMBER OF FISH COLLECTED FROM EACH STATION ON THE CALUMET RIVER, DEEP-DRAFT PORTION OF THE LITTLE CALUMET RIVER, CALUMET-SAG CHANNEL, AND WEST BRANCH DUPAGE RIVER DURING 2010

Fish Species or Hybrid (x)	Calumet River Station 55 130th Street	Little Calumet River Station 76 Halsted Street	Calumet-Sag Channel Station 59 Cicero Avenue	West Branch DuPage River Station 64 Lake Street
Gizzard shad	41	169	82	0
Central mudminnow	0	2	0	0
Grass pickerel	0	1	0	0
Goldfish	0	19	2	0
Common carp	11	69	20	5
Golden shiner	0	7	8	0
Spotfin shiner	1	0	14	0
Bluntnose minnow	24	0	1	0
Fathead minnow	0	25	1	0
Emerald shiner	0	0	4	0
Smallmouth buffalo	1	1	0	0
Black buffalo	1	6	0	0
White sucker	2	41	0	0
Black bullhead	0	3	0	0
Yellow bullhead	0	3	2	3
Channel catfish	0	0	1	0
Brook silverside	6	0	0	0
Yellow bass	0	1	0	0
White perch	1	0	1	0
Black crappie	0	2	0	0
White crappie	0	0	1	0
Rock bass	21	0	0	0
Largemouth bass	68	135	31	3
Smallmouth bass	98	0	0	0

TABLE B-3 (Continued): NUMBER OF FISH COLLECTED FROM THE CALUMET RIVER, DEEP-DRAFT PORTION OF THE LITTLE CALUMET RIVER, CALUMET-SAG CHANNEL, AND WEST BRANCH DUPAGE RIVER DURING 2010

Fish Species or Hybrid (x)	Calumet River Station 55 130th Street	Little Calumet River Station 76 Halsted Street	Calumet-Sag Channel Station 59 Cicero Avenue	West Branch DuPage River Station 64 Lake Street
Green sunfish	4	6	2	16
Bluegill	4	23	11	3
Pumpkinseed	18	17	0	0
Orangespotted sunfish	0	0	0	1
Yellow perch	4	7	0	0
Freshwater drum	1	0	0	0
Round goby	14	0	0	0
Carp x goldfish	0	1	0	0
Total Number of Fish	320	538	181	31

TABLE B-4: NUMBER OF FISH COLLECTED FROM EACH STATION ON THE DES PLAINES RIVER, NORTH BRANCH CHICAGO RIVER, HIGGINS CREEK, AND SALT CREEK DURING 2010

Fish Species or Hybrid (x)	North Branch Chicago River	Des Plaines River			Higgins Creek	Salt Creek
	Station 96 Albany Avenue	Station 13 Lake-Cook Road	Station 22 Ogden Avenue	Station 91 Material Service Road	Station 78 Wille Road	Station 18 Devon Avenue
Gizzard shad	0	0	1	0	0	0
Central mudminnow	13	0	0	0	0	0
Goldfish	1	0	1	0	0	0
Common carp	0	0	0	1	0	0
Hornyhead chub	0	0	1	0	0	0
Creek chub	0	0	3	0	6	0
Spotfin shiner	0	48	9	0	0	1
Fathead minnow	4	0	0	0	227	0
Bluntnose minnow	0	6	0	3	2	6
White sucker	0	0	11	0	0	0
Yellow bullhead	6	0	2	15	0	7
Channel catfish	0	0	0	5	0	0
Blackstripe topminnow	0	13	1	1	0	0
Mosquitofish	0	0	0	1	0	0
Black crappie	0	1	0	0	0	0
Rock bass	0	1	1	0	0	0
Largemouth bass	0	4	1	1	0	9
Green sunfish	49	35	17	1	0	4
Warmouth	0	1	0	0	0	0

TABLE B-4 (Continued): NUMBER OF FISH COLLECTED FROM EACH STATION ON THE DES PLAINES RIVER, NORTH BRANCH CHICAGO RIVER, HIGGINS CREEK, AND SALT CREEK DURING 2010

Fish Species or Hybrid (x)	North Branch Chicago River	Des Plaines River			Higgins Creek	Salt Creek
	Station 96 Albany Avenue	Station 13 Lake-Cook Road	Station 22 Ogden Avenue	Station 91 Material Service Road	Station 78 Wille Road	Station 18 Devon Avenue
Bluegill	0	4	7	0	0	1
Iowa darter	0	0	0	0	0	1
Johnny darter	0	7	1	1	0	0
Blackside darter	0	2	2	0	0	0
Green sunfish x bluegill	0	0	0	0	0	2
Pumpkinseed x bluegill	0	0	1	0	0	0
Round goby	0	0	2	1	0	0
Total Number of Fish	73	122	61	30	235	31