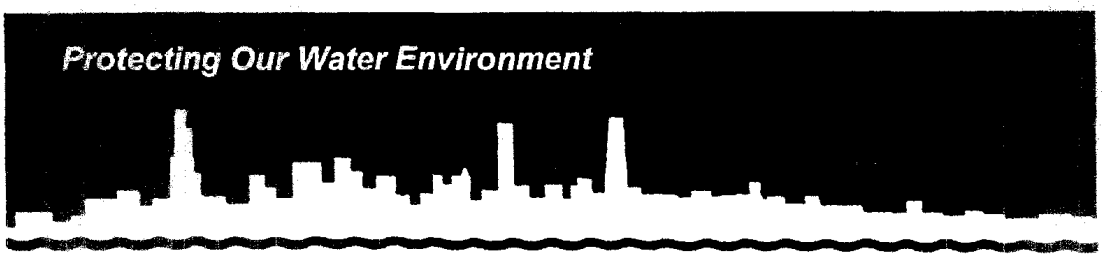

Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 01-4

ABUNDANCE AND DISTRIBUTION OF FISH IN THE NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997

February 2001

Metropolitan Water Reclamation District of Greater Chicago
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ABUNDANCE AND DISTRIBUTION OF FISH IN THE NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997

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Particular thanks are due to Olga Mackey and Adela Martinez-Johnson for typing the report.

DISCLAIMER

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

SUMMARY AND CONCLUSIONS

Summary

During the summer of 1996 and 1997, quantitative samples of fish were collected from nine stations using electrofishing gear and seines for the North Branch of the Chicago River (North Branch) watershed in Cook County above the junction with the North Shore Channel (Channel). Fish community characteristics included species composition, abundance, and calculation of the index of biotic integrity (IBI).

Conclusions

Based on the results from the 1996-1997 surveys, the following conclusions can be drawn regarding the fish community at these nine stations in the North Branch watershed.

1. Seventeen species of fish were collected.
2. Overall, bluegill sunfish accounted for 94.3 percent of the total number of fish collected.
3. A total of 14,630 fish were collected from all sampling stations.
4. The average calculated IBI scores for the sampling stations ranged from a low of 26 to a high of 36, which indicate a partially supporting aquatic life use, as defined by the Illinois Environmental Protection Agency (IEPA).

INTRODUCTION

In 1975, the Research and Development (R&D) Department initiated a comprehensive monitoring program to characterize the biological communities in Metropolitan Chicago inland waterways. The primary objective of the monitoring program is to characterize water quality on the basis of the abundance and distribution of fish and benthic invertebrates. Over a period of years, this monitoring will serve to define trends and, where appropriate, to assess the effects of pollution control activities implemented by the District on instream water quality. This report describes the fish community at nine locations in the North Branch watershed from Lake-Cook Road to the junction with the Channel during biological surveys conducted in 1996 and 1997. Benthic invertebrates were not monitored during 1996 and 1997.

DESCRIPTION OF STUDY AREA

The North Branch watershed is on the west side of the subcontinental divide that lies just inland from the shores of Lake Michigan. The 113 square mile watershed is located both in Lake and Cook Counties (Ogata, 1975). Approximately 46 percent of the North Branch watershed is in Lake County.

The North Branch watershed is drained by three rivers: the Skokie River, the Middle Fork, and the West Fork. The Skokie River originates in Park City, Illinois and flows south-southeast before merging with the Middle Fork in Northfield, Illinois. The Middle Fork begins in Waukegan, Illinois and flows south-southeast to the confluence with the Skokie River. This confluence is the beginning of the North Branch which continues flowing south for a short distance before joining with the West Fork (Hill, 2000). The West Fork originates in Mettawa, Illinois and flows south-southeast merging with the North Branch in Golf, Illinois. The North Branch continues flowing south and then southeast before joining with the Channel east of Albany Avenue in Chicago.

Just upstream of the confluence with the Channel, the North Branch flows over the North Branch Dam. Upstream of the dam, the North Branch is a shallow stream. Downstream of the dam, the North Branch is part of a deep-draft navigable waterway system. The deep-draft portion of the North Branch flows south, eventually merging with the Chicago River just south of

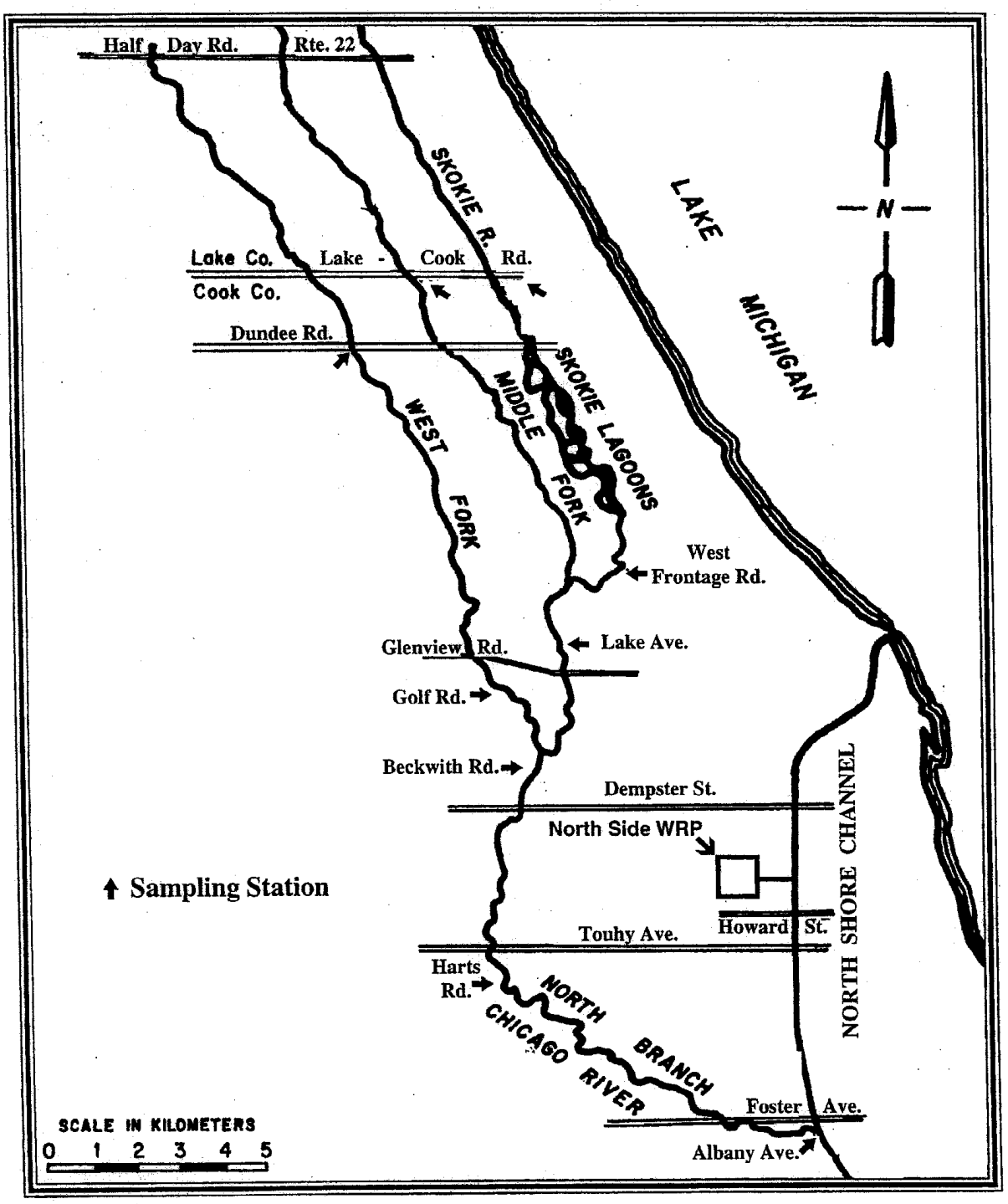
Kinzie Street in downtown Chicago. This study is limited to the shallow streams within Cook County and upstream of the North Branch Dam.

Nine sampling stations were established on the shallow portions of the North Branch from Lake-Cook Road to the confluence with the Channel. Two stations were located on the West Fork, one station on the Middle Fork, two stations on the Skokie River, and four stations on the North Branch. The location of the nine monitoring stations is shown in Figure 1 and presented in Table 1.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE 1

SAMPLING STATIONS ON THE NORTH BRANCH OF THE CHICAGO RIVER



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1

LOCATION OF FISH SAMPLING STATIONS
ON THE NORTH BRANCH OF THE CHICAGO RIVER

Waterway	Location of Sampling Station
West Fork of the North Branch	Approximately 10 meters upstream of Dundee Road
West Fork of the North Branch	Approximately 20 meters upstream of Golf Road
Middle Fork of the North Branch	Approximately 800 meters downstream of Lake-Cook Road
Skokie River	Approximately 20 meters downstream of Lake-Cook Road
Skokie River	Approximately 100 meters downstream of West Frontage Road
North Branch of the Chicago River	Approximately 20 meters downstream of Lake Avenue
North Branch of the Chicago River	Immediately downstream of Beckwith Road
North Branch of the Chicago River	Approximately 5 meters downstream of Harts Road
North Branch of the Chicago River	Approximately 5 meters downstream of the footbridge at Albany Avenue

MATERIALS AND METHODS

Electrofisher and Seine Fish Collections

At each of nine stations, fish were collected in the North Branch during July and August of 1996 and 1997. Sampling equipment used to collect fish included the following:

1. A direct current backpack electrofisher was used to collect fish. The water was electrified with 0.7 to 1 amp of current. In most instances, two 40-meter backpack electrofisher collections were conducted at each station. R&D personnel electrified a 40-meter reach of the river by moving upstream parallel to the bank. Additional staff followed the individual with 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. However, if the river was less than five meters wide, electrofishing occurred only once along a 40-meter reach. The total time that the water was electrified during each 40-meter collection was noted. The total shocking time for a 40-meter collection ranged from 10 to 19 minutes.
2. A 25-foot bag seine with 3/16-inch mesh was also used to collect fish. R&D staff pulled the

seine traveling upstream parallel to the bank for a distance of 40 meters. In most instances, a separate 40-meter seine collection occurred along each bank.

The total area of river monitored varied with stream width. For example, a 20-meter wide river sampled with two 40-meter electrofisher collections and two 40-meter seine collections would equate to a monitoring area of 800 square meters.

Sample Analysis

In the field, large fish (greater than 150 mm) 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. Large fish were returned alive to the river. Small fish (less than 150 mm) were preserved in 10 percent (v/v) formalin and returned to the laboratory for further analysis. Small fish were processed in a similar manner as the large fish, except that they were weighed to the nearest 0.01 gram.

IBI

The 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 (3). Individual metric scores are added to calculate a total IBI score (example shown in Table 2). A high IBI indicates high biological integrity or health and low disturbance or lack of perturbations. Conversely, a low IBI indicates low biological integrity and high disturbance or degradation.

In Illinois, expectations for selected IBI metrics have been developed on a regional basis (Hite and Bertrand, 1989). Eight IBI regions have been identified where scoring criteria reflect conditions in the region. The northeast region was used in the present study.

Separate IBI metric scores are based on the relative abundance of fish collected with each fishing gear (Hite and Bertrand, 1989). In the present study, the relative abundances were estimates of the average number of fish per bag seine haul and the total number of fish collected per electrofishing hour. The average number of fish per seine was determined by dividing the total collection by the number of individual 40-meter seine hauls. The number of fish collected per electrofishing hour was determined by extrapolating the total number of fish collected during each electrofishing sample

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 2

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT DUNDEE ROAD ON THE WEST FORK OF THE NORTH BRANCH OF THE CHICAGO RIVER, AUGUST 26, 1996

IBI Metric	Fishing Gear: Seine Sample Value	Seine Metric Scores[a]	Electrofisher Sample Value	Electrofisher Metric Scores[a]
Number of Species Per Sample	4	1	6	3
Number of Sucker Species	0	1	1	1
Number of Sunfish Species	2	5	2	5
Number of Darter Species	0	1	0	1
Number of Intolerant Species	0	1	0	1
Percent Green Sunfish	1.1	5	7.69	3
Percent Hybrids	0	5	0	5
Percent Diseased or Abnormal	2.2	1	0	5
Percent Omnivores	32.97	3	23.08	3
Percent Insectivorous Cyprinids	0	1	0	1
Percent Carnivores	60.44	5	15.38	5
Number of Fish	91[b]	3	13[c]	1
Shocking Time (min)	NA[d]	NA	11	NA
IBI (Sum of Metric Scores)		32		34

[a]Metric scores based on the West Fork, a second order stream in the Northeast Illinois region.
[b]Total number of fish collected during two seine hauls.
[c]Total number of fish collected during two backpack electrofisher collections. Total shocking time 11 minutes.
[d]Not applicable.

(ranging from 10 to 19 minutes) to the total number of fish that would have been collected if electrofishing had continued for one hour.

IBI metrics also differ according to stream size. Stream order was used to estimate stream size. Unbranched tributaries are first order streams. Two first order streams merge to form a second order stream, etc. (Hite and Bertrand, 1989). Stream orders for the North Branch were obtained from the IEPA.

In 1984, the IEPA and the Illinois Department of Conservation developed a five-tiered biological stream characterization system based on the composition and condition of the fishery resources (Hite and Bertrand, 1989). The characterization system describes stream conditions as a function of the IBI.

A three-tiered biological characterization system based on IBI metric scores (approved by the United States Environmental Protection Agency) is currently used by the IEPA to assess aquatic life use in General Use Waters in Illinois (IEPA, 2000). The three aquatic life use categories are fully supporting, partially supporting, and not supporting (Table 3).

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 3

AQUATIC LIFE USE CATEGORIES FOR
ILLINOIS RIVERS AND STREAMS

IBI Score	Aquatic Life Use Category
41-60	Fully Supporting
21-40	Partially Supporting
12-20	Not Supporting

RESULTS

During 1996 and 1997, 17 species of fish, plus a carp x goldfish hybrid and two sunfish hybrids, were collected from nine stations on the North Branch (Table 4). A combined total of 14,630 fish were collected from all locations during the two year study (Table 5). Fish collected at each of the nine sampling stations are presented in Appendix Tables AI-1 through AI-9. The calculated IBI for both the seine and back-pack electrofisher collections at each of the nine sampling stations is presented in Appendix Tables AII-1 through AII-9.

Overall, bluegill sunfish accounted for 94.3 percent of the fish collected from the North Branch during 1996 and 1997 (Table 5). Bluegills ranged in percentage composition from 9 percent at Dundee Road on the West Fork to 98 percent at Golf Road (West Fork), Lake Avenue (North Branch) and Albany Avenue (North Branch).

Game fish collected in the study area included black bullhead, green sunfish, pumpkinseed sunfish, orangespotted sunfish, bluegill, largemouth bass, black crappie, and hybrid sunfish.

West Fork, Dundee Road

During 1996-1997, 7 fish species were collected from Dundee Road on the West Fork (Table 5). Largemouth bass (53.4 percent), fathead minnows (27.1 percent), bluegill (9.3 percent), and carp (5.1 percent), accounted for 94.9 percent of

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 4

COMMON AND SCIENTIFIC NAMES OF FISH COLLECTED FROM THE NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997

Common Name[1]	Scientific Name[1]
MINNOW FAMILY	CYPRINIDAE
Goldfish	*Carassius auratus*
Common carp	*Cyprinus carpio*
Carp x Goldfish hybrid	*Cyprinus carpio x Carassius auratus*
Golden shiner	*Notemigonus crysoleucas*
Emerald shiner	*Notropis atherinoides*
Bluntnose minnow	*Pimephales notatus*
Fathead minnow	*Pimephales promelas*
SUCKER FAMILY	CATOSTOMIDAE
White sucker	*Catostomus commersoni*
CATFISH FAMILY	ICTALURIDAE
Black bullhead	*Ameiurus melas*
LIVEBEARER FAMILY	POECILIIDAE
Western mosquitofish	*Gambusia affinis*
Sailfin molly	*Poecilia latipinna*
STICKLEBACK FAMILY	GASTEROSTEIDAE
Brook stickleback	*Culaea inconstans*
SUNFISH FAMILY	CENTRARCHIDAE
Green sunfish	*Lepomis cyanellus*
Pumpkinseed	*Lepomis gibbosus*
Orangespotted sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Largemouth bass	*Micropterus salmoides*
Black crappie	*Pomoxis nigromaculatus*
Green sunfish x Pumpkinseed sunfish hybrid	*L. cyanellus x L. gibbosus*
Green sunfish x Bluegill hybrid	*L. cyanellus x L. macrochirus*

[1]Common and scientific names from Robins, 1991.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 5

TOTAL NUMBER AND PERCENTAGE COMPOSITION OF FISH SPECIES COLLECTED, AND IBI SCORES AT NINE STATIONS ON THE NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997[1]

	West Fork		Middle Fork	Skokie River		North Branch Chicago River				
Fish Species	Dundee Road	Golf Road	Lake-Cook Road	Lake-Cook Road	West Frontage Road	Lake Avenue	Beckwith Road	Harts Road	Albany Avenue	All Stations
Goldfish	0	3 (0.03)	0	3 (0.22)	0	0	2 (0.63)	0	0	8 (0.05)
Carp	6 (5.08)	63 (0.72)	0	7 (0.51)	0	3 (0.12)	49 (15.51)	3 (4.11)	1 (0.50)	132 (0.90)
Carp x goldfish hybrid	0	1 (0.01)	0	0	0	0	0	0	0	1 (0.01)
Golden shiner	1 (0.85)	1 (0.01)	5 (3.94)	0	2 (0.17)	0	0	0	0	9 (0.06)
Emerald shiner	0	2 (0.02)	0	0	0	0	0	0	0	2 (0.01)
Bluntnose minnow	0	8 (0.09)	0	0	11 (0.91)	0	2 (0.63)	0	0	21 (0.14)
Fathead minnow	32 (27.12)	52 (0.59)	44 (34.65)	54 (3.92)	11 (0.91)	5 (0.21)	6 (1.90)	12 (16.44)	1 (0.50)	217 (1.48)
White sucker	1 (0.85)	42 (0.48)	4 (3.15)	0	3 (0.25)	1 (0.04)	28 (8.86)	2 (2.74)	0	81 (0.55)
Black bullhead	0	1 (0.01)	0	4 (0.29)	2 (0.17)	0	2 (0.63)	0	0	9 (0.06)
Mosquitofish	0	0	3 (2.36)	9 (0.65)	0	0	0	0	0	12 (0.08)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 5 (Continued)

TOTAL NUMBER AND PERCENTAGE COMPOSITION OF FISH SPECIES COLLECTED, AND IBI SCORES AT NINE STATIONS ON THE NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997[1]

Fish Species	West Fork		Middle Fork	Skokie River		North Branch Chicago River				All Stations
	Dundee Road	Golf Road	Lake-Cook Road	Lake-Cook Road	West Frontage Road	Lake Avenue	Beckwith Road	Harts Road	Albany Avenue	
Sailfin molly	0	0	3 (2.36)	0	0	0	0	0	0	3 (0.02)
Brook stickleback	0	0	2 (1.57)	0	0	0	1 (0.32)	0	1 (0.50)	4 (0.03)
Green sunfish	4 (3.39)	7 (0.08)	4 (3.15)	26 (1.89)	21 (1.73)	17 (0.71)	21 (6.65)	9 (12.33)	1 (0.50)	110 (0.75)
Pumpkinseed	0	1 (0.01)	0	1 (0.07)	0	0	0	0	0	2 (0.01)
Orangespotted sunfish	0	2 (0.02)	12 (9.45)	0	0	0	8 (2.53)	0	0	22 (0.15)
Bluegill	11 (9.32)	8,580 (97.52)	37 (29.13)	1,244 (90.34)	1,119 (92.33)	2,369 (98.34)	195 (61.71)	47 (64.38)	196 (98.00)	13,798 (94.31)
Largemouth bass	63 (53.39)	33 (0.38)	13 (10.24)	14 (1.02)	35 (2.89)	14 (0.58)	2 (0.63)	0	0	174 (1.19)
Black crappie	0	0	0	14 (1.02)	0	0	0	0	0	14 (0.10)
Green sunfish x pumpkinseed hybrid	0	1 (0.01)	0	1 (0.07)	6 (0.50)	0	0	0	0	8 (0.05)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 5 (Continued)

TOTAL NUMBER AND PERCENTAGE COMPOSITION OF FISH SPECIES COLLECTED, AND IBI SCORES AT NINE STATIONS ON THE NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997[1]

Fish Species	West Fork		Middle Fork	Skokie River		North Branch Chicago River				All Stations
	Dundee Road	Golf Road	Lake-Cook Road	Lake-Cook Road	West Frontage Road	Lake Avenue	Beckwith Road	Harts Road	Albany Avenue	
Green sunfish x bluegill hybrid	0	1 (0.01)	0	0	2 (0.17)	0	0	0	0	3 (0.02)
Total Fish	118	8,798	127	1,377	1,212	2,409	316	73	200	14,630
Total Species[2]	7	13	10	10	8	6	11	5	5	17
IBI Score	30	35	31	36	34	31	30	26	27	26-36

[1]Percentage composition is shown in parentheses for each species collected at each of nine stations, and for all stations combined.
[2]Hybrids not included in total number of species.

the total catch of 118 fish. The average IBI score for the West Fork at Dundee Road during the 1996-1997 surveys was 30.

West Fork, Golf Road

During 1996-1997, 13 fish species were collected from Golf Road on the West Fork (Table 5). Bluegills accounted for 97.5 percent of the total catch of 8,798 fish. The average IBI score for the West Fork at Golf Road during the 1996-1997 surveys was 35.

Middle Fork, Lake-Cook Road

During 1996-1997, 10 fish species were collected from Lake-Cook Road on the Middle Fork (Table 5). Fathead minnows (34.7 percent), bluegill (29.1 percent), largemouth bass (10.2 percent), and orangespotted sunfish (9.5 percent) accounted for 83.5 percent of the total catch of 127 fish. The average IBI score for the Middle Fork at Lake-Cook Road during the 1996-1997 surveys was 31.

Skokie River, Lake-Cook Road

During 1996-1997, 10 fish species were collected from Lake-Cook Road on the Skokie River (Table 5). Bluegills accounted for 90.3 percent of the total catch of 1,377 fish. The average IBI score for the Skokie River at Lake-Cook Road during the 1996-1997 surveys was 36.

Skokie River, West Frontage Road

During 1996-1997, 8 fish species were collected from West Frontage Road on the Skokie River (Table 5). Bluegills accounted for 92.3 percent of the total catch of 1,212 fish. The average IBI score for the Skokie River at West Frontage Road during the 1996-1997 surveys was 34.

North Branch, Lake Avenue

During 1996-1997, 6 fish species were collected from Lake Avenue on the North Branch (Table 5). Bluegills accounted for 98.3 percent of the total catch of 2,409 fish. The average IBI score for the North Branch at Lake Avenue during the 1996-1997 surveys was 31.

North Branch, Beckwith Road

During 1996-1997, 11 fish species were collected from Beckwith Road on the North Branch (Table 5). Bluegill (61.7 percent), carp (15.5 percent), white suckers (8.9 percent), and green sunfish (6.7 percent) accounted for 92.7 percent of the total catch of 316 fish. The average IBI score for the North Branch at Beckwith Road during the 1996-1997 surveys was 30.

North Branch, Harts Road

During 1996-1997, 5 fish species were collected from Harts Road on the North Branch (Table 5). Bluegill (64.4 percent), fathead minnows (16.4 percent), and green

sunfish (12.3 percent) accounted for 93.2 percent of the total catch of 73 fish. The average IBI score for the North Branch at Harts Road during the 1996-1997 surveys was 26.

North Branch, Albany Avenue

During 1996-1997, 5 fish species were collected from Albany Avenue on the North Branch (Table 5). Bluegills accounted for 98.0 percent of the total catch of 200 fish. The average IBI score in the North Branch at Albany Avenue during the 1996-1997 surveys was 27.

DISCUSSION

Hynes (1960) in his classic work on the biology of water pollution stated that the effects of environmental perturbations are primarily biological in nature and, therefore, should be quantified using biological information.

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 and Dudley, 1981; Karr et al., 1986). The natural habitat is referred to as the reference condition. The environmental quality of an aquatic system can be assessed by comparing its biological integrity to a reference condition where environmental stressors and perturbations are relatively minimal. Environmental stress in aquatic ecosystems is primarily caused by poor water and sediment quality and inadequate physical habitat. These chemical and physical stressors reduce the species diversity of aquatic communities. Species diversity includes both the total number of species and the relative abundance of individuals in each group.

An unstressed fish community supports a large number of species with relatively few individuals within each group (high species diversity). Conversely, when a community is under stress, the number of pollution tolerant species increases while the total number of species decreases, and the number of

individuals remaining in the pollution tolerant groups increases (low species diversity).

Overall, the fish community in the North Branch during the 1996-1997 surveys was composed primarily of one species of fish, bluegills, resulting in a low species diversity (Table 5). The predominance of one species of fish indicates environmental stress. Environmental factors or conditions that may be causing this stress and limiting fish diversity in the North Branch include the following: (1) periodic separate nonpoint stormwater discharges in the West Fork, Middle Fork, and Skokie River; (2) lack of diverse instream habitat due to channelization and modification of the riparian zone (IEPA, 1998); (3) excessive bank erosion and siltation (IEPA, 1998); (4) periodic discharges from combined sewer overflows in the shallow draft portion of the North Branch (IEPA, 1998), as reflected by a decrease in the IBI between Lake Avenue (IBI=31) and Albany Avenue (IBI= 27) on the North Branch, (5) contaminated sediments (Allen and Polls, 1992; IEPA, 1998); and (6) point source discharges from water reclamation plants in Lake County, Illinois (IEPA, 1998).

The average IBI scores from data collected in the present study area ranged from a low of 26 at Harts Road in the North Branch to a high of 36 at Lake-Cook Road in the Skokie River (Table 6). The calculated IBI scores indicate that the West Fork, Middle Fork, Skokie River, and shallow draft portion of

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 6

AQUATIC LIFE USES IN THE NORTH BRANCH OF THE CHICAGO RIVER BASED ON THE AVERAGE INDEX OF BIOTIC INTEGRITY SCORES DURING 1996 AND 1997

Sampling Station	Average IBI Score	Aquatic Life Use
West Fork		
Dundee Road	30	Partially Supporting
Golf Road	35	Partially Supporting
Middle Fork		
Lake-Cook Road	31	Partially Supporting
Skokie River		
Lake-Cook Road	36	Partially Supporting
West Frontage	34	Partially Supporting
North Branch		
Lake Avenue	31	Partially Supporting
Beckwith Road	30	Partially Supporting
Harts Road	26	Partially Supporting
Albany Avenue	27	Partially Supporting

the North Branch are partially supporting aquatic life use waterbodies, as defined by the IEPA.

Aquatic life use assessments in the North Branch were determined using fish data collected by District staff during 1996 and 1997. These assessments may not agree with IEPA 305(b) assessments because different sets of data were used in the analysis.

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APPENDIX AI

FISH COLLECTION STATISTICS FOR NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-1

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT DUNDEE ROAD ON THE WEST FORK OF THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/26/96								
Bluegill	11	39.84	49	29	93	3.62	0.38	14.30
Fathead minnow	32	107.12	65	35	75	3.35	0.47	5.29
Golden shiner	1	0.56	40	40	40	0.56	0.56	0.56
Green sunfish	2	51.40	106	99	113	25.70	24.20	27.20
Largemouth bass	57	191.39	63	47	88	3.36	1.50	9.09
White sucker	1	7.25	84	84	84	7.25	7.25	7.25
Total	104	397.56						
8/6/97								
Carp	6	24.02	57	47	71	4.00	2.19	7.50
Green sunfish	2	0.90	28	27	28	0.45	0.43	0.47
Largemouth bass	6	21.00	64	57	69	3.50	2.30	4.70
Total	14	45.92						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-2

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT GOLF ROAD ON THE WEST FORK OF THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/2/96								
Bluegill	457	172.43	26	19	86	0.38	0.08	10.80
Carp	3	18.72	67	44	88	6.24	1.17	11.84
Emerald shiner	2	0.77	35	33	37	0.39	0.34	0.43
Fathead minnow	31	9.44	31	23	40	0.30	0.10	0.65
Golden shiner	1	0.15	27	27	27	0.15	0.15	0.15
Green sunfish	6	37.20	68	49	84	6.20	2.30	10.90
Green sunfish x bluegill	1	6.88	72	72	72	6.88	6.88	6.88
Green sunfish x pumpkinseed	1	4.29	61	61	61	4.29	4.29	4.29
Largemouth bass	26	164.24	55	38	208	6.32	0.50	127.50
Orangespotted sunfish	1	2.20	53	53	53	2.20	2.20	2.20
Pumpkinseed	1	11.80	87	87	87	11.80	11.80	11.80
White sucker	19	22.66	48	36	60	1.19	0.31	2.35
Total	549	450.78						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-2 (Continued)

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT GOLF ROAD ON THE WEST FORK OF THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
7/30/97								
Black bullhead	1	152.80	224	224	224	152.80	152.80	152.80
Bluegill	8,123	2,395.87	27	7	39	0.29	0.08	0.71
Bluntnose minnow	8	8.58	47	38	58	1.07	0.28	1.87
Carp	60	129.85	48	33	71	2.16	0.64	5.75
Carp x goldfish	1	1.51	43	43	43	1.51	1.51	1.51
Fathead minnow	21	13.78	39	25	52	0.66	0.14	1.77
Goldfish	3	2.51	37	36	37	0.84	0.74	0.96
Green sunfish	1	13.10	89	89	89	13.10	13.10	13.10
Largemouth bass	7	9.66	48	37	56	1.38	0.50	2.20
Orangespotted sunfish	1	5.20	67	67	67	5.20	5.20	5.20
White sucker	23	20.23	43	30	53	0.88	0.32	1.84
Total	8,249	2,753.09						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-3

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE-COOK ROAD ON THE MIDDLE FORK OF THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/27/96								
Bluegill	34	37.41	37	23	67	1.10	0.23	5.70
Fathead minnow	11	8.60	42	35	49	0.78	0.45	1.37
Golden shiner	5	15.68	58	41	104	3.14	0.68	11.83
Green sunfish	3	25.40	78	70	86	8.47	5.20	11.80
Largemouth bass	9	15.07	52	42	63	1.67	0.80	2.80
Mosquitofish	3	3.64	37	27	49	1.21	0.54	1.90
Orangespotted sunfish	12	55.60	64	55	75	4.63	2.80	7.40
Sailfin molly	2	1.08	33	31	35	0.54	0.45	0.63
White sucker	3	65.77	102	54	175	21.92	2.02	58.20
Total	82	228.25						
8/21/97 (seine only)								
Bluegill	3	1.06	27	21	34	0.35	0.14	0.67
Brook stickleback	2	1.40	40	34	46	0.70	0.42	0.98
Fathead minnow	32	45.85	49	36	60	1.43	0.31	2.77
Green sunfish	1	3.30	57	57	57	3.30	3.30	3.30
Largemouth bass	3	6.20	56	48	60	2.07	1.20	2.50
White sucker	1	4.42	72	72	72	4.42	4.42	4.42
Total	42	13.92						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-3 (Continued)

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE-COOK ROAD ON THE MIDDLE FORK OF THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/27/97 (electrofisher only)								
Fathead minnow	1	1.61	50	50	50	1.61	1.61	1.61
Largemouth bass	1	2.30	59	59	59	2.30	2.30	2.30
Sailfin molly	1	2.76	52	52	52	2.76	2.76	2.76
Total	3	6.67						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-4

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE-COOK ROAD ON THE SKOKIE RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/28/96								
Black bullhead	2	118.30	155	118	191	59.15	23.20	95.10
Bluegill	268	201.32	34	23	45	0.75	0.17	22.00
Carp	6	56.07	77	60	91	9.35	6.07	14.10
Fathead minnow	53	64.11	46	37	55	1.21	0.62	1.88
Green sunfish	13	207.70	74	27	122	15.98	0.39	42.20
Largemouth bass	12	63.15	71	47	103	5.26	1.37	14.30
Total	354	710.65						
8/26/97								
Black bullhead	2	2.68	45	43	46	1.34	1.07	1.61
Black crappie	14	18.98	48	37	57	1.36	0.61	2.08
Bluegill	976	313.38	26	21	133	0.32	0.12	36.80
Carp	1	7.59	74	74	74	7.59	7.59	7.59
Fathead minnow	1	3.45	68	68	68	3.45	3.45	3.45
Goldfish	3	35.21	82	65	95	11.74	5.40	17.31
Green sunfish	13	90.63	63	25	95	6.97	0.29	16.80
Green sunfish x pumpkinseed	1	1.20	40	40	40	1.20	1.20	1.20
Largemouth bass	2	183.90	161	88	233	91.95	8.50	175.40
Mosquitofish	9	1.96	25	21	32	0.22	0.11	0.49
Pumpkinseed	1	0.62	33	33	33	0.62	0.62	0.62
Total	1,023	659.60						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-5

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT WEST FRONTAGE ROAD ON THE SKOKIE RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/22/96								
Black bullhead	2	3.46	44	37	51	1.73	0.93	2.53
Bluegill	162	270.67	36	18	104	1.67	0.05	20.10
Fathead minnow	9	9.17	44	38	62	1.02	0.65	2.58
Golden shiner	1	1.39	51	51	51	1.39	1.39	1.39
Green sunfish	5	71.63	79	34	118	14.33	0.89	32.90
Green sunfish x pumpkinseed	6	44.98	70	63	76	7.50	4.92	9.49
Largemouth bass	12	31.73	58	40	92	2.64	0.82	9.10
White sucker	2	8.55	67	57	77	4.28	2.58	5.97
Total	199	441.58						
7/31/97								
Bluegill	957	637.01	28	18	108	0.67	0.09	27.30
Bluntnose minnow	11	30.36	62	55	71	2.76	1.68	4.51
Fathead minnow	2	2.15	45	37	53	1.08	0.57	1.58
Golden shiner	1	2.50	67	67	67	2.50	2.50	2.50
Green sunfish	16	140.10	74	47	106	8.76	1.80	21.80
Green sunfish x bluegill	2	32.07	92	78	105	16.04	10.57	21.50
Largemouth bass	23	31.42	47	40	60	1.37	0.70	2.78
White sucker	1	2.53	61	61	61	2.53	2.53	2.53
Total	24	33.95						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-6

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE AVENUE ON THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/5/96								
Bluegill	192	112.97	27	15	102	0.59	0.03	19.50
Fathead minnow	4	1.67	34	30	39	0.42	0.27	0.68
Green sunfish	7	24.86	51	25	78	3.55	0.29	10.60
Largemouth bass	6	11.74	55	44	67	1.96	1.10	3.10
White sucker	1	2.59	60	60	60	2.59	2.59	2.59
Total	210	153.83						
7/28/97 (seine only)								
Bluegill	2,127	622.45	25	16	133	0.29	0.05	58.60
Carp	2	11.79	71	67	74	5.90	5.16	6.63
Fathead minnow	1	0.87	45	45	45	0.87	0.87	0.87
Largemouth bass	3	5.04	47	45	51	1.68	1.44	2.14
Total	2,133	640.15						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-6 (Continued)

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE AVENUE ON THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
7/29/97 (electrofisher only)								
Bluegill	50	26.14	29	21	71	0.52	0.13	6.50
Carp	1	3.79	60	60	60	3.79	3.79	3.79
Green sunfish	10	55.27	65	47	80	5.53	2.17	9.60
Largemouth bass	5	7.80	50	44	54	1.56	1.00	2.00
Total	66	93.00						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-7

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT BECKWITH ROAD ON THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/1/96								
Black bullhead	2	249.72	179	122	235	124.86	29.52	220.20
Bluegill	26	130.66	47	21	142	5.03	0.14	65.70
Carp	6	96.22	90	69	108	16.04	6.14	27.54
Fathead minnow	4	6.94	50	25	60	1.74	0.12	2.59
Green sunfish	9	57.25	61	25	94	6.36	0.28	17.60
Orangespotted sunfish	7	46.79	68	43	84	6.68	1.37	12.00
White sucker	27	93.60	55	36	161	3.47	0.52	53.16
Total	81	681.18						
8/20/97								
Bluegill	169	65.42	27	18	66	0.39	0.08	4.60
Bluntnose minnow	2	5.12	60	58	61	2.56	2.41	2.71
Brook stickleback	1	1.05	46	46	46	1.05	1.05	1.05
Carp	43	321.46	72	45	87	7.48	1.73	12.14
Fathead minnow	2	2.42	47	43	50	1.21	0.96	1.46
Goldfish	2	4.77	51	46	55	2.39	1.92	2.85

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-7 (Continued)

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT BECKWITH ROAD ON THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/20/97 (Continued)								
Green sunfish	12	66.22	59	24	94	5.52	0.29	18.30
Largemouth bass	2	6.90	62	44	80	3.45	0.80	6.10
Orangespotted sunfish	1	4.80	66	66	66	4.80	4.80	4.80
White sucker	1	4.08	73	73	73	4.08	4.08	4.08
Total	235	482.24						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-8

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT HARTS ROAD ON THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/21/96								
Bluegill	30	7.50	24	18	36	0.25	0.12	0.78
Green sunfish	3	16.70	61	39	77	5.57	0.90	10.60
Total	33	24.20						
8/5/97								
Bluegill	17	4.32	25	21	29	0.25	0.15	0.42
Carp	3	11.70	57	47	63	3.90	2.41	5.09
Fathead minnow	12	4.43	32	24	43	0.37	0.11	0.89
Green sunfish	6	36.83	64	27	86	6.14	0.43	12.10
White sucker	2	1.03	36	35	37	0.52	0.48	0.55
Total	40	58.31						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-9

STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT ALBANY AVENUE ON THE NORTH BRANCH CHICAGO RIVER
DURING 1996 AND 1997

Fish Species	Number of Fish	Total Weight (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
7/30/96								
Bluegill	62	8.91	22	17	27	0.14	0.06	0.27
Fathead minnow	1	0.12	24	24	24	0.12	0.12	0.12
Total	63	9.03						
8/1/97								
Bluegill	134	45.08	27	21	35	0.34	0.14	0.67
Brook stickleback	1	0.70	38	38	38	0.70	0.70	0.70
Carp	1	1.58	45	45	45	1.58	1.58	1.58
Green sunfish	1	2.80	58	58	58	2.80	2.80	2.80
Total	137	50.16						

APPENDIX AII

INDEX OF BIOTIC INTEGRITY FOR NINE STATIONS ON THE NORTH BRANCH OF THE CHICAGO RIVER DURING 1996 AND 1997

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-1

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT DUNDEE ROAD ON THE WEST FORK OF THE NORTH BRANCH CHICAGO RIVER DURING 1996 AND 1997

IBI Metric	8/26/96 Electrofisher	8/26/96 Seine	8/6/97 Electrofisher	8/6/97 Seine
	Actual data			
# Species per sample	6	4	1	3
# Sucker species	1	0	0	0
# Sunfish species	2	2	0	1
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
% Green sunfish	7.69	1.10	0	18.18
% Hybrids	0	0	0	0
% Diseased	0	2.20	0	0
% Omnivores	23.08	32.97	100	27.27
% Insectivorous cyprinids	0	0	0	0
% Carnivores	15.38	60.44	0	54.54
Abundance				
Total # fish	13	91	3	11
Shock time (min)	11	-	10	-
# Fish per hour[1]	71	-	18	-
Average # per haul	-	46	-	6
	Corresponding Score[2]			
# Species per sample	3	1	1	1
# Sucker species	1	1	1	1
# Sunfish species	5	5	1	3
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	3	5	5	3
% Hybrids	5	5	5	5
% Diseased	5	1	5	5
% Omnivores	3	3	1	3
% Insectivorous cyprinids	1	1	1	1
% Carnivores	5	5	1	5
Abundance	1	3	1	1
IBI score	34	32	24	30

[1]Extrapolation.
[2]Metric scores based on the West Fork at Dundee Road, a second order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-2

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT GOLF ROAD ON THE WEST FORK OF THE NORTH BRANCH CHICAGO RIVER DURING 1996 AND 1997

IBI Metric	8/2/96		7/30/97	
	Electrofisher	Seine	Electrofisher	Seine
	----------Actual data----------			
# Species per sample	6	9	7	9
# Sucker species	1	1	1	1
# Sunfish species	3	3	2	2
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
% Green sunfish	6.25	0.21	0.40	0
% Hybrids	2.50	0	0.40	0
% Diseased	2.50	0.20	0.40	0.04
% Omnivores	1.25	7.25	5.26	0.99
% Insectivorous cyprinids	0	0.43	0	0
% Carnivores	16.25	2.77	1.62	0.02
Abundance				
Total # fish	80	469	247	8,001
Shock time (min)	15	-	17	-
# Fish per hour[1]	320	-	872	-
Average # per haul	-	235	-	4,001
	----------Corresponding Score[2]----------			
# Species per sample	3	3	3	3
# Sucker species	1	1	1	1
# Sunfish species	5	5	5	5
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	3	5	5	5
% Hybrids	1	5	3	5
% Diseased	1	3	3	3
% Omnivores	5	5	5	5
% Insectivorous cyprinids	1	1	1	1
% Carnivores	5	3	3	1
Abundance	1	5	5	5
IBI score	28	38	36	36

[1]Extrapolation.

[2]Metric scores based on the West Fork at Golf Road, a second order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-3

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT LAKE-COOK ROAD ON THE MIDDLE FORK OF THE NORTH BRANCH CHICAGO RIVER DURING 1996 AND 1997

IBI Metric	8/27/96 Electrofisher	8/27/96 Seine	8/21/97 Seine	8/27/97 Electrofisher
	Actual data			
# Species per sample	8	7	6	3
# Sucker species	1	1	1	0
# Sunfish species	3	2	2	0
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
% Green sunfish	8.11	0	2.38	0
% Hybrids	0	0	0	0
% Diseased	2.70	0	0	0
% Omnivores	8.11	28.89	76.19	33.33
% Insectivorous cyprinids	0	0	0	0
% Carnivores	18.92	4.44	7.14	33.33
Abundance				
Total # fish	37	45	42	3
Shock time (min)	18	-	-	10
# Fish per hour[1]	123	-	-	18
Average # per haul	-	45	21	-
	Corresponding Score[2]			
# Species per sample	3	3	1	1
# Sucker species	1	1	1	1
# Sunfish species	5	3	3	1
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	3	5	5	5
% Hybrids	5	5	5	5
% Diseased	1	5	5	5
% Omnivores	5	3	1	3
% Insectivorous cyprinids	1	1	1	1
% Carnivores	5	3	5	5
Abundance	1	1	1	1
IBI score	32	32	30	30

[1]Extrapolation.

[2]Metric scores based on the Middle Fork at Lake Cook Road, a third order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-4

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT
LAKE-COOK ROAD ON THE SKOKIE RIVER
DURING 1996 AND 1997

IBI Metric	8/28/96 Electrofisher	8/28/96 Seine	8/26/97 Electrofisher	8/26/97 Seine
	Actual data			
# Species per sample	5	6	5	8
# Sucker species	0	0	0	0
# Sunfish species	2	2	3	4
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
% Green sunfish	5.15	3.11	4.09	0.50
% Hybrids	0	0	0.45	0
% Diseased	1.03	0.78	0.40	0
% Omnivores	18.56	15.95	1.82	0.12
% Insectivorous cyprinids	0	0	0	0
% Carnivores	4.12	3.11	1.36	1.62
Abundance				
Total # fish	97	257	220	803
Shock time (min)	14	-	17	-
# Fish per hour[1]	416	-	776	-
Average # per haul	-	129	-	402
	Corresponding Score[2]			
# Species per sample	1	3	1	3
# Sucker species	1	1	1	1
# Sunfish species	5	5	5	5
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	3	5	5	5
% Hybrids	5	5	3	5
% Diseased	1	3	3	5
% Omnivores	5	5	5	5
% Insectivorous cyprinids	1	1	1	1
% Carnivores	3	3	3	3
Abundance	3	5	5	5
IBI score	30	38	34	40

[1]Extrapolation.
[2]Metric scores based on the Skokie River at Lake-Cook Road, a second order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-5

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT
WEST FRONTAGE ROAD ON THE SKOKIE RIVER
DURING 1996 AND 1997

IBI Metric	8/22/96		7/31/97	
	Electrofisher	Seine	Electrofisher	Seine
	Actual data			
# Species per sample	4	6	5	5
# Sucker species	0	1	0	1
# Sunfish species	2	3	2	1
# Darter species	0	1	0	0
# Intolerant species	0	0	0	0
% Green sunfish	4.81	0	10.53	0
% Hybrids	5.77	0	0.66	0.12
% Diseased	0	0	1.30	0.10
% Omnivores	0.96	9.47	1.97	1.28
% Insectivorous cyprinids	0	0	0	0
% Carnivores	2.88	9.47	7.24	1.39
Abundance				
Total # fish	104	95	152	861
Shock time (min)	17	-	18	-
# Fish per hour[1]	367	-	507	-
Average # per haul	-	48	-	431
	Corresponding Score[2]			
# Species per sample	1	3	1	1
# Sucker species	1	1	1	1
# Sunfish species	5	3	5	3
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	5	5	3	5
% Hybrids	1	5	3	3
% Diseased	5	5	1	3
% Omnivores	5	5	5	5
% Insectivorous cyprinids	1	1	1	1
% Carnivores	3	5	5	3
Abundance	3	3	5	5
IBI score	32	38	32	32

[1]Extrapolation.
[2]Metric scores based on the Skokie River at West Frontage Road, a second order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-6

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT LAKE AVENUE ON THE NORTH BRANCH CHICAGO RIVER DURING 1996 AND 1997

IBI Metric	8/5/96 Electrofisher	8/5/96 Seine	7/28/97 Seine	7/29/97 Electrofisher
	Actual data			
# Species per sample	4	3	4	4
# Sucker species	0	1	0	0
# Sunfish species	2	1	1	2
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
% Green sunfish	5.93	0	0	15.15
% Hybrids	0	0	0	0
% Diseased	0.85	0	0.10	0
% Omnivores	1.69	2.17	0.14	1.52
% Insectivorous cyprinids	0	0	0	0
% Carnivores	5.08	0	0.14	7.58
Abundance				
Total # fish	118	92	2,133	66
Shock time (min)	12	-	-	16
# Fish per hour[1]	590	-	-	248
Average # per haul	-	46	1,067	-
	Corresponding Score[2]			
# Species per sample	1	1	1	1
# Sucker species	1	1	1	1
# Sunfish species	3	1	1	3
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	3	5	5	3
% Hybrids	5	5	5	5
% Diseased	3	5	3	5
% Omnivores	5	5	5	5
% Insectivorous cyprinids	1	1	1	1
% Carnivores	5	1	1	5
Abundance	3	3	5	1
IBI score	32	30	30	32

[1]Extrapolation.
[2]Metric scores based on the North Branch at Lake Avenue, a third order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-7

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT BECKWITH ROAD ON THE NORTH BRANCH CHICAGO RIVER DURING 1996 AND 1997

IBI Metric	8/1/96 Electrofisher	8/1/96 Seine	8/20/97 Electrofisher	8/20/97 Seine
	Actual data			
# Species per sample	6	6	7	7
# Sucker species	1	1	0	1
# Sunfish species	3	2	3	2
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
% Green sunfish	17.65	0	15.07	0.62
% Hybrids	0	0	0	0
% Diseased	0	3.33	1.40	0
% Omnivores	13.73	10.00	28.77	17.28
% Insectivorous cyprinids	0	0	0	0
% Carnivores	0	0	2.74	0
Abundance				
Total # fish	51	30	73	162
Shock time (min)	19	-	13	-
# Fish per hour[1]	161	-	337	-
Average # per haul	-	15	-	81
	Corresponding Score[2]			
# Species per sample	1	1	3	3
# Sucker species	1	1	1	1
# Sunfish species	5	3	5	3
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	3	5	3	5
% Hybrids	5	5	5	5
% Diseased	5	1	1	5
% Omnivores	5	5	3	5
% Insectivorous cyprinids	1	1	1	1
% Carnivores	1	1	3	1
Abundance	1	1	1	5
IBI score	30	26	28	36

[1]Extrapolation.

[2]Metric scores based on the North Branch at Beckwith Road, a third order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-8

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT HARTS ROAD ON THE NORTH BRANCH CHICAGO RIVER DURING 1996 AND 1997

IBI Metric	8/21/96		8/5/97	
	Electrofisher	Seine	Electrofisher	Seine
	Actual data			
# Species per sample	2	1	5	4
# Sucker species	0	0	1	1
# Sunfish species	2	1	2	1
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
# % Green sunfish	25	0	31.58	0
% Hybrids	0	0	0	0
% Diseased	0	0	0	0
% Omnivores	0	0	21.05	52.38
% Insectivorous cyprinids	0	0	0	0
% Carnivores	0	0	0	0
Abundance				
Total # fish	12	21	19	21
Shock time (min)	14	-	15	-
# Fish per hour[1]	51	-	76	-
Average # per haul	-	11	-	11
	Corresponding Score[2]			
# Species per sample	1	1	1	1
# Sucker species	1	1	1	1
# Sunfish species	3	1	3	1
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	1	5	1	5
% Hybrids	5	5	5	5
% Diseased	5	5	5	5
% Omnivores	5	5	3	1
% Insectivorous cyprinids	1	1	1	1
% Carnivores	1	1	1	1
Abundance	1	1	1	1
IBI score	26	28	24	24

[1]Extrapolation.

[2]Metric scores based on the North Branch at Harts Road, a third order stream in the Northeast Illinois region.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-9

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY AT ALBANY AVENUE ON THE NORTH BRANCH CHICAGO RIVER DURING 1996 AND 1997

IBI Metric	7/30/96		8/1/97	
	Electrofisher	Seine	Electrofisher	Seine
	Actual data			
# Species per sample	1	1	3	2
# Sucker species	0	0	0	0
# Sunfish species	0	1	2	1
# Darter species	0	0	0	0
# Intolerant species	0	0	0	0
% Green sunfish	0	0	20	0
% Hybrids	0	0	0	0
% Diseased	0	0	0	0
% Omnivores	100	0	20	0
% Insectivorous cyprinids	0	0	0	0
% Carnivores	0	0	0	0
Abundance				
Total # fish	1	62	5	132
Shock time (min)	11	-	11	-
# Fish per hour[1]	5	-	27	-
Average # per haul	-	31	-	66
	Corresponding Score[2]			
# Species per sample	1	1	1	1
# Sucker species	1	1	1	1
# Sunfish species	1	1	3	1
# Darter species	1	1	1	1
# Intolerant species	1	1	1	1
% Green sunfish	5	5	3	5
% Hybrids	5	5	5	5
% Diseased	5	5	5	5
% Omnivores	1	5	3	5
% Insectivorous cyprinids	1	1	1	1
% Carnivores	1	1	1	1
Abundance	1	1	1	3
IBI score	24	28	26	30

[1]Extrapolation.

[2]Metric scores based on the North Branch at Albany Avenue, a third order stream in the Northeast Illinois region.