Metropolitan Water Reclamation District of Greater Chicago

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BIOLOGICAL CONDITIONS IN THE DES PLAINES RIVER DURING 1992 AND 1993

April 2000

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BIOLOGICAL CONDITIONS IN THE DES PLAINES RIVER DURING 1992 AND 1993

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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.

EXECUTIVE SUMMARY

The Des Plaines River within Cook County, Illinois was studied during 1992 and 1993. The studies were designed to determine the water quality within the system by examining populations of the indigenous biota, including selected bacterial indicators, benthic invertebrates, and fish. The Des Plaines River must meet the General Use Water Quality Standards of the State of Illinois for fecal coliform bacteria (Title 35: Subtitle C: Chapter I: Part 302 B: § 302.209 Fecal Coliform). Although there are no biological criteria for benthic invertebrates or fish, the General Use water quality standards protect aquatic life in the Des Plaines River.

A summary of the major results of the biological samplings are shown in Figure 1.

Des Plaines River Water Quality

BACTERIA

Geometric mean densities of total and fecal coliform bacteria, and fecal streptococci indicated that the water quality of the Des Plaines River varied little among the seven sampling stations (Figure 1). There was some indication that

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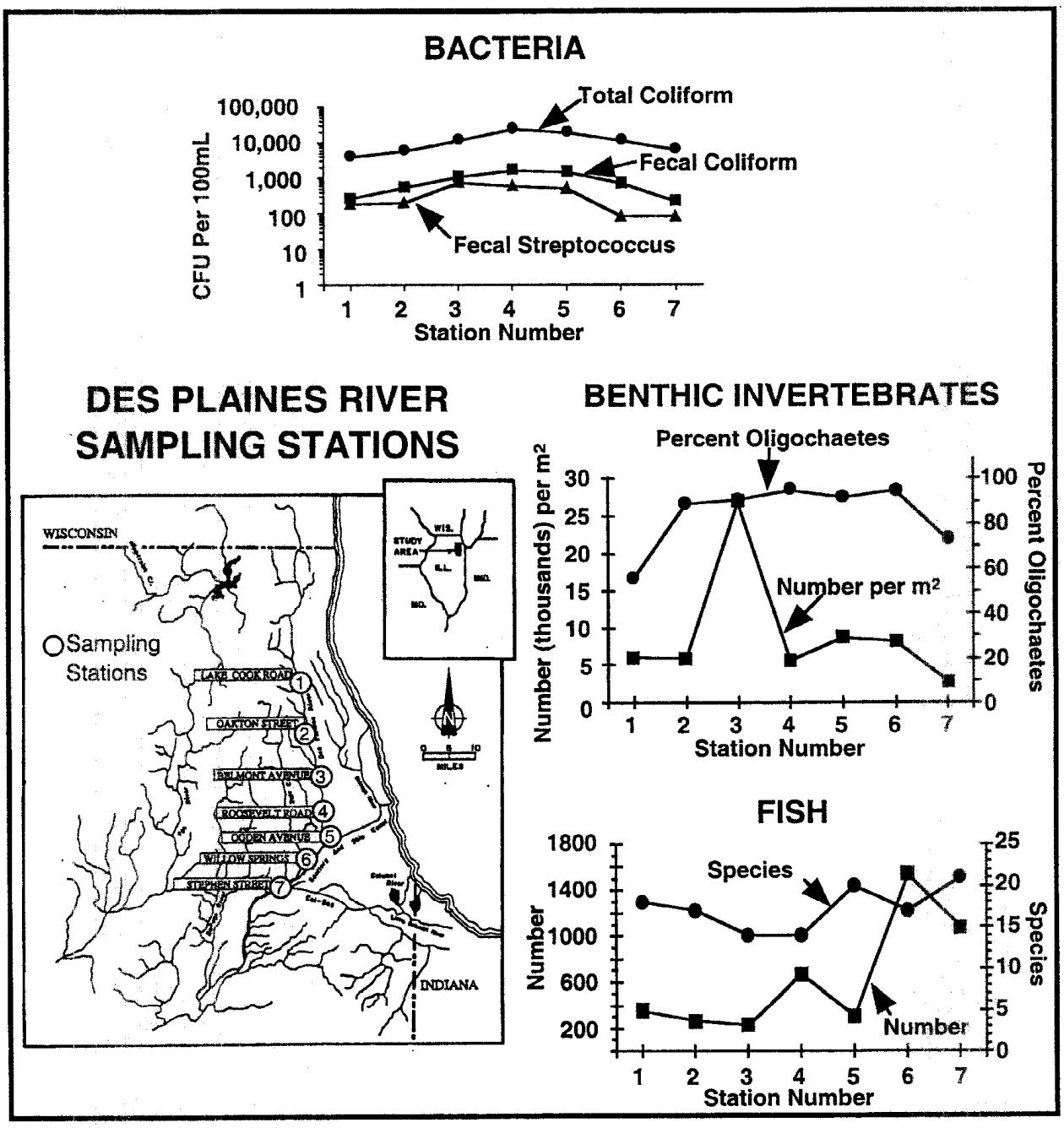
FIGURE 1

SUMMARY OF BIOLOGICAL SAMPLING RESULTS FROM THE ECOSYSTEMATIC STUDY OF THE DES PLAINES RIVER IN COOK COUNTY, ILLINOIS DURING 1992 AND 1993



water quality was best at Lake-Cook Road and at Stephen Street, the most upstream and downstream stations, respectively, in the Des Plaines River as it flows through Cook County. The observed greater mean densities of indicator bacteria at the Roosevelt Road and Ogden Avenue stations may be attributable to flow from Silver Creek, the Salt Creek flood control structures, combined sewer overflows, and flow from Salt Creek, which transports treated wastewater from water reclamation plants in Cook and DuPage Counties.

BENTHIC INVERTEBRATES

A benthic community composed almost entirely of aquatic worms (less diversity) denotes organic/nutrient enrichment and sedimentation, and a subsequent reduction in the self-purification process. Benthic invertebrate data from the Des Plaines River indicate that water quality was best at the Lake-Cook Road station. These data also indicated that the Stephen Street station had recovered from organic/nutrient enrichment. Oligochaete worms dominated the benthic community at Oakton, Belmont, Roosevelt, Ogden, and Willow Springs, comprising more than 88 percent of the fauna. However, densities of benthic invertebrates less than 15,000/m^2, as found at these stations, are indicative of mild rather than severe nutrient/organic enrichment. The stations at Lake-Cook Road and

Stephen Street had a relatively low percentage of pollution tolerant oligochaete worms, 55.7 and 73.0 percent, respectively. The benthic invertebrate communities at these two stations were not dominated by oligochaetes, but were composed of other intolerant benthic organisms, midges and caddis fly larvae, suggesting a more balanced benthic community structure.

FISH

The Indices of Biotic Integrity (IBIs) calculated from the data collected for this study indicated that the Des Plaines River in Cook County is a Class D stream with fair stream quality. This reach is classified as a limited aquatic resource. The IBI classes are explained in the report on page 14. Average IBI scores ranged from 25 to 30. As differences among IBI scores of 10 percent or less are considered to be not significant, there was not much difference in stream quality among the seven Des Plaines River sample stations.

However, the fish collection data did suggest that water and sediment quality were better at Lake-Cook Road than at the six downstream monitoring stations. Of the 30 fish species collected from the Des Plaines River during 1999, five are classified as intolerant of siltation or environmental degradation, and nine fish species are classified as being to

of environmental conditions. The remaining 16 fish species are considered to be of intermediate tolerance to environmental degradation. Fish species tolerant of environmental degradation increased in percent composition from 23.2 percent at Lake-Cook Road (location where the Des Plaines River flows into Cook County from Lake County) to 87.9 percent at Stephen Street in Lemont (location where the Des Plaines River flows into Will County from Cook County). Conversely, those species intolerant of siltation and environmental degradation decreased in percent composition with 47.3 percent intolerant at Lake-Cook Road and 1.2 percent at Stephen Street. Environmental conditions affecting the diversity of the fish population have improved towards the end of the study reach since more fish species were collected at the Stephen Street station than at any other monitoring station (Figure 1).

Chemical analyses of water showed that relatively good water quality occurred at each Des Plaines River monitoring station, such that a balanced fish community had the potential to be maintained. However, water quality alone does not consider habitat, flow or other physical factors. It appears that these other factors were limiting the fish populations in the Des Plaines River in Cook County.

INTRODUCTION

The Metropolitan Water Reclamation District of Greater Chicago (District) is concerned about water quality in natural and man-made waterways within its service area. In 1975, the Research and Development (R&D) Department initiated a monitoring program to characterize the biological communities in Chicago area inland waterways (1). The program was called an "Ecosystematic Study" since the ecological monitoring of the waterways was conducted on a systematic basis. This allowed for comprehensive monitoring, both spatial and temporal, of all the waterways within the District's service area, as shown in Table 1. During 1992 and 1993, the Ecosystematic Study included the Des Plaines River in Cook County. The results from this study are included in this report.

The primary objectives of the Ecosystematic Study of the Des Plaines River were to describe the aquatic biological communities in order to assess the effects of pollution control activities implemented by the District. Bacterial densities were measured in water because bacteria are good indicators of the sanitary quality of the water for human and animal health. Benthic invertebrates were monitored because they are indicators of the water and sediment quality in the Des Plaines River. Fish were collected because they are indicators

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TABLE 1

WATERWAYS MONITORED DURING THE ECOSYSTEMATIC STUDY

YEARS	WATERWAYS
1975, 1976 and 1977	North Shore Channel North Branch of the Chicago River Chicago River South Branch of the Chicago River Chicago Sanitary and Ship Canal Calumet River Little Calumet River Cal-Sag Channel
1978 and 1979	Des Plaines River in Cook County
1980 and 1981	North Branch of the Chicago River including the West Fork, Middle Fork, and Skokie River
1982 and 1983	Little Calumet River and Thorn Creek
1984 and 1985	Wilmette, Chicago and Calumet Harbors
1986 and 1987	North Shore Channel North Branch Chicago River
1988 and 1989	Calumet River Little Calumet River Cal-Sag Channel
1990 and 1991	Chicago Sanitary and Ship Canal
1992 and 1993	Des Plaines River in Cook County

of the quality of the river for fish. In addition, the chemical quality of the water was determined at the time of fish collections in order to assess the relative toxicity of the water to fish.

Study Area

The Des Plaines River is a shallow, sluggish stream. The entire Des Plaines River watershed covers 448,000 acres (700 square miles) in Kenosha and Racine Counties in Wisconsin and in Lake, Cook, DuPage and Will Counties in Illinois. In Cook County, much of the river's adjacent flood plain is owned by the Cook County Forest Preserve District. In the area of the District's jurisdiction (Figure 2), the Des Plaines River flows southward through a highly urbanized watershed from the Lake-Cook County Line to Highway 171, at which point it flows southwestward, parallel and adjacent to the Chicago Sanitary and Ship Canal, to Lockport (2).

Biological Samples

BACTERIA

Total coliforms (TC), fecal coliforms (FC), and fecal streptococci (FS), are indicator organisms used by the District to evaluate the sanitary quality of water. Analyses (Figure 2) for these indicator bacteria have been performed

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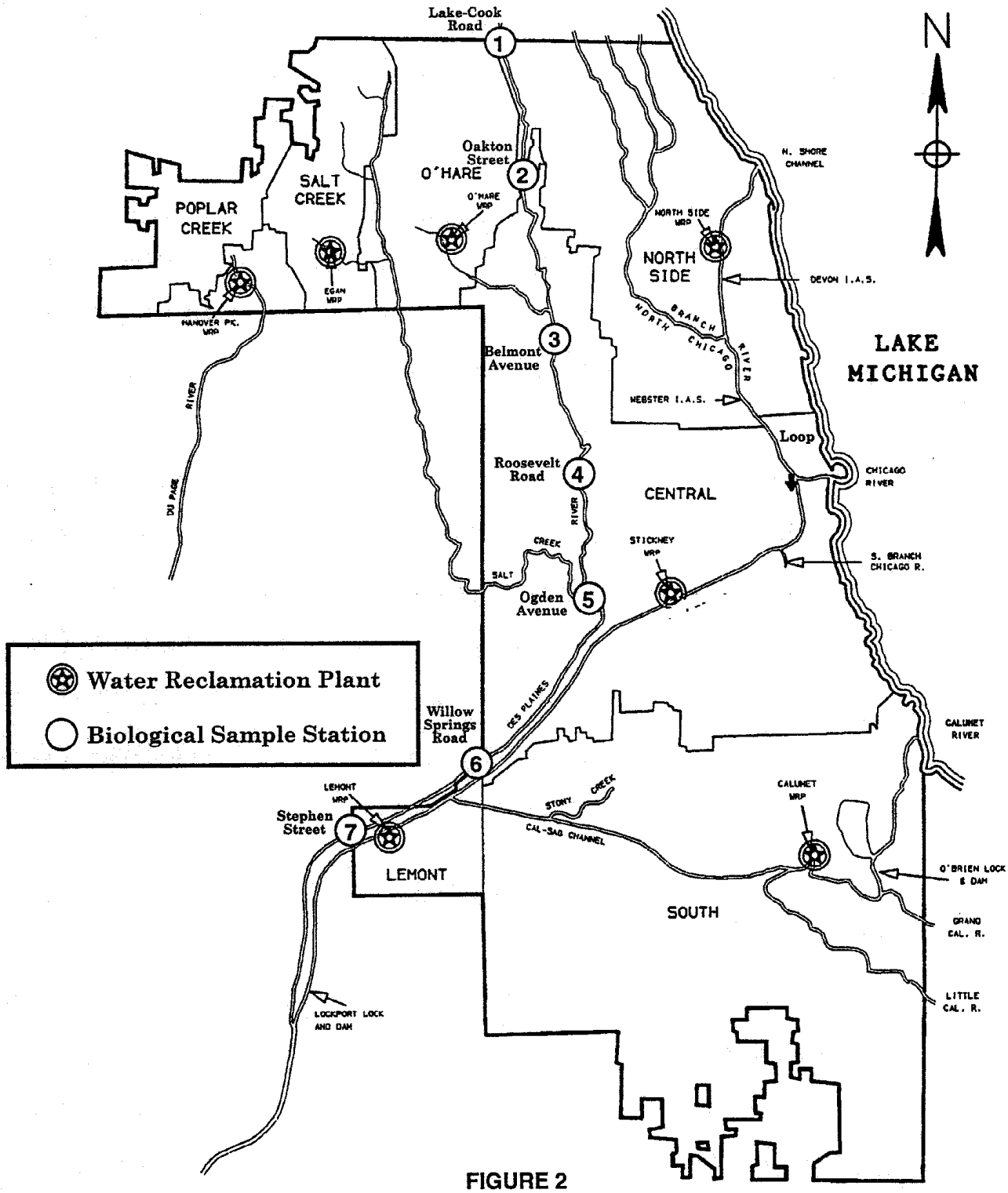

FIGURE 2

MAP OF MAJOR FACILITIES, SERVICE AREAS, AND BIOLOGICAL SAMPLE STATIONS DURING THE 1992-1993 ECOSYSTEMATIC STUDY

routinely on all District waterways, including the Des Plaines River, for many years.

The *Enterococcus* group is a subgroup of the FS that is a valuable bacterial indicator for determining the extent of fecal contamination of recreational surface waters. Studies at bathing beaches have shown that swimming associated gastroenteritis is related directly to the quality of the bathing water and that enterococci are efficient bacterial indicators of water quality (4).

Escherichia coli (*E. coli*) is a member of the fecal coliform group. *E. coli* is also a valuable indicator of bathing water quality (4).

Pseudomonas aeruginosa is a common inhabitant of soil and water and has a worldwide distribution. It is responsible for a number of infections in humans, particularly in debilitated or immunocompromised hosts.

Salmonella are enteric pathogens, some species of which occur naturally in the environment.

The Standard Plate Count (SPC) is used to estimate the total number of viable heterotrophic bacteria in water.

BENTHIC INVERTEBRATES

Benthic invertebrates have been used to assess the biological quality of aquatic systems. These organisms are sensi-

tive to both physical and chemical changes in the environment and continually monitor water and sediment quality. They also have sufficiently long life cycles and low motility, and, therefore, define past and present environmental conditions.

This report describes the benthic invertebrate community in that portion of the Des Plaines River in Cook County during surveys conducted in 1992 and 1993. In the present study, the environmental condition of the river was evaluated using benthic invertebrates. Measures of benthic community health included species richness, total abundance, and percent composition of major benthic groups.

FISH

Fish collections and analyses give the most meaningful index of water quality to the public. Fish occupy the upper levels of the aquatic food chain as the ultimate aquatic consumer. Therefore, changes in water quality that significantly affect the other kinds of organisms within the aquatic community will also affect the species composition and abundance of the fish population.

A knowledge of the assemblage of fish species in a stream and the numerical relationships of these species provides an excellent biological picture of the watercourse and its well being. When such information is available over a long period

of time, fish can be one of the most sensitive indicators of the quality of the aquatic environment (3).

METHODS AND MATERIALS

Bacteria

SAMPLE COLLECTION

Water samples for bacterial analysis were collected quarterly from bridges crossing over the Des Plaines River at seven stations, as indicated in Figure 2. Samples were placed in sterile four-liter plastic containers, with sufficient sodium thiosulfate to neutralize 15 mg/L chlorine, and transported on ice to the Research and Development Laboratory in Stickney, Illinois.

SAMPLE ANALYSIS

Sample analyses began approximately six to twenty-four hours after sample collection and two to twenty-two hours after the last sample was collected. *Pseudomonas aeruginosa* densities were determined according to the tentative method in Standard Methods for the Examination of Water and Wastewater, 15th edition (Standard Methods) (4). *Salmonella* densities were estimated using the most probable number (MPN) technique described by Kenner and Clark (5). Presumptive *Salmonella* isolates were confirmed biochemically and using the API 20® system for the identification of enterobacteriaceae with polyvalent "O" antisera (Group A-E;Vi, Lot No. G3GIUG, Expiration July 1, 1994, BBL®) and membrane filtration procedures for TC, FC, FS, and total heterotrophic bacteria were performed ac-

cording to Standard Methods, 14th edition (6). *Enterococcus*, and *E. coli* were enumerated using membrane filtration procedures developed by Dufour (7), and Dufour et al.(8), respectively.

Colony confirmation percentages for TC, FC, FS, *E. coli*, *Enterococcus*, and *Pseudomonas aeruginosa* were 78 percent, 93 percent, 91 percent, 84 percent, 89 percent, and 75 percent, respectively, as presented in Table 2.

Benthic Invertebrates

Seven sampling stations were established along the Des Plaines River extending from Lake-Cook Road in Wheeling, Illinois to Stephen Street in Lemont, Illinois, as shown in Figure 2 and described in Table 3. A linear transect was established at each of the seven sampling stations. Benthic samples were collected at two points (center and right or left side) on each transect.

At each sampling station, triplicate sediment samples were collected with a petite Ponar Grab sampler from the center and from one of the sides of the Des Plaines River. A petite Ponar Grab sampler collects sediment from an area of 0.023 m^2. The samples were collected during April and May

METROPOLITAN WATER RECLAMATION DISTRCT OF GREATER CHICAGO

TABLE 2

RESULTS OF COLONY CONFIRMATION TESTS[1] FOR THE ECOSYSTEMATIC STUDY DURING THE PERIOD APRIL 1992 THROUGH OCTOBER 1993

Analysis	Primary Isolation Medium	Number of Colonies Picked	Number of Colonies Confirmed	Percent Confirmed
Total Coliforms	m-Endo	223	174	78
Fecal Coliforms	mFC	221	205	93
Escherichia coli	mTEC	222	187	84
Fecal Streptococcus	KF Streptococcus	233	212	91
Enterococcus	mE	211	187	89
Pseudomonas aeruginosa	mPA	169	127	75

[1]Total coliform: gas in lauryl tryptose broth and gas in brilliant green bile broth or Colifirm® test kit (an enzyme detection system from Millipore). Fecal coliform: gas in EC medium at 44.5°C. *Escherichia coli*: gas in lauryl tryptose broth; oxidase test (negative); citrate (negative); urease (negative). Fecal Streptococcus: catalase (negative); growth at 45°C; growth in 40% bile. *Enterococcus*: growth on, and blackening of, bile esculin agar; growth at 45°C; growth in 6.5% NaCl. *Pseudomonas aeruginosa*: casein hydrolysis and yellowish to greenish diffusable pigments on milk agar.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 3

DESCRIPTION OF BENTHIC INVERTEBRATE SAMPLING STATIONS IN THE DES PLAINES RIVER

Sampling Station Number	Description of Waterway	Sampling Station[1]
1	Des Plaines River	200 feet below Lake-Cook Road bridge in the center and along the right bank of the river.
2	Des Plaines River	150 feet above the Oakton Street bridge in the center and along the left bank of the river.
3	Des Plaines River	400 feet above the Milwaukee Road Rail-road bridge in the center and along the left bank of the river.
4	Des Plaines River	300 feet above the Roosevelt Road bridge in the center and along the left bank of the river.
5	Des Plaines River	1000 feet above the Ogden Avenue bridge in the center and along the left bank of the river.
6	Des Plaines River	300 feet above the Willow Springs Road bridge in the center and along the left bank of the river.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 3 (Continued)

DESCRIPTION OF BENTHIC INVERTEBRATE SAMPLING STATIONS IN THE DES PLAINES RIVER

Sampling Station Number	Description of Waterway	Sampling Station[1]
7	Des Plaines River	Beneath the Stephen Street bridge in the center and along the left bank of the river.

[1]Sampling site facing upstream in the waterway.

1992, July and August 1992, April and May 1993, and June though August 1993. Due to high flows and elevated water levels, no sediment samples were collected during April and May in 1992 at Lake-Cook Road and Oakton Street. The sediment samples were washed and screened in the field using a field sieve bucket with 250-micron openings. The sieved material was placed in a one gallon plastic container and returned to the laboratory for processing. All samples were stored at 4.0°C until processed.

The sediment samples were washed and screened in the laboratory through a U.S. Standard Number 60 sieve (250-micron openings). The sieved material was examined under a stereomicroscope at 7 to 30x magnification. All invertebrates were removed from the finer residual material, sorted into major taxonomic groups, and counted within three to four days from the time of sampling. In situations where there were large numbers of organisms in the sample, estimates of their abundance were made using a subsampling device. Identification of the benthic organisms was to the lowest possible taxonomic level.

The average number/m^2 and percentage composition of benthic invertebrates were calculated.

Fish

SAMPLE COLLECTION

Fish were collected during August and October in both 1992 and 1993 at each of seven locations on the Des Plaines River, as shown in Figure 2.

The gear used to collect the fish included the following:

1. A direct current backpack electrofisher. The water was electrified with 0.7 to 1 amp of current. Stunned fish were picked out of the water with dip nets. In most cases, the section of river sampled extended for 40 meters. Whenever possible, both sides of the river were electrofished.
2. A 25-foot bag seine with 3/16-inch mesh. In most cases, the section of river sampled extended for 40 meters. Whenever possible, both sides of the river were seined.

SAMPLE ANALYSIS

Large 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, while at the sampling site and returned alive to

the river. Small fish were preserved in 10 percent (v/v) formalin and processed later in the laboratory. Small fish were processed in a similar manner as the large fish, except that they were weighed to the nearest 0.01 gram.

Index of Biotic Integrity (IBI). Fish populations integrate both chemical and physical perturbations that affect stream quality. Stream quality for fish is affected by the chemical and physical quality of the water, the quality of the physical habitat and the variability of stream flow.

The IBI assesses the health of a fish community using 12 fish community measures, or metrics, which fall into three broad categories: 1) species composition, 2) trophic composition, and 3) fish abundance and condition. The IBI has been used in Illinois (9,10) to develop a five-tiered stream classification system predicated largely on the type and condition of the fishery resource. This five-tiered classification system was used in this report to describe the stream quality of the Des Plaines River. The five categories of the stream classification system which describe stream quality as a function of IBI are:

Class A. Good stream quality for fish, IBI of 51 to 60, a unique aquatic resource, comparable to the best situations without human disturbance.

Class B. Good stream quality for fish, IBI of 41 to 50, a highly valued aquatic resource, a good sport fishery.

Class C. Fair stream quality for fish, IBI of 31 to 40, a moderate aquatic resource, a bullhead, sunfish, and carp fishery.

Class D. Fair stream quality for fish, IBI of 21 to 30, a limited aquatic resource, carp or other less desirable species support fishery.

Class E. Poor stream quality for fish, IBI less than or equal to 20, a restricted use aquatic resource, no sport fishery, few fish of any species present.

In this study IBIs were calculated based on information published by the Illinois Environmental Protection Agency (10). A sample calculation is shown in Table 4. An IBI was calculated for the catch with each type of fishing gear used (i.e., for both minnow seine and backpack electrofishing gear). The IBIs for each gear type were averaged together for each sample location for each of the four sample events during 1992-93.

Chemical Analysis and Bluegill Toxicity Indices. Water from the Des Plaines River was collected at the same stations

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 4

CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR STATION NUMBER 1 AT LAKE COOK ROAD ON THE DES PLAINES RIVER ON AUGUST 11, 1993

IBI Metric	Fishing Gear Used			
	Seine		Electrofisher	
	Sample Value	Metric Scores[a]	Sample Value	Metric Scores[a]
Number of Species Per Sample	12	3	6	1
Number of Sucker Species	0	1	0	1
Number of Sunfish Species	4	5	3	3
Number of Darter Species	1	1	0	1
Number of Intolerant Species	2	3	0	1
Percent Green Sunfish	4.3	5	58.3	1
Percent Hybrids	0	5	2.8	1
Percent Diseased or Abnormal	1.4	1	2.8	1
Percent Omnivores	11.6	5	2.8	5
Percent Insectivorous Cyprinids	36.2	3	0	1
Percent Carnivores	13.0	5	16.7	5
Number of Fish	69[b]	1	120[c]	1
IBI (Sum of Metric Scores)		38		22

[a]Metric scores based on the Des Plaines River being an order 5 stream in the Northeast Illinois basin.
[b]Total number of fish collected seining.
[c]Number of fish caught per hour of backpack electrofishing.

and on the same day as the fish collections. The Bluegill Toxicity Index (BTI) was calculated for un-ionized ammonia, arsenic, boron, cadmium, total residual chlorine, chromium, copper, cyanide, fluoride, iron, methylene blue active substances (MBAS), lead, manganese, mercury, nickel, nitrite plus nitrate, phenol, silver, and zinc. These analyses were performed by the Analytical Laboratories Division of the Research and Development Department according to Standard Methods for the Examination of Water and Wastewater, 15th Edition (4). Effects of temperature, total hardness, dissolved oxygen, and pH on toxicity were also considered. A sample calculation is shown in Table 5.

A component toxicity, expressed in bluegill toxic units (BGTUs) was calculated for each toxicant by dividing the environmental concentration of the toxicant by its 96 hour LC_{50} to bluegill.

The 96 hour LC_{50} is the concentration of toxicant which is lethal to 50 percent of the test fish during a 96 hour period. A list of the 96 hour LC_{50}s for each toxicant is shown in Table 6.

The component toxicities were then summed to yield the toxicity index (also in BGTUs). A sample of river water with a toxicity of 1.0 BGTU, for example, would be lethal, by definition, to 50 percent of the bluegills exposed to it for 96

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 5

CALCULATION OF THE BLUEGILL TOXICITY INDEX (BTI) FOR A WATER SAMPLE FROM THE DES PLAINES RIVER AT STATION NUMBER 1, LAKE-COOK ROAD, WHEELING, ILLINOIS, AUGUST 11, 1993

Water Quality Constituent	Analytical Value	Bluegill Toxic Units (BGTUs)
Limiting Factors		
Temperature (°C)	22.5	
Hardness (mg/L as $CaCO_3$)	308	
Dissolved Oxygen (mg/L)	6.52	
pH (units)	7.25	
Total NH_3-N (mg/L)	0.30	
Toxicants		
Un-ionized NH_3 (mg/L)	0.0031	0.0058
Arsenic (mg/L)	<0.2	0.0000
Boron (mg/L)	0.23	0.0001
Cadmium (mg/L)	<0.005	0.0000
Total Residual Chlorine (mg/L)	<0.01	0.0000
Chromium (Tri) (mg/L)	<0.006	0.0000
Chromium (Hex) (mg/L)	<0.006	0.0000
Copper (mg/L)	0.010	0.0011
Cyanide (mg/L)	0.007	0.0671
Fluoride (mg/L)	0.56	0.0126
Iron (mg/L)	1.00	0.0304
MBAS (mg/L)	0.008	0.0041
Lead (mg/L)	<0.08	0.0000
Manganese (mg/L)	0.09	0.0022
Mercury (µg/L)	<0.1	0.0000
Nickel (mg/L)	<0.05	0.0000
NO_2+NO_3-N (mg/L)	5.23	0.0026
Phenol (mg/L)	<0.003	0.0000
Silver (mg/L)	<0.006	0.0000
Zinc (mg/L)	0.400	0.0275
BTI (Sum of Toxicities)		0.1536

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 6

96 HOUR LC_{50} (CONCENTRATION OF TOXICANT WHICH IS LETHAL TO 50 PERCENT OF THE TEST FISH IN 96 HOURS) FOR EACH WATER QUALITY CONSTITUENT INCLUDED IN THE CALCULATION OF THE BLUEGILL TOXICITY INDEX

Water Quality Constituent	96-Hour LC_{50} (mg/L)

Un-ionized Ammonia	If Temperature ≤ 22°C, then A = 0.012
	If Temperature ≥ 28°C, then A = 0.026
	If 23°C ≤ Temperature ≤27°C, then
	A = (0.193 x Temperature - 22) + 0.64
	
	If 45.7 ≤ DO%[a] ≤100.3, then
	B = (0.13297 x DO%) - 0.32965
	If DO% < 45.7, then B = 0.278
	If DO% > 100.3, then B = 1.004
	
	LC_{50} = A x B

Arsenic	20.2
Boron	2393
Cadmium	(0.100321 x Hardness) - 0.066417
Total Chlorine Residual	0.012 (If Temperature > 30°C) 0.026 (If Temperature < 20°C) 0.25 - (0.015 x (Temperature - 21)) If 20°C ≥ Temperature ≤30°C
Chromium	125.5
Copper	((0.031834 x Hardness) - 0.248404) x (0.72210 (log10 DO%)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 6(Continued)

96 HOUR LC_{50} (CONCENTRATION OF TOXICANT WHICH IS LETHAL TO 50 PERCENT OF THE TEST FISH IN 96 HOURS) FOR EACH WATER QUALITY CONSTITUENT INCLUDED IN THE CALCULATION OF THE BLUEGILL TOXICITY INDEX

Water Quality Constituent	96-Hour LC_{50} (mg/L)
Cyanide	(-0.00333 x Temperature) + 0.235) x ((0.003089 x DO%) + 0.691071)
Fluoride	44.4
Iron	32.9
MBAS	(0.029256 x DO%) - 0.353387
Lead	(1.355 x Hardness) - 0.9 x (0.72210 x $\log_{10}$DO%) - 0.43707
Manganese	40
Mercury	9.540[b]
Nickel	(0.100971 x Hardness) + 3.250588
NO_2 + NO_3	4.4268 x 8753
Phenol	(0.72210 x $\log_{10}$DO%) - 0.43707
Silver	0.0039
Zinc	(0.182889 x DO%) + ((0.042461 x Hardness) - 12.96521)

[a]DO% = Percent saturation of dissolved oxygen.
[b]48-Hour LC_{50}.

hours (24).

BTI values used for the classification of stream water quality are shown in Table 7.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 7

CLASSIFICATION OF STREAM WATER TOXICITY TO FISH BASED ON THE BLUEGILL TOXICITY INDEX (BTI)

BTI in Bluegill Toxic Units (BGTUs[1])	Water Quality[2]
< 0.2	Good. Acceptable toxicant concentrations such that balanced fish populations are maintained in the stream. No acute toxicity.
0.2 to 0.4	Fair. Marginal toxicity. Toxicant concentrations becoming unacceptably high. Balanced bass-bluegill fish populations changing to unbalanced carp-dominated populations.
> 0.4 to < 1.0	Poor. Stressful toxicity. Relatively high concentrations of toxicants. Unbalanced fish populations due to toxicity.
≥ 1.0	Very poor. Lethal toxicity. High concentrations of toxicants causing death to ≥ 50 percent of the fish.

[1]BGTUs calculated as shown in Table 5.
[2]Based on information in reference 11

RESULTS

Bacteria

Geometric means of the bacterial groups determined during 1992 and 1993 in the Des Plaines River are summarized in Table 8. The data from which Table 8 was derived are presented in Tables AI-1 - AI-7.

Geometric mean densities of TC and FC indicator bacteria were relatively low at Lake-Cook Road, the furthest upstream station in Cook County. The geometric mean densities of TC and FC were highest at Roosevelt Road in central Cook County, and decreased to relatively low levels at Stephen Street, near the point where the Des Plaines River flows out of Cook County. Similar trends can be seen in Table 8 for the geometric mean densities of FS, *E. coli*, *Enterococci* and total heterotrophic bacteria, that is, low densities were observed at the farthest upstream and downstream locations and relatively higher densities were observed in the mid-river portion of Cook County. Geometric mean densities of *P. aeruginosa* were highest at Lake Cook Road and lowest at Oakton Street. *Salmonella* geometric mean densities were about the same (0.21 to 0.24 MPN/100 mL) in the Des Plaines River throughout Cook County.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 8

GEOMETRIC MEANS OF BACTERIAL DENSITIES[1] IN THE DES PLAINES RIVER FOR THE PERIOD APRIL 1992 THROUGH OCTOBER 1993

Sample Station	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
Lake-Cook Road	4,100	270	190	210	130	8,000	110	0.21
Oakton Street	5,900	550	210	330	220	9,500	18	0.21
Belmont Avenue	12,000	1,100	760	870	410	12,000	66	0.21
Roosevelt Road	25,000	1,700	600	1,000	180	10,000	50	0.22
Ogden Avenue	20,000	1,500	510	600	310	8,600	27	0.22
Willow Springs Road	12,000	720	85	440	87	7,400	42	0.24
Stephen Street	6,600	230	85	160	31	6,000	28	0.24

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = *Enterococcus*; SPC = Standard plate count for total heterotrophic bacteria; EC = *Escherichia coli*; PA = *Pseudomonas aeruginosa*; SAL = *Salmonella*.

As shown in Tables AI-1 through AI-7, FC levels exceeded the Illinois General Use Standard of 400 cfu/100 mL over the two-year period, in 3 of 8 samples (38%) from all three of the following stations: Lake Cook Road; Oakton Street; and Stephen Street. FC levels exceeded the Illinois General Use Standard in 4 of 8 samples (50%) from the Willow Springs Road station, in 5 of 8 samples (63%) from the Ogden Avenue station, and in 6 of 8 samples (75%) from both the Belmont Avenue and Roosevelt Road stations.

Benthic Invertebrates

Benthic invertebrates collected at each of the seven sampling stations along the Des Plaines River during the spring and summer of 1992 and 1993 are presented in Tables AII-1 through AII-7.

A total of 61 benthic taxa were collected from the seven sampling stations on the Des Plaines River (Table 9). The number of taxa collected ranged from a low of 14 at Willow Springs Road to a high of 33 at Lake-Cook Road.

As shown in Table 10, the estimated average number of benthic invertebrates found in the study area during the 1992-1993 surveys was 8,713/m^2. The average numbers ranged from a low of 3,036/m^2 at Stephen Street to a high of 23,474/m^2 at Belmont Avenue.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9

BENTHIC INVERTEBRATES COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993

Taxon Number	Phylum	Class	Order	Family	Genus/Species
			HYDRA		
1	Coelenterata	Hydrozoa	Hydroida	Hydridae	*Hydra* sp.
			FLATWORMS		
2	Platyhelminthes	Turbellaria	Tricladida		
			SLUDGEWORMS		
3	Annelida	Oligochaeta			
			LEECHES		
4	Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae	*Helobdella stagnalis*
5	Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae	*Placobdella ornata*
6	Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	*Mooreobdella fervida*
7	Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	*Mooreobdella microstoma*
			AQUATIC SOW BUGS		
8	Arthropoda	Crustacea	Isopoda	Asellidae	*Caecidotea intermedius*
			SCUDS		
9	Arthropoda	Crustacea	Amphipoda	Talitridae	*Hyalella azteca*

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9 (Continued)

BENTHIC INVERTEBRATES COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993

Taxon Number	Phylum	Class	Order	Family	Genus/Species
			CRAYFISH		
10	Arthropoda	Crustacea	Decapoda	Cambarinae	*Cambarus* sp.
11	Arthropoda	Crustacea	Decapoda	Cambarinae	*Orconectes virilis*
			MAYFLIES		
12	Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis* sp.
13	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	*Ephemerella* sp.
14	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	*Hexagenia* sp.
			DRAGONFLIES		
15	Arthropoda	Insecta	Odonata	Gomphidae	*Gomphus* sp.
16	Arthropoda	Insecta	Odonata	Lebellulidae	*Plathemis* sp.
			WATER BUGS		
17	Arthropoda	Insecta	Hemiptera	Corixidae	
			ALDERFLIES		
18	Arthropoda	Insecta	Megaloptera	Sialidae	*Sialis* sp.
			CADDISFLIES		
19	Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* sp.
20	Arthropoda	Insecta	Trichoptera	Glossosomatidae	*Glossosoma* sp.
21	Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis* sp.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9 (Continued)

BENTHIC INVERTEBRATES COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993

Taxon Number	Phylum	Class	Order	Family	Genus/Species
			BEETLES		
22	Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia* sp.
23	Arthropoda	Insecta	Coleoptera	Elmidae	*Narpus* sp.
24	Arthropoda	Insecta	Coleoptera	Elmidae	*Stenelmis* sp.
			MOSQUITOS		
25	Arthropoda	Insecta	Diptera	Culucidae	*Aedes* sp.
			MIDGEFLIES		
26	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Chironomus* sp.
27	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Cladopelma* sp.
28	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Cladotanytarsus* sp.
29	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Cryptochironomus* sp.
30	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Cryptotendipes* sp.
31	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Dicrotendipes* sp.
32	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Einfeldia* sp.
33	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Glyptotendipes* sp.
34	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Microspectra* sp.
35	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Paracladopelma* sp.
36	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Paratanytarsus* sp.
37	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Paratendipes* sp.
38	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Pheaenospectra* sp.
39	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Polypedilium* sp.
40	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Rheotanytarsus* sp.
41	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Seatheria* sp.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9 (Continued)

BENTHIC INVERTEBRATES COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993

Taxon Number	Phylum	Class	Order	Family	Genus/Species
			MIDGEFLIES (Continued)		
42	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Stictochironomus* sp.
43	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Tanytarsus* sp.
44	Arthropoda	Insecta	Diptera	Chironomidae[a]	*Tribelos* sp.
45	Arthropoda	Insecta	Diptera	Chironomidae[b]	*Cricotopus* sp.
46	Arthropoda	Insecta	Diptera	Chironomidae[b]	*Eukiefferiella* sp.
47	Arthropoda	Insecta	Diptera	Chironomidae[b]	*Nanocladius* sp.
48	Arthropoda	Insecta	Diptera	Chironomidae[c]	*Ablabesmyia* sp.
49	Arthropoda	Insecta	Diptera	Chironomidae[c]	*Macropelopia* sp.
50	Arthropoda	Insecta	Diptera	Chironomidae[c]	*Procladius* sp.
51	Arthropoda	Insecta	Diptera	Chironomidae[c]	*Tanypus* sp.
			BITING MIDGES		
52	Arthropoda	Insecta	Diptera	Heleidae	*Ceratopogon* sp.
			SNAILS		
53	Mollusca	Gastropoda	Basommatophora	Ancylidae	*Ferrissia parallela*
54	Mollusca	Gastropoda	Basommatophora	Physidae	*Physella integra*
55	Mollusca	Gastropoda	Basommatophora	Planorbidae	*Gyraulus parvus*
56	Mollusca	Gastropoda	Mesogastropoda	Hydrobiidae	*Amnicola limosa*
57	Mollusca	Gastropoda	Mesogastropoda	Pleuroceridae	*Pleurocera acuta*

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9 (Continued)

BENTHIC INVERTEBRATES COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993

Taxon Number	Phylum	Class	Order	Family	Genus/Species
			CLAMS		
58	Mollusca	Pelecypoda	Veneroida	Sphaeriidae	*Musculium* sp.
59	Mollusca	Pelecypoda	Veneroida	Sphaeriidae	*Pisidium* sp.
60	Mollusca	Pelecypoda	Veneroida	Sphaeriidae	*Sphaerium* sp.
61	Mollusca	Pelecypoda	Veneroida	Corbiculidae	*Corbicula fluminea*

[a]Subfamily Chironominae in the Family Chironomidae.
[b]Subfamily Orthocladinae in the Family Chironomidae.
[c]Subfamily Tanypodinae in the Family Chironomidae.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 10

AVERAGE NUMBER OF BENTHIC INVERTEBRATE ORGANISMS PER SQUARE METER COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH TAXONOMIC GROUP REPRESENTED OF THE TOTAL NUMBER OF ALL TAXA, AT EACH OF SEVEN STATIONS AND FOR ALL STATIONS COMBINED

Taxonomic Group	Des Plaines River Sample Station							Average All Stations
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	
Hydra	0	0	0	0	0	0	2 (0.06)	0.3 (0.003)
Flatworms	0	0	0	0	48 (0.54)	0	4 (0.12)	7 (0.08)
Sludgeworms	3,360 (55.65)	5,220 (88.76)	21,287 (90.68)	5,351 (95.03)	7,987 (91.38)	7,756 (94.70)	2,213 (72.88)	7,596 (87.18)
Leeches	4 (0.07)	0	324 (1.38)	32 (0.56)	22 (0.25)	2 (0.02)	14 (0.48)	57 (0.65)
Aquatic sow bugs	6 (0.10)	2 (0.04)	5 (0.02)	3 (0.06)	6 (0.07)	0	4 (0.12)	4 (0.04)
Scuds	0	2 (0.04)	0	0	2 (0.02)	0	2 (0.06)	0.8 (0.01)
Crayfish	0	0	5 (0.02)	0	0	0	4 (0.12)	1 (0.01)
Mayflies	25 (0.41)	0	0	2 (0.03)	0	0	27 (0.89)	8 (0.09)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 10 (Continued)

AVERAGE NUMBER OF BENTHIC INVERTEBRATE ORGANISMS PER SQUARE METER COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH TAXONOMIC GROUP REPRESENTED OF THE TOTAL NUMBER OF ALL TAXA, AT EACH OF SEVEN STATIONS AND FOR ALL STATIONS COMBINED

Taxonomic Group	Des Plaines River Sample Station							Average All Stations
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	
Dragonflies	0	0	11 (0.05)	2 (0.03)	0	0	2 (0.06)	2 (0.02)
Water Bugs	120 (1.99)	2 (0.04)	0	0	0	2 (0.02)	0	18 (0.20)
Alderflies	4 (0.07)	0	0	0	0	0	0	0.6 (0.01)
Caddisflies	56 (0.92)	0	0	2 (0.03)	32 (0.36)	0	266 (8.76)	51 (0.58)
Beetles	57 (0.95)	46 (0.79)	0	0	0	0	13 (0.42)	17 (0.19)
Mosquitos	0	0	0	0	0	3 (0.04)	0	0.5 (0.01)
Midgeflies	2,317 (38.37)	530 (9.01)	186 (0.79)	204 (3.62)	318 (3.64)	418 (5.10)	351 (11.56)	618 (7.09)
Biting Midges	80 (1.33)	36 (0.61)	0	0	0	0	4 (0.12)	17 (0.20)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 10 (Continued)

AVERAGE NUMBER OF BENTHIC INVERTEBRATE ORGANISMS PER SQUARE METER COLLECTED FROM THE DES PLAINES RIVER DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH TAXONOMIC GROUP REPRESENTED OF THE TOTAL NUMBER OF ALL TAXA, AT EACH OF SEVEN STATIONS AND FOR ALL STATIONS COMBINED

Taxonomic Group	Des Plaines River Sample Station							Average All Stations
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	
Snails	4 (0.07)	15 (0.25)	380 (1.62)	5 (0.08)	209 (2.39)	4 (0.04)	127 (4.17)	106 (1.22)
Clams	4 (0.07)	27 (0.47)	1,276 (5.43)	32 (0.56)	117 (1.34)	6 (0.08)	5 (0.18)	210 (2.41)
Sum All Taxa	6,038	5,880	23,474	5,631	8,741	8,189	3,036	8,713

The average numbers of benthic invertebrates found in Des Plaines River sediment during the spring and summer of 1992 and 1993 were 8,381 and 8,906/m^2, respectively.

Overall, oligochaete worms and chironomid midge larvae accounted for 87.2 and 7.1 percent, respectively, of the total benthos collected from the Des Plaines River sediment during the 1992-1993 surveys.

LAKE-COOK ROAD

A total of 33 benthic taxa, most identified to species, were collected at the Lake-Cook Road station (Table AII-1). As shown in Table 10, overall, oligochaete worms and chironomid larvae accounted for 55.7 and 38.3 percent, respectively, of the total number of benthic organisms. The remaining 6.0 percent of the benthic fauna was composed of leeches, mayflies, caddis flies, beetles, bugs, snails, and fingernail clams. The estimated average number of benthic invertebrates found at the Lake-Cook Road station during the 1992-93 surveys was 6,038/m^2.

OAKTON STREET

A total of 17 benthic taxa, most identified to species, were collected at the Oakton Street station (Table AII-2). Overall, oligochaete worms and chironomid larvae accounted for 88.8 and 9.0 percent, respectively, of the total number of

benthic organisms (Table 10). The remaining 2.2 percent of the benthic fauna was composed of isopods, beetles, bugs, snails, and fingernail clams. The estimated average number of benthic invertebrates found at the Oakton Street station during the 1992-93 surveys was 5,880/m^2.

BELMONT AVENUE

A total of 18 benthic taxa, most identified to species, were collected at the Belmont Avenue station (Table AII-3). Overall, oligochaete worms, chironomid larvae, and fingernail clams accounted for 90.7, 0.8, and 5.4 percent, respectively, of the total number of benthic organisms (Table 10). The remaining 3.1 percent of the benthic fauna was composed of leeches, isopods, snails, and fingernail clams. The estimated average number of benthic invertebrates found at the Belmont Avenue station during the 1992-93 surveys was 23,474/m^2.

ROOSEVELT ROAD

A total of 21 benthic taxa, most identified to species, were collected at the Roosevelt Road station (Table AII-4). Overall, oligochaete worms and chironomid larvae accounted for 95.0 and 3.6 percent, respectively, of the total number of benthic organisms (Table 10). The remaining 1.4 percent of the benthic fauna was composed of leeches, isopods, mayflies, caddis flies, snails, and fingernail clams. The estimated average

number of benthic invertebrates at the Roosevelt Road station during the 1992-93 surveys was 5,631/m^2.

OGDEN AVENUE

A total of 22 benthic taxa, most identified to species, were collected at the Ogden Avenue station (Table AII-5). Overall, oligochaete worms, chironomid larvae, and snails accounted for 91.4, 3.6, and 2.4 percent, respectively, of the total number of benthic organisms (Table 10). The remaining 2.6 percent of the benthic fauna was composed of flatworms, leeches, isopods, caddis flies, snails, and fingernail clams. The estimated average number of benthic invertebrates at the Ogden Avenue station during the 1992-93 surveys was 8,741/m^2.

WILLOW SPRINGS ROAD

A total of 14 benthic taxa, most identified to species, were collected at the Willow Springs Road station (Table AII-6) Overall, oligochaete worms and chironomid larvae accounted for 94.7 and 5.1 percent, respectively, of the total number of benthic organisms (Table 10). The remaining 0.2 percent of the benthic fauna was composed of leeches, isopods, beetles, snails, and fingernail clams. The estimated average number of benthic invertebrates at the Willow Springs Road station during the 1992-93 surveys was 8,189/m^2.

STEPHEN STREET

A total of 32 benthic taxa, most identified to species, were collected from the Stephen Street station (Table AII-7). Overall, oligochaete worms, chironomid larvae, and caddis fly larvae accounted for 72.9, 11.6, and 8.8 percent, respectively, of the total number of benthic organisms (Table 10). The remaining 6.7 percent of the benthic fauna was composed of hydra, flatworms, leeches, isopods, amphipods, mayflies, beetles, snails, and fingernail clams. The average number of benthic invertebrates at the Stephen Street station during the 1992-93 surveys was 3,036/m^2.

Fish

ABUNDANCE AND SPECIES COMPOSITION

During 1992 and 1993, 30 species of fish, plus the carp x goldfish hybrid and two sunfish hybrids, from nine families, were collected from seven locations on the Des Plaines River (Table 11). A combined total of 4,422 fish were collected, (Table 12). Results of fish collections for each sampling event are presented in Tables AIII-1 through AIII-7.

As shown in Table 12, 90.6 percent of the total fish collection was composed of seven species, including 2,294 bluntnose minnows (51.8 percent), 415 spotfin shiners (9.4

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 11

COMMON AND SCIENTIFIC NAMES OF THE FISHES COLLECTED IN THE DES PLAINES RIVER DURING 1992 AND 1993

Common Name[1]	Scientific Name[1]
HERRING FAMILY	CLUPEIDAE
Gizzard shad[5]	*Dorosoma cepedianum*
PIKE FAMILY	ESOCIDAE
Northern pike[2,9]	*Esox lucius*
MINNOW FAMILY	CYPRINIDAE
Goldfish[4,5]	*Carassius auratus*
Common carp[4,5]	*Cyprinus carpio*
Carp x Goldfish Hybrid	*Cyprinus carpio x Carassius auratus*
Spotfin shiner[2,7]	*Cyprinella spiloptera*
Golden shiner[4,5]	*Notemigonus crysoleucas*
Emerald shiner[7]	*Notropis atherinoides*
Ozark minnow[2,3]	*Notropis nubilus*
Sand shiner[7]	*Notropis stramineus*
Mimic shiner[2,5]	*Notropis volucellus*
Bluntnose minnow[4,5]	*Pimephales notatus*
Fathead minnow[4,5]	*Pimephales promelas*
Creek chub[4,7]	*Semotilus atromaculatus*
SUCKER FAMILY	CATOSTOMIDAE
White sucker[4,6]	*Catostomus commersoni*
CATFISH FAMILY	ICTALURIDAE
Black bullhead[8]	*Ameiurus melas*
Yellow bullhead[4,8]	*Ameiurus natalis*
Channel catfish[9]	*Ictalurus punctatus*
Tadpole madtom[8]	*Noturus gyrinus*
KILLIFISH FAMILY	CYPRINODONTIDAE
Blackstripe topminnow[8]	*Fundulus notatus*

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 11 (Continued)

COMMON AND SCIENTIFIC NAMES OF THE FISHES COLLECTED IN THE DES PLAINES RIVER DURING 1992 AND 1993

Common Name[1]	Scientific Name[1]
LIVEBEARER FAMILY	POECILIIDAE
Western mosquitofish	*Gambusia affinis*
SUNFISH FAMILY	CENTRARCHIDAE
Green sunfish[4,8]	*Lepomis cyanellus*
Pumpkinseed[8]	*Lepomis gibbosus*
Orangespotted sunfish[8]	*Lepomis humilis*
Bluegill[8]	*Lepomis macrochirus*
Green sunfish x Pumpkinseed Hybrid	*L. cyanellus x L. gibbosus*
Green sunfish x Bluegill Hybrid	*L. cyanellus x L. macrochirus*
Smallmouth bass[2,3,9]	*Micropterus dolomieu*
Largemouth bass[9]	*Micropterus salmoides*
White crappie[9]	*Pomoxis annularis*
Black crappie[9]	*Pomoxis igromaculatus*
PERCH FAMILY	PERCIDAE
Johnny darter[8]	*Etheostoma nigrum*
Blackside darter[8]	*Percina maculata*

[1]Common and scientific names based upon reference 13.
[2]Intolerant of siltation (9).
[3]Intolerant of environmental degradation and severe environmental conditions (15)
[4]Tolerant of environmental degradation and severe enviromental conditions (15)
[5]Omnivore (9).
[6]Omnivore (15).
[7]Insectivorous cyprinid (9).
[8]Insectivore (15).
[9]Top carnivore (9).

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 12

TOTAL NUMBER OF EACH FISH SPECIES COLLECTED DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH SPECIES REPRESENTED OF THE TOTAL NUMBER OF ALL FISHES, AT EACH OF SEVEN STATIONS ON THE DES PLAINES RIVER AND FOR ALL STATIONS COMBINED

Fish Species	Des Plaines River Sample Station							
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	All Stations
Gizzard shad	0	0	0	0	0	6 (0.4)	3 (0.3)	9 (0.2)
Northern pike	4 (1.1)	1 (0.4)	1 (0.4)	0	0	0	0	6 (0.1)
Goldfish	0	0	1 (0.4)	21 (3.2)	1 (0.3)	0	4 (0.4)	27 (0.6)
Carp	9 (2.6)	1 (0.4)	0	4 (0.6)	5 (1.6)	0	3 (0.3)	22 (0.5)
Carp x goldfish hybrids	0	0	0	3 (0.5)	0	0	0	3 (0.1)
Ozark minnow	0	0	0	0	0	0	1 (0.1)	1 (0.02)
Golden shiner	0	0	0	0	1 (0.3)	1 (0.1)	2 (0.2)	4 (0.1)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 12 (Continued)

TOTAL NUMBER OF EACH FISH SPECIES COLLECTED DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH SPECIES REPRESENTED OF THE TOTAL NUMBER OF ALL FISHES, AT EACH OF SEVEN STATIONS ON THE DES PLAINES RIVER AND FOR ALL STATIONS COMBINED

	Des Plaines River Sample Station							
Fish Species	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	All Stations
Emerald shiner	0	0	0	0	0	0	4 (0.4)	4 (0.1)
Spotfin shiner	162 (45.9)	58 (22.1)	66 (29.1)	92 (13.9)	19 (6.2)	7 (0.5)	11 (1.0)	415 (9.4)
Sand shiner	5 (1.4)	25 (9.5)	25 (11.0)	36 (5.4)	48 (15.7)	6 (0.4)	36 (3.4)	181 (4.1)
Mimic shiner	1 (0.3)	0	0	0	0	0	0	1 (0.02)
Bluntnose minnow	7 (2.0)	29 (11.1)	62 (27.3)	227 (34.3)	66 (21.6)	1,064 (69.1)	839 (78.3)	2,294 (51.9)
Fathead minnow	6 (1.7)	10 (3.8)	25 (11.0)	187 (28.3)	0	20 (1.3)	0	248 (5.6)
Creek chub	0	0	1 (0.4)	0	1 (0.3)	0	4 (0.4)	6 (0.1)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 12 (Continued)

TOTAL NUMBER OF EACH FISH SPECIES COLLECTED DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH SPECIES REPRESENTED OF THE TOTAL NUMBER OF ALL FISHES, AT EACH OF SEVEN STATIONS ON THE DES PLAINES RIVER AND FOR ALL STATIONS COMBINED

Fish Species	Des Plaines River Sample Station							
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	All Stations
White sucker	0	10 (3.8)	1 (0.4)	2 (0.3)	10 (3.3)	1 (0.1)	7 (0.7)	31 (0.7)
Black bullhead	1 (0.3)	0	0	0	2 (0.7)	0	0	3 (0.1)
Yellow bullhead	0	0	4 (1.8)	0	1	0 (0.3)	0	5 (0.1)
Channel catfish	4 (1.1)	1 (0.4)	0	0	0	0	1 (0.1)	6 (0.1)
Tadpole madtom	0	1 (0.4)	0	1 (0.2)	2 (0.7)	2 (0.1)	0	6 (0.1)
Blackstripe topminnow	18 (5.1)	13 (5.0)	15 (6.6)	37 (5.6)	1 (0.3)	10 (0.7)	18 (1.7)	112 (2.5)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 12 (Continued)

TOTAL NUMBER OF EACH FISH SPECIES COLLECTED DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH SPECIES REPRESENTED OF THE TOTAL NUMBER OF ALL FISHES, AT EACH OF SEVEN STATIONS ON THE DES PLAINES RIVER AND FOR ALL STATIONS COMBINED

Fish Species	Des Plaines River Sample Station							
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	All Stations
Western Mosquitofish	1	0	0	0	15 (4.9)	48 (3.1)	30 (2.8)	93 (0.1)
Green sunfish	60 (17.0)	62 (23.7)	18 (7.9)	4 (0.6)	77 (25.2)	81 (5.3)	83 (7.7)	385 (8.7)
Pumpkinseed	1 (0.3)	11 (4.2)	3 (1.3)	0	5 (1.6)	13 (0.8)	2 (0.2)	35 (0.8)
Orangespotted sunfish	0	3 (1.2)	0	0	3 (1.0)	13 (0.8)	10 (0.9)	29 (0.7)
Bluegill	46 (13.0)	5 (1.9)	2 (0.9)	21 (3.2)	41 (13.4)	253 (16.4)	1 (0.1)	369 (8.3)
Smallmouth bass	0	0	0	0	0	0	1 (0.1)	1 (0.02)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 12 (Continued)

TOTAL NUMBER OF EACH FISH SPECIES COLLECTED DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH SPECIES REPRESENTED OF THE TOTAL NUMBER OF ALL FISHES, AT EACH OF SEVEN STATIONS ON THE DES PLAINES RIVER AND FOR ALL STATIONS COMBINED

Fish Species	Des Plaines River Sample Station							
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	All Stations
Largemouth bass	6 (1.7)	1 (0.4)	0	0	4 (1.3)	13 (0.8)	11 (1.0)	35 (0.8)
White crappie	0	0	0	0	0	1 (0.1)	0	1 (0.02)
Black crappie	6 (1.7)	0	0	1 (0.2)	2 (0.7)	0	0	9 (0.2)
Green sunfish x pumpkinseed hybrid	0	0	0	0	1 (0.3)	0	0	1 (0.02)
Bluegill x green sunfish hybrids	1 (0.3)	0	0	0	0	0	0	1 (0.02)
Johnny darter	14 (4.0)	25 (9.5)	3 (1.3)	22 (3.3)	0	0	0	64 (1.5)

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 12 (Continued)

TOTAL NUMBER OF EACH FISH SPECIES COLLECTED DURING 1992 AND 1993, AND THE PERCENTAGE (IN PARENTHESES) THAT EACH SPECIES REPRESENTED OF THE TOTAL NUMBER OF ALL FISHES, AT EACH OF SEVEN STATIONS ON THE DES PLAINES RIVER AND FOR ALL STATIONS COMBINED

Fish Species	Des Plaines River Sample Station							All Stations
	Lake-Cook Road	Oakton Street	Belmont Avenue	Roosevelt Road	Ogden Avenue	Willow Springs Road	Stephen Street	
Blackside darter	2 (0.6)	6 (2.3)	0	4 (0.6)	1 (0.3)	1 (0.1)	1 (0.1)	15 (0.3)
Total Fish	353	262	227	662	306	1,540	1,072	4,422
Total Species	18	17	14	14	20	17	21	30

percent), 385 green sunfish (8.9 percent), 369 bluegill (8.3 percent), 248 fathead minnows (5.6 percent), 181 sand shiners (4.1 percent), and 112 blackstripe topminnows (2.5 percent). Of these seven species, only the fathead minnow was not collected at all seven of the Des Plaines River stations.

The common carp made up less than 1 percent of the total Des Plaines River collection, but comprised 67 percent of the total catch by weight.

Game fish present in the Des Plaines River in Cook County included: northern pike, black bullhead, yellow bullhead, channel catfish, green sunfish, pumpkinseed sunfish, orange-spotted sunfish, bluegill, smallmouth bass, largemouth bass, white crappie, black crappie, and hybrid sunfish.

Lake-Cook Road. Eighteen fish species were collected from Lake-Cook Road in the Des Plaines River (Table 12). Spotfin shiners (45.9 percent), green sunfish (17.0 percent), bluegill (13 percent), and blackstripe topminnows accounted for 81.0 percent of the total catch of 353 fish.

Oakton Street. Seventeen fish species were collected from Oakton Street in the Des Plaines River (Table 12). Green sunfish (23.7 percent), spotfin shiners (22.1 percent), bluntnose minnows (11.1 percent), sand shiners (9.5 percent), johnny darters (9.5 percent) and blackstripe topminnows (5.0

percent) accounted for 80.9 percent of the total catch of 262 fish.

Belmont Avenue. Fourteen fish species were collected from Belmont Avenue in the Des Plaines River (Table 12). Spotfin shiners (29.1 percent), bluntnose minnows (27.3 percent), sand shiners (11.0 percent), fathead minnows (11.0 percent), green sunfish (7.9 percent) and blackstripe topminnows (6.6 percent) accounted for 92.9 percent of the total catch of 227 fish.

Roosevelt Road. Fourteen fish species were collected from Roosevelt Road in the Des Plaines River (Table 12). Bluntnose minnows (34.3 percent), fathead minnows (28.3 percent), spotfin shiners (13.9 percent), green sunfish (7.9 percent), blackstripe topminnows (5.6 percent) and sand shiners (5.4 percent) accounted for 87.5 percent of the total catch of 662 fish.

Ogden Avenue. Twenty fish species were collected from Ogden Avenue in the Des Plaines River (Table 12). Green sunfish (25.2 percent), bluntnose minnows (21.6 percent), sand shiners (15.7 percent), bluegill (13.4 percent), spotfin shiners (6.2 percent) and mosquitofish (4.9 percent) accounted for 86.9 percent of the total catch of 306 fish.

Willow Springs Road. Seventeen fish species were collected from Willow Springs Road in the Des Plaines River (Ta-

ble 12). Bluntnose minnows (69.1 percent), bluegill (16.4 percent), and green sunfish (5.3 percent) accounted for 86.9 percent of the total catch of 1,540 fish.

Stephen Street. Twenty-one fish species were collected from Stephen Street in the Des Plaines River (Table 12). Bluntnose minnows (78.3 percent) and green sunfish (7.7 percent) accounted for 86.0 percent of the total catch of 1,072 fish.

INDEX OF BIOTIC INTEGRITY

Calculated IBI values for individual collections from the Des Plaines River ranged from 16 to 40, indicating poor to fair stream quality for fish (Tables AIV-1 to AIV-7).

As shown in Table 13, average IBIs for individual monitoring stations ranged from 25 to 30, indicating that the Des Plaines River in Cook County is a Class D stream, with fair stream quality for fish, and is a limited aquatic resource.

BLUEGILL TOXICITY INDEX

The BTI was calculated from results of chemical analysis for water samples collected at the time of fish collections in the Des Plaines River. Water quality constituents and BTIs for each sample in the Des Plaines River during 1992-93 are presented in Tables AV-1 through AV-7. Average BTI for each Des Plaines River station was 0.1 BGTUs (Table 14). This was

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TABLE 13

STREAM QUALITY DESCRIPTIONS BASED ON THE AVERAGE INDEX OF BIOTIC INTEGRITY (IBI) FOR THE DES PLAINES RIVER DURING 1992 AND 1993

Station	IBI	Stream Class	Stream Quality	BSC[1]
Lake-Cook Road	30	D[2]	Fair[2]	Limited Aquatic Resource
Oakton Street	28	D	Fair	Limited Aquatic Resource
Belmont Avenue	26	D	Fair	Limited Aquatic Resource
Roosevelt Road	26	D	Fair	Limited Aquatic Resource
Ogden Avenue	26	D	Fair	Limited Aquatic Resource
Willow Springs Road	30	D	Fair	Limited Aquatic Resource
Stephen Street	25	D	Fair	Limited Aquatic Resource

[1]Biological Stream Characterization, based on IBI range listed in reference 10.
[2]IBI of 21 to 30, carp or other less desirable species support fishery.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 14

WATER QUALITY DESCRIPTIONS BASED ON THE AVERAGE BLUEGILL TOXICITY INDEX (BTI) FOR THE DES PLAINES RIVER DURING 1992 AND 1993

Station	BTI	Water Quality
Lake-Cook Road	0.1	Good[1]
Oakton Street	0.1	Good
Belmont Avenue	0.1	Good
Roosevelt Road	0.1	Good
Ogden Avenue	0.1	Good
Willow Springs Road	0.1	Good
Stephen Street	0.1	Good

[1]Acceptable toxicant concentrations such that balanced fish populations are maintained in the stream.

indicative of good water quality with acceptable toxicant concentrations such that balanced fish populations could be maintained in the Des Plaines River at each of these stations.

DISCUSSION

Bacteria

The Des Plaines River cuts across Cook County as it travels southward. The fecal coliform density increases as the river flows from Lake into Cook County, peaks at Roosevelt Road or Ogden Avenue, and then decreases to a level similar to Lake-Cook Road as the river leaves Cook County.

Bacterial densities were lowest at the upper (Lake-Cook Road) and lower (Stephen Street) Des Plaines River stations, and highest at the mid-river stations of Belmont Avenue, Roosevelt Road and Ogden Avenue. Possible sources for the temporary increase in bacteria in the Des Plaines River south of Lake-Cook Road to Ogden Avenue are the intrusion of Silver Creek, Salt Creek flood control structures, combined sewer overflows, and the confluence of the river with Salt Creek. Silver Creek joins the Des Plaines River north of Roosevelt Road and south of the Belmont Avenue sampling station. Various structures built to control flooding along Salt Creek deliver portions of its flow, permanently in some cases, to the Des Plaines River between Belmont Avenue and Ogden Avenue. Salt Creek flows into the Des Plaines River just north of Ogden Avenue, and is the receiving stream for treated wastewater and their bacterial loads, from the John E. Egan Water

Reclamation Plant, the Wood Dale wastewater treatment facility, the Addison wastewater treatment facility, and the Salt Creek Drainage Basin Treatment Plant.

Benthic Invertebrates

A diverse community of benthic invertebrates in aquatic systems is one of the critical factors in the stabilization of organic wastes, a process known as self-purification. The efficiency with which this process proceeds depends to a large extent upon the diversity of the community, the more diverse the benthic community, the quicker and more complete will be the self-purification process, all other factors in the stream being equal. Overloading rivers or streams with organic enrichment or the introduction of toxic substances will tend to decrease the benthic community diversity, and thus reduce the overall efficiency of the purification process.

Organically enriched sediments in rivers and streams usually support benthic populations which are predominately or entirely composed of tolerant species of oligochaete worms, chironomid midge larvae, isopods, leeches, and air breathing pulmonate snails. As the self-purification process continues, these benthic organisms, especially the worms and midges, may succeed or replace each other with resultant changes in the major benthic groups and overall community abundance (18).

Tolerant oligochaete worms dominated the benthic community at Oakton, Belmont, Roosevelt, Ogden, and Willow Springs, comprising more than 88 percent of the benthic fauna (Table 15). A benthic community composed almost entirely of aquatic worms (less diversity) denotes excessive organic/nutrient enrichment and sedimentation, and a subsequent reduction in the self-purification process. Even though the oligochaetes dominated the benthic fauna, the abundance of worms at Oakton, Belmont, Roosevelt, Ogden, and Willow Springs was generally less than 15,000/m^2, indicating mild nutrient/organic enrichment rather than excessive nutrient/organic enrichment.

It should be noted, however, that the benthic communities at the Lake-Cook Road (most upstream) and Stephen Street (most downstream) stations, which are directly above and below sampling stations at Oakton, Belmont, Roosevelt, Ogden, and Willow Springs, were not dominated entirely by pollution tolerant oligochaetes, but were composed of other intolerant benthic organisms, midges and caddis fly larvae, suggesting a more balanced benthic community (Table 15). At Lake-Cook Road and Stephen Street, 55.7 and 73.0 percent, respectively, of the benthic invertebrates were worms. In addition, the number of benthic taxa found at Lake-Cook Road (33) and Stephen Street (32) were substantially greater than collected at Oakton (17),

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TABLE 15

CHARACTERISTICS OF THE BENTHIC INVERTEBRATE COMMUNITIES
AT SEVEN SAMPLING STATIONS ON THE DES PLAINES RIVER DURING 1992 AND 1993

Station	Number of Taxa	Estimated Average Number of Individuals (numbers/m^2)	Oligochaete Worms (% of total community)	Chironomid Midges (% of total community)	Dominant Benthic Group(s)
Lake-Cook Road	33	6,038	55.7	38.4	worms, midges
Oakton Street	17	5,880	88.8	9.0	worms
Belmont Avenue	18	23,474	90.7	0.8	worms
Roosevelt Road	21	5,631	95.0	3.6	worms
Ogden Avenue	22	8,741	91.4	3.6	worms
Willow Springs Road	14	8,189	94.7	5.1	worms
Stephen Street	32	3,036	72.9	11.6	worms, midges, caddis flies

Belmont (18), Roosevelt (21), Ogden (22), and Willow Springs Road (14).

Compared to monitoring stations upstream in the Des Plaines River at Oakton, Belmont, Roosevelt, Ogden, and Willow Springs, a recovery from nutrient/organic enrichment at Stephens Street is apparent as shown by an increase in species richness (32), a decrease in the dominance of aquatic worms (73%), and a corresponding increase in the abundance of intolerant benthic organisms (mayflies, caddis flies, beetles, and midge larvae), denoting a more balanced benthic invertebrate community.

Fish

A summary of fish community characteristics for the seven stations monitored during 1992-1993 in the Des Plaines River (Table 16) shows that fish tolerant of environmental degradation (Table 11) increased in percent composition as the Des Plaines River flowed through Cook County from Lake-Cook Road to Stephen Street in Lemont. Conversely, those species intolerant of siltation or intolerant of environmental degradation (Table 11) decreased in percent composition as the river traveled through the same reach. These data indicate that water quality conditions were best at Lake-Cook Road and decreased as the Des Plaines River flowed through Cook County.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 16

FISH COMMUNITY CHARACTERISTICS
FOR SAMPLING STATIONS IN THE DES PLAINES RIVER, 1992 AND 1993

Station	Number of Fish Species	Number of Fish Collected	Tolerant Fish (% of total community)	Intolerant Fish (% of total community)	Major Fish Families[1]
Lake-Cook Road	18	353	23.2	47.3	Minnows[2], Sunfish, Darters
Oakton Street	17	262	42.8	22.5	Minnows[2], Sunfish Darters
Belmont Avenue	14	227	49.3	29.5	Minnows[2], Sunfish
Roosevelt Road	14	662	67.2	13.9	Minnows[2]
Ogden Avenue	20	306	53.0	6.2	Minnows[3], Sunfish
Willow Springs Road	17	1,540	75.8	0.5	Minnows, Sunfish
Stephen Street	21	1,072	87.9	1.2	Minnows, Sunfish

[1]Making up 5% or more of the total catch.
[2]Including blackstripe topminnows (Killifish family).
[3]Including mosquitofish (Livebearer family).

Stream quality, as measured by the IBI, is based on an estimation of biological integrity. Biological integrity is the ability to support a balanced, integrated, adaptive community having a species composition, diversity and functional organization comparable to a reference condition where perturbation is relatively minimal. Stream quality is collectively the combination of chemical, biological, and physical features that characterize stream ecosystems. Chemical attributes include nutrients and toxics in both the water and sediments; biological attributes include the fauna and flora; and physical features include stream hydrology (e.g., flow, discharge, and velocity), and habitat (substrate composition and instream cover) (19).

The IBIs calculated from data collected during the subject study indicate that the Des Plaines River in Cook County is a Class D stream with fair stream quality. It is classified as a limited aquatic resource. Average IBI scores ranged from 25 to 30. Since differences among IBI scores of 10 percent or less are considered to be not significant (15), there were minimal differences in stream quality among the seven Des Plaines River sample locations.

The water quality measured at the time fish were collected was good. Water and sediment quality and impaired physical habitat are almost always the causes of reduced bi-

otic integrity (15). As determined by the BTI, the Des Plaines River water samples were of a good chemical water quality for fish, and would be expected to support a balanced fish population. However, water quality alone does not take into account habitat, flow or other factors. Evidently, other environmental factors were limiting the fish populations of the Des Plaines River in Cook County. For example:

1. The natural sluggish flow of the Des Plaines River, as well as modifications to its channel, banks, and flood plain have resulted in a lack of diverse physical habitat for fish. Diverse fish habitat (such as substrate, cover, channel features, and velocity) has been correlated with the IBI (20).
2. Periodic discharges from combined sewers may have contributed to residual toxicity or sediment oxygen demand in sediments at the seven sampling stations in the Des Plaines River.
3. Carp populations are known to uproot and consume aquatic plants and may interfere with the spawning of fishes such as the northern pike. Carp may also cause nesting fishes to leave their nests, exposing eggs and fry to predation. A lack of aquatic vegetation disrupts habitat, de-

creases cover, and increases predation on young fish, such as catfishes and sunfishes (21).

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APPENDIX AI

BACTERIAL INDICATOR DENSITIES FOR THE DES PLAINES RIVER DURING 1992 AND 1993

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-1

BACTERIAL INDICATOR DENSITIES[1] FOR THE DES PLAINES RIVER AT LAKE-COOK ROAD DURING 1992 AND 1993

Date	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
04/27/92	1,400	30	10	50	30	3,200	10	0.15
05/18/92	2,000	150	140	50	5	4,200	190	0.15
08/17/92	6,400	200	1,400	50	500	42,000	500	0.15
10/26/92	5,000	150	60	180	120	11,000	220	0.15
03/22/93	5,300	1,400	380	1,600	420	2,900	30	0.35
05/17/93	500	100	28	130	23	3,700	80	0.15
08/16/93	8,000	1,300	560	500	240	5,000	300	0.2
10/18/93	42,000	990	2,800	1,700	3,000	51,000	100	0.77

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = Enterococcus; SPC = Standard Plate Count; EC = Escherichia coli; PA = Pseudomonas aeruginosa; SAL = Salmonella.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-2

BACTERIAL INDICATOR DENSITIES[1] FOR THE DES PLAINES RIVER AT OAKTON STREET DURING 1992 AND 1993

Date	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
04/27/92	1,100	150	20	110	40	3,400	10	0.15
05/18/92	900	80	10	20	30	2,700	10	0.15
08/17/92	2,100	400	160	110	39	4,800	50	0.2
10/26/92	2,100	170	60	120	130	8,000	130	0.15
03/22/93	140,000	6,000	9,800	8,000	6,000	12,000	32	0.75
05/17/93	2,100	140	38	91	32	6,000	5	0.15
08/16/93	50,000	5,800	3,400	3,700	3,100	83,000	1	0.45
10/18/93	23,000	2,100	1,500	1,900	1,400	31,000	100	1.05

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = Enterococcus; SPC = Standard Plate Count; EC = *Esherichia coli*; PA = *Pseudomonas aeruginosa*; SAL = *Salmonella*.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-3

BACTERIAL INDICATOR DENSITIES[1] FOR THE DES PLAINES RIVER AT BELMONT AVENUE DURING 1992 AND 1993

Date	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
04/27/92	20,000	1,000	3,500	1,600	3,200	5,400	10	0.15
05/18/92	6,900	1,000	70	430	110	6,100	60	0.15
08/17/92	14,000	1,000	490	1,600	290	17,000	30	0.2
10/26/92	4,000	240	150	240	170	N.A.[3]	50	0.15
03/22/93	5,200	600	4,000	300	120	1,400	130	0.45
05/17/93	3,000	290	120	200	70	8,000	10	0.2
08/16/93	100,000	23,000	7,000	10,000	5,200	120,000	2,500	1.15
10/18/93	48,000	2,000	1,800	2,000	1,000	37,000	120	0.35

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = Enterococcus; SPC = Standard Plate Count; EC = *Escherichia coli*; PA = *Pseudomonas aeruginosa*; SAL = *Salmonella*.

[3]N.A. = No analysis.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-4

BACTERIAL INDICATOR DENSITIES[1] FOR THE DES PLAINES RIVER AT ROOSEVELT ROAD DURING 1992 AND 1993

Date	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
04/27/92	17,000	1,600	580	1,500	800	6,700	20	0.15
05/18/92	2,700	240	690	160	20	4,900	10	0.15
08/17/92	69,000	4,500	270	1,500	230	12,000	60	0.15
10/26/92	49,000	2,100	320	1,500	250	4,700	90	0.15
03/22/93	8,000	1,200	250	800	250	1,300	80	0.2
05/17/93	4,000	140	60	120	43	4,700	3	0.15
08/16/93	480,000	56,000	15,000	21,000	210	290,000	2,300	2.15
10/18/93	55,000	2,200	2,100	1,100	600	35,000	70	0.15

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = Enterococcus; SPC = Standard Plate Count; EC = *Esherichia coli*; PA = *Pseudomonas aeruginosa*; SAL = *Salmonella*.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-5

BACTERIAL INDICATOR DENSITIES[1] FOR THE DES PLAINES RIVER AT OGDEN AVENUE DURING 1992 AND 1993

Date	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
04/27/92	12,000	900	280	500	200	4,200	10	0.15
05/18/92	2,500	240	80	60	30	3,700	50	0.15
08/17/92	52,000	2,400	2,600	500	310	12,000	10	0.2
10/26/92	7,000	310	130	140	160	4,600	50	0.15
03/22/93	6,800	800	260	360	210	390	11	0.15
05/17/93	2,800	240	34	150	32	4,700	2	0.15
08/16/93	740,000	130,000	28,000	38,000	23,000	300,000	3,700	0.55
10/18/93	150,000	6,000	2,500	3,700	1,800	64,000	12	1.15

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = Enterococcus; SPC = Standard Plate Count; EC = *Esherichia coli*; PA = *Pseudomonas aeruginosa*; SAL = *Salmonella*.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-6

BACTERIAL INDICATOR DENSITIES[1] FOR THE DES PLAINES RIVER AT WILLOW SPRINGS ROAD DURING 1992 AND 1993

Date	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
04/27/92	5,000	540	30	340	100	5,000	10	0.15
05/18/92	4,800	110	20	90	10	3,000	30	0.15
08/17/92	22,000	600	32	340	17	8,300	20	0.45
10/26/92	11,000	250	46	270	49	5,400	60	0.15
03/22/93	4,400	300	65	210	130	760	80	0.15
05/17/93	1,000	60	19	29	14	1,800	3	0.15
08/16/93	380,000	130,000	5,500	28,000	4,900	260,000	1,700	0.35
10/18/93	54,000	3,600	460	3,000	460	36,000	70	0.15

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = Enterococcus; SPC = Standard Plate Count; EC = *Esherichia coli*; PA = *Pseudomonas aeruginosa*; SAL = *Salmonella*.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AI-7

BACTERIAL INDICATOR DENSITIES[1] FOR THE DES PLAINES RIVER AT STEPHEN STREET DURING 1992 AND 1993

Date	Bacterial Group[2]							
	TC	FC	FS	EC	ENT	SPC	PA	SAL
04/27/92	3,600	130	10	60	10	2,300	10	0.45
05/18/92	2,100	10	20	18	9	4,700	30	0.2
08/17/92	5,700	120	500	60	5	5,600	20	0.15
10/26/92	7,000	200	35	100	25	7,400	30	0.15
03/22/93	6,300	1,200	90	380	100	950	110	0.2
05/17/93	1,400	20	13	20	6	1,900	2	0.15
08/16/93	30,000	6,000	1,500	3,700	1,100	59,000	190	3.75
10/18/93	46,000	1,800	430	2,100	110	37,000	50	0.15

[1]All densities are given in colony forming units (cfu)/100 mL except SPC which is in cfu/mL and SAL which is in most probable number (MPN)/per 100 mL.

[2]TC = Total Coliform; FC = Fecal Coliform; FS = Fecal Streptococcus; ENT = Enterococcus; SPC = Standard Plate Count; EC = *Escherichia coli*; PA = *Pseudomonas aeruginosa*; SAL = *Salmonella*.

APPENDIX AII

BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER DURING 1992 AND 1993

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-1

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT LAKE-COOK ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
July 1992, Right Bank[1]			
ANNELIDA			
Oligochaeta	1,254	1,140	456
INSECTA			
Ephemeroptera			
Caenis sp.			38
Hemiptera			
Corixidae	38	76	76
Megaloptera			
Sialis sp.		38	
Coleoptera	76	114	
Diptera			
Chironomidae			
Tanypodinae	410	756	359
Orthocladinae	95	89	
Chiroominae	2,649	3,601	1,275
July 1992, Center of Channel			
ANNELIDA			
Oligochaeta	532	1,330	532
Hirudinea			
Mooreobdella microstoma		38	228
CRUSTACEA			
Isopoda			
Caecidotea intermedius		38	
INSECTA			
Ephemeroptera			
Caenis sp.		76	114
Hemiptera			
Corixidae	1,862	114	
Tricoptera			
Hydropsyche sp.	190		
Oecetis sp.			114
Coleoptera			
Stenelmis sp.	190	76	114

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-1 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT LAKE-COOK ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
July 1992, Center of Channel (Continued)			
Insecta (Continued)			
Diptera			
Chironomidae			
Tanypodinae	168	40	202
Chironominae	820	948	2,040
MOLLUSCA			
Gastropoda			
Gyraulus parvus			38
April 1993, Right Bank[1]			
ANNELIDA			
Oligochaeta	13,961	5,168	16,340
INSECTA			
Ephemeroptera			
Caenis sp.	64		
Coleoptera			
Dubiraphia sp.	127	76	
Diptera			
Chironomidae	7,425	4,788	7,068
Heleidae	381	152	304
MOLLUSCA			
Gastropoda			
Gyraulus parvus		38	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-1 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT LAKE-COOK ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
April 1993, Center of Channel			
ANNELIDA			
Oligochaeta			1,596
INSECTA			
Tricoptera			
Cheumatopsyche sp.			76
Coleoptera			
Stenelmis sp.			76
Diptera			
Chironomidae	266	152	3,192
June 1993, Right Bank[1]			
ANNELIDA			
Oligochaeta	5,738	3,800	5,814
Hirudinea			
Mooreobdella fervida	38		
INSECTA			
Ephemeroptera			
Caenis sp.		38	
Megaloptera			
Sialis sp.		38	
Coleoptera	76	114	
Dubiraphia sp.	28	38	76
Diptera			
Chironomidae			
Tanypodinae		756	359
Chironominae	67	643	2,546
Heleidae			
Ceratopogon sp.	152	114	304

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-1 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT LAKE-COOK ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
June 1993, Center of Channel			
ANNELIDA			
Oligochaeta	114	1,976	722
CRUSTACEA			
Isopoda			
Caecidotea intermedius			76
INSECTA			
Ephemeroptera			
Caenis sp.	38	38	38
Tricoptera			
Cheumatopsyche sp.	114	76	432
Coleoptera			
Dubiraphia sp.		38	
Diptera			
Chironomidae			
Chironominae	456	425	1,178
Heleidae		38	
MOLLUSCA			
Pelecypoda			
Pisidium sp.	38		38

[1]Facing upstream in the waterway.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-2

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT OAKTON STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
July 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	1,520	4,408	2,622
INSECTA			
Hemiptera			
Corixidae			38
Coleoptera			
Dubiraphia sp.		38	
Diptera			
Chironomidae			
Tanypodinae	495	866	498
Chironominae	37	274	376
MOLLUSCA			
Pelecypoda			
Sphaerium sp.		38	
July 1992, Center of Channel			
ANNELIDA			
Oligochaeta	7,068	8,512	3,268
CRUSTACEA			
Amphipoda			
Hyalella azteca			38
INSECTA			
Coleoptera			
Dubiraphia sp.	38		76
Diptera			
Chironomidae			
Tanypodinae	568	205	217
Chironominae	306	365	201

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-2 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT OAKTON STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
July 1992, Center of Channel Continued)			
MOLLUSCA			
Gastropoda			
Pleurocera acuta	38		
Pelecypoda			
Pisidium sp.	38		
Sphaerium sp.	114	38	152
April 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	5,548	9,310	8,644
INSECTA			
Coleoptera			
Dubiraphia sp.	228	114	228
Diptera			
Chironomidae	380	304	418
Heleidae	152	152	266
April 1993, Center of Channel			
ANNELIDA			
Oligochaeta	8,816	6,422	1,482
INSECTA			
Diptera			
Chironomidae	76		
MOLLUSCA			
Gastropoda			
Pleurocera acuta		152	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-2 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT OAKTON STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
June 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	14,212	1,520	9,956
CRUSTACEA			
Isopoda			
Caecidotea intermedius			38
INSECTA			
Coleoptera			
Dubiraphia sp.			114
Diptera			
Chironomidae			
Tanypodinae	159	74	168
Chironominae	981	192	2,226
Heleidae			
Ceratopogon sp.	38	38	
MOLLUSCA			
Gastropoda			
Pleurocera acuta			76
Pelecypoda			
Musculium sp.			38
Pisidium sp.		38	38
June 1993, Center of Channel			
ANNELIDA			
Oligochaeta	38	304	304
Diptera			
Chironomidae			
Chironominae		38	114

[1]Facing upstream in the waterway.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-3

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT BELMONT AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
April, 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	3,078	16,378	13,338
Hirudinea			
Helobdella stagnalis		152	
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	38	38	38
MOLLUSCA			
Gastropoda			
Amnicola limosa	152	532	190
Pelecypoda			
Pisidium sp.	190	190	38
April, 1992, Center of Channel			
ANNELIDA			
Oligochaeta	19,950	6,308	2,850
Hirudinea			
Mooreobdella microstoma	684		228
INSECTA			
Diptera			
Chironomidae			
Orthocladinae			38
Chironominae		228	
MOLLUSCA			
Gastropoda			
Amnicola limosa		76	38
Pleurocera acuta	608	114	114
Pelecypoda			
Musculium sp.	38		
Pisidium sp.	1,482	114	950
Sphaerium sp.		1,786	532

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-3 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT BELMONT AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
July, 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	27,792	24,852	25,460
Hirudinea			
Helobdella stagnalis	72	38	
Mooreobdella microstoma	688	190	285
CRUSTACEA			
Decapoda			
Cambarus sp.		76	
INSECTA			
Odonata			
Gomphus sp.		76	95
Diptera			
Chironomidae			
Tanypodinae	304	456	94
Chironominae			191
MOLLUSCA			
Gastropoda			
Amnicola limosa	760	114	114
Pleurocera acuta	76	570	356
Pelecypoda			
Musculium sp.		114	38
Pisidium sp.	380	608	
Sphaerium sp.	2,128	594	1,102
July 1992, Center of Channel			
ANNELIDA			
Oligochaeta	25,878	6,270	19,152
Hirudinea			
Helobdella stagnalis			38
Mooreobdella microstoma	570	228	560
CRUSTACEA			
Isopoda			
Caecidotea intermedius			76

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-3 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT BELMONT AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
July 1992, Center of Channel (Continued)			
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	38		
Chironominae	152	76	
MOLLUSCA			
Gastropoda			
Amnicola limosa	38	190	266
Ferrissia parallela			38
Pleurocera acuta	152	152	684
Pelecypoda			
Musculium sp.	950	114	950
Pisidium sp.	1,527	2,850	560
Sphaerium sp.	625	38	442
April 1993, Left Bank[1]			
No organisms in bottom sediment samples			
April 1993, Center of Channel			
No organisms in bottom sediment samples			
July 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	113,253	14,022	722
Hirudinea			
Helobdella stagnalis	678	114	
Mooreobdella microstoma	334		
INSECTA			
Diptera			
Chironomidae			
Chironominae	759	342	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-3 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT BELMONT AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
July 1993, Left Bank[1] (Continued)			
MOLLUSCA			
Gastropoda			
Amnicola limosa	253		
Pleurocera acuta	76	38	
Pelecypoda			
Musculium sp.			38
Sphaerium sp.	759		
August 1993, Center of Channel			
No organisms in bottom sediment sample.			

[1]Facing upstream in the waterway.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-4

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT ROOSEVELT ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
April 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	760	608	3,724
INSECTA			
Odonata			
Plathemis sp.	38		
Diptera			
Chironomidae			
Tanypodinae		114	
MOLLUSCA			
Pelecypoda			
Sphaerium sp.	114		
April 1992, Center of Channel			
ANNELIDA			
Oligochaeta	11,780	7,106	15,884
Hirudinea			
Mooreobdella microstoma	38		
Helobdella stagnalis			76
CRUSTACEA			
Isopoda			
Caecidotea intermedius			38
INSECTA			
Diptera			
Chironomidae			
Orthocladinae	114	110	114
Chironominae		152	
MOLLUSCA			
Gastropoda			
Ferrissia parallela		38	
Pelecypoda			
Pisidium sp.	76	152	
Sphaerium sp.	38		

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-4 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT ROOSEVELT ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	2,546	4,560	8,360
Hirudinea			
Mooreobdella microstoma	38	342	114
Plaobdella ornata	38		
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	38	38	
MOLLUSCA			
Gastropoda			
Physella integra	38		
August 1992, Center of Channel			
ANNELIDA			
Oligochaeta	4,864	10,336	6,080
Hirudinea			
Mooreobdella microstoma		38	
INSECTA			
Diptera			
Chironomidae			
Tanypodinae		153	57
Chironominae	76	75	57
MOLLUSCA			
Pelecypoda			
Musculium sp.		38	
Pisidium sp.		76	
Sphaerium sp.		76	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-4 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT ROOSEVELT ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
May 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	1,748	1,254	1,306
INSECTA			
Diptera			
Chironomidae	76	38	
May 1993, Center of Channel			
ANNELIDA			
Oligochaeta	760	4,712	3,420
INSECTA			
Diptera			
Chironomidae		114	152
MOLLUSCA			
Pelecypoda			
Muculium sp.	114		38
August 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	6,916	2,774	8,132
INSECTA			
Ephemeroptera			
Hexagenia sp.		38	
Diptera			
Chironomidae			
Tanypodinae	38	114	
Chironominae		38	76
MOLLUSCA			
Pelecypoda			
Sphaerium sp.		38	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-4 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT ROOSEVELT ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1993, Center of Channel			
ANNELIDA			
Oligochaeta	13,224	4,750	2,812
Hirudinea			
Mooreobdella microstoma	76		
CRUSTACEA			
Isopoda			
Caecidotea intermedius			38
INSECTA			
Trichoptera			
Cheumatopsyche sp.	38		
Diptera			
Chironomidae			
Tanypodinae		41	
Chironominae	1,748	985	380
MOLLUSCA			
Gastropoda			
Ferrissia parallela			38

[1]Facing upstream in the waterway.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-5

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT OGDEN AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
May 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	26,904	9,234	15,808
Hirudinea			
Helobdella stagnalis			76
Mooreobdella microstoma			76
CRUSTACEA			
Isopoda			
Caecidotea intermedius			38
INSECTA			
Diptera			
Chironomidae			
Orthocladinae	76		38
Chironominae	76	76	
MOLLUSCA			
Gastropoda			
Amnicola limosa	38		38
Pleurocera acuta	418	380	76
Pelecypoda			
Musculium sp.		38	
Pisidium sp.	76		
Sphaerium sp.	76		
May 1992, Center of Channel			
ANNELIDA			
Oligochaeta	9,804	4,978	16,112
CRUSTACEA			
Isopoda			
Caecidotea intermedius	38		

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-5 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT OGDEN AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
May 1992, Center of Channel (Continued)			
INSECTA			
Diptera			
Chironomidae			
Orthocladinae	38		38
Chironominae	76		38
MOLLUSCA			
Gastropoda			
Amnicola limosa		304	
August 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	4,636	14,440	15,656
Hirudinea			
Helobdella stagnalis	38	76	228
INSECTA			
Trichoptera			
Oecetis sp.			76
Diptera			
Chironomidae			
Tanypodinae	113		
Chironominae	113	722	380
MOLLUSCA			
Gastropoda			
Pleurocera acuta	266	380	456
Pelecypoda			
Corbicula fluminea	38		
Musculium sp.	38		
Pisidium sp.	114	38	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-5 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT OGDEN AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1992, Center of Channel			
TURBELLARIA		304	342
ANNELIDA			
Oligochaeta	1,862	684	1,482
CRUSTACEA			
Isopoda			
Caecidotea intermedius		38	
INSECTA			
Trichoptera			
Cheumatopsyche sp.	228	76	266
Diptera			
Chironomidae			
Chironominae	190	114	114
MOLLUSCA			
Gastropoda			
Amnicola limosa			38
Pleurocera acuta	532	228	608
Pelecypoda			
Corbicula fluminea	38	38	
Musculium sp.	38		
Pisidium sp.	38		
Sphaerium sp.	38		
May 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	22,800	22,116	16,664
CRUSTACEA			
Isopoda			
Caecidotea intermedius		38	
INSECTA			
Diptera			
Chironomidae	304	190	228

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-5 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT OGDEN AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
May 1993, Center of Channel			
ANNELIDA			
Oligochaeta	38		388
CRUSTACEA			
Amphipoda			
Hyallela azteca			38
INSECTA			
Diptera			
Chironomidae		304	
MOLLUSCA			
Gastropoda			
Amnicola limosa	38		
Pleurocera acuta	152	38	38
August 1993, Left Bank[1]			
TURBELLARIA			
Tricladida sp.		38	
ANNELIDA			
Oligochaeta	528	2,432	4,978
Hirudinea			
Mooreobdella microstoma		38	
INSECTA			
Diptera			
Chironomidae			
Tanypodinae			96
Chironominae	1,254	2,166	702
MOLLUSCA			
Gastropoda			
Pleurocera acuta	152	38	114
Pelecypoda			
Pisidium sp.		380	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-5 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT OGDEN AVENUE DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1993, Center of Channel			
TURBELLARIA			
Tricladida sp.	114	38	304
ANNELIDA			
Oligochaeta	38		114
INSECTA			
Trichoptera			
Cheumatopsyche sp.		38	76
Diptera			
Chironomidae			
Tanypodinae		38	38
Chironominae	38		76
MOLLUSCA			
Gastropoda			
Pleurocera acuta	152	228	304
Pelecypoda			
Musculium sp.	152	228	154
Pisidium sp.	192	160	301
Sphaerium sp.	264	106	39

[1]Facing upstream in the waterway.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-6

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT WILLOW SPRINGS ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
May 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	10,070	4,712	2,546
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	38	38	114
MOLLUSCA			
Gastropoda			
Amnicola limosa	48	304	
May 1992, Center of Channel			
ANNELIDA			
Oligochaeta	11,286	17,860	17,528
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	38		143
August 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	2,356	1,748	874
Hirudinea			
Moorbdella microstoma		38	
INSECTA			
Hemiptera			
Corixidae	38		
Diptera			
Chironomidae			
Tanypodinae	2,280	2,394	2,432

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-6 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT WILLOW SPRINGS ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1992, Left Bank[1] (Continued)			
MOLLUSCA			
Gastropoda			
Pleurocera acuta	38		
Pelecyoda			
Pisidium sp.		76	
August 1992, Center of Channel			
ANNELIDA			
Oligochaeta	5,814	3,990	3,420
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	418	114	228
May 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	7,296	2,128	4,674
INSECTA			
Diptera			
Chironomidae	266		
May 1993, Center of Channel			
ANNELIDA			
Oligochaeta	15,314	15,884	18,050
INSECTA			
Diptera			
Chironomidae	114	152	304

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-6 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT WILLOW SPRINGS ROAD DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1993, Left Bank[1]			
ANNELIDA			
Oligochaeta	4,522	646	7,486
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	38		38
Chironominae	38		
August 1993, Center of Channel			
ANNELIDA			
Oligochaeta	7,714	9,538	10,678
INSECTA			
Diptera			
Culcidae			
Aedes sp.	76		
Chironomidae			
Tanypodinae	342	152	228
Chironominae		38	76
MOLLUSCA			
Pelecypoda			
Corbicula fluminea			38
Sphaerium sp.	38		

[1]Facing upstream in the waterway.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-7

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT STEPHEN STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
May 1992, Left Bank[1]			
ANNELIDA			
Oligochaeta	7,600	6,802	6,802
CRUSTACEA			
Isopoda			
Caecidotea intermedius	38		
Amphipoda			
Hyaella azteca	38		
INSECTA			
Diptera			
Chironomidae			
Tanypodinae	1,026	722	
Orthocladinae	76	38	76
Chironominae	152	38	152
Heleidae	76		
May 1992, Center of Channel			
ANNELIDA			
Oligochaeta	836	760	1,102
INSECTA			
Ephemeroptera			
Ephemerella sp.		38	38
Tricoptera			
Cheumatopsyche sp.	1,064		1,102
Glossosoma sp.		646	
Diptera			
Chironomidae			
Orthocladinae	152	190	114
Chironominae	266	152	114
MOLLUSCA			
Gastropoda			
Pleurocera acuta	76	228	

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-7 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT STEPHEN STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1992, Left Bank[1]			
TURBELLARIA		76	
ANNELIDA			
Oligochaeta	152	1,292	2,812
Hirudinea			
Helobdella stagnalis			76
Mooreobdella microstoma		76	114
CRUSTACEA			
Decapoda			
Orconectes virilis	38		
INSECTA			
Ephemeroptera			
Caenis sp.		228	152
Coleoptera			
Narpus sp.			38
Diptera			
Chironomidae			
Tanypodinae		123	68
Chironominae	38	333	274
MOLLUSCA			
Gastropoda			
Amnicola limosa		76	
Pleurocera acuta	152		
Pelecypoda			
Pisidium sp.		76	
August 1992, Center of Channel			
ANNELIDA			
Oligochaeta		152	532
CRUSTACEA			
Decopoda			
Orconectes virilis			38

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-7 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT STEPHEN STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1992, Center of Channel (Continued)			
INSECTA			
Ephemeroptera			
Caenis sp.		38	
Odonata		38	
Tricoptera			
Cheumatopsyche sp.	646	1,368	760
Coleoptera			
Elmidae			76
Diptera			
Chironomidae			
Tanypodinae	45	138	
Orthocladinae	176	197	45
Chironominae	45	197	221
MOLLUSCA			
Gastropoda			
Amnicola limosa			38
Pleurocera acuta	570	76	836
Pelecypoda			
Musculium sp.		38	
May 1993, Left Bank[1]			
COELENTERATA			
Hydra sp.	38		
ANNELIDA			
Oligochaeta	5,244	2,356	1,102
INSECTA			
Ephemeroptera			
Caenis sp.			38
Coleoptera			
Stenelmis sp.	38		
Diptera			
Chironomidae	646	38	342

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-7 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER AT STEPHEN STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
May 1993, Left Bank[1] (Continued)			
MOLLUSCA			
Gastropoda			
Amnicola limosa	51		
Pleurocera acuta	101	190	
May 1993, Center of Channel			
ANNELIDA			
Oligochaeta	2,622	1,710	1,064
INSECTA			
Coleoptera			
Stenelmis sp.	76		38
Diptera			
Chironomidae	228	418	76
MOLLUSCA			
Gastropoda			
Pleurocera acuta	190	38	
August 1993, Left Bank[1]			
No organisms present in grab samples.			
August 1993, Center of Channel			
ANNELIDA			
Oligochaeta	2,432	1,026	76
Hirudinea			
Mooreobdella sp.			38
CRUSTACEA			
Isopoda			
Caecidotea intermedius	38		

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AII-7 (Continued)

NUMBER OF BENTHIC INVERTEBRATES IN THE DES PLAINES RIVER
AT STEPHEN STREET DURING 1992 AND 1993

Taxonomic Group	Number of Benthic Organisms (Numbers/m^2) Grab Sample 1	Grab Sample 2	Grab Sample 3
August 1993, Center of Channel (Continued)			
INSECTA			
Ephemeroptera			
Caenis sp.	38		
Diptera			
Chironomidae			
Tanypodinae	114		152
Chironominae	76	76	38
MOLLUSCA			
Gastropoda			
Pleurocera acuta		38	

[1]Facing upstream in the waterway.

APPENDIX AIII

FISH CATCH STATISTICS FOR THE DES PLAINES RIVER DURING 1992 AND 1993

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-1

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE-COOK ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/4/92 Collection								
Carp	4	5699.00	468	437	500	1424.75	1036.00	1619.00
Spotfin shiner	66	112.19	55	37	77	1.70	0.37	3.97
Sand shiner	3	3.97	53	48	56	1.32	0.78	1.68
Bluntnose minnow	1	0.20	31	31	31	0.20	0.20	0.20
Fathead minnow	1	0.22	29	29	29	0.22	0.22	0.22
Green sunfish	9	98.94	74	24	110	10.99	0.23	28.49
Bluegill	4	45.57	85	69	112	11.39	5.79	23.00
Blackside darter	1	1.07	50	50	50	1.07	1.07	1.07
8/4/92 Totals	89	5961.16						
10/21/92 Collection								
Spotfin shiner	68	179.33	62	22	75	2.64	0.08	4.50
Sand shiner	2	2.37	48	35	60	1.19	0.42	1.95
Bluntnose minnow	3	6.04	54	44	70	2.01	0.90	4.00
Black bullhead	1	150.00	224	224	224	150.00	150.00	150.00
Blackstripe topminnow	4	1.82	37	35	40	0.46	0.34	0.62
Green sunfish	6	106.60	95	73	128	17.77	7.30	41.10
Bluegill	10	60.48	47	28	128	6.05	0.34	41.80

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-1(Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE-COOK ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/21/92 Collection (Continued)								
Black crappie	1	2.30	61	61	61	2.30	2.30	2.30
Johnny darter	5	9.00	57	53	62	1.80	1.41	2.26
Blackside darter	1	2.95	66	66	66	2.95	2.95	2.95
10/21/92 Totals	101	520.89						
8/11/93 Collection								
Northern pike	4	162.50	200	184	215	40.63	34.00	49.00
Carp	1	1431.00	467	467	467	1431.00	1431.00	1431.00
Spotfin shiner	25	46.11	57	26	75	1.84	0.12	4.12
Mimic shiner	1	0.71	45	45	45	0.71	0.71	0.71
Bluntnose minnow	2	0.17	25	23	27	0.09	0.07	0.10
Fathead minnow	5	2.11	33	23	52	0.42	0.07	1.34
Channel catfish	4	1.53	36	32	39	0.38	0.32	0.44
Blackstripe topminnow	5	6.15	50	31	58	1.23	0.23	1.77
Green sunfish	24	166.13	59	28	112	6.92	0.32	32.50
Pumpkinseed	1	45.50	123	123	123	45.50	45.50	45.50
Bluegill	17	49.22	35	21	124	2.90	0.11	40.50
Largemouth bass	5	5.98	46	41	51	1.20	0.87	1.63

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-1(Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT LAKE-COOK ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/11/93 Collection (Continued)								
Black crappie	2	38.50	95	52	137	19.25	1.50	37.00
Bluegill x green sunfish hybrid	1	17.50	95	95	95	17.50	17.50	17.50
Johnny darter	8	2.37	35	32	38	0.30	0.20	0.40
8/11/93 Totals	105	1975.48						
10/1/93 Collection								
Carp	4	6910.00	469	400	565	1727.50	1040.00	3000.00
Spotfin shiner	3	2.81	43	29	64	0.94	0.18	2.30
Bluntnose minnow	1	0.38	38	38	38	0.38	0.38	0.38
Blackstripe topminnow	9	10.76	48	34	66	1.20	0.31	2.54
Green sunfish	21	236.11	74	30	138	11.24	0.42	59.00
Bluegill	15	10.45	36	27	45	0.70	0.20	1.39
Largemouth bass	1	4.00	66	66	66	4.00	4.00	4.00
Black crappie	3	54.21	83	45	156	18.07	0.98	52.00
Johnny darter	1	1.21	56	56	56	1.21	1.21	1.21
10/1/93 Totals	58	7229.93						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-2

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT OAKTON STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/5/92 Collection								
Carp	1	2752.00	544	544	544	2752.00	2752.00	2752.00
Spotfin shiner	36	91.81	62	45	70	2.55	0.70	3.69
Sand shiner	20	32.79	55	48	59	1.64	0.90	2.06
Bluntnose minnow	9	14.64	52	33	66	1.63	0.25	3.06
Fathead minnow	7	4.95	41	35	53	0.71	0.38	1.77
White sucker	5	382.11	128	63	335	76.42	2.03	363.00
Blackstripe topminnow	2	4.79	61	60	62	2.40	2.16	2.63
Green sunfish	30	294.15	69	30	127	9.81	0.49	50.00
Pumpkinseed	7	68.48	78	70	81	9.78	6.48	12.00
Orangespotted sunfish	3	23.59	72	66	75	7.86	6.19	8.91
Johnny darter	16	12.36	44	38	48	0.77	0.47	1.01
Blackside darter	4	2.92	44	37	51	0.73	0.42	1.09
8/5/92 Totals	140	3684.59						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-2 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT OAKTON STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/22/92 Collection								
Spotfin shiner	5	6.01	43	23	72	1.20	0.12	3.67
Bluntnose minnow	3	1.59	39	26	47	0.53	0.13	0.84
Fathead minnow	2	5.42	62	59	64	2.71	2.31	3.11
White sucker	5	299.07	141	83	268	59.81	6.75	224.00
Tadpole madtom	1	7.92	79	79	79	7.92	7.92	7.92
Blackstripe topminnow	5	9.56	56	45	66	1.91	0.83	3.42
Green sunfish	5	41.84	74	55	85	8.37	3.44	12.00
Pumpkinseed	2	27.90	88	85	90	13.95	13.20	14.70
Bluegill	1	5.70	71	71	71	5.70	5.70	5.70
Johnny darter	3	3.93	53	45	59	1.31	0.77	1.70
Blackside darter	1	2.16	63	63	63	2.16	2.16	2.16
10/22/92 Totals	33	411.10						
8/16/93 Collection								
Northern pike	1	49.00	208	208	208	49.00	49.00	49.00
Spotfin shiner	9	11.43	51	41	62	1.27	0.54	2.37
Sand shiner	2	2.54	44	25	62	1.27	0.13	2.41
Bluntnose minnow	5	6.73	52	36	63	1.35	0.30	2.45

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-2 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT OAKTON STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/16/93 Collection (Continued)								
Blackstripe topminnow	1	0.14	26	26	26	0.14	0.14	0.14
Green sunfish	20	111.52	56	24	108	5.58	0.22	28.00
Pumpkinseed	1	29.50	108	108	108	29.50	29.50	29.50
Bluegill	3	1.72	33	26	37	0.57	0.21	0.81
Largemouth bass	1	2.00	54	54	54	2.00	2.00	2.00
Blackside darter	1	2.81	69	69	69	2.81	2.81	2.81
8/16/93 Totals	44	217.39						
10/5/93 Collection								
Spotfin shiner	8	2.47	30	21	51	0.31	0.06	1.18
Sand shiner	3	6.23	62	61	63	2.08	2.01	2.12
Bluntnose minnow	12	5.39	37	23	49	0.45	0.08	0.94
Fathead minnow	1	0.11	25	25	25	0.11	0.11	0.11
Channel catfish	1	1.43	55	55	55	1.43	1.43	1.43
Blackstripe topminnow	5	2.39	39	36	40	0.48	0.41	0.55
Green sunfish	7	26.46	53	31	75	3.78	0.58	9.00
Pumpkinseed	1	27.00	110	110	110	27.00	27.00	27.00

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-2 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT OAKTON STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/5/93 Collection(Continued)								
Bluegill	1	0.92	41	41	41	0.92	0.92	0.92
Johnny darter	6	4.60	46	37	53	0.77	0.34	1.17
10/5/93 Totals	45	77.00						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-3

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT BELMONT AVENUE, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/6/92 Collection								
Goldfish	1	277.00	227	227	227	277.00	277.00	277.00
Spotfin shiner	8	31.00	66	50	82	3.88	1.47	6.70
Sand shiner	18	44.50	60	53	69	2.47	1.39	3.94
Bluntnose minnow	5	19.00	63	31	84	3.80	0.19	7.92
Fathead minnow	11	7.47	35	25	63	0.68	0.13	3.47
White sucker	1	1.02	50	50	50	1.02	1.02	1.02
Yellow bullhead	1	36.00	135	135	135	36.00	36.00	36.00
Blackstripe topminnow	2	5.15	63	63	63	2.58	2.34	2.81
Green sunfish	2	27.00	84	81	87	13.50	13.00	14.00
Pumpkinseed	3	31.00	77	70	87	10.33	7.00	14.00
8/6/92 Totals	52	479.14						
10/23/92 Collection								
Spotfin shiner	10	2.16	24	17	33	0.22	0.09	0.40
Sand shiner	3	2.16	31	13	60	0.72	0.06	1.98
Bluntnose minnow	6	8.99	43	19	71	1.50	0.06	3.92
Fathead minnow	14	26.42	54	39	65	1.89	0.41	3.63
Yellow bullhead	1	29.20	132	132	132	29.20	29.20	29.20
Blackstripe topminnow	5	7.05	47	31	65	1.41	0.32	3.18

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-3 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT BELMONT AVENUE, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/23/92 Collection (Continued)								
Green sunfish	2	10.00	66	63	68	5.00	4.70	5.30
10/23/92 Totals	41	85.98						
8/17/93 Collection								
Spotfin shiner	9	15.57	49	20	73	1.73	0.04	4.38
Bluntnose minnow	13	4.97	32	25	65	0.38	0.10	2.56
Creek chub	1	1.05	47	47	47	1.05	1.05	1.05
Yellow bullhead	2	2.27	38	23	52	1.14	0.16	2.11
Blackstripe topminnow	4	1.52	34	30	42	0.38	0.24	0.62
Green sunfish	7	37.80	58	26	77	5.40	0.27	10.00
Bluegill	2	0.77	30	28	31	0.39	0.34	0.43
Johnny darter	2	1.05	39	33	45	0.53	0.26	0.79
8/17/93 Totals	40	65.00						
10/11/93 Collection								
Northern pike	1	90.00	264	264	264	90.00	90.00	90.00
Spotfin shiner	39	13.80	33	19	58	0.35	0.04	1.89
Sand shiner	4	3.10	49	34	67	0.78	0.28	1.63
Bluntnose minnow	38	14.69	36	25	49	0.39	0.08	0.98

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-3 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT BELMONT AVENUE, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/11/93 Collection (Continued)								
Blackstripe topminnow	4	2.02	39	30	45	0.51	0.25	0.72
Green sunfish	7	50.60	61	37	92	7.23	1.00	16.90
Johnny darter	1	1.22	52	52	52	1.22	1.22	1.22
10/11/93 Totals	94	175.43						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-4

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT ROOSEVELT ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/12/92 Collection								
Goldfish	9	103.97	67	35	130	11.55	0.67	43.00
Carp	3	5.13	47	43	50	1.71	1.22	2.04
Carp x goldfish hybrid	3	8.73	53	42	69	2.91	1.42	5.65
Bluntnose minnow	1	0.52	39	39	39	0.52	0.52	0.52
Fathead minnow	6	6.11	44	40	52	1.02	0.62	1.89
White sucker	1	1.90	53	53	53	1.90	1.90	1.90
Green sunfish	3	25.40	74	65	83	8.47	5.00	12.10
Bluegill	1	2.70	56	56	56	2.70	2.70	2.70
8/12/92 Totals	27	154.46						
8/31/92 Collection								
Goldfish	11	16.57	45	38	57	1.51	0.78	3.14
Carp	1	2.98	54	54	54	2.98	2.98	2.98
Sand shiner	1	0.54	40	40	40	0.54	0.54	0.54
Bluntnose minnow	25	17.58	44	39	52	0.70	0.52	1.27
Fathead minnow	143	123.66	44	20	58	0.86	0.07	1.96
White sucker	1	7.21	85	85	85	7.21	7.21	7.21

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-4 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT ROOSEVELT ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/31/92 Collection(Continued)								
Blackstripe topminnow	22	13.96	36	22	60	0.63	0.10	2.20
8/31/92 Totals	204	182.50						
10/30/92 Collection								
Goldfish	1	317.00	243	243	243	317.00	317.00	317.00
Sand shiner	1	0.31	33	33	33	0.31	0.31	0.31
Bluntnose minnow	32	8.54	29	19	56	0.27	0.04	1.69
Fathead minnow	34	36.44	44	17	59	1.07	0.03	2.41
Blackstripe topminnow	3	2.51	37	23	55	0.84	0.17	1.97
10/30/92 Totals	71	364.80						
8/20/93 Collection								
Sand shiner	1	0.14	28	28	28	0.14	0.14	0.14
Bluntnose minnow	24	3.95	28	22	35	0.16	0.07	0.32
Tadpole madtom	1	0.53	38	38	38	0.53	0.53	0.53
Blackstripe topminnow	5	1.16	30	21	35	0.23	0.07	0.38

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-4 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT ROOSEVELT ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/20/93 Collection (Continued)								
Green sunfish	1	0.42	29	29	29	0.42	0.42	0.42
Bluegill	19	12.68	35	23	42	0.67	0.17	1.09
Black crappie	1	2.19	57	57	57	2.19	2.19	2.19
Johnny darter	22	7.11	33	25	43	0.32	0.12	0.66
Blackside darter	4	1.91	40	31	50	0.48	0.23	0.87
8/20/93 Totals	78	30.09						
10/13/93 Collection								
Spotfin shiner	92	13.29	26	17	39	0.14	0.03	0.51
Sand shiner	33	5.97	29	20	37	0.18	0.04	0.38
Bluntnose minnow	145	42.82	33	19	47	0.30	0.03	0.88
Fathead minnow	4	0.49	25	18	30	0.12	0.05	0.19
Blackstripe topminnow	7	6.54	44	35	67	0.93	0.34	3.17
Bluegill	1	1.04	40	40	40	1.04	1.04	1.04
10/13/93 Totals	282	70.15						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-5

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT OGDEN AVENUE, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/11/92 Collections								
Goldfish	1	8.59	89	89	89	8.59	8.59	8.59
Carp	1	1.64	48	48	48	1.64	1.64	1.64
Golden shiner	1	0.22	31	31	31	0.22	0.22	0.22
Spotfin shiner	2	5.45	62	60	64	2.73	2.56	2.89
Sand shiner	38	63.40	56	40	69	1.67	0.47	3.34
Bluntnose minnow	47	83.73	55	28	72	1.78	0.10	3.93
Creek chub	1	0.55	41	41	41	0.55	0.55	0.55
White sucker	5	19.29	70	62	76	3.86	2.53	4.88
Black bullhead	1	28.00	130	130	130	28.00	28.00	28.00
Tadpole madtom	1	4.46	66	66	66	4.46	4.46	4.46
Green sunfish	6	35.57	64	46	82	5.93	1.99	10.70
Pumpkinseed	2	12.10	70	66	73	6.05	5.40	6.70
Orangespotted sunfish	1	3.93	60	60	60	3.93	3.93	3.93
8/11/92 Totals	107	266.93						
10/28/92 Collection								
Spotfin shiner	4	13.40	66	62	73	3.35	2.48	4.82
Sand shiner	3	9.30	66	62	69	3.10	2.47	3.51
Bluntnose minnow	11	24.19	53	26	77	2.20	0.18	4.83

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-5 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT OGDEN AVENUE, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/28/92 Collection (Continued)								
White sucker	3	975.00	321	301	348	325.00	260.00	410.00
Tadpole madtom	1	3.94	64	64	64	3.94	3.94	3.94
Blackstripe topminnow	1	0.32	31	31	31	0.32	0.32	0.32
Mosquitofish	14	4.40	26	20	41	0.31	0.13	1.02
Green sunfish	8	45.20	67	58	80	5.65	3.50	9.20
Pumpkinseed	3	28.40	80	77	86	9.47	8.30	11.70
Orangespotted sunfish	2	13.80	75	70	80	6.90	5.50	8.30
Black crappie	1	169.00	211	211	211	169.00	169.00	169.00
10/28/92 Totals	51	1286.95						
8/13/93 Collection								
Carp	3	5231.50	487	470	499	1743.83	1520.50	1905.00
Sand shiner	6	10.10	56	39	62	1.68	0.52	2.26
Bluntnose minnow	7	10.08	51	27	62	1.44	0.10	2.13
White sucker	2	158.50	196	183	209	79.25	60.50	98.00
Black bullhead	1	36.50	148	148	148	36.50	36.50	36.50
Green sunfish	34	277.63	68	30	115	8.17	0.45	31.50
Bluegill	13	94.08	52	20	135	7.24	0.22	56.00
Largemouth bass	2	3.44	51	47	55	1.72	1.39	2.05

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-5 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT OGDEN AVENUE, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/13/93 Collection (Continued)								
Black crappie	1	34.00	135	135	135	34.00	34.00	34.00
Green sunfish x pumpkinseed hybrid	1	26.50	107	107	107	26.50	26.50	26.50
8/13/93 Totals	70	5882.33						
10/8/93 Collection								
Carp	1	1439.00	478	478	478	1439.00	1439.00	1439.00
Spotfin shiner	13	19.09	51	26	65	1.47	0.12	2.89
Sand shiner	1	2.61	67	67	67	2.61	2.61	2.61
Bluntnose minnow	1	0.16	29	29	29	0.16	0.16	0.16
Yellow bullhead	1	130.50	205	205	205	130.50	130.50	130.50
Mosquitofish	1	0.24	29	29	29	0.24	0.24	0.24
Green sunfish	29	187.89	66	35	100	6.48	0.70	17.80
Bluegill	28	79.11	51	32	95	2.83	0.38	15.40
Largemouth bass	2	17.40	85	63	106	8.70	3.10	14.30
Blackside darter	1	0.92	50	50	50	0.92	0.92	0.92
10/8/93 Totals	78	1876.92						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-6

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS AT WILLOW SPRINGS ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/13/92 Collection								
Bluegill	10	7.53	24	13	73	0.75	0.06	6.60
Bluntnose minnow	176	69.92	37	21	58	0.40	0.08	1.87
Fathead minnow	8	3.50	34	19	42	0.44	0.06	0.83
Gizzard shad	2	11.95	83	83	83	5.98	5.89	6.06
Green sunfish	10	28.61	41	11	80	2.86	0.10	10.40
Largemouth bass	2	12.10	80	76	83	6.05	5.30	6.80
Mosquitofish	9	2.81	27	21	34	0.31	0.20	0.69
Orangespotted sunfish	3	14.09	62	55	68	4.70	3.24	5.60
Pumpkinseed	6	35.25	55	14	87	5.87	0.10	13.60
8/13/92 Totals	226	185.76						
8/19/92 Collection								
Bluntnose minnow	72	51.51	42	26	68	0.72	0.12	3.49
Fathead minnow	1	0.31	31	31	31	0.31	0.31	0.31
Green sunfish	16	30.16	36	19	78	1.89	0.14	10.30
Pumpkinseed	1	5.9	69	69	69	5.90	5.90	5.90
White sucker	1	4.74	79	79	79	4.74	4.74	4.74
8/19/92 Totals	91	92.62						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-6 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT WILLOW SPRINGS ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/29/92 Collection								
Golden shiner	1	0.98	52	52	52	0.98	0.98	0.98
Spotfin shiner	4	0.82	24	22	31	0.21	0.16	0.29
Sand shiner	6	2.77	36	28	57	0.46	0.17	1.58
Bluntnose minnow	772	649.00	43	21	74	0.84	0.09	4.26
Fathead minnow	10	6.11	39	28	53	0.61	0.20	1.10
Tadpole madtom	2	6.11	54	33	75	3.06	0.50	5.61
Blackstripe topminnow	3	1.99	40	37	43	0.66	0.48	0.87
Mosquitofish	33	6.82	25	19	42	0.21	0.06	0.93
Green sunfish	20	34.42	39	21	87	1.72	0.16	11.00
Pumpkinseed	6	39.60	68	29	82	6.60	0.40	11.00
Orangespotted sunfish	7	12.03	41	30	62	1.72	0.55	4.50
Bluegill	15	63.54	46	15	109	4.24	0.14	22.00
Largemouth bass	3	93.47	103	52	182	31.16	2.17	86.00
10/29/92 Totals	882	917.66						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-6 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT WILLOW SPRINGS ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/18/93 Collection								
Bluntnose minnow	19	3.25	27	17	47	0.17	0.03	0.79
Blackstripe topminnow	4	1.45	35	25	40	0.36	0.12	0.51
Mosquitofish	3	1.23	30	24	41	0.41	0.10	0.98
Green sunfish	16	12.66	31	25	68	0.79	0.22	6.00
Orangespotted sunfish	3	12.50	60	55	67	4.17	3.00	6.00
Bluegill	145	90.99	32	17	92	0.63	0.03	13.00
Largemouth bass	4	10.68	57	46	70	2.67	1.30	4.50
White crappie	1	0.38	36	36	36	0.38	0.38	0.38
Blackside darter	1	0.29	35	35	35	0.29	0.29	0.29
8/18/93 Totals	196	133.43						
10/12/93 Collection								
Gizzard shad	4	206.10	159	94	284	51.53	8.10	155.00
Spotfin shiner	3	0.36	26	24	28	0.12	0.10	0.14
Bluntnose minnow	25	8.48	35	25	46	0.34	0.10	0.80
Fathead minnow	1	0.18	29	29	29	0.18	0.18	0.18
Blackstripe topminnow	3	3.91	50	41	65	1.30	0.58	2.62
Mosquitofish	3	0.68	27	24	32	0.23	0.11	0.42

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-6 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT WILLOW SPRINGS ROAD, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/12/93 Collection (Continued)								
Green sunfish	19	77.20	52	20	109	4.06	0.11	23.10
Bluegill	83	88.51	39	21	88	1.07	0.13	11.80
Largemouth bass	4	14.00	65	60	72	3.50	2.50	4.40
10/12/93 Totals	145	399.42						

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-7

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS AT STEPHEN STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/17/92 Collection								
Gizzard shad	1	0.17	29	29	29	0.17	0.17	0.17
Golden shiner	2	20.35	81	42	120	10.18	0.58	19.77
Sand shiner	7	14.18	58	50	65	2.03	1.32	3.15
Bluntnose minnow	157	202.65	49	21	78	1.29	0.07	4.88
White sucker	4	20.04	75	65	89	5.01	2.95	8.16
Blackstripe topminnow	1	2.45	63	63	63	2.45	2.45	2.45
Mosquitofish	9	4.27	32	23	39	0.47	0.11	0.95
Green sunfish	16	158.46	71	23	109	9.90	0.23	30.00
8/17/92 Totals	197	422.57						
10/27/92 Collection								
Gizzard shad	1	3.62	72	72	72	3.62	3.62	3.62
Goldfish	2	3.15	44	36	51	1.58	0.78	2.37
Carp	3	11.72	62	58	65	3.91	2.84	4.78
Sand shiner	10	8.95	44	33	64	0.90	0.26	2.50
Bluntnose minnow	279	302.28	45	27	82	1.08	0.18	6.69
White sucker	1	23.00	134	134	134	23.00	23.00	23.00

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-7 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT STEPHEN STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/27/92 Collection (Continued)								
Blackstripe topminnow	1	0.60	40	40	40	0.60	0.60	0.60
Mosquitofish	13	7.12	33	26	45	0.55	0.23	1.28
Green sunfish	14	108.72	68	35	114	7.77	0.84	25.40
Orangespotted sunfish	4	5.15	40	35	50	1.29	0.82	2.42
10/27/92 Totals	328	474.31						
8/12/93 Collection								
Goldfish	2	3.66	50	49	50	1.83	1.72	1.94
Ozark minnow	1	0.44	38	38	38	0.44	0.44	0.44
Spotfin shiner	3	4.37	53	45	60	1.46	0.91	1.77
Sand shiner	4	6.22	55	50	61	1.56	1.18	2.15
Bluntnose minnow	199	273.23	53	25	73	1.37	0.09	4.23
Creek chub	1	0.91	45	45	45	0.91	0.91	0.91
White sucker	2	256.99	171	62	279	128.50	2.49	254.50
Channel catfish	1	0.38	36	36	36	0.38	0.38	0.38
Blackstripe topminnow	2	1.83	45	36	54	0.92	0.40	1.43

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-7 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT STEPHEN STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
8/12/93 Collection (Continued)								
Mosquitofish	7	3.08	32	24	38	0.44	0.12	0.78
Green sunfish	8	32.05	58	42	68	4.01	2.46	6.50
Pumpkinseed	2	1.61	36	35	37	0.81	0.69	0.92
Bluegill	1	22.50	107	107	107	22.50	22.50	22.50
Smallmouth bass	1	3.74	66	66	66	3.74	3.74	3.74
Largemouth bass	8	334.18	90	37	265	41.77	0.68	305.00
8/12/93 Totals	242	945.19						
10/7/93 Collection								
Gizzard shad	1	7.17	94	94	94	7.17	7.17	7.17
Emerald shiner	4	16.79	84	82	85	4.20	3.53	4.64
Spotfin shiner	8	4.33	36	28	65	0.54	0.17	2.36
Sand shiner	15	16.44	48	32	62	1.10	0.25	2.35
Bluntnose minnow	204	229.37	49	27	73	1.12	0.12	4.02
Creek chub	3	5.05	55	51	61	1.68	1.30	2.30
Blackstripe topminnow	14	12.61	44	35	63	0.90	0.36	2.59
Mosquitofish	1	0.54	36	36	36	0.54	0.54	0.54
Green sunfish	45	212.10	55	27	106	4.71	0.36	28.50

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIII-7 (Continued)

FISH CATCH STATISTICS FOR ELECTROFISHING AND MINNOW SEINE COLLECTIONS
AT STEPHEN STREET, DES PLAINES RIVER, DURING 1992 AND 1993

Fish Species	Number of Fish	Weight of Catch (grams)	Total Length (mm)			Body Weight (grams)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
10/7/93 Collection (Continued)								
Orangespotted sunfish	6	6.50	41	36	48	1.08	0.70	1.77
Largemouth bass	3	29.00	89	72	102	9.67	4.50	14.00
Blackside darter	1	0.63	43	43	43	0.63	0.63	0.63
10/7/93 Totals	305	540.53						

APPENDIX AIV

INDEX OF BIOTIC INTEGRITY FOR FISH COLLECTIONS FROM THE DES PLAINES RIVER DURING 1992 AND 1993

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-1

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR LAKE COOK ROAD ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/4/92		10/21/92		8/11/93		10/1/93	
	BP	SEINE	BP	SEINE	BP	SEINE	BP	SEINE
Species Per Sample	4	7	5	10	6	12	8	2
Sucker Species	0	0	0	0	0	0	0	0
Sunfish Species	2	2	2	3	3	4	3	1
Darter Species	0	1	1	2	0	1	1	0
Intolerant Species	1	1	0	1	0	2	1	0
% Green Sunfish	42	2	31	1	58	4	38	0
% Hybrids	0	0	0	0	3	0	0	0
% Diseased	0	0	0	0	3	1	4	0
% Omnivores	21	3	6	2	3	12	7	50
% Insectivorous Cyprinids	32	88	0	82	0	36	5	0
% Carnivores	0	0	0	1	17	13	7	0
Total Fish	19	60	16	85	36	69	56	2
Shock time (min)	17	-	21	-	18	-	20	-
Stream Order	5	5	5	5	5	5	5	5
Stream Basin	2	2	2	2	2	2	2	2
Metric Factors								
Species Per Sample	1	1	1	3	1	3	1	1
Sucker Species	1	1	1	1	1	1	1	1
Sunfish Species	3	3	3	3	3	5	3	1
Darter Secies	1	1	1	1	1	1	1	1
Intolerant Species	1	1	1	1	1	3	1	1
% Green Sunfish	1	5	1	5	1	5	1	5
% Hybrid	5	5	5	5	1	5	5	5
% Diseased	5	5	5	5	1	1	1	5
% Omnivores	3	5	5	5	5	5	5	1
% Insectivorous Cyprinids	3	5	1	5	1	3	1	1
% Carnivores	1	1	1	3	5	5	5	1
Abundance	1	3	1	3	1	1	1	1
IBI	26	36	26	40	22	38	26	24

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-2

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR OAKTON STREET ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/5/92		10/22/92		8/16/93		10/5/93	
	BP	SEINE	BP	SEINE	BP	SEINE	BP	SEINE
Species Per Sample	5	11	7	9	6	4	6	6
Sucker Species	0	1	1	1	0	0	0	0
Sunfish Species	2	3	3	1	3	0	3	1
Darter Species	0	2	0	2	1	0	0	1
Intolerant Species	0	1	1	1	0	1	1	0
% Green Sunfish	78	8	24	6	74	0	19	7
% Hybrids	0	0	0	0	0	0	0	0
% Diseased	0	1	0	6	7	0	0	0
% Omnivores	7	13	6	25	0	29	32	21
% Insectivorous Cyprinids	0	50	24	6	0	65	26	21
% Carnivores	0	0	0	0	4	6	0	7
Total Fish	27	113	17	16	27	17	31	14
Shock time (min)	14	-	14	-	10	-	13	-
Stream Order	5	5	5	5	5	5	5	5
Stream Basin	2	2	2	2	2	2	2	2
Metric Factors								
Species Per Sample	1	3	1	3	1	1	1	1
Sucker Species	1	1	1	1	1	1	1	1
Sunfish Species	3	3	3	1	3	1	3	1
Darter Secies	1	1	1	1	1	1	1	1
Intolerant Species	1	1	1	1	1	1	1	1
% Green Sunfish	1	3	1	3	1	5	3	3
% Hybrid	5	5	5	5	5	5	5	5
% Diseased	5	3	5	1	1	5	5	5
% Omnivores	5	5	5	3	5	3	3	3
% Insectivorous Cyprinids	1	5	3	1	1	5	3	3
% Carnivores	1	1	1	1	3	5	1	5
Abundance	1	3	1	1	1	1	1	1
IBI	26	34	28	22	24	34	28	30

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-3

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR BELMONT AVENUE ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/6/92		10/23/92		8/17/93		10/11/93	
	BP	SEINE	BP	SEINE	BP	SEINE	BP	SEINE
Species Per Sample	8	10	5	3	8	4	7	2
Sucker Species	1	1	0	0	0	0	0	0
Sunfish Species	2	2	1	0	2	1	1	0
Darter Species	0	0	0	0	1	1	1	0
Intolerant Species	0	1	0	0	1	1	1	1
% Green Sunfish	13	4	14	0	11	33	8	0
% Hybrids	0	0	0	0	0	0	0	0
% Diseased	0	0	4	0	0	8	1	0
% Omnivores	40	33	43	93	46	0	40	50
% Insectivorous Cyprinids	0	50	0	7	14	50	46	50
% Carnivores	0	0	0	0	0	0	1	0
Total Fish	15	52	14	15	28	12	92	92
Shock time (min)	14		14	-	13	-	15	
Stream Order	5	5	5	5	5	5	5	5
Stream Basin	2	2	2	2	2	2	2	2
Metric Factors								
Species Per Sample	1	3	1	1	1	1	1	1
Sucker Species	1	1	1	1	1	1	1	1
Sunfish Species	3	3	1	1	3	1	1	1
Darter Secies	1	1	1	1	1	1	1	1
Intolerant Species	1	1	1	1	1	1	1	1
% Green Sunfish	3	5	3	5	3	1	3	5
% Hybrid	5	5	5	5	5	5	5	5
% Diseased	5	5	3	5	5	1	1	5
% Omnivores	3	3	3	1	1	5	3	1
% Insectivorous Cyprinids	1	5	1	1	1	5	5	5
% Carnivores	1	1	1	1	1	1	3	1
Abundance	1	1	1	1	1	1	3	1
IBI	26	34	22	24	24	24	28	28

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-4

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR ROOSEVELT ROAD ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/12/92	8/31/92		10/30/92	
	SEINE	BP	SEINE	BP	SEINE
Species Per Sample	7	1	7	2	4
Sucker Species	1	0	1	0	0
Sunfish Species	2	0	0	0	0
Darter Species	0	0	0	0	0
Intolerant Species	0	0	0	0	0
% Green Sunfish	11	0	0	0	0
% Hybrids	11	0	0	0	0
% Diseased	0	0	0	0	1
% Omnivores	70	100	88	100	94
% Insectivorous Cyprinids	0	0	0.5	0	2
% Carnivores	0	0	0	0	0
Total Fish	27	1	203	3	66
Shock time (min)	15	5	-	12	-
Stream Order	5	5	5	5	5
Stream Basin	2	2	2	2	2
Metric Factors					
Species Per Sample	1	1	1	1	1
Sucker Species	1	1	1	1	1
Sunfish Species	3	1	1	1	1
Darter Species	1	1	1	1	1
Intolerant Species	1	1	1	1	1
% Green Sunfish	3	5	5	5	5
% Hybrid	1	5	5	5	5
% Diseased	5	5	5	5	1
% Omnivores	1	1	1	1	1
% Insectivorous Cyprinids	1	1	1	1	1
% Carnivores	1	1	1	1	1
Abundance	1	1	1	1	1
IBI	20	24	24	24	20

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-4 (Continued)

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR ROOSEVELT ROAD ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/20/93		10/13/93	
	BP	SEINE	BP	SEINE
Species Per Sample	4	8	6	5
Sucker Species	0	0	0	0
Sunfish Species	2	2	1	0
Darter Species	0	2	0	0
Intolerant Species	0	0	1	1
% Green Sunfish	14	0	0	0
% Hybrids	0	0	0	0
% Diseased	0	0	0	0
% Omnivores	14	32	70	50
% Insectivorous Cyprinids	0	1	26	48
% Carnivores	0	1	0	0
Total Fish	7	71	43	239
Shock time (min)	11	-	16	-
Stream Order	5	5	5	5
Stream Basin	2	2	2	2
Metric Factors				
Species Per Sample	1	1	1	1
Sucker Species	1	1	1	1
Sunfish Species	3	3	1	1
Darter Secies	1	1	1	1
Intolerant Species	1	1	1	1
% Green Sunfish	3	5	5	5
% Hybrid	5	5	5	5
% Diseased	5	5	5	5
% Omnivores	5	3	1	1
% Insectivorous Cyprinids	1	1	3	5
% Carnivores	1	3	1	1
Abundance	1	1	1	5
IBI	28	30	26	32

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-5

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR OGDEN AVENUE ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/11/92		10/28/92		8/13/93		10/8/93	
	BP	SEINE	BP	SEINE	BP	SEINE	BP	SEINE
Species Per Sample	10	7	5	7	5	5	9	2
Sucker Species	1	1	0	1	0	1	0	0
Sunfish Species	2	2	2	2	3	1	2	0
Darter Species	0	0	0	0	0	0	1	0
Intolerant Species	0	1	0	1	0	0	1	1
% Green Sunfish	32	0	26	0	65	0	43	0
% Hybrids	0	0	0	0	2	0	0	0
% Diseased	5	1	3	5	4	6	11	0
% Omnivores	42	49	16	30	6	39	3	0
% Insectivorous Cyprinids	11	44	0	35	0	33	5	100
% Carnivores	0	0	0	5	6	0	3	0
Total Fish	19	88	31	20	52	18	67	11
Shock time (min)	17	-	14	-	13	-	18	-
Stream Order	5	5	5	5	5	5	5	5
Stream Basin	2	2	2	2	2	2	2	2
Metric Factors								
Species Per Sample	3	1	1	1	1	1	3	1
Sucker Species	1	1	1	1	1	1	1	1
Sunfish Species	3	3	3	3	3	1	3	1
Darter Secies	1	1	1	1	1	1	1	1
Intolerant Species	1	1	1	1	1	1	1	1
% Green Sunfish	1	5	1	5	1	5	1	5
% Hybrid	5	5	5	5	1	5	5	5
% Diseased	1	1	1	1	1	1	1	5
% Omnivores	3	1	5	3	5	3	5	5
% Insectivorous Cyprinids	1	3	1	3	1	3	1	5
% Carnivores	1	1	1	3	5	1	3	1
Abundance	1	3	1	1	3	1	1	1
IBI	22	26	22	28	24	24	26	32

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-6

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR WILLOW SPRINGS ROAD ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/13/92		8/19/92		10/29/92	
	BP	SEINE	BP	SEINE	BP	SEINE
Species Per Sample	4	8	5	2	7	12
Sucker Species	0	0	1	0	0	0
Sunfish Species	2	3	2	1	3	4
Darter Species	0	0	0	0	0	0
Intolerant Species	0	0	0	0	0	1
% Green Sunfish	30	2	40	7	4	1
% Hybrids	0	0	0	0	0	0
% Diseased	20	0	0	0	0	0
% Omnivores	0	90	53	93	63	94
% Insectivorous Cyprinids	0	0	0	0	0	1
% Carnivores	10	0.5	0	0	4	0
Total Fish	10	207	30	61	57	798
Shock time (min)	7	-	12	-	15	-
Stream Order	5	5	5	5	5	5
Stream Basin	2	2	2	2	2	2
Metric Factors						
Species Per Sample	1	1	1	1	1	3
Sucker Species	1	1	1	1	1	1
Sunfish Species	3	3	3	1	3	5
Darter Secies	1	1	1	1	1	1
Intolerant Species	1	1	1	1	1	1
% Green Sunfish	1	5	1	3	5	5
% Hybrid	5	5	5	5	5	5
% Diseased	1	5	5	5	5	5
% Omnivores	5	1	1	1	1	1
% Insectivorous Cyprinids	1	1	1	1	1	1
% Carnivores	5	1	1	1	3	1
Abundance	1	5	1	3	3	5
IBI	26	30	22	24	30	34

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-6 (Continued)

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY (IBI) FOR WILLOW SPRINGS ROAD ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/18/93		10/12/93	
	BP	SEINE	BP	SEINE
Species Per Sample	6	9	8	8
Sucker Species	0	0	0	0
Sunfish Species	3	4	2	2
Darter Species	0	1	0	0
Intolerant Species	0	0	1	1
% Green Sunfish	5	9	23	4
% Hybrids	0	0	0	0
% Diseased	5	1	0	0
% Omnivores	5	10	13	28
% Insectivorous Cyprinids	0	0	3	1
% Carnivores	9	2	4	1
Total Fish	22	174	71	74
Shock time (min)	13	-	22	-
Stream Order	5	5	5	5
Stream Basin	2	2	2	2
Metric Factors				
Species Per Sample	1	3	1	1
Sucker Species	1	1	1	1
Sunfish Species	3	5	3	3
Darter Secies	1	1	1	1
Intolerant Species	1	1	1	1
% Green Sunfish	5	3	1	5
% Hybrid	5	5	5	5
% Diseased	1	3	5	5
% Omnivores	5	5	5	3
% Insectivorous Cyprinids	1	1	1	1
% Carnivores	5	3	3	3
Abundance	1	5	1	1
IBI	30	36	28	30

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AIV-7

METRICS USED IN THE CALCULATION OF THE INDEX OF BIOTIC INTEGRITY FOR STEPHEN STREET ON THE DES PLAINES RIVER DURING 1992 AND 1993

IBI Metric	8/17/92		10/27/92		8/12/93		10/7/93	
	BP	SEINE	BP	SEINE	BP	SEINE	BP	SEINE
Species Per Sample	5	6	8	4	10	7	11	4
Sucker Species	0	1	0	1	0	1	0	0
Sunfish Species	1	0	2	0	2	1	2	0
Darter Species	0	0	0	0	0	0	1	0
Intolerant Species	0	0	0	0	1	1	1	0
% Green Sunfish	22	0	4	0	18	0	16	0
% Hybrids	0	0	0	0	0	0	0	0
% Diseased	3	0	0	0	0	2	2	0
% Omnivores	65	90	88	79	36	94	65	84
% Insectivorous Cyprinids	0	6	2	14	2	4	9	16
% Carnivores	0	0	0	0	20	1	1	0
Total Fish	72	125	313	14	45	197	274	31
Shock time (min)	19	-	15	-	7	-	23	-
Stream Order	5	5	5	5	5	5	5	5
Stream Basin	2	2	2	2	2	2	2	2
Metric Factors								
Species Per Sample	1	1	1	1	3	1	3	1
Sucker Species	1	1	1	1	1	1	1	1
Sunfish Species	1	1	3	1	3	1	3	1
Darter Secies	1	1	1	1	1	1	1	1
Intolerant Species	1	1	1	1	1	1	1	1
% Green Sunfish	1	5	5	5	3	5	3	5
% Hybrid	5	5	5	5	5	5	5	5
% Diseased	1	5	5	5	1	5	1	5
% Omnivores	1	1	1	1	3	1	1	1
% Insectivorous Cyprinids	1	1	1	1	1	1	1	1
% Carnivores	1	1	1	1	5	1	3	1
Abundance	1	3	5	1	3	5	5	1
IBI	16	26	30	24	30	28	28	24

APPENDIX AV

BLUEGILL TOXICITY INDEX FOR WATER SAMPLES FROM THE DES PLAINES RIVER TAKEN AT THE TIME OF FISH COLLECTIONS DURING 1992 AND 1993

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AV-1

WATER QUALITY CONSTITUENTS AND BLUEGILL TOXICITY INDICES (BTIs) FOR LAKE-COOK ROAD ON THE DES PLAINES RIVER DURING 1992 AND 1993

Water Quality Constituent	Date of Sample Collection			
	8/4/92	10/21/92	8/11/93	10/1/93
	---------- Analytical Value ----------			
Temperature (°C)	20.3	9	22.5	14.0
Hardness (mg/L as CaCO3)	350	344	308	302
Dissolved Oxygen (mg/L)	8.37	9.04	6.52	8.70
pH (units)	8.18	7.89	7.25	7.78
Total NH3-N (mg/L)	0.1	0	0.30	0
Un-ionized NH3-N (mg/L)	0.0070	<0.02	0.0031	<0.02
Arsenic (mg/L)	<0.2	<0.2	<0.2	<0.2
Boron (mg/L)	0.1600	0.1600	0.23	0.18
Cadmium (mg/L)	<0.005	<0.005	<0.005	<0.005
Total Residual Chlorine (mg/L)	<0.01	<0.01	<0.01	<0.01
Chromium (Tri)(mg/L)	<0.006	<0.006	<0.006	<0.006
Chromium (Hex)(mg/L)	<0.006	<0.006	<0.006	<0.006
Copper (mg/L)	<0.004	<0.004	0.010	<0.004
Cyanide (mg/L)	0.0060	0.0070	0.007	0.004
Fluoride (mg/L)	0.5400	0.6500	0.56	0.700
Iron (mg/L)	0.9000	0.3000	1.00	1.10
MBAS (mg/L)	0.0030	0.0230	0.008	0.007
Lead (mg/L)	<0.08	<0.08	<0.08	<0.08
Manganese (mg/L)	0.0300	0.0500	0.09	0.09
Mercury (µg/L)	<0.1	<0.1	<0.1	<0.1
Nickel (mg/L)	<0.05	<0.05	<0.05	<0.05
NO2+NO3 (mg/L)	5.3000	7.3000	5.23	4.08
Phenol (mg/L)	<0.003	0.0020	<0.003	<0.003
Silver (mg/L)	<0.006	<0.006	<0.006	<0.006
Zinc (mg/L)	<0.006	<0.006	0.400	<0.006
	------ Bluegill Toxic Units (BGTUs) ------			
Un-ionized NH3-N (mg/L)	0.0114	0.0000	0.0058	0.0000
Arsenic (mg/L)	0.0000	0.0000	0.0000	0.0000
Boron (mg/L)	0.0001	0.0001	0.0001	0.0001
Cadmium (mg/L)	0.0000	0.0000	0.0000	0.0000
Total Residual Chlorine (mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Tri)(mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Hex)(mg/L)	0.0000	0.0000	0.0000	0.0000
Copper (mg/L)	0.0000	0.0000	0.0011	0.0000
Cyanide (mg/L)	0.0509	0.0347	0.0671	0.0194
Fluoride (mg/L)	0.0122	0.0146	0.0126	0.0158
Iron (mg/L)	0.0274	0.0091	0.0304	0.0334
MBAS (mg/L)	0.0013	0.0110	0.0041	0.0031
Lead (mg/L)	0.0000	0.0000	0.0000	0.0000
Manganese (mg/L)	0.0008	0.0012	0.0022	0.0022
Mercury (µg/L)	0.0000	0.0000	0.0000	0.0000
Nickel (mg/L)	0.0000	0.0000	0.0000	0.0000
NO2+NO3 (mg/L)	0.0027	0.0037	0.0026	0.0021
Phenol (mg/L)	0.0000	0.0001	0.0000	0.0000
Silver (mg/L)	0.0000	0.0000	0.0000	0.0000
Zinc (mg/L)	0.0000	0.0000	0.0275	0.0000
BTI (Sum of Toxicities)	0.1066	0.0746	0.1536	0.0761

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AV-2

WATER QUALITY CONSTITUENTS AND BLUEGILL TOXICITY INDICES (BTIs) FOR OAKTON STREET ON THE DES PLAINES RIVER

Water Quality Constituent	Date of Sample Collection			
	8/5/92	10/25/92	8/16/93	10/5/93
	---------- Analytical Value ----------			
Temperature (°C)	19.8	8.7	23.0	12.0
Hardness (mg/L as CaCO3)	282	353	203	317
Dissolved Oxygen (mg/L)	9.02	9.4	4.98	9.24
pH (units)	8.73	7.55	7.20	8.96
Total NH3-N (mg/L)	0	0	0.1	0
Un-ionized NH3-N (mg/L)	<0.02	<0.02	0.0009	<0.02
Arsenic (mg/L)	<0.2	<0.2	<0.2	<0.2
Boron (mg/L)	0.14	0.16	0.13	0.20
Cadmium (mg/L)	<0.005	<0.005	<0.005	<0.005
Total Residual Chlorine (mg/L)	<0.01	<0.01	<0.01	<0.01
Chromium (Tri) (mg/L)	<0.006	<0.006	<0.006	0.009
Chromium (Hex) (mg/L)	<0.006	<0.006	<0.006	0.009
Copper (mg/L)	<0.004	<0.004	0.01	0.01
Cyanide (mg/L)	0.004	0.007	0.006	0.007
Fluoride (mg/L)	0.58	0.62	0.43	0.63
Iron (mg/L)	0.60	0.40	1.30	0.80
MBAS (mg/L)	0.0000	0.018	0.007	0.012
Lead (mg/L)	<0.08	0.0000	<0.08	<0.08
Manganese (mg/L)	0.08	0.05	0.11	0.08
Mercury (µg/L)	<0.1	<0.1	<0.1	<0.1
Nickel (mg/L)	<0.05	<0.05	<0.05	<0.05
NO2+NO3 (mg/L)	3.40	6.40	2.42	5.14
Phenol (mg/L)	0.001	0.002	<0.003	<0.003
Silver (mg/L)	<0.006	<0.006	<0.006	<0.006
Zinc (mg/L)	<0.006	<0.006	0.10	<0.006
	------ Bluegill Toxic Units (BGTUs) ------			
Un-ionized NH3-N (mg/L)	0.0000	0.0000	0.0024	0.0000
Arsenic (mg/L)	0.0000	0.0000	0.0000	0.0000
Boron (mg/L)	0.0001	0.0001	0.0001	0.0001
Cadmium (mg/L)	0.0000	0.0000	0.0000	0.0000
Total Residual Chlorine (mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Tri) (mg/L)	0.0000	0.0000	0.0000	0.0001
Chromium (Hex) (mg/L)	0.0000	0.0000	0.0000	0.0001
Copper (mg/L)	0.0000	0.0000	0.0019	0.0010
Cyanide (mg/L)	0.0332	0.0344	0.0621	0.0338
Fluoride (mg/L)	0.0131	0.0140	0.0097	0.0142
Iron (mg/L)	0.0182	0.0122	0.0395	0.0243
MBAS (mg/L)	0.0000	0.0083	0.0049	0.0052
Lead (mg/L)	0.0000	0.0000	0.0000	0.0000
Manganese (mg/L)	0.0020	0.0012	0.0028	0.0020
Mercury (µg/L)	0.0000	0.0000	0.0000	0.0000
Nickel (mg/L)	0.0000	0.0000	0.0000	0.0000
NO2+NO3 (mg/L)	0.0017	0.0032	0.0012	0.0026
Phenol (mg/L)	0.0001	0.0001	0.0000	0.0000
Silver (mg/L)	0.0000	0.0000	0.0000	0.0000
Zinc (mg/L)	0.0000	0.0000	0.0094	0.0000
BTI (Sum of Toxicities)	0.0684	0.0734	0.1340	0.0834

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AV-3

WATER QUALITY CONSTITUENTS AND BLUEGILL TOXICITY INDICES (BTIs) FOR BELMONT AVENUE ON THE DES PLAINES RIVER

Water Quality Constituent	Date of Sample Collection 8/6/92	10/23/92	8/17/93	10/11/93
	Analytical Value			
Temperature (°C)	20.9	13.3	23.4	10.0
Hardness (mg/L as CaCO3)	292	333	235	242
Dissolved Oxygen (mg/L)	8.08	7.72	4.22	7.60
pH (units)	8.39	7.95	7.37	7.34
Total NH3-N (mg/L)	0	0	0.10	0.10
Un-ionized NH3-N (mg/L)	0.0000	0.0000	0.0014	0.0005
Arsenic (mg/L)	<0.2	<0.2	<0.2	<0.2
Boron (mg/L)	0.17	0.18	0.16	0.24
Cadmium (mg/L)	<0.005	<0.005	<0.005	<0.005
Total Residual Chlorine (mg/L)	<0.01	<0.01	<0.01	<0.01
Chromium (Tri) (mg/L)	<0.006	<0.006	<0.006	<0.006
Chromium (Hex) (mg/L)	<0.006	<0.006	<0.006	<0.006
Copper (mg/L)	<0.004	<0.004	<0.004	0.010
Cyanide (mg/L)	0.006	0.007	0.006	0.005
Fluoride (mg/L)	0.75	0.65	0.64	0.73
Iron (mg/L)	0.60	0.50	1.20	0.20
MBAS (mg/L)	0.000	0.032	0.017	0.019
Lead (mg/L)	<0.08	<0.08	<0.08	<0.08
Manganese (mg/L)	0.08	0.06	0.11	0.05
Mercury (µg/L)	<0.1	<0.1	<0.1	<0.1
Nickel (mg/L)	<0.05	<0.05	<0.05	<0.05
NO2+NO3 (mg/L)	3.40	5.80	3.56	4.83
Phenol (mg/L)	<0.003	<0.003	<0.003	<0.003
Silver (mg/L)	<0.006	<0.006	<0.006	<0.006
Zinc (mg/L)	<0.006	<0.006	<0.006	<0.006
	Bluegill Toxic Units (BGTUs)			
Un-ionized NH3-N (mg/L)	0.0000	0.0000	0.0043	0.0012
Arsenic (mg/L)	0.0000	0.0000	0.0000	0.0000
Boron (mg/L)	0.0001	0.0001	0.0001	0.0001
Cadmium (mg/L)	0.0000	0.0000	0.0000	0.0000
Total Residual Chlorine (mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Tri) (mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Tri) (mg/L)	0.0000	0.0000	0.0000	0.0000
Copper (mg/L)	0.0000	0.0000	0.0000	0.0015
Cyanide (mg/L)	0.0522	0.0352	0.0649	0.0257
Fluoride (mg/L)	0.0169	0.0146	0.0144	0.0164
Iron (mg/L)	0.0182	0.0152	0.0365	0.0061
MBAS (mg/L)	0.0000	0.0165	0.0146	0.0109
Lead (mg/L)	0.0000	0.0000	0.0000	0.0000
Manganese (mg/L)	0.0020	0.0015	0.0028	0.0012
Mercury (µg/L)	0.0000	0.0000	0.0000	0.0000
Nickel (mg/L)	0.0000	0.0000	0.0000	0.0000
NO2+NO3 (mg/L)	0.0017	0.0029	0.0018	0.0024
Phenol (mg/L)	0.0000	0.0002	0.0000	0.0000
Silver (mg/L)	0.0000	0.0000	0.0000	0.0000
Zinc (mg/L)	0.0000	0.0000	0.0000	0.0000
BTI (Sum of Toxicities)	0.0911	0.0863	0.1394	0.0656

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AV-4

WATER QUALITY CONSTITUENTS AND BLUEGILL TOXICITY INDICES (BTIs) FOR ROOSEVELT ROAD ON THE DES PLAINES RIVER

Water Quality Constituent	Date of Sample Collection 8/12/92	8/31/92	10/30/92	8/20/93	10/13/93
	---------- Analytical Value ----------				
Temperature (°C)	22	20.3	10.3	24.5	10.0
Hardness (mg/L as CaCO3)	250	175	292	235	284
Dissolved Oxygen (mg/L)	5.08	4.25	6.94	2.88	8.56
pH (units)	7.69	7.52	7.76	7.44	7.63
Total NH3-N (mg/L)	0.1	0.2	0.1	0.2	0.2
Un-ionized NH3-N (mg/L)	0.0027	0.0032	0.0013	0.0036	0.0019
Arsenic (mg/L)	<0.2	<0.2	<0.2	<0.2	<0.2
Boron (mg/L)	0.19	0.19	0.33	0.28	0.24
Cadmium (mg/L)	<0.005	<0.005	<0.005	<0.005	<0.005
Total Residual Chlorine (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (Tri) (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
Chromium (Hex) (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
Copper (mg/L)	0.0200	0.0000	0.0000	0.03	<0.004
Cyanide (mg/L)	0.006	0.004	0.008	0.005	0.005
Fluoride (mg/L)	0.74	0.59	0.82	0.53	0.69
Iron (mg/L)	0.90	0.70	0.70	0.90	0.30
MBAS (mg/L)	0.0100	0.0140	0.0040	0.022	0.01
Lead (mg/L)	<0.08	<0.08	<0.08	<0.08	<0.08
Manganese (mg/L)	0.10	0.06	0.05	0.10	0.05
Mercury (µg/L)	<0.1	<0.1	<0.1	0.10	<0.1
Nickel (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05
NO2+NO3 (mg/L)	4.10	3.70	6.60	2.90	5.29
Phenol (mg/L)	<0.003	0.0010	0.0010	<0.003	<0.003
Silver (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
Zinc (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
	------ Bluegill Toxic Units (BGTUs) ------				
Un-ionized NH3-N (mg/L)	0.0087	0.0153	0.0038	0.0116	0.0040
Arsenic (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Boron (mg/L)	0.0001	0.0001	0.0001	0.0001	0.0001
Cadmium (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Total Residual Chlorine (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Chromium (Tri) (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Chromium (Hex) (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Copper (mg/L)	0.0030	0.0000	0.0000	0.0060	0.0000
Cyanide (mg/L)	0.0603	0.0399	0.0420	0.0577	0.0250
Fluoride (mg/L)	0.0167	0.0133	0.0185	0.0119	0.0155
Iron (mg/L)	0.0274	0.0213	0.0213	0.0274	0.0091
MBAS (mg/L)	0.0070	0.0128	0.0025	0.0313	0.0050
Lead (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Manganese (mg/L)	0.0025	0.0015	0.0012	0.0025	0.0012
Mercury (µg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Nickel (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
NO2+NO3 (mg/L)	0.0021	0.0019	0.0033	0.0015	0.0027
Phenol (mg/L)	0.0000	0.0001	0.0001	0.0000	0.0000
Silver (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Zinc (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
BTI (Sum of Toxicities)	0.1277	0.1061	0.0928	0.1499	0.0626

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AV-5

WATER QUALITY CONSTITUENTS AND BLUEGILL TOXICITY INDICES (BTIs) FOR OGDEN AVENUE ON THE DES PLAINES RIVER

Water Quality Constituent	Date of Sample Collection 8/11/92	10/28/92	8/13/93	10/8/93
	---------- Analytical Value ----------			
Temperature (°C)	24.3	11.6	25.5	17.0
Hardness (mg/L as CaCO3)	241	273	274	299
Dissolved Oxygen (mg/L)	8.2	9.74	8.08	9.31
pH (units)	7.75	7.85	7.48	7.63
Total NH3-N (mg/L)	0.1	0	0	0
Un-ionized NH3-N (mg/L)	0.0036	<0.02	<0.02	<0.02
Arsenic (mg/L)	<0.2	<0.2	<0.2	<0.2
Boron (mg/L)	0.19	0.30	0.26	0.31
Cadmium (mg/L)	<0.005	<0.005	<0.005	<0.005
Total Residual Chlorine (mg/L)	<0.01	<0.01	<0.01	<0.01
Chromium (Tri) (mg/L)	<0.006	<0.006	<0.006	<0.006
Chromium (Hex) (mg/L)	<0.006	<0.006	<0.006	<0.006
Copper (mg/L)	<0.004	<0.004	0.01	<0.004
Cyanide (mg/L)	0.005	0.007	0.007	0.006
Fluoride (mg/L)	0.79	0.84	0.78	0.77
Iron (mg/L)	0.90	0.60	1.20	0.30
MBAS (mg/L)	0.0000	0.008	0.011	0.013
Lead (mg/L)	<0.08	<0.08	<0.08	<0.08
Manganese (mg/L)	0.08	0.04	0.08	0.04
Mercury (µg/L)	<0.1	<0.1	<0.1	0.10
Nickel (mg/L)	<0.05	<0.05	<0.05	<0.05
NO2+NO3 (mg/L)	4.40	7.80	5.55	6.05
Phenol (mg/L)	<0.003	0.0020	<0.003	<0.003
Silver (mg/L)	<0.006	<0.006	<0.006	<0.006
Zinc (mg/L)	<0.006	<0.006	0.10	<0.006
	------ Bluegill Toxic Units (BGTUs) ------			
Un-ionized NH3-N (mg/L)	0.0033	0.0000	0.0000	0.0000
Arsenic (mg/L)	0.0000	0.0000	0.0000	0.0000
Boron (mg/L)	0.0001	0.0001	0.0001	0.0001
Cadmium (mg/L)	0.0000	0.0000	0.0000	0.0000
Total Residual Chlorine (mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Tri) (mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Hex) (mg/L)	0.0000	0.0000	0.0000	0.0000
Copper (mg/L)	0.0000	0.0000	0.0012	0.0000
Cyanide (mg/L)	0.0474	0.0334	0.0689	0.0282
Fluoride (mg/L)	0.0178	0.0189	0.0176	0.0173
Iron (mg/L)	0.0274	0.0182	0.0365	0.0091
MBAS (mg/L)	0.0000	0.0035	0.0048	0.0057
Lead (mg/L)	0.0000	0.0000	0.0000	0.0000
Manganese (mg/L)	0.0020	0.0010	0.0020	0.0010
Mercury (µg/L)	0.0000	0.0000	0.0000	0.0000
Nickel (mg/L)	0.0000	0.0000	0.0000	0.0000
NO2+NO3 (mg/L)	0.0022	0.0039	0.0028	0.0031
Phenol (mg/L)	0.0000	0.0001	0.0000	0.0000
Silver (mg/L)	0.0000	0.0000	0.0000	0.0000
Zinc (mg/L)	0.0000	0.0000	0.0057	0.0000
BTI (Sum of Toxicities)	0.1001	0.0792	0.1396	0.0645

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AV-6

WATER QUALITY CONSTITUENTS AND BLUEGILL TOXICITY INDICES (BTIs) FOR WILLOW SPRINGS ROAD ON THE DES PLAINES RIVER

Water Quality Constituent	Date of Sample Collection				
	8/13/92	8/19/92	10/29/92	8/18/93	10/12/93
	Analytical Value				
Temperature (°C)	20.4	22.8	11	25.0	11.0
Hardness (mg/L as CaCO3)	266	346	283	229	276
Dissolved Oxygen (mg/L)	6.34	10.06	9.26	5.29	8.6
pH (units)	7.84	8.79	7.9	7.65	7.65
Total NH3-N (mg/L)	0	0	0	0.1	0.2
Un-ionized NH3-N (mg/L)	0.0000	0.0000	0.0000	0.003	0.0022
Arsenic (mg/L)	<0.2	<0.2	<0.2	<0.2	<0.2
Boron (mg/L)	0.19	0.18	0.30	0.15	0.23
Cadmium (mg/L)	<0.005	<0.005	<0.005	<0.005	<0.005
Total Residual Chlorine (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (Tri) (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
Chromium (Hex) (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
Copper (mg/L)	<0.004	<0.004	<0.004	0.01	<0.004
Cyanide (mg/L)	0.005	0.005	0.008	0.006	0.006
Fluoride (mg/L)	0.68	0.77	0.87	0.52	0.62
Iron (mg/L)	0.8	0.8	1.0	1.5	0.5
MBAS (mg/L)	0.004	0.009	0.001	0.019	0.004
Lead (mg/L)	<0.08	<0.08	<0.08	<0.08	<0.08
Manganese (mg/L)	0.09	0.08	0.05	0.1	0.06
Mercury (µg/L)	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05
NO2+NO3 (mg/L)	3.9000	5.5000	7.6000	2.75	4.55
Phenol (mg/L)	<0.003	<0.003	0.0010	<0.003	<0.003
Silver (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
Zinc (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006
	Bluegill Toxic Units (BGTUs)				
Un-ionized NH3-N (mg/L)	0.0000	0.0000	0.0000	0.0044	0.0044
Arsenic (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Boron (mg/L)	0.0001	0.0001	0.0001	0.0001	0.0001
Cadmium (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Total Residual Chlorine (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Chromium (Tri) (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Chromium (Hex) (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Copper (mg/L)	0.0000	0.0000	0.0000	0.0016	0.0000
Cyanide (mg/L)	0.0459	0.0453	0.0388	0.0648	0.0297
Fluoride (mg/L)	0.0153	0.0173	0.0196	0.0117	0.0140
Iron (mg/L)	0.0243	0.0243	0.0304	0.0456	0.0152
MBAS (mg/L)	0.0022	0.0039	0.0004	0.0118	0.0019
Lead (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Manganese (mg/L)	0.0022	0.0020	0.0012	0.0025	0.0015
Mercury (µg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Nickel (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
NO2+NO3 (mg/L)	0.0020	0.0028	0.0038	0.0014	0.0023
Phenol (mg/L)	0.0000	0.0000	0.0001	0.0000	0.0000
Silver (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
Zinc (mg/L)	0.0000	0.0000	0.0000	0.0000	0.0000
BTI (Sum of Toxicities)	0.0920	0.0957	0.0946	0.1439	0.0691

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE AV-7

WATER QUALITY CONSTITUENTS AND BLUEGILL TOXICITY INDICES (BTIs) FOR STEPHEN STREET, LEMONT ON THE DES PLAINES RIVER DURING 1992 AND 1993

Water Quality Constituent	Date of Sample Collection			
	8/17/92	10/27/92	8/12/93	10/7/93
	---------- Analytical Value ----------			
Temperature (°C)	21.7	12	25.0	16.0
Hardness (mg/L as CaCO3)	301	278	282	325
Dissolved Oxygen (mg/L)	10.36	8.28	8.44	9.18
pH (units)	8.18	7.86	8.03	7.82
Total NH3-N (mg/L)	0	0	0	0
Un-ionized NH3-N (mg/L)	<0.02	<0.02	<0.02	<0.02
Arsenic (mg/L)	<0.2	<0.2	<0.2	<0.2
Boron (mg/L)	0.16	0.25	0.26	0.23
Cadmium (mg/L)	<0.005	<0.005	<0.005	<0.005
Total Residual Chlorine (mg/L)	<0.01	<0.01	<0.01	<0.01
Chromium (Tri) (mg/L)	0.0000	0.0000	0.004	0.007
Chromium (Hex) (mg/L)	0.0000	0.0000	0.004	0.007
Copper (mg/L)	0.0000	0.0000	0.02	0.04
Cyanide (mg/L)	0.004	0.006	0.005	0.007
Fluoride (mg/L)	0.70	0.75	0.86	0.69
Iron (mg/L)	1.0	1.3	1.9	0.1
MBAS (mg/L)	0.004	0.005	0.006	0.012
Lead (mg/L)	<0.08	<0.08	<0.08	<0.08
Manganese (mg/L)	0.10	0.06	0.11	0.02
Mercury (µg/L)	<0.1	<0.1	<0.1	0.1
Nickel (mg/L)	<0.05	<0.05	<0.05	<0.05
NO2+NO3 (mg/L)	4.10	6.50	4.35	5.15
Phenol (mg/L)	0.0010	0.0010	<0.003	<0.003
Silver (mg/L)	<0.006	<0.006	<0.006	<0.006
Zinc (mg/L)	0.0000	0.0000	0.1	0.1
	------ Bluegill Toxic Units (BGTUs) ------			
Un-ionized NH3-N (mg/L)	0.0000	0.0000	0.0000	0.0000
Arsenic (mg/L)	0.0000	0.0000	0.0000	0.0000
Boron (mg/L)	0.0001	0.0001	0.0001	0.0001
Cadmium (mg/L)	0.0000	0.0000	0.0000	0.0000
Total Residual Chlorine (mg/L)	0.0000	0.0000	0.0000	0.0000
Chromium (Tri) (mg/L)	0.0000	0.0000	0.0000	0.0001
Chromium (Hex) (mg/L)	0.0000	0.0000	0.0000	0.0001
Copper (mg/L)	0.0000	0.0000	0.0023	0.0040
Cyanide (mg/L)	0.0350	0.0299	0.0485	0.0330
Fluoride (mg/L)	0.0158	0.0169	0.0194	0.0155
Iron (mg/L)	0.0304	0.0395	0.0578	0.0030
MBAS (mg/L)	0.0017	0.0025	0.0026	0.0052
Lead (mg/L)	0.0000	0.0000	0.0000	0.0000
Manganese (mg/L)	0.0025	0.0015	0.0028	0.0005
Mercury (µg/L)	0.0000	0.0000	0.0000	0.0000
Nickel (mg/L)	0.0000	0.0000	0.0000	0.0000
NO2+NO3 (mg/L)	0.0021	0.0033	0.0022	0.0026
Phenol (mg/L)	0.0001	0.0001	0.0000	0.0000
Silver (mg/L)	0.0000	0.0000	0.0000	0.0000
Zinc (mg/L)	0.0000	0.0000	0.0054	0.0053
BTI (Sum of Toxicities)	0.0877	0.0937	0.1410	0.0694