THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

DEPARTMENT OF RESEARCH AND DEVELOPMENT

FISH SURVEY OF NORTHEASTERN ILLINOIS STREAMS

This report was prepared as part of the NIPC-MSDGC 208 Contract and represents Work Item III-5C(2), Fish Survey of Northeastern Illinois Streams

Samuel G. Dennison

January 1978

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The Appendix referenced above is not attached.
It is available upon request.

Note: The Appendix is also available on this website

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I. INTRODUCTION

A. Background

The streams of northeastern Illinois flow through a tremendously urbanized area. The Chicago metropolitan area includes six counties: Cook, Du Page, Kane, Lake, McHenry and Will. Also present are such large cities as Aurora and Elgin. The fishes inhabitating the streams which flow through this area are a reflection of the primitive fish population of the area's streams and the impact which urbanization has had upon the water quality of these streams.

The need for water quality investigations based upon extensive fish surveys has been recognized. Living organisms are useful indicators of pollution since they concentrate the pollutants in the food chain (which eventually includes man). Also, because they live within the aquatic environment, they are likely to reflect the range of water quality parameters which they have physically endured.

As a group, fishes are tolerant and adaptable organisms that can survive considerable habitat abuse, but the ecological tolerances of the many different species vary tremendously. The mere knowledge that fish exist in a stream indicates nothing about water quality, but knowledge of the assemblage

of species and their numerical relationships provides the ichthyologist with an excellent biological picture of the water course and its well being.

Smith[1] has already classified the major stream systems in the six-county area. The Des Plaines River system (including the Chicago Channel system) is listed as poor (63 species present) indicating considerable modification of the stream from its original condition. The Fox River system is listed as good to excellent (102 species present).

Recently Bertrand,[2] Langbein and Wight,[3] Dennison,[4] and Sparks and Starrett[5] have reported results of electrofishing surveys of the Fox River (1975), Des Plaines River (1974), Chicago Channel System (1974 and 1975) and the Illinois River (1959 - 1974), respectively.

B. Objective

An electrofishing survey of the major streams within the Federal "208" Area Wide Waste Treatment Management Plan's area of

interest was carried out during 1976 as an adjunct to a largescale assessment of the water quality of northeastern Illinois streams.

C. Scope

The major drainage systems of concern in this program included the Fox River System - Kane, Kendall, Lake and Mc Henry Counties, and the Des Plaines River System - Cook, Du Page, Lake and Will Counties, including the Chicago Channel System - Cook, Lake and Will Counties. Fish were collected from 60 major sampling areas (c.f., Figure 1) throughout these two major systems, including as many of the major and minor tributaries as possible.

Major streams and their tributaries within these systems wherein fish sampling was carried out included the following:

DES PLAINES RIVER SYSTEM*

Des Plaines River

- Mill Creek
- Bull Creek
- Indian Creek
- Mc Donald Creek
- Feehanville Ditch
- Weller's Ditch
- Willow Creek
- Crystal Creek
- Silver Creek
- Flag Creek
- Sawmill Creek
- Black Partridge Creek
- Sugar Run Creek
- Salt Creek
  - Spring Brook
  - Ginger Creek
  - Addison Creek
- Hickory Creek
  - Marley Creek
  - Spring Creek

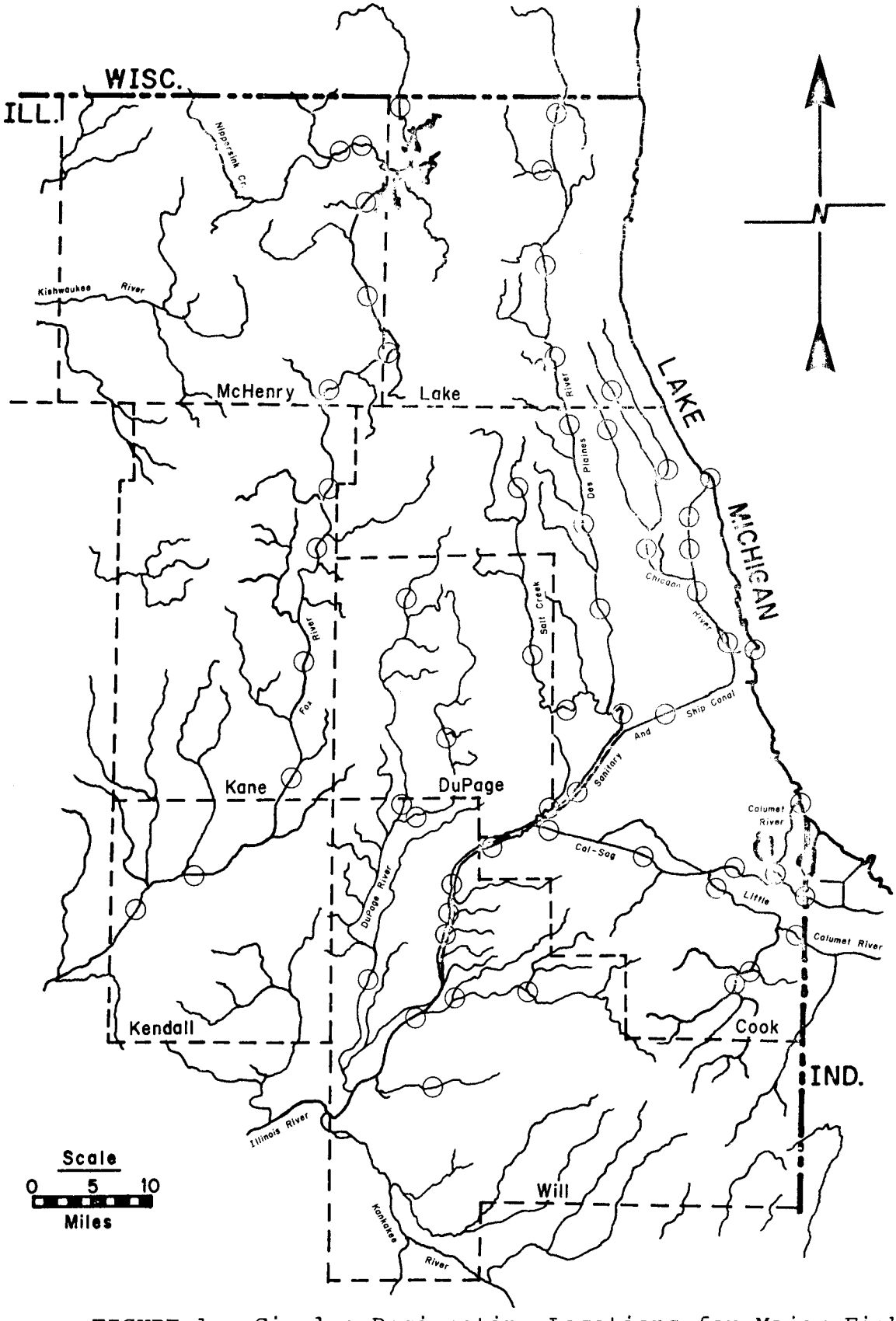

FIGURE 1 Circles Designating Locations for Major Fish Collecting Areas During 1976 In Northeastern Illinois Streams

Des Plaines River (continued)

- Jackson Creek
  - Manhattan Creek
- Du Page River
  - Lilly Cache Creek
  - Hammel Creek

Chicago Channel System

- Chicago River
  - West Fork, North Branch
  - Middle Fork, North Branch
  - Skokie River
- North Shore Channel
- Sanitary & Ship Canal
  - Shell Creek
- Calumet River
- Little Calumet River
  - Grand Calumet River
  - Thorn Creek
    - Deer Creek
    - Butterfield Creek
    - North Creek
  - Midlothian Creek
- Cal - Sag Channel
  - Tinley Creek
  - Stoney Creek
  - Mill Creek
  - Illinois & Michigan Canal

FOX RIVER SYSTEM*

Fox River

- Nippersink Creek
- Dutch Creek
- Boone Creek
- Griswalk Lake Drain
- Cotton Creek
- Flint Creek
- Tower Lake Drain
- Crystal Creek
- Jelkes Creek
- Tyler Creek
- Poplar Creek
- Norton Creek
- Mill Creek
- Indian Creek
- Waubansee Creek

Fox River (continued)

Blackberry Creek
Robroy Creek
Big Rock Creek
Little Rock Creek

*Streams are listed in their order of entrance into the major river system, north to south.

II. SITE SELECTION

A. Criteria for Selecting Sites

Sixty major sampling areas were to be chosen for collection of fish samples for the 208 program. Criteria set for site selection of these major sampling areas were as follows:

1. In order to determine the distribution of fishes within a a stream system, it is desirable to sample as many areas as possible throughout the reaches of the stream. Therefore, collection efforts will be concentrated within those streams throughout which the greatest number of sampling stations may be distributed in Northeastern Illinois.
2. Whenever possible, the major sampling areas should be set in sites close to the 10-day chemical sampling stations, for later correlation with these data.
3. The major sampling areas should include subsample sites which are useful for obtaining a correct picture of the water quality of the area, and which are accessible with the gear available.
4. Whenever possible, potential "problem" sites (in terms of adverse effects upon water quality) should be sampled within the major areas.

B. Description of Site

In order to conduct a fish survey of the streams under study, each site was judged to include different stream habitats within

the major stream and any tributaries near the area in question which may yield information as to possible influences upon the water quality of the major stream.

An example of how a site was investigated is depicted in Figure 2, showing site #7, Algonquin, on the Fox River. This site included a boat electrofishing sample in the pool upstream of the dam (labeled #7), and also samples obtained by use of a seine and backpack electrofishing unit within the tailrace of the dam (#86) and 200 meters downstream of the dam (#85). Since the tributary, Crystal Creek, entered the Fox River from the west, directly below the Algonquin dam, the mouth of this creek, as well as an area of creek 100 meters upstream from the mouth, was sampled by use of the seine and backpack electrofisher.

A list of each sample site, including a list and description of each subsample area within the site, is given in Table A-1 of the Appendix.

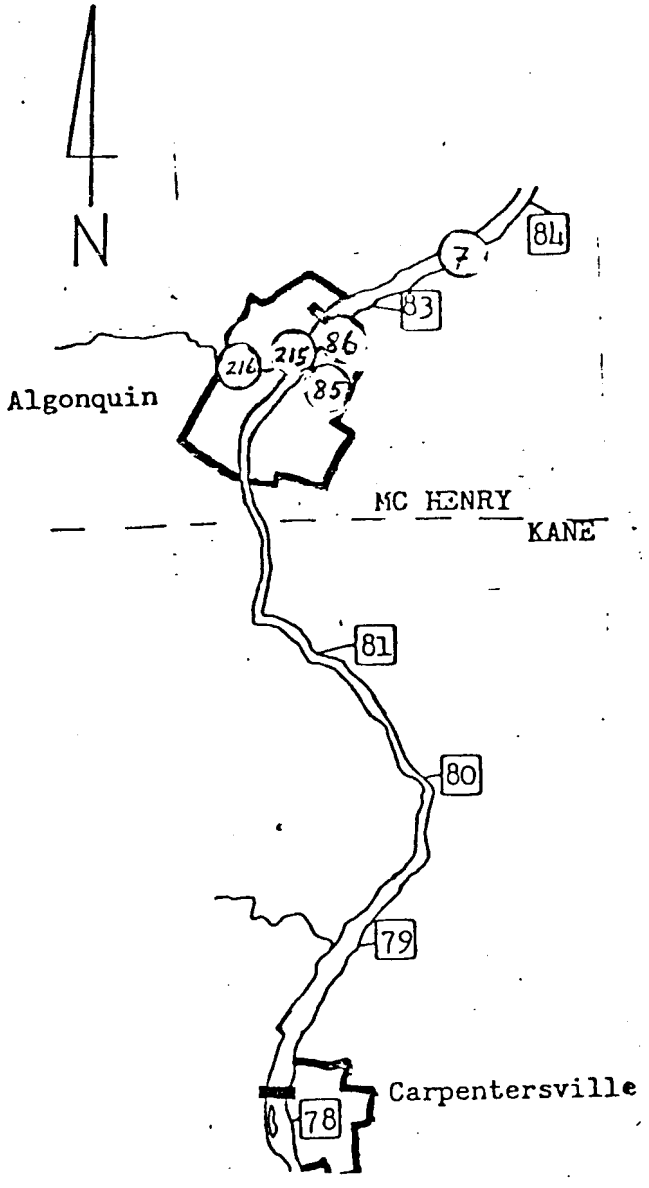

Figure 2. Fox River fish sampling area at Algonquin, fish sample site numbers are listed in circles, river miles from the Illinois River in squares

III. PROCEDURE

Depending on the physical conditions of the sampling site (e.g., water depth, bottom type, current velocity) the following gear were used to collect fish specimens:

1. A 230-volt, 180 cycle, 3-phase alternating current (8 - 11 amps), boat-mounted, boom electrofisher followed by a backup boat; fish being stunned and collected with dip nets.
2. A direct current backpack electrofisher yielding 300 - 400 volts, 0.7 - 0.9 amps; operating from a 12-volt battery; fish being stunned and collected with dip nets. Whenever possible, the backpacker and dipnetters were followed by two men dragging a 15-ft, 3/16-inch mesh minnow seine.
3. A 30-ft, 3/16-inch mesh minnow seine 4-ft high with a 4-x4-x4-ft bag was used occasionally when access by the boat shocker was not available and it was deemed necessary to supplement the backpack/seine collection; or when neither the boat shocker nor backpack shocker could be used.
4. The backpack shocker and dip nets alone were used at the tailraces of dams or in other areas where the bottom of the stream contained too much debris for other gear to be useful.
5. An electric seine operating from a 115-volt generator was also used in a few situations and fish were collected with dip nets and seines as with the backpack-shocker procedure. Since the electric seine proved to be a cumbersome gear, it was not often used.

The following methods were used with the above gear:

The boat shocker: - was used on large streams of sufficient depth and access. Generally a 400-m section of stream was marked off by use of an optical range finder and fish were shocked on both sides of the stream for a total of 800 m of shoreline. In some cases a shorter amount of shoreline was sampled due to physical problems (usually depth); this usually occurred at tributary mouths or in sections of narrow streams where the deep water area was limited.

The backpack shocker/seine: - was used on narrower or shallower streams where a boat shocker was not appropriate. Generally a 40-m section of stream was marked off by use of an optical range finder and fish were shocked either (a), on both sides of the stream for a total of 80 m of shoreline, or if the stream was narrow and the backpack/seine covered all or most of its width then (b), two 40-m sections of stream were measured in line, and a total of 80 m of stream length was sampled. Whenever possible, the 40-m section (or first section of an 80-m section) was begun 100 m upstream of the tributary mouth (if on a tributary) or 150 to 200 m downstream of a dam tailrace if on a major channel.

The 30-ft, 3/16-inch mesh minnow seine, 4 ft high with a 4-x4-x4-ft bag: - would be pulled for a certain distance of shoreline in some areas to supplement some collections. In one case it was dragged behind a 14-ft boat equipped with the backpack shocker on the bow. Total length of a haul with the seine alone or with the gear it was used with is listed for each collection site in the Appendix.

The backpack shocker with dip nets alone: - was used for known amounts of time while sampling the tailraces of dams in various streams. It was also used for 40-m lengths of stream which were so filled with debris or rubble that it would have been of little use to have tried to pull a seine behind it. Sampling was done otherwise in the same manner as the backpack/seine, but without a seine.

The electric seine: - was used in narrow streams. Generally a 40-m section of stream was blocked with 3/16-inch minnow seines, and the electric seine, followed by a 3/16-inch minnow seine and with two dipnetters between the electric seine and minnow seine, was pulled along the stream toward the upstream block seine. This method was repeated 3 or 4 times within the blocked off area in order to collect "all" the fish.

Shocking time was noted for all electrofisher sampling. Distance of stream covered were noted for all methods.

All large fish collected were identified to species, weighed to the nearest gram, and measured for standard length and total length to the nearest millimeter. They were then returned to the stream of capture. Most small fish (less than 80 millimeters total length) were preserved in 10 to 15% formalin and identified, weighed, and measured in the laboratory.

IV. WATER QUALITY INDICATORS

A. Species Diversity

Diversity indices are useful for measuring the quality of an environment for a community of fish species. Their use is based on the generally observed phenomenon that relatively undisturbed environments support communities having large numbers of species with no individual species present in overwhelming abundance. If the species in such a community are ranked on the basis of their numerical abundance, there will be relatively few species with large numbers of individuals and large numbers of species represented by only a few individuals. Many forms of stress tend to reduce diversity by making the environment unsuitable for some species or by giving other species the competitive advantage.[6]

The indices most commonly used to measure "species diversity" in terms of "uncertainty of encounter" are: Brillouin's H and the Shannon[9] H' (equations (1) and (2) below):

$$(1) \quad H = \frac{1}{N} \left(\log N! - \sum_{i}^{s} \log N_i! \right)$$

where N_i = total number of species in the collection;

$$(2) \quad H' = - \sum_{i}^{s} \frac{N_i}{N} \log \frac{N_i}{N}$$

where $\frac{N_i}{N} = p_i$ = the relative importance of species$_i$ in the sample.

Both of these indices have the three following desirable properties.[7]

1) for given s the indices are the greatest when $p_i = 1/s$ for all species (i.e., the species are distributed with even abundances);
2) given two completely even communities, one with s species and one with s + 1 species, the latter will have the greater index; and
3) if the community members are subjected to more than one classification (not necessarily independent) the indices can be added. This is useful if one wants to measure generic diversity and species diversity in one number. This can be carried all the way up the hierarchical classification scheme for organisms if one so desires.

To be accurate on our use of information theory, the proper index of the two is Brillouin's H. This is the information (entropy) of the collection. Shannon's H' is considered to be the maximum likelihood estimator of a collection's information when using a random sample rather than the entire collection. There is a correction term for bias and an estimator of the variance defined for H' if the total number of species in the collection (S) is known (regardless of whether all species occur in the sample).

We recognize that we are not dealing with random samples. We also have to deal with the problem of multiple collection methods. Also, between two localities using the same methods there comes into play numerous factors that limit the comparability of any two collections. Since we feel that most of the error in our collecting would tend to reduce the apparent diversity (usually because our sample size is too small to adequately represent the very patchy nature of a river system) and since H'

approaches H (population) as sample size increases, we choose to report H'. We do so in terms of numbers of individuals and in terms of gram-weight of the species (H'_B). We pass along the warning that the smaller the collection the less likely we are to be near the true H' of the population and that H's calculated for 40 backpack samples are not directly comparable to boat shocker samples. Where multiple methods are used in the same area they would probably be best used on a per unit effort basis to calculate proportions of species (p_i) for incorporation into H', but this is a matter of interpretation.

Evenness, J', is a measure of the distribution of individuals within an assemblage of species.

$$J' = H'/H_{max}$$

where H_{max} is a tabular value of the maximum diversity a given assemblage of species could have, which would be the case when all species in an assemblage had equal numbers of individuals.

B. Body Condition Factor

In analyzing the success of a population of fish, one is struck by variations in the conditions between individuals of the same species as well as between species.

In waters which contain several species, the variation in condition or plumpness is usually greater between species than between individuals within a species; the bass in a lake may be in good flesh while the bluegills may be thin; at any specific time the variation in condition within a species may not be large. Larger differences may be noted at other

times of the year, or even over longer periods, the latter situation perhaps reflecting long-time changes in food availability, or changes in population density. [8]

General word descriptions of condition are likely to be subjective, and not clear to others interested in this phenomenon. For this reason, several methods have been devised for converting condition to a numerical value which may represent an index which allows for a more objective comparison between populations either on a geographical, time, or species basis. [8]

Condition has been expressed in this study by a factor K^{10} (total body length used in computation) where:

$$K = \frac{W\,10^5}{L^3}$$

where W = weight in grams

L = length in millimeters

and 10^5 is a factor to bring the value of K near unity.

General long term features, such as environment, food supply and degree of parasitization may affect the fish's condition directly, or where K is correlated with length, via the growth rate and average size. Seasonal changes have frequently been studied with the aid of condition factors, which have been shown to be correlated with gonad cycles, rate of feeding, etc. Short-term cycles of alternating growth in weight and growth in length have also been revealed by the use of condition factors.

V. RESULTS AND DISCUSSION

Summary statistics for fish length and weight data are listed in Appendix Tables A-2 to A-10. Data as to catch per unit effort (per 30 minutes or 10 minutes electrofishing and per 400 meters or 40 meters of shoreline electrofished) by numbers and by weight and percent (relative abundance) of catch/species by number and by weight, as well as total weight of catch are listed according to each site from which the fish were collected in Appendix Tables A11 - A24. Data for body condition factor of fish collected are listed in Appendix Tables A25 to A33.

The Fox River System was more diverse as to number of species than either the DesPlaines or the Chicago Channel System/Calumet River. A total of 74 species was collected within this system (80 varieties , including hybrids and mirror carp),60 species (65 varieties) in the Des Plaines River System, and 31 species (35 varieties) in the Chicago Channel System/Calumet River.

Catch statistics for the Fox, DesPlaines and Chicago Channel System are listed in Tables 1 to 4, downstream to upstream. On the average, more species were caught in the Fox River (16) than in the DesPlaines River (10) per sample. Number and weight of catch were greater in the DesPlaines River than in the Fox River (average of 173 individuals at 37 kilograms per DesPlaines sample to 121 individuals at 20 kilograms per Fox River sample) but the species diversity and evenness values were higher in the Fox River (based either on numbers or weight) than in the DesPlaines River, indicating a healthier ecological environment in the Fox River.

Table 1. Number of species (S) of fish, number (N) and weight (Wt) in kilograms of fish collected per 30 minutes of electrofishing (boat shocker - 230 v. AC), species diversity (H') and evenness (J')by number of fish collected, and species diversity (H'_B) and evenness (J'_B) by weight (kilograms) of fish collected within the main channel and tributaries of the Fox River during 1976. Site numbers are listed in parentheses below river mile.

Parameter	River Mile															
	32.5 (13)	37.7 (90)	50.5 (84)	58.3 (10)	69.1 (87)	73.5 (8)	83.5 (7)	90.0 (6)	96.8 (138)*	98.2 (5)	99.7 (4)	101.5 (213)*	103.8 (211)*	105.7 (101)	107.3 (3)*	115.0 (1)
S	22	15	18	15	12	21	11	11	13	22	12	6	9	16	15	20
N	174.94	118.82	81.71	159.29	38.83	173.45	48.95	107.13	217.10	60.86	173.14	36.92	91.58	96.73	109.26	216.26
Wt	52.63	18.93	9.67	6.97	11.37	44.54	10.72	26.82	3.50	9.58	43.68	0.26	0.63	33.46	30.33	16.34
H'	2.31	2.15	2.21	1.75	2.00	2.32	1.78	1.75	1.94	2.47	1.60	1.51	1.62	1.76	2.24	2.39
J'	0.73	0.76	0.76	0.62	0.80	0.77	0.74	0.73	0.76	0.80	0.64	0.78	0.71	0.64	0.81	0.77
H'_B	1.45	1.66	1.99	1.04	1.14	0.96	1.08	0.69	2.01	1.38	0.84	0.96	1.69	1.08	1.19	1.57
J'_B	0.45	0.58	0.69	0.37	0.46	0.31	0.45	0.29	0.78	0.45	0.34	0.49	0.74	0.39	0.43	0.51

* Tributary stations
River mile 96.8 = Griswald Lake Drain, Mc Henry County,200 meters above mouth with Fox River
River mile 101.5 = Boone Creek, Mc Henry County, 100 meters above mouth with Fox River
River mile 103.8 = Dutch Creek, Mc Henry County, 100 meters above mouth with Fox River
River mile 107.3 = Nippersink Creek, Mc Henry County, Stream mile 7.4 above mouth with Fox River

Table 2 Number of species (S) of fish, number (N) and weight (Wt) in kilograms of fish collected per 30 minutes of electrofishing (boat shocker - 230 v. AC), species diversity (H') and evenness (J') by number of fish collected, and species diversity (H'_B) and evenness (J'_B) by weight (kilograms) of fish collected within the main channel and tributaries of the Des Plaines River during 1976. Site numbers are listed in parentheses below river mile.

Parameter	River Mile 3.8 (237)*	3.8 (236)*	6.5 (196)	13.3 (119)	13.3 (187)*	35.2 (22)	45.1 (21)	45.1 (83)*	45.4 (126)	55.1 (20)	67.0 (19)	74.0 (18)	79.0 (17)	101.8 (204)	102.0 (205)
S	18	10	9	7	15	11	3	5	8	7	12	10	11	13	14
N	204.28	88.64	749.99	241.65	158.64	89.97	14.59	35.31	131.25	195.40	122.40	123.30	154.50	97.50	71.33
Wt	3.99	0.24	27.13	53.12	16.85	15.44	1.49	6.10	38.74	35.54	40.60	70.64	42.48	61.80	53.43
H'	1.39	1.43	1.11	1.34	1.81	2.01	1.09	1.08	1.55	1.15	1.44	1.45	1.43	1.49	1.62
J'	0.46	0.58	0.51	0.69	0.65	0.81	0.79	0.60	0.67	0.52	0.58	0.58	0.58	0.58	0.56
H'_B	1.67	0.91	1.14	1.05	1.15	1.15	0.16	1.17	1.08	1.10	0.58	0.39	0.24	0.29	0.94
J'_B	0.56	0.37	0.52	0.69	0.41	0.46	0.12	0.65	0.47	0.50	0.24	0.16	0.10	0.11	0.53

* Tributary stations: River mile 3.8 = Du Page River, Will County, Stream mile 0.8 above mouth with Des Plaines River (site #237)
River mile 3.8 = Du Page River, Will County, Mouth with Des Plaines River (site #236)
River mile 13.3 = Hickory Creek, Will County, Stream mile 4.7 above mouth with Des Plaines River - 110 meters above dam in Pilcher Park, Joliet
River mile 45.1 = Salt Creek, Cook County, Stream mile 3.0 above mouth with Des Plaines River

Table 3. Number of species (S) of fish, number (N) and weight (Wt) in kilograms of fish collected per 30 minutes of electrofishing (boat shocker - 230 v. AC), species diversity (H') and evenness (J') by number of fish collected, and species diversity (H'_B) and evenness (J'_B) by weight (kilograms) of fish collected within the North Shore Channel, the branches and main channel of the Chicago River, and the Sanitary and Ship Canal during 1976. Site numbers are listed in parentheses below river miles (measured from Grafton, Illinois)

Parameter	River Mile									
	292.1 (50)	307.9 (49)	317.8 (48)	325.5 (67)	327.0 (60)*	326.0 (56)	332.5 (55)	335.6 (59)	339.0 (58)	342.6 (57)
S	4	2	3	5	15	0	4	1	3	13
N	23.69	2.00	6.41	33.07	202.33	0.00	4.80	1.58	17.00	320.26
Wt	6.72	1.42	1.40	20.87	35.57	0.00	0.25	0.46	10.08	36.09
H'	1.11	0.69	1.43	1.59	1.39	0.00	1.39	0.64	1.21	1.68
J'	0.69	1.00	0.89	0.89	0.49	0.00	1.00	0.92	0.87	0.62
H'_B	1.11	0.23	1.23	0.80	0.96	0.00	1.03	0.11	0.96	1.62
J'_B	0.69	0.33	0.76	0.45	0.34	0.00	0.74	0.16	0.69	0.60

* Chicago River Lock area

Table 4. Number of species (S) of fish, number (N) and weight (Wt) in kilograms of fish collected per 30 minutes of electrofishing (boat shocker - 230 v. AC), species diversity (H') and evenness (J') by number of fish collected, and species diversity (H'_B) and evenness (J'_B) by weight (kilograms) of fish collected within the main channel and tributaries of the Cal - Sag Channel, Little Calumet River, and Calumet River during 1976. Site numbers are listed in parentheses below river miles (measured from Grafton, Illinois).

Parameter	River Mile										
	303.7 (180)*	304.2 (43)	309.2 (182)*	314.8 (44)	319.0 (171)	319.5 (39)*	320.1 (40)	324.7 (46)	325.7 (47)*	327.0 (165)	333.5 (45)**
S	6	2	7	8	1	8	7	7	0	10	12
N	42.00	1.36	67.15	24.64	1.73	10.64	15.70	103.63	0.00	477.50	52.98
Wt	1.52	0.12	23.46	0.25	0.01	0.23	0.21	16.66	0.00	17.65	38.67
H'	1.50	0.69	1.75	1.66	1.60	1.90	0.79	0.81	0.00	1.60	1.99
J'	0.84	1.00	0.80	0.76	0.77	0.86	0.38	0.34	0.00	0.77	0.75
H'_B	0.85	0.10	1.24	1.49	0.20	1.69	1.12	0.62	0.00	1.21	0.77
J'_B	0.47	0.14	0.56	0.68	0.29	0.77	0.54	0.26	0.00	0.58	0.29

* Tributary stations: River mile 303.7 = Illinois & Michigan Canal, 40 meters above mouth with Cal - Sag Channel
River mile 309.2 = Stony Creek, 100 meters above mouth with Cal - Sag Channel
River mile 319.5 = Little Calumet River, 2000 meters above junction with Cal - Sag Channel
River mile 325.7 = Grand Calumet River, 2 miles above junction with Calumet River

* Calumet Yacht Club Marina, Lake Michigan, 1 mile south of Calumet River "mouth" with Lake Michigan, Calumet Harbor

The North Shore Channel/Sanitary and Ship Canal and Calumet River/Cal-Sag Channel had the lowest numbers of species (5), numbers (77) and weight of catch (9 kilograms) per sample than did either the Fox River or the DesPlaines River. Indeed, fish were found to be concentrated mostly in those areas nearest to Lake Michigan, and they do not enter the Chicago Channel System in any appreciable numbers. Diversity and evenness values are of less use here since the low numbers of fish cause them to be insensitive as measures of true water quality for fish life.

Tables 5 to 8 list data for the tributaries of the Fox River, Des Plaines River and the Chicago Channel System. On the average (per sample) tributaries of the Fox River have more species (13), more individuals (148) and greater diversity ($H' = 1.63$, $H'_B = 1.50$) and evenness ($J' = 0.65$, $J'_B = 0.59$) than do those of the DesPlaines River ($S = 6$, $N = 61$, $H' = 1.13$, $H'_B = 0.87$, $J' = 0.57$, $J'_B = 0.42$). Again species diversity and evenness become less useful indices in the tributaries of the Chicago Channel System. These tributaries have an average of only 3 species, 24 individuals and 0.1 kilograms per sample.

The greater average weight per sample in the DesPlaines River tributaries (1.6 kilograms) than in the Fox River tributaries is attributed to the greater number of carp and goldfish in the former group.

TABLES 5 NUMBER OF SPECIES (S) OF FISH, NUMBER (N) AND WEIGHT (WT) IN KILOGRAMS OF FISH COLLECTED PER 10 MINUTES OF ELECTROFISHING (BACKPACK SHOCKER - 200 to 400 V. PULSED D.C.) SPECIES DIVERSITY (H') AND EVENNESS (J') BY NUMBER OF FISH COLLECTED, AND SPECIES DIVERSITY (H'_B) AND EVENNESS (J'_B) BY WEIGHT (KILOGRAMS) OF FISH COLLECTED WITHIN THE TRIBUTARIES (100 METERS UPSTREAM FROM MOUTH) OF THE FOX RIVER DURING 1976. SITE NUMBERS ARE LISTED IN PARENTHESES BELOW RIVER MILE.

	RIVER MILES												
PARA-METERS	31.7[1] (93)	32.0 (246)	36.5 (230)	43.6 (228)	49.5 (226)	53.6 (224)	63.2 (222)	69.9 (220)	73.2 (219)	75.5[2] (217)	82.9 (216)	90.6[3] (214)	107.5[4] (106)
S	11	16	23	14	4	11	12	13	16	19	14	3	13
N	21.56	167.46	334.01	86.97	159.99	125.30	111.60	65.62	119.50	570.92	84.12	13.60	56.92
WT	0.41	0.61	1.04	0.56	0.67	1.22	0.22	0.13	0.67	5.11	0.43	0.17	0.50
H'	2.20	1.88	1.93	1.90	0.38	1.38	1.86	1.79	1.62	1.71	1.69	0.80	1.99
J'	0.92	0.68	0.61	0.70	0.27	0.58	0.75	0.68	0.58	0.58	0.64	0.73	0.78
H'_B	1.21	2.25	2.37	1.86	0.40	1.18	1.44	1.72	1.62	1.61	1.86	0.29	1.71
J'_B	0.51	0.81	0.75	0.69	0.29	0.61	0.58	0.67	0.58	0.55	0.70	0.27	0.67

1. Big Rock/Little Rock Creek confluence, Kendall County. (T.36 N/R 6E/S. 34 SW.)
2. Jelkes Creek, Kane County, Stream Mile 0.4 above mouth with Fox River (T.42 N/R 8E/S. 27SE)
3. Flint Creek, Lake County, Stream Mile 1.2 above mouth Fox River (T.43 N/R 8E/S 15 NW)
4. Nippersink Creek, McHenry County, Stream Mile 6.5 above mouth with Fox River (T.46 N/R 8E/S 30 NW)

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 6

NUMBER OF SPECIES (S) OF FISH, NUMBER (N) AND WEIGHT (WT.) IN KILOGRAMS OF FISH COLLECTED PER 10 MINUTES OF ELECTROFISHING (BACKPACK SHOCKER - 200 TO 400V. PULSED D.C., ELECTRIC SEINE - 120V. A.C.), SPECIES DIVERSITY (H') AND EVENNESS (J') BY NUMBER OF FISH COLLECTED, AND SPECIES DIVERSITY (H'_B) AND EVENNESS (J'_B) BY WEIGHT (KILOGRAMS) OF FISH COLLECTED WITHIN THE TRIBUTARIES (100 METERS UPSTREAM FROM MOUTH) OF THE DES PLAINES RIVER DURING 1976. SITE NUMBERS ARE LISTED IN PARENTHESES BELOW RIVER MILE

	RIVER MILES												
Para-Meter	6.5* (198)	13.3[1]* (132)	27.0**[3] (66)	30.5** (64)	33.5* (244)	51.9*** (78)	59.8* (79)	64.9* (207)	68.4* (114)	69.0[2]* (62)	79.7*** (63)	91.45* (61)	102.0* (15)
S	4	9	6	8	9	7	7	0.00	1	6	3	15	9
N	22.00	129.98	18.01	123.34	110.01	144.43	7.63	0.00	1.67	63.56	58.89	6.80	38.18
WT.	0.08	0.77	1.17	8.04	0.77	8.04	0.04	0.00	0.13	0.11	0.56	0.03	0.58
H'	0.55	1.85	1.47	1.73	1.14	1.37	1.18	0.00	0.00	0.98	0.75	2.17	1.55
J'	0.40	0.84	0.82	0.79	0.52	0.66	0.57	0.00	0.00	0.55	0.68	0.81	0.71
H'_B	0.74	1.71	0.21	0.73	1.70	0.84	1.75	0.00	0.00	1.30	0.18	1.07	1.07
J'_B	0.53	0.78	0.12	0.33	0.71	0.40	0.84	0.00	0.00	0.73	0.16	0.41	0.49

* Tributary stations where backpack shocking was employed, followed by a 15 ft., 3/16" square mesh seine when practical
** Tributary stations where electric seine was employed, followed by a 15 ft. or 30 ft., 3/16" square mesh seine
1. Hickory Cr., Will County, 2.2 miles upstream from mouth with Des Plaines (T35N/R. 10E/S 15NE)
*** Tributary station where both backpack and electric seine shocking was employed, followed by a 15 ft., 3/16" square mesh seine
2. McDonald Creek, Cook County, stream mile 1.0 above mouth with Des Plaines River (T.42N/R. 11E/S.25SW)
3. Black Partridge Creek, Cook County, 200 meter above mouth with Des Plaines River (T. 37N/R. 11E/S. 19NW)

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 7

NUMBER OF SPECIES (S) OF FISH, NUMBER (N) AND WEIGHT (WT.) IN KILOGRAMS OF FISH COLLECTED PER 10 MINUTES OF ELECTROFISHING (BACKPACK SHOCKER - 200 TO 400V. PULSED D.C.), SPECIES DIVERSITY (H') AND EVENNESS (J') BY NUMBER OF FISH COLLECTED, AND SPECIES DIVERSITY (H'_B) AND EVENNESS (J'_B) BY WEIGHT (KILOGRAMS) OF FISH COLLECTED WITHIN THE MAJOR TRIBUTARIES (100 METERS UPSTREAM FROM MOUTH) OF THE DES PLAINES RIVER DURING 1976. SITE NUMBERS ARE LISTED IN PARENTHESES BELOW RIVER MILE

RIVER MILES

Para-Meters	Salt Creek			Du Page River					
	3.6 (81)	13.8 (69)	28.2 (73)	10.6 (75)	14.4 (241)	29.5* (33)	29.7** (31)	38.5** (30)	49.2* (32)
S	0	3	2	9	13	14	6	6	5
N	0.00	3.75	1.54	22.84	841.54	240.00	2.97	14.57	25.91
WT.	0.00	0.06	0.64	0.12	0.93	2.96	0.44	0.19	0.06
H'	0.00	0.82	0.69	1.51	1.11	2.12	1.58	1.55	1.25
J'	0.00	0.75	1.00	0.69	0.43	0.88	0.88	0.87	0.78
H'_B	0.00	0.67	0.15	1.50	1.16	1.27	0.20	1.50	1.34
J'_B	0.00	0.61	0.22	0.68	0.45	0.53	0.11	0.84	0.83

* West Branch, Du Page River
** East Branch, Du Page River

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 8 NUMBER OF SPECIES (S) OF FISH, NUMBER (N) AND WEIGHT (WT) IN KILOGRAMS OF FISH COLLECTED PER MINUTES ELECTROFISHING (BACKPACK SHOCKER - 200 to 400 V PULSED D.C.) SPECIES DIVERSITY (H') AND EVENNESS (J') BY NUMBER OF FISH COLLECTED, AND SPECIES DIVERSITY (H'_B) AND EVENNESS (J'_B) BY WEIGHT (KILOGRAMS) OF FISH COLLECTED WITHIN THE TRIBUTARIES (100 M UPSTREAM FROM MOUTH) OF THE CALUMET/MSD WATERWAYS DURING 1976. SITE NUMBERS ARE LISTED IN PARENTHESES BELOW RIVER MILE.

	RIVER MILE							
	CALUMET RIVER SYSTEM					CHICAGO RIVER SYSTEM		
PARAMETERS	314.0 (186)	8.6[1] (41)	13.7[2] (172)	16.2[3] (161)	16.9[4] (169)	15.6 (54)	27.2 (51)	29.9 (52)
S	3	2	5	2	3	0	5	3
N	58.32	0.90	24.00	52.50	21.65	0.00	26.26	12.00
WT	0.12	0.005	0.50	0.07	0.07	0.00	0.12	0.08
H'	0.47	0.69	1.23	0.11	0.79	0.00	1.12	0.87
J'	0.43	1.00	0.76	0.16	0.72	0.00	0.70	0.79
H'_B	0.79	0.46	1.00	0.31	0.73	0.00	1.04	0.65
J'_B	0.72	0.66	0.62	0.45	0.66	0.00	0.65	0.59

1 Thorn Creek, Cook County, Stream Mile 12.9 above mouth with Little Calumet River (T.36 N/R 14 E/S 34 NW)
2 North Creek, Cook County, Stream Mile 0.5 (14.4) above mouth with Thorn Creek (T. 35 N/R 14 E/S 2 NW)
3 Butterfield Creek, Cook County, Stream Mile 0.1 (16.3) above mouth with Thorn Creek (T. 35 N/R 14 E/S 4 SW)
4 Deer Creek, Cook County, Stream Mile 0.2 (17.1) above mouth with Thorn Creek (T. 36 N/R 14 E/S 10 NW)

Water samples for chemical analysis were taken at the time of the fish population samplings. Results of the analyses for several parameters are listed in Tables 9 - 12. Table 13 summarizes the fish catch data along the river systems.

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 9

Results of Chemical Analysis of Water from Fox River Tributaries

Tributary	Site #	Fox River Mile	Solids (mg/l)				Nitrogen (mg/l)			pH	Total CN (mg/l)	BOD (mg/l)	
			Total	Total Suspended	Volatile Suspended	Dissolved Solids	Total	NH_3-N	NO_2 + NO_3			5 day	20 day
Dutch Creek	211	103.8	608	40	10	568	0.9	0.4	0.9	7.6	0.00	2	32
Boone Creek	213	101.5	722	5	2	717	1.1	0.1	1.1	8.0	0.24	5	49
Flint Creek	214	90.6	942	18	11	924	6.5	4.4	1.5	8.5	0.02	12	26
Mill Creek	224	53.6	520	10	3	510	0.6	0.1	0.8	8.0	0.003	4	10
Indian Creek	226	49.5	706	6	2	700	0.5	0.1	0.2	8.0	0.001	3	11
Robroy Creek*	117	32.0	498	3	1	495	0.6	0.1	2.2	8.2	0.011	2	7
Robroy Creek	246	32.0	464	2	1	462	0.3	0.1	2.2	8.0	0.026	2	9
Big Rock/Little Rock Creek	247	31.7	466	6	5	460	0.5	0.1	4.5	8.2	0.017	3	10

Tributary	COD (mg/l)	Phenol (ug/l)	Chloride (mg/l)	Sulfate (mg/l)	Soluble Phosphate (mg/l)	Total Alkalinity (mg/l as $CaCO_3$)	Turbidity≠ (JTU)	M.B.A.S. (mg/l)	Conductivity (umhos/cm)	Hardness (mg/l as $CaCO_3$)
Dutch Creek	20	0	63	89	0.11	260	14	0	600	439
Boone Creek	16	0	102	55	0.10	302	3	0.02	650	393
Flint Creek	34	2	25	68	1.68	322	5	0.04	700	397
Mill Creek	10	0	34	60	0.10	284	7	0	500	402
Indian Creek	12	0	64	106	0.11	328	6	0	675	483
Robroy Creek*	11	0	34	91	0.24	279	0	0	650	397
Robroy Creek	7	0	20	91	0.22	265	2	0	550	385
Big Rock/Little Rock Creek	11	3	32	57	0.51	287	1	0	550	356

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
TABLE 9 (cont.)
Results of Chemical Analysis of Water from Fox River Tributaries

Tributary	Zinc (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Lead (mg/l)	Mercury (ug/l)	SiO_2 (mg/l)	Dissolved Oxygen (mg/l)
Dutch Creek	0.08	0	0	105	43	0	2.4	10.8	11.3
Boone Creek	0.05	0.02	0.01	85	44	0.06	0.1	15.2	12.0
Flint Creek	0.03	0.02	0	85	45	0.03	1.3	15.3	14.3
Mill Creek	0.01	0	0.02	90	43	0	0.3	5.7	10.7
Indian Creek	0.02	0	0.01	114	48	0.04	0.1	9.9	13.2
Robroy Creek*	0.04	0.02	0.01	88	43	0.04	0	8.7	13.7
Robroy Creek	0.03	0.02	0	85	42	0.04	0.1	9.2	13.8
Big Rock/Little Rock Creek	0.03	0.01	0.01	75	41	0.05	0.6	9.7	15.1

*Mouth of Robroy Creek

≠HACH turbidimeter calibrated against a formazin plastic standard.

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 10

Results of Chemical Analysis of Water From Des Plaines River Tributaries

Tributary	Site #	River Mile	Solids (mg/l)				Nitrogen (mg/l)			pH	Total CN^- (mg/l)	BOD (mg/l)	
			Total	Total Suspended	Volatile Suspended	Dissolved Solids	Total	NH_3-N	$NO_2 + NO_3$			5 day	20 day
North Branch Mill Creek	201	102.0	556	6	4	550	1.8	0.1	0.1	7.6	0.019	6	23
North Branch Mill Creek	202	102.0	690	25	5	665	0.7	0.1	0.2	8.2	0.000	4	27
South Branch Mill Creek	203	102.0	664	16	5	648	2.4	0.9	2.7	7.6	0.18	6	9
South Branch Mill Creek	076	102.0	556	7	2	549	1.1	0.1	0.1	7.7	0.003	4	12
Mill Creek	200	102.0	530	10	5	520	1.7	0.1	0.1	7.8	0.028	5	50
Mill Creek	199	102.0	558	16	4	542	0.5	0.1	0.1	8.0	0.003	3	18
Weller's Ditch	207	64.9	458	37	11	421	2.5	0.3	0.8	7.1	0.007	29	16
Weller's Ditch*	206	64.9	728	112	26	616	2.2	1.0	4.6	7.5	0.005	11	19
Salt Creek*	127	45.2	984	24	3	960	2.5	1.3	4.7	7.6	0.041	3	8
Flag Creek	244	33.5	1362	25	3	1337	1.6	0.1	19.4	8.1	0.014	5	21
Flag Creek*	242	33.2	1006	8	3	998	3.6	1.9	8.0	8.0	0.014	6	27
Hickory Creek	27	13.3	1018	3	1	1015	0.6	0.1	2.2	8.5	0.007	5	7
Hickory Creek	26	13.3	840	8	1	832	0.7	0.1	2.2	8.2	0.019	8	12
Manhattan Creek	191	6.5	648	14	2	634	0.5	0.1	2.2	8.9	0.009	12	16
Jackson Creek	193	6.5	714	85	11	629	0.9	0.1	1.1	8.0	0.001	11	17
Jackson Creek	194	6.5	736	170	10	566	0.5	0.1	1.3	7.9	0.004	6	9
Jackson Creek	28	6.5	646	29	3	617	1.0	0.1	0.3	7.5	0	6	9
Jackson Creek	195	6.5	704	3	1	701	0.6	0.1	0.4	8.0	0.004	7	9
Jackson Creek	198	6.5	556	21	5	535	4.4	3.0	4.7	7.2	0.030	15	32
Jackson Creek	197	6.5	568	21	5	547	4.6	2.9	4.6	7.3	0.036	11	77
Jackson Creek	196	5.5	496	9	4	487	1.8	0.1	0.5	8.3	0.033	8	69

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
TABLE 10 (cont.)
Results of Chemical Analysis of Water from Des Plaines River Tributaries

Tributary	Site #	COD (mg/l)	Phenol (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Soluble Phosphate (mg/l)	Total Alkalinity (mg/l as $CaCO_3$)	Turbidity≠ (JTU)	M.B.A.S. (mg/l)	Conductivity (umhos/cm)	Hardness (mg/l as $CaCO_3$)
North Branch Mill Creek	201	46	17	60	68	0.28	272	5	0.040	460	349
North Branch Mill Creek	202	22	0	45	89	0.15	371	18	0.098	500	476
South Branch Mill Creek	203	33	0	60	130	7.30	215	8	0.059	600	298
South Branch Mill Creek	076	36	1	64	136	0.17	167	4	0.000	650	313
Mill Creek	200	32	0	53	68	0.26	223	5	0.019	600	299
Mill Creek*	199	NA	2	33	102	0.16	268	8	0.040	550	406
Weller's Ditch	207	70	9	71	34	0.24	133	54	0.178	500	204
Weller's Ditch*	206	30	5	119	130	1.03	208	23	0.119	525	364
Salt Creek*	127	170	0	201	233	1.55	244	14	0.238	980	398
Flag Creek	244	24	0	233	177	5.60	216	7	0.000	1425	398
Flag Creek*	242	24	0	65	164	3.00	252	6	0.000	1100	391
Hickory Creek	27	36	0	20	259	0.94	284	5	0.198	1500	484
Hickory Creek	26	28	0	20	218	0.45	277	14	0.079	1450	451
Manhattan Creek	191	12	0	224	102	0.68	241	18	0.059	1450	335
Jackson Creek	193	12	0	225	123	0.12	206	23	0.059	1200	353
Jackson Creek	194	40	0	20	150	0.24	218	40	0.396	1350	356
Jackson Creek	028	16	0	12	130	0.30	223	20	0.020	1150	348
Jackson Creek	195	32	0	19	280	0.10	208	8	0.020	1260	350
Jackson Creek	198	22	6	104	171	0.19	218	1	0.020	600	392
Jackson Creek	197	28	1	84	89	0.94	136	7	0.000	575	252
Jackson Creek	196	28	6	212	82	0.94	136	6	0.000	600	229

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 10 (cont.)

Results of Chemical Analysis of Water From Des Plaines River Tributaries

NA = No Analysis)

Tributary	Site #	Zinc (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Lead (mg/l)	Mercury (ug/l)	SiO_2 (mg/l)	Dissolved Oxygen (mg/l)
North Branch Mill Creek	201	0.02	0.02	0.00	72	41	0.05	0.1	5.9	4.7
North Branch Mill Creek	202	0.03	0.02	0.00	100	55	0.07	0.0	18.4	12.5
South Branch Mill Creek	203	0.03	0.02	0.00	60	36	0.04	0.0	18.1	5.5
South Branch Mill Creek	076	0.02	0.01	0.00	66	36	0.05	0.0	1.8	7.0
Mill Creek	200	0.12	0.02	0.00	62	35	0.07	0.2	1.3	4.7
Mill Creek*	199	0.02	0.02	0.00	90	44	0.05	0.0	14.0	5.6
Weller's Ditch	207	0.12	0.02	0.02	49	20	0.37	0.1	26.4	5.36
Weller's Ditch*	206	0.04	0.02	0.00	88	35	0.08	0.1	12.6	5.36
Salt Creek*	127	0.05	0.00	0.06	97	38	0.06	0.26	12.0	11.8**
Flag Creek	244	0.06	0.01	0.00	100	36	0.06	0.4	12.3	17.9
Flag Creek	242	0.06	0.02	0.00	94	38	0.06	0.4	9.6	16.4
Hickory Creek	27	0.02	0.02	0.01	118	46	0.02	0.3	10.0	11.8
Hickory Creek	26	0.01	0.02	0.01	105	46	0.04	0.1	10.6	10.2
Manhattan Creek	191	0.02	0.02	0.01	75	36	0.10	0.2	4.9	15.7
Jackson Creek	193	0.03	0.02	0.00	77	39	0.06	0.2	7.5	8.4
Jackson Creek	194	0.03	0.03	0.01	78	39	0.05	0.8	4.4	9.5
Jackson Creek	028	0.02	0.02	0.01	75	39	0.05	0.0	8.3	7.5
Jackson Creek	195	0.02	0.01	0.01	71	42	0.05	0.2	2.4	9.7
Jackson Creek	198	0.02	0.00	0.01	86	43	0.05	0.8	2.4	13.6
Jackson Creek	197	0.10	0.01	0.02	63	23	0.10	1.0	8.2	9.46
Jackson Creek	196	0.09	0.02	0.02	59	20	0.02	0.6	8.1	5.6

*Creek Mouth

**Hach Meter D.O.

≠Hach Turbidimeter calibrated against a formazin plastic standard.

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 11

Results of Chemical Analysis of Water from Little Calumet River and Cal - Sag Channel Tributaries

Tributary	Site #	River Mile	Solids (mg/l)				Nitrogen (mg/l)			pH	Total CN^- (mg/l)	BOD (mg/l)	
			Total	Total Suspended	Volatile Suspended	Dissolved Solids	Total	NH_3-N	$NO_2 + NO_3$			5 day	20 day
Deer Creek	169	16.8***	366	43	16	323	1.4	0.1	1.4	7.5	0.002	8	15
Butterfield Creek	160	16.2***	824	41	15	783	2.7	1.4	0.9	7.5	0.005	15	32
Thorn Creek	42	16.2***	1536	29	9	1507	11.2	9.8	1.8	7.9	0.008	13	11
Thorn Creek	41	12.9***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
North Creek	172	13.8	1010	31	3	979	1.0	< 0.1	1.8	7.8	0.006	4	2
Little Calumet River*	174	319.6	604	23	4	581	9.7	8.2	1.2	7.5	0.021	5	4
Tinley Creek*	175	314.0	412	10	2	402	0.9	< 0.1	0.1	8.0	0.009	2	8
Stony Creek	182	309.2	874	41	11	833	6.9	5.5	1.0	7.5	0.021	2	47
I & M Canal	181	303.7	656	27	6	629	4.5	3.1	2.4	7.5	0.001	2	29

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 11 (cont.)

Results of Chemical Analysis of Water from Little Calumet River and Cal - Sag Channel Tributaries

(NA = No Analysis)

Tributary	Site #	COD (mg/l)	Phenol (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Soluble Phosphate (mg/l)	Total Alkalinity (mg/l as $CaCO_3$)	Turbidity≠ (JTU)	M.B.A.S. (mg/l)	Conductivity (umhos/cm)	Hardness (mg/l as $CaCO_3$)
Deer Creek	169	44	0	47	95	0.32	86	48	0.079	1050	126
Butterfield Creek	160	48	0	160	136	0.56	164	37	0.079	1400	318
Thorn Creek	42	68	6	370	280	5.70	318	13	0.119	1500	601
Thorn Creek	41	NA	NA	524	331	NA	NA	NA	0.158	NA	NA
North Creek	172	12	0	56	283	0.26	327	16	0.048	950	750
Little Calumet River*	174	16	3	108	116	0.67	177	16	0.158	1300	264
Tinley Creek*	175	8	0	62	123	0.11	147	12	0.079	550	255
Stony Creek	182	51	0	29	191	0.37	286	18	0.059	800	456
I & M Canal	181	40	0	27	150	0.53	198	15	0.040	650	305

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 11 (cont.)

Results of Chemical Analysis of Water from Little Calumet River and Cal - Sag Channel Tributaries

(NA = No Analysis)

Tributary	Site #	Zinc (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Lead (mg/l)	Mercury (ug/l)	SiO_2 (mg/l)	Dissolved Oxygen (mg/l)
Deer Creek	169	0.06	0.02	0.01	29	13	0.07	0.1	11.7	6.7
Butterfield Creek	160	0.05	0.02	0.02	76	31	0.06	0.1	6.7	3.3
Thorn Creek	42	0.07	0.03	0.00	150	55	0.04	0.1	14.7	4.7
Thorn Creek	41	NA	NA	NA	NA	NA	NA	NA	NA	2.7
North Creek	172	0.02	0.00	0.00	185	70	0.00	0.2	12.8	6.9
Little Calumet River*	174	0.55	0.00	0.05	66	24	0.12	0.3	7.2	2.6
Tinley Creek*	175	0.03	0.03	0.00	56	28	0.11	0.1	3.2	2.5
Stony Creek	182	0.05	0.00	0.05	110	44	0.04	0.2	8.5	4.8
I & M Canal	181	0.10	0.03	0.08	66	34	0.04	0.2	6.9	2.6**

*River or Creek mouth

**Dissolved Oxygen reading determined on HACH meter

***Thorn Creek Stream Mile

≠HACH turbidimeter calibrated against a formazin plastic standard

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 12 RESULTS (3 MONTH AVERAGES) OF CHEMICAL ANALYSIS OF WATER FROM THE FOX RIVER, DES PLAINES RIVER AND CHICAGO CHANNEL SYSTEM/CALUMET RIVER DURING 1976

	pH Range	Alkalinity (mg/l)	Turbidity (JTU)	Solids (mg/l)			Nitrogen (mg/l)			Dissolved Oxygen (mg/l)	BOD (mg/l)	
				Total	Total Suspended	Volatile Suspended	Total	$N\text{-}NH_4$	NO_2+NO_3		5 day	20 day
FOX RIVER												
UPPER	8.1-8.7	213	23	476	54	18	1.82	0.14	0.48	12.2	2	13
MIDDLE	8.2-8.7	214	25	495	65	19	2.06	0.21	0.63	11.0	7	13
LOWER	8.3-8.6	217	25	526	67	20	2.02	0.22	0.93	10.1	7	13
DES PLAINES RIVER												
UPPER	7.7-8.2	212	31	696	63	12	2.68	1.80	2.63	9.6	5	9
MIDDLE	7.6-8.4	184	28	683	51	11	2.12	1.03	3.41	8.9	5	12
LOWER	7.4-8.3	179	26	658	52	10	2.87	1.84	3.33	7.8	4	9
CALUMET RIVER/CAL-SAG CHANNEL												
UPPER	7.7-8.0	110	11	268	18	4	0.76	0.34	0.46	9.3	2	6
MIDDLE	7.4-7.5	176	20	594	33	9	10.83	10.00	0.71	5.0	6	12
LOWER	7.5	179	18	648	32	9	9.97	9.32	0.74	5.1	4	12
NORTH SHORE CHANNEL/NO. BR. CHICAGO RIVER												
UPPER*	8.2-8.3	110*	13	240	20	5	0.64	0.19	0.24	5.0	3	4
MIDDLE	7.2-7.4	189	10	475	15	5	8.58	7.94	1.53	3.8	4	10
LOWER	7.8-8.1	111*	7	207	12	4	0.62	0.20	0.21	10.2	2*	3*
SANITARY & SHIP CANAL												
UPPER	7.4-7.6	149	13	343	22	6	4.52	3.93	0.77	5.2	3	8
MIDDLE	7.3-7.4	148	11	490	21	6	3.85	2.91	3.29	4.3	3	9
LOWER	7.3-7.4	155	13	508	23	7	5.53	4.71	2.49	4.1	3	8

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 12 (Cont'd) RESULTS (3 MONTH AVERAGES) OF CHEMICAL ANALYSIS OF WATER FROM THE FOX RIVER, DES PLAINES RIVER AND CHICAGO CHANNEL SYSTEM/CALUMET RIVER DURING 1976

	Temperature °C	COD (mg/l)	TOC (mg/l)	Sol. P (mg/l)	SiO_2 (mg/l)	Hardness (mg/l as $CaCO_3$)	Chlorophyll-a (ug/l)
FOX RIVER							
UPPER	16	74	35	0.12	2.52	301	127.62
MIDDLE	18	73	35	0.15	1.62	306	133.85
LOWER	17	76	35	0.25	2.11	309	147.62
DES PLAINES RIVER							
UPPER	12	91	34	0.82	10.35	377	31.65
MIDDLE	13	103	34	0.97	8.08	339	58.04
LOWER	16	94	31	0.78	7.02	303	44.34
CALUMET RIVER/CAL-SAG CHANNEL							
UPPER	14	41	17	0.14	1.33	156	6.80
MIDDLE	16	89*	32*	0.95	5.68	256	18.01
LOWER	16	84*	31*	0.86	5.53	276	41.78
NORTH SHORE CHANNEL/NO. BR. CHICAGO RIVER							
UPPER*	18	35	17	0.18	1.17	147	8.10
MIDDLE	16	66*	30*	1.64	6.19	228	2.86
LOWER	12	29*	16*	0.18	0.68*	144*	5.17*
SANITARY & SHIP CANAL							
UPPER	19	59*	25*	0.72	3.53	183	5.70
MIDDLE	19	70*	26*	0.57	5.02	200	2.99
LOWER	20	70*	27*	0.64	5.00	229	12.31

* Data for June and September, only (December omitted)

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

TABLE 13

NUMBER AND WEIGHT (PER 30 MINUTES BOAT ELECTROFISHING), SPECIES DIVERSITY - BY NUMBERS AND WEIGHT (SUBSCRIPT B) AND PERCENT GAME, ROUGH AND FORAGE FISH COLLECTED DURING 1976 (208 PROGRAM)

	NUMBER PER 30 MIN.	WEIGHT (K) PER 30 MIN.	SPECIES DIVERSITY H'	SPECIES DIVERSITY H'_B	EVENNESS J'	EVENNESS J'_B	PERCENT GAME FISH WEIGHT	PERCENT GAME FISH ABUNDANCE	PERCENT FORAGE FISH WEIGHT	PERCENT FORAGE FISH ABUNDANCE	PERCENT ROUGH FISH WEIGHT	PERCENT ROUGH FISH ABUNDANCE
FOX RIVER												
UPPER	137	25.8	1.91	1.22	0.72	0.42	28.62	64.07	0.35	28.33	71.03	7.60
MIDDLE	126	23.4	2.00	0.97	0.78	0.38	18.47	75.98	0.08	5.79	81.45	18.23
LOWER	134	22.1	2.11	1.54	0.72	0.52	9.58	52.95	0.23	11.22	90.19	35.83
DES PLAINES RIVER												
UPPER	112	57.1	1.50	0.34	0.58	0.13	3.82	43.55	0.01	3.66	96.17	52.79
MIDDLE	116	29.1	1.31	0.73	0.64	0.33	3.17	29.67	0.02	2.07	96.81	68.26
LOWER	293	24.0	1.47	1.06	0.65	0.47	2.73	9.95	21.29	74.82	75.98	15.23
CALUMET RIVER/CAL - SAG CHANNEL												
UPPER	291	17.2	1.21	0.92	0.56	0.42	4.61	6.92	4.66	85.78	90.73	7.30
MIDDLE	14	0.2	1.35	0.94	0.64	0.50	30.38	67.97	2.66	10.26	66.96	21.77
LOWER	1	0.1	0.69	0.10	1.00	0.14	0.00	0.00	2.02	50.00	97.98	50.00
NORTH SHORE CHANNEL/NORTH BR. CHICAGO RIVER												
UPPER	167	23.1	1.45	1.29	0.75	0.65	4.34	12.02	6.75	75.26	88.91	12.72
MIDDLE	2	0.2	0.68	0.38	0.64	0.30	25.96	42.86	1.94	14.28	72.10	42.86
LOWER	118	28.2	1.49	0.88	0.69	0.40	3.88	19.78	2.32	69.27	93.80	10.95
SANITARY & SHIP CANAL												
UPPER	6	1.4	1.43	1.23	0.89	0.76	3.92	5.88	1.18	11.77	94.90	82.35
MIDDLE	2	1.4	0.69	0.23	1.00	0.33	0.00	0.00	0.00	0.00	100.00	100.00
LOWER	24	6.7	1.11	1.11	0.69	0.69	2.77	7.81	0.00	0.00	97.23	92.19

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