



**Region 2  
Watershed Program  
5931 Fox River Drive  
Plano, Illinois 60548**

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**Fish Community Survey  
of  
LAKE MICHIGAN BASIN  
Cook County  
Illinois**

**September 2001  
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## Introduction

The Lake Michigan Basin was surveyed in 2001 by the Illinois Department of Natural Resources (IDNR) in cooperation with the Illinois Environmental Protection Agency (IEPA). This effort is part of a Statewide monitoring program designed to measure the health of Illinois streams using fish community, macroinvertebrate, habitat, water and sediment quality data. Under this program, major basins of the State are evaluated every five years to determine the overall condition of the streams and monitor long term changes as part of reporting requirements under Section 305(b) of the Federal Clean Water Act. Data from basin surveys are also used in watershed and fisheries management applications.

This report summarizes results of the fish surveys including species composition, distribution, and determination of stream quality based on fish community structure. Water quality, sediment and physical habitat sampling results will be published by IEPA in a separate report.

## Methods

The watersheds sampled in this study include the Chicago River, and the Little Calumet River Sub-Basins (Figures 1, 2). Although both of these river systems historically drained to Lake Michigan, due to human modifications in the early 1900's, they now drain into the Illinois River Watershed through the Sanitary and Ship Canal, combined with water diversions from Lake Michigan (Moore et al 1998). These watersheds, also referred to as the Chicago Waterway System, are characterized by extensive urban land use and channel modification for wastewater/storm water conveyance and navigation. The Chicago River, including the North Branch of the Chicago River and its tributaries (Figure 1), flow through parts of Lake and Cook County, draining an area of 548 square miles. Flow in parts of these systems is influenced by diversions of Lake Michigan water. The Little Calumet River drainage in Cook and Will Counties (Figure 2), includes Thorn Creek and its tributaries, Butterfield, North, and Deer Creeks, covering 265 square miles. Tinley Creek, a direct tributary to the Cal-Sag Channel drains an area of 13.1 square miles.

Table 1. Lake Michigan Basin Survey sampling information

IDNR ID NO.	IEPA STA. CODE	DATE	STREAM NAME	COUNTY	SAMPLING GEAR*	EFFORT (minutes)
11253	HCCA-04	31-Jul-01	North Shore Channel	Cook	BE	60
11254	HCC-02	31-Jul-01	N. Br. Chicago River	Cook	BE	60
11255	HCCD-09	01-Aug-01	Skokie River	Cook	BE/PE	54
11256	HCCC-04	01-Aug-01	N. Br. Middle Fk Chicago River	Cook	BE/SH	30
11257	HB-01	27-Aug-01	Little Calumet	Cook	BE	60
11258	HA-04	27-Aug-01	Little Calumet	Cook	BE	60
11259	HBDB-03	28-Aug-01	Butterfield Creek	Cook	ES	22
11260	HBDC-02	28-Aug-01	Deer Creek	Cook	ES	37
11261	HBDA-01	29-Aug-01	North Creek	Cook	ES	42
11262	HF-01	29-Aug-01	Tinley Creek	Cook	ES	40
11263	HBD-05	30-Aug-01	Thorn Creek	Cook	ES	37

\*BE = boat electrofishing; BP = backpack electrofishing; ES = electric seine; SH = seine haul

The surveys were conducted from July 31 to August 30, 2001. A total of 11 locations were sampled (Table 1), 4 in the Chicago River Sub-basin (Figure 1) and 7 in the Little Calumet Sub-basin (Figure 2). Detailed station descriptions and legal locations are presented in Table 2. Fish were collected using boat electrofishing, backpack electrofishing and seining. Locations with water depth greater than 1.6 meters were sampled using a 12 - foot boat equipped with a 3500 watt - 3 phase generator (AC). Where habitat and water depths permitted, supplemental collections were made at boat sites using a backpack electrofishing unit (DC) or a 15-meter (50 ft.) minnow seine with 6 mm (0.25 in.) mesh. Wadable sites, less than 1.6 meters, were sampled using a 9-meter (30 ft.) electric seine, powered by a single-phase, 1600 watt generator (Bayley et al. 1989). At electric seine sites, upstream and downstream limits of each sampling station were blocked by nets to prevent escape and/or entry into the station during sampling. Larger fish specimens were weighed, measured and returned to the stream. Smaller individuals were preserved and identified in the laboratory.

At each station, stream conditions were evaluated using the Index of Biotic Integrity (IBI) (Smogor 2000). The IBI is a widely-used stream quality index based on the fish community attributes including, the number and types of species present, tolerance to degradation, trophic status, and habitat preferences. IBI scores range from 0-60, with higher scores indicating better quality. Data for all gear types were combined to calculate the IBI for an individual location. The IBI is the basis for determining the letter-based Biological Stream Characterization (BSC)(Bertrand et al. 1996) rating which ranges from A (highest) to E (lowest). Individual metric scores for each station can be found in the Appendix, Table A-1 and Table A-2. Qualitative habitat observations were made at each station and appear in Table A-3.

Table 2. Lake Michigan Basin Survey location information (All Stations in Cook County)

<b>IDNR ID NO.</b>	<b>IEPA STA. CODE</b>	<b>STREAM NAME</b>	<b>ACCESS LOCATION</b>	<b>TOWN- SHIP</b>	<b>RANGE</b>	<b>SEC.</b>
11253	HCCA-04	North Shore Channel	Wilson Ave., US	40N	13E	NW1
11254	HCC-02	N. Br. Chicago River	N. Shore Channel Confl	40N	13E	NE13
11255	HCCD-09	Skokie River	Winnetka Road Bridge	42N	19E	E19
11256	HCCC-04	N. Br. Md. Fk. Chi.R.	Chick Evan Golf Course	41N	12E	NE17
11257	HB-01	Little Calumet	Ashland Ave. Bridge	37N	14E	SW32
11258	HA-04	Little Calumet	Rt.1 Halstead Ave. Bridge	37N	14E	NE32
11259	HBDB-03	Butterfield Creek	Veterans Memorial Park	35N	14E	NW8
11260	HBDC-02	Deer Creek	Cottage Grove Ave	36N	14E	NW11
11261	HBDA-01	North Creek	Sweet Woods FP	35N	14E	NW2
11262	HF-01	Tinley Creek	Conkley FPD	37N	13E	32
11263	HBD-05	Thorn Creek	Rt. 30 Bridge	35N	14E	NE20

## Results and Discussion

### *Chicago River Sub-Basin*

A total of 644 fish, representing 18 species, were collected during the 2001 survey (Table 3). Three non-native species were collected including common carp, goldfish, and mosquitofish,

a species whose natural range is limited to Southern Illinois. Species diversity was low ranging from 8 to 15 for all the stations (Table 3). Abundance was also low compared to other Illinois streams of similar size. Largemouth bass was the most abundant species in the basin, followed by green sunfish and bluegill. White sucker, common carp, and gizzard shad were also abundant. These 6 species combined made up 86% of the total abundance in the basin.

The North Shore Channel (HCCA-04), and the North Branch of the Chicago River (HCC-02) have similar morphology: straightened, low gradient channels with homogeneous structure and no riffles. Large areas of submerged aquatic vegetation and woody debris accounted for most of the habitat present. Water quality may be a limiting factor, due to large volume of wastewater inputs and urban runoff (Moore et al. 1998). Stream quality at these stations as measured by the IBI was very low, with ratings in the D and E range (Table 3). HCC-02 had the highest number of species and the greatest abundance of fish for the entire sub-basin. The presence of the West River Park Dam (Figure 1) within this station had an apparent impact on abundance and diversity. Most of the largemouth bass and other sunfish species were collected in close proximity to the dam, which created an area of high hydraulic diversity. Water quality may have been better in this area as well, due to input from the upper North Branch and oxygenation of the water below the dam structure. Recent collections near HCC-02 and HCCA-04 (Dennison et al., 1998) found similar species compositions. A collection at Touhy Avenue on the North Branch (Figure 1, HCC-07) conducted in 1996 (IDNR unpublished data), also found highly degraded conditions with only 7 species and 30 individuals in the sample.

The Middle Fork of the North Branch at Station HCCC-4 had characteristics of a natural channel, with meander bends present. The channel was very low gradient without riffle and pool development. Instream cover was very low (10%), with 50% of the substrate composed of silt and mud (Table A-3). Poor habitat conditions were reflected in an IBI score of 16 (Table 3). The fish community was composed of only 7 native species, with green sunfish, white sucker, and carp the most dominant species. Macroinvertebrate sampling at this station (IDNR unpublished data) and other locations in the upper North Branch and Middle Fork (Moore et al. 1998), suggest that water quality is not a limiting factor.

The stream channel appeared to be channelized at Station HCCD-09 on the Skokie River. Instream cover was very low (5%), comprised of woody debris and limited areas of submerged vegetation (Table A-3). Tolerant, generalist species dominated the collection at this location, resulting in an IBI of 20 (Table 3, A-2). The presence of walleye at this station was probably due to escape from the Skokie Lagoons, which is located a short distance upstream and actively managed for sportfish.

Although largemouth bass and bluegill were among the most abundant species over the entire Chicago River Sub-basin, sportfishing opportunities were very limited. Individuals captured in most areas were small juveniles or young-of-the-year, with very few catchable-sized fish present. One exception was the area below West River Park Dam at HCC-02, where largemouth bass were relatively abundant in a range of sizes up to 400 mm (16 inches).

Throughout the Chicago River Sub-basin, IBI scores reflect very poor conditions. No benthic invertivores were present (Table A-1, Appendix), which may be indicative of frequent

high flow conditions, often found in urbanized watersheds. Habitat and water quality were significant limiting factors at many locations, accounting for low species diversity and lack of intolerant species (Table A-1). In areas of the upper North Branch, upstream of West River Park Dam, habitat and water quality appear to be adequate to support higher species diversity (Moore et al. 1998). Lack of connection to a high quality recruitment source due to the presence of the West River Park Dam (Figure 1), in combination with poor conditions in the North Shore Channel and lower North Branch, also present a significant limiting factor.

Table 3. Summary of fish collection for 2001 Lake Michigan Basin Survey, all methods combined, Chicago River Sub-basin.

COMMON NAME	SCIENTIFIC NAME	North	N. Branch		Mid. Fork	total
		Shore	Chicago	Skokie	N. Branch	
		Channel	River	River	Chicago R.	
		HCCA-04	HCC-02	HCCD-09	HCCC-04	
Gizzard shad	<i>Dorosoma cepedianum</i>	41	17	2	0	60
Goldfish	<i>Carassius auratus</i>	4	9	2	4	19
Carp	<i>Cyprinus carpio</i>	13	20	9	22	64
Carp x Goldfish hybrid	<i>Cyprinus carpio x Carassius auratus</i>	1	0	0	1	2
Golden shiner	<i>Notemigonus crysoleucas</i>	1	1	0	0	2
Spotfin shiner	<i>Cyprinella spiloptera</i>	0	1	0	0	1
Bluntnose minnow	<i>Pimephales notatus</i>	3	2	0	0	5
White sucker	<i>Catostomus commersoni</i>	8	2	26	35	71
Yellow bullhead	<i>Ameiurus natalis</i>	0	3	3	2	8
Black bullhead	<i>Ameiurus melas</i>	1	5	0	2	8
Blackstripe topminnow	<i>Fundulus notatus</i>	0	0	1	31	32
Mosquitofish	<i>Gambusia affinis</i>	0	0	0	4	4
Black crappie	<i>Pomoxis nigromaculatus</i>	0	3	4	0	7
Largemouth bass	<i>Micropterus salmoides</i>	14	83	46	10	153
Green sunfish	<i>Lepomis cyanellus</i>	5	26	30	26	87
Bluegill x Gr. sunfish hybrid	<i>L. macrochirus x L. cyanellus</i>	0	5	1	0	6
Bluegill	<i>Lepomis macrochirus</i>	9	39	24	13	85
Pumpkinseed	<i>Lepomis gibbosus</i>	0	1	0	0	1
Orangespotted sunfish	<i>Lepomis humilis</i>	0	24	2	0	26
Walleye	<i>Stizostedion vitreum</i>	0	0	3	0	3
<b>total individuals</b>		100	241	153	150	644
<b>total species</b>		10	15	12	10	18
<b>total native species</b>		8	13	10	7	15
<b>IBI (BSC)</b>		<b>14 (E)</b>	<b>23 (D)</b>	<b>20 (E)</b>	<b>16(E)</b>	

### *Calumet/Little Calumet River Sub-basin*

A total of 1246 individuals, representing 21 native species were collected in the Little Calumet River Sub-basin (Table 4). In addition, four non-native species were found: common carp, and goldfish, white perch and round goby. Tolerant species dominated the communities in this sub-basin, with bluntnose minnow, creek chub, and gizzard shad the most numerous species. Diversity and abundance were higher in this Sub-basin compared to the Chicago River Sub-basin, however, few intolerant species were present (Table A-2).

The Little Calumet River stations, HB-01 and HA-04, were very poor quality, with low

IBI scores, and BSC ratings in the “E” range, the lowest possible rating (Table 4). HA-04 was

Table 4. Summary of fish collection for 2001 Lake Michigan Basin Survey, all methods combined - Calumet/ Little Calumet River Sub-basin.

COMMON NAME	SCIENTIFIC NAME	Little	Little	Butter-	Deer	North	Thorn	Tinley	total
		Calumet River	Calumet River	Field Creek	Creek	Creek	Creek	Creek	
		HB-01	HA-04	HBDB-03	HBDC-02	HBDA-01	HBD-05	HF-01	
Round goby	<i>Neogobius melanostomus</i>	1	2	0	0	4	0	0	7
White perch	<i>Morone americana</i>	0	8	0	0	1	0	0	9
Bowfin	<i>Amia calva</i>	0	1	0	0	0	0	0	1
Gizzard shad	<i>Dorosoma cepedianum</i>	69	78	1	0	92	0	0	240
Central mudminnow	<i>Umbra limi</i>	1	0	0	0	0	0	0	1
Grass pickerel	<i>Esox americanus</i>	0	0	0	1	24	0	0	25
Goldfish	<i>Carassius auratus</i>	1	9	0	0	0	0	0	10
Carp	<i>Cyprinus carpio</i>	33	31	1	13	0	0	0	78
Golden shiner	<i>Notemigonus crysoleucas</i>	0	0	3	0	0	0	0	3
Creek chub	<i>Semotilus atromaculatus</i>	0	1	16	27	4	116	50	214
Central stoneroller	<i>Campostoma anomalum</i>	0	0	0	0	0	0	28	28
Fathead minnow	<i>Pimephales promelas</i>	0	0	1	0	0	3	0	4
Bluntnose minnow	<i>Pimephales notatus</i>	0	7	74	66	5	1	83	236
Emerald shiner	<i>Notropis atherinoides</i>	0	12	0	0	0	0	0	12
Bigmouth shiner	<i>Notropis dorsalis</i>	0	0	2	0	0	0	0	2
White sucker	<i>Catostomus commersoni</i>	0	2	20	1	0	35	61	119
Channel catfish	<i>Ictalurus punctatus</i>	1	0	0	0	0	0	0	1
Yellow bullhead	<i>Ameiurus natalis</i>	0	4	5	0	0	0	0	9
Largemouth bass	<i>Micropterus salmoides</i>	4	40	1	0	5	6	5	61
Smallmouth bass	<i>Micropterus dolomieu</i>	0	1	0	0	0	0	0	1
Warmouth	<i>Lepomis gulosus</i>	1	0	0	0	0	0	0	1
Green sunfish	<i>Lepomis cyanellus</i>	1	4	2	12	2	7	55	83
Bluegill x Gr. sunfish hybrid	<i>L. macrochirus</i> x <i>L. cyanellus</i>	0	0	1	0	0	0	0	1
Bluegill	<i>Lepomis macrochirus</i>	2	14	1	1	8	0	20	46
Orangespotted sunfish	<i>Lepomis humilis</i>	0	0	0	1	0	0	0	1
Johnny darter	<i>Etheostoma nigrum</i>	0	0	2	13	8	0	30	53
<b>total individuals</b>		114	214	130	135	153	168	332	1246
<b>total species</b>		10	15	13	9	10	6	9	25
<b>total native species</b>		7	11	12	8	8	6	9	21
<b>IBI (BSC)</b>		<b>11 (E)</b>	<b>20 (E)</b>	<b>17 (E)</b>	<b>18 (E)</b>	<b>22 (D)</b>	<b>22 (D)</b>	<b>10 (E)</b>	

located in the Cal-Sag Channel, a man-made waterway. Habitat was present, but limited to small areas of woody debris and scattered beds of submergent and emergent vegetation. Smallmouth bass, an intolerant species, and bowfin were found only at HA-04. Species diversity was lower at HB-01, compared to HA-04 (Table 4). Gizzard shad and common carp made up nearly 90% of the catch at HA-04. The substrate at HA-01 was composed largely of silt and sand, with very little instream cover. Both stations were dominated by generalist feeders with no specialist invertivores present (Table A-2).

The Thorn Creek Watershed included the tributaries Butterfield Creek, Deer Creek, and North Creek. All stations in this watershed had limited fish communities with BSC rating in the “D” and “E” range (Table 4). Unlike most other areas of the Lake Michigan Basin, remnant populations of stream species such as johnny darter, creek chub, and grass pickerel were found. However, overall diversity was low, with no intolerant species present (Table A-2).

Natural channel morphology, with good riffle/ pool development was present at Butterfield Creek (HBDB-03), which may have accounted for the high number of native minnow species at this location, in comparison to other stations (Table A-2). The North Creek location, HBDA-01, also had good habitat features, an unaltered natural channel with a well developed flood plain. In contrast, habitat was limited in Deer Creek (HBDC-03) with a deeply incised channel and poor riffle development, although benthic invertivores were present (Table A-2). Thorn Creek also had a very incised channel and poor floodplain connection, and despite the presence of abundant habitat (Table A-3), only 6 species were present at HBD-05. A previous sample collected in 1996 on Thorn Creek at HBD-04 (Figure 2) also yielded only 6 species (INDR unpublished data). Despite some areas of good habitat, the Thorn Creek Watershed had limited fish communities. The lack of connection to a good quality large river system combined with local water quality problems and a highly urbanized landscape appear to contribute to poor fish diversity in this watershed .

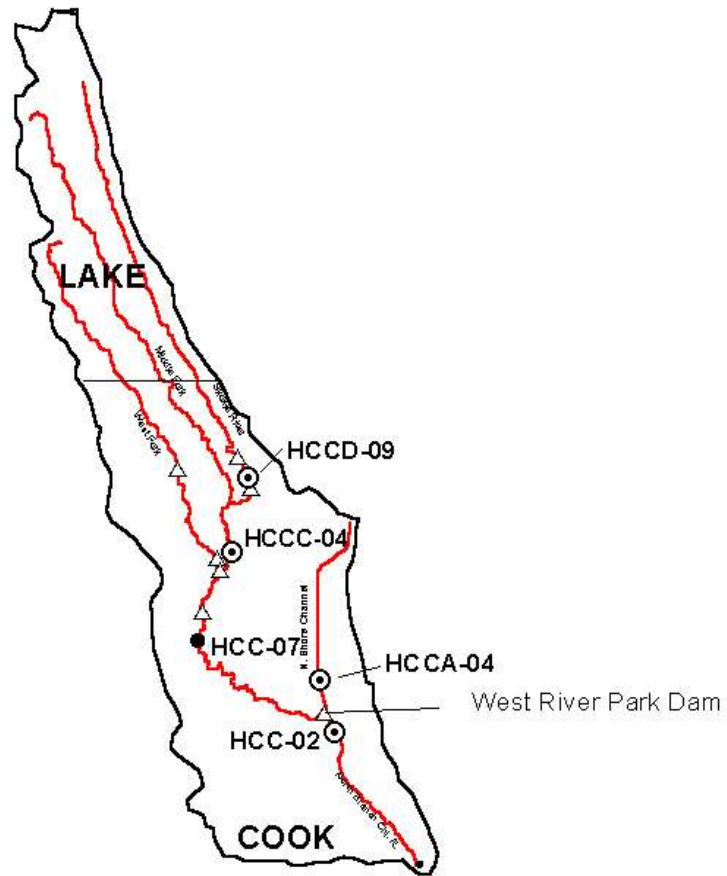
Tinley Creek, a direct tributary to the Cal Sag Channel, had the highest abundance of fish in the Calumet sub-basin, however, diversity was low with only 9 species present with a high percentage of tolerants (Table 4, Table A-2), resulting in an IBI of 10 (E). Tinley Creek had good riffle/pool develop, along with other natural habitat feature, but much like the Thorn Creek watershed, suffers from lack of good connection to a quality recruitment source, and urbanization in the watershed.

## **Acknowledgements**

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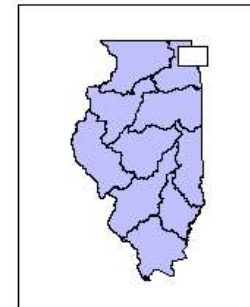
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**LEGEND :**

- ⊙ 2001 Sampling Stations
- 1996 Sampling Station
- △ Dams
- selected streams



**Figure 1. Station Locations for the 2001 Lake Michigan Basin Survey - Chicago River Sub-Basin**

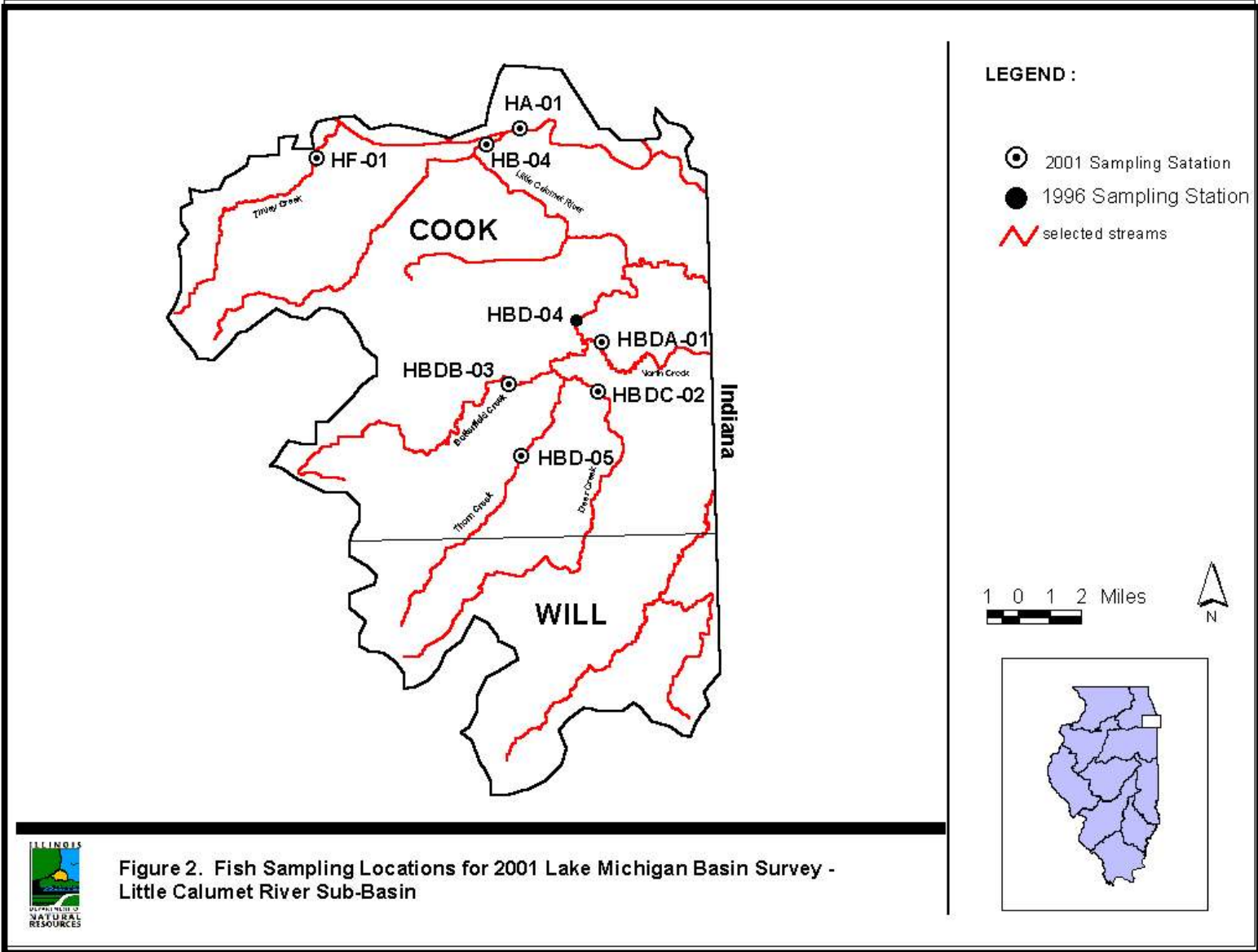


Figure 2. Fish Sampling Locations for 2001 Lake Michigan Basin Survey - Little Calumet River Sub-Basin



# APPENDIX 1

Table A-1. Individual IBI metric scores for each Station in Lake Michigan Basin Survey - Chicago River Sub-Basin

Stream Name IEPA Station Code	North Shore Channel HCCA-04		N. Br. Chicago River HCC-02		Skokie River HCCD-09		N. Br. Mdle. Fk. Chicago River HCCC-04	
	Number	% Score	Number	% Score	Number	% Score	Number	% Score
<b>Native Fish Species</b>	7	1	13	3	10	2	8	2
<b>Native Sucker Species</b>	1	1	1	1	1	1	1	2
<b>Native Sunfish Species</b>	3	4	6	6	5	6	3	5
<b>Native Intolerant Species</b>	0	0	0	0	0	0	0	0
<b>Native Minnow Species</b>	2	1	3	2	0	0	0	0
<b>Nat. Benthic Invertivores</b>	0	0	0	0	0	0	0	0
<b>% Specialist Benthic Inv.</b>	0	0	0	0	0	0	0	0
<b>% Generalist Feeders</b>	86	2	52	6	63	6	70	4
<b>% Crse. Sbstste. Spawner</b>	0	0	0	0	2	1	0	0
<b>% Tolerant Species</b>	35	5	26	5	46	4	60	3
<b>total</b>		14		23		20		16

Table A-2. Individual IBI metric scores for each Station in Lake Michigan Basin Survey -Little Calumet River Sub-Basin

Stream Name	Little Calumet River	Little Calumet River	Butterfield Creek	Deer Creek	North Creek	Tinley Creek	Thorn Creek
IEPA Station Code	HB-01	HA-04	HBDB-04	HBDC-02	HBDA-10	HF-01	HBD-05
	Number - % Score	Number - % Score	Number - % Score	Number - % Score	Number - % Score	Number - % Score	Number - % Score
Native Fish Species	7 1	11 2	12 3	8 2	8 2	8 2	6 1
Native Sucker Species	0 0	1 1	1 2	1 2	0 0	1 2	1 2
Native Sunfish Species	4 4	4 3	3 5	3 5	3 6	3 6	2 3
Native Intolerant Species	0 0	1 1	0 0	0 0	0 0	0 0	0 0
Native Minnow Species	0 0	3 2	5 3	2 1	2 1	3 2	3 2
Nat. Benthic Invertivores	0 0	0 0	1 1	1 1	1 1	1 1	0 0
% Specialist Benthic Inv.	0 0	0 0	2 1	10 4	6 2	9 3	0 0
% Generalist Feeders	95 1	70 6	97 1	89 2	73 4	81 3	96 1
% Crse. Sbstрте. Spawner	0 0	1 1	0 0	0 0	0 0	9 1	0 0
% Tolerant Species	32 5	36 4	94 1	88 1	9 6	75 2	96 1
<b>total</b>	<b>11</b>	<b>20</b>	<b>17</b>	<b>18</b>	<b>22</b>	<b>22</b>	<b>10</b>

Table A-3. Qualitative habitat observations for the 2001 Lake Michigan Basin Survey. Substrate, cover, and morphology are each given as a percent of total area in the sample station.

		Substrate				Cover	Morphology		
<b>IEPA STA. CODE</b>	<b>STREAM NAME</b>	%Silt/ Mud	%Sand	%Gravel	%Cobble	%Cover	%Pool	%Riffle	%Run
HCCA-04	North Shore Channel	50	25	25	0	30	0	0	100
HCC-02	N. Br. Chicago River	60	20	20	0	20	50	0	50
HCCD-09	Skokie River	65	10	15	0	5	100	0	0
HCCC-04	N. Br. Md. Fk. Chi.R.	50	25	25	0	10	100	0	0
HB-01	Little Calumet	60	35	5	0	5	20	0	80
HA-04	Little Calumet	20	50	30	0	10	100	0	0
HBDB-03	Butterfield Creek	20	30	30	20	25	45	15	40
HBDC-02	Deer Creek	50	25	25	0	15	50	5	45
HBDA-01	North Creek	95	0	5	0	10	80	0	20
HBD-05	Thorn Creek	5	10	50	35	30	60	30	10
HF-01	Tinley Creek	20	60	15	5	20	60	15	25