Transactions of Illinois Academy of Sciences
(1984), Volume 77, 1 and 2, pp. 77-93

AN ASSESSMENT OF THE FISH FAUNA OF LAKE CALUMET AND ITS ADJACENT WETLANDS, CHICAGO, ILLINOIS: PAST, PRESENT, AND FUTURE

David W. Greenfield† and John D. Rogner*
Department of Biological Sciences
Northern Illinois University
DeKalb, Illinois 60115

ABSTRACT

A survey of the fishes of Lake Calumet and its adjacent wetlands was conducted from September 1981 through August, 1982. A total of 27 fish species from 10 different families was collected within the entire area sampled. Twenty-six of these species were present in Lake Calumet and eight from the wetlands east of Lake Calumet. Comparisons of present species composition with historical records have shown a number of species previously occurring in the lake appear to have been extirpated. The fish community in Lake Calumet is nonetheless relatively diverse. The quality of fish faunas within various subsections of the lake was assessed using Karr's (1981) index and related to habitat modification.

INTRODUCTION

Lake Calumet, in Chicago, is the largest body of water in Cook County that is located west of Lake Michigan. This lake and its adjacent wetlands remained relatively undisturbed by human activity until about 1930 when mining for beach sand was undertaken and filling activities in the north edge of the marsh began (Beecher, 1981). Since that time the area has been greatly modified with extensive dredging and filling activities, so that now the east shore contains several large slips. In addition, two dikes have been placed across the lake (Figure 1).

Published information relating to the fish fauna of Lake Calumet or the adjacent wetlands appears to be scant (Table 1). Slightly more general information is available for some portions of the Calumet River and surrounding areas. The

†Present address: The Graduate School, University of Colorado, 1100 14th Street, Denver, CO 80202.
*Present address: U.S. Army Corps of Engineers, Chicago District Office.

earliest report was that of Nelson (1876) who reported nine fish species from the Calumet River. Meek and Hildebrand (1910) reported fishes known to occur in Lake Calumet (3 species) and the Calumet River (9 sp.). Less specific information concerning fish species from the Lake Calumet area may be obtained from examining distribution maps for various fish species in Illinois. The early Illinois survey of Forbes and Richardson (1920) recorded a total of 31 fish species in the general area around Lake Calumet. Woods and Beecher (unpublished) collected eight species in Lake Calumet in 1941 and deposited their collections at the Field Museum of Natural History, Chicago. Information on the fish fauna of Lake Calumet was published by Vidal and Wight (1975) in a review of the Cook County Surface Water Resources. Two fish samples were reported, one taken in 1952 (11 sp.) and the other in 1970 (10 sp.). Dennison (1978) prepared a survey of the fishes of Northeastern Illinois streams and included two stations on the Calumet River in the general vicinity of Lake Calumet. The first was on the east bank of the Calumet River at 130th Street, and contained two species. The second station was 2,000 feet north of O'Brien Lock and Dam, and contained 13 species (combined in Table 1). The most recent information on the general area of Lake Calumet is that obtained as a result of contract between the Metropolitan Sanitary District of Greater Chicago and Chicago District of the U.S. Army Corps of Engineers (Polls *et al.*, 1980). Although no samples were taken either within Lake Calumet proper or the wetlands in the general vicinity, samples were taken at the southern end of the lake where it joins the Calumet River at Turning Basin Number five, just north of 130th Street, and at several localities on the Calumet River between that site and Lake Michigan. Seventeen species were recorded from Turning Basin Number five.

Because of the uniqueness of this wetland area within the Chicago City limits, the availability of information of fish species present prior to disturbances, and the possibility of future developments that might affect the Lake Calumet fish fauna, a study was undertaken to determine the present composition of that fish fauna.

METHODS

Collections were made on the following dates: 4 & 5 September 1981; 21 & 24 May 1982; 22 & 23 June 1982; 15, 16, 20 & 23 July 1982; 11 & 12 August 1982. Collections were made using a 15-meter bag seine with 11-mm mesh wings and a 5-mm mesh bag, a 7.6-meter bag seine with a 5-mm mesh, or a 4.6-meter minnow seine with a 2-mm mesh. In addition, electrofishing was conducted using a Coffelt Electro-Shocker, AC current, 125-250 volts. Specimens either were preserved in a 10 percent formalin solution in the field, returned to the laboratory, washed in water and transferred to 40 percent isopropyl alcohol or, if readily identifiable in the field, were returned to the water. In the laboratory, specimens were identified using Smith (1979).

Representative samples of fish species collected have been deposited at the Field Museum of Natural History, the Illinois Natural History Survey and the Northern Illinois University fish museum collection.

Scientific names of fish species are listed in Tables 1 & 2, thus common names are used throughout the report.

Collections were made at the following localities having a fish fauna within the wetlands adjacent to the Lake Calumet: four ponds south of 122nd Street, east

of Stony Island Avenue and north of Turning Basin No. 5; a canal directly east of the Norfolk and Western Railroad tracks between 116th and 122nd streets and two ponds located directly east of the canal and to the west of Torrence Avenue; wetland area bounded by Stony Island Avenue on the west, 110th Street on the north, 116th Street on the south and the Norfolk and Western Railroad tracks on the east; wetland area east of Stony Island Ave, north of 110th Street, south of 103rd Street and the Norfolk and Western Railroad yard on the east. Because several of these sites were modified during the course of this study, and others have been modified since the study was completed, the fishes collected at particular localities will not be reported separately, but will be reported as from "Adjacent Wetlands."

For purposes of sampling, Lake Calumet was divided into nine subsections (Sampling Sites) (Figure 1). Because of extensive filling activities, most of the shoreline of the lake consisted of cement rubble. In some areas, soil was dumped or graded over the rubble and terrestrial vegetation was established. Along the south and east shores of the lake, large slips have been dredged to accommodate shipping. Much of the shoreline in these areas consisted of steep walls of wood or metal. The depth throughout the lake varied greatly. Much of the area was relatively shallow (2.0 meters); however, a number of areas had been dredged to depths as great as 10 meters. The bottom appeared to be soft mud in most areas.

Sampling Site 1 - This is the northernmost section of Lake Calumet, bounded by a dike on the south, that has a small break (approximately 1 meter wide; July 1982) allowing a flow of water from this area to the south. The shoreline bounding this subsection was cement rubble except for the northern shore where the fill is soil. About 8 acres (3.2 ha) of emergent vegetation extended into the water at the northern part of the area. Most of this area was relatively deep, exceeding 2 meters. This area was sampled during May, July and August.

Sampling Site 2 - This is the western part of Lake Calumet directly south of Sampling Site 1, bounded by the dike to the north and a second dike to the south. The southern dike had an opening approximately 10 meters wide, allowing exchange of water between Sampling Site 2 and areas to the south. Depending upon the relative water levels and/or wind velocity, there may be a strong current flowing in either direction through this opening in the dike. The shoreline of this area was mostly cement rubble, with small sand/mud beaches present at scattered localities. Small amounts of vegetation were present at scattered localities along the shoreline. Most of this area was relatively shallow, averaging around 1.5 meters. This site was sampled in July.

Sampling Site 3 - This is the portion of the lake directly east of Sampling Site 2. This site had a spit of land extending out into the lake from the eastern shoreline. North of the spit was a long beach extending north to the dike separating Sampling Sites 1 and 3. South of the spit was an inlet that bordered on the southern dike. The inlet carried discharge from adjacent wetlands through a culvert under the proposed Stony Island Ave. Extension. This created a microhabitat different from other portions of Sampling Site 3. The average depth of 3 was 1.5 meters. This site was sampled during July and August.

Sampling Site 4 - This site is along the western shore of the lake south of the dike forming the southern border of Sampling Site 2 and north of a line extending from the northern tip of an island located near the eastern side of the lake. This

area includes a canal that parallels the Calumet Expressway Frontage Road and enters the lake just south of the dike separating sites 2 and 3 from 4. Sampling was conducted in the canal and where it empties into the lake. Depth in this area averaged around 1.5 meters. This site was sampled in July and September.

Sampling Site 5 - This area includes the eastern shore of the lake south of the dike separating sites 2 and 3 from 4 and 5. It includes the area just south of the dike with a depth of 2.0 meters and the slip to the south with depths in excess of 2.0 meters. The shoreline was mostly cement rubble. This site was sampled in July.

Sampling Site 6 - This site is located on the eastern shore of the lake directly south of site 5, and includes a large slip opposite the island. The shoreline was mostly cement rubble except at the eastern end of the slip where vegetation was present. The depth was greater than 2.0 meters. This area was sampled once in July.

Sampling Site 7 - This site represents the western shoreline of the lake south of site 4. The area had considerable soil pushed over the cement rubble, allowing for development of vegetation. The substrate was soft mud and water depth was shallow, about 1.5 meters or less. The area was sampled once in August.

Sampling Site 8 - This site is along the western shoreline of the island that runs north-south near the east shore of the lake. The water was shallow, less than 1.5 meters, the bottom was soft mud and the shoreline had dense stands of vegetation. This area was sampled once in July.

Sampling Site 9 (Turning Basin Number 5) - This site is located at the southern end of Lake Calumet where it joins the Calumet River. Sampling was conducted along the north shore where the water was shallow (1.5 meters or less) and the bottom a mixture of mud and gravel. This site was sampled during June and August.

RESULTS AND DISCUSSION

A total of 27 fish species from 10 different families was collected within the entire area sampled (Table 2). Twenty-six of these species were present in Lake Calumet and eight from the wetlands east of Lake Calumet. There was a maximum of five species at a single site within the wetlands. One species, the central mudminnow, was collected only in the adjacent wetlands and not in Lake Calumet. Within Lake Calumet there was a maximum of 16 species at any single site. An additional species, the chinook salmon, was present in the fall. No endangered or threatened species were collected or observed in the area sampled.

Young-of-the-year, as well as individuals of assorted sizes, of all eight species present in the adjacent wetlands were taken, indicating reproduction was occurring in those areas. Lake Calumet is connected by the Calumet River to Lake Michigan and by the Little Calumet River and Calumet-Sag Channel to the DesPlaines River. Because of these connections, it cannot be assumed fish species taken within the lake reproduce there; however, young-of-the-year of the following species were taken in the lake: Johnny darter, channel catfish, black bullhead, largemouth bass, orangespotted sunfish and gizzard shad. Gravid female and ripe male carp and fathead minnows were taken. In addition, the other species present were represented by different age groups suggesting, but not demonstrating, reproduction.

A comparison of the fishes collected in the adjacent wetlands with those from Lake Calumet shows there is nothing unique about the fish fauna of the palustrine

areas. Except for two palustrine localities where the central mudminnow was abundant (ponds south of 122nd Street), the adjacent wetlands do not support a fish fauna that is notably different from that in nearby Lake Calumet. The presence of large central mudminnow populations at the two ponds may be related to the absence of predaceous fishes, the abundance of aquatic vegetation, and their differential tolerance to winter low O_2 levels. The central mudminnow is obviously present in the Lake Calumet drainage area because that was the source for the fish fauna for the palustrine wetlands, but it must occur in low numbers and is consequently difficult to collect.

The presence of 26 fish species in Lake Calumet indicates a relatively diverse fish community. Comparisons of the Lake Calumet fish fauna with other lacustrine wetlands are difficult because of the relative sizes of the bodies of water involved. Comparisons could be made with Lake Michigan, to which Lake Calumet is connected by the Calumet River, but fish diversity is influenced by various factors including lake size and depth thereby rendering such a comparison meaningless in determining habitat quality (Barbour and Brown 1974). Thus, one cannot directly compare the 114 species of fishes recorded from all of Lake Michigan with the 26 species taken in Lake Calumet in this study. Becker (1976) surveyed the inland fishes of the Lake Michigan Drainage Basin and indicated on maps that 46 species occurred in the general vicinity of Lake Calumet, including Lake Michigan, the Grand and Little Calumet Rivers. Thus, the total number of species taken in Lake Calumet (26) is a little over half (56.5%) the number recorded from the entire area.

One species taken during this study in Lake Calumet, the orangespotted sunfish, was not listed by Becker for the Lake Michigan Drainage Basin; however, Smith (1979) indicated its presence in the Lake Calumet area on a map. Nineteen species on Becker's list were not taken in Lake Calumet during this study (Table 3). Smith (1979) assembled a set of distribution maps similar to those presented by Becker, indicating 15 species specifically from Lake Calumet. Both Becker (1976) and Smith (1979) included older published records in their distribution maps. thus the species they listed do not necessarily live in the area at the present time. Of the 15 species they listed for Lake Calumet, eight (53.3%) were pre-1908 records: lake sturgeon; bowfin; smallmouth buffalo; black buffalo; highfin carpsucker; banded killifish; and black crappie. The only species listed by Smith (1979) as a post-1950 record for Lake Calumet that we did not collect, was the Iowa darter (*Etheostoma exile*).

Meek and Hildebrand (1910) reported three species of fishes from Lake Calumet, one of which, the tadpole madtom, was not taken during this study.

Woods and Beecher (unpublished) collected eight species in Lake Calumet in 1941 and deposited their collections at the Field Museum of Natural History, Chicago. The only species they collected that was not taken in this study was a single specimen of the starhead topminnow.

Information on the fish fauna of Lake Calumet was published by Vidal and Wight (1975) in a review of the Cook County Surface Water Resources. Two fish samples were reported, one taken in 1952 and the other in 1970. The 1952 sample included northern pike and grass pickerel but these species were not present in the 1970 sample nor were they taken during this study. Collections made at Sampling Site 9 (Turning Basin Number 5) by Dennison (1978) did not contain any species that were not taken in this study.

A single specimen of the freshwater drum was taken at Sampling Site 3, in the northeastern portion of Lake Calumet. This specimen was of particular interest because the literature indicates that the species was thought to have been extirpated in that general region: "Recent records for all of northeastern Illinois are lacking, and the species has been extirpated in southern Lake Michigan" (Smith, 1979). "The freshwater drum (Fig. 109) is found in the southern two-thirds of the Basin: it is common in the lower Wolf and Fox river systems of Wisconsin; in Illinois, the drum probably is extirpated; in Indiana and lower Michigan, the species is occasionally found in the lowermost portions of tributaries to the Lake" (Becker, 1976).

Although the fish community within Lake Calumet is not unique, it is relatively good. Utilizing Karr's (1981) index to evaluate the quality of the fish fauna a score of 48 was obtained for the entire lake (Table 4). This score is within the "Good" range and is comparable to scores obtained for the Fox River (Karr 1981). Karr developed his assessment criteria for stream systems and thus the numerical boundaries for index values indicating habitat quality cannot be transferred directly to a lake situation. Two criteria utilized in his index relate directly to the difference between fluviatile and lacustrine habitats: the presence of darter species and the number of individuals of insectivorous cyprinids. One would not expect to find as many of these species present in high quality lacustrine system as in a high quality fluviatile system. Another factor to be considered is the relationship between the total number of individuals collected at a site and the sampling effort. The number of individuals collected also may be greatly influenced by large numbers of individuals of a single species, such as a school of gizzard shad in Lake Calumet. Thus, if Karr's system was designed for lacustrine wetlands, the quality would have been rated even higher. The factors contributing to this higher rating include the total number of species present (25 plus the seasonal salmon), the presence of a darter species, a good diversity of sunfish species, low numbers of green sunfish, a moderate number of individuals of insectivorous cyprinids, and the presence of top carnivores. One top carnivore, the largemouth bass, is particularly abundant in the northernmost section of Lake Calumet (site 1). The largemouth bass is an ecologically tolerant species; however, it is intolerant of excessive turbidity and siltation. Smith (1979) stated that siltation, fluctuating water levels, and a general deterioration of water quality have contributed to its decline in Illinois.

Another carnivore present in the lake and particularly abundant at site 1 was the black crappie. This species is an indicator of relatively good habitat quality because it is less tolerant of turbidity and silt than the white crappie. The latter species was much less abundant at all sites than the black crappie. The black crappie is most abundant in well-vegetated lakes and clear backwaters of rivers (Smith 1979). Another species that is indicative of clear water is the yellow perch, which also was present in site 1.

The ratio of fathead minnows to bluntnose minnows in a body of water also provides an indication of habitat quality. Larger proportions of bluntnose minnows are present in areas of reduced turbidity, whereas the fathead minnow is more common in turbid water with mud bottoms. In Lake Calumet, the bluntnose minnow was the more abundant species, whereas in the adjacent wetlands the reverse was true.

The sand shiner was relatively abundant in Lake Calumet. This species usually occurs in habitats with clear water and substrates of sand or gravel and Smith (1979) stated it "...is seldom, if ever, found in turbid streams flowing over clay or silt." Becker (1976) stated the species is often unable to adjust to increased erosion and siltation. Thus the continued existence of this species in Lake Calumet indicates the habitat has not been degraded enough to cause the extirpation of this species.

Differences in the quality of the fish fauna were noted within various portions of Lake Calumet. The highest number of species (16) was taken at three localities, the northernmost section (site 1), site 3 directly south of site 1, and site 9 at the southern end of the lake at the junction of the lake and the Calumet River. In terms of game species, higher population levels of black crappie, white crappie, largemouth bass, pumpkinseed and bluegill were present in site 1. Sand shiners, an indicator of clear water conditions also were abundant at this site. In addition, a single specimen of the spotfin shiner, a species preferring clear, weedy lakes or rivers, was taken at site 1. In referring to this species, Becker (1976) stated it "probably has been extirpated in the Illinois portion of the (Lake Michigan) Basin." The emerald shiner was more abundant at site 1 than at any other locality within the lake. Becker (1976) reported this species is an important forage fish for both predatary fish species and many bird species such as gulls, terns, mergansers, and cormorants. Because of these various factors, site 1 is considered to contain the highest quality fish community within Lake Calumet. Karr's index yielded a value of 42 for this site (Table 4).

Site 3 also contained 16 species, but the population level of game species is lower than at site 1. Two species were taken here that were not taken anywhere else in the lake, the rainbow smelt and the freshwater drum, each represented by a single individual. The Johnny darter was present at this site but absent at site 1. The reduced number of individuals of game species may be related to the shallower water at site 3 as compared to site 1. This site has a fish community second in quality only to site 1. Karr's index yielded a value of 42 for this site (Table 4).

The site within Lake Calumet that ranked third in importance as fish habitat, with a total of 16 species, was site 9 (Turning Basin 5). Except for the yellow perch, game species were either lacking or were in low numbers at this site. The Johnny darter was most abundant at site 9, as was the spottail shiner. Becker (1976) pointed out that the spottail shiner is adversely affected by pollution and siltation from industry and agriculture; thus its abundance at this site suggests water quality is good enough to allow its continued existence. Karr's index yielded a value of 44 for this site (Table 4).

Other sites within Lake Calumet varied in the quality of the fish communities present; however, there appeared to be a reduction in the number of fish species present at sites where the most extensive habitat modifications have occurred. The slips, for example, along the east side of the lake where extensive shoreline dredging has occurred (site 5) do not offer the variety of habitats available to fish species at most other sites within the lake.

At sites where soil was present along the edge of the lake (often covering the cement rubble dumped along the shore), vegetation had developed and provided additional habitat for fishes and also for invertebrates that serve as a food source

for fishes. Many sites within the lake could be greatly improved as fish habitat by covering the cement rubble with soil.

Assuming that Lake Calumet is not severely impacted in the future by pollution from adjacent industry or landfill operations, the lake should provide suitable habitat for continued existence and reproduction of fish species. Additional filling of the northern portion of Lake Calumet will have a detrimental impact upon the good fish fauna now present in that area. Construction of additional slips along the shoreline also will reduce the suitability of this area for fishes as has been demonstrated by comparing fish populations in developed and undeveloped areas.

LITERATURE CITED

Barbour, C.D. and J.H. Brown. 1974. Fish species diversity in lakes. Amer. Nat. 108:473-489.

Becker, G.C. 1976. Environmental status of the Lake Michigan Region. Volume 17. Inland fishes of the Lake Michigan Drainage Basin. Argonne National Laboratory, AN/ES-40.

Beecher, W.J. 1981. Chicago's lost marsh. Chicago Academy of Sciences Newsletter 5 (1).

Dennison, S.G. 1978. Fish survey of northeastern Illinois streams. Metropolitan Sanitary District of Greater Chicago, Dept. of Research and Development.

Forbes, S.A. and R.E. Richardson. 1920. The fishes of Illinois. 2nd ed. Ill. Nat. Hist. Survey.

Karr, J.R. 1981. Assessment of biotic integrity using fish communities. Fisheries 6:21-27.

Meek, S.E. and S.F. Hildebrand. 1910. A synoptic list of the fishes known to occur within 50 miles of Chicago. Field Mus. Nat. Hist., Zool. Ser. Publ. 7:223-338.

Nelson, E.W. 1876. A partial catalogue of the fishes of Illinois. Illinois Mus. Nat. Hist. Bull. 1:33-52.

Polls, I., S. Dennison, B. Schmeelk and C. Spielman. 1980. Aquatic biological and water quality survey for the U.S. Army Corps of Engineers, Chicago District. Metropolitan Sanitary District of Greater Chicago, Department of Research and Development.

Smith, P.W. 1979. The fishes of Illinois. University of Illinois Press, Urbana. 314 pp.

Vidal, P.J. and H.L. Wight. 1975. Cook County surface water resources. Illinois Department of Conservation, Division of Fisheries.

ACKNOWLEDGEMENTS

We would like to thank the following persons for assistance in the field: Stephen L. Brinton, Jung-ti Chang, Ik-Soo Kim, John L.A. Mitchell, and David M. Wildrick. Paula Rebert prepared and photographed figure 1.

Table 1. Fish species recorded from the Lake Calumet area from 1876 to 1980 by various authors. Asterisks indicate species not listed in Dennison's report but found in his collections at the Field Museum of Natural History. Question marks indicate incomplete identifications, (e.g., sunfish, bullhead, crappie). CR = Calumet River, LC = Lake Calumet, LCA = Lake Calumet Area, TB = Turning Basin 5.

Scientific Name	Common Name	1 1876 CR	2 1910 LC	 CR	3 1920 LCA	4 1941 LC	5 1952 LC	5 1970 LC	6 1978 TB	7 1980 TB
Acipenser fluvescens	lake sturgeon	+								
Lepisosteus osseus	longnose gar	+								
Amia calva	bowfin		+		+					
Alosa pseudoharengus	alewife							+	+	+
Dorosoma cepedianum	gizzard shad							+	+	+
Umbra limi	central mudminnow				+					
Esox americanus vermiculatus	grass pickerel			+			+			
Esox lucius	northern pike			+	+		+			
Catostomus commersoni	white sucker			+						
Ictiobus niger	black buffalo				+					
Ictiobus bubalus	smallmouth buffalo				+					

Table 1. (continued)

Scientific Name	Common Name	1 1876 CR	2 1910 LC	2 1910 CR	3 1920 LCA	4 1941 LC	5 1952 LC	5 1970 LC	6 1978 TB	7 1980 TB
Carpoides velifer	highfin carpsucker				+					
Erymyzon sucetta	lake chubsucker			+	+					
Pimephales notatus	bluntnose minnow				+	+		+	+	+
Pimephales promelas	fathead minnow							+		+
Carassius auratus	goldfish					+	+	+	+	+
Cyprinus carpio	common carp					+	+	+	+	+
Notemigonus crysoleucas	golden shiner			+	+	+				+
Notropis emiliae	pugnose minnow				+					
N. stramineus	sand shiner									+
N. heterolepis	blacknose shiner				+					
N. heterodon	blackchin shiner	+			+					
N. blennius	river shiner				+					
N. hudsonius	spottail shiner				+				+ *	+
N. spilopterus	spotfin shiner				+					
N. atherinoides	emerald shiner				+				+	+
Ictalurus melas	black bullhead			+		+	?			
Ictalurus natalis	yellow bullhead			+			?			
Noturus gyrinus	tadpole madtom		+							
Aphredoderus sayanus	pirate perch	+								
Fundulus diaphanus	banded killifish				+					

Table 1. (continued)

Scientific Name	Common Name	1 1876 CR	2 1910 LC	 CR	3 1920 LCA	4 1941 LC	5 1952 LC	5 1970 LC	6 1978 TB	7 1980 TB
Fundulus dispar	starhead topminnow				+	+				
Labidesthes sicculus	brook silverside				+					
Pomoxis annularis	white crappie				+		?			
Pomoxis nigromaculatus	black crappie		+		+		?		+	+
Ambloplites rupestris	rock bass				+		+			
Lepomis cyanellus	green sunfish	+					?	+	+	+
Lepomis humilis	orangespotted sunfish								+ *	+
Lepomis megalotis	longear sunfish				+					
Lepomis macrochirus	blugill	+		+	+		+	+		+
Lepomis gibbosus	pumpkinseed				+	+			+	+
Micropterus salmoides	largemouth bass	+			+	+	+	+	+	+
Perca flavescens	yellow perch	+	+		+		+	+	+	+
Percina caprodes	logperch	+			+					
Etheostoma nigrum	johnny darter				+					
Etheostoma camurum	bluebreast darter				+					
Morone chrysops	white bass				+					

1. Nelson (1876); 2. Meek & Hildebrand (1910); 3. Forbes & Richardson (1920); 4. Woods & Beecher (1941); 5. Vidal & Wight (1975); 6. Dennison (1978); 7. Polls *et al.*, (1980).

Table 2. Number of each fish species caught (retained and released combined) at the wetlands adjacent to Lake Calumet and at each of 9 sampling sites in Lake Calumet. Frequency of occurrence for multiple samples indicated in parenthesis.

	Adjacent Wetlands (sampled 34 times)	Lake Calumet Sampling Sites (and number of times sampled)								
		1	2	3	4	5	6	7	8	9
FAMILY and Species		(4)	(2)	(3)	(1)	(2)	(1)	(1)	(1)	(2)
UMBRIDAE										
central mudminnow										
Umbra limi	410(8)									
CLUPEIDAE										
alewife										
Alosa pseudoharengus			4(2)	22(3)		14(1)			17	42(2)
gizzard shad										
Dorosoma cepedianum		405(3)	64(2)	1138(3)	428	687(2)	732	86	163	205(2)
SALMONIDAE										
chinook salmon										
Oncorhynchus tshawytscha			+	+	+	+	+	+	+	+
OSMERIDAE										
rainbow smelt										
Osmerus mordax				1(1)						
CYPRINIDAE										
goldfish										
Carassius auratus	87(7)							2		1(1)
comon carp										
Cyprinus carpio	105(6)	24(3)	2(2)	47(2)	11	55(2)	58	45		11(2)
golden shiner										
Notemigonus crysoleucas		12(3)	2(1)	3(2)			10	2		2(1)

Table 2. (continued)

FAMILY and Species	Adjacent Wetlands (sampled 34 times)	Lake Calumet Sampling Sites (and number of times sampled)								
		1 (4)	2 (2)	3 (3)	4 (1)	5 (2)	6 (1)	7 (1)	8 (1)	9 (2)
emerald shiner *Notropis atherinoides*		17(3)				1				1(1)
spottail shiner *Notropis hudsonius*									1	113(1)
spotfin shiner *Notropis spilopterus*		1(1)								
sand shiner *Notropis stramineus*		37(4)		10(2)					33	17(2)
bluntnose minnow *Pimephales notatus*		171(4)	57(2)	75(2)		90(1)	2	6	85	343(2)
fathead minnow *Pimephales promelas*	3113(19)	3(3)	46(2)	54(3)	11	19(1)	3	23	20	33(2)
CATOSTOMIDAE										
quillback *Carpiodes cyprinus*										1(1)
ICTALURIDAE										
black bullhead *Ictalurus melas*	7(2)		3(1)					21		
channel catfish *Ictalurus punctatus*					2			2		
CENTRARCHIDAE										
green sunfish *Lepomis cyanellus*	511(11)	6(3)								5(1)

Table 2. (continued)

FAMILY and Species	Adjacent Wetlands (sampled 34 times)	Lake Calumet Sampling Sites (and number of times sampled)								
		1 (4)	2 (2)	3 (3)	4 (1)	5 (2)	6 (1)	7 (1)	8 (1)	9 (2)
pumpkinseed *Lepomis gibbosus*	125(7)	101(4)	7(1)	2(1)		3(1)	4	2	1	3(1)
hybrid *L. cyanellus X L. gibbosus*	5(1)									
orangespotted sunfish *Lepomis humilis*	6(1)	39(4)	5(2)	25(1)		2(1)	2	10		3(1)
bluegill *Lepomis macrochirus*		27(3)	1(1)							
largemouth bass *Micropterus salmoides*		92(4)		5(2)		1(1)		3		
white crappie *Pomoxis annularis*		71(2)		1(1)				1		
black crappie *Pomoxis nigromaculatus*		169(4)	1(1)	6(1)				3		
PERCIDAE Johnny Darter *Etheostoma nigrum*			11(2)	13(2)						17(2)
yellow perch *Perca flavescens*		3(3)	99(2)	14(2)		29(1)	30		1	9(2)
SCIAENIDAE freshwater drum *Aplodinotus grunniens*				1(1)						
Total number of species	9	16	13	16	4	9	9	13	8	16

Table 3. Fish species recorded by Becker (1976) from the general area of Lake Calumet not taken during 1981-82 fish survey.

Scientific Name	Common Name
Amia calva	bowfin
Esox americanus vermiculatus	grass pickerel
Esox lucius	northern pike
Notropis blennius	river shiner
Notropis emiliae	pugnose minnow
Notropis heterodon	blackchin shiner
Notropis heterolepis	blacknose shiner
Carpiodes velifer	highfin carpsucker
Erimyzon oblongus	creek chubsucker
Ictiobus bubalus	smallmouth buffalo
Ictiobus cyprinellus	bigmouth buffalo
Noturus gyrinus	tadpole madtom
Fundulus diaphanus	banded killifish
Fundulus dispar	starhead topminnow
Labidesthes sicculus	brook silverside
Ambloplites rupestris	rock bass
Lepomis megalotis	longear sunfish
Etheostoma exile	Iowa darter
Percina caprodes	logperch

Table 4. EVALUATION OF FISH COMMUNITIES AT WETLAND UNITS. (Quality grades used are minus, 1 point; zero, 3 points; and plus, 5 points. Numbers in parentheses are numbers of species or individuals.)

	Number of					
Sampling Site	Total Species	Total Individuals	Darter Species	Sunfish Species	Sucker Species	Intolerant Species
1	+ (16)	+ (1178)	− (0)	+ (3)	− (0)	− (0)
2	+ (13)	0(302)	0(1)	+ (3)	− (0)	− (0)
3	+ (16)	+ (1417)	0(1)	+ (2)	− (0)	− (0)
4	− (4)	0(452)	− (0)	− (0)	− (0)	− (0)
5	0(9)	+ (900)	− (0)	+ (2)	− (0)	− (0)
6	0(9)	+ (842)	− (0)	+ (2)	− (0)	− (0)
7	+ (13)	0(206)	− (0)	+ (2)	− (0)	− (0)
8	0(8)	0(339)	− (0)	0(1)	− (0)	− (0)
9	+ (16)	+ (804)	0(1)	+ (2)	0(1)	− (0)
Entire Lake	+ (25)	+ (6440)	0(1)	+ (3)	0(1)	− (0)

Sampling Site	Proportion of					
	Omnivores	Insectivorous Cyprinids	Green Sunfish	Top Carnivores	Hybrids	Diseased etc.
1	– (615)	+ (55)	0(6)	+ (335)	+ (0)	+ (0)
2	– (178)	– (0)	+ (0)	+ (100)	+ (0)	+ (0)
3	– (1339)	9(10)	+ (0)	0(26)	+ (0)	+ (0)
4	– (450)	– (0)	+ (0)	– (0)	+ (0)	+ (0)
5	– (865)	– (0)	+ (0)	0(30)	+ (0)	+ (0)
6	– (805)	– (1)	+ (0)	0(30)	+ (0)	+ (0)
7	– (185)	– (0)	+ (0)	0(7)	+ (0)	+ (0)
8	– (285)	+ (34)	+ (0)	0(19)	+ (0)	+ (0)
9	– (638)	+ (131)	0(5)	0(9)	+ (0)	+ (0)
Entire Lake	– (5360)	+ (231)	+ (11)	+ (556)	+ (0)	+ (0)

Sampling Site	Quality Index	Class for Streams
1	42	fair
2	40	fair
3	42	fair
4	26	poor
5	32	poor
6	31	poor
7	36	fair-poor
8	36	fair-poor
9	44	fair
Entire Lake	48	good

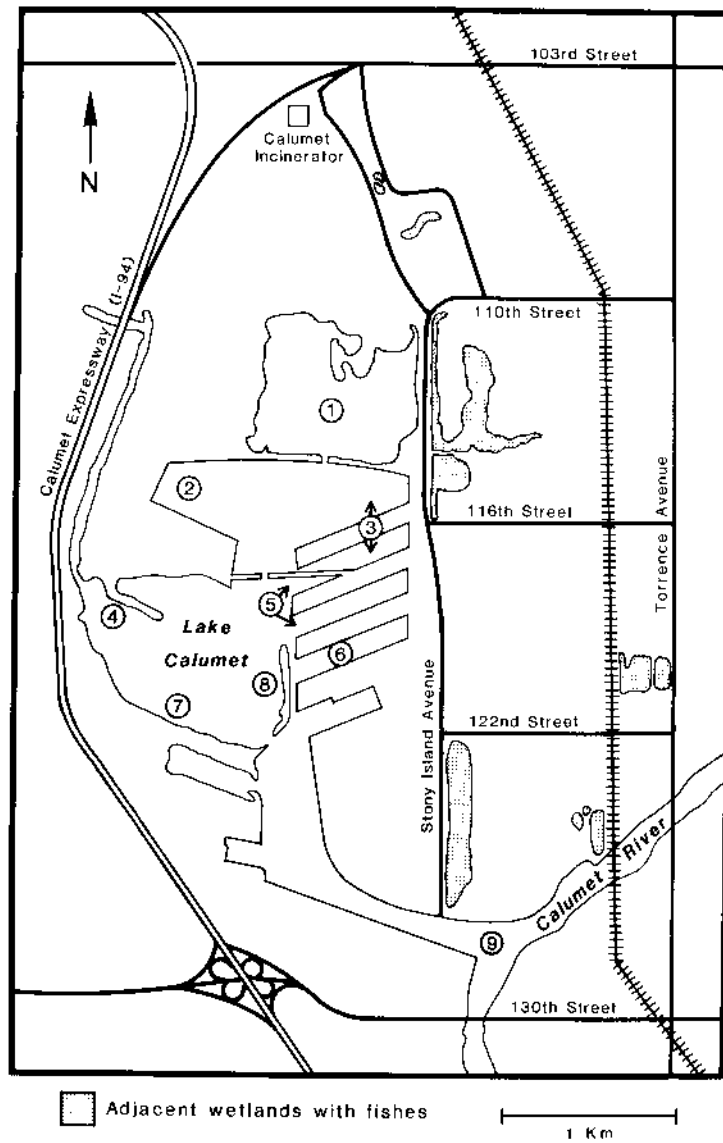

Figure 1. Map of Lake Calumet and its adjacent wetlands that contain fishes showing sampling sites 1-9.