



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

1999 Fish Community Survey
of
MAZON RIVER BASIN
Grundy County, Illinois

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Introduction

The Mazon River Basin was surveyed in 1999 by the Illinois Environmental Protection Agency and the Illinois Department of Natural Resources. This effort is part of a statewide monitoring program to measure the health of Illinois streams using fish community, macroinvertebrate, habitat, water and sediment quality sampling. Data from basin surveys is 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 of fish community structure. Results are compared to a similar survey conducted in the Mazon River Basin in 1993 and other historic fish collections.

Methods

The Mazon River watershed drains an area of 548 square miles, located primarily in Grundy and northeastern Livingston Counties (Figure 1). Major tributaries include Johnny Run, East Fork and West Fork Mazon River. The mainstem of the river is 33 miles long, flowing North/North West to its confluence with the Illinois River, South of Morris, Illinois. Landuse is primarily agriculture. Surface mining is prevalent in the Northeastern section of the basin, resulting in major hydrologic modifications including 3 miles of mainstem channelization. A section of the mainstem near the mouth of the river has also been relocated. Throughout the entire basin, over 70 miles of tributary streams have been channelized (ISIS 1999), primarily smaller streams. No dams were observed during the survey and no records of dams exist in the Illinois Stream Information System (ISIS 1999).

The surveys were conducted from August 9 to August 11, 1999. Stream flow was very low during this period, with most locations in a pooled condition with no obvious flow. Records at the USGS gauging station near Coal City, Illinois, show that flow was below 1 cubic foot per second (cfs) during the fish surveys (Figure 2). Average flow for August, based on records beginning in 1939 at this location is 93.7 cfs compared to average flow for August 1999 of 2.43 cfs.

A total of six locations were sampled in 1999, 2 on the mainstem of the Mazon River and 4 tributary sites (Table 1, Figure 1). Sampling sites used in 1999 were the same as the previous IDNR/IEPA survey of the Mazon River Basin conducted in 1993. (For legal locations and detailed station descriptions, see Appendix Table A-1). Fish were collected using boat electrofishing, backpack electrofishing and seining, similar to methods used in the 1993 survey. 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 were permitting, supplemental collections were made at boat sites using a backpack electrofishing unit (DC) and a 15-meter (50 ft.) minnow seine with 6 mm (0.25 in.) mesh. Wadable site, less than 1.6 meters, were sampled using a 9-meter (30 ft.) electric seine, powered by a 1 single-phase, 1600 watt generator (Bayley et al. 1989). At electric seine stations, 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

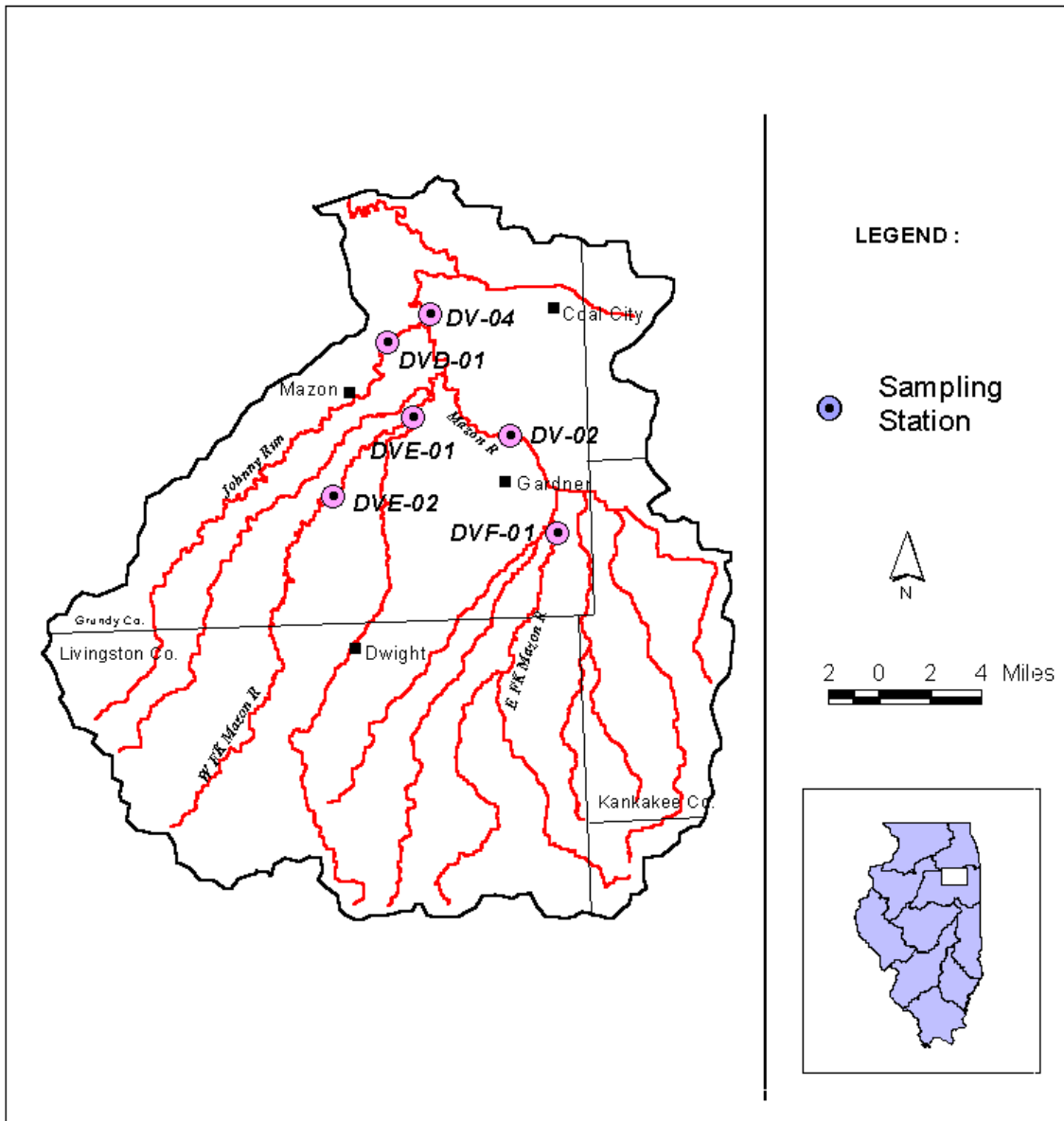


Figure 1. Mazon River Basin with 1999 sampling station locations.

Table 1. Mazon River Basin sampling stations, and collection information.

IDNR ID	IEPA CODE	SAMPLING DATE	STREAM NAME	COUNTY	SAMPLING GEAR	MINUTES SAMPLING	STREAM ORDER
11194	DVD-01	09-Aug-99	Johnny Run	Grundy	ES	60	4
11189	DVE-02	11-Aug-99	W. Fk. Mazon River	Grundy	ES	29	4
11193	DVE-03	10-Aug-99	W. Fk. Mazon River	Grundy	BE,BP,SH	45	4
11188	DVF-01	11-Aug-99	E. Fk. Mazon River	Grundy	ES	35	4
11192	DV-02	10-Aug-99	Mazon River	Grundy	BE,BP,SH	75	5
11190	DV-04	10-Aug-99	Mazon River	Grundy	BE,BP,	60	5

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

individuals were preserved and identified by the Illinois Natural History Survey in Champaign, IL. At each station, stream conditions were evaluated using the Index of Biotic Integrity (IBI)(Karr et al. 1986). The IBI is a widely-used stream quality measurement based on the fish community taking into account, the number and types of species present, their tolerance to degradation, food and habitat preferences and fish condition. IBI scores range from 12-60 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).

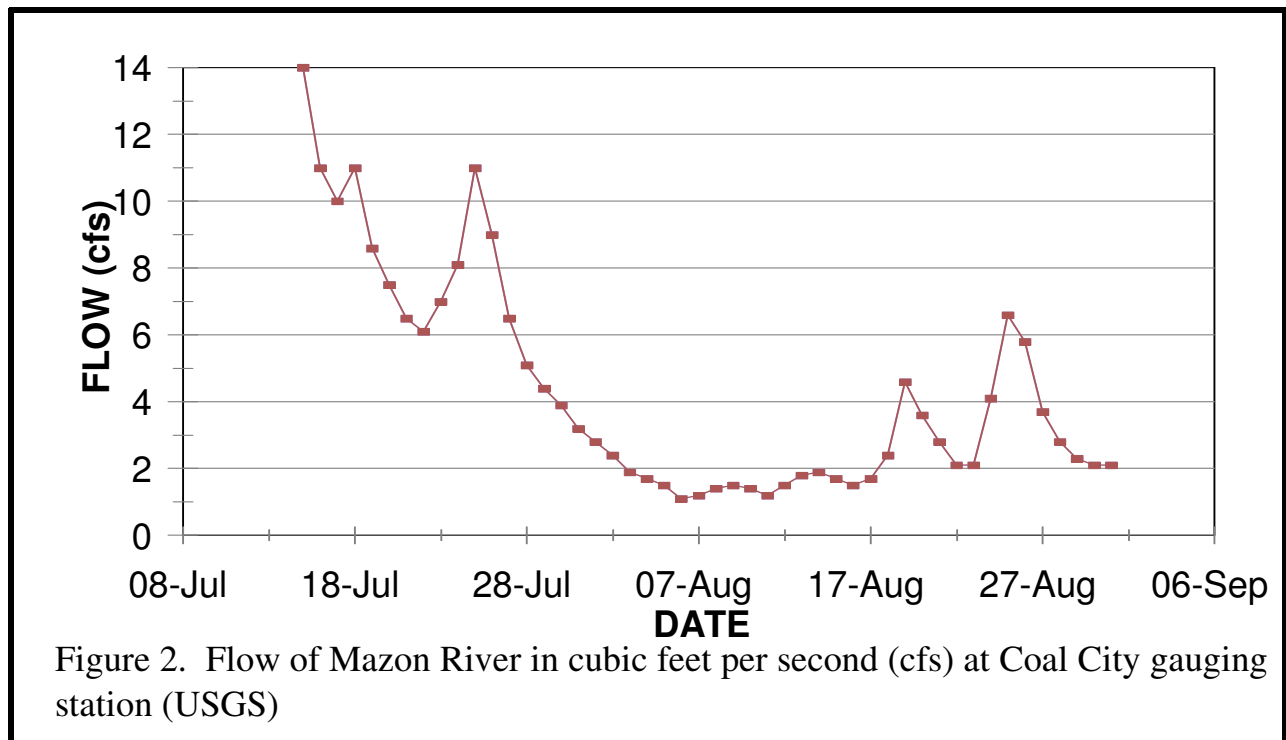


Figure 2. Flow of Mazon River in cubic feet per second (cfs) at Coal City gauging station (USGS)

Results and Discussion

Species Abundance and Distribution

A total of 4,750 fish, representing 46 species, were collected during the 1999 Mazon Basin survey (Table 2). The cyprinid, or minnow family, was the most abundant, representing 64 percent of the overall collection. Red shiners (*Cyprinella lutrensis*) and bluntnose minnows (*Pimephales notatus*) were the most numerous minnow species present (Table 2). The catostomid, or sucker family, and the sunfish family, each with 10 species present, were the next most abundant families. Golden redhorse (*Moxostoma anisurum*), shorthead redhorse (*Moxostoma macrolepidotum*), black redhorse (*Moxostoma duquesnei*) and northern hogsucker (*Hypentelium nigricans*) were the most numerous suckers species found in the basin. The most abundant sunfish were longear sunfish (*Lepomis megalotis*), smallmouth bass (*Micropterus dolomieu*) and green sunfish (*Lepomis cyanellus*) (Table 2). The minnow, sucker and sunfish families together accounted for over 85 percent of all fish collected. Although the abundance of fish was higher in the tributary stations compared to the mainstem stations, species distribution was similar (Table 2).

Species richness at individual stations ranged from 23 to 42, with 5 out of 6 stations yielding 30 or more species (Table 3). Approximately 80 percent of species recorded for the basin occurred at 3 or more locations. Species represented by only one individual for the entire basin include river carpsucker (*Carpoides carpio*), white crappie (*Pomoxis annularis*) and logperch (*Percina caprodes*). A total of 9 species were represented by 5 or fewer individuals (Table 2). No threatened or endangered species were found in 1999.

Table 4. Species recorded from Illinois Natural History Survey Database not collected in 1999 survey.

Scientific name	Common name
<i>Ericymba buccata</i>	silverjaw minnow
<i>Notropis boops</i>	bigeye shiner
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Notropis rubellus</i>	rosyface shiner
<i>Notropis shumardi</i>	silverband shiner
<i>Pimephales vigilax</i>	bullhead minnow
<i>Erimyzon oblongus</i>	creek chubsucker
<i>Ameiurus melas</i>	black bullhead
<i>Noturus gyrinus</i>	tadpole madtom
<i>Morone mississippiensis</i>	yellow bass
<i>Morone chrysops</i>	white bass
<i>Percina phoxocephalas</i>	slenderhead darter

Total number of species collected in the basin was similar in 1993 and 1999 with 45 and 46, respectively. Due to low water, pooled conditions in 1999, total numbers of species and individuals was generally higher at each station, compared to 1993. Overall, species composition was generally similar between 1993 and 1999.

Historic records (Illinois Natural History Survey Database) shows a total of 58 species from the Mazon Basin. Most of the 12 species not collected in 1999 (Table 4) are very common in Northeastern Illinois and likely still occur in the Mazon River Basin. Failure to collect these species was probably due to limited locations sampled in 1999. Exceptions include *Notropis boops*, bigeye shiner, and *Notropis shumardi*, silverband minnow. Bigeye shiner is an Illinois endangered species (Illinois Endangered Species Protection Board 1999) whose occurrence is rare throughout the State (Smith 1979). This species was last collected from the Mazon River Basin in 1966 (Illinois Natural History Database). Silverband shiner is also limited in distribution, primarily inhabiting larger rivers with only occasional migration into smaller tributaries, like the Mazon River (Smith 1979). Red shiners, were much more abundant in 1999 than in 1993. This species is very tolerant and is thought to be displacing more sensitive species (Page and Smith, 1970). Hybridization between the red shiner and the closely related spotfin shiner, *Notropis spilopterus*, was found in 1999 and was not reported from 1993 surveys.

Stream Quality - Index of Biotic Integrity

Index of Biotic Integrity (IBI) scores for 1999 are presented in Table 5, along with results at the same locations for 1993. Overall, IBI scores at all the stations ranged from 46 to 56 in 1999 and were very similar to those found in 1993. Results from the 1999 Basin Survey suggest that the Mazon River remains a relatively high quality stream system showing little change since 1993. All Stations scored in the “A” and high “B” range described by Illinois Biological Stream Characterization (Bertrand et al. 1996) as “Unique” and “Highly Valued” Aquatic Resources. (Individual scores for each of the 12 metrics used in calculating the IBI can be found in the Appendix, Table A-2).

Table 5. Index of Biotic Integrity (IBI) and Biological Stream Characterization for Mazon River Basin.					
Stream	Station Code	1993		1999	
		IBI	BSC	IBI	BSC
Mazon River	DV-02	51	A	56	A
Mazon River	DV-04	49	B	46	B
Johnny Run	DVD-01	53	A	49	B
W. Fork. Mazon River	DVE-02	49	B	47	B
W. Fork Mazon River	DVE-03	49	B	53	A
E. Fork Mazon River	DVF-01	51	A	47	B
IBI range for BSC ratings: A = 60-51; B = 50-41; C = 40-31; D = 30-21; E >21.					

High quality ratings observed in the Mazon River Basin were due in part to the presence of diverse habitat conditions. Riffles and pools were present at all stations along with other habitat features including undercut banks, woody debris and boulders. The emergent plant, *Justica americana* (water willow) , was abundant at many stations providing cover and a source of food organisms. Substrate at each station was composed largely of gravel, cobble, and sand, with silt generally covering less than 20% of the area (Table 6).

Table 6 Composition of substrate at Mazon River Basin sampling locations

Stream Name	IEPA Code	% Silt-Mud	%Sand	% Gravel	% Cobble	% Boulder
Johnny Run	DVD-01	0	0	45	40	15
West Fork Mazon River	DVE-02	15	30	30	15	0
West Fork Mazon River	DVE-03	13	20	50	15	2
East Fork Mazon River	DVF-01	10	20	40	25	5
Mazon River	DV-02	20	30	30	20	>1
Mazon River	DV-04	0	0	60	30	10

Sportfish

Smallmouth bass, largemouth bass (*Micropterus salmoides*) and rock bass (*Ambloplites rupestris*) were the most numerous sportfish collected (Table 2). A total of 40 young-of-the-year (Y-O-Y) smallmouth bass indicates presence of a reproducing population. Nineteen smallmouth bass in the quality-size range (>280 mm or 11 inches; Anderson and Nuemann 1996) were captured in 5 hours of electrofishing. Larger fish were generally found at the mainstem stations, DV-02, and DV-04. Largemouth bass Y-O-Y were also relatively common, but only one quality-sized (>300 mm, 12 inches) fish was found. Rock bass had a higher percentage of quality-sized (17) present, however, only 3 Y-O-Y were found. One large (774 mm, 30 inches) flathead catfish (*Pylodictis olivaris*) was captured at DV-04 (Table 2). Channel catfish (*Ictalurus punctatus*) were relatively rare with only 8 fish captured in the entire basin. Few channel catfish were also collected in 1993.

Summary

Fish communities in the Mazon River Basin have shown only minor changes since last sampled in 1993. Fish species diversity was relatively high at all stations sampled in 1999, and many sensitive species were present. Sampling sites were located primarily on the larger tributaries which have not been modified extensively by channelization, therefore habitat conditions were favorable. The presence of good habitat was reflected in the BSC stream ratings which were in the “A” and “B” range. The absence of dams is also an important factor in the maintenance of fish communities by retaining connections between the Mazon tributaries, the mainstem, and the Illinois River. This is especially critical under conditions of low water and drought, as observed in 1999, where species may be lost in some areas.

Algal blooms observed in the pooled areas suggests the presence of elevated nutrients. High concentration of algae can deplete dissolved oxygen, especially under low water, warm weather conditions in isolated pools. Nutrient management, and creation or expansion of vegetated buffer strips along stream will help preserve and improve water quality in the watershed. The increase in abundance of tolerant species such as the red shiners and bluntnose minnow from 1993 to 1999 may indicate some deterioration of water quality conditions. Catchable-sized smallmouth and rock bass are present, however, public access in the Mazon Basin is very minimal, limiting angling opportunities.

Acknowledgements

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Table 2. Summary of fish collection for 1999 Mazon Basin Survey - all methods combined.

COMMON NAME	SCIENTIFIC NAME	Mainstem	Tributaries	Total	Percent of Total
Longnose gar	<i>Lepisosteus osseus</i>	1	3	4	0.08
Gizzard shad	<i>Dorosoma cepedianum</i>	28	84	112	2.36
Grass pickerel	<i>Esox americanus</i>	3	0	3	0.06
Carp	<i>Cyprinus carpio</i>	15	19	34	0.72
Creek chub	<i>Semotilus atromaculatus</i>	3	29	32	0.67
Hornyhead chub	<i>Nocomis biguttatus</i>	0	27	27	0.57
Central stoneroller	<i>Campostoma anomalum</i>	13	63	76	1.60
Suckermouth minnow	<i>Phenacobius mirabilis</i>	1	4	5	0.11
Striped shiner	<i>Luxilus chrysocephalus</i>	2	177	179	3.77
Redfin shiner	<i>Lythrurus umbratilis</i>	3	404	407	8.57
Spotfin shiner	<i>Cyprinella spiloptera</i>	115	108	223	4.69
Red X Spotfin hybrid	<i>C. lutrensis x C. spiloptera</i>	14	44	58	1.22
Red shiner	<i>Cyprinella lutrensis</i>	32	745	777	16.36
Bluntnose minnow	<i>Pimephales notatus</i>	93	870	963	20.27
Bullhead minnow	<i>Pimephales vigilax</i>	24	1	25	0.53
Bigmouth shiner	<i>Notropis dorsalis</i>	3	0	3	0.06
Sand shiner	<i>Notropis ludibundus</i>	111	140	251	5.28
Silverjaw minnow	<i>Ericymba buccata</i>	2	0	2	0.04
Smallmouth buffalo	<i>Ictiobus bubalus</i>	6	0	6	0.13
Quillback	<i>Carpiodes cyprinus</i>	9	49	58	1.22
River carsucker	<i>Carpiodes carpio</i>	0	1	1	0.02
White sucker	<i>Catostomus commersoni</i>	1	17	18	0.38
Northern hog sucker	<i>Hypentilium nigricans</i>	18	30	48	1.01
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	24	53	77	1.62
Black redhorse	<i>Moxostoma duquesni</i>	37	7	44	0.93
Golden redhorse	<i>Moxostoma erythrurum</i>	79	174	253	5.33
Silver redhorse	<i>Moxostoma anisurum</i>	5	10	15	0.32
Channel catfish	<i>Ictalurus punctatus</i>	6	2	8	0.17
Yellow bullhead	<i>Ameiurus natalis</i>	0	12	12	0.25
Flathead catfish	<i>Pylodictus olivaris</i>	2	0	2	0.04
Stonecat	<i>Noturus flavus</i>	6	3	9	0.19
Blackstripe topminnow	<i>Fundulus notatus</i>	15	47	62	1.31
Brook silverside	<i>Labidesthes sicculus</i>	6	11	17	0.36
White crappie	<i>Pomoxis annularis</i>	0	1	1	0.02
Rock bass	<i>Ambloplites rupestris</i>	14	28	42	0.88
Largemouth bass	<i>Micropterus salmoides</i>	34	50	84	1.77
Smallmouth bass	<i>Micropterus dolomieu</i>	29	95	124	2.61
Green sunfish	<i>Lepomis cyanellus</i>	16	112	128	2.69
Bluegill x Green hybrid	<i>L. macrochirus x L. cyanellus</i>	0	7	7	0.15
Bluegill	<i>Lepomis macrochirus</i>	45	27	72	1.52
Longear sunfish	<i>Lepomis megalotis</i>	28	178	206	4.34
Orangespotted sunfish	<i>Lepomis humilis</i>	10	56	66	1.39
Blackside darter	<i>Percina maculata</i>	17	57	74	1.56
Slenderhead darter	<i>Percina phoxocephala</i>	5	8	13	0.27
Logperch	<i>Percina caprodes</i>	1	0	1	0.02
Johnny darter	<i>Etheostoma nigrum</i>	4	38	42	0.88
Banded darter	<i>Etheostoma zonale</i>	20	29	49	1.03
Freshwater drum	<i>Aplodinotus grunniens</i>	20	10	30	0.63
	total no.	920	3830	4750	100
	no. species	43	40	46	

Table 3. Summary of fish collection for 1999 Mazon Basin Survey at each station - all methods combined.

COMMON NAME	SCIENTIFIC NAME	Mazon	Mazon	Johnny	W. Fork	W. Fork	E. Fork
		River	River	Run	Mazon R.	Mazon R.	Mazon R.
		DV-02	DV-04	DVD-01	DVE-02	DVE-03	DVF-01
Longnose gar	<i>Lepisosteus osseus</i>	1	0	0	0	0	3
Gizzard shad	<i>Dorosoma cepedianum</i>	11	17	54	17	7	6
Grass pickerel	<i>Esox americanus</i>	2	1	0	0	0	0
Carp	<i>Cyprinus carpio</i>	5	10	1	11	7	0
Creek chub	<i>Semotilus atromaculatus</i>	3	0	22	5	0	2
Hornyhead chub	<i>Nocomis biguttatus</i>	0	0	18	3	1	5
Central stoneroller	<i>Campostoma anomalum</i>	13	0	21	3	15	24
Suckermouth minnow	<i>Phenacobius mirabilis</i>	1	0	0	0	2	2
Striped shiner	<i>Luxilus chrysocephalus</i>	2	0	50	28	75	24
Redfin shiner	<i>Lythrurus umbratilis</i>	1	2	28	106	265	5
Spotfin shiner	<i>Cyprinella spiloptera</i>	108	7	10	9	87	2
Hybrid shiner	<i>Cyprinella hybrid</i>	13	1	8	2	29	5
Red shiner	<i>Cyprinella lutrensis</i>	32	0	1	64	675	5
Bluntnose minnow	<i>Pimephales notatus</i>	83	10	300	144	219	207
Bullhead minnow	<i>Pimephales vigilax</i>	20	4	0	0	1	0
Bigmouth shiner	<i>Notropis dorsalis</i>	3	0	0	0	0	0
Sand shiner	<i>Notropis ludibundus</i>	111	0	39	37	60	4
Silverjaw minnow	<i>Ericymba buccata</i>	2	0	0	0	0	0
Smallmouth buffalo	<i>Ictiobus bubalus</i>	6	0	0	0	0	0
Quillback	<i>Carpiodes cyprinus</i>	5	4	0	12	37	0
River carpsucker	<i>Carpiodes carpio</i>	0	0	0	0	1	0
White sucker	<i>Catostomus commersoni</i>	1	0	10	3	3	1
Northern hog sucker	<i>Hypentilium nigricans</i>	4	14	1	16	6	7
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	6	18	10	16	23	4
Black redhorse	<i>Moxostoma duquesni</i>	5	32	2	0	5	0
Golden redhorse	<i>Moxostoma erythrurum</i>	48	31	34	53	84	3
Silver redhorse	<i>Moxostoma anisurum</i>	3	2	6	0	4	0
Channel catfish	<i>Ictalurus punctatus</i>	6	0	0	1	0	1
Yellow bullhead	<i>Ameiurus natalis</i>	0	0	5	2	4	1
Flathead catfish	<i>Pylodictus olivaris</i>	1	1	0	0	0	0
Stonecat	<i>Noturus flavus</i>	6	0	2	0	0	1
Blackstripe topminnow	<i>Fundulus notatus</i>	15	0	18	12	11	6
Brook silverside	<i>Labidesthes sicculus</i>	1	5	0	0	10	1
White crappie	<i>Pomoxis annularis</i>	0	0	0	1	0	0
Rock bass	<i>Ambloplites rupestris</i>	7	7	14	3	8	3
Largemouth bass	<i>Micropterus salmoides</i>	22	12	6	18	6	20
Smallmouth bass	<i>Micropterus dolomieu</i>	12	17	42	1	15	37
Green sunfish	<i>Lepomis cyanellus</i>	13	3	38	63	5	6
Bluegill x Green hybrid	<i>Lepomis hybrid</i>	0	0	7	0	0	0
Bluegill	<i>Lepomis macrochirus</i>	42	3	18	6	0	3
Longear sunfish	<i>Lepomis megalotis</i>	12	16	114	24	29	11
Orangespotted sunfish	<i>Lepomis humilis</i>	9	1	16	27	11	2
Blackside darter	<i>Percina maculata</i>	17	0	4	12	10	31
Slenderhead darter	<i>Percina phoxocephala</i>	5	0	0	6	2	0
Logperch	<i>Percina caprodes</i>	1	0	0	0	0	0
Johnny darter	<i>Etheostoma nigrum</i>	4	0	15	2	3	18
Banded darter	<i>Etheostoma zonale</i>	20	0	14	0	6	9
Freshwater drum	<i>Aplodinotus grunniens</i>	13	7	0	1	9	0
	total no.	695	225	928	708	1735	459
	no. species	42	23	30	31	33	31

Appendix

Table A-1. Detailed description of sampling locations for 1999 Mazon River Basin survey.

IDNR ID	IEPA CODE	TOWNSHIP	RANGE	SECTION	ACCESS DESCRIPTION	DISTANCE FROM TOWN
11194	DVD-01	NW 11	32N	7E	Spring Road Bridge	2.5 Miles NE of Mazon
11189	DVE-02	NW 09	31N	7E	SW Corner of Bridge	6 Miles N of Dwight Gardner Road.
11193	DVE-03	SW 24	32N	7E	Braceville Road Bridge	2.5 Miles ESE of Mazon
11188	DVF-01	SW 23	31N	8E	SW Corner of Bridge Crossing	.1 Mile S of S William Good Farm Road.
11192	DV-02	NE 24	32N	8E	I-55 Bridge	2 Miles N of Gardner.
11190	DV-04	SW 31	33N	8E	Rt 113 Bridge	4 Miles W of Coal City.

Table A-2. Individual IBI metric scores for each Satation in Mazon River Basin

Stream Name EPA Station Code	Johnny Run DVD-01	W. Fk Mazon River DVE-02	W. Fk Mazon River DVE-03	E. Fk Mazon River DVF-01	Mazon River DV-02	Mazon River DV-04
	Number - % Score	Number - % Score	Number - % Score	Number - % Score	Number - % Score	Number - % Score
Fish Species	28 5	32 5	34 5	32 5	37 5	24 5
Darter Species	3 3	3 3	4 5	3 3	5 5	0 1
Sunfish Species	4 5	5 5	4 3	5 5	4 5	4 5
Sucker Species	5 5	6 5	8 5	5 5	8 5	7 5
Intolerant Species	9 5	8 5	10 5	9 5	11 5	8 5
% Green Sunfish	7 5	7 3	0 5	1 5	2 5	1 5
% Omnivores	25 3	28 3	15 5	48 1	18 5	24 3
% Insectivorous Minnows	14 1	36 3	70 5	12 1	40 3	5 1
% Piscivores	12 5	3 3	2 3	11 5	7 5	16 5
Individuals Per Hour	506 5	1417 5	2405 5	765 5	562 5	244 3
% Hybrids	0 3	0 3	0 3	0 3	0 3	0 3
% Diseased	0 5	0 5	0 5	0 5	0 5	0 5
total	50	48	54	48	56	46