The Long-term Illinois River Fish Population Monitoring Program

F-101-R

Final Report

Todd M. Koel and Richard E. Sparks

Illinois Natural History Survey
LTRMP Havana Field Station
704 North Schrader Avenue
Havana, Illinois 62644-1088

November 1999

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The Long-term Illinois River Fish Population Monitoring Program

F-101-R
Segments 6-10
Final Report

to be submitted to the
Illinois Department of Natural Resources
and
U.S. Fish and Wildlife Service

by
Todd M. Koel and Richard E. Sparks

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DISCLAIMER

The findings, conclusions, and views expressed herein are those of the researchers and should not be considered as the official position of the United States Fish and Wildlife Service or the Illinois Department of Natural Resources.

ACKNOWLEDGMENT OF SUPPORT

The Long-term Illinois River Fish Population Monitoring Program (F-101-R) is supported by the Federal Aid in Sport Fish Restoration Act (P.L. 81-681, Dingell-Johnson/Wallop-Breaux).

EXECUTIVE SUMMARY

During late August and September each year 1994-1998, we sampled 26 sites on the Illinois River Waterway and one site on Reach 26 of the Mississippi River by electrofishing to monitor fish communities. From 1994-1998, we collected a total of 25,921 fish representing 62 species (plus five hybrids) from fourteen families during 125.70 hours of sampling at 26 sites on the Illinois Waterway and a single site on the Mississippi River. Of these fishes, 25,278 individuals were collected from the Illinois Waterway sites, and 643 were collected from Brickhouse Slough of the Mississippi River. The year with the greatest overall catch of fishes was 1995 (7941 individuals, $CPUE_N$ = 325 fish per hour) and the year with the lowest overall catch of fishes was 1994 (3421 individuals, $CPUE_N$ = 131 fish per hour). For all stations combined, the greatest number of species were collected in 1995 (48 species plus 3 hybrids) and the least were in 1997 (38 species plus 4 hybrids). The number of species collected from upper waterway reaches ranged from 12 for Starved Rock in 1996 to 24 for Marseilles in 1995. The number of species collected from middle river reaches ranged from 23 for La Grange Reach in 1997 to 34 for Peoria Reach in 1996. The number of species collected from the lower river (Alton Reach) ranged from 18 in 1994 to 25 in 1995. The Peoria Reach consistently had highest species richness during all years (1994-1998) of sampling for this project.

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[a]Job numbers and titles refer to the F-101-R annual work plans

ACKNOWLEDGMENTS

Project F-101-R is supported by the Federal Aid to Sportfish Restoration Act (P.L. 81-681, Dingell-Johnson/Wallop-Breaux), with funds administered by the U.S. Fish and Wildlife Service and the Illinois Department of Natural Resources (IDNR). Mr. Larry Dunham (IDNR); Mr. Bill Bertrand (IDNR); Mr. Michael Sweet (IDNR); Dr. David Thomas, Chief of the Illinois Natural History Survey (INHS); Dr. Edward Armbrust, Acting Chief (INHS); and Dr. David Philipp, former Director of the Center for Aquatic Ecology (INHS); provided administrative support. Ms. Cammy Smith of the Long Term Resource Monitoring Program Field Station at Havana provided secretarial support and data entry and verification. Mr. Thad Cook, Mr. Kip Stevenson, and Mr. Scott Whitney assisted with the field work. Mr. K. Douglas Blodgett was Co-Investigator of this project until 1998. Mr. Thomas Lerczak was Project Manager until 1995. This survey was originally conceived and initiated in 1957 by the late Dr. William C. Starrett.

INTRODUCTION

The goals of the Long-term Illinois River Fish Population Monitoring Program include: 1) determination of spatial and temporal trends in fish populations of the Illinois River; 2) Develop a long-term fisheries database useful for evaluating resource management strategies; and 3) provide information required to manage the fishery of the Illinois River. This report presents a summary of data collected 1994-1998 during segments 6-10 of federal aid project F-101-R, The Long-term Illinois River Fish Population Monitoring Program. Previous summaries of the long-term data set, begun in 1957, were given by Sparks and Starrett (1975), Sparks (1977), Sparks and Lerczak (1993), Lerczak and Sparks (1994), and Lerczak et al. (1994). The annual reports for project F-101-R have continuously built on previously collected data. The format used in this report is patterned after previous annual reports of this project (Lerczak et al. 1993, 1994, 1995, and 1996 and Koel et al. 1997 and 1998) to allow for easy comparisons of data among years. The objective of this report is to provide a summary document of Illinois River fish population data collected 1994-1998 during federal aid project F-101-R.

STUDY AREA

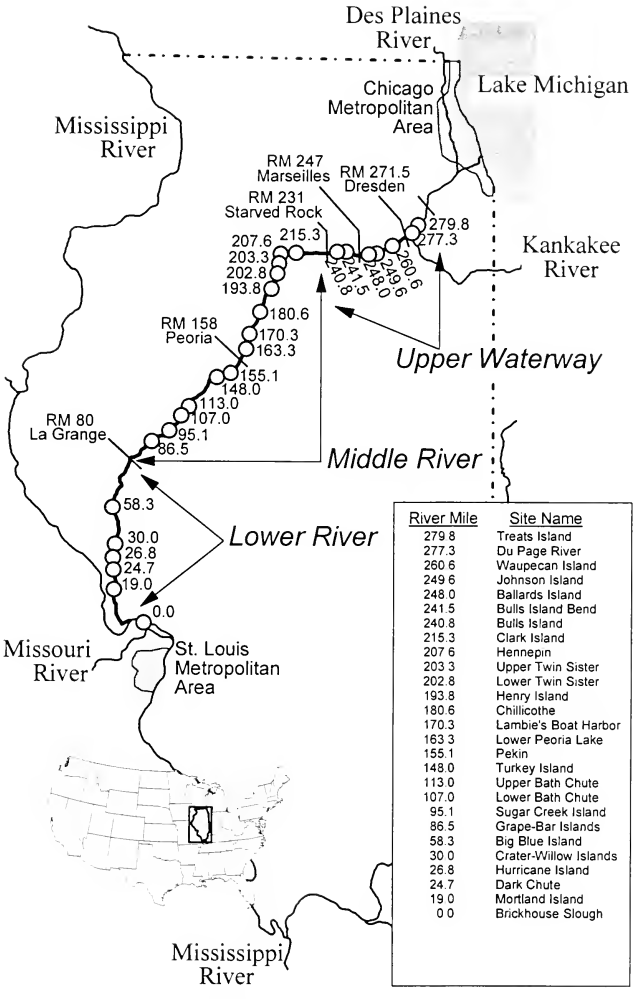
Twenty-six fish sampling sites were at fixed locations along the Illinois Waterway as defined by Sparks and Starrett (1975:347) and Lerczak et al. (1994:9)

(Table 1). Twenty-four of the sites were along the Illinois River, with two additional sites on the lower Des Plaines River, which along with the Illinois River is part of the Illinois Waterway. One additional site was on the Mississippi River (Figure 1). Seventeen of the sites were in side channels; the rest of the sites were in other habitats, including the main channel border, or in a combination of habitat types (see Lerczak et al. 1994:9). By calculating the average river mile of each fish sampling site for the total period of record (1957-present), the sites were "renamed" in 1998 to reflect river mile (Figure 1). For this and all subsequent reports, we will refer to sites by these approximate average river miles (site mile, Tables 1-5) for use in all figures and tables. In text we will refer to sites by average river mile as well as by common site descriptions (e.g., Brickhouse Slough, Mortland Island, etc.).

MATERIALS AND METHODS

Fish populations were sampled by electrofishing from a 16-ft (5-m) aluminum boat using a Homelite 3000-watt, three-phase AC electric generator. Boat configuration includes three poles extended from the bow with metal electrodes, connecting to the electric generator, extended from the ends of the poles to approximately 20 inches (0.5 m) below the water line. The same generator and electrode configuration have been used since 1957.

Prior to fish sampling, water quality and flow measurements (e.g., dissolved



River Mile	Site Name
279.8	Treats Island
277.3	Du Page River
260.6	Waupecan Island
249.6	Johnson Island
248.0	Ballards Island
241.5	Bulls Island Bend
240.8	Bulls Island
215.3	Clark Island
207.6	Hennepin
203.3	Upper Twin Sister
202.8	Lower Twin Sister
193.8	Henry Island
180.6	Chillicothe
170.3	Lambie's Boat Harbor
163.3	Lower Peoria Lake
155.1	Pekin
148.0	Turkey Island
113.0	Upper Bath Chute
107.0	Lower Bath Chute
95.1	Sugar Creek Island
86.5	Grape-Bar Islands
58.3	Big Blue Island
30.0	Crater-Willow Islands
26.8	Hurricane Island
24.7	Dark Chute
19.0	Mortland Island
0.0	Brickhouse Slough

Figure 1. Three segments of the Illinois River Waterway sampled by electrofishing to monitor fish communities during August and September, 1994-1998.

Table 1 Station information and characteristics during sampling in 1994 All stations except where noted are on the Illinois River and are listed in downstream to upstream order Site miles are the average river mile and refer to Figure 1

Sampling		Site		End time	Duration	Temp (°F)		DO		Secchi	Cond		Vel	Depth[b] (ft)		Stage[c]
Order	Date	Mile[a]	Name	(CST)	(h)	air	water	(ppm)	(%Sat)	(in)	(umhos)	Volts	(ft/s)	min	max	(ft)
Reach 26, Mississippi River																
16	7-Sep	0 0	Brickhouse Slough[d]	11:30	1 00	66 2	73 4	9 9	121 02%	10 2	400	225	0 0	0 3	3 3	420 5
Alton Reach																
17	7-Sep	19 0	Mortland Island	16:00	1 00	75 2	75 4	5 3	66 05%	9 8	625	200	1 0	0 7	3 3	420 5
19	8-Sep	24 7	Dark Chute	12:30	1 00	77 4	73 9	5 0	61 42%	8 7	625	195	0 7	0 7	4 9	420 3
18	8-Sep	26 8	Hurricane Island	10:10	1 00	68 0	73 6	4 8	58 79%	8 7	625	200	0 8	0.7	4 9	420 3
15	6-Sep	30 0	Crater-Willow Islands	18:45	1 00	78 8	74 5	5 7	70 42%	10 2	425	195	0 5	0 7	6 6	420 1
14	6-Sep	58 3	Big Blue Island	14.50	1 00	77 0	72 9	5 8	70 56%	8 7	425	195	1 4	0 3	6 6	420.1
La Grange Reach																
7	26-Aug	86 5	Grape Bar Islands	17:00	1 00	79 7	78 1	6 7	85 64%	7 9	475	200	0 7	0 7	6 6	429 7
6	26-Aug	95 1	Sugar Creek Island	12:10	1 00	74 7	77 4	6 3	80 01%	7 1	450	200	0 6	0 7	6 6	429.7
5	25-Aug	107 0	Lower Bath Chute	16:30	1 00	91 4	78 6	4 8	61 64%	7 5	350	200	0 8	0 7	4 9	430 5
4	25-Aug	113 0	Upper Bath Chute	12:20	1 00	83 7	77 2	4 5	57 04%	8.7	425	190	0 8	0 7	4 9	430 5
13	2-Sep	148 0	Turkey Island	14:30	0 50	75 7	72 7	7 0	84 99%	5 9	350	200	1 0	0.7	6 6	431 6
20	9-Sep	155 1	Pekin	13:10	1 00	72 5	74 8	8 7	107 80%	9 8	650	190	0 8	0 7	6 6	430 9
Peoria Reach																
1	22-Aug	163 3	Lower Peoria Lake	15:00	0 70	77 7	77 9	11 3	144 17%	7 1	600	210	0 0	0 7	4 9	440.8
2	23-Aug	170 3	Lambie's Boat Harbor	12:45	1 00	75 4	75.0	10 5	130 35%	8 3	600	210	0 0	0 7	2 6	440 6
3	24-Aug	180 6	Chillicothe	12:29	1 00	75 2	75 9	6 1	76 38%	9 8	450	190		0 7	3 3	441 0
10	1-Sep	193 8	Henry Islartd	10:00	1 00	68 0	74 1	7 3	89 84%	9 8	600	200	0 7	0 3	6 6	440 8
9	31-Aug	202 8	Lower Twin Sister	15:03	0.75	73 4	76 5	8 7	109 55%	13 8	450	170	0 7	0 7	6 6	440 9
8	31-Aug	203 3	Upper Twin Sister	12:40	1 00	72 9	76 6	8 2	103 36%	14 6	450	190	0.7	0 7	6 6	440 9
12	2-Sep	207 6	Hennepin	9:15	0 50	57 9	73 9	8 5	104 41%	11 8	475	195	0 4	0 3	6 6	440 7
11	1-Sep	215 3	Clark Island	15:00	1 00	72 0	75 6	9 5	118 61%	11 0	450	205	0 9	0 3	6 6	440 8
Starved Rock Reach																
22	12-Sep	240 8	Bulls Island	16:45	1 00	84 2	78 8	10 8	138 95%	21 3	650	190	1 3	0 7	6 6	459 2
21	12-Sep	241 5	Bulls Island Bend	14:35	1 00	77 0	77 9	9 9	126 31%	20 5	650	190	0 7	0 7	6 6	459 2
Marseilles Reach																
23	13-Sep	248 0	Ballards Island	10:00	1 00	70 3	75 2	9 0	111 94%	16 5	650	195	0 0	0 3	3 3	483 5
24	13-Sep	249 6	Johnson Island	11:45	0 50	78 8	76 6	9 2	115 96%	21 7	650	190		0 7	4 9	483 5
25	13-Sep	260 6	Waupecan Island	15:10	1 00	77 7	79.0	9 3	119 87%	27 6	700	190		0 3	6 6	484 0
Dresden Reach																
26	14-Sep	277 3	Du Page River[e]	12:10	1 00	76 1	78 8	7 6	97 78%	27 6	700	185	0 0	0 7	4 9	504 9
27	14-Sep	279 8	Treats Island[e]	14:30	1 00	80 1	83 1	7 5	100 32%	26 8	650	185	0 7	0 3	6 6	504 9
Minimum					0 50	57 9	72 7	4 5	57 04%	5 9	350	170	0 0	0 3	2 6	420 1
Maximum					1 00	91 4	83 1	11 3	144 17%	27 6	700	225	1 4	0 7	6 6	504 9
Mean					0 92	75 4	76 2	7 7	96 78%	13 0	539	196	0 6	0 6	5 5	444 8
Total time electrofished					24 95											

[a]Refers to approximate average river mile electrofished at each site, 1957-1997

[b]Estimated during sampling

[c]Feet above sea level at the U S Army Corps of Engineers river gage nearest to the sampling site

[d]Mississippi River

[e]Des Plaines River

Table 2. Station information and characteristics during sampling in 1995. All stations except where noted are on the Illinois River and are listed in downstream to upstream order. Site miles are the average river mile and refer to Figure 1.

Sampling		Site		End time	Duration	Temp (°F)		DO		Secchi	Cond.		Vel.	Depth[b] (ft)		Stage[c]
Order	Date	Mile[a]	Name	(CST)	(h)	air	water	(ppm)	(%Sat.)	(in)	(umhos)	Volts	(ft/s)	min	max	(ft)
Reach 26, Mississippi River																
24	20-Sep	0.0	Brickhouse Slough[d]	10:50	1.00	67.3	68.0	9.0	104.25%	9.1	350	210	0.0	0.3	6.6	419.0
Alton Reach																
23	19-Sep	19.0	Mortland Island	17:30	1.00	62.6	71.6	7.3	87.68%	8.3	800	200	0.5	0.3	3.3	420.1
22	19-Sep	24.7	Dark Chute	13:00	1.00	67.3	71.4	7.2	86.31%	8.7	600	200		0.3	6.6	420.1
21	19-Sep	26.8	Hurricane Island	10:25	1.00	65.3	71.4	6.7	80.31%	8.3	650	190		0.3	3.3	420.1
20	18-Sep	30.0	Crater-Willow Islands	16:15	1.00	66.6	73.2	7.3	89.06%	7.9	700	190		0.3	4.9	420.0
19	18-Sep	58.3	Big Blue Island	12:30	1.00	62.6	72.5	7.9	95.73%	7.1	650	190	1.4	0.7	4.9	420.0
La Grange Reach																
16	14-Sep	86.5	Grape-Bar Islands	11:10	1.00	69.6	71.4	7.7	92.30%	7.1	650	190	0.6	0.7	4.9	429.6
17	14-Sep	95.1	Sugar Creek Island	13:50	1.00	72.3	72.5	7.0	84.82%	7.1	650	185	0.3	0.3	4.9	429.6
18	15-Sep	107.0	Lower Bath Chute	10:30	1.00	66.0	70.9	5.7	67.99%	7.1	450	195	0.7	0.7	6.6	430.1
25	22-Sep	113.0	Upper Bath Chute	11:55	1.00	59.4	62.1	7.3	79.45%	5.9	600	210	0.7	0.7	4.9	430.2
10	8-Sep	148.0	Turkey Island	12:40	0.50	63.5	74.3	7.2	88.79%	7.1	690	190	0.5	0.3	6.6	431.2
15	13-Sep	155.1	Pekin	11:30	1.00	70.2	71.4	9.0	107.88%	7.1	650	185		0.7	6.6	431.4
Peoria Reach																
1	29-Aug	163.3	Lower Peoria Lake	14:45	0.75	89.4	88.9	13.0	182.84%	7.5	700	180	0.0	0.7	3.3	440.6
6	5-Sep	170.3	Lambie's Boat Harbor	12:30	1.00	79.5	79.7	10.1	131.02%	6.7	700	175	0.0	0.3	3.3	440.5
5	1-Sep	180.6	Chillicothe	11:45	1.00	78.8	83.3	5.8	77.72%	10.6	700	185	0.5	0.7	6.6	441.1
2	30-Aug	193.8	Henry Island	14:35	1.00	85.6	85.1	6.4	87.12%	14.2	720	180		0.3	9.8	441.1
4	31-Aug	202.8	Lower Twin Sister	13:10	0.75	82.4	83.8	8.1	109.02%	15.7	700	180	0.7	0.3	6.6	441.2
3	31-Aug	203.3	Upper Twin Sister	10:55	1.00	82.2	83.8	7.5	100.94%	15.7	700	180	0.6	0.7	6.6	441.2
7	6-Sep	207.6	Hennepin	11:30	0.50	74.7	80.4	8.1	105.75%	15.0	710	185		0.3	6.6	441.1
8	6-Sep	215.3	Clark Island	14:20	1.00	80.2	80.6	9.1	119.02%	13.8	700	185	0.7	0.7	6.6	441.1
Starved Rock Reach																
11	11-Sep	240.8	Bulls Island	13:30	1.00	70.7	73.6	8.8	107.78%	23.6	600	200	0.7	0.3	6.6	459.2
9	7-Sep	241.5	Bulls Island Bend	10:15	1.00	68.7	79.0	7.0	90.22%	25.6	650	185	0.5	0.3	4.9	459.2
Marseilles Reach																
13	12-Sep	248.0	Ballards Island	10:20	1.00	69.3	67.1	9.1	104.44%	12.6	600	190	0.6	0.3	3.3	483.2
12	11-Sep	249.6	Johnson Island	17:10	0.50	72.0	73.9	9.3	114.24%	21.7	650	195	0.6	0.3	6.6	483.3
14	12-Sep	260.6	Waupecan Island	15:50	1.00	73.6	74.8	9.1	112.75%	25.6	650	185	0.5	0.3	3.3	483.7
Dresden Reach																
27	25-Sep	277.3	Du Page River[e]	16:30	1.00	68.2	70.3	7.8	92.48%	24.4	450	210	0.0	0.3	4.9	504.8
26	25-Sep	279.8	Treats Island[e]	12:45	1.00	68.5	70.7	7.4	88.09%	26.8	450	210	0.0	0.3	6.6	504.8
Minimum					0.50	59.4	62.1	5.7	67.99%	5.9	350	175	0.0	0.3	3.3	419.0
Maximum					1.00	89.4	88.9	13.0	182.84%	26.8	800	210	1.4	0.7	9.8	504.8
Mean					0.93	71.7	75.0	8.0	99.56%	13.0	634	191	0.5	0.4	5.5	444.7
Total time electrofished					25.00											

[a]Refers to approximate average river mile electrofished at each site, 1957-1997.

[b]Estimated during sampling

[c]Feet above sea level at the U.S. Army Corps of Engineers river gage nearest to the sampling site.

[d]Mississippi River.

[e]Des Plaines River.

Table 3. Station information and characteristics during sampling in 1996. All stations except where noted are on the Illinois River and are listed in downstream to upstream order. Site miles are the average river mile and refer to Figure 1.

Sampling		Site		End time	Duration	Temp (°F)		DO		Secchi	Cond.		Vel.	Depth[b] (ft)		Stage[c]
Order	Date	Mile[a]	Name	(CST)	(h)	air	water	(ppm)	(%Sat.)	(in)	(umhos)	Volts	(ft/s)	min	max	(ft)
Reach 26, Mississippi River																
24	18-Sep	0.0	Brickhouse Slough[d]	8:40	1.00	61.5	66.6	8.10	92.44%	8.7	380	220	0.0	0.1	0.3	419.0
Alton Reach																
23	17-Sep	19.0	Mortland Island	18:00	1.00	70.7	72.0	6.90	83.17%	10.6	660	185	0.6	0.1	2.0	421.2
21	17-Sep	24.7	Dark Chute	13:00	1.00	69.4	71.6	6.60	79.27%	9.8	590	185	0.7	0.1	2.5	421.2
22	17-Sep	26.8	Hurricane Island	15:15	1.00	70.9	71.8	6.90	83.02%	11.4	650	185	0.9			421.2
25	18-Sep	30.0	Crater-Willow Islands	12:50	1.00	71.8	70.9	6.60	78.71%	7.9	670	185	1.3	0.2	1.8	421.1
26	18-Sep	58.3	Big Blue Island	16:15	1.00	71.8	72.0	7.80	94.02%	9.1	650	185	1.3	0.1	3.0	421.3
La Grange Reach																
27	19-Sep	86.5	Grape-Bar Islands	11:00	1.00	59.9	68.5	7.10	82.70%	7.1	680	200	0.7	0.1	1.8	429.4
20	13-Sep	95.1	Sugar Creek Island	11:40	1.00	60.4	75.9	5.00	62.62%	9.8	690	185	0.9	0.1	2.0	429.5
16	9-Sep	107.0	Lower Bath Chute	12:58	1.00	74.1	79.0	3.60	46.39%	7.1	710	185	0.8	0.2	4.2	430.1
7	3-Sep	113.0	Upper Bath Chute	15:39	1.00	82.2	81.3	6.30	82.94%	7.5	690	185	1.5	0.2	1.3	430.3
19	12-Sep	148.0	Turkey Island	10:25	0.50	71.2	77.5	6.20	78.84%	8.3	695	185	0.8	0.1	2.0	430.9
18	10-Sep	155.1	Pekin	15:08	1.00	77.2	79.7	7.50	97.29%	8.7	700	185	1.0	0.2	5.0	442.0
Peoria Reach																
1	26-Aug	163.3	Lower Peoria Lake	14:24	0.75	82.0	82.6	13.90	185.07%	26.0	600	185	0.0	0.2	2.0	440.6
17	10-Sep	170.3	Lambie's Boat Harbor	10:50	1.00	71.8	72.5	7.70	93.31%	6.7	625	185	0.0	0.1	0.3	440.4
2	27-Aug	180.6	Chillicothe	11:59	1.00	77.2	79.3	7.50	96.97%	11.0	690	185	0.5	0.3	2.0	441.0
3	28-Aug	193.8	Henry Island	12:37	1.00	79.2	80.8	7.32	95.90%	10.2	700	185	0.9	0.3	2.0	440.9
4	28-Aug	202.8	Lower Twin Sister	17:12	0.75	83.3	82.9	9.40	125.55%	11.8	720	185	0.6	0.3	3.0	440.9
5	29-Aug	203.3	Upper Twin Sister	9:43	1.00	77.0	79.2	13.30	171.68%	11.0	750	185	0.8	0.2	2.0	440.9
8	4-Sep	207.6	Hennepin	14:18	0.50	78.8	81.3	11.00	144.81%	9.8	690	185	0.8	0.2	1.5	440.8
6	29-Aug	215.3	Clark Island	14:15	1.00	74.5	79.7	10.20	132.32%	12.2	710	185	0.8	0.5	3.0	440.9
Starved Rock Reach																
15	6-Sep	240.8	Bulls Island	11:55	1.00	74.3	80.8	8.30	108.73%	17.7	730	185	0.8	0.2	3.0	459.5
14	6-Sep	241.5	Bulls Island Bend	9:30	1.00	75.2	80.6	7.70	100.71%	21.3	720	185	0.6	0.2	3.0	459.5
Marseilles Reach																
12	5-Sep	248.0	Ballards Island	17:35	0.75	80.4	82.8	10.30	137.36%	20.1	710	185	0.6	0.2	1.5	438.4
13	5-Sep	249.6	Johnson Island	19:25	0.50	78.4	82.2	10.00	132.71%	18.1	710	185	0.8	0.2	3.0	438.4
11	5-Sep	260.6	Waupecan Island	14:38	1.00	82.0	83.3	8.60	115.24%	22.8	710	185	1.2	0.2	1.5	484.4
Dresden Reach																
10	5-Sep	277.3	Du Page River[e]	10:48	1.00	66.2	85.3	6.50	88.62%	28.7	730	185	0.3	0.2	1.5	504.6
9	4-Sep	279.8	Treats Island[e]	18:20	1.00	82.9	86.7	6.50	89.74%	19.7	760	185	0.6	0.2	1.5	504.6
Minimum					0.50	59.9	66.6	3.6	46.39%	6.7	380	185	0.0	0.1	0.3	419.0
Maximum					1.00	83.3	86.7	13.9	185.07%	28.7	760	220	1.5	0.5	5.0	504.6
Mean					0.92	74.2	78.0	8.0	102.97%	13.1	679	187	0.7	0.2	2.2	442.0
Total time electrofished					24.75											

[a]Refers to approximate average river mile electrofished at each site, 1957-1997.

[b]Estimated during sampling.

[c]Feet above sea level at the U.S. Army Corps of Engineers river gage nearest to the sampling site.

[d]Mississippi River.

[e]Des Plaines River.

Table 4. Station information and characteristics during sampling in 1997. All stations except where noted are on the Illinois River and are listed in downstream to upstream order. Site miles are the average river mile and refer to Figure 1.

Sampling		Site		End time	Duration	Temp (°F)		DO		Secchi	Cond.		Vel.	Depth[b] (ft)		Stage[c]
Order	Date	Mile[a]	Name	(CST)	(h)	air	water	(ppm)	(%Sat.)	(in)	(umhos)	Volts	(ft/s)	min	max	(ft)
Reach 26, Mississippi River																
25	30-Sep	0.0	Brickhouse Slough[d]	9:00	1.00	57.7	65.3	7.43	83.68%	6.7	390	210	0.3	0.1	2.0	419.0
Alton Reach																
24	29-Sep	19.0	Mortland Island	14:30	1.00	79.2	71.1	7.80	93.18%	10.2	595	175	1.0	0.1	3.0	420.5
20	26-Sep	24.7	Dark Chute	10:25	1.00	69.8	71.6	6.03	72.42%	9.8	650	175	0.6	0.1	3.0	420.4
21	26-Sep	26.8	Hurricane Island	13:20	1.00	74.5	72.0	7.40	89.20%	9.8	650	175	1.3			420.4
22	26-Sep	30.0	Crater-Willow Islands	16:44	1.00	77.7	74.8	8.40	104.12%	8.7	650	175	0.7	0.1	3.0	420.4
23	29-Sep	58.3	Big Blue Island	10:30	1.00	63.3	68.5	7.70	89.69%	9.8	610	175	1.0	0.1	4.0	420.5
La Grange Reach																
5	05-Sep	86.5	Grape-Bar Islands	11:15	1.00	65.1	74.3	5.80	71.52%	9.1	600	210	1.2	0.1	4.0	429.6
4	04-Sep	95.1	Sugar Creek Island	11:00	1.00	58.1	74.7	8.89	110.00%	5.3	400	200	1.6	0.1	3.0	429.9
7	08-Sep	107.0	Lower Bath Chute	14:00	1.00	74.8	74.8	5.85	72.51%	5.5	670	210	0.8	0.1	5.0	430.6
6	08-Sep	113.0	Upper Bath Chute	11:50	1.00	72.1	74.5	6.71	82.89%	5.5	690	200	1.0	0.1	5.0	430.6
26	03-Oct	148.0	Turkey Island	10:00	0.50	67.3	68.0	9.33	108.07%	7.9	630	170		0.1	1.0	431.1
27	03-Oct	155.1	Pekin	12:15	1.00	74.7	66.6	8.99	102.60%	8.5	610	165		0.1	2.0	431.8
Peoria Reach																
1	02-Sep	163.3	Lower Peoria Lake	12:25	1.00	78.1	78.3	10.19	130.45%	7.1	600	200	0.2	0.2	3.0	441.0
3	03-Sep	170.3	Lambie's Boat Harbor	14:35	1.00	67.3	74.5	9.55	117.97%	6.3	600	200	0.5	0.1	1.5	440.9
2	03-Sep	180.6	Chillicothe	10:55	1.00	64.6	76.1	6.88	86.31%	8.3	700	200	1.5	0.1	3.0	440.9
19	18-Sep	193.8	Henry Island	14:00	1.00	79.7	77.2	8.05	102.02%	12.2	700	160	0.7	0.1	4.0	441.3
18	18-Sep	202.8	Lower Twin Sister	11:30	0.75	74.8	77.2	8.82	111.78%	12.6	700	160	0.7	0.1	4.0	441.3
17	18-Sep	203.3	Upper Twin Sister	10:05	1.00	69.1	76.8	8.44	106.60%	12.6	710	155	0.7	0.1	4.0	441.3
16	17-Sep	207.6	Hennepin	14:30	0.50	79.3	78.4	10.77	138.10%	13.0	710	160	1.0	0.1	3.0	441.3
15	17-Sep	215.3	Clark Island	12:30	1.00	71.6	76.6	9.26	116.76%	13.6	700	160	0.7	0.1	4.0	441.3
Starved Rock Reach																
14	12-Sep	240.8	Bulls Island	11:30	1.00	59.7	75.0	8.37	103.93%	17.7	700	210	0.1	0.1	3.0	464.5
13	12-Sep	241.5	Bulls Island Bend	9:40	1.00	54.0	75.0	8.41	104.42%	18.1	700	210	0.8	0.1	3.0	464.5
Marseilles Reach																
11	11-Sep	248.0	Ballards Island	13:15	0.75	75.9	76.6	10.40	131.13%	18.1	680	210	0.5	0.1	3.0	464.6
12	11-Sep	249.6	Johnson Island	16:00	0.50	74.5	77.0	10.74	135.88%	16.1	700	210	0.7	0.1	4.0	464.6
10	11-Sep	260.6	Waupecan Island	9:45	1.00	60.6	77.0	8.08	102.23%	18.7	700	210	0.7	0.1	4.0	484.6
Dresden Reach																
9	10-Sep	277.3	Du Page River[e]	16:45	1.00	71.2	80.4	8.49	110.86%	20.7	725	200	0.9	0.1	5.0	504.9
8	10-Sep	279.8	Treats Island[e]	12:40	1.00	71.2	80.2	7.33	95.56%	23.6	725	210	1.0	0.1	3.0	504.9
Minimum					0.50	54.0	65.3	5.8	71.52%	5.3	390	155	0.1	0.1	1.0	419.0
Maximum					1.00	79.7	80.4	10.8	138.10%	23.6	725	210	1.6	0.2	5.0	504.9
Mean					0.93	69.9	74.5	8.3	102.74%	11.7	648	189	0.8	0.1	3.3	443.9
Total time electrofished					25.00											

[a]Refers to approximate average river mile electrofished at each site, 1957-1997.

[b]Estimated during sampling

[c]Feet above sea level at the U.S. Army Corps of Engineers river gage nearest to the sampling site.

[d]Mississippi River.

[e]Des Plaines River.

Table 5. Station information and characteristics during sampling in 1998. All stations except where noted are on the Illinois River and are listed in downstream to upstream order. Site miles are the average river mile and refer to Figure 1.

Sampling		Site		End time	Duration	Temp (°F)		DO		Secchi	Cond.		Vel.	Depth[b] (ft)		Stage[c]
Order	Date	Mile[a]	Name	(CST)	(h)	air	water	(ppm)	(%Sat.)	(in)	(umhos)	Volts	(ft/s)	min	max	(ft)
Reach 26, Mississippi River																
16	10-Sep	0.0	Brickhouse Slough[d]	10:30	1.00		73.9	5.0	61.44%	5.9	443	210	0.1	0.1	6.0	
Alton Reach																
15	9-Sep	19.0	Mortland Island	16:00	1.00		82.0	6.6	87.45%	14.2	744	170	0.7	0.1	12.0	420.2
14	9-Sep	24.7	Dark Chute	13:00	1.00		79.5	5.8	75.12%	9.8	773	190	0.4	0.1	8.0	420.2
13	9-Sep	26.8	Hurricane Island	11:00	1.00		78.1	6.3	80.51%	8.7	775	180	0.6	0.1	8.0	420.2
12	8-Sep	30.0	Crater-Willow Islands	17:00	1.00		80.8	6.5	85.15%	8.7	766	190	0.9	0.1	8.0	420.2
11	8-Sep	58.3	Big Blue Island	12:15	1.00		80.4	7.2	94.02%	9.8	780	200	0.6	0.1	12.0	420.2
La Grange Reach																
2	31-Aug	86.5	Grape-Bar Islands	15:55	1.00		80.8	6.2	81.22%	8.3	758	175	0.7	0.1	8.0	429.4
1	31-Aug	95.1	Sugar Creek Island	11:50	1.00		81.3	5.3	69.77%	7.1	782	170	0.8	0.1	8.0	429.4
18	11-Sep	107.0	Lower Bath Chute	14:00	1.00		77.0			7.1		175	1.0	0.1	12.0	431.0
17	11-Sep	113.0	Upper Bath Chute	11:00	1.00		75.2			7.1		180	1.1	0.1	12.0	431.0
20	14-Sep	148.0	Turkey Island	13:45	0.50		78.8	6.9	88.77%	9.1	778	170	0.9	0.1	6.0	431.1
19	14-Sep	155.1	Pekin	10:45	1.00		77.4	7.7	97.75%	8.7	773	170	0.9	0.1	8.0	431.6
Peoria Reach																
5	1-Sep	163.3	Lower Peoria Lake	18:30	1.00		83.7	6.5	87.37%	7.1	789	195	0.0	0.1	6.0	440.9
4	1-Sep	170.3	Lambie's Boat Harbor	15:00	1.00		84.4	7.6	102.81%	6.7	835	195	0.0	0.1	3.0	440.9
3	1-Sep	180.6	Chillicothe	10:20	1.00		80.6	5.5	71.93%	7.9	805	175	0.6	0.1	3.0	440.7
10	4-Sep	193.8	Henry Island	13:30	1.00		80.4	7.9	103.16%	12.6	720	175	0.7	0.1	8.0	440.4
9	4-Sep	202.8	Lower Twin Sister	9:45	1.00		79.9	7.8	101.35%	16.1	717	175	0.5	0.1	12.0	440.4
8	3-Sep	203.3	Upper Twin Sister	16:30	1.00		82.8	7.1	94.68%	11.8	715	185	0.3	0.1	14.0	440.5
7	3-Sep	207.6	Hennepin	13:30	1.00		81.0	7.4	97.10%	7.9	704	185	0.5	0.1	14.0	440.5
6	3-Sep	215.3	Clark Island	10:20	1.00		78.6	8.4	107.89%	15.7	716	185	0.7	0.1	8.0	440.9
Starved Rock Reach																
27	23-Sep	240.8	Bulls Island	13:00	1.00		78.8	6.2	79.77%	17.3	794	180	0.4	0.1	12.0	459.1
26	23-Sep	241.5	Bulls Island Bend	10:15	1.00		77.7	6.2	78.97%	17.3	796	180	0.4	0.1	12.0	459.1
Marseilles Reach																
25	22-Sep	248.0	Ballards Island	15:15	1.00		81.5	5.8	76.48%	22.8	797	180	0.1	0.1	3.0	483.5
24	22-Sep	249.6	Johnson Island	13:15	0.75		81.5	6.5	85.71%	23.6	792	180	0.2	0.1	3.0	483.5
23	22-Sep	260.6	Waupecan Island	9:45	1.00		82.2	7.9	104.84%	22.8	782	175	0.9	0.1	6.0	484.2
Dresden Reach																
22	21-Sep	277.3	Du Page River[e]	15:00	0.75		86.9	5.3	73.28%	22.8	786	175	0.2	0.1	8.0	504.7
21	21-Sep	279.8	Treats Island[e]	12:30	1.00		86.4	6.3	86.71%	23.2	786	195	0.4	0.1	6.0	504.7
Minimum					0.50		73.9	5.0	61.44%	5.9	443	170	0.0	0.1	3.0	420.2
Maximum					1.00		86.9	8.4	107.89%	23.6	835	210	1.1	0.1	14.0	504.7
Mean					0.96		80.4	6.6	86.93%	12.6	756	182	0.5	0.1	8.4	445.7
Total time electrofished					26.00											

[a]Refers to approximate average river mile electrofished at each site, 1957-1997.

[b]Estimated during sampling.

[c]Feet above sea level at the U.S. Army Corps of Engineers river gage nearest to the sampling site.

[d]Mississippi River.

[e]Des Plaines River.

oxygen, specific conductance, temperature, surface velocity) were taken at the upstream end of each site. Sampling at each site typically lasted one hour, with all obvious structure (e.g. downed trees, woody debris, rock rip-rap) intensively sampled for fishes. Stunned fish were gathered with a dip net (1/4-in [0.64-cm] mesh) and stored in an oxygenated livewell until sampling was completed. Fish were then identified to species, measured (total length and weight), inspected for externally visible abnormalities (sores, fin erosion, etc.), and returned to the water. A detailed description of the electrofishing method and equipment are provided by Lerczak et al. (1994, Appendix A).

A. Criteria for Sampling

Fish collection by the Long-term Illinois River Fish Population Monitoring Program occurs during the last week in August and September each year to increase the probability of collecting young-of-year fishes with a 1/4 inch mesh dip net. Sampling at each site is only conducted if river water levels are low and stable, as determined by the U.S. Army Corps of Engineers, who maintain gage sites along the length of the Illinois River waterway. Also, sampling for this project does not occur if water temperatures have fallen unseasonably low (below 58 C), which are not typically reached on the Illinois River until mid-October (Kofoid 1903, LTRMP unpublished data 1999).

B. Data Analysis

At each site, number of individual fish and total weight (pounds) were tallied for each species. Fish catch rates were calculated as the number of individuals collected per hour of electrofishing ($CPUE_N$) and as weight in pounds collected per hour of electrofishing ($CPUE_W$). For 1994-1998, data from sites were grouped into reaches defined by navigation dams (Figure 1) as follows: Alton Reach, river mile (RM) 0-80; La Grange Reach, RM 80-158; Peoria Reach, RM 158-231; Starved Rock Reach, RM 231-247; Marseilles Reach, RM 247-271.5; and Dresden Reach, RM 271.5-286 on the Des Plaines River. Data from reaches were combined further into three groups (lower and middle Illinois River segments, and the upper Illinois Waterway segment) defined by their location along the river and by the amount of off-channel habitat accessible to fish per unit length of river (Lerczak et al. 1994:5 and Figure 1). Lerczak et al. (1994, 1995, and 1996) showed that river fish communities of the three segments differed substantially enough to give segment designations biological meaning. Separate tables were constructed listing only those species that accounted for at least 95% of the total catch rates. This percentage was arbitrarily chosen to emphasize species of most importance in analyzing fish community composition.

RESULTS AND DISCUSSION (Job 4)

A. Project F-101-R Field Sampling, 1994-1998

Before each fish sampling season began, all equipment was tested and repaired as necessary. Due to the arrival of the new project manager Koel, and loss of all senior staff from the Havana Field Station during this project, training for new staff was more intensive than that needed in recent years; new staff were trained in electrofishing methods and safety procedures **(Job 1)**. All field sampling for this project occurred during late August and September each year, with typically one hour spent electrofishing at each of 27 fixed sites, each year **(Job 2)**.

The long-term database was converted from R-Base computer format to an updated, Microsoft Access 97 format. Data collected during F-101-R were entered directly into this database, and verified against original field data sheets until no errors were detected **(Job 3)**. The original data sheets of this project (1957-1997) were originally stored in a vault along Quiver Creek at Forbes Biological Station. Due to moisture problems and a fire hazard within this vault, the data were moved and are now stored in flame-resistant cabinets at the Long Term Resource Monitoring Program Field Station at 704 N. Schrader Avenue, Havana **(Job 3)**. Data analysis has occurred at the LTRMP Havana Field Station **(Job 4)** with results presented at several public and scientific meetings.

B. Electrofishing Stations

All 27 long-term sites were sampled for fishes and physio-chemical parameters each year from 1994-1997. Site listings and water quality parameters are provided by Tables 1-5 **(Job 5)**. All values were within the ranges expected based upon previous sampling (see Lerczak et al. 1994:17-24). All sites were sampled with water temperatures and river levels (Tables 1-5) within our previously established criteria.

1994. All stations were sampled between 22 August and 29 September 1994, taking 27.95 hours, with sampling times ranging from 0.5 to 1.0 hour (Table 1). Sampling was conducted in full daylight between the hours of 8:45 AM and 6:45 PM. The ranges for physical measurements during the 1994 sampling season were as follows: air temperature, 57.9-91.4 F; water temperature, 72.7-83.1 F; dissolved oxygen concentration, 4.5-11.3 ppm; Secchi disk transparency, 5.9-27.6 inches; specific conductance, 350-700 umhos; surface velocity, 0.0-1.4 ft/s; water depth, 0.3-6.6 ft (Table 1).

1995. All stations were sampled between 29 August and 25 September 1995, taking 25.00 hours, with sampling times ranging from 0.5 to 1.0 hour (Table 2). Sampling was conducted in full daylight between the hours of 9:15 AM and 5:30 PM. The ranges for physical measurements during the 1995 sampling season were as

follows: air temperature, 59.4-89.4 F; water temperature, 62.1-88.9 F; dissolved oxygen concentration, 5.7-13.0 ppm; Secchi disk transparency, 5.9-26.8 inches; specific conductance, 350-800 umhos; surface velocity, 0.0-1.4 ft/s; water depth, 0.3-9.8 ft (Table 2).

1996. All stations were sampled between 26 August and 19 September 1996, taking 24.75 hours, with sampling times ranging from 0.5 to 1.0 hour (Table 3). Sampling was conducted in full daylight between the hours of 7:40 AM and 7:25 PM. The ranges for physical measurements during the 1996 sampling season were as follows: air temperature, 59.9-83.3 F; water temperature, 66.6-86.7 F; dissolved oxygen concentration, 3.6-13.9 ppm; Secchi disk transparency, 6.7-28.7 inches; specific conductance, 380-760 umhos; surface velocity, 0.0-1.5 ft/s; water depth, 0.1-5.0 ft (Table 3).

1997. All stations were sampled between 2 September and 3 October 1997, taking 25.00 hours, with sampling times ranging from 0.5 to 1.0 hour (Table 4). Sampling was conducted in full daylight between the hours of 8:00 AM and 4:45 PM. The ranges for physical measurements during the 1997 sampling season were as follows: air temperature, 54.0-79.7 F; water temperature, 65.3-80.4 F; dissolved oxygen concentration, 5.8-10.8 ppm; Secchi disk transparency, 5.3-23.6 inches; specific conductance, 390-725 umhos; surface velocity, 0.1-1.6 ft/s; water depth, 0.1-5.0 ft (Table 4).

1998. All stations were sampled between 31 August and 23 September 1998, taking 26.00 hours, with sampling times ranging from 0.5 to 1.0 hour (Table 5). Sampling was conducted in full daylight between the hours of 8:45 AM and 6:30 PM. The ranges for physical measurements during the 1998 sampling season were as follows: air temperature, (not measured); water temperature, 73.9-86.9 F; dissolved oxygen concentration, 5.0-8.4 ppm; Secchi disk transparency, 5.9-23.6 inches; specific conductance, 443-835 umhos; surface velocity, 0.0-1.1 ft/s; water depth, 0.0-14.0 ft (Table 5).

C. Catch Rates in Numbers of Individuals

In this report, for each year (1994-1998) catch rates of the number of individuals collected per hour of electrofishing are calculated for each of the seven Illinois River navigation reaches (Figure 1). Similar summaries are presented for fish weights. Common names used throughout this report follow Robins et al. (1991). Common and scientific names are listed in APPENDIX A. Number of individuals of each fish species collected per hour of electrofishing and species rankings by waterway reach and year are summarized by Tables 6 through 15.

Numbers of Fish Collected. From 1994-1998, we collected a total of 25,921 fish representing 62 species (plus five hybrids) from fourteen families during 125.70 hours of sampling at 26 sites on the Illinois Waterway and a single site on the

Table 6 Number of individuals of each fish species collected per hour of electrofishing ($CPUE_N$) at Reach 26 of the Mississippi River (Brickhouse Slough) and at six reaches of the Illinois River Waterway in 1994

	Reach and Hours Fished							
Species	Reach 26 1.00	Alton 5.00	La Grange 8.50	Peoria 6.95	Starved Rock 2.00	Marseilles 2.50	Dresden 2.00	Overall $CPUE_N$ 26.95
Lepisosteidae								
longnose gar			0.12					0.04
Amiidae								
bowfin		0.20						0.04
Clupeidae								
gizzard shad	7.00	12.40	10.71	6.47	7.00	14.80	22.50	11.17
skipjack herring				0.86		0.40		0.26
threadfin shad		0.40		6.33				1.71
Hiodontidae								
goldeye			0.24	0.29				0.15
Cyprinidae								
bullhead minnow					1.50	26.80	68.50	1.19
bluntnose minnow			0.12	0.58	8.00	1.20	4.00	7.68
common carp	3.00	6.80	24.12	6.91	4.00	3.60	9.50	12.10
common carp x goldfish						0.80	3.50	0.33
emerald shiner	4.00	1.80	1.65	18.56	21.00	31.20	10.00	10.98
golden shiner						0.80	2.50	0.26
goldfish			0.12	0.43			0.50	0.19
minnow (unid.)				0.29		0.40		0.11
red shiner			1.29		1.00	2.40		0.71
sand shiner					4.00	6.80		0.93
silver chub	1.00			1.01				0.30
spottail shiner				0.43		1.20	15.50	1.37
Catostomidae								
bigmouth buffalo		2.00	6.24	4.17				3.41
golden redhorse			0.12	0.43	0.50	1.60	1.00	0.41
highfin carpsucker					0.50			0.04
northern hog sucker						0.40		0.04
quillback				0.14				0.04
river carpsucker			0.12	3.02	0.50	1.60	0.50	1.04
shorthead redhorse			1.88	2.45			1.00	1.30
smallmouth buffalo	4.00	3.60	4.82	5.90	9.00	1.60		4.68
Ictaluridae								
channel catfish	1.00	16.20	4.94	1.73	4.50	1.20		5.49
flathead catfish		0.20	0.47	0.14			0.50	0.26
yellow bullhead		0.40						0.07
Atherinidae								
brook silverside							0.50	0.04
Percichthyidae								
white bass	2.00	2.60	10.35	5.18	3.50	2.40		5.64
Centrarchidae								
black crappie	12.00	9.20	11.41	2.16			1.00	6.38
bluegill	33.00	44.60	30.71	31.94	3.50	9.60	10.00	29.31
bluegill x green sunfish				0.58			0.50	0.19
green sunfish	1.00	0.80	0.59	12.95	1.00	1.60	14.50	5.01
largemouth bass	12.00	7.40	4.35	5.18	0.50	7.60	1.00	5.34
orangespotted sunfish	2.00		0.12	0.14	0.50		0.50	0.22
pumpkinseed							0.50	0.04
redear sunfish	1.00							0.04
rock bass							1.00	0.04
smallmouth bass			0.12	0.43	2.50	2.40	5.00	0.93
warmouth		0.60	0.35					0.22
white crappie			0.94	0.29				0.37
Percidae								
sauger	1.00	0.20	0.71	0.72				0.48
slenderhead darter						0.40		0.04
Sciaenidae								
freshwater drum	27.00	12.40	12.82	11.22		2.00	0.50	10.46
Total number per hour	111.00	121.80	129.41	130.94	73.00	122.80	174.50	131.05
Number of species/hybrids	15/0	18/0	26/0	28/1	18/0	22/1	22/2	42/2

Table 7. Species ranked by relative abundance in number of fish collected per hour for 1994. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	3 (10.2)	5 (8.3)	6 (4.9)	4 (9.6)	3 (12.1)	2 (12.9)
threadfin shad			7 (4.8)			
Cyprinidae						
bluntnose minnow				9 (2.1)	2 (21.8)	1 (39.3)
bullhead minnow				3 (11.0)		8 (2.3)
common carp	6 (5.6)	2 (18.6)	5 (5.3)	6 (5.5)	7 (2.9)	6 (5.4)
common carp x goldfish						9 (2.0)
emerald shiner		12 (1.3)	2 (14.2)	1 (28.8)	1 (25.4)	5 (5.7)
golden shiner						10 (1.4)
red shiner				10 (1.4)	8 (2.0)	
sand shiner				6 (5.5)	6 (5.5)	
silver chub			15 (0.8)			
spottail shiner						3 (8.9)
Catostomidae						
bigmouth buffalo	9 (1.6)	7 (4.8)	10 (3.2)			
golden redhorse					10 (1.3)	
river carpsucker			11 (2.3)		10 (1.3)	
shorthead redhorse		11 (1.5)	12 (1.9)			
smallmouth buffalo	7 (3.0)	9 (3.7)	8 (4.5)	2 (12.3)	10 (1.3)	
Ictaluridae						
channel catfish	2 (13.3)	8 (3.8)	14 (1.3)	5 (6.2)	11 (0.6)	
Percichthyidae						
white bass	8 (2.1)	6 (8.0)	9 (4.0)	7 (4.8)	8 (2.0)	
Centrarchidae						
black crappie	4 (7.6)	4 (8.8)	13 (1.6)			11 (1.0)
bluegill	1 (36.6)	1 (23.7)	1 (24.4)	7 (4.8)	4 (7.8)	5 (5.7)
green sunfish			3 (9.9)		10 (1.3)	4 (8.3)
largemouth bass	5 (6.1)	10 (3.4)	9 (4.0)		5 (6.2)	
smallmouth bass				8 (3.4)	8 (2.0)	7 (2.9)
Sciaenidae						
freshwater drum	3 (10.2)	3 (9.9)	4 (8.6)		9 (1.6)	
Numbers of fishes accounting for 95%	10	12	16	12	16	12

Table 8 Number of individuals of each fish species collected per hour of electrofishing ($CPUE_N$) at Reach 26 of the Mississippi River (Brickhouse Slough) and at six reaches of the Illinois River Waterway in 1995

	Reach and Hours Fished							
Species	Reach 26 1 00	Alton 5 00	La Grange 5 50	Peoria 7 00	Starved Rock 2 00	Marseilles 2 50	Dresden 2 00	Overall $CPUE_N$ 25 00
Lepisosteidae								
shortnose gar				0 14				0 04
Amiidae								
bowfin		0 20						0 04
Clupeidae								
gizzard shad	54 00	42 60	88 73	125 86	242 50	90 00	50 50	97 88
skipjack herring		0 20		0 43				0 16
Hiodontidae								
goldeye	1.00	1 60	0 91					0 56
Cyprinidae								
bluntnose minnow		0 20	0 18		23 00	24 40	150 00	16 36
bullhead minnow		0 40	0 73	0 29	59 00	50 00	186 50	24 96
central stoneroller							3 00	0 24
common carp	4 00	3 40	25 82	6 86	1 00	7 60	6 00	9 76
common carp x goldfish							1 00	0 08
emerald shiner	3 00	6 60	11 09	12 29	438 50	71 20	10 50	50 36
golden shiner			0 36	5 57		0 80	3 50	2 00
goldfish			0 18	2 43				0 72
grass carp			0 18					0 04
minnow (unid)			0 18		3 50	3 60		0 68
red shiner	2 00	0 40	0 55	1.00	20 50	42 40	7 00	7 00
sand shiner					43 00			3 44
silver chub				0 71				0.20
spottail shiner				5 29	2 00	2 40		1 88
suckermouth minnow						0 80		0 08
Catostomidae								
bigmouth buffalo		6 80	4 36	3 14				3 20
black buffalo			0 36					0 08
golden redhorse					1 00	0 40	0 50	0 16
river carpsucker	9 00			5 86	1 50	0 80		2 20
shorthead redhorse		0 20	1 45	0 71		0 80		0 64
smallmouth buffalo	18 00	5 00	6 55	13 43	8 50	1 20	0 50	7 76
quillback				0 29	0 50			0.12
Ictalundae								
black bullhead				0 14			0 50	0 08
channel catfish		10 20	3 09	2 00		0 40	0 50	3 36
flathead catfish		1 40	0 91	0 14			0 50	0 56
yellow bullhead				0 29		0 40		0.12
Cyprinodontidae								
blackstripe topminnow			0 18				1 00	0.12
Poeciliidae								
mosquitofish			0 36					0.08
Atherinidae								
brook silverside	1 00	0 20	0 18					0.12
Percichthyidae								
striped x white bass		0 20		0 29				0.12
white bass	1 00	3 00	20 91	8 29	1 50	0 40		7 72
Centrarchidae								
black crappie	8 00	5 20	9 64	5 29	0 50		0 50	5 04
bluegill	42 00	44 80	40 18	39 86	15 00	42 40	83 00	42 72
bluegill x green sunfish			0.18	1 00			0 50	0 36
green sunfish	1.00	0 60	0 55	9 29	4 00	2 80	46 00	7 16
largemouth bass	5 00	7 60	4 73	10 71		9 60	11 50	7 64
orangespotted sunfish	3 00	0 20		1 00		0 80	21.00	2 20
pumpkinseed		0 20		0 14			0 50	0 12
redear sunfish						0 80		0 08
rock bass							6 50	0 52
smallmouth bass				0 57	1.00	1 20	9 00	1 08
warmouth	1.00	0 20	1 09					0 32
white crappie		0 60	2 18	1 86	0 50	0 40		1 20
Percidae								
logperch					0 50			0 04
sauger	1 00		0 18	0 14				0 12
walleye				0 14				0 04
Sciaenidae								
freshwater drum	36 00	8 20	15 09	25 57		1 20		13 68
Total number per hour	190 00	150 20	241 09	291 00	867 50	356 80	600 00	325 24
Number of species/hybrids	17/0	25/1	28/1	32/2	19/0	24/0	23/1	48/3

Table 9. Species ranked by relative abundance in number of fish collected per hour for 1995. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	2 (28.4)	1 (36.8)	1 (43.3)	2 (28.0)	1 (25.2)	4 (8.4)
Cyprinidae						
bluntnose minnow				5 (2.7)	5 (6.8)	2 (25.0)
bullhead minnow				3 (6.8)	3 (14.0)	1 (31.1)
common carp	10 (2.3)	3 (10.7	9 (2.4)		7 (2.1)	
emerald shiner	7 (4.4)	6 (4.6)	5 (4.2)	1 (50.5)	2 (20.0)	8 (1.8)
golden shiner			11 (1.9)			
red shiner				6 (2.4)	4 (11.9)	10 (1.2)
sand shiner				4 (5.0)		
spottail shiner			12 (1.8)			
Catostomidae						
bigmouth buffalo	6 (4.5)	10 (1.8)	13 (1.1)			
river carpsucker			10 (2.0)			
smallmouth buffalo	9 (3.3)	8 (2.7)	4 (4.6)			
Ictaluridae						
channel catfish	3 (6.8)	11 (1.3)				
Percichthyidae						
white bass	11 (2.0)	4 (8.7)	8 (2.8)			
Centrarchidae						
black crappie	8 (3.5)	7 (4.0)	12 (1.8)			
bluegill	1 (29.8)	2 (16.7)	2 (13.7)		4 (11.9)	3 (13.8)
green sunfish			7 (3.2)			5 (7.7)
largemouth bass	5 (5.1)	9 (2.0)	6 (3.7)		6 (2.7)	7 (1.9)
orangespotted sunfish						6 (3.5)
smallmouth bass						9 (1.5)
Sciaenidae						
freshwater drum	4 (5.5)	5 (6.3)	3 (8.8)			
Numbers of fishes accounting for 95%	11	11	14	6	8	10

Table 10 Number of individuals of each fish species collected per hour of electrofishing ($CPUE_N$) at Reach 26 of the Mississippi River (Brickhouse Slough) and at six reaches of the Illinois River Waterway in 1996

	Reach and Hours Fished							
Species	Reach 26 1 00	Alton 5 00	La Grange 5 50	Peoria 7 00	Starved Rock 2 00	Marseilles 2 25	Dresden 2 00	Overall $CPUE_N$ 24 75
Lepisosteidae								
shortnose gar			0 18					0 04
Clupeidae								
gizzard shad	2.00	25 80	126.00	150 75	109.00	63.08	39 50	98 99
skipjack herring		0 40	0 91	0 88				0 57
threadfin shad		8 00	2.73	3 63		0 51	2 00	3 60
Cyprinidae								
bluntnose minnow							1 00	0 08
bullhead minnow			0 18					0 04
carp x goldfish						0 51	1.00	0 12
common carp	9 00	7.20	36 36	6 50	3 00	5 13	6 00	13 13
emerald shiner	1.00	1 80	8 00	8 75	11 50	1 54	8 50	6 75
fathead minnow				0 13				0 04
golden shiner			0.18	0 63			0 50	0 28
goldfish			0 36	0 50			1.00	0 32
grass carp		0 20						0 04
red shiner		0 60	2 00	0 13	10 00	1 54		1 54
silverband shiner				0 13				0 04
spottail shiner				1 25	3 00	5 64	8 00	1 74
Catostomidae								
bigmouth buffalo		2 60	5 27	3 38		1.54	0 50	2 95
golden redhorse				0 25				0 08
river carpsucker	7.00	0 20	0 55	1 25	0 50	1 03		0 97
smallmouth buffalo	6 00	4 60	5 82	6 88	7.00	5.13	0 50	5 70
shorthead redhorse		0 60	0 73	0 75		0 51	0 50	0 61
Ictalundae								
black bullhead			0.18	0 13				0 08
channel catfish	2.00	19 40	4 73	1 13	0 50	1.03	0 50	5 58
flathead catfish		0 80	0 36	0 13				0 28
yellow bullhead				0 13			0 50	0 08
Cyprinodontidae								
blackstripe topminnow			0 36					0 08
Athennidae								
brook silverside		0 20	1.09					0 28
Percichthyidae								
white bass	5 00	13 60	56 18	8 50				18 18
Centrarchidae								
black crappie		2.60	6 18	4 13				3 23
bluegill	6 00	15 40	16 73	23 75	1.00	6.15	14 50	16 48
bluegill x green sunfish				0.13				0 04
green sunfish	1.00	0 20	0 36	2 88			5 50	1 54
largemouth bass	1 00	5 80	2 91	7 38	2 00	4 62	6 00	5 25
orangespotted sunfish	1 00	0 40		0 75	0 50	2 05	3 50	0 85
rock bass						0 51	1 50	0 16
smallmouth bass				0 13	0.50			0 08
warmouth			0 91	0 13				0 24
white crappie		0 60	0 55	0.50		0 51		0 44
Percidae								
logperch				0 13				0 04
mud darter				0 13				0 04
sauger		0 20	2 00	0 63				0 69
walleye				0 25				0 08
Sciaenidae								
freshwater drum	12 00	4 40	33 09	13 25		1 54	0 50	13 17
Total number per hour	53 00	115 60	314 91	249 88	148 50	102 56	101.50	204 52
Number of species/hybrids	12/0	23/0	28/0	34/1	12/0	17/1	19/1	41/2

Table 11. Species ranked by relative abundance in number of fish collected per hour for 1996. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	1 (22.3)	1 (40.0)	1 (60.3)	1 (73.4)	1 (61.5)	1 (38.9)
threadfin shad	5 (6.9)		10 (1.5)			8 (2.0)
Cyprinidae						
common carp	6 (6.2)	3 (11.5)	8 (2.6)	5 (2.0)	4 (5.0)	5 (5.9)
emerald shiner		6 (2.5)	4 (3.5)	2 (7.7)	7 (1.5)	3 (8.4)
red shiner				3 (6.7)	7 (1.5)	
spottail shiner				5 (2.0)	3 (5.5)	4 (7.9)
Catostomidae						
bigmouth buffalo	10 (2.2)	8 (1.7)	11 (1.4)		7 (1.5)	
smallmouth buffalo	8 (4.0)	7 (1.8)	7 (2.8)	4 (4.7)	4 (5.0)	
Ictaluridae						
channel catfish	2 (16.8)	9 (1.5)				
Percichthyidae						
white bass	4 (11.8)	2 (17.8)	5 (3.4)			
Centrarchidae						
black crappie	10 (2.2)	8 (2.0)	9 (1.7)			
bluegill	3 (13.3)	5 (5.3)	2 (9.5)		2 (6.0)	2 (14.3)
green sunfish						6 (5.4)
largemouth bass	7 (5.0)		6 (3.0)		5 (4.5)	5 (5.9)
orangespotted sunfish					6 (2.0)	7 (3.4)
rock bass						9 (1.5)
Sciaenidae						
freshwater drum	9 (3.8)	4 (10.5)	3 (5.3)		7 (1.5)	
Number of fishes accounting for 95%	11	10	11	6	11	10

Table 12 Numbers of individuals of each fish species collected per hour of electrofishing ($CPUE_N$) on Reach 26 of the Mississippi River (Brickhouse Slough) and on six reaches of the Illinois River Waterway in 1997

	Reach and Hours Fished							
	Reach 26	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden	Overall $CPUE_N$
Species	1 00	5 00	5 50	7 25	2 00	2 25	2 00	25 00
Amiidae								
bowfin		0 20						0 04
Clupeidae								
gizzard shad	11 00	27 20	46 36	97 38	49 00	40 89	14 00	53 04
skipjack herring		0 60	1 82	0 28		0 44		0 64
threadfin shad		0 20				6 22		0 60
Cyprinidae								
bluntnose minnow					41 00	9 33	115 00	13 32
bullhead minnow				3 17	0 50	8 44		1 72
central stoneroller					0 50	0 44	3 00	0 32
common carp	20 00	15 40	23 09	16 14		4 89	6 50	14 60
common carp x goldfish				0 41				0 12
emerald shiner		31 20	12 55	25 24	69 50	57 78	10 00	27 88
golden shiner			0 36	0 41			1 50	0 32
goldfish				0 55			0 50	0 20
grass carp				0 41				0 12
red shiner	1 00	2 20		1 38	29 00	52 00		7 88
silver chub	1 00		0 18	0 14				0 12
spottail shiner				1 38	2 00	0 44		0 60
Catostomidae								
bigmouth buffalo	1 00	9 20	5 64	12 55				6 76
golden redhorse			0 18	0 14		0 44	0 50	0 16
river carpsucker		0 20	0 18	1 24		0 44		0 48
shorthead redhorse		0 80	1 09	1 24	1 50		0 50	0 92
smallmouth buffalo	14 00	5 40	4 73	14 34	6 50	2 22	1 50	7 68
Ictalundae								
channel catfish	7 00	13 20	5 82	2 07	0 50	2 22	0 50	5 08
flathead catfish		2 80	0 55	0 14			0 50	0 76
freckled madtom			0 18					0 04
tadpole madtom						0 44		0 04
Percichthyidae								
striped bass x white bass			0 18					0 04
white bass	8 00	5 00	14 55	10 21				7 48
Centrarchidae								
black crappie	2 00	3 00	4 55	6 90	0 50	0 44	1 50	3 88
bluegill	20 00	31 80	22 36	27 03	3 50	9 78	48 00	24 92
bluegill x green sunfish				0 14	0 50	0 44	10 50	0 96
green sunfish		2 20	0 18	3 72	2 00	4 89	15 50	3 40
green x orangespotted sunfish				0 14				0 04
largemouth bass	4 00	2 40	2 18	9 10	1 00	3 11	9 00	4 84
longear sunfish							1 00	0 08
orangespotted sunfish	21 00	0 80	0 91	1 79			1 50	1 84
pumpkinseed				0 14				0 04
rock bass							2 00	0 16
smallmouth bass		0 40		0 55		0 89	1 00	0 40
white crappie		0 60	2 00	1 38		0 44		1 00
Percidae								
logperch	1 00			1 24				0 40
sauger	2 00		0 36	0 14				0 20
Sciaenidae								
freshwater drum	65 00	11 80	15 27	21 38		1 78		14 68
Total number per hour	178 00	166 60	165 27	262 48	207 50	208 44	244 00	207 80
Number of species/hybrids	15/0	22/0	23/1	30/3	14/1	22/1	20/1	38/4

Table 13. Species ranked by relative abundance in number of fish collected per hour for 1997. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	3 (16.3)	1 (28.1)	1 (37.1)	2 (23.6)	3 (19.6)	4 (5.7)
threadfin shad					7 (3.0)	
Cyprinidae						
bluntnose minnow				3 (19.8)	5 (4.5)	1 (47.1)
bullhead minnow			12 (1.2)		6 (4.1)	
central stoneroller						9 (1.2)
common carp	4 (9.2)	2 (14.0)	5 (6.1)		8 (2.3)	8 (2.7)
emerald shiner	2 (18.7)	6 (7.6)	3 (9.6)	1 (33.5)	1 (27.1)	6 (4.1)
red shiner				4 (14.0)	2 (24.9)	
Catostomidae						
bigmouth buffalo	7 (5.5)	8 (3.4)	7 (4.8)			
smallmouth buffalo	8 (3.2)	9 (2.9)	6 (5.5)	5 (3.1)		
Ictaluridae						
channel catfish	5 (7.9)	7 (3.5)	13 (0.8)			
flathead catfish	11 (1.7)					
Percichthyidae						
white bass	9 (3.0)	5 (8.8)	8 (3.9)			
Centrarchidae						
black crappie	10 (1.8)	10 (2.8)	10 (2.6)			
bluegill	1 (19.1)	3 (13.5)	2 (10.3)	6 (1.7)	4 (4.7)	2 (19.7)
bluegill x green sunfish						5 (4.3)
green sunfish			11 (1.4)		8 (2.3)	3 (6.4)
largemouth bass	12 (1.4)	11 (1.3)	9 (3.5)		9 (1.5)	7 (3.7)
Sciaenidae						
freshwater drum	6 (7.1)	4 (9.2)	4 (8.1)			
Number of fishes accounting for 95%	12	11	13	6	10	9

Table 14 Numbers of individuals of each fish species collected per hour of electrofishing ($CPUE_N$) on Reach 26 of the Mississippi River (Brickhouse Slough) and on six reaches of the Illinois River Waterway in 1998

	Reach and Hours Fished							
					Starved			Overall
	Reach 26	Alton	La Grange	Pecna	Rock	Marseilles	Dresden	$CPUE_N$
Species	1 00	5 00	5 50	8 00	2 00	2 75	1 75	26 00
Clupeidae								
gizzard shad	33 00	23 60	50 18	65 38	58 00	20 36	21 14	44 58
skipjack herring			0 36	0 38	0 50			0 23
threadfin shad		2 00	0 73	3 13				1 50
Hiodontidae								
goldeye			0 18					0 04
Cyprinidae								
bullhead minnow		0 20		1 25	7 50	1 82	0 57	1 23
bluntnose minnow	1 00		0 18	0 63	2 50	5 09	14 29	1 96
common carp	4 00	8 80	24 36	9 13	1 50	4 00	4 00	10 62
common carp x goldfish				0 25				0 08
emerald shiner	7 00	15 20	0 91	1 50	109 50	42 91	5 71	17 19
golden shiner	1 00						0 57	0 08
goldfish			0 36	0 38				0 19
grass carp		0 20		0 13				0 08
red shiner		0 20	0 18					0 08
sand shiner				0 13				0 04
silver chub				0 13				0 04
silverband shiner		0 20	0 55					0 15
spotfin shiner		0 20			7 00	12 36		1 88
spottail shiner				2 25	8 50	0 36		1 38
Catostomidae								
bigmouth buffalo		3 60	3 27	6 13				3 27
black buffalo			0 18	0 25				0 12
golden redhorse				0 38	1 00	1 09	1 14	0 38
quillback			0 36		3 00		0 57	0 35
river carpsucker	3 00	0 20	0 36	2 13		0 36		0 92
shorthead redhorse			0 91	0 75				0 42
smallmouth buffalo		1 00	6 18	11 38	17 00	5 45	4 57	7 19
white sucker			0 18					0 04
Ictaluridae								
channel catfish	5 00	8 20	4 55	2 38	1 00	0 36	2 86	3 77
flathead catfish		2 20	1 82	1 13				1 15
Cyprinodontidae								
blackstripe topminnow		0 20					2 86	0 23
Poeciliidae								
mosquitofish				0 13				0 04
Percichthyidae								
white bass	6 00	6 00	21 09	10 88	2 00	1 45		9 50
yellow bass			0 18					0 04
Centrarchidae								
black crappie		0 40	2 00	6 75	1 50	1 09		2 81
bluegill	15 00	10 40	12 73	26 75	2 00	1 09	14 29	14 73
bluegill x green sunfish		0 20		1 63			5 71	0 92
bluegill x orangespotted sunfish						1 09	0 57	0 15
green sunfish		0 40	0 55	12 25	2 50	2 55	31 43	6 54
largemouth bass	1 00	1 40	3 27	8 75	2 50	3 27	2 86	4 42
orangespotted sunfish	19 00	0 20		3 13			1 14	1 81
pumpkinseed						0 36		0 04
smallmouth bass				0 38	0 50		1 71	0 27
warmouth			0 18	0 25				0 12
white crappie			0 18	0 88				0 31
Percidae								
mud darter		0 20						0 04
sauger	1 00	0 20	2 00	1 00				0 81
slenderhead darter				0 13				0 04
Sciaenidae								
freshwater drum	15 00	7 20	22 91	16 63	0 50	0 73	1 14	12 12
Total number per hour	111 00	92 60	160 91	198 63	228 50	105 82	117 14	153 88
Number of species/hybrids	13/0	24/1	29/0	33/2	19/3	18/1	17/2	44/3

Table 15. Species ranked by relative abundance in number of fish collected per hour for 1998. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	1 (25.1)	1 (31.2)	1 (32.9)	2 (25.4)	2 (19.2)	2 (18.0)
threadfin shad	10 (2.2)		11 (1.6)			
Cyprinidae						
bullhead minnow				5 (3.3)	9 (1.7)	
bluntnose minnow				8 (1.1)	5 (4.8)	3 (12.2)
common carp	4 (9.5)	2 (15.1)	7 (4.6)		6 (3.8)	8 (3.4)
emerald shiner	2 (16.4)			1 (47.9)	1 (40.5)	5 (4.9)
spotfin shiner				6 (3.1)	3 (11.7)	
spottail shiner			14 (1.1)	4 (3.7)		
Catostomidae						
bigmouth buffalo	8 (3.9)	8 (2.0)	10 (3.1)			
quillback				7 (1.3)		
river carpsucker			15 (1.1)			
smallmouth buffalo		6 (3.8)	5 (5.7)	3 (7.4)	4 (5.2)	7 (3.9)
Ictaluridae						
channel catfish	5 (8.9)	7 (2.8)	13 (1.2)			9 (2.4)
flathead catfish	9 (2.4)	12 (1.1)				
Cyprinodontidae						
blackstripe topminnow						9 (2.4)
Percichthyidae						
white bass	7 (6.5)	4 (13.1)	6 (5.5)		10 (1.4)	
Centrarchidae						
black crappie		10 (1.2)	9 (3.4)			
bluegill	3 (11.2)	5 (7.9)	2 (13.5)			3 (12.2)
bluegill x green sunfish			16 (0.8)			5 (4.9)
green sunfish			4 (6.2)	8 (1.1)	8 (2.4)	1 (26.8)
largemouth bass	11 (1.5)	8 (2.0)	8 (4.4)	8 (1.1)	7 (3.1)	9 (2.4)
orangespotted sunfish			11 (1.6)			
smallmouth bass						12 (1.5)
Percidae						
sauger		10 (1.2)				
Sciaenidae						
freshwater drum	6 (7.8)	3 (14.2)	3 (8.4)			
Number of fishes accounting for 95%	11	12	16	10	10	12

Mississippi River. Of these fishes, 25, 278 individuals were collected from the Illinois Waterway sites, and 643 were collected from Brickhouse Slough of the Mississippi River. These results are similar to the first five years of F-101-R (1989-1993), when 60 species of fishes were collected representing 12 families (Lerczak et al. 1995: 25). The year with the greatest overall catch of fishes was 1995 (7941 individuals, $CPUE_N$ 325) (Table 8) and the year with the fewest overall catch of fishes was 1994 (3421 individuals, $CPUE_N$ 131) (Table 6).

For all stations combined, the greatest number of species were collected in 1995 (48 species plus 3 hybrids) and the least were in 1997 (38 species plus 4 hybrids) (Tables 8 and 12, respectively). The number of species collected from upper waterway reaches ranged from 12 for Starved Rock in 1996 (Table 10) to 24 for Marseilles in 1995 (Table 8). The number of species collected from middle river reaches ranged from 23 for La Grange Reach in 1997 (Table 12) to 34 for Peoria Reach in 1996 (Table 10). The number of species collected from the lower river (Alton Reach) ranged from 18 in 1994 (Table 6) to 25 (Table 8) in 1995. The Peoria Reach consistantly had highest species richness during all years (1994-1998) of sampling.

Rankings by Relative Abundance. Rankings by relative abundance in number of fish collected per hour highlight the consistent dominance by gizzard shad during all years except 1994, when small cyprinids (emerald shiner and bluntnose minnow) and bluegill were most numerous (Tables 7, 9, 11, 13, and 15). Gizzard

shad ranked first in numerical abundance in La Grange, Peoria, and Marseilles reaches in 1995, all reaches in 1996, La Grange and Peoria reaches in 1997, and Alton, La Grange and Peoria reaches in 1998 (Tables 9, 11, 13, and 15). Other numerically important species have included bluntnose minnow, bullhead minnow, emerald shiner, bluegill, and green sunfish. Bluntnose minnow ranked first in numerical abundance in Dresden Reach in 1994 and 1997 (Tables 7 and 13). Bullhead minnow ranked first in numerical abundance in Dresden Reach in 1995 (Table 9). Emerald shiner ranked first in numerical abundance in Starved Rock and Marseilles reaches during all years of this project except 1996 (Tables 7, 9, 13, and 15). Bluegill ranked first in numerical abundance in Alton, La Grange, and Peoria reaches in 1994 and in Alton Reach in 1995 and 1997 (Tables 7, 9, and 13). Green sunfish ranked first in numerical abundance in Dresden Reach in 1998 (Table 15).

$CPUE_N$ of Five Most Numerically Abundant Species. Catch rates in numbers of individuals collected per hour by electrofishing for the top five most numerically abundant species are shown in Figures 2 through 6 for the lower, middle, and upper Illinois waterway reaches. For gizzard shad, a similar trend was noticed in all three river sections (Figure 2). Lowest gizzard shad $CPUE_N$ occurred in 1994 in all sections, and was highest in 1995 (lower and upper river) and 1996 (middle river), prior to a decline in $CPUE_N$ in 1996, 1997, and 1998. Overall, catches of gizzard shad have been much higher in the middle and upper river than in the lower river. Catches of common carp have been highest ($CPUE_N$ 15-20) in the middle Illinois

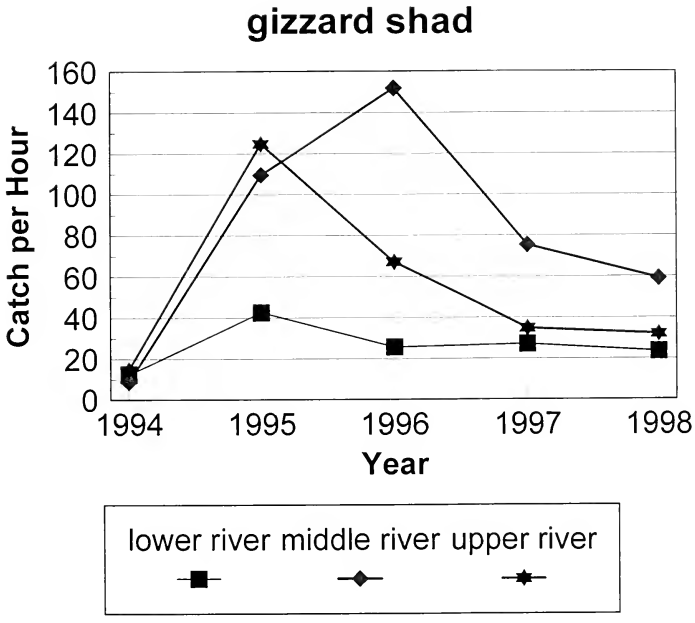


Figure 2. Catch per hour of gizzard shad from 1994 through 1998 in the lower (Alton Reach), middle (La Grange and Peoria reaches), and upper (Starved Rock, Marseilles, and Dresden reaches) Illinois River waterway.

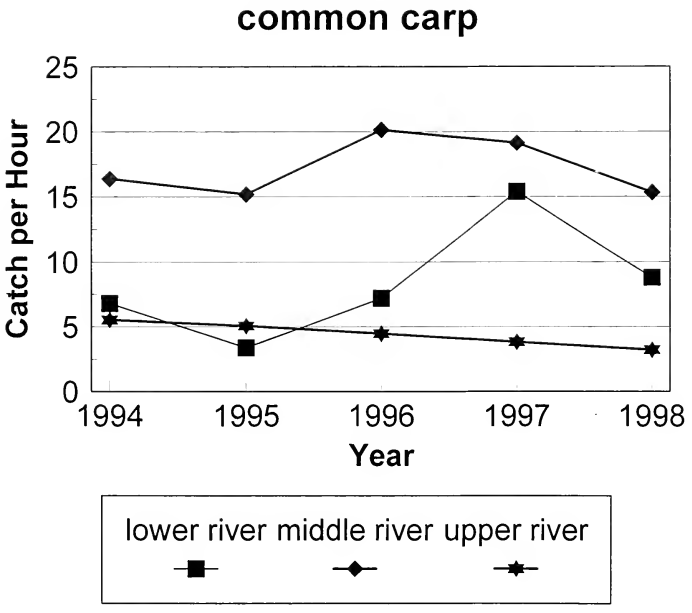


Figure 3. Catch per hour of common carp from 1994 through 1998 in the lower (Alton Reach), middle (La Grange and Peoria reaches), and upper (Starved Rock, Marseilles, and Dresden reaches) Illinois River waterway.

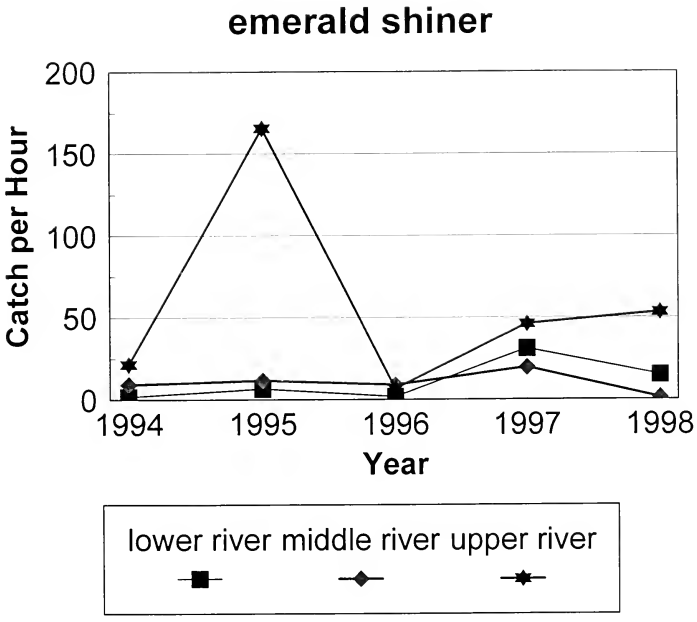


Figure 4. Catch per hour of emerald shiner from 1994 through 1998 in the lower (Alton Reach), middle (La Grange and Peoria reaches), and upper (Starved Rock, Marseilles, and Dresden reaches) Illinois River waterway.

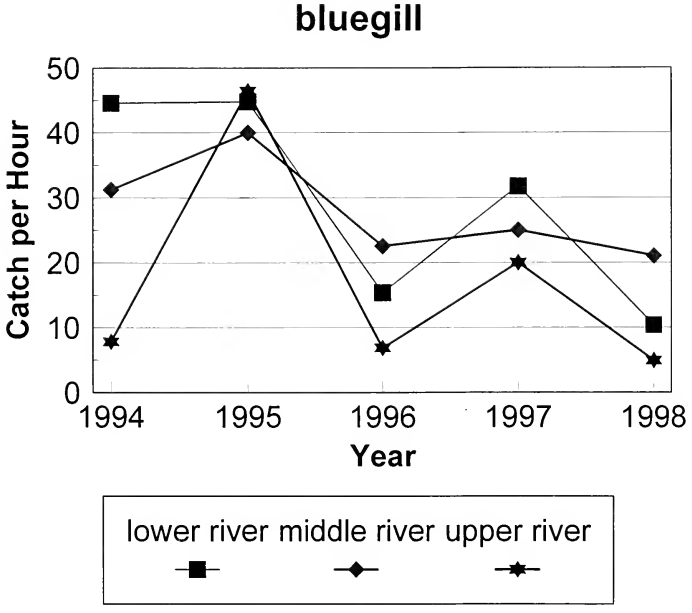


Figure 5. Catch per hour of bluegill from 1994 through 1998 in the lower (Alton Reach), middle (La Grange and Peoria reaches), and upper (Starved Rock, Marseilles, and Dresden reaches) Illinois River waterway.

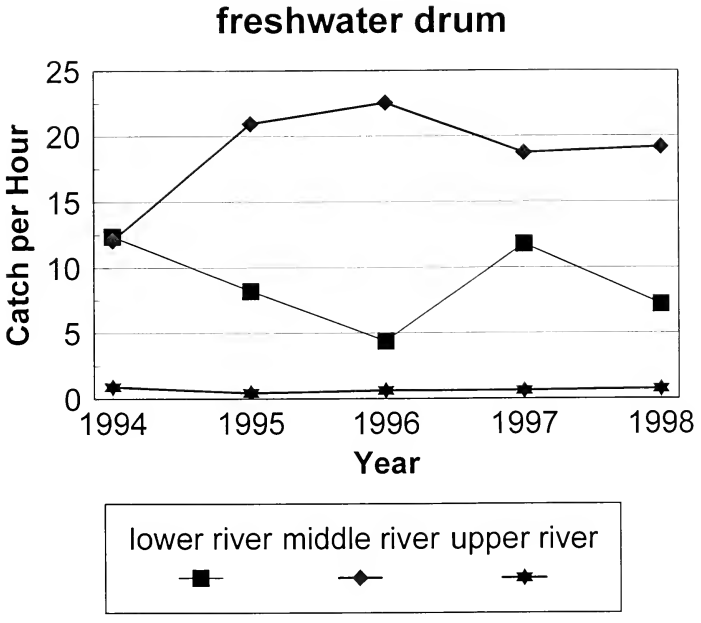


Figure 6. Catch per hour of freshwater drum from 1994 through 1998 in the lower (Alton Reach), middle (La Grange and Peoria reaches), and upper (Starved Rock, Marseilles, and Dresden reaches) Illinois River waterway.

River reaches (Figure 3). Far fewer common carp have been taken in the upper river, where $CPUE_N$ has been consistantly low during the five years of this project; only 5 common carp per hour or less have been collected from 1994 through 1998. Catches of emerald shiner have typically been less than $CPUE_N$ 50 except in the upper river reaches in 1995, when average $CPUE_N$ was 165 (Figure 4). Catches of bluegill in all three river sections have shown similar trends over the five years of this study (Figure 5). Bluegill $CPUE_N$ was highest in 1995 ($CPUE_N$ 40-46) and has exhibited an annual cyclical pattern in population size. This pattern appears to be consistant throughout the entire waterway. Catches of freshwater drum have been highest in the middle river reaches ($CPUE_N$ 12-23) (Figure 6). Collections in the lower river have ranged from $CPUE_N$ 5-12, and in the upper river have been extremely low by comparison, with $CPUE_N$ <1 during all years of this project.

D. Catch Rates in Weights (pounds) Collected per Hour by Reach.

Catch rates in pounds of fish collected per hour ($CPUE_W$) were also examined to provide an estimation of fish biomass and production of each Illinois River reach. Overall, $CPUE_W$ ranged from 48 pounds per hour in 1995 to 74 pounds per hour in 1997 (Tables 16-25). La Grange Reach has consistantly provided the highest catches in weight ($CPUE_W$ 81-108) except in 1997, when average hourly collections from Peoria Reach were 114 pounds (Table 22). Lowest catches in weight each year have typically come from Starved Rock ($CPUE_W$ 11-32) and Marseilles ($CPUE_W$

Table 16. Pounds of each fish species collected per hour of electrofishing ($CPUE_W$) at six reaches of the Illinois River Waterway in 1994. Pounds per hour less than 0.01 are indicated by 0.00

	Reach and Hours Fished						
Species	Alton 5.00	La Grange 8.50	Peoria 6.95	Starved Rock 2.00	Marseilles 2.50	Dresden 2.00	Overall CPUE 26.95
Lepisosteidae							
shortnose gar		0.04					0.01
Amiidae							
bowfin	0.44						0.08
Clupeidae							
gizzard shad	0.99	1.49	0.74	1.85	1.75	1.98	1.29
shipjack herring			0.24		0.02		0.06
threadfin shad	0.01		0.02				0.01
Hiodontidae							
goldeye		0.05	0.11				0.04
Cyprinidae							
bluntnose minnow				0.00	0.06	0.21	0.02
bullhead minnow		0.00	0.00	0.02	0.00	0.02	0.00
carp x goldfish					0.86	4.38	0.40
common carp	21.91	47.95	12.30	9.14	5.46	20.97	25.10
emerald shiner	0.00	0.00	0.03	0.07	0.10	0.07	0.03
golden shiner					0.00	0.05	0.00
goldfish		0.12	0.15				0.08
minnow (unid.)			0.00		0.00	0.00	0.00
red shiner		0.00		0.00	0.00		0.00
sand shiner				0.01	0.01		0.00
silverchub			0.02				0.01
spottail shiner			0.00		0.01	0.10	0.01
Catostomidae							
bigmouth buffalo	4.37	18.50	12.36				9.83
golden redhorse		0.00	0.35	0.22	0.61	0.52	0.20
highfin carpsucker				0.37			0.03
northern hog sucker					0.02		0.00
quillback			0.17				0.04
river carpsucker		0.16	4.14	0.38	1.37	0.85	1.34
shorthead redhorse		0.64	1.27			0.03	0.53
smallmouth buffalo	1.05	3.18	5.15	12.11	3.26		3.73
Ictaluridae							
channel catfish	18.59	7.11	2.48	4.51	1.27		6.78
flathead catfish	0.56	1.44	0.44			4.35	0.99
yellow bullhead	0.17						0.03
Atherinidae							
brook silverside						0.00	0.00
Percichthyidae							
white bass	0.41	1.56	1.23	0.47	0.46		0.96
Centrarchidae							
black crappie	2.40	3.67	0.30			0.38	1.71
bluegill	2.70	1.90	2.20	0.03	0.54	0.77	1.78
bluegill x green sunfish			0.19			0.00	0.05
green sunfish	0.04	0.04	1.23	0.06	0.17	0.36	0.38
largemouth bass	6.43	5.53	3.02	0.21	4.20	0.21	4.14
orangespotted sunfish		0.00	0.01	0.00		0.01	0.00
pumpkinseed						0.06	0.00
rock bass						0.18	0.01
smallmouth bass		0.00	0.02	0.07	0.11	0.80	0.08
warmouth	0.05	0.01					0.01
white crappie		0.33	0.12				0.14
Percidae							
sauger	0.03	0.14	0.12				0.08
slenderhead darter					0.00		0.00
Sciaenidae							
freshwater drum	2.28	1.29	2.15		0.66	0.88	1.51
Total pounds per hour	62.42	95.17	50.56	29.50	20.95	37.24	61.52

Table 17. Species ranked by relative abundance in pounds of fish collected per hour for 1994. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad		9 (1.6)	11 (1.4)	4 (6.3)	4 (8.4)	4 (5.3)
Cyprinidae						
carp x goldfish					7 (4.1)	2 (11.8)
common carp	1 (35.1)	1 (50.4)	2 (24.3)	2 (31.0)	1 (26.1)	1 (56.3)
Catostomidae						
bigmouth buffalo	4 (7.0)	2 (19.4)	1 (24.4)			
golden redhorse					9 (2.9)	9 (1.4)
river carpsucker			4 (8.2)		4 (6.5)	6 (2.3)
shorthead redhorse			9 (2.5)			
smallmouth buffalo	8 (1.7)	6 (3.3)	3 (10.2)	1 (41.1)	3 (15.6)	
Ictaluridae						
channel catfish	2 (29.8)	3 (7.5)	6 (4.9)	3 (15.3)	6 (6.1)	
flathead catfish						3 (11.7)
Percichthyidae						
white bass		8 (1.7)	10 (2.4)	5 (1.6)		
Centrarchidae						
black crappie	6 (3.8)	5 (3.9)				
bluegill	5 (4.3)	7 (2.0)	7 (4.4)		10 (2.6)	8 (2.1)
green sunfish			10 (2.4)			
largemouth bass	3 (10.3)	4 (5.8)	5 (6.0)		2 (20.0)	
smallmouth bass						7 (2.1)
Sciaenidae						
freshwater drum	7 (3.7)		8 (4.3)		8 (3.2)	5 (2.4)
Numbers of fishes accounting for 95%	8	9	12	5	10	9

Table 18. Pounds of each fish species collected per hour of electrofishing ($CPUE_N$) at six reaches of the Illinois River Waterway in 1995. Pounds per hour less than 0.01 are indicated by 0.00

	Reach and Hours Fished						
Species	Alton 5.00	La Grange 5.50	Peoria 7.00	Starved Rock 2.00	Marseilles 2.50	Dresden 2.00	Overall CPUE 24.00
Lepisosteidae							
shortnose gar			0.13				0.04
Amiidae							
bowfin	0.75						0.16
Clupeidae							
gizzard shad	1.05	1.46	2.82	5.30	3.37	3.07	2.42
skipjack herring	0.02		0.02				0.01
Hiodontidae							
goldeye	0.21	0.05					0.06
Cyprinidae							
bluntnose minnow	0.00	0.00		0.05	0.10	0.36	0.04
bullhead minnow	0.00	0.00	0.00	0.08	0.09	0.44	0.05
carp x goldfish						1.12	0.09
central stoneroller						0.02	0.00
common carp	6.63	47.84	7.34	1.79	7.47	11.51	16.37
emerald shiner	0.01	0.02	0.03	1.39	0.16	0.02	0.15
golden shiner		0.00	0.03		0.00	0.02	0.01
goldfish		0.01	0.13				0.04
grass carp		1.24					0.28
minnow (unid.)		0.00		0.00	0.00		0.00
red shiner	0.00	0.00	0.01	0.02	0.11	0.02	0.02
sand shiner				0.04			0.00
silverchub			0.00				0.00
spottail shiner			0.01	0.00	0.02		0.01
suckermouth minnow					0.01		0.00
Catostomidae							
bigmouth buffalo	18.27	11.29	7.63				8.62
black buffalo		0.61					0.14
golden redhorse				0.11	0.05	0.06	0.02
river carpsucker			1.99	0.62	0.60		0.69
shorthead redhorse	0.03	0.26	0.15		0.50		0.16
smallmouth buffalo	2.19	2.89	4.37	8.42	1.47	0.55	3.29
quillback			0.01	0.45			0.04
Ictalundae							
black bullhead			0.02			0.00	0.01
channel catfish	8.90	1.88	1.60		0.91	0.00	2.85
flathead catfish	0.53	1.47	0.02			6.17	0.97
yellow bullhead			0.10		0.12		0.04
Cyprinodontidae							
blackstripe topminnow		0.00				0.00	0.00
Poeciliidae							
mosquitofish		0.00					0.00
Atherinidae							
brook silverside	0.00	0.00					0.00
Percichthyidae							
striped x white bass	0.13		0.17				0.08
white bass	1.66	3.15	2.78	0.14	0.01		1.89
Centrarchidae							
black crappie	1.35	2.54	1.09	0.26		0.17	1.22
bluegill	1.81	2.04	2.86	0.22	0.88	1.07	1.88
bluegill x green sunfish		0.02	0.14			0.03	0.05
green sunfish	0.00	0.03	0.85	0.15	0.14	1.34	0.39
largemouth bass	6.25	4.78	2.99		2.56	5.19	3.97
orangespotted sunfish	0.00		0.01		0.00	0.12	0.01
pumpkinseed	0.04		0.00			0.05	0.01
redear sunfish					0.01		0.00
rock bass						1.67	0.14
smallmouth bass			0.04	0.04	0.04	1.64	0.16
warmouth	0.00	0.04					0.01
white crappie	0.21	0.51	0.46	0.24	0.08		0.32
Percidae							
logperch				0.01			0.00
sauger		0.01	0.01				0.01
walleye			0.01				0.00
Sciaenidae							
freshwater drum	0.86	0.88	1.70		0.11		0.89
Total pounds per hour	51.05	83.01	39.49	19.34	18.79	34.65	47.61

Table 19. Species ranked by relative abundance in pounds of fish collected per hour for 1995. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	9 (2.1)	10 (1.8)	6 (7.1)	2 (27.4)	2 (17.9)	4 (8.9)
Cyprinidae						
carp x goldfish						8 (3.2)
common carp	3 (13.0)	1 (57.6)	2 (18.6)	3 (9.3)	1 (39.8)	1 (33.2)
emerald shiner				4 (7.2)	9 (0.9)	
Catostomidae						
bigmouth buffalo	1 (35.8)	2 (13.6)	1 (19.32)			
river carpsucker			8 (5.0)	5 (3.2)	7 (3.2)	
shorthead redhorse					8 (2.7)	
smallmouth buffalo	5 (4.3)	5 (3.5)	3 (11.1)	1 (43.5)	4 (7.8)	10 (1.6)
quillback				6 (2.3)		
Ictaluridae						
channel catfish	2 (17.4)	8 (2.3)	10 (4.1)		5 (4.8)	
flathead catfish		9 (1.8)				2 (17.8)
Percichthyidae						
white bass	7 (3.3)	4 (3.8)	7 (7.0)	7 (1.3)		
Centrarchidae						
black crappie	8 (2.6)	6 (3.1)	11 (2.8)			
bluegill	6 (3.6)	7 (2.5)	5 (7.2)		6 (4.7)	9 (3.1)
green sunfish			12 (2.2)			7 (3.9)
largemouth bass	4 (12.2)	3 (5.8)	4 (7.6)		3 (13.6)	3 (15.0)
rock bass						5 (4.8)
smallmouth bass						6 (4.7)
white crappie				8 (1.2)		
Sciaenidae						
freshwater drum	10 (1.7)		9 (4.3)			
Numbers of fishes accounting for 95%	10	10	12	8	9	10

Table 20. Pounds of each fish species collected per hour of electrofishing ($CPUE_N$) at six reaches of the Illinois River Waterway in 1996. Pounds per hour less than 0.01 are indicated by 0.00

	Reach and Hours Fished						
Species	Alton 5.00	La Grange 5.50	Peoria 7.00	Starved Rock 2.00	Marseilles 2.25	Dresden 2.00	Overall CPUE 24.75
Lepisosteidae							
shortnose gar		0.20					0.04
Clupeidae							
gizzard shad	0.54	2.48	3.77	2.88	1.54	2.73	2.32
skipjack herring	0.09	0.17	0.05				0.07
threadfin shad	0.02	0.04	0.03			0.01	0.02
Cyprinidae							
bluntnose minnow						0.01	0.00
bullhead minnow		0.00					0.00
carp x goldfish					0.70	1.79	0.21
common carp	15.71	71.15	14.05	4.93	8.65	14.74	25.34
emerald shiner	0.01	0.03	0.04	0.04	0.00	0.05	0.03
fathead minnow			0.00				0.00
golden shiner		0.01	0.02			0.01	0.01
goldfish		0.02	0.09			0.34	0.06
grass carp	1.30						0.26
red shiner		0.02	0.00		0.01		0.01
silverband shiner			0.00				0.00
spottail shiner			0.01		0.01	0.02	0.00
Catostomidae							
bigmouth buffalo	6.61	15.86	11.29		2.62	0.48	8.33
golden redhorse			0.05				0.01
river carpsucker	0.09	0.10	1.25	0.72	0.08		0.46
shorthead redhorse	0.65	0.56	0.25		0.38	0.17	0.37
smallmouth buffalo	3.38	2.21	5.81	8.97	4.19	0.07	3.93
Ictaluridae							
black bullhead		0.00	0.08				0.02
channel catfish	19.06	5.32	1.57	0.54	1.25	1.00	5.71
flathead catfish	0.65	0.14	0.06				0.18
yellow bullhead			0.00			0.14	0.01
Cyprinodontidae							
blackstripe topminnow		0.00					0.00
Atherinidae							
brook silverside		0.00					0.00
Percichthyidae							
white bass	2.09	2.94	3.88				2.17
Centrarchidae							
black crappie	1.10	1.39	0.72				0.73
bluegill	0.79	0.58	1.17	0.05	0.44	0.96	0.74
bluegill x green sunfish			0.02				0.01
green sunfish	0.01	0.01	0.48			0.30	0.16
largemouth bass	5.75	1.92	3.75	1.01	2.97	2.11	3.17
orangespotted sunfish	0.00		0.09		0.07	0.10	0.04
rock bass					0.16	0.51	0.06
smallmouth bass			0.03	0.53			0.05
warmouth		0.09	0.02				0.03
white crappie	0.03	0.01	0.16		0.25		0.08
Percidae							
logperch			0.00				0.00
mud darter			0.00				0.00
sauger	0.01	0.14	0.03				0.04
walleye			0.01				0.00
Sciaenidae							
freshwater drum	0.83	2.62	1.67		1.26	0.85	1.40
Total pounds per hour	58.74	108.00	50.46	19.67	24.57	26.39	56.09

Table 21. Species ranked by relative abundance in pounds of fish collected per hour for 1996. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad		6 (2.3)	5 (7.5)	3 (14.6)	5 (6.3)	2 (10.4)
Cyprinidae						
carp x goldfish					7 (2.8)	4 (6.8)
common carp	2 (26.7)	1 (65.9)	1 (27.9)	2 (25.1)	1 (35.2)	1 (55.9)
grass carp	7 (2.2)					
Catostomidae						
bigmouth buffalo	3 (11.3)	2 (14.7)	2 (22.4)		4 (10.7)	9 (1.8)
river carpsucker			9 (2.5)	5 (3.7)		
smallmouth buffalo	5 (5.8)		3 (11.5)	1 (45.6)	2 (17.0)	
Ictaluridae						
channel catfish	1 (32.5)	3 (4.9)	8 (3.1)		6 (5.1)	5 (3.8)
Percichthyidae						
white bass	6 (3.6)	5 (2.7)	4 (7.7)			
Centrarchidae						
black crappie	8 (1.9)					
bluegill		4 (3.7)	10 (2.3)			6 (3.7)
largemouth bass	4 (9.8)		6 (7.4)	4 (5.1)	3 (12.1)	3 (8.0)
rock bass						8 (1.9)
Sciaenidae						
freshwater drum	9 (1.4)		7 (3.3)		6 (5.1)	7 (3.2)
Number of fishes accounting for 95%	9	6	10	5	8	9

Table 22 Pounds of each fish species collected per hour of electrofishing ($CPUE_N$) at six reaches of the Illinois River Waterway in 1997. Pounds per hour less than 0.01 are indicated by 0.00.

	Reach and Hours Fished						
				Starved			Overall
	Alton	La Grange	Peoria	Rock	Marseilles	Dresden	CPUE
Species	5.00	5.50	7.25	2.00	2.25	2.00	25.00
Amiidae							0.00
bowfin	0.77						0.15
Clupeidae							0.00
gizzard shad	0.56	1.21	2.03	1.32	0.90	1.06	1.24
skipjack herring	0.19	0.10	0.05		0.05		0.08
threadfin shad	0.00				0.03		0.00
Cyprinidae							0.00
bluntnose minnow				0.05	0.02	0.33	0.03
bullhead minnow			0.01	0.01	0.01		0.00
central stoneroller				0.01	0.00	0.02	0.00
common carp	29.69	41.83	27.13		9.94	13.82	25.01
common carp x goldfish			0.20				0.06
emerald shiner	0.07	0.03	0.09	0.17	0.20	0.04	0.08
golden shiner		0.00	0.00			0.03	0.00
goldfish			0.01			0.47	0.04
grass carp			3.19				0.93
red shiner	0.01		0.00	0.04	0.12		0.02
silver chub		0.00	0.00				0.00
spottail shiner			0.01	0.01	0.00		0.00
Catostomidae							0.00
bigmouth buffalo	30.89	18.20	40.49				21.93
golden redhorse		0.09	0.04		0.18	0.25	0.07
river carpsucker	0.00	0.06	1.34		0.49		0.45
shorthead redhorse	0.01	0.16	0.88	0.05		0.07	0.30
smallmouth buffalo	4.52	3.75	13.29	7.69	2.09	2.96	6.62
Ictaluridae							0.00
channel catfish	12.39	5.41	2.94	0.91	3.10	1.73	5.01
flathead catfish	3.08	0.14	0.30			1.90	0.89
freckled madtom		0.00					0.00
tadpole madtom					0.00		0.00
Percichthyidae							0.00
striped bass x white bass		0.61					0.13
white bass	2.91	3.99	8.16				3.83
Centrarchidae							0.00
black crappie	1.59	1.37	1.94	0.17	0.07	0.96	1.28
bluegill	0.27	1.40	1.85	0.02	0.50	1.61	1.07
bluegill x green sunfish			0.01	0.01	0.01	0.29	0.03
green sunfish	0.01	0.02	0.28	0.01	0.13	0.70	0.16
green x orangespotted sunfish			0.02				0.00
largemouth bass	2.64	1.22	6.10	0.63	1.00	2.94	2.94
longear sunfish						0.05	0.00
orangespotted sunfish	0.00	0.01	0.09			0.01	0.03
pumpkinseed			0.00				0.00
rock bass						0.40	0.03
smallmouth bass	0.08		0.07		0.46	0.25	0.10
white crappie	0.57	0.46	0.23		0.31		0.31
Percidae							0.00
logperch			0.00				0.00
sauger		0.04	0.01				0.01
Sciaenidae							0.00
freshwater drum	1.38	1.12	3.40		0.76		1.58
Total pounds per hour	91.65	81.24	114.17	11.06	20.37	29.84	74.42

Table 23. Species ranked by relative abundance in pounds of fish collected per hour for 1997. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad		8 (1.5)	9 (1.8)	2 (11.9)	5 (4.4)	6 (3.5)
Cyprinidae						
common carp	2 (32.4)	1 (51.5)	2 (23.8)		1 (48.8)	1 (46.3)
goldfish						9 (1.6)
grass carp			7 (2.8)			
Catostomidae						
bigmouth buffalo	1 (33.7)	2 (22.4)	1 (35.5)			
river carpsucker					7 (2.4)	
smallmouth buffalo	4 (4.9)	5 (4.6)	3 (11.6)	1 (69.5)	3 (10.3)	2 (9.9)
Ictaluridae						
channel catfish	3 (13.5)	3 (6.7)	8 (2.6)	3 (8.2)	2 (15.2)	4 (5.8)
flathead catfish	5 (3.6)					3 (6.4)
Percichthyidae						
white bass	6 (3.2)	4 (4.9)	4 (7.1)			
Centrarchidae						
black crappie	8 (1.7)	7 (1.7)	10 (1.7)			7 (3.2)
bluegill		6 (1.7)			7 (2.4)	5 (5.4)
green sunfish						8 (2.3)
largemouth bass	7 (2.9)	8 (1.5)	5 (5.4)	4 (5.7)	4 (4.9)	2 (9.9)
smallmouth bass					8 (2.2)	
Sciaenidae						
freshwater drum			6 (3.0)		6 (3.7)	
Number of fishes accounting for 95%	8	9	10	4	9	10

Table 24 Pounds of each fish species collected per hour of electrofishing ($CPUE_W$) at six reaches of the Illinois River Waterway in 1998 Pounds per hour less than 0 01 are indicated by 0 00

	Reach and Hours Fished						
	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden	Overall $CPUE_W$
Species	5 00	5 50	8 00	2 00	2 75	1 75	26 00
Clupeidae							
gizzard shad	0 31	1 27	2 51	1 68	2 20	2 16	1 61
skipjack herring		0 01	0 01	0.05			0 01
threadfin shad	0 02	0 01	0 02				0 01
Hiodontidae							
goldeye		0 13					0.03
Cyprinidae							
bullhead minnow	0 00		0 00	0 01	0 00	0 00	0 00
bluntnose minnow		0 00	0 00	0 01	0 02	0 02	0 00
common carp	21 95	50 25	18 28	2 29	13 10	11 11	22.78
common carp x goldfish			0.33				0.10
emerald shiner	0 02	0 00	0 01	0 35	0 17	0 02	0 05
golden shiner						0 05	0.00
goldfish		0 05	0 06				0 03
grass carp	0 29		1 80				0 61
red shiner	0.00	0.00					0 00
sand shiner			0 00				0 00
silver chub			0 00				0 00
silverband shiner	0.00	0.00					0 00
spotfin shiner	0 00			0 02	0 05		0 01
spottail shiner			0 01	0 03	0.00		0 01
Catostomidae							
bigmouth buffalo	10.24	12.75	17 97				10 19
black buffalo		0 13	0 35				0 14
golden redhorse			0 20	0 36	0 71	0 48	0 20
quillback		0 28		2 32		0 29	0 26
river carpsucker	0 41	0 47	2 13		0 40		0 88
shorthead redhorse		0 34	0 40				0 20
smallmouth buffalo	0 93	4.69	11 15	19 90	6 76	7 57	7 36
white sucker		0 01					0 00
Ictaluridae							
channel catfish	8 87	5 26	2 80	2 10	0 29	4 94	4 21
flathead catfish	1 47	2 80	4 80				2 35
Cyprinodontidae							
blackstripe topminnow	0.00					0 01	0 00
Poeciliidae							
mosquitofish			0 00				0 00
Percichthyidae							
white bass	2 42	3 70	4 11	0 64	0 22		2 58
yellow bass		0 01					0 00
Centrarchidae							
black crappie	0.01	0 42	2 14	0 69	0 28		0 83
bluegill	0.14	0 51	1 49	0 08	0 10	0 59	0 65
bluegill x green sunfish	0 00		0 14			0 46	0 08
bluegill x orangespotted sunfish					0 01	0 01	0 00
green sunfish	0 00	0.00	0 55	0 06	0 11	1 40	0 28
largemouth bass	0 46	1.49	4 94	1 62	1 33	0 39	2 22
orangespotted sunfish	0.00		0 04			0.02	0 01
pumpkinseed					0 02		0 00
smallmouth bass			0.00	0.01		0 03	0.00
warmouth		0 03	0 01				0 01
white crappie		0.03	0 35				0 11
Percidae							
mud darter	0 00						0.00
sauger	0.02	0.15	0 06				0 05
slenderhead darter			0 00				0 00
Sciaenidae							
freshwater drum	0.75	3 71	2 84	0 15	0 11	2 47	1 99
Total pounds per hour	48 31	88 52	79 48	32 32	25 88	32 03	59 85

Table 25. Species ranked by relative abundance in pounds of fish collected per hour for 1998. Species were added to the list in descending order of abundance until 95% of the total catch for that reach was obtained. Percentages are in parentheses.

	Rankings by Reach					
Species	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad			9 (3.2)	5 (5.2)	3 (8.5)	5 (6.7)
Cyprinidae						
common carp	1 (45.4)	1 (56.8)	1 (23.0)	3 (7.1)	1 (50.6)	1 (34.7)
grass carp			12 (2.3)			
Catostomidae						
bigmouth buffalo	2 (21.2)	2 (14.4)	2 (22.6)			
golden redhorse					5 (2.7)	8 (1.5)
quillback				2 (7.2)		
river carpsucker			11 (2.7)		6 (1.5)	
smallmouth buffalo	6 (1.9)	4 (5.3)	3 (14.0)	1 (61.6)	2 (26.1)	2 (23.6)
Ictaluridae						
channel catfish	3 (18.4)	3 (5.9)	8 (3.5)	4 (6.5)	7 (1.1)	3 (15.4)
flathead catfish	5 (3.0)	7 (3.2)	5 (6.0)			
Percichthyidae						
white bass	4 (5.0)	6 (4.2)	6 (5.2)			
Centrarchidae						
black crappie			10 (2.7)	7 (2.1)		
bluegill						7 (1.9)
green sunfish						6 (4.4)
largemouth bass		8 (1.7)	4 (6.2)	6 (5.0)	4 (5.1)	
Sciaenidae						
freshwater drum		5 (4.2)	7 (3.6)			4 (7.7)
Number of fishes accounting for 95%	6	8	12	7	7	8

19-26) reaches of the upper river.

In the following data summary, discussion is restricted to species that each separately accounted for over 10% of the total catch and to species that were of special significance. A 95% list was produced for each reach, in which species were ranked by relative abundance (pounds per hour) and added to the list until 95% of the total catch rate for that reach was obtained. Overall, these data indicate that in terms of weight the fish communities of the Illinois River continue to be dominated by common carp, bigmouth buffalo, and channel catfish in the lower and middle river, and common carp, smallmouth buffalo, gizzard shad, channel catfish, and largemouth bass in the upper waterway. Common carp ranked first by relative abundance in pounds of fish collected per hour in Alton, La Grange, Marseilles, and Dresden reaches in 1994; La Grange, Marseilles, and Dresden reaches in 1995; La Grange, Peoria, Marseilles, and Dresden reaches in 1996; La Grange, Marseilles, and Dresden reaches in 1997; and Alton, La Grange, Peoria, Marseilles, and Dresden reaches in 1998 (Tables 17, 19, 21, 23, and 15). Bigmouth buffalo ranked first by relative abundance in pounds of fish collected per hour in Peoria Reach in 1994 and in Alton and Peoria reaches in 1995 and in 1997 (Tables 17, 19, and 23). Channel catfish ranked first by relative abundance in pounds of fish collected per hour in Alton Reach in 1996 (Table 21). Smallmouth buffalo ranked first by relative abundance in pounds of fish collected per hour in Starved Rock Reach during all five years of this project (1994-1998).

E. Details of 1998 Sampling

In 1998 we collected a total of 4,001 fish representing 44 species (plus three hybrids) from eleven families during 26.00 h of sampling at 26 sites on the Illinois Waterway and a single site on the Mississippi River (Appendices B-E). Gizzard shad was the most abundantly collected species, representing 29.0% of the total catch, followed by emerald shiner (11.2%), bluegill (9.6%), freshwater drum (7.9%), common carp (6.9%), and white bass (6.2%). Gizzard shad were collected at all 27 sites and common carp and bluegill were collected at 26 sites. The sample from Lambie's Boat Harbor (RM170.3, Peoria Reach) yielded the most fish (389, 9.7% of the total collected from all 27 sites). The most species collected at a single site was 23 from Chillicothe (RM 180.6) in Peoria Reach. The fewest species collected at a single site was seven from Johnson Island (RM 249.6) in Marseilles Reach.

CONCLUSIONS

Our electrofishing collections on the Illinois River Waterway during August and September 1994-1998 documented the continuing recovery of the system's biological integrity. Once dominated by introduced and relatively pollution tolerant species such as common carp and goldfish (Lerczak and Sparks 1994), the Illinois River now supports a diverse assemblage of fishes, many of which support economically important sport fisheries. Ninety-four species and six hybrids have been collected since William Starrett began this survey in 1957. Seventy species

and four hybrids have been documented by project F-101-R sampling (1989-present); 44 species and three hybrids from eleven families were collected during 26.00 h of sampling in 1998. One species, the freckled madtom (a single specimen), was collected for the first time during project F-101-R sampling along the waterway; it was taken at Sugar Creek Island on La Grange Reach (middle river) in 1997. Also not collected previously was a green sunfish x orangespotted sunfish hybrid, found at the Lower Twin Sister site (RM 202.8) in 1997. We continue to document the relatively low abundance of common carp in Starved Rock Reach; this species has ranked extremely low in terms of catch rate in numbers in Marseilles and Dresden Reaches for several years. Goldfish, which were abundant in our samples in 1989 (82 individuals were collected) occurred only infrequently at sites in 1997 and 1998 (5 individuals were collected each year). Small minnow species, such as bluntnose minnow, bullhead minnow, emerald shiner, and red shiner, were extremely low in abundance in the upper waterway in 1996. However, sampling in 1997 and 1998 indicates these species are once again numerous in these reaches.

We noticed a high degree of variability in species richness among sites and also among river reaches. Some of this variability can be explained by sampling duration (site comparisons) or the number of sites sampled (reach comparisons), but there is also evidence some of our sites are inherently lower in species richness than others. For example, at most sites we have collected an average of 14-16 species during the ten years of project F-101-R sampling. However, at Hennipin (RM 207.6),

Pekin (RM 155.1), and Turkey Island (RM 148.0) the average has been 11 species (Appendix F). It also should be noted from Appendix F that low numbers of species typically occurred at sites following the drought years of the late 1980s (1989 and 1990), while high species richness at sites typically occurred following a high water year (1995). In 1998, the greatest number of species (39) was collected from Peoria Reach and the fewest species (14) were collected from Starved Rock Reach (Appendices D and E). The high richness of Peoria Reach is likely due, in part, to its position along the waterway which includes the Great Bend (above Hennepin) of the Illinois River. This reach represents a transition from a river which is constricted, lacks contiguous backwaters, and is high in gradient (upper river) to a large river floodplain system with low gradient (lower river) (Sparks 1977); species typical of both the upper and lower waterway have been collected and are common in Peoria Reach.

The total weight of fishes collected 1994-1998 was also highest in Peoria Reach, where $CPUE_W$ was 114.14 (Table 8). Species accounting for this high catch in weight were bigmouth buffalo, common carp, smallmouth buffalo, and white bass. Catch in weight was also high in La Grange and Alton Reaches. For example, of 1,860 pounds of fish collected during our 1997 survey, 1,732 pounds (93%) were collected from the lower and middle river, and only 128 pounds (7%) were collected from the upper river. These catches reflect the high productivity of the lower and middle Illinois River floodplain ecosystem.

Sportfishes were collected throughout the waterway in during all five years of this project (1994-1998), although catch rate in number and weight varied among reaches. For channel catfish, we collected more individuals and pounds per hour in the Alton Reach (lower river) than in the middle or upper river reaches (Tables 6-15). The white bass, however, were most abundant and provided the highest $CPUE_W$ in the middle river; $CPUE_N$ was typically highest in La Grange Reach. Centrarchids such as black crappie were most abundant in the middle river reaches. Bluegill $CPUE_N$ was greatest in the upper waterway, although $CPUE_W$ was typically highest in Peoria Reach of the middle river. Largemouth bass $CPUE_N$ has been greatest in Peoria Reach of the middle river. As in previous years of project F-101-R sampling, we collected only low numbers of smallmouth bass and sauger from the Illinois River Waterway, probably due to the locations of our sites, mostly in relatively shallow side channels behind islands.

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APPENDIX A. Fish species collected during Long-term Resource Monitoring of the Illinois Waterway, 1957-1998. Common names marked by an asterisk indicate species that were collected from 1989 through 1998 during federal aid project F-101-R. Common and scientific names are from Robins et al. (1991). Habitat associations are based on behavioral descriptions from Pflieger (1975) and communications with INHS fisheries biologists.

Family Name	Common Name	Scientific Name	Habitat Association (B = benthic, blank = pelagic)
Lepisosteidae	longnose gar*	Lepisosteus osseus	
	shortnose gar*	Lepisosteus platostomus	
	spotted gar*	Lepisosteus oculatus	
Amiidae	bowfin*	Amia calva	
Hiodontidae	goldeye*	Hiodon alosoides	
	mooneye*	Hiodon tergisus	
Anguillidae	American eel	Anguilla rostrata	
Clupeidae	gizzard shad*	Dorosoma cepedianum	
	skipjack herring*	Alosa chrysochloris	
	threadfin shad*	Dorosoma petenense	
Cyprinidae	bigmouth shiner*	Notropis dorsalis	B
	bluntnose minnow*	Pimephales notatus	
	bullhead minnow*	Pimephales vigilax	
	common carp*	Cyprinus carpio	B
	common carp x goldfish*	Cyprinus carpio x Carassius auratus	B
	central stoneroller*	Campostoma anomalum	B
	common shiner	Luxilus cornutus	
	creek chub	Semotilus atromaculatus	
	emerald shiner*	Notropis atherinoides	
	fathead minnow*	Pimephales promelas	
	ghost shiner	Notropis buchanani	
	golden shiner*	Notemigonus crysoleucas	
	goldfish*	Carassius auratus	B
	grass carp*	Ctenopharyngodon idella	
	hornyhead chub	Nocomis biguttatus	
	Mississippi silvery minnow	Hybognathus nuchalis	B
	pugnose minnow	Opsopoeodus emiliae	
	red shiner*	Cyprinella lutrensis	
	redfin shiner	Lythrurus umbratilis	
	ribbon shiner	Lythrurus fumeus	
	river shiner*	Notropis blennius	
	sand shiner*	Notropis stramineus	
	spotfin shiner	Cyprinella spiloptera	
	silver chub*	Macrhybopsis storeriana	B
	silverband shiner*	Notropis shumardi	
	silverjaw minnow	Notropis buccatus	B
	spottail shiner*	Notropis hudsonius	
	steelcolor shiner	Cyprinella whipplei	
	striped shiner	Luxilus chrysocephalus	
	suckermouth minnow*	Phenacobius mirabilis	B
Catostomidae	bigmouth buffalo*	Ictiobus cyprinellus	B
	black buffalo*	Ictiobus niger	B
	black redhorse	Moxostoma duquesnei	B
	golden redhorse*	Moxostoma erythrurum	B
	highfin carpsucker*	Carpiodes velifer	B
	northern hog sucker*	Hypentelium nigricans	B
	quillback*	Carpiodes cyprinus	B
	river carpsucker*	Carpiodes carpio	B
	river redhorse*	Moxostoma carinatum	B
	shorthead redhorse*	Moxostoma macrolepidotum	B
	silver redhorse	Moxostoma anisurum	B
	smallmouth buffalo*	Ictiobus bubalus	B
	white sucker*	Catostomus commersoni	B

Appendix A. Continued.

Family Name	Common Name	Scientific Name	Habitat Association (B = benthic, blank = pelagic)
Ictaluridae	black bullhead*	Ameiurus melas	B
	blue catfish	Ictalurus furcatus	B
	brown bullhead*	Ameiurus nebulosus	B
	channel catfish*	Ictalurus punctatus	B
	flathead catfish*	Pylodictis olivaris	B
	freckled madtom*	Noturus nocturnus	B
	tadpole madtom	Noturus gyrinus	B
	white catfish	Ameiurus catus	B
	yellow bullhead*	Ameiurus natalis	B
Esocidae	grass pickerel*	Esox americanus vermiculatus	
	northern pike	Esox lucius	
Salmonidae	rainbow trout	Oncorhynchus mykiss	
Percopsidae	trout-perch	Percopsis omiscomaycus	B
Cyprinodontidae	blackstripe topminnow*	Fundulus notatus	
Poeciliidae	western mosquitofish*	Gambusia affinis	
Atherinidae	brook silverside*	Labidesthes sicculus	
Percichthyidae	striped bass	Morone saxatilis	
	striped bass x white bass*	Morone saxatilis x M. chrysops	
	white bass*	Morone chrysops	
	white perch*	Morone americana	
	yellow bass*	Morone mississippiensis	
Centrarchidae	black crappie*	Pomoxis nigromaculatus	
	bluegill*	Lepomis macrochirus	
	green sunfish*	Lepomis cyanellus	
	green sunfish x bluegill*	Lepomis cyanellus x L. macrochirus	
	green sunfish x orangespotted sunfish*	Lepomis cyanellus x L. humilis	
	green sunfish x pumpkinseed	Lepomis cyanellus x L. gibbosus	
	largemouth bass*	Micropterus salmoides	
	longear sunfish*	Lepomis megalotis	
	orangespotted sunfish*	Lepomis humilis	
	orangespotted sunfish x bluegill	Lepomis humilis x L. macrochirus	
	pumpkinseed*	Lepomis gibbosus	
	redear sunfish*	Lepomis microlophus	
	rock bass*	Ambloplites rupestris	
	smallmouth bass*	Micropterus dolomieu	
	spotted sunfish*	Lepomis punctatus	
	warmouth*	Lepomis gulosus	
	white crappie*	Pomoxis annularis	
Percidae	bluntnose darter	Etheostoma chlorosomum	B
	johnny darter	Etheostoma nigrum	B
	logperch*	Percina caprodes	B
	mud darter*	Etheostoma asprigene	B
	sauger*	Stizostedion canadense	
	slenderhead darter*	Percina phoxocephala	B
	walleye*	Stizostedion vitreum	
	yellow perch*	Perca flavescens	
Sciaenidae	freshwater drum*	Aplodinotus grunniens	B

APPENDIX B. Numbers of individuals of each fish species collected on the Mississippi River (Brickhouse Slough) and the lower Illinois River (Alton Reach, RM 0-80) in 1998.

	River Mile and Hours Fished						
	Miss. River	Lower Illinois River					
	0.0	19.0	24.7	26.8	30.0	58.3	Total
Species	1.00	1.00	1.00	1.00	1.00	1.00	5.00
Clupeidae							
gizzard shad	33	10	44	26	23	15	118
threadfin shad	0	3	2	0	5	0	10
Cyprinidae							
bullhead minnow	0	0	1	0	0	0	1
bluntnose minnow	1	0	0	0	0	0	0
common carp	4	10	1	5	15	13	44
golden shiner	1	0	0	0	0	0	0
emerald shiner	7	1	4	2	63	6	76
grass carp	0	0	0	1	0	0	1
red shiner	0	0	0	1	0	0	1
silverband shiner	0	0	0	0	0	1	1
spotfin shiner	0	0	1	0	0	0	1
Catostomidae							
bigmouth buffalo	0	2	0	6	6	4	18
river carpsucker	3	0	0	0	0	1	1
smallmouth buffalo	0	0	3	0	1	1	5
Ictaluridae							
channel catfish	5	4	9	7	15	6	41
flathead catfish	0	2	4	1	3	1	11
Cyprinodontidae							
blackstripe topminnow	0	0	0	0	0	1	1
Percichthyidae							
white bass	6	7	8	5	9	1	30
yellow bass							
Centrarchidae							
black crappie	0	0	0	0	1	1	2
bluegill	15	7	18	3	12	12	52
bluegill x green sunfish	0	0	0	0	1	0	1
green sunfish	0	0	1	0	1	0	2
largemouth bass	1	3	2	0	1	1	7
orangespotted sunfish	19	0	0	0	1	0	1
Percidae							
mud darter	0	0	0	1	0	0	1
sauger	1	1	0	0	0	0	1
Sciaenidae							
freshwater drum	15	3	9	5	13	6	36
Total individuals	111	53	107	63	170	70	463
Total species/hybrids	13/0	12/0	14/0	12/0	15/1	15/0	24/1

APPENDIX C Numbers of individuals of each fish species collected on La Grange Reach (RM 80-158) of the middle Illinois River (RM 80-231) in 1998

	River Mile and Hours Fished							
Species	86 5 1 00	95 1 1 00	107 1 1 00	113 0 1 00	148 0 0 50	155 1 1 00	La Grange Reach Total 5 50	Middle River Total 13 50
Clupeidae								
gizzard shad	108	82	12	65	2	7	276	799
skipjack herring	0	1	0	0	1	0	2	5
threadfin shad	1	0	0	0	3	0	4	29
Hiodontidae								
goldeye	0	0	0	0	0	1	1	1
Cyprinidae								
bluntnose minnow	0	0	0	1	0	0	1	6
common carp	2	41	15	45	11	20	134	207
emerald shiner	2	0	1	2	0	0	5	17
goldfish	0	0	1	0	0	1	2	5
red shiner	1	0	0	0	0	0	1	1
silverband shiner	0	3	0	0	0	0	3	3
Catostomidae								
bigmouth buffalo	0	0	13	4	0	1	18	67
black buffalo	0	1	0	0	0	0	1	3
quillback	2	0	0	0	0	0	2	2
river carpsucker	0	0	0	2	0	0	2	19
shorthead redhorse	1	0	0	0	2	2	5	11
smallmouth buffalo	3	0	9	18	0	4	34	125
white sucker	0	0	0	0	0	1	1	1
Ictaluridae								
channel catfish	4	5	4	7	3	2	25	44
flathead catfish	2	1	3	2	1	1	10	19
Percichthyidae								
white bass	8	7	9	9	12	71	116	203
yellow bass	0	0	1	0	0	0	1	1
Centrarchidae								
black crappie	1	0	9	1	0	0	11	65
bluegill	18	2	26	21	2	1	70	284
green sunfish	0	0	3	0	0	0	3	101
largemouth bass	3	1	8	6	0	0	18	88
warmouth	0	0	1	0	0	0	1	3
white crappie	1	0	0	0	0	0	1	8
Percidae								
sauger	1	0	0	6	1	3	11	19
Sciaenidae								
freshwater drum	4	12	16	25	3	66	126	259
Total individuals	162	156	131	214	41	181	885	2474
Total species/hybrids	17/0	11/0	16/0	15/0	11/0	14/0	29/0	39/2

APPENDIX D Numbers of individuals of each fish species collected on Peoria Reach (RM 158-231) of the middle Illinois River (RM 80-231) in 1998

	River Mile and Hours Fished									
Species	163 3 1 00	170 3 1 00	180 6 1 00	193 8 1 00	202 8 1 00	203 3 1 00	207 6 1 00	215 3 1 00	Peoria Reach Total 8 00	Middle River Total 13 50
Clupeidae										
gizzard shad	32	187	20	53	27	6	155	43	523	799
skipjack herring	0	0	0	1	1	0	1	0	3	5
threadfin shad	0	1	0	0	8	3	9	4	25	29
Cyprinidae										
bullhead minnow	0	0	10	0	0	0	0	0	10	10
bluntnose minnow	0	0	0	3	0	0	0	2	5	6
common carp	11	11	10	8	2	5	1	25	73	207
common carp x goldfish	0	0	0	1	0	1	0	0	2	2
emerald shiner	0	0	5	0	0	0	2	5	12	17
goldfish	0	3	0	0	0	0	0	0	3	5
grass carp	0	0	0	0	0	0	0	1	1	1
sand shiner	0	0	0	0	0	0	1	0	1	1
silver chub	0	0	0	0	1	0	0	0	1	1
spottail shiner	0	0	14	3	0	0	1	0	18	18
Catostomidae										
bigmouth buffalo	0	2	1	0	0	26	1	19	49	67
black buffalo	0	1	1	0	0	0	0	0	2	3
golden redhorse	0	0	2	0	1	0	0	0	3	3
river carpsucker	8	3	5	0	0	0	1	0	17	19
shorthead redhorse	0	0	2	0	3	0	0	1	6	11
smallmouth buffalo	21	12	4	4	7	25	2	16	91	125
Ictaluridae										
channel catfish	2	1	3	7	3	3	0	0	19	44
flathead catfish	0	0	3	4	1	0	1	0	9	19
Poeciliidae										
mosquitofish	0	0	1	0	0	0	0	0	1	1
Percichthyidae										
white bass	3	1	26	17	11	13	3	13	87	203
Centrarchidae										
black crappie	0	6	11	0	1	15	4	17	54	65
bluegill	46	86	42	4	8	17	1	10	214	284
bluegill x green sunfish	2	8	1	0	0	1	0	1	13	13
green sunfish	66	8	2	0	2	1	19	0	98	101
largemouth bass	8	23	15	2	7	9	5	1	70	88
orangespotted sunfish	0	1	2	0	0	0	19	3	25	25
smallmouth bass	0	0	0	0	0	0	3	0	3	3
warmouth	0	2	0	0	0	0	0	0	2	3
white crappie	3	2	0	0	0	2	0	0	7	8
Percidae										
sauger	0	3	1	2	0	0	2	0	8	19
slenderhead darter	0	0	1	0	0	0	0	0	1	1
Sciaenidae										
freshwater drum	42	28	40	1	8	8	2	4	133	259
Total individuals	244	389	222	110	91	135	233	165	1589	2474
Total species/hybrids	11/1	19/1	23/1	13/1	16/0	13/2	20/0	15/1	39/2	39/2

APPENDIX E. Numbers of individuals of each fish species collected on Starved Rock, Marseilles, and Dresden Reaches of the upper Illinois River waterway (RM 231-280) in 1998

	River Mile and Hours Fished							
	Starved Rock		Marseilles			Dresden		Upper Waterway Total
	240.8	241.5	248.0	249.6	260.6	277.3	279.8	
Species	1.00	1.00	1.00	0.75	1.00	0.75	1.00	6.50
Clupeidae								
gizzard shad	29	87	12	25	19	25	12	209
skipjack herring	0	1	0	0	0	0	0	1
Cyprinidae								
bullhead minnow	8	7	0	5	0	0	1	21
bluntnose minnow	1	4	13	0	1	3	22	44
common carp	3	0	4	4	3	2	5	21
emerald shiner	111	108	41	16	61	3	7	347
golden shiner	0	0	0	0	0	1	0	1
spotfin shiner	0	14	6	12	16	0	0	48
spottail shiner	17	0	1	0	0	0	0	18
Catostomidae								
golden redhorse	2	0	1	0	2	0	2	7
quillback	0	6	0	0	0	1	0	7
river carpsucker	0	0	0	0	1	0	0	1
smallmouth buffalo	27	7	5	2	8	7	1	57
Ictaluridae								
channel catfish	1	1	0	0	1	2	3	8
Cyprinodontidae								
blackstripe topminnow	0	0	0	0	0	3	2	5
Percichthyidae								
white bass	0	4	2	2	0	0	0	8
Centrarchidae								
black crappie	2	1	3	0	0	0	0	6
bluegill	1	3	1	0	2	13	12	32
bluegill x green sunfish	0	0	0	0	0	8	2	10
bluegill x orangespotted sunfish	0	0	2	0	1	1	0	4
green sunfish	3	2	6	0	1	25	30	67
largemouth bass	4	1	8	0	1	3	2	19
orangespotted sunfish	0	0	0	0	0	1	1	2
pumpkinseed	0	0	1	0	0	0	0	1
smallmouth bass	1	0	0	0	0	0	3	4
Sciaenidae								
freshwater drum	0	1	1	0	1	2	0	5
Total individuals	210	247	107	66	118	100	105	953
Total species/hybrids	14/0	15/0	15/1	7/0	13/1	14/2	14/1	24/2

APPENDIX F. Species richness (S) at Long-term Illinois River Fish Population Monitoring (F-101-R) sites.

Description	Site #	Reach	Low S (year)	High S (year)	Mean S[1]
Treats Island	279.8	3	11 (1992)	19 (1995)	15
Du Page River	277.3	3	12 (1989 & 1992)	18 (1994)	15
Waupecan Island	260.6	4	11 (1996)	19 (1989)	14
Johnson Island	249.6	4	6 (1993)	16 (1995)	12
Ballards Island	248.0	4	10 (1991)	19 (1995)	15
Bulls Island Bend	241.5	5	8 (1990)	18 (1993)	14
Bulls Island	240.8	5	8 (1990 & 1996)	16 (1989)	12
Clark Island	215.3	6	11 (1990)	21 (1995)	15
Hennepin	207.6	6	2 (1990)	20 (1998)	11
Upper Twin Sister	203.3	6	8 (1990)	17 (1989,94,97)	14
Lower Twin Sister	202.8	6	7 (1992)	16 (1995 & 1998)	12
Henry Island	193.8	6	12 (1991)	19 (1996)	15
Chillicothe	180.6	6	14 (1989,91,92,96)	22 (1997)	16
Lambie's Boat Harbor	170.3	6	9 (1989)	20 (1996)	16
Lower Peoria Lake	163.3	6	10 (1989)	16 (1996)	14
Pekin	155.1	7	6 (1992)	16 (1996)	11
Turkey Island	148.0	7	9 (1989 & 1997)	15 (1990)	11
Upper Bath Chute	113.0	7	12 (1994)	18 (1989 & 1996)	15
Lower Bath Chute	107.0	7	9 (1992)	18 (1990)	15
Sugar Creek Island	95.1	7	10 (1989)	19 (1995)	14
Grape-Bar Islands	86.5	7	7 (1989)	23 (1994)	14
Big Blue Island	58.3	8	9 (1990)	19 (1995)	14
Crater-Willow Islands	30.0	8	12 (1992 & 1994)	17 (1989)	15
Hurricane Island	26.8	8	11 (1990)	20 (1997)	15
Dark Chute	24.7	8	11 (1994)	17 (1990)	14
Mortland Island	19.0	8	11 (1989)	16 (1991 & 1997)	14
Brickhouse Slough	0.0	26	10 (1990)	17 (1991 & 1995)	15

[1]Sites 0.0-215.3 were not sampled during 1993 (n=9 years) (sites 240.8-279.8 n=10 years).

Appendix G (Job 5). Publications, reports, and presentations which resulted from research conducted during segments 6, 7, 8, 9, and 10 of project F-101-R, the Long-term Illinois River Fish Population Monitoring Program (funded under Federal Aid in Sportfish Restoration Act, P.L. 81-681, Dingell-Johnson, Wallop-Breaux).

I. Publications

Koel, T.M. 1998. Channel catfish (*Ictalurus punctatus*) in the Upper Mississippi River System. Project Status Report 98-11. U.S. Geological Survey, Environmental Management Technical Center, Onalaska, Wisconsin.

Koel, T.M., R. Sparks, and R.E. Sparks. 1998. Channel catfish in the Upper Mississippi River System. Survey Reports No. 353. Illinois Natural History Survey, Champaign.

Lerczak, T.V., R.E. Sparks, and K.D. Blodgett. 1994. Some upstream-to-downstream differences in Illinois River fish communities. Transactions of the Illinois State Academy of Science 87(Supplement):53. (Abstract)

Lerczak, T.V. 1995. Fish community changes in the Illinois River, 1962-1994. American Currents (Summer Issue).

Lerczak, T.V. 1995. The gizzard shad in nature's economy. Illinois Audubon. (Summer Issue). Reprinted in Big River 2(12):1-3.

Lerczak, T.V. and R.E. Sparks. 1995. Fish populations in the Illinois River. Pages 7-9 *in* G.S. Farris, editor. Our living resources 1994. National Biological Survey, Washington, D.C.

Lerczak, T.V., R.E. Sparks, and K.D. Blodgett. 1995. Long-term trends (1959-1994) in fish populations of the Illinois River. Transactions of the Illinois State Academy of Science 88(Supplement):74. (Abstract)

Lerczak, T.V., R.E. Sparks, and K.D. Blodgett. 1995. Long-term trends (1959-1994) in fish populations of the Illinois River with emphasis on upstream-to-downstream trends. Proceedings of the Mississippi River Research Consortium 27:62-63.

Lerczak, T.V. 1996. Illinois River fish communities: 1960s versus 1990s. Illinois Natural History Survey Report No. 339.

Raibley, P.T., K.D. Blodgett, and R.E. Sparks. 1995. Evidence of grass carp (*Ctenopharyngodon idella*) reproduction in the Illinois and upper Mississippi Rivers. Journal of Freshwater Ecology 10:65-74.

Sparks, R.E. 1995. Value and need for ecosystem management of large rivers and their floodplains. Bioscience 45:168-182.

Sparks, R.E. 1995. Environmental effects. Pages 132-162 *in* S.A. Changnon, editor. The great flood of 1993. University Corporation for Atmospheric Research (UCAR) and Westview Press.

II. Technical Papers (presenter in bold)

Koel, T.M. and R.E. Sparks. 1999. Interannual variation in catches of young-of-year fish correlated with hydrology of the Upper Mississippi River System. 47th Annual Meeting of the North American Benthological Society, May 23-24, Duluth, Minnesota.

Koel, T.M. 1999. Changes in fish community structure: effects of hydrological variability in the Upper Mississippi River System. Presented to the Illinois Natural History Survey, Center for Aquatic Ecology, Havana Field Station Director Search Committee and Senior Staff, March 24, 1999.

Koel, T.M. 1998. Spatial and temporal variability of channel catfish populations in the Upper Mississippi River System. Illinois Department of Natural Resources LTRMP field station biannual retreat, December 15, Dickson Mounds, Illinois.

Koel, T.M. 1998. Long Term Resource Monitoring Program Showcase: analysis of catfish catch. Environmental Management Program Coordinating Committee, Fall Quarterly Meeting, November 19-20, Rock Island, Illinois.

Koel, T.M. and K.D. Blodgett. 1998. Fish-environment associations: effects of inter-annual hydrological variability on fish populations of the Illinois River waterway, 1957-1997. Upper Mississippi River Conservation Committee, Fish Technical Section Annual Fall Meeting, September 15-17, Dubuque, Iowa.

Koel, T.M., K.S. Irons, T.M. O'Hara, K.D. Blodgett, and R.E. Sparks. 1998. Changes in fish community structure: effects of hydrological variability in the Upper Mississippi River System. 128th Annual Meeting of the American Fisheries Society. August 23-27, Hartford, Connecticut.

Koel, T.M., T.M. Mihuc, R.E. Sparks, and K.D. Blodgett. Upper Mississippi River System status and trends report. Fish species-environment relationships: LTRMP data analysis and preliminary results. 54th Annual Meeting of the Upper Mississippi River Conservation Committee, Moline, Illinois, 17-19 March 1998.

Blodgett, K.D. and T.M. Mihuc. Decision support using Long Term Resource Monitoring Program component data and supplementary data on the Illinois River. 54th Annual Meeting of the Upper Mississippi River Conservation Committee, Moline, Illinois, 17-19 March 1998.

Koel, T.M. and T.M. Mihuc. Fish abundance in the La Grange Reach of the Illinois River correlated with environmental factors: problems of cross-component analysis. Presented at the Long Term Resource Monitoring Program Annual Winter Meeting, Davenport, Iowa, 13 January 1998.

Lerczak, T.V., R.E. Sparks, and K.D. Blodgett. Some upstream-to-downstream differences in Illinois River fish communities. Contributed paper presented at the Illinois State Academy of Science Annual Meeting, Galesburg, Illinois, 7 October 1994.

Sparks, R.E. Large river-floodplain ecosystems of the Midwest: status, trends, and management needs. Presented at the U.S. Environmental Protection Agency's "Ecological Seminar Series" held in Chicago, Illinois, 14 March.

III. Poster Presentations (presenter in bold)

Koel, T.M. and R.E. Sparks. 1998. The Long-term Illinois River Fish Population Monitoring Program. National Meeting of the Ecological Society of America, August 10-14, Spokane, Washington.

Lerczak, T.V., R.E. Sparks, and K.D. Blodgett. Long-term trends (1959-1993) in fish populations of the Illinois River. Poster presented at the 56th Midwest Fish and Wildlife Conference, Indianapolis, Indiana, 4-7 December 1994.

Lerczak, T.V., R.E. Sparks, and K.D. Blodgett. Long-term trends (1959-1994) in fish populations of the Illinois River. Poster presented at the Illinois State Academy of Science Annual Meeting, Charleston, Illinois, 6 October 1995.

Lerczak, T.V., R.E. Sparks, and K.D. Blodgett. Long-term trends (1959-1994) in fish populations of the Illinois River with emphasis on upstream-to-downstream differences. Poster presented at the annual meeting of the Mississippi River Research Consortium, La Crosse, Wisconsin, 26-28 April 1995.

IV. Popular Presentations

Lerczak, T.V. Wintering bald eagles along the Illinois River and factors affecting their environment. Invited presentation to the Peoria Audubon Society, Peoria, Illinois, 8 March 1995.

Lerczak, T.V. Seminar on Illinois River environmental issues. Conducted for Biology 140 (Human Ecology) at Spoon River College, 27 June 1994.

Lerczak, T.V. A photo trip up the Illinois River. After dinner talk presented to Havana Rotary Club, Havana, Illinois, 17 April 1995.

Blodgett, K.D. Ecosystem management for the Illinois River: can biological integrity be restored? Invited lecture for Earth Day celebration at Spoon River College, Canton , Illinois, 19 April 1995.

V. Data Requests

1. Sam Cull, City of Peru, Electric Department, Peru, Illinois
2. Stanley and Associates, Muscatine, Iowa
3. U.S. Army Corps of Engineers, Rock Island
4. Shelly Miller, Aquatic Ecologist, The Nature Conservancy, Peoria
5. K. Douglas Blodgett, Project Manager, The Nature Conservancy, Havana
6. Kevin Irons, Fishery Biologist, LTRMP, Havana