

**ILLINOIS
NATURAL HISTORY
SURVEY**

**THE LONG-TERM ILLINOIS RIVER FISH
POPULATION MONITORING PROGRAM**

Project F-101-R-17

Annual Report to the
Illinois Department of Natural Resources

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May 2006



The Long-Term Illinois River Fish Population Monitoring Program

F-101-R-17

Annual Report

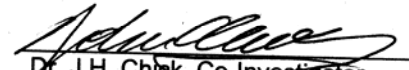
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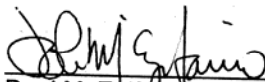
May 2006



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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. 81-6814, Dingell-Johnson/Wallop-Breaux).

EXECUTIVE SUMMARY

Between 22 August and 26 September 2005, 27 sites on the Illinois River Waterway and one site on Reach 26 of the Mississippi River were electrofished to monitor fish communities. A total of 7,676 fish representing 56 species (plus 2 hybrids) from 13 families were collected during 26.58 hours of sampling. Collections made in 2005 indicated a continued abundance of gizzard shad and bluegill throughout most of the waterway with higher numbers of freshwater drum in the lower waterway. Common carp and goldfish, species which were once dominant, continue to remain relatively low in abundance throughout the Illinois River Waterway, contributing only 1.4% and 0.3% of the total catch respectively. Blacknose daces, creek chubs, and common shiners were collected for the first time during project F-101-R sampling along the waterway. Blacknose daces were collected from two sites, Bull's Island (RM 240.8, Starved Rock Reach) and Bull's Island Bend (RM 241.5, Starved Rock Reach). Creek chubs were only collected from one site (Bull's Island), while common shiners were collected at four sites in four reaches; the Mouth of the DuPage River (RM 277.4, Dresden Reach), Waupecan Island (RM 260.6, Marseilles Reach), Bull's Island Bend, and Hennepin Island (RM 207.6, Peoria Reach). Silver carp were again collected during project F-101-R sampling. Every site in the lower and middle waterway, except Lambie's Boat Harbor (RM 170.3, Peoria Reach) produced silver carp in 2005. The sample from Bull's Island yielded the highest collection of total fish (635, 8.3% of the total collected from all 28 sites). Species richness at sites ranged from 25 at Hennepin Island to 13 at Turkey Island (RM 148.0, La Grange Reach). Species richness of the lower, middle, and upper waterway was 30, 44, and 42 respectively. In 2005, cyprinid numbers continued to remain relatively high in the upper waterway, with emerald shiner being the most abundant cyprinid making up 9.8% of the total upper waterway catch. Bluegill ranked highest overall in relative abundance for the entire upper waterway (28.9%) and first in all three reaches as well. Bluegill catch percentages for Dresden, Marseilles, and Starved Rock reaches were 11.6%, 8.6%, and 8.7%, respectively. Important sport fish species such as bluegill, largemouth bass, and channel catfish were collected in all six waterway reaches in 2005. Bluegill catch per unit effort in number ($CPUE_N$) ranged from 164.00 in Dresden reach (upper waterway) to 9.85 in La Grange Reach (lower waterway). Largemouth bass $CPUE_N$ ranged from 41.00 in Starved Rock Reach (upper waterway) to 0.54 in La Grange reach (middle waterway). Channel catfish $CPUE_N$ ranged from 7.03 in Alton reach (lower waterway) to 0.41 in Marseilles Reach (upper waterway). In terms of pounds of fish collected per hour ($CPUE_w$), silver carp ranked first over all reaches comprising 20.3% of the total biomass. Silver carp also ranked first in Alton and La Grange Reaches and comprised 8.4% and 6.7% of the total catch in weight, respectively. Bigmouth buffalo ranked first and comprised 5.4% of the total catch in weight for Peoria reach with a $CPUE_w$ of 18.19 pounds per hour. Smallmouth buffalo ranked first and comprised 1.0% of the total catch in weight for Starved Rock reach, common carp ranked first and comprised 2.7% of the total catch in weight for Marseilles reach, while largemouth bass ranked first and comprised 2.9% of the total catch in weight for Dresden Reach with a $CPUE_w$ of 9.75 pounds per hour. No fish collected in 2005 exhibited externally visible abnormalities, which may indicate improved water quality, especially in the upper waterway.

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^aJob numbers and titles refer to the F-101-R-17 annual work plan dated January 2005

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INTRODUCTION

This report presents a summary of data collected in 2005 during segment 17 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), Lerczak et al. (1994), Koel and Sparks (1999), and McClelland and Pegg (2004). The annual reports for project F-101-R will continue to build on previously collected data with major analyses of the long-term data set scheduled at five-year intervals with the next summary due at the end of segment 20. The format used in this report is patterned after previous annual reports of this project (Lerczak et al. 1993, 1994, 1995, and 1996; Koel et al. 1997 and 1998; Koel and Sparks 1999; Arnold et al. 2000; McClelland and Pegg 2001, 2002, 2003, 2004) to allow for easy comparisons of data among years.

STUDY AREA AND METHODS

Twenty-seven sites at fixed locations were sampled for fish along the Illinois Waterway. Twenty-six of these site locations are defined by Sparks and Starrett (1975) and Lerczak et al. (1994). In 1999, the twenty-seventh site was added at Moore's Towhead in the Alton Reach, Illinois River mile 75.3, to more closely monitor fish communities near the Nature Conservancy's (TNC) floodplain restoration project (Spunky Bottoms). Twenty-five of the sites were along the Illinois River, with two additional sites on the lower Des Plaines River. The Des Plaines River, along with the Illinois River forms part of the Illinois Waterway. One additional site was on the

Mississippi River (Figure 1). Seventeen of the sites were in side channels; the remaining sites were in other habitats, including the main channel border, or in a combination of habitat types (see Lerczak et al., 1994).

Following water quality measurements (e.g., dissolved oxygen) at each site, fish populations were sampled by electrofishing from a 16-ft (5-m) aluminum boat using a 3000-watt, three-phase AC generator. Sampling at each site typically lasted one hour. 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, and returned to the water. More details on the electrofishing method and equipment are given by Lerczak et al. (1994).

DATA ANALYSIS (Job 4)

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 ($CPUE_W$). Catch data, both numbers of individuals and pounds collected per sample and hour, were summarized and reported by collection site. Data from sites were also 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, middle, and upper Illinois Waterway segments) defined by their location along the river (waterway) and by the amount of off-channel habitat

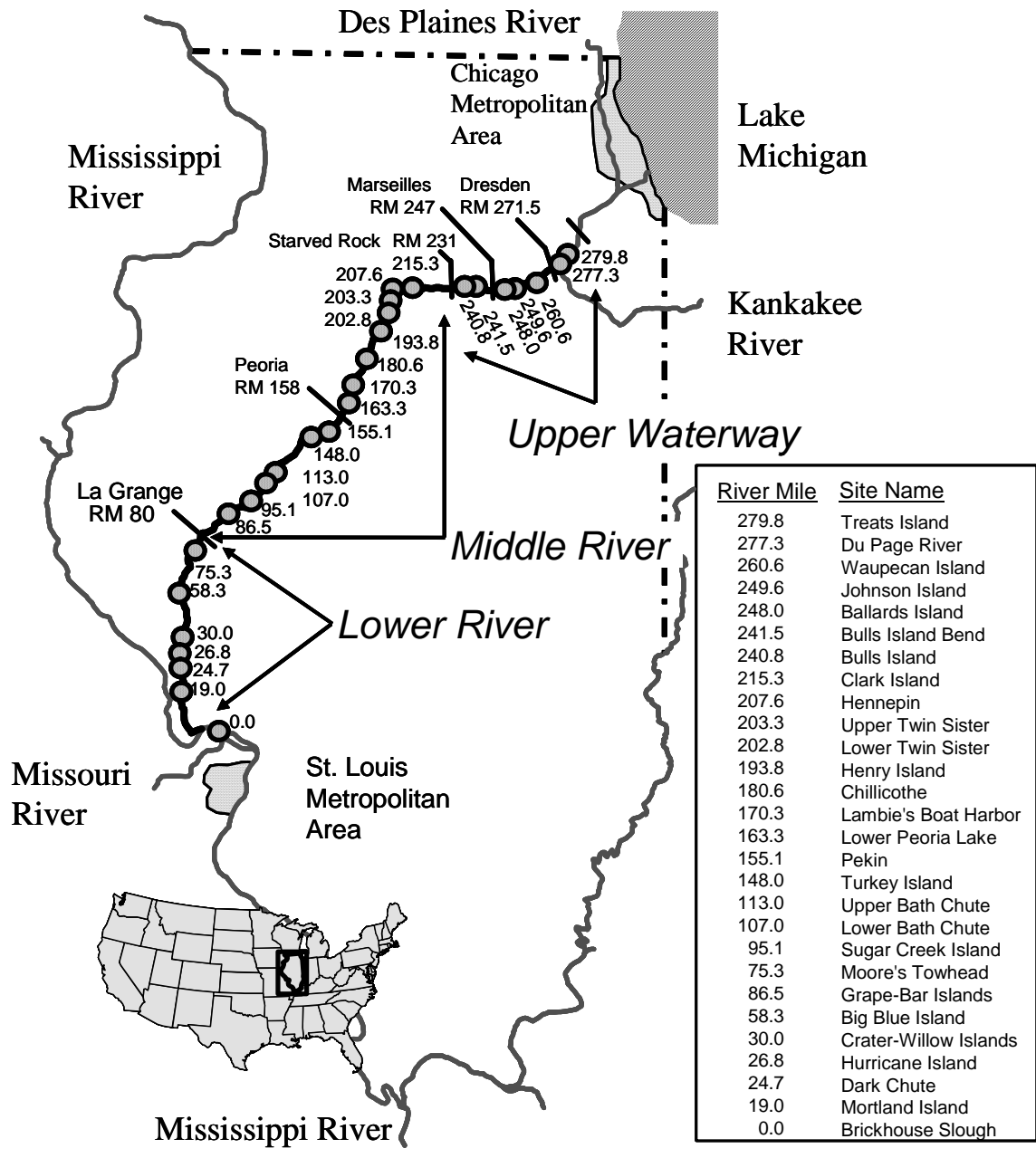


Figure 1. Three segments of the Illinois River Waterway sampled by electrofishing to monitor fish communities in 2005.

accessible to fish per unit length of river (Figure 1; Lerczak et al. 1994). Lerczak et al. (1994, 1995, and 1996) found river fish communities of the three segments differed substantially enough to give segment designations biological meaning.

RESULTS AND DISCUSSION (Job 5)

All equipment was tested and repaired as necessary before the fish sampling season began, and staff were given a review in safety procedures and electrofishing methods (**Job 1**).

All 28 sites were sampled between 22 August and 26 September 2005 (**Job 2**); total sampling time was 26.58 h (Table 1). Collected data were entered into Microsoft ACCESS 2000, and verified against original field data sheets until no errors were detected (**Job 3**). The original data sheets from this year's sampling and all of the other original data sheets of this project (1957-2005) are stored in flame-resistant cabinets at the Illinois River Biological Station at 704 N. Schrader Avenue, Havana (**Job 3**).

A. CONDITIONS DURING ELECTROFISHING RUNS

Sampling was conducted in full daylight between 8:15 AM and 2:45 PM (Table 1). The ranges for physical measurements collected during the 2005 sampling season were as follows: air temperature, 68.0-87.1 °F; water temperature, 73.8-86.4 °F; dissolved oxygen concentration, 4.8-9.6 ppm; Secchi disk transparency, 18.0-100.0 cm; conductivity, 446-844 umhos/cm; surface velocity, 0.02-0.30 ft/s; water depth, 0.5-7.0 ft.

Table 1. Station information and characteristics during sampling in 2005. 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 Order	Date	Site Mile ^a	Name	Sample river mile		End time (CST)	Duration (h)	Temp (°F)		DO (ppm)	Secchi (cm)	Cond. (umhos)	Vel. (ft/s)		Depth ^b (ft) Stage ^c			
				lower	upper			mean	air				water	(% Sat.)	min	max	min	max
Reach 26, Mississippi River																		
28	26-Sep	0.0	Brickhouse Slough ^v	204.9	205.3	205.1	11:20	1.00	72.4	75.2	6.45	78.08%	31.0	446	200	0.03	0.5	6.0
Alton Reach																		
18	2-Sep	19.0	Montland Island	18.1	19.5	18.8	11:10	1.00	79.0	80.4	9.42	121.42%	31.0	809	160	0.15	0.5	6.0
21	2-Sep	24.7	Dark Chute	24.5	25.5	25.0	8:15	1.00	68.0	79.3	7.67	88.84%	30.0	807	160	0.05	0.5	6.0
20	1-Sep	26.8	Hurricane Island	27.0	27.9	27.5	13:50	1.00	86.9	81.1	8.95	123.75%	30.0	803	160	0.15	0.5	6.5
19	1-Sep	30.0	Crater-Willow Island	29.2	30.8	30.0	11:30	1.00	79.0	80.1	7.78	100.28%	30.0	806	160	0.11	0.5	6.0
26	30-Aug	58.3	Big Blue Island	58.0	59.0	58.5	12:30	1.00	78.6	81.1	7.18	92.20%	38.0	824	140	0.09	0.5	5.5
27	30-Aug	75.3	Moore's Towhead				9:55	0.83	77.7	79.9	6.24	79.47%	34.0	816	140	0.21	0.5	5.0
La Grange Reach																		
6	23-Aug	86.5	Grape-Bar Islands	85.7	87.0	86.4	12:20	1.00	78.6	83.5	6.19	79.49%	28.0	836	140	0.19	0.5	6.5
5	23-Aug	95.1	Sugar Creek Island	94.5	95.0	94.8	9:40	1.00	68.9	82.9	5.20	60.79%	28.0	828	150	0.19	0.5	5.5
8	22-Aug	107.1	Lower Bath Chute	106.9	107.3	107.1	14:30	1.00	83.2	85.1	6.22	83.27%	28.0	828	140	0.15	1.0	6.0
7	22-Aug	113.0	Upper Bath Chute	112.8	113.2	113.0	10:28	1.00	77.9	84.4	4.79	61.11%	29.0	827	140	0.28	1.0	6.0
17	29-Aug	148.0	Turkey Island	148.0	148.3	148.2	13:55	0.58	83.2	83.5	5.82	77.92%	18.0	844	140	0.09	0.5	6.0
25	29-Aug	155.1	Pekin	154.5	155.3	154.9	10:10	1.00	79.0	79.7	6.48	83.52%	25.0	831	140	0.30	0.5	6.0
Peoria Reach																		
2	24-Aug	163.4	Lower Peoria Lake	163.5	163.6	163.6	9:40	1.00	75.2	73.8	7.68	95.52%	18.0	806	140	0.05	0.5	3.5
1	24-Aug	170.3	Lambie's Boat Harbor	170.6	170.8	170.4	13:00	0.75	83.3	76.1	9.61	128.77%	18.0	806	140	0.02	0.5	3.0
3	25-Aug	180.6	Chillicothe	180.6	181.1	180.9	9:40	1.00	71.0	78.4	7.01	83.70%	19.0	786	140	0.13	0.5	5.5
4	25-Aug	193.8	Henry Island	193.3	194.5	193.9	13:21	1.00	72.4	79.7	7.66	92.73%	34.0	769	150	0.07	0.5	6.0
13	20-Sep	202.8	Lower Twin Sister	202.4	203.2	202.8	13:05	1.00	80.1	78.4	8.33	108.45%	53.0	730	160	0.19	0.5	6.0
12	20-Sep	203.3	Upper Twin Sister	203.3	203.5	203.4	10:45	1.00	78.9	76.5	7.09	91.30%	50.0	733	160	0.19	1.0	6.5
11	31-Aug	207.7	Hennepin	207.6	208.1	207.9	10:45	1.00	74.1	81.5	8.27	101.78%	64.0	770	150	0.21	0.5	6.5
22	12-Sep	215.3	Clark Island	214.9	215.6	215.3	11:30	1.00	83.3	80.8	7.04	94.33%	59.0	785	150	0.21	0.5	2.5
Starved Rock Reach																		
10	6-Sep	240.8	Bulls Island	240.3	241.0	240.7	14:45	1.00	85.5	83.1	9.17	125.27%	55.0	776	160	0.10	0.5	7.0
9	6-Sep	241.5	Bulls Island Bend	241.1	241.6	241.4	14:45	1.00	85.5	83.1	9.17	125.27%	55.0	776	160	0.10	0.5	7.0
Marseilles Reach																		
14	7-Sep	248.0	Ballards Island	247.7	248.2	248.0	8:00	1.00	68.4	81.1	7.62	88.63%	64.0	800	160	0.11	0.5	5.0
15	7-Sep	249.7	Johnson Island	249.7	249.8	249.8	9:45	0.42	78.6	82.0	8.66	111.21%	70.0	766	160	0.11	0.5	4.5
16	7-Sep	260.6	Waupecan Island	260.2	261.1	260.7	12:00	1.00	83.2	84.2	8.00	107.10%	68.0	770	160	0.10	0.5	5.5
Dresden Reach																		
23	21-Sep	277.4	Du Page River ^d	276.8	277.8	277.3	11:45	1.00	80.1	83.1	6.25	81.37%	100.0	702	160	0.03	0.5	6.0
24	21-Sep	279.9	Treats Island ^e	279.6	280.1	279.9	14:35	1.00	87.1	86.4	6.34	87.81%	86.0	721	150	0.09	0.5	5.5
Minimum																		
Maximum																		
Mean																		
Total time electrofished																		
26.58																		

^aRefers to approximate average river mile electrofished at each site, 1957-2004.

^bEstimated during sampling.

^cFeet above sea level at the U.S. Army Corps of Engineers river gage nearest to the sampling site.

^dMississippi River.

^eDes Plaines River.

All values were within the ranges expected based upon previous sampling (Lerczak et al. 1994; Koel and Sparks 1999). All sites were sampled within our established water temperature and river level criteria (Table 1; Lerczak et al. 1994).

B. ELECTROFISHING RESULTS

The following data summaries proceed through several levels of detail. First, data on the numbers of individual fish (by species) collected at each of the 28 sites are presented. Then, catch rates of the number of individuals collected per hour of electrofishing are calculated for each of the seven navigation reaches. Similar summaries are presented for fish weights. Results conclude with fish health as determined by external visual inspection. Common names used throughout this report follow Robins et al. (1991). Common and scientific names are listed in APPENDIX A.

Numbers of Fish Collected

We collected a total of 7,676 fish representing 56 species (plus two hybrids) from 13 families during 26.58h of sampling at 27 sites on the Illinois Waterway and a single site on the Mississippi River in 2005. Gizzard shad was the most abundantly collected species, representing 24.7% of the total catch, followed by bluegill (20.3%), freshwater drum (9.6%), emerald shiner (8.3%), bluntnose minnow (5.8%), and green sunfish (4.6%). Gizzard shad and bluegill were collected at all 28 sites, common carp and emerald shiners were collected at 26 sites, channel catfish and freshwater drum were collected at 25 sites, bullhead minnows were collected at 23 sites, and smallmouth buffalo and white bass were collected at 22 sites. The sample from Bull's Island (RM 240.8, Starved Rock Reach) yielded the most fish (635, 8.5% of the total collected from

all 28 sites). The most species collected at one site was 25, obtained from Hennepin Island (RM 207.6) in Peoria Reach. The fewest species collected at a single site was 13 from Turkey Island (RM 148.0) in La Grange Reach and Johnson Island (RM 249.6) in Marseilles Reach. The sample from Turkey Island yielded the fewest fish at 28.

Of the 56 species and two hybrid crosses, 11 species (black buffalo, black bullhead, creek chub, golden shiner, highfin carpsucker, longear sunfish, mooneye, pumpkinseed, silver chub, and tadpole madtom) were collected at only a single site; whereas 10 species (blacknose dace, blackstripe topminnow, river shiner, sauger, shortnose gar, silverband shiner, threadfin shad, quillback, white perch, and yellow bass) were collected at only two sites. Sixteen species (blacknose dace, black bullhead, brook silverside, common shiner, golden shiner, highfin carpsucker, logperch, longear sunfish, mosquitofish, mooneye, skipjack herring, silver chub, threadfin shad, tadpole madtom, quillback, and white perch) were represented by single individuals at sites, and a maximum of two individuals were collected at sites for each of five species (grass carp, sauger, sand shiner, shortnose gar, and yellow bass).

On the 27 Illinois Waterway sites, we collected 7,490 fish representing 56 species (plus two hybrids) from 13 families during 25.58 h of sampling. At Brickhouse Slough on the Mississippi River (RM 204.9), we collected 186 fish representing 20 species from eight families (Table 2). Total catch from Brickhouse Slough in 2005 was the highest collection since 1995 when a total catch of 190 fish was recorded (Lerczak et al. 1996).

Table 2. Numbers of individuals of each fish species collected on the Mississippi River (Brickhouse Slough) and the lower Illinois Waterway (Alton Reach, RM 0-80) in 2005.

Species	Mile Effort	River Mile and Hours Fished							Total
		Miss. River	Lower Illinois River						
		0.0 1.00	19.0 1.00	24.7 1.00	26.8 1.00	30.0 1.00	58.3 1.00	75.3 0.83	
Lepisosteidae									
shortnose gar		0	0	1	0	0	0	0	1
Clupeidae									
gizzard shad		43	53	19	121	30	56	164	443
skipjack herring		0	0	0	0	0	0	1	1
threadfin shad		1	0	0	0	0	0	0	0
Cyprinidae									
bullhead minnow		2	8	5	2	0	6	2	23
common carp		3	2	1	2	3	3	3	14
emerald shiner		17	22	22	83	10	30	40	207
grass carp		1	0	0	0	0	1	0	1
red shiner		0	7	0	4	0	5	0	16
sand shiner		0	0	0	0	0	0	2	2
silverband shiner		1	0	0	0	0	0	0	0
silver carp		0	2	19	4	6	2	1	34
silver chub		0	0	0	0	0	0	1	1
spotfin shiner		0	0	0	6	0	0	0	6
Catostomidae									
bigmouth buffalo		0	0	0	1	2	1	0	4
river carpsucker		0	2	0	1	6	8	3	20
shorthead redhorse		1	3	3	2	0	1	1	10
smallmouth buffalo		6	2	1	0	1	4	2	10
Ictaluridae									
channel catfish		4	3	12	4	8	6	8	41
flathead catfish		1	2	1	2	3	5	2	15
Atherinopsidae									
brook silverside		1	1	0	1	0	0	0	2
Moronidae									
white bass		2	4	6	8	10	11	10	49
yellow bass		0	0	0	0	0	0	2	2
Centrarchidae									
black crappie		1	1	0	1	2	1	0	5
bluegill		48	9	31	22	21	65	2	150
bluegill x green sunfish		0	0	0	0	1	1	0	2
green sunfish		17	1	0	4	3	1	0	9
largemouth bass		4	0	2	0	0	2	0	4
orangespotted sunfish		11	12	9	3	2	1	0	27
warmouth		1	0	0	0	0	0	0	0
white crappie		0	0	0	0	1	0	0	1
Percidae									
sauger		0	1	0	0	0	0	0	1
Sciaenidae									
freshwater drum		21	60	20	33	42	30	19	204
Total individuals		186	195	152	304	151	240	263	1305
Total species/hybrids		20/0	19/0	15/0	19/0	16/1	20/1	17/0	29/1

On the lower waterway, we collected 1,305 fish representing 29 species plus one hybrid (Table 2). In 2005, species richness ranged from 15 at Dark Chute (RM 24.7) to 20 at Big Blue Island (RM 58.3). This was the highest species richness recorded for Big Blue Island and for any site in the lower waterway in F-101-R sampling. Hurricane Island (RM 26.8) exhibited the highest catch in the lower waterway with 304 total fish. This represents the highest catch for Hurricane Island in F-101-R sampling, the previous high catch was 255 fish collected in 1997 (Koel et al., 1998)

We collected 3,355 fish species representing 44 species plus two hybrids on the middle waterway (Tables 3 and 4). From six sites on La Grange Reach (RM 80-158), 759 fish representing 32 species and one hybrid were collected, while eight sites on Peoria Reach (RM 158-231) produced 2,595 fish representing 37 species and two hybrids. Species richness ranged from 13 species collected at Turkey Island (RM 148.0, La Grange Reach) to 25 at Hennepin Island (RM 207.6, Peoria Reach) in 2005. This is the highest species richness ever recorded at Hennepin Island, and the highest species richness recorded for any single site in F-101-R sampling. A previous high species collection of 23 was recorded in 1994 at the Grape-Bar Islands (RM 86.5) site in La Grange Reach, a number that was also surpassed by species collections at Chillicothe (RM 180.6) and Henry (RM 193.8) Islands in Peoria Reach in 2005 (24 and 23 species, respectively; Lerczak et al. 1995). Species collections at Lower Peoria Lake (19 species; RM 163.3) and Lower Twin Sisters Island (20 species; RM 202.8) sites in Peoria Reach and Sugar Creek Island (20 species; RM 95.1) and Pekin (19 species; RM 155.1) sites in La Grange Reach were also the highest ever recorded for these locations in F-101-R sampling. In addition to species richness, Hennepin Island

Table 3. Numbers of individuals of each fish species collected on La Grange Reach (RM 80-158) of the middle Illinois Waterway (RM 80-231) in 2005.

Species	Mile Effort	River Mile and Hours Fished						La Grange	Middle
		86.5 1.00	95.1 1.00	107.1 1.00	113 1.00	148 0.58	155.1 1.00	Reach Total 5.58	River Total 13.3
Lepisosteidae									
shortnose gar		0	0	0	0	0	2	2	2
Clupeidae									
gizzard shad		70	27	15	33	3	31	179	967
skipjack herring		0	0	0	1	1	0	2	5
Cyprinidae									
bullhead minnow		12	8	1	0	2	1	24	54
common carp		2	8	13	3	2	3	31	76
emerald shiner		17	10	7	10	0	26	70	135
grass carp		0	0	0	1	0	0	1	6
red shiner		3	8	3	5	0	0	19	24
river shiner		1	0	0	0	0	0	1	1
silverband shiner		0	0	0	0	3	0	3	3
silver carp		3	11	4	24	6	5	53	80
spottail shiner		0	0	0	0	0	5	5	58
Catostomidae									
bigmouth buffalo		0	1	0	2	1	2	6	66
golden redhorse		0	0	0	1	0	5	6	10
river carpsucker		5	3	1	1	0	1	11	35
shorthead redhorse		0	0	0	0	0	1	1	5
smallmouth buffalo		0	2	4	2	0	0	8	116
Ictaluridae									
channel catfish		4	3	3	6	10	13	39	87
flathead catfish		5	9	11	4	1	0	30	44
tadpole madtom		0	1	0	0	0	0	1	1
Poeciliidae									
western mosquitofish		1	1	0	0	0	0	2	2
Moronidae									
white bass		5	3	6	1	1	8	24	67
white perch		0	0	0	0	0	1	1	2
yellow bass		0	0	0	0	0	2	2	2
Centrarchidae									
black crappie		0	3	3	1	0	0	7	43
bluegill		10	10	22	8	1	4	55	550
bluegill x green sunfish		0	0	1	0	0	0	1	14
green sunfish		4	0	2	0	0	3	9	200
largemouth bass		1	0	0	0	1	1	3	52
orangespotted sunfish		0	4	0	0	0	0	4	80
warmouth		0	5	1	0	0	0	6	6
white crappie		0	4	2	0	0	0	6	10
Sciaenidae									
freshwater drum		28	23	9	21	38	28	147	504
Total Individuals		171	144	108	124	70	142	759	3355
Total species/hybrids		16/0	20/0	17/1	16/0	13/0	19/0	32/1	44/2

Table 4. Numbers of individuals of each fish species collected on Peoria Reach (RM 158-231) of the middle Illinois Waterway (RM 80-231) in 2005.

Species	River Mile and Hours Fished									Peoria Reach Total	Middle River Total
	Mile Effort	163.3 1.00	170.3 0.75	180.6 1.00	193.8 1.00	202.8 1.00	203.3 1.00	207.6 1.00	215.3 1.00		
Hiodontidae											
mooneye		0	0	0	0	0	1	0	0	1	1
Clupeidae											
gizzard shad		68	126	16	18	24	11	314	211	788	967
skipjack herring		0	0	1	1	0	0	1	0	3	5
Cyprinidae											
bluntnose minnow		0	0	0	0	1	0	1	1	3	3
bullhead minnow		2	0	4	5	7	3	7	2	30	54
common carp		9	6	8	11	1	4	2	4	45	76
common carp x goldfish		0	0	0	2	0	0	0	0	2	2
common shiner		0	0	0	0	0	0	1	0	1	1
emerald shiner		7	0	4	12	1	15	14	12	65	135
golden shiner		0	1	0	0	0	0	0	0	1	1
goldfish		0	4	0	16	0	0	0	0	20	20
grass carp		1	1	2	0	0	0	1	0	5	6
red shiner		0	0	1	1	0	0	0	3	5	24
silver carp		2	0	4	7	6	2	1	5	27	80
spotfin shiner		0	0	0	0	4	2	0	0	6	6
spottail shiner		4	2	4	13	3	0	27	0	53	58
Catostomidae											
bigmouth buffalo		1	2	4	7	9	25	0	12	60	66
golden redhorse		0	0	2	0	1	1	0	0	4	10
quillback		1	0	0	0	0	0	0	0	1	1
river carpsucker		8	0	5	0	5	2	0	4	24	35
shorthead redhorse		0	0	0	2	0	0	2	0	4	5
smallmouth buffalo		12	7	10	9	18	39	2	11	108	116
Ictaluridae											
black bullhead		0	1	0	0	0	0	0	0	1	1
channel catfish		3	1	24	9	2	1	1	7	48	87
flathead catfish		0	0	2	5	2	2	1	2	14	44
Moronidae											
white bass		4	0	8	8	7	7	1	8	43	67
white perch		0	0	1	0	0	0	0	0	1	2
Centrarchidae											
black crappie		0	2	6	3	0	18	7	0	36	43
bluegill		160	76	49	64	25	34	67	20	495	550
bluegill X green sunfish		9	0	0	0	1	0	3	0	13	14
green sunfish		87	52	6	6	3	4	33	0	191	200
largemouth bass		6	8	14	5	0	2	10	4	49	52
orangespotted sunfish		28	13	13	4	0	0	16	2	76	80
smallmouth bass		1	0	0	0	1	2	2	2	8	8
white crappie		0	0	1	1	0	0	2	0	4	10
Percidae											
logperch		0	0	0	1	0	0	1	0	2	2
sauger		0	0	0	0	0	0	2	0	2	2
Sciaenidae											
freshwater drum		94	155	46	21	15	15	4	7	357	504
Total individuals		507	457	235	231	136	189	523	317	2595	3355
Total species/hybrids		19/1	16/1	24/0	23/1	19/1	20/0	25/1	18/0	36/2	44/2

was also the site of highest total catch on the middle river with a total of 523 fish. This is the highest number of fish ever collected in F-101-R sampling for the Hennepin Island site with a previous high of 387 fish recorded in 1997 (Koel et al. 1998). In addition to the high numbers observed at Hennepin Island, the Lower Peoria Lake site recorded a total catch of 507 fish. This also represents the highest number of fish ever collected for Lower Peoria Lake in F-101-R sampling.

We collected 2,819 fish representing 41 species plus two hybrid crosses (Table 5) on the upper waterway in 2005. Species richness ranged from 13 at Johnson Island (RM 240.8, Marseilles Reach) to 22 at Bull's Island Bend (RM 241.5, Starved Rock Reach). This species collection observed at Bull's Island Bend ties the previous high species collection observed in 2001 (McClelland and Pegg 2002). Additionally, species collections at Bull's Island (19 species; RM 240.8, Starved Rock Reach), Ballard's Island (20 species; RM 248.0, Marseilles Reach), and Waupecan Island (21 species; RM 260.6, Marseilles Reach) were the highest recorded for these sites in F-101-R sampling. The collection at Ballard's Island of 492 fish also represented the highest total catch at this site in F-101-R sampling, where a previous high total catch of 472 fish was recorded in 1995 (Lerczak et al. 1996). Collections at Johnson Island remained lowest in the upper waterway with 99 fish collected in 2005.

Table 5. Numbers of individuals of each fish species collected on Starved Rock, Marseilles, and Dresden Reaches of the upper Illinois Waterway (RM 231-280) in 2005.

Species	River Mile and Hours Fished								Upper Waterway Total
	Mile Effort	Starved Rock		Marseilles			Dresden		
		240.8	241.5	248	249.6	260.6	277.4	279.8	6.42
Clupeidae									
gizzard shad		37	127	149	17	27	65	22	444
skipjack herring		0	0	1	0	1	0	0	2
threadfin shad		0	0	0	1	0	0	0	1
Cyprinidae									
blacknose dace		1	1	0	0	0	0	0	2
bluntnose minnow		117	19	58	0	29	63	156	442
bullhead minnow		45	27	23	3	3	0	0	101
central stoneroller		0	0	1	0	1	0	1	3
common carp		0	1	6	2	1	0	6	16
common carp x goldfish		0	0	0	0	0	1	0	1
common shiner		0	7	0	0	1	5	0	13
creek chub		5	0	0	0	0	0	0	5
emerald shiner		143	54	31	9	3	26	10	276
gold fish		0	0	1	0	0	0	0	1
red shiner		0	4	7	0	0	0	0	11
river shiner		0	7	0	0	0	0	0	7
sand shiner		2	2	0	0	0	0	0	4
spotfin shiner		85	31	34	16	23	12	19	220
spottail shiner		4	4	5	1	3	1	2	20
Catostomidae									
black buffalo		4	0	0	0	0	0	0	4
golden redbhorse		0	0	0	1	1	0	0	2
highfin carpsucker		0	1	0	0	0	0	0	1
quillback		1	0	0	0	0	0	0	1
river carpsucker		4	0	1	0	1	1	0	7
shorthead redbhorse		0	0	0	1	5	0	0	6
smallmouth buffalo		3	2	3	0	2	0	1	11
Ictaluridae									
channel catfish		0	5	0	0	1	1	3	10
flathead catfish		1	0	0	0	0	0	0	1
Fundulidae									
blackstripe topminnow		0	0	3	0	0	0	12	15
Poeciliidae									
western mosquitofish		0	0	0	0	0	0	1	1
Moronidae									
white bass		0	2	0	0	1	0	0	3

Table 5. (continued)

Numbers of individuals of each fish species collected on Starved Rock, Marseilles, and Dresden Reaches of the upper Illinois Waterway (RM 231-280) in 2005.

Centrarchidae								
black crappie	0	0	0	0	0	2	2	4
bluegill	130	114	122	33	87	186	142	814
bluegill X green sunfish	0	6	6	2	0	13	12	28
green sunfish	22	17	10	0	6	29	45	129
largemouth bass	27	55	26	11	9	28	10	166
longear sunfish	0	0	1	0	0	0	0	1
orangespotted sunfish	0	0	0	0	0	0	7	7
pumpkinseed	0	0	0	0	0	0	3	3
rock bass	0	0	0	0	0	11	0	11
smallmouth bass	2	5	3	1	1	3	0	15
white crappie	0	0	1	0	0	0	0	1
Percidae								
logperch	0	1	0	0	0	0	0	1
Sciaenidae								
freshwater drum	2	2	0	1	3	0	0	8
Total individuals	635	494	492	99	209	447	454	2819
Total species/hybrids	19/0	22/1	20/1	13/1	21/0	14/2	17/1	41/2

Catch Rates in Numbers of Individuals Collected per Hour by Reach.

In the following data summary, most of the discussion is restricted either to species that each separately accounted for over 10% of the total catch or to species that were of special significance.

Alton (lower waterway, Illinois River). The 95% lists (species were added to the list until 95% of the total catch in numbers was obtained) for Alton, La Grange, and Peoria Reaches remained similar to each other, as in past years, although total catch in numbers per hour ($CPUE_N$) varied within reaches. Thirteen species accounted for 95.3% of the total catch in Alton Reach (Tables 6 and 7) and overall, $CPUE_N$ was 223.8 in 2005. This is the highest catch rate observed in Alton Reach in F-101-R sampling; the previous high $CPUE_N$ of 166.60 occurred in 1997 (Koel et al. 1998). The highest $CPUE_N$ for an individual species was 75.99 for gizzard shad, which made up 34.0% of the total fish collected in this reach. Emerald shiners ranked second with a $CPUE_N$ of 35.51 (15.9% of the total), and freshwater drum ranked third with a $CPUE_N$ of 34.99 (15.6% of the total). Largemouth bass catch in number was the lowest ever recorded for Alton Reach in F-101-R sampling with a $CPUE_N$ of 0.69.

La Grange (middle waterway, Illinois River). Nineteen species accounted for 96.2% of the total catch in La Grange Reach (Tables 6 and 7). Overall, $CPUE_N$ was 136.03, the highest catch rate since 1998 when a $CPUE_N$ of 160.91 was observed (Koel and Sparks 1999). The highest $CPUE_N$ occurred in 1996 (314.91; Koel et al. 1997). In 2005, the highest $CPUE_N$ for any species was 32.08 for gizzard shad, which made up 23.6% of the total fish collected in this reach. Freshwater drum ranked second with a

Table 6. 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 Waterway in 2005.

Species	Reach and Hours Fished							Overall CPUE _N
	Reach 26 1.00	Alton 5.83	La Grange 5.58	Peoria 7.75	Starved Rock 2.00	Marseilles 2.42	Dresden 2.00	
Lepisosteidae								
shortnose gar		0.17	0.36					0.53
Clupeidae								
gizzard shad	43.00	75.99	32.08	101.68	82.00	79.75	43.50	457.99
skipjack herring		0.17	0.36	0.39		0.83		1.74
threadfin shad	1.00					0.41		1.41
Hiodontidae								
mooneye				0.13				0.13
Cyprinidae								
blacknose dace					1.00			1.00
bluntnose minnow				0.39	68.00	35.95	109.50	213.84
bullhead minnow	2.00	3.95	4.30	3.87	36.00	11.98		62.10
central stoneroller						0.83	0.50	1.33
common carp	3.00	2.40	5.56	5.81	0.50	3.72	3.00	23.98
common carp x goldfish				0.26			0.50	0.76
common shiner				0.13	3.50	0.41	2.50	6.54
creek chub					2.50			2.50
emerald shiner	17.00	35.51	12.54	8.39	98.50	17.77	18.00	207.71
golden shiner				0.13				0.13
goldfish				2.58		0.41		2.99
grass carp	1.00	0.17	0.18	0.65				1.99
red shiner		2.74	3.41	0.65	2.00	2.89		11.69
river shiner			0.18		3.50			3.68
sand shiner		0.34			2.00			2.34
silverband shiner	1.00		0.54					1.54
silver carp		5.83	9.50	3.48				18.81
silver chub		0.17						0.17
spotfin shiner		1.03		0.77	58.00	30.17	15.50	105.47
spottail shiner			0.90	6.84	4.00	3.72	1.50	16.95
Catostomidae								
bigmouth buffalo		0.69	1.08	7.74				9.50
black buffalo					2.00			2.00
golden redhorse			1.08	0.52		0.83		2.42
highfin carpsucker					0.50			0.50
quillback				0.13	0.50			0.63
river carpsucker		3.43	1.97	3.10	2.00	0.83	0.50	11.83
shorthead redhorse	1.00	1.72	0.18	0.52		2.48		5.89
smallmouth buffalo	6.00	1.72	1.43	13.94	2.50	2.07	0.50	28.15
Ictaluridae								
black bullhead				0.13				0.13
channel catfish	4.00	7.03	6.99	6.19	2.50	0.41	2.00	29.13
flathead catfish	1.00	2.57	5.38	1.81	0.50			11.26
tadpole madtom			0.18					0.18
Fudulidae								
blackstripe topminnow						1.24	6.00	7.24
Poeciliidae								
western mosquitofish			0.36				0.50	0.86
Atherinidae								
brook silverside	1.00	0.34						1.34

Table 6. (continued)

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 Waterway in 2005.

Species	Reach and Hours Fished							Overall CPUE _N
	Reach 26	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden	
Moronidae								
white bass	2.00	8.40	4.30	5.55	1.00	0.41		21.66
white perch			0.18	0.13				0.31
yellow bass		0.34	0.36					0.70
Centrarchidae								
black crappie	1.00	0.86	1.25	4.65			2.00	9.76
bluegill	48.00	25.73	9.86	63.87	122.00	100.00	164.00	533.46
bluegill X green sunfish		0.34	0.18	1.68	3.00	3.31	12.50	21.00
green sunfish	17.00	1.54	1.61	24.65	19.50	6.61	37.00	107.91
largemouth bass	4.00	0.69	0.54	6.32	41.00	19.01	19.00	90.55
longear sunfish						0.41		0.41
orangespotted sunfish	11.00	4.63	0.72	9.81			3.50	29.66
pumpkinseed							1.50	1.50
rock bass							5.50	5.50
smallmouth bass				1.03	3.50	2.07	1.50	8.10
warmouth	1.00		1.08					2.08
white crappie		0.17	1.08	0.52		0.41		2.18
Percidae								
logperch				0.26	0.50			0.76
sauger		0.17		0.26				0.43
Sciaenidae								
freshwater drum	21.00	34.99	26.34	46.06	2.00	1.65		132.05
Total Number per hour	186.00	223.82	136.03	334.97	564.50	330.56	450.50	288.79
Number of species/hybrids	20/0	30/0	33/0	38/1	28/0	28/0	23/1	58/1

Table 7. Species ranks by relative abundance (number of fish collected per hour) for 2005 on the 6 reaches of the Illinois Waterway. 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.

Species	Rankings by Reach					
	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	1 (34.0)	1 (23.6)	1 (30.4)	3 (14.5)	2 (24.1)	3 (9.7)
Cyprinidae						
bullhead minnow	9 (1.8)	9 (3.2)	15 (1.2)	7 (6.4)	7 (3.6)	
bluntnose minnow				4 (12.0)	3 (10.9)	2 (24.3)
common carp		7 (4.1)	12 (1.7)		9 (1.1)	
common shiner				10 (.6)		
emerald shiner	2 (15.9)	3 (9.2)	7 (2.5)	2 (17.4)	6 (5.4)	6 (4.0)
red shiner	11 (1.2)	10 (2.5)			11 (.9)	
river shiner				10 (.6)		
silver carp	7 (2.6)	5 (7.0)	16 (1.0)			
spotfin shiner				5 (10.3)	4 (9.1)	7 (3.4)
spottail shiner			9 (2.0)	9 (.7)	9 (1.1)	
Catostomidae						
bigmouth buffalo		15 (.8)	8 (2.3)			
golden redbreast		15 (.8)				
river carpsucker	10 (1.5)	11 (1.4)				
smallmouth buffalo		13 (1.1)	5 (4.2)			
Ictaluridae						
channel catfish	6 (3.1)	6 (5.1)	11 (1.8)			
flathead catfish	12 (1.2)	8 (4.0)				
Fudulidae						
blackstripe topminnow						9 (1.3)
Moronidae						
white bass	5 (3.8)	9 (3.2)	13 (1.7)			
Centrarchidae						
black crappie		14 (.9)	14 (1.4)			
bluegill	4 (11.5)	4 (7.2)	2 (19.1)	1 (21.6)	1 (30.3)	1 (36.4)
bluegill X green sunfish					10 (1.0)	8 (2.8)
green sunfish		12 (1.2)	4 (7.4)	8 (3.5)	8 (2.0)	4 (8.2)
largemouth bass			10 (1.9)	6 (7.3)	5 (5.8)	5 (4.2)
orangespotted sunfish	8 (2.1)		6 (2.9)			
rock bass						10 (1.2)
smallmouth bass				10 (.6)		
warmouth		15 (.8)				
white crappie		15 (.8)				
Sciaenidae						
freshwater drum	3 (15.6)	2 (19.4)	3 (13.8)			
Number of species accounting for 95 % of total catch	12	19	16	12	12	10

CPUE_N of 26.34 (19.4% of the total). The exotic silver carp, which were collected for the first time in F-101-R sampling in the La Grange Reach in 2002 and ranked seventh in 2004, were recorded as the fifth most common species in the La Grange Reach in 2005 (McClelland and Pegg 2003, 2005).

Peoria (middle waterway, Illinois River). Sixteen species accounted for 95.2% of the total catch in Peoria Reach (Tables 6 and 7). Overall, CPUE_N was 334.97 representing the highest catch rate ever recorded for Peoria Reach in F-101-R sampling. Previous high catch rates of 291.00 and 285.57 were observed in 1995 and 1996, respectively (Lerczak et al. 1996; Koel et al. 1997). The highest CPUE_N for any species was 101.68 for gizzard shad, which composed 30.4% of the total fish collected in this reach. This catch rate is up from the CPUE_N of 19.45 and 19.12 observed in 2003 and 2004, respectively (McClelland and Pegg 2004, 2005). Bluegill ranked second in Peoria Reach with a CPUE_N of 63.87 (19.1% of the total), representing the highest catch rate ever recorded for this species in F-101-R sampling. Bluegills have ranked among the top two species since 1990 in the Peoria Reach (Lerczak et al. 1993, 1994, 1995, 1996; Koel et al. 1997, 1998, 1999; Arnold et al. 2000; McClelland and Pegg 2001, 2002, 2003, 2004, 2005). Freshwater drum ranked third in 2005 with a CPUE_N of 46.06 (13.8% of the total). This also represents the highest catch rate recorded for freshwater drum in the Peoria Reach, with a previous high catch rate of 25.57 recorded in 1995 (Lerczak et al. 1994). Silver carp, which were collected for the first time in F-101-R sampling in the Peoria Reach in 2004, ranked in the top 95% of total catch in 2005. A total of 27 silver carp were collected, with collections in every site except Lower Peoria Lake in Peoria Reach. Collections at Clark Island (RM 215.3)

marks the furthest upstream collection of this species in F-101-R sampling. Common shiner and mooneye were collected for the first time in the Peoria Reach, a single common shiner was collected at Hennepin Island (RM 207.6) and a single mooneye was collected at Upper Twin Sisters Island (RM 203.3). Collections of common shiners in Peoria Reach and subsequent reaches mark the first observations of this species in F-101-R sampling.

Starved Rock (upper waterway, Illinois River). Twelve species accounted for 95.6% of the total catch in Starved Rock Reach (Tables 6 and 7). Overall, $CPUE_N$ was 564.50 in 2005. This catch rate is the second highest $CPUE_N$ recorded for Starved Rock Reach in F-101-R sampling; the highest catch was recorded in 1995 with a $CPUE_N$ of 867.50. The highest $CPUE_N$ for any species was 122.00 recorded for bluegill comprising 21.6% of the total catch. This is the highest catch rate ever recorded for bluegill in Starved Rock Reach, more than doubling the previous high of 36.00 fish per hour observed in 2001 (McClelland and Pegg 2002). Emerald shiners ranked second in numbers of fish per hour with a catch rate of 98.50 comprising 17.4% of the total catch. Gizzard shad ranked third in numbers of fish per hour at 82.00 comprising 14.5% of the catch. Bluntnose minnow and spotfin shiners ranked fourth and fifth by catch rate with a $CPUE_N$ of 68.00 (12.0% of total catch) and 58.00 (10.3% of total catch), respectively. These catch rates represent the highest ever observed over all reaches for these species in F-101-R sampling. Largemouth bass collections in Starved Rock Reach were exceptionally high in 2005. Although this species ranked sixth (7.3% of total catch) overall in Starved Rock Reach, the $CPUE_N$ of 41.00 is the highest catch rate ever observed for largemouth bass over all reaches in F-101-R sampling. This catch rate

nearly doubles the previous high of 22.50 fish per hour observed in Dresden Reach in 2004 (McClelland and Pegg 2005). Flathead catfish, creek chub, common shiner, and blacknose dace were all collected in Starved Rock Reach for the first time in F-101-R sampling. A single flathead catfish, five creek chubs, and a single blacknose dace were collected at Bull's Island and seven common shiners and a single blacknose dace were collected at Bull's Island Bend. This marks the first observation of blacknose daces over all reaches in F-101-R sampling.

Marseilles (upper waterway, Illinois River). Twelve species accounted for 95.3% of the total catch in Marseilles Reach (Tables 6 and 7) and overall CPUE_N was 330.56 in 2005. This represents the second highest catch rate for the Marseilles Reach in F-101-R sampling, the highest catch rate occurred in 1995 with a CPUE_N of 356.80 (Lerczak et al. 1996). The highest CPUE_N for any species was 100.00 for bluegill, consisting of 30.3% of the total fish collected in this reach. This is the highest CPUE_N ever recorded for bluegill in the Marseilles Reach in F-101-R sampling. Gizzard shad ranked second with a CPUE_N of 79.75 (24.1% of total). Bluntnose minnow ranked third with a CPUE_N of 35.95 (10.9% of total). This is the highest catch rate observed for this species in the Marseilles Reach, a previous high CPUE_N of 25.20 was recorded in 2004 (McClelland and Pegg 2005). Largemouth bass were collected in high numbers in Marseilles Reach in 2005, a catch rate of 19.03 (5.8% of the total catch) was the highest CPUE_N ever recorded for this species in Marseilles Reach in F-101-R sampling. Common shiners were collected for the first time in the Marseilles Reach at Waupecan Island; one individual was collected.

Dresden (upper waterway, Des Plaines River). Ten species accounted for 95.5% of the total catch in Dresden Reach (Tables 6 and 7). Overall, CPUE_N was 450.50 in 2005. This catch rate represents the second highest CPUE_N in Dresden Reach in F-101-R sampling, a previous high catch rate of 600.00 was observed in 1995 (Lerczak et al. 1996). In 2005, the highest CPUE_N for any species was 164.00 for bluegill, which made up 36.4% of the fish collected. This is the highest catch rate for bluegill in Dresden Reach since the beginning of project F-101-R, the previous high catch rate of 131.00 was recorded in 2001. Bluntnose minnow ranked second with a CPUE_N of 109.50 (24.3% of total). Gizzard shad ranked third with a CPUE_N of 43.50, comprising 9.7% of the catch. Largemouth bass continues to rank high in Dresden Reach, in 2005 this species ranked fifth in abundance, the catch rate of 19.00 (4.2% of total) was the second highest recorded in F-101-R sampling for this species in Dresden Reach. In addition, common shiners were collected for the first time in Dresden Reach at the Mouth of the Du Page River (RM 277.3). Five individuals were collected at this site.

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

The following data summary and discussion is restricted to species that individually accounted for over 10% of the total catch and to species that were of special interest. A 95% list was produced for each reach, in which species were ranked by relative biomass (pounds per hour) and added to the list until 95% of the total catch rate in weight for that reach was obtained. Overall, these data indicate that in terms of biomass the fish communities of the Illinois Waterway are now dominated by silver carp

and common carp, with bigmouth buffalo and channel catfish also playing a dominant role in the lower and middle waterway. Common carp, largemouth bass, gizzard shad, channel catfish, and bluegill are dominant species in terms of biomass in the upper waterway.

Alton (lower waterway, Illinois River). Ten species accounted for 94.1% of the total catch by weight in pounds per hour ($CPUE_W$) in Alton Reach (Tables 8 and 9) in 2005. Overall $CPUE_W$ was 56.51. This catch weight is slightly lower than catch weights observed in Alton Reach in 2004 when a $CPUE_W$ of 63.74 was observed (McClelland and Pegg 2005). Silver carp $CPUE_W$ ranked highest at 28.42 (50.3% of total). This is the the highest recorded $CPUE_W$ for silver carp over all reaches since they were first collected in 2001 by F-101-R sampling. Common carp ranked second with a $CPUE_W$ of 6.38 (11.3% of total), which is the lowest $CPUE_W$ recorded for this species in F-101-R sampling for the lower waterway. Channel catfish ranked third with a $CPUE_W$ of 6.12 (10.8% of total).

La Grange (middle waterway, Illinois River). Nine species accounted for 93.8% of the total catch by weight in La Grange Reach (Tables 8 and 9) in 2005. Overall, $CPUE_W$ was 56.31, a catch weight that is down from the $CPUE_W$ of 79.74 observed in 2004 (McClelland and Pegg 2005). Similar to Alton Reach, silver carp ranked first in La Grange Reach catch by weight with a $CPUE_W$ of 22.73 (40.4% of the total). Silver carp were first collected in 2002 in La Grange Reach and catch weights have continually increased annually. The catch weight observed for this species in 2005 is the highest recorded in La Grange Reach and the second highest ever

Table 8. Pounds of each fish species collected per hour of electrofishing (CPUE_W) on Reach 26 of the Mississippi River (Brickhouse Slough) and on six reaches of the Illinois Waterway in 2005. Pounds per hour less than 0.01 but greater than zero are indicated by 0.00.

Species	Reach and Hours Fished							Overall CPUE
	Reach 26	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden	
Lepisosteidae								
shortnose gar		0.18	0.26					0.44
Hiodontidae								
mooneye				0.01				0.01
Clupeidae								
gizzard shad	3.95	2.51	0.86	4.36	3.45	3.59	4.49	23.21
skipjack herring		0.01	0.02	0.02		0.05		0.10
threadfin shad	0.06					0.01		0.07
Cyprinidae								
blacknose dace					0.01			0.01
bluntnose minnow				0.00	0.21	0.13	0.41	0.75
bullhead minnow	0.01	0.01	0.01	0.01	0.10	0.03		0.17
central stoneroller						0.01	0.01	0.02
common carp	6.16	6.38	10.58	13.55	1.12	9.28	6.38	53.45
common carp x goldfish				0.26			1.12	1.38
common shiner				0.00	0.03	0.01	0.05	0.09
creek chub					0.02			0.02
emerald shiner	0.04	0.08	0.03	0.03	0.26	0.07	0.06	0.57
golden shiner				0.00				0.00
goldfish				0.25		0.04		0.29
grass carp	2.02	0.56	0.28	1.42				4.28
red shiner		0.01	0.01	0.00	0.01	0.01		0.04
river shiner			0.00		0.01			0.01
sand shiner		0.00			0.01			0.01
silverband shiner	0.00		0.00					0.00
silver carp		28.42	22.73	17.42				68.57
silver chub		0.00						0.00
spotfin shiner		0.00		0.00	0.20	0.13	0.03	0.36
spottail shiner			0.01	0.04	0.02	0.02	0.00	0.09
Catostomidae								
bigmouth buffalo		1.89	2.49	18.19				22.57
black buffalo					3.52			3.52
golden redhorse			0.20	0.14		0.23		0.57
highfin carpsucker					0.33			0.33
quillback				0.01	0.55			0.56
river carpsucker		1.95	0.32	2.37	1.03	0.52	0.96	7.15
shorthead redhorse	0.07	1.69	0.21	0.36		0.54		2.87
smallmouth buffalo	5.16	1.31	1.69	17.84	3.51	1.66	0.03	31.20
Ictaluridae								
black bullhead				0.02				0.02
channel catfish	2.11	6.12	3.38	9.01	2.30	0.11	3.58	26.61
flathead catfish	0.73	1.46	9.66	2.58	0.11			14.54
tadpole madtom			0.00					0.00
Fundulidae								
blackstripe topminnow						0.00	0.01	0.01
Poeciliidae								
western mosquitofish			0.00				0.00	0.00
Atherinidae								
brook silverside	0.00	0.00						0.00

Table 8. (continued)

Pounds of each fish species collected per hour of electrofishing (CPUEw) on Reach 26 of the Mississippi River (Brickhouse Slough) and on six reaches of the Illinois Waterway in 2005. Pounds per hour less than 0.01 but greater than zero are indicated by 0.00.

Species	Reach and Hours Fished							Overall CPUE
	Reach 26 1.00	Alton 5.83	La Grange 5.58	Peoria 7.75	Starved Rock 2.00	Marseilles 2.42	Dresden 2.00	
Moronidae								
white bass	0.07	1.47	0.95	2.82	0.86	0.43		6.60
yellow bass		0.02	0.03					0.05
white perch			0.05	0.00				0.05
Centrarchidae								
black crappie	0.18	0.26	0.21	1.29			0.85	2.79
bluegill	3.04	0.51	0.32	4.33	1.42	1.94	3.65	15.21
bluegill X greensunfish		0.00	0.02	0.19	0.02	0.15	2.31	2.69
green sunfish	1.36	0.03	0.07	1.65	0.39	0.39	1.90	5.79
largemouth bass	2.78	0.36	0.33	3.74	1.16	3.88	9.75	22.00
longear sunfish						0.04		0.04
orangespotted sunfish	0.11	0.03	0.00	0.07			0.02	0.23
pumpkinseed							0.01	0.01
rock bass							0.81	0.81
smallmouth bass				0.42	0.36	0.54	0.10	1.42
warmouth	0.07		0.03					0.10
white crappie		0.01	0.14	0.19		0.01		0.35
Percidae								
logperch				0.00	0.01			0.01
sauger		0.01		0.21				0.22
Sciaenidae								
freshwater drum	6.70	1.23	1.42	5.60	0.41	0.56		15.92
Total pounds per hour	34.62	56.51	56.31	108.40	21.43	24.38	36.53	338.18

Table 9. Species ranked by relative biomass in pounds of fish collected per hour for 2005. 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.

Species	Rankings by Reach					
	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden
Clupeidae						
gizzard shad	4 (4.4)	9 (1.6)	7 (4.0)	3 (16.1)	3 (14.7)	3 (12.3)
Cyprinidae						
common carp	2 (11.3)	2 (18.8)	4 (12.5)	7 (5.2)	1 (38.1)	2 (17.5)
common carp x goldfish						8 (3.1)
silver carp	1 (50.3)	1 (40.4)	3 (16.1)			
Catostomidae						
bigmouth buffalo	6 (3.3)	5 (4.4)	1 (16.8)	1 (16.4)		
highfin carpsucker				14 (1.5)		
quillback				10 (2.6)		
river carpsucker	5 (3.5)		12 (2.2)	8 (4.8)	8 (2.1)	9 (2.6)
shorthead redhorse	7 (3.0)				7 (2.2)	
smallmouth buffalo	10 (2.3)	6 (3.0)	2 (16.5)	2 (16.4)	5 (6.8)	
Ictaluridae						
channel catfish	3 (10.8)	4 (6.0)	5 (8.3)	4 (10.7)		5 (9.8)
flathead catfish	9 (2.6)	3 (17.2)	11 (2.4)			
Moronidae						
white bass	8 (2.6)	8 (1.7)	10 (2.6)	9 (4.0)	9 (1.8)	
Centrarchidae						
black crappie						10 (2.3)
bluegill			8 (4.0)	5 (6.6)	4 (8.0)	4 (10)
bluegill X green sunfish						6 (6.3)
green sunfish			13 (1.5)	12 (1.8)	10 (1.6)	7 (5.2)
largemouth bass			9 (3.5)	6 (5.4)	2 (15.9)	1 (26.7)
smallmouth bass				13 (1.7)	7 (2.2)	
Sciaenidae						
freshwater drum		7 (2.5)	6 (5.2)	11 (1.9)	6 (2.3)	
Number of species accounting for 95% of total catch	10	9	13	14	11	10

recorded in F-101-R sampling (McClelland and Pegg 2003, 2004, 2005). Common carp ranked second in total catch in weight in La Grange Reach with a $CPUE_W$ of 10.58 (18.8% of total). The catch by weight for common carp represents one of the lowest observations in the La Grange Reach, second only to the catch weight recorded in 1991 (6.34; Lerczak et al. 1992). Flathead catfish ranked third with a $CPUE_W$ of 9.66 (17.2% of total). The catch by weight for flathead catfish is the highest ever recorded for La Grange Reach in F-101-R sampling, more than doubling the previous high $CPUE_W$ of 4.33 recorded in 2004 (McClelland and Pegg 2005). The catch by weight for largemouth bass on the La Grange Reach prior to 1996 varied, but was typically near 5 pounds per hour (Lerczak et al. 1993, 1994, 1995, 1996). $CPUE_W$ for largemouth bass has been well below 5 pounds per hour for the last nine of ten years (1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, and 2005) and below one pound per hour since 2001 (Koel et al. 1997, 1998; Koel and Sparks, 1999; Arnold et al. 2000; McClelland and Pegg 2002, 2003, 2004, 2005). The catch by weight for largemouth bass (0.33) was the third lowest ever recorded in La Grange Reach.

Peoria (middle waterway, Illinois River). Thirteen species accounted for 95.6% of the total catch by weight in Peoria Reach (Tables 8 and 9). Overall, $CPUE_W$ was 108.40. This is the highest catch by weight recorded for all reaches of the Illinois Waterway in 2005 and the second highest catch by weight ever recorded in F-101-R sampling for Peoria Reach and across all other reaches. The highest species specific $CPUE_W$ was 18.19 for bigmouth buffalo, which made up 16.8% of the total catch by weight for this reach in 2005. Smallmouth buffalo ranked second with a $CPUE_W$ of

17.84 (16.5% of total), the highest catch weight recorded for this species in Peoria Reach. Previous high a CPUE_W for smallmouth buffalo was 17.44 observed in 1999 (Arnold et al. 2000). Silver carp ranked third with a CPUE_W of 17.42, the highest catch weight ever observed for this species in Peoria Reach. Similar to Alton and La Grange Reaches, Silver carp catch weights have increased each year of their collection in Peoria Reach. Common carp ranked fourth with a CPUE_W of 13.55 (12.5% of total). Bluegill and channel catfish catch weights were observed as the highest recorded for Peoria Reach for these species in F-101-R sampling. CPUE_W in 2005 for bluegill was 4.33, with 9.01 for channel catfish; the previous high for bluegill of 3.49 was recorded in 1992 and 8.64 for channel catfish recorded in 2004 (Lerczak et al. 1993; McClelland and Pegg 2005).

Starved Rock (upper waterway, Illinois River). Fourteen species accounted for 95.1% of the total catch by weight in Starved Rock Reach (Tables 8 and 9). Overall, CPUE_W was 21.43 in 2005. The highest CPUE_W for any species was 3.52 for black buffalo, which made up 16.4% of the total. This catch by weight represents the highest ever recorded for black buffalo in only the second year this species has ever been collected in Starved Rock Reach in F-101-R sampling. Smallmouth buffalo ranked second with a CPUE_W of 3.51 (16.4% of total) and gizzard shad ranked third with a CPUE_W of 3.45 (16.1% of total). Channel catfish ranked fourth in catch by weight with a CPUE_W of 2.30 (10.7% of total). Bluegill catch by weight was the highest ever recorded for this species in Starved Rock Reach for F-101-R sampling. CPUE_W for bluegill in 2005 was 1.42; previous high catch by weight was 1.05 recorded in 1989 (Sparks and Blodgett 1990).

Marseilles (upper waterway, Illinois River). Eleven species accounted for 95.7% of the total catch by weight in Marseilles Reach (Tables 8 and 9). Overall, CPUE_W was 24.38 and is the highest catch by weight obtained from this reach since 1998 when a CPUE_W of 25.88 was observed (Koel and Sparks, 1999). Common carp CPUE_W was highest at 9.28 (38.1% of total). Largemouth bass ranked second with a CPUE_W of 3.88 (15.9% of total). Largemouth bass catch by weight for 2005 is the highest ever recorded for Marseilles Reach; the previous high CPUE_W of 3.22 was observed in 1992 (Lerczak et al. 1993). Gizzard shad ranked third with a CPUE_W of 3.59 (14.7% of total). Bluegill ranked fourth with a CPUE_W of 1.94 (8.9% of total). This is the highest catch by weight for bluegill in the Marseilles Reach in F-101-R sampling; a previous high CPUE_W of 0.89 was recorded in 2001 (McClelland and Pegg 2002).

Dresden (upper waterway, Des Plaines River). Ten species accounted for 95.8% of the total catch by weight in Dresden Reach (Tables 8 and 9). Overall, CPUE_W was 36.53. The highest CPUE_W for any species in Dresden Reach for 2005 was 9.75 for largemouth bass, which made up 26.7% of the total. This is the third highest CPUE_W recorded for largemouth bass in Dresden Reach and the fourth highest over all reaches since F-101-R was initiated. Common carp ranked second with a CPUE_W of 6.38 (17.5% of total). Gizzard shad ranked third with a CPUE_W of 4.49 (12.3% of total) and bluegill ranked fourth with a CPUE_W of 3.65 (10.0% of total). The hybrid bluegill x green sunfish catch by weight was the highest ever observed for this taxa in Dresden Reach and over all reaches for F-101-R sampling with 2.31 pounds per hour collected in 2005 ranking it sixth (6.3% of total) in Dresden Reach.

Fish Health Determined by External Visual Inspection.

No fish were observed to have externally visible abnormalities in 2005. This is the first year in F-101-R that there have been no recordings of incidences of externally visible abnormalities (e.g., sores, eroded fins).

CONCLUSIONS

Samples collected by electrofishing on the Illinois Waterway during August and September 2005 provided evidence of continued increase in species richness, catch rates, and a decrease in abnormalities. Ninety-eight species and six hybrids have been collected since William Starrett began this survey in 1957. Eighty species and five hybrids have been documented by project F-101-R sampling (1989-present); 56 species and two hybrids from 13 families were collected during 26.58 h of sampling in 2005. Blacknose daces, creek chubs, and common shiners were collected for the first time during project F-101-R sampling along the waterway; two specimens of blacknose dace and five creek chubs were collected in Starved Rock Reach (upper waterway). Blacknose daces were collected at each site in Starved Rock Reach (Bull's Island and Bull's Island Bend) and creek chubs were collected at one site (Bull's Island). Fourteen specimens of common shiners were collected at four sites in four reaches; five individuals were collected at the Mouth of the DuPage River site in Dresden Reach, one individual was collected at Waupecan Island in Marseilles Reach, seven individuals were collected at Bull's Island Bend in Starved Rock Reach, and one individual was collected at Hennepin Island in Peoria Reach. Peoria Reach continues to produce the

highest number of species (36) along the waterway and the highest total catch (2,595). This could be due, in part, to a greater number of sites in this reach, varied site types (backwater and side channel), and 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, has few contiguous backwaters, and is high in gradient (upper river) to a large river floodplain system with low gradient (lower river) (Sparks 1977).

Catch rates in terms of numbers of fish collected per hour and total catch numbers along the Illinois Waterway were among the highest ever recorded for most reaches. Alton and Peoria Reaches recorded their highest catch rates and total catch numbers with Peoria Reach total catch being the highest ever recorded in F-101-R sampling while Starved Rock, Marseilles, and Dresden Reaches recorded their second highest catch rates and total catch numbers. These high catches may be due in part to low water conditions for most of the year in all reaches. River stages, as indicated by U.S. Army Corps of Engineers gauging stations used for F-101-R sampling, were below flood stage for nearly the entire year which may have aided in fish concentration at collection sites.

The catch by weight of fishes collected was also highest in Peoria Reach, where $CPUE_w$ was 108.44 (Table 8). Species accounting for this high catch in weight were bigmouth buffalo, smallmouth buffalo, silver carp, and common carp. Silver carp are a relatively new species to F-101-R sampling and although catch numbers of this species are increasing steadily, biomass collections have escalated at an almost alarming rate. Since their first collection in Alton Reach in 2001, silver carp biomass has become the

dominant species by weight for the middle and lower waterways with a total of 427.70 pounds collected in 2005. Common carp, another non-native fish, is the only species that contends with silver carp in terms of biomass; 238.70 pounds of common carp were collected throughout the entire waterway in 2005. Of the 1,693.95 pounds of fish collected during our 2005 survey, 1,154.74 pounds (68.2%) were collected from the middle river. The upper waterway produced 174.8 pounds (10.3%) while the lower waterway produced 329.80 pounds (19.5%). These catches may be reflective of higher productivity of the middle Illinois Waterway floodplain ecosystem.

Sport fishes were collected throughout the waterway in 2005, although catch rate in number and weight varied among reaches. For channel catfish, we again collected more individuals per hour in Alton Reach (lower waterway) than in the middle or upper waterway reaches; however pounds per hour were higher for Peoria Reach (middle waterway). White bass were most abundant and provided the highest $CPUE_W$ in the middle waterway; $CPUE_N$ and $CPUE_W$ were highest in Peoria Reach. Black crappies were most abundant and provided the highest catches by weight in Peoria Reach of the middle waterway. Bluegill $CPUE_N$ was greatest in Starved Rock Reach in the upper waterway, but $CPUE_W$ was highest in Peoria Reach. Largemouth bass $CPUE_N$ was exceptionally high in Starved Rock Reach in 2005, and catch in number throughout the upper waterway was higher than both the lower and middle waterway. Catch by weight for largemouth bass was also higher in the upper waterway, with Dresden Reach $CPUE_W$ highest over all, indicating collections of larger fish in that reach when compared to Starved Rock Reach. As in previous years of project F-101-R sampling, we collected only low numbers of sauger. Smallmouth bass, which are usually found in

low numbers, were again collected in every reach of the upper waterway and in the Peoria Reach of the middle waterway.

No fish were observed to have externally visible abnormalities for the second straight year in F-101-R sampling. This may suggest water and sediment quality of the Illinois Waterway may be improving for fishes.

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APPENDIX A. Fish species collected during Long-term Monitoring of the Illinois Waterway, 1957-2005. Common names marked by an asterisk indicate species that were collected from 1989 through 2005 during federal aid project F-101-R. Common and scientific names are from Robins et al. (1991) and Cross et al. (1995). Habitat associations are based on behavioral descriptions from Pflieger (1975), Cross et al. (1995) and communications with INHS fisheries biologists.

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

Appendix A Continued.

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

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

Description	Site #	Reach	Low S (year)	High S (year)
Treats Island	279.8	3	10 (2003)	19 (1995)
Du Page River	277.4	3	11 (1999 & 2000)	18 (1994)
Waupecan Island	260.6	4	11 (1996)	21 (2005)
Johnson Island	249.6	4	6 (1993)	16 (1995)
Ballards Island	248.0	4	10 (1991)	21 (2005)
Bulls Island Bend	241.5	5	8 (1990)	23 (2005)
Bulls Island	240.8	5	8 (1990, 96, 99)	19 (2005)
Clark Island	215.3	6	11 (1990)	21 (1995)
Hennepin	207.6	6	2 (1990)	26 (2005)
Upper Twin Sister	203.3	6	8 (1990)	22 (2001)
Lower Twin Sister	202.8	6	7 (1992)	20 (2005)
Henry Island	193.8	6	12 (1991)	24 (2005)
Chillicothe	180.6	6	14 (1989,91,92,96)	24 (2005)
Lambie's Boat Harbor	170.3	6	9 (1989)	20 (1996)
Lower Peoria Lake	163.3	6	10 (1989)	20 (2005)
Pekin	155.1	7	6 (1992)	19 (2005)
Turkey Island	148.0	7	8 (2004)	17 (1999)
Upper Bath Chute	113.0	7	12 (1994)	22 (2001)
Lower Bath Chute	107.1	7	9 (1992)	19 (2001)
Sugar Creek Island	95.1	7	10 (1989, 1999 and 2003)	20 (2005)
Grape-Bar Islands	86.5	7	7 (1989)	23 (1994)
Moore's Towhead	75.3	8	6 (2002)	17 (2004, 2005)
Big Blue Island	58.3	8	9 (1990)	20 (2005)
Crater-Willow Islands	30.0	8	11 (2003)	18 (1999)
Hurricane Island	26.8	8	11 (1990, 1999, 2004)	20 (1997)
Dark Chute	24.7	8	11 (1994, 2004)	17 (1990)
Mortland Island	19.0	8	10 (2003)	16 (1991, 97, 99)
Brickhouse Slough	0.0	26	10 (1990)	20 (2005)

¹Sites 0.0-215.3 were not sampled during 1993 (n=10 years) (sites 240.8-279.8 n=11 years).

Appendix C (Job 5).

Publications, reports, and presentations that resulted from research conducted during segments 6-15 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, Wallup-Breaux).

I. Publications

Koel, T.M. and Richard E. Sparks. 2000. Ecohydrology of the Illinois River and development of ecological criteria for operation of dams. Regulated Rivers: Research and Management.

Koel, T.M. 2000. Ecohydrology and development of ecological criteria for operation of dams. Project Status Report 2000-02. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, Onalaska, Wisconsin.

Koel, T.M. 2000. Abundance of age-0 fishes correlated with hydrologic indicators. Project Status Report 2000-03. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, Onalaska, Wisconsin.

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 Report 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: 1960's versus 1990's. *Illinois Natural History Survey Report No. 339*.

McClelland, Michael A., Mark A. Pegg, and Timothy W. Spier. 2006. Longitudinal Patterns of the Illinois Waterway Fish Community. *Journal of Freshwater Ecology*. 21/1:91-99.

Pegg, M.A. and M.A. McClelland. 2004. Assessment of spatial and temporal fish community patterns in the Illinois River. *Ecology of Freshwater Fish* 13:125-135.

Pegg, M. A. 2002. Invasion and transport of non-native aquatic species in the Illinois River. Pages 203-209 in A.M. Strawn, editor. *Proceedings of the 2001 Governor's conference on the management of the Illinois River System, Special Report Number 27, Illinois Water Resources Center, Champaign, Illinois*.

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. Essays

Pegg, M.A. 2002. Aquatic resource monitoring in the Upper Mississippi River Basin. *INHS Reports*. Number 371:8-9.

III. Technical Papers

McClelland, Michael A. and Thad R. Cook. A Comparison of Fixed and Random Site Sampling on the Illinois River. Presented at the 38th Annual Meeting of the Mississippi River Research Consortium, La Crosse WI, April 27-28, 2006.

McClelland, Michael A., Mark A. Pegg, Kevin S. Irons, and T. Matt O'Hara. Fish

Abundances of Backwater Lakes with Connectivity Gradients in the La Grange Reach, Illinois River. Presented at the 37th Annual Meeting of the Mississippi River Research Consortium, La Crosse, WI, April 28-29, 2005.

McClelland, Michael A., Kevin S. Irons, T. Matt O'Hara, Mark A. Pegg, and Thad R. Cook. A Comparison of Two Electrofishing Gears Used for Fish Monitoring on the Illinois River. Presented at the 36th Annual Meeting of the Mississippi River Research Consortium, LaCrosse, WI, April 1-2, 2004.

McClelland, Michael A. and Mark A. Pegg. Longitudinal Patterns of the Illinois Waterway Fish Community. Presented at the 64th Annual Midwest Fish and Wildlife Conference, Kansas City, MO, December 7-10, 2003.

Pegg, M.A. and M.A. McClelland. Assessment of spatial and temporal fish community patterns in the Illinois River. Presented at the American Fisheries Society meeting, Quebec City, Quebec Canada, August, 2003.

O'Hara, T.M., K.S. Irons, M.A. McClelland, and M.A. Pegg. Status of bighead carp and silver carp in the La Grange Reach, Illinois River and possible impacts to the commercial fishery. 41st Annual Meeting of the Illinois Chapter of the American Fisheries Society, Mt. Vernon, Illinois, 4-6 March, 2003.

Irons, K.S., T.M. O'Hara, M.A. McClelland, and M.A. Pegg. Status of non-native fish species in the Illinois River. 41st Annual Meeting of the Illinois Chapter of the American Fisheries Society, Mt. Vernon, Illinois, 4-6 March, 2003.

O'Hara, T.M., K.S. Irons, M.A. McClelland, and M.A. Pegg. Status of bighead carp and silver carp in the La Grange Reach, Illinois River and possible impacts to the commercial fishery. Presented at the 34th Annual Meeting of the Mississippi River Research Consortium, LaCrosse, Wisconsin, April, 2002.

Irons, K.S., T.M. O'Hara, M.A. McClelland, and M.A. Pegg. White perch distributions in the Illinois River: detecting an invasive species with the Long Term Resource Monitoring Program. Presented at the 34th Annual Meeting of the Mississippi River Research Consortium, LaCrosse, Wisconsin, April, 2002.

O'Hara, T.M., K.S. Irons, M.A. McClelland, and M.A. Pegg. Status of bighead carp and silver carp in the La Grange Reach, Illinois River and possible impacts to the commercial fishery. Presented at the 2002 North Central Division American Fisheries Society River and Streams Technical Committee Meeting, Moline, Illinois, March 2002.

McClelland, M.A., Irons, K.S., and T.M. O'Hara, and M.A. Pegg. White perch (morone

americana) occurrence in the Illinois River, Upper Mississippi River System. Presentation at the Illinois-Iowa American Fisheries Society Annual Meeting, Moline, Illinois, February , 2002.

Pegg, M.A. Invasion and transport of non-native aquatic species in the Illinois River. 2001 Governor's conference on the management of the Illinois River System, Peoria, Illinois, October, 2001.

Koel, T.M. and Richard E. Sparks. Ecohydrology of the Illinois River: development of criteria for operation of the La Grange and Peoria locks and dams. 32nd Annual Meeting of the Mississippi River Research Consortium, La Crosse, Wisconsin, April 13-14, 2000.

Koel, T.M., T.R. Cook, and K.S. Irons. Criteria for biota-friendly operations of the Peoria and La Grange locks and dams, Illinois River Waterway. 61st Midwest Fish and Wildlife Conference, Chicago, Illinois December 5-8, 1999.

Koel, T.M. and R.E. Sparks. 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, Duluth, Minnesota, May 23-24, 1999.

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

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

Koel, T.M. and K.D. Blodgett. 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, Dubuque, Iowa, September 15-17, 1998.

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

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.

IV. Poster Presentations

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

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 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.

McClelland, Michael A., Mark A. Pegg, Kevin S. Irons, and T. Matt O'Hara. Fish

Abundances of Backwater Lakes with Connectivity Gradients in the La Grange Reach, Illinois River. Presented at the 135th Annual Meeting of the American Fisheries Society, Anchorage, AK, September 11-15, 2005.

Pegg, M.A. and M.A. McClelland. Long-term fish population trends along the Illinois River. Poster presented at the 63rd Midwest Fish and Wildlife Conference, Des Moines, Iowa, December, 2001.

Pegg, M.A. and M.A. McClelland. Long-term fish population trends along the Illinois River. Poster presented at the 131st Annual Meeting of the American Fisheries Society, Phoenix, Arizona, August, 2001.

V. 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.

McClelland, M.A. The Long Term Illinois River Fish Population Monitoring Program. After dinner talk presented to Central Christian Men's 10th Annual Fish Fry, August 2003.

VI. Data Requests

1. Sam Cull, City of Peru, Electrical Department, Peru, Illinois

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