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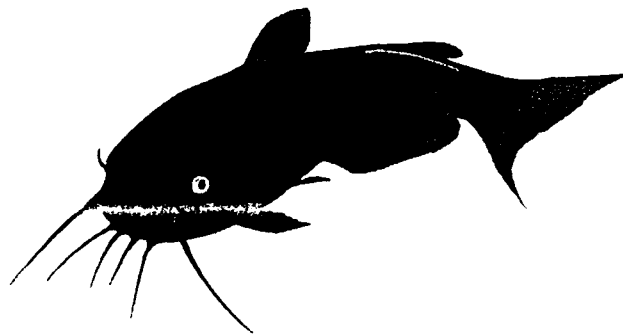
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Annual Report

Todd M. Koel, Richard E. Sparks, K. Douglas Blodgett,
and Scott D. Whitney

Illinois Natural History Survey
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Havana, Illinois 62644-1055



Center for Aquatic Ecology Technical Report 97/14

The Long-term Illinois River Fish Population Monitoring Program

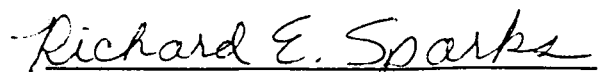
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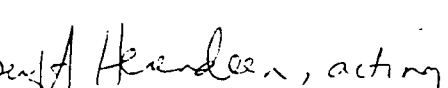
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December 1997


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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

Between 26 August and 19 September 1996, 26 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 5,062 fish representing 41 species (plus two hybrids) from 11 families were collected during 24.75 h of sampling. Our monitoring indicated the abundance of an important forage species, gizzard shad, and the continued recovery of several sport fishes such as white bass and bluegill. Gizzard shad represented 48.4% of the total catch in numbers and was present at all 27 sites, followed by white bass (8.9%, 20 sites), and bluegill (8.1%, 25 sites). Common carp and goldfish, often regarded as indicators of polluted or degraded river environments, comprised only 6.4% and 0.2% of the total catch, respectively. Mud darter and silverband shiner were collected for the first time during project F-101-R sampling from Henry Island (RM 193.9, Peoria Reach). The sample from Pekin (RM 154.9, La Grange Reach) yielded the most fish (524, 10.4% of the total collected from all 27 sites). Species richness at sites ranged from 20 at Detweiller Marina (RM 170.7) in Peoria Reach to 8 at Bulls Island (RM 240.7) in Starved Rock Reach. Species richness of the lower, middle, and upper waterway was 23, 38, and 23, respectively. In 1996 we noticed a decline in small cyprinid abundance in the upper waterway compared to that observed in 1995. Although emerald shiner ranked second by relative abundance (7.7%) in Starved Rock Reach, the catch in numbers ($CPUE_N$) was only 11.50 in 1996, compared to 438.50 in 1995. Also, bullhead minnow were not collected in any upper waterway reach in 1996, and bluntnose minnow were not collected in either Starved Rock or Marseilles reaches. Emerald shiner and bullhead minnow were among the most abundant species collected in these reaches in 1995. Important sportfish species such as channel catfish and largemouth bass were collected in all three waterway segments in 1996. Channel catfish $CPUE_N$ in Alton Reach (lower waterway) was 19.40, which is the highest catch rate for this species in this reach since 1989. Largemouth bass $CPUE_N$ was highest in Peoria Reach (7.38) but catches were also high in Dresden and Alton Reaches where $CPUE_N$ was 6.00 and 5.80, respectively. As in previous years, common carp continued to be an abundant species in La Grange Reach of the middle waterway ($CPUE_N=36.36$), but the species was not abundant in the upper waterway. However, when considering the catch rate in terms of pounds of fish collected per hour ($CPUE_w$), common carp was the dominant species in all except Starved Rock and Alton Reaches. Common carp $CPUE_w$ ranged from 71.15 in La Grange Reach to 4.93 in Starved Rock Reach. Smallmouth buffalo $CPUE_w$ was highest in Starved Rock Reach, and channel catfish $CPUE_w$ was highest in Alton Reach, at 8.97 and 19.06, respectively. Sediment-contact fishes (e.g., common carp) had a higher incidence of externally-visible abnormalities than water-column fishes (e.g., bluegill). The highest incidence occurred in the upper waterway, where 34.2% of benthic fishes had abnormalities in 1996. This indicates that stressful factors are associated with sediments in the Chicago-Joliet area.

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^aJob numbers and titles refer to the F-101-R-8 annual work plan dated 12 January 1996

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INTRODUCTION

This report presents a summary of data collected in 1996 during segment 8 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 will continue to build on previously collected data with major analyses of the long-term data set scheduled for the five-year project report at the end of segment 10. The format used in this report is patterned after previous annual reports of this project (Lerczak et al. 1993, 1994, 1995, and 1996) to allow for easy comparisons of data among years. Data analyses are more limited in scope for this report due to the departure of the project manager Tom Lerczak and the resulting increased workload associated with acquiring and training new staff.

STUDY AREA AND METHODS

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

Table 1. 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. Station codes (MR, L1, etc.) refer to Figure 1.

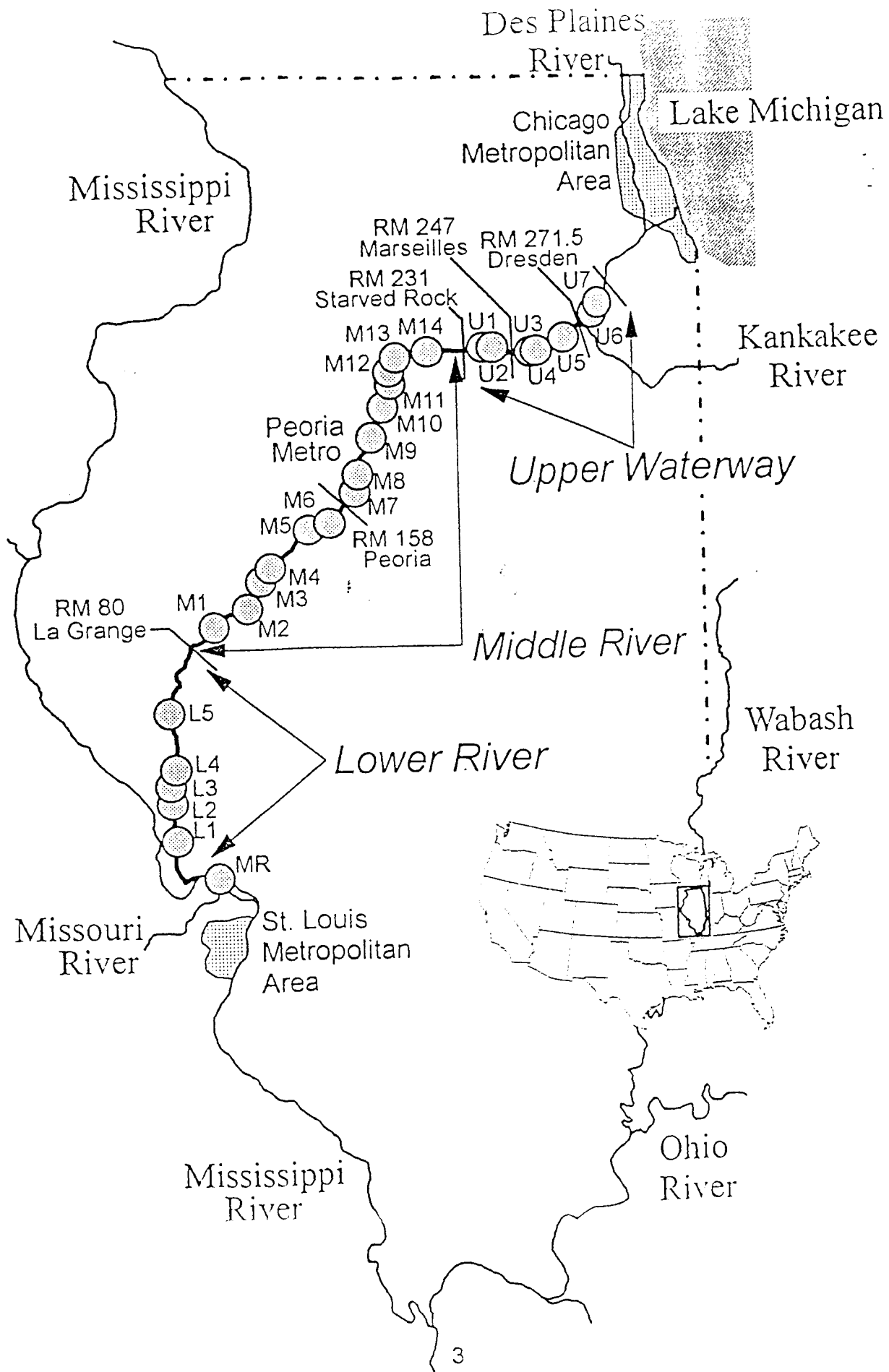
Order	Date	Station name	River mile		End time (CST)	Duration (h)	Temp (°F)		DO (ppm)	Secchi (in)	Cond. (umhos)	Volts	Vel. (ft/s)		Depth* (ft)		Stage ^b (ft)
			lower	upper			air	water					min	max			
Reach 26, Mississippi River																	
24	18-Sep	Brickhouse Slough ^c (MR)	204.9	205.3	08:40	1.00	61.5	66.6	8.1	8.66	380	220	0.0	0.1	0.3	419.00	
Alton Reach																	
23	17-Sep	Mortland Island (L1)	18.1	19.5	18:00	1.00	70.7	72.0	6.9	10.62	660	185	0.6	0.1	2.0	421.21	
21	17-Sep	Dark Chute (L2)	24.5	25.5	13:00	1.00	69.4	71.6	6.6	9.84	590	185	0.7	0.1	2.5	421.24	
22	17-Sep	Hurricane Island (L3)	27.0	27.9	15:15	1.00	70.9	71.8	6.9	11.41	650	185	0.9	0.2	1.3	421.22	
25	18-Sep	Crater-Willow Islands (L4)	29.2	30.8	12:50	1.00	71.8	70.9	6.6	7.87	670	185	1.3	0.2	1.8	421.10	
26	18-Sep	Big Blue Island (L5)	58.0	59.0	16:15	1.00	71.8	72.0	7.8	9.05	650	185	1.3	0.1	3.0	421.32	
La Grange Reach																	
27	19-Sep	Grape-Bar Islands (M1)	85.7	87.0	11:00	1.00	59.9	68.5	7.1	7.08	680	200	0.7	0.1	1.8	429.40	
20	13-Sep	Sugar Creek Island (M2)	94.5	95.0	11:40	1.00	60.4	75.9	5.0	9.84	690	185	0.9	0.1	2.0	429.50	
16	09-Sep	Lower Bath Chute (M3)	106.9	107.3	12:58	1.00	74.1	79.0	3.6	7.08	710	185	0.8	0.2	4.2	430.10	
7	03-Sep	Upper Bath Chute (M4)	112.8	113.2	15:39	1.00	82.2	81.3	6.3	7.48	690	185	1.5	0.2	1.3	430.33	
19	12-Sep	Turkey Island (M5)	148.0	148.3	10:25	0.50	71.2	77.5	6.2	8.26	695	185	0.8	0.1	2.0	430.93	
18	10-Sep	Pekin (M6)	154.5	155.3	15:08	1.00	77.2	79.7	7.5	8.66	700	185	1.0	0.2	5.0	441.97	
Peoria Reach																	
1	26-Aug	Lower Peoria Lake (M7)	163.5	163.6	14:24	0.75	82.0	82.6	13.9	26.00	600	185	0.0	0.2	2.0	440.59	
17	10-Sep	Lambie's Boat Harbor (M8)	170.6	170.8	10:50	1.00	71.8	72.5	7.7	6.69	625	185	0.0	0.1	0.3	440.40	
2	27-Aug	Chillicothe (M9)	180.6	181.1	11:59	1.00	77.2	79.3	7.5	11.02	690	185	0.5	0.3	2.0	441.03	
3	28-Aug	Henry Island (M10)	193.3	194.5	12:37	1.00	79.2	80.8	7.3	10.23	700	185	0.9	0.3	2.0	440.91	
4	28-Aug	Lower Twin Sister (M11)	202.4	203.2	17:12	0.75	83.3	82.9	9.4	11.81	720	185	0.6	0.3	3.0	440.91	
5	29-Aug	Upper Twin Sister (M12)	203.3	203.5	09:43	1.00	77.0	79.2	13.3	11.02	750	185	0.8	0.2	2.0	440.90	
8	04-Sep	Hennepin (M13)	207.6	208.1	14:18	0.50	78.8	81.3	11.0	9.84	690	185	0.8	0.2	1.5	440.84	
6	29-Aug	Clark Island (M14)	214.9	215.0	14:15	1.00	74.5	79.7	10.2	12.20	710	185	0.8	0.5	3.0	440.90	
Starved Rock Reach																	
15	08-Sep	Bulls Island (U1)	240.3	241.0	11:55	1.00	74.3	80.8	8.3	17.71	730	185	0.8	0.2	3.0	459.46	
14	06-Sep	Bulls Island Bend (U2)	241.1	241.6	09:30	1.00	75.2	80.6	7.7	21.25	720	185	0.6	0.2	3.0	459.46	
Marselles Reach																	
12	05-Sep	Ballards Island (U3)	247.7	248.2	17:35	0.75	80.4	82.8	10.3	20.07	710	185	0.6	0.2	1.5	438.35	
13	05-Sep	Johnson Island (U4)	249.7	249.8	19:25	0.50	78.4	82.2	10.0	18.11	710	185	0.8	0.2	3.0	438.35	
11	05-Sep	Waupeca Island (U5)	260.2	261.1	14:38	1.00	82.0	83.3	8.6	22.83	710	185	1.2	0.2	1.5	484.44	
Dresden Reach																	
10	05-Sep	Mouth of Du Page River ^d (U6)	276.8	277.8	10:48	1.00	66.2	85.3	6.5	28.74	730	185	0.3	0.2	1.5	504.64	
9	04-Sep	Treats Island ^d (U7)	279.6	280.1	18:20	1.00	82.9	86.7	6.5	19.68	760	185	0.6	0.2	1.5	504.63	
Summary																	
Minimum					0.50	59.9	60.6	3.6	6.7	380	185	0.0	0.1	0.3			
Maximum					1.00	83.3	86.7	13.9	28.7	760	220	1.5	0.5	5.0			
Mean					0.90	74.2	78.0	8.0	13.1	679	187	0.7	0.2	2.2			
Total time electrofished					24.75												

*Estimated during sampling.

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

^cMississippi River.

^dDes Plaines River.



Lerczak et al. 1994:9).

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, 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

For each sample, numbers of individual fish and total weights (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 also 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.

RESULTS AND DISCUSSION (Job 4)

Before the fish sampling season began, all equipment was tested and repaired as necessary. Due to the impending departure of project manager Lerczak, 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 27 sites were sampled between 26 August and 19 September 1996 (**Job 2**); total sampling time was 24.75 h (Table 1). Collected data were entered into a computerized data base (R-Base software), rectified with original field data sheets, and entry errors were corrected as necessary (**Job 3**). The original data sheets were stored in a flame-resistant vault at Forbes Biological Station, Havana (**Job 3**).

A. CONDITIONS DURING ELECTROFISHING RUNS

Sampling was conducted in full daylight between 7:40 AM and 7:25 PM (Table 1). The ranges for physical measurements collected 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 in; conductivity, 380-760 umhos/cm; surface velocity, 0.0-1.5 ft/s; water depth, 0.1-5.0 ft. All values were within the ranges expected based upon previous sampling

(see Lerczak et al. 1994:17-24, Lerczak et al. 1995:7, and Lerczak et al. 1996:2). All sites were sampled with water temperatures and river levels (Table 1) within our established criteria (see Lerczak et al. 1994:10-13).

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 27 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

In 1996 we collected a total of 5,062 fish representing 41 species (plus two hybrids) from 11 families during 24.75 h of sampling at 26 sites on the Illinois Waterway and a single site on the Mississippi River. Gizzard shad was the most abundantly collected species, representing 48.4% of the total catch, followed by white bass (8.9%), bluegill (8.1%), freshwater drum (6.4%); common carp (6.4%), and emerald shiner (3.3%). Gizzard shad were collected at all 27 sites, and bluegill were taken at 25 sites. The sample from Pekin (RM 154.9, La Grange Reach) yielded the most fish (524, 10.4% of the total collected from all 27 sites). The most

species collected at a single site was 20 from Detweiller Marina (RM 170.7) in Peoria Reach. The fewest species collected at a single site was eight from Bulls Island (RM 240.7) in Starved Rock Reach. Of the 41 species and 2 hybrid crosses, 10 species and one hybrid cross were collected at only a single site, and five species were collected at only two sites. Seven species and one hybrid cross were represented by single individuals, and only two individuals were collected for each of seven species.

From 26 sites on the Illinois Waterway, we collected 5,009 fish representing 41 species (plus two hybrids) from 11 families during 23.75 h of sampling. At Brickhouse Slough on the Mississippi River (RM 204.9), we collected 53 fish representing 12 species from seven families (Table 2). This year's sample from Brickhouse Slough provided fewer fish and relatively low diversity compared with other samples collected at this site since 1991 (see Lerczak et al. 1994:49, 1995:9, 1996:8).

On the lower Illinois River, we collected 578 fish representing 23 species (Table 2). The total abundance and species richness were slightly lower than observed in 1995, when 751 fish representing 25 species were collected (Lerczak et al. 1996:8). In 1996, species richness ranged from 14 at Mortland Island (RM 18.8), Dark Chute (RM 25.0), and Hurricane Island (RM 27.5) to 15 at Crater-Willow Islands (RM 30.0) and Big Blue Island (RM 58.5). The species richness at Dark Chute was greater than observed in recent years; only 11 species were collected in 1994, and 13 were collected in 1995. However, in 1996 fewer species were

Table 2. Number of individuals of each fish species collected on the Mississippi River (Brickhouse Slough) and the lower Illinois River (Alton Reach, RM 0-80) in 1996.

Species	River Mile and Hours Fished						Total
	Miss. River	Lower Illinois River					
	205.1 1.00	18.8 1.00	25.0 1.00	27.5 1.00	30.0 1.00	58.5 1.00	
Clupeidae							
gizzard shad	2	6	33	60	25	5	129
skipjack herring	0	0	0	1	0	1	2
threadfin shad	0	23	7	0	2	8	40
Cyprinidae							
common carp	9	6	5	2	8	15	36
emerald shiner	1	4	0	2	3	0	9
grass carp	0	0	0	0	0	1	1
red shiner	0	0	0	0	1	2	3
Catostomidae							
bigmouth buffalo	0	3	0	2	5	3	13
river carpsucker	7	0	1	0	0	0	1
shorthead redhorse	0	0	1	1	0	1	3
smallmouth buffalo	6	9	3	1	7	3	23
Ictaluridae							
channel catfish	2	15	15	23	24	20	97
flathead catfish	0	0	0	0	4	0	4
Atherinidae							
brook silverside	0	1	0	0	0	0	1
Percichthyidae							
white bass	5	6	28	19	8	7	68
Centrarchidae							
black crappie	0	1	3	1	6	2	13
bluegill	6	10	22	20	10	15	77
green sunfish	1	0	1	0	0	0	1
largemouth bass	1	3	5	7	8	6	29
orangespotted sunfish	1	0	2	0	0	0	2
white crappie	0	0	0	2	1	0	3
Percidae							
sauger	0	1	0	0	0	0	1
Sciaenidae							
freshwater drum	12	2	6	5	5	4	22
Total individuals	53	90	132	146	117	93	578
Total species/hybrids	12/0	14/0	14/0	14/0	15/0	15/0	23/0

collected at Crater-Willow Islands and Big Blue Island than in 1995, when 16 and 19 species were found, respectively.

On the middle Illinois River, we collected 3,731 fish representing 38 species plus one hybrid (one bluegill x green sunfish) (Tables 3 and 4). From six sites on La Grange Reach (RM 80-158), 1732 fish representing 28 species were collected. From eight sites on Peoria Reach (RM 158-231), 1999 fish representing 34 species and the bluegill x green sunfish hybrid were collected. Species richness ranged from 9 at Hennepin Island (RM 207.9) to 20 at Lambie's Boat Harbor (RM 170.7); habitat diversity was low at Hennepin Island and sampling time was only 0.5 h. In 1995, 15 species were collected at Hennepin Island during 0.5 h (Lerczak et al. 1996:10). A substantial reduction in species richness was also observed at Clark Island (RM 215.3); 14 species were collected in 1996, whereas 21 and 19 species were collected in 1994 and 1995, respectively. However, even though species richness was lower at Clark Island in 1996, the total abundance of fishes collected was higher than in recent years. In 1996, 347 individuals were collected compared to 325 in 1995 and 165 in 1994. A species never before collected during Long-term Illinois River Fish Population Monitoring, the mud darter, was taken at Henry Island (RM 193.9) of Peoria Reach.

On the upper waterway in 1996 we collected 700 fish representing 23 species plus one hybrid (three carp x goldfish) (Table 5). This is substantially fewer fish than collected in 1995, when 3,827 individuals representing 34 species and two hybrids were collected (Lerczak et al. 1996:11). Large declines in cyprinids were

Table 3. Number of individuals of each fish species collected on La Grange Reach (RM 80-155) of the middle Illinois River (RM 80-231) in 1996.

Species	River Mile and Hours Fished						La Grange	Middle
	86.4 1.00	94.6 1.00	107.1 1.00	113.0 1.00	148.2 0.50	154.9 1.00	Reach Total 5.50	River Total 12.50
Lepisosteidae								
shortnose gar	0	0	0	0	0	1	1	1
Clupeidae								
gizzard shad	40	49	93	173	76	257	693	1699
skipjack herring	1	0	0	0	0	4	5	12
threadfin shad	0	0	0	2	0	13	15	44
Cyprinidae								
bullhead minnow	0	1	0	0	0	0	1	1
common carp	23	110	26	28	7	6	200	252
emerald shiner	32	7	4	1	0	0	44	114
golden shiner	0	0	1	0	0	0	1	6
goldfish	0	0	0	0	1	1	2	6
red shiner	9	0	0	2	0	0	11	12
Catostomidae								
bigmouth buffalo	3	0	6	16	1	3	29	56
river carpsucker	0	0	0	1	1	1	3	13
shorthead redhorse	1	1	1	0	0	1	4	10
smallmouth buffalo	4	8	3	3	3	11	32	87
Ictaluridae								
black bullhead	0	0	0	0	0	1	1	2
channel catfish	4	4	10	1	4	3	26	35
flathead catfish	1	0	0	1	0	0	2	3
Cyprinodontidae								
blackstripe topminnow	1	0	1	0	0	0	2	2
Atherinidae								
brook silverside	3	2	1	0	0	0	6	6
Percichthyidae								
white bass	16	29	43	45	45	126	309	377
Centrarchidae								
black crappie	10	1	16	7	0	0	34	67
bluegill	30	8	23	30	0	1	92	282
green sunfish	1	0	0	1	0	0	2	25
largemouth bass	2	6	5	2	1	0	16	75
warmouth	3	0	1	1	0	0	5	6
white crappie	0	0	0	3	0	0	3	7
Percidae								
sauger	0	0	3	0	3	5	11	16
Sciaenidae								
freshwater drum	13	12	31	34	2	90	182	282
Total individuals	199	236	273	351	147	524	1732	3731
Total species/hybrids	19/0	13/0	17/0	18/0	11/0	16/0	26/0	33/1

Table 4. Number of individuals of each fish species collected on Peoria Reach (RM 155-231) of the middle Illinois River (RM 80-231) in 1996.

Species	River Mile and Hours Fished								Peoria Reach Total	Middle River Total
	163.6 0.75	170.7 1.00	180.9 1.00	193.9 1.00	202.8 0.75	203.4 1.00	207.9 0.50	215.3 1.00		
Clupeidae										
gizzard shad	67	103	76	414	43	52	202	249	1206	1899
skipjack herring	0	0	0	2	1	1	0	3	7	12
threadfin shad	0	0	4	6	3	10	2	4	29	44
Cyprinidae										
common carp	13	8	10	4	0	0	0	17	52	252
emerald shiner	2	1	0	5	34	9	3	16	70	114
fathead minnow	0	0	0	1	0	0	0	0	1	1
golden shiner	2	1	0	1	1	0	0	0	5	6
goldfish	0	4	0	0	0	0	0	0	4	6
red shiner	0	0	0	0	1	0	0	0	1	12
silverband shiner	0	0	0	1	0	0	0	0	1	1
spottail shiner	0	0	6	0	0	2	0	0	10	10
Catostomidae										
bigmouth buffalo	0	0	0	1	0	5	2	19	27	56
golden redhorse	0	0	2	0	0	0	0	0	2	2
river carpsucker	4	2	2	0	1	0	1	0	10	13
shorthead redhorse	0	0	0	2	1	1	0	2	6	10
smallmouth buffalo	10	3	12	4	2	6	7	9	55	87
Ictaluridae										
black bullhead	0	1	0	0	0	0	0	0	1	2
channel catfish	2	6	0	1	0	0	0	0	9	35
flathead catfish	0	0	0	0	0	1	0	0	1	3
yellow bullhead	0	1	0	0	0	0	0	0	1	1
Percichthyidae										
white bass	8	1	13	6	13	16	4	7	63	377
Centrarchidae										
black crappie	2	9	5	1	0	10	0	6	33	67
bluegill	75	53	15	16	9	12	0	10	190	262
bluegill x green sunfish	1	0	0	0	0	0	0	0	1	1
green sunfish	14	8	0	0	0	0	0	1	23	25
largemouth bass	13	31	1	3	4	4	1	2	59	75
orangespotted sunfish	0	6	0	0	0	0	0	0	6	6
smallmouth bass	1	0	0	0	0	0	0	0	1	1
warmouth	0	1	0	0	0	0	0	0	1	6
white crappie	2	0	0	1	0	1	0	0	4	7
Percidae										
logperch	0	1	0	0	0	0	0	0	1	1
mud darter	0	0	0	1	0	0	0	0	1	1
sauger	1	2	2	0	0	0	0	0	5	15
walleye	0	0	2	0	0	0	0	0	2	2
Sciaenidae										
freshwater drum	33	15	34	4	6	7	3	2	105	288
Total individuals	250	257	166	474	121	139	225	347	1999	3731
Total species/hybrids	16/1	20/0	14/0	19/0	13/0	15/0	9/0	14/0	34/1	38/1

Table 5. Number of individuals of each fish species collected in Starved Rock, Marseilles, and Dresden Reaches of the upper Illinois Waterway (RM 231-280) in 1996.

Species	River Mile and Hours Fished							Upper Waterway Total
	Starved Rock		Marseilles			Dresden		
	240.7 1.00	241.4 1.00	249.0 0.75	249.8 0.50	260.7 1.00	277.3 1.00	279.9 1.00	
Clupeidae								
gizzard shad	124	94	98	8	17	72	7	420
threadfin shad	0	0	1	0	0	4	0	5
Cyprinidae								
bluntnose minnow	0	0	0	0	0	0	2	2
carp x goldfish	0	0	1	0	0	1	1	3
common carp	5	1	4	4	2	2	10	28
emerald shiner	8	15	0	1	2	16	1	43
golden shiner	0	0	0	0	0	0	1	1
goldfish	0	0	0	0	0	1	1	2
red shiner	8	12	0	2	1	0	0	23
spottail shiner	0	6	6	2	3	7	9	33
Catostomidae								
bigmouth buffalo	0	0	1	1	1	1	0	4
river carpsucker	0	1	0	2	0	0	0	3
shorthead redhorse	0	0	1	0	0	0	1	2
smallmouth buffalo	8	6	0	8	2	1	0	25
Ictaluridae								
channel catfish	0	1	1	1	0	0	1	4
yellow bullhead	0	0	0	0	0	1	0	1
Centrarchidae								
bluegill	1	1	4	5	3	24	5	43
green sunfish	0	0	0	0	0	3	8	11
largemouth bass	1	3	7	1	1	9	3	25
orangespotted sunfish	1	0	2	0	2	3	4	12
rock bass	0	0	0	1	0	3	0	4
smallmouth bass	0	1	0	0	0	0	0	1
white crappie	0	0	1	0	0	0	0	1
Sciaenidae								
freshwater drum	0	0	1	1	1	0	1	4
Total individuals	155	141	125	37	35	148	55	700
Total species/hybrids	8/0	11/0	12/1	13/0	11/0	14/1	14/1	23/1

most notable. In 1996, only 2 bluntnose minnow, 43 emerald shiner, and 23 red shiner were collected compared to 407 bluntnose minnow, 1076 emerald shiner, and 161 red shiner in 1995. Also, no bullhead minnow were collected in 1996 whereas 616 were collected on the upper waterway in 1995. Other relatively large declines in abundance were gizzard shad and bluegill; 420 gizzard shad were collected in 1996 compared to 1369 in 1995, and 43 bluegill were collected in 1996 compared to 500 in 1995. Abundances of fishes at sites in 1996 were more similar to those observed in 1994 in the upper waterway, although overall species richness in 1996 (23) was much lower than in 1994 (31). Species richness in 1996 ranged from 8 at Bull's Island (RM 240.7) to 14 at the mouth of the Du Page River (RM 277.3) and Treats Island (RM 279.9). The species richness of upper waterway sites were more similar to sites on the lower Illinois River (Table 2), although species composition at lower river sites was somewhat different than that of the upper waterway.

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

In the following data summary, 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. At all reaches in 1996, the gizzard shad ranked first by relative abundance in number of fish collected per hour.

Alton (lower river). The 95% lists (species were added to the list until 95% of the total catch rate in numbers was obtained) for Alton, La Grange, and Peoria Reaches were similar, although CPUE₉₅ varied among reaches. Eleven species accounted for 94.5% of the total catch in Alton Reach (Tables 6 and 7). Overall,

Table 6. Number of individuals of each fish species collected per hour of electrofishing (CPUE_h) at Reach 26 of the Mississippi River (Brickhouse Slough) and at six reaches of the Illinois River Waterway in 1995.

Species	Reach and Hours Fished							Overall CPUE _h 24.75
	Reach 26 1.00	Alton 5.00	La Grange 5.50	Peoria 7.00	Starved Rock 2.00	Marseilles 2.25	Dresden 2.00	
Lepisosteidae								
shortnose gar			0.18					0.04
Clupeidae								
gizzard shad	2.00	25.60	126.00	150.75	109.00	63.06	39.50	98.99
skipjack herring		0.40	0.91	0.63				0.57
threadfin shad		6.00	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	6.00	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 redbreast				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 redbreast		0.60	0.73	0.75		0.51	0.50	0.61
Ictaluridae								
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
Atherinidae								
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	6.16	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	29.0	34.1	12.0	17.1	19.1	41.2

Table 7. 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.

Species	Rankings by Reach					
	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

CPUE_N was 115.60 in 1996. This is similar to catches observed in other years since project F-101-R began in 1989; a low CPUE_N of 75.05 occurred in 1992 and a high of 150.02 occurred in 1995 (Lerczak et al. 1994, 1995, and 1996). In 1996, the highest CPUE_N for all species was 25.80 for gizzard shad, which made up 22.3% of the total fish collected in this reach. Channel catfish ranked second with a CPUE_N of 19.40 (16.8% of the total), the highest catch rate of this species since 1989. The CPUE_N of bluegill was 15.40 (13.3% of the total) and of white bass was 13.60 (11.8% of the total). From 1991-1995 the bluegill was the highest ranked species on this reach of the river. In 1990, as in 1996, the gizzard shad was the highest ranked species. In 1989, the freshwater drum was the highest ranked species; in 1996 this species was ranked ninth and made up only 3.8% of the total fish collected in Alton Reach.

La Grange (middle river). Ten species accounted for 94.6% of the total catch in La Grange Reach (Tables 6 and 7). Overall, CPUE_N was 314.91 in 1996, which was the highest observed in this reach since 1989 (Lerczak et al. 1994, 1995, and 1996). In 1996, the highest CPUE_N for all species was 126.00 for gizzard shad, which made up 40.0% of the total fish collected in this reach. The catch rate of gizzard shad greatly exceeded other catches on this reach since 1989; the previous high occurred in 1995 when CPUE_N was 88.73. Low CPUE_N of gizzard shad in La Grange Reach during the first 8 segments of project F-101-R was 5.80 in 1992. White bass ranked second with a CPUE_N of 56.18 (17.8 % of the total). The catch rate of white bass in La Grange Reach has increased each year since 1992 when

CPUE_N was only 1.80. Common carp ranked third with a CPUE_N of 36.36 (11.5% of the total). Carp have ranked 1-3 in La Grange Reach during every segment of project F-101-R except 1991.

Peoria (middle river). Eleven species accounted for 95.0% of the total catch in Peoria Reach (Tables 6 and 7). Overall, CPUE_N was 249.88 in 1996. This catch rate is the second highest observed at this reach since 1989 (CPUE_N was 291.00 in 1995) (Lerczak et al. 1994, 1995, and 1996). In 1996, the highest CPUE_N for all species was 150.75 for gizzard shad, which made up 60.3% of the total fish collected in this reach. The gizzard shad catch rate of Peoria Reach was higher than that of all other reaches and was also relatively high in 1995 (CPUE_N was 125.86). Bluegill ranked second with a CPUE_N of 23.75 (9.5% of the total), and all other species made up only 6% or less of the total catch in Peoria Reach. The bluegill catch rate was slightly lower than in other recent years. (CPUE_N has been 31.94 or greater since 1992).

Starved Rock (upper river). Six species accounted for 96.5% of the total catch in Starved Rock Reach (Tables 6 and 7). Overall, CPUE_N was 148.50 in 1996. This catch rate is much lower than the overall CPUE_N of 867.50 observed in 1995, but is higher than all other years of project F-101-R for Starved Rock Reach (Lerczak et al. 1994, 1995, and 1996). High CPUE_N in 1995 was primarily due to gizzard shad and an abundance of emerald shiner and several other cyprinids. In 1996, the highest CPUE_N for all species was 109.00 for gizzard shad, which made up 73.4% of the total fish collected in this reach. Emerald shiner ranked second by

relative abundance (7.7%) but $CPUE_N$ was only 11.50 in 1996, compared to 438.50 in 1995. As during all other segments of project F-101-R, common carp $CPUE_N$ was low in 1996 (3.00); the highest catch rate of carp since 1989 in Starved Rock Reach was only 9.00 per hour (in 1993). Unlike other recent years, bullhead minnows were not collected in any upper river reach in 1996. Bluntnose minnows were not collected in either Starved Rock or Marseilles reaches.

The overall species composition of the upper waterway was different than the lower and middle river in that no channel catfish, white bass, or black crappies were collected in the upper waterway, but each made the 95% list for the lower and middle river (Table 7). Bluntnose minnow, goldfish, red shiner, spottail shiner, green sunfish, orangespotted sunfish, and rock bass made the 95% list for the upper waterway but did not occur in reaches of the lower and middle river.

Marseilles (upper river). Eleven species accounted for 95.5% of the total catch in Marseilles Reach (Tables 6 and 7). Overall, $CPUE_N$ was 102.56 in 1996. This catch rate is much lower than the overall $CPUE_N$ of 356.80 observed in 1995, but is similar to other years of project F-101-R for Marseilles Reach (Lerczak et al. 1994, 1995, and 1996). High $CPUE_N$ in 1995 was primarily due to gizzard shad and an abundance of small cyprinids and bluegill. In 1996, the highest $CPUE_N$ for all species was 63.08 for gizzard shad, which made up 61.5% of the total fish collected at this reach. This catch rate is the second highest observed at this reach since 1989 ($CPUE_N$ was 90.00 in 1995) (Lerczak et al. 1994, 1995, and 1996). Bluegill ranked second by relative abundance (6.0%) but $CPUE_N$ was only 6.15 in 1996,

compared to 42.40 in 1995. The largemouth bass catch rate on this reach was 4.62 and was comparable to other reaches sampled in 1996 (high largemouth bass CPUE_N was 7.38 in Peoria Reach).

Dresden (Des Plaines River). Ten species accounted for 93.6% of the total catch in Dresden Reach (Tables 6 and 7). Overall, CPUE_N was 101.50 in 1996. This catch rate is much lower than the overall CPUE_N of 600.00 observed in 1995, and is the lowest for Marseilles Reach since 1992 (Lerczak et al. 1994, 1995, and 1996). High CPUE_N in 1995 was primarily due to an abundance of bluntnose and bullhead minnows and bluegill; CPUE_N of bluntnose minnow was only 1.00 in 1996, and no bullhead minnow were collected. The highest CPUE_N for all species was 39.50 for gizzard shad, which made up 38.9% of the total fish collected at this reach. Gizzard shad CPUE_N was similar to other segments of project F-101-R. Highest gizzard shad CPUE_N for Dresden Reach was 50.50 in 1995. Bluegill ranked second with a CPUE_N of 14.50 (14.3% of the total), and all other species made up only 8.4% or less of the total catch at Dresden Reach. The bluegill catch rate was much lower than observed in 1995 (83.00), but was comparable to other recent years. The catch rate of common carp of 6.00 per hour in Dresden Reach was similar to all other waterway reaches (CPUE_N ranges 3.00 at Starved Rock to 7.20 at Alton, except for La Grange Reach, where CPUE_N of common carp was 36.36).

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

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 fish communities of the Illinois River in terms of weight 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, and largemouth bass in the upper waterway.

Alton (lower river). Nine species accounted for 95.2% of the total catch by weight in pounds per hour ($CPUE_w$) in Alton Reach (Tables 8 and 9). Channel catfish $CPUE_w$ was highest at 19.06 (32.5% of the total), which is the highest $CPUE_w$ for this species observed in Alton Reach since the beginning of project F-101-R; low $CPUE_w$ for channel catfish was 4.45 in 1989 (Lerczak et al. 1994, 1995, and 1996). Common carp ranked second with a $CPUE_w$ of 15.71 (26.7% of the total) which is much higher than occurred in 1995, when common carp $CPUE_w$ was 6.63. Bigmouth buffalo ranked third with a $CPUE_w$ of 6.61 (11.3% of the total). Bigmouth buffalo $CPUE_w$ was much lower than in 1995, when the species ranked first with a $CPUE_w$ of 18.27, but is similar to catches of other segments of project F-101-R. Largemouth bass $CPUE_w$ was 5.75 (9.8% of the total). All other species accounted for less than ten percent of the total catch by weight.

La Grange (middle river). Six species accounted for 94.2% of the total catch by weight in La Grange Reach (Tables 8 and 9). This is notably fewer species than

Table 8. Pounds of each fish species collected per hour of electrofishing (CPUE_h) at Reach 26 of the Mississippi River (Brickhouse Slough) and at six reaches of the Illinois River Waterway in 1996. Pounds per hour less than 0.01 are indicated by 0.00.

Species	Reach and Hours Fished							Overall CPUE
	Reach 26	Alton	La Grange	Peoria	Starved Rock	Marseilles	Dresden	
Lepisosteidae	1.00	5.00	5.50	7.00	2.00	2.25	2.00	24.75
shortnose gar			0.20					0.04
Clupeidae								
gizzard shad	0.03	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	18.83	15.71	71.15	14.05	4.93	8.65	14.74	25.10
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 redbreast				0.05				0.02
river carpsucker	2.57	0.09	0.10	1.25	0.72	0.08		0.56
shorthead redbreast		0.65	0.56	0.25		0.38	0.17	0.37
smallmouth buffalo	3.70	3.38	2.21	5.81	8.97	4.19	0.07	0.05
Ictaluridae								
black bullhead			0.00	0.08				0.02
channel catfish	2.78	19.06	5.32	1.57	0.54	1.25	1.00	5.83
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	0.04	2.09	2.94	3.88				2.18
Centrarchidae								
black crappie		1.10	1.39	0.72				0.74
bluegill	0.67	0.79	0.58	1.17	0.05	0.44	0.95	0.77
bluegill x green sunfish				0.02				0.01
green sunfish		0.01	0.01	0.48			0.30	0.16
largemouth bass	1.14	5.75	1.92	3.75	1.01	2.97	2.11	3.22
orangespotted sunfish		0.00		0.09		0.07	0.10	0.04
rock bass						0.16	0.51	0.05
smallmouth bass				0.03	0.53			0.05
warmouth			0.09	0.02				0.02
white crappie		0.03	0.01	0.15		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	0.24	0.83	2.62	1.67		1.26	0.85	1.41
Total pounds per hour	30.00	58.74	108.00	50.46	19.67	24.57	25.39	57.31

Table 9. 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.

Species	Rankings by Reach					
	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

in 1995 when 10 species made the 95% list for weight. Common carp CPUE_w was highest at 71.15 (65.9% of the total). This is the highest CPUE_w observed in La Grange Reach for this species since the beginning of project F-101-R; low CPUE_w for common carp was 6.33 in 1991 (Lerczak et al. 1994, 1995, and 1996). Bigmouth buffalo ranked second with a CPUE_w of 15.86 (14.7% of the total), a rate similar to other segments of project F-101-R.

Peoria (middle river). Ten species accounted for 95.6% of the total catch by weight in Peoria Reach (Tables 8 and 9). Common carp CPUE_w was highest at 14.05 (27.9% of the total). This catch is similar to other segments of project F-101-R; high common carp CPUE_w was 24.48 in 1989 and low CPUE_w was 7.34 in 1995 (Lerczak et al. 1994, 1995, and 1996). Bigmouth buffalo ranked second with a CPUE_w of 11.29 (22.4% of the total) and smallmouth buffalo ranked third with a CPUE_w of 5.81 (11.5% of the total). Bigmouth buffalo ranked first in catch by weight in 1995 but CPUE_w was lower (7.63, 19.32% of the total). Smallmouth buffalo catch in 1996 was similar to 1995, when CPUE_w was 4.37.

Starved Rock (upper river). Five species accounted for 94.1% of the total catch by weight in Starved Rock Reach (Tables 8 and 9). Smallmouth buffalo CPUE_w was highest at 8.97 (45.6% of the total); this is the only reach where this species ranked highest in 1996. These results were similar to other segments of project F-101-R. In 1995 smallmouth buffalo CPUE_w was 8.42; low CPUE_w was 0.47 in 1989 and high CPUE_w was 12.11 in 1994 (Lerczak et al. 1994, 1995, and 1996).

Common carp ranked second with a CPUE_w of 4.93 (25.1% of the total) and gizzard shad ranked third with a CPUE_w of 2.88 (14.6% of the total). These species also ranked in the top three in catch by weight in 1995. Unlike in the lower and middle river, the bigmouth buffalo is not a dominant species in Starved Rock Reach. Also, unlike in 1995, small cyprinid species (emerald shiner) were not high enough in abundance to make the 95% list by weight.

Marseilles (upper river). Seven species plus one hybrid (carp x goldfish) accounted for 94.3% of the total catch by weight in Marseilles Reach (Tables 8 and 9). Common carp CPUE_w was highest at 8.65 (35.2% of the total) which is much lower than observed for early segments of project F-101-R; common carp CPUE_w was 15.31 in 1989 and 22.67 in 1990 (Lerczak et al. 1994, 1995, and 1996). Smallmouth buffalo ranked second with a CPUE_w of 4.19 (17.0% of the total), largemouth bass ranked third with a CPUE_w of 2.97 (12.1% of the total), and bigmouth buffalo ranked fourth with a CPUE_w of 2.62 (10.7% of the total).

Dresden (Des Plaines River). Eight species plus one hybrid (carp x goldfish) accounted for 95.5% of the total catch by weight in Dresden Reach (Tables 8 and 9). Common carp CPUE_w was highest at 14.74 (55.9% of the total). This is similar to other segments of project F-101-R. Low common carp CPUE_w was 9.81 in 1992 and high CPUE_w was 20.97 in 1994 (Lerczak et al. 1994, 1995, and 1996). Gizzard shad ranked second with a CPUE_w of 2.73 (10.4% of the total) and largemouth bass ranked third at 2.11 (8.0% of the total). Dresden Reach was the only one with rock

bass in its 95% list (CPUE_w was 0.51, 1.9% of the total).

Fish Health Determined by External Visual Inspection.

Sediment-contact (benthic) fishes (e.g., common carp) had higher incidences of externally-visible abnormalities (eg., sores, eroded fins) than water-column fishes (eg., bluegill) (Figure 2). A total of 108 fishes collected in 1996 had abnormalities, of which 77 (71.3%) were sediment-contact fishes. There was a longitudinal (upstream-downstream) gradient in the percentage of fishes with abnormalities, with highest incidence in the upper waterway, particularly in Dresden Reach. Of the 76 benthic fishes collected in the upper waterway, 26 of them (34.2%) had external abnormalities. In the middle and lower waterway, only 5.9% and 3.0% of benthic fishes showed abnormalities, respectively. This trend was documented during previous years also (Lerczak et al. 1994:68, 1995:39, 1996:29). Incidence of water-column fishes with abnormalities was only slightly higher (2.7%) in the upper waterway than in the middle (0.3%) and lower (1.1%) waterway.

CONCLUSIONS

Samples collected by electrofishing on the Illinois River Waterway during August and September 1996 provided evidence that fish communities in the lower, middle, and upper waterway are substantially different in terms of species composition by number and by weight. Of 76 species and 3 hybrids collected previously during segments of project F-101-R, 41 species and 2 hybrids were collected in 1996. The mud darter has not previously been collected during Long-

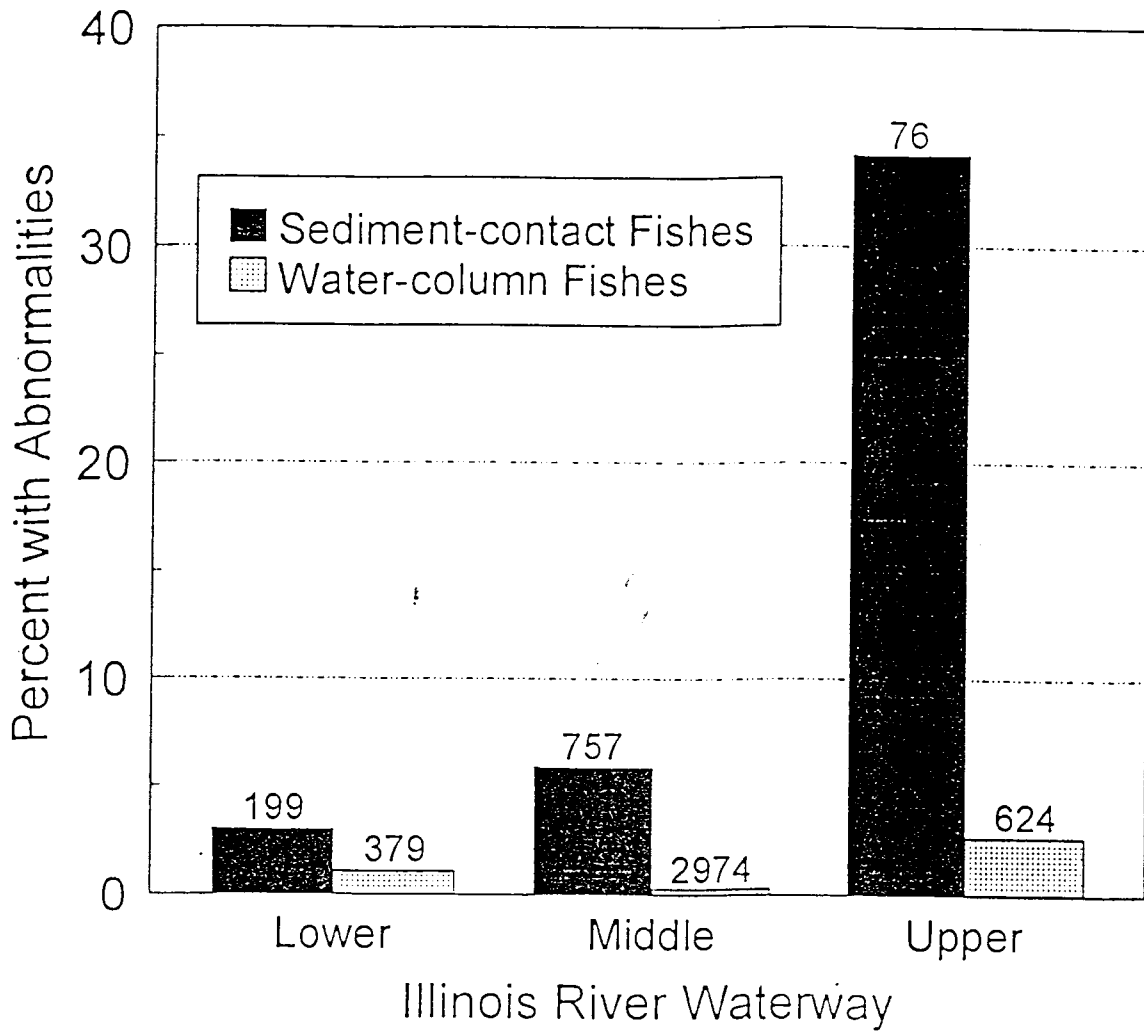


Figure 2. Percent of sediment-contact and water-column fishes with externally visible abnormalities (eg., sores, eroded fins) collected from the Illinois River Waterway in 1996. Data are grouped by river segment as in Figure 1. Numbers above each bar are the total fish collected in each category for the specified river segment. Habitat associations for species are defined in APPENDIX A.

term Illinois River Fish Population Monitoring, and the silverband shiner has not been collected during earlier segments of project F-101-R. Overall, results from this year's sampling were similar to data collected in recent years. Numbers of individuals and pounds of each species collected have varied, however, both temporally (among years) and also spatially (among sites) along the waterway.

Although gizzard shad ranked first in number of fish collected per hour in all reaches, numbers of other small forage species and also of large benthivores and piscivores varied among reaches. The relatively high numbers of gizzard shad in the waterway, most of which were small enough to be vulnerable, should provide an excellent forage base for sport fishes such as largemouth and smallmouth bass. Largemouth bass were collected in all reaches, but catches in numbers were highest in Peoria, Dresden, and Alton Reaches. Smallmouth bass were collected (in low abundance) only in Peoria and Starved Rock Reaches. It is possible that smallmouth bass populations are under represented in our samples; this species is known to avoid habitats occupied by largemouth bass (Becker 1983) and may not occupy side-channels during late summer. An important sauger fishery exists below the Peoria Dam but we have collected only 18 sauger in the La Grange Reach during project F-101-R sampling (six sauger were collected in 1994, one in 1995, and 11 in 1996).

The highest densities of sportfish species exist in the lower and middle waterway: Three of the top four ranked species in Alton Reach are highly favored by

anglers (channel catfish, bluegill, and white bass). The catch of channel catfish was the highest observed since 1989. Although not as popular with anglers, the bigmouth buffalo is an important species in terms of $CPUE_W$ in the lower and middle waterway; smallmouth buffalo is important in terms of $CPUE_W$ and $CPUE_N$ in the upper waterway. Common carp $CPUE_N$ was highest in La Grange Reach of the middle waterway, but continued to be low in the upper waterway; common carp $CPUE_W$ was high in all reaches.

We noticed a drastic decline in abundances of small cyprinid species such as emerald shiner, bullhead minnow, and bluntnose minnow in the upper waterway. Populations of these species in terms of abundance are known to vary each year. Only by continued monitoring will we be able to determine if our samples have represented a true decline in cyprinid abundance at the upper waterway sites. It is unlikely that piscivore abundance in the upper waterway is high enough to limit these cyprinid populations, especially with the co-occurring gizzard shad abundance. Most likely, the environmental conditions were not favorable during spawning or for overwintering of these species in 1996 which reduced their overall abundance.

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APPENDIX A. Fish species collected during Long-term Resource Monitoring of the Illinois Waterway, 1957-1996. Common names marked by an asterisk indicate species that were collected from 1989 through 1996 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*	<u>Lepisosteus osseus</u>	
	shortnose gar*	<u>Lepisosteus platostomus</u>	
	spotted gar*	<u>Lepisosteus oculatus</u>	
Amiidae	bowfin*	<u>Amia calva</u>	
Hiodontidae	goldeye*	<u>Hiodon alosoides</u>	
	mooneye*	<u>Hiodon tergisus</u>	
Anguillidae	American eel	<u>Anquilla rostrata</u>	
Clupeidae	gizzard shad*	<u>Dorosoma cepedianum</u>	
	skipjack herring*	<u>Alosa chrysochloris</u>	
	threadfin shad*	<u>Dorosoma petenense</u>	
Cyprinidae	bigmouth shiner*	<u>Notropis dorsalis</u>	B
	bluntnose minnow*	<u>Pimephales notatus</u>	
	bullhead minnow*	<u>Pimephales vigilax</u>	
	common carp*	<u>Cyprinus carpio</u>	B
	common carp x goldfish*	<u>Cyprinus carpio</u> x <u>Carassius auratus</u>	B
	central stoneroller*	<u>Campostoma anomalum</u>	B
	common shiner	<u>Luxilus cornutus</u>	
	creek chub	<u>Semotilus atromaculatus</u>	
	emerald shiner*	<u>Notropis atherinoides</u>	
	fathead minnow*	<u>Pimephales promelas</u>	
	ghost shiner	<u>Notropis buchmanii</u>	
	golden shiner*	<u>Notemigonus crysoleucas</u>	
	goldfish*	<u>Carassius auratus</u>	B
	grass carp*	<u>Ctenopharyngodon idella</u>	
	hornyhead chub	<u>Nocomis biguttatus</u>	
	Mississippi silvery minnow	<u>Hybognathus nuchalis</u>	B
	pugnose minnow	<u>Opsopoeodus emiliae</u>	
	red shiner*	<u>Cyprinella lutrensis</u>	
	redfin shiner	<u>Lythrurus umbratilis</u>	
	ribbon shiner	<u>Lythrurus fumeus</u>	
	river shiner*	<u>Notropis blennioides</u>	
	sand shiner*	<u>Notropis stramineus</u>	
	spotfin shiner	<u>Cyprinella spiloptera</u>	
	silver chub*	<u>Macrhybopsis storeriana</u>	B
	silverband shiner*	<u>Notropis shumardi</u>	
	silverjaw minnow	<u>Notropis buccatus</u>	B
	spottail shiner*	<u>Notropis hudsonius</u>	
steelcolor shiner	<u>Cyprinella whipplei</u>		
striped shiner	<u>Luxilus chrysocephalus</u>		
suckermouth minnow*	<u>Phenacobius mirabilis</u>	B	
Catostomidae	bigmouth buffalo*	<u>Ictiobus cyprinellus</u>	B
	black buffalo*	<u>Ictiobus niger</u>	B
	black redhorse	<u>Moxostoma duquesnei</u>	B
	golden redhorse*	<u>Moxostoma erythrurum</u>	B
	highfin carpsucker*	<u>Carpionodes velifer</u>	B
	northern hog sucker*	<u>Hypentelium nigricans</u>	B
	quillback*	<u>Carpionodes cyprinus</u>	B
	river carpsucker*	<u>Carpionodes carpio</u>	B
	river redhorse*	<u>Moxostoma carinatum</u>	B
	shorthead redhorse*	<u>Moxostoma macrolepidotum</u>	B
	silver redhorse	<u>Moxostoma anisurum</u>	B
	smallmouth buffalo*	<u>Ictiobus bubalus</u>	B
	white sucker*	<u>Catostomus commersoni</u>	B

Appendix A. Continued.

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

Appendix B (Job 5). Publications, reports, and presentations which resulted from research conducted during segments 6, 7, and 8 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

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.

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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.

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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)

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)

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. 1995. 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, Box 299, 1415 Water St., Peru, Illinois 61354
2. Stanley and Associates, Muscatine, Iowa
3. U.S. Army Corps of Engineers, Rock Island