

FISH COMMUNITY CHANGES IN THE ILLINOIS RIVER, 1962-1994

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Native fishes of the Illinois River have had a hard existence for most of this century. Sources of stress to the riverine ecosystem have included excessive pollution from human sewage and industrial wastes, draining of floodplain wetlands and conversion to agriculture, excessive siltation of fish spawning and overwintering areas, overharvesting of fisheries, and manipulation of water levels to maintain a commercial navigation (barge traffic) channel. By the 1950s, even though some pollution control had been in effect throughout the river system for decades, the river's fish communities suffered from degraded conditions. By 1972, at least 20 species of native fishes had been extirpated from the river.

In 1957, the Illinois Natural History Survey began an annual program to monitor fish populations in the Illinois River. Collections were made by electroshocking from a 16-ft boat, usually, for one hour at each of 26 stations distributed along the river's entire 273-mile length (see Fig. 1). Fish were stunned in the electric field, gathered with a net, and stored in a livewell. They were then identified, measured, and returned to the water.

Analysis of over 30 years of data on fish populations has revealed trends which show many native fishes have persisted, despite damage to their environment; and some species have re-colonized reaches where they apparently had been absent for years. This article focuses on some of the general, changing patterns evident in the river fish communities. For more details and data, readers are referred to the "Selected Bibliography."

OVERVIEW OF STUDY AREA

Distance on the Illinois River is measured in river miles (RM) with RM 0 at the Mississippi River (Fig. 1). Three river segments are recognized based upon the amount of fish habitat (e.g., floodplain backwaters) in area per river mile, exclusive of the main river channel (Fig. 1). The lower river begins at the Mississippi and continues to the navigation dam at RM 80; the middle river extends from RM 80 to the navigation dam at RM 231; and the upper river is from RM 231 to the confluence of the Des Plaines and Kankakee rivers. Because backwaters are important to river fish for spawning and overwintering, the river segments

so defined help to determine causes for upstream-to-downstream differences in fish communities.

SUMMARY OF ELECTROFISHING RESULTS, 1962-1994

To see how native fishes have fared since 1962, the first year of consistent data collection, fish communities of the three river segments were examined by looking at the number of species collected and the proportion of native fishes making up total catches. Carp and goldfish, both pollution-tolerant habitat generalists, are the two major exotic fishes in the Illinois River. Other exotics to the Illinois River (white perch *Morone mississippiensis* and striped bass *Morone saxatilis*) have been present in catches only sporadically and/or in very small numbers. Because of similarities in fish communities, data from the lower and middle river were combined in some cases.

Up to 1970 on the lower/middle river, carp averaged 26% of the total catch, goldfish 0.2%, and their hybrids 0.4%. On the upper river, which is closest to Chicago area pollution sources, carp averaged 21% of the total catch, goldfish 18%, and their hybrids 1.4%. Native fishes, therefore, on average accounted for roughly three-fifths to slightly over two-thirds of the catches.

Following the 1960s, catches of carp have steadily declined throughout the river, while catches of certain native

fishes from some sections of the river have increased. Since 1989 on the lower/middle river, carp averaged 10% of the total catch, goldfish 0.3%, and their hybrids 0.1%. On the upper river, carp averaged 5% of the total catch, goldfish 1%, and their hybrids 1%. These data show that for the last six years, native species made up about 90% or more of the catches.

Since 1957, 92 species representing 18 families have been collected on the electrofishing project (see Lerczak et al. 1994). To determine which species were most important in terms of characterizing fish communities, lists were made of only those species that, taken together in descending order of abundance, made up 95% of the total catch for each of the three river segments.

The number of species on the 95% lists for the middle and upper river segments were higher in recent years compared with the 1960s. In 1963, for example, the 95% list consisted of 10 species on the middle river and just four species on the upper river, slightly less than two-thirds of which were carp and goldfish (Table 1). In 1994, where data were fairly typical of recent years, the 95% list consisted of 15 species on the middle river and 16 species plus one hybrid on the upper river (Table 1). On the lower river, although the number of species on the 95% lists were similar in 1963 (11) and 1994 (10), the percentage of native fishes increased from about two-thirds to over 90%; and the bluegill was consistently

the highest ranked species since 1991. Although total catches for all species combined were lower in 1994 compared with 1963 for all river segments (Table 1), data from other years need to be examined before statements about trends can be made.

CAUSAL FACTORS AND MORE CHANGE

What happened over the last three decades that allowed fish communities to shift from being dominated by carp and goldfish toward a more native composition? The best answer seems to be that water quality has improved, largely as a result of better control of municipal and industrial pollutants. This has allowed some species that are less tolerant of pollution (e.g., bluegill) to increase. On the other hand, spawning habitats that had been spared from being drained and leveed off from the river have been rapidly filling with fine silt particles from excessive erosion on the watershed, and this situation has gotten worse since the 1950s with more intensive farming practices. Although improvements in water quality appear to have offset, at least temporarily, the degrading effects of excessive siltation on habitats for some fish species, further improvements in water quality may be much harder to achieve, and siltation continues almost unabated. At the same time, pressures of exploitation from the usual sources mentioned earlier continue to increase. For example, the U.S. Army Corps of Engineers is making plans to expand the river's navigation capacity, and the

sport fishing industry has recently begun to stage intensive largemouth bass and sauger fishing tournaments. Recent exotic species introductions to the Illinois River and its backwaters include the grass carp (*Ctenopharyngodon idella*) and zebra mussel (*Dreissena polymorpha*). Others surely are on the way, each with a unique ability to affect the system in unknown ways. More changes for the Illinois River and its fish communities, it would seem, are likely in store.

SELECTED BIBLIOGRAPHY

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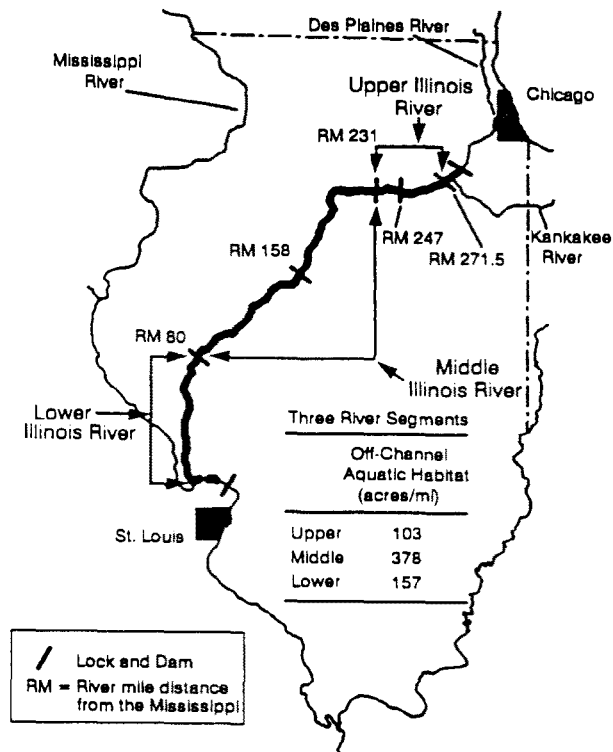


Figure 1. State of Illinois showing the Illinois River (in bold).

Table 1. Species that made up 95% of the total catch per hour in 1963 and 1994 and the percentage of the total catch for each species for the specified river segment and year. Catches from these two years are fairly typical of their respective time periods. NC indicates the species was not collected in that river segment for that year. Blanks indicate the species was collected, but was not on the 95% list for that river segment and year.

Common Name	Scientific Name ^a	1963 (%)			1994 (%)		
		Lower	Middle	Upper	Lower	Middle	Upper
Gizzard Shad	<i>Dorosoma cepedianum</i>	32.2	41.0	8.1	10.2	6.8	12.0
Threadfin Shad	<i>Dorosoma petenense</i>	NC	NC	NC		2.2	NC
Common Carp	<i>Cyprinus carpio</i>	33.8	22.0	28.7	5.6	12.6	4.5
Carp x Goldfish	<i>C. carpio x Carassius auratus</i>	NC			NC	NC	1.1
Goldfish	<i>Carassius auratus</i>	NC		32.0	NC		
Bluntnose Minnow	<i>Pimephales notatus</i>	NC		NC	NC	NC	25.8
Bullhead Minnow	<i>Pimephales vigilax</i>	NC	NC	NC	NC		3.4
Emerald Shiner	<i>Notropis atherinoides</i>	4.3	16.8	27.1		7.1	17.5
Red Shiner	<i>Cyprinella lutrensis</i>	NC		NC	NC		1.0
Sand Shiner	<i>Notropis ludibundus</i>	NC		NC	NC	NC	3.1
Spottail Shiner	<i>Notropis hudsonius</i>	NC			NC		4.2
Bigmouth Buffalo	<i>Ictiobus cyprinellus</i>	4.5	NC	1.6	4.1	NC	
Golden Redhorse	<i>Moxostoma erythrurum</i>	NC	NC	NC	NC		0.9
River Carpsucker	<i>Carpionodes carpio</i>		NC	NC	1.1		
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>		NC		NC	1.6	
Smallmouth Buffalo	<i>Ictiobus bubalus</i>		1.0	NC	3.0	4.1	2.7
Channel Catfish	<i>Ictalurus punctatus</i>	8.4	0.8	NC	13.3	2.7	1.5
White Bass	<i>Morone chrysops</i>		3.5	NC	2.1	6.2	1.6
Yellow Bass	<i>Morone mississippiensis</i>	0.8		NC	NC	NC	NC
Black Crappie	<i>Pomoxis nigromaculatus</i>	4.1	1.0	NC	7.6	5.6	
Bluegill	<i>Lepomis macrochirus</i>	4.5	4.9	36.3	24.0	6.4	
Green Sunfish	<i>Lepomis cyanellus</i>		1.6		4.7	4.4	
Largemouth Bass	<i>Micropterus salmoides</i>		1.6	NC	6.1	3.6	2.7
Orangespotted Sunfish	<i>Lepomis humilis</i>	2.1		NC			
Smallmouth Bass	<i>Micropterus dolomieu</i>	NC		NC	NC		2.6
White Crappie	<i>Pomoxis annularis</i>	0.8		NC	NC		NC
Freshwater Drum	<i>Aplodinotus grunniens</i>	1.0		NC	10.2	9.3	
Total number of individuals collected per hour		171	298	242	122	130	123
Number of species making up 95%		11	10	4	10	15	16 ^b

Scientific names are from Page and Burr (1991).

^b Does not include carp x goldfish hybrid.

Due to the Editors error, in the last issue of AC Table one of the article titled Fish Community Changes in the Illinois River, should be as follows.

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